ΕΛΛΗΝΙΚΗ
ΕΠΙΣΤΗΜΟΝΙΚΗ
ΕΤΑΙΡΕΙΑ
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

Τα Νέα της Ε Ε Ε Ε Γ Μ

15

Αρ. 15 – ΙΟΥΝΙΟΣ 2008

SIMSG ISSMGE

Σεισμός στην βορειοδυτική Πελοπόννησο

Ισχυρή σεισμική δόνηση, μεγέθους 6.5 βαθμών της κλίμακας Ρίχτερ, σημειώθηκε στις 3:25 το μεσημέρι της Κυριακής 8ης Ιουνίου 2008, η οποία έγινε ιδιαίτερα αισθητή σε πολλές περιοχές της χώρας. Σύμφωνα με ανακοίνωση του Εθνικού Δικτύου σεισμογράφων, το επίκεντρο του σεισμού τοποθετείται στην περιοχή της Ανδραβίδας Ηλείας, 205 km δυτικά της Αθήνας (37.9°N – 21.5°E) και το εστιακό βάθος εκτιμάται σε 10 km. Ο σεισμός έγινε αισθητός εκτός από την Πελοπόννησο, στην Αττική, σε ολόκληρη τη Στερεά Ελλάδα και μέχρι τα Ιωάννινα την Καρδίτσα και την Νότια Ιταλία.

Δύο άνθρωποι έχασαν τη ζωή τους εξαιτίας του σεισμού: ένας άνδρας καταπλακώθηκε από την κατάρρευση παλιάς στέγης στην Κάτω Αχαΐα και μία ηλικιωμένη γυναίκα εξέπνευσε από ανακοπή καρδιάς κατά τη μεταφορά της στο νοσοκομείο. Σε νοσοκομείο μεταφέρθηκαν με τραύματα συνολικά 90 άτομα, εκ των οποίων εισαγωγή έκαναν 6 άτομα, ενώ τα υπόλοιπα αποχώρησαν μετά την παροχή των πρώτων βοηθειών.

Εξ άλλου, σώο απεγκλωβίστηκε ένα κοριτσάκι στη Φώστενα Αχαΐας, το οποίο είχε εγκλωβιστεί μέσα στο σπίτι του που καταπλακώθηκε από δέντρο. Τρία ακόμα άτομα απεγκλωβίστηκαν σώα από σπίτι που είχε καταρρεύσει στο Βαρθολομιό Ηλείας.

Φωτογραφία: Το Πόρτο Κατσίκι στην Λευκάδα την ώρα του σεισμού.

(συνέχεια στην σελίδα 3)

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Peter Vaughan (1935 – 2008) 3

Σεισμός στην βορειοδυτική Πελοπόννησο 3

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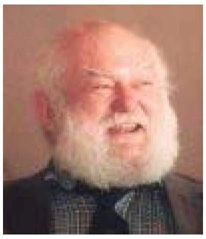
Peter Vaughan (1935 - 2008)



Peter Vaugham, Emeritus Professor of Ground Engineering at Imperial College, London died of a heart attack on 16th May 2008 in Suffolk, UK. He was born in Luton, UK on 10th March 1935.

Peter Vaughan earned his BSc (Eng) ACGI Civil Engineering Degree in 1956, the Diploma of Imperial College course in Soil Mechanics in 1959 and the Doctor of Civil Engineering Degree and DIC in 1965, all from Imperial College.

From 1956 to 1958 Peter Vaughan worked for two years for Sandeman Kennard & Partners as an assistant engineer on the design of various waterworks. From 1959 to 1960 he worked again for Sandeman Kennard on the design of the Balderhead Dam. After a year (1963-64) as temporary member of the academic staff at Imperial College, he spent three years (1964 – 1967) as supervising engineer on the construction of the embankments of the Kainji Dam in Nigeria and then he became an associate of Sandeman Kennard & Partners (1967 – 1969) and project engineer for Cow Green Embankment Dam and the repair of the Balderhead Dam after it suffered cracking on first impounding.

He joined the Soil Mechanics Section of the Department of Civil and Environmental Engineering of Imperial College in 1970 as a Lecturer. He served as Lecturer, Senior Lecturer and Reader until 1987, when he was appointed as Professor of Ground Engineering to 1994. Since 1994, Professor Peter Vaughan was an Emeritus Professor at the Imperial College, and a consultant in geotechnical engineering.

While at Imperial College, Peter Vaughan carried out extensive research in a wide range of subjects, and supervised more than twenty PhD programmes. Peter Vaughan had published some 80 papers on technical subjects, and gave the Rankine Lecture to the British Geotechnical Society in 1994. He had given numerous lectures to international conferences.

Peter Vaughan was one of the founding members of GCG and had been responsible for specialist advice to consulting firms, contractors, utilities and public authorities on a wide range of problems. His work had been concerned with various embankment dams in UK and overseas, including the reconstruction of Carsington Dam after its failure during construction, and Roadford Dam, where he was a member of the Advisory Panel.

During the last years he was involved with a review of dam performance for Ardligh Dam, Essex, with a safety review for Mica Dam, Canada, and the rehabilitation of the three dams of the Cascade of Dauga in Latvia, for which he was a member of the Advisory Panel. He had been involved extensively with the rehabilitation of old clay embankments for London Underground Limited.

Ο Peter Vaughan ήταν ιδιαίτερα αγαπητός στους μεταπτυχιακούς σπουδαστές των Soil Mechanics Courses του I.C. και πολλά από τα μέλη της ΕΕΕΕΓΜ, μαθητές του, θα αναπολούν την καλοκάγαθη φυσιογνωμία του και τα αστεία του, με ένα ποτήρι μπύρα, τα απογεύματα των Παρασκευών στις pubs γύρω από το I.C. Καλό ταξίδι Peter.

Χρήστος Τσατσανίφος

ΣΕΙΣΜΟΣ ΣΤΗΝ ΒΟΡΕΙΟΔΥΤΙΚΗ ΠΕΛΟΠΟΝΝΗΣΟ

(συνέχεια από την πρώτη σελίδα)

Κατεστραμμένο από το σεισμό οίκημα στο χωριό Βάλμη της Ηλείας

Ζημιές, σε παλαιές κυρίως κατοικίες, σημειώθηκαν κυρίως στην Αχαΐα και την Ηλεία.

Οι δήμοι που κυρίως επλήγησαν στην Αχαΐα είναι οι: Δύμης, Μόβρης, Ωλενίας, Λαρισσού, Φαρρών, Τριταίας, Βραχνέικων, Παραλίας και ένα μέρος της Μεσσάτιδος. Εκκενώθηκε μια κλινική στον Αλισσό στο δήμο Δύμης και οι νοσηλευόμενοι σε αυτό μεταφέρθηκαν σε ξενοδοχείο.

Δύο λιθόκτιστες κατοικίες κατέρρευσαν στη Βιομηχανική Περιοχή της Πάτρας. Ρωγμές σημειώθηκαν σε κτίρια του αεροδρομίου της Ανδραβίδας.

Στην Κάτω Αχαΐα, στο Βαρθολομιό και στα Φώσταινα περίπου είκοσι οικήματα κατέρρευσαν, ενώ στην ευρύτερη περιοχή σημειώθηκε διακοπή ηλεκτρικού ρεύματος σε περίπου 25.000 πελάτες της ΔΕΗ.

Στην πόλη της Πάτρας εκκενώθηκαν για προληπτικούς λόγους το κτίριο του Οργανισμού Λιμένος Πατρών και περίπου πέντε πολυκατοικίες. Στον Πύργο κατέρρευσε το ανατολικό τμήμα της στέγης του Αγίου Νικολάου.

Ρωγμές και πτώση σοβάδων παρατηρήθηκαν σε κτίρια στα στρατιωτικά αεροδρόμια Ανδραβίδας και Αράξου. Στο στρατιωτικό αεροδρόμιο της Ανδραβίδας ενεργοποιήθηκε ο εφεδρικός πύργος ελέγχου, ενώ στο στρατιωτικό αεροδρόμιο του Αράξου εκκενώθηκε ένα υπόστεγο υποστήριξης.

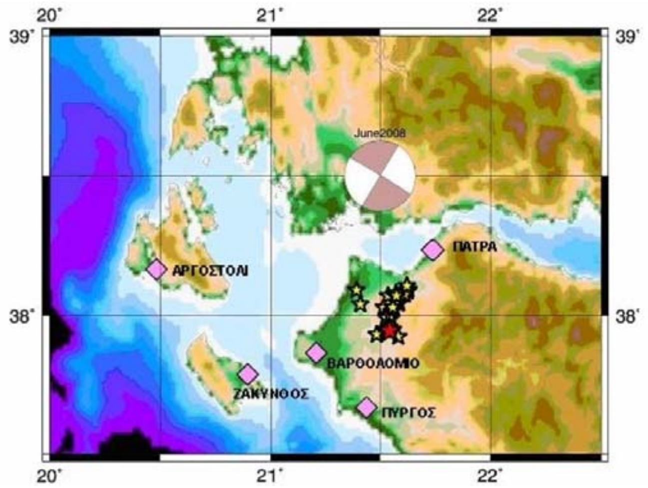
Προβλήματα στην κυκλοφορία δημιουργήθηκαν από κατολισθήσεις στην Εθνική Οδό Αθηνών - Πατρών στο ύψος του Διακοφτού και σε δρόμους στα Τσουκαλέικα Αχαΐας και στο Λατζόι και στη Νεράιδα Πύργου. Επίσης διεκόπησαν τα δρομολόγια του ΟΣΕ από Πάτρα - Πύργο και αντίστροφα, λόγω ζημιάς στις σιδηροτροχιές στο ύψος της Κάτω Αχαΐας.

Σύμφωνα με ανακοίνωση του ΙΤΣΑΚ, κατεγράφησαν οι ακόλουθες μέγιστες επιταχύνσεις:

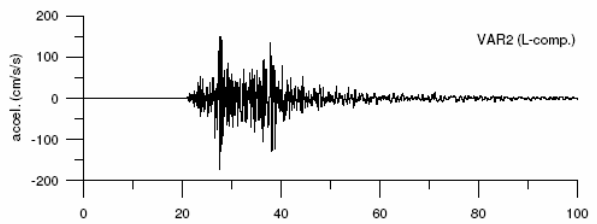
Βαρθολομιό	0.17 g
Πάτρα	0.09 g
Πύργος	0.19 g
Ζάκυνθος	0.04 g
Αργοστόλι	0.03 g

Σημειώνεται ότι η Πάτρα και ο Πύργος κατατάσσονται, σύμφωνα με τον Ελληνικό Αντισεισμικό Κανονισμό, σε ζώνη σεισμικής επικοινδυνότητας ΙΙ, με τιμή συντελεστή σεισμικής επιβάρυνσης α = 0.24 g.

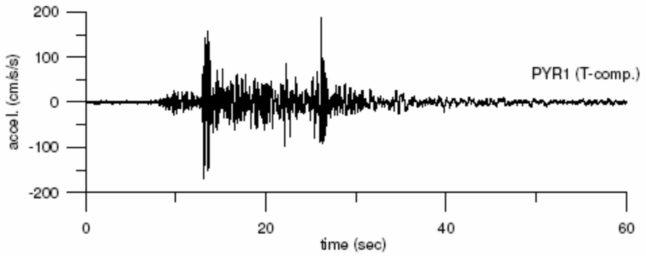
Στο παρακάτω σχήμα (από την ανακοίνωση του ΙΤΣΑΚ) παρουσιάζεται η γεωγραφική κατανομή των σταθμών επιταχυνσιογράφων του ΙΤΣΑΚ (ροζ ρόμβοι), το επίκεντρο του κυρίως σεισμού (κόκκινο άστρο) και των μετασεισμών, καθώς και ο μηχανισμός γέννεσης του σεισμού.



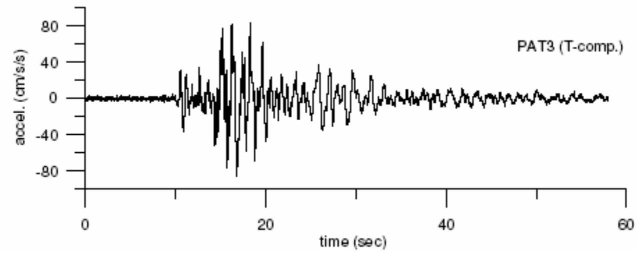
Στα σχήματα που ακολουθούν δίνονται τα γραφήματα των συνιστωσών με την μεγαλύτερη επιτάχυνση από τους τρεις σταθμούς με τις μεγαλύτερες επιταχύνσεις (Πύργος, Βαρθολομιό και Πάτρα), καθώς και τα αντίστοιχα φάσματα απόκρισης αυτών, τα οποία συγκρίνονται με τα ελαστικά φάσματα σχεδιασμού του Ελληνικού Αντισεισμικού Κανονισμού για την Ζώνη ΙΙ και για εδαφικές κατηγορίες Α, Β και Γ.



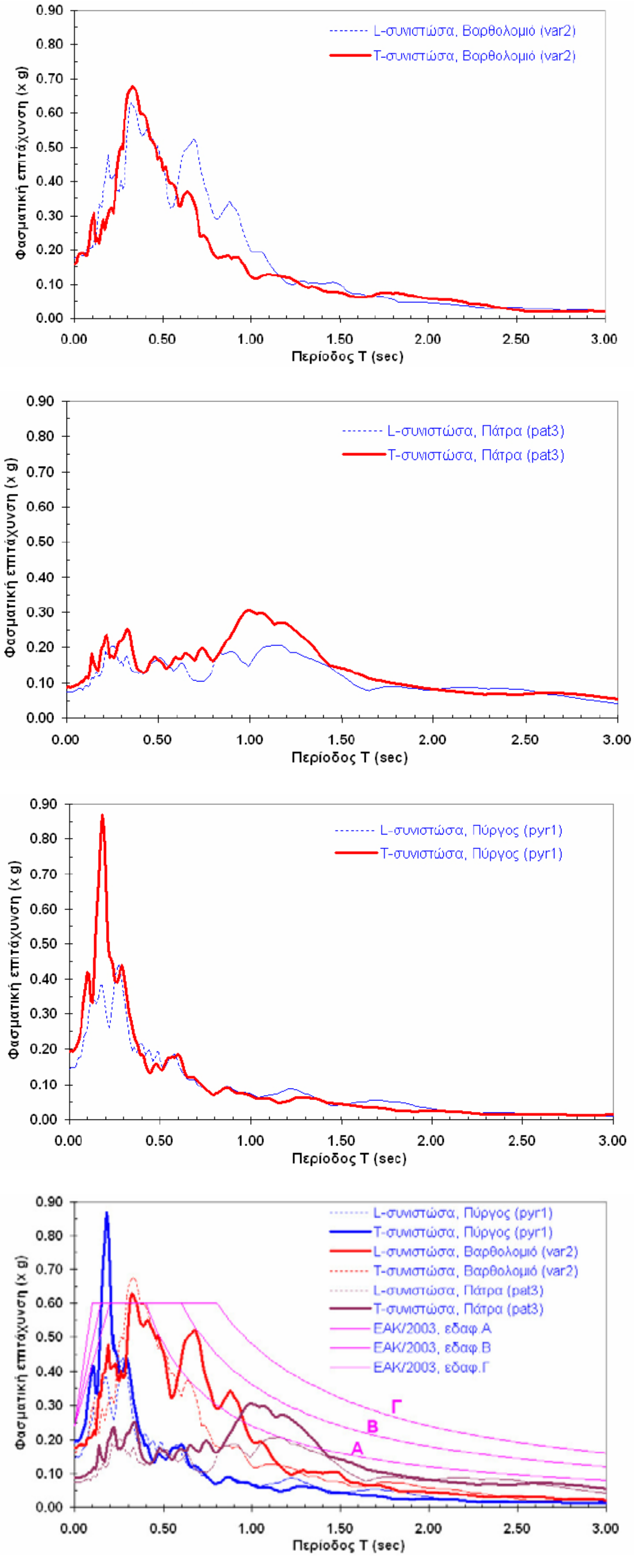
Βαρθολομιό



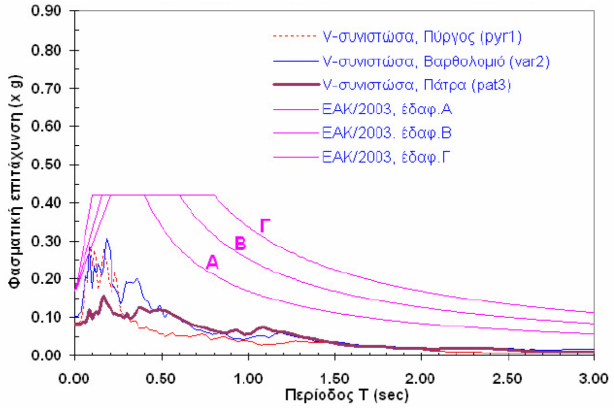
Πύργος



Πάτρα



Ελαστικά φάσματα απόκρισης των οριζοντίων συνιστωσών του κύριου σεισμού στο Βαρθολομιό, στον Πύργο και στην Πάτρα σε σχέση με το επίπεδο του σεισμού σχεδιασμού του ΕΑΚ / 2003



Ελαστικά φάσματα απόκρισης των κατακορύφων συνιστωσών του κύριου σεισμού στο Βαρθολομιό, στον Πύργο και στην Πάτρα σε σχέση με το επίπεδο του σεισμού σχεδιασμού του ΕΑΚ / 2003

Στη συνέχεια παρατίθενται φωτογραφίες των επιπτώσεων του σεισμού (στοιχεία από την ανακοίνωση του ΙΤΣΑΚ).

