

Department of Civil Engineering
Bangladesh University of Engineering & Technology

CE 441: Foundation Engineering

3.00 credits, 3 hrs/week

Compulsory Course

Course teachers

Dr. Sarwar Jahan Md. Yasin - 2 class per week

and

Dr. Eqramul Hoque - 1 class per week

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Course Outline

- **Soil investigation techniques**
- Types of foundations
- Bearing capacity of shallow and deep foundations
- Settlement and distortion of foundations
- Design and construction of footings
- Rafts and piles
- **Slope stability analysis**

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BOOKS & REFERENCES

Text Book

- **Principles of Foundation Engineering, B M Das (4th edn.)**

Reference Books

- **Physical and Geotechnical Properties of Soils, Joseph E Bowels (2nd edn.)**
- **Geotechnical Engineering: Principles and Practices, Donald P Coduto (Eastern Economy Edition, 2003)**
- **Foundation Engineering, Peck, Henson, Thornburn**

Other books are also referred in the slides of different topics.

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Course Outcomes (COs)

At the end of the course students should be able to

CO1	plan sub-soil investigation program and prepare sub-soil investigation report for various civil engineering projects
CO2	analyse an existing slope to check its stability using several limit equilibrium methods & design new earth slopes
CO3	determine the bearing capacity for shallow and deep foundations for homogeneous or layered soil
CO4	evaluate the total settlement of a footing or pile group in sand or clay
CO5	decide on appropriate types of foundation for a structure and design footings, raft or piles foundations

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Lecture Plan

Lecture	Topics
	Soil Investigation Techniques
1	Purpose of soil exploration
2	Soil exploration program: Project assessment, Site Geology, Field reconnaissance, Location, spacing and depth of boring
3	Exploratory borings: Techniques & Equipments, Borelogs, Soil profile, Observation of water table
4	Soil sampling- Procedure for collection, Sample quality and Engineering Practice
5	Field Tests : SPT, SPT correlations; CPT, PMT, Dilatometer, Vane shear, Dynamic Probing
6	Geophysical explorations - Seismic, Resistivity
7	Sub-soil exploration report

1 CT may be taken on the topics covered in Lecture-3 & 4 or Lecture 5

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Soil Investigation!! Sub-soil Exploration!!

Site Exploration and Characterization

The process of exploring to characterize or define small scale properties of substrata at construction sites is unique to geotechnical engineering. In other engineering disciplines, material properties are specified during design, or before construction or manufacture, and then controlled to meet the specification. Unfortunately, subsurface properties cannot be specified; they must be deduced through exploration.

Charles H. Dowding (1979)

Coduto p.46

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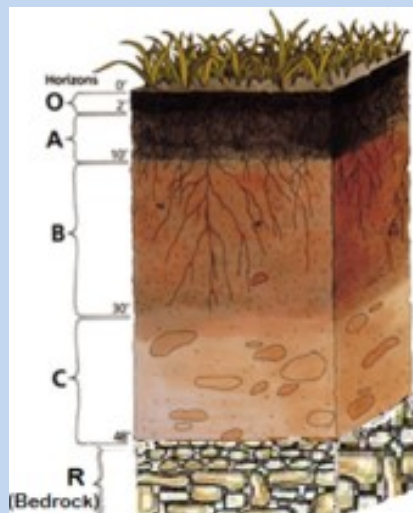
Purpose of soil exploration

- Identify the **nature of deposit** (type and thickness of soil layers)
- Assess the **suitability of sub-soil** for the anticipated loads (from building, embankment, road, landfill etc.)
- Determine the **location of bedrock/ bearing stratum**
- Determine the **location of ground water table** and its variation

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Bedrock

The solid unweathered rock that lies beneath the loose surface deposits of soil, alluvium, etc.



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Purpose of soil exploration.....contd.

- Assess potential **foundation problems** (e.g. expansive soil, collapsible soil, liquefiable soil, ground settlement/heaving etc.)
- Decide on appropriate **type of foundation** and depths
- Determine the necessity, extent and process of **ground improvement/ modification**

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Purpose of soil exploration.....contd.

- **Collect soil samples** to perform laboratory tests for soil characterization and **determination** of various appropriate **design parameters**.
- Decide on suitable **construction methods** and sequence of construction

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