

CE 481

Geotechnical Engineering II

2nd Semester 1437/1438 H

INSTRUCTOR

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TEXT BOOKS

- **Text Books:**

1. Das, B.M. *Principles of Geotechnical Engineering*, Latest edition.
2. Das, B. M. Chapter 8, *Principles of Foundation Engineering*, Latest edition

- **Supplementary References:**

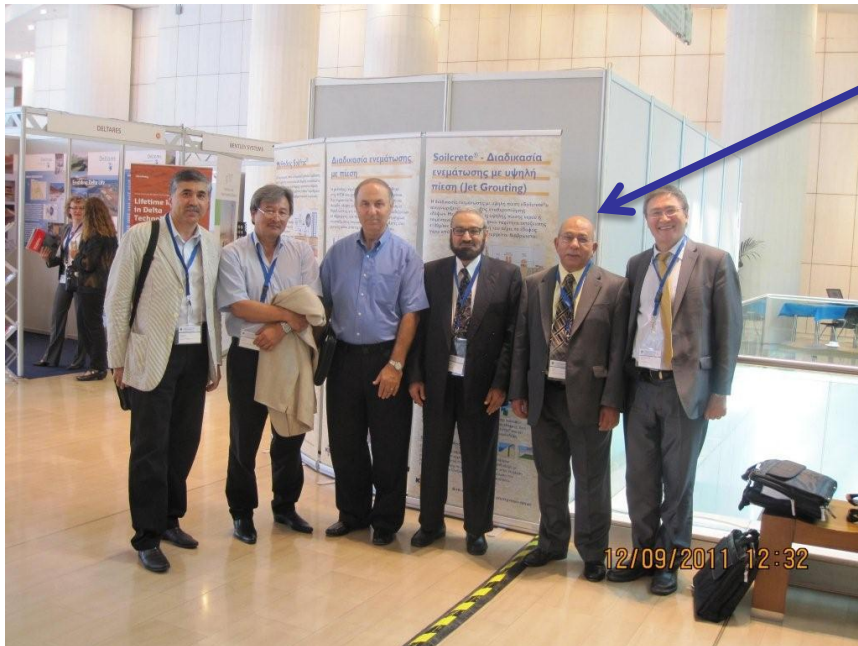
- Holtz, R.D. and Kovacs, W.D. (1981). *An Introduction to Geotechnical Engineering*, Prentice Hall.
- Bowles, J. (1992). *Engineering Properties of Soils and their Measurement*, McGraw Hill.

TEXT BOOKS

Text Book

"Principles of Geotechnical Engineering"

Braja M. Das



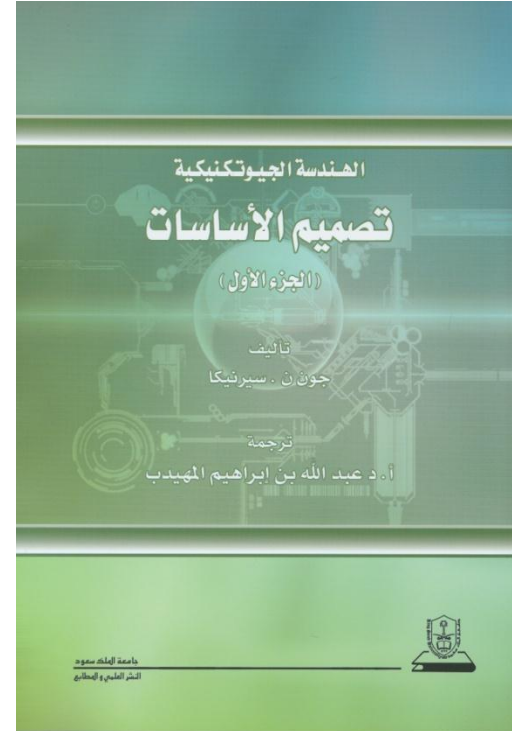
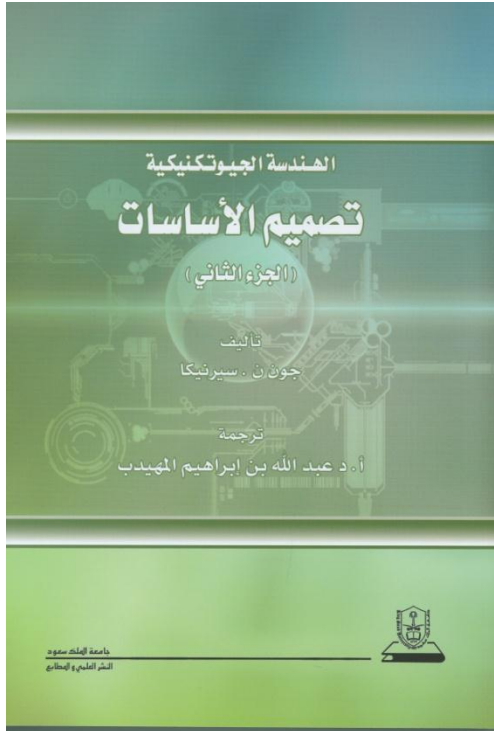
TEXT BOOKS



