

CE 431: GROUND IMPROVEMENT TECHNIQUES (3-1-0: 4)

Introduction

Need for Ground Improvement, Different types of problematic soils, Emerging trends in ground Improvement.

Mechanical Stabilization

Shallow and deep compaction requirements, Principles and methods of soil compaction, Shallow compaction and methods. Properties of compacted soil and compaction control, Deep compaction and Vibratory methods, Dynamic compaction.

Hydraulic Modification

Ground Improvement by drainage, Dewatering methods, Design of dewatering systems, Preloading, Vertical drains, vacuum consolidation, Electro-kinetic dewatering, design and construction methods.

Modification by Admixtures

Cement stabilization and cement columns, Lime stabilization and lime columns. Stabilization using bitumen and emulsions, Stabilization using industrial wastes, Construction techniques and applications.

Grouting

Permeation grouting, compaction grouting, jet grouting, different varieties of grout materials, grouting under difficult conditions.

In Situ Soil Treatment Methods

Soil nailing and ground anchors, rock anchoring, micro-piles, design methods, construction techniques. Functions and applications of geosynthetics – geotextiles, geogrids, geomembranes; soil reinforcement using strips, bars and geosynthetics.

Case Studies

Case studies of ground improvement projects.

Text Books:

1. S. K. Gulhati and M. Datta, "Geotechnical Engineering", Tata McGraw Hill.
2. H.R. Hausmann, "Principles of Ground Modification", McGraw-Hill Book Company.

References:

1. M. R. Hausmann, "Engineering Principles of Ground Modification", McGraw-Hill Pub, Co.
2. P. Nicholson, "Soil Improvement and Ground Modification Methods", Butterworth-Heinemann Ltd.
3. R. M. Koerner, "Designing with Geosynthetics", Prentice Hall Inc.