Supporting a New Slab

Q. *What's the best way to support a new garage slab next to an existing foundation wall?*

A. *Brent Anderson responds:* There are many ways to support a garage slab next to a basement wall. The best approach is to provide compacted backfill to 95% Proctor density from the footing to the sub-base (see "Soil Compaction Basics," 3/94). The sub-base should consist of 4 to 6 inches of coarse aggregate (illustration A below).

If the job schedule or budget does not allow for careful soil compaction around the basement wall, then any area of overexcavation should be backfilled with minimum 1 1/2-inch-diameter clean gravel, which will self-compact evenly under the weight of the slab and any future loads.

Another option is to use a shelf angle to support the edge of the garage slab (B). We usually recommend a continuous 3x3x3/8-inch steel angle, bolted to the concrete foundation wall every 16 inches with 1/2-inch-diameter bolts. However, this will support only the slab edge, and will not prevent distress cracking that may occur as the soil under the slab consolidates, leaving voids where the slab is not supported. A preventive measure is to use #3 or #4 reinforcing steel placed 12 inches on-center both directions in the slab. This will enhance the slab's ability to span the voids as soil consolidation occurs.

Slabs can also be connected to the basement wall with rebar pins (C). This is essentially the same concept as a shelf angle. However, because the steel reinforcement restricts slab edge movement, there may be more cracking on the garage floor.

Another technique is to support the slab on wall pilasters or concrete piers (D) bearing either on the footing below or wherever areas of soil subsidence are suspected.

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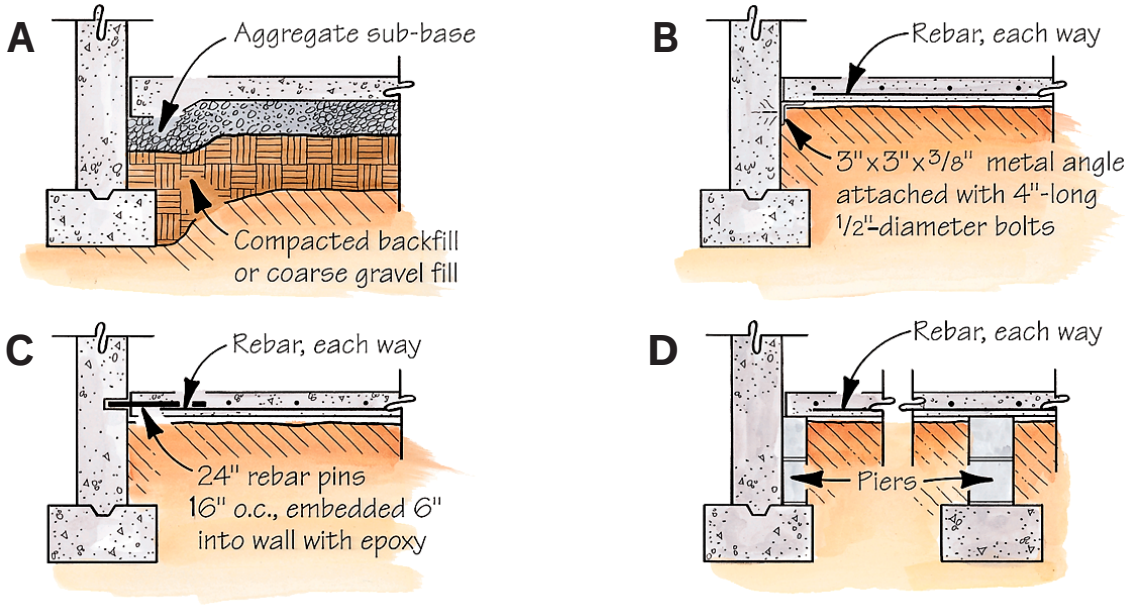
Are Truss Plates Strong Enough?

Q. *I've always framed roofs with solid-sawn lumber. When I look at trusses, they seem flimsy, especially at the connector plates. How can those thin metal plates hold a truss together? The teeth don't seem long enough to really penetrate the wood. Also, with changes in temperature and humidity in attics, it seems as if the swelling and shrinking of the wood would cause the plates to work loose over time.*

A. *Stephen Smulski responds:* Appearances can be deceiving. A truss is a

Supporting a Garage Slab



highly engineered structural component designed to be used in a vertical position. Though flexible when (incorrectly) carried horizontally, a truss is rigid when upright because it acts like a thin, deep beam. The metal connector plates holding chords and webs together are more than up to the task of resisting the tension or compression forces that develop in the various joints in a truss under load.

Made from 20-gauge to 14-gauge (0.036 to 0.071 inch) galvanized steel with a minimum yield strength of 33,000 psi, the plates are first sized according to the forces that will be exerted on them by expected service loads. Then the plates are enlarged to offset the withdrawal forces that result when trusses flex sideways during handling and erection.

In joints under compression, the plates are designed to carry half of the load, with wood-to-wood bearing taking care of the rest. Plates carry the entire load in joints under tension. With about eight 3/8-inch-long teeth per square inch, the dozens of teeth in a typical truss plate act like so many short nails sharing the same head. The holding power lost to lack of length is made up for by the increased number of teeth.

While there have been isolated cases where plates worked loose from trusses subjected to repeated extreme wetting and drying, the amount of shrinkage and swelling that takes place in trusses protected from the weather in attics and floors is so small that plate loosening isn't an issue. The majority of trusses are made from S-DRY (i.e., maximum 19% moisture content) 2x4 and 2x6 dimension lumber that shrinks little after the trusses are installed. When trusses are made with green lumber, design engineers use oversized plates that allow for greater shrinkage without compromising holding power.

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