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Role of Soil Parameters on Loading of Buried Structures

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ABSTRACT

Load rating is the process to evaluate and explore the structural capacity of bridges as much as possible within safety range. As a balance between economy and safety, proper load ratings save money and keep public safe. Knowing the contribution and interaction of each different soil parameter on the loading can significantly reduce the amount of work when load rating those structures. However, for buried structures without plans, such contribution or interaction is never known. This parametric study explores how much each soil parameter of three types of soils can affect the loading of buried structures without plans. An existing computer software is employed to model the buried structures without plans and to simulate the theoretical structural responses using 2D finite element analysis approach. The study shows different results for different soil types. In general, as initial tangent Young's modulus and density increase, moments, thrusts, and shears increase. Plus, as power-law coefficient for initial tangent Young's modulus and initial tangent bulk modulus increase, moments, thrusts, and shears always decrease for silty clay whereas they first increase and then decrease for gravelly sand and sandy silt. In conclusion, initial tangent Young's modulus, power-law coefficient for initial tangent Young's modulus, initial tangent bulk modulus, and density are the four most sensitive soil parameters with respect to their effects on loading of buried structures.

KEYWORDS

Soil Parameter, Contribution, Loading, Buried Structures