GROUND STABILIZATION BY TOP FEED PROCESS

METHOD STATEMENT

PLANT & EQUIPMENT

The technique involves the use of a vibroflot, comprising a hydraulic powered eccentric weight assembly enclosed in heavy tubular steel casing. The vibroflot is suspended from a crawler crane. The basic length of the vibroflot assembly is 8 meters although extension tubes may be added to increase the vibroflot length as the depth of treatment dictates. The vibrator diameter is 310mm and is powered by a 130 kW portable diesel power pack and thus generates high centrifugal forces in the horizontal plane at a frequency of 50 cycles per second in most cases. The nose of the vibroflot is tapered to aid penetration of the ground while vertical fins prevent the vibroflot rotating during penetration. Attached to the vibroflot is a tube of 200mm diameter, and a stone hopper. If pre-drilling/pre-loosening is required, it will be accomplished with a Watson 300 or equivalent drill rig.

DRY STONE COLUMNS TECHNIQUE

This is a completely dry technique and the cycle of operations is described as follows. The vibroflot and a stone hopper suspended from the crane, are lowered to the ground and penetrate quickly through the weak soils. Where stiff or dense soils or rubble fill materials are encountered, the hole may be predrilled/pre-loosened through these layers. After reaching the required depth, the sluice gate is open in the hopper, graded aggregate (usually 40mm SS) then travels down the tube, aided by compressed air, this aggregate is then released into the ground at the tip of the vibroflot, where it is compacted. This process is a continuous method and the stone column is fully formed when removal of the flot from the ground occurs.

In areas where the hole is stable, the stone column may be formed using the dry top feed method. Using this method, the vibroflot is withdrawn and a small quantity of graded stone aggregate is introduced into the hole. The vibroflot is lowered again to compact the infill and interlock it tightly with the surrounding soil. This cycle is repeated until a stone column is built up to ground level.

In granular soils, the effect of the vibrations is to produce a marked improvement in the Relative Density of the surrounding material thus significantly improving the allowable bearing capacity and settlement characteristics. In cohesive soils, little improvement occurs in the engineering properties of the clay soils between stone columns and the improvement of the formation is achieved by the combined effect of the weak soils and the stiffer stone columns.

STONE COLUMNS

Compacted stone columns are constructed to effect stabilization of the treated ground. Typically, stone column diameters are in the order of 650-750mm. The column diameter will naturally vary with the technique and soils condition, but generally the weaker the soils, the larger the diameter of the stone column.

The stone columns are normally constructed directly beneath the main foundations, usually in single or multiple rows beneath strip foundations and in groups beneath pad foundations. Area or floor slab treatment is normally carried out in grid spacing. The spacing and arrangements of the stone columns are dependent on the soils conditions and the loads carried by the foundations.

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