# Soil behavior

Engineering

Soil Behavior SOIL BEHAVIOR Soil behavior involves all the processes occurring on the surface of the earth as a result of the agents of the very processes. This research paper explores the characteristics of soil under: liquefaction, soil improvement, geophysical methods, excavation safety and intelligent compaction. A case study for geotechnical failure will also be provided.

Liquefaction is the process by which the earthquake or heavy material on the earth surface causes the earth materials to reduce in its stiffness and strength, thus rendering it vulnerable to erosion by the erosion agents. It occurs majorly in soils that are water saturated. All air spaces in this kind of soil are filled with water. Before the impact of the earthquake, soil water has low pressure, but the impact of the earthquake increases the pressure of the water in the soil, particularly between the individual soil particles (Muiri, 1990). These particles, pressing against one another, break and reduce in strength and stiffness. Developments made on the surface of the earth by human efforts exert heavy weight on the soil increasing the pressure in the soil water and this too can cause changes in the strength of the soil.

Ground improvements are the various ways by which soil engineering properties are made better in order to reduce exertion of pressure on the soil particles by the water. The properties of concern are; the ability of the soil to pass water, shear strength and soil stiffness. In this move, expensive and sophisticated materials and other tools are laid below the foundations to support the weights of heavy structures on the ground. Other techniques are also employed, e. g. dykes, tunnels, channels, reservoirs and embankments, which have been used to reduce the impact of the earthquakes. This reduces the water pressure on the soil particles. This is done by engineers depending

on the size of the structures and the intensity of the earthquakes in the region.

Geophysical methods are the methods used to collect data, relating to waves, in the soil. These are; Direct Current Electrical Resistivity, Induced Polarization and Spectral Induced Polarization where directly, electricity is pumped into the ground to collect and record all the information on ground waves. Another method is Electromagnetic and Ground Penetrating Radar in which the information is recorded with no direct contact with the earth media. It uses EM waves also. Gravity and Microgravity is another method of measuring the waves using gravimeters. This method obtains the masses and densities of the soil. Apart from the above named methods, is Magnetic method, which targets mineral deposits and man-made structures by measuring local variations of the geomagnetic field to detect the magnetic fields emerging from the liquid outer part of the earth. Nuclear Magnetic Resonance is a geophysical method, which explores ground water measuring magnetic signals (Meier, 2010). Seismology and Seismic Survey is a method in which the seismographs are used to detect the waves travelling to and from the centre of the earth.

Thousands of people die from the excavation accidents. The excavation process should be done with care after careful evaluation of the characteristics of the soil. The information concerning vulnerability of the soil to collapse, and pat history should be given to guide the excavators in order to cab the menace. Other measures like Battering the excavation sides and Temporary support should be kept in mind prior to the commencement of the excavation exercise. These will reduce the accident risks during the exercise. It is also advisable to conduct frequent and thorough inspection in

order to detect small deviations.

A building collapse case study

Overturned apartment complex buildings in Niigata in 1964

In 1964, in Niigata city, many buildings collapsed killing hundreds of people and causing destruction to property.

Intelligent compaction: when pavements begin to wear and become weak before their expected time, showing signs of cracking and crumbling, may be due to poor compacting of the base layer. To cab this menace, intelligent compacting rollers are used to provide uniformity and quality, enhancing long lasting performance. Frequent checkups are also recommended to detect deviations which would otherwise be dangerous. In conclusion, care and knowhow are very key in the pursuit of the said exercises, if we have to prevent the accidents.

Reference

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