Lateral Bracing Requirements

Part 9 of the BC Building Code 2024

ILLUSTRATED GUIDE

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Disclaimer

This guide is only intended to provide readers with lateral bracing requirements in Part 9 of the BC Building Code 2024 (the "Code"). Do not rely solely on this guide. Carefully review the Code and consult reputable professionals and construction specialists to help interpret and apply it. It is the responsibility of all persons undertaking the design and construction of a home to fully comply with the requirements of the Code. It is also recommended that readers check with the Authority Having Jurisdiction and professional associations (e.g., EGBC, AIBC, ASTTBC) for the latest requirements of professional engineering services for Part 9 wood-frame construction. The authors, contributors, funders and publishers assume no liability for the accuracy of the statements made or for any damage, loss, injury or expense that may be incurred or suffered as a result of the use of or reliance on the contents of this guide. The views expressed do not necessarily represent those of individual contributors or of BC Housing.

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Organization of This Guide

1 Introduction

Part 9 construction embraces the design and construction of houses with prescriptive requirements that result in safe comfortable houses. The BC Building Code [i] (the "Code") is constantly revised in response to the continually improving understanding about the complex environmental loads and seismic hazards that impact the performance of houses.

Trends in home construction are shifting to narrower homes and larger open-concept houses with fewer interior walls and bigger windows. This reduces the redundancy typical of Part 9 wood-frame construction. As such, lateral loads, such as those due to earthquakes and wind, could negatively affect the performance of houses in all locations of British Columbia (BC). This guide has been produced in an effort to clearly describe the new Code requirements for the lateral bracing of houses in BC. Designers will need to consider these requirements when creating the form of the exterior walls, as well as the dimensions and locations of interior walls. Builders will need to understand the material requirements, as well as the construction methods necessary to fabricate braced wall panels at required locations throughout the structure.

In an earthquake, the acceleration of the ground creates lateral forces on a structure. The magnitude of the lateral forces on a house is influenced by its height and weight. The exterior and interior walls are the key components for resisting the lateral forces collected from the floors and roof over the height of the house.

Seismic Design Parameter

Seismic hazard at a site can be characterized by the Seismic Design Parameter S_{max}, which is taken as the larger of (2/3)S(0.2) and S(0.5), where S(0.2) and S(0.5) are design spectral accelerations at 0.2 and 0.5 seconds, respectively, as illustrated in Figure 1.1. Table C-3 of Appendix C to the Code provides S_{max} for each Site Class for all locations of BC. When the Site Class is not determined by a professional engineer, the value of S_{max} for unknown Site Class should be taken. [ii]

While S_{max} is provided for different locations across BC for each Site Class, S_{max} for Site Class C is used as a trigger for the application of certain seismic design provisions.

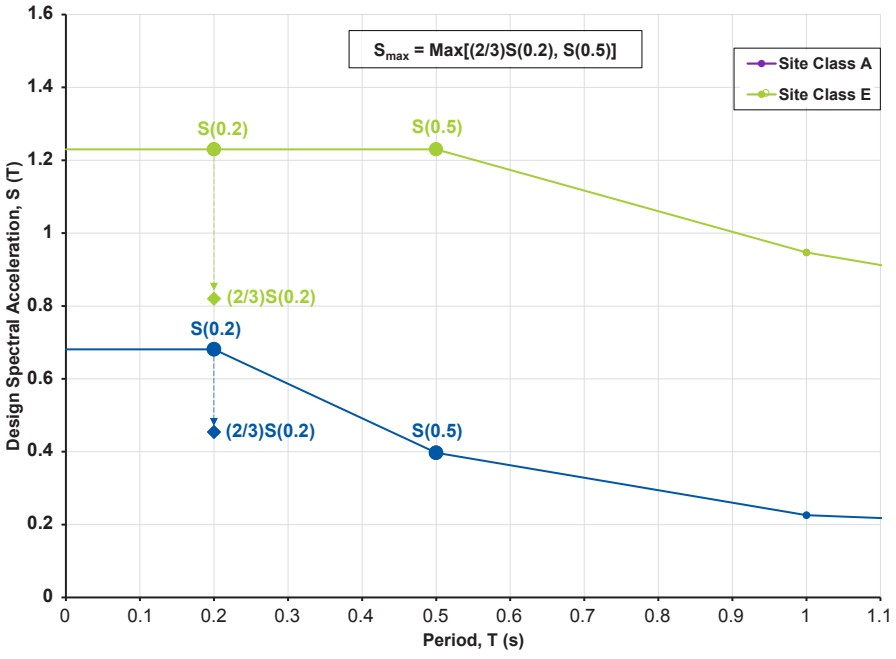


Figure 1.1: Illustration of Seismic Design Parameter (S_{max}) Calculation for a Location in BC for Site Class A and Site Class E

[i] Government of British Columbia. (2024). British Columbia Building Code 2024. Victoria, British Columbia.

[ii] 9.4.2.5.[1].

The simple basis of improving the seismic response of a house to an earthquake is to ensure that there are adequate full height walls sheathed or finished with panels well fastened to the frame. The attachment of sheathing increases the lateral (back and forth) resistance to the ground motion experienced during an earthquake. Several of these braced wall panels installed at key locations from the foundation to the roof structure, and located on all exterior walls of the house, result in a strong structure.

Part 9 houses can be quite resistant to lateral loads because of the redundant nature of wood-frame construction. House designs can also include features that result in a reduction of the resistance to lateral seismic load, such as interruptions in the braced wall panels from openings (such as windows), significant misalignment (such as walls on subsequent floors that are significantly set back from lower floors), large openings through exterior walls; open interior floor plans (which eliminate many of the interior walls) and the use of heavy construction methods like concrete floor toppings, tile roofing, or heavy cladding. Failure can occur in shear at the roof-to-wall, wall-to-wall, and wall-to-foundation connections, as well as racking failure of the walls.

This guide mainly focuses on Part 9 wood-frame construction provisions for lateral resistance to seismic forces. Notwithstanding local bylaws, these Part 9 provisions represent a prescriptive solution for the construction of houses, which does not require the involvement of a professional engineer in BC. It is the responsibility of all persons undertaking the design and construction of a home to fully comply with the Code, including the requirements for wind forces. Appendix E presents a list of Part 9 provisions for wind design and calculations.

Professional engineering services are required when the design of a Part 9 building or its structural components falls outside the scope of Part 9 of the Code, or is required by the client or Authority Having Jurisdiction (AHJ). It is recommended that designers check with the AHJ and professional associations (e.g., EGBC, AIBC, ASTTBC) for the latest requirements before starting work on a Part 9 building project. When a structural engineer is involved, structural members and connections must be designed according to good engineering practice such as that provided in CWC “Engineering Guide for Wood Frame Construction” [iii], or according to Part 4 of the Code. It is not required that structural engineers expand the scope of work beyond the components or areas that fall outside Part 9 of the Code, but it is recommended that they encourage the involvement of a structural engineer of record for coordination and administrative purposes.

[iii] CWC. 2014. Engineering Guide for Wood Frame Construction. Canadian Wood Council (CWC), Ottawa, Ontario.

2.1 Braced Wall Band

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) shows the three floor plans aligned on a drawing and braced wall band shown enclosing all of the walls of the front elevation of the house. The requirements for braced wall bands are provided in Section 3.2.

The second figure (middle) shows the band applied to the floor plans as they would stack in construction.

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

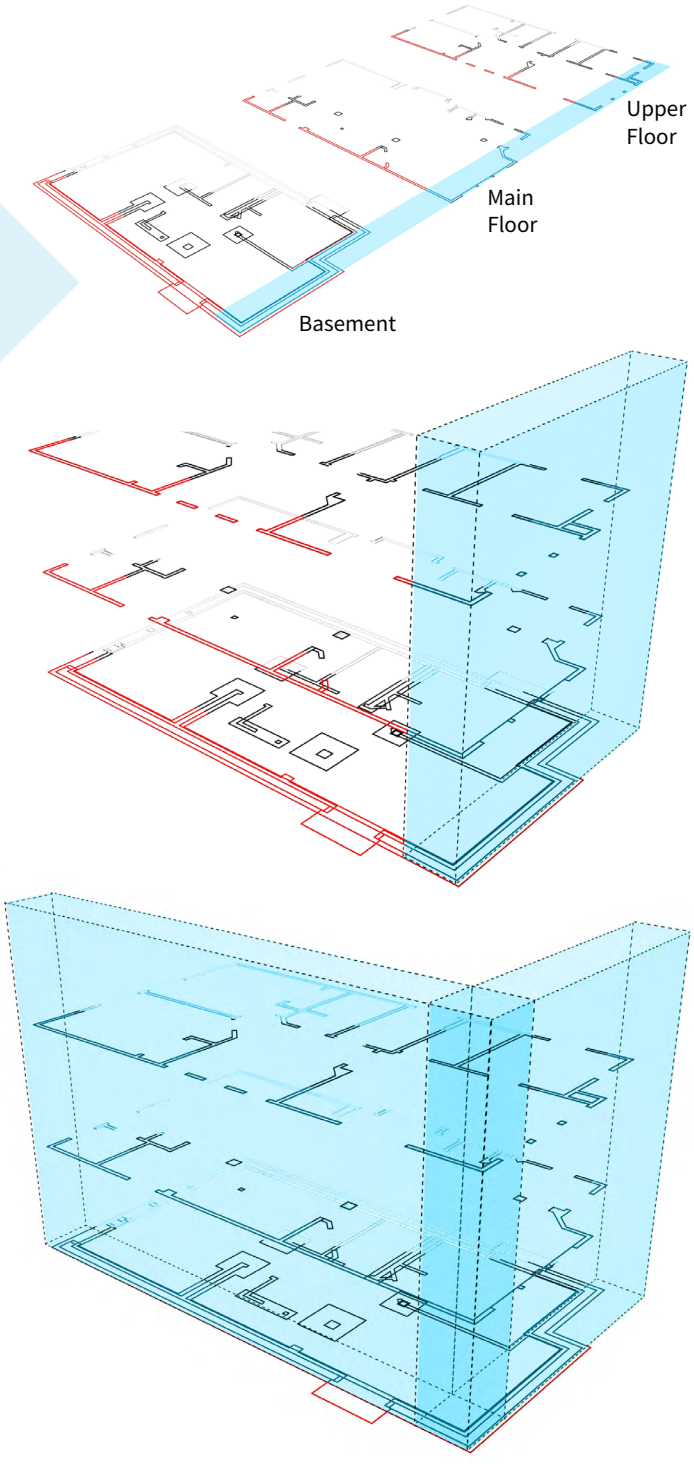


Figure 2.1: Illustration of Braced Wall Bands

2.2 Braced Wall Panel

The lateral forces on a building cannot be resisted with unbraced studs and plates. The motion will tend to deflect the studs and result in significant damage or even failure. By adding sheathing (e.g., plywood or OSB to the exterior and drywall to the interior), resistance to lateral loads can be achieved.

The attachment of sheathing increases the lateral (back and forth) resistance to the ground motion experienced during an earthquake.

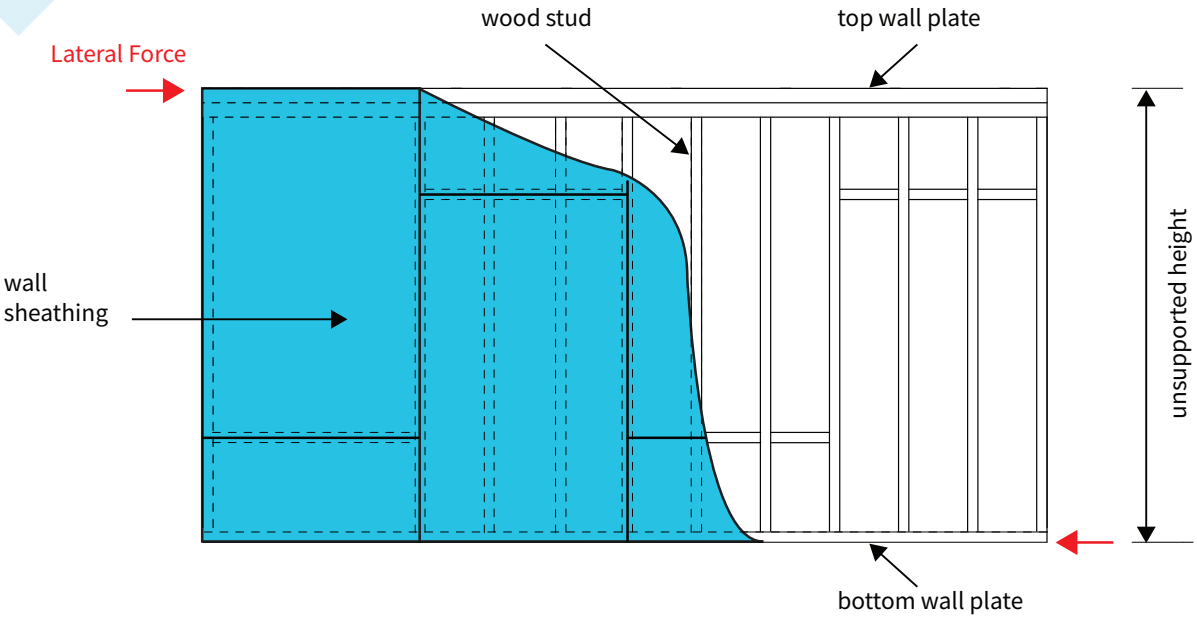


Figure 2.2: Illustration of Unsupported Height of Braced Wall Panels

A braced wall panel is a portion of a wood-frame wall designed and installed to provide the required resistance to lateral loads due to earthquakes. Unlike the imaginary braced wall band, a braced wall panel is an actual physical element that meets certain dimension and construction requirements. Braced wall panels must be located within a braced wall band to be considered effective.

Braced Wall Panels

Braced wall panels must be constructed with reference framing types [iv]. Reference framing types and their corresponding fastening and anchoring requirements are provided in Section 2.4.

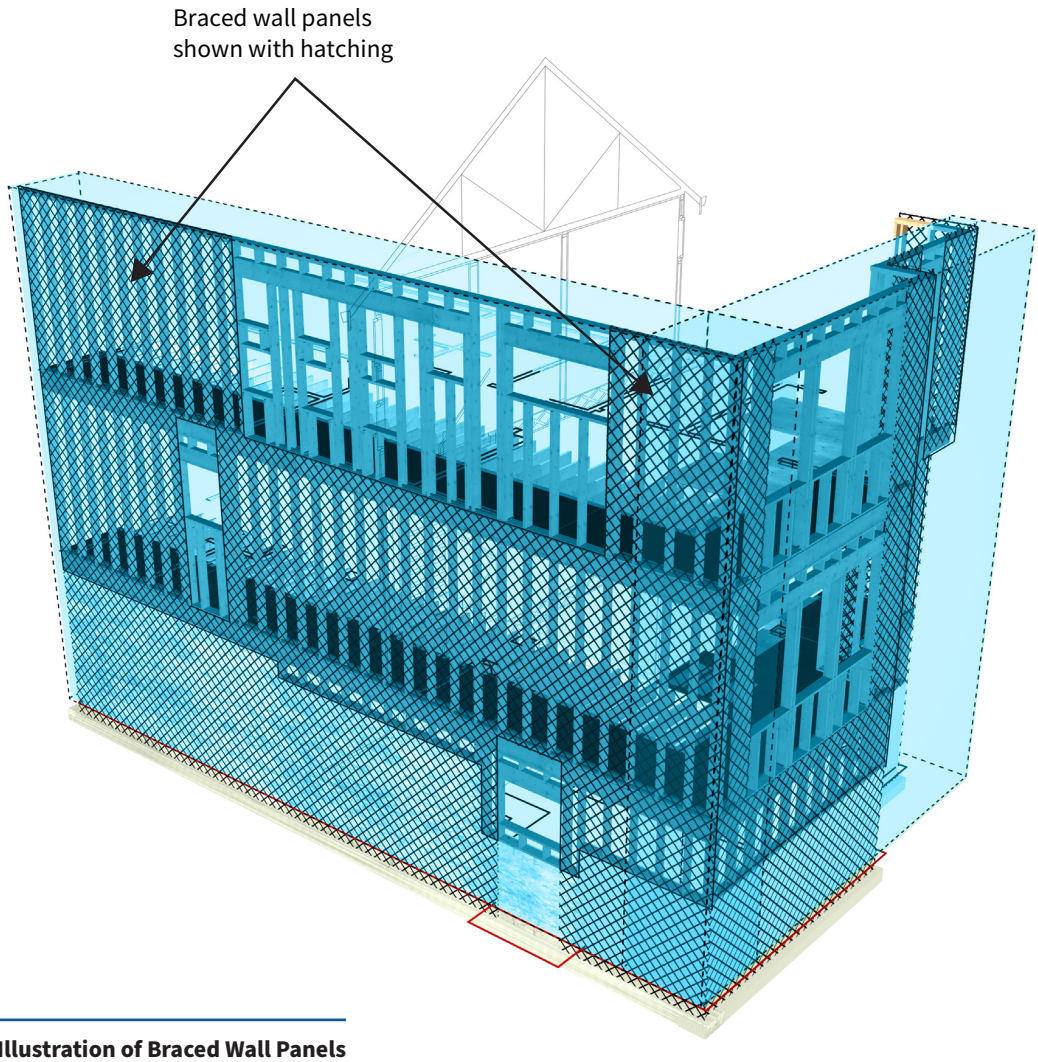


Figure 2.3: Illustration of Braced Wall Panels

2.3 Sheathing

Sheathing consists of structural panels attached to the wall and roof framing. Its primary purpose is to provide lateral resistance and stability against wind or seismic forces. Additionally, sheathing acts as a secure surface for attaching exterior cladding materials and interior finishes.

Typically, wood-based exterior braced wall panels are finished on the interior side with gypsum board. In areas with lower lateral force demands, when gypsum board is applied on the interior side of exterior braced wall panels, the use of wood-based sheathing on the exterior side may be skipped, if certain criteria are met.

[iv] 9.23.3.5.(3)

2.4 Referencing Framing Types

Referencing framing types are divided into three categories: wood-sheathed panel (WSP), diagonal wood (lumber) board (DWB), and gypsum wall board (GWB). Table 2.1 outlines the available reference framing types for use as a braced wall panel and their corresponding fastening methods. [v] This table does not require that gypsum board be installed on both sides of a GWB assembly.

Table 2.1: Definitions of Referencing Framing Types and Corresponding Fastening Requirements

Reference framing type [1]	Minimum Sheathing Element [2] and Maximum Stud Spacing	Common, Spiral or Ring Thread Nails	Screws	Minimum Number or Maximum Spacing of Fasteners [3] [4] along Panel Edges Fastened to Framing
GWB-O (interior side of WSP and DWB framing types)	12.5 mm gypsum board for 600 mm stud spacing	2.48 mm diameter ring thread with 20 mm penetration into support framing [5]	3.45 mm shank diameter, Type W, with 20 mm penetration into support framing [6]	200 mm o.c. for nails or 300 mm o.c. for screws
GWB-A	12.5 mm gypsum board for 600 mm stud spacing			200 mm o.c. for nails or 300 mm o.c. for screws
GWB-B	12.5 mm gypsum board for 400 mm stud spacing			200 mm o.c.
GWB-C	12.5 mm gypsum board for 400 mm stud spacing			150 mm o.c.
GWB-D	12.5 mm gypsum board, blocked, for 400 mm stud spacing			100 mm o.c.
WSP-A	9.5 mm plywood, OSB or waferboard for 400 mm stud spacing	2.84 mm × 51 mm [8]	NP [9]	150 mm o.c.
WSP-B	11 mm plywood, OSB or waferboard, blocked, [7] for 600 mm stud spacing	3.25 mm × 63 mm [8]		150 mm o.c.
WSP-C	11 mm plywood, OSB or waferboard, blocked, [7] for 600 mm stud spacing	3.25 mm × 63 mm [8]		100 mm o.c.
WSP-D	11 mm plywood, OSB or waferboard, blocked, [7] for 600 mm stud spacing	3.25 mm × 63 mm [8]		75 mm o.c.
WSP-E	15.5 mm plywood, OSB or waferboard, blocked, [7] for 600 mm stud spacing	3.66 mm × 63 mm [8]		75 mm o.c.
DWB	19 mm diagonal lumber board, for 600 mm stud spacing	3.25 mm × 63 mm [8]	3.25 mm × 51 mm	2 per support framing where lumber width ≤ 184 mm or 3 per support framing where lumber width > 184 mm

[1] See Note A-Table 9.23.3.5.-C.

[2] Plywood, OSB, waferboard and board lumber must conform to the material standards specified in Subsection 9.23.17. Wood-based panels may be installed vertically or horizontally. Gypsum sheathing must conform to the requirements for gypsum board set out in Subsection 9.29.5.

[3] See Note A-9.23.3.1.(2)

[4] For plywood, OSB, or waferboard panel sheathing, the maximum fastener spacing along intermediate supports must be 300 mm o.c. For gypsum sheathing, the maximum spacing along intermediate supports must conform to Sentence 9.29.5.8.(4) for nails and to Sentence 9.29.5.9.(4) for screws.

[5] Nails for GWB framing types must conform to Article 9.29.5.6.

[6] Screws for GWB framing types must conform to Article 9.29.5.7.

[7] Where blocking is required, horizontal joints of panel sheathing must occur over blocking consisting of not less than 38 mm × 89 mm lumber oriented either edgewise or flatwise, and the panel sheathing must be fastened to the blocking.

[8] Nails for WSP and DWB framing types must conform to Article 9.23.3.1.

[9] NP = not permitted.

[v] Table 9.23.3.5.-C

2.5 Construction Weight

A building's weight greatly affects the forces it experiences during an earthquake. In Part 9 earthquake-resistant design, wood-frame construction is classified into normal-weight or heavyweight construction. Table 2.2 illustrates the requirements for normal-weight and heavyweight construction types. Note that the dead weight in Table 2.2 refers to the total weight of the assembly.

Table 2.2: Average Dead Weight per Storey for Normal-weight Construction and Heavyweight Construction

Wood-Frame Construction	Average Dead Weight per Storey	
	Normal-weight Construction	Heavyweight Construction [(1)]
Floors	≤ 0.5 kPa	≤ 1.5 kPa
Partitions and Interior Walls	≤ 0.5 kPa	≤ 0.5 kPa
Roof	≤ 0.5 kPa	≤ 1.0 kPa
Exterior Walls	≤ 0.4 kPa	≤ 1.2 kPa

[(1)] Only one heavyweight assembly is permitted. Buildings with more than one heavyweight assembly is outside the scope of Part 9.

For buildings clad at full height with masonry or stone veneer, the average dead weight of the veneer must not exceed 1.9 kPa or 3.2 kPa, respectively. [vi] It is recommended that designers also check with local AHJs for additional requirements or limitations on the attachment of these claddings.

The weight limitations dictate the types of materials and finishes that can be utilized. In normal-weight construction, the floor can support ceramic tile, hardwood and carpet, totalling a maximum average dead weight of 0.5 kPa. A normal-weight roof assembly, also limited to 0.5 kPa, can include for example asphalt shingles, wood shingles, and steel roofing. Exterior wall construction can incorporate fibre-cement board, wood, vinyl, and lightweight metal panels.

Heavyweight floor construction, allowing for an additional 1.0 kPa, can support a 38 mm thick concrete topping. Heavyweight roof construction can accommodate slate or clay tile shingles, and the installation of solar panels over normal-weight roofing such as asphalt shingles. Heavyweight walls support cladding like cementitious stucco and heavier-weight metal panels. They can even accommodate adhered manufactured or natural stone veneer when averaged with lighter claddings, using the Area-Weighted Average method presented in Appendix A.

Cladding is the external layer or covering attached to the exterior surface of the wall. Cladding can be made from various materials such as wood, metal, vinyl, brick, stone, or composite materials. Figure 2.4 shows the approximate weight of various common cladding types. [vii] Fully clad in Part 9 wood-frame construction means that there are no openings, and partially clad means 50% or less coverage of an elevation.

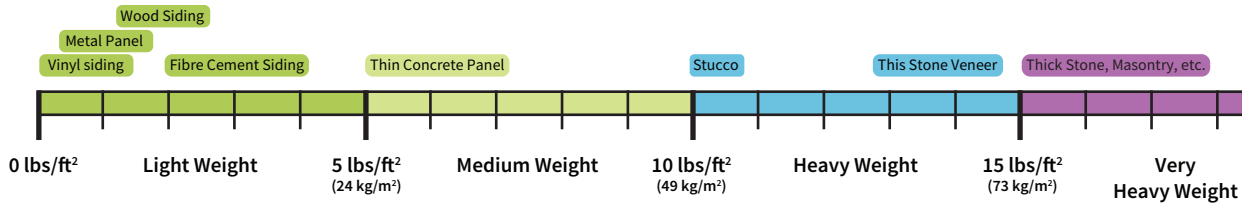


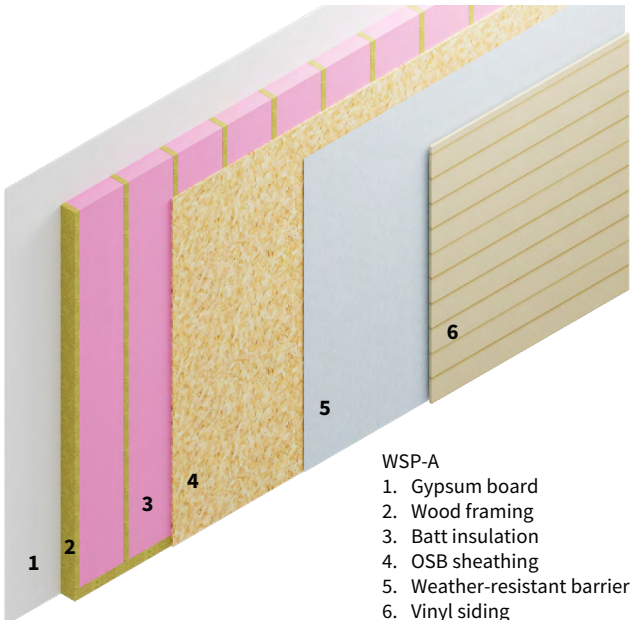
Figure 2.4: Approximate Weight for Various Common Cladding Types

Exterior walls that are partially clad with heavy materials may be classified as normal-weight if the area-weighted average of the cladding weights does not exceed 0.4 kPa per storey. The same approach can be applied to floor and roof assemblies (See Table 2.2 and Appendix A).

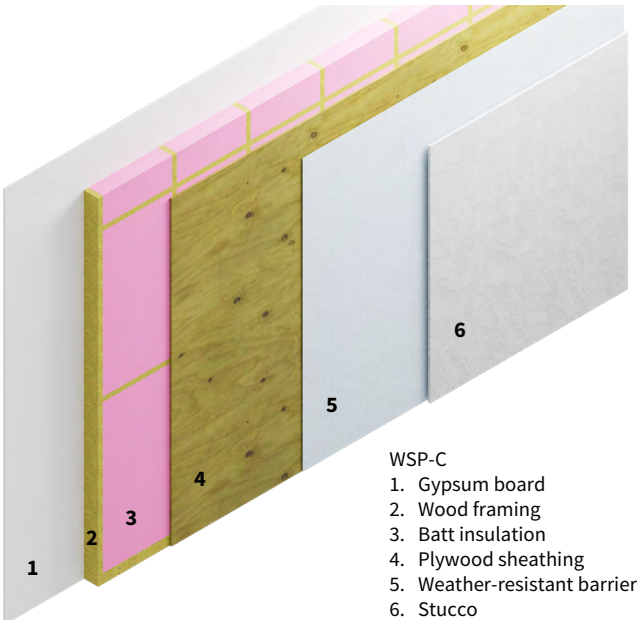
[vi] 9.23.2.7.(4) and 9.23.2.7.(5)
[vii] BC Housing. 2022. Illustrated Guide – R22+ Effective Walls in Residential Construction in British Columbia. BC Housing, Burnaby, BC.

2.6 Exterior and Interior Walls

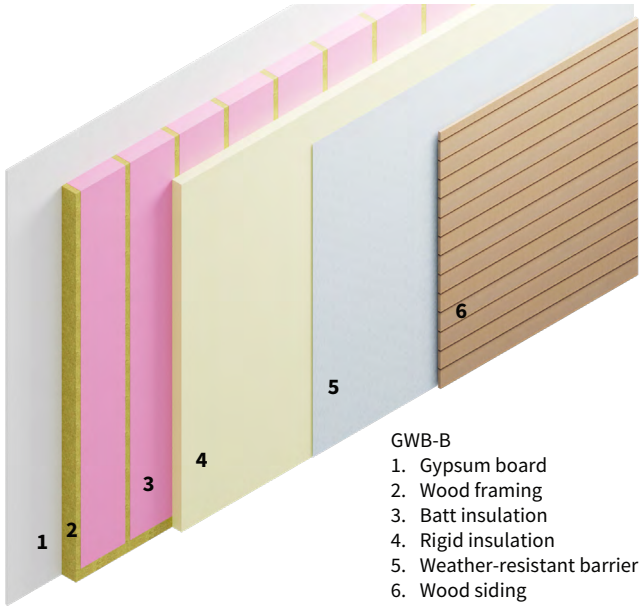
Exterior and interior walls within braced wall bands must be constructed with reference framing types as illustrated in Table 2.1 to meet the lateral bracing requirements of the Code. Figure 2.5 illustrates the details of sample exterior and interior walls.



a) Details of a WSP-A Exterior Wall (normal-weight construction)



(b) Details of a WSP-C Exterior Wall (heavyweight construction)



(c) Details of a GWB-B Exterior Wall (normal-weight construction)

(d) Details of a Double GWB-A Interior Wall (normal-weight construction)

Figure 2.5: Details of Sample Exterior and Interior Walls

This section illustrates main wood-frame construction bracing requirements for resisting seismic forces according to Part 9 of the Code. Additional system considerations for wood-frame construction are provided in Section 4. The requirements for professional engineering services are described in Section 1.

3.1 Determination of Lateral Bracing Method

The flowchart in Figure 3.1 is used to assist in determining the lateral bracing method for Part 9 wood-frame construction. Firstly, determine the S_{max} and Reference Hourly Wind Pressure (RHWP) for the construction location. After obtaining this information, start the logical process as illustrated in Figure 3.1 from the top.