ترجمة كتاب "الهندسة الجيوتكنيكية : ميكانيكا التربة" لمؤلفه (جون سيرنيكا) بعد موافقة مركز الترجمة بجامعة الملك سعود ودعمه، إدارة النشر العلمي والمطابع، جامعة الملك سعود، ١٤٢٦ هـ.

حصل هذا الكتاب على جائزة خادم الحرمين الشريفين عبدالله بن عبدالعزيز العالمية للترجمة ١٤٢٨ هـ (٢٠٠٨ م).

TEXT BOOKS



حصل هذا الكتاب على جائزة مؤسسة الكويت للتقدم العلمي (معرض الكويت الرابع والثلاثين للكتاب لعام ٢٠٠٩ م) عن أفضل كتاب مترجم إلى اللغة العربية في العلوم

COURSE CONTENTS

Topic	References
• Compressibility and Consolidation of Soil	Chapter 11 [Ref#1]
• Shear Strength	Chapter 10, 12 [Ref#1]
• Slope Stability	Chapter 15 [Ref#1]
• Lateral Earth Pressure	Chapter 13 [Ref#1]
• Retaining Structures	Chapter 8 [Ref#2]

COURSE GRADE DISTRIBUTION

• Quizzes and Home works	Weekly – (Given by TA)	10%
• 1 st Midterm*	Wednesday 01/07/1438 (29/03/2017)	25%
• 2 nd Midterm*	Wednesday 14/08/1438 (10/05/2017)	25%
• Final Exam		40%
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• Total		100%

• **15 minutes after Maghreb Prayer**

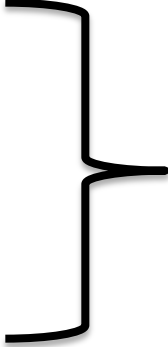
☐ BONUS (2 marks)

☐ BONUS (Group work)

Course Attendance

Lectures

Tutorial



25% !!!!

Book!!!

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.

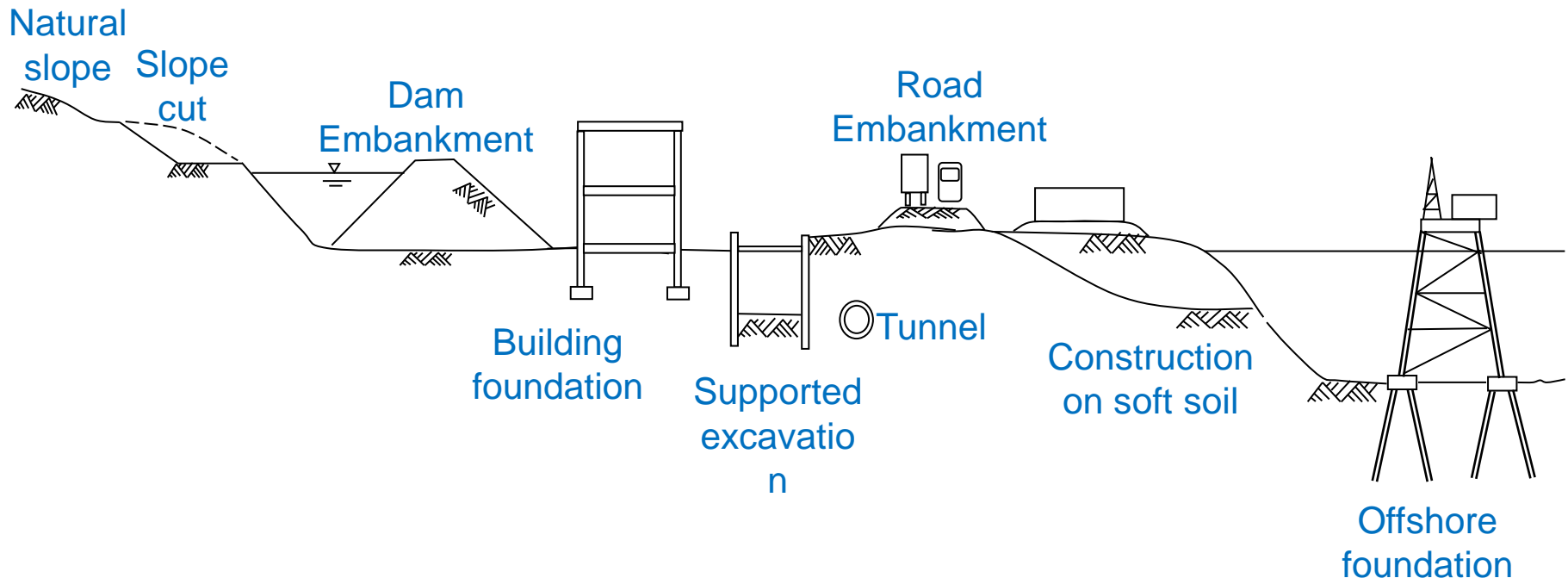
Rock Engineering is the application of the principles of rock mechanics to practical problems

