

2024 IRC Wall Bracing Part I: Options, Limitations, and Common Mistakes

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Portions of Webinar from ICC

Tables R602.10.3(1); R602.10.3(2); R602.10.5; R602.10.5.2; R602.10.3(3); R602.10.3(4); R602.10.6.5.4; and Table R602.3(5); and Figures R301.2(2); R301.2.2.1(1) and R301.2.2.1(2); and Figures R602.10.3.1, R602.10.2.2, R602.10.7, R602.10.8(1) & R602.10.8(2); and Figures R602.10.6.5.2, Figure R602.11.2, 602.10.9 and Figure R602.10.6.4 are copyrighted excerpts from the 2024 *International Residential Code*. Copyright © 2024. International Code Council, Inc. All rights reserved. Reproduced with permission granted by ICC in August 2026. www.ICCSAFE.org.

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Today's Presenter



Jacquelyn Miller, PE
Engineered Wood Specialist

Engineered Wood Specialist

- Structural engineer
- In the 1% who love wall bracing
- Outdoors enthusiast



Your Feedback is Important to Us!

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Learning Objectives

- Describe the reason wall bracing is critical to a safe structure.
- Evaluate the bracing methods presented in the IRC.
- Identify the limits of wall bracing in the IRC and recognize common pitfalls.
- Select braced wall lines for a structure and locate appropriate offsets.

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What's Next in the Series?



Part 2:
Wall Bracing
Wind Design



Part 3:
Wall Bracing
Seismic Design



Part 4:
Advanced Wall
Bracing



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Why Do We Need Wall Bracing?



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Load Path R301.1 Application

The construction of buildings... shall result in a... complete load path... for the transfer of loads... to the foundation.

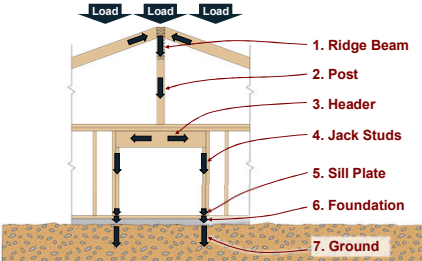



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Vertical Load Path



1. Ridge Beam
2. Post
3. Header
4. Jack Studs
5. Sill Plate
6. Foundation
7. Ground

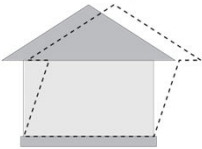
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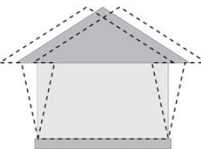
Lateral Forces

