UNIVERSITI SAINS MALAYSIA

First Semester Examination
2013/2014 Academic Session

December 2013 / January 2014

REG 363 – Site Investigation
(Kajian Tapak)

Duration : 3 hours
(Masa: 3 jam)

Please check that this examination paper consists of SIX printed pages before you begin the examination.

Sila pastikan bahawa kertas peperiksaan ini mengandungi ENAM muka surat yang tercetak sebelum anda memulakan peperiksaan ini.

Students are allowed to answer all questions either in English OR in Bahasa Malaysia only.

Pelajar dibenarkan menjawab semua soalan dalam Bahasa Inggeris ATAU Bahasa Malaysia sahaja.

Answer **FIVE** questions only.

*Jawab **LIMA** soalan sahaja.*

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai].

1. In order to measure the density of compacted soil on site, Sand Replacement Method test was carried out. 4.87 kg of soil were extracted from a hole at the surface of the soil. The hole was then filled with 3.56 kg of loose dry standard sand.

   Bagi menentukan ketumpatan tanah di tapak, Kaedah "Sand Replacement" telah digunakan. Sebanyak 4.87 kg tanah telah dikeluarkan dari lubang yang dikorek. Lubang tersebut kemudiannya dipenuhkan dengan 3.56 kg pasir piawai.

   (a) If it takes 6.58 kg of the same sand to fill a container of 0.0042 m^3 in volume, determine the bulk density of the soil.

   Jika sebuah bekas berisipadu 0.0042 m^3 boleh memuatkan 6.58 kg pasir piawai tersebut, tentukan densiti pukal tanah yang diambil di tapak.

   (10 marks/*markah*)

   (b) In a water content determination, 24 g of the original soil was dried in an oven at 105 ºC. The dried specimen weighed 20 g. Calculate the percentage of moisture.

   Dalam penentuan jumlah air pula, 24 g tanah dari tapak telah dikeringkan dalam oven pada 105 ºC. Spesimen yang kering adalah 20 g. Kira peratusan air.

   (5 marks/*markah*)

   (c) What is the dry unit weight of the compacted soil?

   Apakah berat unit untuk tanah yang telah dimampatkan ditapak itu?

   (5 marks/*markah*)

2. Describe the procedure of Proctor Compaction Test and explain its role in the earthwork construction.

   Perihalkan prosedur menjalankan ujian Mampatan Proctor dan jelaskan peranan ujian ini dalam pembinaan kerjatanah.

   (20 marks/*markah*)

3. (a) Describe typical lab and field tests in site investigation contracts.

Perihalkan ujian-ujian makmal dan di tapak yang selalunya terdapat dalam kontrak kajian tapak.

(10 marks/*markah*)

(b) What does SPT stand for in site investigation works and what is the major use of its data?

Apakah itu SPT dari aspek kerja kajian tapak dan apakah kegunaan utama data yang diperolehi?

(5 marks/*markah*)

(c) How do you monitor pore pressure water pressure under the ground during construction and explain why it is important to monitor the pressure.

Bagaimana tekanan air di bawah tanah boleh diperhatikan dan jelaskan mengapa ianya penting untuk memerhatikannya.

(5 marks/*markah*)

4. Describe in detail any two (2) statement below. (Using sketches if needed)

(a) Sampling
(b) Slope stabilization
(c) Soil characteristic

Jelaskan dengan terperinci dua (2) perkara di bawah. (Gunakan lakaran jika perlu)

(a) Persampelan
(b) Kestabilan cerun
(c) Ciri-ciri tanah

(20 marks/*markah*)

5. (a) State the three (3) phases of a moist soil sample. Use a suitable diagram to present the phase diagram of a moist soil sample and the various volumetric and weight parameters of soil.

Nyatakan tiga (3) fasa sampel tanah yang basah. Dengan menggunakan gambarajah yang sesuai, tunjukkan gambarajah fasa contoh tanah basah bersertakan parameter isipadu dan berat tanah.

(6 marks/*markah)*

(b) For a given soil, the following parameters have been determined in the soil laboratory:

Specific gravity of soil solid particles, $G_s = 2.68$, moist unit weight, $\gamma = 18.6$ kN/m^3 and moisture content, w = 14.8 %. Determine:

Bagi satu sampel tanah, parameter tanah tersebut telah ditentukan di makmal kaji tanah:

Graviti tentu zarah pejal tanah, $G_s = 2.68$, berat unit basah, $\gamma = 18.6$ kN/m^3 dan kandungan kelembapan, w=14.8%. Tentukan:

(i) Dry unit weight of soil, γ_{dry}
Berat unit kering tanah

(ii) Void ratio, *e*
Nisbah Lompang

(iii) Porosity, n
Keliangan

(iv) Degree of saturation, S
Tahap ketepuan

(14 marks/*markah*)

6. (a) Describe the three (3) types of soil settlement which can be expected to occur when a surcharge load is being exerted on a given soil mass.

