

# RETROFIT Improvements

## Roof-to-Wall Attachment

Making  
Homes  
Safer in  
Disasters

### Retrofit Opportunity

- Roof sheathing replacement
- Soffit replacement
- Residing

### Purpose

- To create a continuous load-path from the roof to the wall
- To resist uplift forces from wind
- To resist lateral forces from wind and earthquakes

### Benefits

- Strengthens connections in wind and seismic events

### Hazards

Wind



Rain



Flood



Seismic



Fire



Snow



### Summary

In many homes built before 1990, roof trusses or rafters were fastened to the wall with two framing nails angled into the rafter and wall plate in what is known as a toe-nailed connection. The connection is inadequate to resist the force of high wind pushing up on the overhang and soffit (which can act like a sail to catch wind). In hurricane and gale wind conditions, roof structural supports have been pried away from the wall by the force of wind. Installing a stronger mechanical connection between the roof framing members and the wall will increase the capability of the roof structure to withstand the uplift forces from hurricane winds and lateral forces from earthquakes.

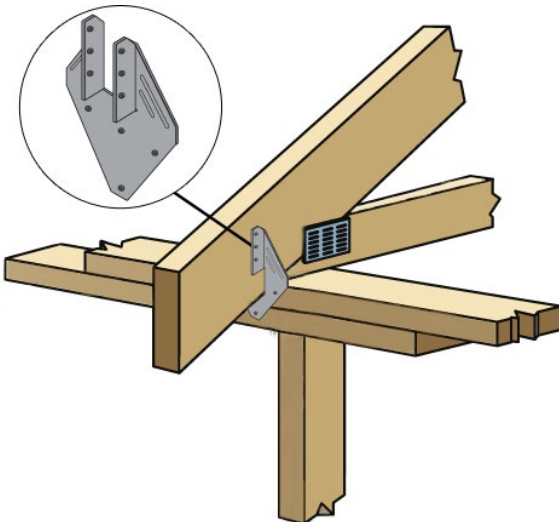
Steel hardware, such as is often seen on outdoor decks, can provide the secure connection required between roof and wall framing. Tie down hardware, also known as hurricane clips, can be installed for under \$10. A house sized 40' x 30' requires approximately 42 pieces, so providing added assurance with tie down hardware would cost between \$200 and \$400. This cost, however, assumes direct and simple access to the wall and roof framing, which is not often the case in a completed house. But, retrofitting roof tie down hardware becomes cost effective when included in the scope of other remodeling work such as residing, replacing soffit and fascia, or replacing roof sheathing at the overhang. Consult your contractor for the inclusion of this and other safety details that will add value and peace of mind to your planned home improvement projects.

### Illustrations

#### Retrofit

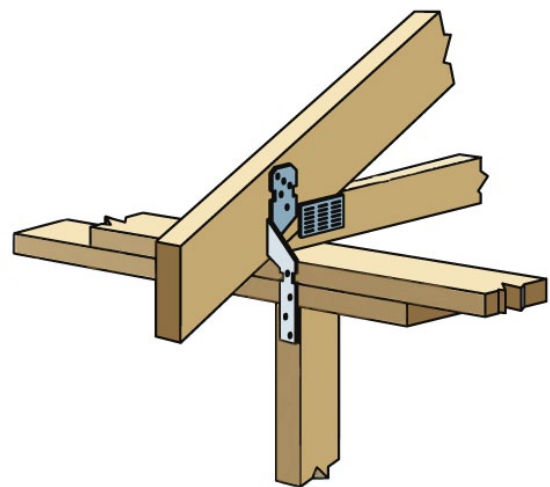
##### Option 1:

*Hurricane clip connecting the truss or rafter to top plates.*



##### Option 2:

*Tie strap connecting the truss or rafter to the wall stud and top plates.*



## Potential Damage



Photo: [www.fema.gov](http://www.fema.gov)

## Key Steps

- Plan this retrofit as a part of a larger home improvement project to maximize cost efficiency, as access to the wall and roof framing intersection (from inside or outside) is necessary.
- Inspect the framing to ensure a continuous load path.
- Inspect for existing tie-down hardware and determine additional hardware requirements.
- Install tie-down hardware before proceeding with larger project. Hardware installation will require about two hours, so it shouldn't materially affect the pace of the overall project.
- Your contractor may have additional ideas on how to improve the safety of your home.
- For more details about this retrofit improvement, please refer to the list of Resources in the section below.

## Resources

FEMA, *Home Builder's Guide to Coastal Construction*  
<http://www.fema.gov/library/viewRecord.do?id=2138>