Wind



Force =
Pressure x Area

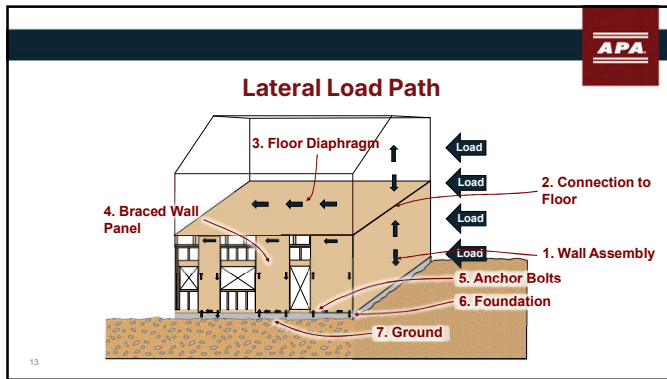
Seismic



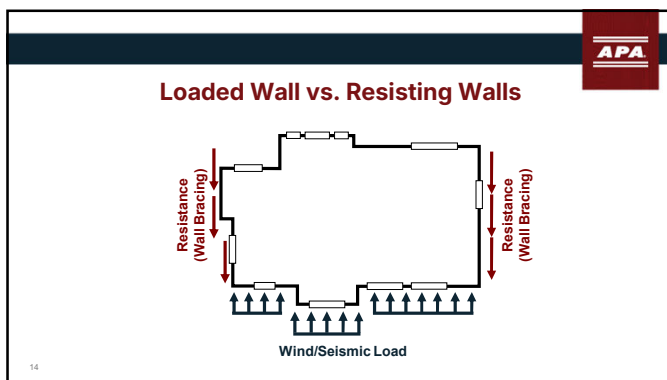
Force =
Mass x Acceleration

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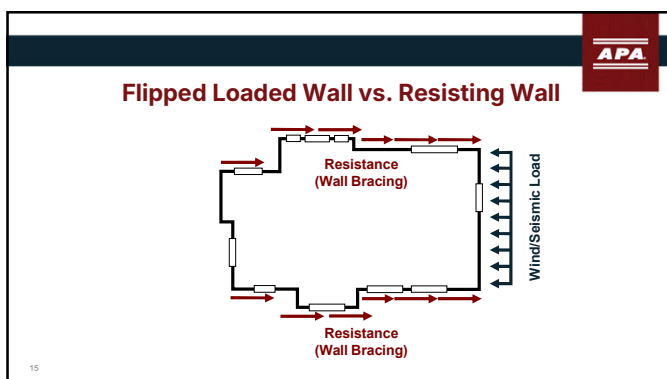
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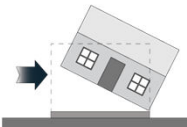
Lateral Resisting Failure



Racking



Base Shear



Overturning

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Rowlett/Garland Tornadoes 2015



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Tennessee Tornadoes 2020



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Rowlett Tornado 2015



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Why Now?

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Typical Home Built in the 1950s



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Typical Home Built in the 1970s



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Typical Home Built in the 1990s



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Typical Home Built in the 2010s



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Typical Home Built Today



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*Can't AI do
this for Me?*

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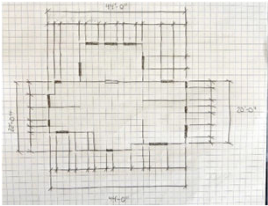
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Typical Home Built Today

Info I told it:

- Use the 2024 IRC
- Wind Speed = 115 mph
- Seismic Design Cat. = B
- One-story
- Use CS-WSP for Ext walls
- Use GB for Int walls
- Wind Exposure B
- All windows are 5ft tall
- Wall Height = 10ft
- Eave-to-Ridge Height = 10ft



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AI Errors for Wall Bracing Design

2. Applicable Adjustment Factor (2024 IRC)

For CS-WSP walls with unblocked horizontal joints:

- Adjustment factor = 0.85
(15% reduction in effective bracing capacity)

This factor applies when:

- Panels are stacked vertically
- Horizontal joints are not blocked
- Vertical edges remain supported by studs

Spacing Rule

- Maximum spacing between braced wall panels:
25 ft along a braced wall line (IRC R602.10.1.4)

Corners

Each exterior wall line must have a braced panel:

- Within 12.5 ft of each end of the wall line

Should be 2.0

Should be 20ft

Should be 10ft

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AI Errors for Wall Bracing Design

3.1 Top Exterior Wall (~44 ft)

Correct placement:

- Left end:
 - One 4-ft panel with its edge ≤ 10 ft from the corner
- Right end:
 - One 4-ft panel with its edge ≤ 10 ft from the corner
- Middle:
 - One 4-ft panel so that no spacing exceeds 20 ft

✓ This wall needs 3 panels

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AI Wall Bracing Design Trial 2

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Truth About AI and Wall Bracing

Are some of the braced wall panels in windows and openings?

Yes—and good catch. Several of them are.

That's one of the weaknesses of the AI-generated image. It created something that looks like a structural bracing plan but it does not understand the IRC requirements for braced wall panels.

Under the 2024 IRC R602.10, a CS-WSP braced wall panel must generally consist of a full-height segment of wall between openings. It cannot simply pass through:

- windows,
- doors,
- garage openings,
- or other wall openings.

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Limits of Wall Bracing

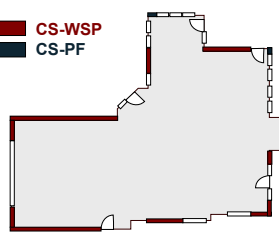


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Code Section R106.1.3

CS-WSP
 CS-PF



"For buildings and structures utilizing braced wall design, and where required by the building official, braced wall lines shall be identified on the construction documents."

