



DEALING WITH THE ELEMENTS

2012 BCBE Conference & AGM

**2012 CODE CHANGES – SAFETY,
EFFICIENCY *and* SUSTAINABILITY**



New Seismic Provisions

Brought to you by:



Homeowner
Protection Office
Branch of BC Housing

Toll-Free: 1 800 407 7757

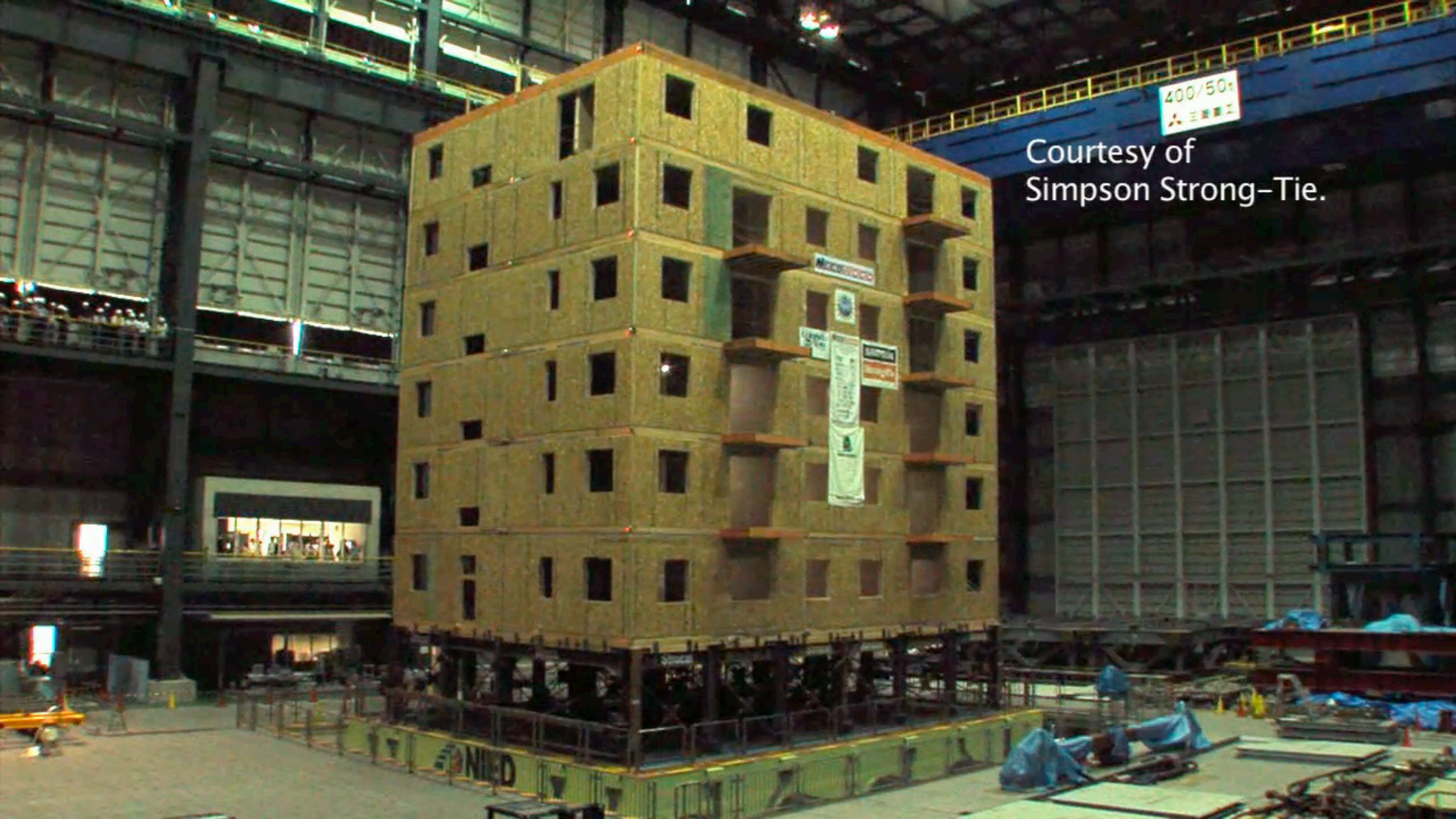
Email: hpo@hpo.bc.ca

Website: www.hpo.bc.ca

Presented by:

Murray Frank

Constructive Home Solutions Inc.



Courtesy of
Simpson Strong-Tie.

6 Storey Seismic Testing

Full Scale Testing Facility Japan

Courtesy of Simpson Strong-Tie.



6 Storey Seismic Testing

Full Scale Testing Facility Japan

Seismic Requirements

65% of new homes in BC



The Guide

Anticipated in Spring, 2012

March, 2011

ILLUSTRATED GUIDE

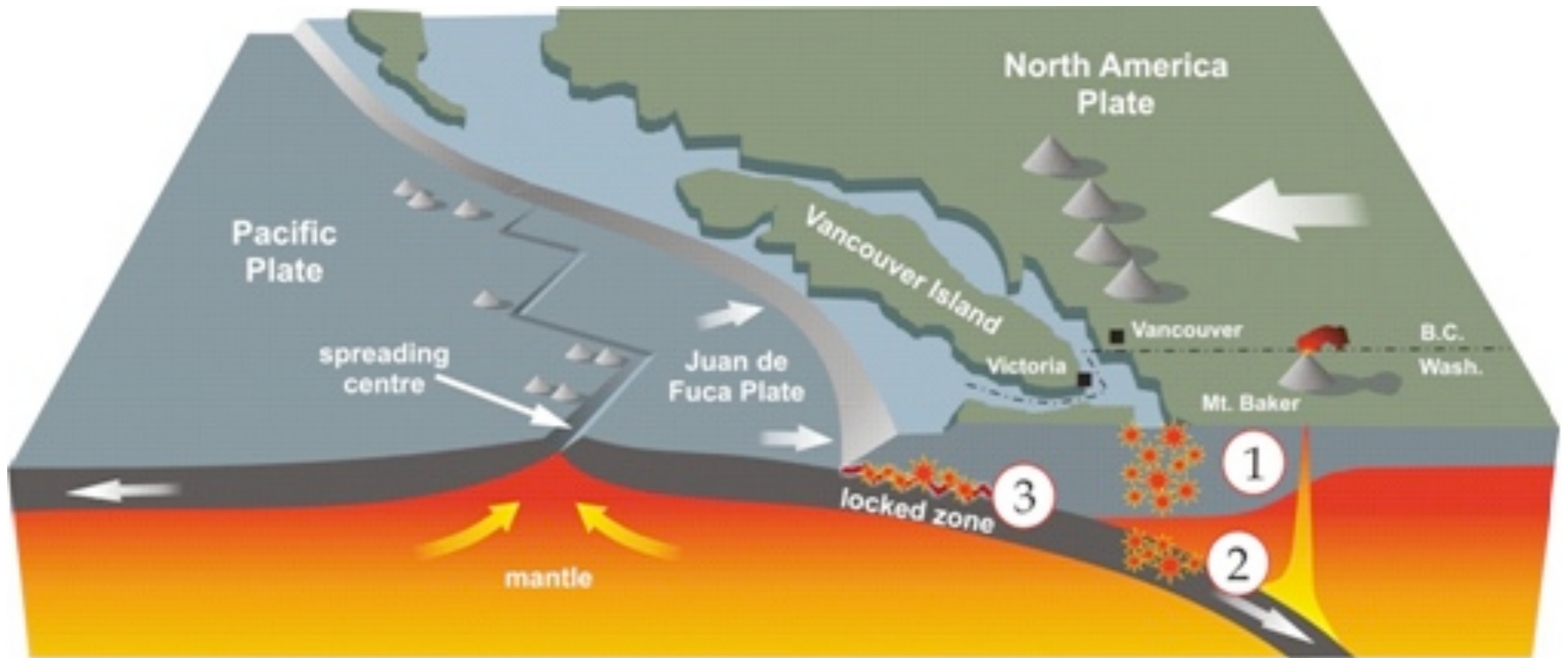
**Prescriptive
Lateral Bracing
Requirements
Part 9 Buildings
Located in High
Seismic Zones in
the 2011 BC
Building Code**



Changes to the BC Building Code
include requirements for houses in
high seismic zones

This guide has been developed to assist home designers and builders to understand the new requirements affecting Part 9 homes in the high seismic zones in British Columbia. The requirements for locating required lateral bracing panels, and for the construction details for those panels are described with text and illustrations.





