

ISA Report

Structural Corner

Sign Footing Choices Determine Costs

By W T "Dub" Northcutt

Getting a copy of the soil report before you start can save you and your customer money.

Sign contractors need to be aware of the footing size for the sign to be estimated, fabricated or installed. The footing's size will affect the support pole's length and the amount of concrete in a direct-burial system, or the amount of concrete and reinforcing steel in a spread footing. All of these concerns directly affect project cost.

Each of the two basic footings for pole signs features important variables. Direct-burial footings can be narrow and deep, or husky and shallow, and they can be reduced if a legitimate restraint is available. Spread footings can be short and wide, or long and narrow, depending on location and proximity to property lines.

Direct-burial footings are usually less expensive, based on the available soil depth. Spread footings can replace direct-burial footings, but they can't be placed as close to a property line.

Many sign footings are designed using code-allowable soil pressures because the allowable soil-pressure information is not available to the structural designer. Geotechnical reports are generally more expensive than the savings you can realize based on the data, although some building officials will not approve a foundation design without a report. You can really save money when the property owner provides a soil report for the building foundations.

Design Variables

For a basic, simplified example, let's compare some of the design variables in the following illustration:

For a direct-burial footing, based on an allowable lateral soil pressure of 100 p.s.f./ft. (the minimum allowable by code), the footing will be 5 ft. in diameter and 18 ft., 9 in. deep. Required concrete will be 14 cubic yards. If the allowable lateral soil pressure could be 250 p.s.f./ft. (based on a soil report), a 5-ft. diameter footing will be 13 ft., 4 in. deep, which will be 10 cubic yards of concrete.

That depth difference saves 30% of the concrete and 30% of the buried pole. Thirty percent is a substantial savings, especially if you are competing for the project, or if the contract is already signed based on lower soil capacity.

Footing in Concrete

If the sign is being installed in a paved area with a minimum 4-in. concrete slab, approximately 750 sq. ft. (twice the sign cabinet's area), then you can further reduce the direct-burial footings. For the 100 p.s.f./ft. pressure, the 5-ft. diameter footing will be 13 ft., 4 in. deep, a 30% saving as well.

The 250 p.s.f./ft. footing design will be 5 ft. in diameter and 9 ft., 9 in. deep, for a total of 7 cubic yards of concrete. This, again, represents a 30% savings from the non-restrained 250 p.s.f./ft. footing, but it's also a 50% saving of the original 100 p.s.f./ft. design. You can realize a substantial savings if you can acquire the property information beforehand.

Spread Footings

Here's something interesting about spread footings. If the design is based on the code-allowable pressure of 1,000 p.s.f., the footing will be 16 ft. wide by 16 ft. long by 2 ft. thick, for a total of 19 cubic yards of concrete. Because the footing sits on the ground, but is not "buried," it must be designed to resist overturning based on the code's wind loads. The 16-ft. by 16-ft. by 2-ft. footing is balanced so that the soil pressures are acceptable, and the overturning restraint meets the code requirement.

If the design is based on the soil report's allowable pressure of 2,500 p.s.f., the footing can be smaller in the plan view (12 ft. by 12 ft.) but much thicker to prevent the wind from blowing the sign over. The footing will be 12 ft. wide by 12 ft. long by 5 ft. thick. The 12-ft. by 12-ft. footing requires 27 cubic yards of concrete versus 18 cubic yards for the 16-ft. by 16-ft. footing, and the reinforcing steel increases by 60%.

You might think that the lower-capacity soil pressure would require a heavier footing. Actually, use the higher soil-capacity footing if there is not enough room on the site for the 16-ft. by 16-ft. footing.

The point is, footings and sign poles can be substantially smaller if the soil values are obvious and certified. Building owners on the same property as the sign can help save money by supplying a soil report, and the sign contractor can create an advantage for himself if he can get this report beforehand.

W T "Dub" Northcutt is president of Structural Technology Consultants, Inc., San Diego. You may contact him at signengineer@stcsd.com.