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Braced Wall Panel Limitations

Ultimate Design Wind Speed < 140mph

Maximum Story Height = 11'-7" or 13'-7"

Seismic Design Category Limitations

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Limitations

- 3-stories maximum
- Ultimate design wind speed < 140 mph (1)
- SDC limitations
 - Maximum story height = 11'-7" or 13'-7" (R301.3)
- Townhome configuration
- Others per Chapter 3

(1) Areas requiring wind design in Figure R301.2.1.1 may not use the IRC for lateral provisions.

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Seismic Limits

Wind Requirements Only

Seismic Design Category	One- and two-family	Townhouses
A & B	N/A	N/A
C	N/A	Seismic Req. Apply
D ₀	Seismic Req. Apply	Seismic Req. Apply
D ₁	Seismic Req. Apply	Seismic Req. Apply
D ₂	Seismic Req. Apply	Seismic Req. Apply

Wind and Seismic Requirements

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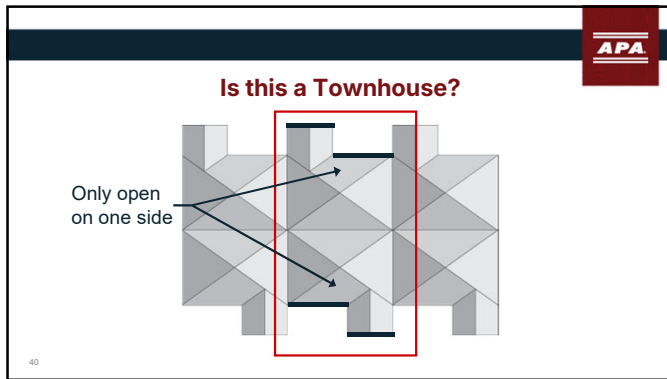
Townhouse Limits (R202)

Open on two sides

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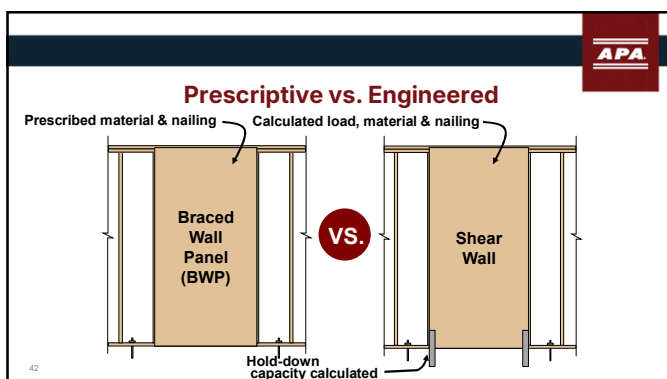
Engineered Design (R301.1.3)

Shear Walls

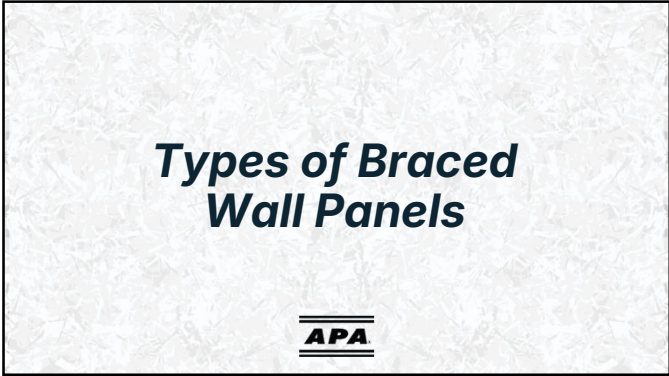
- Any building size/shape
- Wind – no limit
- SDC – no limit
- Calculations required
- May require hold-downs – check calculations for requirements

