

Fire Engineering®

Construction Concerns: Wood Framing: Sill Plate Anchors

Article and photos by Gregory Havel

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Since builders and building codes started being concerned about seismic forces and wind removing [wood](#) frame structures from their foundations, floor joists, stud walls, and roof trusses or rafters have been connected together so that the entire structure can resist high winds or earthquakes as a single unit.

Photo 1 shows a type of steel anchor bolt that is commonly used to connect wood sill plates to [concrete](#) or masonry foundations. These anchor bolts are set in place when the foundation wall is poured (or the concrete block foundation wall is grouted) with the threaded end up. Photo 2 shows a concrete foundation with wood sill plates already attached with anchor bolts. The floor joists will be attached to the sill plate and braced, and the floor deck of plywood or oriented strand board (OSB) will be nailed to the joists.



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(1)



(2)

Other types of fasteners have also been used for this purpose, included power-driven [steel](#) pins and self-tapping lag-screws designed to hold wood to concrete.

Photo 3 shows another type of sill plate anchor that is in common use today. This anchor is of galvanized steel in a “Y” shape, with the base of the “Y” corrugated, perforated, or textured to bond to the concrete. These anchors are set into the concrete [foundation](#) as it is poured. The two tabs above the concrete are perforated for nails, which will be driven into the edge of the sill plate and into the rim board (which braces and conceals the ends of the floor joists) to hold them in place.



(3)

Photo 4 shows this type of wall plate anchor in place, and nailed into the sill plate (the bottom board) and rim board. The plywood floor deck has already been nailed in place and used to support the assembly of a wood stud [wall](#), which will be tipped up and nailed through the plywood into the joists. The OSB sheathing will be nailed into the face of the rim board and the edge of the sill plate to add strength and conceal the anchor. The perforated polyolefin moisture barrier will be unfolded and stapled to cover the joints between the wall, the floor assembly, and the foundation.



(4)

The type of sill plate anchor shown in photos 3 and 4 has been tested by independent laboratories and is advertised as meeting the consensus standards cited by building codes to ensure structural strength and resistance to [collapse](#) under abnormal conditions like earthquakes, hurricanes, and tornadoes.

This type of fastener may also provide additional stability to a wood frame structure during a fire, but cannot be assumed to significantly reduce the possibility of structural collapse. The fasteners are the weak point of any [structure](#), and it takes the failure of only a few to initiate a sequence of fastener failures that will result in a partial or total collapse.

For additional information on ways in which wood frame structures are connected to provide wind and seismic resistance, see the “Construction Concerns” articles [9/27/2011](#) and [7/28/2008](#).



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