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Effect of Size and Soil Characteristic on Contribution of Side and Tip Resistance of the Drilled Shafts Axial Load Carrying Capacity

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Abstract : Drilled shafts are the most popular of deep foundations, because they have the capability that one single shaft can easily carry the entire load of a large column from a bridge or tall building. Drilled shaft may be an economical alternative to pile foundations because a pile cap is not needed, which not only reduces that expense, but also provides a rough surface in the border of soil and concrete to carry a more axial load. Due to the larger construction sizes of drilled shafts, they have an excellent axial load carrying capacity. Part of the axial load carrying capacity of the drilled shaft is resisted by the soil below the tip of the shaft which is tip resistance and the other part is resisted by the friction developed around the drilled shaft which is side resistance. The condition at the bottom of the excavation can affect the end bearing capacity of the drilled shaft. Also, type of the soil and size of the drilled shaft can affect the frictional resistance. The main loads applied on the drilled shafts are axial compressive loads. It is important to know how many percent of the maximum applied load will be shed inside friction and how much will be transferred to the base. The axial capacity of the drilled shaft foundation is influenced by the size of the drilled shaft, and soil characteristics. In this study, the effect of the size and soil characteristic will be investigated on the contribution of side resistance and end-bearing capacity. Also, the study presents a three-dimensional finite element modeling of a drilled shaft subjected to axial load using ANSYS. The top displacement and settlement of the drilled shaft are verified with analytical results. The soil profile is considered as Table 1 and for a drilled shaft with 7 ft diameter and 95 ft length the stresses in z-direction are calculated through the length of the shaft. From the stresses in z-direction through the length of the shaft the side resistance can be calculated and with the z-direction stress at the tip, the tip resistance can be calculated. The result of the side and tip resistance for this drilled shaft are compared with the analytical results.

Keywords : Drilled Shaft Foundation, size and soil characteristic, axial load capacity, Finite Element
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