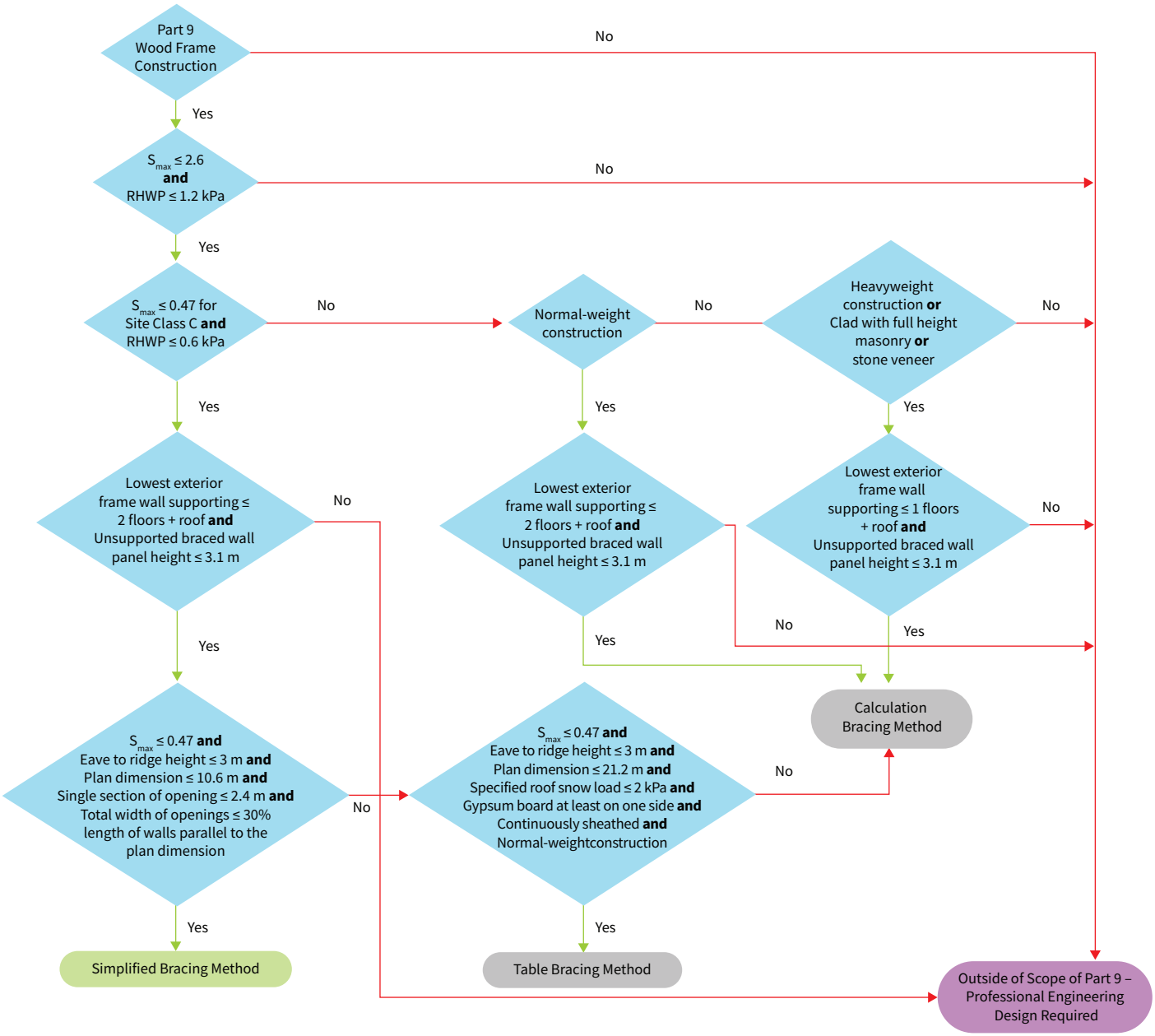


Figure 3.1: Flowchart for the Determination of Seismic Bracing Requirements for Part 9 Wood-frame Construction

As shown in Figure 3.1, the Calculation Bracing Method [viii] is permitted to be used if all of the following requirements are met:

1. $S_{max} \leq 2.6$ and RHWP ≤ 1.2 kPa (High Wind and Seismic Forces and lower).
2. The lowest exterior frame walls support a roof and no more than 2 floors in a normal-weight building. For heavyweight construction, the lowest frame walls are only permitted to support a roof and 1 floor.
3. The unsupported height of braced wall panels (see Figure 2.2) does not exceed 3.1 m.

For buildings subjected to Low to Moderate Wind and Seismic Forces (i.e., S_{max} for Site Class C ≤ 0.47 and RHWP ≤ 0.6 kPa, where Site Class refers to very dense soil and soft rock as defined in Article 4.1.8.4 of the Code), the Simplified Bracing Method [ix] or the Table Bracing Method is permitted if certain requirements are met (see Figure 3.1). [x] A summary of these two methods, including the requirements that must be met, is provided in Appendix B.

As an alternative to these three bracing methods, it is permitted to use the background equations specified in Note A-9.23.13.9.(3) and Note A-9.23.13.9.(4) of the Code for bracing design. An online design tool developed by CWC, based on the background equations for wind and seismic loads, is accessible from CWC Design Tools.

Buildings outside of the scope of Part 9 must be designed in accordance with Part 4 or good engineering practice such as that provided in the CWC “Engineering Guide for Wood Frame Construction”.

[viii] 9.23.13.9
[ix] 9.23.13.7
[x] 9.23.13.8

3.2 Braced Wall Bands

Braced wall bands must surround the perimeter of the building, and additional braced wall bands may be required at interior wall locations. Braced wall bands can be up to 1.2 m wide. They must be full storey height and aligned with braced wall bands on storeys above and below. [xi]

Braced Wall Band

The maximum space between bands depends on whether they are in the basement or crawl space (where it can be up to 15 m) [xii], or above (where it can be up to 10.6 m) [xiii]. Exceptions and trade offs are examined in Section 4 of this guide.

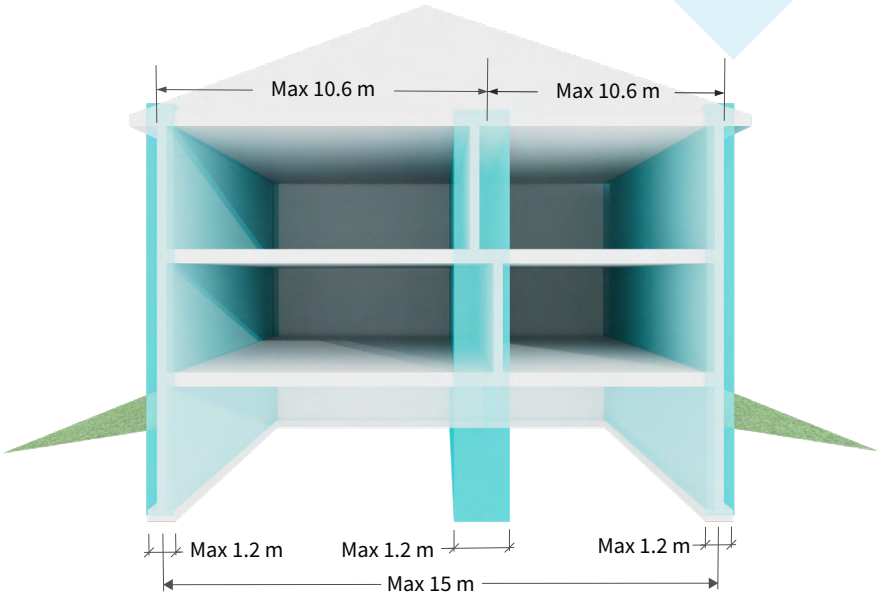


Figure 3.2: Illustration of Braced Wall Bands in a Two-Storey House

Designer Note

The braced wall band must lap with adjacent braced wall bands at both ends. [xiv] The centre line of each braced wall band extends to the outer edge of the connected braced wall bands.

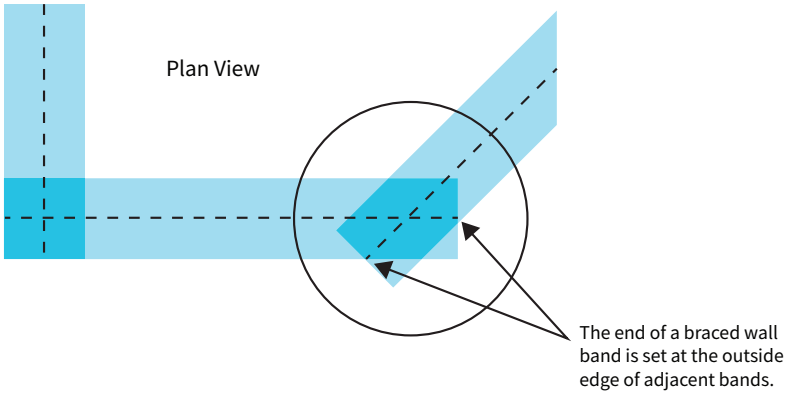
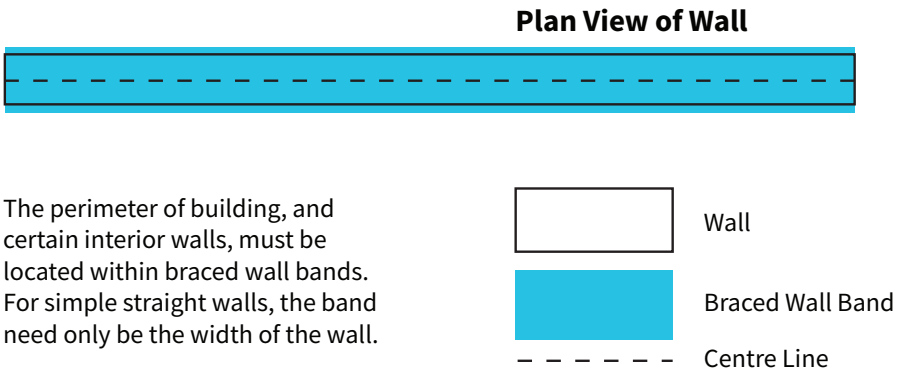


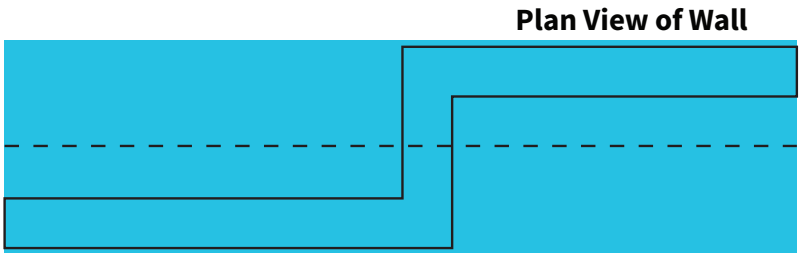
Figure 3.3: Illustration of the Lap Between Two Adjacent Braced Wall Bands

[xi] 9.23.13.4.(1)(a), (b), (c) and (e)
[xii] 9.23.13.5.(2)(b)
[xiii] Table 9.23.13.5
[xiv] 9.23.13.4.(1)(d)

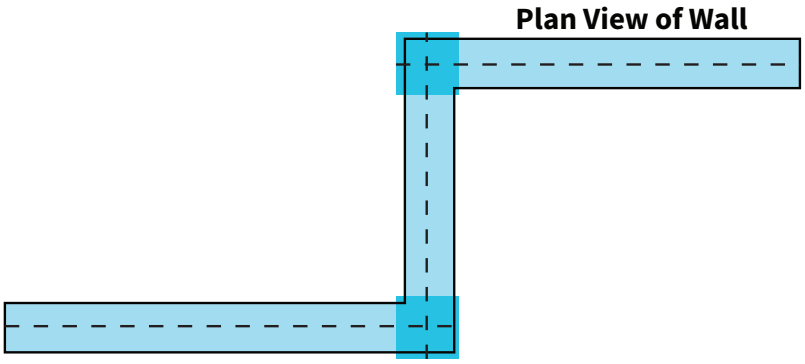
Offset Wall Profiles

The widths of braced wall bands identified by the designer can have an impact on the design of the house and the layout of its walls.





Walls that contain small offsets can be included within the braced wall band as long as the band does not exceed 1.2 m in width and all of the wall elements are located within the band. The jog of this wall is not included as part of the length of the braced wall panel (even if it is sheathed in accordance with the requirements for a braced wall panel).



Walls that contain significant offsets (i.e., offsets greater than 1.2 m) will require separate braced wall bands. Each band must contain the required minimum braced wall panels.

Figure 3.4: Plan View of Wall Offsets

Split Level

A split-level house would require a braced wall band at the location of the split when the change in the floor level is greater than the depth of one floor joist. [xv]

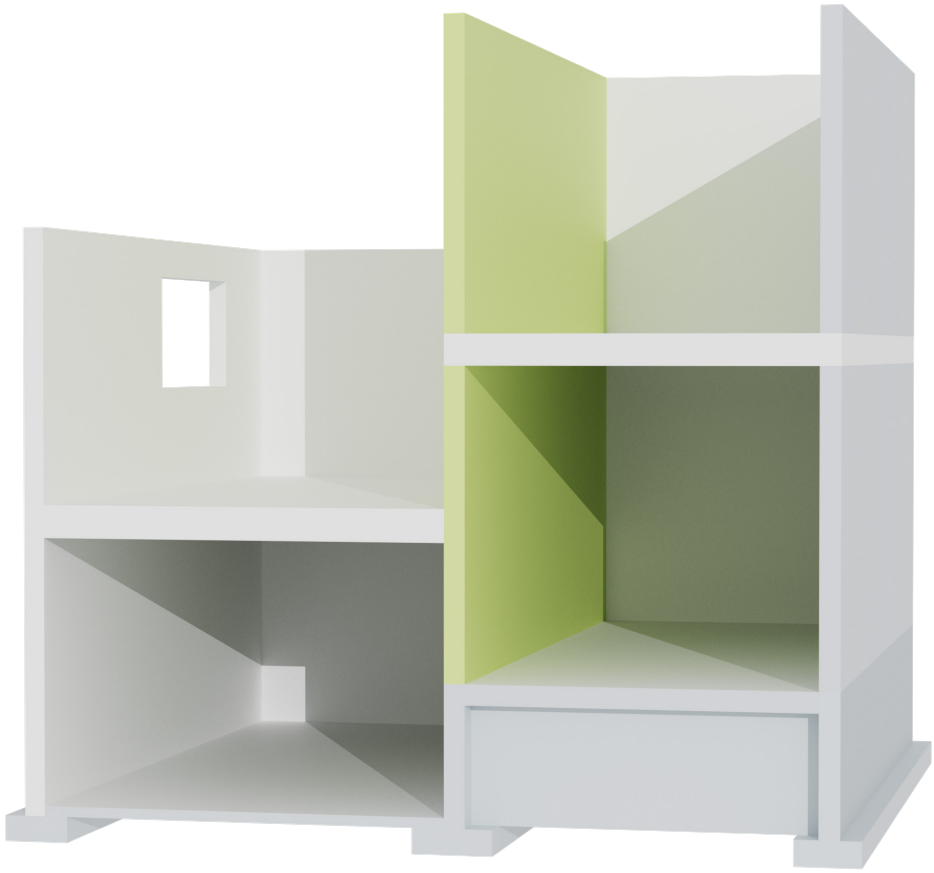


Figure 3.5: Elevation View of Split Level in a Two-Storey House

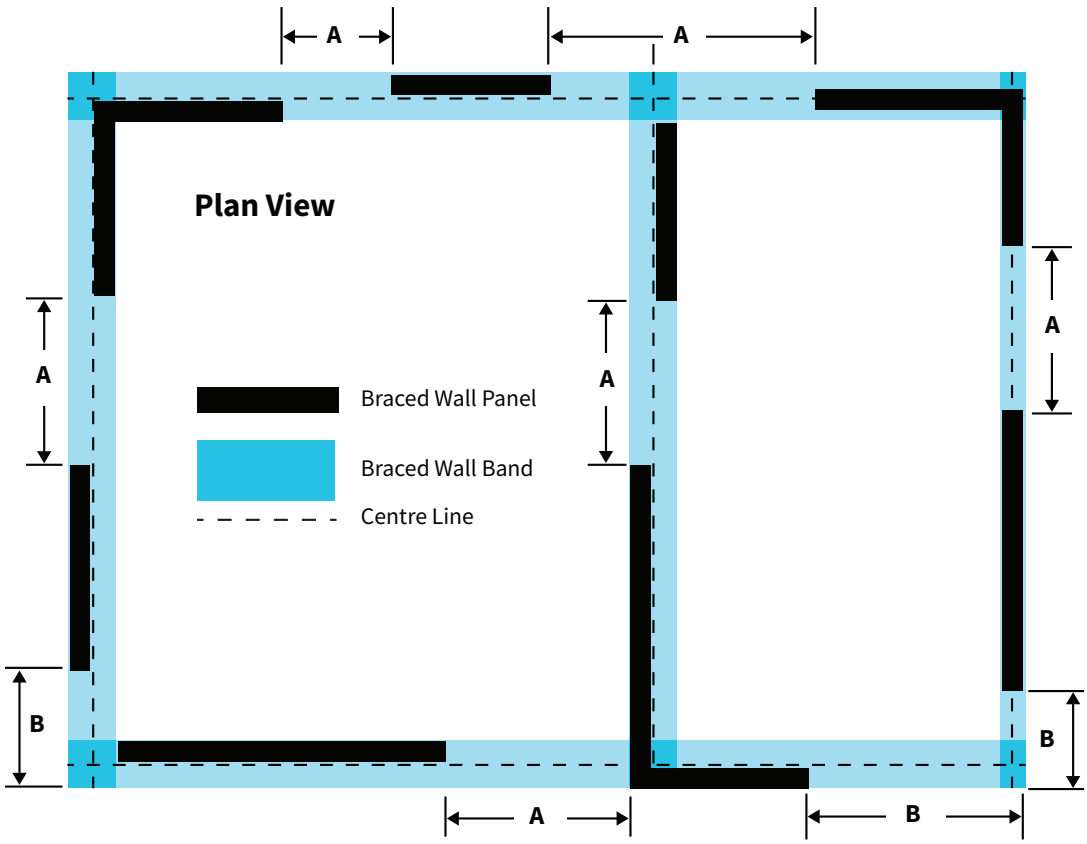
3.3 Braced Wall Panels

Braced wall panels must be located within braced wall bands, be laterally supported at each floor level and the roof, and extend, as applicable, from the top of the supporting footing, slab or subfloor to the underside of the floor, ceiling or roof framing above.

[xv] 9.23.13.4.(2)

3.3.1 Placement of Braced Wall Panels

The maximum distance between adjacent required braced wall panels in a braced wall band ("A" as illustrated in Figure 3.6) must not exceed 6.4 m except for the case illustrated in Figure 3.7. The maximum distance from the end of a braced wall band to the edge of the closest required braced wall panel ("B" as illustrated in Figure 3.6) must not exceed 2.4 m.



A Distance between braced wall panel edges

B Distance from end of braced wall band to end of 1st braced wall panel

Figure 3.6: Distances Between Required Braced Wall Panels in Braced Wall Bands

Measured from the edges of the panels, the maximum distance between adjacent braced wall panels may be increased to 7.3 m, provided that, throughout the height of the building, all braced wall panels within that particular braced wall band are at least 1.2 m in length. [xvi]

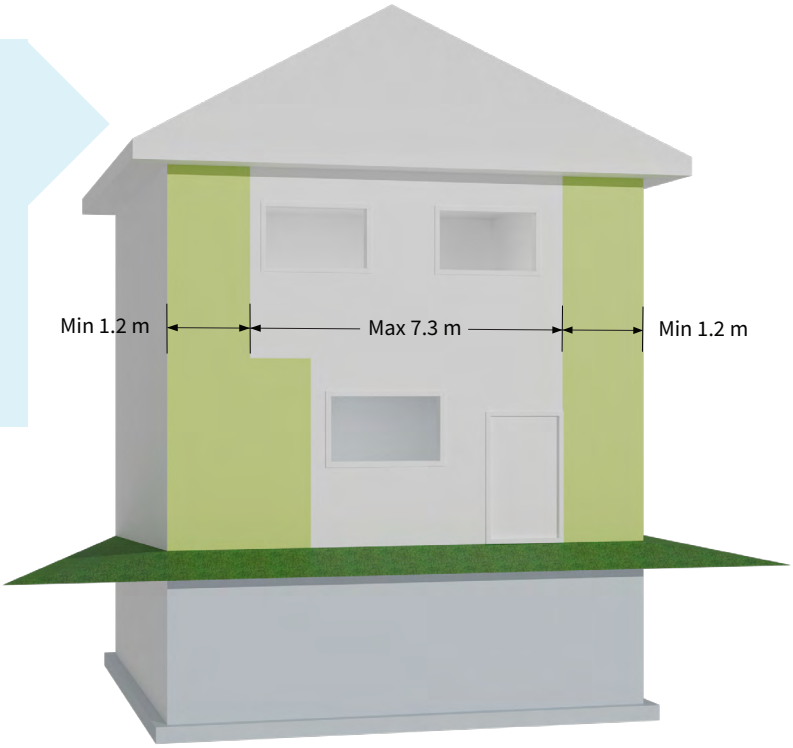
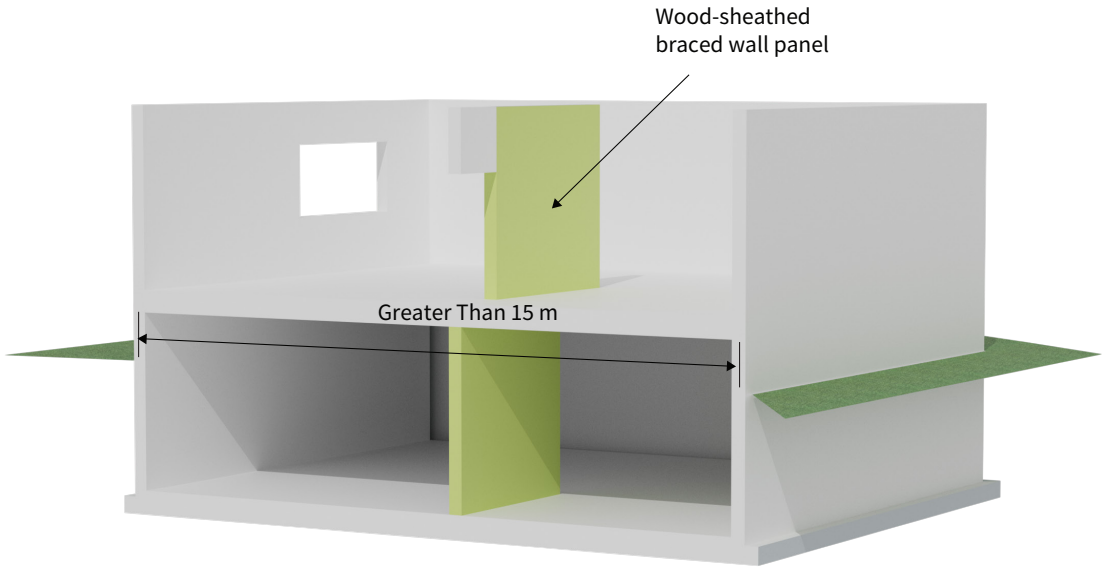


Figure 3.7: Increased Maximum Spacing Between Adjacent Braced Wall Panels

3.3.2 Basement and Crawl Space

Braced wall panels in basements and crawl spaces must be sheathed with OSB, plywood, waferboard or diagonal lumber and are required under all interior braced wall bands containing wood-sheathed braced wall panels. [xvii]

Figure 3.8: Braced Wall Panels in the Basement



Where a basement or crawl space is not required to be designed as a storey for bracing (see Section 3.5), braced wall panels do not need to be continuous through the basement or crawl spaces provided: (i) the span between adjacent braced wall bands or foundation walls (perimeter or interior) does not exceed 15 m, and (ii) the braced wall panel above is not constructed with WSP framing types. [xviii]

[xvi] 9.23.13.12.(8)
[xvii] 9.23.13.6.(3)
[xviii] 9.23.13.5.(2)(b)

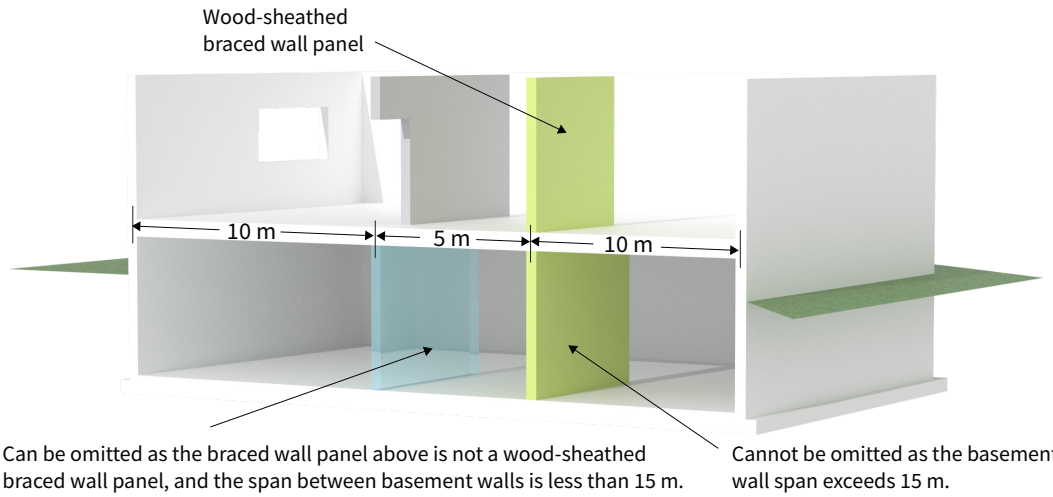


Figure 3.9: Exceptions for Braced Wall Panels in the Basement

3.3.3 Lengths of Braced Wall Panels

3.3.3.1 Minimum Lengths of Individual Braced Wall Panels

The minimum length of an individual braced wall panel sheathed only with gypsum board or diagonal lumber is 1.2 m. For wood-sheathed braced wall panels, the minimum length depends on where the panel is located. [xix]

The minimum length of wood-sheathed braced wall panel located at the end of a braced wall band where the braced wall panel connects to an intersecting braced wall panel is 600 mm.

If the panel is not located at the end of a braced wall band or, if the panel is located at the end of a braced wall band where the braced wall panel does not connect to an intersecting braced wall panel, the minimum length is 750 mm.

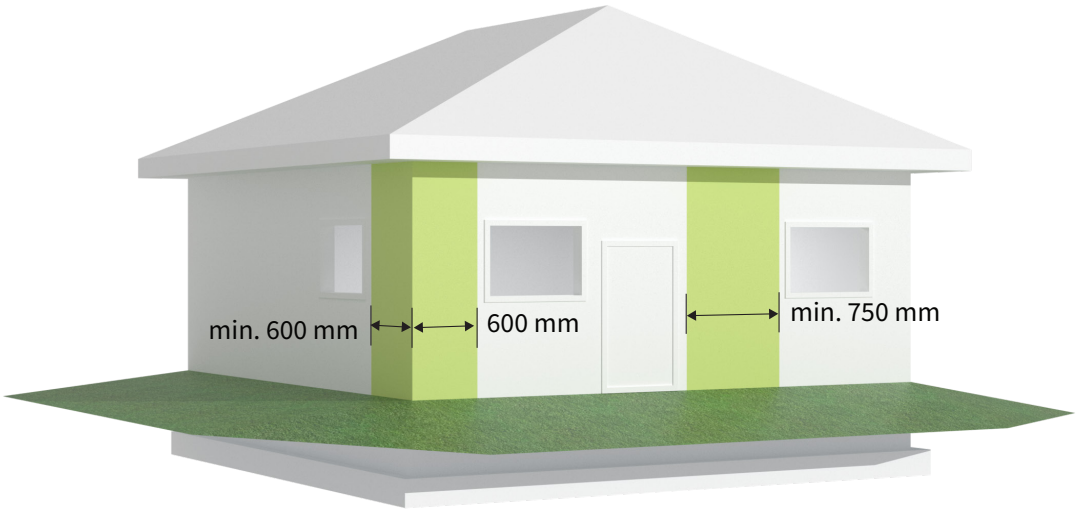


Figure 3.10: Minimum Lengths of Wood-sheathed Braced Wall Panels

[xix] Table 9.23.13.5.

3.3.3.2 Minimum Total Length of Braced Wall Panels in a Braced Wall Band

This sub-section focuses on the calculation of minimum total length of braced wall panels using the Calculation Bracing Method. The bracing requirements for the Simplified Bracing Method and the Table Bracing Method can be found in Appendix B.

The minimum total length of braced wall panels in a braced wall band must be taken as the greater of the minimum total length determined for RHWP and the minimum total length determined for S_{max}. The requirements presented herein focus on the calculation of the minimum total length for S_{max}. Appendix E provides a list of Part 9 provisions for wind design and calculations (including the calculation of the minimum total length for RHWP).

Minimum total length	=	**Unadjusted minimum total length**	x	**Adjustment factors**
L_s	=	L_{us}	x	$K_{weight}K_{snow}K_{Sspacing}K_{Snumber}K_{gyp}K_{sheath}$

Unadjusted Minimum Total Length

Appendix C provides the unadjusted minimum total lengths (L_{us}) of braced wall panels in a braced wall band. L_{us} is determined based on S_{max} reference framing type, and building plan dimension parallel to the braced wall band, L_{wl}.

Adjustment Factors

Adjustment factors are applied to L_{us} to account for the following aspects. Appendix D tabulates the values of adjustment factors.

- Weight of construction and cladding (K_{weight})

The movement of the ground results in the acceleration of the building's mass, which in turn triggers the development of forces within the structure. As seismic forces are directly proportional to the weight of the building, the adjustment factor K_{weight} accounts for construction weights greater than normal-weight construction.

The K_{weight} depends on the building's construction weight, the building plan dimension parallel to the braced wall band, L_{wl}, and whether masonry or stone veneer cladding is present on one or two faces of the building. Only veneer cladding on building faces perpendicular to the direction of the seismic motion is considered to affect the seismic load.

- Roof snow load (K_{snow})

Like the construction weight, the roof snow load affects the total weight of the building. The unadjusted minimum total length of braced wall panels provided in Appendix C accounts for the effect of specified roof snow load up to 2 kPa. If the load exceeds this limit, the adjustment factor K_{snow} is applied to accommodate the increased weight. A formula to calculate specified roof snow load is provided in the Code. [xx]

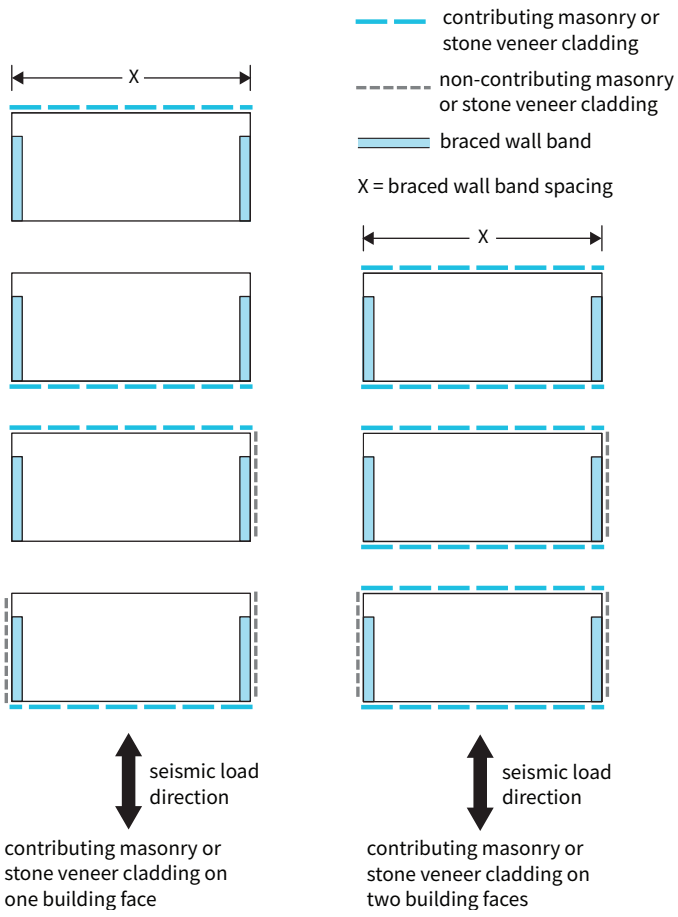


Figure 3.11: Contribution of Masonry or Stone Veneer Cladding to Seismic Load

[xx] 9.4.2.2.

