



**Jet Grout Machine**

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# SOIL IMPROVEMENT

Jet grouting technology

## Soil Improvement Technology:

Environment & Infrastructure Management Solution (EIMS) Limited introduces Jet Grout technology for soil improvement. It is a sustainable and hazard free technology of soil improvement for new as well as old structure. Ground improvement methods are becoming increasingly popular in geo-technical engineering to solve construction problems and to offer new design solutions. Jet grouting is a general term describing a construction method which utilizes a high speed fluid to cut, replace and then mix the native soil with a cementing material. The high velocity jet stream is developed by using high pressure pumps, which eject

the fluid through relatively large nozzles or injectors. Recently Jet grouting has already been tested by EIMS in different critical garments and residential buildings to improve the soil bearing capacity to sustain from soil liquefaction and to take earthquake seismic load condition. This method also improves the existing building foundation without disturbing existing structure as well as for new construction plan where liquefaction problem exists. The most important feature of jet grouting is that jetting allows the cementing medium to be uniformly mixed with a wide range of soils, i.e. sands and gravel or even hard clayey soils.

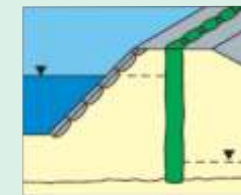
## Jet Grout Technology

Jet Grout is the one of the effective solution against liquefaction which occurs due to earthquake in liquefiable sandy soil. So it is a great technology for building a safe structure in an earthquake prone country like Bangladesh.

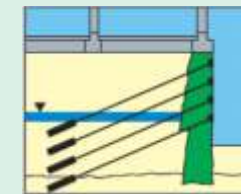
Jet grout piles are installed by initially drilling a small hole, typically 100 mm in diameter to the required depth. Double fluid jet grouting is typically constructed from the bottom upwards. In the double fluid system, the grout is encased within a shroud of compressed air. The air acts as a buffer between the groundwater and the grout, greatly increasing the cutting efficiency. It also

creates turbulence in the waste spoil, improving the efficiency of its removal. In this method a special coaxial drill string and jet monitor has been used. The cutting jets are located above the grout supply, which allows a nearly complete replacement of the soil with grout as the monitor is withdrawn. Column size is dependent on parameters such as rotation rate of monitor, lift rate, injection pressure and grout flow rate. Selection and control of these parameters are the main task in construction stage to attain desirable results for the structure.

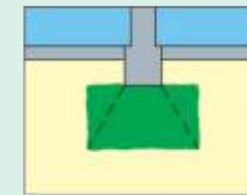
## Application of Jet Grout Technology in Bangladesh



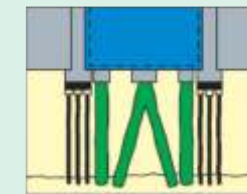
Cut of wall to protect river erosion: Soilcrete column provide resistance against Higher Mechanical Strain by shear force. Also provide impermeable curtain.



Shore protection/ Seepage Barrier can be done with Underpinning by means of low deformation gravity walls with jet grouting column.



Soil beneath shallow foundation can be strengthened to improve the bearing capacity at higher level.



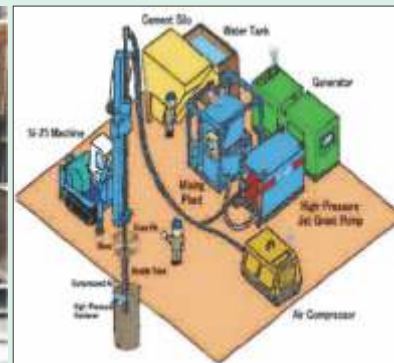
Deep Foundation (Retrofitting)- Soilcrete is used for new foundation which required special care in view of nearby existing structures such as historical buildings.



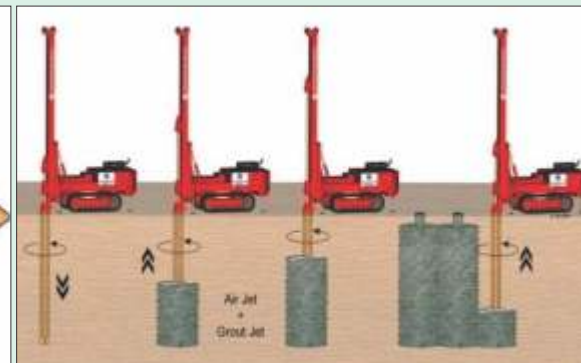
Grouting Machine



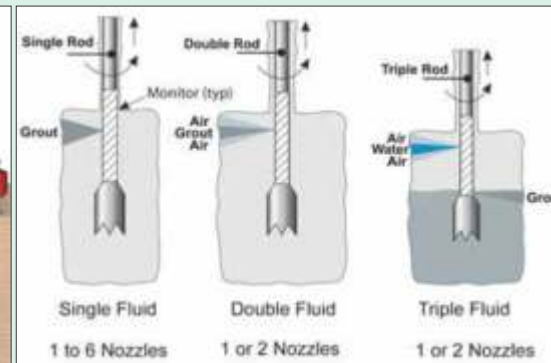
High Pressure Jet Grout Pump System



Jet Grout Technology



Jet Grouting Layout (Double Tube Method)



Pile Load Test on Jet Grout Pile



Hydraulic Jack



Dial Gauge

## Advantages of the method:

Efficiency and Advantage over Traditional Technology

- Suitable for all kind of soil;
- Grout Pile installation is quick process;
- Strengthening of soil beneath existing foundation is possible (retrofitting purpose);
- Also act as deep foundation itself, so reduction of foundation cost.

- Appropriate as protective measures against soil liquefaction and site amplification
- Effective solution for controlling ground water permeability in soil.
- Depending on soil type Jet Grout can improve the bearing capacity of soil more than any other conventional soil improvement method.

## About EIMS

EIMS is a fast growing multidisciplinary engineering organization engaged in the areas of civil and structural engineering, urban planning and design, construction, retrofitting, Soil Improvement and project management services. EIMS has started its journey since 2005 and finally registered as a limited company on 2011 with the vision "Safe & Sustainable Infrastructure across the world as a technical think tank" through the motto "we are for your safety".

## Mission

- Innovation of new technologies for creating safe & sustainable infrastructure.
- Adoption of evolving technologies to act as a leading technical think tank.
- Ensuring quality of service by complying with internationally recognized codes and standards of practices.
- Developing resilient infrastructure by harmonizing technological solution, societal needs and environmental safeguard through participatory approach.

## EIMS Affiliations

- One of five as a qualified assurance firm to conduct structural integrity assessment for Bangladesh Worker's safety
- One of twelve in Bangladesh to conduct Inspection for Factories and Establishments.
- One of three in whole Asia as a qualified firm to design, monitor and conduct feasibility study of World Food Programme (WFP) and UNICEF (20 countries)

## Major Area of Services:

- Soil Assessment and Implementation Work
- Seismic Vulnerability Assessment
- Structural Design, Detail Engineering Assessment, supervision and retrofitting
- Building Inspection and Checking
- Project management (Technical)
- Environmental and Social Management
- Urban Planning and Design
- Topographical and Hydrological Survey