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**.





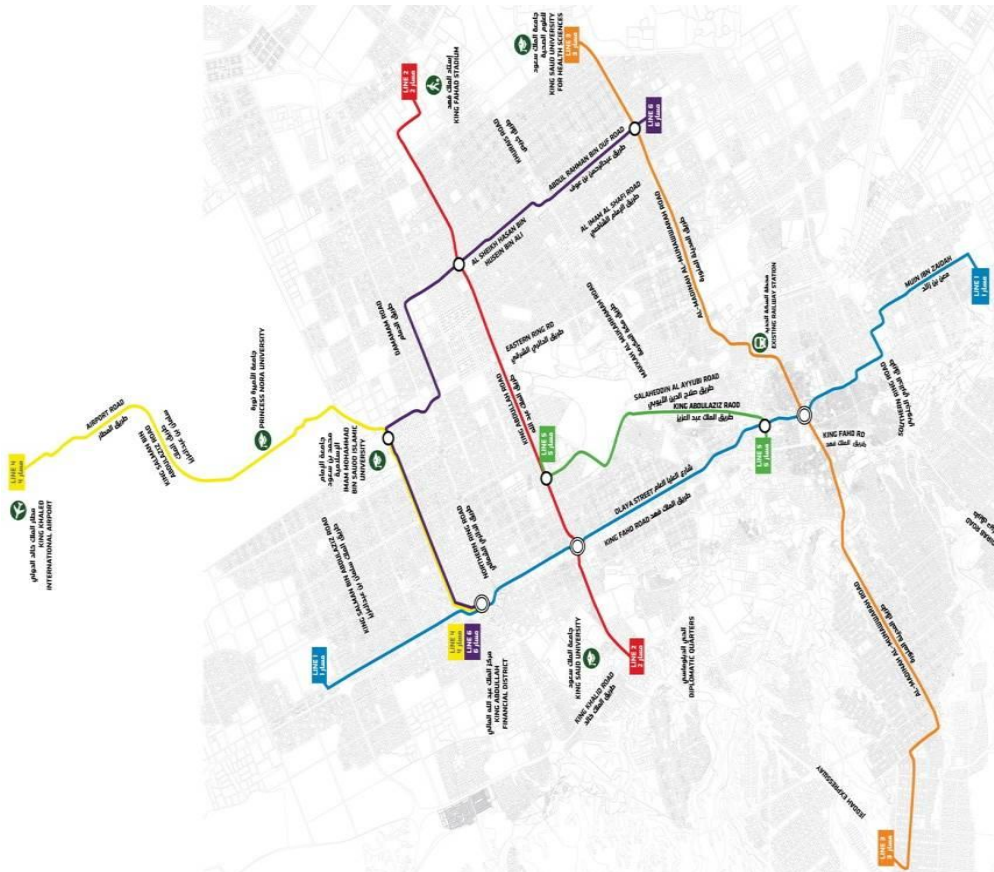








RIYADH METRO



RIYADH METRO

Track No.	Color Track	Axis Track	Track Length	Stations Number
Line 1	Blue	Olaya Street	38 km	39 stations
Line 2	Red	King Abdullah	25.3 km	14 stations
Line 3	Orange	Madina Al Munawra	40.7 km	32 stations
Line 4	Yellow	King Khaled Airport	29.2 km	13 stations
Line 5	Green	King Abdul Aziz	12.9 km	25 stations
Line 6	Purple	Hassan bin Hussain	30 km	9 stations

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
- Retaining walls.

