GROUND STABILIZATION BY BOTTOM 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 metres 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 whilst vertical fins prevent the vibroflot rotating during penetration. Attached to the vibroflot is a tube of 200mm diameter, and a stone hopper.

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, is lowered to the ground and penetrates quickly through the weak soils. After reaching the required depth, the sluice gate is open in the hopper, graded aggregate (usually 40mm single size) 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 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 stabilisation of the treated ground. Typically, stone column diameters are of the order of 500-600mm. 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.