มหาวิทยาลัยสงขลานครินทร์

คณะวิศวกรรมศาสตร์

การสอบกลางภาค ประจำภาคการศึกษาที่ 2 ปีการศึกษา 2551

สอบวันที่ 26 ธันวาคม 2551 เวลา 09.00-12.00 น.

วิชา 220-527 Geosynthetics Engineering ห้องสอบ A400

ข้อกำหนด:

1. ข้อสอบ มี 6 ข้อ คะแนนเต็ม 60 คะแนน ให้ทำทุกข้อ
2. ให้นำสมุด Lecture, Sheet และ หนังสือ เข้าห้องสอบได้
3. ให้นำเครื่องคิดเลขทุกชนิดเข้าห้องสอบได้

ออกข้อสอบโดย

ดร. พิพัฒน์ ทองฉิม

22 ธันวาคม 2551

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1. Given the following set of data from a soil-geotextile friction test

   1.1 Plot the Mohr failure envelope. (3 points)

   1.2 Obtain the friction angle. (3 points)

   1.3 Calculate the fabric efficiency based on a soil friction angle 38 degree. (4 points)

Normal Stress (lb./in.^{2})	Shear Strength (lb./in.^{2})
2.5	1.25
5.0	2.90
10.0	5.20
20.0	10.90

2. Regarding geotextiles used in separation,

   2.1 What is the ultimate burst pressure of a geotextile supporting 3-in. maximum-size stone and heavy trucks with a tire inflation pressure of 150 lb./in.^{2} ? Use $p= 0.75p_a$, a sum of partial factors of safety 2.0, and a global factor of safety of 2.0. (3 points)

   2.2 What is the ultimate puncture resistance using $FS_p = 2.0$ and $FS_g = 1.5$ of a geotextile from a rock of 3 in. size with a vehicle tire pressure of 150 lb./in.^{2} on the aggregate surface? If factors of 0.33, 0.155, and 0.6 for S_1, S_2, and S_3, respectively. (3 points)

2.3 What energy is mobilized by a rock of 6-in. size falling out of a dump truck 6 ft. to the geotextile, if the geotextile rests on a soft soil of CBR = 3? (4 points)

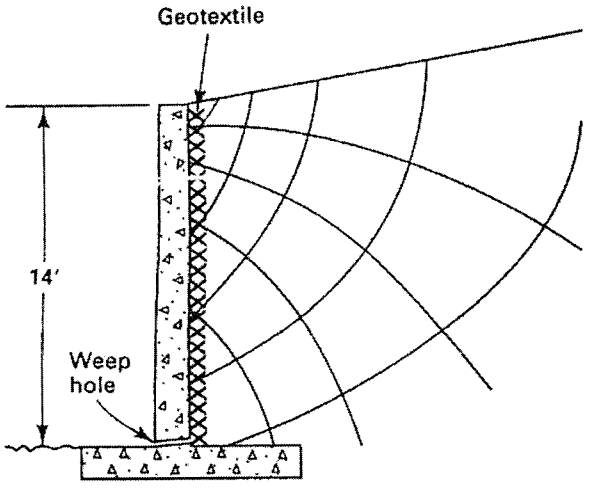
3. Regarding geotextiles in reflective cracking assuming reinforcement as primary function ,

3.1 Using DTN_N = 200 and CBR = 4, what is T_A using Figure 2.70 in Koerner 's Book (1994).? (3 points)

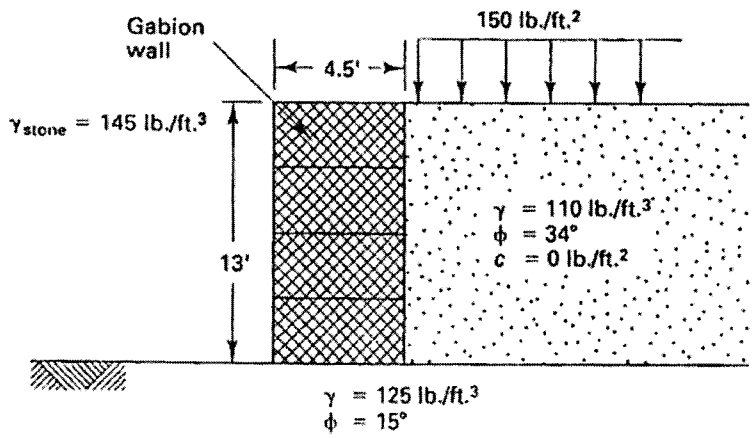
3.2 Using DTN_N = 200 and a geotexile resulting in FEF = 4.0, what is T_A if the CBR = 4 ? (3 points)

3.3 What is the T_A difference between 3.1 and 3.2 ? (4 points)

4. For the 14-ft.-high concrete cantilever retaining wall of the example in Section 2.9.3 in Koerner 's Book (1994), recalculate the soil 's permeability to determine what value is required to have the θ_{act} = 0.011 ft.^{3}/min.-ft. be adequate with FS = 4.0 (i.e., work the problem backward) **(10 points)**



5. Determine the factor of safety against sliding and overturning (i.e. the external stability) for the following wall carrying a surcharge load of 150 lb./ft.^{2} **(10 points)**



6. Using the approach indicated by Figure 3.13 and 3.14 (r_u=0.50) in Koerner 's Book (1994). , determine the number, spacing, and length of the UX 1200 geogrids needed to stabilize the following embankment using a global FS = 1.25. Use a combined partial factor of safety of 5.4 on the value listed in Table 3.2 to arrive at allowable geogrid strength. **(10 points)**