BCBC2024
Part 9 Lateral Bracing Series

Presentation 2 of 2 : February 27th, 2025

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Welcome

1. Introduction
2. Today's Presentation
   - Recap
   - New Concepts
   - The Calculation Method
   - Example
   - Questions?

Subsection 9.23.13 Framework **RECAP+**

Part 9:
Housing and Small Buildings

<600m2 building area
<3 storeys
Group C, D, E and F2/3 occupancies

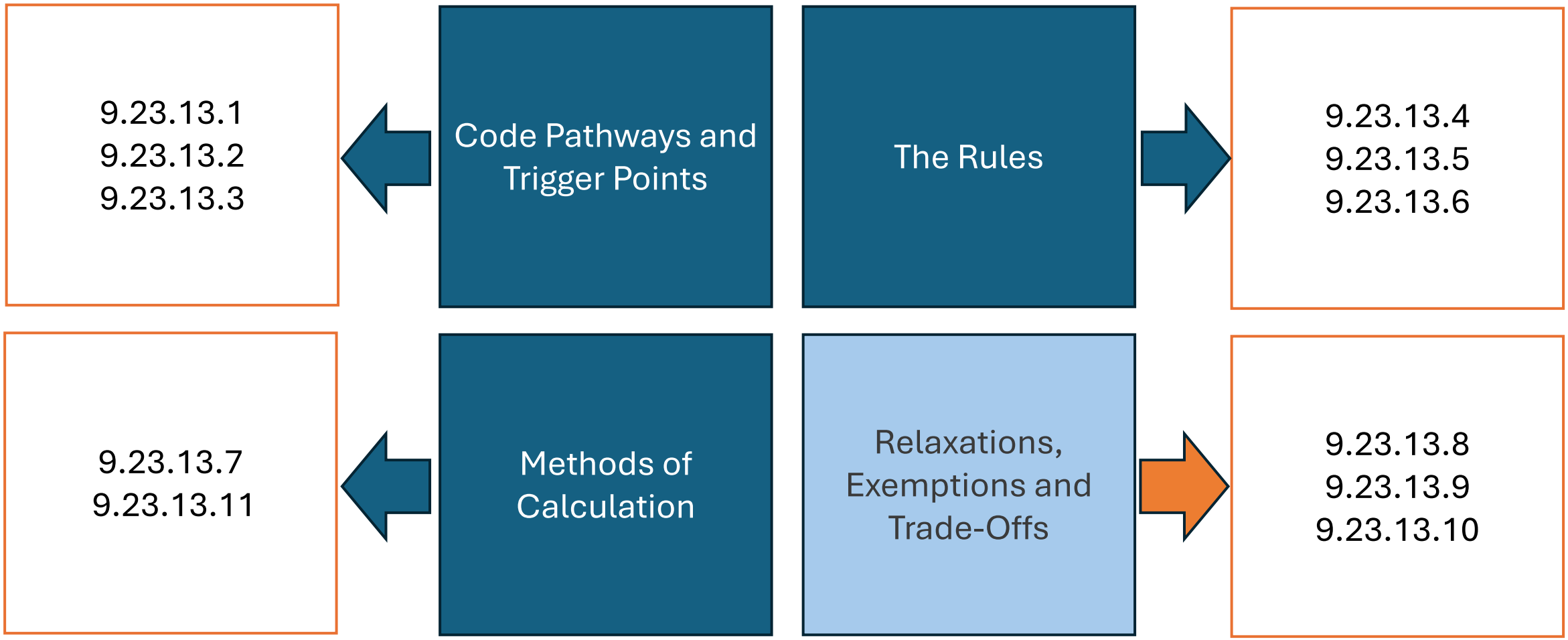
Section 9.23:
Wood-Frame Construction

Generally comprised of lumber frames of small repetitive structural members @ <2ft o.c and clad, sheathed or braced on one side

Subsection 9.23.13:
Bracing to Resist Lateral Loads due to Wind and Earthquake

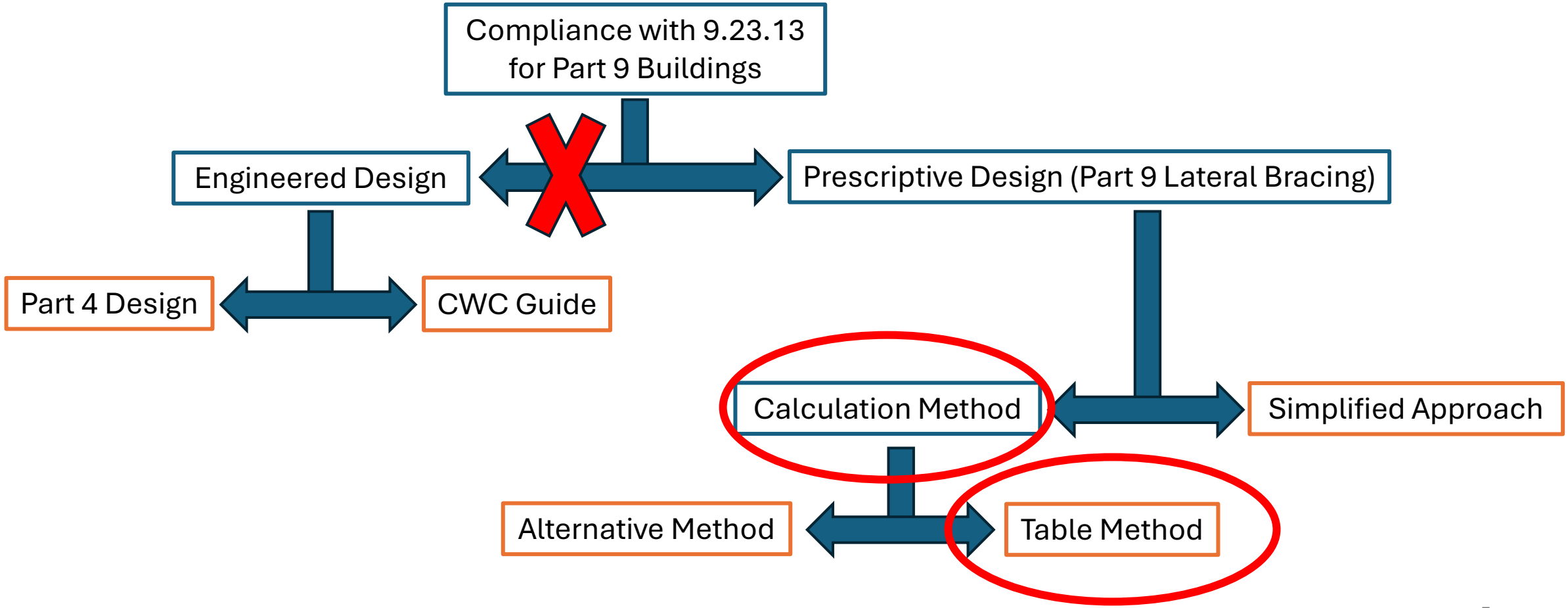
? ? ? ?

Subsection 9.23.13 Framework **RECAP+**



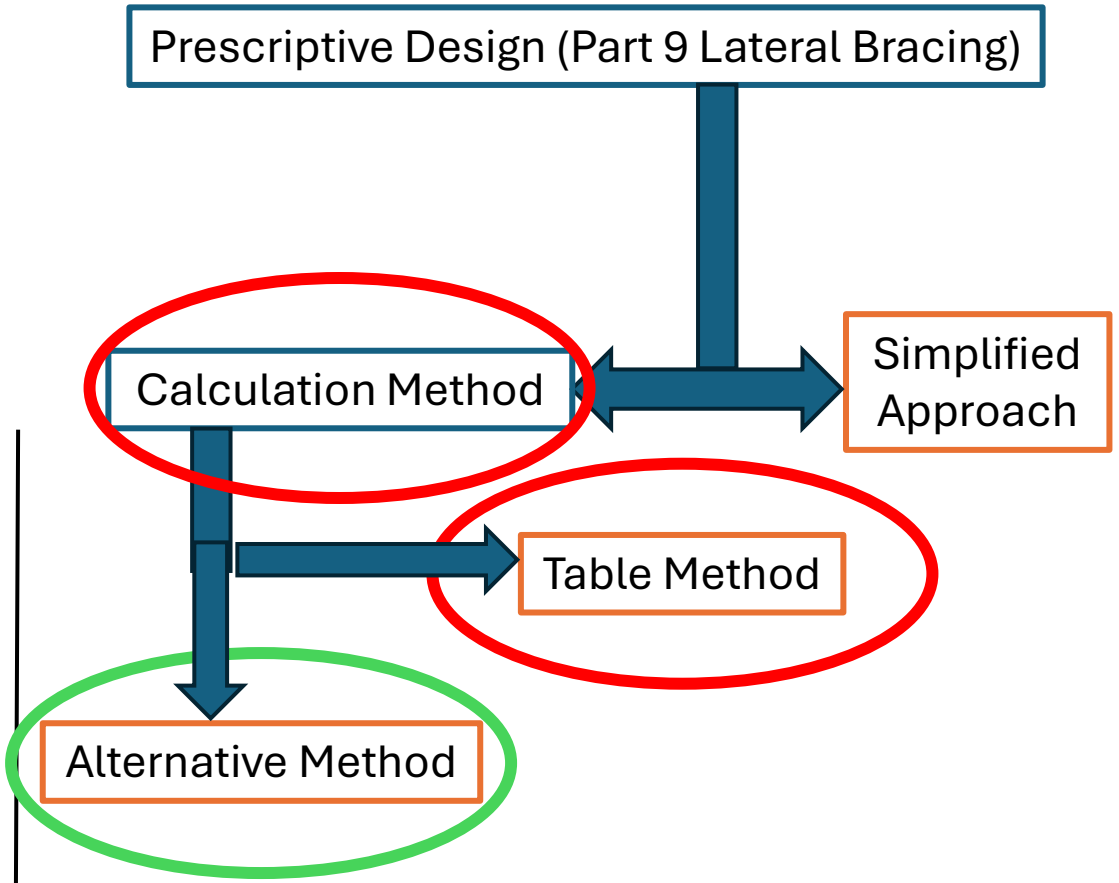
Subsection 9.23.13 Framework **RECAP+**

Box 1: Code Pathways and Trigger Points



Subsection 9.23.13 Framework **RECAP+**

Box 1: Code Pathways and Trigger Points

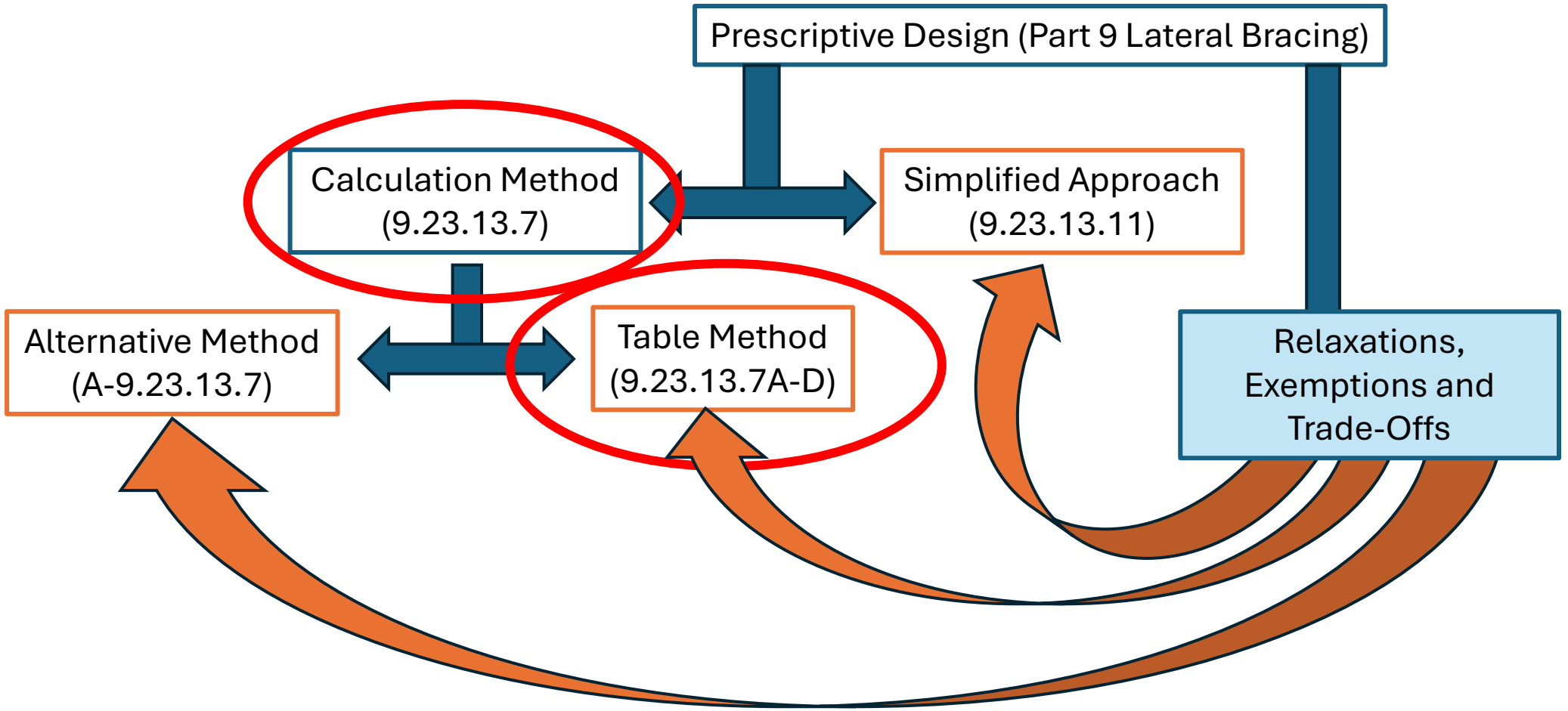


The Calculation Method (Tables)

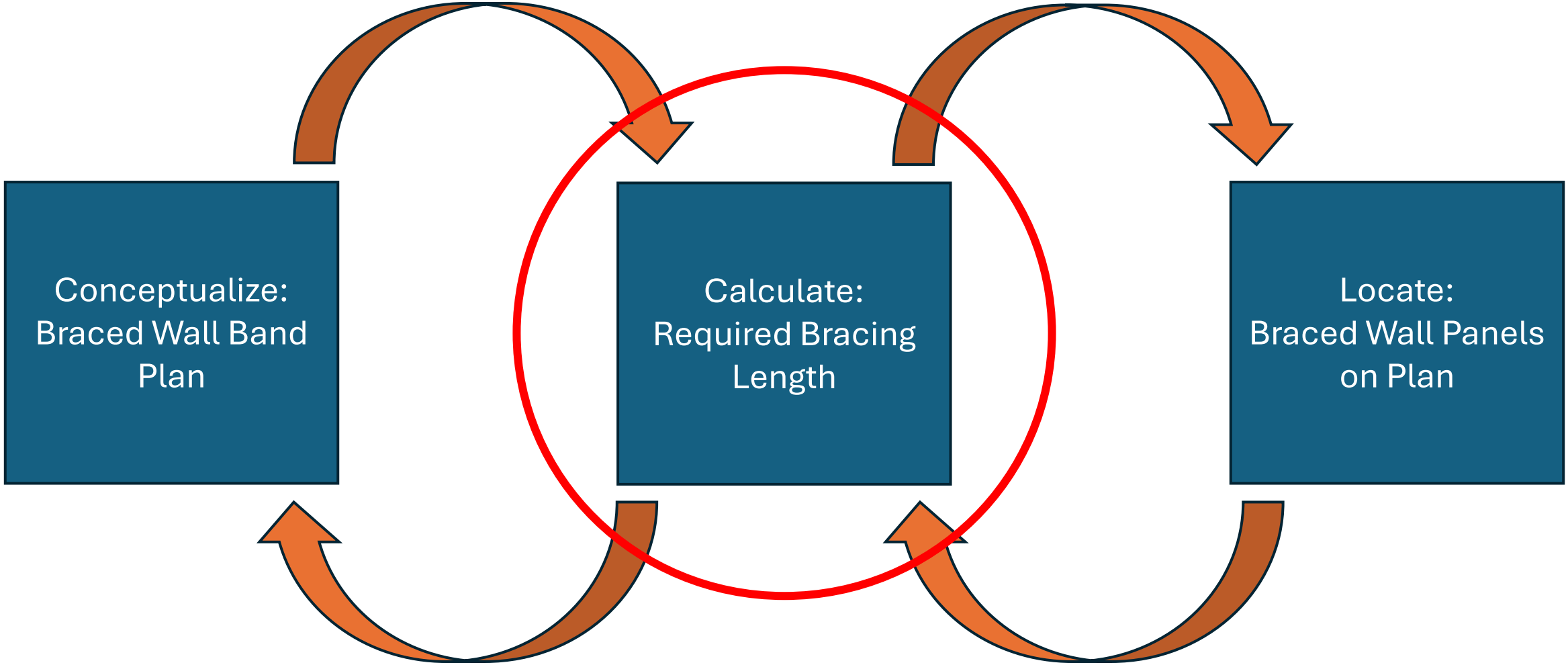
- Site Class is A, B, C, D, E or Unknown (not F)
- Smax no greater than 2.6 (2.52)
- HWP (1/50) no greater than 1.2kPa (0.72kPa)
- Roof Snow Load no greater than 6kPa (6.125kPa)
- Panel height no greater than 10' (3.1m)
- Eave-to-Ridge Roof Height no greater than 19' 8" (6m)
- Lowest exterior wood-framed walls support no more than;
  - 2 floors of normal weight construction, or
  - 1 floor of heavy weight construction

Subsection 9.23.13 Framework **RECAP+**

Box 3: Methods of Calculation



Overview of the Design Process **RECAP+**



Overview of the Design Process **RECAP+**

Step 2: Calculate the Required Bracing Length

Combine an understanding of Design Inputs

Site Details
- Site Specific and Regional Climate Data
- Site Specific and Regional Seismic Hazard

Building Design Details
- Dimensions
- Weight of Construction
- Methods of Construction

Braced Wall Band Plan Details
- Number of Bands
- Average Spacing of Bands

Process through a Method of Calculation

Amount of Bracing Length

New Concepts: Overview

Overview

Reference Framing Types **RECAP+**

Building Plan Dimension **RECAP+**

Storeys for Bracing (Introduction)

Site Class and Smax

Hourly-Wind-Pressure and Wind Exposure

Adjustment Factors

Sheathing Continuity

Primary/Secondary Bracing Sheathing

New Concepts: Reference Framing Types RECAP+

Reference Framing Types

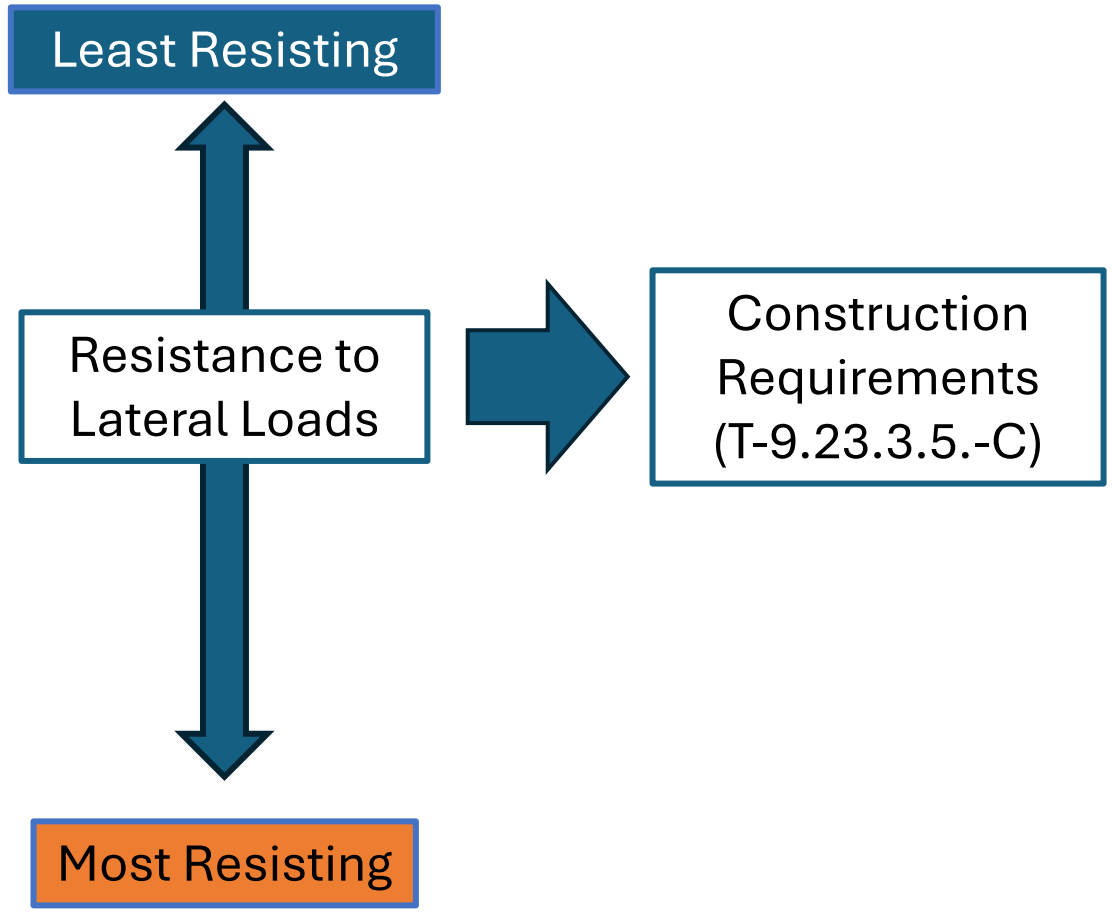
Factored Shear Resistance, kN/m

Tbl A-9.23.3.5.-C

0.61	GWB-O
1.15	GWB-A
1.98	GWB-B
2.67	GWB-C
3.28	GWB-D
3.28	WSP-A
6.22	WSP-B
7.15	WSP-C
7.85	WSP-D
8.71	WSP-E

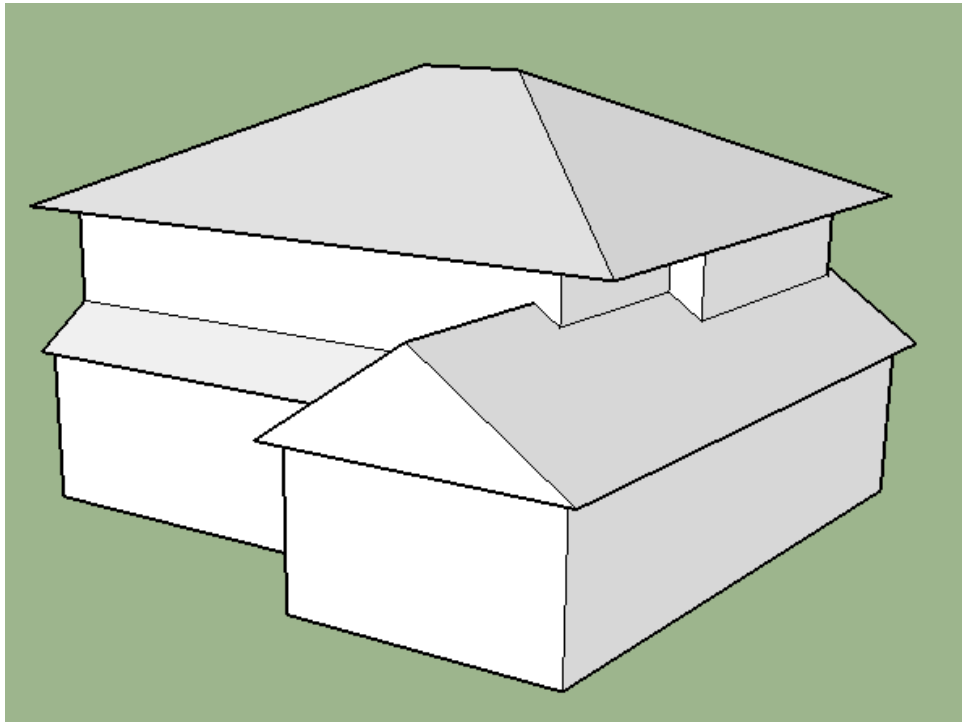
9.23.13.5.(3)

