

## DYNAMIC REPLACEMENT: THE INFLUENCE OF POUNDER DIAMETER AND GROUND CONDITIONS ON SHAPE AND DIAMETER OF THE COLUMNS

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### Abstract

Dynamic replacement (DR) is a ground improvement technique that has been used now for almost 50 years. During the formation of a DR column a crater is created which is then filled with a coarse material and compacted again. The length, diameter and shape of such a column cannot be observed directly, which makes the design and execution more troublesome. In the article presented are the dimensions and shapes of 18 columns from eight different test fields. They were formed by means of pounders of various masses (9 or 11.5 Mg) and dimensions (1.00 or 1.05 m in diameter, 1.8 or 2.0 m in height). Based on the observations and measurements, it was concluded that the shape and diameter of a DR column is influenced by the parameters of the soft soil that is supposed to be improved (its thickness, physical state and location in the profile), as well as by the diameter of the pounder. It was revealed that, as the length of the columns increased, the column shapes changed from: a cylinder, through a truncated cone, a barrel to an asymmetric barrel. The diameters of all of the columns were 1.4–2.8 times larger than the diameters of the used pounders and the largest values were noted along the depth of the weakest layer. The presented results may be useful to the profession. When the thickness of the weak soil, its type and state are known and the technological parameters are similar to the ones presented in this paper, it is possible to predict the shape and diameter of the columns depending on the diameter of the pounder.

Keywords: Dynamic replacement columns; Geotechnical engineering; Ground improvement; Column shape; Weak soils.