

RETROFIT Improvements

Wall-to-Foundation Attachment

Making
Homes
Safer in
Disasters

Retrofit Opportunity

- When doing work in an unfinished basement
- Garage walls (unfinished) and slab-on-grade foundation walls when either exterior siding is removed at bottom plate or interior trim is removed

Purpose

- To create a continuous load-path between the foundation and the roof
- To improve sill plate-to-foundation attachment

Benefits

- Prevents house from moving off its foundation in a seismic event
- Provides resistance to wind uplift forces during a hurricane or gale wind
- Prevents house from lifting off the foundation during a flood

Hazards

Wind



Rain



Flood



Seismic



Fire



Snow



Summary

In older homes, the connection between the house sill plate and the foundation wall may be inadequate to withstand either a lateral force from wind or earthquake or an upward force from wind catching cantilevers or overhangs farther up the face of the building. Installation of additional bolts will not only provide a stronger connection between the foundation and sill plate, but it will also provide a link in the structural load path which under static conditions travels from the roof to the foundation, but changes direction with seismic and wind movement.

Typically, 1/2" to 5/8" diameter anchor bolts with 3" x 3" square plate washers are specified on spacing at 24" to 36" apart to secure the sill plate to the foundation. As with other hardware which secures the components of a house along the load path, each piece of installed hardware costs under \$10 to install in a new house. This cost, however, assumes that there is direct and simple access to the sill plate foundation, which is not often the case in an existing house. But, unfinished basements and garages — and some remodeling projects — present the opportunity to strengthen the connection at the foundation more simply. The sill plate and foundation can be drilled and filled with expansion bolts or epoxy adhesive and a threaded rod. Hardware that connects along the face of the foundation and framing member has been developed for seismic retrofits. Consult your contractor about the necessity and feasibility of this and other safety details that will add value and peace of mind to your home improvement project.

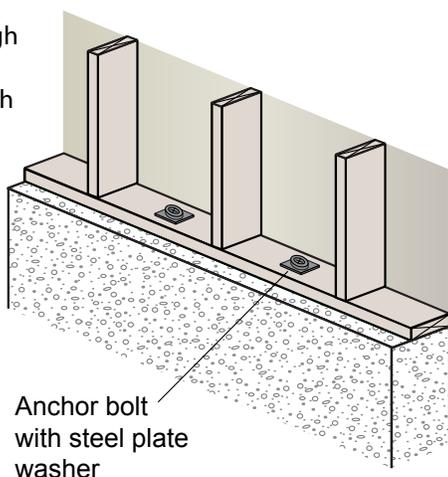
Illustrations

Retrofit

Option 1:

Bolt attached through bottom plate

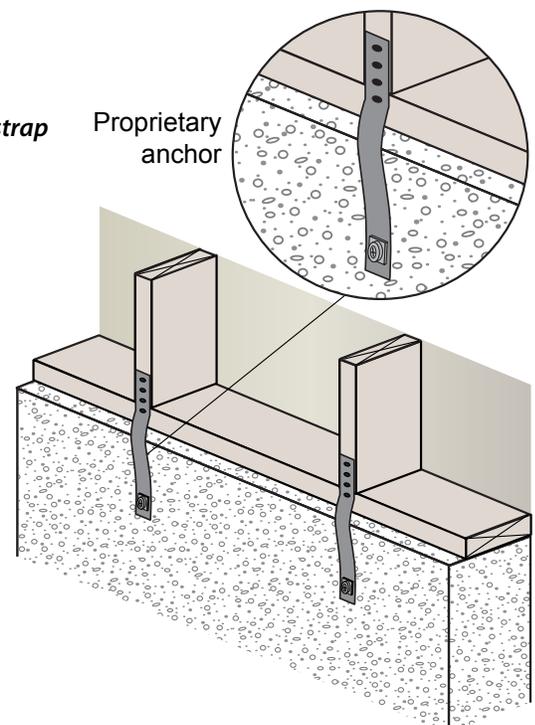
Expansion bolts or threaded rod can be attached through the bottom plate into the foundation through pre-drilled holes. Where the strength of the concrete foundation is in question, bolts can be set with a two part epoxy per manufacturer's specifications.



Option 2:

Bolt attached with strap

If the house has a very short cripple wall or none at all, a strap can be used with a bolt.



Potential Damage



Source: U.S.
Department of
Housing and Urban
Development

Key Steps

- This retrofit can be undertaken separately or as part of a larger project such as a kitchen remodel where drywall removal is necessary.
- Strengthen the house incrementally as walls and sill plates are accessible.
- Inspect the foundation and sill plate connections where visibility is possible (i.e., unfinished garage or basement). (Note: Opening one exterior wall will reveal the pattern of sill plate connection that is likely to have been repeated throughout the home.)
- Install additional connections. (Your contractor can determine the type of connections needed and their required spacing.)
- 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>

FEMA, *Homebuilders' Guide to Earthquake-Resistant Design and Construction*

<http://www.fema.gov/library/viewRecord.do?id=2103>

HUD, *Hurricane Retrofit Strategies: Repairing Walls and Floors*

<http://www.pathnet.org/sp.asp?id=16371>

