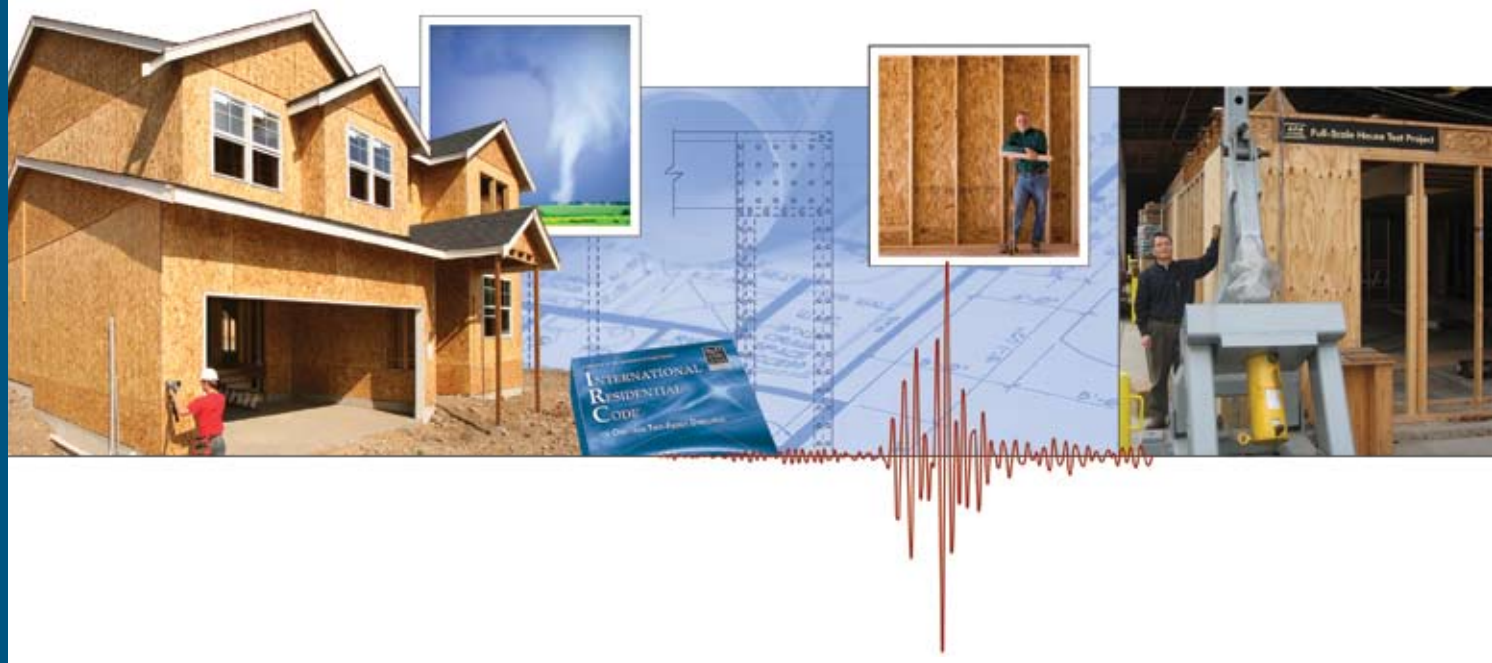
Brace Walls with Wood

Plywood and OSB Meet Whole House Bracing Challenges



APA

WOOD STRUCTURAL PANELS TAKE THE HEADACHES OUT OF HOME BUILDING

Almost 70 percent of homebuilders have already discovered a straightforward solution for code bracing requirements and job site uncertainties: sheathing all exterior walls with wood structural panels. By using plywood or oriented strand board (OSB), builders not only meet code, but also get maximum design flexibility, provide owners a safe structure and reduce callbacks, material use and labor issues.

Fully sheathing a house with plywood or OSB gives builders the ability to construct code-approved wall segments narrower than any permitted with other sheathing products and without complicated hold downs. Home designers enjoy the flexibility available with wood structural panels, while homeowners appreciate the security of hazard-resistant construction. Most all luxury homes use plywood or OSB for a reason: wood structural panels are the best product money can buy at an overall cost that's affordable for any builder.

