

NARROW WALL BRACING WITHOUT HOLD-DOWNS FOR USE IN A FULLY SHEATHED HOUSE



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Tests show APA's Narrow Wall Bracing Method (a portal-frame structure) performs comparably to existing code-permitted bracing for residential structures when built on rigid foundations or raised wood floor assemblies. Section R602.10.5 of the 2003 International Residential Code (IRC) permits a 4:1 aspect ratio (e.g., 96-inches tall by 24-inches wide) for narrow wall segments constructed with no hold-down devices when the home is fully sheathed with wood structural panels and the narrow wall segment is adjacent to a limited-height window. More than 25 full-scale cyclic tests in two phases demonstrated that APA's 6:1 aspect ratio portal frame design performed comparably to the IRC's provisions.

PHASE I

The first phase of testing on APA's Narrow Wall Bracing Method evaluated wall assemblies connected to rigid foundations, therefore limiting designs to installation on rigid foundations (*Technical Topics: Narrow Garage Wall Bracing for One- and Two-Story Homes*, TT-077). The tests showed the 6:1 aspect-ratio (e.g., 96-inches tall by 16-inches wide) portal frame design performed approximately equal to or better than the IRC-permitted 4:1 aspect-ratio wall segment (APA, 2003). This comparative testing was the basis for a successful code change proposal (RB178-03/04) to the 2003 IRC in Section R602.10.5, as confirmed in the 2004 Supplement to the International Codes (ICC, 2004).

PHASE II

The second phase of testing on APA's Narrow Wall Bracing Method, completed in summer 2004, evaluated its performance on raised floor assemblies. Test results also showed the 6:1 aspect ratio portal-frame design performed approximately equal to or better than the IRC 4:1 aspect-ratio wall segment when both are built on a raised-floor assembly (APA, 2004). APA has proposed code changes to the 2003 IRC in the 2004-05 code-change development cycle based on these tests. The proposed code changes and the matching recommendations herein are intended to replace previous APA code changes from Phase I tests of the Narrow Wall Bracing Method.

This proposal would change the current IRC limitations (Seismic Design Categories A-C, first of two stories and garages only), making the method consistent with IRC sections R602.10.1, R602.10.5 and IRC Table R602.10.1 for installations on both rigid foundations and raised wood floors. APA proposes the following limitations when using the 6:1 aspect ratio APA Narrow Wall Bracing Method:

- Requirements of IRC Section R602.10.5 apply (i.e., fully sheathed wood-structural-panel walls, corner details as specified, etc.).
- Wall segments are built in accordance with Figures 1, 2 and 3.
- For purposes of meeting the bracing requirements of Table R602.10.1, wall segments constructed in accordance with IRC section R602.10.5 and Figures 1, 2 and 3 may be considered Method-3 bracing. In addition, the width of the

vertical segment of the APA Narrow Wall Bracing Method is permitted to be considered as equal to its measured width multiplied by 1.5. For example, a 16-inch-wide vertical-wall segment constructed per Figures 1, 2 and 3 can be counted as 24 inches.

■ The amount of bracing required for certain stories, wind speeds and Seismic Design Categories are as given in IRC Table R602.10.1.

REFERENCES

APA, 2003. *Testing a Portal Frame Design For Use as Bracing in Fully Sheathed Structures*, APA Report T2003-48, APA – The Engineered Wood Association, Tacoma, WA.

APA, 2004. *Testing a Portal Frame Design on Raised Wood Floors For Use as Bracing in Fully Sheathed Structures*, APA Report T2004-38, APA – The Engineered Wood Association, Tacoma, WA.

ICC, 2004. *Supplement to the International Codes*, International Code Council, Country Club Hills, IL.