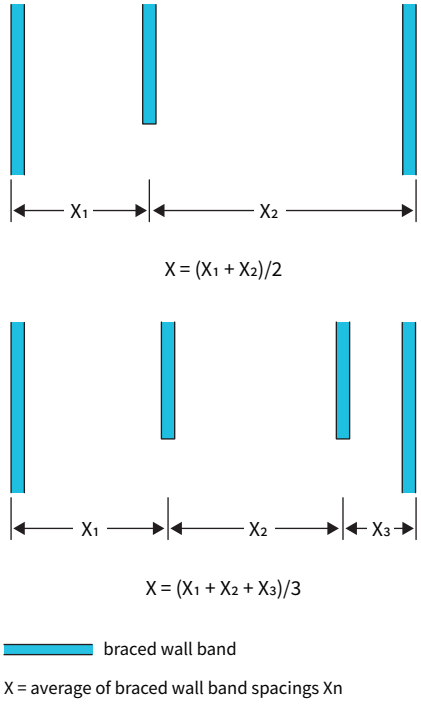


Figure 3.12: Calculation of Average Braced Wall Band Spacing

- Braced wall band spacing ($K_{Sspacing}$)

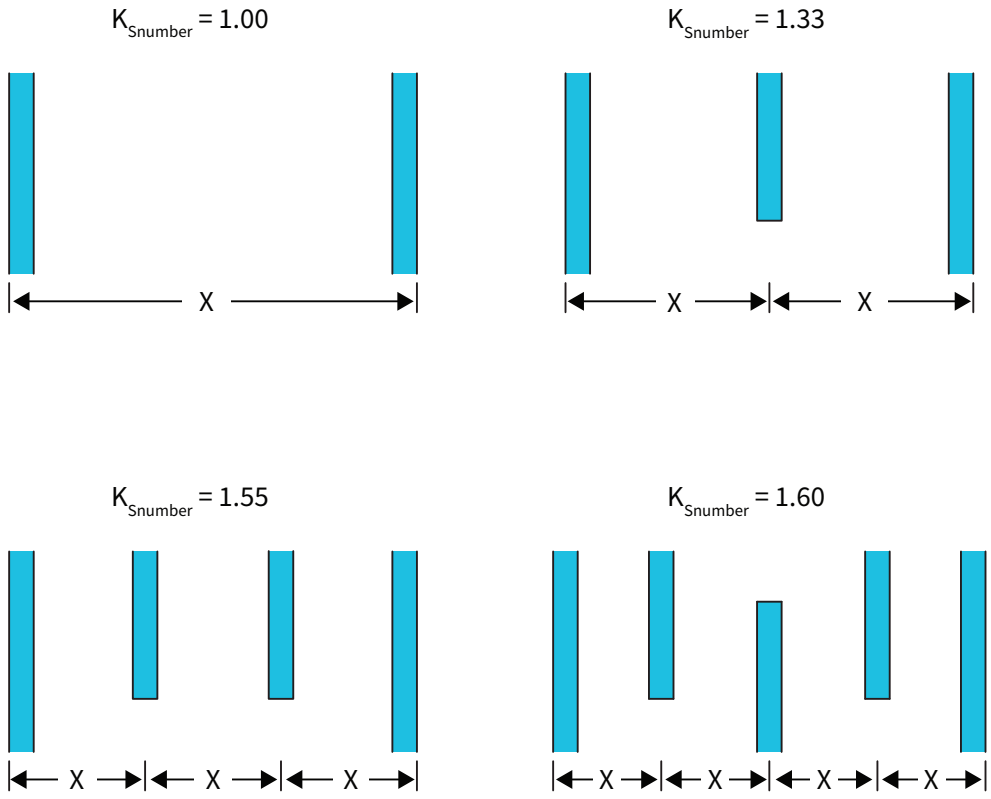
The adjustment factor $K_{Sspacing}$ addresses the impact of spacing between braced wall bands. The distance between braced wall bands is set at a baseline value for a spacing of 7.6 m. To accommodate variations in spacing, an adjustment factor is applied accordingly.

In cases where there are three or more parallel braced wall bands with uneven spacing, an average spacing can be utilized to calculate $K_{Sspacing}$, as long as the spacing between any of the braced wall bands above grade does not exceed 10.6 m.[xxi]

- Number of parallel braced wall bands ($K_{Snumber}$)

The adjustment factor $K_{Snumber}$ considers the impact of having more than two parallel braced wall bands to withstand seismic loads. As the minimum total braced wall panel length is calculated according to the spacing of braced wall bands, $K_{Snumber}$ adjusts for the actual distribution of loads over these bands.

[xxi] 9.23.13.9.(5)



X = braced wall band spacing

Figure 3.13: Adjustment for the Number of Braced Wall Bands for Resistance to Seismic Forces

- Interior gypsum board (K_{gyp})

The adjustment factor K_{gyp} accounts for the effects of omitting gypsum board from the interior side of wood-sheathed braced wall panels. If gypsum board is omitted, the minimum total braced wall panel length should be increased. For a GWB-type panel, this factor is equal to 1.0.

- Intermittent braced wall panels (K_{sheath})

There are two types of bracing: continuous sheathing (see Figure 3.14) and intermittent sheathing (see Figure 3.15).

In **continuously** sheathed braced wall bands, wall segments not designated as braced wall panels are constructed with the same sheathing, but not necessarily with the same thickness and fastening as used in the designated braced wall panels. It can be constructed with any sheathing material (plywood, OSB or waferboard for WSP, gypsum board for GWB and diagonal lumber board for DWB) and the corresponding minimum fastening. [xxii] For continuous sheathing, the adjustment factor K_{sheath} is equal to 1.0.

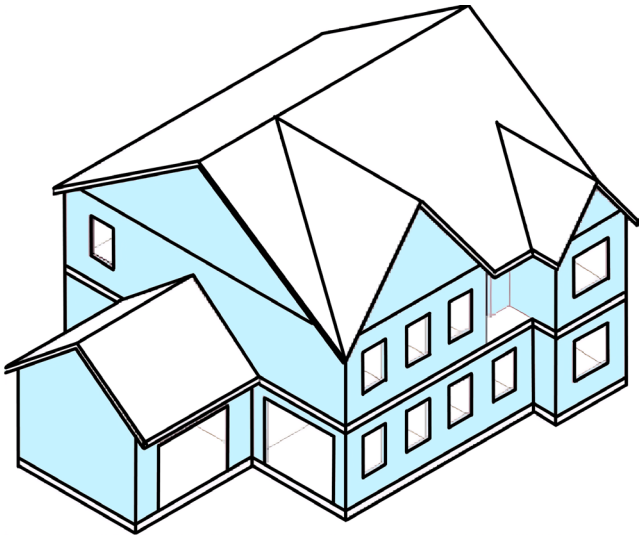


Figure 3.14: Continuous Sheathing of Braced Wall Panels in Braced Wall Bands

Intermittent sheathing offers the flexibility of using non-structural sheathing in areas where bracing is not required, including above and below openings. Where the common edges of adjacent sheathing panels are fastened to separate studs, as can be the case in modular or panelized construction, the wall must be considered as intermittently sheathed unless the studs are connected in compliance with the requirements for doubled studs in braced wall panels. [xxiii] For intermittent sheathing, the adjustment factor K_{sheath} is equal to 1.15.

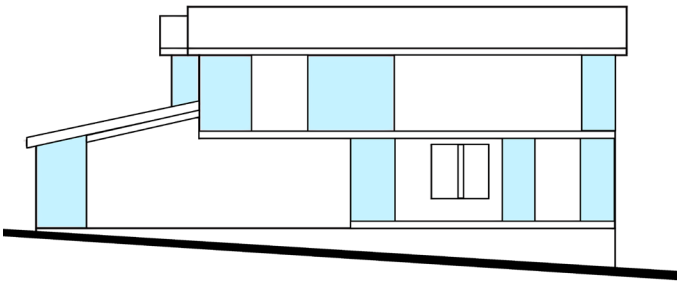


Figure 3.15: Intermittent Sheathing of Braced Wall Panels in Braced Wall Bands

[xxii] Table 9.23.3.5.-A
[xxiii] 9.23.13.9.(7)

3.4 Mixing Reference Framing Types within Braced Wall Bands

To accommodate an interior GWB panel aligning with an exterior panel of WSP framing type in the same braced wall band, mixing reference framing types are used.

In a braced wall band, panels of WSP-A or WSP-B framing types are permitted to replace panels of any GWB type, provided that the total length of all mixed braced wall panels is determined based on the GWB framing type.

As shown in Figure 3.16, mixing reference framing types are used in the 1 m exterior wall section in the centre braced wall band in perpendicular direction. Although WSP is used as the exterior panel, it must be considered as GWB when calculating the minimum total length of braced wall panels in this braced wall band. Alternatively, the lengths of the braced wall panels of mixed framing types can be determined by a professional engineer based on accepted engineering principles. [xxiv]

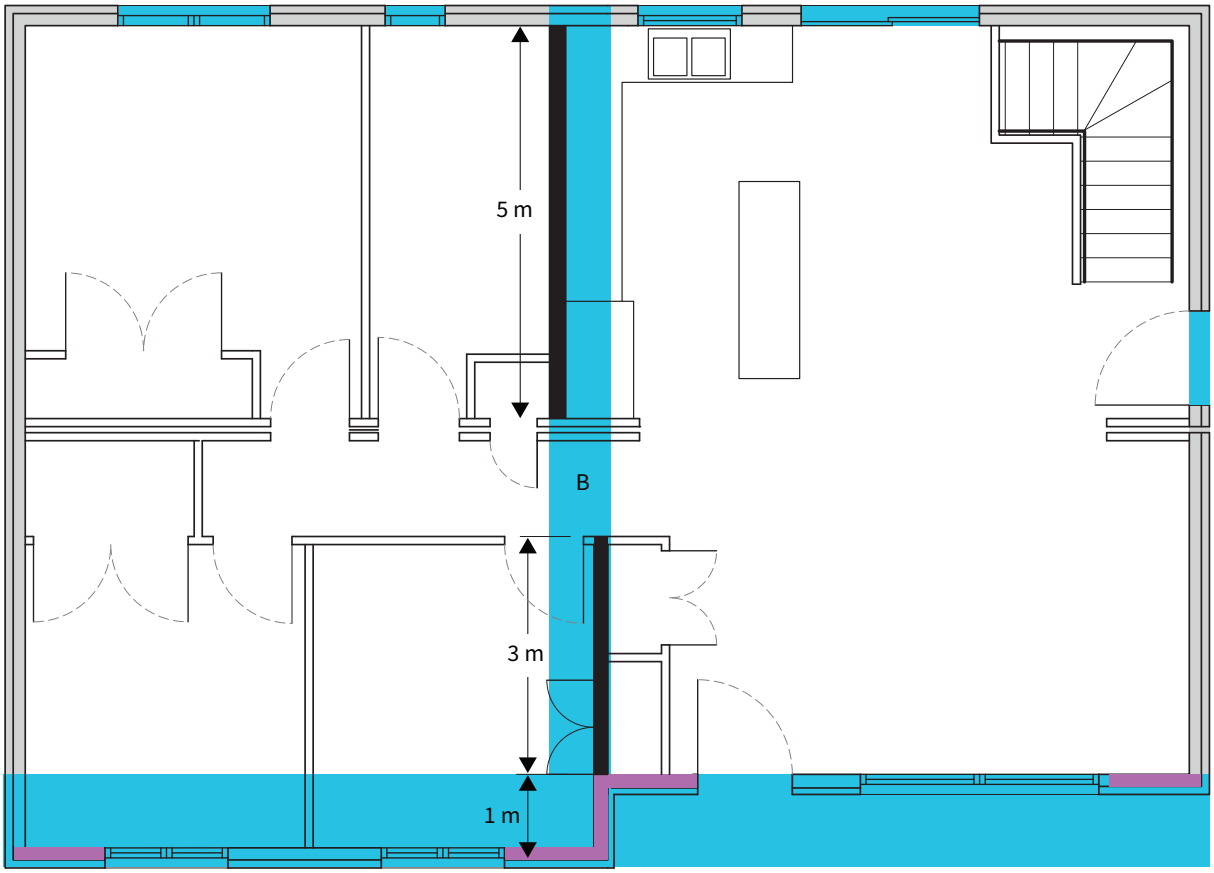


Figure 3.16: Mixing of Reference Framing Types in the Centre Braced Wall Band in Perpendicular Direction

In stacked braced wall bands, mixing braced wall panel framing types is permitted but wood-sheathed panels can not be positioned above gypsum-sheathed or diagonal-lumber-sheathed panels. [xxv]

[xxiv] 9.23.13.6.(5)
[xxv] 9.23.13.6.(4)

3.5 Foundation Cripple Walls

Cripple walls, also known as knee walls or pony walls, are short wood-frame stud walls extending from the top of the foundation walls or crawl space to the underside of the lowest floor framing. They are used to raise the elevation of a floor above the foundation. Cripple walls play a crucial role in the load transfer and are susceptible to failure when subjected to lateral loads.

Cripple walls are not required to be considered as an additional storey if all the following requirements are met; otherwise, cripple walls must be considered as an additional storey and be designed to conform to the lateral bracing requirements illustrated in this guide.

1. The cripple wall must not support heavyweight construction, masonry veneer or stone veneer. [xxvi]
2. Foundation cripple walls must be either framed with solid blocking (practical with short cripple wall heights), or adhere to the same construction methods as the braced wall panels in the storey above but sheathed with wood sheathing. [xxvii] If the cripple wall is constructed with the same method as the braced wall panels in the storeys above, the length of the braced wall panels within the cripple wall is required to be equal to the length of the braced wall panels multiplied by an adjustment factor of 1.2, in addition to any adjustments required in Section 3.3.3.2.
3. The height and length of the cripple wall must meet the following requirements.

If $S_{max} \leq 0.6$, the maximum height of the cripple wall is limited to 1.2 m and the maximum length of the cripple wall is limited to 6.0 m. [xxviii]

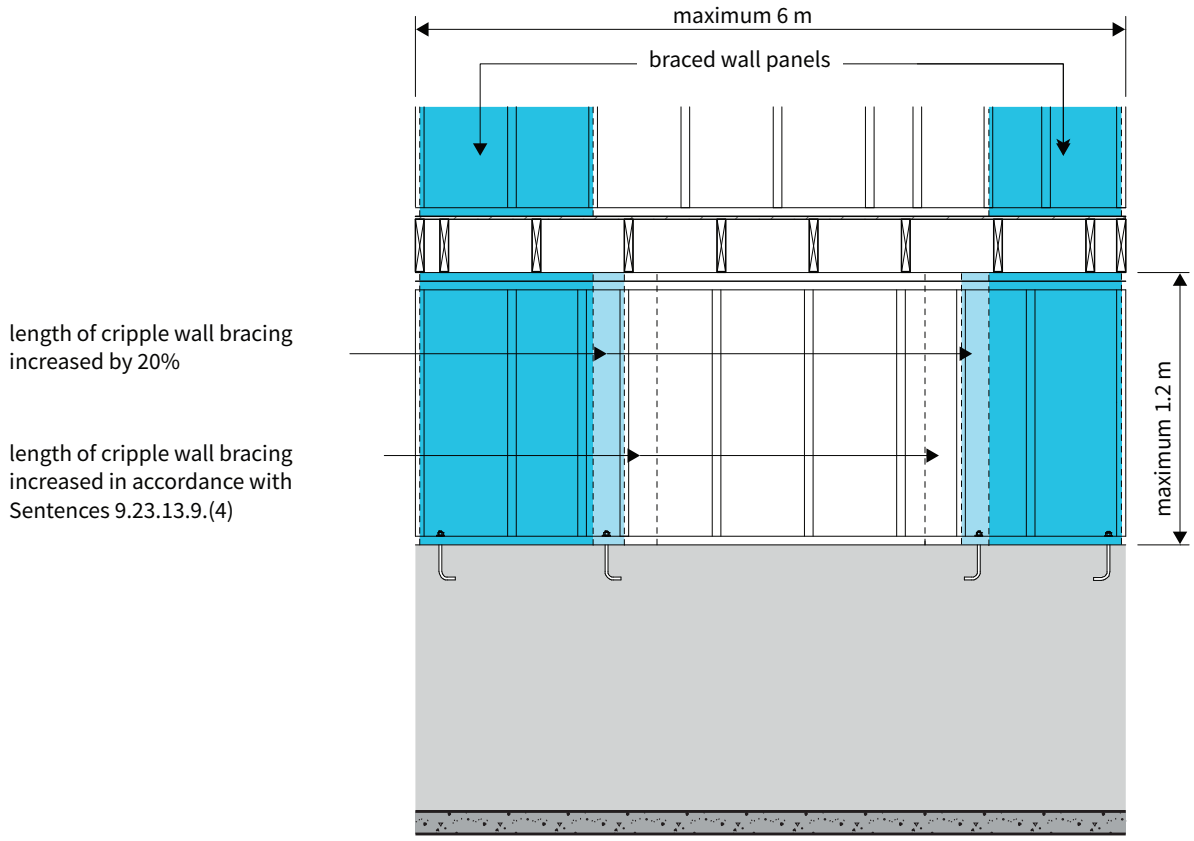


Figure 3.17: Cripple Walls at Locations Where $S_{max} \leq 0.6$

[xxvi] 9.23.13.10.(2)(d)
[xxvii] 9.23.13.10.(2)(c)
[xxviii] 9.23.13.10.(2) (a) and (b)

If S_{max} > 0.6, the maximum height of the cripple wall is limited to 0.35 m and the maximum length of the cripple wall is limited to 5.0 m. [xxix]

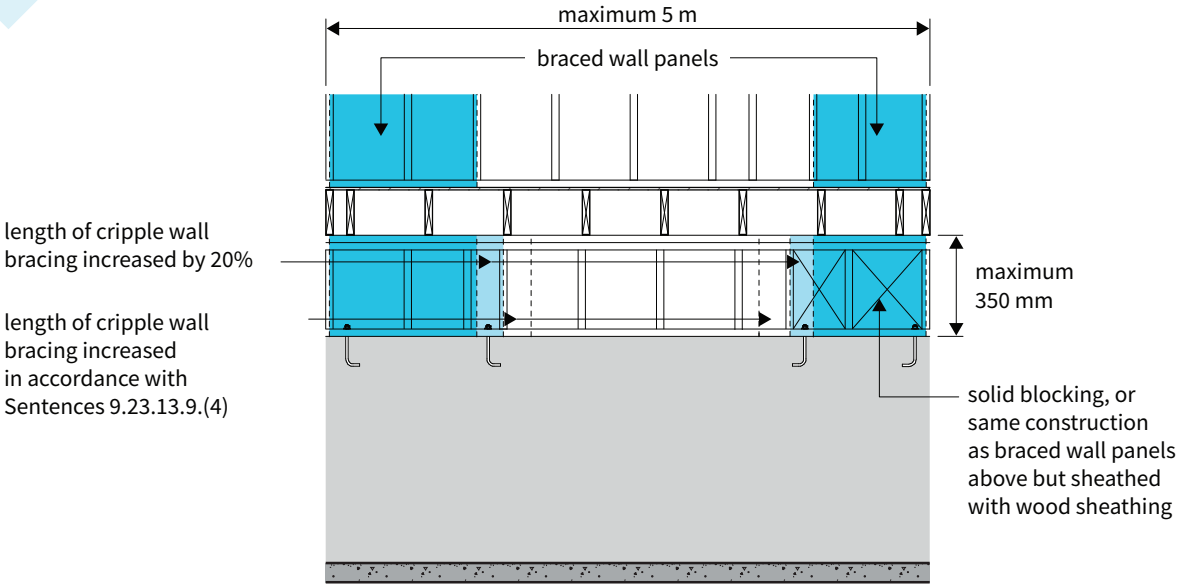
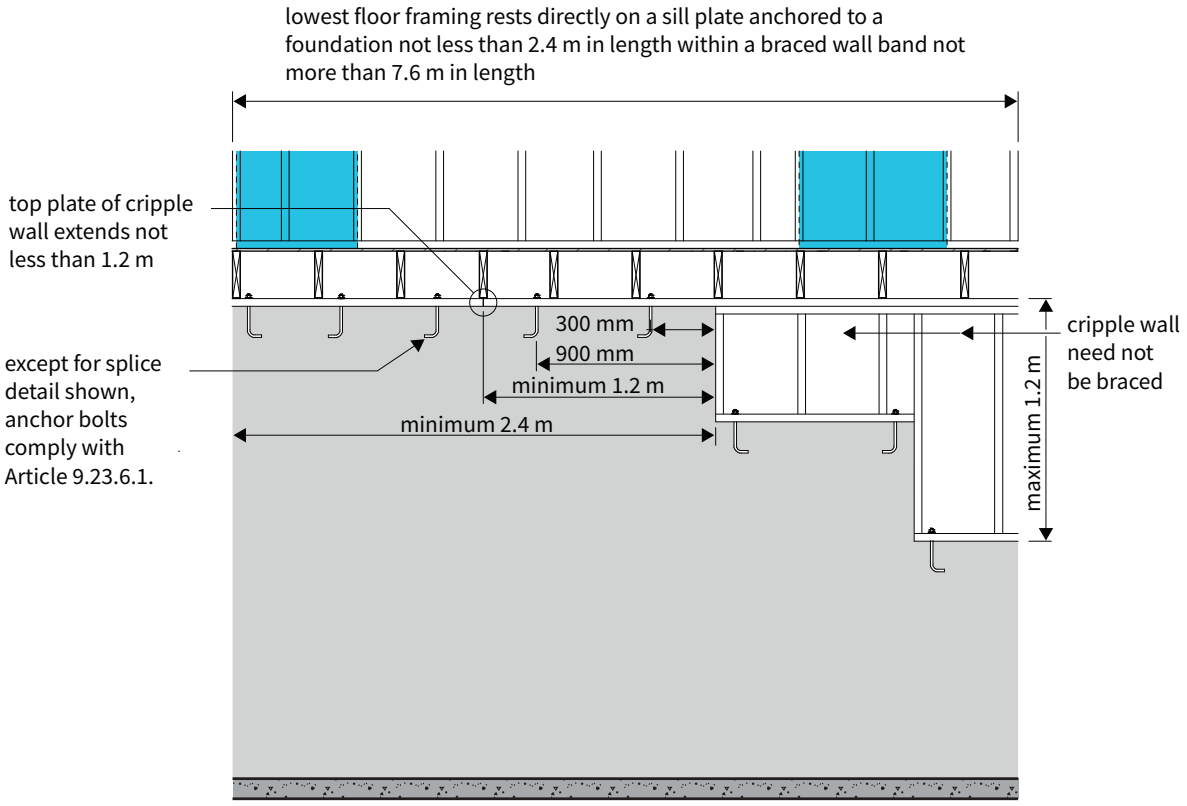


Figure 3.18: Cripple Walls at Locations Where S_{max} > 0.6

[xxix] 9.23.13.10.(3)

3.6 Cripple Walls in Stepped Foundations

Cripple walls are frequently employed alongside a stepped foundation to ensure a consistent floor elevation. Cripple walls over a stepped foundation need not be braced if the stepped foundation provides sufficient bracing for the braced walls it supports (as shown in Figure 3.19).



If the full-height foundation wall is less than 2.4 m in length, the attachment of the first-storey braced wall to the foundation is insufficient to complete the lateral load path. In this case, the cripple wall must be braced, and while it is advisable for the top plate to be anchored to the foundation, it is not mandatory.

Figure 3.19: Cripple Walls in a Stepped Foundation

3.7 Fastening and Anchorage Requirements

Table 3.1 contains the fastening requirements for subflooring, wall sheathing not in a required braced wall panel, roof sheathing, anchorage requirements and the minimum number of nails on each side of doubled top plate splices. Fastening of wall sheathing in required braced wall panels can be found in Section 2.4.

Table 3.1: Fastening Requirements of Subflooring, Wall Sheathing Not in a Braced Wall Panel and Roof Sheathing

	Element	Minimum # or Maximum Spacing of Fasteners	Minimum Length of Fasteners, mm					
			Common or Spiral Nails	Ring Thread Nails	Screws	Roofing Nails	Staples	14-gauge Staples
S_{max} < 0.47 for Site class C and RHWP ≤ 0.6 kPa	Board lumber ≤ 184 mm wide	2 per support	51	45	45	n/a	51	n/a
	Board lumber > 184 mm wide	3 per support	51	45	45	n/a	51	
	Fibreboard ≤ 13 mm thick	150 mm o.c. along edges and 300 mm o.c. along intermediate supports	n/a	n/a	n/a	44	28	
	Gypsum board ≤ 13 mm thick		n/a	n/a	n/a	44	n/a	
	Plywood, OSB or waferboard ≤ 10 mm thick		51	45	45	n/a	38	
	10 mm < Plywood, OSB or waferboard ≤ 20 mm thick		51	45	45	n/a	51	
	20 mm < Plywood, OSB or waferboard ≤ 25 mm thick		57	51	51	n/a	n/a	
S_{max} ≤ 0.6 and 0.6 kPa < RHWP ≤ 0.8 kPa or S_{max} > 0.47 for Site Class C, S_{max} ≤ 0.6 and RHWP ≤ 0.8 kPa	Board lumber ≤ 184 mm wide	2 per support	63	63	51	n/a		63
	Board lumber > 184 mm wide	3 per support	63	63	51			63
	Plywood, OSB or waferboard ≤ 20 mm thick	150 mm o.c. along the edges of sheathing panels and 300 mm o.c. along intermediate supports	63	63	51			63
	20 mm < Plywood, OSB or waferboard ≤ 25 mm thick		63	63	57			n/a
S_{max} ≤ 2.6 and 0.8 kPa < RHWP ≤ 1.2 kPa or S_{max} > 0.47 for Site Class C, 0.6 < S_{max} ≤ 2.6 and RHWP ≤ 1.2 kPa	Plywood, OSB or waferboard ≤ 20 mm thick	75 mm o.c. along the edges of sheathing panels and 300 mm o.c. along intermediate supports; and for roof sheathing where HWP is equal to or greater than 0.8 kPa and less than 1.2 kPa, 50 mm o.c. within 1 m of the edges of the roof	63	63	51			n/a
	20 mm < Plywood, OSB or waferboard ≤ 25 mm thick		63	63	57			n/a

It is worth noting that nail diameters in Table 9.23.3.1 of the Code are not typically compatible or commercially available with power driven tools. Where power nails or nails with a diameter smaller than that required in Table 3.1 are used to connect framing, the reduction in nail diameter must be accounted for by either reducing the required nailing spacing in sheathing or increasing the required number of nails in accordance with Note A-9.23.3.1.(2).

The anchorage of braced wall panels is required to be provided by fastening the sill plate to the foundation with anchor bolts. Table 3.2 provides the maximum spacing between anchor bolts within required braced wall panels. At least two anchor bolts per braced wall panel, one at each end, are required and must be located at opposite ends of the braced wall panel within 0.5 m of the foundation end or within 0.3 m of the end of the braced wall panel.

Table 3.2: Anchor Bolt Spacing within Braced Wall Panels

		Maximum Spacing of Anchor Bolts, m										
Reference Framing Type		GWB-O	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E	DWB
$S_{max} \leq 2.6$ and RHWP ≤ 1.2 kPa	Anchor Bolt Diameter 12.7 mm	n/a	2.4	2.4	1.8	1.4	1.4	0.8	0.7	0.6	0.5	0.8
	Anchor Bolt Diameter 15.9 mm	n/a	2.4	2.4	2.4	2.1	2.1	1.2	1.0	0.9	0.8	1.2

Table 3.3 provides the nailing requirements for doubled top plate splices in buildings subjected to High Seismic Forces (i.e., S_{max} for Site Class C > 0.47 and $S_{max} \leq 2.6$). Buildings subjected to Extreme Seismic Forces ($S_{max} > 2.6$) must be designed according to Part 4 of the Code.

Table 3.3: Minimum Number of Nails on Each Side of Doubled Top Plate Splice for S_{max} for Site Class C > 0.47 and $S_{max} \leq 2.6$ [1] [2] [3]

	Weight of Construction or Cladding Type			
	Normal-weight Construction	Heavyweight Construction [4]	Masonry Veneer (on one or more building faces) [4] [5]	Stone Veneer (on one or more building faces) [4] [5]
$S_{max} \leq 0.60$	4	7	8	10
$0.6 < S_{max} \leq 0.8$	6	8	9	12
$0.8 < S_{max} \leq 1.2$	9	12	14	19
$1.2 < S_{max} \leq 1.6$	12	16	19	25
$1.6 < S_{max} \leq 2.0$	14	20	23	31
$2.0 < S_{max} \leq 2.6$	19	25	30	40

[1] The minimum number of nails on each side of doubled top plate splice for 0.6 kPa < RHWP ≤ 1.2 kPa is determined according to Table 9.23.11.4.-C of the Code. The minimum number of nails on each side of double top plate splice is taken as the greater of the minimum numbers for S_{max} in this table and for RHWP in Table 9.23.11.4.-C, respectively.
[2] Part 4 should be used if S_{max}>2.6 or RHWP > 1.2 kPa.
[3] For a braced wall band spacing of 7.6 m or less, the minimum number of nails may be divided by 2.
[4] Part 4 should be used if the number of storeys is 2 or more.
[5] Where the height of the masonry or stone veneer does not exceed a half storey above the foundation, the veneer may be disregarded.

4 Additional System Considerations

This section illustrates additional system considerations for Part 9 wood-frame construction, including exceptions, trade offs and the connection of wood-sheathed braced wall panels to roof framing.

4.1 Exceptions

For certain structural elements, such as porches and garages, the requirements for spacing and dimensions of braced wall bands and braced wall panels need not to be compliant. These exceptions apply where $S_{max} \leq 1.2$ and RHWP ≤ 1.2 kPa.

