

PROFESSIONAL ENGINEERS ONTARIO
NATIONAL EXAMINATION – DECEMBER 2002
98-GEOL-A6 SOIL MECHANICS

3 HOURS DURATION

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- NOTES:
1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
 2. Any non-communicating calculator is permitted. This is an OPEN-BOOK exam. The candidate must indicate the type of calculator being used (i.e. write the name and model designation of the calculator, on the first inside left hand sheet of the exam workbook).
 3. Questions have the values shown.
 4. Candidates must identify clearly the source of charts used and where applicable the source of assumed values used in the calculations.
 5. In the absence of specific parameters required in the formulation and solution of problems, the candidates are expected to exercise sound engineering judgment and to clearly state their assumptions.
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1. A slurry of silica particles in brine (aqueous solution of salt) is said to have a density of 1070 kg/m^3 and a moisture content of 29%. Is this possible? Explain your answer with appropriate assumptions and calculations. (value 15)
2. Classify the soils of figure Q.2 according to the Unified Soil Classification System. The fines of soil A have a liquid limit of 60% and a plastic limit of 20%, while those of soil B have a liquid limit of 30% and a plastic limit of 20%. In addition to providing the “letter” classification, provide a descriptive name for each soil. (value 20)
3. Define the term “sensitive clays” (such as those found in the Ottawa river valley or in Rissa, Norway) and explain their existence. (value 15)
4. a. Calculate the consolidation settlement of the 2m layer of fill illustrated on figure Q.4, 1 year after emplacement. (value 15)
- b. Determine the degree of consolidation reached by the clay in the middle of the clay layer after 6 months. (value 5)

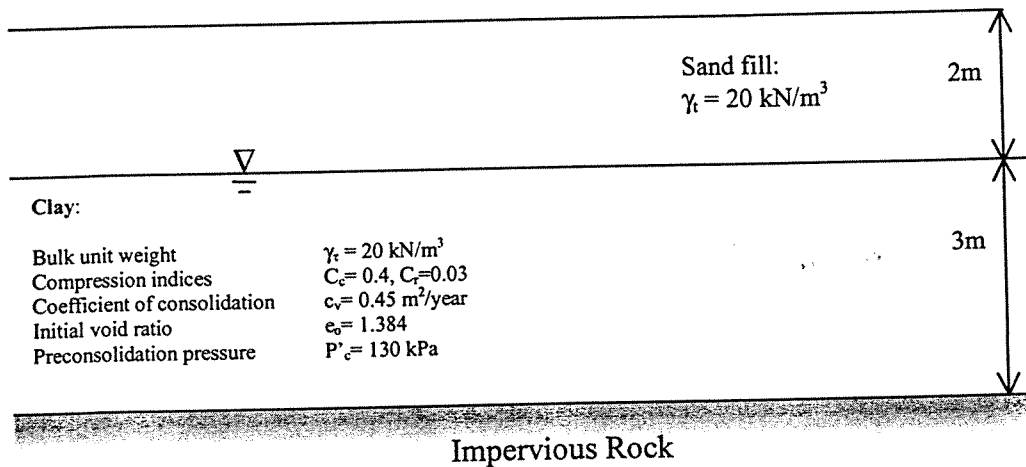


Figure Q.4

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5. Consider the rigid retaining wall illustrated on Figure Q.5. Calculate the force “F” required to prevent the wall from moving. Assume that the base is restrained horizontally but is free to rotate.

(value 20)