FIGURE 1

CONSTRUCTION DETAILS FOR THE APA NARROW WALL BRACING METHOD WITHOUT HOLD-DOWNS OVER CONCRETE OR MASONRY BLOCK FOUNDATION

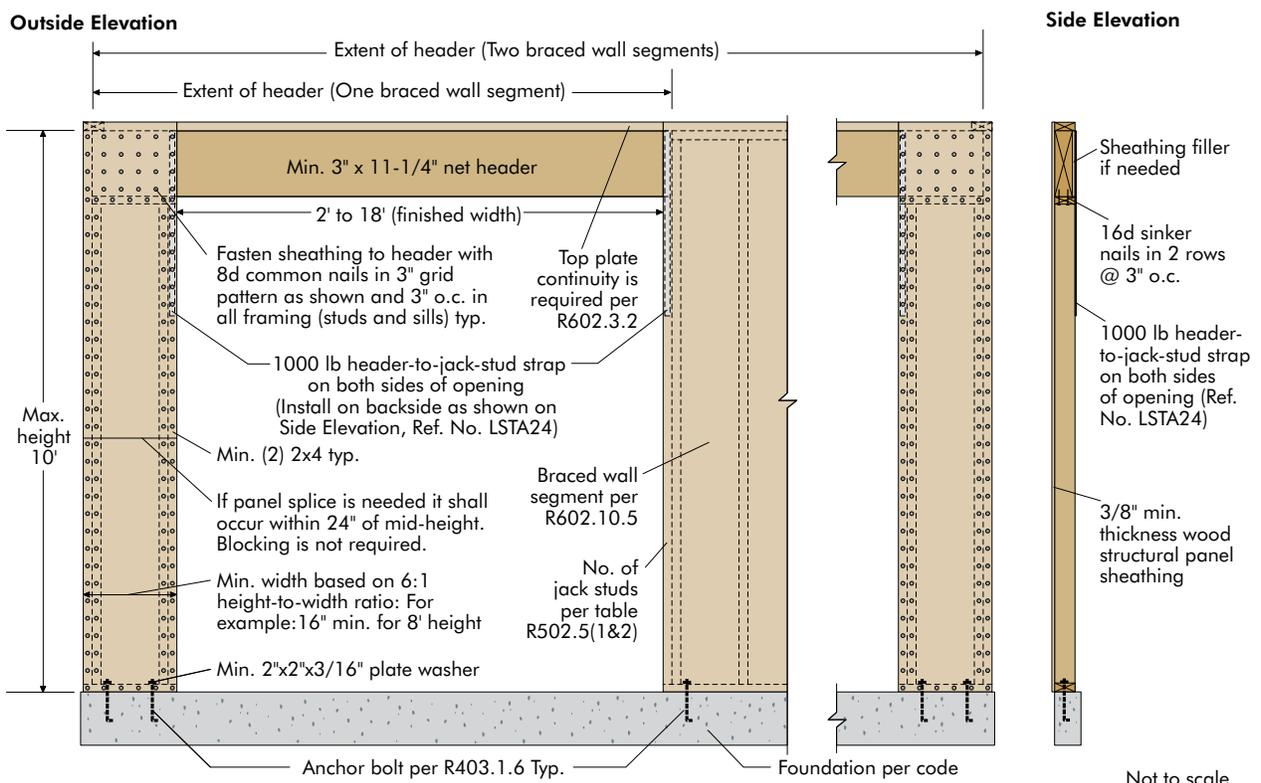
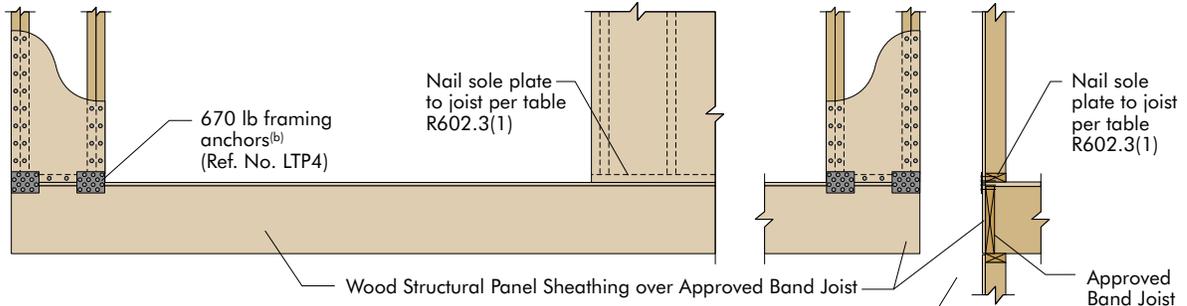


FIGURE 2

CONSTRUCTION DETAILS FOR THE APA NARROW WALL BRACING METHOD WITHOUT HOLD-DOWNS OVER RAISED WOOD FLOOR OR SECOND FLOOR – FRAMING ANCHOR OPTION^(a)

Outside Elevation

Side Elevation



Framing anchors installed per the anchor manufacturer's recommendation.

Use engineered wood Rim Board®, I-joist, or **DRY** lumber rim joist to minimize potential for buckling over band joist.

Notes:

- (a) See Figure 1 for complete framing detail.
- (b) Framing anchors may also be rotated vertically.

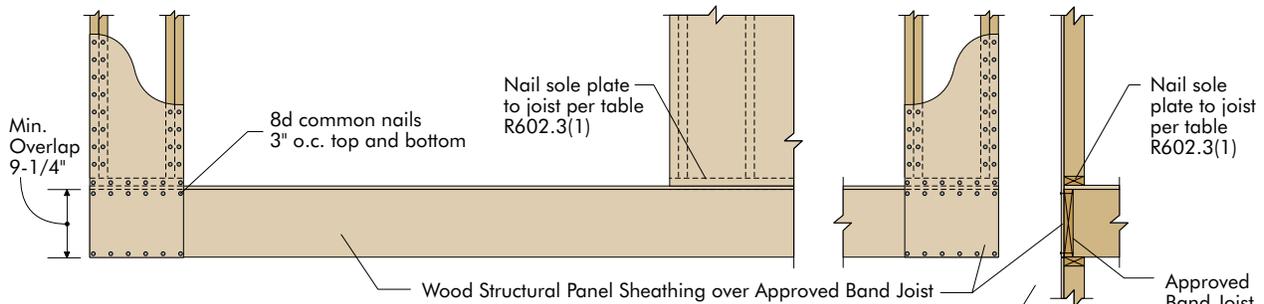
Not to scale

FIGURE 3

CONSTRUCTION DETAILS FOR THE APA NARROW WALL BRACING METHOD WITHOUT HOLD-DOWNS OVER RAISED WOOD FLOOR OR SECOND FLOOR – WOOD STRUCTURAL PANEL OVERLAP OPTION^(a)

Outside Elevation

Side Elevation



Use engineered wood Rim Board, I-joist, or **DRY** lumber rim joist to minimize potential for buckling over band joist.

Note:

- (a) See Figure 1 for complete framing detail.

Not to scale

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