These values will be important for truss manufacturers designing bracing to top chord of roof trusses

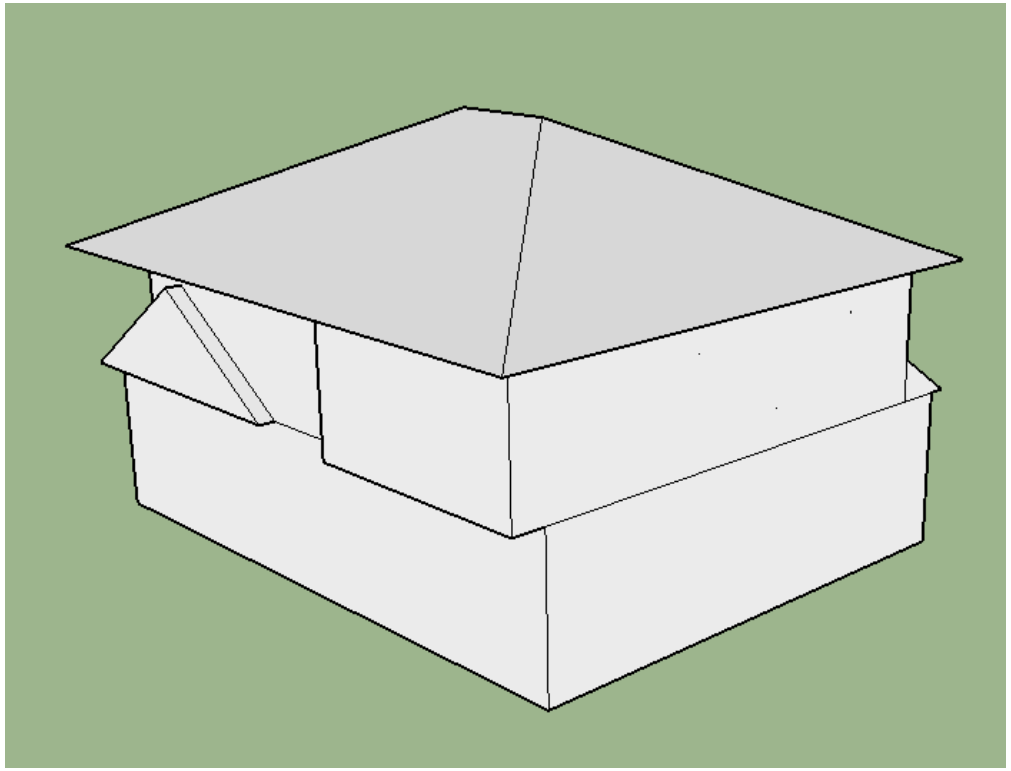


New Concepts: Building Plan Dimension **RECAP+**

Building Plan Dimension



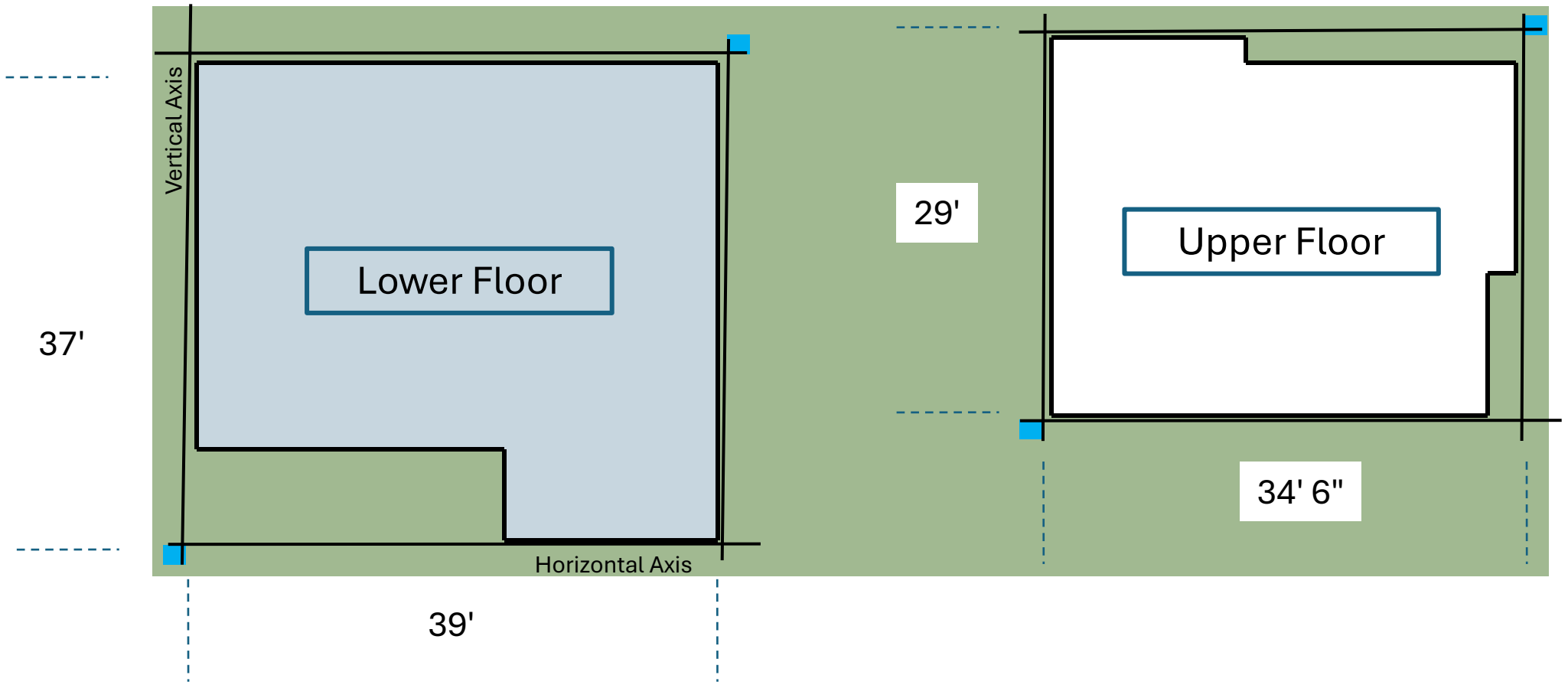
Front Right Isometric



Back Left Isometric

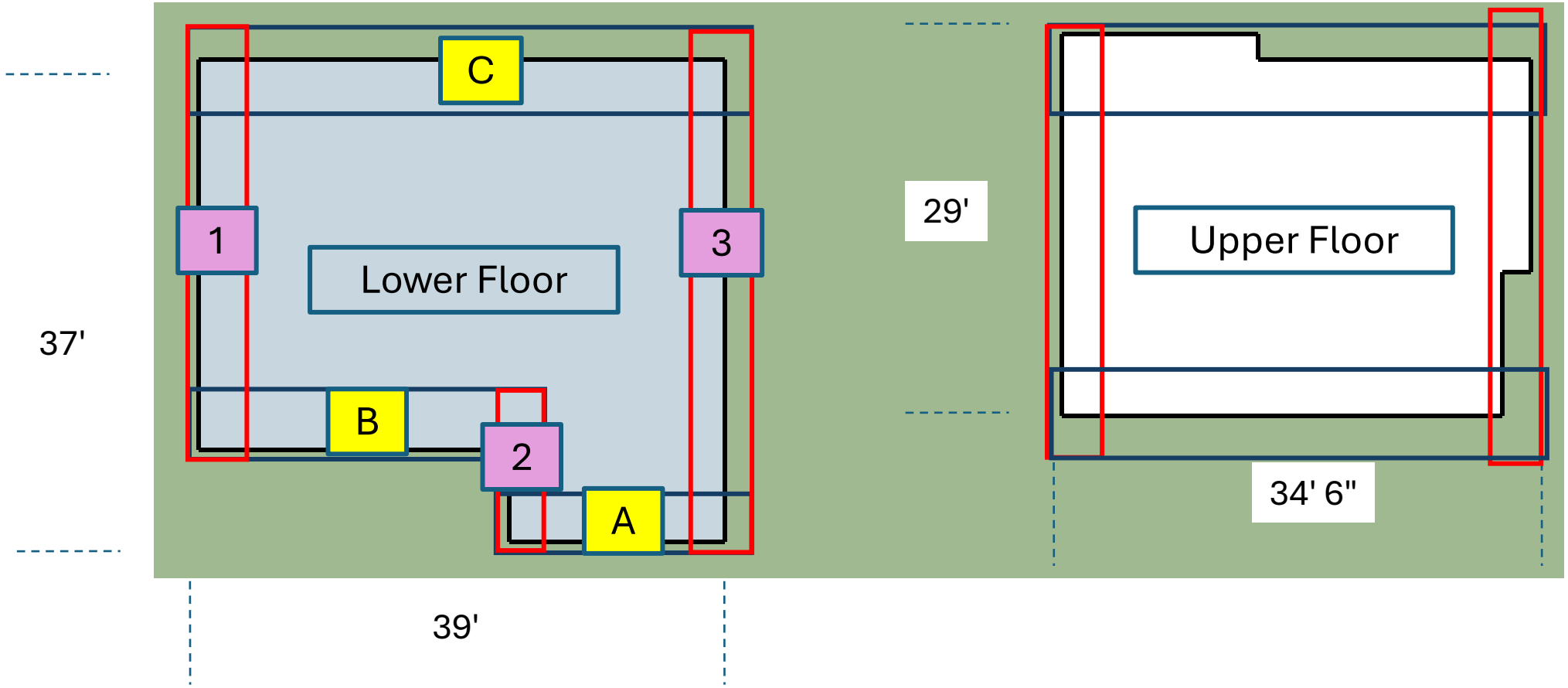
New Concepts: Building Plan Dimension **RECAP+**

Building Plan Dimension



New Concepts: Building Plan Dimension **RECAP+**

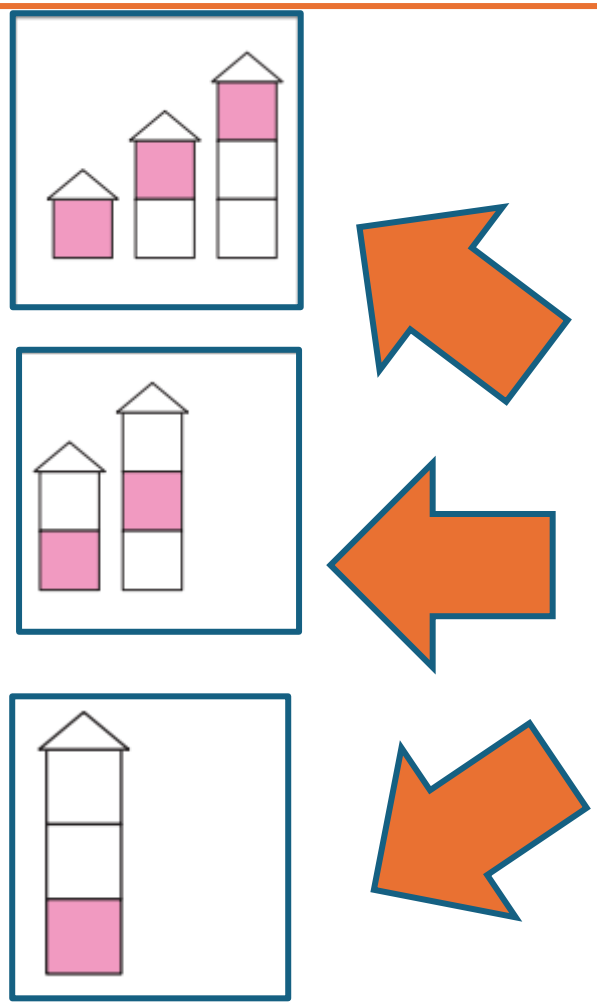
Building Plan Dimension - Parallel to a Band



New Concepts: Storeys for Bracing (Intro)

With walls on the storey supporting:

Roof Only	R
Roof plus 1 Floor	R+1F
Roof plus 2 Floors	R+2F



Graphics are visual representation of the

Storey for Bracing

in the Methods of Calculation tables

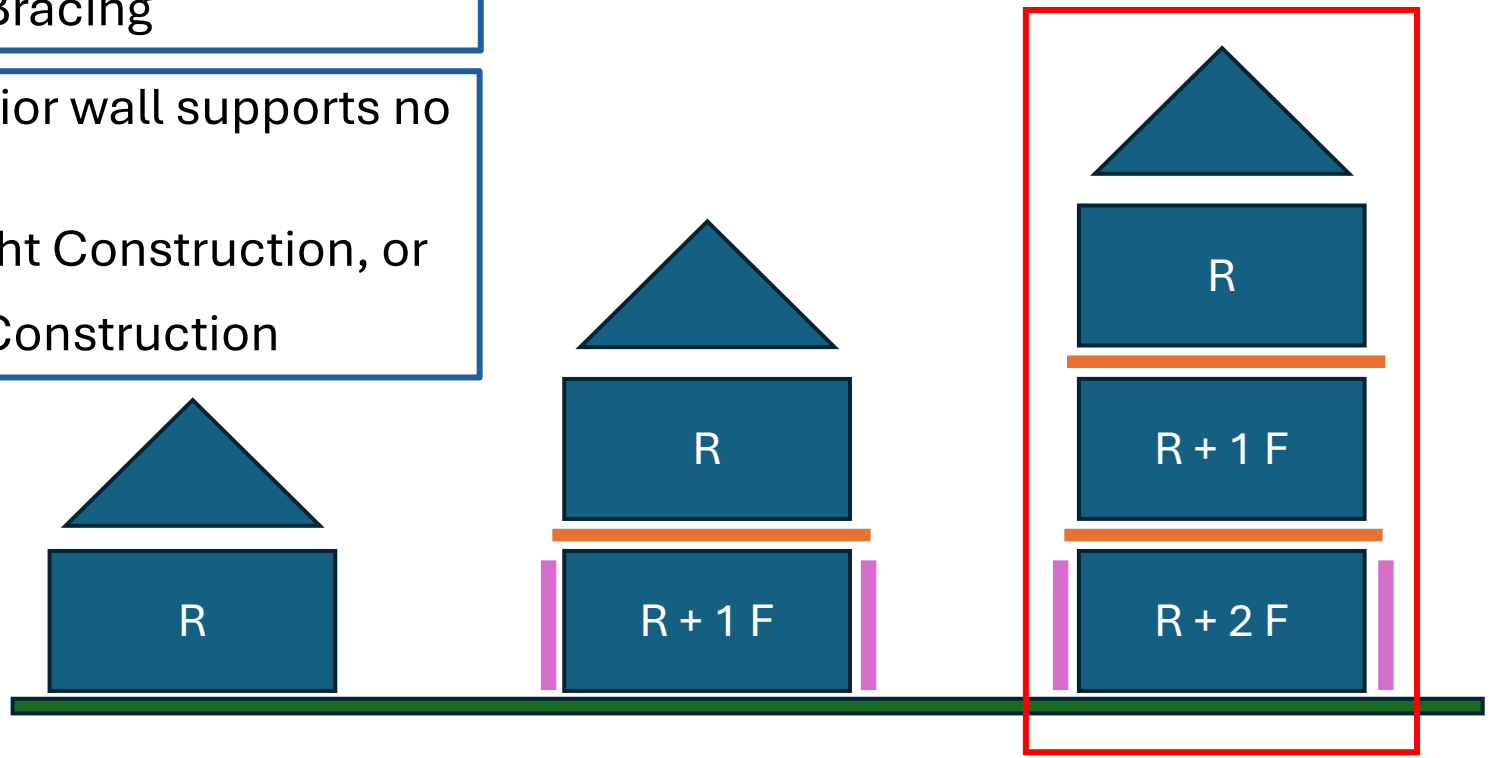
New Concepts: Storeys for Bracing (Intro)

In Buildings designed with a Slab-on-Grade

All storeys are Storeys for Bracing

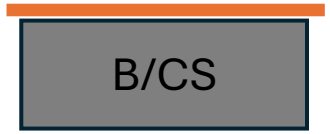
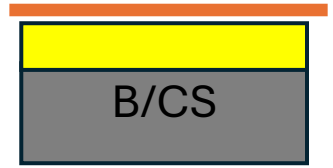
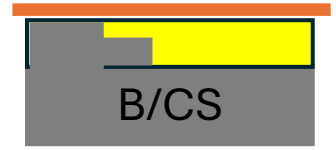
Lowest wood-framed exterior wall supports no more than:

- 2 floors in Normal Weight Construction, or
- 1 floor in Heavyweight Construction



Not Permitted with Heavyweight Construction*

New Concepts: Storeys for Bracing (Intro)

Basements/Crawlspace Types:		Three Scenarios for each B/CS Type	Outcome
First wood-framed floor is supported directly by foundation at exterior		1. Design meets a Relaxation clause	Not designed as a Storey for Bracing
First wood-framed floor is supported by wood-framed walls at exterior		2. Design meets 1., but the Designer designates B/CS as a Storey for Bracing	Must be designed as a Storey for Bracing
First wood-framed floor is supported a foundation and wood-framed walls at exterior		3. Design does not meet Relaxation clause	Must be designed as a Storey for Bracing

- Storeys for Bracing require the code user to utilize a Method of Calculation for determination of required bracing length
- Bracing length in B/CS that are NOT Storeys for Bracing is based on the bracing length in Band above (through Relaxations)

New Concepts: Storeys for Bracing (Intro)

In Buildings using a Basement/Crawlspace as a Storey for Bracing

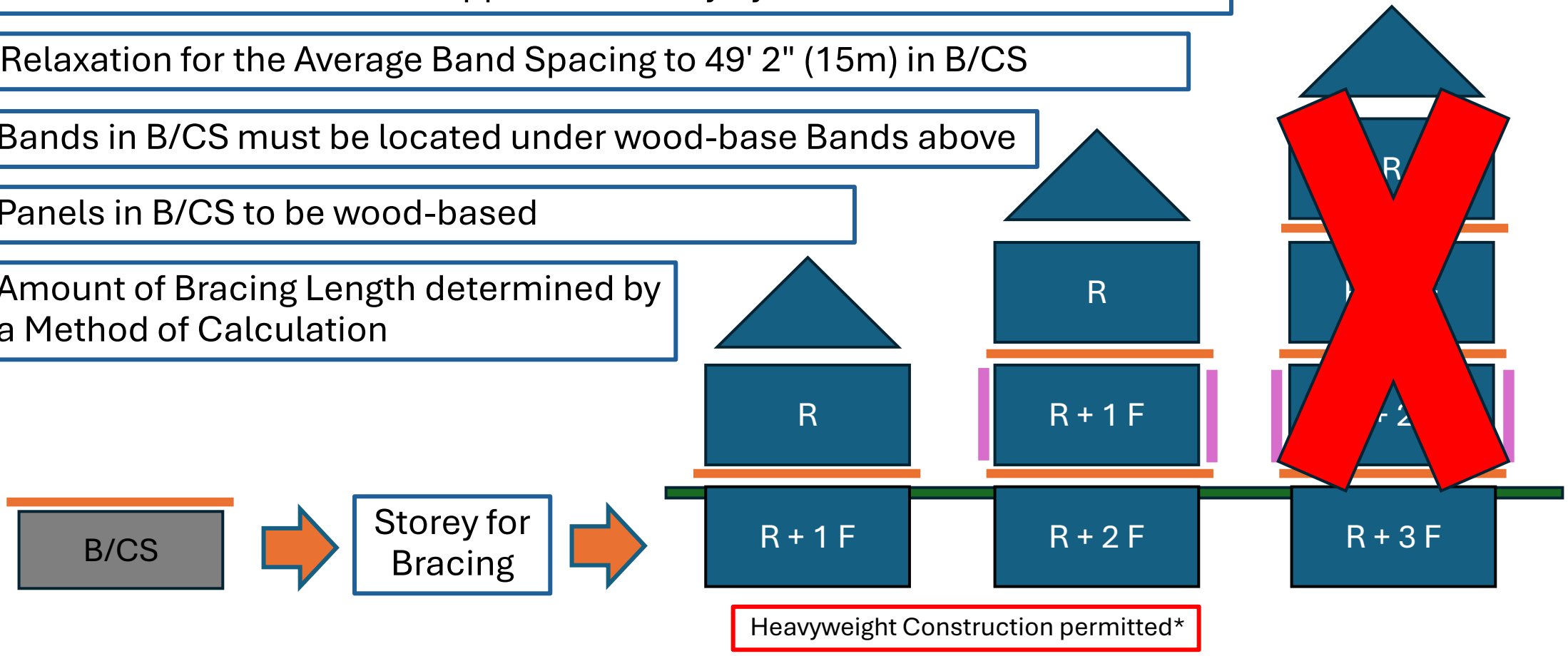
First wood-framed floor is supported directly by foundation at exterior