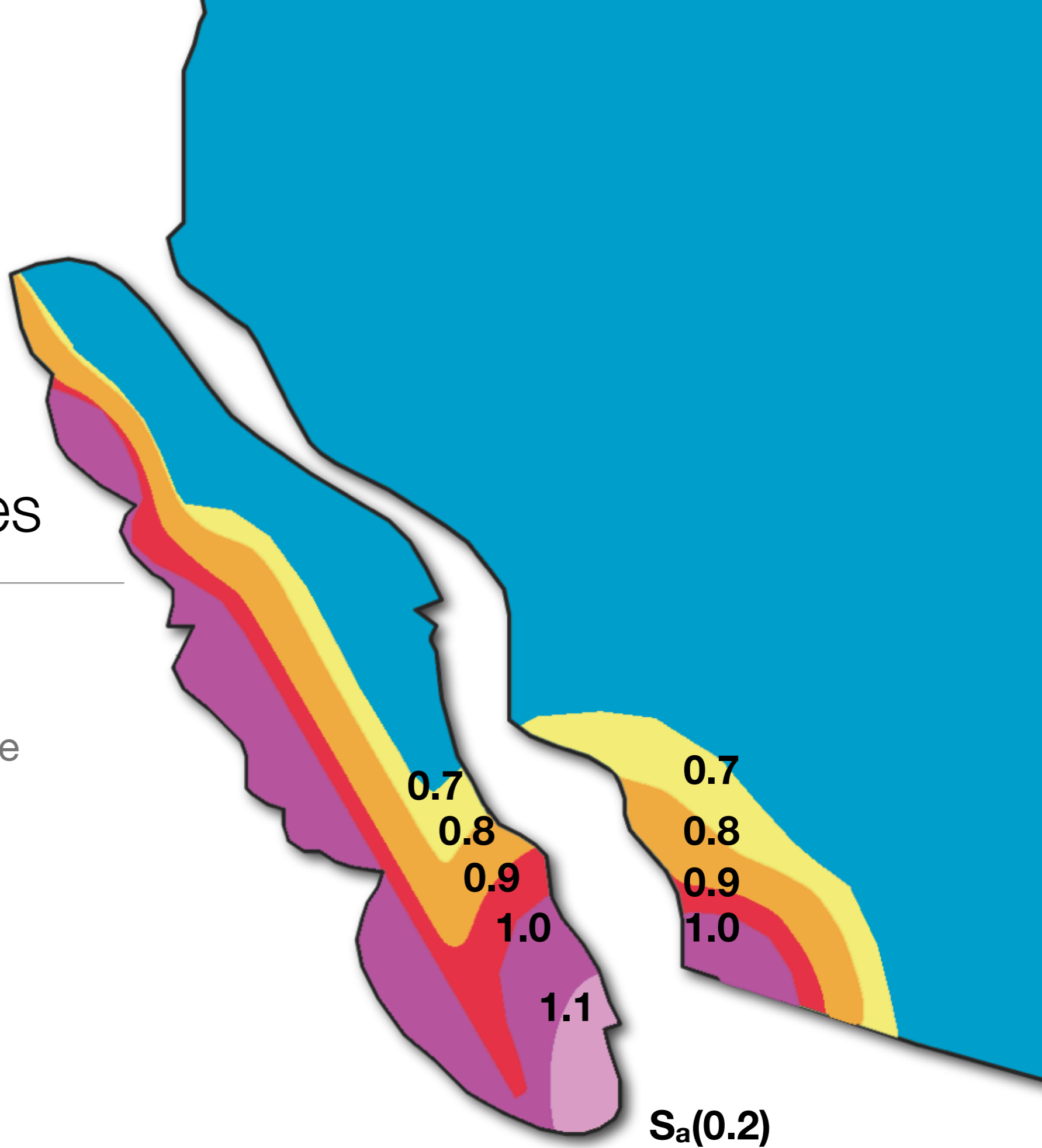
Juan de Fuca Plate

Earthquakes will Happen Again

BC Seismic Zones

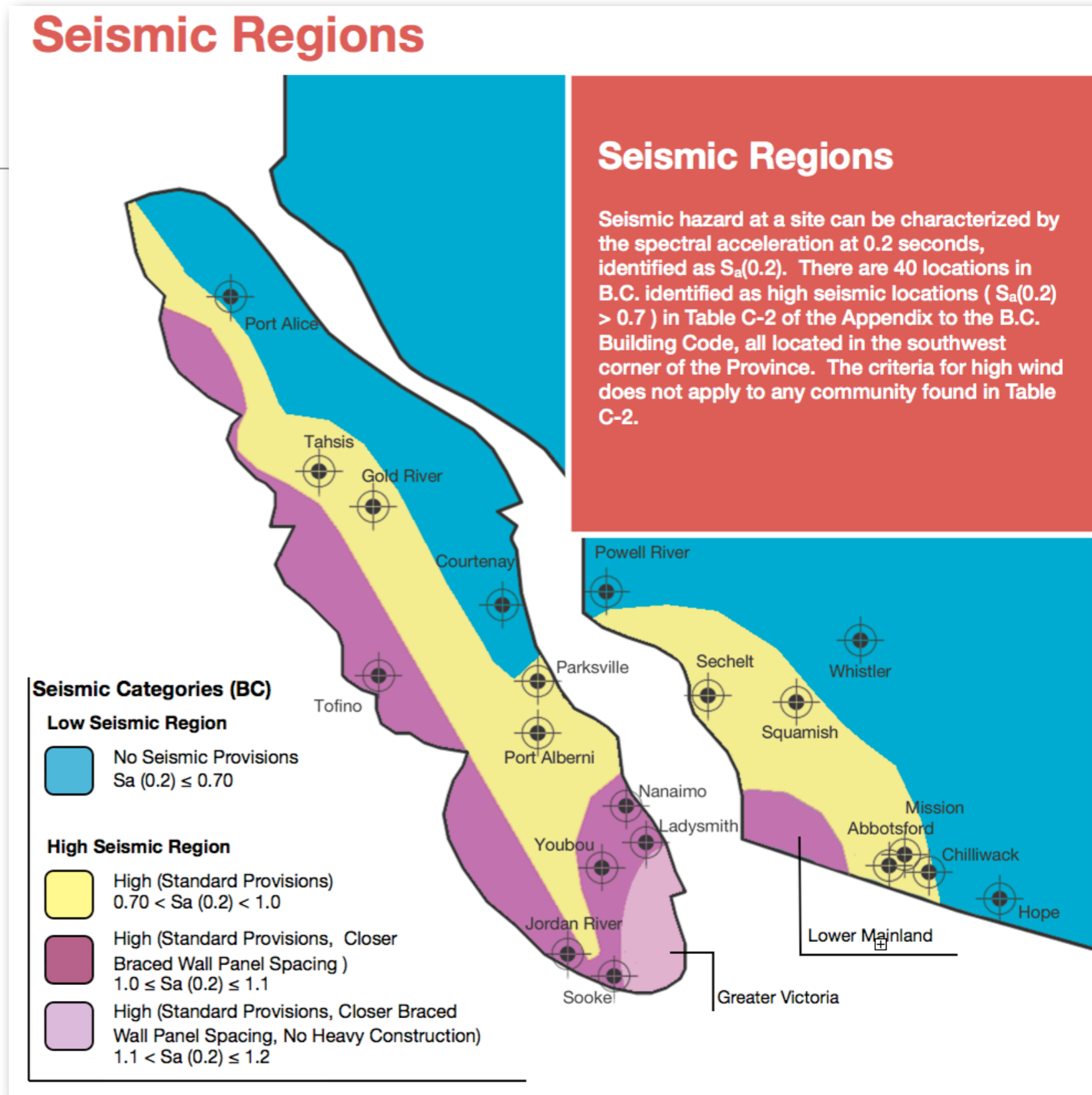
Coastal Seismic

Seismic Spectral Response
 $S_a(0.2)$ greater than 0.70

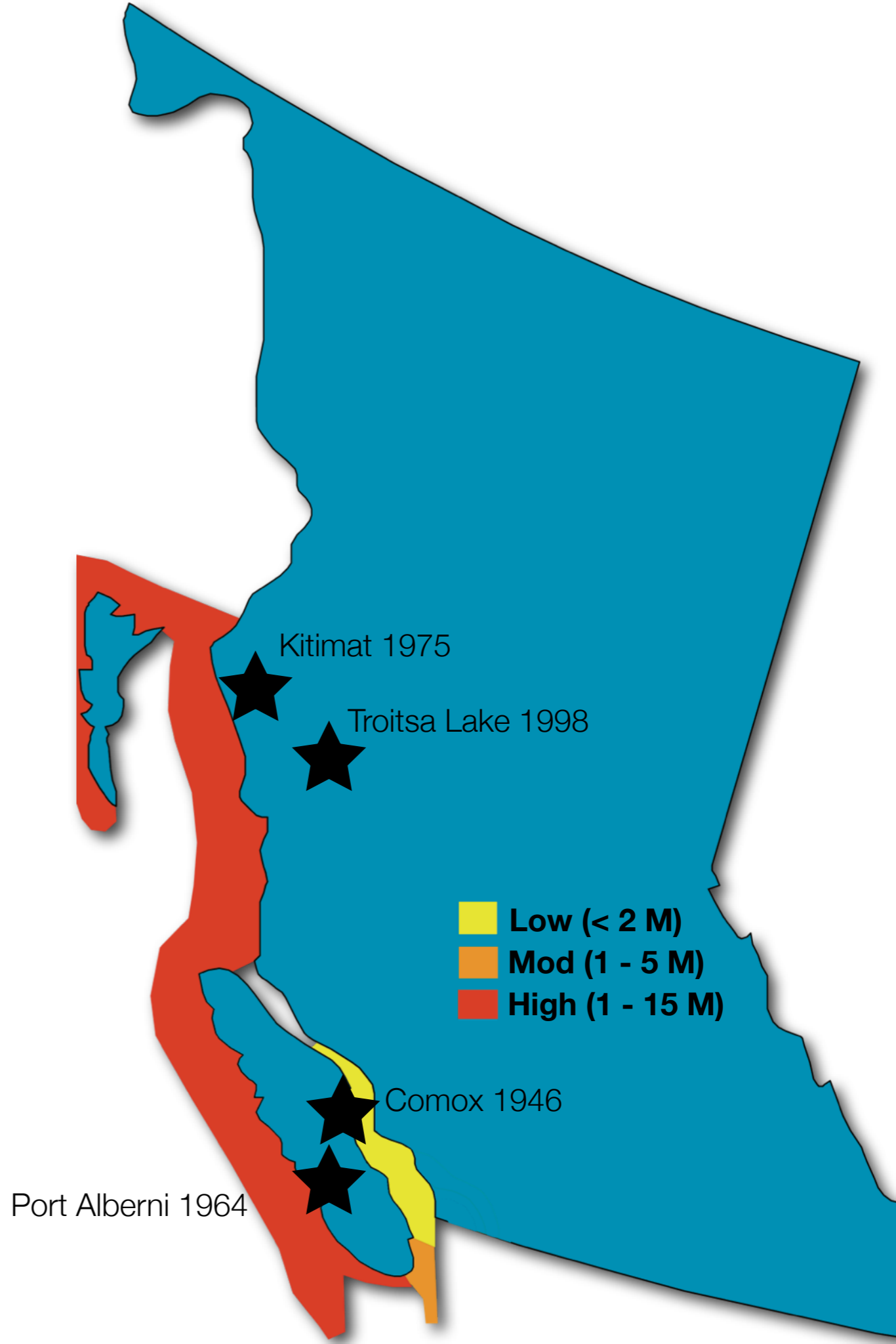


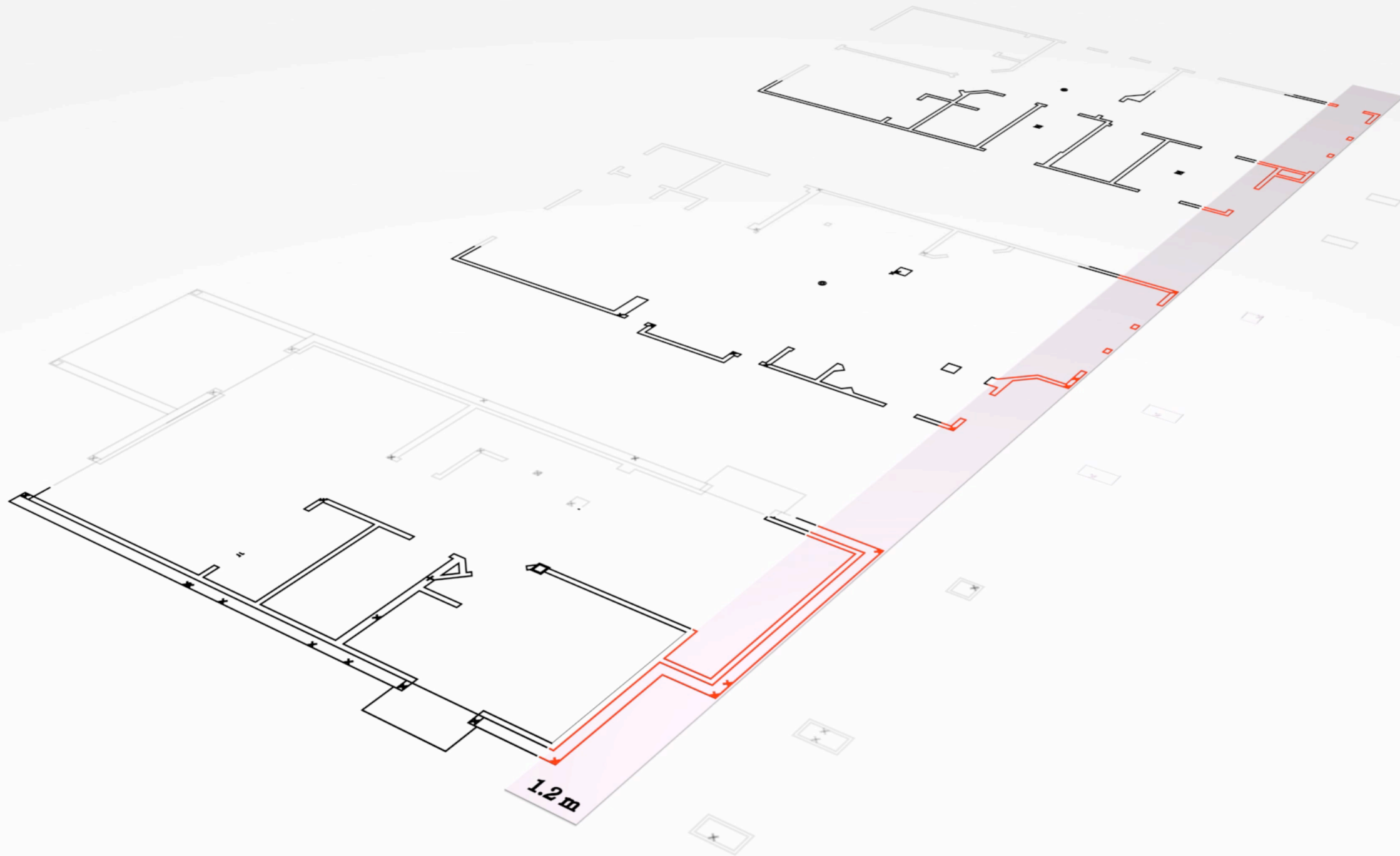
9.23 Lateral Loads

- Coastal Seismic Zone
- No High Wind Zone in BC
- New Appendix adds more communities
- Table C-2, Appendix to the Code, $S_a(0.2) > 0.7$



BC Tsunami Risk





Braced Wall Band

The 1.2 m "Zone"



Braced Wall Panel



The Strength of a Sheathed Wall

The Concept

- Sheathed walls, roofs and floors transfer loads to the ground (Braced Wall Panels)
- Sheathed walls loose strength with increased openings
- To be effective, sheathed walls must be in 1.2 m bands at the perimeter and possibly at interior walls (Braced Wall Bands)