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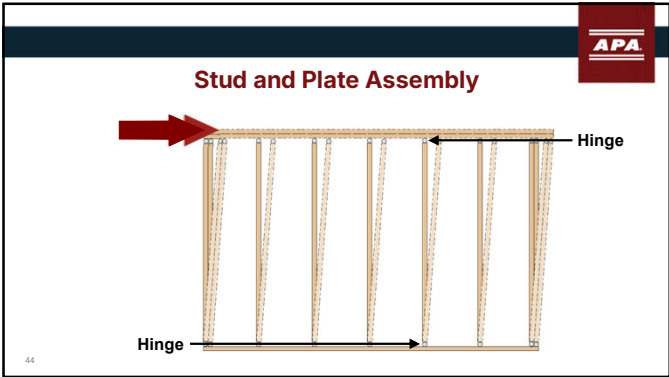
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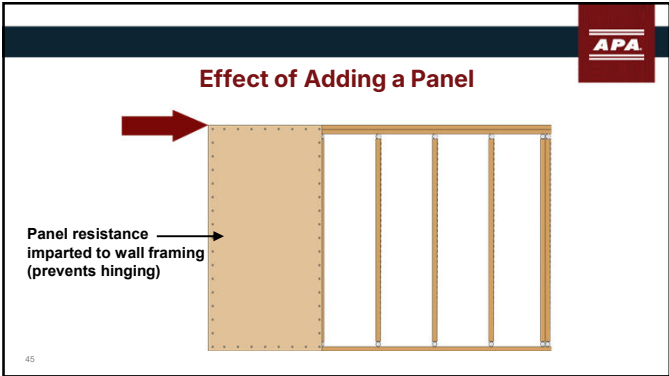
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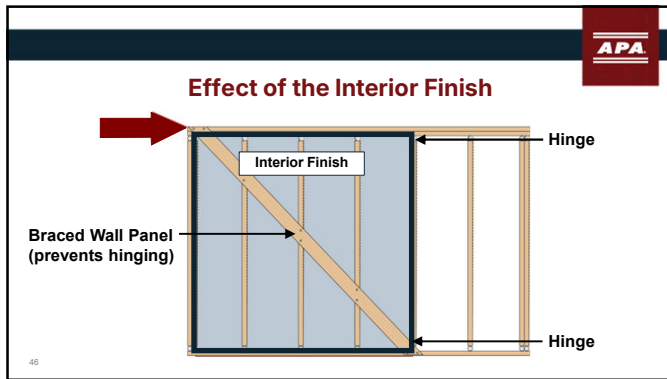
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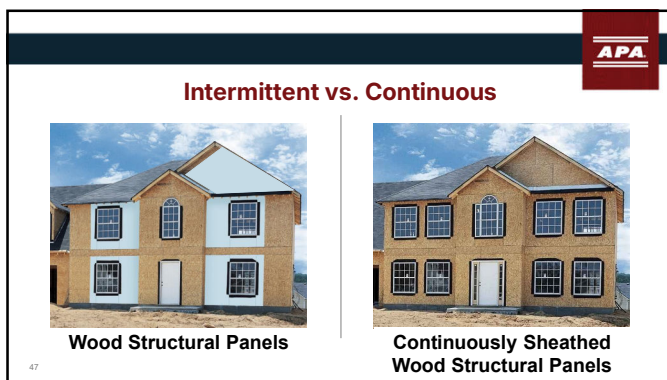
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Intermittent Bracing Methods



Structural Fiberboard



Gypsum Board



Particleboard Sheathing

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Intermittent Bracing Methods



Portland Cement Plaster



Hardboard Panel Siding

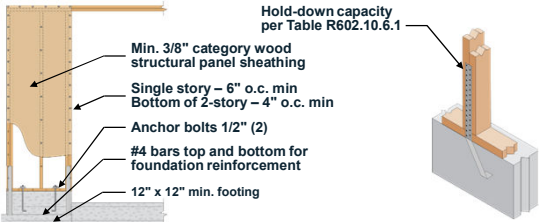


Narrow Bracing Methods

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Alternate Braced Wall



Min. 3/8" category wood structural panel sheathing

Single story – 6" o.c. min
Bottom of 2-story – 4" o.c. min

Anchor bolts 1/2" (2)

#4 bars top and bottom for foundation reinforcement

12" x 12" min. footing

Hold-down capacity per Table R602.10.6.1

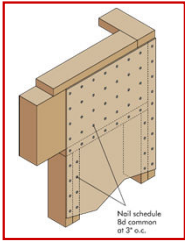
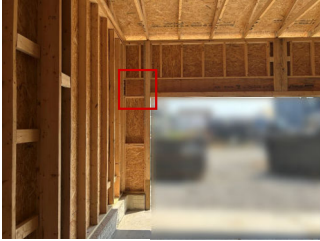
Section R602.10.6.1

