

Caution! Excavation Zone!

Exercise Care When Excavating Adjacent to Existing Buildings

By Steven E. Schaefer, P.E.

Our firm has been called to investigate a number of building failures due to excavations adjacent to, and below, the elevation of a building's footings.

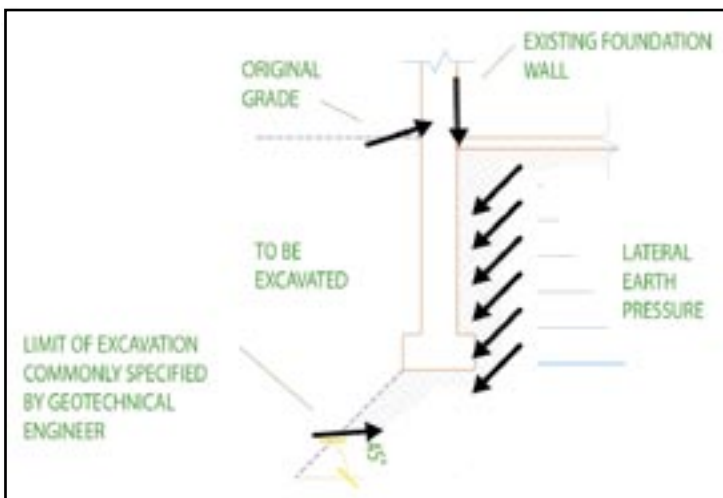
Typically, with the clay soils in our area, the geotechnical engineers note in their reports not to excavate below a 45° line extending out and down from the bottom edge of the existing footing, unless underpinning or shoring is installed. (The actual angle will depend on the type of soil and possibly the length of time the excavation will be left open.) This should be intuitive, but is easily overlooked.

We have also found that the geotechnical report frequently fails to mention that the lateral soil pressure pushing outward on the existing foundation wall, below the slab-on-grade, may cause a failure even though the excavation does not cross the 45° line. The further the bottom of the wall or footing extends below the floor slab, the greater chance of a problem due to the unbalanced lateral earth pressure.

Another thing to keep in mind is that the slab-on-grade is typically not tied to the wall and doesn't brace the wall against outward lateral soil pressure. The wall may also be un-braced at the first floor or above sub-basements because the backfill is providing the restraint against outward movement of the wall. Excavating on the outside removes this restraint.

When reviewing the need for underpinning or shoring, don't just check the elevation of the new floor level that will be constructed but the total excavation that will be required for the footing projection, formwork and any possible plumbing or utilities. Although shoring or underpinning may be considered a "means and method of construction" for which the contractor is responsible, make sure you call out the need for it in the construction documents. It is a lot easier

to address the issue when preparing construction documents, rather than trying to convince an owner after a collapse has occurred that it wasn't your fault because the contractor should have known shoring or underpinning was required. ■



Note: The lateral earth pressure must be considered when evaluating the stability of an existing foundation adjacent to an excavation. This may require the use of tie back anchors, bracing or underpinning, even though the excavation limit specified by the geotechnical engineer is not exceeded.

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