Braced Wall Panel

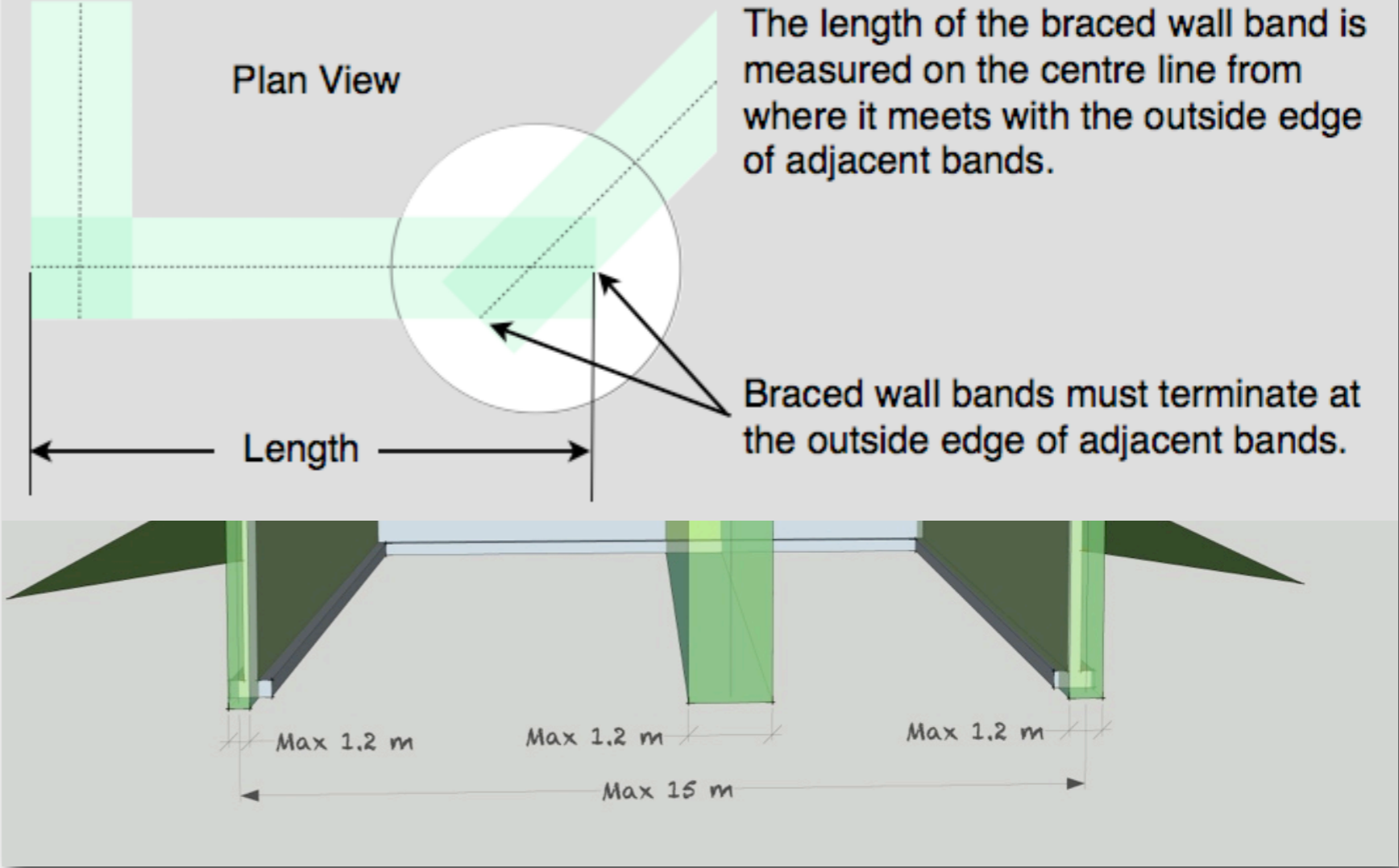
- Glazing Area and Open Concept have reduced BWP area in modern homes



Braced Wall Band

- Depending on zone, bands must not exceed 10.6 m or 7.6 m spacing
- Bands can not exceed 1.2 m in width
- To contribute, Braced Wall Panels must be within the Braced Wall Bands

Designer Note



Offset Walls

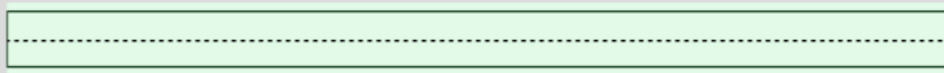
- Benefit to establish narrowest BWB possible
- Small offsets can exist within the BWB
- Larger offsets require multiple bands

Offset Wall Profiles

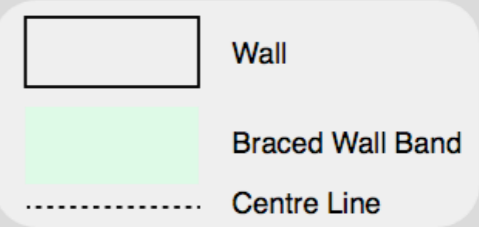
It is a design benefit to establish the narrowest braced wall band possible while still capturing offset wall elements (with ≤ 1.2 m total offset from outside to outside).

Designer Note

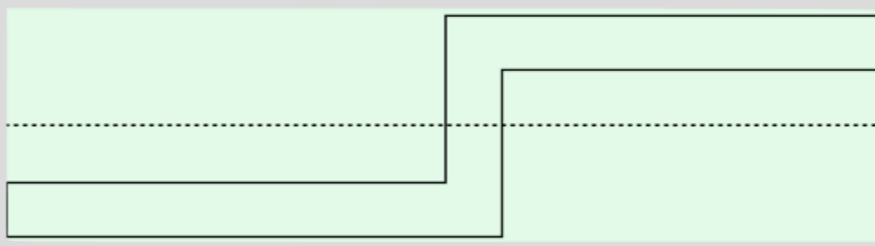
Plan View of Wall



The perimeter of building, and certain interior walls, shall be located within braced wall bands. For simple straight walls, the band need only be the width of the wall.

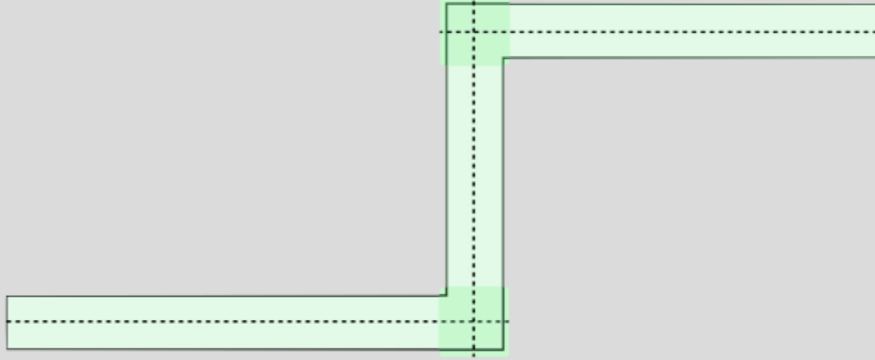


Plan View of Wall



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 return section 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).

Plan View of Wall



Walls that contain significant offsets will require separate braced wall bands. Each band element shall contain the required minimum braced wall bands for the type and height of construction, and for the specific spectral acceleration for the location of the building.

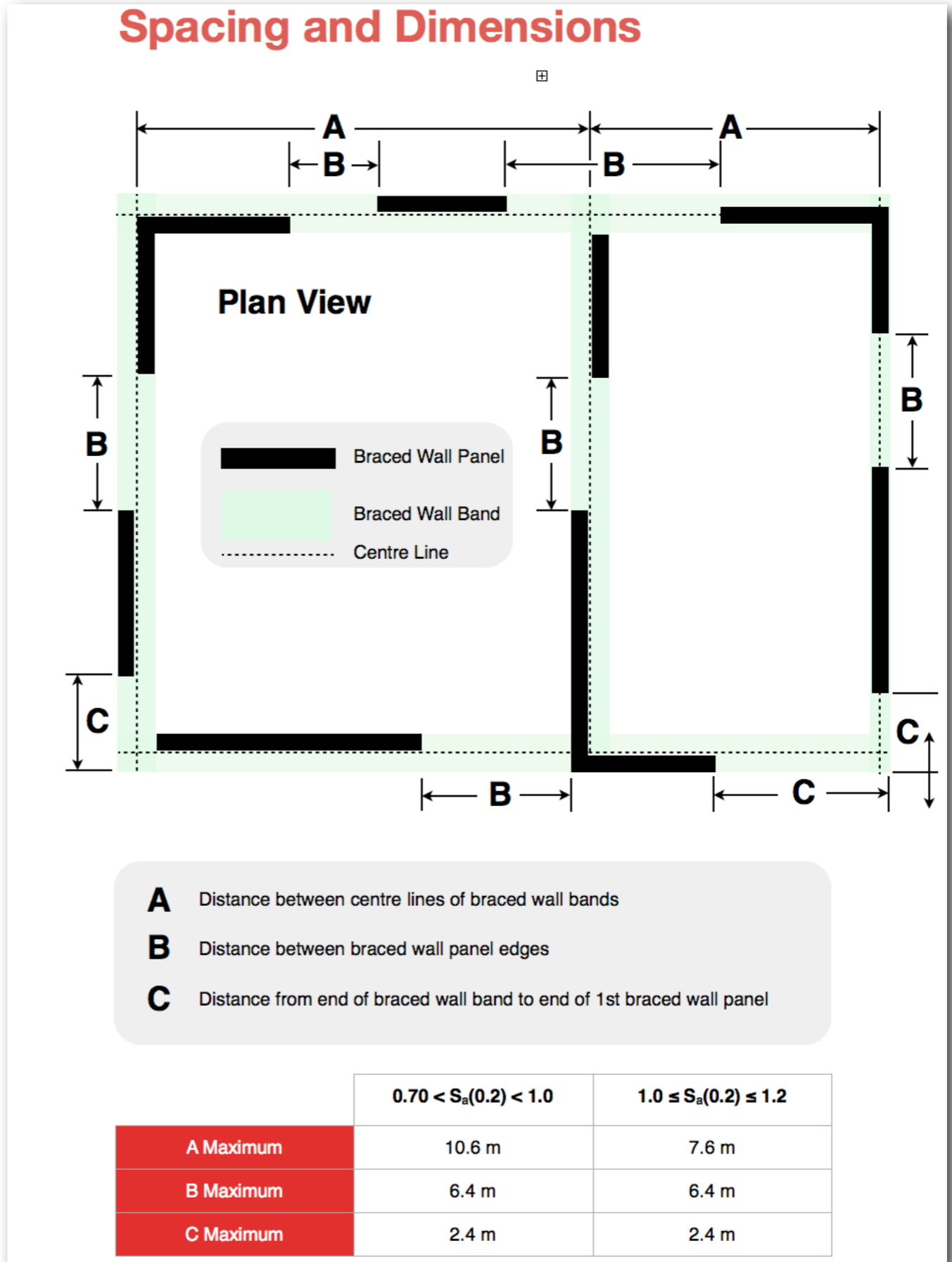
Braced Wall Panel

- Offset within 1.2 m (within BWB)



