RETROFIT Improvements

Making Homes Safer & More Resilient in Disaster-Prone Areas

Gable End Bracing

SCOPE

This document provides homeowners with an overview of retrofit techniques for gable end wall bracing in hurricane-prone regions and other high-wind areas.

PURPOSE

Braced gable end walls can help to minimize the risk of wind damage and water intrusion during storms.

BENEFITS

- Minimizes risk of structural damage to the house.
- Minimizes the associated risk of water damage during a storm.
- Helps protect occupants and household contents.

RETROFIT OPPORTUNITY

Can be done within the attic where gable end walls are 3 ft. high or taller.

TIPS

- Bracing gable walls in an attic with an access panel or door can be a "do-it-yourself" job.
- Inspect the attic for adequate roof system and gable end bracing.
- If you are unsure whether your gable end roof is adequately braced, have a home inspector or licensed contractor inspect it.
- In the attic, place walking planks along the bottom chords or ceiling joists to prevent damage to the ceiling below.
- Your contractor may have additional ideas on how to improve the resiliency of your home.

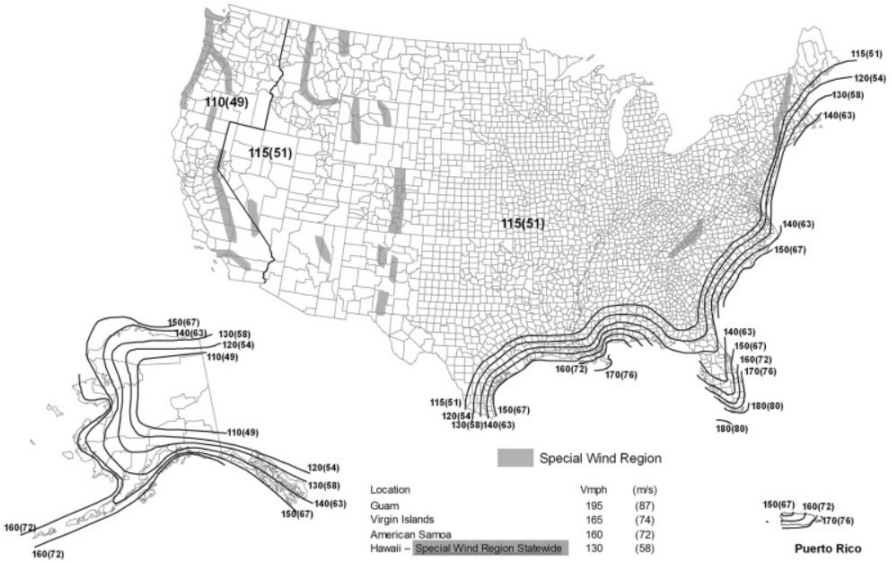
HAZARD AND RISK

Gable end walls are the triangle-shaped wall sections found at the ends of a pitched (gable) roof and generally run parallel to the roof rafters or trusses forming the gable. During a hurricane or other high-wind event, inadequately braced or improperly anchored gable end walls are vulnerable to failure and can become detached from the rest of the structure. A gable end wall failure can make the house susceptible to wind and water intrusion into the attic that can cause extensive damage and even building failure.

SOLUTION

The connection of the gable end wall to the rest of the structure must be strong enough to resist the lateral wind forces and pressures that try to separate it from the roof above and vertical wall below. Typically, gable end framing is connected to the wall framing below and roof sheathing above using nails only. This may not be sufficient in hurricane-prone regions and other high-wind areas (see Figure 1). In these areas, gable end bracing should be installed in accordance with the best practices provided by this document or an engineered design.

Does my home need gable end bracing? This retrofit is recommended for homes located in hurricane-prone regions and high-wind areas and with gable walls greater than 3-ft. high that lack adequate anchoring or bracing.



Wind Region Terminology

Hurricane-Prone Regions*: Areas along the Atlantic and Gulf coasts where V>115mph, and Hawaii, Puerto Rico, Guam, Virgin Islands, and American Samoa.*

High-Wind Areas *(not code defined): Generally where V>115mph including portions of Alaska.*

FIGURE 1. Wind Regions. *Source: Figure R301.2(5)A Excerpted from the 2018 International Residential Code; Copyright 2017; Washington, D.C.: International Code Council. Reproduced with permission. All rights reserved. www.ICCSAFE.org*

COST

Installation costs can vary significantly depending on gable end wall and attic configurations and local labor rates. For a typical 2,500 sq. ft. home with two gable end walls, an estimated cost for professional installation ranges from approximately $1,900 to $3,000. The estimated cost of materials only ranges from $400 to $600.

