

PAPER NOT PRESENTED DURING PROGRAMME

VIBRO CONCRETE COLUMN CONSTRUCTION IN PEAT/SOFT SOIL

by

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ABSTRACT

The Bottom Feed Vibro-Replacement System represented a major advance in ground improvement technology with its dry construction of high integrity compacted stone columns in weak cohesive soils. Now the bottom feed concept has been extended to construct Vibro Concrete Columns (VCC) through very weak cohesive and organic soils which are unsuitable for proper applications of conventional Vibro-Replacement techniques. Since being developed in 1976, the VCC technique has been used as a ground modification method beneath embankments and structures with large floor loads. This paper presents the design concept, construction, and monitoring of VCC, as well as case histories of its recent use in Europe and North America.

INTRODUCTION

The evolution of vibrating pokers or vibroflots has given the geotechnical design community the opportunity to address and treat an ever-increasing range of soil types. The original depth vibrators were designed in Germany in the 1930's with specific intent to densify relatively clean sand profiles. During the 1950's, stone backfill was introduced in Europe for placement into the vibro holes in order to reinforce cohesive soil layers that could not be treated by densification alone. Utilization of the stone backfill has also provided enhanced densification, shear strength improvement, and drainage in treated soil profiles.

Use of stone columns for reinforcement of relatively soft cohesive layers has required some degree of support by the existing, surrounding soil. However, there is limitation of stone column use in peat and very soft soil deposits where the surrounding soil shear strength is not sufficient to prevent shear or bulging of the stone column itself. Introduction of the bottom-feed vibro technique in Europe in the 1970's was extended to facilitate placement of concrete columns through the bottom-feed system.

CONCEPT AND DESIGN

VCC provides a foundation system which extends the range of soils that can be treated by vibro techniques to include layers of very weak material such as peat,

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A list of the advantages that the VCC system offers foundation designers and constructors includes the following:

1. High levels of production - significant reductions to contract periods.
2. Capable of developing necessary load bearing capacity at shallower depths - benefits of displacement type system and enlarged base.
3. No spoil/contaminant removal off-site.
4. Low noise levels - environmentally friendly.
5. Vibration levels relatively lower than alternative displacement type piled solution - environmentally friendly.
6. Fully instrumented equipment to monitor, control and record construction.
7. Enlarged column heads reduces costs of slab construction.