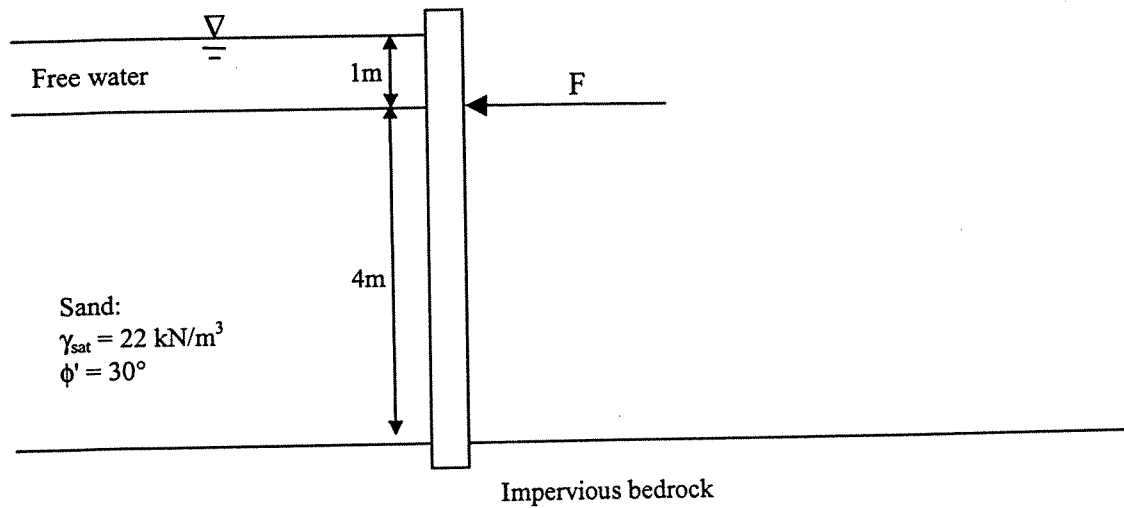


Figure Q.5

6. Identify and discuss the significance of 3 factors that control the stability of a slope. (value 10)

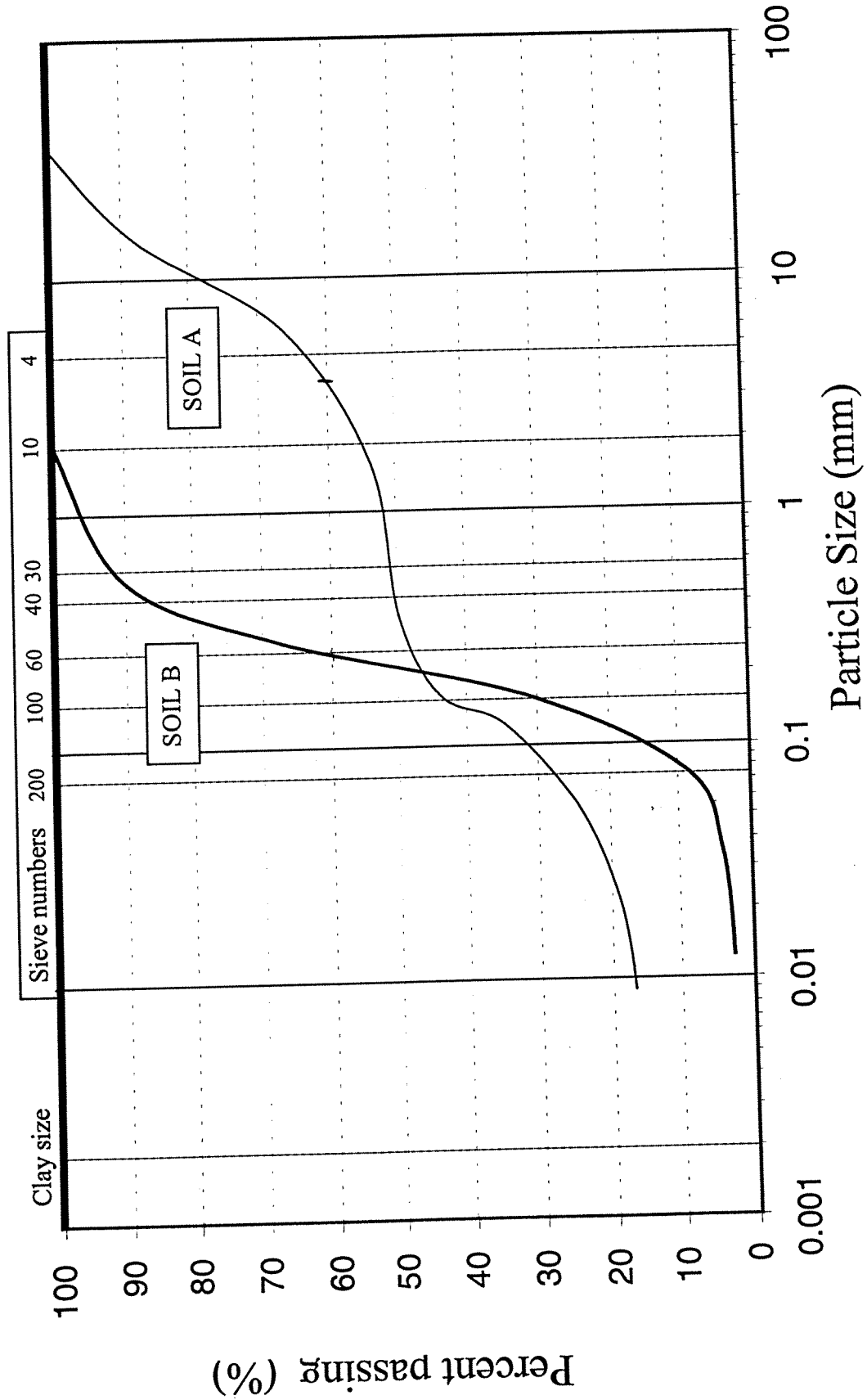


Figure Q.2