



[Home](#)

[Home](#) > [Structural Connections](#) > [Gable End Walls](#)

[PDF Version](#) [Questions](#)

[Roofs](#)

[Openings](#)

Gable End Walls

[Features & Equip.](#) [Gable End Checklist](#), [Connection at Top of Wall](#), [Gable End Retrofit Guide](#)

[Leaks](#)

[Structural](#)

[Survey & Decisions](#)

Your house has a gable end if it has a triangular wall that sits on a rectangular wall. If so, the gable end walls of your home can take a tremendous beating during a hurricane. If not properly braced and anchored, it can collapse and you will have a catastrophic amount of damage to your home. However, of all the possible structural retrofits, gable end walls are usually the easiest to strengthen and deserve to be a high priority on your retrofit list. Basically there are three things to be concerned about with gable end walls. First, the most common type of



The most common gable end failure is one where the wall loses support along its top edge and is folded outward

(click image for larger version)

failure is loss of roof sheathing from the gable end that results in the gable wall losing its bracing along the top edge. The second most common type of gable end failure is at the connection between the rectangular and triangular walls. The third potential weak link is the actual framing members that make up the gable end wall structure. In many houses, these members are simply the structural members of the last roof truss. Consequently, they are 2x4 lumber members that end up being bent by pressures applied to the wide flat part of the 2x4s – the direction in which they are the thinnest and therefore weakest. In homes with rafters and ceiling joists, the wall structure will typically be made of 2x4s turned so that wind forces are applied to the narrow face of the 2x4s (the orientation with the strongest resistance to bending of the 2x4s) but they may only be just toe-nailed to the rafters and ceiling joist.



An example of the second most common type of gable end failure - the connection between the rectangular and triangular walls – It is rare that you actually find one that looks like this because usually the wall below fails and the whole end collapses.

(click image for larger version)



This is the more common look of a gable end failure when the triangular wall and rectangular wall separate

(click image for larger version)

In the photo above on the left, notice that wind has caused the gable end triangle to be partially pulled off the rectangular wall below. A little more wind would likely have caused the whole gable end to come off the building thereby exposing it to a lot more wind damage and certainly water damage.

In general, the taller the gable end triangle, the greater the risk of damage. For gable ends that are shorter than about 4-feet, the forces applied by a 140 mph gust along the top and bottom edges of the gable end wall will be less than 100 pounds per foot of gable width. Most nailed connections can handle these forces. In addition, if the gable end is less than about 4-feet tall, it will be difficult to crawl out to the gable end and to do much work. Consequently, unless your roof deck (sheathing) is stapled on and you have not or will not be able to re-nail the decking in the near future, it is probably not worth the effort to retrofit the connections if the gable end triangle wall is less than about 4-feet tall. This guide provides instructions on how to retrofit gable ends that are in need of strengthening.

Gable end walls on rooms with vaulted or cathedral ceilings, while common (particularly when facing the coast or water), pose special problems for retrofitting. Unless special care was taken in the design and construction of these walls to provide the kind of bracing they need to stand up to strong winds, they are very likely to fail. The structural solutions usually involve beams that either span across the width of the wall or columns that span from floor to ceiling. In many cases, when the wall was originally constructed, the builder could have used continuous members that run from the floor to the ceiling and avoided the weakness. If you have one of these walls, you probably can push on the wall and see it deflect (move). If so, you need to hire a structural engineer to develop a good structural solution for your particular situation.



Gable end wall with cathedral ceiling - note the horizontal joint running across the wall just below the semicircular window. The arrows point to where this wall is apt to fail in strong winds. Because there are no continuous vertical members crossing the indicated line, that line becomes a hinge point where the wall is likely to buckle.

(click image for larger version)



The red lines indicate where continuous wall framing members could have been used by the builder to avoid the weak connection between the rectangular wall at the bottom and the triangular wall at the top. A large continuous horizontal beam (probably a glue laminated beam) that is well anchored to the side walls would be an alternate solution.

(click image for larger version)

More Information and Details:

A set of instructions is included in this guide for retrofitting gable end walls with a flat ceiling (not a cathedral ceiling or vaulted ceiling). The method is suitable for both wood frame and masonry walls and for truss and rafter roof framing systems. When the method is followed, it will strengthen your gable end wall and bring the bracing up to modern code requirements.

The gable end wall retrofit process should begin with an evaluation of the actual conditions of your wall. A gable end checklist has been prepared to help with this evaluation. You will need a flashlight, a tape measure and the checklist. A digital camera will also be helpful so that you can take pictures of the various conditions to refresh your memory as you plan the retrofits with your contractor or for yourself if you are an accomplished do-it-yourselfer. Click on [Gable End Checklist](#) to download a copy of the checklist.

A critical part of protecting your gable end from damage and keeping water out is to make sure that the roof sheathing stays in place. If you have re-roofed your house and had the roof deck re-nailed following the recommendations in this guide, you have gone a long way towards solving the most common problems encountered with gable end roofs in hurricanes. If you have not had your roof deck re-nailed, there are still some measures that you can take to help keep the roof sheathing in place during a hurricane. In addition, if you have a gable roof overhang that is greater than about 8-inches or have an even longer overhang with outlookers (extra framing running perpendicular to the trusses or rafters that supports the overhang) then there are some additional steps you may need to take. Click on [Connection at Top of Wall](#) for suggestions concerning keeping sheathing attached and additional bracing issues for gable roof overhangs.

The gable end retrofit guide is quite long and contains a lot of detail. Don't

let that scare you into thinking that gable end retrofitting is difficult, it isn't. The gable end bracing retrofit guide is lengthy because it contains information intended to make the process understandable and to pass along some work-arounds, hints, and tricks that have been learned. You can view it [on-line](#) or download a [PDF Version](#) of the entire gable end retrofit guide instructions.

[Back to main structural page](#)

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Division of Emergency Management

Bureau of Recovery and Mitigation

2555 Shumard Oak Boulevard

Tallahassee, Florida 32399-2100

Voice: (850) 413-9816

[Questions](#)