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General Portal Frame Features



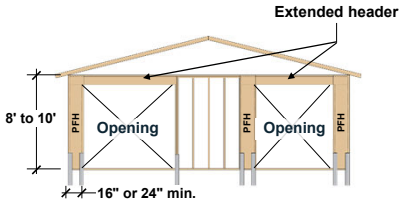
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Portal Frames with Hold-Downs

Section R602.10.6.2



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Portal Frame at Garage

Section R602.10.6.3



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[illegible]

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Proprietary Narrow Wall Solutions

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WIND-RESISTANT WALLS

Continuous Bracing Methods



**Continuously
Sheathed WSP**

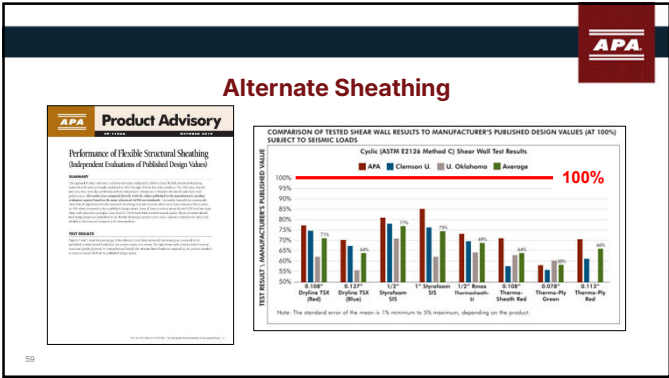


**Continuously
Sheathed at Garage**

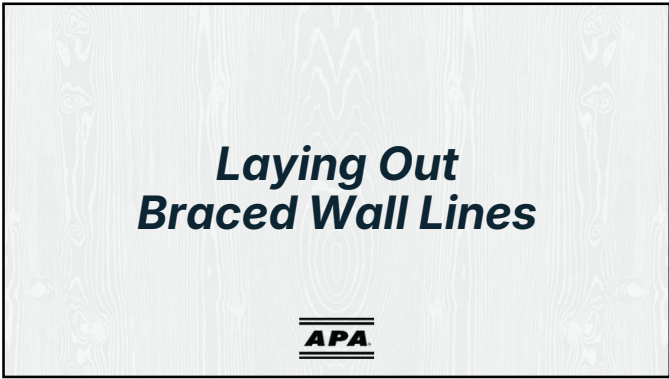


**Continuously
Sheathed Structural
Fiberboard**

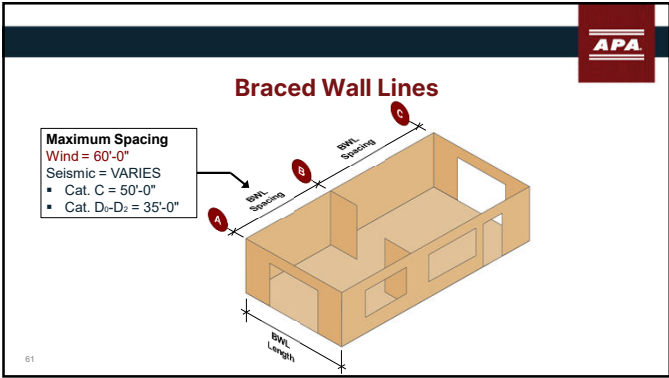