Κατολίσθηση πρανούς

Επιφανειακή διάρρηξη

Εκκλησία στη Βάλμη (κατασκευής 1898)

Πτώση τοίχου πλήρωσης στο Βαρθολομιό

Κατάρρευση κτιρίου από ωπλισμένο σκυρόδεμα (κατασκευής 1983-1984) στα Άνω Διδαχαίικα

Σημαντικές βλάβες σε διώροφο κτίριο από φέρουσα τοιχοποιία στη Φώσταινα

Καταστροφή κτιρίου από πτώση βράχου στον οικισμό Σαντομέρι

Ο βράχος που κατέστρεψε το κτίριου στον οικισμό Σαντομέρι

Οι πρώτες διαπιστώσεις εκπροσώπων του ΤΕΕ από τις αυτοψίες στις σεισμόπληκτες περιοχές έχουν ως εξής (από το Ενημερωτικό Δελτίο ΤΕΕ, 23.06.2008):

Παρά το μέγεθος του σεισμού, το μικρό εστιακό βάθος και την άμεση γειτνίαση με το επίκεντρο, το πλήθος των ζημιών σε σύγχρονες οικοδομές είναι μικρό.

Οι σοβαρότερες βλάβες και οι καταρρεύσεις (σχετικά περιορισμένος ο αριθμός τους) εντοπίζονται σε παλαιές οικοδομές – ως επί το πλείστον πλνθόκτιστα και ομοπλινθόκτιστα κτίσματα – με κακή ποιότητα δόμησης και σαφή έλλειψη συντήρησης.

Εκτεταμένες, αντιθέτως, είναι οι ζημιές σε οικοσκευές και εμπορεύματα.

Βασικό συμπέρασμα που προκύπτει είναι ότι ο νέος αντισεισμικός κανονισμός δοκιμάστηκε στην πράξη και επιβεβαιώθηκε η επάρκειά του. Όπου εφαρμόστηκε με ακρίβεια από τους μηχανικούς, οι ζημιές ήταν περιορισμένες και δίχως κίνδυνο για τους ενοίκους ή τους χρήστες των κτισμάτων.

ΑΡΘΡΑ

Τα ακόλουθα άρθρα αποτελούν συμμετοχή μελών της ΕΕΕΕΓΜ στο πρόσφατο *1st International Conference on Education and Training in Geo-Engineering Sciences: Soil Mechanics and Geotechnical Engineering, Engineering Geology, Rock Mechanics, Constantza, Romania, 2-4 June 2008*.

"Design and Construction of Underground Works" A Postgraduate Course in the National Technical University of Athens

P. G. Marinos
National Technical University of Athens
Director of the Postgraduate Programme

ABSTRACT

The construction of underground works has recently grown considerably worldwide, mainly for the development of communication infrastructures. Advances in engineering offer today the necessary background to implement underground projects, mainly tunnels and chambers of such size and under such adverse conditions that a few decades ago their construction would have been impossible. To assure the current and future availability of proper human resources that would be able to carry out the challenges of the design and construction of such underground works, a postgraduate course is established since 1998 jointly by the Schools of Mining Engineering and of Civil Engineering in the National Technical University of Athens. The postgraduate course covers four major fields: Engineering Geology and Ground Investigation; Design; Construction and Monitoring; Management. The course leads to the "Post Graduate Specialization Diploma" in the area of the "Design and Construction of Underground Works" after the successful completion of one calendar year of courses and the preparation of a thesis. The paper gives details of the structure of this course aimed to produce specialized graduates for the Civil and Mining Engineering industry.

1 INTRODUCTION - OBJECTIVES

The aim of the postgraduate course "Design and construction of Underground Structures" in the National Technical University of Athens (NTUA) is to offer specialized knowledge at a high level, through rigorously structured courses of lectures, tutorials, laboratory and field work, specialized workshops and the completion of a thesis at the end of the course.

The necessity of such a postgraduate course emerges from the considerable worldwide growth of tunnelling and underground construction for the improvement of existing or the planning and construction of new communication infrastructure, new hydraulic routes, and the need of extended subsurface use in urban development and storage areas. The evolution of technology allows today the implementation of financially favorable construction methods under adverse geological conditions demanding special design solutions and particular excavation techniques.

In Greece the recent and continuing construction of tunnels and metro works, in difficult geological conditions and weak ground conditions offers an excellent opportunity to provide a full scale model for educational purposes and in situ work and training. Additionally, students have the opportunity to be enrolled for a PhD degree via this postgraduate programme.

2 SUPPORTING SCHOOLS AND ADMINISTRATION

The course is offered through a collaboration of the School of Mining Engineering and the School of Civil Engineering of NTUA and administrated by a special Committee consisting of nine members. It is taught jointly by the Department of Geotechnical Engineering and the Department of Management of the School of Civil Engineers and the Departments of Mining and of Geological Sciences of the School of Mines.

3 DURATION OF THE COURSE

The duration of the course for a full time student is one calendar year divided into three terms of four months each. Extension of the above period is not generally granted, unless the student is registered as a part – time student and completes the course in two years. The two first terms are devoted to lecture courses and associated activities such as tutorials, laboratory and field work, while the third term is devoted to the preparation and presentation of a dissertation. The course commences each October.

4 COURSE STRUCTURE

The postgraduate course is developed in the following fields:

- Geological model, ground investigation, ground behaviour, design parameters

- Design of underground works

- Construction (conventional, mechanized) and monitoring

- Organization and Management

Each of these fields is supported by a series of compulsory and optional lecture courses, together with tutorials, laboratory work, field work and attendance of invited lectures. Each student must pass eight (8) lecture courses each term out of which seven (7) are compulsory and one (1) optional. The total weekly hours per semester do not exceed 18. Each lecture course is taught for 2 to 3 hours weekly. One day of the week is dedicated to lectures from invited speakers, academics, experts, consultants or contractors.

The lecture courses are:

- 1st TERM

<u>Compulsory Courses</u>

• Engineering Geology for Underground Works
• Ground Investigation
• Advanced Rock Mechanics
• Design of Underground Works
• Design and Feasability Analysis of Underground facilities
• Organization and Management of Underground Projects
• Mechanics of Continuous Medium

<u>Optional (1 subject must be selected)</u>

• Instrumentation in Geotechnical Engineering
• Electrical and Mechanical Installations – Ventilation
• Ground water and their Confrontation.

- 2nd TERM

Compulsory Courses

• Numerical Methods of Analysis
• Drilling and Blasting Techniques for Underground Works
• Reinforcement and Support Systems
• Mechanized Excavation of Tunnels
• Shallow and Urban Tunnels – Retaining Structures – Ground Settlements

• Tunnel portals
• Equipment for Excavation, Loading and Transportation

Optional (1 subject must be selected)

• Construction Management Information Systems
• Techno-Economic Decision Analysis
• Risk Management in Issues of Safety and Health
• Earthquake resistant design of Tunnels.

Written examinations take place at the end of each term.

At the end of the 1st term a compalsory field trip to tunnels under construction takes place. During this one week long trip a group project is assigned to 2 to 3 (*) students each day. At the end of the second term an optional 10 days tour takes place in Europe, focused mainly at the base tunnels under construction (Gotthard, Lyon-Torino).

5 ADMISSION

Civil and Mining Engineers with a 5 year degree are eligible for acceptance to the course after a selection procedure based on academic performance. Other engineering disciplines and geologists are also eligible under certain additional obligations, provided they have already an MSc degree in Engineering Geology or Geotechnics and/or a substantial experience.

About 100 candidates apply for the course each year and 20 are successful.

The selection is based on the performance of the candidates during their undergraduate studies, their final year diploma thesis and their knowledge in software applications, the English and/or other languages. Previous experience in design and construction and letters of recommendation are co-evaluated. Students with experience from the tunnelling or civil works industry are welcome and it is aimed to cover 30% of the places in the course. Such students can share their experience from practice with the other students who have just obtained their first degree.

6 INFRASTRUCTURE

Besides the support of the laboratories of Soil Mechanics, Foundation and Engineering Geology, Rock Mechanics and Mining Technology of the two participating Schools, the postgraduate course has its own library facilities, specialized software applications and working space in a PC laboratory.

7 RESULTS

The course has already a life of 10 years and so far the postgraduate degree has been awarded to 182 graduates with the following distribution:

- Civil Engineers: 58%
- Mining Engineers: 31%
- Geologists: 5%
- Mineral Resources Engineers: 3%
- Other: 2%

Our postgraduates are in constant demand. This includes:

- Public sector (Ministries, State Companies): 30%
- Design Companies: 30%
- Construction Companies: 15%
- Academia: 1%
- Irrelevant to Tunnelling: 6%
- No data: 18%

The students fill every year a questionnaire where they express anonymously their opinion for the content of lectures and organization of the course. The answers to all questions give rates corresponding to more than 80% in satisfaction.

8 CONCLUSIONS

The course leads to the "Post Graduate Specialization Diploma" in the area of the "Design and Construction of Underground Works" (http://www.ntua.gr/tunnelling/). The course has been evaluated from external reviewers who concluded that "The postgraduate programme "Design and Construction of Underground Works" is unique in Greece". The reviewers recognize the course as high quality from any point of view and particularly useful and strongly recommend and suggest its support. They acknowledge that "the postgraduates have clearly increased prospects for their professional careers". The course has already obtained the official agreement from the central admission for its continuation, before its reconsideration, until 2011.

In our knowledge, at present two postgraduate courses on Tunnelling are running in Europe, all in English language: "Tunnelling and Tunnel Boring Machines" in the Polytechnico di Torino (every other year) (www.formazione.corep.it/gallerie.htm) and "Tunnelling – an International Advanced Training Programme" in the Ecole Polytechnique de Lausanne (since this year) (www.lmr.epfl.ch/mas), while a new course "NATM Engineer" will be jointly organized from 2009 by the Graz University of Technology and the University of Leoben (NATM@tugraz.at).

(*) An example: in the 2007 field trip, tunnel design and construction were related with: active faults, karstic rocks, weak and squeezing rock masses, cataclassites, clays, rock masses with frequently varying nature or anisotropic behaviour, strong but weathered rocks, unstable slopes.

Industry-Academia collaboration produces geotechnical case studies for undergraduate instruction: an example, a proposal

M. Pantazidou
School of Civil Engineering, National Technical University of Athens, Greece

G.A. Anagnostopoulos
Pangaea Consulting Engineers LTD, Athens, Greece (now at OTM Consultants, Athens, Greece)

C. Tsatsanifos
Pangaea Consulting Engineers LTD, Athens, Greece

ABSTRACT

This paper describes a collaboration between geotechnical engineering consultants and civil engineering faculty with the aim of compiling material from geotechnical projects that are suitable for undergraduate instruction. The ultimate goal of this work is to serve as a proposal for establishing an ongoing consulting-university collaboration program, ideally supported by national Societies of Soil Mechanics and Geotechnical Engineering. To this end, the paper proposes a case template, which helps with the organization of the project information, presents an example case study developed as a pilot by a consultant-faculty team and discusses the viability of an ongoing industry-academia collaboration program.

1 INTRODUCTION

The need for compiling cases suitable for undergraduate instruction arises from the observation that students most often get exposed to high-profile cases, which are both well documented and good candidates to excite interest (e.g., Teyssandier, 2002; Burland et al., 2003). However, they are poor examples of cases relevant to the work experience of a young engineer. Moreover, the intricate nature of these high-profile cases, which contributes to their dissemination value, also makes their details inaccessible to most undergraduate students. It is argued that geotechnical instruction will benefit from moderate-scale projects that can give undergraduates the opportunity to choose on their own an abstraction to represent the real system and to apply some of the formulas they are taught in class. In addition to the pure instructional value of this undertaking, students also benefit by getting a flavor of the more manageable projects assigned to young engineers at the beginning of their career.

In order to minimize time spent on the selection and compilation of the necessary project information, a case template was developed, which also helps with the presentation of the case study in class. The entries of the template were selected by considering the realities of industry (e.g., the type of data and calculations available for ordinary consulting projects), as well as instructional desiderata (e.g., links with material customarily covered in undergraduate geotechnical courses). This template provided the basis for the development of an example case study with the material from a reinforced-earth project assigned to the second author of the paper, who completed the analysis and report writing for the project under the supervision of the third author. The paper discusses the considerations for template development and case selection, describes the key aspects of the earth-reinforcement project included in the instructional material produced, and concludes with suggestions for a broader industry-academia collaboration program, with emphasis on incentives for the longevity of such a program.

2 CASE TEMPLATE

The development of a template for the presentation of a case study serves two purposes. First, it reduces the time needed for the consultant to pick the relevant material from the long paper-and-report trail of a typical project. In addition, the completed template provides an organized overview of the case for the instructor, who can use it as-is, or reorganize it to suit particular educational objectives and teaching styles.

The template is developed taking into account that the instructor has foremost to tell a story. Within the story, the instructor has to fit an undergraduate-level geotechnical problem that can be (a) analyzed with methods described in typical geotechnical textbooks and (b) presented at a detail enabling the students to follow the calculations performed. The development of the template also reflects the belief that particular emphasis must be placed on the selection of soil parameters needed for the calculations. In this way, students are not left with the wrong impression that "analysis is all that matters; soil parameters will always, somehow, be given". The template developed with this rationale is summarized in Table 1. It includes seven general categories of information described in detail below.

Table 1. Case template with project information grouped in categories.

[1] Project introduction
- Type of project (e.g., reinforced slope)
- Location of project (with enough detail to be located on a road map)
- Pictures of the site (ideally before & after construction)

[2] Geologic information
- Map with borehole locations
- Geologic/soil profile
- Groundwater table

[3] Relevant analyses
- Characteristic cross section(s)
- Types of analyses to be performed

[4] Geotechnical investigation & evaluation of test results
- Soil tests performed and results
- Soil profile used in analysis
- Soil parameters used in analysis

[5] Construction – design considerations
- Constraints and data known prior to analysis

[6] Geotechnical analyses performed
- Basic features / steps of each type of analysis
- Presentation of results

[7] Key points / messages

[1] The first category provides descriptive information on the type and the location of the particular project. It is important that students can locate the project in relation to something known to them. If the project is in a remote location or abroad, a brief tourist-type introduction will help in attracting students' interest. Maps and pictures are necessary for a lively introduction.

[2] In the second category, the students are reminded that they will deal with a geotechnical project, which typically requires basic knowledge of the subsurface, such as geologic/soil profile and the location of the water table. In this category, it must be clear whether information was obtained (a) from boreholes drilled specifically for the project presented or for other projects in the vicinity, or (b) simply based on existing maps.