Compressibility of soils

Shear strength of soils

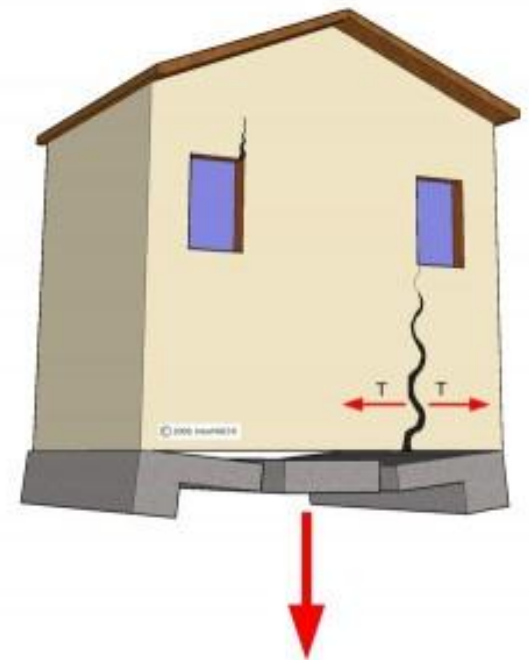
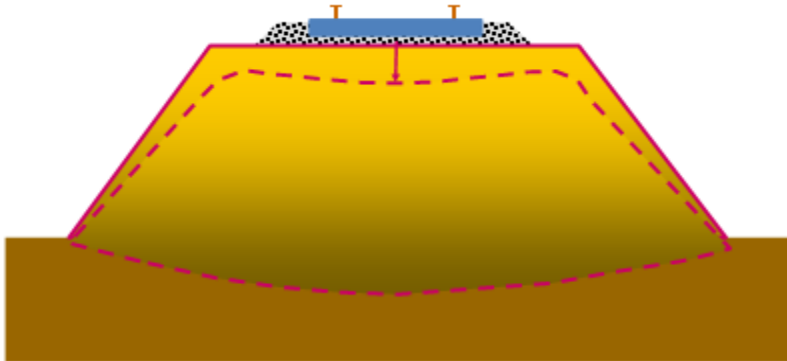
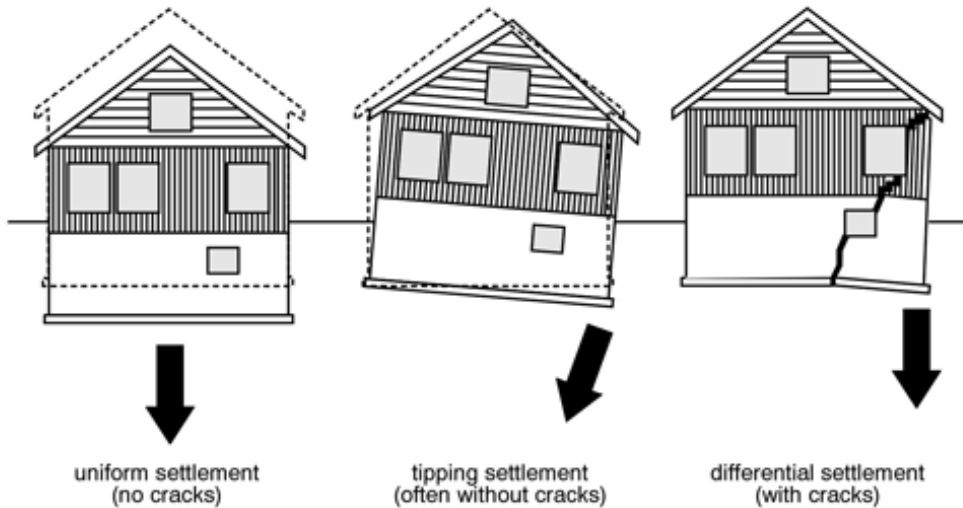
Slope stability