Relaxation for the Average Band Spacing to 49' 2" (15m) in B/CS

Bands in B/CS must be located under wood-base Bands above

Panels in B/CS to be wood-based

Amount of Bracing Length determined by a Method of Calculation



New Concepts: Storeys for Bracing (Intro)

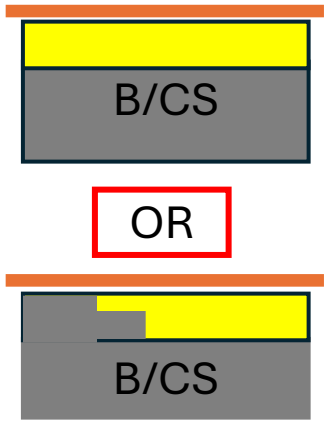
In Buildings using a Basement/Crawlspace as a Storey for Bracing

First wood-framed floor is supported by wood-framed walls at the exterior

All Storeys for Bracing to meet the Rules

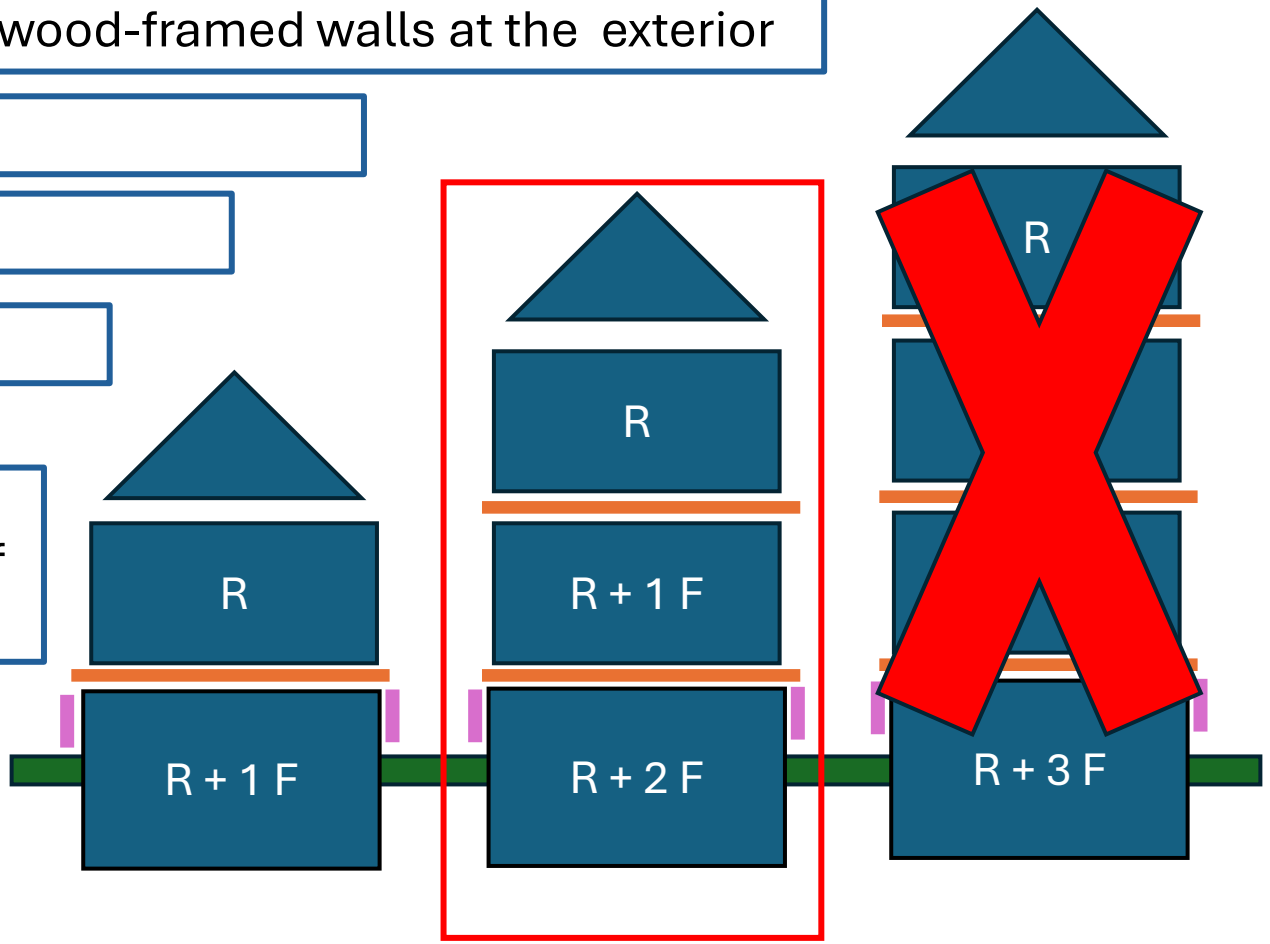
No Relaxation for Band Spacing in B/CS

Panels in B/CS to be wood-based



Amount of Bracing Length determined by a Method of Calculation

Storey for Bracing

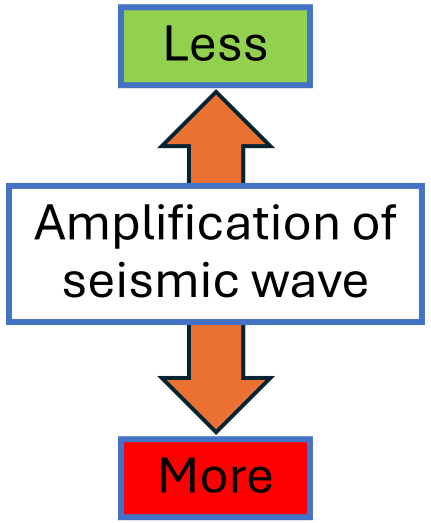


Not Permitted with Heavyweight Construction*

New Concepts: Site Class

Site Class

- A way of rating the quality of the specific building site soils to quantify their ability to amplify, or reduce, seismic waves as they affect our building

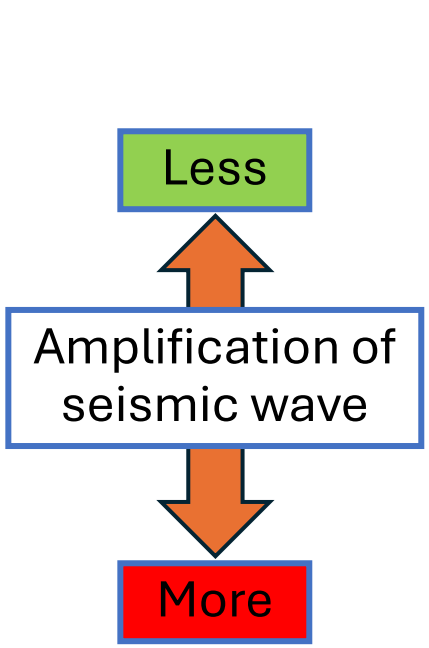


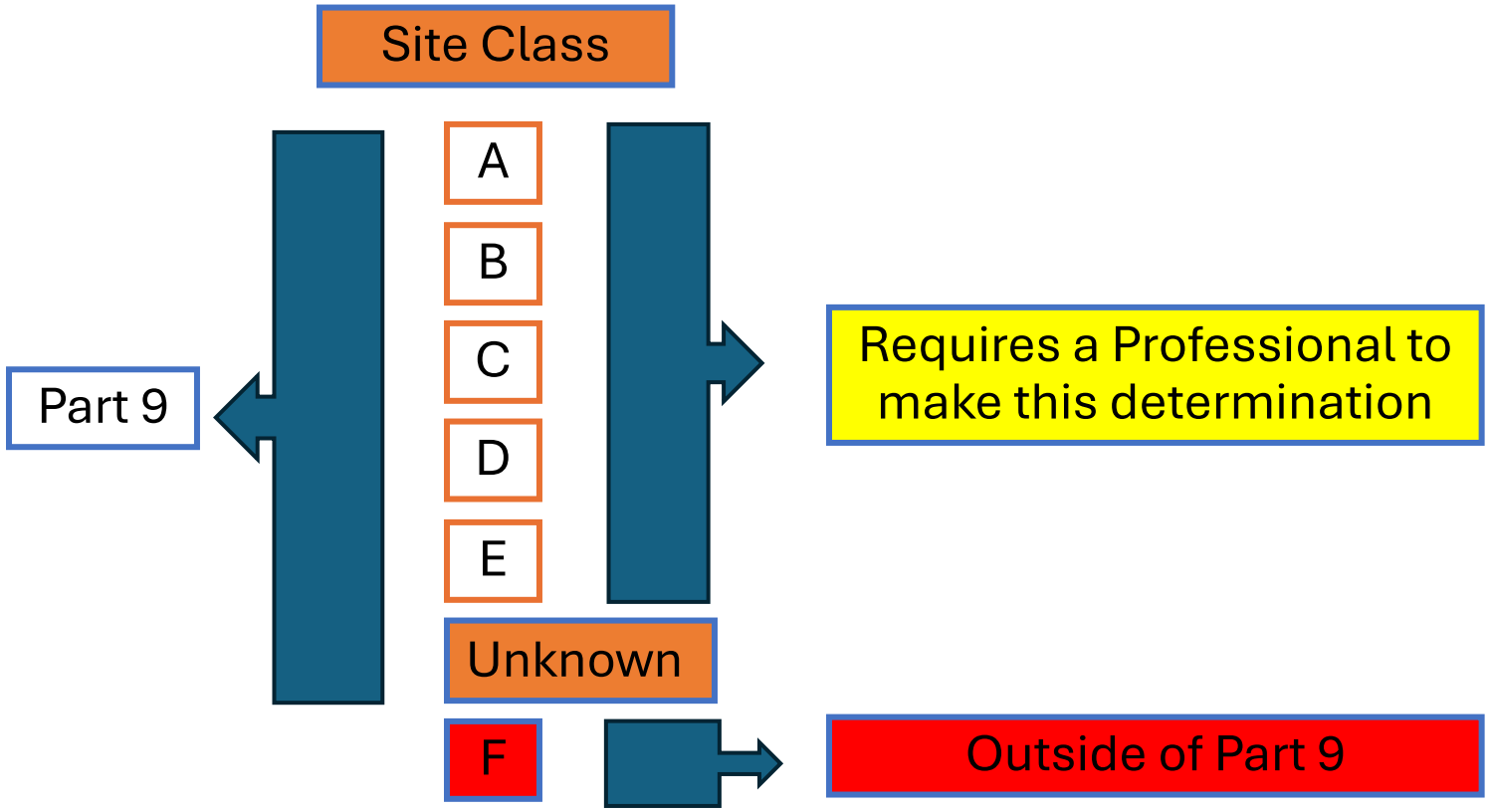
Site Class	General Description
A	Hard Rock
B	
C	Very Dense Soil
D	
E	Soft Soils
Unknown	
F	Other Soils

New Concepts: Site Class

Site Class

- A way of rating the quality of the specific building site soils to quantify their ability to amplify, or reduce, seismic waves as they affect our building



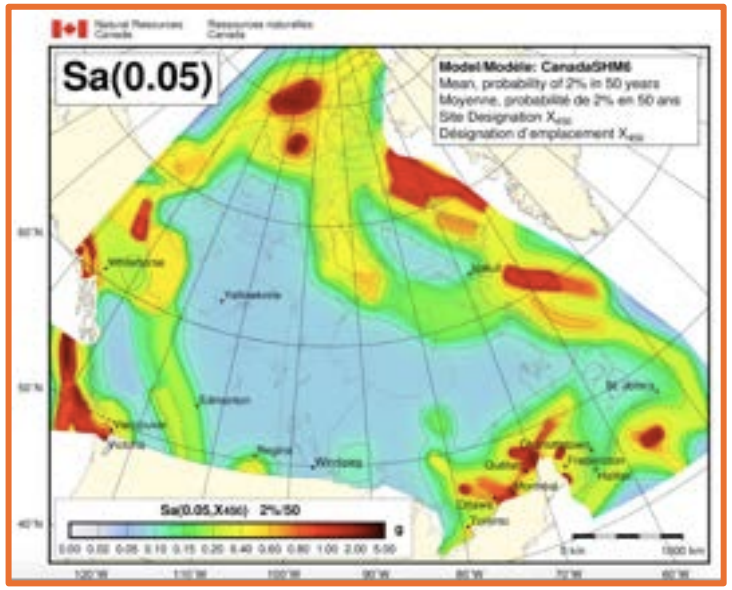


New Concepts: Smax

Seismic Design Parameter

- A parameter (just a number on a scale) to combine the regional seismic hazard and our site-specific adjustment for seismic hazard (Site Class) into a single reference number

Regional Seismic Hazard



+

Site Class

A

B

C

D

E

Unknown

=

Smax

The higher the number the higher the risk

New Concepts: Smax

Seismic Design Parameter Examples

Regional Seismic Hazard	Site Class	Smax
Nanaimo	A	0.571
	C	1.150
	Unknown	1.550
Kelowna	A	0.070
	C	0.155
	Unknown	0.302

New Concepts: Adjustment Factors

Factoring

- A simple and useful way of making broad stroke adjustments to a base number

Unadjusted		Factors		Adjusted
10		1 x 1 x 1 x 1 x 1.0		10
10		1 x 1 x 1 x 1 x 1.5		15
10		1 x 1 x 1 x 1 x 0.5		5

New Concepts: Adjustment Factors

K(W) Adjustment Factors – For bracing calculations for Wind loads only

SYMBOL	NAME	REF = 1
K(W)exp	Exposure/Terrain	Rough Terrain
K(W)roof	Roof Height	10' (3m)
K(W)spacing	Average Band Spacing	25' (7.6m)
K(W)number	Number of Bands	2

New Concepts: Adjustment Factors

K(S) Adjustment Factors – For bracing calculations for Earthquake loads only

SYMBOL	NAME	REF = 1
K(S)snow	Roof Snow Load	2 kPa
K(S)weight	Weight of Construction	Normal
K(S)spacing	Average Band Spacing	25' (7.6m)
K(S)number	Number of Bands	2

New Concepts: Adjustment Factors

K Factors – For bracing calculations for Wind and Earthquake loads

SYMBOL	NAME	REF = 1
Kgyp	Interior Gypsum Wall Board	Installed
Ksheath	Sheathing Continuity	Continuous

New Concepts: Hourly Wind Pressure

Hourly Wind Pressure (1/50 year)

- Regional wind hazard value for designing bracing to resist lateral loads due to Wind
- BCBC Appendix C for your specific Location

New Concepts: Factors – K(W)(exp)

(Wind) Exposure Factor

K(W)exp is determined based on the site terrain

Rough terrain is suburban, urban, or wooded terrain extending upwind from the building uninterrupted for at least 1 km

Open terrain is level terrain with only scattered trees, buildings or other obstructions, open water or shorelines

- Conceptually (and mathematically) provides a site-specific adjustment to the regional wind hazard
- Buildings, trees and other obstructions deflect wind pressure

New Concepts: Factors – K(W)exp

(Wind) Exposure Factor

Table 9.23.13.7-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{exp} (1)	Wind exposure: apply factor to all *storeys* in both directions	All *storeys* All *storeys* in 1 – *storey building* All *storeys* in 2 – *storey building* All *storeys* in 3 – *storey building*	Rough terrain Open terrain	1.00 1.29 1.40 1.48

Source: BC Building Code 2024

New Concepts: Factors – K(W)roof

(Wind) Roof Height Eave-to-Ridge Factor

- Height of the tallest roof on the uppermost floor
- Some confusion in the name, but suggest measuring from the top of the top plate in the storey below the roof, to the top of the roof

Conceptually (and mathematically) affects the "sail area" when determining wind loads

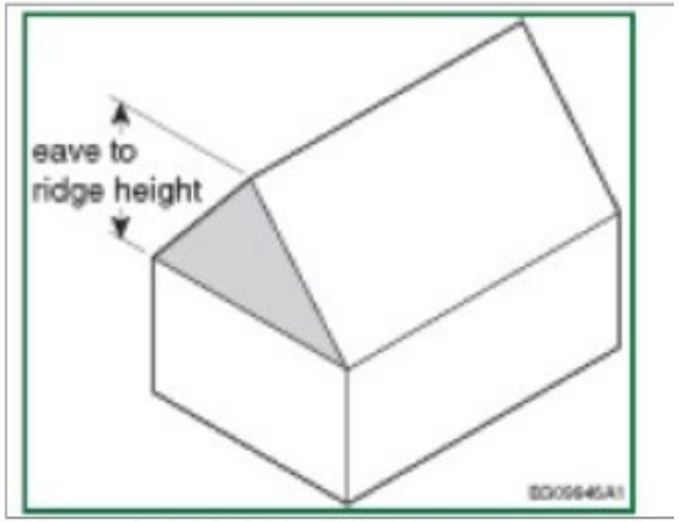
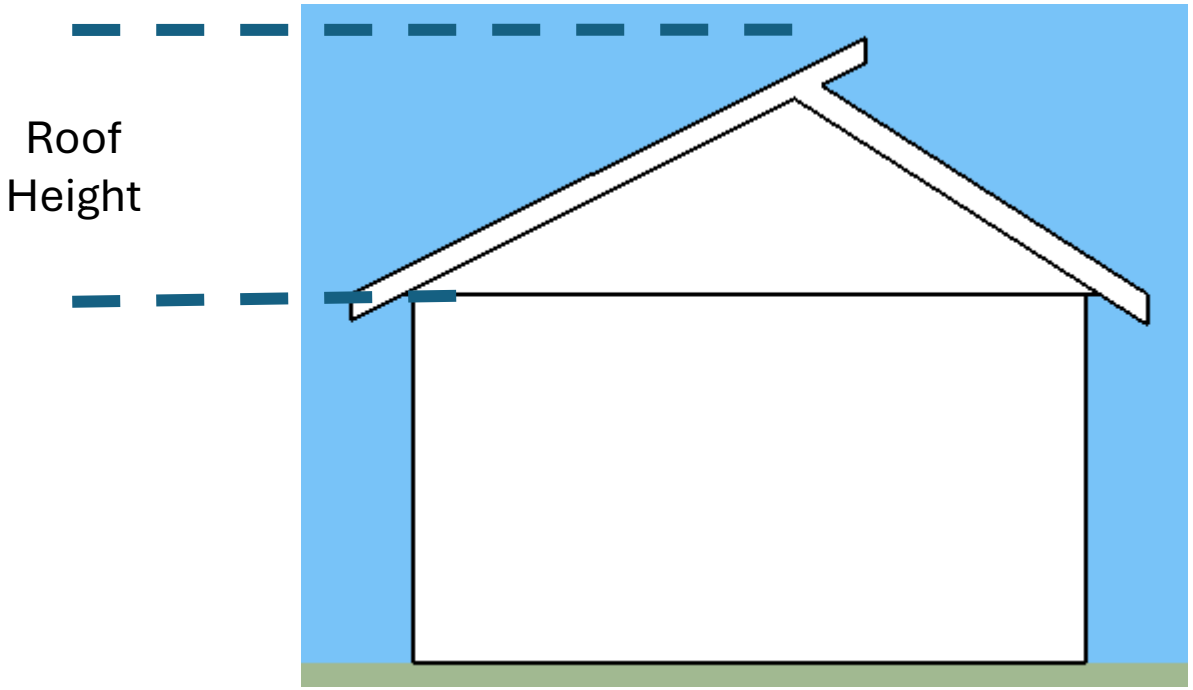