[3] The third category includes representative cross-sections and a list of all the types of analyses performed for the project. This is the kind of information needed by instructors in order to decide whether the case can fit in their geotechnical course. However, it is not a problem if the students are able to follow in detail only some types of analyses; on the contrary, it is useful if students become aware of the difference between the entire set of calculations required by a project and the portion of the total they can tackle themselves. The analyses that will later be presented in detail (category 6), however, will be accompanied by specific references to textbooks or some other readily-available source. From an educational perspective, it is valuable if a discussion is also included on possible alternative methods of analysis considered (but not necessarily carried out).

[4] The fourth category includes the findings of the geotechnical investigation as well as the evaluation of test results needed to determine the soil parameters used in the analyses. It is important that the distinction be made between results of tests performed and values used in analyses. If engineering judgement informed the selection, it has to be at least acknowledged if not fully justified.

[5] The fifth category includes any additional considerations and input needed to complete the analyses, such as, design constraints or material properties provided by manufacturers.

[6] The sixth category includes the step-by-step calculations performed and a summary presentation of the results.

[7] It is desirable to include a final category providing the "engineering moral of the story". It would be of particular value if the junior consultant of the team noted here anything new learned from the project.

3 EXAMPLE CASE STUDY

3.1 Project information

This section summarizes selectively the project information compiled. The information is presented according to the numbered categories in the case template. Some comments made from an instructional point of view are also interspersed.

[1] The selected project is a mechanically stabilized earth (MSE) wall, with reinforcement of the retained soil material and facing made of gabions (for a detailed, textbook-type description of gabions, see McCarthy, 1998). The wall keeps in place an embankment of the rural road connecting the town of Metsovo and the village of Anthochori. The construction of the retaining structure was part of the restoration of the rural road system, which was affected during construction of the nearby Egnatia Highway (Wikipedia, 2008a). Egnatia follows an east-west route in Northern Greece. It is named after the Ancient Roman "Via Egnatia" (Wikipedia, 2008b), as the two roughly coincide over a significant portion. The location of the project is close to Metsovo, a popular winter resort in the Pindos Mountains of northwest Greece, also distinguished for its traditional architecture.

[2] Knowledge of the general geology of the area informed the choices made for the soil characteristics. In this respect, this is not an ideal project for instruction, since the students will not get an opportunity to ponder on soil parameter selection. On the other hand, though, students will get a flavor of moderate-scale projects, for which a general knowledge of the soil material is adequate.

Below a shallow erosion layer, the parent rock material is classified as siltstone. The geological formation of the area is the Flysch of the Ionian Zone. In the Metsovo area, the Flysch consists of red or gray siltstone, with pieces of sandstone. The elevation of the water table was below the area of interest for this project. The top erosion layer is the soil phase of the siltstone and consists mainly of clayey gravel. This top layer (demarcated with a dashed line in Figure 1) was removed and together with the excavated portion of the siltstone slope were used as a backfill material for the MSE wall. Because sampling locations from nearby projects were considered, maps with borehole locations are not provided.

[3] The MSE wall had a maximum height of 12m and a length of 80m. On top of the MSE wall, a 2m-high embankment was constructed as a foundation for the rural road. Figure 1 shows the cross-section of the wall at its maximum height. The wall is built with a gabion face, at an inward angle of 5° from the vertical. Wire mesh and polymer geogrid are placed horizontally at each reinforcement layer.

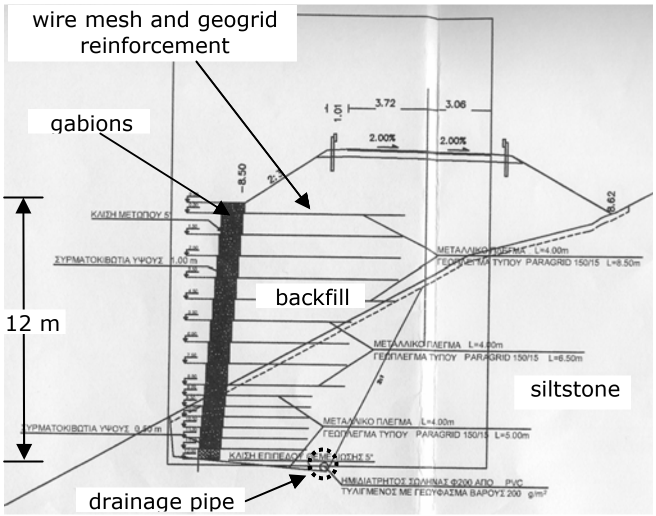


Figure 1. Cross-section of the reinforced wall and embankment considered in stability calculations.

The design of an MSE wall includes two types of calculations: sizing for (1) external stability and (2) internal stability. The general procedure is described by Koerner (1998), among others.

Sizing for external stability included four calculations for potential failure mechanisms, which are:

- Sliding on the base of the wall,
- Overturning of the wall,
- Bearing capacity failure, and
- Overall – Deep seated stability (rotational slip-surface or slip along a plane of weakness).

There is also a fifth calculation, checking for maximum differential settlement of the MSE wall, which was not relevant in this project since the foundation material is rock. In the aforementioned calculations, the MSE wall is considered as a solid mass (including the facing, the reinforcements and the backfill soil in between the reinforcements). These calculations were performed for static stability and also for seismic stability using the Mononobe – Okabe method (Kramer, 1996), as specified by the Greek Seismic Code. The calculations of external stability are performed for an anticipated reinforcement length L_o=6.5m, which determines the width of the wall. These calculations may indicate that a longer reinforcement is needed, if the factors of safety are not adequate or if the eccentricity of the load perpendicular to the base (as determined from the bearing capacity analysis) is bigger than $L_o/6$ (Mitchell & Villet, 1987; Koerner, 1998). The adequacy of the anticipated length will finally be determined by the calculations for internal stability (pullout failure).

Internal failure of an MSE wall can occur in two ways:

- Failure by elongation or breakage of the reinforcements, due to large tensile forces in the inclusions and
- Pullout failure, when the tensile forces in the reinforcements become larger than the pullout resistance of the reinforcements.

Calculations are again performed both for static and seismic stability. The calculations for internal stability are performed in order to establish the specific reinforcement product and the appropriate reinforcement length and spacing (which should also be compatible with the spacing of the facing).

[4] The soil parameters used in the calculations were determined, as mentioned, on the basis of sampling and testing conducted for projects in the vicinity. The soil profile used for the calculations is shown in Figure 1. The material behind the 6.5m-wide wall consists of 7m of siltstone and 5m of backfill, while the embankment is 2m-high. The soil parameters used in the analyses are given in Table 2.

Table 2. Soil parameters used in analyses.

Material type	Properties
Siltstone	c_s = 100 kPa, φ_s = 25° γ_s = 24 kN/m^3
Backfill material	c_b = 5 kPa, φ_b = 28° γ_b = 20 kN/m^3

[5] After performing the analyses, the specific type of the preselected reinforcement material (ParaGrid™) was determined on the basis of the desired tensional strength. Product details are mentioned in this case because when it comes to manufactured geo-materials, it is a good exercise for the students to have a look at the product specifications and make the connections between the information provided by the manufacturer and the values of the parameters needed for the calculations. It should be noted that the wire mesh of the gabions extended for 3m beyond the upper horizontal side of each gabion, offering a total reinforcement length of 4m. The tensional strength of the wire mesh used, according to the manufacturer, is in the range of 40 to 50 kN/m.

Other relevant design or construction considerations with bearing on analysis include the placement of drainage pipes at the bottom of the backfill (see Figure 1) to ensure that there will be no water built-up behind the retaining wall. In addition, smaller-size gabions of 0.50m were selected close to the wall toe to allow for closer placement of the reinforcement over a height of 3.5m. Above this height, 1-m gabions were used, as shown on Figure 1.

[6] From the analyses previously listed, only the two critical calculations will be described in the available space for this paper: sliding (external stability) and tension analysis (internal stability), which imposed the requirement of the close reinforcement spacing by the wall toe.

External Stability: Sliding on the base of the wall

The solid body considered, consisting of the wall facing and the reinforced mass, is shown on Figure 2. It is a rectangle with dimensions 6.5m by 12m, tilted inwards at an angle of 5°. Whereas final reinforcement lengths vary along the height of the wall (see Figure 1), wall width was assumed equal to a representative length of L_o = 6.5 m. The forces resulting from earth pressures and exerted on the back of the wall are as follows: P_{A1} is the thrust of the backfill material over a height of H_1+H_2 (2m embankment + 5m backfill), P_{A2}+P_{A3} is the thrust of siltstone over a height of H_3=7m, and P_{A4} is the thrust of traffic load q = 20kN/m^2, which is assumed to be transferred only through the backfill material. An average slope inclination of δ_i=12° from the top of the wall was assumed for the embankment.

The factor of safety for sliding along the wall base, FS_{sl}, is calculated from the following equation:

$$FS_{sl} = \frac{\Sigma P_R}{\Sigma P_D} = \frac{c_b L_o + N \tan \delta_{sl}}{F_{sl}} \geq 1.5 \qquad (1)$$

where the symbols in Eq. 1 are as listed below:

ΣP_R: forces resisting sliding along the wall base

ΣP_D: forces driving sliding along the wall base

c_b: cohesion of the backfill material

L_o: width of wall

N: the sum of the forces acting perpendicular to the wall base

δ_{sl}: angle of friction along the wall base, assumed to be equal to $2\varphi_b/3$

F_{sl}: the parallel-to-the-base component of the thrust on the back of the wall (P_{A1}, P_{A2}, P_{A3}, P_{A4}) minus the same component of the wall weight (W_1, W_2).

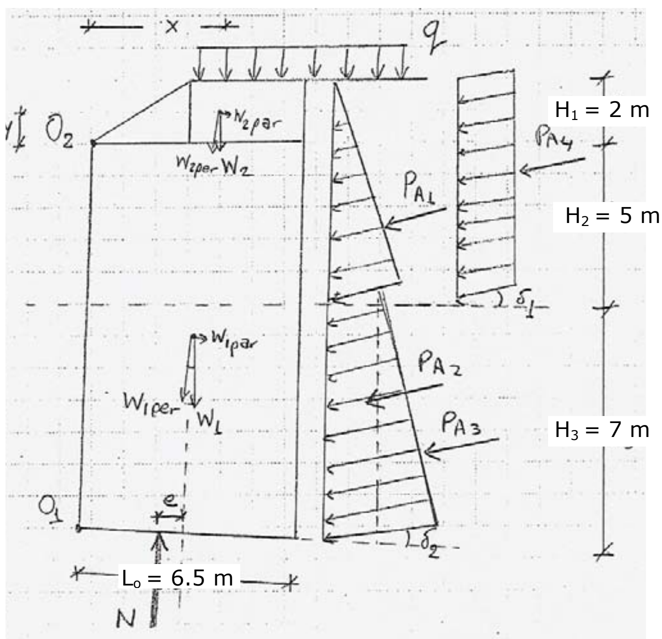


Figure 2. Hand sketch of the wall and the forces considered for the calculations of external stability (part of the calculations included in the appendix of the project report).

In applying Equation 1, several assumptions were made. For static stability, the coefficient of active earth pressure for the backfill (P_{A1}, P_{A4} in Figure 2) was calculated according to Coulomb's theory for the thrust of a cohesionless material against a rough wall [e.g., Equation 11.10 in Kramer (1996)]. When applying Coulomb's equation, the small cohesive shear resistance of the backfill material was neglected. What is more, in order to calculate a coefficient of active thrust for the siltstone, an equivalent friction angle was determined, which was equal to φ_{seq}=40° (considering the Mohr circles for the siltstone and for this cohesionless equivalent material, both materials exhibit the same shearing resistance for the stress level at the wall base). The coefficient of active earth pressure for the siltstone (P_{A2}, P_{A3} in Figure 2) was calculated as K_{As}=tan^2(45-φ_{seq}/2). Lateral earth thrusts P_{A1} and P_{A4} were assumed to be inclined at an angle δ_i (the assumed slope for the embankment) from the normal to the back of the wall, whereas P_{A2} and P_{A3} were assumed to be inclined at 2 φ_{seq}/3.

It should be noted that the influence of the traffic load q was only considered through its corresponding thrust (P_{A4}), but neglected in the calculations of the forces that act perpendicular (and parallel) to the wall base. This is a conservative approach recommended for live loads by Mitchell and Villet (1987). Finally, the passive earth pressure at the toe (see Figure 1) and the increased shear strength of the sliding gabions (relatively to the shear strength of the sliding soil) were ignored. For these assumptions, the calculated factor of safety for sliding along the wall base is FS_{sl} =1.89.

The active earth pressures for seismic stability was calculated with the Mononobe-Okabe method, which considers additional pseudostatic horizontal and vertical forces, with magnitudes related to the mass of the failing soil and pseudostatic accelerations $a_h=k_h g$ and $a_v=k_v g$, thus introducing an additional angle in Coulomb's equation, ψ = tan^{-1}[k_h/(1-k_v)] [e.g., Equation 11.16 in Kramer (1996)]. The maximum seismic acceleration is expressed as $a=kg$. According to the Greek Seismic Code, for the Metsovo area, k = 0.16. The code further specifies a coefficient q_w=1.5 for a flexible structure such as a reinforced soil wall. With this information, the coefficients of the Mononobe-Okabe method are as follows: $k_h=k/q_w$ =0.107 and k_v= 0.3k =0.048. For these values, the corresponding factor of safety for sliding along the wall base is FS_{sl} =1.05. Table 3 summarizes all the results of the analyses for external stability.

Table 3. Factors of safety, FS, from the calculations for external stability.

	Static *FS*		Seismic *FS*	
	Needed	**Actual**	**Needed**	**Actual**
Sliding	1.5	1.89	1	1.05
Over-turning	2	2.73	1.5	1.73
Bearing capacity	3	5.29	2	2.66
Overall stability*	1.4	3.51[a] 1.41[b]	1	2.91[a] 1.28[b]

*for surface failure
[a] beneath the toe wall
[b] crossing the reinforcements

Internal stability: tensile failure

The tensional strength of the reinforcement (expressed in kN/m) should be greater than the tensional force per meter (F_H) applied to it, which is calculated as follows:

$$F_H = \sigma_h S_v / C_r \quad (2)$$

where the symbols in Eq. 2 are as listed below:

σ_h: horizontal stress at the reinforcement level
S_v: vertical spacing of reinforcements
C_r: horizontal coverage of reinforcements (equal to 1 for continuous placement of the geogrid).

The horizontal stress at the reinforcement level is calculated in reference to the vertical stress σ_v as:

$$\sigma_h = K_A \sigma_v, \qquad K_A = \tan^2(45 - \varphi/2) \quad (3)$$

where K_A is the active earth pressure coefficient, and φ = φ_b or φ_{seq}, for the backfill and the siltstone, respectively. The vertical stress is in turn calculated in reference to the sketch shown on Figure 3.

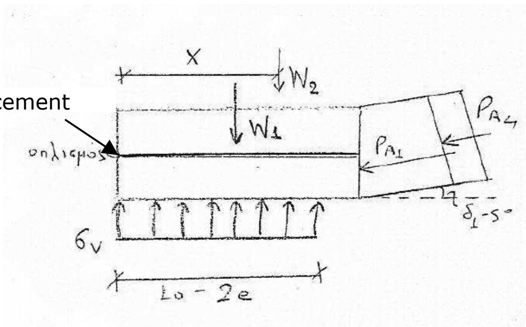


Figure 3. Detail of forces acting on a reinforcement layer in the upper part of the wall (part of the calculations included in the appendix of the project report).

It is worth noting that according to calculations in textbooks (e.g., Koerner, 1998) the vertical stress at the reinforcement is simply $\sigma_v = \gamma z + q$. For the more conservative approach followed herein, which takes into account that the vertical stress is greater than the overburden pressure due to the eccentricity introduced by the lateral earth pressures (Mitchell and Villet, 1987), σ_v at each reinforcement level is calculated as:

$$\sigma_v = N_R / (L_o - 2e) \quad (4)$$

where the symbols in Eq. 4 are as listed below:

N_R: vertical force acting on the reinforcement
L_o: length of reinforcement
e: eccentricity, for $e=\Sigma M_v/N_R$, and M_v = moments over the vertical axis of symmetry of the reinforcement.

