



## DEPARTMENT OF CIVIL ENGINEERING

Faculty of Civil Engineering  
Khulna University of Engineering & Technology  
Khulna-9203, Bangladesh

## সিভিল ইঞ্জিনিয়ারিং বিভাগ

সিভিল ইঞ্জিনিয়ারিং অনুষদ  
খুলনা প্রকৌশল ও প্রযুক্তি বিশ্ববিদ্যালয়  
খুলনা-৯২০৩, বাংলাদেশ  
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*Post-Conference (ICCESD 2020)*

# Workshop on Geotechnical Engineering for Practicing Civil Engineers

*Day1 & Day 2: Good practices and planning of geotechnical investigation; Understanding and interpretation of geotechnical field and laboratory test results; Establishment of foundation design parameters; Design of ground improvement of soft clay soils; Pile foundation design and construction issues; Settlement of shallow and pile foundations; Case studies on civil engineering applications*



**Speaker**

Dr. AHM Kamruzzaman  
Chartered Professional  
Geotechnical Engineer,  
Australia



**Speaker**

Assoc. Prof. Hadi Khabbaz  
School of Civil and Env.  
Eng., UTS, Sydney,  
Australia



**Speaker**

Prof. Dr. Rokonzaman  
Department of Civil  
Engineering, KUET,  
Bangladesh

**February 10-11, 2020**

**Department of Civil Engineering, KUET**

*Fee: 10,000 BDT per person\**

*Registration deadline: February 06, 2020 (limited seats only)*

*\*Lunch and Certificate will be provided*

**For more information and registration:**

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### Workshop on Geotechnical Engineering for Practicing Civil Engineers

#### Program schedule:

Day One: 10 <sup>th</sup> Feb 2020			
Time	Activity	Topic	Speaker(s)
9:00 am – 9:15 am	<b>Welcome</b>	Opening Remarks	
9:15 am – 10:30 am	<b>Topic 1</b>	Soil behaviour including an overview on engineering geology and soil mechanics	A/Prof Hadi Khabbaz
10:30 am – 11:00 am	<i>Morning break</i>		
11:00 am – 12:00 pm	<b>Topic 2</b>	Good practices of geotechnical investigation on civil engineering applications; Planning of geotechnical field and laboratory investigations	Dr Kamruzzaman
12:00pm – 1:00pm	<b>Topic 3</b>	Understanding of field and laboratory investigation test results from soil investigation reports; Interpretation of design soil parameters (e.g. strength, deformation)	Dr Kamruzzaman
1:00 pm – 2:30 pm	<i>Prayer &amp; Lunch break</i>		
2:30pm – 4:00pm	<b>Topic 4</b>	Settlement of shallow foundations, including load stress distributions, immediate, consolidation and creep settlements	A/Prof Hadi Khabbaz
4:00 pm – 4:30 pm	<i>Prayer &amp; Afternoon break</i>		
4:30 pm – 5:00 pm	<b>Tutorial</b>	Practice questions and discussion	All

Day Two: 11 <sup>th</sup> Feb 2020			
Time	Activity	Topic	Speaker(s)
9:00 am – 10:30 am	<b>Topic 5</b>	Overview of bearing capacity of shallow foundation; Theory and design of ground improvement of soft clay soils	A/Prof Hadi Khabbaz, Prof Rokonzaman
10:30 am – 11:00 am	<i>Morning break</i>		
11:00 pm – 12:00 pm	<b>Topic 6</b>	Geotechnical design of various types of retaining walls including gravity and cantilever walls, sheet piles, bored pile walls and anchored walls	A/Prof Hadi Khabbaz
12:00 pm – 1:00 pm	<b>Topic 7</b>	Overview of pile foundation and design of driven and cast in-situ bored piles	Dr Kamruzzaman
1:00 pm – 2:30 pm	<i>Prayer &amp; Lunch break</i>		
2:30 pm – 4:00 pm	<b>Topic 8</b>	Design of cast in-situ bored piles (continued); Construction issues of bored piles	Dr Kamruzzaman
4:00 pm – 4:30 pm	<i>Prayer &amp; Afternoon break</i>		
4:30 pm – 5:00 pm	<b>Tutorial</b>	Practice questions and discussion	All
5:00 pm – 5:15 pm		Closing Remarks	

*Post-Conference (ICCESD 2020)*

## **Workshop on Geotechnical Engineering for Practicing Civil Engineers**

*10-11 February 2020*

*Department of Civil Engineering, KUET, Khulna, Bangladesh*

### **Speaker(s):**



**Dr AHM Kamruzzaman (Zaman)**

PhD (NUS), MEng (AIT), BScEng (Civil)  
Fellow and Chartered Professional Geotechnical  
Engineer, Australia (FIEAust CPEng, 2941381)  
National Engineers Register, Australia (NER,  
2941381)  
Honorary Principal Fellow, University of  
Wollongong, Australia  
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**Associate Professor Hadi Khabbaz**

PhD (UNSW), MEng, BSc (Hon)  
Deputy Head of School (Research)  
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Dr. Md. Rokonzaman  
Professor  
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## **Synopsis of Topics:**

### **Topic 1: Soil behaviour including an overview on engineering geology and soil mechanics**

The purpose of this topic is to provide an overview of engineering geology and soil behaviour concepts and applications. Many fundamental and main topics will briefly be discussed, including soil origin, phase relationships, surface and deep compaction, the effective stress concept, seepage and dewatering systems, consolidation and shear strength of cohesive and cohesionless soils.

