

CE 481

Geotechnical Engineering II

2nd Semester 1445 H

INSTRUCTOR

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TEXT BOOK

PRINCIPLES OF



GEOTECHNICAL ENGINEERING

Ninth Edition

COURSE CONTENTS

Topic	Reference
• Compressibility and Consolidation of Soil	Chapter 11
• Shear Strength	Chapters 10, 12
• Slope Stability	Chapter 15
• Lateral Earth Pressure	Chapter 13

COURSE GRADE DISTRIBUTION

Quizzes and Home works	10%
1st Midterm	25%
2nd Midterm	25%
Final Exam	40%
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Total	100%

1st Midterm **Wednesday 10/9/1445 (20/03/2024) @ 10:00 P.M.**

2nd Midterm **Monday 07/11/1445 (15/05/2024) @ 6:45 P.M.**

Course Attendance

Lectures

Tutorial

Book!!!



25% !!!!

Branches of Geotechnical Engineering

In a general sense, geotechnical engineering has two broad branches:

- **Soil Engineering**
- **Rock Engineering**

Soil Engineering is the application of the principles of soil mechanics to practical problems.

Soil Mechanics is the **branch** of geotechnical engineering that deals with the physical properties of soil and behavior of soil masses subjected to various types of forces. It applies the basic principles of mechanics including kinematics, dynamics, fluid mechanics and the mechanics of materials to soils.

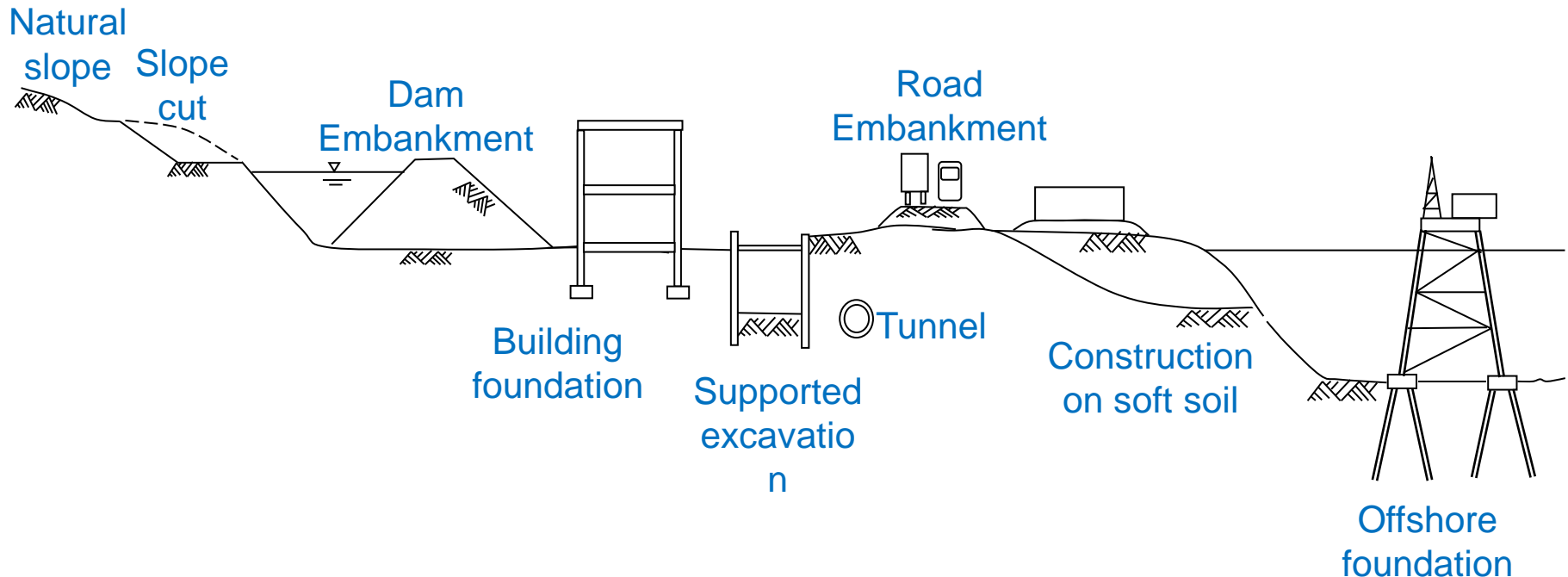
Rock Engineering is the application of the principles of rock mechanics to practical problems