The calculations for tensile failure were performed in an Excel spreadsheet because they must be repeated for every reinforcement depth and until a suitable spacing S_v is determined. The calculations for static stability indicated that reinforcement was necessary below an elevation of 6.5m from the top of the wall; above that elevation the tensional strength of the wire mesh was adequate. The calculations for seismic stability in addition indicated the need to place reinforcement every 0.5m below the elevation of 8.5m from the top of the wall (for a total of six rows). The maximum tensile force was calculated at the elevation of 8.5m from the top of the wall and was equal to 113.3 kN/m. This requirement is met with ParaGrid™ 150/15, which has a longitudinal tensile strength of 150 kN/m. Table 4 summarizes the results of the analyses for internal stability for the seismic case. According to the results shown on this table, ParaGrid™ 100/15 would be adequate for the reinforcements at 7.5, 10.5, 11 and 11.5m and ParaGrid™ 80/15 for the remaining elevations, even without taking into account the contribution of the wire mesh. As a result, the average factor of safety against tensile failure for the entire wall is above 1.5. For ease of construction, the same reinforcement product was placed in all elevations. The results of pullout analysis indicated that reinforcements were also needed close to the top of wall (although not required from a tensional strength perspective).

[7] Since there were no available soil data from the specific site (no boreholes and no laboratory tests), the design of the wall was extra conservative. The soil parameters used in the analyses and the assumption that the full active thrust from the rock is acting on the wall (by neglecting the cohesion of the rock, which can reduce the thrust significantly) were conservative. Finally, the selection of the geogrid product was based on the maximum tensile strength required, although in most reinforcement elevations geogrids of smaller tensile strength could be used.

Table 4. Summary of calculation results for internal stability (seismic case).

Reinforcement level from top of wall (m)	Total length of reinforcement, L_{tot}* (m)	Tensional strength required** (kN/m)
0.5	8.5	16.3
1.5	8.5	22.6
2.5	8.5	28.5
3.5	8.5	37.5
4.5	8.5	47.5
5.5	6.5	64.1
6.5	6.5	78.4
7.5	6.5	94.7
8.5	6.5	113.3
9.0	6.5	61.9
9.5	5.0	67.5
10.0	5.0	73.6
10.5	5.0	80.4
11.0	5.0	87.8
11.5	5.0	96.0

* Pullout check
** Tension check

In the absence of site-specific borehole and laboratory data, we can use soil parameters from relevant sites, guided by the experience of senior consulting engineers and observations from the site geology. In this case, there was a significant experience with the rock formations of the area and their properties, obtained from the great number of available soil test results and geological reconnaissance studies in the greater Metsovo area.

Finally, it is not always necessary to use a computer program when designing a simple geotechnical structure, such as a reinforced earth wall, even when suitable software is available (e.g., WinWall). In many cases, we can use the equations provided in textbooks covering applied geotechnical topics. In this way, the engineer can better understand the mechanisms that can lead to failure and design accordingly, by carrying out the appropriate stability checks. If the calculations are long and repetitive, they could be imported in a spreadsheet, such as Excel, MathCad etc.

3.2. Discussion on material production

This section discusses some experiences from the production of the educational material. Regarding the required time commitment, the three members of the team, a junior consultant, a senior consultant and a faculty member, met in person two times. During the first 1.5-hour meeting, the two consultants introduced the faculty member to the project. Following that meeting, the junior consultant compiled most of the necessary information, partly completing the case template. To ensure the "teachability" of the material, the faculty member then located connections between analytical approaches followed in the project and procedures described in textbooks. This was a stage that took longer than anticipated and will be discussed further later in this section. During the second meeting of the team, which was brief, the discussion focused on clarifications on the analysis methodology and on justifications concerning assumptions made.

The difficulty in matching textbook procedures and analyses performed for the selected reinforced soil retaining structure partly arises from the simple geometries treated in textbooks, which must aim at communicating the basic features of a procedure. Additional difficulties stem from the simplifying assumptions that are necessary to match a particular problem with the constraints of a specific method. The instructor has to strike a balance between (a) using simplistic problems that conform perfectly to textbook-type examples and (b) loading the students with a long array of simplifications needed to handle a more realistic problem. These general comments are substantiated with specific examples related to the analyses of reinforced earth walls in general and specifically to the one presented in this paper.

One of the most basic steps in an analysis of a reinforced earth retaining wall is the calculation of the lateral earth pressures. The two textbooks consulted with sections on reinforced retaining structures (Das 1998; Koerner, 1998) provide examples where lateral earth pressures are calculated for the assumption of a smooth wall (Rankine's theory). This conservative assumption is not realistic for a reinforced earth wall, but simplifies the calculations of both the earth pressure coefficients and the resulting forces, which act perpendicular to the wall back. However, this difficulty can be turned into an opportunity if the students are asked to repeat the lengthy calculations made with the assumption of a rough wall in this project, for the easier case of the smooth wall. By comparing the two factors of safety, students will realize the effect of the simplifications made. The particular project also offers an opportunity to the students to get a flavor of the many smaller-scale decisions made during analysis, such as turning the cohesive siltstone into an equivalent cohesionless material and computing lateral thrust from the traffic load only through the backfill material.

The selection of parameters presents similar difficulties, although of smaller magnitude. An example will be given for the sliding analysis presented, which concerns the angle of sliding friction, δ_{sl}, at the base of the wall. Das (1998) recommends a value equal to $2\varphi_b/3$ (as assumed herein), Koerner (1998) mentions that δ_{sl} will be smaller than φ_b and considers it a given in a solved example, whereas Mitchell & Villet (1987) recommend the lower friction angle of the two sliding surfaces.

In summary, in order to match textbook material with real-life projects, a series of decisions need to be made regarding (a) the specifics of the application of the generally accepted methodology and (b) the parameters used in analysis. Because instructors typically feel comfortable teaching material they draw from a much larger pool of sources, for the presentation of the specific case it is recommended that the instructor also have access to at least one of focused publications, some of which are included in the references (Mitchell & Villet, 1987; Collin, 1996; Elias & Christopher 1997).

4 PREREQUISITES FOR INDUSTRY-ACADEMIA COLLABORATION

This section proposes procedures and conditions that will foster the collaboration between industry and academia for the production of instructional material. The authors believe there are three basic conditions: streamlined production of the instructional materials, visibility provided by a national geotechnical society and a system of incentives for the participating consultants and faculty members.

The case template together with an example case study saves time on the side of the consultant. It will help if the instructional material is produced shortly after the project is completed, while it is still in memory and its files are easily accessed.

The proposed collaboration has to be announced and supported by a national geotechnical society. The third author of this paper, who is officer of the Hellenic Society for Soil Mechanics and Geotechnical Engineering (HSSMGE), believes that such a collaboration will be viable in the close-knit geotechnical community in Greece, where frequent and close collaborations take place between industry and academia. The proposed collaboration will be announced in the newsletter of HSSMGE and in flyers, during events organized by the society. In addition, two members of the society will be assigned as contact points, one from the industry the other from academia.

However, because the proposed activity involves additional effort not directly contributing to a commercial or research project, some distinct system of incentives must be in place. It is the third author's belief that companies will cover the time of a junior consultant, provided that the activity will have some visibility in the geotechnical community. A prize for good cases was discussed among the authors but was not favored, because it may introduce a competitive element among consulting companies and end up acting as a disincentive. It is therefore proposed that productive collaborations be publicized in the newsletter of the society. In addition, some special session could be dedicated for case presentation and dissemination in national geotechnical conferences. If other national societies also support such a collaboration, a rich database can be developed with cases from all over the world, since with a little additional effort the cases can also be prepared in English.

Although universities appear to be the immediate beneficiaries of this collaboration, incentives must be in place on the academia side as well. Considering that it is easier to teach with textbook-type examples, it will help if instructors who are involved in the development of the cases and/or who use them in instruction get some recognition from their universities.

5 CONCLUDING REMARKS

This paper claims that there is a need for "ordinary" consulting cases in undergraduate instruction. This need arises when faculty members are mainly involved in "high-profile" projects that require high-level expertise. It also arises for junior faculty, or faculty who teach topics outside their main research focus and area of professional expertise.

It is further proposed that this need be addressed by collaborating teams of consultants and faculty members. A suitable team will include a faculty member, whose role will be to make sure that the produced instructional material is "teachable", a junior consultant intimately involved with the case, who will compile the needed information, and a senior consultant, who will devote only some minimal time, providing his/her knowledge of the "big picture" of the project.

To make the proposal tangible, the authors presented in this paper some representative results of a pilot consulting-university collaboration which produced instructional material for a reinforced earth retaining structure. All the information is included in the completed template and a PowerPoint presentation, available on the internet (www.pangaea.gr and users.ntua.gr/mpanta). It should be noted that the authors chose a modest-scale project within a high-profile project, i.e., the Egnatia Highway, bypassing on purpose the majestic bridges and the long tunnels of Egnatia, for a project that involved some calculations most students would follow in an undergraduate geotechnics class. At the same time, the project is rich enough to also include some analyses suitable for an advanced course on soil improvement.

In order to encourage similar collaborations, the authors finally discuss measures necessary to ensure the viability of a consulting-university collaboration: streamlining the production of the instructional materials, providing visibility ideally through a national geotechnical society and instituting a system of incentives on both sides.

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ΑΝΑΦΟΡΕΣ ΤΟΥ ΤΥΠΟΥ ΣΕ ΤΕΧΝΙΚΑ ΘΕΜΑΤΑ

ΠΡΟΦΗΤΕΣ ΚΑΙ ΕΠΙΜΗΘΕΙΣ
Δρ. Σπύρος Καβουνίδης (*)

Στην ιατρική μάθαμε να ξεχωρίζουμε τις διάφορες ειδικότητες. Για κατάγματα θα πάμε στον ορθοπεδικό, για προβλήματα καρδιάς στον καρδιολόγο μα την εγχείρηση θα την κάνει ο καρδιοχειρουργός. Στις φυσικές επιστήμες και ιδιαίτερα στις γεω-επιστήμες αυτές οι διακρίσεις δεν είναι σε όλους τόσο σαφείς. Ας ξεκαθαρίσουμε λοιπόν κάποιους όρους και ειδικότητες που ίσως μπερδεύουν και σίγουρα μπερδεύονται τώρα μάλιστα με τα μετα-σεισμικά τηλεοπτικά σήριαλς.

Εδαφομηχανικός: Πολιτικός μηχανικός ειδικευμένος στην μηχανική των εδαφών. Ασχολείται δηλαδή με τα εδάφη σε σχέση με τις κατασκευές. Συνήθως ασχολείται μέχρι κάποιες δεκάδες μέτρα από την επιφάνεια. Γενικότερα λέγεται γεωτεχνικός μηχανικός βασικά για να συμπεριλάβει εκτός από το χώμα και τους βράχους

Γεωτεχνικός: (ελληνική αποκλειστικότητα!) λέγεται ο επιστήμων που έχει σχέση με τη γεωργία – κτηνοτροφία, δηλαδή γεωπόνος, κτηνίατρος. Για περίεργο λόγο εν Ελλάδι περιλαμβάνονται στο επονομαζόμενο Γεωτεχνικό Επιμελητήριο και οι γεωλόγοι

Γεωτεχνικός: (παντού πλην Ελλάδος) ο εδαφομηχανικός, ο γεωτεχνικός μηχανικός (αγγλιστί ο όρος: geotechnical)

Γεωλόγος: Ο επιστήμων που ασχολείται με την ποιοτική περιγραφή των πετρωμάτων, τη γένεσή τους, την ιστορία τους και την κατάστασή τους. Η ενασχόλησή του φτάνει συνήθως μέχρι μερικές εκατοντάδες μέτρα από την επιφάνεια

Τεχνικός Γεωλόγος: Ειδίκευση του γεωλόγου συνήθως (τουλάχιστον στο εξωτερικό) με μεταπτυχιακές σπουδές (engineering geologist). Ασχολείται με τη δομή των πετρωμάτων και με την ποιοτική περιγραφή της κατάστασής τους σε σχέση με έργα πολιτικού μηχανικού

Εδαφολόγος: Γεωπόνος που ασχολείται με το έδαφος όπου φύονται διάφορα φυτά π.χ. το κηπευτικό χώμα, δηλαδή περίπου μισό έως ένα μέτρο από την επιφάνεια (αγγλιστί topsoil)

Σεισμολόγος: Φυσικός (κυρίως) που έχει ειδικευτεί στα θέματα γένεσης των σεισμών, διάδοσης των σεισμικών κυμάτων, θεωρίας των λιθοσφαιρικών πλακών, σεισμικότητας και σεισμικής επικινδυνότητας κ.α. Το πεδίο ενασχόλησής του φτάνει αρκετά χιλιόμετρα μέσα στη γη μέχρι τον πυρήνα της

Αντισεισμική Μηχανική: Η επιστήμη και τεχνολογία (ειδικότητα πολιτικού μηχανικού) που ασχολείται με τη μελέτη των κατασκευών (κτίρια, γέφυρες, λιμάνια κλπ) για να αντέχουν σε σεισμούς

Εδαφοδυναμική: Ιδιαίτερο πεδίο ειδίκευσης του εδαφομηχανικού που έχει σχέση με τη μελέτη συμπεριφοράς του εδάφους υπό δυναμική φόρτιση (δηλαδή υπό δυνάμεις που επιβάλλονται στιγμιαία ή με περιοδικότητα)

Γεωτεχνική Αντισεισμική Μηχανική: Η εδαφοδυναμική αλλά ειδικά για σεισμική φόρτιση. Μελετά τη διάδοση των κυμάτων βασικά στο πάνω τμήμα του υπεδάφους που ενδιαφέρει πρακτικά τις κατασκευές και ασχολείται ιδιαιτέρως με την αλληλεπίδραση εδάφους-κατασκευής

Παρεξηγήσεις όμως υπάρχουν και για το τι τεκμηριώνουν οι σπουδές, διασαφηνίσεις χρειάζονται για θέματα έρευνας και εφαρμογής της και για το πως δημοσιοποιούνται τα αποτελέσματά της

Τεκμήριο σπουδών: Οι σπουδές αποτελούν τεκμήριο γνώσης ενός επιστημονικού πεδίου και οι σπουδές ειδίκευσης τεκμήριο γνώσης σε μεγαλύτερο βάθος ενός ειδικότερου πεδίου. Το τεκμήριο δεν επαληθεύεται πάντα. Δηλαδή κάποιος (όχι σπάνια) μπορεί να μην έχει αρκετή γνώση του επιστημονικού πεδίου που σπούδασε. Και αντίστροφα (πολύ σπάνιο αλλά όχι αδύνατο) κάποιος μπορεί να γνωρίζει πολύ καλά ένα ειδικό πεδίο χωρίς να έχει παρακολουθήσει συστηματικές (πανεπιστημιακές) σπουδές στο πεδίο αυτό. Παραδείγματος χάριν ένας από τους μεγαλύτερους εδαφομηχανικούς ήταν ο Roscoe ο οποίος είχε σπουδάσει μηχανολόγος

Έρευνα: Η προσπάθεια επέκτασης των ορίων της υπάρχουσας γνώσης. Στις φυσικές επιστήμες η προσπάθεια γίνεται με θεωρία, πείραμα, μετρήσεις, παρατηρήσεις. Γίνεται κυρίως είτε στα Πανεπιστήμια (πέραν των μεταπτυχιακών) είτε σε ειδικά ερευνητικά κέντρα. Παρενθετικά, με αυτή την έννοια είναι ακατανόητη η εισαγωγή ερευνητικών προγραμμάτων σε Τ.Ε.Ι. Αν έχουν τη δυνατότητα (όποια την έχουν) θα πρέπει ίσως πρώτα – πρώτα να γίνουν ΑΕΙ.

Η θεωρία δίνει τη σχέση αιτίου – αιτιατού και εξηγεί τα αποτελέσματα πειραμάτων και μετρήσεων. Βασική προϋπόθεση η επαναληψιμότητα των αποτελεσμάτων.

Σεισμολογική έρευνα: Ασχολείται με την έρευνα του εσωτερικού της γης, ειδικότερα με τους μηχανισμούς γένεσης των σεισμών και δυναμικής διάρρηξης ("σπασίματος") των πετρωμάτων. Ασχολείται ακόμη με μεθόδους προσδιορισμού των σεισμικών παραμέτρων ενός σεισμού και με τη στατιστική ανάλυση ιστορικών σεισμών.