Figure A-9.23.13.7.(3) -B
Eave-to-ridge Height

Source: BC Building Code 2024

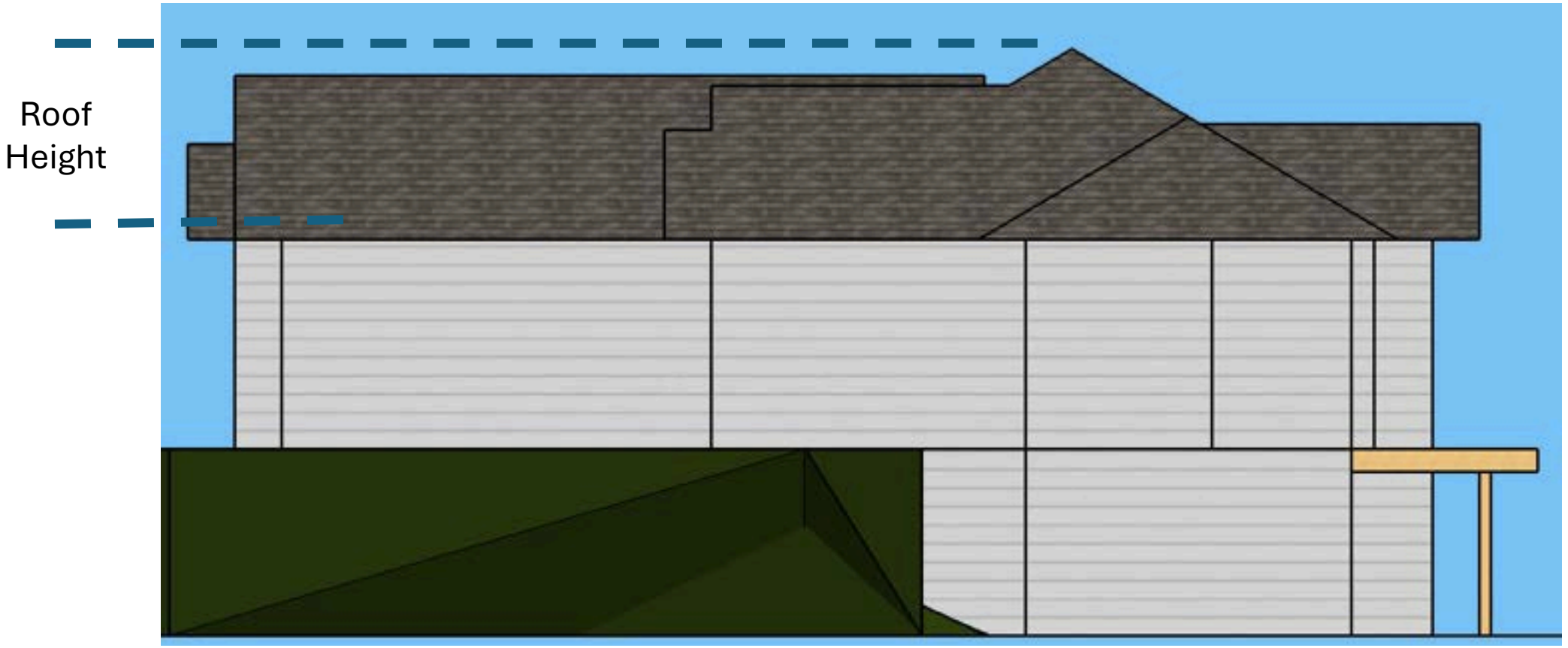
New Concepts: Factors – K(W)roof

(Wind) Roof Height Eave-to-Ridge Factor



New Concepts: Factors – K(W)roof

(Wind) Roof Height Eave-to-Ridge Factor



New Concepts: Factors – K(W)roof

(Wind) Roof Height Eave-to-Ridge Factor

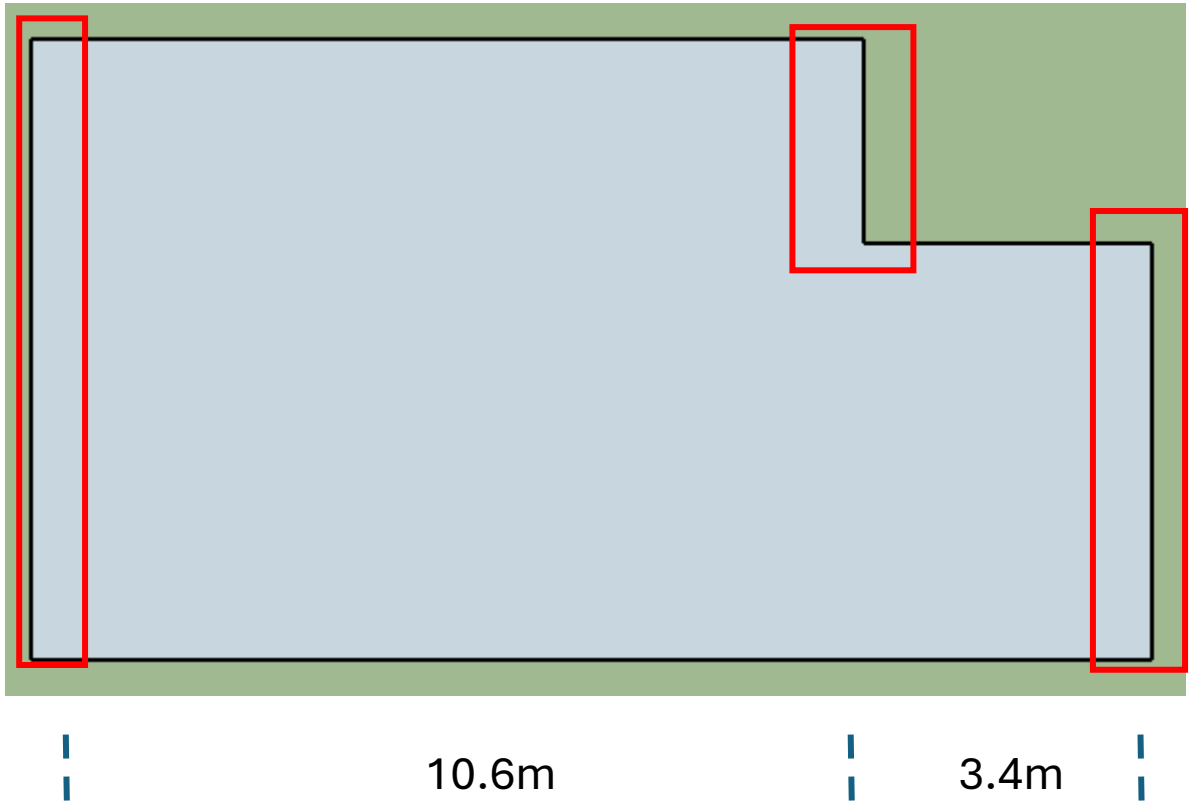
Table 9.23.13.7.-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
Kroof (2)	Roof eave-to-ridge height: apply factor separately to each *storey*	*Storey* supporting roof only	≤ 1.5 m 3.0 m 4.5 m 6.0 m	0.52 1.00 1.58 1.99
		Storey supporting roof and 1 floor	≤ 1.5 m 3.0 m 4.5 m 6.0 m	0.79 1.00 1.26 1.47
		Storey supporting roof and 2 floors	≤ 1.5 m 3.0 m 4.5 m 6.0 m	0.87 1.00 1.16 1.31

Source: BC Building Code 2024

New Concepts: Factors – K(W)spacing and K(W)number

(Wind) Average Band Spacing of Bands, and Number of Parallel Bands, in the same Orthogonal Direction Factors



Distance between centerlines of furthest end Bands 14m

3 Bands

2 spacings

14m / 2 spacings

Average Band Spacing = 7m

New Concepts: Factors – K(W)spacing

(Wind) Average Band Spacing of Bands in the same Orthogonal Direction Factor

Table 9.23.13.7.-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
$K_{Wspacing}$ (2) (3) (4)	*Braced wall band* spacing: apply factor to all *braced wall panels* per *building* plan direction	Any *storey*	3.8 m 7.6 m 10.6 m 15 m (5)	0.51 1.00 1.35 1.86

Source: BC Building Code 2024

New Concepts: Factors – K(W)number

(Wind) Number of Parallel Bands in same Orthogonal Direction Factor

Table 9.23.13.7.-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
$K_{Wnumber}$	Number of parallel *braced wall bands*: apply factor to all *braced wall panels* per *building* plan direction	Any *storey*	2 3 4 ≥ 5	1.00 1.28 1.38 1.43

Source: BC Building Code 2024

New Concepts: Factors – K(S)(weight)

(Seismic) Weight of Construction Factor

- Not a new concept, but code users now have more details on how to determine Weight of Construction

- Normal weight provides for typical wood-framed assemblies with lightweight/normal weight finish materials (roof coverings, floor finished and claddings)

- Heavyweight provides for typical wood-framed assemblies with heavyweight finish materials (roof coverings, floor finishes or claddings)

- Stone/Masonry veneer provides for typical wood-framed wall assemblies with stone/masonry veneer claddings

New Concepts: Factors – K(S)snow

(Seismic) Roof Snow Load Factor

Table 9.23.13.7-D
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Seismic Forces
Forming Part of Sentence 9.23.13.7.(4)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{snow} (4)	Stone veneer cladding perpendicular to the *braced wall band*, 2 height, fully clad: Apply fa resonding to dept irection of the *br nd* for one or two *building* face(s).	*Storey* supporting roof only	≤ 2kPa	1.00
			3 kPa	1.20
			4 kPa	1.40
			5 kPa	1.60
			6 kPa	1.80

Apply separately to each Storey for Bracing

Source: BC Building Code 2024

New Concepts: Factors – K(S)spacing & K(S)number

(Seismic) Average Band Spacing of Bands in the same Orthogonal Direction Factor, and
(Seismic) Number of Parallel Bands in same Orthogonal Direction Factor

Table 9.23.13.7.-D
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Seismic Forces
Forming Part of Sentence 9.23.13.7.(4)

Symbol	Description	*Storey*	Condition	Adjustment Factor
$K_{Sspacing}$ (5) (6)	*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 (7)	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

Wind Values

0.51 1.00 1.35 1.86
1.00 1.28 1.38 1.43

Source: BC Building Code 2024

New Concepts: Factors – Kgyp & Ksheath

(Wind and Seismic) Interior/Reverse Gypsum Wall Board Factor, and
(Wind and Seismic) Sheathing Continuity Factor

Table 9.23.13.7.-D
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Seismic Forces
Forming Part of Sentence 9.23.13.7.(4)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or ommitted 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

Wind Values

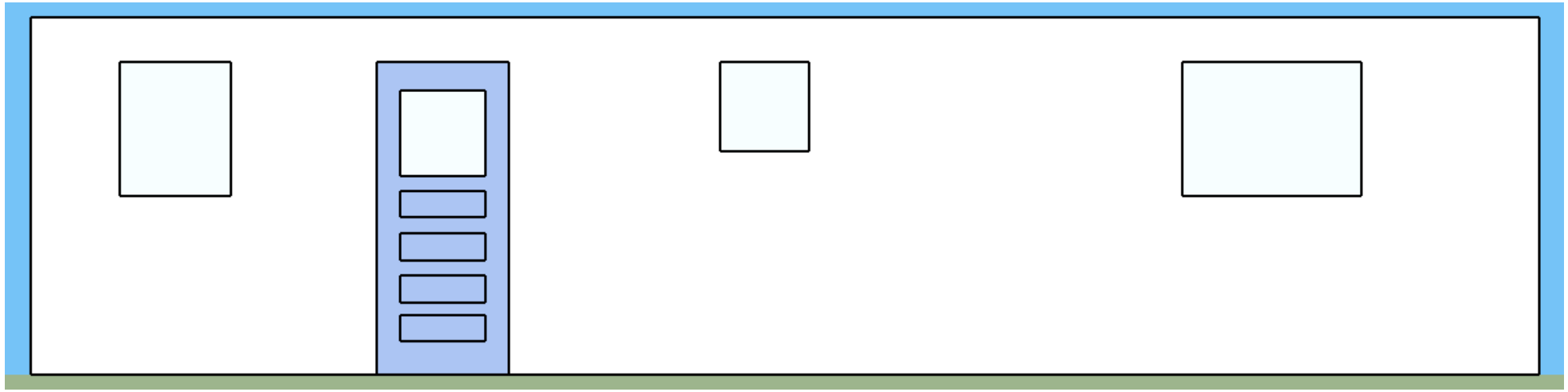
1.00
1.20
1.40

1.00
1.15

Source: BC Building Code 2024

New Concepts: Sheathing Continuity

Typical exterior wall elevation representing a Band

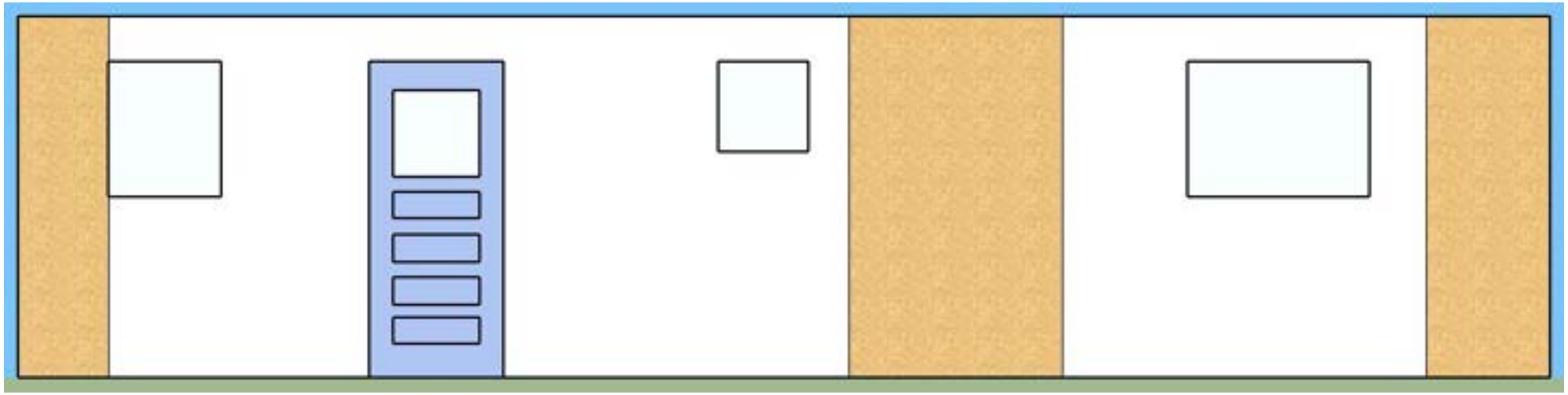


New Concepts: Sheathing Continuity

Required Panels are located within the Band

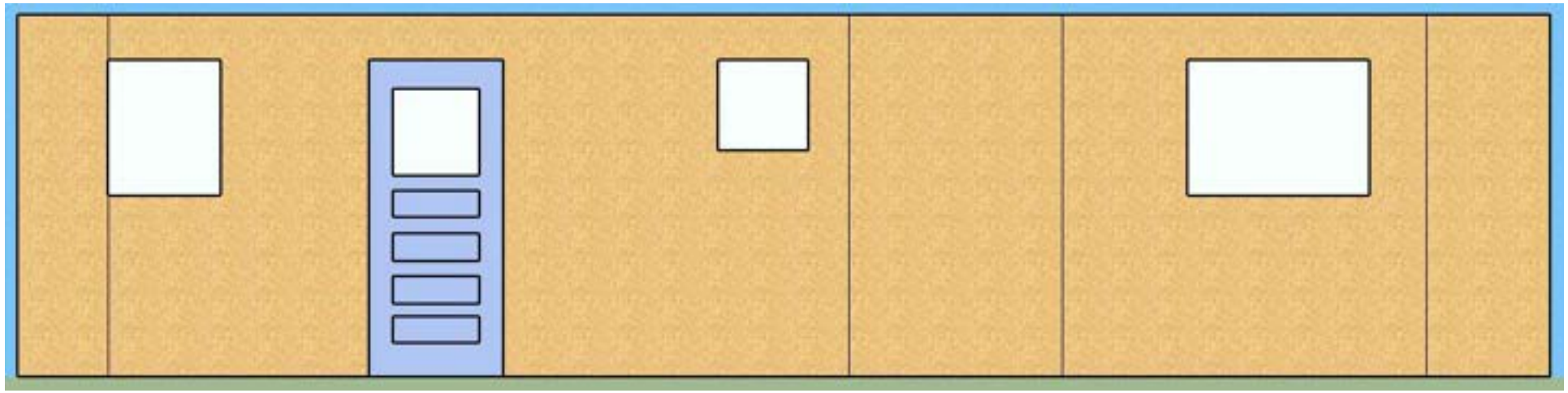
Panels can be of any Reference Framing Type^

Panels can be located in any Band^



New Concepts: Sheathing Continuity

- Band is sheathed with between Panels with same material type as Panels
- Intermediate sheathing does not need to meet construction requirements of Panels
- Band is considered Continuously Sheathed
- Ksheath = 1



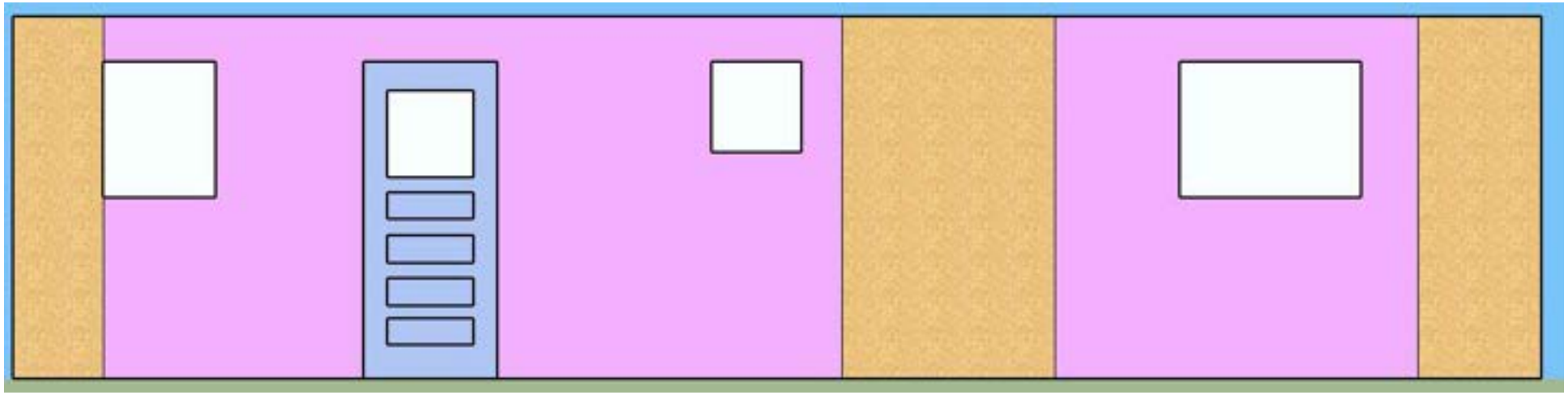
New Concepts: Sheathing Continuity

Band is sheathed with alternative materials between Panels

Provision allows for foam or wood-fiber sheathing to be used

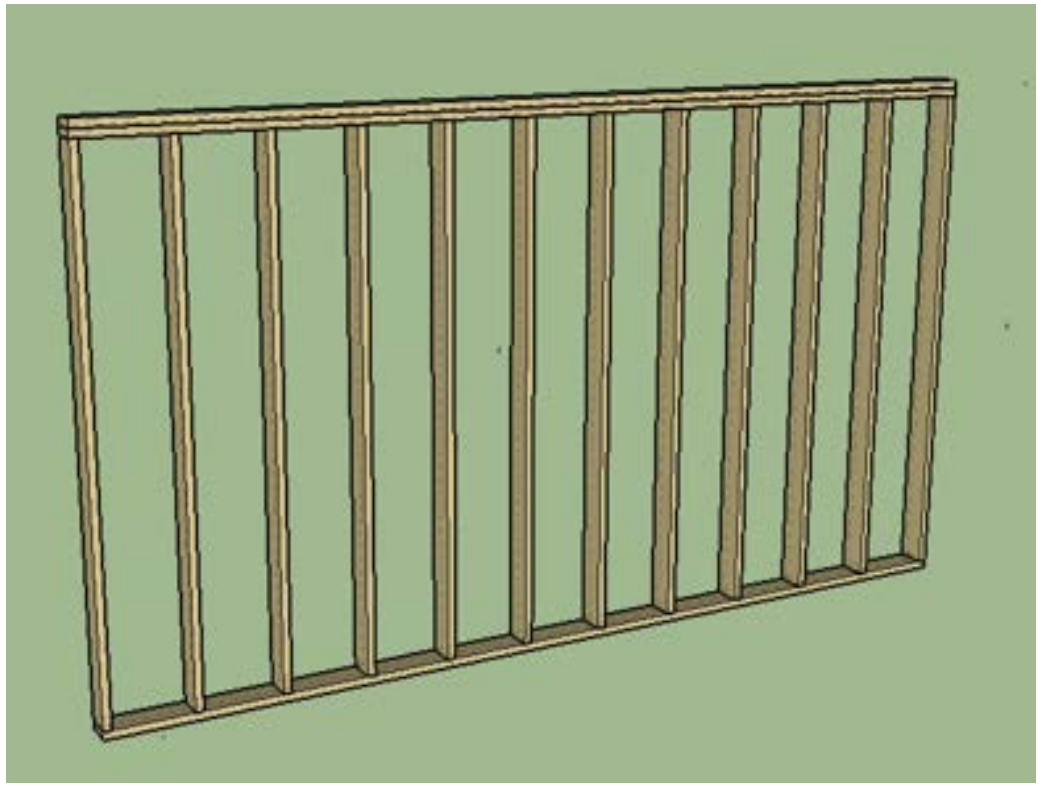
Band is considered Intermittently Sheathed

Ksheath = 1.15



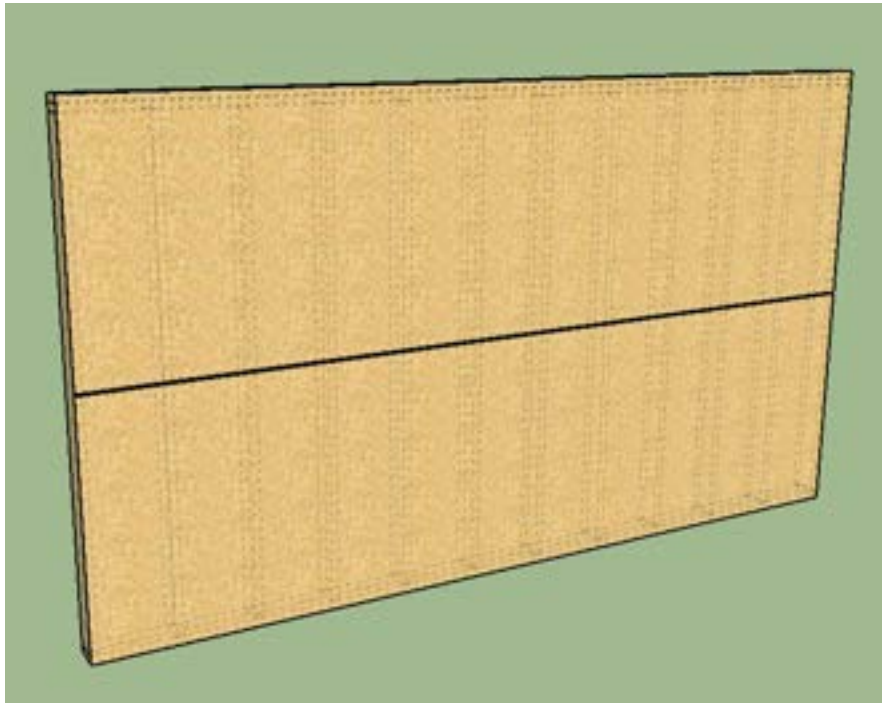
New Concepts: Primary and Secondary Bracing