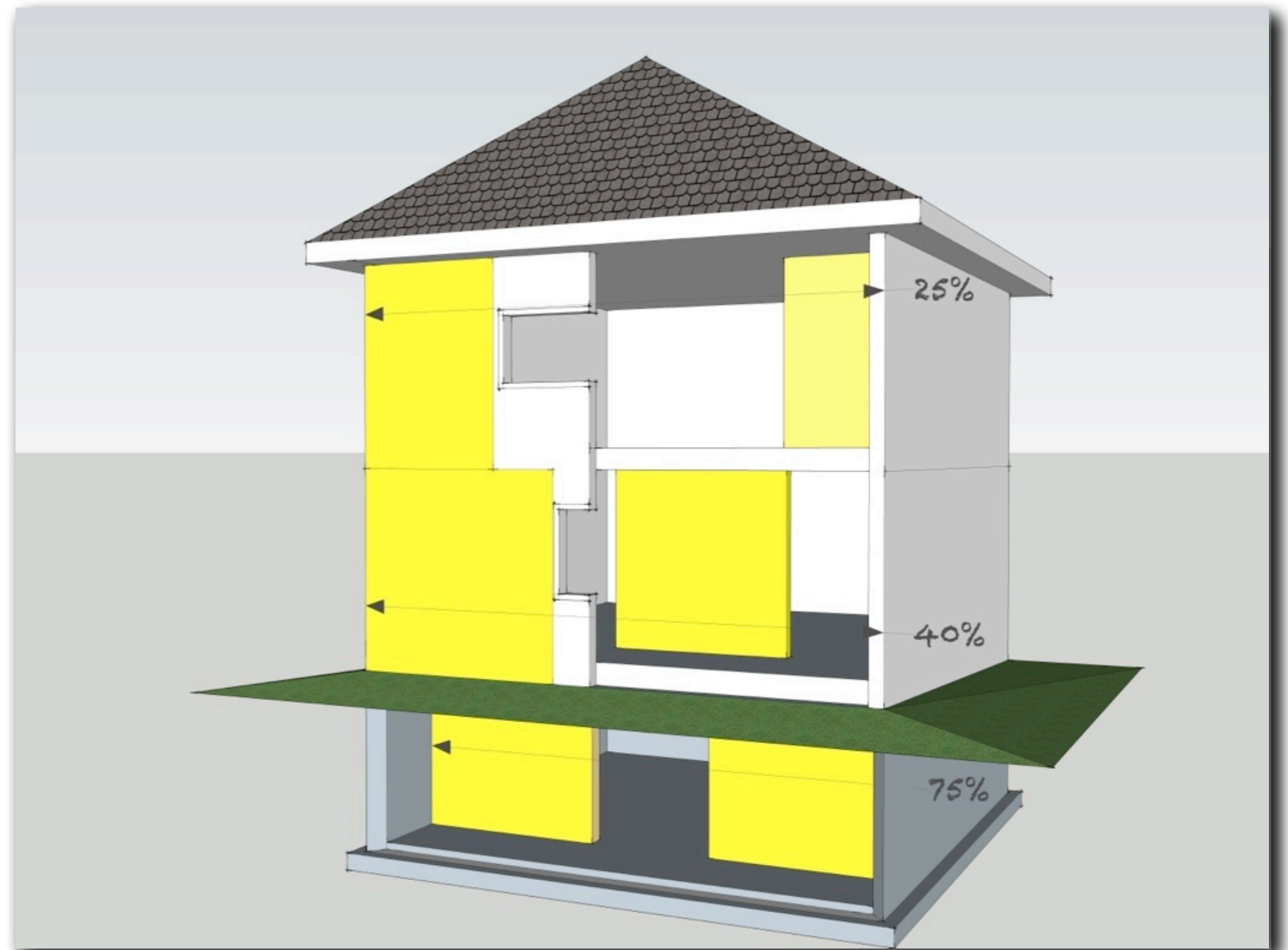
Spacing

- Distance between BWB depends on zone
- Distance between BWP and Distance of BWP to corner does not change



Length of Panels

- Light construction BWP lengths
- Heavy construction
 - concrete floor or roof
 - limit 2 storey above grade
 - no Part 9 provision for highest zone



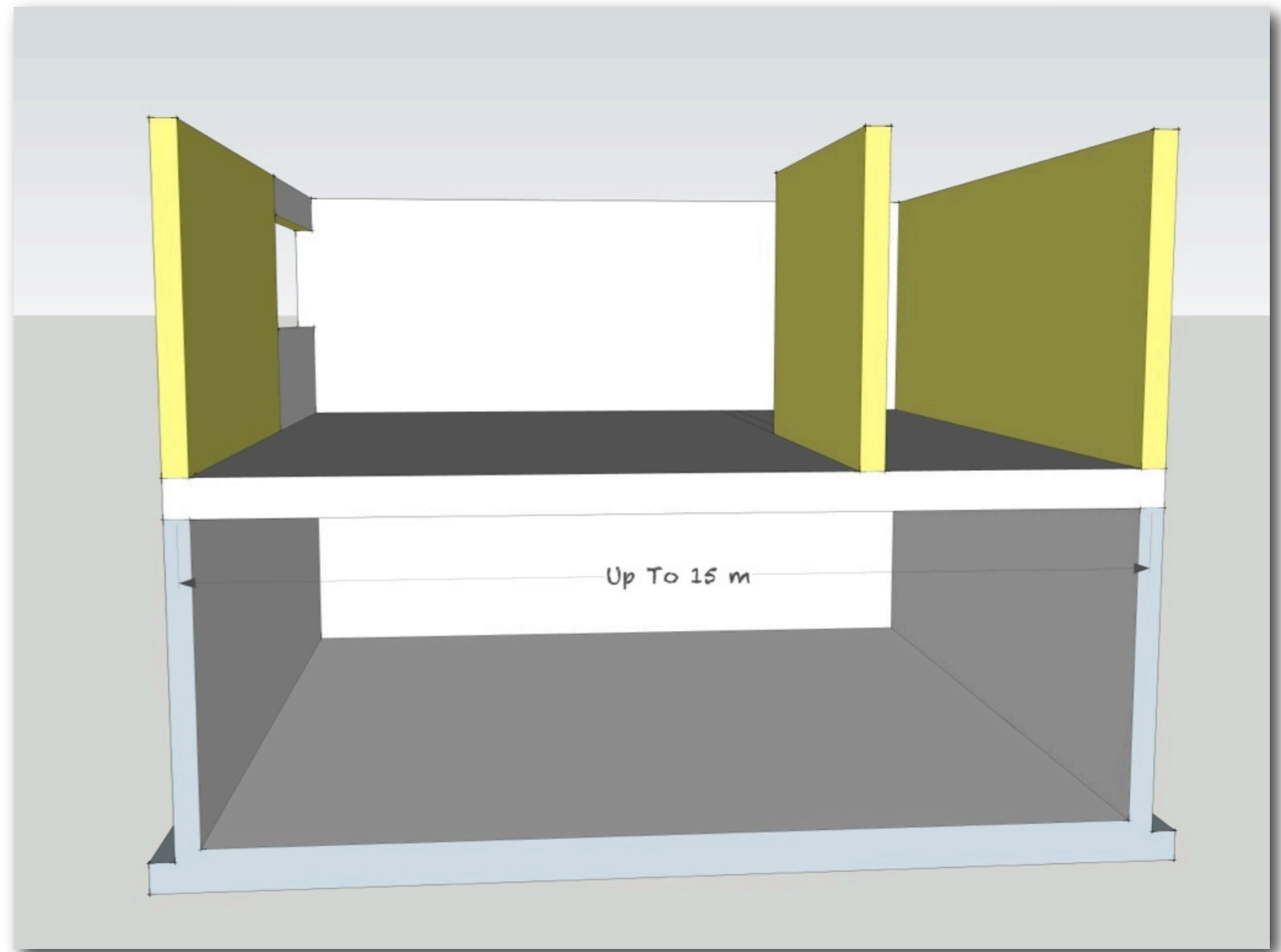
Length of Panels

- Minimum panel length 750 mm
- Corner panel can be 600 if continuous to panel on adjacent face