Terangkan tiga (3) jenis ubah bentuk tanah yang dijangka berlaku sekiranya satu beban dikenakan ke atas satu jisim tanah.

(4 marks/*markah)*

(b) For the soil profile given in Figure 1, calculate the magnitude of primary consolidation settlement of the clay layer when a uniformly distributed load of $\Delta\sigma$ is applied at the surface of the ground as shown. It was found that the pre-consolidation pressure, σ_c^1, of the clay is 130kN/m^2. The swell index of the clay, $C_s = C_c/6$ whereby C_c is the compression index of the clay. Use empirical Equation 1 to aid your calculation.

Bagi profil tanah yang diberi dalam Rajah 1, kirakan magnitud perubahan bentuk tanah utama apabila satu beban seragam $\Delta\sigma$ dikenakan pada permukaan tanah seperti yang ditunjukkan. Didapati bahawa tegasan pra-ubah bentuk, σ_c^1, untuk tanah liat tersebut ialah 130kN/m^2. Indeks pengembangan tanah liat tersebut, $C_s = C_c/6$. C_c ialah indeks mampatan tanah liat tersebut. Gunakan Persamaan 1 untuk membantu pengiraan anda.

(16 marks/*markah*)

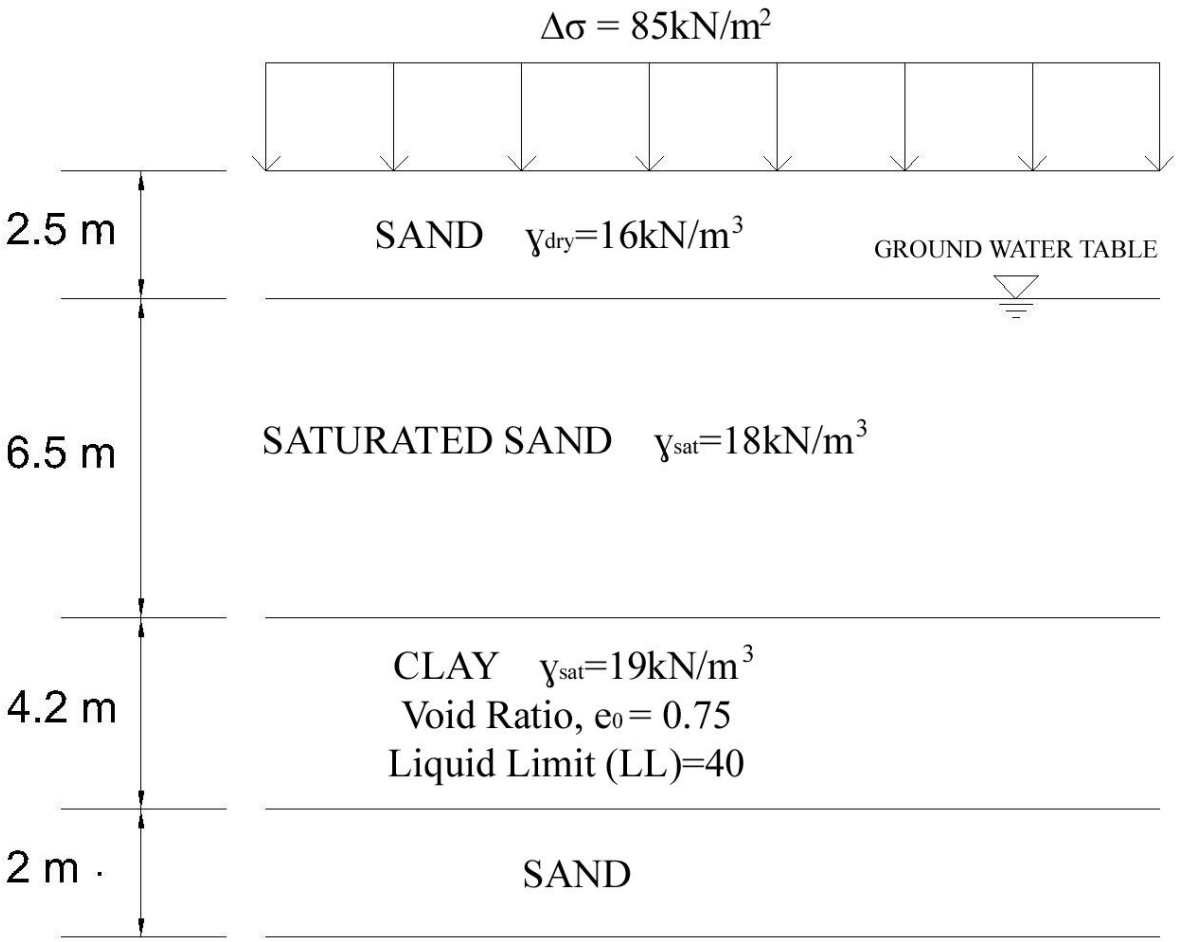

Figure 1: Sub-soil profile/*Rajah 1 : Profil sub tanah*

Compression index, C_c=0.009(LL-10)

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