4.1.1 Open or Enclosed Space

Portions of the perimeter of a single open or enclosed space are exempted from bracing requirements if all of the following conditions are met: (i) the roof of the space projects not more than 3.5 m or the length of the space parallel to the wall framing of the house (i.e., perpendicular plan dimension), whichever is less, as shown in Figure 4.1, (ii) the portion of the perimeter structure does not support a floor, (iii) the roof of the space is integral with the roof of the rest of the building with framing members not more than 400 mm o.c., or is constructed with roof framing not more than 400 mm o.c., and (iv) the end-joists or end-rafters for the roof of the space are fastened to a built-column (see Figure 4.1). [xxx]

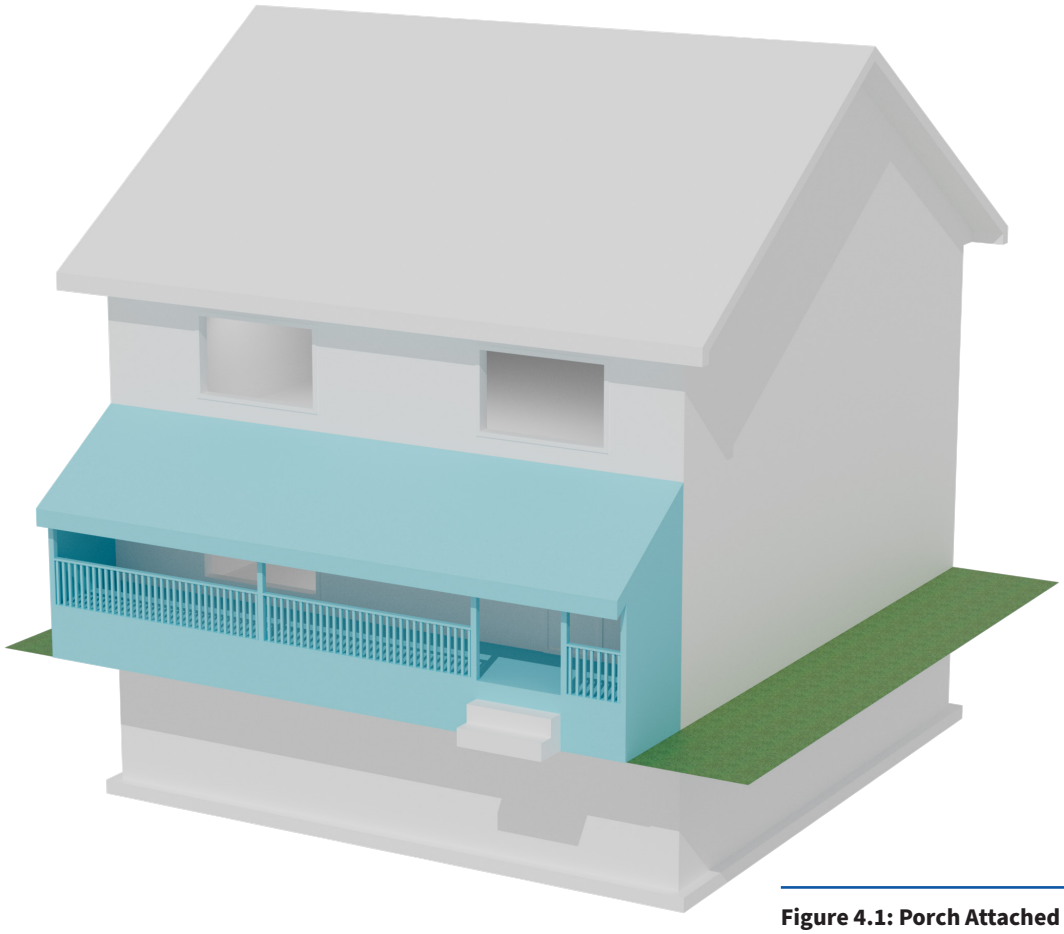
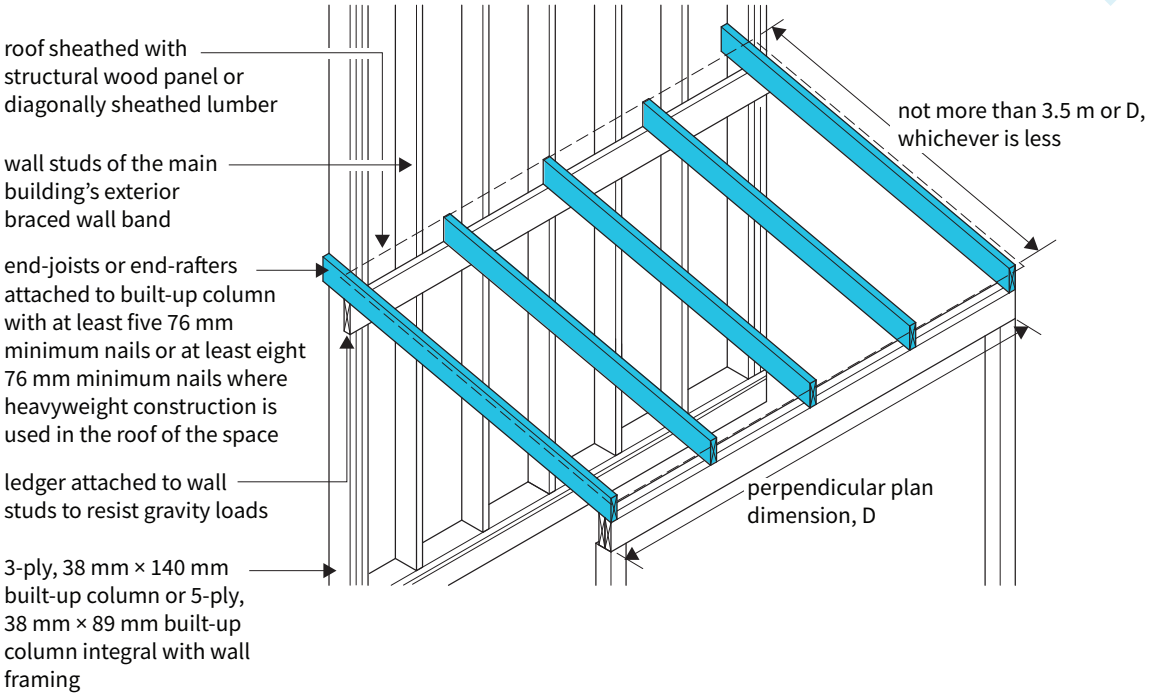


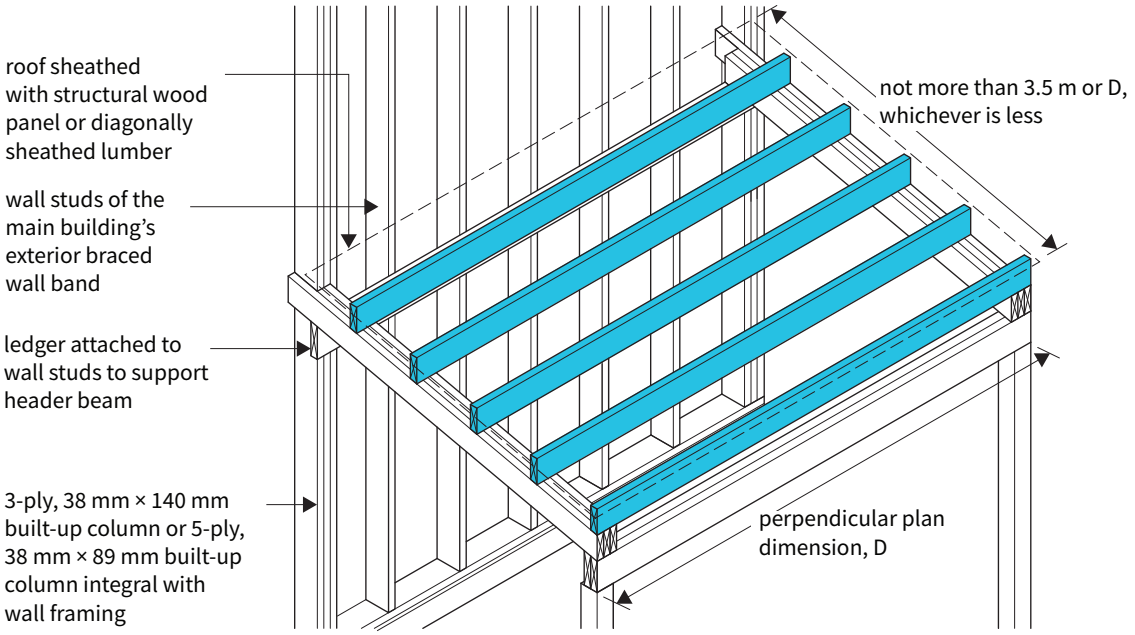
Figure 4.1: Porch Attached to a House

[xxx] 9.23.13.12.(2)(a) and (b)

The roof of the space must be integral with the roof of the house or framed and fastened to the wall framing (see Figure 4.2).



(a) Framing perpendicular to plane of wall (balloon construction)



(b) Framing parallel to plane of wall (balloon construction)

Figure 4.2: Attachment of a Porch Roof to Exterior Wall Framing

4.1.2 Garages

All detached garages supporting no floors of construction are exempted from bracing requirements. [xxxi]

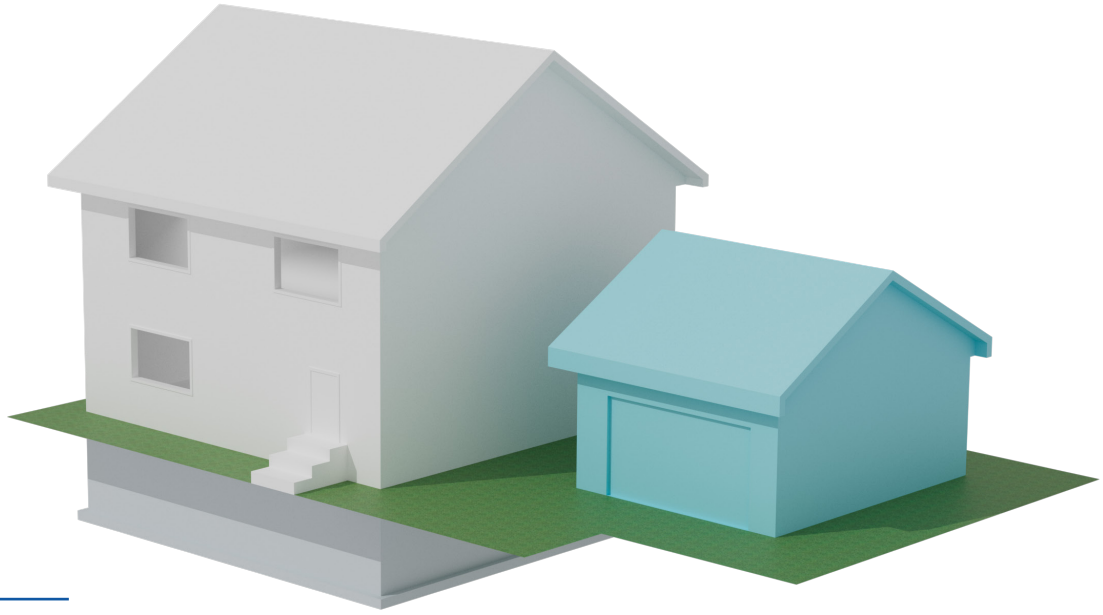


Figure 4.3: Detached Garage

The front wall of attached garages serving a single dwelling unit and supporting no floors of construction is exempt from bracing requirements.

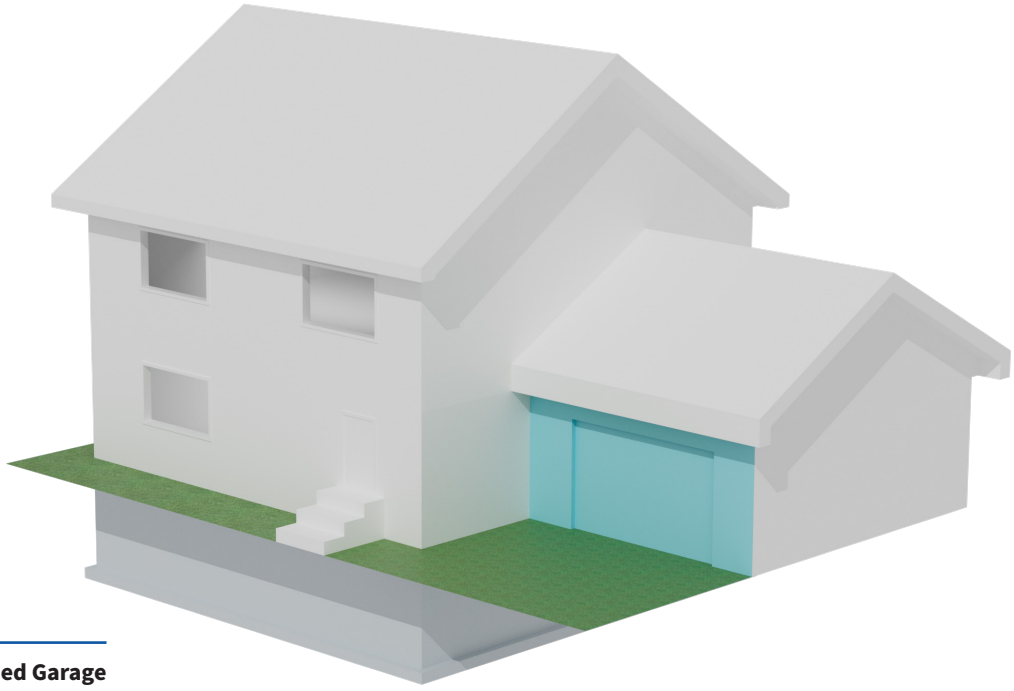


Figure 4.4: Attached Garage Supporting No Floor of Construction

[xxxi] 9.23.13.12.(3)

If the attached garage supports not more than one floor of construction, the garage door is a permitted large opening, provided that the back wall of the garage is not more than 7.6 m from the garage door, as well as at least half of the length of the back wall of the garage and one quarter of the length of the side walls are constructed of wood-sheathed braced wall panels. [xxxii]

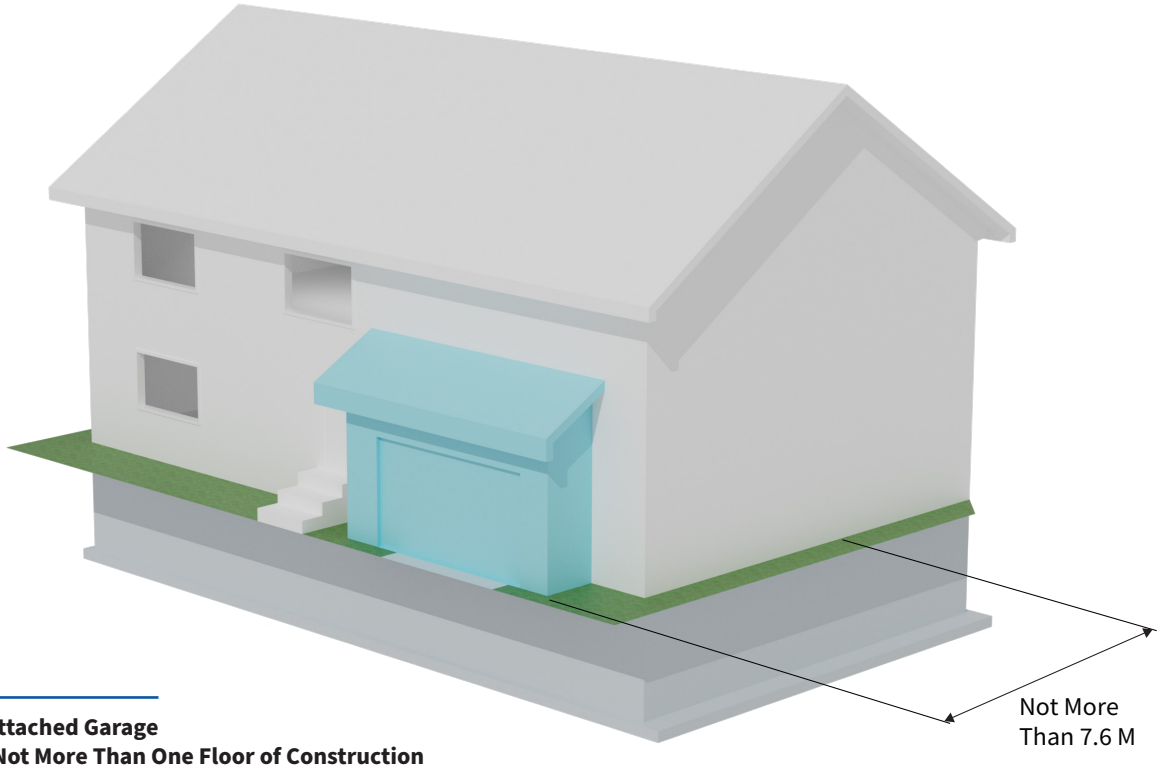


Figure 4.5: Attached Garage Supporting Not More Than One Floor of Construction

[xxxii] 9.23.13.12.(4)

4.2 Trade Offs

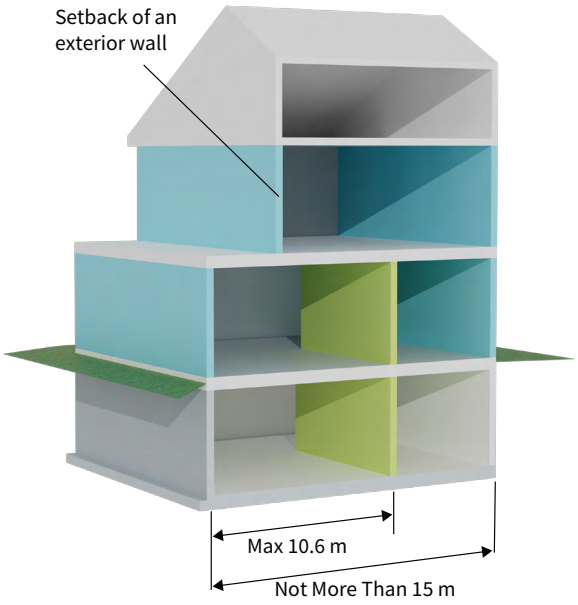


Figure 4.6: Set Back of an Exterior Wall at the Uppermost Storey

Only one exterior wall in each orthogonal direction of the uppermost storey can be set back (see Figure 4.6 where the exterior wall on the second floor is set back). Walls with minor offsets (i.e., offsets not exceeding 1.2 m) are not considered set back. To accommodate the setback, the adjacent interior braced wall band of the storey below the setback must meet all of the following requirements: (i) is spaced not more than 10.6 m from the exterior wall below the setback wall, (ii) consists of braced wall panels within the braced wall band are constructed of a wood-based material in Table 2.1 (or Table 9.23.3.5 of the Code), (iii) extends to the foundation, and (iv) is not taken into consideration when providing braced wall panels constructed of wood-based material at spacing intervals of not more than 15 m for basements and crawl spaces. The exterior walls perpendicular to the set back wall must have their top plates connected with nails at no greater than half the required spacing in Table 5.1 (or Table 9.23.3.4 of the Code), and have their top plate splices fastened with twice the number of nails specified in Sentence 9.23.11.4.(5) of the Code.

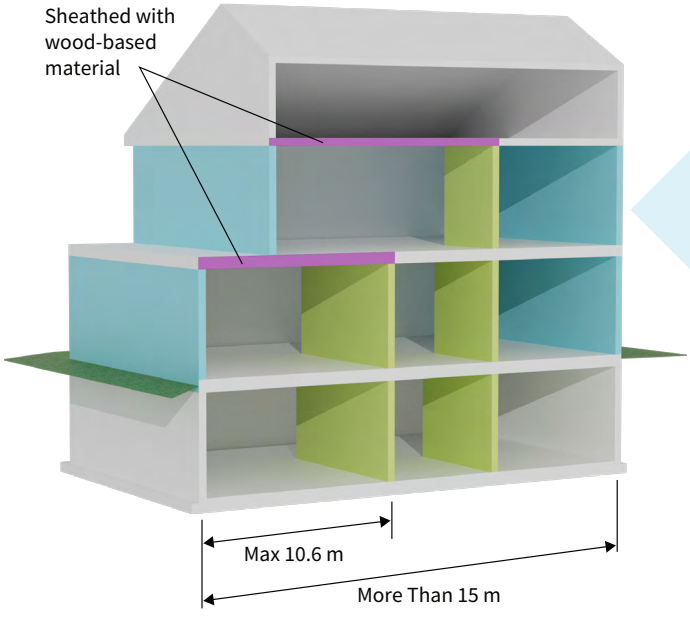


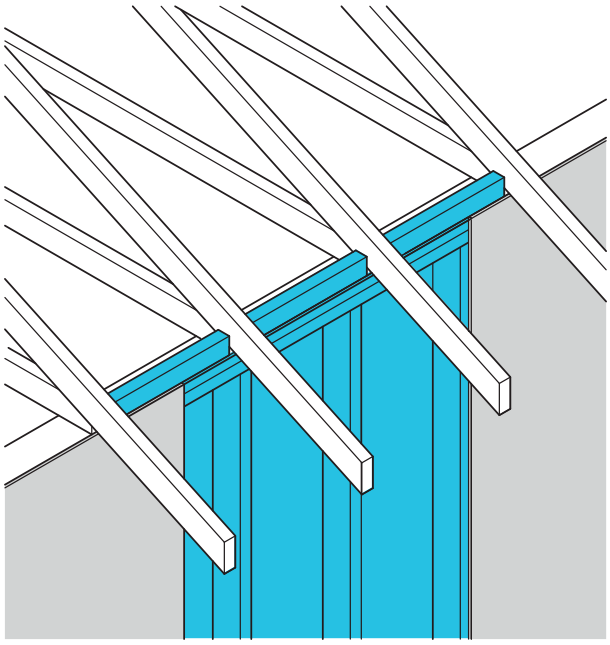
Figure 4.7: Roof and Floor Sheathing for an Exterior Wall Set Back at the Uppermost Storey

Where the exterior wall at the uppermost storey is set back from the exterior wall of the storey below, the roof and floor space supporting the set back wall must be sheathed with a wood-based material between the exterior wall of the storey below the setback and the adjacent interior braced wall bands of the storey below the setback (see Figure 4.7). [xxxiii]

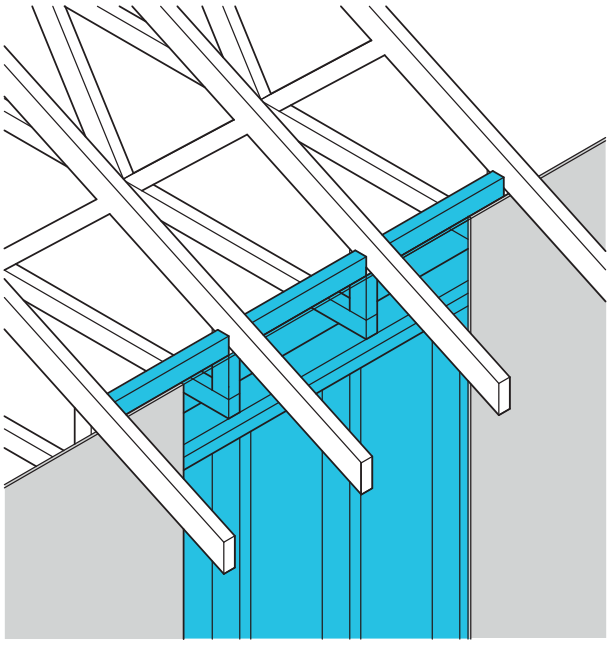
[xxxiii] 9.23.13.12.(6)

4.3 Connection of Wood-sheathed Braced Wall Panels to Roof Framing

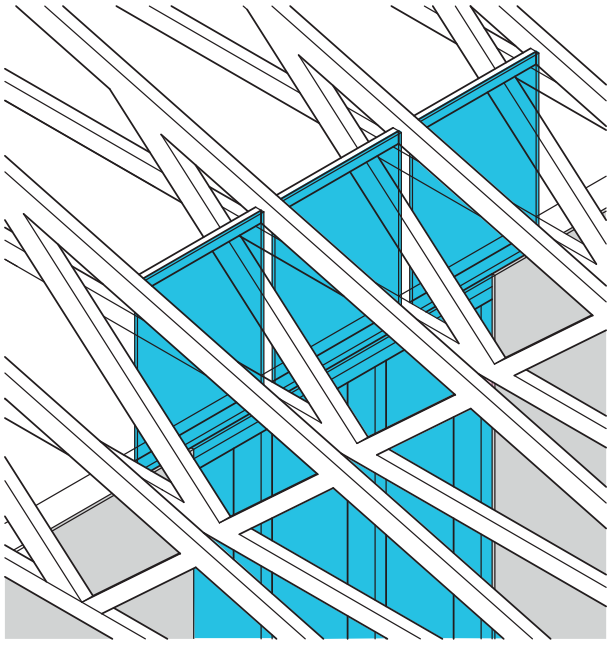
In the uppermost storey, interior or exterior wood-sheathed braced wall panels, other than WSP-A (see Figure 4.8), are required to extend to the roof framing. Also, the top plate of these panels needs to be connected to the top chords of perpendicular or offset parallel trusses, the perpendicular or offset parallel joists or rafters, or rafters, joists or trusses. More details on such connections are provided in Sentence 9.23.13.5.(3) of the Code.



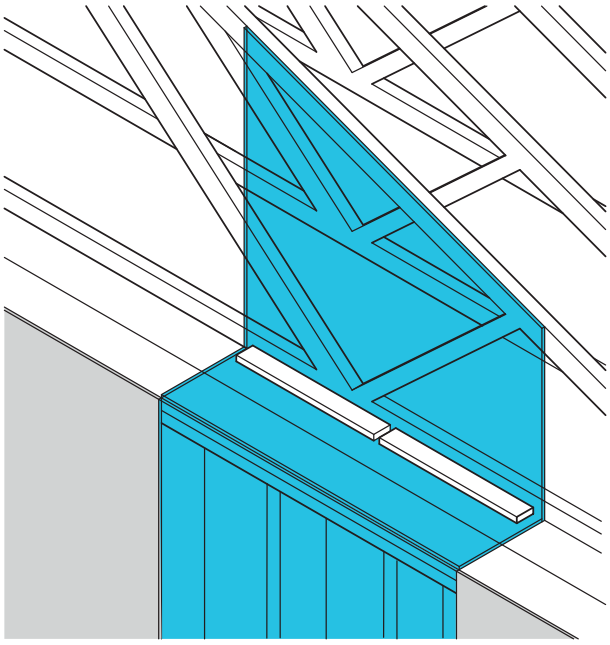
Regular truss



Raised heel truss



Interior wood BWP perpendicular



Interior wood BWP parallel

Figure 4.8: Connection of Wood-sheathed Braced Wall Panels to Roof Framing

Table 5.1 provides construction requirements for braced wall panels and their connections to the roof, floor and foundation specified in Part 9 of the Code.

Table 5.1: Wood-frame Construction Requirements Specified in Part 9 of the Code

Construction Detail	Code/Guide Reference	Description of Minimum Requirement
Nailing of Framing	9.23.3.4.(1)	
Floor joist or blocking perpendicular to sill plate or top wall plate below – toe nail		Two 82 mm nails per floor joist or blocking
Rim joist, trimmer joist or blocking – supporting walls with required braced wall panels – to sill plate or top wall plate – toe nail		82 mm nails at 150 mm o.c.
Floor joist to stud (balloon construction)		Two 76 mm nails
Doubled studs at openings, or studs at walls or wall intersections and corners		76 mm nails at 750 mm o.c.
Doubled studs at openings, within walls, or abutting studs at wall intersections and corners in required GWB or WSP-A braced wall panels [(1)]		76 mm nails at 300 mm o.c.
Doubled studs at openings, within walls, or abutting studs at wall intersections and corners in required WSP-B or WSP-C braced wall panels [(1)]		76 mm nails at 150 mm o.c.
Doubled studs at openings, within walls, or abutting studs at wall intersections and corners in required WSP-D or WSP-E braced wall panels [(1)]		76 mm nails at 100 mm o.c.
Doubled top wall plates		76 mm nails at 600 mm o.c.
Bottom wall plate or sole plate to floor joists, rim joists or blocking (exterior walls)		82 mm nails at 400 mm o.c.
Bottom wall plate or sole plate – in required braced wall panels – to floor joists, rim joists or blocking (exterior walls)		82 mm nails at 150 mm o.c.
Interior walls to framing or subflooring		82 mm nails at 600 mm o.c.
Required braced wall panels – in interior walls – to framing above and below		82 mm nails at 150 mm o.c.
Horizontal member over openings in non-loadbearing walls – each end		Two 82 mm nails
Lintels to studs		Two 82 mm nails at each end
Ceiling joist to plate – toe nail each end		Two 82 mm nails

Construction Detail	Code/Guide Reference	Description of Minimum Requirement
Roof rafter, roof truss or roof joist to plate – toe nail	9.23.3.4.(1)	Three 82 mm nails
Roof strut to loadbearing wall – toe nail		Two 82 mm nails
End-joist or end-rafter to built-up wall stud		Five 76 mm nails for normal-weight construction or eight 76 mm nails for heavyweight construction
Fasteners for Subflooring or Sheathing	Section 3.7 of this guide	Minimum length of fasteners and minimum number or maximum spacing of fasteners
Anchorage of Building Frames	Section 3.7 of this guide	Maximum anchor bolt spacing
Support of Walls	9.23.9.8.(6)	All walls supported (blocking or joists) for required fastening
Bracing and Lateral Support	9.23.10.2.(1)	Prevention of buckling with blocking or strapping
Spacing of Nails	9.29.5.8.(4)	Nails for gypsum board spaced not more than 200 mm o.c.
Spacing of Screws	9.29.5.9.(4)	Screws for gypsum board spaced not more than 300 mm o.c.
Nails, Staples, and Screws	9.29.6.3.(2)	Fastener spacing for plywood finish that provides required bracing for braced wall panels
Nails and Screws	9.29.9.3.(2)	Fastener spacing for particleboard, OSB or waferboard finish that provides required bracing for braced wall panels

(1) The requirements for doubled studs in required braced wall panels can be waived when applying the Calculation Bracing Method and the walls are assumed to be intermittently sheathed. [xxxiv]

Where power nails or nails with a diameter smaller than that required in Table 9.23.3.1 of the Code are used to connect framing, the reduction in nail diameter must be accounted for by either reducing the required nailing spacing in sheathing or increasing the required number of nails in accordance with Note A-9.23.3.1.(2).

[xxxiv] 9.23.3.4.(3)

It is important to note that the design examples in this chapter consider only the calculations of minimum total lengths of braced wall panels within braced wall bands for seismic forces, L_{us}. The minimum total lengths of braced wall panels within braced wall bands for wind forces, L_{uw}, must also be calculated. Appendix E provides a list of Part 9 provisions for wind design and calculations. The minimum total length of braced wall panels within a braced wall band must be taken as the greater of L_{us} and L_{uw}.

6.1 Single-storey House with Normal-weight Construction

This example demonstrates the bracing design for a single-storey building with a basement.

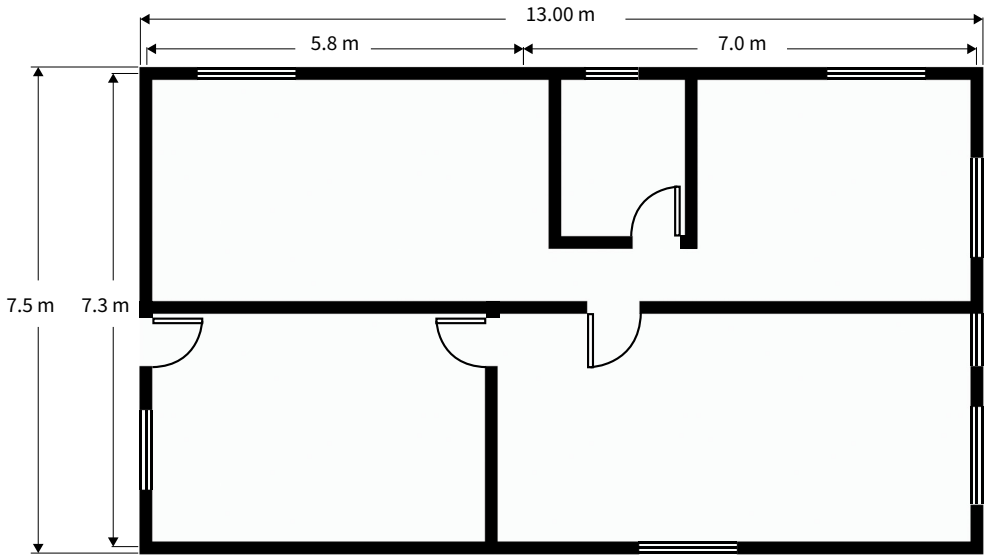


Figure 6.1: Main Floor Plan

Given:

- Single-storey house with basement
- Location: Chilliwack, BC
- Rectangular shape with dimensions: 13.0 m × 7.5 m
- Site Class unknown
- Normal-weight construction

Highlights:

This example addresses the following requirements in the Code:

- High Wind and Seismic Forces
- Average braced wall band spacing for the main floor
- Gypsum boards on interior walls and wood-sheathed panels on exterior walls
- Braced wall bands spaced < 15.0 m in the basement and the interior walls on the main floor are constructed with gypsum board

Step 1.
Determine the bracing design method.

The S_{max} values for Site Class C and for unknown Site Class in Chilliwack, BC are 0.583 and 0.887, respectively, according to Table C-3 of Appendix C of the Code. The Hourly Wind Pressure (HWP) with annual probability of exceedance of 1/500 (or 1/500 HWP) is 0.74 kPa according to Table C-2 of Appendix C of the Code. The RHWP is calculated as 0.53 kPa according to Article 9.4.2.3 of the Code. Given the S_{max} and RHWP values, the building is subjected to High Wind and Seismic Forces according to Section 3.1.

The 1/1000 snow load and 1/1000 rain load at Chilliwack are 3.5 kPa and 0.5 kPa, respectively, according to Table C-2 of Appendix C of the Code. The specified roof snow load in Chilliwack is calculated as 1.62 kPa, according to Article 9.4.2.2 of the Code.

Based on the information collected above, the building is permitted to be designed according to the Calculation Bracing Method, Part 4, or good engineering practice according to Section 3.1. In this example, the Calculation Bracing Method is used to demonstrate the bracing design requirements.

Step 2.
Determine the locations and spacing of braced wall bands on the main floor.