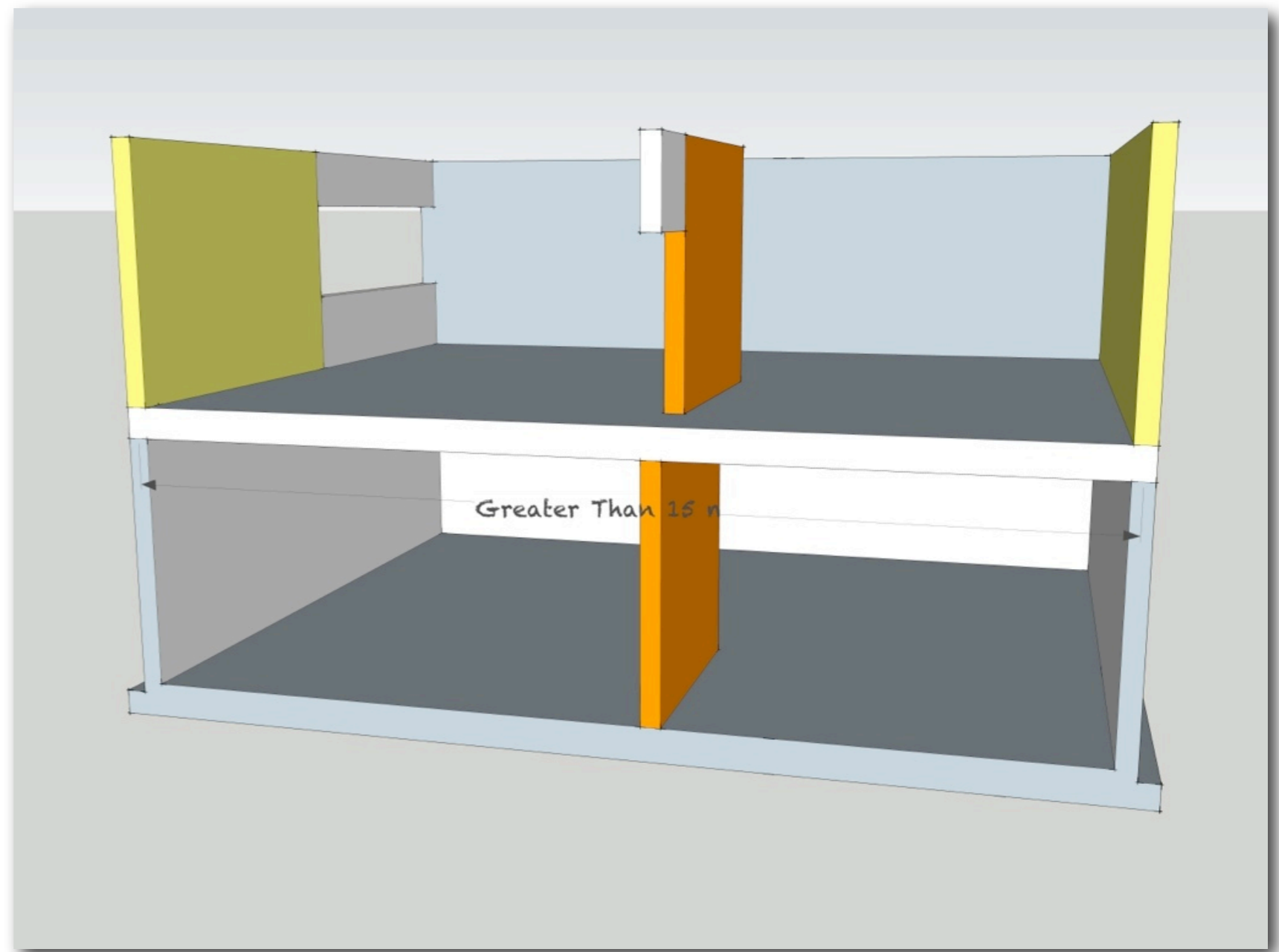
Spacing & Dimensions

- BWP does not need to be continuous in basement where span does not exceed 15 m

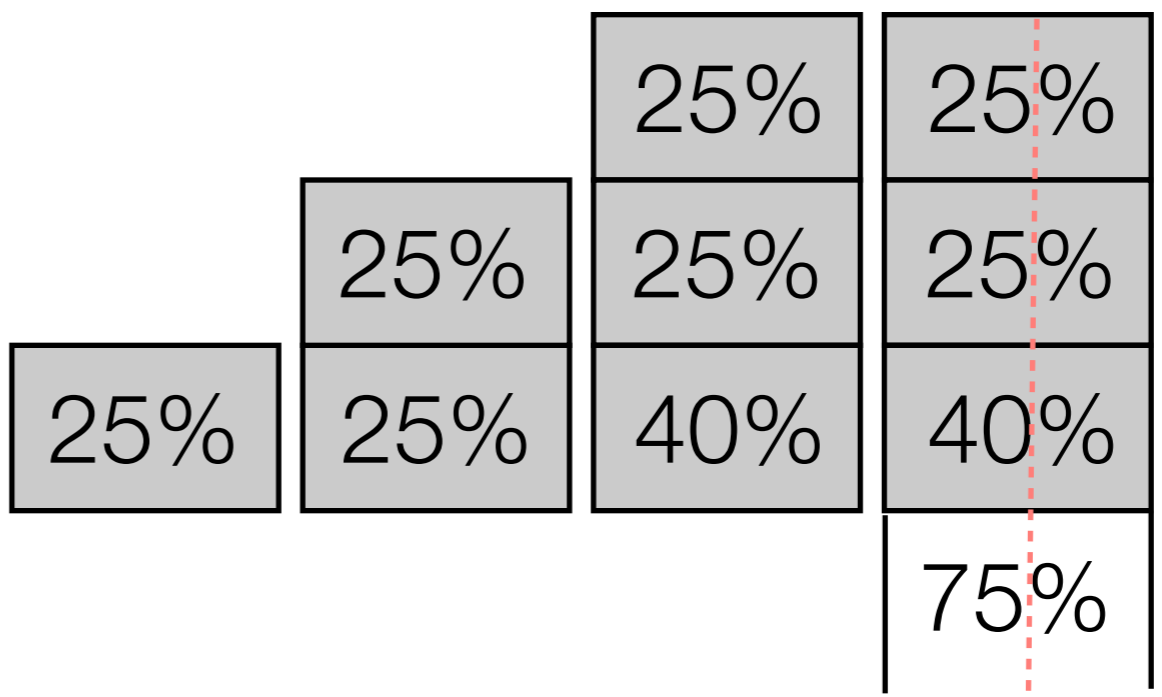


Spacing & Dimensions

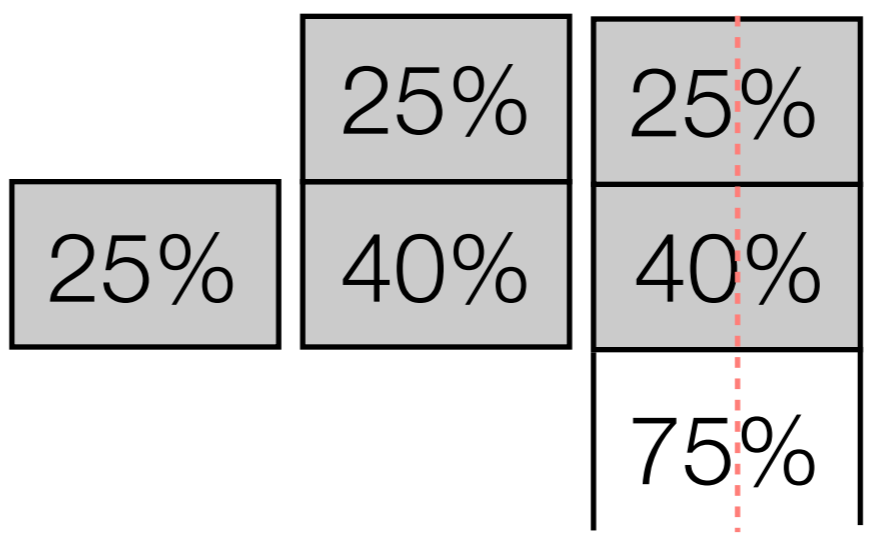
- Where a wood sheathed BWP wall is used in the basement, it must be continuous through the BWB



Light Construction



Heavy Construction

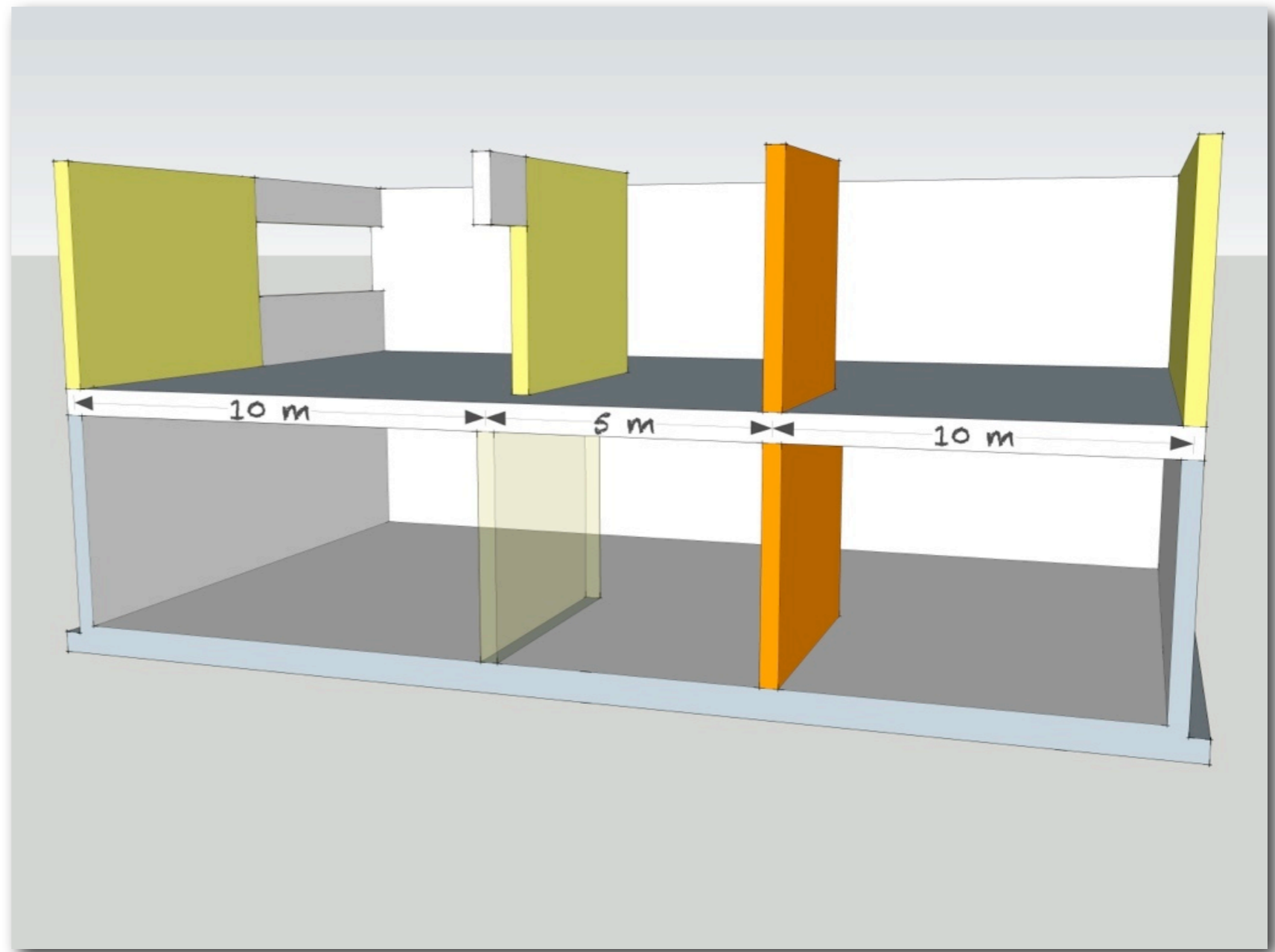


Braced Wall Panel

- Minimum Total Length of Braced Wall Panels

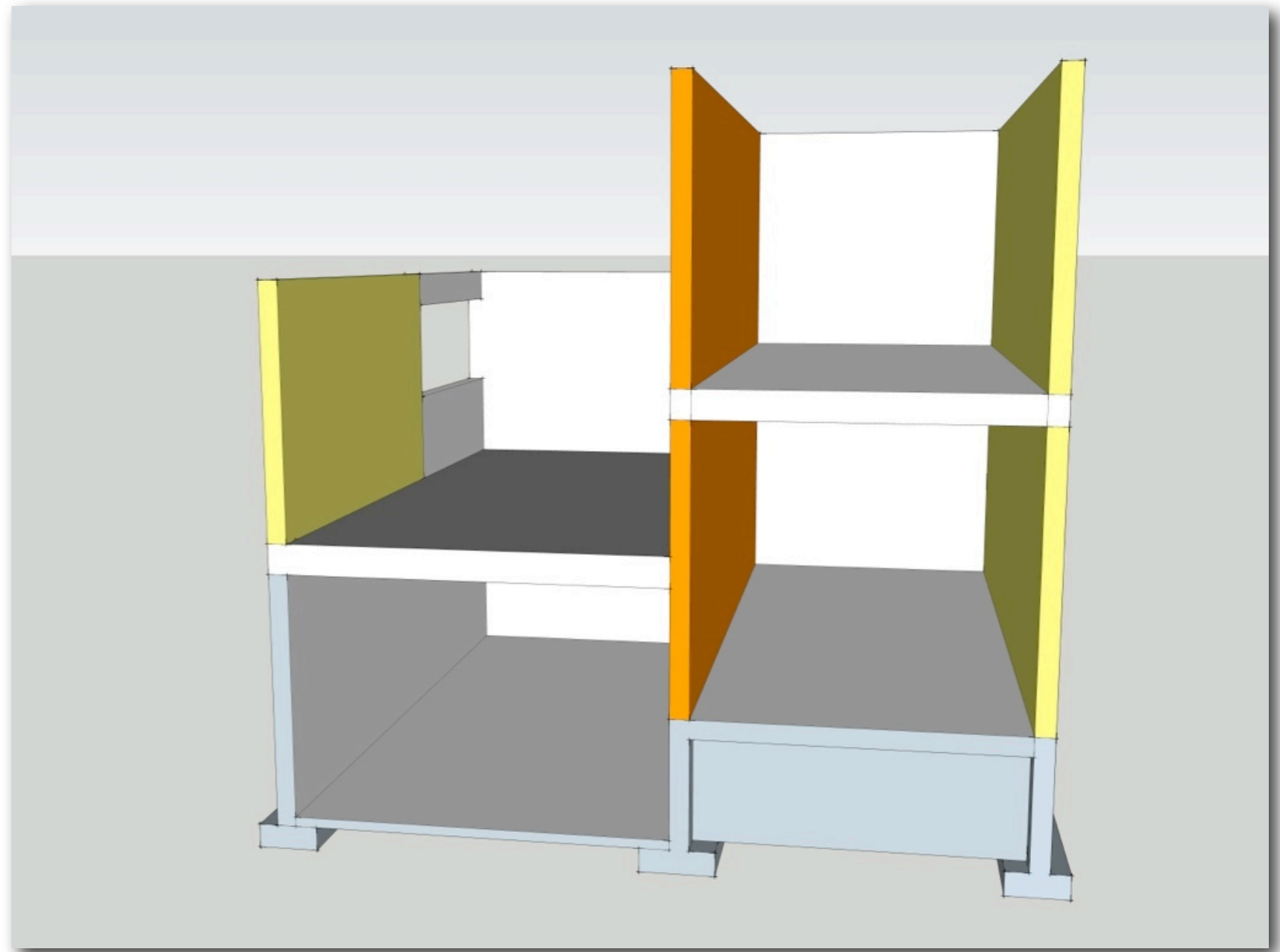
Spacing & Dimensions

- Where a wood sheathed BWP is used in the basement, it must be continuous through the BWB



