

## **NARROW GARAGE WALL BRACING FOR ONE- AND TWO-STORY HOMES**

New portal frame designs, developed by APA, have been tested to show bracing performance that is comparable to existing code-permitted bracing for residential structures (APA Technical Topic TT-073). There is a frequent desire to use narrow wall designs without hold-downs at garage door openings. According to the code, in the lower seismic regions of the U.S., 24-in. narrow wall designs can currently be applied with no hold-down devices when the home is fully sheathed with wood structural panels (see Section R602.10.5 of the 2003 International Residential Code). One drawback, however, is the one-story limitation for this application (see IRC Table R602.10.5 footnote b). The limitation represents a significant restriction since many dwellings have a second story over the garage.

APA conducted a series of tests to justify expanding no-hold-down portal frame application recommendations to two-story dwellings, where the portal frame is applied to the first story in a fully sheathed structure in areas with low seismic risk (APA, 2003). Results of this test program show that 16-in.-wide portal frame designs, with a 6:1 height-to-width ratio as measured at the vertical wall segment, performed comparably to wall bracing systems currently accepted in the IRC for use in any of three stories of a fully sheathed structure.

APA tests show that the portal frame segment depicted in Figure 1 provides bracing-level performance that is comparable to IRC bracing permitted under multiple stories. Use of the detail shown in Figure 1, however, should be limited as follows:

- Use next to garage door openings only.
- Apply to the first story in residences of up to two stories.
- Completely sheath the structure with wood structural panels and use wall corner detailing as shown in Figure 1, per IRC Section R602.10.5.
- Use only in Seismic Design Categories A-C, and limit to wind speed regions in accordance with the general conventional construction limitations stated in the IRC.

### **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.

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**Figure 1. Recommended construction details for APA portal frame bracing without hold-downs**