The floor plan with suggested braced wall bands is provided in Figure 6.2. The requirements for individual braced wall bands can be found in Section 3.2. In addition to surrounding the perimeter of the building, an interior braced wall band is provided to ensure the maximum distance between the centre lines of adjacent braced wall bands is not greater than 10.6 m.

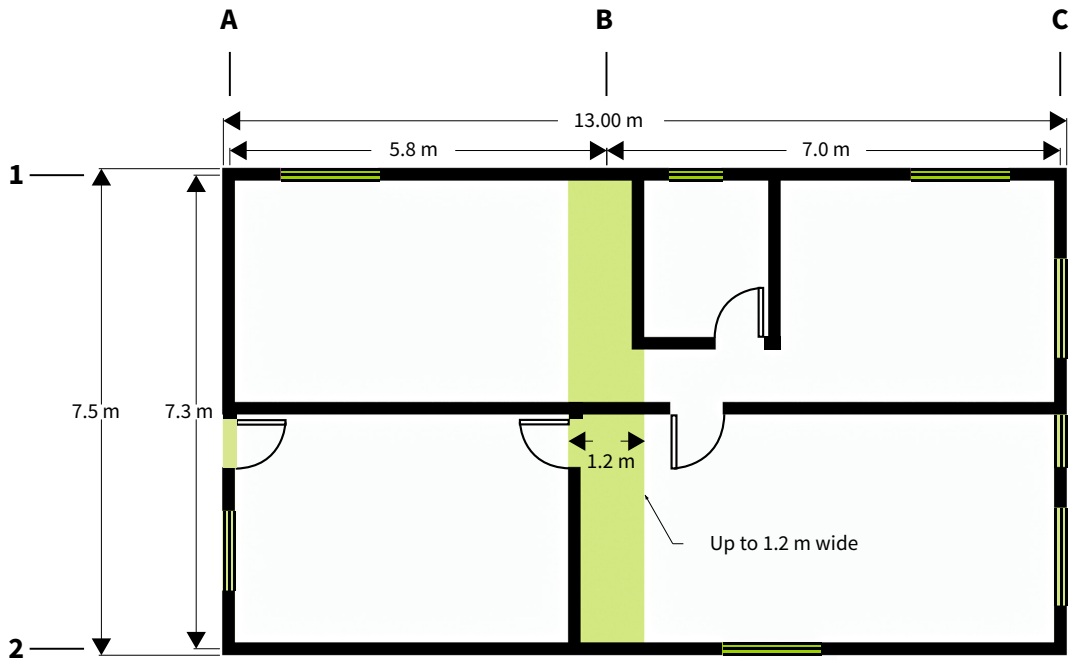


Figure 6.2: Braced Wall Bands on the Main Floor

Step 3.
Determine the unadjusted minimum total length of braced wall panels in a braced wall band.

Appendix C provides the unadjusted minimum total lengths of braced wall panels for seismic forces. Assuming that the interior walls are sheathed with gypsum board and exterior walls are wood-sheathed, the unadjusted minimum lengths of braced wall panels within a braced wall band determined according to Figure 6.3.

S_{max}	Storey	Building Plan Dimension Parallel to Braced Wall Band, L_{wl}, m	Unadjusted Minimum Total Length of Braced Wall Panels Within a Braced Wall Band for Seismic Forces									
			Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side)	Gypsum-Sheathed Framing Type (with gypsum board on only one side)				Wood-Sheathed Framing Type (with gypsum board on opposite side)				
			DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
0.8 < S_{max} ≤ 1.2		3.1	0.38	2.83	1.65	1.22	0.99	0.66	0.35	0.30	0.28	0.25
		6.1	0.65	4.88	2.83	2.10	1.71	1.14	0.60	0.52	0.47	0.43
		9.1	0.92	6.92	4.02	2.98	2.42	1.62	0.85	0.74	0.67	0.61
		12.2	1.20	9.03	5.24	3.89	3.16	2.11	1.11	0.96	0.88	0.79
		15.2	1.47	10.88	6.32	4.69	3.81	2.59	1.36	1.18	1.08	0.97
		18.3	1.75	13.18	7.65	5.67	4.62	3.08	1.62	1.41	1.28	1.16

Identify the storey

Select the building dimension parallel to the braced wall band

Based on the reference framing type, select the unadjusted minimum total length

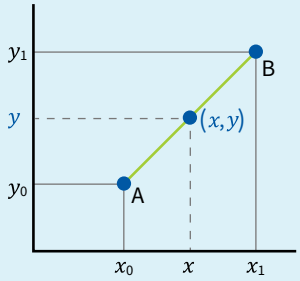
Select range of S_{max}

Figure 6.3: Determination of Unadjusted Minimum Total Lengths of Braced Wall Panels Within Braced Wall Band B (see Figure 6.2)

When designing the braced wall panels for braced wall band B on the main floor, where the building dimension parallel to that band measures 7.5 m, the GWB-C framing type was chosen according to Appendix C of this guide. Since the building dimension parallel to this band falls between two limits provided in the table, a linear interpolation between the two unadjusted minimum total lengths is conducted to determine the unadjusted minimum total length. Alternatively, the higher limit can be used as a conservative estimate.

Overview of the Linear Interpolation Method

Linear interpolation involves estimating a point between two known points by considering a straight line between them and determining the coordinates of any point along that line (see Figure 6.4).



$$y = y_0 + (x - x_0)\frac{(y_1 - y_0)}{(x_1 - x_0)}$$

- x_0 and y_0 are the coordinates of known point A.
- x_1 and y_1 are the coordinates of known point B.
- x is the x-coordinate of the point of interest, and y is the y-coordinate of the point of interest.

Figure 6.4: Overview of the Linear Interpolation Method

The unadjusted minimum total length of braced wall panels in braced wall band B is calculated using the linear interpolation method:

$$y = 2.10 + (7.5 - 6.1)\frac{(2.98 - 2.10)}{(9.1 - 6.1)} = 2.51 \text{ m}$$

$x_0 = 6.10$ m	$x = 7.50$ m	$x_1 = 9.10$ m
$y_0 = 2.10$ m	$y =$ **2.51 m**	$y_1 = 2.98$ m

For a 7.5 m braced wall band with given conditions, the unadjusted minimum total length of braced wall panels within this band is 2.51 m.

The same approach is applied to the 7.5 m braced wall bands A and C. By employing reference framing type WSP-A in each band, the unadjusted minimum total length of braced wall panels in each band is calculated as 1.36 m.

Similarly, for the 13 m braced wall bands 1 and 2, by utilizing reference framing type WSP-A, the unadjusted minimum total length of braced wall panels in each band is calculated as 2.24 m.

Step 4.
Determine the values of adjustment factors to be applied to the unadjusted minimum total lengths.

Adjustment factors are used to account for the effects of various conditions on the minimum total length of braced wall panels within braced wall bands. Appendix D tabulates the values of adjustment factors for various conditions. A linear interpolation is permitted for K_{weight}, K_{snow} and $K_{Sspacing}$, when the value of the adjustment factor falls between two adjacent limits. [xxxv]

Table 6.1 provides the values of adjustment factors based on the given conditions in this example.

Table 6.1: Adjustment Factors for Braced Wall Panels in Each Braced Wall Band

Seismic Adjustment Factor	A, B, C	1, 2	Note
K_{weight}	1.00	1.00	Normal-weight construction
K_{snow}	1.00	1.00	Specified roof snow load ≤ 2.0 kPa
$K_{Sspacing}$	0.87	0.97	Linear interpolation was applied
$K_{Snumber}$	1.33	1.00	$K_{Snumber}$ = 1.33, three parallel BWB $K_{Snumber}$ = 1.00, two parallel BWB
K_{gyp}	1.00	1.00	Gypsum board installed on the interior side of braced wall panel
K_{sheath}	1.00	1.00	Braced wall panels are continuously sheathed
Factor Total	**1.16**	**0.97**	

$K_{Sspacing}$: To establish $K_{Sspacing}$, an average braced wall band spacing was computed due to the uneven spacing of parallel braced wall bands A, B, and C.

$$\frac{5.8\text{m} + 7.0\text{m}}{2} = 6.4\text{m}$$

The spacing between braced wall bands 1 and 2 is 7.3 m. In both directions, because the values fall between two limits, linear interpolation was applied to calculate the values of $K_{Sspacing}$.

K_{snow}: The specified roof snow load was calculated as 1.62 kPa in Step 1. The value of K_{snow} was taken as 1.0 according to Appendix D of this guide.

[xxxv] Notes to Table 9.23.13.9.-D

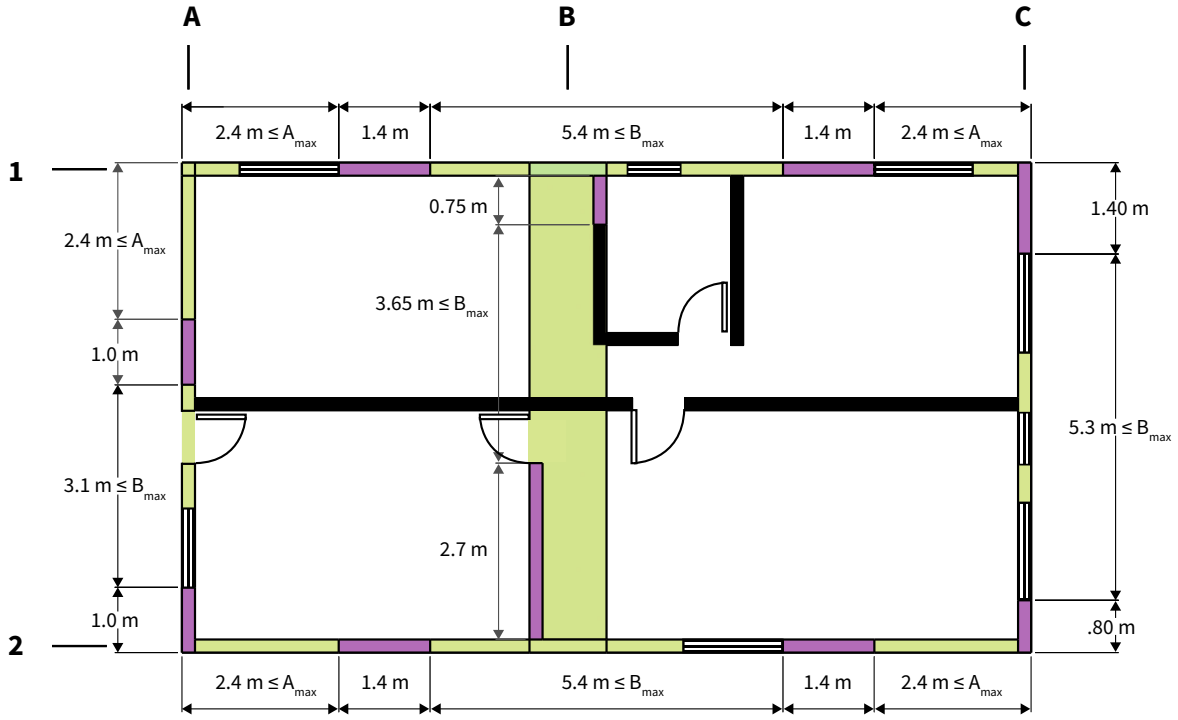
Step 5.
Determine the lengths and placement of braced wall panels in each braced wall band.

By applying the adjustment factors determined in Step 4 to the unadjusted minimum total lengths of braced wall panels in Step 3, one can obtain the minimum total lengths of braced wall panels in each band (see Table 6.2). The design bracing length for each braced wall band must be at least the minimum total length of braced wall panels in the band.

Table 6.2: Minimum Total Lengths and Provided Lengths of Braced Wall Panels (BWP) Within Each Braced Wall Band (BWB)

Braced Wall Band	Framing Type	Building dimension || to BWB (m)	Unadjusted BWP length (m)	Adjusted BWP length (m)	Bracing Length Provided (m)	Status
A	WSP-A	7.5	1.36	1.58	2.0	✓
B	GWB-C	7.5	2.51	2.91	3.45	✓
C	WSP-A	7.5	1.36	1.58	2.20	✓
1	WSP-A	13.0	2.24	2.17	2.80	✓
2	WSP-A	13.0	2.24	2.17	2.80	✓

Figure 6.5 illustrates the placement and measurements of the braced wall panels on the main floor of the building. Note that the braced wall panels in the interior braced wall band are not aligned but are located within a 1.2 m wide braced wall band. The placement of these panels was chosen to adhere to the spacing and dimension limits outlined in Section 2.



Note: A_{max} and B_{max} denote the maximum distances described in Figure 3.6.

Figure 6.5: Arrangement and Measurements of Braced Wall Panels on Main Floor

Step 6.

Design the interior braced wall bands in the basement.

The exterior walls of the basement are foundation walls, which are not required to be designed as bracing elements. Given that the maximum distance between foundation walls does not exceed 15 m, and considering that the interior walls on the main floor are sheathed with gypsum board, it is therefore not required to place an interior braced wall band in the basement.

6.2 Large Three-storey Row House with Normal-weight Construction

This example demonstrates the bracing design for a large three-storey row house with normal-weight construction.

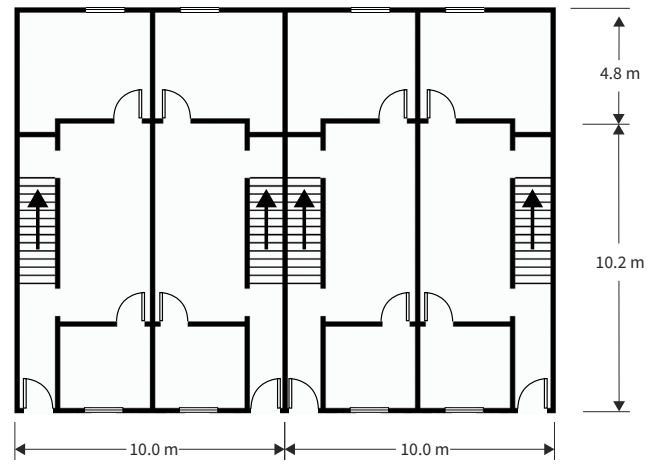
Given:

- Three-storey building
- Location: Port Alberni, BC
- Rectangular shape with dimensions: 15.0 m x 20.0 m
- Site Class C
- Normal-weight construction

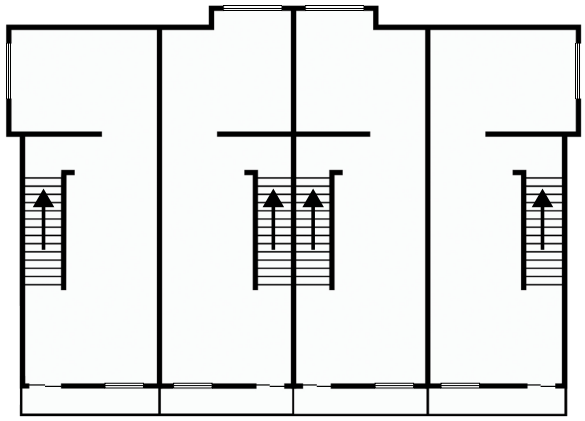
Highlights:

This example addresses the following requirements in the Code:

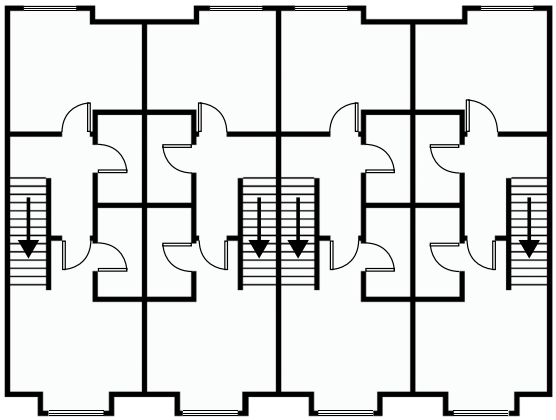
- High Wind and Seismic Forces
- “Average” braced wall band spacing
- Large-dimension building
- Large openings



MAIN FLOOR



2ND FLOOR



3RD FLOOR

Figure 6.6 Floor Plans

Step 1.
Determine the bracing design method.

The S_{max} value for Site Class C in Port Alberni, BC is 1.29, according to Table C-3 of Appendix C of the Code. The 1/500 HWP is 0.5 kPa according to Table C-2 of Appendix C of the Code. The RHWP is calculated as 0.36 kPa according to Article 9.4.2.3 of the Code. Given the S_{max} and RHWP values, the building is subjected to High Wind and Seismic Forces according to Section 3.1.

The 1/1000 snow load and 1/1000 rain load in Port Alberni are 4.2 kPa and 0.6 kPa, respectively, according to Table C-2 of Appendix C of the Code. The specified roof snow load in Port Alberni is calculated as 1.94 kPa, according to Article 9.4.2.2 of the Code.

Based on the information collected above, the building is permitted to be designed according to the Calculation Bracing Method, Part 4, or good engineering practice according to Section 3.1. In this example, the Calculation Bracing Method is used to demonstrate the bracing design requirements.

Step 2.
Determine the locations and spacing of braced wall bands.

Figure 6.7 illustrates the floor plans with recommended braced wall bands. These bands are positioned along the building's perimeter, with additional interior braced wall bands in both directions to comply with the requirement regarding the maximum distance between the centerlines of adjacent braced wall bands.

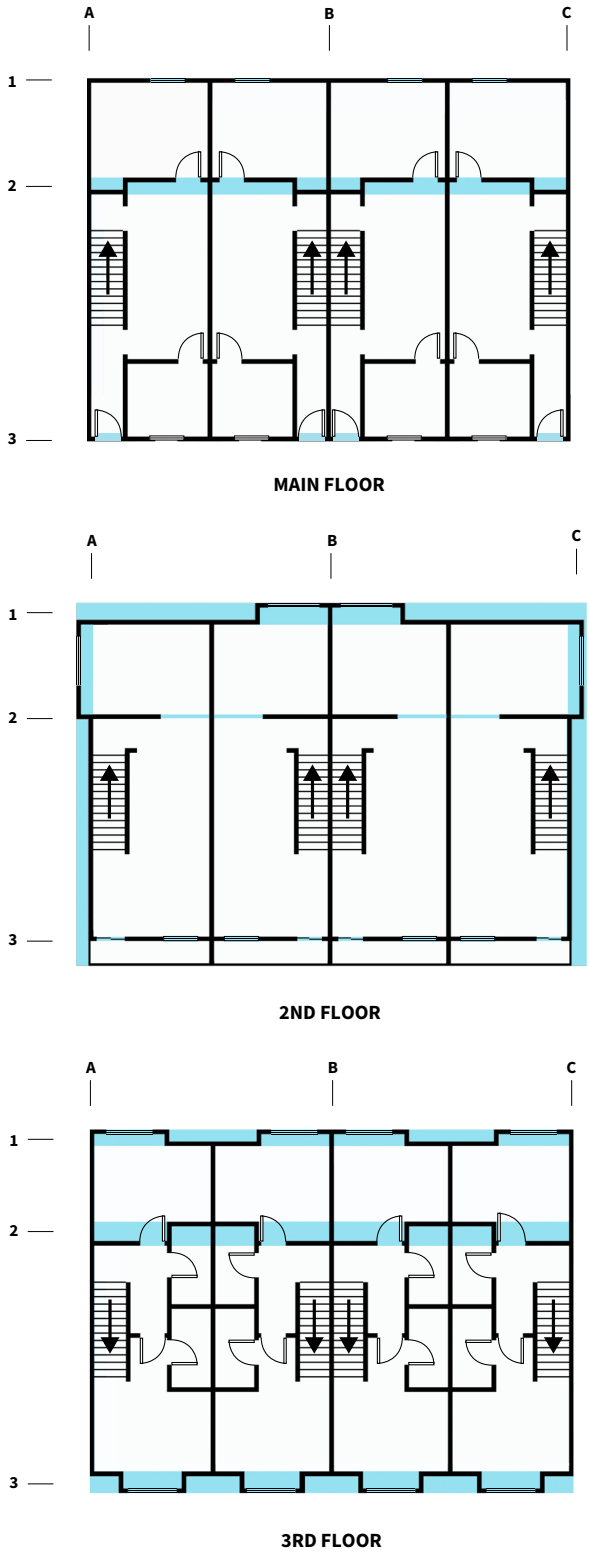


Figure 6.7: Braced Wall Bands on Each Floor

Step 3.
Determine the unadjusted minimum total length of braced wall panels in a braced wall band.

The reference framing types employed in Example 6.1 are not sufficient for this building due to the open concept design. This design makes it difficult to utilize gypsum board in cases where S_{max} is high, since the lengths of interior walls do not comply with the bracing requirements.

In all braced wall bands on the first and second floors, WSP-B framing type was chosen. On the third floor, to optimize the design, WSP-A framing type was utilized for the external braced wall panels, while GWB-D was used for the internal ones.

Because the building dimension parallel to braced wall bands 1, 2, and 3 is equal to 20 m, which exceeds the values provided in Appendix C for selecting the unadjusted minimum total length of braced wall panels (18.3 m), a linear extrapolation was employed to determine the length of these panels. The approach is in principle similar to the linear interpolation method described in Example 6.1. While interpolation provides estimates within the data range, extrapolation extends predictions beyond it. As such, the same formula, as illustrated in Example 6.1, is applied to estimate the unadjusted minimum total lengths of these panels.

Step 4.
Determine the values of adjustment factors to be applied to the unadjusted minimum total lengths.

Table 6.3 provides the values of adjustment factors based on the given conditions in this example.

Table 6.3: Adjustment Factors for Each Braced Wall Band on the Main Floor

Adjustment Factor	A, B, C	1, 2, 3	Note
K_{weight}	1.00	1.00	Normal-weight construction
K_{snow}	1.00	1.00	Specified roof snow load of 2 kPa or less
$K_{Sspacing}$	1.22	0.94	Linear interpolation was applied
$K_{Snumber}$	1.33	1.33	Three parallel BWB
K_{gyp}	1.00	1.00	Gypsum board installed on the interior side of BWP
K_{sheath}	1.00	1.00	Continuously sheathed
Factor Total	**1.62**	**1.25**	

$K_{Sspacing}$: Braced wall bands A, B, and C are evenly spaced at intervals of 9.5 m. Bands 1, 2, and 3 are not evenly spaced; an average spacing of 7 m was determined. Linear interpolation was applied to determine the value of $K_{spacing}$. For further guidance on conducting linear interpolation, please refer to Example 6.1.

K_{snow}: The specified roof snow load was calculated as 1.94 kPa in Step 1. The value of K_{snow} was taken as 1.0 according to Appendix D of this guide.

The values of adjustment factors in the table above are applicable to the second and third storeys because: (i) the building falls under normal-weight construction, (ii) the specified roof snow load does not exceed 2.0 kPa, and (iii) all braced wall bands on the second and third storeys are placed in the same locations as those on main floor.

Step 5.
Determine the lengths and placement of braced wall panels in each braced wall band.

By applying the adjustment factors determined in Step 4 to the unadjusted minimum total lengths of braced wall panels in Step 3, one can obtain the minimum total lengths of braced wall panels in each band (see Table 6.4).

Table 6.4: Unadjusted Minimum Total Lengths of Braced Wall Panels in Each Braced Wall Band

Floor	Braced Wall Band	Building dimension || to BWB (m)	Framing Type	Unadjusted BWP length (m)	Adjusted BWP length (m)	Bracing Length Provided (m)	Status
Main	A	15.0	WSP-B	6.08	9.85	10.60	✓
	B	15.0	WSP-B	6.08	9.85	14.60	✓
	C	15.0	WSP-B	6.08	9.85	14.60	✓
	1	20.0	WSP-B	7.92	9.90	11.40	✓
	2	20.0	WSP-B	7.92	9.90	11.00	✓
	3	20.0	WSP-B	7.92	9.90	10.00	✓
2nd	A	15.0	WSP-B	4.93	7.99	8.20	✓
	B	15.0	WSP-B	4.93	7.99	10.20	✓
	C	15.0	WSP-B	4.93	7.99	8.20	✓
	1	20.0	WSP-B	5.13	6.41	8.90	✓
	2	20.0	WSP-B	5.13	6.41	6.60	✓
	3	20.0	WSP-B	5.13	6.41	7.60	✓
3rd	A	15.0	WSP-A	3.41	5.52	6.00	✓
	B	15.0	GWB-D	5.03	8.15	10.20	✓
	C	15.0	WSP-A	3.41	5.52	6.00	✓
	1	20.0	WSP-A	4.47	5.59	5.60	✓
	2	20.0	GWB-D	6.75	8.44	8.60	✓
	3	20.0	WSP-A	4.47	5.59	5.63	✓

Figure 6.8 illustrates the placement of the braced wall panels on the three storeys of the building.

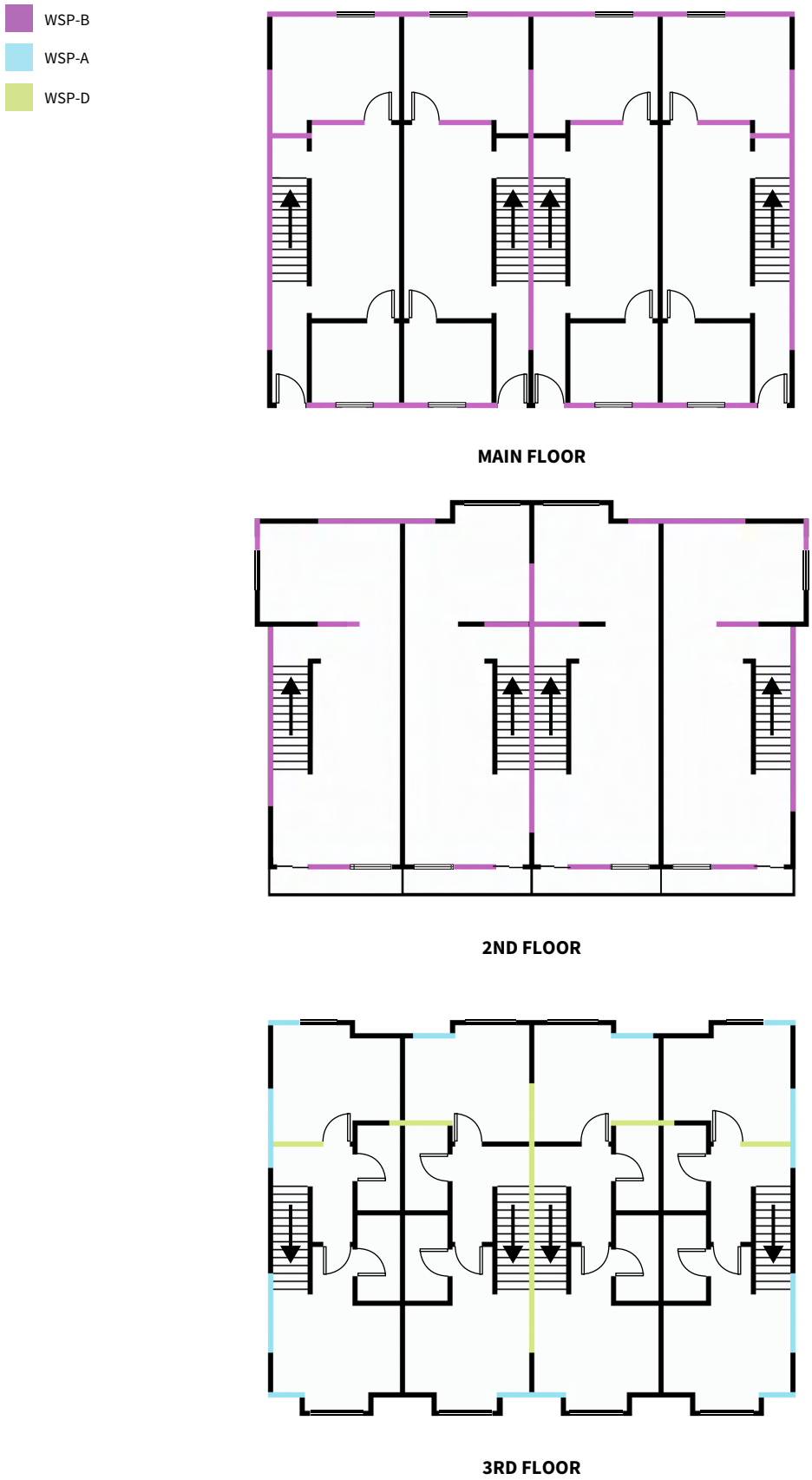


Figure 6.8: Placement of Braced Wall Panels in Each Braced Wall Band

6.3 Two-Storey House with Heavyweight Construction

This example demonstrates the bracing design for a two-storey house with heavyweight construction.

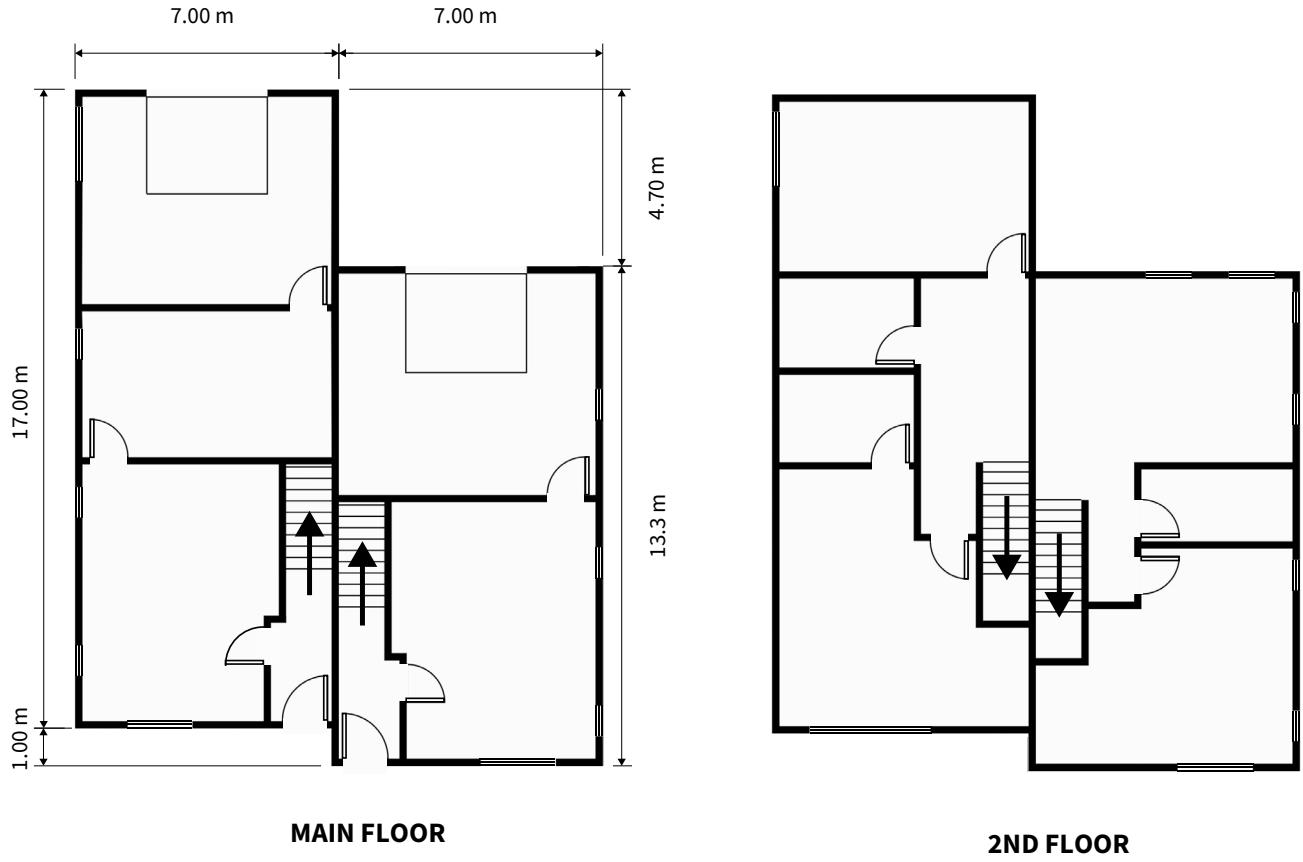


Figure 6.9: Floor Plans

Given:

- Two-storey building
- Location: Squamish, BC
- Irregular shape with dimensions: 14.0 m × 18.0 m
- Unknown Site Class
- Garage attached to the back wall
- Heavyweight construction (the building is clad with heavyweight materials)

Highlights:

This example addresses the following requirements in the Code:

- High Wind and Seismic Forces
- Attached garage supporting one floor of construction
- Building with heavyweight construction
- Mixing reference framing types in the same braced wall band
- Intermittent sheathing (continuous exterior insulation is provided to enhance thermal performance)

Step 1.
Determine the bracing design method.