Applications of Geotechnical Engineering

- **Foundation Engineering**
- **Tunnel Engineering**
- **Dam Engineering**
- **Retaining Walls**
- **Slope Stability**
- **Geoenvironmental Engineering**
- **Pavement Engineering**
- **Earthquake Engineering**
- **Geosynthetics**
- **Geothermal**

CIVIL ENGINEERING PROJECTS

- All civil engineering projects (buildings, roads, bridges, dams, tunnels and water tanks ..) are constructed **on** or **in** the **ground**.
- Civil engineers are required to assess and avoid the major risks posed by **ground conditions**.











GEO-ENGINEERING AT KSU

CE 382 Geotechnical Engineering I

CE 380 Soil Mechanics Laboratory

CE 481 Geotechnical Engineering II

CE 483 Foundation Engineering

Elective Courses:

- CE 484 Deep Foundations
- CE 485 Introduction to Rock Mechanics
- CE 486 Improvement of Geotechnical Engineering Materials
- CE 487 Geotechnical Engineering in Arid Regions
- CE 488 Selective Topics in Geotechnical Engineering

Postgraduate

M.Sc. : CE 581 to CE 589

Ph.D. : CE 681 to CE 689

CE 382 Geotechnical Engineering I

- **Soil minerals**
- **Types of rocks**
- **Weathering process**
- **Formation of soils**

- **Phase relations**
- **Consistency limits and indices**
- **Classification of soils**

- **Soil compaction**

- **Flow through soils (permeability and seepage)**

- **Principle of effective stress**
- **Stresses in soil masses**

CE 481 Geotechnical Engineering II

Discussion of the fundamental behavior of soils, particularly its strength and deformation and then applying this in the solution of some practical problems of which in this course we will cover:

- Slope stability
- Lateral earth pressures

Compressibility of soils

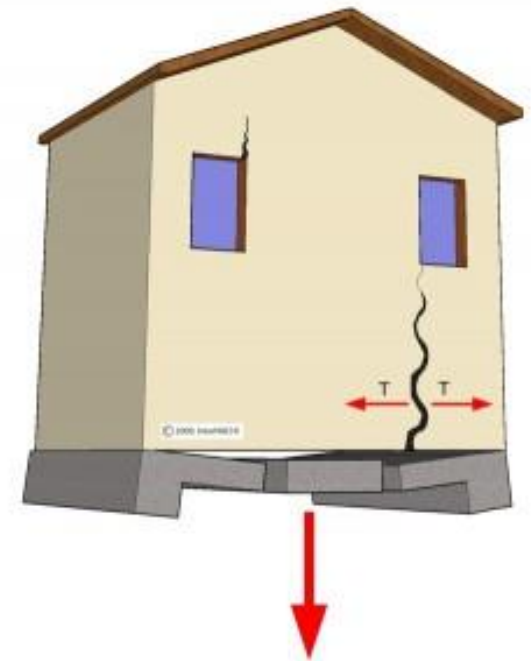
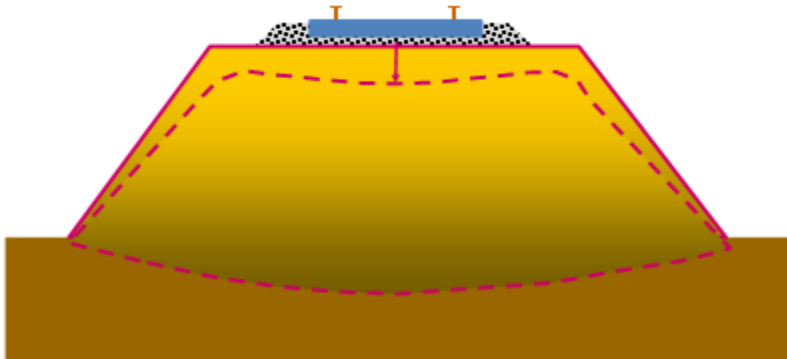
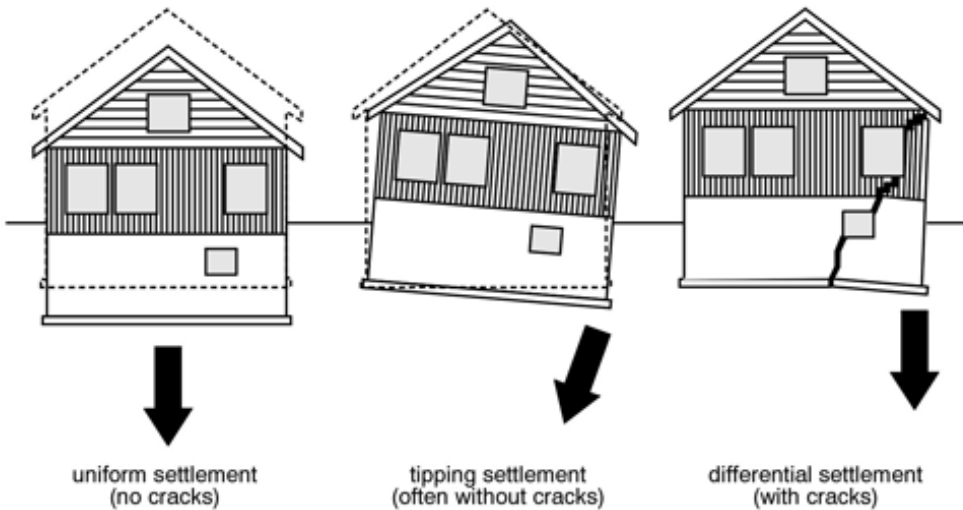
Shear strength of soils