Το "ιερό δισκοπότηρο" για τους σεισμολόγους είναι η εύρεση μεθόδων βραχείας πρόγνωσης (τόπος, μέγεθος, χρόνος) ενός σεισμού. Παρά τις προσπάθειες διεθνώς δεν υπάρχει αξιοσημείωτη πρόοδος στο θέμα. Μάλιστα έγκυροι επιστήμονες έχουν και θεωρητικά υποστηρίξει ότι η αξιόπιστη πρόβλεψη είναι ανέφικτη λόγω της χαοτικής φύσης του προβλήματος.

Δημοσιοποίηση ερευνών: Σε όλους τους επιστημονικούς κλάδους οι έρευνες που έχουν κάποια αποτελέσματα δημοσιεύονται σε επιστημονικά περιοδικά ή/και ανακοινώνονται σε επιστημονικά συνέδρια. Συνήθως οι σημαντικές έρευνες δημοσιεύονται (μετά από κρίση) στα καλά επιστημονικά περιοδικά της ειδικότητας. [Σημείωση: η προσφορά για δημοσιεύσεις είναι μεγάλη αφού αποτελούν κριτήριο προαγωγής και καταξίωσης. Γι' αυτό υπάρχουν συχνά πολλά επιστημονικά περιοδικά αλλά λίγα θεωρούνται σημαντικά]. Μετά τη δημοσίευση μπορεί να ακολουθήσει σχολιασμός ή αμφισβήτηση από άλλους ειδικούς.

Εφαρμογή της έρευνας: Μια έρευνα που έχει καταλήξει σε σημαντικά συμπεράσματα και για την εγκυρότητα της οποίας υπάρχει συναίνεση της επιστημονικής κοινότητας της συγκεκριμένης ειδικότητας είναι δυνατόν να μπορεί να έχει πρακτική εφαρμογή. Αυτό μπορεί να αφορά είτε οργανισμούς ανάπτυξης (development) είτε κράτη είτε υπερεθνικά σύνολα.

Τελευταία γίναμε πάλι μάρτυρες της επανάληψης ενός κακόγουστου σήριαλ. Πρέπει να γίνει απολύτως σαφές ότι η ανακοίνωση μέσω της τηλεόρασης πιθανών στοιχείων μιας έρευνας είναι <u>εκτός της επιστημονικής δεοντολογίας</u>. Πόσο μάλλον που η έρευνα για πρόγνωση σεισμών (εξ όσων γνωρίζω) δεν έχει δώσει αξιόλογα αποτελέσματα οπουδήποτε στον κόσμο και σίγουρα όχι τέτοια που να μπορούν να οδηγήσουν σε εφαρμογή.

Άρα η δια τηλεοράσεως ανακοινώσεις πέρα από τηλεθέαση και τρομολαγνεία δεν προσφέρουν τίποτα ούτε στην επιστήμη ούτε στο κοινωνικό σύνολο. Δεν έχουν δε, σε ότι αφορά τις επιστημονικές μεθόδους, διαφορετική ποιότητα από το "νερό του Καματερού", το θαύμα του Βησσαρίωνα και τα οράματα της "Αγίας Αθανασίας του Αιγάλεω".

Τέλος, χωρίς διάθεση υποβάθμισης συνολικά της (λίγης δυστυχώς) επιστημονικής έρευνας στην Ελλάδα, πρόοδος στον τομέα της πρόγνωσης των σεισμών θα οδηγούσε αναποδράστως σε πρόσκληση συμμετοχής σε ομάδες που ασχολούνται διεθνώς με το θέμα, συνοδευόμενη με πακτωλό χρηματοδοτήσεων. Έχω την εντύπωση ότι τέτοιες προσκλήσεις δεν έχουν υπάρξει.

Αυτό που έχει άμεσο και πρακτικό νόημα είναι, τόσο ως επιστημονική κοινότητα όσο και – γενικότερα – ως κοινωνικό σύνολο, να αποφασίσουμε ποιο επίπεδο προστασίας από τους σεισμούς θέλουμε να έχουμε. Η απάντηση είναι οικονομική και πολιτική εμπεριέχεται δε (αναγκαστικά χονδρικά) στον κάθε φορά ισχύοντα αντισεισμικό κανονισμό. Αρκεί βέβαια να τον εφαρμόζουμε.

(*) Πολιτικός Μηχανικός ΕΜΠ, Ph.D. Stanford University Από το 1998 έως το 2005 ήταν Πρόεδρος της Ελληνικής Επιστημονικής Εταιρείας Εδαφομηχανικής και Θεμελιώσεων

(ΕΛΕΥΘΕΡΟΤΥΠΙΑ, 23.06.2008)

ΑΝΑΣΚΟΠΗΣΗ ΓΕΓΟΝΟΤΩΝ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ

XVI PRAGUE GEOTECHNICAL LECTURE
Δρ. Χρήστος Τσατσανίφος

Την Δευτέρα 26 Μαΐου 2008, στα πλαίσια της PRAŽSKÉ GEOTECHNICKÉ DNY 2008, παρουσιάστηκε από τον Χρήστο Τσατσανίφο, Πρόεδρο της ΕΕΕΕΓΜ, η XVI Prague Geotechnical Lecture με τίτλο «Building in Ancient Cities: Geotechnical Engineering Challenges». Η εκδήλωση πραγματοποιήθηκε στην Academy of Science of the Czech Republic, Praha παρουσία πολυπληθούς ακροατηρίου, μεταξύ των οποίων εκπρόσωποι της Ελληνικής Πρεσβείας στην Πράγα και Έλληνες συνάδελφοι δραστηριοποιούμενοι στην Τσεχία. Στη συνέχεια παρατίθεται περίληψη της διάλεξης, ενώ το πλήρες κείμενό της θα δημοσιευθή σε επόμενο τεύχος των ΝΕΩΝ.

The existence of antiquities in the ground environment in urban areas makes it unfavourable for the developer, mainly for two reasons: Firstly because there is a demand that the archaeological resource, if significant, be preserved in situ and secondly because the need for construction of new buildings and other structures next to existing monuments and historic buildings pose, most of the times, significant construction difficulties. In both cases innovative engineering solutions are required to overcome these difficulties.

Athens, a large modern city with a history of more than 5,200 years (starting in prehistoric period, around 3200 B.C.) and one of the largest economical, political and cultural centres of antiquity, holds into its substratum an archaeological treasure. Fig. 1 shows the major archaeological sites in the centre of Athens and among them the walls of the city constructed in the 5th century B.C. by Themistocles. Experience has shown that practically there is no square metre within the walls where shallow excavations will not find ancient ruins.

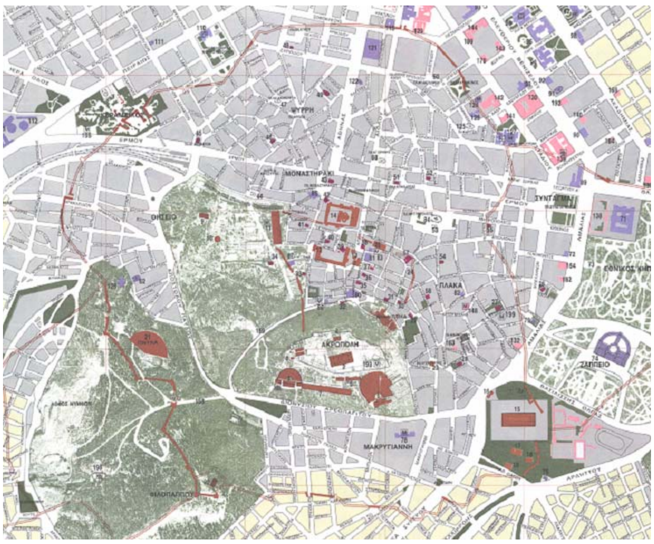


Fig. 1. Major archaeological sites in the centre of Athens

Any excavation in the centre of Athens is supervised by the archaeological service and, depending on the significance of the ruins and the cost of the land expropriation (if they are found in a private property), decision is made whether they should remain in situ, either in the open air or in the basement / ground floor of the new building to be visited, or can be moved or can be thoroughly backfilled and build on top of the fill without destroying them. Of course, there are many cases where the construction of the new building was completely cancelled because of the significance of the antiquities found.

It is obvious that in the case where the antiquities are kept visit able under the new buildings, the role of the geotechnical and structural engineers is very significant, since they have to design the foundations without destroying the antiquities and the immediate superstructure in a way that permits the nice display of the antiquities. Similarly, the construction of a new building next to a monument or a historic building requires elegant geotechnical design in order to avoid damaging the monument. Finally, the preservation, the restoration or the rehabilitation of an old structure poses many challenges to be solved by the geotechnical engineer.

The geotechnical interventions in the process of building in ancient cities range from simple measures as thorough backfilling the antiquities, to complex applications as micro piling and fore poling under the antiquities or ground movement control using integrated hydraulic jacks to push back retaining walls. In this paper the general principles of intervention in ancient structures and a quick review of the methods for the geotechnical intervention in monuments are presented, as well as examples of the contribution of geotechnical engineering for solving problems related to preservation, restoration and rehabilitation of monuments and historic buildings in ancient cities, some from the authors' experience, some from the literature.

FIRST INTERNATIONAL CONFERENCE on EDUCATION and TRAINING in GEO-ENGINEERING SCIENCES: Soil Mechanics and Geotechnical Engineering, Engineering Geology, Rock Mechanics

Constantza - Romania, 2 - 4 June 2008

The Romanian Society for Soil Mechanics and Geotechnical Engineering (RSSMGE) organised on 2-4 June 2008 in Constantza the *First International Conference on Education and Training in Geo-engineering Sciences: Soil Mechanics and Geotechnical Engineering, Engineering Geology, Rock Mechanics*.

JTC3 "Education and Training in Geo-engineering Sciences" of FIGS, chaired by Prof. Luis Gonzalez de Vallejo and ETC16 "Education and Training in Geotechnical Engineering" of ISSMGE, chaired by Prof. Iacint Manoliu were involved in the preparation of the Conference.

A number of 120 participants from 6 continents and 23 countries took the opportunity to meet and discuss many challenges faced by the education and training in the field of *Geo-engineering*, defined as "*engineering with, on or in geological materials*" in a document prepared to set up a cooperation under the auspices of a Federation of International Geo-engineering Societies (FIGS) having ISSMGE, IAEG and ISRM as founding members.

The Conference has been honoured by the presence of Pedro Seco e Pinto - President of ISSMGE, Roger Frank - Vice-president for Europe of ISSMGE, Waldemar Hachich – Vice-president for South America of ISSMGE and of three former Presidents of IAEG: Dr. Niek Rengers, Prof. Ricardo Oliveira and Prof. Paul Marinos. Prof. Giovanni Barla, former Vice-president for Europe of ISRM, represented ISRM.

Distinguished personalities of the three Sister Societies have delivered fourteen lectures: John Burland, Ricardo Oliveira, John Atkinson, Mark Jaska, Giovanni Barla, Luis Van Rooy, Niek Rengers, Trevor Orr, Ian May, Luis Gonzales de Vallejo, Keith Turner, Frans Barends, Waldemar Hachich and Mike Devrient. During the six Discussion Sessions a number of 24 papers have been presented by the authors. The Conference Scientific programme included also a Workshop on *the Bologna process and geo-engineering education* under auspices of the project EUCEET (European Civil Engineering Education and Training).

CRC Press/Balkema publishes the Proceedings of the Conference in a volume of 525 pages. Editors are Prof. Iacint Manoliu and Prof.

Nicoleta Radulescu.

(από το ISSMGE Bulletin, June 2008)

Στο συνέδριο συμμετείχαν τα μέλη της ΕΕΕΕΓΜ Ανδρέας Αναγνωστόπουλος, Παύλος Μαρίνος και Μαρίνα Πανταζίδου (οι Π. Μαρίνος και Μ. Πανταζίδου παρουσίασαν τα άρθρα που παρατίθενται σε αυτό το τεύχος των ΝΕΩΝ).

Διάλεξη
Καθηγητή Αθανάσιου Παπαγιαννάκη
Προέδρου της Σχολής Πολιτικών Μηχανικών και Μηχανικων Περιβάλλοντος του
University of San Antonio, California, USA

The Geotechnical Roots of Modern Pavement Design

Η διάλεξη παρουσιάστηκε την Τρίτη 17 Ιουνίου 2008 στην Αίθουσα Εκδηλώσεων του Τεχνικού Επιμελητηρίου Ελλάδας. Στη συνέχεια παρουσιάζεται περίληψή της.

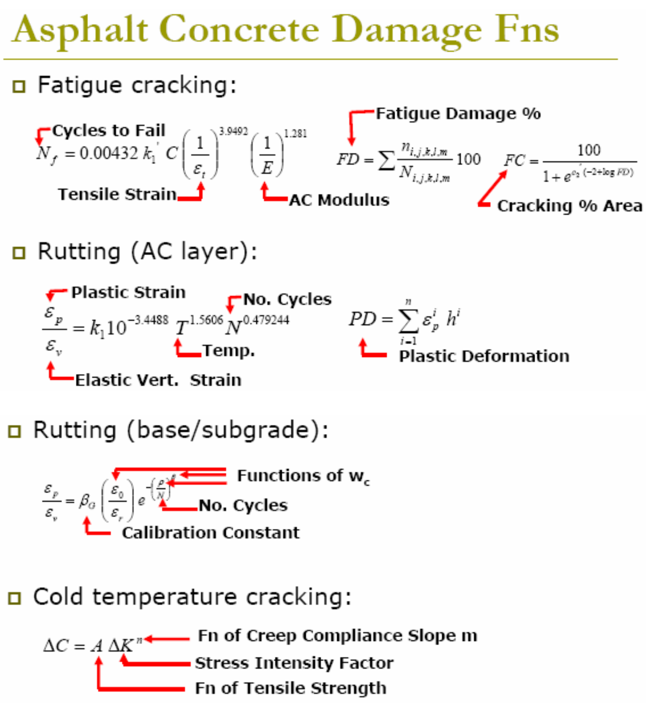
The objectives of the lecture are:

- Provide an insight into the fundamentals of pavement material characterization and its input into the new M-E pavement design developed in the US under the NCHRP Study 1-37A.
- Describe characterization of traffic loading, subgrade, base and surface layer (asphalt and Portland concrete) properties and discuss some of the damage models used to predict pavement deterioration.

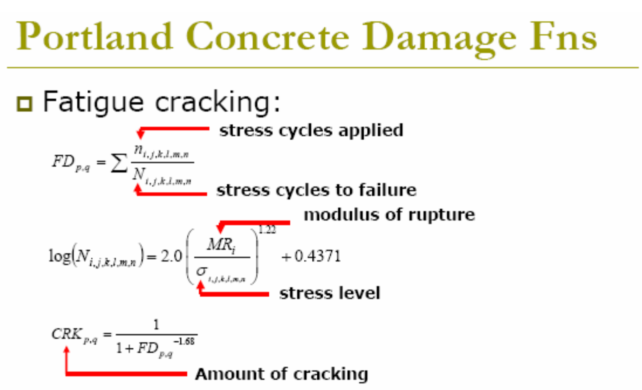
The 2002 M-E PDG (released in June 2004) approach (www.trb.org/mepdg):

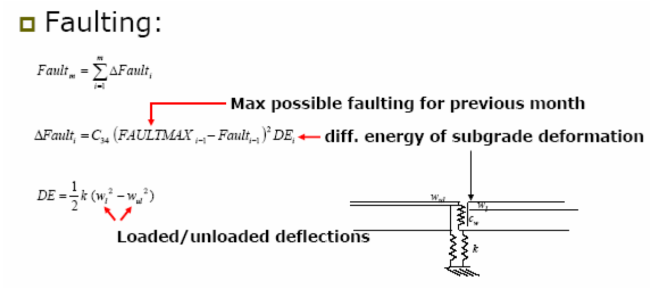
- Compute structural responses to load:
  - Layered visco-elastic analysis for asphalt concrete
  - FE analysis of portland concrete slabs on:
    - Solid (Boussinesq) or
    - Liquid (Winkler) foundation
- Accumulate damage from computed strains:
  - Asphalt concrete (flexible):
    - Fatigue cracking (bottom-up and top-down)
    - Plastic deformation (in all layers)
    - Cold-temperature cracking
    - Roughness
  - Portland concrete (rigid/depends on configuration):
    - Fatigue cracking
    - Faulting
    - Punch-outs
    - Roughness

For the Flexible Pavement Analysis:



For the Rigid Pavement Analysis:





Περισσότερες πληροφορίες στην ηλ.δι. at.papagiannakis@utsa.edu.

