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## Wood Frame Wall Evaluation Checklist

[Wood Frame Roof-to-Wall Connections](#), [Load Paths through Wood Frame Walls](#),  
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[Click here to download a PDF version of this checklist.](#)

### Investigating the Roof-to-Wall Connection:

#### Inspection:

If your garage is unfinished (i.e. it does not have drywall on the ceiling or walls where the rafters or trusses are connected at the eaves, look at the top of that wall for metal straps connecting between the rafters or trusses and the double top plate on the wall. If do not have an unfinished garage, go into the attic with a flashlight to look at the connection between the trusses or rafters and the outside walls of the house where the rafters or trusses connect at the eaves. It will be easiest to determine this where there is no insulation, like over the garage. Try to determine whether you can see any indication of metal straps. If you see straps, check to see whether they are on every connection or every other connection.

If you do see straps between the roof framing members and the top of the wall that are located on the inside surface of the wall, you should try to determine whether there are corresponding straps on that same side of the wall connecting the top plate to the wall studs, or a rod or cable assembly connecting the top plate to the floor or foundation. You may be able to use a metal detector to determine whether there are straps connecting the double top plate to the wall studs. Drag it across the inside surface of your exterior walls about 4-inches below the ceiling to avoid picking up nails between the top plate and the studs. To determine whether you have threaded rods or cables connecting the top plate to the floor or foundation, you can scan the top of the wall for metal plate washers with a threaded rod and nut sticking up above the plate as an indication that you have a threaded rod or cable system. These systems are relatively new, so if your house is more that 10 to 15 years old, it is unlikely that you will find them.

Look for the following:

1. Are there any metal straps connecting the roof rafters or trusses to the top of the wall?

Yes, at least some

No, none

2. If there are metal straps, are they installed at the end of every truss or rafter or to the end of every other truss or rafter?

Yes - Every Truss/Rafter

No - Every Other Truss/Rafter

3. If the straps are located on the inside surface of the wall, are there any indications of additional straps on the inside surface of the wall that connect the top plate to the studs or are there any indications of threaded rods or cables connecting the top plate to the floor or foundation?

Yes

No

4. If the straps are located on the outside surface of the wall, is there plywood or OSB sheathing on the outside of the wall that extends up to the top of the double top plate; or are there any indications of additional straps on the outside surface of the wall connecting the top plate to the wall studs; or are there any indications of threaded rods or cables connecting the top plate to the floor or foundation?

Yes

No

5. Do the straps wrap over the top of the rafters?

Yes - I have trusses or the straps wrap over rafters

No - I have rafters and the straps do not wrap over the top of the rafters.

#### **Assessment:**

If you answered "No" to question 1, your home is in need of hurricane straps. Several ways to install them are outlined in [Wood Frame Walls](#).

An alternative more affordable approach you can do, at least as a start, that will reduce your risk of loss of the whole roof is to protect all large windows and doors on the whole house including the garage door. This will reduce the chance that wind forces will also be pushing up and out from the inside of your house. You should make sure that your garage door is protected or replaced with an appropriate wind rated one if you don't already have one. Protecting your windows and doors could mean the difference between the home keeping its roof on or losing it when the winds climb above category 1 strength. You should definitely plan on evacuating if a category 2 or above storm is threatening your area, even if you protect the windows.

If the answers to all of the applicable questions are "Yes", your roof is probably reasonably well strapped to the walls and you should concentrate on other areas of vulnerability, including wall strength and anchorage of the walls to the floor as outlined below.

If the answer to question 1 is "Yes" but the answer to question 2, 3, 4 and/or 5 as applicable is "No", you may want to consider additional work on connecting the

roof to the walls if it can be done inexpensively. Retrofitting the roof to wall connection is particularly important if your roof has a fairly low slope, the home is more than about 30 feet wide, you have open (unobstructed ) areas around your house, and you live in an area where the 3-second gust design wind speed is greater than 120 mph. Again, the least expensive thing you can do (as a start) that will reduce your risk of loss of the roof is to protect all large windows and doors because this will reduce the chance that wind forces will also be pushing up and out from the inside of your house. You should make sure that your garage door is protected or replaced with an appropriate wind rated one if you don't already have one. Protecting your windows and doors could mean the difference between the home keeping its roof on or losing it when the winds climb above category 2 strength. You should definitely plan on evacuating if a category 3 or stronger storm is threatening your area, even if you protect the windows.