Lateral earth pressures

Retaining walls

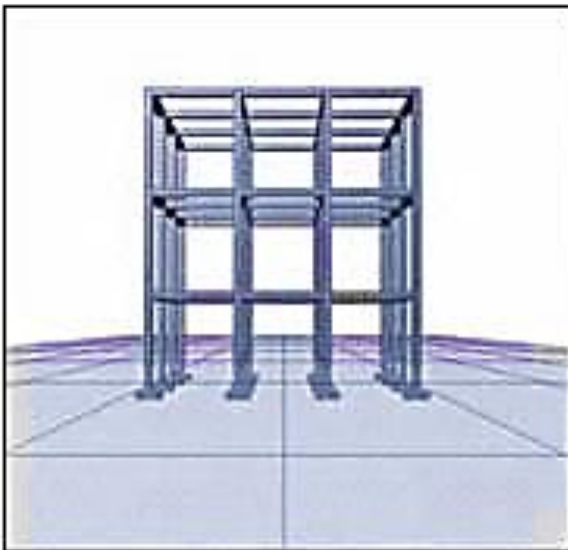
COMPRESSIBILITY OF SOILS

Types of settlement

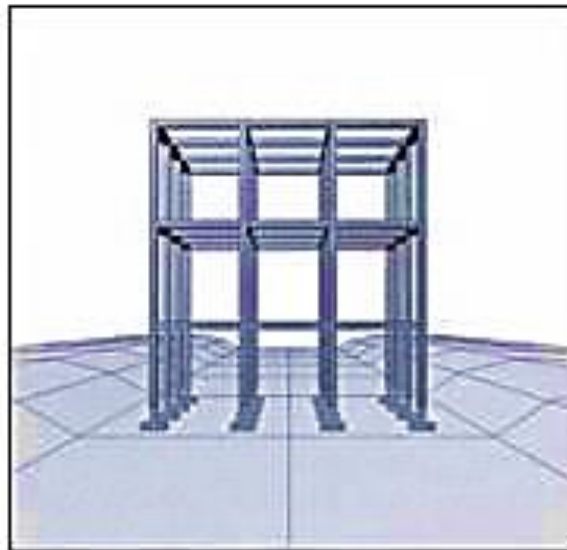


COMPRESSIBILITY OF SOILS

- 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

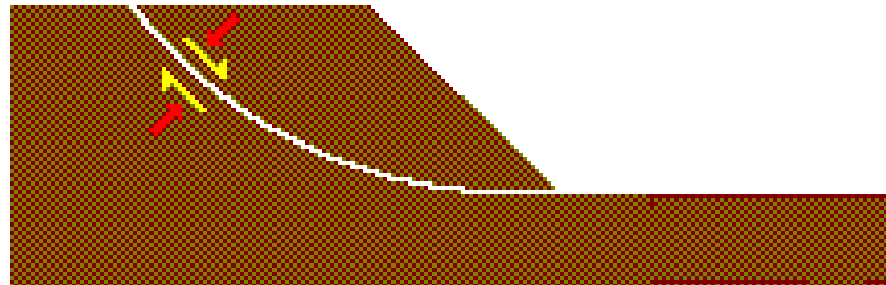
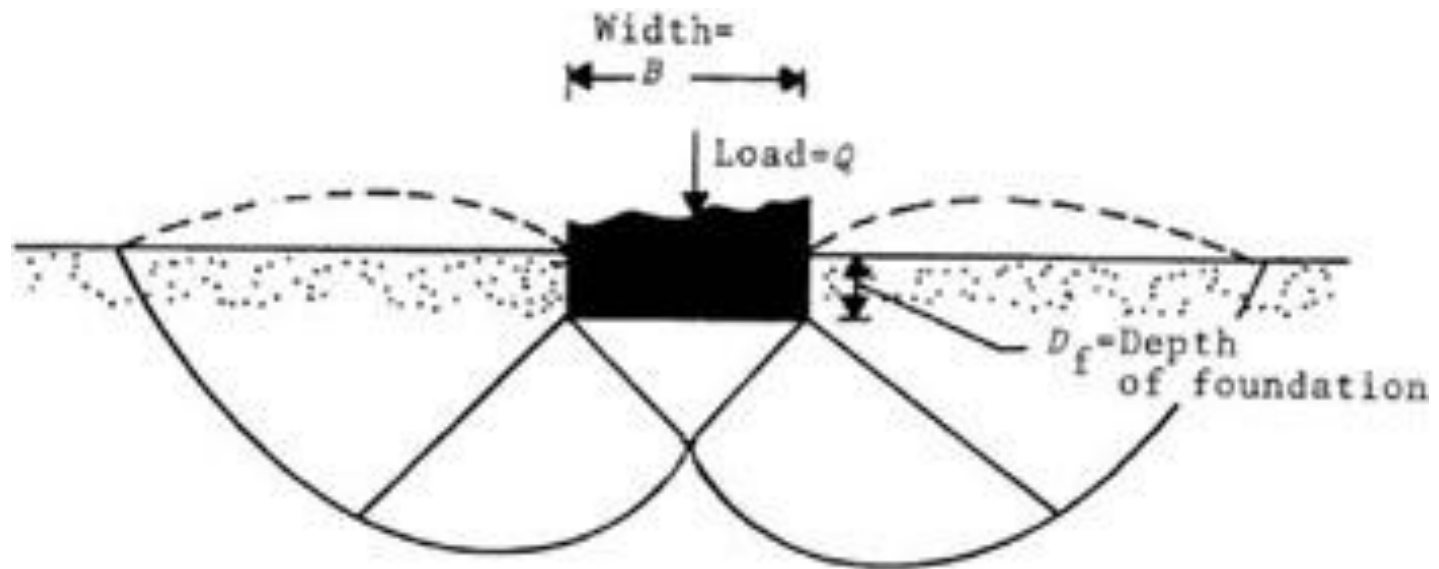