Typical light wood-framed wall without sheathing

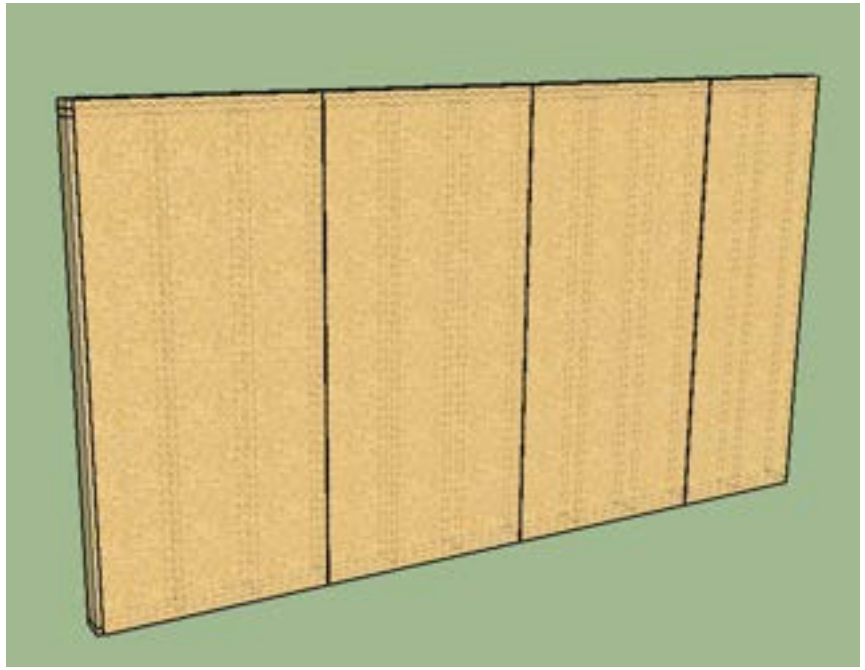


New Concepts: Primary and Secondary Bracing

Primary Bracing (Typically Wood Based Panels on Exterior Walls)



OR

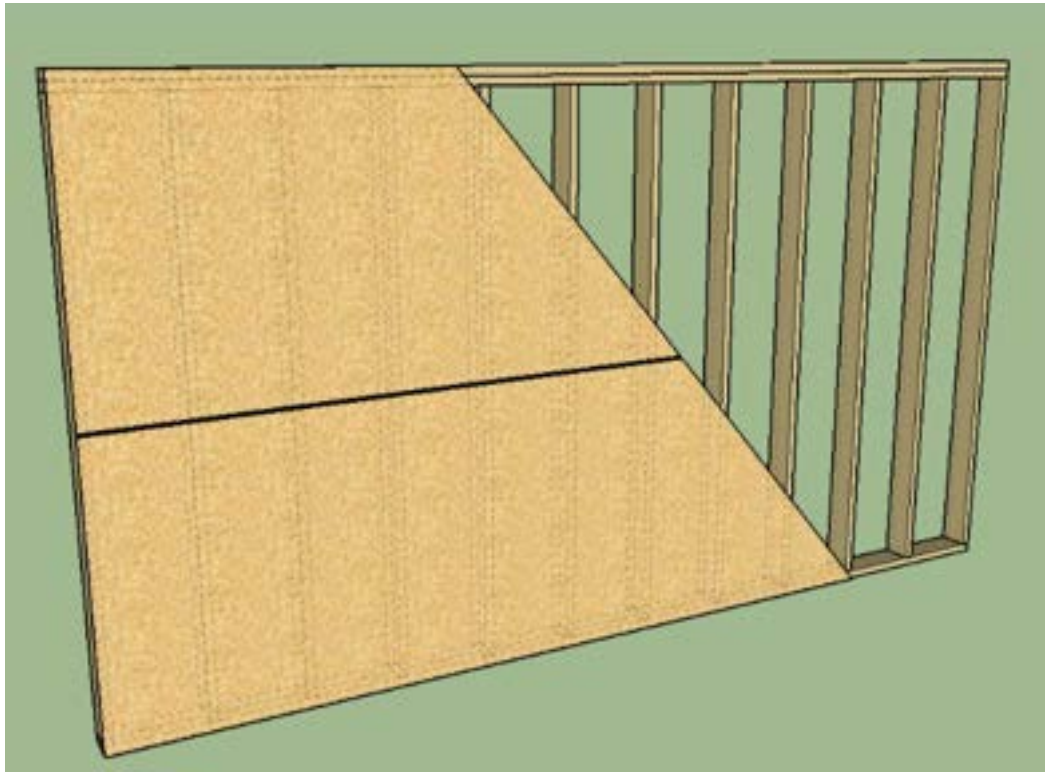


Notes to Table 9.23.3.5.-C:
(2) Plywood, OSB, waferboard and board lumber shall conform to the material standards specified in Subsection 9.23.17. Wood-based panels may be installed vertically or horizontally. Gypsum sheathing shall conform to the requirements of gypsum board in Subsection 9.29.5.

New Concepts: Primary and Secondary Bracing

Primary Bracing (Typically Wood Based Panels on Exterior Walls)

No Blocking Required

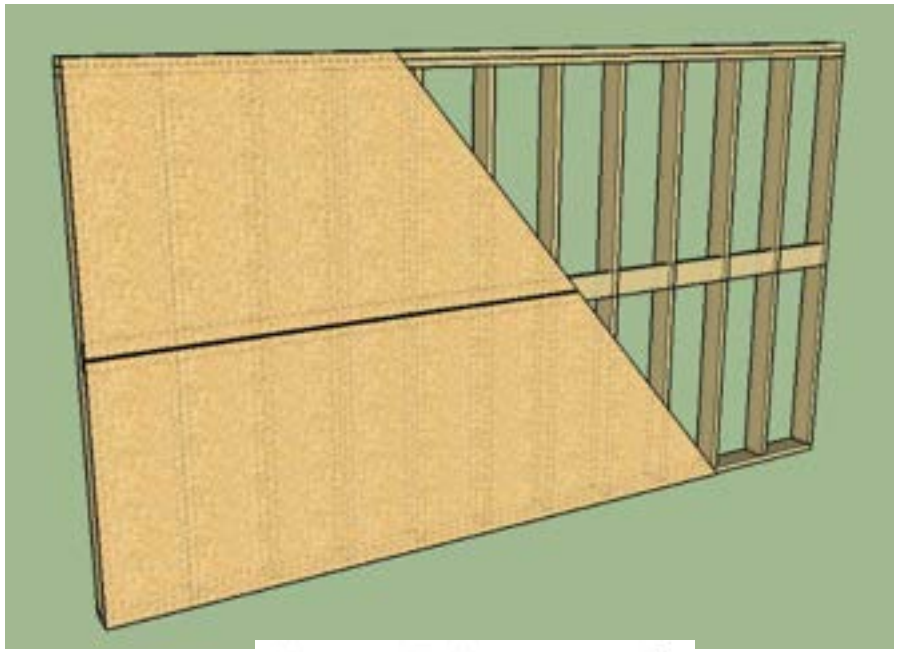


WSP-A	
WSP-B	When studs spaced less than 2' o.c.
WSP-C	When studs spaced less than 2' o.c.
WSP-D	When studs spaced less than 2' o.c.
WSP-E	When studs spaced less than 2' o.c.

New Concepts: Primary and Secondary Bracing

Primary Bracing (Typically Wood Based Panels on Exterior Walls)

Blocking for edge support and nailing of Primary Bracing



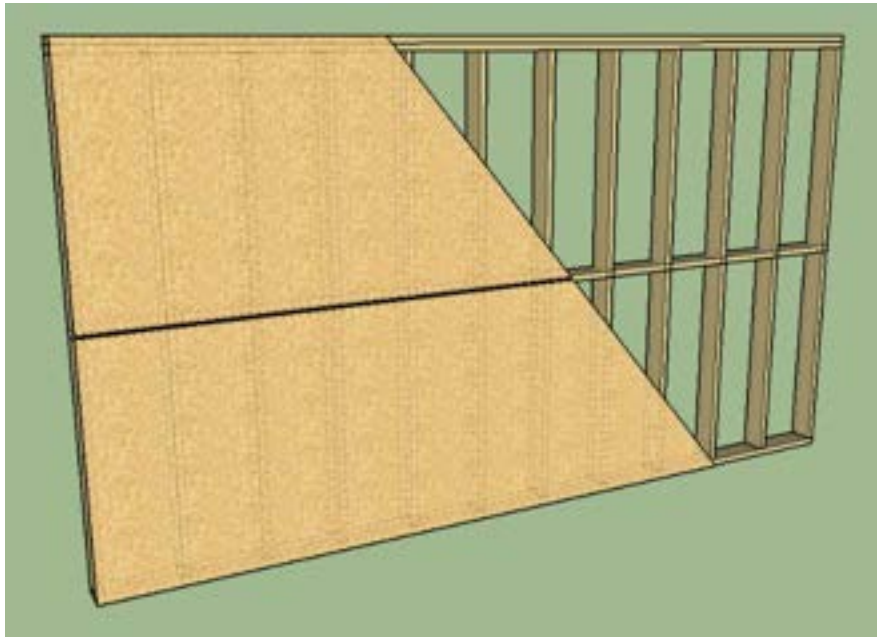
WSP-B

WSP-C

WSP-D

WSP-E

All above with 2' o.c. Stud Spacing



Notes to Table 9.23.3.5.-C:

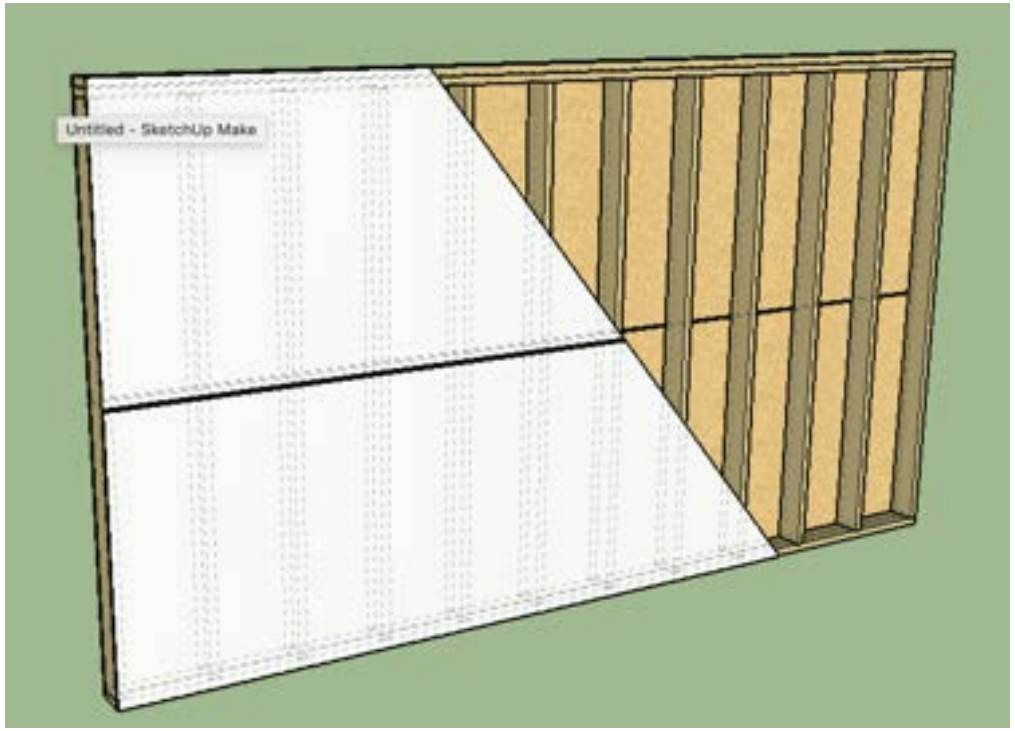
(7) Where blocking is required, horizontal joints of panel sheathing shall occur over blocking consisting of not less than 38 mm x 89 mm lumber oriented either edgewise or flatwise, and the panel sheathing shall be fastened to the blocking.

New Concepts: Primary and Secondary Bracing

Secondary Bracing (Typically Gypsum board on Interior of Exterior Wood Based Panels)

Installed

Kgyp Adjustment Factor is
1 for Band



K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or ommitted on interior side of *braced wall panels*	Any *storey*	Installed	1.00
			Omitted, blocked wall	1.20
			Omitted, unblocked wall	1.40

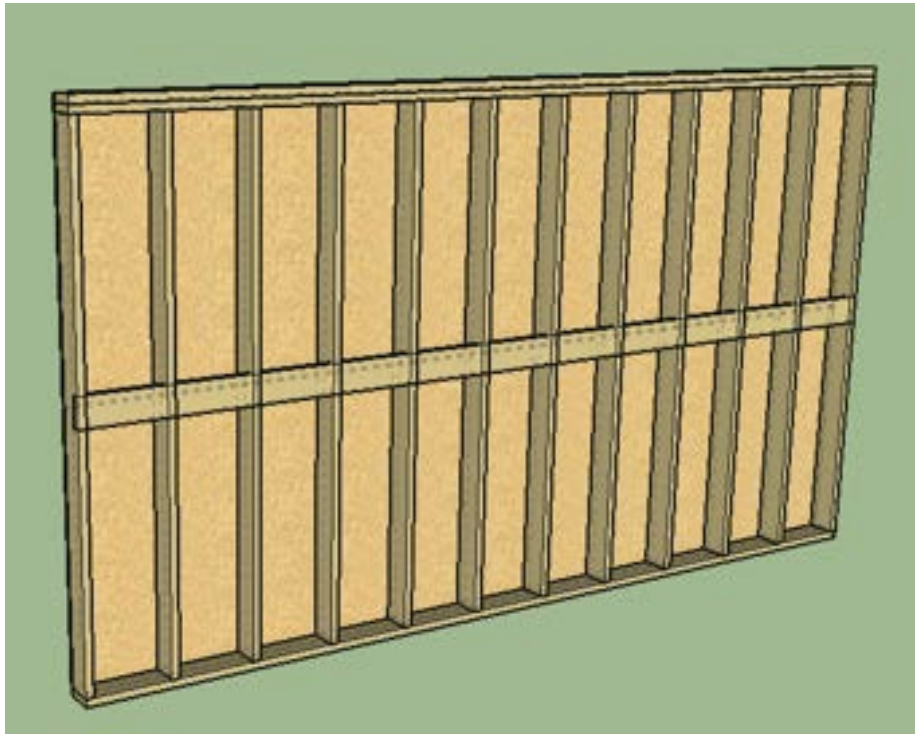
New Concepts: Primary and Secondary Bracing

Secondary Bracing (Typically Gypsum Based Panels on Interior of Exterior Walls)

Omitted, blocked wall

Kgyp Adjustment Factor is 1.20 for Band

If positioned correctly, the blocking could provide for Primary and Secondary blocking requirements



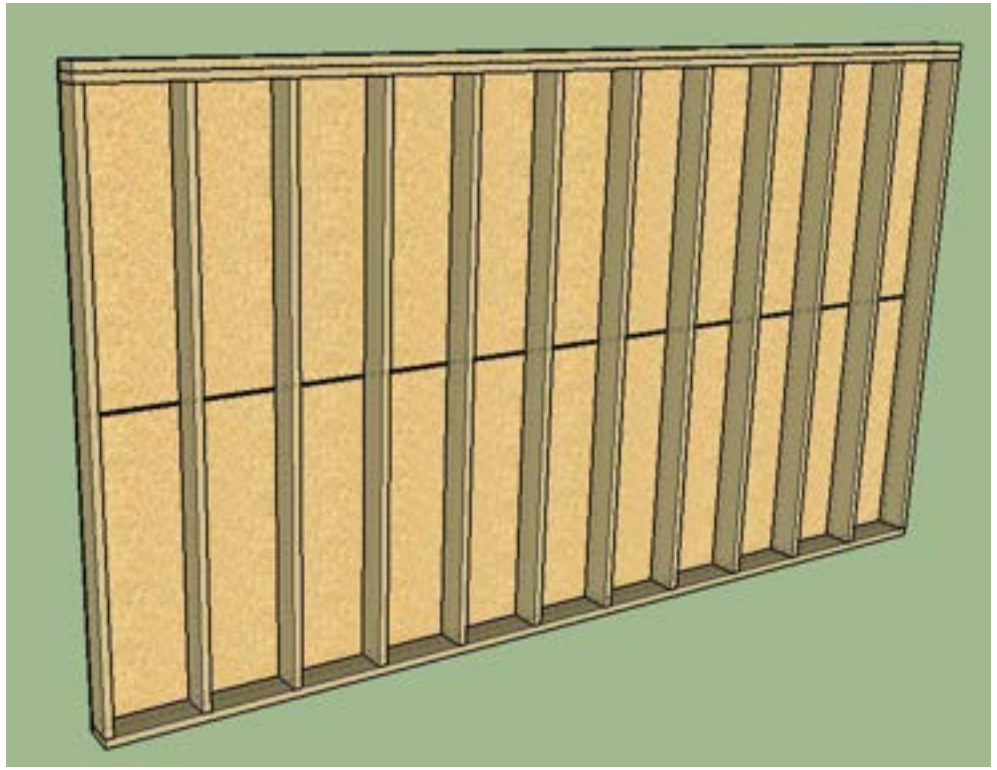
K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or ommitted on interior side of *braced wall panels*	Any *storey*	Installed	1.00
			Omitted, blocked wall	1.20
			Omitted, unblocked wall	1.40

New Concepts: Primary and Secondary Bracing

Secondary Bracing (Typically Gypsum Based Panels on Interior of Exterior Walls)

Omitted, unblocked wall

Kgyp Adjustment Factor is 1.40 for Band



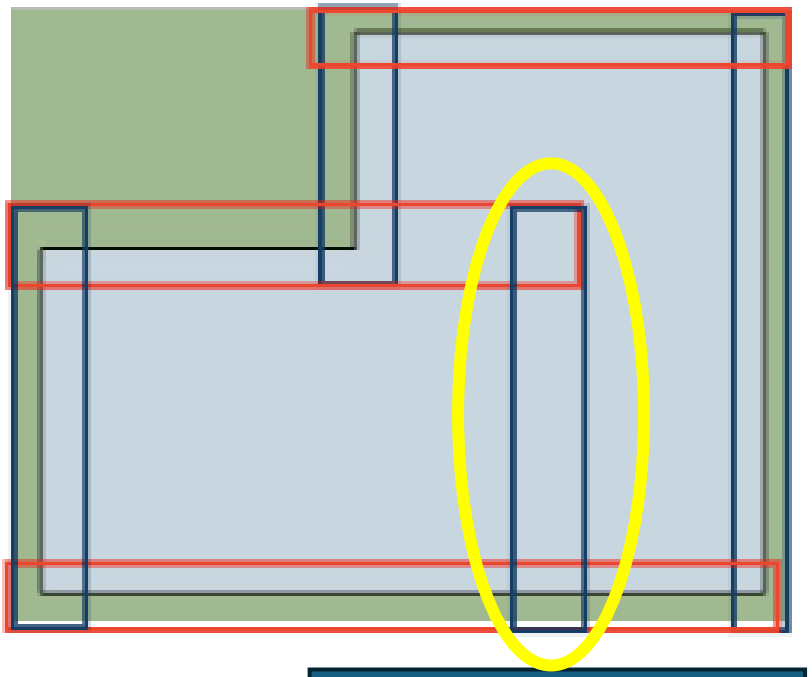
K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or ommitted on interior side of *braced wall panels*	Any *storey*	Installed	1.00
			Omitted, blocked wall	1.20
			Omitted, unblocked wall	1.40

Methods of Calculation: Overview

The Calculation Method (Tables and Alternative), and
The Simplified Approach

The goal with <u>any</u> method of calculation is to determine the total amount of linear bracing (ie Panel) length required;

- within a specific Band,
- on a specific Storey for Bracing,
- within a specific Building,
- built at a specific Site/Location



Understand the Site

Understand the Building

Understand the Braced Wall Band Plan

Methods of Calculation: Overview

Understand the Site

- Location
  - Regional Wind Loads
  - Regional Seismic Loads
  - Regional Snow Loads
- Site
  - Site-specific effects on Wind Loads
  - Site-specific effects on Seismic Loads
  - Site-specific effects on Snow Loads

- All of these have an affect on the amount bracing required in a Band

- All are environmental related aspects that are dependent on site and location

- Designers have no control over these aspects (or only a little)

Methods of Calculation: Overview

Understand the Building

- Size of Building
  - Number of Storeys for Bracing
  - Building Plan Dimensions for each Storey for Bracing
  - Maximum Roof Height on uppermost Storey for Bracing
- Construction of Building
  - Weight of Construction
  - Proposed Reference Framing Type (of Band being calculated)
  - Interior/Reverse Gypsum Board installation
  - Is the Band Continuously Sheathed

- All of these have an affect on the amount bracing required in a Band

- All design related aspects that are dependent on choices of the designer

- Designers have control over all these aspects

Methods of Calculation: Overview

Understand the Braced Wall Band Plan

- Location of the Band being calculated
  - Storey for Bracing
  - Orthogonal Direction
- Context to other Bands in same Storey for Bracing and Orthogonal Direction
  - Number of Bands
  - Average Spacing of Bands

Calculation Method (Tables) Overview

Calculation Summary

Total amount of bracing length required for a Band, on a specific Storey for Bracing, for your specific building design

The Code Tables bracing length for a Band, on a specific Storey for Bracing, for based on the code reference building.