Other sheathing products plague builders with a host of concerns that can lead to costly delays throughout the construction process. Meeting code requirements and satisfying the architectural imperatives of the owner with these products can be a challenge, often requiring engineering, prefabricated products, and hold downs that drive up costs, add time and complicate installation. Often, these problems evaporate with a simple switch to fully sheathing with wood structural panels.

Wood Structural Panels:

- Help builders cost effectively meet code requirements for wall bracing even while using narrow walls
- Add shear and racking strength that help tie the building together to resist nature's forces, including inclement weather during construction
- Provide a solid nail base and continuous coverage for siding, which results in a smooth, even appearance of the finished siding
- Are easy to build with, meaning fewer labor hassles
- Add stiffness and reduce flexing that can cause drywall problems, thus reducing callbacks
- Help protect the structure against airborne debris in high winds
- Provide code-required resistance to wind pressures acting on exterior walls
- Provide an excellent noise barrier when used in combination with insulated wood-framed walls and exterior siding products
- Deliver energy savings to the homeowner with a strong, tight home, while not compromising structural integrity
- Provide an excellent structural foundation for foam sheathing

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MEET WALL BRACING CODE REQUIREMENTS

Code-required wall bracing is a critical aspect of the structural integrity of a home. As home designs continue to become larger and more complicated, bracing is also becoming more critical, and building officials across the country are stringently enforcing the wall bracing code requirements. The International Residential Code's (IRC) eight prescriptive bracing methods require 4-foot or wider bracing segments near the corners of buildings and at prescribed intermediate points, but common home designs rarely include such wide segments, leaving builders caught between meeting code or meeting the owner's and architect's aesthetic concerns. Fortunately, builders have an easy solution: fully sheath walls with wood structural panels.

No Hold Downs.
No Hold Ups.
No Hassles.

The continuous wood structural panel sheathing method (2006 IRC R602.10.5) and the APA Narrow Wall Bracing Method enable builders to meet code bracing requirements, while reducing wall bracing segments to as narrow as 16 inches next to window and door openings without any special components or connectors. Wood structural panels form a strong, stiff shell when joined together, and this inherent strength enables builders to use smaller bracing segments while still maintaining the building's ability to resist lateral loads such as high wind or seismic loads. Because these systems are based on the structural integrity of continuous wood structural panel sheathing for the complete building system, it's important that all exterior walls are fully sheathed with plywood or OSB.

The code requirements for wall bracing can be confusing, but many of the complicated issues can be avoided by using plywood or OSB on all exterior walls of the house. Additionally, a lesser amount of bracing is required, compared to other prescriptive wall bracing materials, when using all wood structural panels. Builders find fully sheathing with wood structural panels eliminates the majority of code-compliance worries, simplifies the construction process and results in a better-performing house.

Wood Structural Panels and Energy

As the cost of energy continues to increase, energy conservation will also continue to be a top priority of builders and designers. True energy conservation is more than just accumulating R values, as leading energy experts point to tighter houses and more efficient mechanical systems for the real keys to cutting energy costs.

Some wall materials, such as the foam sheathing shown in the photo above, are susceptible to field damage. When holes are punched in the board during construction, any energy benefits from the foam sheathing are nullified by the resulting air infiltration.

Wood structural panel sheathing, shown in the photo above, provides a tight connection to the framing material and is strong and puncture resistant. In short, plywood and OSB sheathing provide the homeowner a strong, tight home.