(b) Uniform settlement

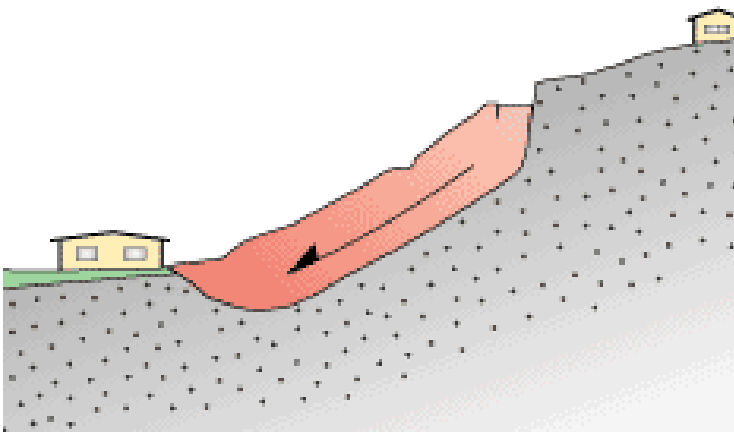
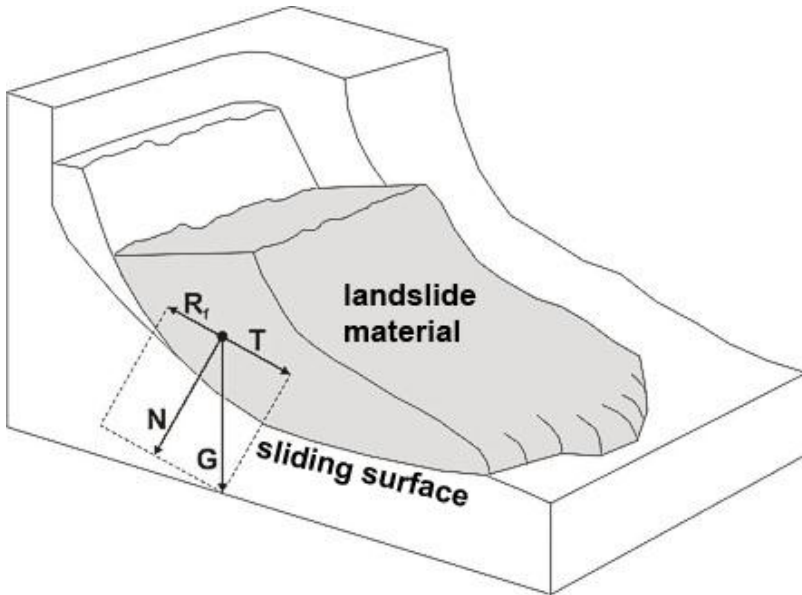


(c) Differential settlement

SHEAR STRENGTH OF SOIL



SLOPE STABILITY



Lateral earth pressure and Retaining Structures

