California bearing ratio cbr biology essay

Science, Biology

Laboratory ReportStudent Number: B Eng. Civil Engineering 2007 - 2008CE2204 Geo-mechanicsLecturer: R J FreemanDate of experiment: 8/4/08ContentsAim of the experiment..... page 3Apparatus..... page 3Procedure..... page 4Observations..... page 5Graph..... page 7Calculations..... page 7Results ..... page 9Discussion .....page 9Conclusion..... page 910) References..... page 91) Aim of the experimentThe aim of this laboratory test is to determine the California Bearing Ratio for a given soil sample in accordance with BS 1377 Test 16. 2) ApparatusFigure 1 - sketch of the soil compaction machine and the mould with its critical dimensionsFigure 2 - sketch of the CBR machine3) ProcedureThe diameter, the height and the mass of the empty CBR mould without its collar were measured. The mass of an empty tin was measured. 6 kg of soil were mixed on a tray with 420ml of water to give a moisture content of 7%. The soil was devided into three parts. The collar was placed on the mould and the mould placed in the compaction machine. The first part of the soil was added and compacted with 62 blows. Then the second part and then the third. Each of them compacted with 62 blows. The collar was removed from the mould and the top of the sample was trimmed. The mass of the mould containing the compacted soil was measured. The mould

with the compacted soil was placed in the CBR testing machine. The surcharge masses were placed on the sample to prevent it from getting out of the mould during the testing. The plunger was set under a force of 50N. The dial gauge was zeroed and the machine was turned on. The reading was taken every 12 seconds. The mould was removed from the machine and the hole which was made by the plunger on the surface of the soil sample was filled and trimmed. Then the mould was turned upside down and placed again in the testing machine to be tested from that side too. After the test was finished a tin was filled with the soil sample in two layers each of them taken from the two sides of mould that were tested. The mass of the tin with the soil was measured. The soil was dried in the oven for about 24 hours and its mass was measured again. 4) Observationsmass of empty mould without collar: 10863. 5g7% water content: 420ml waterweight of mould with soil (hogin): 16071. 0gdiameter of mould: 15. 2cmheight of mould without collar: 12. 6cmtin number: 02weight of empty tin: 17. 7weight of tin + wet soil: 205. 2weight of tin + dry soil: 196. 6gTable 1 - Raw resultstime (sec)top of mouldbottom of mouldreadingreading000122224443666. 5488. 596012107214. 51484171796212010824. 524120282813231321443336. 515641411684647180505019257562046361216686522873712408076252878426492902761009528810610230010810931211911332412512133612812534813713136014613 6Table 2 – Analyzed Resultstime (sec)First test (Top of mould)Second test (bottom of mould)penetration (mm)readingplunger (mm)Force (kN)readingplunger (mm)Force (kN)0000. 000000. 0000. 001220. 020. 25420. 020. 2540. 202440. 040. 50840. 040. 5080. 403660. 060. 7626. 50. 0650. 8250. 60488. 50. 0851. 07990. 091. 1430. 8060120. 121. 524100.

11. 2701. 007214. 50. 1451. 841140. 141. 7781. 2084170. 172. 159170. 172. 1591. 4096210. 212. 667200. 22. 5401. 6010824. 50. 2453. 111240. 243. 0481. 80120280. 283. 556280. 283. 5562. 00132310. 313. 937320. 324. 0632. 20144330. 334. 19036. 50. 3654. 6352. 40156410. 415. 206410. 415. 2062. 60168460. 465. 841470. 475. 9682. 80180500. 56. 349500. 56. 3493. 00192570. 577. 238560. 567. 1113. 20204630. 638. 000610. 617. 7463. 40216680. 688. 580650. 658. 2323. 60228730. 739. 159710. 718. 9283. 80240800. 89. 971760. 769. 5074. 00252870. 8710. 783840. 8410. 4354. 20264920. 9211. 362900. 911. 1304. 40276100112. 290950. 9511. 7104. 602881061. 0612. 9861021. 0212. 5224. 803001081. 0813. 2171091. 0913. 3335. 003121191. 1914. 4931131. 1313. 7975. 203241251. 2515. 1881211. 2114. 7255. 403361281. 2815. 5361251. 2515. 1885. 603481371. 3716. 5591311. 3115. 8845. 803601461. 4617. 5661361. 3616. 4486. 007) Graph5) CalculationsFor the " standard" CBR soil: Penetration (mm)Resistance (kN)2. 513. 25. 020. 0Force required for 2. 5 penetration in 1st test soil (top of mould): 4. 58kNForce required for 5. 0 penetration in 1st test soil (top of mould): 13. 217kNSo for the first test soil the CBR values are: CBR2. 5 = 4. 58 x 100 = 34. 69%13. 2CBR5. 0= 13. 217 x 100 = 66. 09%20. 0Force required for 2. 5 penetration in 2nd test soil (bottom of mould): 4. 83kNForce required for 5. 0 penetration in 2nd test soil (bottom of mould): 13. 333kNSo for the second test soil the CBR values are: CBR2. 5 = 4. 83 x 100 = 36. 59%13. 2CBR5. 0= 13. 333 x 100 = 66. 67%20. 0Mass of the soil sample: (Weight of the mould with soil) –(Weight of the mould without collar) 16. 071 – 10. 863. 5= 5. 2075kgMould Volume (V): = 9. 14Bulk Density: p= = 570kg/m3Moisture Content: Tin No02 = (205. 2-196. 6)/205. 2= 0. 0872=

4. 2%6) ResultssoiltopbottomCBR2. 534. 69%36. 59%CBR5. 066. 09%66. 67%8) DiscussionThe forces at table 2 were determined by interpolation from a table given in the laboratory. The curves of the two soils on the graph are continiously concave upwards so there is no need to correct zero for both soils. The CBR values were calculated by using the resistance of the soils for penetrations of 2. 5mm and 5. 0mm. 9) ConclusionsDuring this lab experiment some errors may have occured during the procedure as the readings of the CBR machine had to be taken every 12 seconds which could not happen accurately. These errors could be eliminated if the procedure was done more carefully.