Ο Καθηγητής Α. Παπαγιαννάκης απεφοίτησε από την Σχολή Πολιτικών Μηχανικών του Εθνικού Μετσοβίου Πολυτεχνείου το 1979. Συνέχισε με μεταπτυχιακές σπουδές στο University of Saskatchewan, όπου έλαβε το M.Sc. το 1982 και κατόπιν στο University of Waterloo, όπου έλαβε το Ph.D το 1988.

Διετέλεσε καθηγητής για 14 χρόνια στο Washington State University και στη συνέχεια καθηγητής στο University of Texas – San Antonio.

Έχει γράψει μεγάλο αριθμό επιστημονικών άρθρων και είναι συγγραφέας του προφάτως εκδοθέντος (Ιανουάριος 2008) textbook “Pavement Design and Materials” (www.wiley.com).

ΝΕΑ ΑΠΟ ΤΙΣ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

Research on Pillar Strength in South Africa

On a recent visit to the Eastern Free State region of South Africa, the ISRM Vice President for Africa Dr Malan stumbled upon this interesting "mushroom" rock formation. This area is known for its beautiful landscape and rock formations created by the erosion of the Clarens formation sandstones and have become a popular alternative tourist destination in South Africa. The base of the mushroom was an approximate rectangular shape reminiscence of a slender pillar with a high width to height ratio. It was a most unfortunate discovery as a rock engineer on holiday does not necessarily want to solve pillar strength problems!

A stability analysis of the feature will be presented in the next issue of the ISRM News Journal. The factor of safety obtained for this "pillar" still appears very large and provided a strong wind does not topple it, visitors should be able to enjoy this interesting formation for many years to come!

(ISRM Newsletter, No. 1 - March 2008)

Nature's in situ shear test

These photos were taken by our Vice President for North America Prof. Derek Martin, during one of his hiking trips last summer in the rocky mountains south of Banff, Alberta. The hiking trail follows the valley and encounters a relatively recent rock slide. The slide has occurred in thick beds of limestone. As the other photos show nature has a simple way of testing for limiting equilibrium. In the close up slide, a tension crack appears to separate the bed and raises the question: does the tension crack occur first and allow the block to slip, or does the block slip first which creates the tension crack?

(ISRM Newsletter, No. 1 - March 2008)

Levees and dams: Same purpose, different standards?

If levees are as potentially hazardous as dams, they should be held to the same standard, says Lawrence Von Thun, who is retired from the U.S. Bureau of Reclamation. "A dam by any other name is still something that holds back water and poses a hazard."

Von Thun has 14 years of experience performing failure mode analysis on 500 projects, including dikes, levees and embankments. His assertions seemed particularly poignant in Katrina-ravaged New Orleans, where a panel of experts discussed the topic during the 2008 Annual Congress of the Geo-Institute of the American Society of Civil Engineers. The event took place March 9-12.

Other speakers reinforced Van Thun's idea. "If a levee holds back water 100% of the time, and people's lives are at risk, it is the same as a dam," says William Marcusson, past-president, ASCE, retired from the U.S. Army Corps of Engineers.

Throughout the years, Von Thun has repeatedly observed that name designation (anything other than dam) is associated with less care in design, construction and operation. Thousands of projects have a main dam and lesser, associated structures. The lesser structures invariably receive less attention, especially in foundation preparation, he says. "Pseudonyms have led to pseudo dams."

"If the consequences and potential for loss of life are there, we have to treat it as a dam," agrees David Bowles, professor of civil and environmental engineering at Utah State University, in Logan, Utah. "We need to target for the same level of safety, but can we get there for some reasonable cost?"

Questions about the ability to finance a higher level of levee safety led panelists to emphasize the importance of effectively communicating risk and providing redundancies, such as evacuation plans, to protect public safety. "No matter what structural designs are in place, people need to be educated that they don't have zero risk," Moser says.

Bowles suggested a shift in focus from levee safety to public safety and from technology-based safety justifications to risk-informed justifications. "Looking for a level of risk that is acceptable is problematic when we are talking about people's lives," Bowles says. "We need to look at tolerable risk — not zero risk — but a risk we are willing to live with provided certain considerations." Bowles lauded the U.S. Army Corps of Engineers' recent shift from the term "hurricane protection system" to "hurricane and storm damage risk reduction system," saying that until risk is effectively communicated, it can't be put into comparative context with other risks.

Communicating risk with the public was the topic of a later panel, which addressed the challenges in communicating complex issues of risk to a public that wants to be assured of its safety and wants to remain economically viable. "The most difficult thing of all is the communication," says Dr. Ed Link, director of U.S. Army Corps of Engineers forensic analysis for Hurricane Katrina. Having spent the past two and a half years on what he describes as "a journey to build a prototype approach on how to quantify risk for the people of New Orleans."

Link says he has been criticized for releasing the Interagency Performance Evaluation Task Force Risk & Reliability maps in the summer of 2007. The maps colorfully depict probable inundation levels using computerized models of 152 storms against pre-Katrina levels of protection, the system on June 1, 2007 and the system when 100-year levels of protection will be in place in 2011. On March 10, the Corps released another set of maps with indicate probable depths of flooding, under the same three system conditions, but adding into the equation internal pumping capacities of 0%, 50% and 100%.

"One of the challenges I've faced is some reluctance to see maps like this," Link says, pointing to a map that indicates the probability of total, citywide inundation, in the event of a 500 year storm, with an incomplete system and no interior pumping capacity. Still, the Corps has adhered to its commitment to be open and transparent and educate the public honestly about conditions on the ground. "I think the greatest risk is not knowing what your risk is," Link says.

The public doesn't like to discuss risk, adding to the problem, says Shirley Laska, professor of sociology at the University of New Orleans. "We are such a privileged society that we really don't want to talk about risk," she says. "For many people, levees are sort of the super-fix, and once they are there, we don't want to be bothered with the solution."

Perhaps developing a new language is part of the solution, says Sheila Grissett, a reporter for the Times-Picayune newspaper in New Orleans. "People don't understand what 100-year storm, what 100-year water level means," Grissett says. "They don't understand those concepts enough to not confuse them. People have lost their Saffir Simpson scale, their 1-5. They have lost their vocabulary, and we have not yet managed to give them another."

However, everyone on the panel agreed that finding a way to communicate that risk is imperative. About 10 years ago, FM Global, an international property insurance provider, realized that it was spending too much time trying to sell recommendations to clients, rather than effectively communicating risk, says Clive Goodwin, an assistant vice president. "Once people understand risk, they say, 'oh what the hell can I do about that?' You've already got the sale before you start," Goodwin says. "If you can get people to understand risk, you can reduce the risk and it will be beneficial for everyone."

(ASCE SmartBrief, March 13, 2008)

ΕΝΔΙΑΦΕΡΟΝΤΑ

Δρόμοι και Γέφυρες

Πώς δικαιολογείται το παράξενο σχήμα της γέφυρας των παρακάτω φωτογραφιών;

Η απάντηση στην επόμενη σελίδα …

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

Για τις παλαιότερες καταχωρήσεις περισσότερες πληροφορίες μπορούν να αναζητηθούν στα προηγούμενα τεύχη του «περιοδικού» και στις παρατιθέμενες ιστοσελίδες.

Green5 Construction for a sustainable environment, 1 - 4 July 2008, Vilnius, Lithuania, www.green5.co.uk

E-UNSAT 2008 1st European Conference on Unsaturated Soils, 2 – 4 July 2008, Durham, UK, www.e-unsat.dur.ac.uk

2008 Seismic Engineering International Conference commemorating the 1908 Messina and Reggio Calabria Earthquake (MERCEA'08), 8 – 11 July 2008, Reggio Calabria and Messina, Italy, www.mercea08.org

GKK 08 - Geomechanics Colloquium Karlsruhe "Fundamentals and Applications of Geomechanics", Scientific Symposium on the occasion of the 70th birthday of Prof. Dr.-Ing. Dr. h.c. Gerd Gudehus and the centenary of Baurat h.c. Prof. Dr. techn. Dr. mont. h.c. Leopold Müller, 24 – 25 July 2008, Karlsruhe, Germany, www.ibf.uni-karlsruhe.de/gkk08/gkk08_en.html

6th International Conference on Case Histories in Geotechnical Engineering and Symposium in Honor of Professor James K. Mitchell, 11 – 16 August 2008, University of Missouri – Rolla, www.6icchge2008.org

International Summer School on Rockslides and Related Phenomena, 20 August – 5 September 2008, Kokomeren River Valley, Kyrgyzstan.

XII International Conference and Field Trip on Landslides (ICFL), the ALPPS 2008 – Alpine Landslide Problems and projects Switzerland 2008, August 23 - September 3, 2008, Bern, Switzerland, www.alpps.ch

International Disaster and Risk Conference IDRC Davos 2008, 24 – 29 August 2008, Davos, Switzerland, www.idrc.info

1st International Conference on Transportation Geotechnics, 25 – 27 August 2008, Nottingham, United Kingdom, www.nottingham.ac.uk/ncg

1st South American Symposium on Rock Excavations, 1 – 2 September 2008 Santa Fé de Bogota, Colombia, www.scg.org.co

2nd International Workshop on GEOTECHNICS OF SOFT SOILS, 3 – 5 September 2008, University of Strathclyde, Glasgow, Scotland, www.iwgss.org

19th European Young Geotechnical Engineers Conference 4 - 5 September 2008, Gyor, Hungary.

EuroGeo4 - 4th European Geosynthetics Conference, 7 – 10 September 2008, Edinburgh, Scotland, United Kingdom - www.eurogeo4.org

International Workshop on Geoenvironment & Geotechnics, 8 – 9 September 2008, Milos Island, Greece - milos.conferences.gr/?geoenv2008

"Stress Wave", 8 – 10 September 2008, Lisbon, Portugal, www.stresswave2008.org

5th International Geotechnical Seminar "Deep Foundations on Bored and Auger Piles", September 8 ÷ 10, 2008, Ghent, Belgium, terzaghi.ugent.be

12th International Conference "Geotechnika - 2008 – Geotechnics" on Techniques, Technologies and Monitoring of the Geotechnical Construction, The High Tatras, Slovak Republic, 10 - 12 September 2008, orgware@mail.t-com.sk

ISSMGE TC28 Hungary
Questions about the construction work of Metro line 4 in Budapest
12-13 September 2008, Budapest, Hungary
issmge-tc28-hungary.net/main.php?menu=1

The Technical Committee TC28 "Underground Construction in Soft Ground" of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) has a major commitment towards collecting information concerning tunnel design and construction in the urban environment, with regard to both bored and braced excavations. The TC 28 Committee has already organized six international symposia in NEW DELHI (1994), LONDON (1996), TOKYO (1999), TOULOUSE (2002), AMSTERDAM (2005) and SHANGHAI (2008). The tables of Contents of the last three symposia can be found on this website.

The TC 28 Committee in cooperation with the Hungarian Tunnelling Association and the Hungarian Chamber of Engineers is pleased to invite you to Budapest the wonderful Capital city of Hungary for the International Workshop (ISSMGE TC28 Hungary 2008) which is being held at the Budapest University of Technology and Economics from 12th to 13th September, 2008. Now the 4th Metro line is being constructed in Budapest and an additional line will likely to be constructed which will also serve as a regional line.

The workshop consists of two days and two parts:

1. Invited lectures:

    - Geological-geotechnical questions of Route of Metro 4 Budapest will be reviewed according to the construction technology,
    - Observations about the construction work of the metro stations and line sections
    - Results of the method of measuring surface sinking

2. Discussion and workshop:

    The modern construction method of tunnelling under major rivers, with regard to special geological factors. Observations, suggestions, opinions.

    Group site visits at various workplaces.

Contact: Prof. József Mecsi or Mrs Andrea Zseni: contact@issmge-tc28-hungary.net

11th Baltic Sea Geotechnical Conference "Geotechnics in Maritime Engineering", 15 – 18 September 2008, Gdansk, Poland - www.11bc.pg.gda.pl

Regional Conference on Geomorphology "Landslides, Floods and Global Environmental Change in Mountain Regions", Brasov, Romania, 15 - 25 September 2008, www.geomorph.org, www.geoinst.ro

1st Southern Hemisphere International Rock Mechanics Symposium, 16 - 19 September 2008, Western Australia, www.shirms.com

ITA – AITES World Tunnel Congress and 34th General Assembly of ITA – AITES, 19 ÷ 25 September 2008, Agra, India - www.cbip.org

4th International Symposium on Pre-Failure Deformation Characteristics of Geomaterials and Symposium Deformation Characteristics of Geomaterials (IS-Atlanta 2008), 21 – 24 September 2008, Atlanta, U.S.A., www.isatlanta2008.org

International Symposium on Conservation of Ancient Sites 2008, 21 – 24 September 2008, Dunhuang, China, www.dha.ac.cn

4th International Symposium on Pre-Failure Deformation Characteristics of Geomaterials AND Symposium on Characterization and Behaviour of Interfaces, 22 – 24 September 2008, Atlanta, Georgia, USA, glenn.rix@ce.gatech.edu

ΤΕΤΑΡΤΟ ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ "ΔΙΑΧΕΙΡΙΣΗ ΚΑΙ ΒΕΛΤΙΩΣΗ ΠΑΡΑΚΤΙΩΝ ΖΩΝΩΝ", 23 – 27 Σεπτεμβρίου 2008, Μυτιλήνη.

The 12th International Conference of IACMAG - International Association for Computer Methods and Advances in Geomechanics, 1 ÷ 6 October 2008, Goa, India

AFTES – International Congress "Building underground for the future", 6 – 8 October 2008, Monaco, www.aftes.asso.fr

HYDRO 2008 "Progressing World Hydro Development" CONFERENCE and EXHIBITION, Ljubljana, Slovenia ~ 6 - 8 October 2008, www.hydropower-dams.com

NUCGE 2008 – International Conference on Numerical Computation in Geotechnical Engineering, October, 27-29 2008, Skikda, Algeria, www.univ-skikda.dz/conference/accueil1.html

57th Geomechanics Colloquy 2008 in honour of the 100th birthday of Leopold Műller and the 40th birthday of the ŐGG, Salzburg, 9 – 10 October 2008, www.oegg.at/english/events/events.htm

14th World Conference on Earthquake Engineering (14WCEE), 12 - 17 October 2008, Beijing, China - www.14wcee.org

SURF 2008

Portorož, Slovenia, Europe
20-22 October 2008

Every 4 years PIARC organizes an international symposium on pavement surface characteristics for roads and airfields, so called SURF events. The first symposium was held at State College, Pennsylvania, USA in June 1988, followed by symposia in Germany (Berlin, June 1992), New Zealand (Christchurch, September 1996), France (Nantes, June 2000), and Canada (Toronto, June 2004). The success and interest shown in these symposia has encouraged PIARC Technical Committee TC 4.2 "Road/Vehicle Interaction" and the Slovenian PIARC National Committee to organize the 6th International Symposium on Pavement Surface Characteristics of Roads and Airfields in 2008. SURF 2008 will be held in Grand Hotel Bernardin, Portorož, Slovenia.

The main objective of the Symposium is to share and discuss experience about how to improve quality through effective management of road infrastructure assets, in accordance with user expectations and managers' requests.

Technical sessions will include:

- Exchange of technology, ideas and visions on road and airport pavement surface characteristics.
- Efficient management of road assets with management systems capable of integrating all infrastructure components, based on performance indicators describing road functionality.
- The condition of surface characteristics-including bridges and geotechnical structures (longitudinal and transverse profiles, distress detection, noise, skid resistance measures, analysis and interpretations etc...).
- Presentation of the results of the work of PIARC TC 4.2 and of cooperation with international institutions, the automotive industry, and organisations dealing with the construction and maintenance of road infrastructures.