### **Investigating the Wall Strength (Load Paths through Wood Frame walls):**

#### **Inspection:**

Generally, it will be 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 really want to know what your walls are made of, and don't mind replacing some wallboard, you could cut out a small section of wallboard on the inside of an exterior wall in a couple of out of the way place. Homes built before the 1970's may have lath boards and plaster or plank siding with little more than tar paper behind the exterior sheathing. In the 1970's plywood began catching on but many homes only had sheathing at the wall corners and some may only have fiber board. Consequently, you may need to look at an exterior wall near one of the corners of the house and near the middle of one of the exterior walls. 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.

If the answers to all of the questions are "Yes", you have a strong well connected wall and you can concentrate on other vulnerability issues.

If the answer to all of the questions is "No", your walls are not very strong and not well connected. The least expensive thing you can do (as a start) that will reduce your risk of having your house break apart in a hurricane is to protect all large windows and doors. You should make sure that your garage door is protected or replaced with an appropriate wind rated one if you don't already have one. Protecting your windows and doors could mean the difference between finding your home still standing or having parts or all of it collapse when the winds climb above category 1 strength. You should definitely plan on evacuating if a category 2 or above storm is threatening your area, even if you protect the windows.

If your answers are a mixture of "Yes's" and "No's", then you have some wall resistance which when combined with the drywall connections may help your home survive stronger winds than a home with all "No" answers. Again, the least expensive thing you can do (as a start) that will reduce your risk of having your house break apart is to protect all large windows and doors. You should make sure that your garage door is protected or replaced with an appropriate wind rated one if you don't already have one. Protecting your windows and doors could mean the difference between finding your home still standing or having parts or all of it collapse when the winds climb above category 2 strength. You should definitely plan on evacuating if a category 3 or above storm is threatening your area, even if you protect the windows.

### **Investigating the Wall-to-Floor Connection:**

**Inspection:** The following questions assume slab on grade construction. For homes with wood frame elevated floors, the exterior walls have to be connected by straps or sheathing to the rim joists (a band of wood members that frame around the edge of the wood frame floor system) and the rim joists have to be connected to the sill plate (pressure treated wood member lying flat on the top of the foundation wall and anchored to the foundation). You should be looking for anchor bolts that attach the sill plate to the foundation. Because the floor framing helps tie the system together, the anchor bolt spacing for the sill plate (below a wood frame floor) can be about twice the spacing indicated in the questions below.

Look at the connection of the wall studs to the bottom plate and the connection of the bottom plate to the foundation. The latest high wind anchorage uses 5/8" anchors with 3" by 3" washers that are at least 1/8" thick. Older installations used 1/2" anchors that were frequently shorter, only 5" or 6" altogether, so that there was less embedment into the concrete and were frequently installed without a great attention to detail. The washers were frequently just regular round steel washers for 1/2" bolts. Recent tests have demonstrated the importance of the larger washers when winds approach design values.

- |  |
|--|
| 1. Do you have anchor bolts or straps embedded in the concrete?<br>[ ] Yes<br>[ ] No |
|--|

2. Is the distance between the anchor bolts or straps 24 inches or less? 18 inches or less if the 3-second gust design wind speed in your area is greater than or equal to 120 mph.

Yes  
 No

3. If you have anchor bolts, are they at least 5/8-inch in diameter and do they have 3-inch by 3-inch by 1/8-inch thick washers between the nuts and the bottom plate?

Yes - or I have straps holding down the bottom plate or connected to the studs  
 No - the bolts are smaller than 5/8-inch and/or they have washers that are smaller than 3" by 3"

4. Do you have large anchors (hold downs) at the ends of the walls or threaded rods or cables that run the full height of the wall?

Yes  
 No

**Assessment:**

*If the answers to all of these questions are "Yes", you have well anchored walls that likely meet the latest high wind standards. If the roof is also well attached to the top of the walls and the walls are well built (first two sets of questions), it is likely (unless your home is hit by surge) that your home will still be standing, even after a major hurricane. But, you may still suffer water damage, particularly if your roof covering or windows and doors are damaged. Consequently, you should focus your attention in those areas.*

*If your answer to the first three questions is "Yes", but your answer to the last question is "No", you still have a pretty well anchored house and it is likely that the home will still be standing after all but the most intense hurricanes.*

*If all of your answers were "No", your house is not well anchored to the foundation and it may suffer structural damage and be moved off its foundations in a strong hurricane. You should plan on evacuating if a category 2 or higher hurricane threatens your area.*

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