The S_{max} values for Site Class C and for unknown Site Class in Squamish, BC are 0.659 and 0.963, respectively, according to Table C-3 of Appendix C of the Code. The 1/500 HWP is 0.77 kPa according to Table C-2 of Appendix C of the Code. The RHWP is calculated as 0.55 kPa according to Article 9.4.2.3 of the Code. Given the S_{max} and RHWP values, the building is subjected to High Wind and Seismic Forces according to Section 3.1.

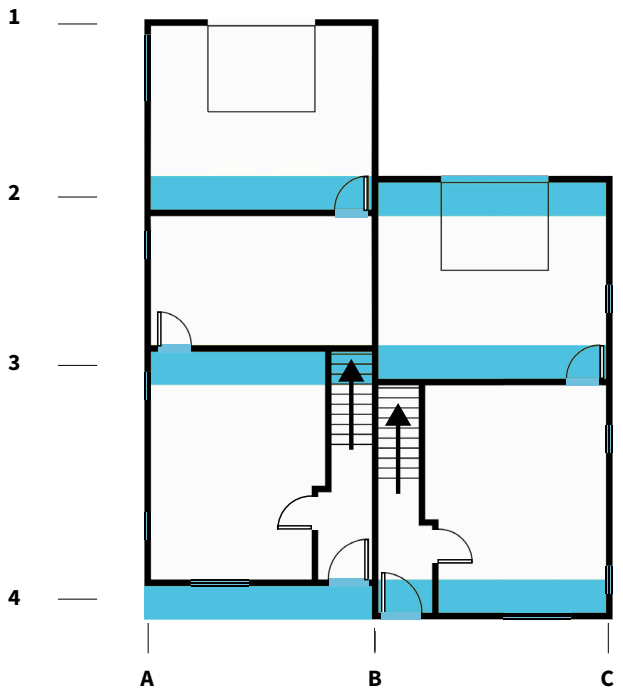
The 1/1000 snow load and 1/1000 rain load in Squamish are 4.3 kPa and 1.1 kPa, respectively, according to Table C-2 of Appendix C of the Code. The specified roof snow load in Squamish is calculated as 2.31 kPa, according to Article 9.4.2.2 of the Code.

The building is of heavyweight construction and the lowest exterior walls support a roof and not more than one floor.

Based on the information collected above, the building is permitted to be designed according to the Calculation Bracing Method, Part 4, or good engineering practice according to Section 3.1. In this example, the Calculation Bracing Method is used to demonstrate the bracing design requirements.

Step 2.
Determine the locations and spacing of braced wall bands.

Figure 6.10 illustrates the floor plans with recommended braced wall bands. Because of the irregular shape of the building and the requirements about the locations of braced wall bands, additional braced wall bands are provided.



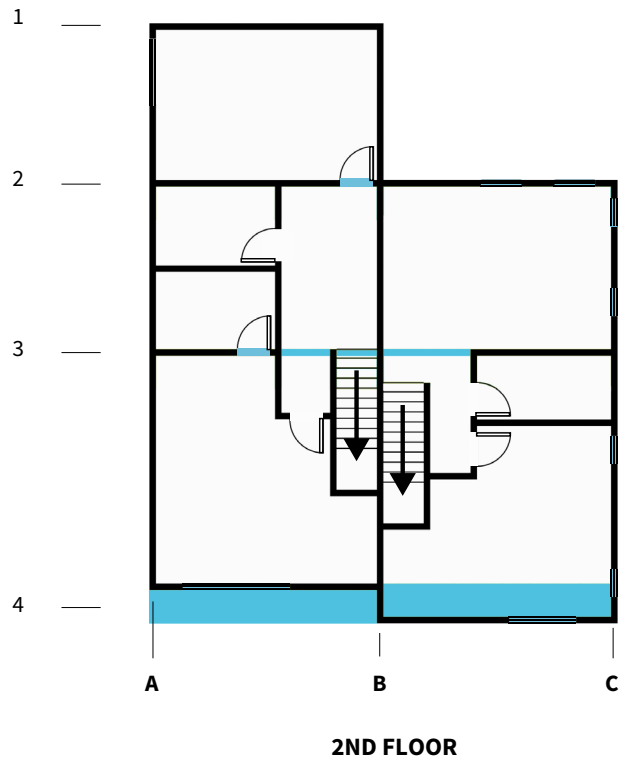


Figure 6.10: Braced Wall Bands in Each Floor

Step 3.
Determine the unadjusted minimum total length of braced wall panels in a braced wall band.

Select the unadjusted minimum lengths of braced wall panels from Appendix C of this guide. WSP-B framing type was chosen for the exterior braced wall panels on both floors and interior braced wall panels on the main floor and GWB-D framing type was chosen for the interior wall panels on the second floor.

This example highlights the application of mixing framing types within a braced wall band. Specifically, on the second floor's braced wall bands B and 2, interior braced wall panels utilize framing type GWB-D, while exterior panels utilize framing type WSP-B. As discussed in Section 3.4, low-resistance wood-based panels with gypsum wall board panels on the same floor is permitted, provided that the total length of all braced wall panels is calculated based on the GWB framing type.

Another key aspect to consider in this example is regarding braced wall band 1 located on the main floor. The front wall of the garage is exempted from length requirements as illustrated in Section 4.1.

Step 4.
Determine the values of adjustment factors to be applied to the unadjusted minimum total lengths.

Table 6.5 provides the values of adjustment factors based on the given conditions in this example.

Table 6.5: Adjustment Factors for Braced Wall Panels in Each Braced Wall Band

Adjustment Factor	A, B, C		1, 2, 3, 4		Note
	Main Floor	2nd Floor	Main Floor	2nd Floor	
K_{weight}	1.51	1.38	1.55	1.40	Heavyweight construction. Linear interpolation was applied.
K_{snow}	1.03	1.06	1.03	1.06	Specified roof snow load of 2.31 kPa. Linear interpolation was applied.
$K_{Sspacing}$	0.93	0.93	0.84	0.84	An average spacing was calculated for bands 1, 2, 3 and 4. Linear interpolation was applied.
$K_{Snumber}$	1.33	1.33	1.50	1.50	$K_{Snumber}$: 1.33 for three parallel BWBs $K_{Snumber}$: 1.50 for four parallel BWBs
K_{gyp}	1.00	1.00	1.00	1.00	Gypsum board installed on the interior side of BWP.
K_{sheath}	1.15	1.15	1.15	1.15	Intermittent sheathing
Factor Total	**2.19**	**2.06**	**2.29**	**2.13**	

K_{weight}: The values of K_{weight} are selected from Appendix D of this guide based on the storey and building dimension. In this example, linear interpolation was applied to calculate the values of K_{weight}. For guidance on conducting linear interpolation, refer to Example 6.1.

Symbol	Description	Storey	Condition	Adjustment Factor
K_{weight} (1) (2)	Normal-weight construction	Any storey	Any L_{wl}	1.0
	Heavy construction: apply factor corresponding to L_{wl} separately to each storey 	 Storey supporting roof only	$L_{wl} \leq 3.1$ m	1.72
			6.1 m	1.54
			9.1 m	1.46
			12.2 m	1.42
			15.2 m	1.39
			≥ 18.3 m	1.38
		 Storey supporting roof and 1 floor	≤3.1m	1.92
			6.1m	1.71
			9.1m	1.62
			12.2m	1.57
			15.2m	1.54
			≥18.3m	1.51

The building dimensions parallel to the braced wall bands are 14.0 m and 18.0 m. Linear interpolation was applied.

Figure 6.11: Determination of K_{weight} for Each Braced Wall Band in Each Storey

$K_{Sspacing}$: Braced wall bands A, B and C are evenly spaced at intervals of 6.9 m. Bands 1, 2, 3 and 4 are not evenly spaced; an average spacing of 6.08 m was determined. Linear interpolation was applied to determine the values of $K_{Sspacing}$.

K_{snow}: The specified roof snow load was calculated as 2.31 kPa in Step 1. Linear interpolation was applied to calculate the values of K_{snow}.

K_{sheath}: The value of K_{sheath} was taken as 1.15 because non-structural sheathing is used for wall segments in areas where bracing is not required.

Step 5.
Determine the lengths and placement of braced wall panels in each braced wall band.

By applying the adjustment factors determined in Step 4 to the unadjusted minimum total lengths of braced wall panels in Step 3, one can obtain the minimum total lengths of braced wall panels in each band (see Table 6.6).

Table 6.6: Unadjusted Minimum Total Lengths of Braced Wall Panels in Each Braced Wall Band

Floor	Braced Wall Band	Building dimension || to BWB (m)	Framing Type	Unadjusted BWP length (m)	Adjusted BWP length (m)	Bracing Length Provided (m)	Status
Main	A	18.0	WSP-B	3.49	7.64	8.70	✓
	B	18.0	WSP-B	3.49	7.64	7.65	✓
	C	18.0	WSP-B	3.49	7.64	7.70	✓
	1	14.0	Not Required	Not Required	Not Required	Not Required	✓
	2	14.0	WSP-B	2.77	6.34	7.20	✓
	3	14.0	WSP-B	3.49	7.64	7.65	✓
	4	14.0	WSP-B	2.77	6.34	7.80	✓
2nd	A	18.0	WSP-B	1.59	3.28	3.60	✓
	B	18.0	GWB-D / WSP-B	4.54	9.35	9.35	✓
	C	18.0	WSP-B	1.59	3.28	3.60	✓
	1	14.0	WSP-B	1.26	2.68	3.00	✓
	2	14.0	GWB-D/ WSP-B	3.55	7.56	7.60	✓
	3	14.0	WSP-B	1.26	2.68	3.30	✓
	4	14.0	WSP-B	1.26	2.68	3.65	✓

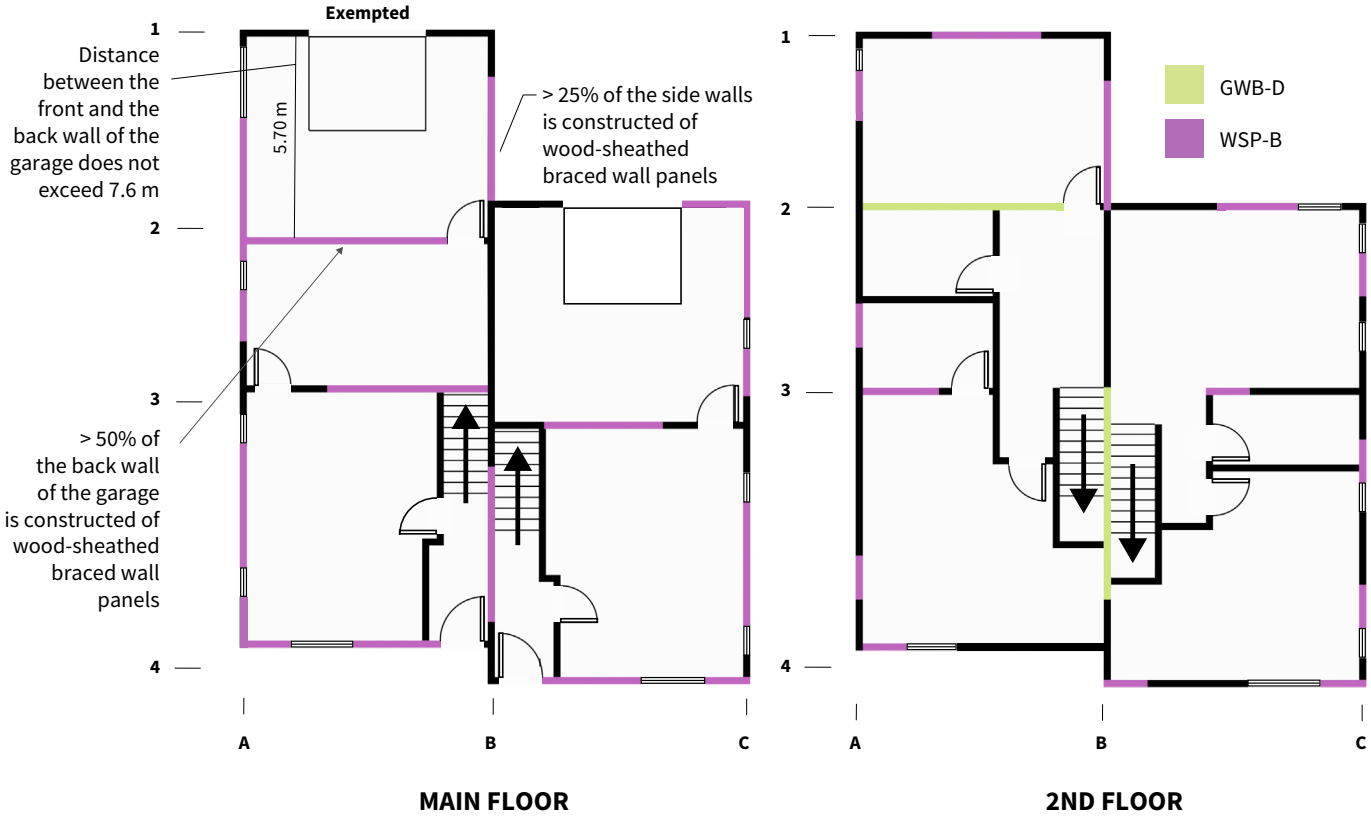


Figure 6.12: Placement of Braced Wall Panels in Each Braced Wall Band

Figure 6.12 illustrates the placement of the braced wall panels on the two floors of the building. It is worth noting that the front wall of the attached garage within braced wall band 1 is exempted from the bracing design because all of the following requirements are met:

1. The distance between the front of the garage and the back wall of the garage is 5.7 m, which does not exceed 7.6 m.
2. More than 50% of the back wall of the garage constructed with wood-sheathed braced wall panels.
3. More than 25 percent of two side walls were constructed with wood-sheathed braced wall panels.

6.4 Two-Storey House Partially Clad with Masonry Veneer

This example demonstrates the bracing design for a two-storey house partially clad with masonry veneer.

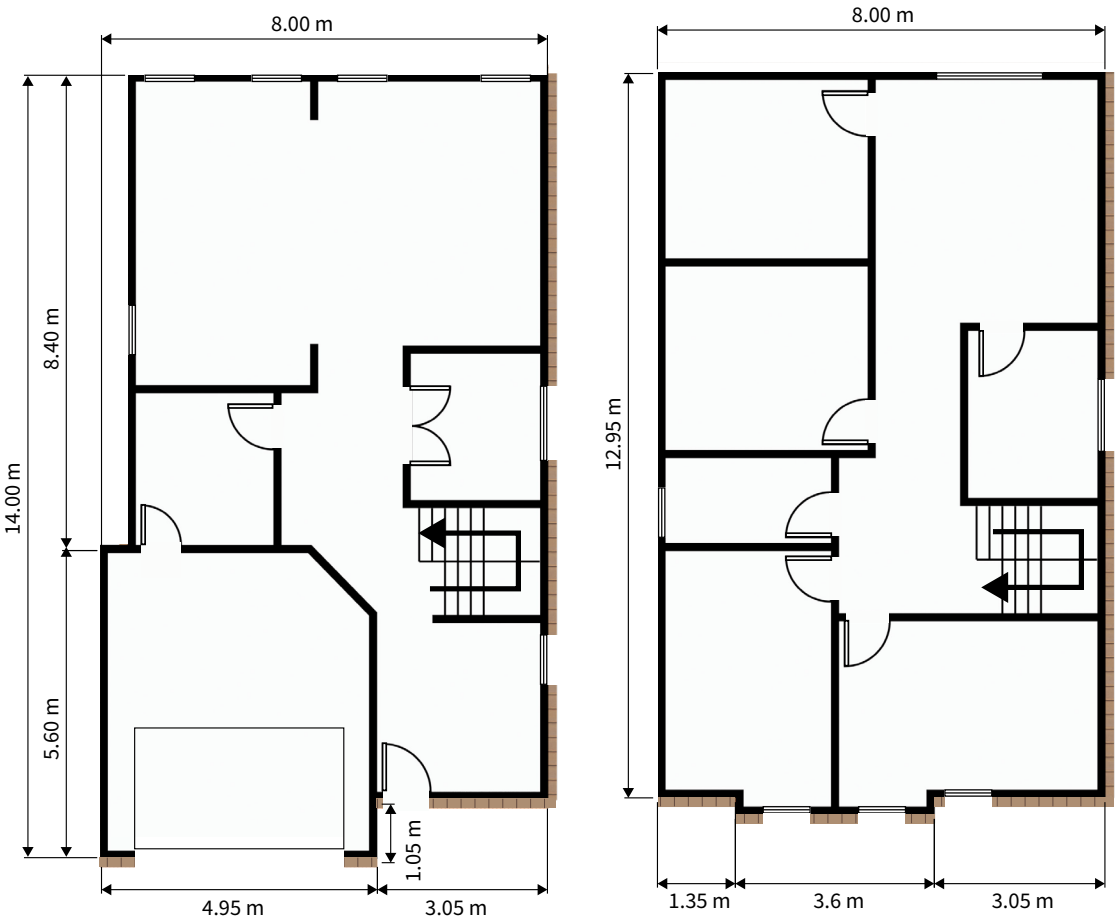


Figure 6.13: Floor Plans

Given:

- Two-storey house
- Location: Penticton, BC
- Rectangular shape with dimensions: 8.0 m × 14.0 m
- Unknown Site Class
- The front wall and one side wall are partially clad with masonry veneer. The back wall and the other side wall are normal-weight.

Highlights:

This example addresses the following requirements in the Code:

- Low to Moderate Wind and Seismic Forces
- Building partially clad with masonry veneer
- Comparison between the Calculation Bracing Method and the Table Bracing Method
- Attached garage supporting one floor of construction

Step 1.
Determine the bracing design method.

The S_{max} values for Site Class C and for unknown Site Class in Penticton, BC are 0.175 and 0.337, according to Table C-3 of Appendix C of the Code. The 1/500 HWP is 0.62 kPa according to Table C-2 of Appendix C of the Code. The RHWP is calculated as 0.44 kPa according to Article 9.4.2.3 of the Code. Given the S_{max} and RHWP values, the building is subjected to Low to Moderate Wind and Seismic Forces according to Section 3.1.

The 1/1000 snow load and 1/1000 rain load in Penticton are 1.9 kPa and 0.2 kPa, respectively, according to Table C-2 of Appendix C of the Code. The specified roof snow load in Penticton is calculated as 0.83 kPa, according to Article 9.4.2.2 of the Code.

The front wall and one side wall are partially clad with masonry veneer, and the back wall and the other side are normal-weight.

Based on the information collected above, the building is permitted to be designed according to the Table Bracing Method, Calculation Bracing Method, Part 4, or good engineering practice according to Section 3.1. In this example, the Calculation Bracing Method is used to demonstrate the bracing design requirements.

Step 2.
Determine the locations and spacing of braced wall bands.

Figure 6.14 illustrates the floor plans with recommended braced wall bands.

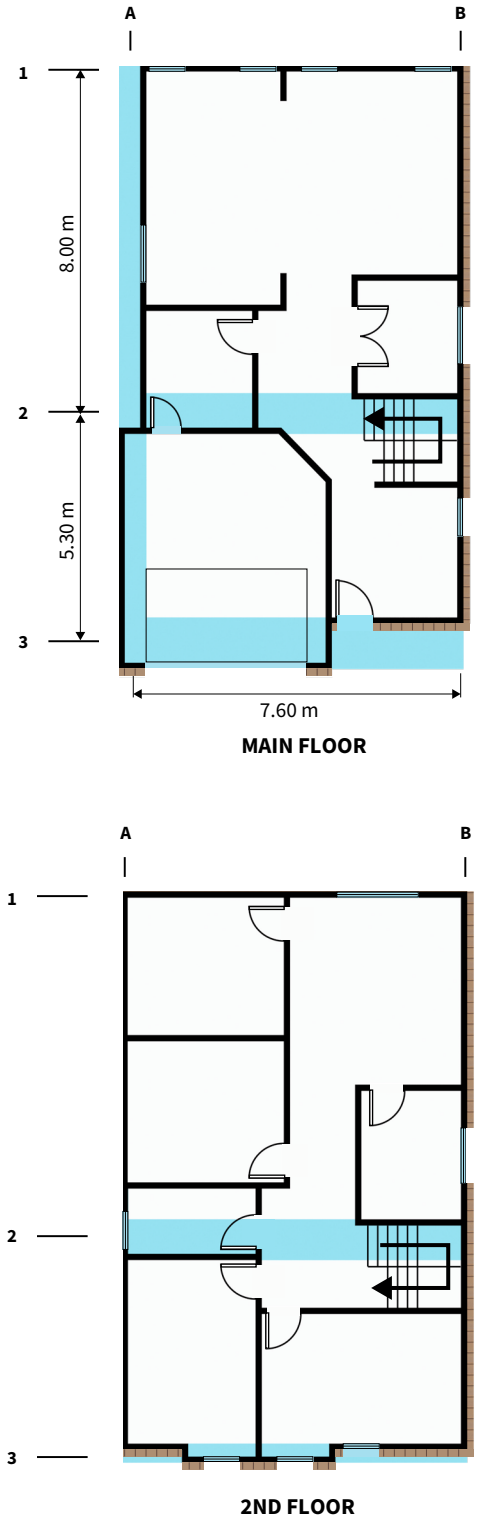


Figure 6.14: Braced Wall Bands on Each Floor

Step 3.
Determine the unadjusted minimum total length of braced wall panels in a braced wall band.

The unadjusted minimum total length of braced wall panels in each braced wall band was selected from Appendix C of this guide. In this example, WSP-A framing type was chosen for the exterior wall bands, and GWB-A framing type was chosen for the interior wall bands.

Step 4.
Determine the values of adjustment factors to be applied to the unadjusted minimum total lengths.

Table 6.7 provides the values of adjustment factors based on the given conditions in this example.

Table 6.7: Adjustment Factors for Braced Wall Panels in Each Braced Wall Band

Adjustment Factor	A and B		1, 2, 3		
	Main Floor	2nd Floor	Main Floor	2nd Floor	
K_{weight}	1.07	1.05	1.13	1.10	Linear interpolation was applied.
K_{snow}	1.00	1.00	1.00	1.00	Specified roof snow load of 0.83 kPa
$K_{Sspacing}$	1.00	1.00	0.90	0.90	An average spacing was calculated for bands 1, 2 and 3 and linear interpolation was applied.
$K_{Snumber}$	1.00	1.00	1.33	1.33	$K_{Snumber}$: 1.00 for two parallel BWB $K_{Snumber}$: 1.33 for three parallel BWB
K_{gyp}	1.00	1.00	1.00	1.00	Gypsum board installed on the interior side of BWP
K_{sheath}	1.00	1.00	1.00	1.00	Continuous sheathing
Factor Total	**1.07**	**1.05**	**1.35**	**1.32**	

K_{weight}: In buildings partially clad with masonry veneer, the values of K_{weight} were selected based on the building dimension and whether cladding is installed on one or two faces of the building. For braced wall panels in braced wall bands A and B, since the front wall is partially clad with masonry veneer, the values of K_{weight} for partially clad with masonry veneer on one building face were selected according to Figure 6.15.

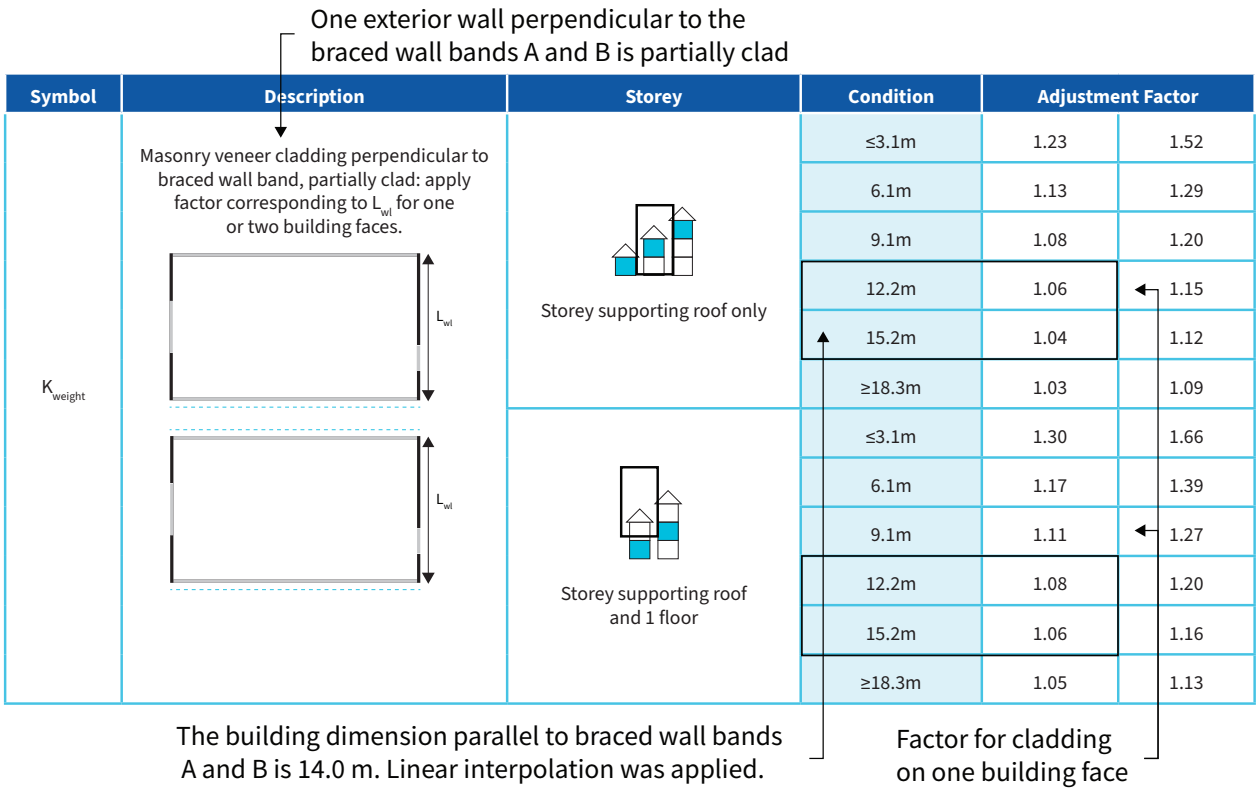


Figure 6.15: Determination of K_{weight} Values for Braced Wall Panels in Braced Wall Bands on Each Floor

The same approach was used to determine the values of K_{weight} for braced wall panels in braced wall bands 1, 2 and 3.

$K_{Sspacing}$: Braced wall bands A and B are spaced at an interval of 7.6 m. Bands 1, 2 and 3 are not evenly spaced; an average spacing of 5.65 m was determined. Linear interpolation was applied to determine the value of $K_{Sspacing}$.

Step 5.
Determine the lengths and placement of braced wall panels in each braced wall band.

By applying the adjustment factors determined in Step 4 to the unadjusted minimum total lengths of braced wall panels in Step 3, one can obtain the minimum total lengths of braced wall panels in each band (see Table 6.8).

Table 6.8: Unadjusted Minimum Total Lengths of Braced Wall Panels in Each Braced Wall Band

Floor	Braced Wall Band	Building dimension || to BWB (m)	Framing Type	Unadjusted BWP length (m)	Adjusted BWP length (m)	Bracing Length Provided (m)	Status
Main	A	14.0	WSP-A	1.75	1.87	2.70	✓
	B	14.0	WSP-A	1.75	1.87	2.50	✓
	1	8.0	WSP-A	1.08	1.46	2.40	✓
	2	8.0	WSP-A	1.08	1.46	3.50	✓
	3	8.0	WSP-A	1.08	1.46	1.50	✓
2nd	A	14.0	WSP-A	0.80	0.84	2.40	✓
	B	14.0	WSP-A	0.80	0.84	2.40	✓
	1	8.0	WSP-A	0.48	0.63	2.40	✓
	2	8.0	GWB-A	2.06	2.72	2.80	✓
	3	8.0	WSP-A	0.48	0.63	2.40	✓

Figure 6.16 illustrates the placement and measurements of the braced wall panels in the building. Similar to Example 6.3, the front wall of the attached garage can be exempted if the side walls of the garage consist of at least 25 percent wood-sheathed braced wall panels.

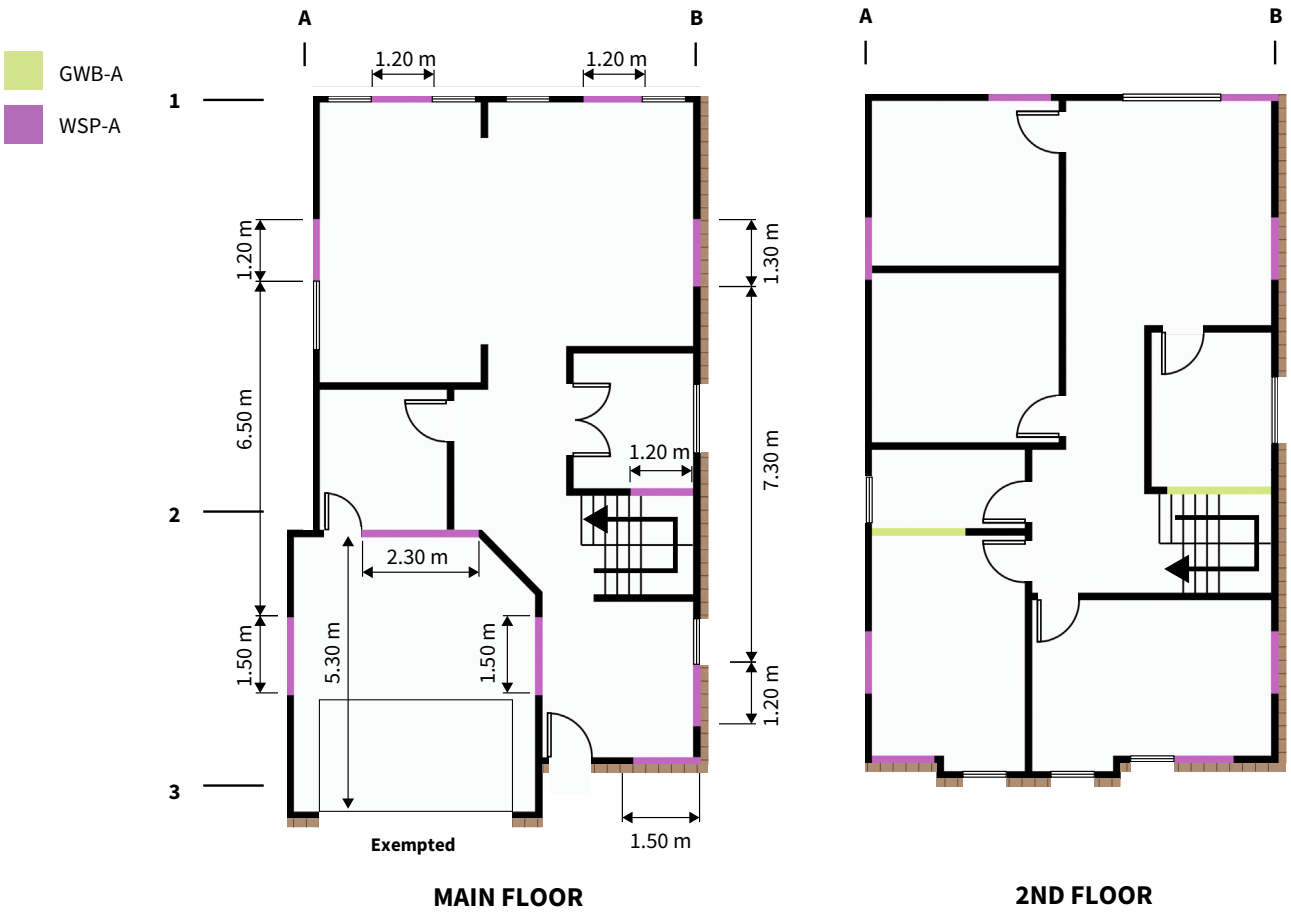


Figure 6.16: Placement of Braced Wall Panels in Each Braced Wall Band

Calculation Bracing Method vs. Table Bracing Method

Table 6.9 illustrates the comparison between the minimum total lengths of braced wall panels in each wall band in each storey determined using the Calculation Bracing Method and the Table Bracing Method, respectively. The minimum total lengths of braced wall panels in each braced wall band using the Table Bracing Method were selected according to the guidance in Appendix B of this guide. The use of the Table Bracing Method is permitted for this example because all the requirements specified in Appendix B of this guide are met. As shown in Table 6.9, it is not feasible to design the bracing for braced wall band 3 using the Table Bracing Method. In this case, the Calculation Bracing Method is used to design the bracing. In this example, 1.8 m WSP-E was selected for braced wall band 3, considering the minimum total lengths of braced wall panels for both seismic and wind forces. Refer to Appendix E for provisions regarding the bracing design for wind forces. Figure 6.17 illustrates the placement of braced wall panels on the two floors of the building using two bracing methods.