Chairman of PIARC TC 4.2: Mr. Bjarne Schmidt
Danish Road Institute
Tel.: +45-72-44-71-40, Fax: +45-72-44-71-05

Chairman of the Scientific Committee: Mr. Mathieu Grondin
Transports Québec
Tel.: +1-418-644-0890 poste 4056, Fax: +1-418-646-6195

Chairman of the Organizing Committee: Mr. Bojan Leben
ZAG Slovenija
Tel.:+386-41-730-518, Fax:+386-1-28-04-264

Xth International Conference "Underground Urban Infrastructure 2008", 22 - 24 October 2008, Wroclaw, Poland, www.wbliw.pwr.wroc.pl/uiua2008

NUCGE 2008 – International Conference on Numerical Computation in Geotechnical Engineering, October, 27-29 2008, Skikda, Algeria - www.univ-skikda.dz/conference/accueil1.html

ICSE-4 Fourth International Conference on Scour and Erosion, Tokyo, 5 - 7 November 2008, icse-4.kz.tsukuba.ac.jp

3ο Πανελλήνιο Συνέδριο Αντισεισμικής Μηχανικής και Τεχνικής Σεισμολογίας, 5 – 7 Νοεμβρίου 2008, Αθήνα, www.civil.ntua.gr/3-PCEEES

Atlantis 2008 - The Atlantis Hypothesis Q Searching for a Lost Land, Athens, 10 - 11 November 2008, atlantis2008.conferences.gr/4299.html

International Conference on Deep Excavations (ICDE), 2008 10 - 12 November 2008, Singapore, www.icde2008singapore.org

International Conference on Management of Landslide Hazard in the Asia-Pacific Region, 11 - 15 November 2008, japan.landslide-soc.org/index-e.html

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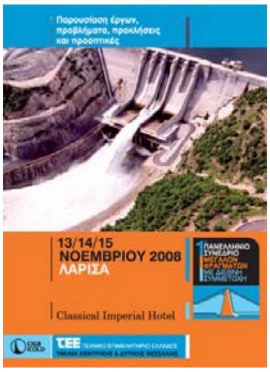

1ο Πανελλήνιο Συνέδριο Μεγάλων Φραγμάτων
13 – 15 Νοεμβρίου 2008, Λάρισα
portal.tee.gr/portal/page/portal/teelar/EKDILWSEIS/damConference

Το συνέδριο διοργανώνεται από το Τεχνικό Επιμελητήριο Ελλάδος. Βασικοί στόχοι του συνεδρίου είναι:

- Η ανάδειξη του ρόλου των φραγμάτων στους τομείς εξασφάλισης υδατικών πόρων, υδροηλεκτρικής ενέργειας, διαχείρισης πλημμυρών κλπ.
- Η παρουσίαση έργων από τον Ελληνικό χώρο και η άντληση εμπειρίας από παραδείγματα επιτυχημένων η μη έργων.
- Ο προβληματισμός γύρω από τις αδυναμίες του Ελληνικού συστήματος σχεδιασμού, κατασκευής και εκμετάλλευσης φραγμάτων (διαφορετικότητα των φορέων υλοποίησης, συχνά ανυπαρξία των φορέων λειτουργίας).
- Η συμβολή στην επίτευξη ενός υψηλού επιπέδου ποιότητας σε όλες τις φάσεις υλοποίησης των έργων.
- Η συμβολή στην αποφυγή άστοχων επενδύσεων με την προβολή τεχνικοοικονομικών κριτηρίων υλοποίησης νέων φραγμάτων για τη διασφάλιση βέλτιστης σχέσης κόστους/οφέλους για κάθε έργο.
- Η ανάδειξη της σοβαρότητας της περιβαλλοντικής διάστασης και της κοινωνικής συνιστώσας για κάθε έργο, ώστε να λαμβάνονται υπόψη και να κοστολογούνται από τα αρχικά στάδια του σχεδιασμού.
- Η παρουσίαση της σύγχρονης διεθνούς τεχνογνωσίας που αφορά στην μελέτη, κατασκευή και την ασφαλή λειτουργία των φραγμάτων.
- Η παρουσίαση του θεσμικού πλαισίου που υπάρχει σε άλλες χώρες και η διατύπωση προτάσεων βελτίωσης της ασφάλειας των έργων με στόχο την σύνταξη εθνικού κανονισμού ασφάλειας φραγμάτων.
- Η συζήτηση συγκεκριμένων αποδοτικών έργων που θα δώσουν βέλτιστες λύσεις στο πρόβλημα περιοχών όπως η Θεσσαλία.

Θεματολόγιο

1. Φράγματα και Περιβάλλον

- Περιβαλλοντικός σχεδιασμός μεγάλων Φραγμάτων, Αειφόρος Ανάπτυξη.
- Εμπλουτισμός - αποκατάσταση υπόγειων υδροφορέων, δημιουργία υγροβιότοπων αντιπλημμυρική προστασία κ.λ.π.
- Περιβαλλοντικές επιπτώσεις από την κατασκευή και λειτουργία φραγμάτων - Μέτρα αντιμετώπισης.
- Παραδείγματα (θετικά και αρνητικά) από την ελληνική και διεθνή πραγματικότητα.

2. Φράγματα & Ενέργεια

- Σημασία των φραγμάτων στον ενεργειακό σχεδιασμό.
- Φράγματα και υβριδικά συστήματα παραγωγής ενέργειας

3. Φράγματα και Ολοκληρωμένη διαχείριση Υδατικών πόρων

- Τα Φράγματα ως έργα διαχείρισης Υδατικών Πόρων πολλαπλού σκοπού.
- Συμβολή στην αποφυγή άστοχων επενδύσεων με την προβολή τεχνικοοικονομικών κριτηρίων υλοποίησης νέων φραγμάτων για τη διασφάλιση βέλτιστης σχέσης κόστους/οφέλους για κάθε έργο.
- Φράγματα και ολοκληρωμένος σχεδιασμός λεκανών απορροής.
- Λεκάνη Θεσσαλίας και βέλτιστες λύσεις υλοποίησης Φραγμάτων.

4. Διακινδύνευση και Ασφάλεια

- Προβληματισμός γύρω από τις αδυναμίες του Ελληνικού συστήματος σχεδιασμού, κατασκευής και εκμετάλλευσης φραγμάτων (διαφορετικότητα των φορέων υλοποίησης, συχνά ανυπαρξία των φορέων λειτουργίας).
- Συστήματα παρακολούθησης της συμπεριφοράς των έργων.
- Διατύπωση προτάσεων βελτίωσης της ασφάλειας των έργων με στόχο την σύνταξη εθνικού κανονισμού ασφάλειας φραγμάτων.
- Παρουσίαση συμβάντων ή περιστατικών συγκεκριμένων έργων από την Ελλάδα ή το εξωτερικό.

5. Εξελίξεις στις Μεθόδους σχεδιασμού & κατασκευής

- Συμβολή στην επίτευξη ενός υψηλού επιπέδου ποιότητας σε όλες τις φάσεις υλοποίησης των έργων.
- Υλικά κατασκευής Φραγμάτων.
- Μέθοδοι κατασκευής, νέες τεχνικές.
- Υδραυλικές κατασκευές Φραγμάτων.
- Αντισεισμικός σχεδιασμός.

6. Γεωλογία και Φράγματα

- Προβλήματα και αντιμετώπισή τους.
- Σύγχρονες μέθοδοι έρευνας.

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The First World Landslide Forum - Implementing the 2006 Tokyo Action Plan on the International Programme on Landslides (IPL) - Strengthening Research and Learning on Earth System Risk Analysis and Sustainable Disaster Management within UN-ISDR as Regards "Landslides", 18 - 21 November 2008, United Nations University, Tokyo, Japan - www.iclhq.org

5th Asian Rock Mechanics Symposium "New Horizons in Rock Mechanics - Development and Applications", 24 - 26 November 2008, Tehran, Iran, www.arms2008.org

5th WBI-International Shortcourse "Rock Mechanics, Stability and Design of Tunnels and Slopes", 27 – 30 November 2008, WBI, Aachen, Germany, www.wbionline.de

3rd International Conference on GEOTECHNICAL & GEOENVIRONMENTAL ENGINEERING, ROCK MECHANICS & ENGINEERING GEOLOGY "Recent Advances", 10 - 12 December 2008, Chiangmai, Thailand www.cipremier.com/ciframeset.htm?index2.htm

GEOAGE Advances in Geotechnical Engineering – IGC 2008, 17 – 19 December 2008, Bangalore, India, civil.iisc.ernet.in/~igc 2008

International Conference on Rock Joints and Jointed Rock Masses, 4 – 11 January 2009, Tucson, Arizona, USA, www.jointedrock2009.org

RGMA-09 International Symposium on Rock Mechanics and Geoenvironment in Mining and Allied Industries, 12 - 14 February 2009, Varanasi, Uttar Pradesh, India, www.itbhu.ac.in/min/conferences

Geosynthetics 2009, 25 - 27 February 2009, Salt Lake City, Utah, USA www.geoshow.info

International Foundation Congress & Equipment EXPO '09, 15 – 19 March 2009, Orlando, Florida, USA, www.ifcee09.org

7th International Conference on GROUND IMPROVEMENT TECHNIQUES, 20 - 22 April 2009, Macau, China, www.cipremier.com/ciframeset.htm?index2.htm

SINOROCK2009 International Symposium on Rock Mechanics "Rock Characterization, Modelling and Engineering Design Methods", 19 - 22 May 2009, Hong Kong, www.hku.hk/sinorock

SINOROCK2009 Extra-terrestrial rock mechanics.

"Safe Tunnelling for the City and Environment" ITA-AITES World Tunnel Congress 2009 and the 35th ITA-AITES General Assembly, Budapest Congress and Word Trade Center, Budapest, Hungary, 23 - 28 May 2009 - www.wtc2009.org

Géotechnique SYMPOSIUM IN PRINT 2009, May 2009, www. geotechnique-ice.com

3rd International Conference on New Development in Rock Mechanics and Engineering & Sanya Forum for the Plan of City and City Construction (NDRM'2009), 24 - 26 May 2009, Sanya, Hainan Island, China, www.ndrm2008.cn

International Symposium on Prediction and Simulation Methods for Geohazard Mitigation IS-Kyoto, 25 – 27 May 2009, Kyoto, Japan, nakisuna2.kuciv.kyoto-u.ac.jp/tc34/is-kyoto

IS-Tokyo 2009 "International Conference on Performance-Based Design in Earthquake Geotechnical Engineering - from case history to practice", 15 – 17 June 2009, Tokyo, Japan, www.comp.tmu.ac.jp/IS-Tokyo

WCCE – ECCE – TCCE Joint Conference "EARTHQUAKE & TSUNAMI", 22 – 24 June 2009, Istanbul, Turkey - www.imo.org.tr/eqt2009

The 3rd International Geotechnical Symposium (IGS2009) on Geotechnical Engineering for Disaster Prevention and Reduction, 22 - 25 July 2009, Harbin, China, igs2009.hit.edu.cn

GeoHunan International Conference: Challenges and Recent Advances in Pavement Technologies and Transportation Geotechnics, 3 – 6 August 2009, dchen@dot.state.tx.us

GeoAfrica 2009 "Geosynthetics For Africa", 2 – 4 September 2009, Cape Town, South Africa, www.gigsa.org

17th International Conference on Soil Mechanics and Geotechnical Engineering "Future of Academia & Practice of Geotechnical Engineering", 5 – 9 October 2009, Alexandria, Egypt - www.2009icsmge-egypt.org

EUROCK'2009 Rock Engineering in Difficult Ground Conditions - Soft Rocks and Karst, 29 - 31 October 2009, Dubrovnik-Cavtat, Croatia, www.eurock2009.hr

IX International Conference on Geosynthetics, Brazil, 2010 - www.igsbrasil.org.br/icg2010

ISRM Regional Symposium on Rock Mechanics
Lausane, Switzerland, 23-25 June 2010

The ISRM Regional Symposium of Rock Mechanics will take place in Lausanne, Switzerland, 23 to 25 June 2010. More information on this conference will be available soon.

The proposed topics to be covered are: rock mechanics theory and fundamentals, constitutive relations and strength criteria; development in numerical methods and numerical modelling techniques; site investigation, in situ stress measurements, and geophysical methods; laboratory experiments and physical modelling techniques; rock mass characterization and classification for design; rock excavation, drilling, blasting, TBM and new excavation technologies; rock support and reinforcement, ground-structure interaction; rock dynamics, seismicity, earthquake and time dependence behaviour; rock engineering applications in foundations, slopes, tunnels and caverns.

XV African Regional Conference on
Soil Mechanics and Geotechnical Engineering
Maputo, Mozambique, 13-16 June 2011

Organizer: Soc. Moçambicana de Geotecnia

XVth European Conference on Soil Mechanics and Geotechnical Engineering, 12 – 15 September 2011, Athens, Greece.

Beijing 2011, 12th International Congress on Rock Mechanics, 16 – 21 October 2011, Beijing, China, www.isrm2011.com

ΝΕΑ ΑΠΟ ΤΟΝ ΚΟΣΜΟ

112 Named in UK Bid Rigging Probe – Μήπως θυμίζει λίγο τον «μαθηματικό τύπο»;

The UK's Office of Fair Trading (OFT) has alleged that 112 construction companies in the UK have engaged in bid rigging. The allegations, in the form of a Statement of Objections, follow one of the largest ever investigations under the UK's Competition Act.

An activity the OFT said was particularly prevalent was cover pricing – the practice of deliberately entering a bid that is too high to win a contract. This is designed to either ensure that work is not won but that a contractor stays in favour with the client for future work, or to ensure a competitor wins a contract.

In addition to widespread cover pricing, the OFT alleges that some companies entered into agreements whereby a successful contractor would make 'compensation payments' to unsuccessful bidders.

Long investigation

The OFT started looking into collusion in the UK construction industry following a specific complaint in 2004. Since then it says it has received evidence of cover pricing "on thousands of tender processes," but has focused its investigation on some 240 specific alleged infringements.

The OFT raided 57 companies as part of its investigation, and has received 37 applications for leniency. Under such arrangements, companies can apply for a reduced fine if they admit their guilt. Following these leniency applications, all the companies being investigated were offered reduced fines, and 40 accepted this offer.

Commenting on the investigation, OFT chief executive John Fingleton said, "The investigation, together with the OFT's previous decisions in the roofing sector, will hopefully send out a strong message to the construction industry about the seriousness with which we view suspected anti-competitive behaviour. Businesses have no excuses for not knowing and abiding by the law."

Although many of the companies named in the OFT's Statement of Objections are small regional contractors, the list also includes some of the bigger names in the UK's, and indeed Europe's, contracting fraternity. These include Balfour Beatty, Ballast Nedam, Bowmer & Kirkland, Carillion, Henry Boot, John Sisk, Kier, Propencity and Willmott Dixon.

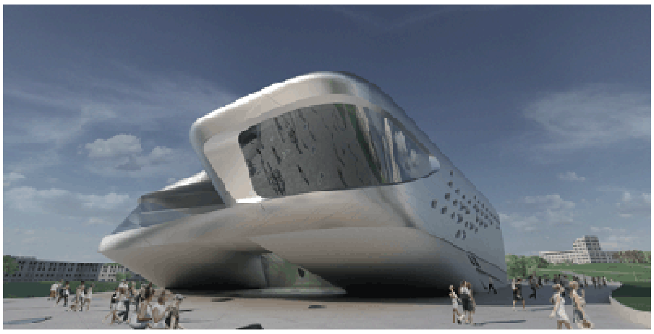
(CONSTRUCTION EUROPE, April 17, 2008, Editor : Chris Sleight)

Hadid wins in Vilnius

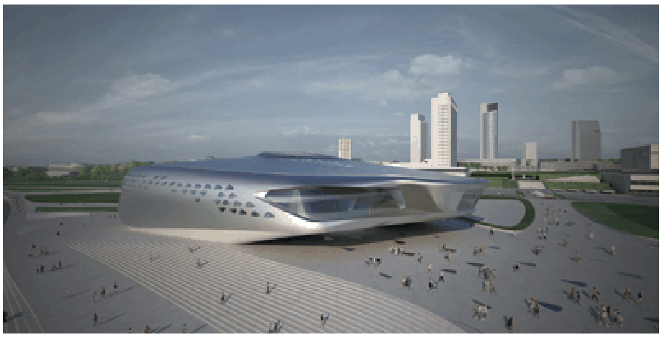
UK-based Zaha Hadid Architects has unveiled its winning design for a new Guggenheim-Hermitage Museum and cultural centre in Vilnius, Lithuania. The new centre for international art will house pieces from collections of both the New York based Solomon R. Guggenheim Foundation and the St. Petersburg based State Hermitage Museum.