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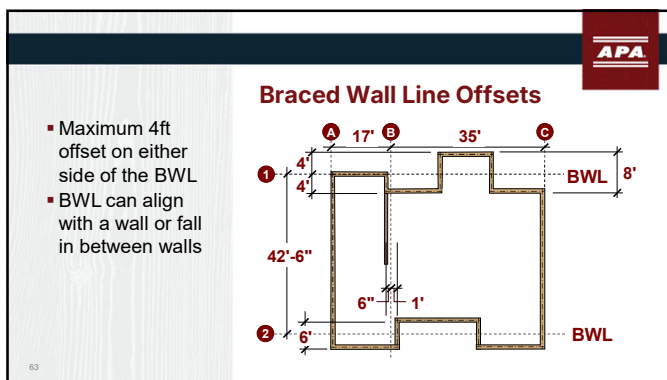
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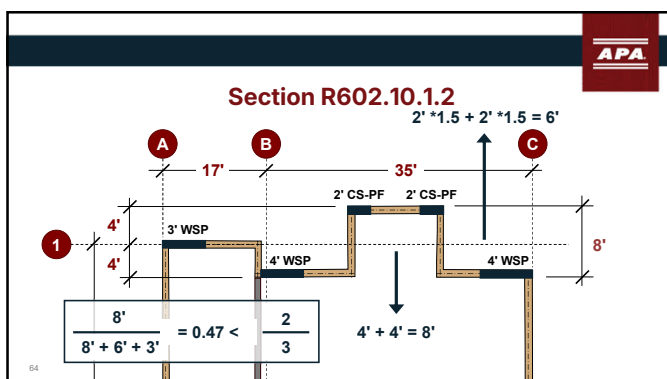
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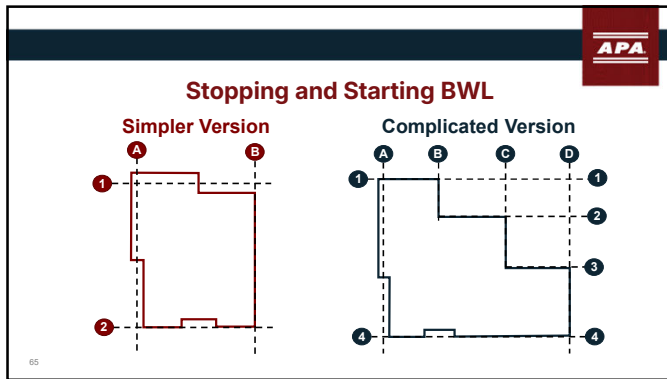
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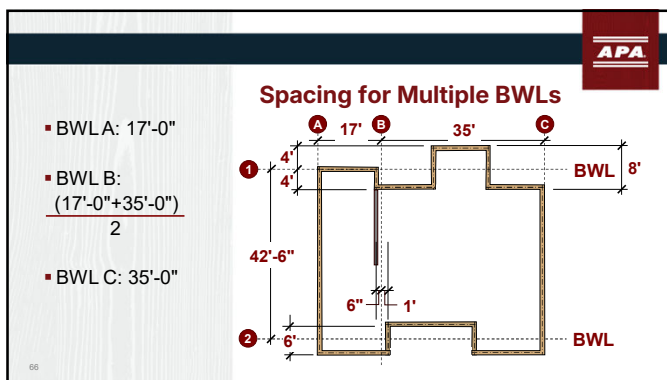
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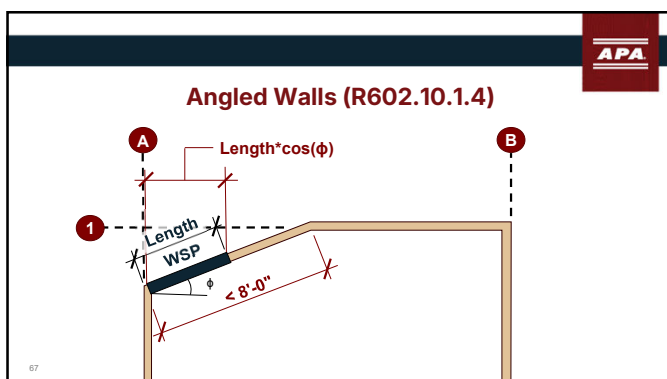
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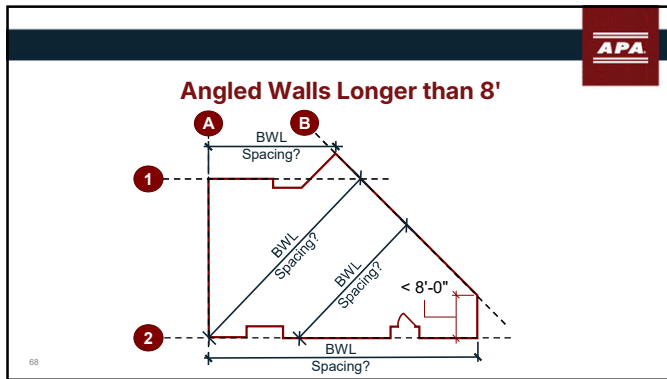
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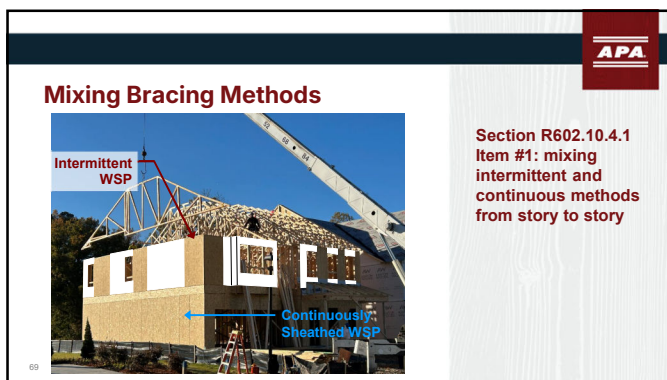
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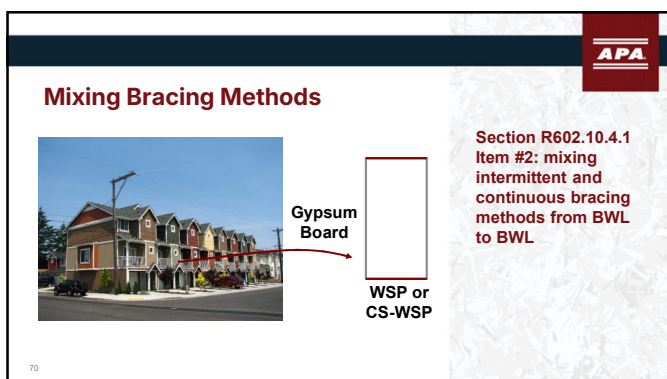
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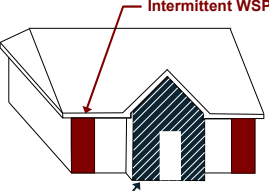