ADDITIONAL RESOURCES

[1] Wind Retrofit Guide for Residential Buildings, Figure 4-15 (FEMA P-804).

[2] IBHS Fortified Home 2020 Standard, p. 57.

[3] 2017 Florida Building Code – Existing Building, Section 104.

[4] Gable End Retrofit Guide (floridadisaster.org)

[5] Lateral Bracing in Gable End Walls, Building America Solution Center.

Code Considerations. The International Residential Code (IRC) requires the roof to wall connection be capable of resisting wind pressures for the building location and provide a continuous load path through other connections down to the foundation. For some high-wind regions, the IRC requires wind design in accordance with other methods including the International Building Code (IBC). The International Existing Building Code (IEBC) provides guidance for gable end bracing in Appendix C, Chapter C1. The Florida Building Code – Existing Building also provides guidance for gable end bracing (Chapter 17 Retrofitting). Ask the local building department about local retrofit requirements for gable end bracing.

Best Practices. In addition to bracing, if not already present, the entire gable end wall should be sheathed using minimum 3/8 in. thick plywood or OSB sheathing and retrofit studs added to provide a maximum 24 in. spacing between gable end wall studs. The Insurance Institute for Business & Home Safety (IBHS) recommends 7/16 in. thick sheathing in hurricane-prone regions. Additionally, gable end wall connections to the wall below should be strengthened, as required, using metal brackets, e.g., at the bottom chord of a gable end wall truss to a wall top plate below, or at gable end wall stud to a wall top plate below.

Figure 2 provides an example installation for gable end bracing:

- Install horizontal 2x4 braces (minimum 6 ft. long) to the top and bottom roof truss chords (shown as item “B” in the figure).
- Preinstall metal strapping to the vertical retrofit stud using 1-1/2 in. long nails.
- Install and attach the vertical retrofit stud to the existing gable end truss or stud
- Nail the the straps to the horizontal braces (B) and install 2x4 compression blocking (A). This blocking helps prevent the retrofit stud being pushed inward by lateral wind forces.
- Repeat by installing a similar brace assembly along the gable end wall at each stud that is 3 ft. high or higher.

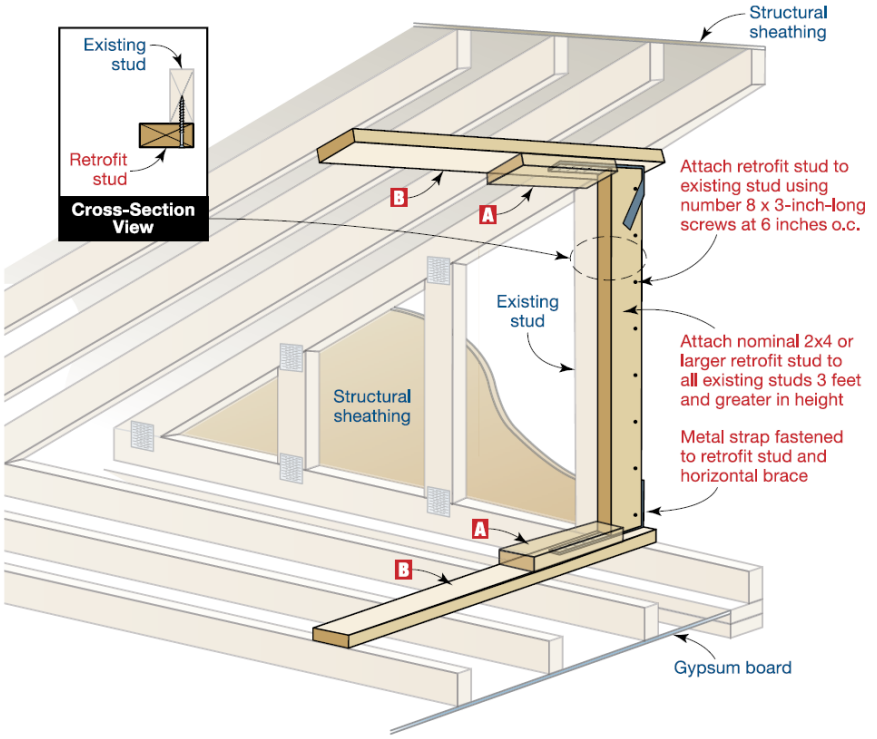


FIGURE 2. Example Gable End Bracing. *Source: FEMA P-804, Figure 4-15.*