Table 6.9: Comparison of the Calculation Bracing Method and the Table Bracing Method

			Equivalent Minimum Total Lengths of BWP (m)		Bracing Design Using the Table Bracing Method			
Floor	**Braced Wall Band**	**Framing Type**	**Calculation Bracing Method [1]**	**Table Bracing Method**	**Framing Type**	**Minimum length of BWP (m)**	**Bracing Length Provided (m)**	**Status**
Main	A	WSP-A	1.87	8.18	WSP-A	8.18	8.20	✓
	B	WSP-A	1.87	8.18	WSP-A	8.18	8.20	✓
	1	WSP-A	1.46	8.183 [2]	WSP-E	3.11	3.15	✓
	2	WSP-A	1.46	8.183 [2]	WSP-E	3.11	3.15	✓
	3	WSP-A	1.46	8.183 [2]		Not feasible [3]		✗
2nd	A	WSP-A	0.84	3.98	WSP-A	3.98	4.00	✓
	B	WSP-A	0.84	3.98	WSP-A	3.98	4.00	✓
	1	WSP-A	0.63	3.98	WSP-A	3.98	4.00	✓
	2	GWB-A	2.72	13.12 [2]	GWB-C	5.66	5.66	✓
	3	WSP-A	0.63	3.98	WSP-E	1.51	2.40	✓

[1] The minimum total lengths of braced wall panels using the Calculation Bracing Method were obtained from Table 6.8.
[2] The minimum total length of braced wall panels exceeds the building dimension parallel to the braced wall band.
[3] Reducing the size of opening (i.e., main entrance) to meet the minimum total length requirement is not feasible.

Figure 6.17: Minimum Total Lengths of Braced Wall Panels Determined Using Two Bracing Methods

The Table Bracing Method reduces the complexity of the design process significantly while still meeting the bracing requirements in most cases. In this example, to satisfy the bracing design requirements, the minimum total lengths of braced wall panels using the Table Bracing Method are approximately four times that obtained from the Calculation Bracing Method. This significant difference is mainly attributed to the fact that the Table Bracing Method considers both wind and seismic forces. It is worth noting that, in Low to Moderate Wind and Seismic Forces, the minimum bracing requirements are often governed by the wind load.

6.5 Single-storey House with Crawl Space

This example demonstrates the bracing design for a single-storey house with crawl space under the main floor.

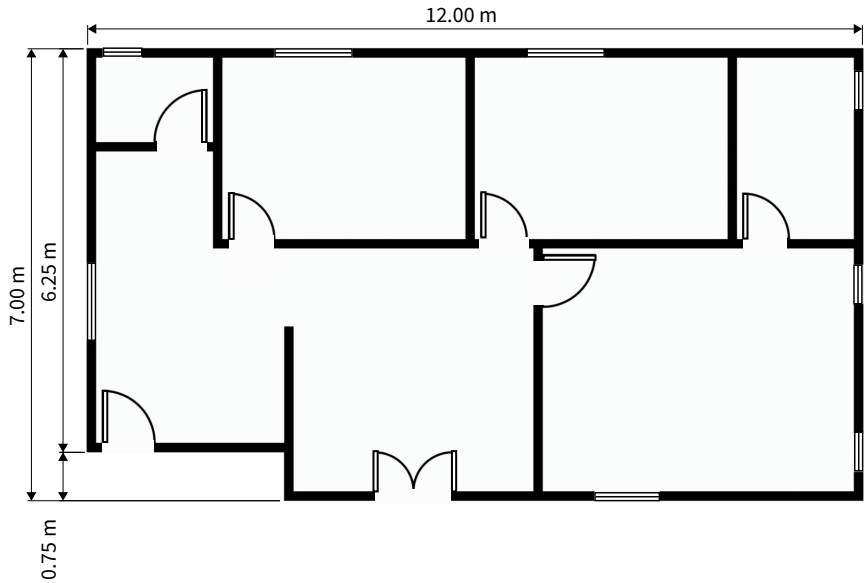


Figure 6.18: Floor Plan

Given:

- One-storey building with crawl space
- Location: Port Alberni, BC
- Rectangular shape with dimensions: 7.0 m × 12.0 m
- Unknown Site Class
- Normal-weight construction with the front wall partially clad with stone veneer

Highlights:

This example addresses the following requirements in the Code:

- High Wind and Seismic Forces
- Building partially clad with stone veneer
- Building with crawl space
- Foundation cripple walls considered as an additional storey

Step 1.
Determine the bracing design method.

The S_{max} values for Site Class C and for unknown Site Class in Port Alberni, BC are 1.29 and 1.66, according to Table C-3 of Appendix C of the Code. The 1/500 HWP is 0.5 kPa according to Table C-2 of Appendix C of the Code. The RHWP is calculated as 0.36 kPa according to Article 9.4.2.3 of the Code. Given the S_{max} and RHWP values, the building is subjected to High Wind and Seismic Forces according to Section 3.1.

The 1/1000 snow load and rain load 1/1000 in Port Alberni are 4.2 kPa and 0.6 kPa, respectively, according to Table C-2 of Appendix C of the Code. The specified roof snow load in Port Alberni is calculated as 1.94 kPa, according to Article 9.4.2.2 of the Code.

The building is of normal-weight construction except by the front wall which is partially clad with stone veneer.

Based on the information collected above, the building is permitted to be designed according to Calculation Bracing Method, Part 4, or good engineering practice according to Section 3.1. In this example, the Calculation Bracing Method is used to demonstrate the bracing design requirements.

Step 2.
Determine the locations and spacing of braced wall bands.

Figure 6.19 illustrates the floor plans with recommended braced wall bands. Because S_{max} is greater than 0.6 and the cripple wall length exceed 5.0 m, the crawl space needs to be considered as an additional storey according to Section 3.5 of this guide. In the crawl space, braced wall panels must be wood-sheathed at intervals not exceeding 15 m. They must also be under all interior braced wall bands that contain wood-sheathed braced wall panels, according to Section 3.3 to this guide. In this example, braced wall band B in the crawl space can be omitted if the braced wall panels within the interior braced wall band are gypsum-sheathed.

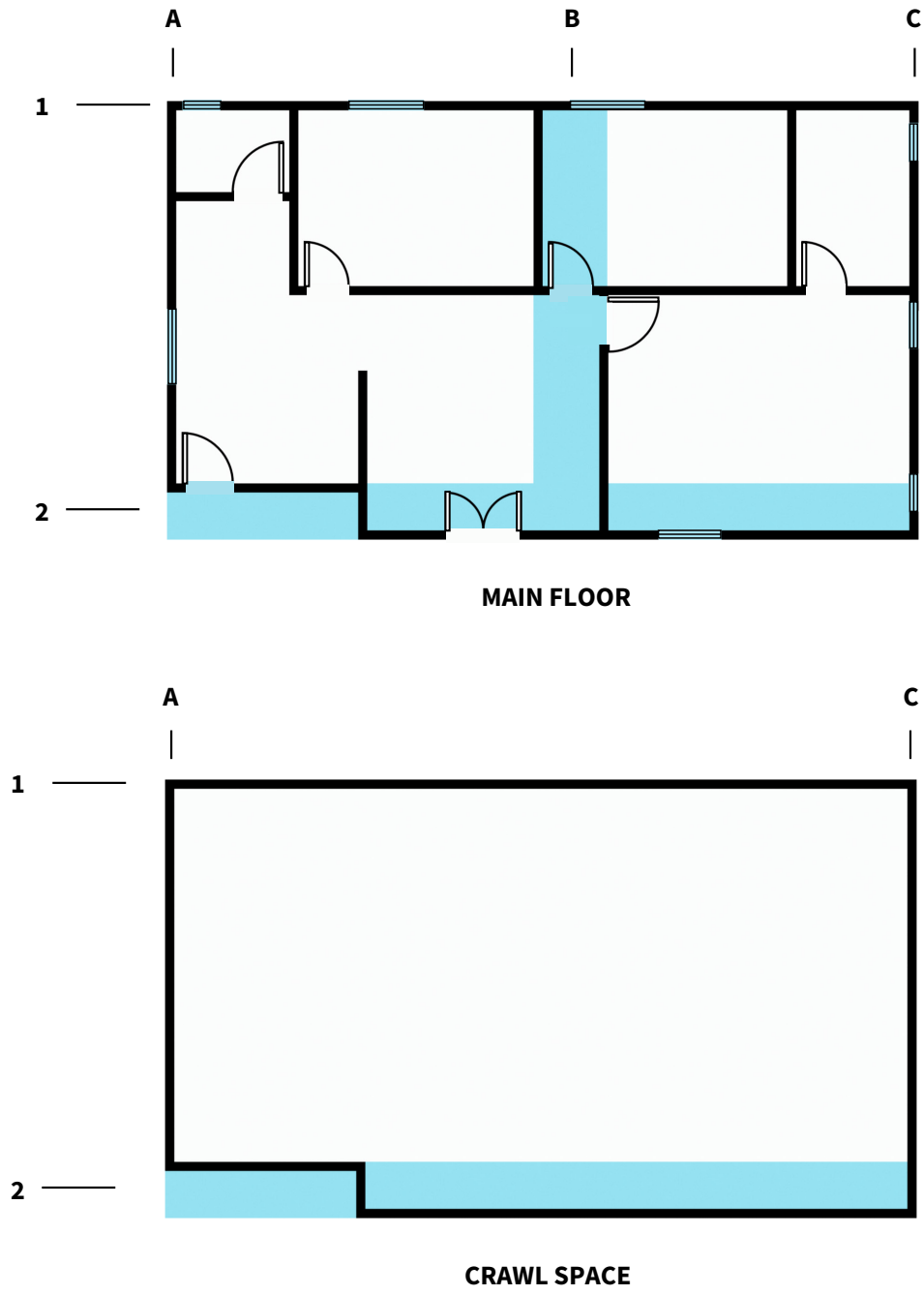


Figure 6.19: Braced Wall Bands on the Main Floor and the Crawl Space

Step 3.
Determine the unadjusted minimum total length of braced wall panels in a braced wall band.

For the main floor, it was assumed that WSP-B framing type was used for exterior braced wall panels and GWB-D was used for interior braced wall panels. For crawl spaces, WSP-B framing type was used for exterior braced wall panels. The interior wall band is omitted because GWB-D was used for interior braced wall panels on the main floor. The unadjusted minimum total length of braced wall panels in each braced wall band was selected from Appendix C of this guide.

Step 4.
Determine the values of adjustment factors to be applied to the unadjusted minimum total lengths.

Table 6.10 provides the values of adjustment factors based on the given conditions in this example.

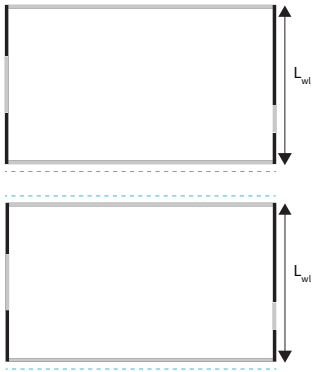
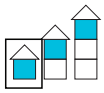
Table 6.10: Adjustment Factors for Braced Wall Panels in Each Braced Wall Band

Seismic A djustment Factor	A, B, C	A and C	1 and 2		Note
	Main Floor	Crawl Space	Main Floor	Crawl Space	
K_{weight}	1.23	1.30	1.00	1.00	K_{weight} is 1.00 for BWBs 1 and 2 as BWBs A, B and C are of normal-weight construction. Linear interpolation was applied for braced wall bands A, B and C that are perpendicular to the front wall partially clad with stone veneer.
K_{snow}	1.00	1.00	1.00	1.00	Specified roof snow load < 2 kPa
$K_{Sspacing}$	0.83	1.51	0.88	0.88	An average spacing was calculated for BWBs A, B and C, respectively, on the main floor. Linear interpolation was applied.
$K_{Snumber}$	1.33	1.00	1.00	1.00	$K_{Snumber}$: 1.00 for two parallel BWB $K_{Snumber}$: 1.33 for three parallel BWB
K_{gyp}	1.00	1.00	1.00	1.00	Gypsum board installed on the interior side of BWP
K_{sheath}	1.00	1.00	1.00	1.00	Continuous sheathing
Factor Total	**1.36**	**1.96**	**0.88**	**0.88**	

K_{weight}: K_{weight} is taken as 1.0 for braced wall bands 1 and 2 because braced wall bands A, B and C are of normal weight construction. The values of K_{weight} for braced wall bands A, B and C were determined as illustrated in Figure 6.20.

One wall perpendicular to the braced wall bands A, B and C is partially clad

The building dimension parallel to the braced wall band is 7.0 m. Linear interpolation was applied.

Symbol	Description	Storey	Condition	Adjustment Factor	
K_{weight}	Stone veneer cladding perpendicular to braced wall band, partially clad: apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof only	≤ 3.1 m	1.44	1.94
			6.1 m	1.25	1.54
			9.1 m	1.17	1.37
			12.2 m	1.13	1.28
			15.2 m	1.10	1.23
			≥ 18.3 m	1.08	1.18
		 Storey supporting roof and 1 floor	≤ 3.1 m	1.56	2.19
			6.1 m	1.33	1.71
			9.1 m	1.22	1.50
			12.2 m	1.17	1.38
			15.2 m	1.13	1.31
			≥ 18.3 m	1.11	1.25

Factor for cladding on one building face

Figure 6.20: Determination of K_{weight} Values for Braced Wall Panels in Each Braced Wall Band

$K_{Sspacing}$: An average spacing of 5.95 m was calculated for braced wall bands A, B and C on the main floor. Linear interpolation was applied to determine the value of $K_{Sspacing}$. For guidance on conducting linear interpolation, please refer to Example 6.1.

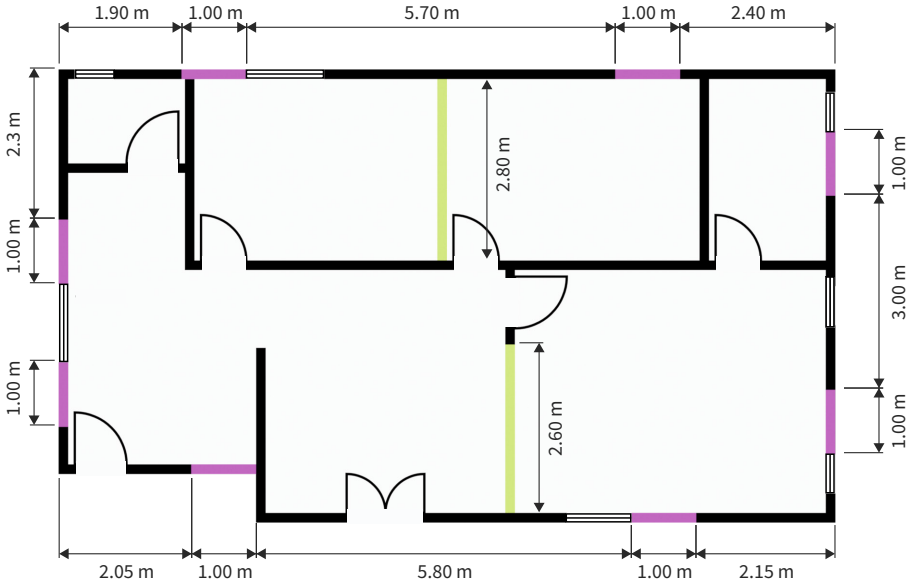
Step 5.
Determine the lengths and placement of braced wall panels in each braced wall band.

By applying the adjustment factors determined in Step 4 to the unadjusted minimum total lengths of braced wall panels in Step 3, one can obtain the minimum total lengths of braced wall panels in each band (see Table 6.11).

Table 6.11: Unadjusted Minimum Total Lengths of Braced Wall Panels in Each Braced Wall Band

Floor	Braced Wall Band	Building dimension || to BWB (m)	Framing Type	Unadjusted BWP length (m)	Adjusted BWP length (m)	Bracing Length Provided (m)	Status
Crawl Space	A	7.0	WSP-B	2.53	4.96	5.00	✓
	C	7.0	WSP-B	2.53	4.96	5.00	✓
	1	12.0	WSP-B	4.02	3.54	3.60	✓
	2	12.0	WSP-B	4.02	3.54	3.60	✓
Main Floor	A	7.0	WSP-B	1.13	1.54	2.00	✓
	B	7.0	GWB-C	3.94	5.36	5.40	✓
	C	7.0	WSP-B	1.13	1.54	2.00	✓
	1	12.0	WSP-B	1.82	1.60	2.00	✓
	2	12.0	WSP-B	1.82	1.60	2.00	✓

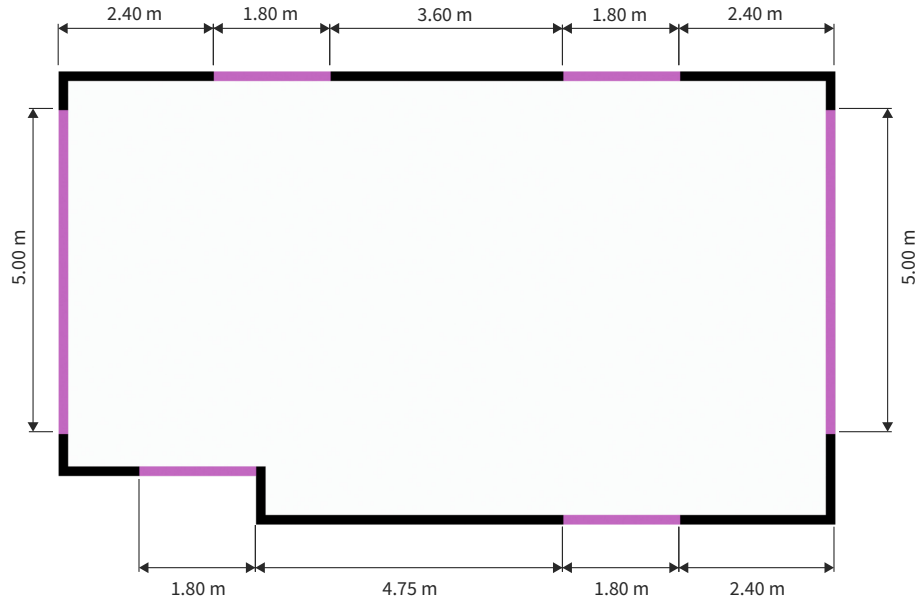
Figure 6.21 illustrates the placement and measurements of the braced wall panels on the main floor and crawl space.



MAIN FLOOR

GWB-D

WSP-A



CRAWL SPACE

Figure 6.21: Placement of Braced Wall Panels in Each Braced Wall Band

Area-Weighted Average Method

The Area-Weighted Average method offers a means to determine the average dead weight per storey and establish whether a Part 9 wood-frame construction falls under normal-weight or heavyweight construction. This calculation involves averaging the weights of materials in each assembly, weighted by their respective areas, over the total area of the assembly. Refer to Note A-9.23.2.7 of the Code for the guidance on the determination of construction weight.

Consider the scenario where a floor spanning 400 m^2, where 25 m^2 is covered with a concrete topping, adding a weight of 1.25 kPa to the floor assembly. Meanwhile, the other 375 m^2 features hardwood floors, contributing a weight of 0.45 kPa to the assembly. The area-weighted average dead weight per storey is calculated as 0.5 kPa. As such, the floor assembly qualifies as normal-weight construction.

$$D_{avg} = \frac{1.25x25+0.45x375}{400} = 0.5 \text{ kPa}$$

where D_{avg} is the area-weighted average dead weight per storey.

Appendix B

Alternative Bracing Methods for Buildings Subjected to Low to Moderate Wind and Seismic Forces

B.1 Simplified Bracing Method

The Simplified Bracing Method is permitted for Part 9 wood-frame construction if all of the following requirements are met:

1. $S_{max} \leq 0.47$,
2. RHWP ≤ 0.6 kPa and rough exposure,
3. Maximum building plan dimension does not exceed 10.6 m,
4. Unsupported wall height is 3.1 m or less,
5. Eave-to-ridge height of the roof does not exceed 3 m,
6. Maximum width of single openings does not exceed 2.4 m, and
7. Total width of openings in the exterior walls on each building side does not exceeding 30 percent of the length of the walls parallel to the plan dimension. The combined width of adjacent openings must be considered a single opening if the width of solid wall between them is less than 750 mm.

Buildings that meet all of the requirements above are exempted from fully complying with the bracing requirements in the Code if any of the following criteria are met:

1. The lowest exterior frame wall supports a roof and no more than 1 floor, the ratio between the longer and shorter building dimensions is less than 2.2, and the exterior walls are constructed with reference framing type WSP-B or,
2. The lowest exterior frame wall supports only a roof, the ratio between the longer and shorter building dimensions is less than 1.5, the building is of normal-weight construction, and the exterior walls are constructed with reference framing type GWB-C.

Where the total width of openings in an exterior wall exceeds 30 percent of the length of the walls parallel to the plan dimension, the walls forming that side of the building must be designed according to the Table Bracing Method (see Appendix B.2) or the Calculation Bracing Method (see Section 3.3.3 of this guide).

B.2 Table Bracing Method

The Table Bracing Method is permitted for Part 9 wood-frame construction if all of the following requirements are met:

1. $S_{max} \leq 0.47$,
2. RHWP ≤ 0.6 kPa,
3. The specified roof snow load does not exceed 2 kPa,
4. Maximum building plan dimension does not exceed 21.2 m,
5. Eave-to-ridge height of the roof does not exceed 3 m,
6. Braced wall panels are constructed with gypsum board on at least one side,
7. Braced wall bands are continuously sheathed, and
8. Building is of normal-weight construction. Wall portions clad with masonry veneer that are located both perpendicular to a braced wall band and within a braced wall band are permitted to be considered as normal-weight construction.

When the Table Bracing Method is used, the minimum total length of braced wall panels within a braced wall band is selected from Table B.1 to Table B.4, which are reproduced from Tables 9.23.13.8.-A through 9.23.13.8.-D of the Code.

While the Table Bracing Method streamlines calculations, it tends to yield conservative minimum total lengths of braced wall panels compared to the Calculation Bracing Method (the main focus of this guide).

Table B.1: Minimum Total Length of Braced Wall Panels Where RHWP ≤ 0.5 kPa and S_{max} ≤ 0.3

Storey	Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side) [1]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [1] [2]				Wood-Sheathed Framing Type (with gypsum board on opposite side) [1]				
	DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
	1.89	9.47 (4.74)	5.50 (2.75)	4.08 (2.04)	3.32 (1.66)	3.32	1.76	1.53	1.39	1.26
	3.89	19.45 (9.73)	11.30 (5.65)	8.38 (4.19)	6.82 (3.41)	6.82	3.61	3.14	2.86	2.59
	5.88	NP (14.71)	17.09 (8.55)	12.67 (6.34)	10.31 (5.16)	10.31	5.46	4.74	4.33	3.92

[1] See Table 2.1 for a description of framing types and fastening requirements.
[2] NP = not permitted. Values within round brackets are permitted for braced wall panels with gypsum board installed on both sides.

Table B.2: Minimum Total Length of Braced Wall Panels Where RHWP ≤ 0.6 kPa and S_{max} ≤ 0.47

Storey	Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side) [1]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [1] [2]				Wood-Sheathed Framing Type (with gypsum board on opposite side) [1]				
	DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
	2.27	11.36 (5.68)	6.60 (3.30)	4.89 (2.45)	3.98 (1.99)	3.98	2.11	1.83	1.67	1.51
	4.66	19.45 (11.68)	11.30 5.65)	10.06 (5.03)	8.18 (4.09)	8.18	4.34	3.76	3.44	3.11
	7.05	NP (17.96)	17.09 (8.55)	15.47 (7.74)	12.59 (6.30)	12.37	6.56	5.69	5.19	4.70

[1] See Table 2.1 for a description of framing types and fastening requirements.
[2] NP = not permitted. Values within round brackets are permitted for braced wall panels with gypsum board installed on both sides.

Table B.3: Minimum Total Length of Braced Wall Panels in a Braced Wall Band Perpendicular to a Building Face Partially Clad with Masonry Veneer Where RHWP ≤ 0.5 kPa and S_{max} ≤ 0.3

Storey	Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side) [1]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [1] [2]				Wood-Sheathed Framing Type (with gypsum board on opposite side) [1]				
	DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
	1.89	9.47 (4.74)	5.50 (2.75)	4.08 (2.04)	3.25 (1.63)	3.32	1.76	1.53	1.39	1.26
	3.89	19.45 (9.73)	11.30 (5.65)	8.38 (4.19)	6.75 (3.37)	6.82	3.61	3.14	2.86	2.59
	5.88	NP (15.01)	17.44 (8.72)	12.93 (6.46)	10.49 (5.25)	10.31	5.46	4.74	4.33	3.92

[1] See Table 2.1 for a description of framing types and fastening requirements.
[2] NP = not permitted. Values within round brackets are permitted for braced wall panels with gypsum board installed on both sides.

Table B.4: Minimum Total Length of Braced Wall Panels in a Braced Wall Band Perpendicular to a Building Face Partially Clad with Masonry Veneer Where RHWP ≤ 0.6 kPa and S_{max} ≤ 0.47

Storey	Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side) [1]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [1] [2]				Wood-Sheathed Framing Type (with gypsum board on opposite side) [1]				
	DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
	2.27	13.12 (6.56)	7.83 (3.81)	5.66 (2.83)	4.89 (2.44)	3.98	2.11	1.83	1.67	1.51
	4.66	NP (15.14)	17.59 (8.79)	13.04 (6.52)	10.57 (5.28)	8.18	4.34	3.76	3.44	3.11
	7.05	NP	20.27 (10.13)	20.27 (10.13)	16.49 (8.24)	12.37	6.56	5.69	5.19	4.70

[1] See Table 2.1 for a description of framing types and fastening requirements.
[2] NP = not permitted. Values within round brackets are permitted for braced wall panels with gypsum board installed on both sides.

Unadjusted Minimum Total Lengths of Braced Wall Panels Within Braced Wall Bands

The unadjusted minimum total lengths of braced wall panels within braced wall bands should be determined in accordance with Table 9.23.13.9.-C of the Code, which is reproduced in this appendix.