NARROW BRACING OPTIONS FOR A FULLY SHEATHED HOME

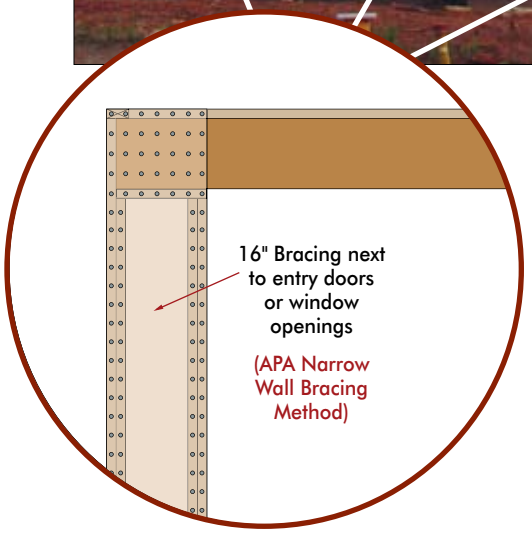
Because fully sheathing a home with plywood or OSB creates a rigid shell structure, the APA Narrow Wall Bracing Method and the continuously sheathed method, referenced in Section R602.10.5 of the 2006 IRC, solve the problem of meeting code requirements while permitting narrow walls. The IRC R602.10.5 method allows for wall segments as narrow as 24 inches, but the APA Narrow Wall Bracing Method takes the concept a step further with a configuration that adds enough structural support to safely reduce bracing width to 16 inches. Both methods can be used all around the house at garage, window and door openings, creating a more pleasing appearance both inside and out. Table 1 summarizes minimum allowable bracing widths permitted by the 2006 IRC, along with the APA Narrow Wall Bracing Method.

TABLE 1

ALLOWABLE BRACING SEGMENT WIDTHS FOR FULLY SHEATHED HOMES

Bracing Construction	Minimum Width of Braced Wall Panel for Wall Height of:			Max. Opening Height Next to the Braced Wall
	8 feet	9 feet	10 feet	
IRC R602.10.5 (see IRC for limitations)	32"	36"	40"	85% of wall height
	24"	27"	30"	65% of wall height
APA Narrow Wall[a] Bracing Method (see Figures 1, 3, 4)	16"	18"	20"	up to bottom of header

Note:
(a) See www.wallbracing.org for details, including APA Technical Note: *Portal Frame Wall Bracing,* Form J740.



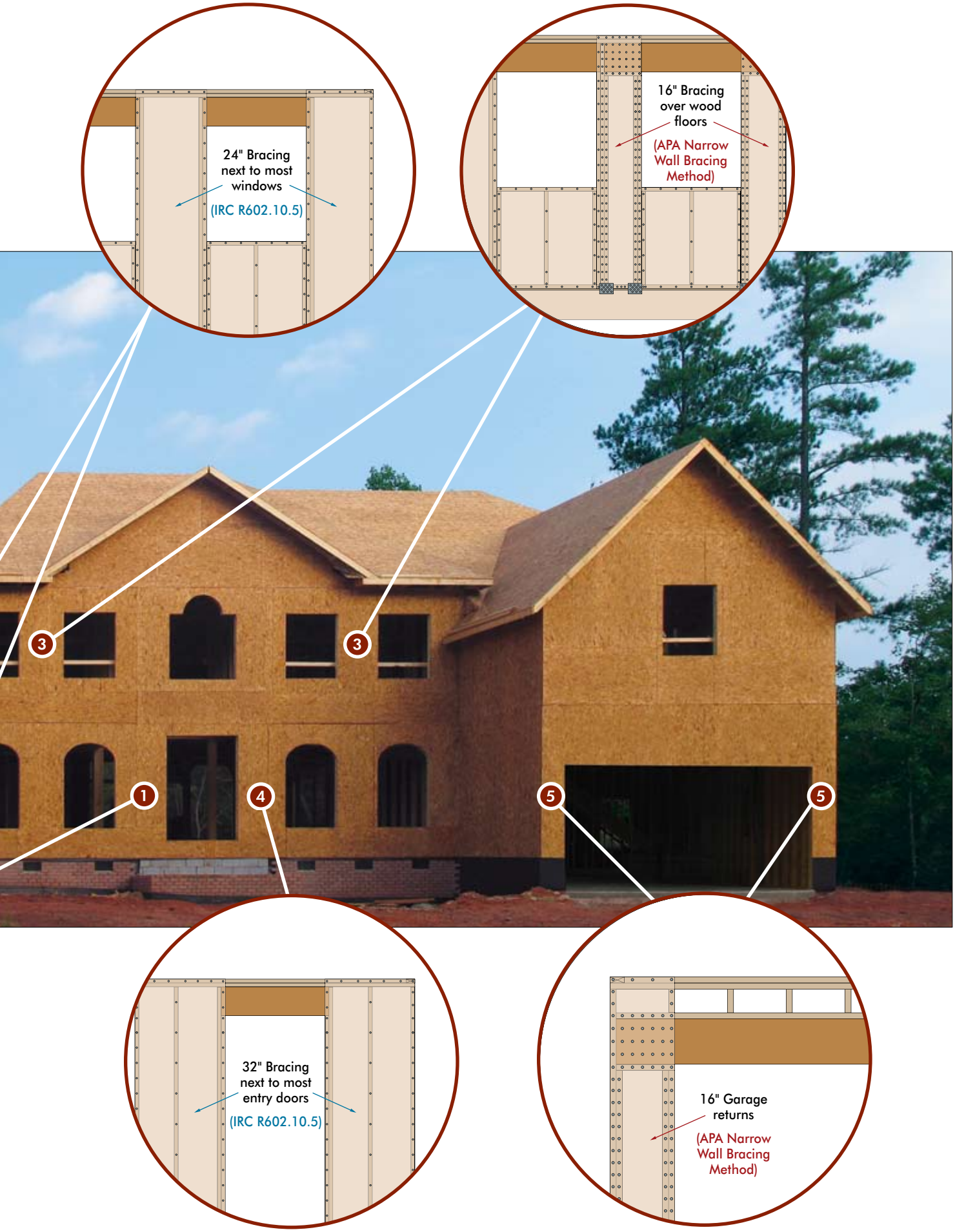
1 The APA Narrow Wall Bracing Method permits 16-inch-wide bracing segments next to most entry doors and windows.

