TOOLBOX TALK #37

TRENCH SHORING DESIGN – PART 1

Contractors can often develop their own shoring designs for trench excavations. However, excavations near adjacent structures, underground utilities, and roadways may come with unique and complex challenges that require professional input. Although contractors can usually utilize manufactured systems with tabulated data, there are times where additional guidance and stamped drawings from a professional engineer (PE) are necessary. Any excavation over 20 feet deep automatically requires the use of a PE. A PE is also necessary when there are heavy surcharges such as heavy equipment, stockpiled equipment, roads, bridges, and buildings close to the excavation. Pes look at all the conditions for the site and develop a shoring or sloping design that will work for that specific location. Working with an experienced engineering team can speed up the process considerably. Contractors may be reluctant to turn to a PE because they fear the PE will develop a shoring design that requires more expensive, non-standard equipment. But many site-specific designed shoring systems use off-the-shelf equipment.

Shoring Designs

OSHAs excavation standard gives contractors 4 options when it comes to setting up a shoring system for an excavation that is 20 feet or less. Only option 4 involves a custom-engineered solution, which is typically required when there are additional surcharges to consider.

Option 1 is for smaller scale excavations. It covers lighter weight timber and aluminum shoring and requires following the OSHA guidelines laid out in Appendices A and C of the excavation standards. This option is not valid if there are surcharges close to the excavation.

Option 2 allows contractors to follow manufacturers' tabulated data for shoring equipment. This is engineering documentation that shows that the manufacturer's engineer has evaluated equipment and has said that it will work at a certain depth, with a certain kind of soil, and under certain site conditions Like Option 1, Option 2 is not valid if there are surcharges close to the excavation.

Most shoring system manufacturers include the following explanation of surcharges in their data tables: "Maximum depth ratings presented in tabular form are not considered adequate when loads imposed by structures or by stored material adjacent to the trench weigh more than the load imposed by 3 feet of soil surcharge. The term 'adjacent' as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

Option 3 allows contractors to use tabulated data from independent professional engineers who aren't associated with the manufacturer but who have developed this data on their own. One example would be if a contractor wants to close off the end of a trench shield with steel plates. Since this field application does not pertain directly to the engineered product, a PE in private practice might perform the engineering analyses to address this condition and make it publicly available because the situation comes up so frequently.

Option 4 requires a site-specific design developed by a registered PE in the state where the work is taking place. This is necessary when the parameters of the trench don't fall within either the appendices or the tabulated data. If you have to go deeper than the data says or if you have extra surcharge loads nearby that aren't included in the data, then it is necessary to go the site-specific engineering route.