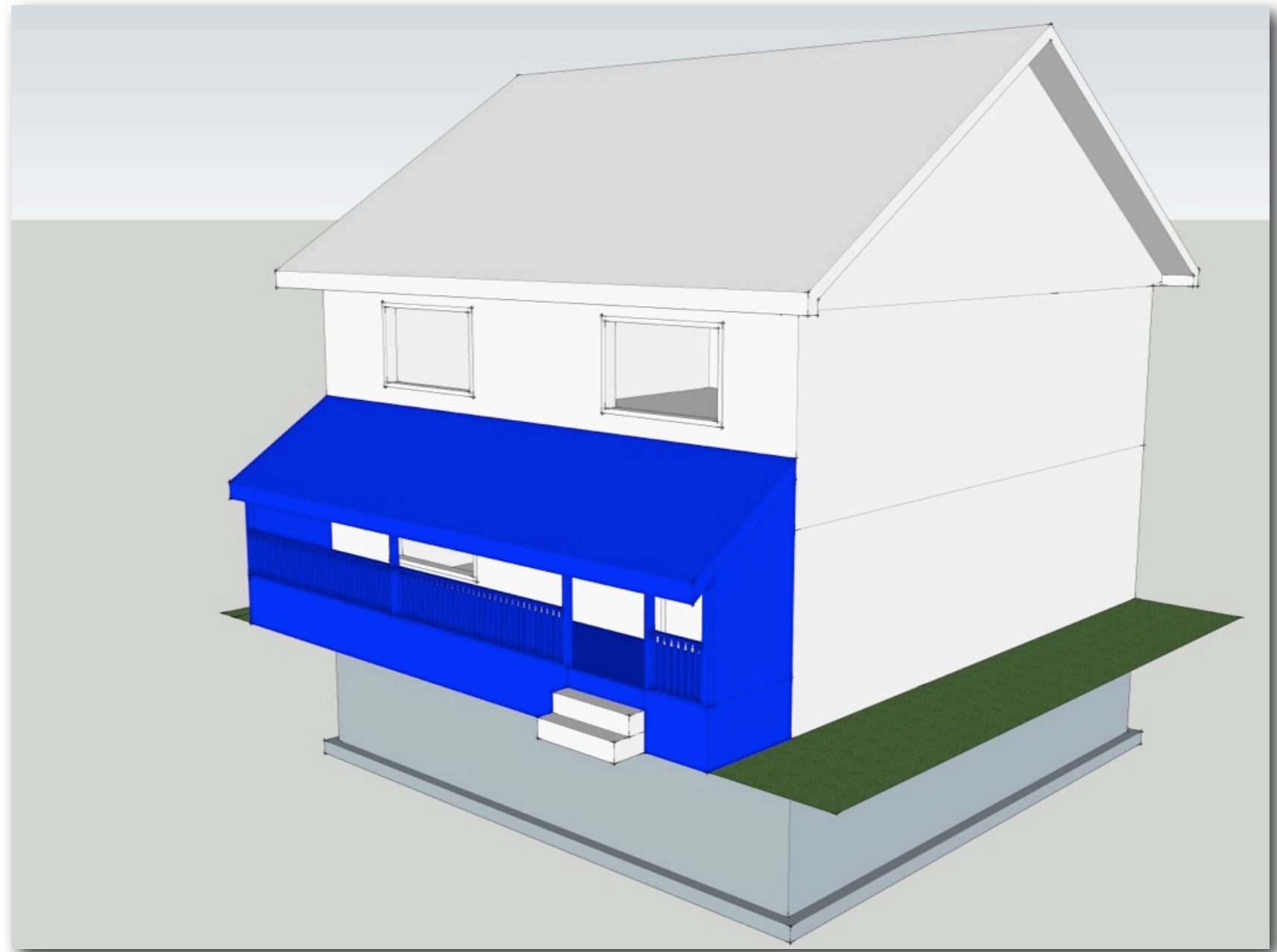
Spacing & Dimensions

- A wood sheathed BWP is used where a split level floor is offset more than the joist height



Exceptions

- The 3 walls of a porch extending not more than 3.5 m from the building are exempt if:
 - porch does not support any floors of construction
 - porch extends not more than 1/2 its length from the building



Porch

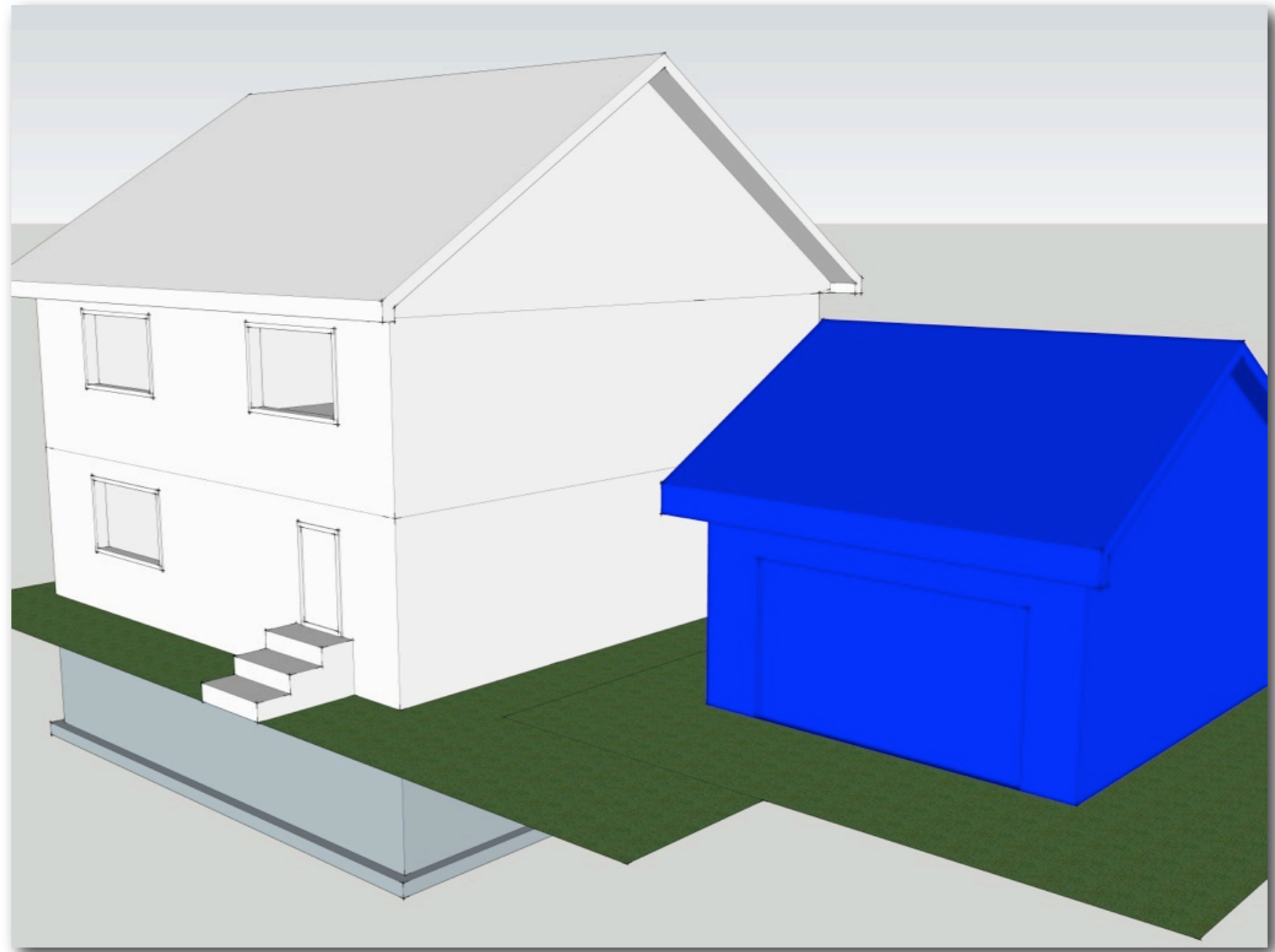
- A proper roof connection reduces the likelihood of collapse at the entry