Construction and mathematical Factors that increase or decrease the Unadjusted Length. Factors change depending on your specific building type, size and location

Calculation Method (Tables) Overview

Calculation Summary for Wind

Wind

3) For resistance to wind pressure, the minimum total length of *braced wall panels* in each *braced wall band*, L_w, shall be determined by applying the adjustment factors provided in Table 9.23.13.7.-B to the unadjusted minimum total *braced wall panel* length Luw provided in Table 9.23.13.7.-A using the following equation:

$$L_w = L_{uw} K_{exp} K_{roof} K_{Wspacing} K_{Wnumber} K_{gyp} K_{sheath} \geq BWP_{min}$$

Source: BC Building Code 2024

Adjusted Length = Unadjusted Length × Factors

Calculation Method (Tables) Overview

Calculation Summary for Earthquake

Earthquake

4) For resistance to seismic forces, the minimum total length of *braced wall panels* in each *braced wall band*, Ls, shall be determined by applying the adjustment factors provided in Table 9.23.13.7.-D to the unadjusted minimum total *braced wall panel* length, Lus, provided in Table 9.23.13.7.-C using the following equation:

$$Ls = L_{us} K_{weight} K_{snow} K_{Sspacing} K_{Snumber} K_{gyp} K_{sheath} \geq BWP_{min}$$

Source: BC Building Code 2024

Adjusted Length = Unadjusted Length × Factors

Calculation Method (Tables) Overview

Calculation Summary Code Table References

Total amount of bracing length required for a Band, on a specific Storey for Bracing, for your specific building design

Wind	Table 9.23.13.7.-A
Earthquake	Table 9.23.13.7.-C

Wind	Table 9.23.13.7.-B
Earthquake	Table 9.23.13.7.-D

Calculation Method (Tables) Overview

Calculation Summary Required Inputs

	Wind	Earthquake (Seismic)
Unadjusted Length	Hourly Wind Pressure (1/50) Reference Framing Type Storey for Bracing	Smax (Location and Site Class) Reference Framing Type Storey for Bracing Building Dimension Parallel to Band
Factors	Exposure Eave-to-Ridge Height Average Spacing of Bands Number of Bands Interior/Reverse Gypsum Sheathing Continuity	Weight of Construction Roof Snow Load Average Spacing of Bands Number of Bands Interior/Reverse Gypsum Sheathing Continuity

Calculation Method (Tables) Overview

Unadjusted Length for Wind

Wind

Unadjusted Length

Table 9.23.13.7.-A

Hourly Wind Pressure (1/50)

Reference Framing Type

Storey for Bracing

Table 9.23.13.7.-A
Unadjusted Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

HWP	*Storey*	Unadjusted Minimum Total *Braced Wall Panel* Length for Wind, Luw, m [1]								
		Diagonal- Lumber-Sheathed Framing Type (with gypsum board on opposite side) [2]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [2] [3]				Wood-sheathed Framing Type (with gypsum board on opposite side) [2]			
		DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
		.65	3.29	1.91	1.42	1.14	1.14	0.60	0.52	0.48	0.43
HWP ≤ 0.3		.33	6.75	3.92	2.91	2.35	2.35	1.24	1.08	0.98	0.88

Unadjusted Length (m)

Source: BC Building Code 2024

Calculation Method (Tables) Overview

Unadjusted Length for Earthquake

Earthquake (Seismic)

Unadjusted Length

Table 9.23.13.7.-C

Smax (Location and Site Class)

Reference Framing Type

Storey for Bracing

Building Dimension Parallel to Band

Table 9.23.13.7.-C
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(4)

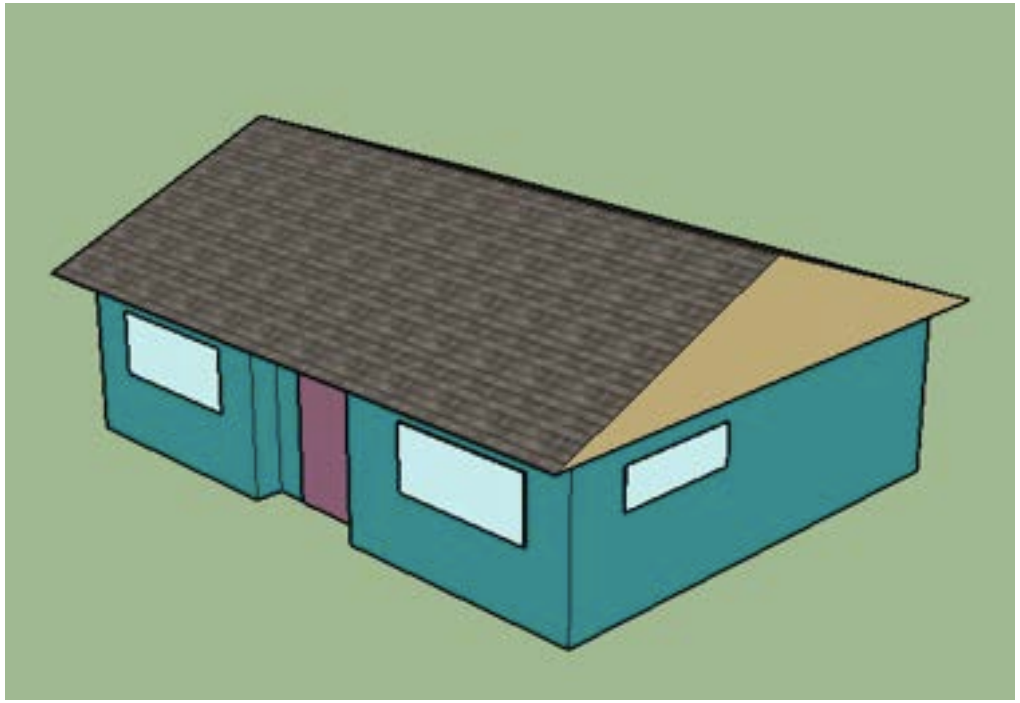
S_{max}	*Storey*	*Building* Plan Dimension Parallel to *Braced Wall Band*, Lwl, m	Unadjusted Minimum Total *Braced Wall Panel* Length for Seismic Forces, L_{us}, m (1) (2)									
			Diagonal-Lumber-Sheathed Framing Type (with gypsum board on opposite side) (3)	Gypsum-Sheathed Framing Type (with gypsum 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										
		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

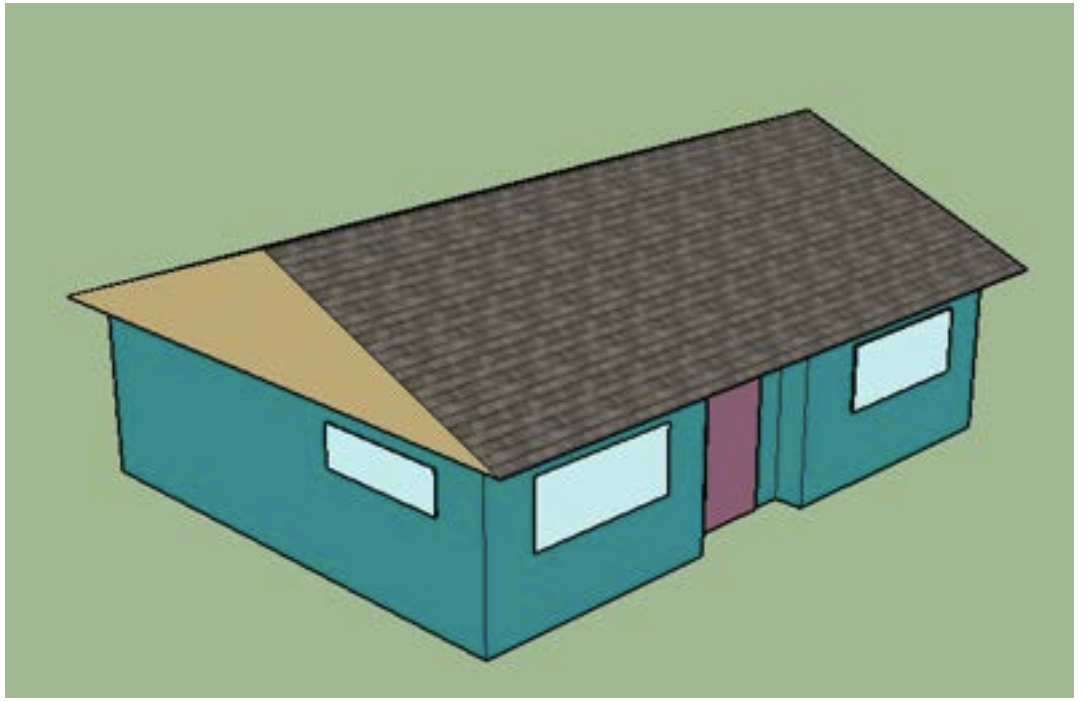
Unadjusted Length (m)

Source: BC Building Code 2024

Example House (Simple)

Overview

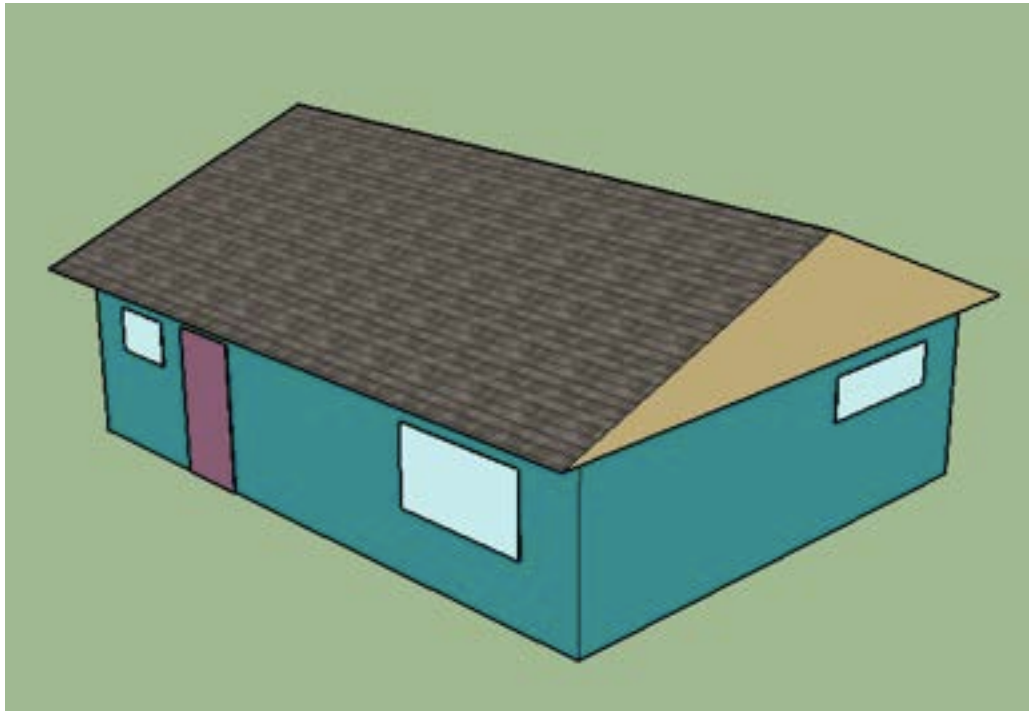


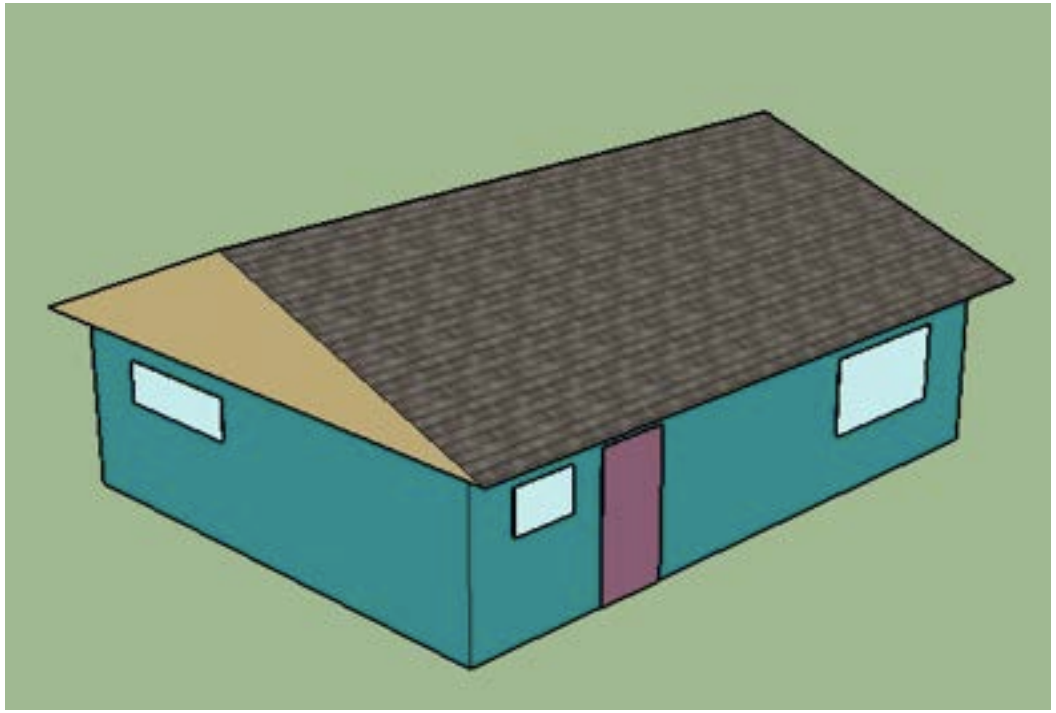


Front

Example House (Simple)

Overview





Back

Example House (Simple)

Understand the Site

- Location
- HWP (1/50)
- Terrain
- Site Class
- Smax
- Roof Snow Load

Table C-2 (continued)

Province and Location	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%									S_s	S_r	1/10	1/50
		2.5% °C	1% °C	Dry °C	Wet °C											

Source: BC Building Code 2024

Table C-3 (continued)

Province and Location	S_{max} for Unknown Site Class	S_{max} According to Site Class				
		A	B	C	D	E

Source: BC Building Code 2024

Example House (Simple)

Understand the Site

Location	Nanaimo
HWP (1/50)	
Terrain	
Site Class	
Smax	
Roof Snow Load	

Table C-2 (continued)

Province and Location	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%												
		2.5% °C	1% °C	Dry °C	Wet °C								S_s	S_r	1/10	1/50
Nanaimo	15	-6	-8	27	19	2920	10	91	1000	1.1	1050	200	2.1	0.4	0.38	0.48

Source: BC Building Code 2024

Table C-3 (continued)

Province and Location	S_{max} for Unknown Site Class	S_{max} According to Site Class				
		A	B	C	D	E
Nanaimo	1.55	0.571	0.7	1.15	1.5	1.55

Source: BC Building Code 2024

Example House (Simple)

Understand the Site

Location	Nanaimo
HWP (1/50)	0.48
Terrain	
Site Class	
Smax	
Roof Snow Load	

Table C-2 (continued)

Province and Location	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%									S_s	S_r	1/10	1/50
		2.5% °C	1% °C	Dry °C	Wet °C											
Nanaimo	15	-6	-8	27	19	2920	10	91	1000	1.1	1050	200	2.1	0.4	0.38	0.48

Source: BC Building Code 2024

Table C-3 (continued)

Province and Location	S_{max} for Unknown Site Class	S_{max} According to Site Class				
		A	B	C	D	E
Nanaimo	1.55	0.571	0.7	1.15	1.5	1.55

Source: BC Building Code 2024

Example House (Simple)

Understand the Site

Location	Nanaimo
HWP (1/50)	0.48
Terrain	
Site Class	
Smax	
Roof Snow Load	1.555

Table C-2 (continued)

Province and Location	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%												
		2.5% °C	1% °C	Dry °C	Wet °C								S_s	S_r	1/10	1/50
Nanaimo	15	-6	-8	27	19	2920	10	91	1000	1.1	1050	200	2.1	0.4	0.38	0.48

Source: BC Building Code 2024

Table C-3 (continued)

Province and Location	S_{max} for Unknown Site Class	S_{max} According to Site Class				
		A	B	C	D	E
Nanaimo	1.55	0.571	0.7	1.15	1.5	1.55

Source: BC Building Code 2024

Example House (Simple)

Understand the Site

Location	Nanaimo
HWP (1/50)	0.48
Terrain	
Site Class	Unknown
Smax	
Roof Snow Load	1.55

Table C-2 (continued)

Province and Location	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%									S_s	S_r	1/10	1/50
		2.5% °C	1% °C	Dry °C	Wet °C											
Nanaimo	15	-6	-8	27	19	2920	10	91	1000	1.1	1050	200	2.1	0.4	0.38	0.48

Source: BC Building Code 2024

Table C-3 (continued)

Province and Location	S_{max} for Unknown Site Class	S_{max} According to Site Class				
		A	B	C	D	E
Nanaimo	1.55	0.571	0.7	1.15	1.5	1.55

Source: BC Building Code 2024

Example House (Simple)

Understand the Site

Location	Nanaimo
HWP (1/50)	0.48
Terrain	
Site Class	Unknown
Smax	1.55
Roof Snow Load	1.555

Table C-2 (continued)

Province and Location	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa	
		January		July 2.5%									S_s	S_r	1/10	1/50
		2.5% °C	1% °C	Dry °C	Wet °C											
Nanaimo	15	-6	-8	27	19	2920	10	91	1000	1.1	1050	200	2.1	0.4	0.38	0.48

Source: BC Building Code 2024

Table C-3 (continued)

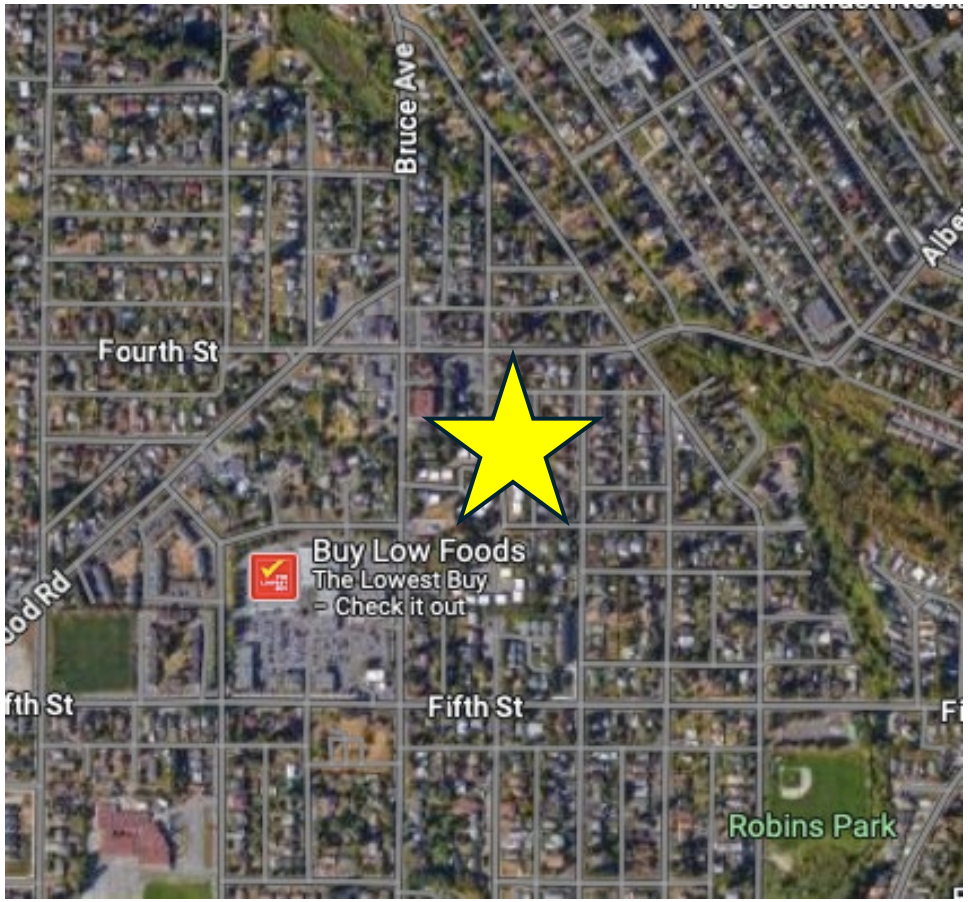
Province and Location	S_{max} for Unknown Site Class	S_{max} According to Site Class				
		A	B	C	D	E
Nanaimo	1.55	0.571	0.7	1.15	1.5	1.55

Source: BC Building Code 2024

Example House (Simple)