2 & 4 Using 2006 IRC R602.10.5, or Section R602.10.4 of the 2007 Supplement to the IRC, bracing segments can be as narrow as 32 inches wide next to entry doors and 24 inches wide next to most windows. No header extensions or special nailing schedules are necessary.

3 Builders can use 16-inch-wide bracing on raised wood floors including those over basements and crawl spaces, on second and third stories and in sunrooms.

5 Builders can easily utilize designs as narrow as 16-inch-wide garage walls without using exotic systems or foundation hold-down devices.

Note: Drawings are for illustrative purposes only. See www.wallbracing.org and the IRC for construction details and limitations.


24" Bracing
next to most
windows
(IRC R602.10.5)
16" Bracing
over wood
floors
(APA Narrow
Wall Bracing
Method)
3
3
1
4
5
5
32" Bracing
next to most
entry doors
(IRC R602.10.5)
16" Garage
returns
(APA Narrow
Wall Bracing
Method)

DESIGN FLEXIBILITY FOR THE WHOLE HOUSE

Modern home designs feature such design elements as a variety of siding types and styles, high ceilings, sunrooms, window walls and second-story bonus rooms. Homebuyers shopping for a new house expect these features, but it's important for designers and builders to understand the consequences of such designs. Taller walls catch more wind, and large window openings decrease the strength of the force-resisting shell of the home, making wall bracing even more important in new homes. Wood structural panels provide the strength needed for today's design trends.

To make up for their structural limitations, some products are required to be installed in 4-foot-wide segments, and let-in bracing and gypsum must be even wider, to meet the code bracing requirements. This, in turn, leads to fewer opportunities for openings like windows and doors, which decreases the value of the home in terms of both its design appeal and its structural integrity. Wood structural panels, however, maintain a house's structural integrity while enabling the narrower wall bracing segment width featured in many of today's home designs.

For partially sheathed bracing options, the IRC (Section R602.10) requires 4-foot-wide bracing segments near the corners of buildings and at prescribed intermediate points. Four-foot-wide bracing segments significantly reduce the wall space available for windows, doorways and garage openings, making efficient house layout difficult for designers and homeowners alike.

Fortunately, the IRC permits narrow wall segments to count as bracing when the house is fully sheathed with wood structural panels. This bracing method, described in IRC Section R602.10.5, permits segments as narrow as 24 inches next to most windows. The APA method permits segments as narrow as 16 inches adjacent to openings, such as garage doors, large windows and sliding glass doors (see Table 1). This bracing option offers more design flexibility for houses, allowing more windows and doors and making a lighter, more open-feeling interior.

THE STRUCTURALLY SUPERIOR CHOICE

A house must be able to resist the loads anticipated during its lifetime. Lateral loads – those acting on the side of a house – result from winds or earthquakes. Walls with the superior bracing are less likely to rack, incur damage or collapse during high wind or an earthquake.