Table C.1: Unadjusted Minimum Total Lengths of Braced Wall Panels

S_{max}	Storey	Building Plan Dimension Parallel to Braced Wall Band, L_{wl}, m	Unadjusted Minimum Total Lengths of Braced Wall Panels [1] [2] for Seismic Forces									
			Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side) [3]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [3] [4]				Wood-Sheathed Framing Type (with gypsum board on opposite side) [3]				
			DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
S_{max} ≤ 0.2		3.1	0.06	0.47	0.27	0.20	0.17	0.11	0.06	0.05	0.05	0.04
		6.1	0.11	0.81	0.47	0.35	0.28	0.19	0.10	0.09	0.08	0.07
		9.1	0.15	1.15	0.67	0.50	0.40	0.27	0.14	0.12	0.11	0.10
		12.2	0.20	1.5	0.87	0.65	0.53	0.35	0.18	0.16	0.15	0.13
		15.2	0.24	1.81	1.05	0.78	0.64	0.43	0.23	0.20	0.18	0.16
		18.3	0.29	2.20	1.28	0.95	0.77	0.51	0.27	0.23	0.21	0.19
		3.1	0.15	1.10	0.65	0.48	0.39	0.26	0.14	0.12	0.11	0.10
		6.1	0.24	1.84	1.07	0.79	0.65	0.43	0.23	0.20	0.18	0.16
		9.1	0.34	2.57	1.49	1.11	0.90	0.60	0.32	0.27	0.25	0.23
		12.2	0.44	3.32	1.93	1.43	1.17	0.78	0.41	0.36	0.32	0.29
		15.2	0.54	3.99	2.31	1.72	1.40	0.95	0.50	0.43	0.39	0.36
		18.3	0.64	4.80	2.79	2.07	1.68	1.12	0.59	0.51	0.47	0.42
		3.1	0.23	1.76	1.02	0.76	0.62	0.41	0.22	0.19	0.17	0.15
		6.1	0.38	2.87	1.67	1.24	1.01	0.67	0.35	0.31	0.28	0.25
		9.1	0.53	3.99	1.49	1.72	1.40	0.93	0.49	0.43	0.39	0.35
		12.2	0.68	5.14	2.99	2.21	1.80	1.20	0.63	0.55	0.50	0.45
		15.2	0.83	6.16	3.58	2.65	2.16	1.46	0.77	0.67	0.61	0.55
		18.3	0.98	7.41	4.30	3.19	2.60	1.73	0.91	0.79	0.72	0.65

$0.2 < S_{max} \leq 0.4$		3.1	0.13	0.94	0.55	0.41	0.33	0.22	0.12	0.10	0.09	0.08
		6.1	0.22	1.63	0.94	0.70	0.57	0.38	0.20	0.17	0.16	0.14
		9.1	0.31	2.31	1.34	0.99	0.81	0.54	0.28	0.25	0.22	0.20
		12.2	0.40	3.01	1.75	1.30	1.05	0.70	0.37	0.32	0.29	0.26
		15.2	0.49	3.63	2.11	1.56	1.27	0.86	0.45	0.39	0.36	0.32
		18.3	0.58	4.39	2.55	1.89	1.54	1.03	0.54	0.47	0.43	0.39
		3.1	0.30	2.23	1.30	0.96	0.78	0.52	0.27	0.24	0.22	0.20
		6.1	0.49	3.69	2.14	1.59	1.29	0.86	0.45	0.39	0.36	0.32
		9.1	0.68	5.14	2.99	2.21	1.80	1.20	0.63	0.55	0.50	0.45
		12.2	0.88	6.65	3.86	2.86	2.33	1.55	0.82	0.71	0.65	0.58
		15.2	1.07	7.97	4.63	3.43	2.79	1.89	1.00	0.87	0.79	0.71
		18.3	1.27	9.61	5.58	4.14	3.37	2.25	1.18	1.03	0.94	0.84
		3.1	0.47	DR (1.12)	2.04	1.51	1.23	0.82	0.43	0.38	0.34	0.31
		6.1	0.76	5.50	3.34	2.48	2.01	1.34	0.71	0.61	0.56	0.50
		9.1	1.06	7.98	4.63	3.44	2.80	1.86	0.98	0.85	0.78	0.70
		12.2	1.36	10.29	5.97	4.43	3.61	2.40	1.26	1.10	1.00	0.90
		15.2	1.66	12.31	7.15	5.30	4.32	2.93	1.54	1.34	1.22	1.10
		18.3	1.96	14.82	8.61	6.38	5.20	3.46	1.82	1.58	1.44	1.30

$0.4 < S_{max} \leq 0.6$		3.1	0.19	1.42	0.82	0.61	0.50	0.33	0.17	0.15	0.14	0.12
		6.1	0.32	2.44	1.42	1.05	0.85	0.57	0.30	0.26	0.24	0.21
		9.1	0.46	3.46	2.01	1.49	1.21	0.81	0.42	0.37	0.34	0.30
		12.2	0.60	4.51	2.62	1.94	1.58	1.05	0.55	0.48	0.44	0.40
		15.2	0.73	5.44	3.16	2.34	1.91	1.29	0.68	0.59	0.54	0.49
		18.3	0.87	6.59	3.83	2.84	2.31	1.54	0.81	0.70	0.64	0.58
		3.1	0.44	DR (1.67)	1.94	1.44	1.17	0.78	0.41	0.36	0.33	0.29
		6.1	0.73	5.53	3.21	2.38	1.94	1.29	0.68	0.59	0.54	0.49
		9.1	1.02	7.71	4.48	3.32	2.70	1.80	0.95	0.82	0.75	0.68
		12.2	1.32	9.97	5.79	4.29	3.50	2.33	1.23	1.07	0.97	0.88
		15.2	1.61	11.96	6.94	5.15	4.19	2.84	1.49	1.30	1.18	1.07
		18.3	1.91	14.41	8.37	6.21	5.05	3.37	1.77	1.54	1.40	1.27
		3.1	0.70	DR (2.64)	3.06	2.27	1.85	1.23	0.65	0.56	0.51	0.46
		6.1	1.14	DR (4.31)	5.01	3.71	3.02	2.01	1.06	0.92	0.84	0.76
		9.1	1.59	DR (5.99)	6.95	5.15	4.20	2.80	1.47	1.28	1.17	1.05
		12.2	2.04	DR (7.72)	8.96	6.64	5.41	3.61	1.90	1.65	1.50	1.35
		15.2	2.49	DR (9.24)	10.73	7.96	6.48	4.39	2.31	2.01	1.83	1.65
		18.3	2.95	DR (11.12)	12.91	9.58	7.80	5.20	2.73	2.38	2.17	1.95

$0.6 < S_{max} \leq 0.8$		3.1	0.25	1.89	1.10	0.81	0.66	0.44	0.23	0.20	0.18	0.17
		6.1	0.43	3.25	1.89	1.40	1.14	0.76	0.40	0.35	0.32	0.29
		9.1	0.61	4.61	2.68	1.99	1.62	1.08	0.57	0.49	0.45	0.40
		12.2	0.80	6.02	3.49	2.59	2.11	1.41	0.74	0.64	0.59	0.53
		15.2	0.98	7.25	4.21	3.12	2.54	1.72	0.91	0.79	0.72	0.65
		18.3	1.16	8.78	5.10	3.78	3.08	2.05	1.08	0.94	0.86	0.77
		3.1	0.59	DR (2.23)	2.59	1.92	1.56	1.04	0.55	0.48	0.43	0.39
		6.1	0.98	DR (3.69)	4.28	3.18	2.58	1.72	0.91	0.79	0.72	0.65
		9.1	1.36	DR (5.14)	5.97	4.43	3.61	2.40	1.26	1.10	1.00	0.90
		12.2	1.76	DR (6.65)	7.72	5.73	4.66	3.11	1.63	1.42	1.29	1.17
		15.2	2.15	DR (7.97)	9.26	6.87	5.59	3.79	1.99	1.73	1.58	1.42
		18.3	2.55	DR (9.61)	11.16	8.28	6.74	4.49	2.36	2.05	1.87	1.69
		3.1	0.93	DR	DR (2.04)	3.03	2.46	1.64	0.86	0.75	0.68	0.62
		6.1	1.52	DR (5.75)	DR (3.34)	4.95	4.03	2.69	1.41	1.23	1.12	1.01
		9.1	2.11	DR (7.98)	DR (4.64)	6.87	5.59	3.73	1.96	1.71	1.55	1.40
		12.2	2.72	DR (10.29)	11.95	8.86	7.21	4.81	2.53	2.20	2.00	1.81
		15.2	3.32	DR (12.32)	14.30	10.61	8.63	5.85	3.08	2.68	2.44	2.20
		18.3	3.93	DR (14.83)	17.22	12.77	10.39	6.93	3.64	3.17	2.89	2.60

$0.8 < S_{max} \leq 1.2$		3.1	0.38	2.83	1.65	1.22	0.99	0.66	0.35	0.30	0.28	0.25
		6.1	0.65	4.88	2.83	2.10	1.71	1.14	0.60	0.52	0.47	0.43
		9.1	0.92	6.92	4.02	2.98	2.42	1.62	0.85	0.74	0.67	0.61
		12.2	1.20	9.03	5.24	3.89	3.16	2.11	1.11	0.96	0.88	0.79
		15.2	1.47	10.88	6.32	4.69	3.81	2.59	1.36	1.18	1.08	0.97
		18.3	1.75	13.18	7.65	5.67	4.62	3.08	1.62	1.41	1.28	1.16
		3.1	0.89	DR	DR (1.95)	2.88	2.35	1.56	0.82	0.71	0.65	0.59
		6.1	1.46	DR (5.53)	DR (3.21)	4.76	3.88	2.58	1.36	1.18	1.08	0.97
		9.1	2.04	DR (7.72)	8.96	6.64	5.41	3.61	1.90	1.65	1.50	1.35
		12.2	2.64	DR (9.97)	11.58	8.59	6.99	4.66	2.45	2.13	1.94	1.75
		15.2	3.22	DR (11.96)	13.89	10.30	8.38	5.68	2.99	2.60	2.37	2.13
		18.3	3.82	DR (14.41)	16.74	12.41	10.11	6.74	3.54	3.08	2.81	2.53
		3.1	1.40	DR	DR (3.06)	DR (2.27)	DR (1.85)	2.46	1.30	1.13	1.03	0.93
		6.1	2.28	DR	DR (5.01)	DR (3.72)	6.04	4.03	2.12	1.84	1.68	1.51
		9.1	3.17	DR	DR (6.95)	DR (5.16)	8.39	5.59	2.94	2.56	2.33	2.10
		12.2	4.09	DR	DR (8.96)	DR (6.65)	10.82	7.21	3.79	3.30	3.01	2.71
		15.2	4.97	DR	DR (10.73)	DR (7.96)	12.95	8.78	4.61	4.01	3.66	3.30
		18.3	5.89	DR	DR (12.92)	DR (9.58)	15.59	10.39	5.46	4.75	4.33	3.90

$1.2 < S_{max} \leq 1.6$		3.1	0.50	DR (1.89)	2.19	1.63	1.32	0.88	0.46	0.40	0.37	0.33
		6.1	0.86	DR (3.25)	3.78	2.80	2.28	1.52	0.80	0.69	0.63	0.57
		9.1	1.22	DR (4.61)	5.36	3.67	3.23	2.16	1.13	0.99	0.90	0.81
		12.2	1.59	12.03	6.99	5.18	4.22	2.81	1.48	1.29	1.17	1.06
		15.2	1.95	14.51	8.43	6.25	5.09	3.45	1.81	1.58	1.44	1.30
		18.3	2.33	17.57	10.20	7.57	6.16	4.11	2.16	1.88	1.71	1.54
		3.1	1.18	DR	DR (2.59)	DR (1.92)	3.13	2.08	1.10	0.95	0.87	0.78
		6.1	1.95	DR	DR (4.28)	DR (3.18)	5.17	3.45	1.81	1.58	1.44	1.29
		9.1	2.72	DR	DR (5.98)	8.86	7.21	4.81	2.53	2.20	2.00	1.81
		12.2	3.52	DR	DR (7.72)	11.45	9.32	6.21	3.27	2.84	2.59	2.33
		15.2	4.29	DR	DR (9.26)	13.73	11.18	7.58	3.98	3.46	3.16	2.85
		18.3	5.09	DR	DR (11.16)	16.55	13.47	8.98	4.72	4.11	3.74	3.37
		3.1	1.86	DR	DR	DR (3.03)	DR (2.47)	DR	1.73	1.50	1.37	1.23
		6.1	3.05	DR	DR	DR (4.95)	DR (4.03)	5.37	2.82	2.46	2.24	2.02
		9.1	4.23	DR	DR	DR (6.87)	DR (5.60)	7.46	3.92	3.41	3.11	2.80
		12.2	5.45	DR	DR (11.95)	DR (8.86)	DR (7.21)	9.62	5.06	4.40	4.01	3.61
		15.2	6.63	DR	DR (14.31)	DR (10.61)	DR (8.64)	11.70	6.15	5.35	4.88	4.40
		18.3	7.85	DR	DR (17.22)	DR (12.77)	DR (10.40)	13.86	7.29	6.34	5.78	5.21

1.6 < S_{max} ≤ 2.0		3.1	0.63	DR	2.74	2.03	1.66	1.10	0.58	0.50	0.46	0.41
		6.1	1.08	DR (4.07)	4.72	3.50	2.85	1.90	1.00	0.87	0.79	0.71
		9.1	1.53	DR (5.77)	6.70	4.96	4.04	2.69	1.42	1.23	1.12	1.01
		12.2	1.99	DR (7.52)	8.74	6.48	5.27	3.52	1.85	1.61	1.47	1.32
		15.2	2.44	DR (9.07)	10.53	7.81	6.36	4.31	2.27	1.97	1.80	1.62
		18.3	2.91	DR (10.98)	12.75	9.46	7.70	5.13	2.70	2.35	2.14	1.93
		3.1	1.48	DR	DR	DR (2.40)	DR (1.96)	2.61	1.37	1.19	1.09	0.98
		6.1	2.44	DR	DR (5.35)	DR (3.97)	DR (3.23)	4.31	2.26	1.97	1.80	1.62
		9.1	3.41	DR	DR (7.47)	DR (5.54)	DR (4.51)	6.01	3.16	2.75	2.50	2.26
		12.2	4.40	DR	DR (9.65)	DR (7.16)	11.65	7.77	4.08	3.55	3.24	2.92
		15.2	5.37	DR	DR (11.08)	DR (8.58)	13.97	9.47	4.98	4.33	3.95	3.56
		18.3	6.36	DR	DR (13.95)	DR (10.35)	16.84	11.23	5.90	5.13	4.68	4.22
		3.1	2.33	DR	DR	DR	DR (3.08)	DR	2.16	1.88	1.71	1.54
		6.1	3.81	DR	DR	DR	DR (5.04)	DR	3.53	3.07	2.80	2.52
		9.1	5.28	DR	DR	DR (8.59)	DR (7.00)	DR	4.90	4.26	3.89	3.50
		12.2	6.81	DR	DR	DR (11.08)	DR (9.02)	12.02	6.32	5.50	5.01	4.51
		15.2	8.29	DR	DR	DR (13.26)	DR (11.00)	14.63	7.69	6.69	6.10	5.49
		18.3	9.82	DR	DR	DR (15.96)	DR (13.00)	17.32	9.11	7.92	7.22	6.51

$2.0 < S_{max} \leq 2.6$		3.1	0.81	DR (3.07)	DR (1.79)	2.65	2.15	1.44	0.75	0.66	0.60	0.54
		6.1	1.40	DR (5.28)	DR (3.07)	4.55	3.70	2.47	1.30	1.13	1.03	0.93
		9.1	1.99	DR (7.50)	8.70	6.45	5.25	3.50	1.84	1.60	1.46	1.32
		12.2	2.59	DR (9.78)	11.36	8.42	6.86	4.57	2.40	2.09	1.90	1.72
		15.2	3.18	DR (11.79)	13.69	10.15	8.27	5.60	2.95	2.56	2.34	2.11
		18.3	3.78	DR (14.28)	16.58	12.30	10.01	6.67	3.51	3.05	2.78	2.51
		3.1	1.92	DR	DR	DR	DR (2.54)	DR	1.78	1.55	1.41	1.27
		6.1	3.17	DR	DR	DR (5.16)	DR (4.20)	5.60	2.94	2.56	2.33	2.10
		9.1	4.43	DR	DR	DR (7.20)	DR (5.86)	7.81	4.11	3.57	3.26	2.93
		12.2	5.72	DR	DR	DR (9.31)	DR (7.58)	10.10	5.31	4.62	4.21	3.79
		15.2	6.98	DR	DR (15.05)	DR (11.16)	DR (9.58)	12.31	6.47	5.63	5.13	4.62
		18.3	8.27	DR	DR (18.14)	DR (13.45)	DR (10.95)	14.60	7.67	6.67	6.08	5.48
		3.1	3.03	DR	DR	DR	DR	DR	2.81	2.44	2.23	2.01
		6.1	4.95	DR	DR	DR	DR	DR	4.59	3.99	3.64	3.28
		9.1	6.87	DR	DR	DR	DR (9.09)	DR	6.37	5.54	5.05	4.55
		12.2	8.86	DR	DR	DR	DR (11.72)	DR	8.22	7.14	6.51	5.87
		15.2	10.78	DR	DR	DR	DR (14.03)	DR	10.00	8.69	7.92	7.14
		18.3	12.76	DR	DR	DR	DR (16.89)	DR	11.84	10.30	9.38	8.46

(1) Unadjusted minimum total lengths of braced wall panels are for the applicable conditions corresponding to an adjustment factor of 1.0 in the equation for L_s.

(2) DR = design required, using the Calculation Bracing Method or according to Part 4, for braced wall panels with typical sheathing. L_{us} values within round brackets, to which the reduction set out in Sentence 9.23.13.9.(6) has been applied, are permitted for braced wall panels with gypsum board installed on both sides.

(3) See Table 2.1 for a description of framing types and fastening requirements.

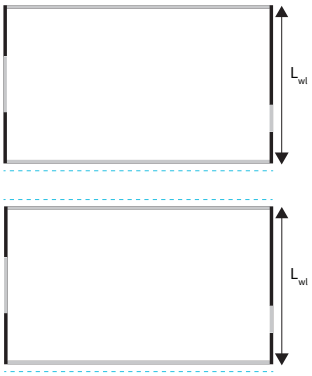
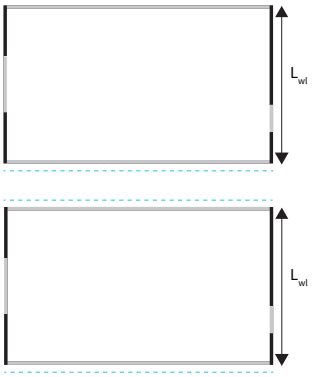
(4) See Sentence 9.23.13.9.(6) for braced wall panels with gypsum board installed on both sides.

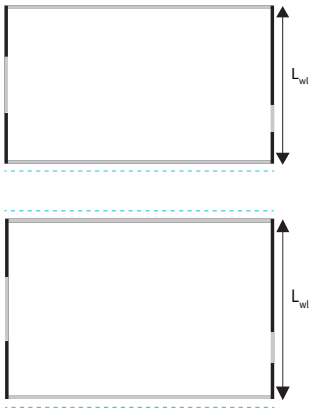
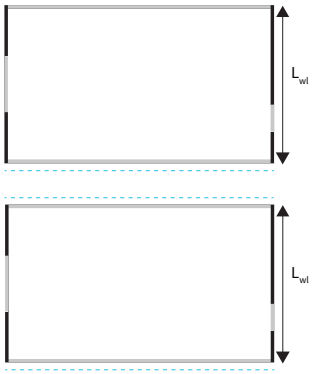
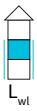
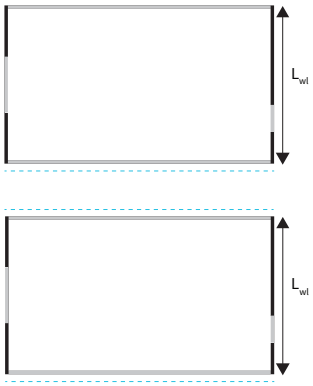
Adjustment Factors for Braced Wall Panels Within Braced Wall Bands in Each Storey

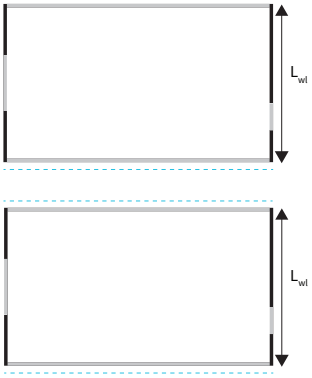
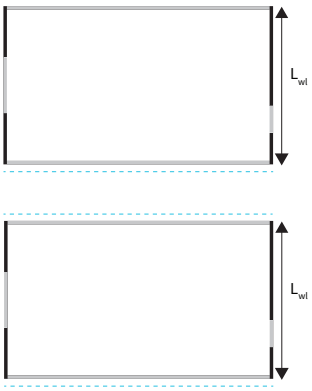
The values of adjustment factors for determining the minimum total lengths of braced wall panels should be calculated according to Table 9.23.13.9.-D of the Code, which is reproduced in this appendix.

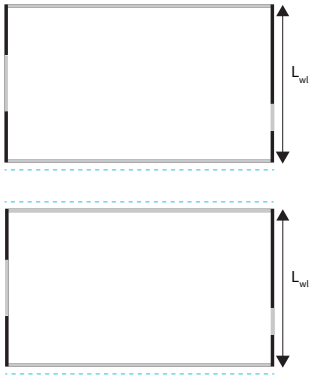
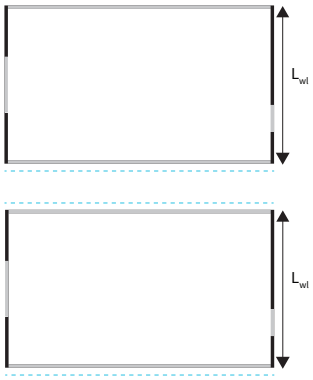
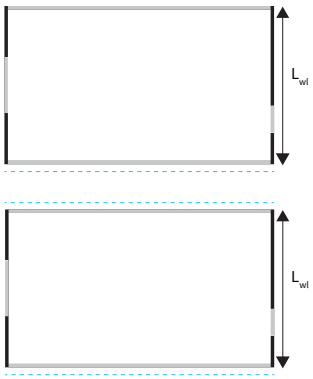
Table D.1: Adjustment Factors for the Determination of Minimum Total Lengths of Braced Wall Panels Within Braced Wall Bands

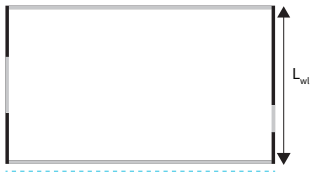
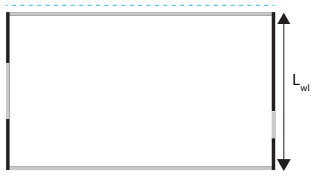
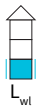
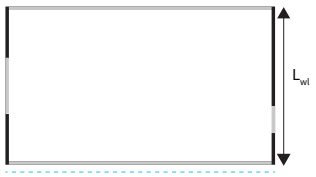
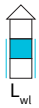
Symbol	Description	Storey	Condition	Adjustment Factor [1]
K_{weight} [2] [3]	Normal-weight construction	Any storey	Any L_{wl}	1.0
	Heavy construction: apply factor corresponding to L_{wl} separately to each storey 	 Storey supporting roof only	$L_{wl} \leq 3.1$ m	1.72
			6.1 m	1.54
			9.1 m	1.46
			12.2 m	1.42
			15.2 m	1.39
			≥ 18.3 m	1.38
		 Storey supporting roof and 1 floor	≤3.1m	1.92
			6.1m	1.71
			9.1m	1.62
			12.2m	1.57
			15.2m	1.54
			≥18.3m	1.51
		 Storey supporting roof and 2 floors	≤3.1m	1.97
			6.1m	1.76
			9.1m	1.67
			12.2m	1.61
			15.2m	1.58
			≥18.3m	1.56
	Masonry veneer half storey above foundation: apply factor corresponding to one building face or two building faces	Storey supporting roof and up to 2 floors	Any L_{wl}	1.00

K_{weight} [2] [3]	Masonry veneer cladding perpendicular to braced wall band, fully clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof only	≤3.1m	1.54	2.13
			6.1m	1.30	1.64
			9.1m	1.21	1.45
			12.2m	1.15	1.34
			15.2m	1.12	1.28
			≥18.3m	1.10	1.23
		 Storey supporting roof and 1 floor	≤3.1m	1.69	2.43
			6.1m	1.40	1.85
			9.1m	1.28	1.60
			12.2m	1.21	1.46
			15.2m	1.17	1.38
			≥18.3m	1.14	1.31
		 Storey supporting roof and 2 floors	≤3.1m	1.73	2.51
			6.1m	1.43	1.91
			9.1m	1.30	1.65
			12.2m	1.22	1.50
			15.2m	1.18	1.41
			≥18.3m	1.15	1.33
	Masonry veneer cladding perpendicular to braced wall band, partially clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof only	≤ 3.1 m	1.23	1.52
			6.1m	1.13	1.29
			9.1m	1.08	1.20
			12.2m	1.06	1.15
			15.2m	1.04	1.12
			≥18.3m	1.03	1.09
		 Storey supporting roof and 1 floor	≤3.1m	1.30	1.66
			6.1m	1.17	1.39
			9.1m	1.11	1.27
			12.2m	1.08	1.20
			15.2m	1.06	1.16
			≥18.3m	1.05	1.13
		 Storey supporting roof and 2 floors	≤3.1m	1.31	1.70
			6.1m	1.18	1.42
			9.1m	1.12	1.29
			12.2m	1.08	1.21
			15.2m	1.07	1.17
			≥18.3m	1.05	1.14

K_{weight} [2] [3]	Masonry veneer cladding perpendicular to the braced wall band, 1-storey height, partially clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof and 1 floor	≤ 3.1 m	1.10	1.22
			6.1 m	1.06	1.13
			9.1 m	1.04	1.09
			12.2 m	1.03	1.07
			15.2 m	1.02	1.05
			≥ 18.3 m	1.02	1.04
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.06	1.14
			6.1 m	1.04	1.08
			9.1 m	1.02	1.06
			12.2 m	1.02	1.04
			15.2 m	1.01	1.03
			≥ 18.3 m	1.01	1.03
	Masonry veneer cladding perpendicular to the braced wall band, 2-storey height, partially clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof and 1 floor	≤ 3.1 m	1.10	1.22
			6.1 m	1.06	1.13
			9.1 m	1.04	1.09
			12.2 m	1.03	1.07
			15.2 m	1.02	1.05
			≥ 18.3 m	1.02	1.04
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.19	1.42
			6.1 m	1.11	1.25
			9.1 m	1.07	1.17
			12.2 m	1.05	1.13
			15.2 m	1.04	1.10
			≥ 18.3 m	1.03	1.08
	Masonry veneer cladding perpendicular to the braced wall band, 1-storey height, fully clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof and 1 floor	≤ 3.1 m	1.23	1.48
			6.1 m	1.13	1.28
			9.1 m	1.09	1.20
			12.2 m	1.07	1.15
			15.2 m	1.06	1.13
			≥ 18.3 m	1.05	1.10
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.15	1.30
			6.1 m	1.09	1.18
			9.1 m	1.06	1.13
			12.2 m	1.04	1.10
			15.2 m	1.04	1.08
			≥ 18.3 m	1.03	1.07

K_{weight} [2] [3]	Masonry veneer cladding perpendicular to the braced wall band, 2-storey height, fully clad: [3] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof and 1 floor	≤ 3.1 m	1.23	1.48
			6.1 m	1.13	1.28
			9.1 m	1.09	1.20
			12.2 m	1.07	1.15
			15.2 m	1.06	1.13
			≥ 18.3 m	1.05	1.10
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.44	1.91
			6.1 m	1.26	1.55
			9.1 m	1.18	1.39
			12.2 m	1.13	1.30
			15.2 m	1.11	1.24
			≥ 18.3 m	1.09	1.20
	Stone veneer half storey above foundation : apply factor corresponding to one or two building faces	Storey supporting a roof and up to 2 floors	Any L_{wl}	1.00	1.00
	Stone veneer cladding perpendicular to braced wall band, fully clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof only	≤ 3.1 m	1.95	2.95
			6.1 m	1.54	2.13
			9.1 m	1.38	1.79
			12.2 m	1.28	1.60
			15.2 m	1.23	1.49
			≥ 18.3 m	1.19	1.40
		 Storey supporting roof and 1 floor	≤ 3.1 m	2.21	3.48
			6.1 m	1.72	2.50
			9.1 m	1.51	2.06
			12.2 m	1.38	1.82
			15.2 m	1.31	1.66
			≥ 18.3 m	1.26	1.55
		 Storey supporting roof and 2 floors	≤ 3.1 m	2.28	3.63
			6.1 m	1.77	2.60
			9.1 m	1.55	2.14
			12.2 m	1.41	1.88
			15.2 m	1.33	1.72
			≥ 18.3 m	1.28	1.60

K_{weight} [2] [3]	Stone veneer cladding perpendicular to braced wall band, partially clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof only	≤ 3.1 m	1.44	1.94
			6.1 m	1.25	1.54
			9.1 m	1.17	1.37
			12.2 m	1.13	1.28
			15.2 m	1.10	1.23
			≥ 18.3 m	1.08	1.18
		 Storey supporting roof and 1 floor	≤ 3.1 m	1.56	2.19
			6.1 m	1.33	1.71
			9.1 m	1.22	1.50
			12.2 m	1.17	1.38
			15.2 m	1.13	1.31
			≥ 18.3 m	1.11	1.25
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.59	2.26
			6.1 m	1.35	1.76
			9.1 m	1.24	1.53
			12.2 m	1.18	1.41
			15.2 m	1.14	1.33
			≥ 18.3 m	1.12	1.27
	Stone veneer cladding perpendicular to the braced wall band, 1-storey height, partially clad: apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof and 1 floor	≤ 3.1 m	1.19	1.40
			6.1 m	1.11	1.24
			9.1 m	1.07	1.17
			12.2 m	1.06	1.13
			15.2 m	1.04	1.10
			≥ 18.3 m	1.04	1.08
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.12	1.25
			6.1 m	1.07	1.15
			9.1 m	1.05	1.11
			12.2 m	1.04	1.08
			15.2 m	1.03	1.07
			≥ 18.3 m	1.02	1.05
	Stone veneer cladding perpendicular to the braced wall band, 2-storey height, partially clad: [4] apply factor corresponding to L_{wl} for one or two building faces. 	 Storey supporting roof and 1 floor	≤ 3.1 m	1.19	1.40
			6.1 m	1.11	1.24
			9.1 m	1.07	1.17
			12.2 m	1.06	1.13
			15.2 m	1.04	1.10
			≥ 18.3 m	1.04	1.08
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.36	1.76
			6.1 m	1.21	1.45
			9.1 m	1.14	1.32
			12.2 m	1.11	1.24
			15.2 m	1.09	1.20
			≥ 18.3 m	1.07	1.16

K_{weight} [2] [3]	Stone veneer cladding perpendicular to the braced wall band, 1-storey height, fully clad: [4] apply factor corresponding to L_{wl} for one or two building faces.  	 Storey supporting roof and 1 floor	≤ 3.1 m	1.40	1.83
			6.1 m	1.24	1.50
			9.1 m	1.17	1.35
			12.2 m	1.13	1.27
			15.2 m	1.10	1.22
			≥ 18.3 m	1.09	1.18
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.26	1.53
			6.1 m	1.15	1.32
			9.1 m	1.11	1.23
			12.2 m	1.08	1.18
			15.2 m	1.07	1.14
			≥ 18.3 m	1.06	1.12
	Stone veneer cladding perpendicular to the braced wall band, 2-storey height, fully clad: [4] apply factor corresponding to L_{wl} for one or two building faces.  	 Storey supporting roof and 1 floor	≤ 3.1 m	1.40	1.83
			6.1 m	1.24	1.50
			9.1 m	1.17	1.35
			12.2 m	1.13	1.27
			15.2 m	1.10	1.22
			≥ 18.3 m	1.09	1.18
		 Storey supporting roof and 2 floors	≤ 3.1 m	1.77	2.58
			6.1 m	1.46	1.96
			9.1 m	1.33	1.68
			12.2 m	1.25	1.53
			15.2 m	1.20	1.43
			≥ 18.3 m	1.17	1.36
K_{snow} [5]	Roof snow load: apply factor in accordance with the specified roof snow load	 Storey supporting roof only	≤ 2kPa	1.00	
			3 kPa	1.20	
			4 kPa	1.40	
			5 kPa	1.60	
			6 kPa	1.80	
		 Storey supporting roof and 1 floor	≤ 2kPa	1.00	
			3 kPa	1.10	
			4 kPa	1.20	
			5 kPa	1.30	
			6 kPa	1.40	
		 Storey supporting roof and 2 floors	≤ 2kPa	1.00	
			3 kPa	1.06	
			4 kPa	1.10	
			5 kPa	1.20	
			6 kPa	1.24	

$K_{Sspacing}$ [6] [7]	Braced wall band spacing: apply factor to all braced wall panels per building plan direction	Any storey	3.8 m	0.60
			7.6 m	1.00
			10.6 m	1.35
			15 m [8]	1.90
$K_{Snumber}$	Number of parallel braced wall bands: apply factor to all braced wall panels per building plan direction	Any storey	2	1.00
			3	1.33
			4	1.50
			≥ 5	1.60
K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or omitted on interior side of braced wall panels	Any storey	Installed	1.00
			Omitted, blocked wall	1.20
			Omitted, unblocked wall	1.40
K_{sheath}	Intermittent braced wall panels: apply factor in accordance with continuity of sheathing within braced wall band	Any storey	Continuously wood-sheathed	1.00
			Intermittently sheathed	1.15

[1] Where there are two values of K_{weight} in one row, the value on the left corresponds to one building face, and the value on the right corresponds to two building faces.

[2] See Section 2.5 for the construction weight classification.

[3] For K_{weight}, linear interpolation between L_{wl} values and between fully clad and partially clad veneer conditions is permitted.

[4] "Fully clad" means that there are no openings, and "partially clad" means 50% or less coverage of an elevation.

[5] For K_{snow}, linear interpolation between roof snow loads is permitted.

[6] For $K_{Sspacing}$, linear interpolation between braced wall band spacings is permitted.

[7] An average braced wall band spacing is permitted to be used for the determination of $K_{Sspacing}$.

[8] A braced wall band spacing of 15 m is only permitted in basements and crawl spaces.

List of Part 9 Provisions for Wind Design And Calculations

Below is a list of Part 9 provisions of the Code for wind design and calculations. It is the responsibility of all persons undertaking the design and construction of a home to fully comply with the Code. It is also recommended that readers check with the Authority Having Jurisdiction and professional associations (e.g., EGBC, AIBC, ASTTBC) for the latest requirements of professional engineering services for Part 9 wood-frame construction.

- 9.4.2.3 Reference Hourly Wind Pressure
- 9.23.3.4 Nailing of Framing
- 9.23.3.5 Fasteners for Sheathing or Subflooring
- 9.23.6.1 Anchorage of Building Frames
- 9.23.11.4 Joints in Top Plates
- 9.23.13 Bracing to Resist Lateral Loads Due to Wind and Seismic Forces
- 9.23.16 Roof Sheathing
- 9.27.5 Attachment of Cladding
- 9.36.2 Building Envelope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