Editorial

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Case studies have a special place in both geotechnical practice and geotechnical instruction. However, there is little systematic discussion on the distinguishing features that make a case history more useful to practice or better suited for instruction. Moreover, there is no tradition of developing case studies as transferable (or reusable) educational products, with the purpose of being used in geotechnical engineering courses in a variety of institutions and educational settings, much like textbooks. The call for papers for this special issue aimed to encourage such a tradition by soliciting case studies accompanied by rich supplementary material developed for instructional purposes in order to address specific learning needs. This aim was achieved to a satisfactory degree by the papers included in this issue.

The case study by Jones (this issue) concerns the construction of a mid-rise building and excavation for two levels of underground parking in an urban environment. The project encompasses site characterization and several aspects of geotechnical design that permit the development of different student activities, each focusing on one of these aspects, for different courses. Specifically, the paper lists the following case study components: 1) Interpretation of subsurface investigations, 2) Design of three types of retaining walls (Gravity, Anchored Soldier Beam, Anchored Sheet Pile), 3) Seepage analysis for a groundwater cutoff wall & limit equilibrium analysis of the wall, and 4) Foundations analysis (shallow, which result in excessively large settlements, and deep). The supplementary material consists of site photographs, data from seven boring logs and two monitoring well logs, grain size classification data, one pile driving record, and γ, c, and φ values from laboratory data. Calculations are not provided, hence instructors contemplating the use of the case study in their courses need to perform all analyses themselves.

The case by Moss et al. (this issue) concerns the development of a shopping center that required placement of fill on soft clay, in order to raise the site above flood elevation. The combined load from the fill and the structure would result in significant and slow consolidation settlements that necessitated the use of preloading and wick drains. The supplementary information includes load-settlement and time-settlement curves that allow students to determine values for the compression index, C_c, and coefficient of consolidation, c_v, and calculate settlement-related quantities for a simplified subsurface profile included in the paper. The paper also gives measurements from monitoring of settlements during the construction period of the fill and surcharge, and until the surcharge was removed. Calculations are not provided, hence instructors contemplating the use of the case study in their courses need to determine parameters and calculate amount and time of settlement themselves.

Zekkos et al. (this issue) describe the failure of a railroad embankment constructed on sloping ground. The failure took place following a period of heavy rainfall, both in the preceding months and during the 24 hours before the failure, causing unintended, semi-permanent ponding of water on the uphill side of the embankment. The use of the case study in instruction demonstrates the reduction of the factor of safety for a slope when considering water seepage compared to a static water table. The supplementary material includes the assignments given to students and measurements from soil classification tests and direct shear tests on reconstituted soil specimens, as well as, upon request by interested instructors, background information on the failure and input files of stability analyses of the embankment.

The previous three papers concern case studies that have already been used repeatedly in instruction. The authors themselves have either first-hand experience with the case, or collaborated with the geotechnical engineer involved in the project in order to prepare the case study material. The case by Xenaki et al. (this issue) has been prepared mainly by the geotechnical engineers of the project, who collaborated with a geotechnical engineering instructor in order to prepare the extensive educational material developed for anticipated use of the case study in instruction. This case too concerns a railroad embankment. It covers all aspects of geotechnical evaluation and calculations, i.e. slope stability and settlement

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calculations. The existence of a fine-grained layer below the embankment resulted in unacceptable settlements, both in magnitude and duration, that necessitated the use of wick drains. The embankment has not been constructed yet, so at present monitoring data are not available. The extensive supplementary material includes the raw data from 11 sampling boreholes, the results of consolidation and shear strength tests, statistical parameters of these laboratory tests, as well as of in situ SPT values, results of slope stability analyses, and very detailed settlement calculations for the critical cross section.

Papers about a case study used in engineering instruction are not a common genre. It is hoped that this special issue will contribute to the discussion on the many open questions that exist for prospective authors and reviewers of such papers.

First, there is the question of writing style for the case study description given to students. Geotechnical engineering education can learn from disciplines such as law, medicine, and more recently science as well, that have a tradition of developing case studies as narratives (e.g. see Herreid [2002] and other case writing resources in http://sciencecases.lib.buffalo.edu/cs/teaching/publications/). A narrative calls for a writing style different from that of technical writing where neutrality is revered. A geotechnical failure offers opportunities to attempt a departure from technical writing norms and describe it in a "whodunit" style.

Questions on content appear easier to address. Projects suitable for undergraduate instruction, in their entirety or in parts, will have the greatest impact so they are highly desirable. Two papers in this issue (Moss et al.; Xenaki et al.) involve consolidation settlement calculations that are taught in practically all undergraduate civil engineering programs. When comparing project descriptions to failure descriptions, it is clear that failures help circumscribe the scope of case studies and focus the analysis on one critical issue. For example, contrast the two railroad embankments in this issue by Xenaki et al. and Zekkos et al.: the slope failure of the embankment in the latter paper frees the instructor from addressing the settlements caused by embankment construction. Existence of monitoring data (Moss et al., this issue) is a big plus, as students can compare their results to what happened. It would be very useful to also present to students the parameter estimates and the results of calculations made by the project engineers. Ideally, we should also show to students the results of calculations made by different geotechnical experts for the same project. Lastly, case studies from different countries are of special interest since they reveal the practices established in different countries – it is hoped that this issue will encourage authors to submit to IJGCH such case studies.

Paper structure has to accommodate the different goals of papers on case studies useful primarily for instruction, as opposed to research or practice. It will be helpful if the authors-instructors go past the level of describing how they used the case study in their own course and discuss how they envision other instructors, with no first-hand knowledge of the project, may use the case in their courses. The instructional materials accompanying the case study should match these envisioned uses by other instructors, which leads to the last question.

How much material instructors need in order to incorporate a case study developed by others in their own teaching? A case study can be used in a lecture mode with a minimum amount of information, e.g. a presentation with commentary will suffice. However, if students are going to become actively engaged with case study material, instructors need to have a very substantial "teacher's book", ideally with both raw data and detailed analyses. But then, these analyses cannot be publicly available, if they include the answers the students are asked to produce! Such problems were addressed in different ways by the authors of the papers in this issue who submitted with their papers supplementary material including more than raw data. For example, Zekkos et al. will make available to instructors upon request the analysis files for slope stability, while Xenaki et al. recommend that students repeat settlement calculations for a non-critical cross section that will require fewer wick drains. Fortunately, until we address such problems as a community, corresponding authors have kindly agreed to respond to e-mail requests from geotechnical engineering instructors who are interested in including in their course any of the case studies described in the papers of this issue and need additional clarifications.

REFERENCE

Herreid, C.F. (2002). Twixt Fact and Fiction, A Case Writer's Dilemma, J. of College Science Teaching, Vol. 31, No. 7, pp. 428-430.

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