The Risk with a Porch

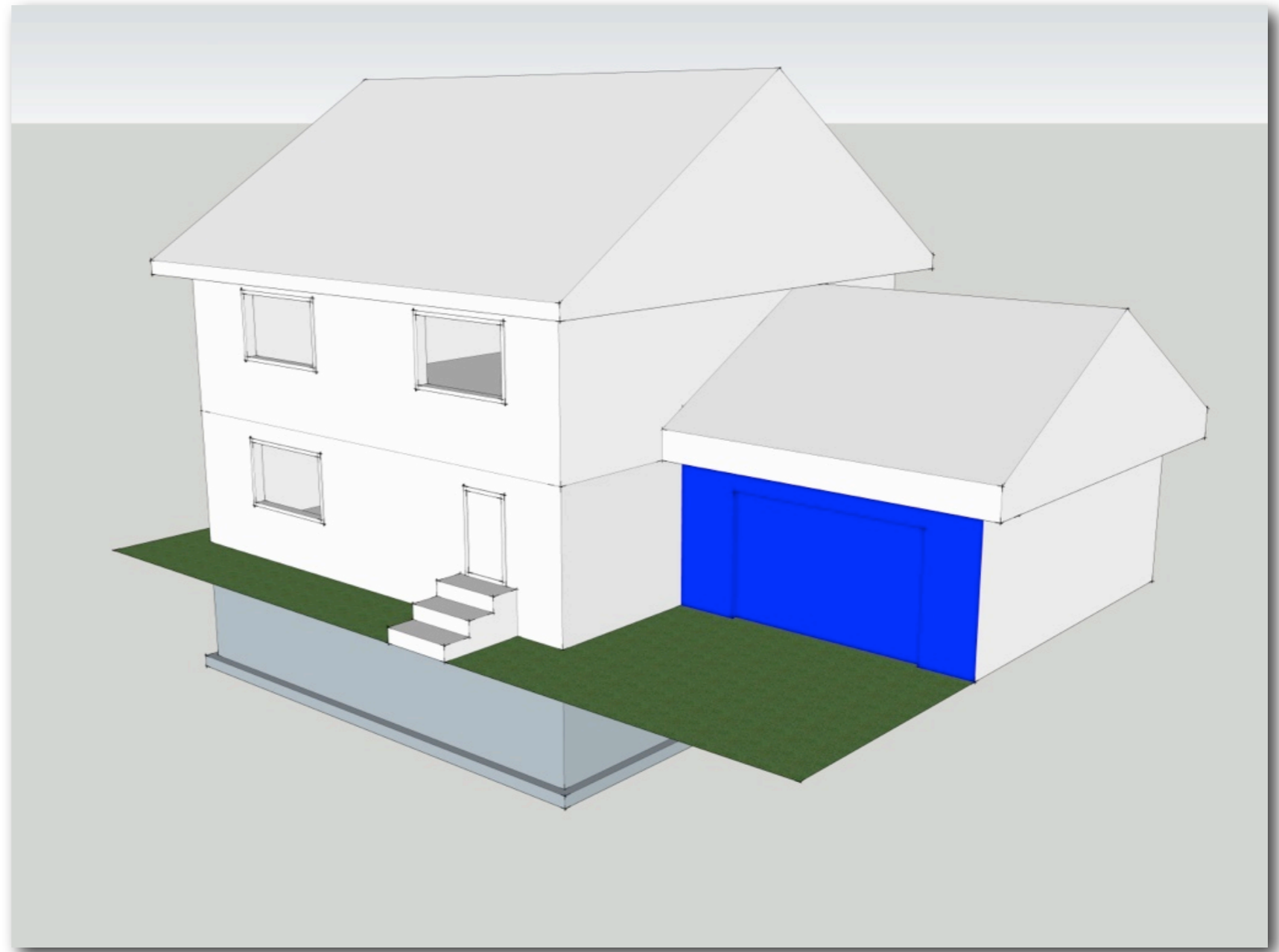
Exceptions

- A detached garage that does not support any floors above, is exempt



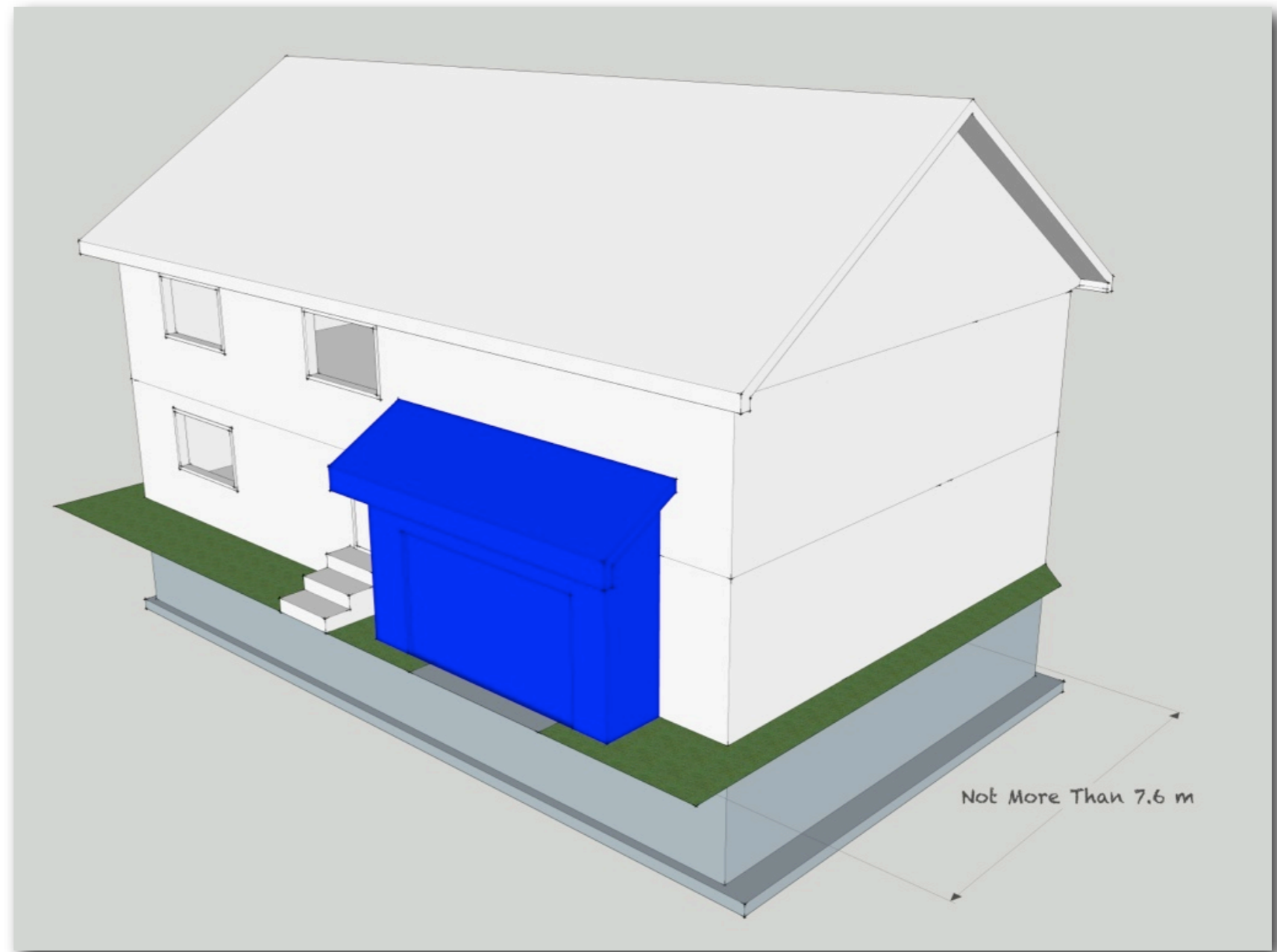
Exceptions

- The front wall of an attached garage that does not support any floors above, is a permitted large opening



Exceptions

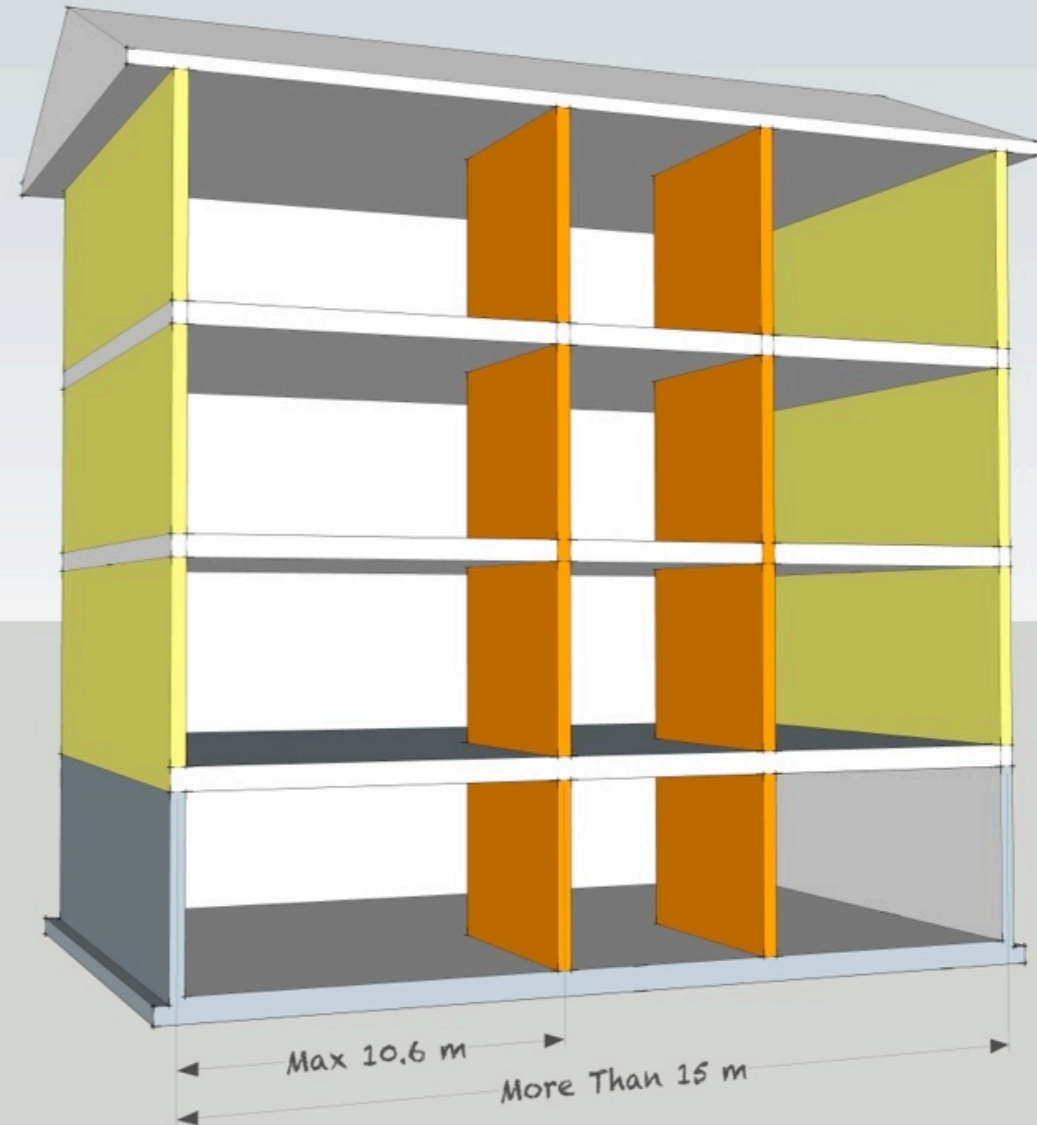
- The front wall of an attached garage that supports not more than one floor above, is a permitted large opening, provided:
 - the other three walls conform, and
 - the back wall is not more than 7.6 m from the front wall



Open Concept

Trade offs

- Where $S_a(0.2)$ is from 1.0 to 1.2, the 7.6 m separation can be increased to 10.6 m, provided:
 - the interior BWP contains wood sheathed BWP wall
 - the wood sheathed BWP is not relied on for open basements

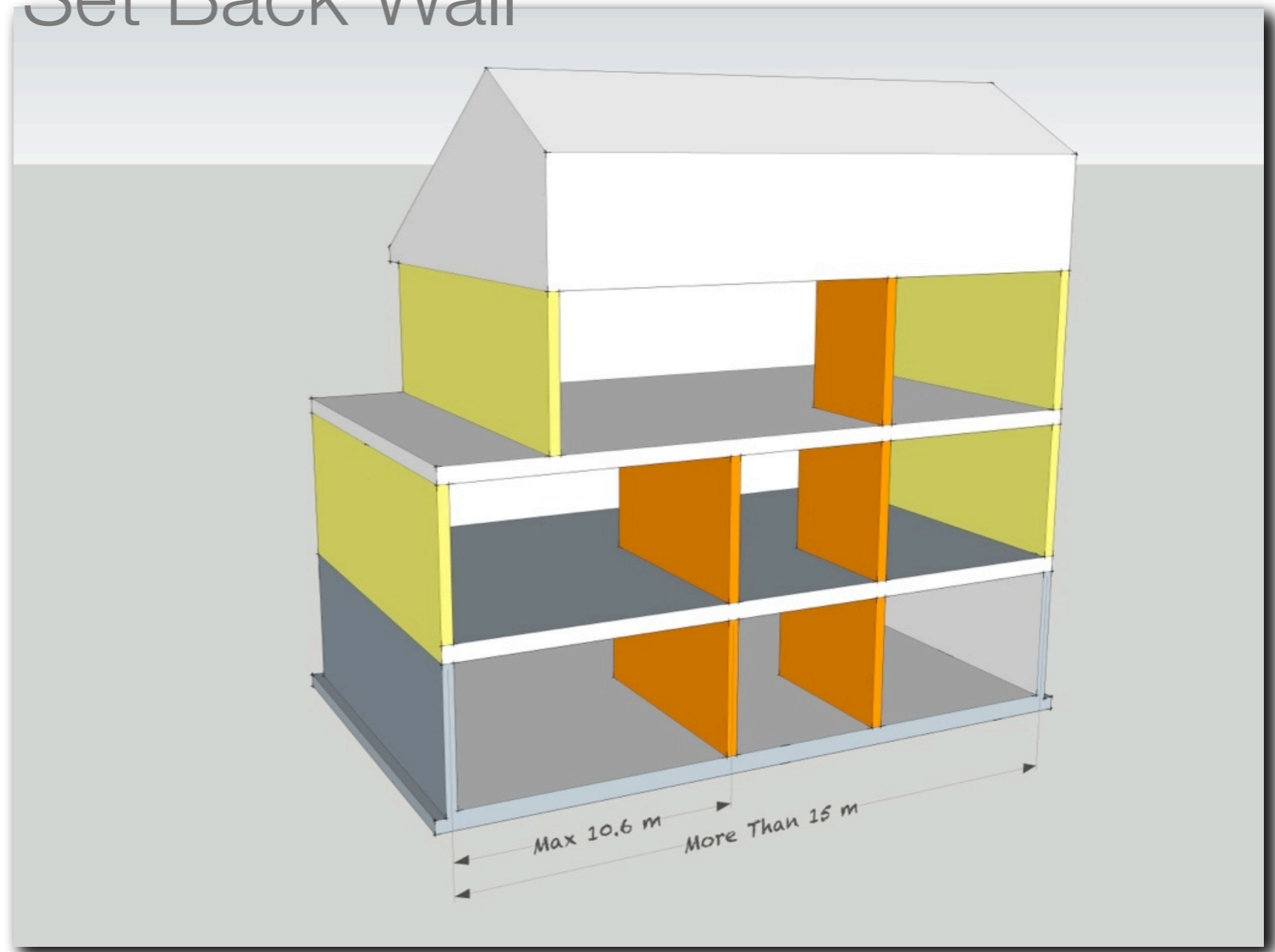


Trade offs

- One exterior wall in each orthogonal direction can be set back, provided:
 - there is a wood sheathed BWP wall not more than 10.6 m back from the supporting exterior wall
 - the perpendicular exterior walls have half the nailing spacing for the top plates and are connected with double the required fasteners, and
 - the roof and floor supporting the set back wall are fully sheathed.