Slope stability

Lateral earth pressures

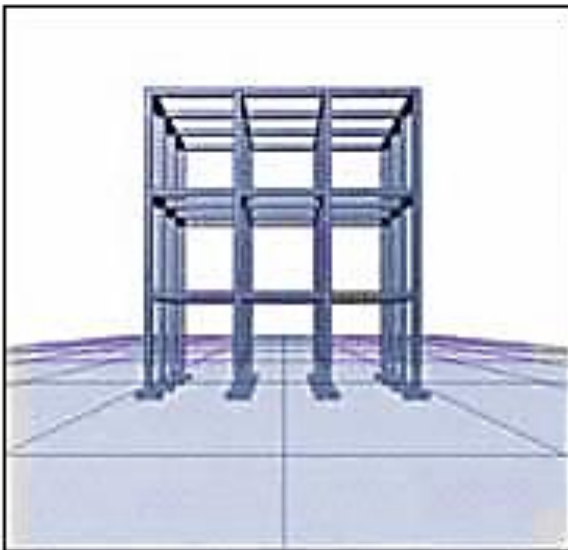
COMPRESSIBILITY OF SOILS

Types of settlement

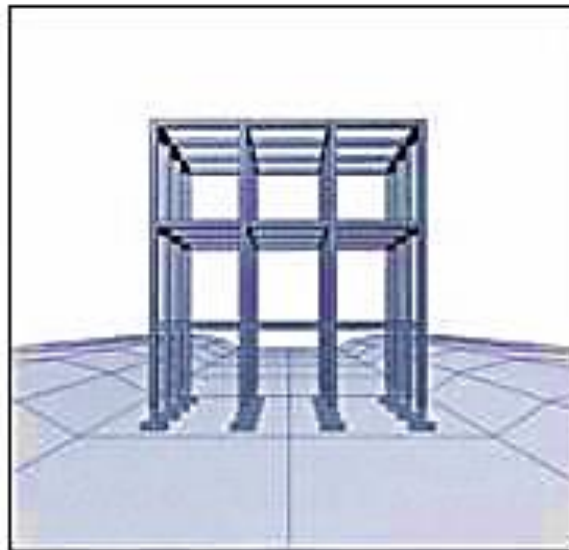


COMPRESSIBILITY OF SOILS

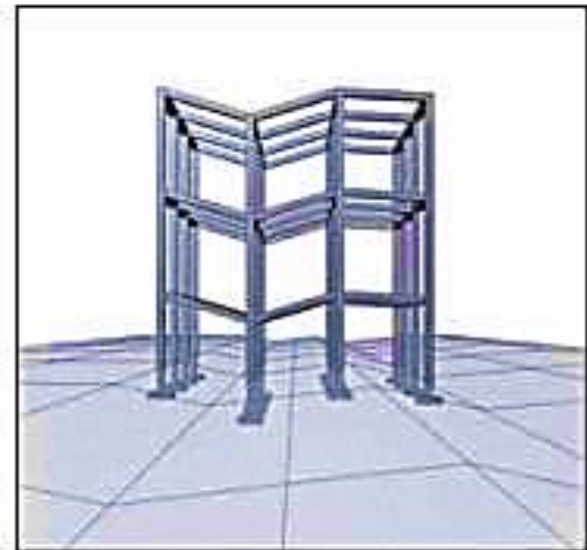
- Settlements at working loads must not cause damage, nor adversely affect the **serviceability** of the structure.
- Possible settlements: **Uniform**, **Differential**, **Immediate**, and **Long-term** consolidation settlement.



(a) *Building before settlement occurs*

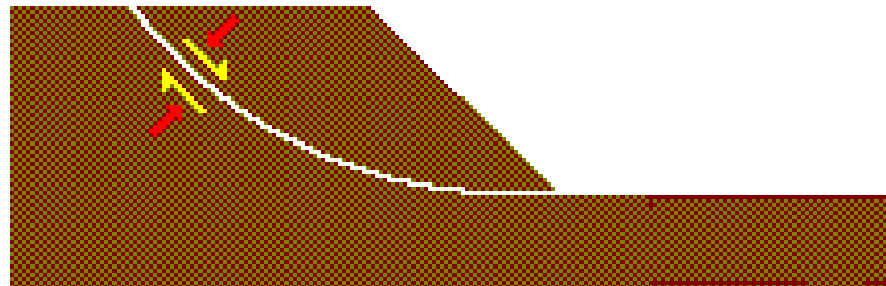
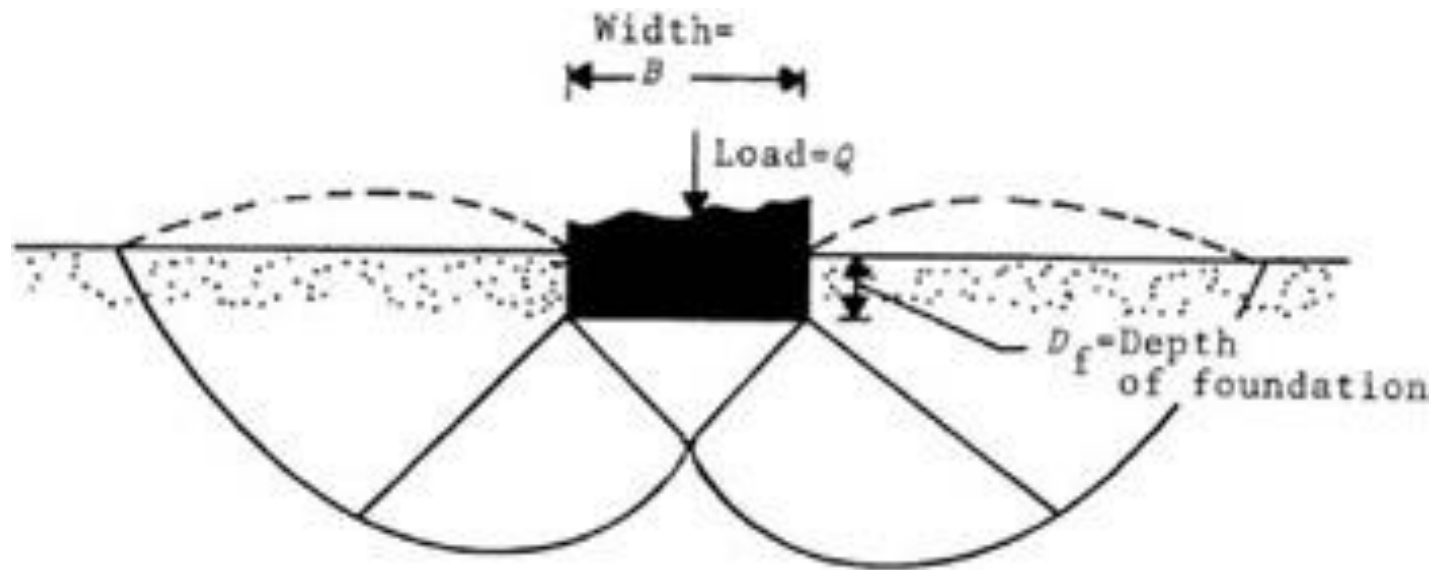