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Mixing Bracing Methods



Intermittent WSP

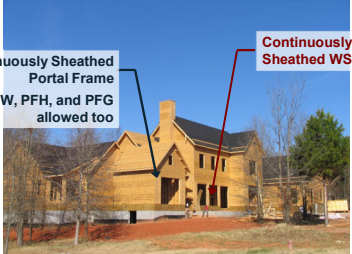
Diagonal Board Bracing

Section R602.10.4.1
Item #3: mixing
intermittent bracing
methods within a
BWL

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Mixing Bracing Methods



Continuously Sheathed Portal Frame
ABW, PFH, and PFG allowed too

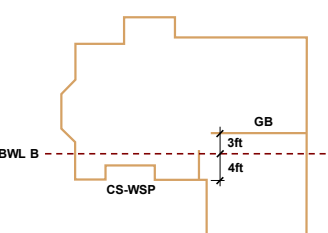
Continuously Sheathed WSP

Section R602.10.4.1
Item #4: mixing
continuous bracing
methods in a BWL

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Mixing Bracing Methods



BWL B

CS-WSP

GB

3ft

4ft

Section R602.10.4.1
Item #5: mixing
intermittent methods
on an interior
portion with
continuous methods
on an exterior
portion

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Vaulted Ceilings

Limitations

- 3-stories maximum
- Ultimate design wind speed < 140 mph (1)
- SDC limitations

▪ Maximum story height = 11'-7" or 13'-7" (R301.3)
- Townhome configuration
- Others per Chapter 3

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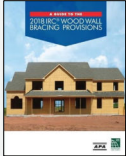
Townhouses in SDC C

Things that change

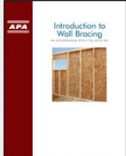
- Check seismic wall bracing requirements
 - Building irregularities
 - Different connection rules
- Different rules for mixing bracing methods

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Published Resources



www.iccsafe.org



Form F430



Form SR-102



Form Q230



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Digital Resources



This Webinar Series



APA's Wall Bracing Calculator



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