

1.4.1.h Jet-Grout

Jet-grout is the form of jet-grout column “soil-crete pile” by drilling a hole specified with its length in the relevant design and then by jetting with proper mixing and pumping equipment with the jetting parameters to achieve designed diameter.

Using a drilling rig holes between 400 to 700 mm diameters will be drilled down to required column depth. The drilling can be carried out by traditional rotary or rotary percussive methods. And then jetting will be done while dragging the drill set at a specified drag and revolution speed.

The rig must be equipped with automatically adjustable drag and revolution speed controls. The jetting takes place at the bottom of the drilling set at the special tool named “monitor” with one or two nozzles the diameter of which is from 1.5 mm to 3.0 mm depending on the design parameters. The cement-water mix ejects from these nozzles at minimum pressure of 300 bars with 250 m/s jet speed.

Dragging the drilling set upwards with a pre-set dragging rate while jetting is continued causes to destroy the natural structure of the soil and then mix the soil with cement-water mix at very high pressure therefore forms a jet-grout column as per Fig. (1.31).

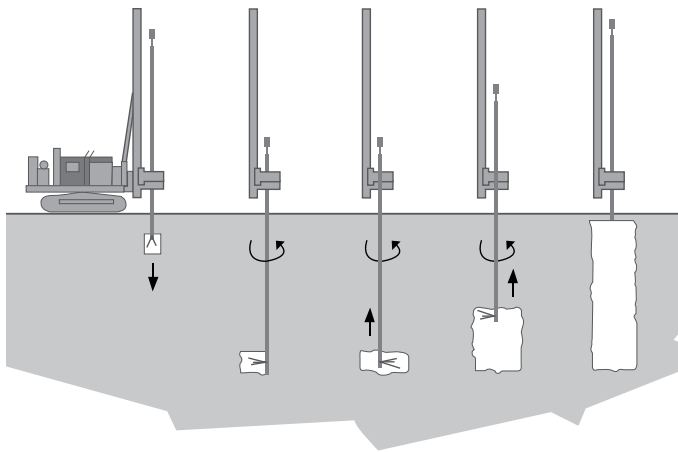


Fig. (1.31): Jet Grouting Technique

The parameters to be used will be designed and checked with trial columns prior to start of the works. With jet grouting, it is possible to treat a broad range of grounds, consisting of different type clays, loose sands and to overcome the drawbacks of the other injection systems. It is a valid alternative to other consolidation systems such as dewatering, micro-piles, stone columns etc.

1.4.2 SAFETY AGAINST LIQUEFACTION

The hydraulic fill, loose, fine and saturated sands may undergo liquefaction (experience significant loss of strength due to build up of pore water pressure and subsequent deformation in some locations under the cyclic loading of earthquakes).

The efficiency of the improvement done to mitigate the liquefaction could be ensured from CPT readings (as per ASTM D 5778 or BS 1377: Part 9: Test 3.1 Amd 8264-95 and also SSMFE test Procedure for Cone Penetration Test (IRTP), 1989 and updated 1997.) through pre and post-agreed tests. The pre CPT shall be carried out every 900 m² maximum, or as per project specs, to compare the results with the post compaction CPT results for the same area as per Fig. (1.31). The locations of post CPTs shall be selected at the central points and/or at one third the maximum distance between the improved points. Proper weighted average for near and far tested points should be considered.

For deep foundations, the achievement of 8.0 MPa weighted average of the tip resistance profile for the post compaction CPT is an accepted criterion of the compaction efficiency.

For shallow foundations, one plate load test/structure to be carried out (as per ASTM D1195/D1195M-09). The acceptance criteria shall be the achieving of targeted bearing pressure of 150 kPa corresponds to settlement of 25 mm maximum.