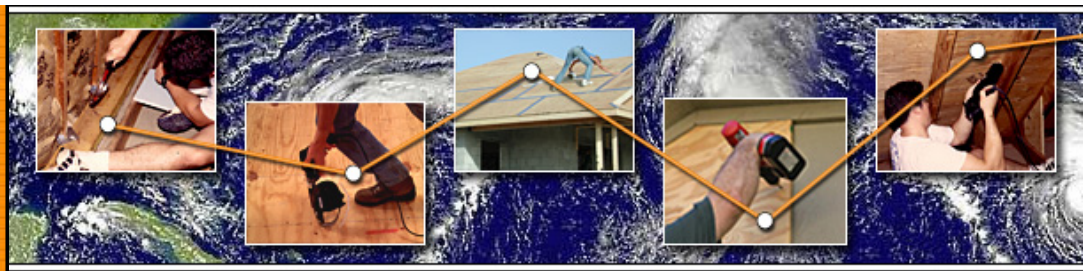

Load Paths through the Wood Frame Walls

Important Characteristics of Well Built Wood Frame Exterior Walls:
To complete the development of an effective continuous load path that connects the roof to the foundations, you need to make sure that the exterior walls are strong enough to withstand the wind forces and are well anchored to the foundation. Inadequate wall strength and poor connections between the wall and foundation can weaken your entire home. These vulnerabilities tend to show up when the highest winds of a major hurricane (Category 3 or higher) strike your home. This is especially true if you live in a one-story home with large roof truss or rafter spans and a low-sloped roof or a two story home of about any size or shape. The walls that are most important in helping to hold the roof on are the exterior walls that the ends of rafters or trusses rest on. These walls can have a lot of uplift applied to them. The dead weight of these walls is only 5 to 10 pounds per square foot. So if a wall is 8' high its dead weight can only restrain 40 to 80 pounds of the hundreds of pounds of uplift that may be applied in a strong hurricane. This points to the necessity of tying the bottoms of wood frame walls to the floor below and ultimately to the foundation. Click on Wood Frame Wall Checklist for assistance in evaluating the condition of your wood frame walls and their anchorage.

In addition to transmitting (connecting) uplift loads on the roof down to the foundations, wall sheathing also is a major contributor in helping keep your house from being blown over or collapsing in a major hurricane. The important factors that affect the performance of the wall sheathing are the type of sheathing, how much of the wall is covered by wood sheathing, how well it is connected to the top plate, bottom plate and the wall studs, and whether joints between the sheets (if any) are blocked (covered by a 2x4 with the sheathing nailed to the 2x4). Acceptable wall sheathing is plywood or OSB panels. Boards or boards with fiber type panels (something other than plywood or OSB) do not provide the kind of bracing that is necessary to restrain walls from collapsing in a major hurricane. Some older homes may have metal or wood diagonal braces that are intended to strengthen the wall against forces acting parallel to the wall and applied along the top edge of the wall. The latest building codes only allow these types of braces instead of sheathing in relatively low wind risk areas.

Inspection Wood Frame Walls:
Frequently it is pretty difficult to determine how well your walls are built or anchored to the foundation unless you open up part of an exterior wall. If you end up having to repair drywall on an exterior wall or are having your home re-sided, you have

an opportunity to check the wall construction details. You may also be able to gain some insight into the likely wall construction by talking with the building official in your community or older well established builders and asking what was typically done at the time your home was built. Other indirect clues include the absence of hurricane straps connecting the trusses or rafters to the top of the wall or straps that are installed on every other truss or rafter connection. If either of these cases exists, chances are that you don't have a particularly strong wall structure and that it may not be very well anchored to the foundation.

If you have difficulty determining how your exterior walls are built, there are now a couple of devices where a small camera and light is mounted at the end of a semi-flexible/semi-rigid (you can bend it to a particular shape and it will hold it) roughly ½" diameter tube that transmits the image back to a small screen. At least one of these devices allows you to record the image. This type of device can be used through a hole in the soffit to examine the top edge of the wall and this may allow you to determine what type of sheathing has been used. Or, you may be able to drill a hole in an unobtrusive area of your exterior wall and examine the wall structure. You may want to drill this hole near a wall corner because metal or wood braces were sometimes installed near the corners of the walls in houses that did not use plywood or OSB sheathing as a means of providing strength against horizontal forces acting parallel to the wall and applied along the top edge of the wall. Print out the Wood Frame Wall Checklist and use it to record information about the wall construction. Assessment suggestions and some idea of the implications of what you find are included on the checklist.

Retrofitting Wood Frame Walls:
If you want to strengthen your walls, probably the only time it makes sense to try and retrofit the walls is if and when you re-side your house or when you rebuild after an event. At that time, you could remove the fiber board or foam panels and replace them with plywood or OSB panels. Make sure that they are nailed around the perimeter using the recommended nailing pattern required by the current building code in your area or if you don't have a local building code in force, get a copy of one of the high wind construction guides such as the Standard Building Code Congress guide SSTD 10 that was last published in 1999 or one of the series of High Wind Guides produced by the American Wood Council that contain lots of good graphics to show proper construction methods for different wind speeds. SSTD 10 is available as a free download at http://www.iccsafe.org/Store/Pages/Product.aspx?id=8744P99_PD-X-SS-P-1999-000001. The wind speeds used in SSTD 10 are fastest-mile wind speeds, not the gust speeds used in this guide. You can add 20 mph to the speeds listed in SSTD 10 to convert to gust speeds. Consequently, the recommendations for 90 mph are for 110 mph gusts, 100 mph correlates to 120 mph and the highest wind speeds listed in the guide, 110 mph, convert to 130 mph gust speeds. The American Wood Council's high wind design guides are available for download at http://www.awc.org/Standards/wfcm.html.

Back to Wood Frame Walls
Back to Main Wall Page

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Questions