Understand the Site

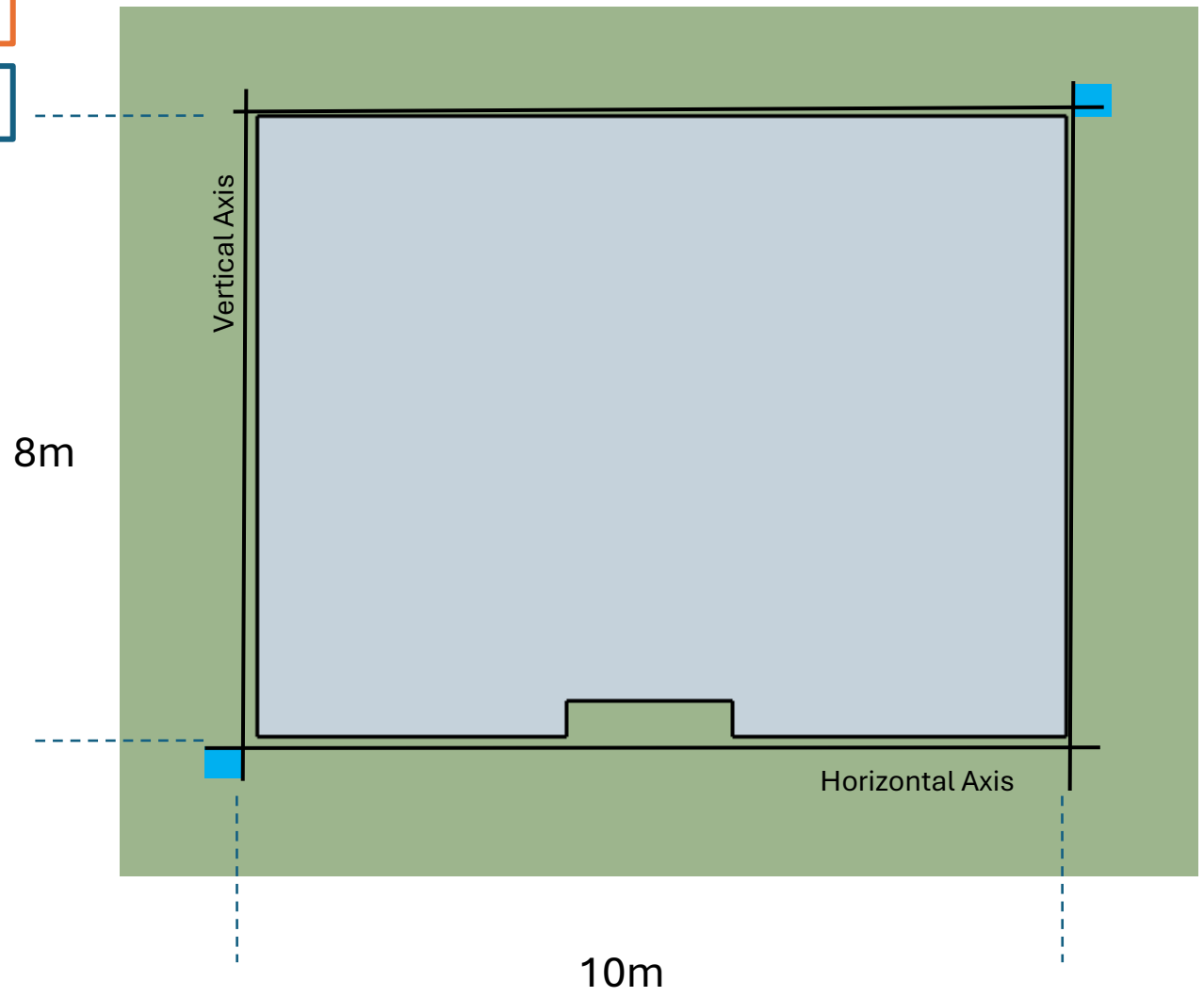
Location	Nanaimo
HWP (1/50)	0.48
Terrain	Rough
Site Class	Unknown
Smax	1.55
Roof Snow Load	1.555



Example House (Simple)

Understand the Building

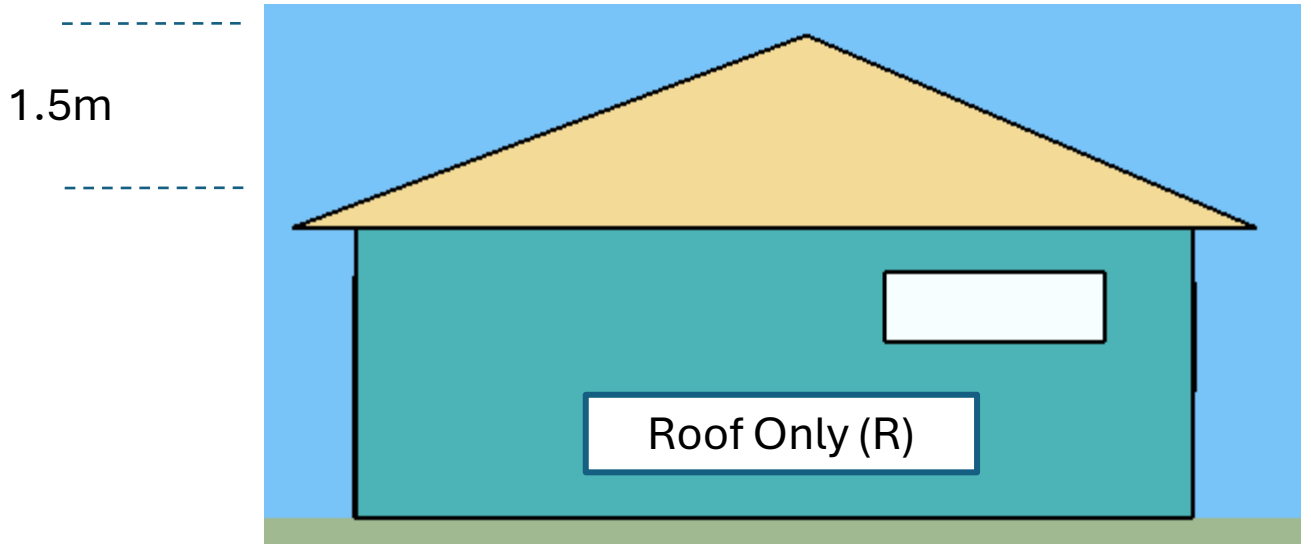
Building Plan Dimensions



Example House (Simple)

Understand the Building

Storeys for Bracing and Eave-to-Ridge Height



Example House (Simple)

Understand the Building

Building Dimensions:

- 10m (Horizontal Axis)
- 8m (Vertical Axis)

- 1.5m (Eave-to-Ridge)

Normal weight Construction

Slab on Grade

1 Storey for Bracing

Lowest wood-framed walls support no floors

Continuously Sheathed

All Bands are WSP-A with interior gypsum board installed

Example House (Simple)

Understand the Braced Wall Band Plan

Band ID and Average Band Spacing

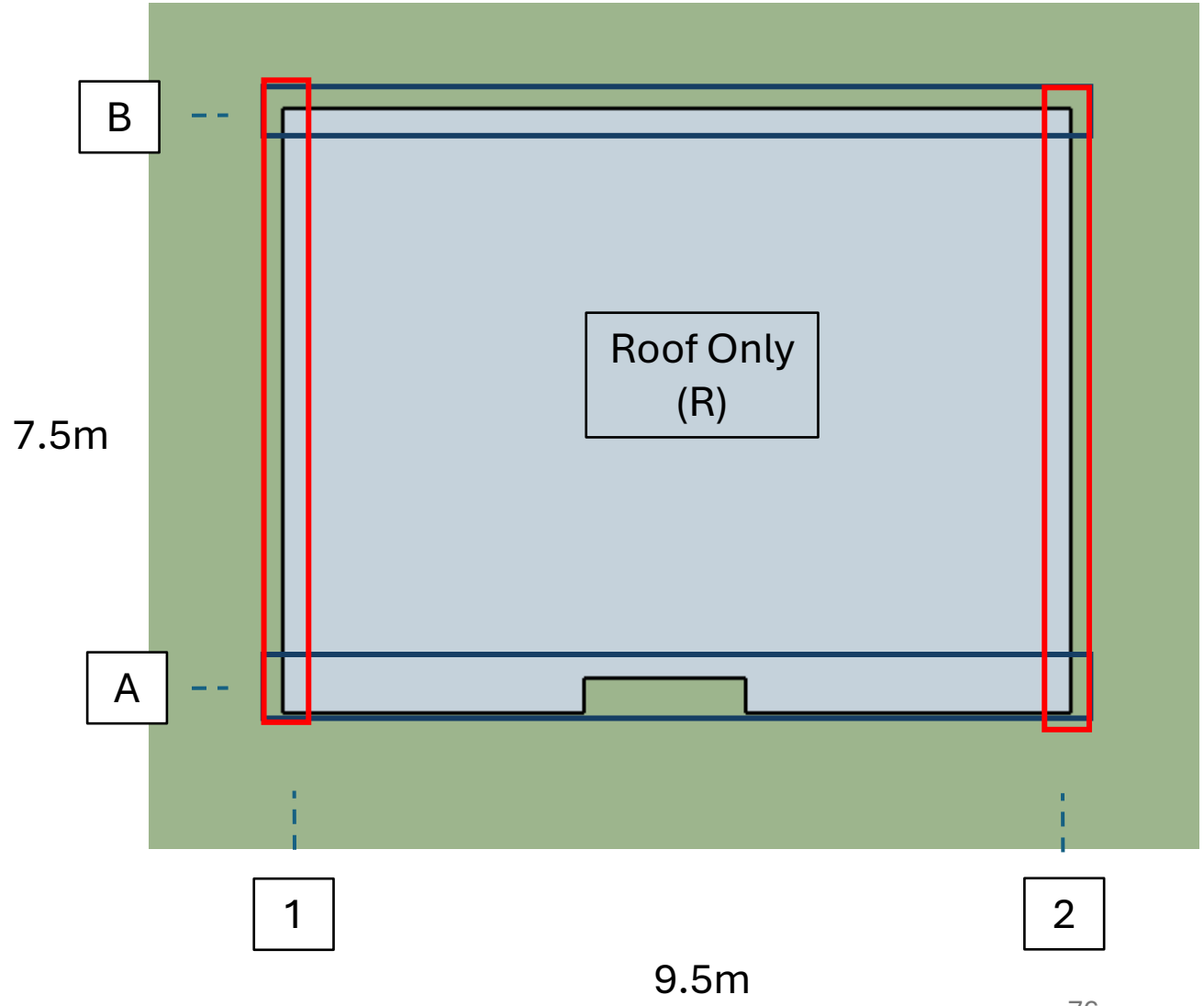
Storey supporting Roof Only (R)

Along Vertical Axis (Bands labelled A, B C…)

Distance between c/l furthest Bands: 7.5m
Number of Bands: 2
Number of Spacings: 1
Average Spacing: 7.5m

Along Horizontal Axis (Bands labelled 1, 2, 3…)

Distance between c/l furthest Bands: 9.5m
Number of Bands: 2
Number of Spacings: 1
Average Spacing: 9.5m

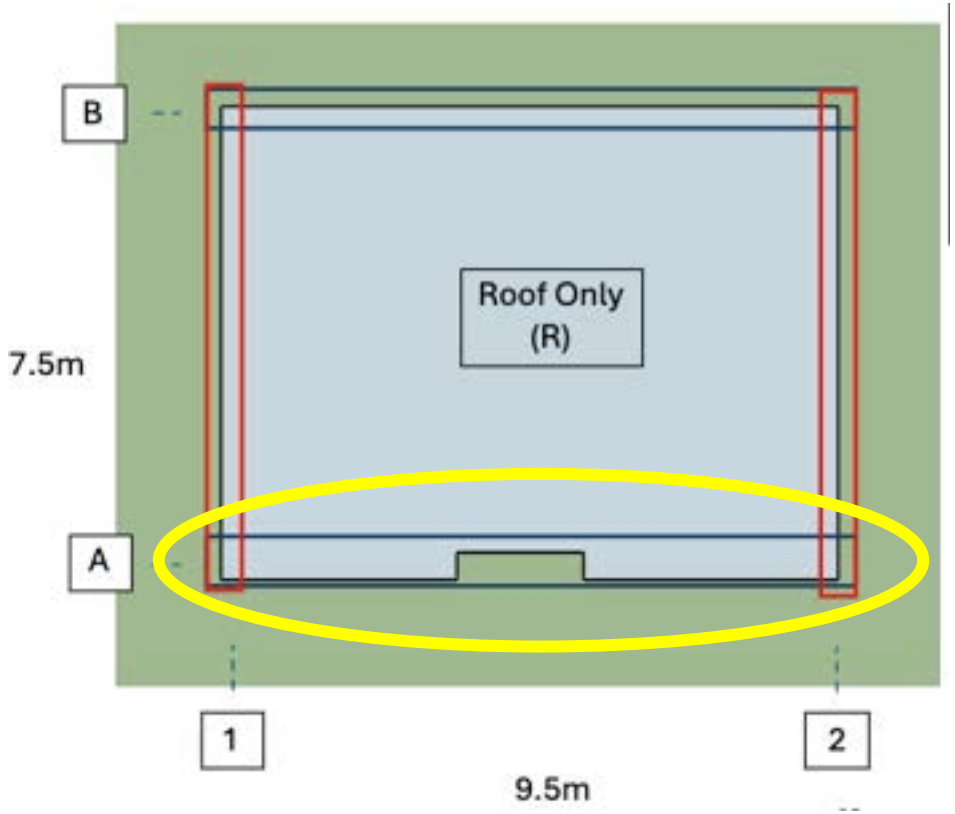


Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A								

- Identify Band for specific Storey for Bracing, Orthogonal Direction and relationship to other Bands



Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90							

- HWP (1/50): 0.48
- Band is on Storey for Bracing with walls supporting Roof Only (R)
- Reference Framing Type is WSP-A

Table 9.23.13.7.-A (continued)

		Unadjusted Minimum Total *Braced Wall Panel* Length for Wind, Luw, m [1]								
		Diagonal- Lumber-Sheathed Framing Type (with gypsum board on opposite side) [2]	Gypsum-Sheathed Framing Type (with gypsum board on only one side) [2] [3]				Wood-sheathed Framing Type (with gypsum board on opposite side) [2]			
HWP	*Storey*	DWB	GWB-A	GWB-B	GWB-C	GWB-D	WSP-A	WSP-B	WSP-C	WSP-D	WSP-E
		1.08	5.84	3.18	2.36	1.90	1.90	1.00	0.87	0.79	0.72
0.4 < HWP ≤ 0.5		2.22	11.25	6.54	4.85	3.92	3.92	2.06	1.79	1.63	1.47

Source: BC Building Code 2024

Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90	1						

- Terrain is rough

Table 9.23.13.7-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{exp} (1)	Wind exposure: apply factor to all *storeys* in both directions	All *storeys* All *storeys* in 1 – *storey building* All *storeys* in 2 – *storey building* All *storeys* in 3 – *storey building*	Rough terrain Open terrain	1.00 1.29 1.40 1.48

Source: BC Building Code 2024

Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90	1	0.52					

- Eave-to-Ridge height is 1.5m

Table 9.23.13.7.-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{roof} (2)	Roof eave-to-ridge height: apply factor separately to each *storey*	*Storey* supporting roof only	≤ 1.5 m 3.0 m 4.5 m 6.0 m	0.52 1.00 1.58 1.99
		Storey supporting roof and 1 floor	≤ 1.5 m 3.0 m 4.5 m 6.0 m	0.79 1.00 1.26 1.47
		Storey supporting roof and 2 floors	≤ 1.5 m 3.0 m 4.5 m 6.0 m	0.87 1.00 1.16 1.31

Source: BC Building Code 2024

Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90	1	0.52	0.99	1.00			

For this Orthogonal Direction
- Average Spacing is 7.5m
- Number of Bands is 2

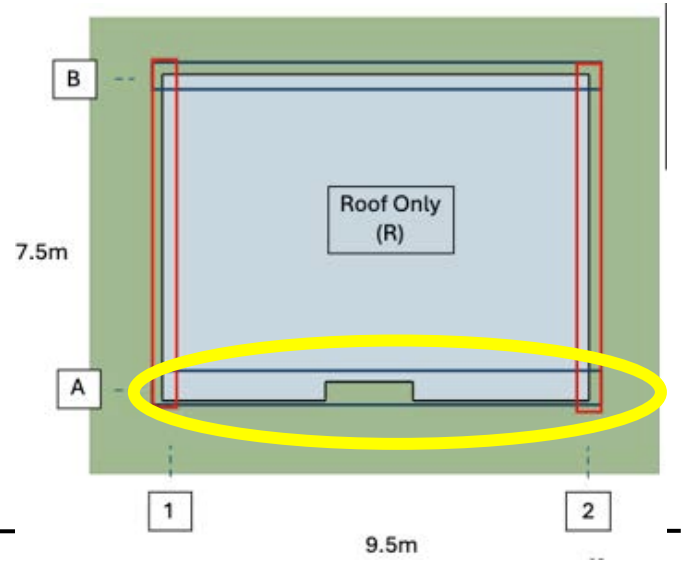


Table 9.23.13.7.-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
$K_{Wspacing}$ (2) (3) (4)	*Braced wall band* spacing: apply factor to all *braced wall panels* per *building* plan direction	Any *storey*	3.8 m 7.6 m 10.6 m 15 m (5)	0.51 1.00 1.35 1.86
$K_{Wnumber}$	Number of parallel *braced wall bands*: apply factor to all *braced wall panels* per *building* plan direction	Any *storey*	2 3 4 ≥ 5	1.00 1.28 1.38 1.43

Source: BC Building Code 2024

Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90	1	0.52	0.99	1	1	1	

- Interior/Reverse Gypsum board installed
- Continuously sheathed

Table 9.23.13.7-B
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(3)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or ommited on interior side of *braced wall panels*	Any *storey*	Installed Omitted, blocked wall Omiitted, unblocked wall	1.00 1.20 1.40
K_{sheath}	Intermittent *braced wall panels*: apply factor in accordance with continuity of sheathing within *braced wall band*	Any *storey*	Continuously sheathed Intermittently sheathed	1.00 1.15

Source: BC Building Code 2024

Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90	1	0.52	0.99	1	1	1	0.978

3) For resistance to wind pressure, the minimum total length of *braced wall panels* in each *braced wall band*, L_w, shall be determined by applying the adjustment factors provided in Table 9.23.13.7.-B to the unadjusted minimum total *braced wall panel* length Luw provided in Table 9.23.13.7.-A using the following equation:

$$L_w = L_{uw}\, K_{exp}\, K_{roof}\, K_{Wspacing}\, K_{Wnumber}\, K_{gyp}\, K_{sheath} \geq BWP_{min}$$

Source: BC Building Code 2024

Example House (Simple)

Calculate for Wind

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(W)exp	K(W)roof	K(W)spac	K(W)num	Kgyp	Ksheath	
R-A	1.90	1	0.52	0.99	1	1	1	0.978
R-B	1.90	1	0.52	0.99	1	1	1	0.978
R-1	1.90	1	0.52	1.22	1	1	1	1.205
R-2	1.90	1	0.52	1.22	1	1	1	1.205

For this Orthogonal Direction
- Average Spacing is 9.5m
- Number of Bands is 2

$K_{Wspacing}$ (2) (3) (4)	*Braced wall band* spacing: apply factor to all *braced wall panels* per *building* plan direction	Any *storey*	3.8 m 7.6 m 10.6 m 15 m (5)	0.51 1.00 1.35 1.86

Source: BC Building Code 2024

Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	K(S)weight	K(S)snow	K(S)
R-A	2.349			

- Smax is 1.55
- Band is on Storey for Bracing supporting Roof Only (R)
- Building Plan Dimension Parallel to Band is 10m
- Reference Framing Type is WSP-A

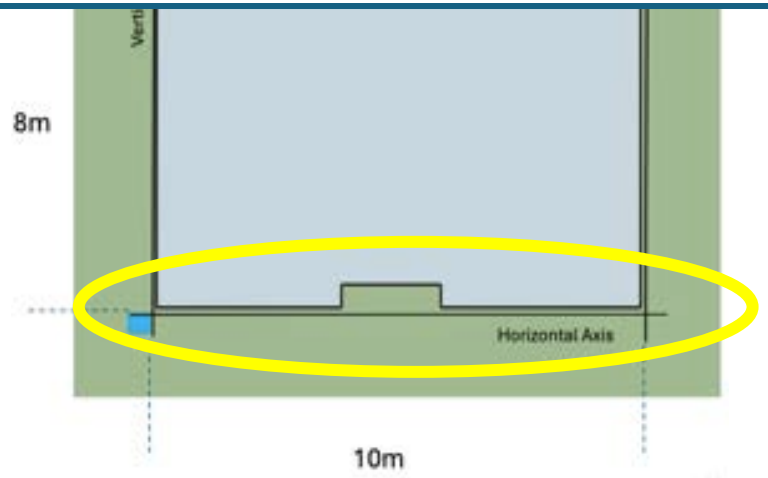


Table 9.23.13.7.-C
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Wind
Forming Part of Sentence 9.23.13.7.(4)

S_{max}	*Storey*	*Building* Plan Dimension Parallel to *Braced Wall Band*, Lwl, m	Unadjusted Minimum Total *Braced Wall Panel* Length for Seismic Forces, L_{us}, m (1) (2)									
			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
1.2 < Smax ≤ 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

Source: BC Building Code 2024

Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(S)weight	K(S)snow	K(S)spac	K(S)num	Kgyp	Ksheath	
R-A	2.349	1						

- Normal weight Construction

Table 9.23.13.7-D
Adjustment Factors for the Determination of Minimum Total Braced Wall Panel Lengths for Seismic Forces
Forming Part of Sentence 9.23.13.7.(4)

Symbol	Description	*Storey*	Condition	Adjustment Factor
	Normal-weight construction	Any *storey*	Any L_{wl}	1.0

Source: BC Building Code 2024

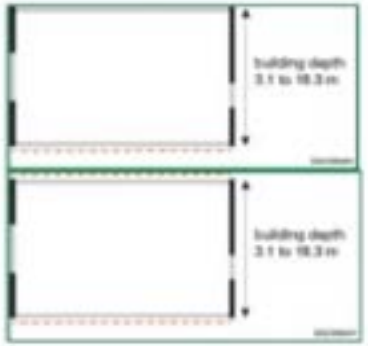
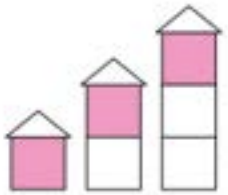
Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(S)weight	K(S)snow	K(S)spac	K(S)num	Kgyp	Ksheath	
R-A	2.349	1	1					

- Roof Snow Load is 1.55kPa
- Band is on Storey for Bracing with walls supporting Roof Only (R)