(b) *Uniform settlement*

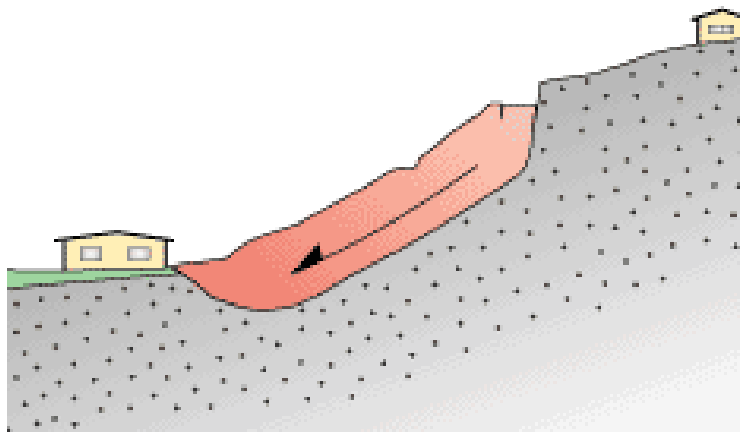
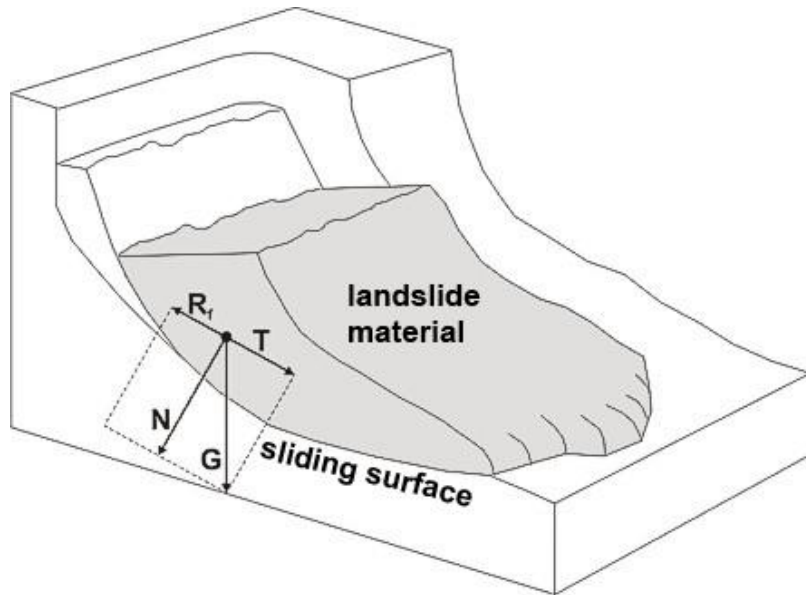


(c) *Differential settlement*

SHEAR STRENGTH OF SOIL



SLOPE STABILITY



Lateral earth pressure and Retaining Structures