Lateral Load Provisions

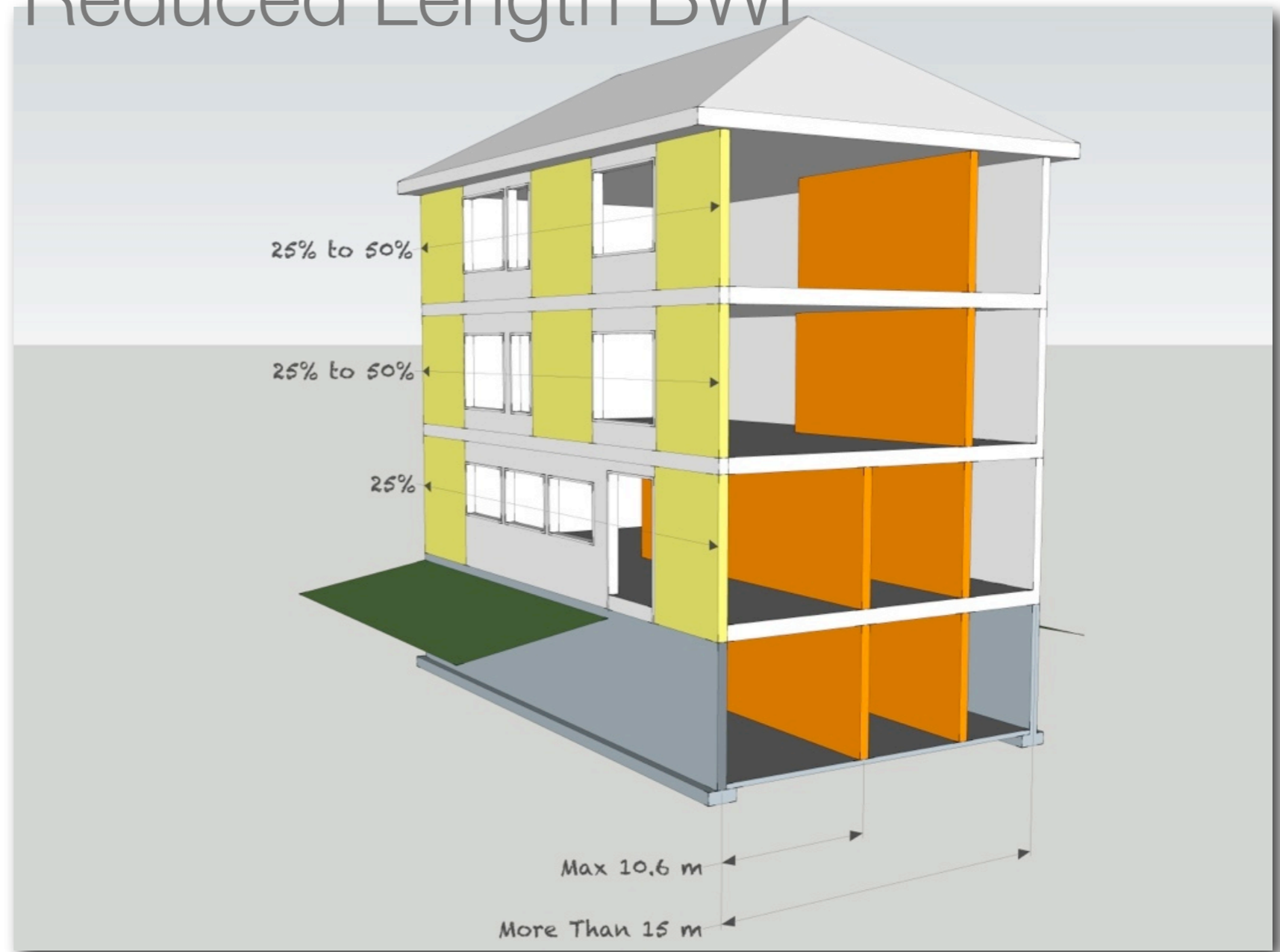
Set Back Wall



Reduced Length BWP

Trade offs

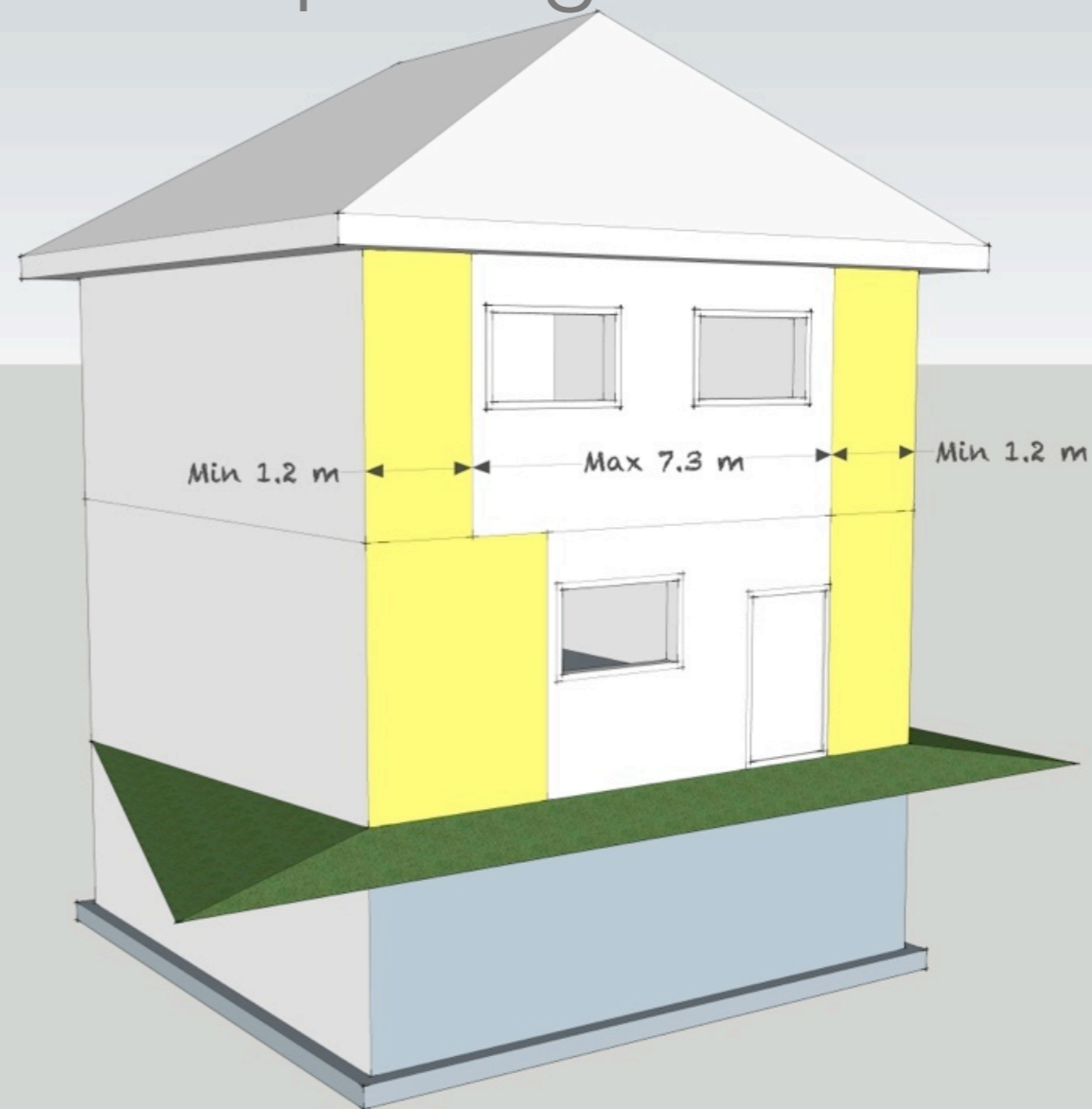
- One wall in each orthogonal direction can have the length of the BWP reduced from 40% to 25%, provided:
 - the length of the BWP for the floors above do not exceed 2 X that of the wall with increased openings, and
 - an additional wood sheathed BWP wall is added within 10.6 m of the affected wall.



Increased Spacing Between BWP

Trade offs

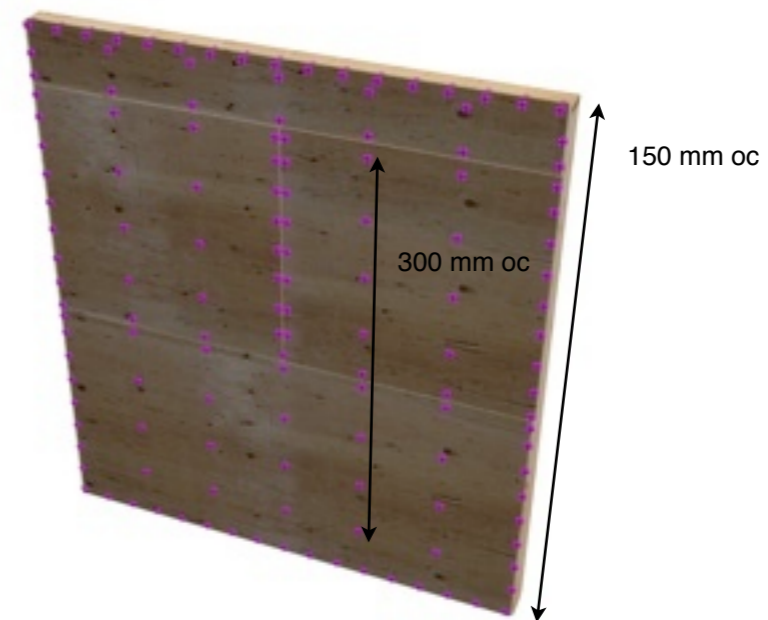
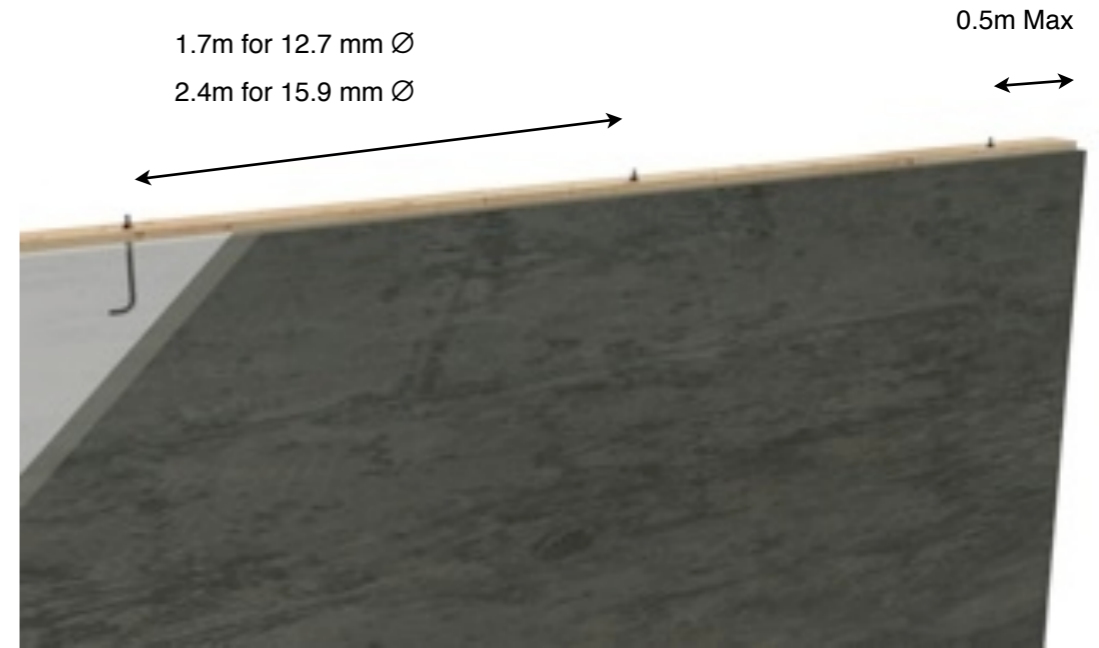
- The maximum distance between BWP can be increased to 7.3 m, provided:
 - all the adjacent BWP within the BWB lengths are a minimum of 1.2 m



Construction Requirements

- Anchor bolts (2 or more floors)
 - 1.7 m spacing for 1/2"
 - 2.4 m spacing for 5/8"
- Sheathing fasteners
 - 300 mm to each stud
 - 150 mm at edges
 - (2 mm gap at all edges still applies)
- For interior BWP, sheathing must be applied to both sides unless fastening is doubled and wood based sheathing used

Anchors and Fasteners



Lateral Load Provisions

Construction Requirements

- Sheathing and lumber requirements per table

Sheathing

Panel Type Cladding, Sheathing or Interior Finish	Minimum Thickness	
	With supports 400 mm o.c.	With supports 600 mm o.c.
Gypsum board interior finish	12.7 mm	15.9 mm
Sheathing complying with CAN/CSA-0325	W16	W24
OSB O-1 and O-2 grades and waferboard R-1 grade	9.5 mm	12.25 mm
Plywood	9.5 mm	12.5 mm
Diagonal Lumber	17 mm	17 mm



DEALING WITH THE ELEMENTS

2012 BCBE Conference & AGM

**2012 CODE CHANGES – SAFETY,
EFFICIENCY *and* SUSTAINABILITY**



New Seismic Provisions

Brought to you by:



Homeowner
Protection Office
Branch of BC Housing

Toll-Free: 1 800 407 7757

Email: hpo@hpo.bc.ca

Website: www.hpo.bc.ca

Presented by:

Murray Frank

Constructive Home Solutions Inc.