Along with the advantage of whole-house bracing, wood structural panels provide universally solid performance as a sub-siding material. Holding fasteners securely, providing impact resistance from storm-blown objects and resisting code-required wind pressures make plywood and OSB the most versatile of all wall sheathing materials.

APA's engineers have observed first-hand the devastation of recent natural disasters and chronicled the effects of different sheathing types. Wood structural panels out-performed other sheathing choices in resistance to flying debris, wind pressures and racking. Wood structural panels also serve as cladding, capable of resisting the required wind pressures blowing on the house during such events.

Tornadoes

Observations from a series of tornadoes in Missouri in May 2003 demonstrate the benefits of wood structural panel sheathing. Homes with plywood or OSB sheathing sustained far less damage than those sheathed with products like non-structural foam or fiberboard and sided with vinyl. Strong winds and windborne debris caused much of the damage in this region.

A detached garage was racked due to inadequate bracing of the front return walls.

OSB wall sheathing fared well under lightweight vinyl siding compared to the non-structural wall sheathing materials shown here.

Plywood sheathing under badly battered vinyl siding remained intact on this wall.

This plywood sheathed house fared much better than the home in the background that had mostly nonstructural wall sheathing. (See photo below.)

The nonstructural wall system of this two-story house offered little resistance to damage from flying debris and lateral forces.

Hurricanes

Hurricane Katrina wreaked havoc across the Gulf Coast in August 2005. Assessment teams concluded that structures built with wood structural panels sustained less damage from the hurricane-force winds than those built with lesser materials.

Homes in the Brighton Place subdivision in Gulfport, Mississippi, experienced very little structural damage. It is believed that this home was representative of the construction in this development. There was a complete load path from foundation to roof, and the walls were fully sheathed with wood structural panels.

Note intact vinyl siding in garage area that was sheathed with wood structural panels, and lack of vinyl siding in areas of the foam sheathing.

This home was in the same neighborhood as the above photo. Foam sheathing was inadequate to resist the wind pressures on the gable ends. Massive water infiltration and damage to home and contents resulted.

Foam sheathing and vinyl were lost on gable-end in Sunkist (Biloxi), Mississippi, just south of I-10. Massive water infiltration and damage to contents resulted.

This neighborhood experienced significant loss of vinyl siding. Yet the fully sheathed homes remained structurally sound.

ABOUT APA

APA is a nonprofit trade association of and for structural wood panel, glued laminated timber, wood I-joist, laminated veneer lumber and other engineered wood product manufacturers. Based in Tacoma, Washington, APA represents approximately 150 mills throughout North America, ranging from small, independently owned and operated companies to large integrated corporations.

Always insist on panels bearing the mark of quality – the APA trademark. Your APA panel purchase is not only your highest possible assurance of product quality, but an investment in the many trade services that APA provides on your behalf. The Association's trademark appears only on products manufactured by member mills and is the manufacturer's assurance that the product conforms to the standard shown on the trademark. That standard may be an APA performance standard, the *Voluntary Product Standard PS 1-07 for Construction and Industrial Plywood* or *Voluntary Product Standard PS 2-04, Performance Standards for Wood-Based Structural-Use Panels.* Panel quality of all APA trademarked products is subject to verification through APA audit.

FOR MORE INFORMATION ON *WALL BRACING*

- **www.wallbracing.org** offers the most current information on the APA Narrow Wall Bracing Method, including links to more APA publications addressing wall bracing.
- **www.apawood.org** is your central resource for all information about engineered wood products, including more than 400 publications and links to APA member manufacturers.
- **www.apacad.org** is your link to getting the APA Narrow Wall Bracing Details in CAD format. Apacad.org offers free detail downloads in .DXF, .DWF, or .DWG file format, ready to drop into your next building plan.
- **help@apawood.org** or (253) 620-7400 is your connection to the APA Product Support Help Desk. Staffed by specialists who have the knowledge to address a diverse range of inquiries related to engineered wood, the Help Desk can answer your questions about the APA Narrow Wall Bracing Method or any other application.

We have field representatives in many major U.S. cities and in Canada who can help answer questions involving APA trademarked products. For additional assistance in specifying engineered wood products, contact us:

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Form No. G440A • Revised November 2008/0200

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