### **Topic 2: Good practices of geotechnical investigation on civil engineering applications, and Planning of geotechnical field and laboratory investigations**

The topic will cover the importance of commonly used geotechnical field and laboratory investigations and their use on civil structures such as bridge/culvert and building foundations, deep excavation, embankment, highways, railways, tunneling etc. Then, the presentation will be focused on “various types of field and laboratory investigations with appropriateness of investigation types for civil structures”. A range of issues such as borehole/cone penetration depth, important items required on the boreholes/CPT logs, reliability of pocket penetrometer/pocket vane and stresses requirement for laboratory test (e.g. UU, CIU and Oedometer test) will be discussed. Emphasis will be given more on soft soil.

This topic has significant impact on costing of investigation when consultant engineers are appointed for planning of investigation work both in design & construction, and design only projects.

### **Topic 3: Understanding of field and laboratory investigation test results, and Interpretation of design soil parameters from soil investigation reports**

Geological model is an important part for selecting foundation depth of preliminary design. In this topic, engineers will be able to understand how to develop geological model profile from factual soil investigation report. The session will also address identification of common mistakes associated with the civil structures design from local soil investigation reports. Following the understanding on geotechnical model, the presentation will cover “how to interpret design parameters such as physical properties, strength & deformation applicable to various types of civil structures. Emphasis will be given to more on local geology (e.g. Dhaka, Chittagong, Khulna) in particular soft soil parameters.

This topic has significant impact on costing as well as to mitigate geotechnical risk on the design and construction of civil structures.

### **Topic 4: Settlement of shallow foundations, including load stress distributions, immediate, consolidation and creep settlements**

The serviceability criterion for design of shallow foundations requires calculation of settlement induced by loads applied to the footings. In order to calculate the settlement, the increase in the vertical stress at different points under a foundation due to different loadings needs to be evaluated. In this topic some methods for calculation of the increase in stresses under various footings will be given first followed by a description of methods most commonly used in the calculation of immediate, and long term settlements.

### **Topic 5: Overview of bearing capacity of shallow foundation; Theory and design of ground improvement of soft clay**

Foundations are part of the structures that transfer loads imposed by the super-structure to the ground. Different types of foundations have been developed to accommodate different ground conditions. Shallow foundations transfer loads to the upper layer of soil which has sufficient capacity to carry the imposed load. The focus of this topic is on the calculations of bearing capacity of foundations under compressive loads considering the effect of shape of footing, depth of footing, load eccentricity, ground slope and load inclination. Furthermore, theory and design of ground improvement of soft clay will be presented with practical examples.

### **Topic 6: Geotechnical design of various types of retaining walls including gravity and cantilever walls, sheet piles, bored pile walls and anchored walls**

Retaining walls can broadly be classified into several categories: gravity walls, cantilever walls, embedded walls, anchored walls and reinforced soil walls. The design of retaining walls takes into account the stability, strength and serviceability of the walls. This topic mostly covers the general design requirements for the stability analysis of walls. Two methods of design including a global factor of safety (GFS) and partial factors of safety (PFS) will be considered at failure for different wall types; and the stability of wall using appropriate failure modes will be evaluated.

### **Topic 7: Overview of pile foundation and design of driven and cast in-situ bored piles**

Traditionally, pile foundation design is carried out from vertical load, and often overlooked many other effects such as horizontal load, negative skin friction due to soft soil and serviceability criteria over the design life. In this topic, engineers will be able to understand how to design economic and robust pile foundation applicable to bridges and building structures based on local geology using the following design considerations:

- a) Pile design from vertical load
- b) Pile design from horizontal load
- c) Pile design from negative skin friction
- d) Pile design from settlement calculation

This topic has significant impact on costing as well as to mitigate geotechnical risk on the design and construction of pile foundations.

### **Topic 8: Construction issues of bored piles**

Following the understanding of design principals of bored pile, this topic will cover various types of construction quality control issues including interpretations of pile integrity and load test results for bored pile foundation.

This topic has significant impact on costing as well as to mitigate geotechnical risk during construction and design life of pile foundations.

### **Note:**

Presentation files and handouts will be delivered for each topic with project examples. Collaborative and mutual discussions along with local engineering problems and solutions will be shared. Hands-on typical design problems will also be solved under the supervision of the presenters.