Table 9.23.13.7.-D (continued)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{snow} (4)	Stone veneer cladding perpendicular to the *braced wall band*, 2 *storey* height, fully clad: Apply factor corresonding to depth Lwl in the direction of the *braced wall band* for  one or two *building* face(s).	 *Storey* supporting roof only	≤ 2kPa	1.00
			3 kPa	1.20
			4 kPa	1.40
			5 kPa	1.60
			6 kPa	1.80

Source: BC Building Code 2024

Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(S)weight	K(S)snow	K(S)spac	K(S)num	Kgyp	Ksheath	
R-A	2.349	1	1	0.99	1			

For this Orthogonal Direction
- Average Spacing is 7.5m
- Number of Bands is 2

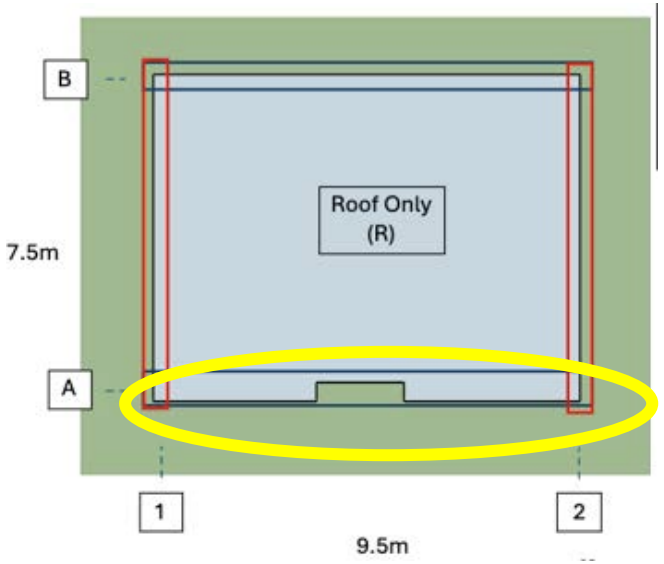


Table 9.23.13.7.-D (continued)

Symbol	Description	*Storey*	Condition	Adjustment Factor
$K_{Sspacing}$ (5) (6)	*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 (7)	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

Source: BC Building Code 2024

Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(S)weight	K(S)snow	K(S)spac	K(S)num	Kgyp	Ksheath	
R-A	2.349	1	1	0.99	1	1	1	

- Interior/Reverse Gypsum board installed
- Continuously sheathed

Table 9.23.13.7.-D (continued)

Symbol	Description	*Storey*	Condition	Adjustment Factor
K_{gyp}	Interior gypsum board: apply factor in accordance with whether gypsum board is installed or ommitted 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

Source: BC Building Code 2024

Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(S)weight	K(S)snow	K(S)spac	K(S)num	Kgyp	Ksheath	
R-A	2.349	1	1	0.99	1	1	1	2.326

4) For resistance to seismic forces, the minimum total length of *braced wall panels* in each *braced wall band*, Ls, shall be determined by applying the adjustment factors provided in Table 9.23.13.7.-D to the unadjusted minimum total *braced wall panel* length, Lus, provided in Table 9.23.13.7.-C using the following equation:

$$Ls = L_{us}\ K_{weight}\ K_{snow}\ K_{Sspacing}\ K_{Snumber}\ K_{gyp}\ K_{sheath} \geq BWP_{min}$$

Source: BC Building Code 2024

Example House (Simple)

Calculate for Earthquake

Band ID	Unadjusted Length	Factors						Adjusted Length
		K(S)weight	K(S)snow	K(S)spac	K(S)num	Kgyp	Ksheath	
R-A	2.349	1	1	0.99	1	1	1	2.326
R-B	2.349	1	1	0.99	1	1	1	2.326
R-1	1.925	1	1	1.22	1	1	1	2.349
R-2	1.925	1	1	1.22	1	1	1	2.349

For this Orthogonal Direction
- Building Dimension || to Band is 8m
- Average Spacing is 9.5m

1.2 < S_{max} ≤ 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

$K_{Sspacing}$ (5) (6)	*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 (7)	1.90

Source: BC Building Code 2024

Example House (Simple)

Wind/Earthquake Calculation Comparison

Band ID	RFT	Adjusted Length (m)		Design Driver
		Wind	Earthquake	
R-A	WSP-A	0.978	2.326	Earthquake
R-B	WSP-A	0.978	2.326	Earthquake
R-1	WSP-A	1.205	2.349	Earthquake
R-2	WSP-A	1.205	2.349	Earthquake

- The BCBC requires the most restrictive design driver be selected for total minimum bracing requirements for each Band

Example House (Simple)

Confirm Minimum Panel Length Requirement

Band ID	RFT	Bracing (m)
R-A	WSP-A	2.326
R-B	WSP-A	2.326
R-1	WSP-A	2.349
R-2	WSP-A	2.349

3) For resistance to wind pressure, the minimum total length of *braced wall panels* in each *braced wall band*, L_w, shall be determined by applying the adjustment factors provided in Table 9.23.13.7.-B to the unadjusted minimum total *braced wall panel* length Luw provided in Table 9.23.13.7.-A using the following equation:

$$L_w = L_{uw}\, K_{exp}\, K_{roof}\, K_{Wspacing}\, K_{Wnumber}\, K_{gyp}\, K_{sheath} \geq BWP_{min}$$

4) For resistance to seismic forces, the minimum total length of *braced wall panels* in each *braced wall band*, Ls, shall be determined by applying the adjustment factors provided in Table 9.23.13.7.-D to the unadjusted minimum total *braced wall panel* length, Lus, provided in Table 9.23.13.7.-C using the following equation:

$$Ls = L_{us}\, K_{weight}\, K_{snow}\, K_{Sspacing}\, K_{Snumber}\, K_{gyp}\, K_{sheath} \geq BWP_{min}$$

Source: BC Building Code 2024

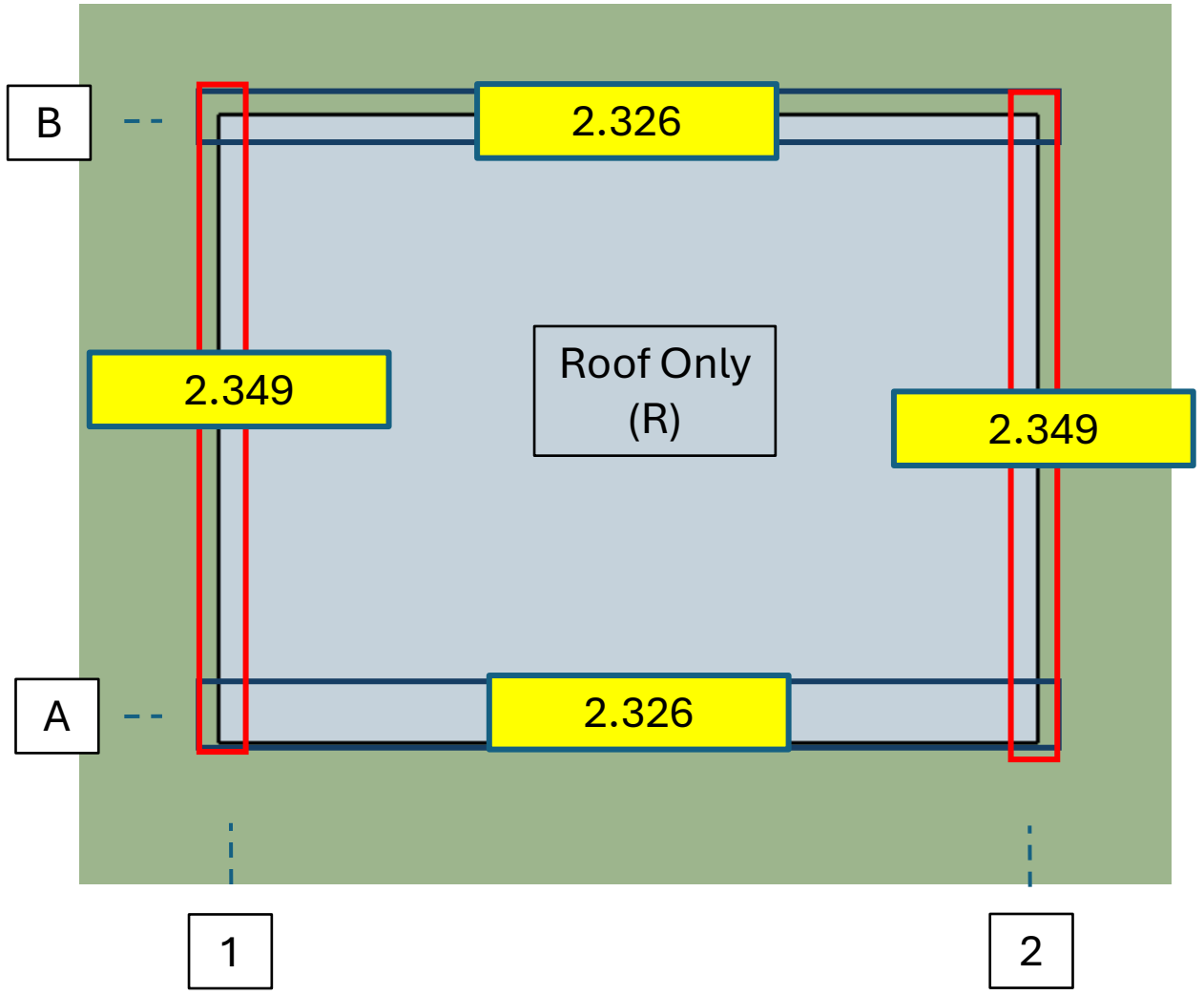
- Final check - the minimum total bracing length is the greater of the calculated adjusted length or the minimum Panel length according to the Rules

Example House (Simple)

Total Length Allocation to Braced Wall Band Plan

Band ID	RFT	Bracing (m)
R-A	WSP-A	2.326
R-B	WSP-A	2.326
R-1	WSP-A	2.349
R-2	WSP-A	2.349

- Minimum total bracing length is allocated back onto Braced Wall Band Plan

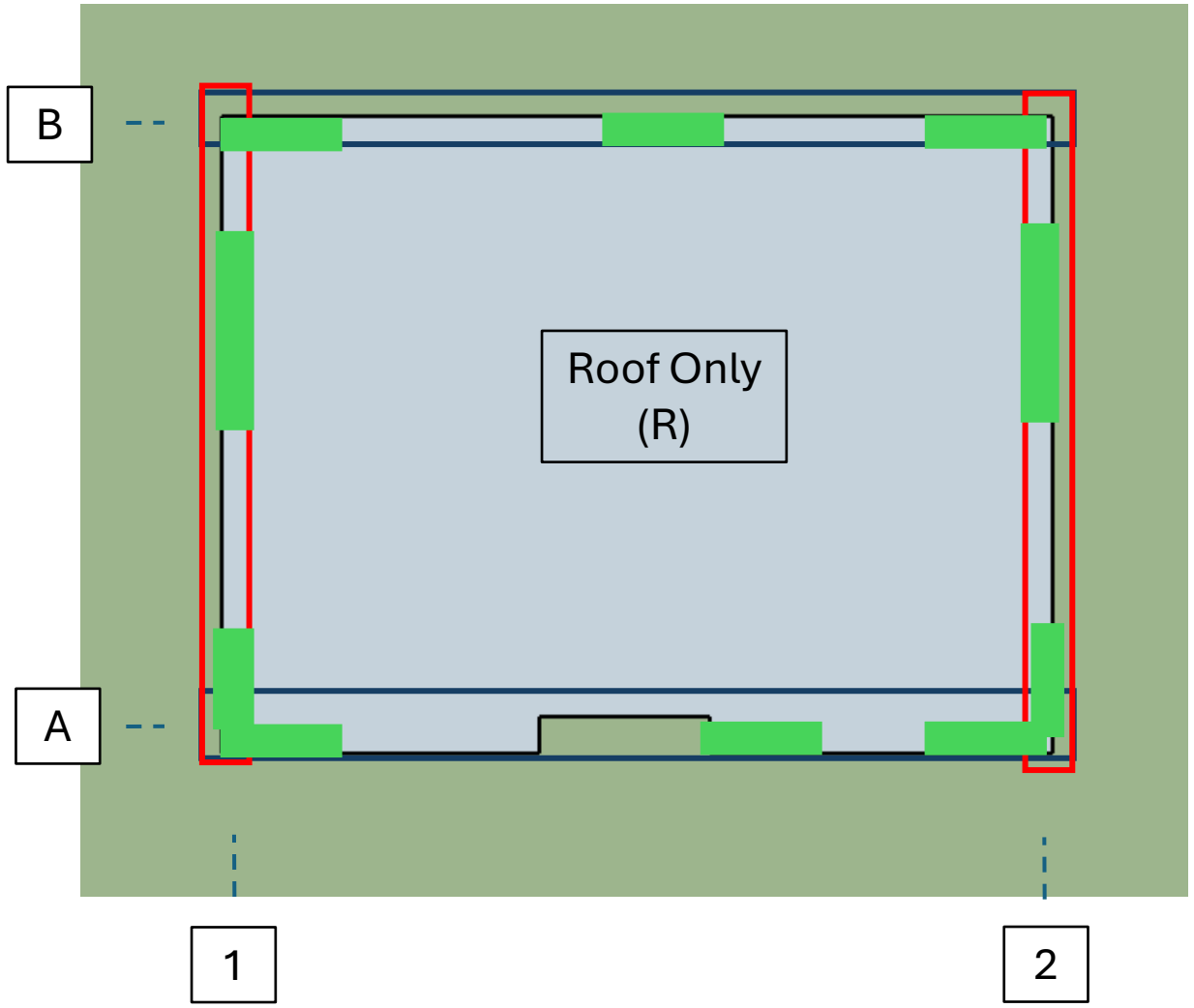


Example House (Simple)

Distribute Panels

Band ID	RFT	Bracing (m)
R-A	WSP-A	2.326
R-B	WSP-A	2.326
R-1	WSP-A	2.349
R-2	WSP-A	2.349

- Total bracing length is allocated through the sum of Panel lengths in each Band. Panels are placed subject to Rules on minimum lengths, spacing etc
- Panels cannot be placed over openings for windows/doors



End/Questions:

Tim Warner
Twarner@boabc.org

Extra Slides

Subsection 9.23.13 Framework RECAP+

Box 1: Code Pathways and Trigger Points Comparison	
The Simplified Approach (55/107 Locations)	The Calculation Method (Table)
Site Class is A, B, C, D, E or Unknown (not F)	Site Class is A, B, C, D, E or Unknown (not F)
Smax no greater than 0.47 (56/107)	Smax no greater than 2.6 (2.52)
HWP (1/50) no greater than 0.6kPa (101/107)	HWP (1/50) no greater than 1.2kPa (0.72kPa)
Roof Snow Load no greater than 2kPa (74/107)	Roof Snow Load no greater than 6kPa (6.125kPa)
Rough Terrain only	Rough or Open Terrain
Panel height no greater than 10' (3.1m)	Panel height no greater than 10' (3.1m)
Eave-to-Ridge Roof Height no greater than 9' 10" (3m)	Eave-to-Ridge Roof Height no greater than 19' 8" (6m)
Normal weight construction only	Lowest exterior wood-framed walls support no more than; • 2 floors of normal weight construction, or • 1 floor of heavy weight construction
Bands must be Continuously Sheathed	
Bands must have interior/reverse gypsum sheathing	

Methods of Calculation Comparison

The Calculation Method (Tables)

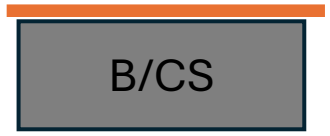
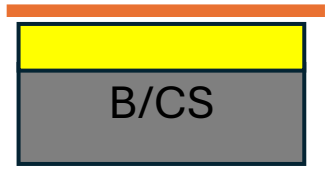
	Wind	Earthquake (Seismic)
Unadjusted Length	Hourly Wind Pressure (1/50) Reference Framing Type	Smax (Location and Site Class) Reference Framing Type Building Dimension Parallel to Band
Factors	Exposure Eave-to-Ridge Height Average Spacing of Bands Number of Bands Interior/Reverse Gypsum Sheathing Continuity	Weight of Construction Roof Snow Load Average Spacing of Bands Number of Bands Interior/Reverse Gypsum Sheathing Continuity

Methods of Calculation Comparison

The Simplified Approach

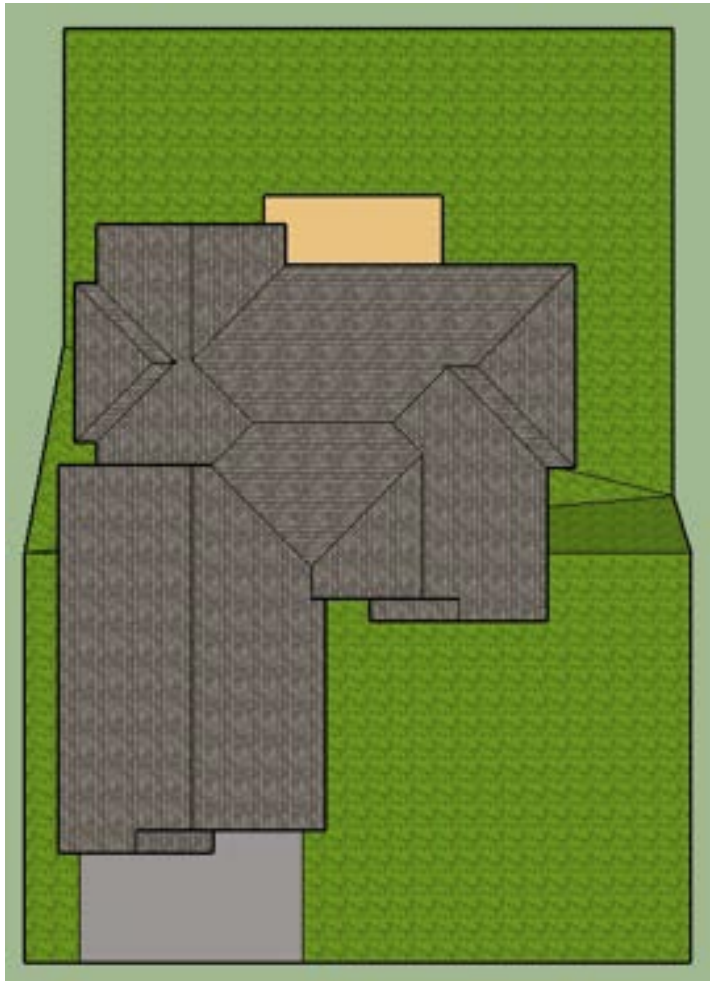
	Wind	Earthquake (Seismic)
Unadjusted Length	Hourly Wind Pressure (1/50) Reference Framing Type	Smax (Location and Site Class) Reference Framing Type Building Dimension Parallel to Band
Factors	Exposure Eave-to-Ridge Height Sheathing Continuity Number of Bands Average Spacing of Bands Interior/Reverse Gypsum	Weight of Construction Roof Snow Load Sheathing Continuity Number of Bands Average Spacing of Bands Interior/Reverse Gypsum

Storeys for Bracing – Basement/Crawlspace

Basements/Crawlspace where:	Relaxation	Not Storey for Bracing
First wood-framed floor is supported directly by foundation at exterior	9.23.13.5.(2)	
First wood-framed floor is supported Cripple Walls at exterior	9.23.13.8.	
First wood-framed floor is supported a Stepped Foundation and Cripple Walls at exterior	9.23.13.9.	

Basement/Crawlspace where:	Permission Clause	Storey for Bracing
The designer designates Basement/Crawlspace as a Storey for Bracing	9.23.13.8.(1)(a)	R+1F OR R+2F

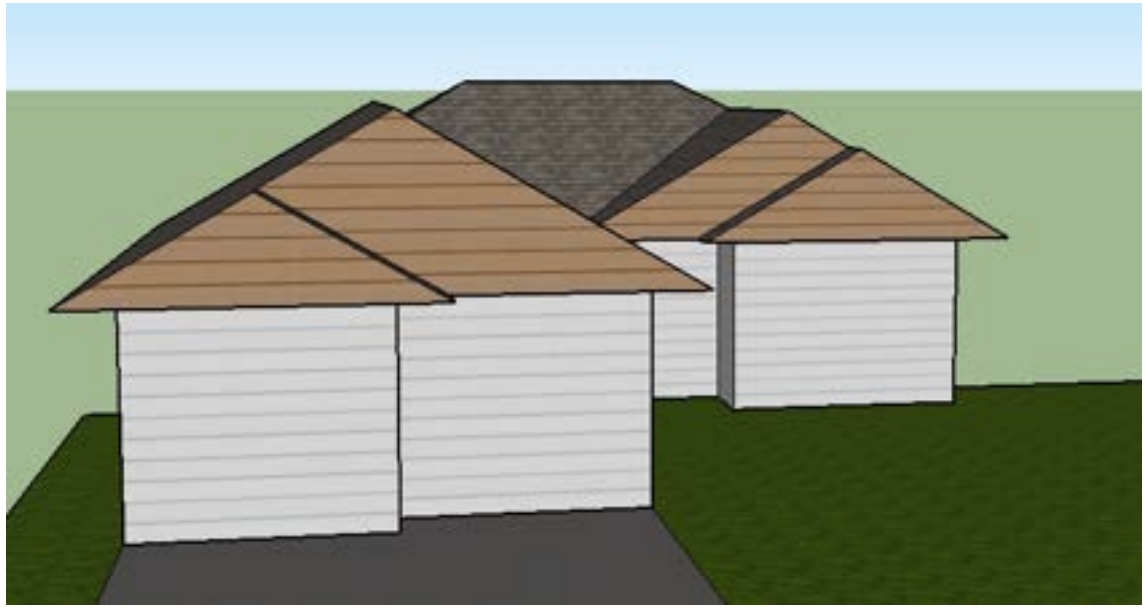
Example House (Not as Simple)



*Google Maps

Example House (Not as Simple)

*Google Maps



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