The Pritzker prize-winning architect was awarded the competition ahead of fellow architects Daniel Libeskind and Massimiliano Fuksas.

Subject to the results of a feasibility study to be carried out later this year, it could open in early 2011.



Commenting on the win Zaha Hadid said, "I am delighted to be working in Vilnius on the Guggenheim Hermitage Museum. The city will be the European Capital of Culture in 2009 and has a long history of art patronage. With such an interest in the arts, Vilnius will continue to develop as a cultural centre where the connection between culture and public life is critical. This museum will be a place where you can experiment with the idea of galleries, spatial complexity and movement."



(CONSTRUCTION EUROPE, April 23, 2008, Editor : Richard High)

World-beating Chinese bridge open for traffic

The longest sea bridge in the world has now opened for traffic in China. Stretching some 36km, the new bridge has been built as part of a plan to boost economic integration and development in the Yangtze River Delta, according to the official Xinhua news agency. The challenges set by the project have led to over 250 technological innovations and engineering breakthroughs. The complicated climate conditions in Hangzhou Bay made the construction one of the most difficult in the world. The project has also survived 19 major challenges, including typhoons, sea tides and geological problems, during construction. Although it is slightly shorter than the 38.4km bridge across Lake Pontchartrain in New Orleans, the world's longest water-spanning structure, this new bridge has set engineering standards due to the difficulties imposed by its location.

Construction work began in November 2003 and the six lane structure has been designed to last 100 years. The bridge will reduce the length of the road trip from Shanghai to the busy port of Ningbo by 120km and traffic using the structure is allowed to travel at up to 100km/h. The new bridge features a 32km section spanning the sea and cost US$1.69 billion to construct. The project marked a major change for China as around 30% of the funding came from private investors, the first time the country's private sector had invested in a major public infrastructure project.

(WORLD HIGHWAYS, May 2, 2008)

Nakheel completes the world

To celebrate four years since its launch, Dubai, United Arab Emirates-based developer Nakheel has released a "never seen before" satellite image of its US$ 20 billion The World development.

Land reclamation on the "epic development" is now complete, said the developer in a statement on its website, adding the image is a "snapshot for the history books."

Measuring 9 km wide and 7 km long, the project is located 4 km offshore from Dubai. The mixed-use private and commercial development of 300 islands adds over 232 km of new beach front to Dubai's coastline.

(INTERNATIONAL CONSTRUCTION, May 6, 2008, Editor: Richard High)

US$ 3 billion fixed link

A consortium led by Vinci has signed a US$ 3 billion design & build contract for the world's longest bridge.

The Qatar-Bahrain causeway will be 40 km long in total, with 18 km of the two-lane dual carriageway carried on embankments in shallow areas. The remaining 22 km of the fixed link will be carried on viaducts, including two 400m span cable-stayed bridges over shipping channels.

The so-called 'Friendship Bridge' will be the first direct link between the two countries, and will cut journey times from the current five hours to 30 minutes.

The consortium carrying out the work comprises Vinci Construction Grands Projects (leader), Hochtief, CCC and QDVC, a joint venture between Vinci and real estate company Qatari Diar. In addition, Vinci subsidiary Medco will be responsible for the dredging work.

Nine months of studies and surveys are now planned, after which construction of the link is expected to take 51 months.

(INTERNATIONAL CONSTRUCTION, May 7, 2008, Editor: Chris Sleight)

Record educational order

The Polish Ministry of Education has agreed to buy more than 860 surveying instruments from Topcon. The order, comprising 430 total stations and 430 optical levels is thought to be a world record.

The equipment will be delivered by TPI - Topcon's exclusive dealer in Poland – to secondary schools and technical colleges throughout the country, following the signing of an agreement on 5 May. The models being delivered are Topcon's GPT3107N reflector-less total stations and AT-G6 levels.

Commenting on the deal, Topcon Europe Positioning director of marketing and sales, Ewout Korpershoek said, "The Ministry of Education has made a wise long-term investment in Poland's future, by making sure that the surveyors of tomorrow get acquainted with state-of-the-are technology at an early phase of their lives.

(CONSTRUCTION EUROPE, May 12, 2008, Editor: Chris Sleight)

Quake puts spotlight on compliance

Concerns are being raised that building codes are not being followed in China, following Monday's devastating earthquake in Sichuan Province. The number of buildings that collapsed, particularly schools, has raised the question of whether they were built to withstand earthquakes, as specified in building codes.

The epicentre of Monday's earthquake was about 90 km northwest of the provincial capital Chengdu, which has a population of just over 11 million people. Although no major collapses have been reported in the city, many buildings are reported to have sustained serious structural damage, with large, visible cracks.

However, it is a different story in some of Sichuan's smaller towns and villages, where the 7.9 Richter Scale quake has caused death and destruction on a scale not seen in China for more than 30 years. At least 13000 people are thought to have been killed, and 60000 are still missing.

Some of the worst hit towns are in Beichuan county, where China's state news agency, Xinhua, reports that 80% of buildings have collapsed. Among these structures is Beichuan Middle school, a 7-storey building, which collapsed trapping as many as 1000 students.

In Shifang two ammonia plants have reportedly collapse, leading to massive leaks of the liquid into the local environment, while in Mianzhiu a steam turbine factory has reportedly collapsed.

The quake, combined with heavy rains also caused landslides, which closed several major highways in the Province, hampering rescue efforts.

This week's earthquake has revived memories of the 1976 earthquake centred on Tangshan in China's Eastern Hebei Province. The tremor all but destroyed this city of 1.6 million people and 225000 people were killed, although many believe this is a huge understatement of the true casualties.

(CONSTRUCTION EUROPE, May 14, 2008, Editor: Chris Sleight)

EIC takes stand on corruption

European International Contractors (EIC), a trade association that represents European contractors working outside their national boundaries, has published a draft position paper on corruption prevention.

Produced by the EIC's Working Group on Ethics, the paper seeks to address the attitude its sees among many governments and NGOs that it says demonise the private sector. Describing such stances as "simplistic policy statements," the EIC makes several points about the nature of corruption. Among other issues, it says that construction companies themselves are often the victims of unethical behaviour on the part of public officials that solicit bribes.

A statement from the EIC said, "The Working Group 'Ethics' has been asked to draft a policy response based on the principle that, for corruption prevention, 'It takes two to tango.'"

The EIC says any anti-corruption policy must be holistic, which is to say it must be implemented by all stakeholders. It also says that any workable policy must be commercially oriented, and be designed to find loopholes where corruption my occur, with a view to prevention.

Speaking at the EIC's general assembly in Milan on 16 May, Per Nielsen, chair of the Working Group said, "Corruption is a real threat to our industry's activities. Not just overseas, but in Europe too.

"We have tried to present some concrete solutions to prevent corruption. It can be don, but only if we act together as contractors."

According to Mr Nielsen, the draft position paper will now be edited to form a formal document, which will hopefully be presented at the EIC's next meeting in Amsterdam in early March.

More information about the EIC is available at: www.eicontractors.de

(CONSTRUCTION EUROPE, May 20, 2008, Editor: Chris Sleight)

Contractor charged in 'Big Dig' fraud

The US Attorney's Office in Massachusetts has filed 49 federal charges against Modern Continental Corporation (MCC) in connection with its work on the Central Artery/Tunnel (CA/T) project - the Big Dig' - in Boston. It is alleged that the company knowingly used substandard materials and forged documentation, and that this contributed to an accident in 2006 in which a motorist was killed.

The list of allegations against MCC is a long one. First, the US attorney's office says that when the company built a series of diaphragm walls, it did so knowing below-specification concrete was being used, and that it faked certificates to cover this up.

Boston's 'Big Dig' in November 1994.

On 15 September 2004, one of these walls blew-out, causing huge traffic delays, but ironically, the Attorney's office said it was this incident that alerted it to the problem and "numerous other un-repaired defects in the slurry (diaphragm) walls built by MCC."

MCC is also charged with using substandard materials and issuing false certificates in relation to ceiling supports on a section of the I-90 tunnel. This section uses concrete panels anchored by epoxy resin. The US Attorney's office alleges the epoxy used was not suitable for long-term applications, and that MCC knew this and again issued false certificates to cover its tracks.

On 10 July, 2006 a ceiling panel anchored with epoxy collapsed, killing a motorist that was driving through the tunnel.

It is also alleged that MCC over-billed the client. It was paid on a time and materials basis, and extracted extra money by classifying apprentices as skilled workers that were billed at a higher hourly rated. The US Attorney says this added up to hundreds of thousands of Dollars.

MCC is also charged with wire fraud because it was paid electronically for these alleged frauds. If convicted on all counts, MCC faces criminal fines of up to US$ 0.5 million and payment of compensation.

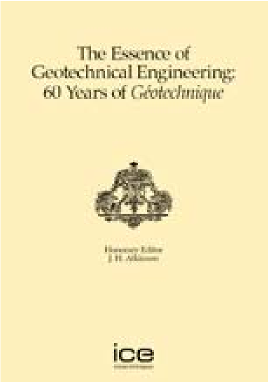
Chapter 11

MCC was not available for comment on the charges, although it has been reported locally that a company spokesman has described the charges as "completely unfounded and without merit."

It has also been reported that the company has filed for protection from its creditors under US Chapter 11 bankruptcy laws.

(INTERNATIONAL CONSTRUCTION, June 24, 2008, Editor: Chris Sleight)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ στις ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



The Essence of Geotechnical Engineering: 60 Years of Géotechnique

Honorary Editor
John Atkinson

This book marks the 60th anniversary of ICE' s world leading journal, *Géotechnique*. It includes a set of seminal papers published in *Géotechnique* over the past 60 years as well as all the papers from the specially commissioned June 2008 Diamond Jubilee issue.

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This valuable desktop archive is included completely free of charge with every order of *The Essence of Geotechnical Engineering: 60 Years of Géotechnique*, to celebrate the 60th anniversary of this world leading publication.

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Géotechnique: Past, present and future

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- Geotechnical publications before Géotechnique
- Geotechnics: the next 60 years

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- Retaining structures
- Slope stability and embankment dams
- Tunnelling
- Ground improvement
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- Groundwater
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- Engineering geology, rock mechanics and rock engineering
- Dynamics

Seminal papers and discussion: 1950–1990

- The measurement of the shear strength of soils
- The sensitivity of clays
- The movement and distribution of water in soils
- The use of the slip circle in the stability analysis of slopes
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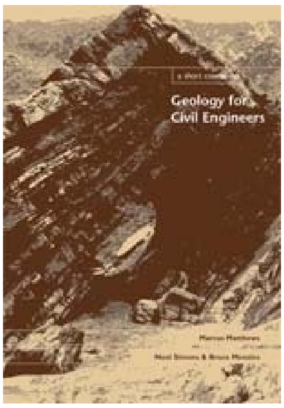
- On the yielding of soils
- A discrete numerical model for granular assemblies
- A computer model for the analysis of ground movements in London Clay
- A constitutive model for partially saturated soils

(Thomas Telford Ltd, 11.07.2008)



A short Course in Geology for Civil Engineers

M. Matthews, N. Simons and B. Menzies

This book explains the process of ground formation – what it is made of and how it behaves as an engineering material.

This enables the civil engineer to work from a few first principles to determine if the ground is an asset or a hazard.

It focuses on the tectonic plate mechanisms that give rise to the geology of our planet and describes the way these create hazards such as volcanic eruptions, earthquakes and tsunamis.

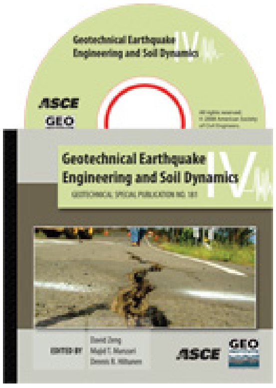
The authors state that groundwater can be both a resource and a hazard and through this book they provide an overview of the origins of geomaterials and their engineering properties.

This book shows how to read the ground by interpreting geological maps and recognising landforms and their associated hazards, such as landslides.

Contents:

- Ground origins: Plate tectonics and the rock cycle
- New ground: Igneous rocks
- Deposited ground: Sedimentary rocks
- Changed ground: Metamorphic rocks
- Ground clock: Stratigraphy and terminology
- Ground structure: Maps, unconformity, faults and folds
- Groundwater: Flow, quality and protection
- Ground hazards: Volcanoes, earthquakes and dissolution features
- Ground properties: Rock strength and compressibility

(Thomas Telford Ltd, 17.04.2008)

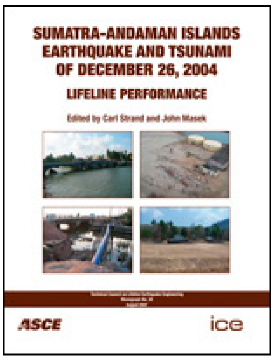


Geotechnical Earthquake Engineering and Soil Dynamics IV

(Geotechnical Special Publication No. 181)

David Zeng, Majid T. Manzari and Dennis R. Hiltunen (Editors)

(American Society of Civil Engineers, 2008)

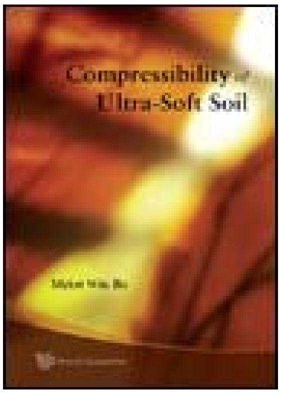


Sumatra-Andaman Island Earthquake and Tsunami of December 26, 2004 - Lifeline Performance

Carl Strand and John Masek (Editors)

On December 26, 2004, one of the largest earthquakes during the last hundred years occurred in the Indian Ocean, outside of Sumatra and the Andaman Islands. This earthquake set into motion a transoceanic tsunami that struck coasts of the Andaman Sea, Bay of Bengal, Indian Ocean, and Arabian Sea. Damages to lifelines as well as enormous casualties were reported in the wake of this disaster. This monograph provides a summary of the damage observations throughout the affected region. Topics covered include: geoscience and tsunami generation, roadway transportation systems, electrical power systems, water systems, wastewater systems, railway systems, airports, seaports and harbors, telecommunications systems, social services, and tsunami warnings, de-alerts and warning systems. This report will be beneficial to all those involved in developing policies to improve preparedness for future tsunami events, including public officials, engineers, scientists, planners, design professionals, facility owners, and the public.

(American Society of Civil Engineers, 2008)



COMPRESSIBILITY OF ULTRA-SOFT SOIL

Myint Win Bo

The formation of an alluvial clay deposit normally goes through sedimentation and consolidation. While the bottom portion is undergoing self-weight consolidation, sedimentation continues to take place at the top. However, the compression behavior of such deposits upon loading is not well understood.

This book describes the compression behavior of ultra-soft soil upon additional load application. Various types of laboratory compression tests suitable for this type of soil are discussed, such as tests using small- and large-scale consolidometers, hydraulic Rowe cells under different drainage conditions, constant rate of loading and constant rate of strain tests. It also explains how to determine the transition point, which differentiates the two distinct behaviors between slurry state and soil state deformation. Methods to determine the compression indices and coefficients of consolidation at different stress ranges, which are required for the prediction of magnitude of settlement and time rate of settlement, are developed. An equation for predicting settlement of ultra-soft soil in both the slurry and soil stages is elaborated upon. These proposed methods of characterization or analyses — which are validated against published data, laboratory measurements and a case study — serve as useful tools for designing and constructing embankments and for carrying out land reclamation on ultra-soft soil.

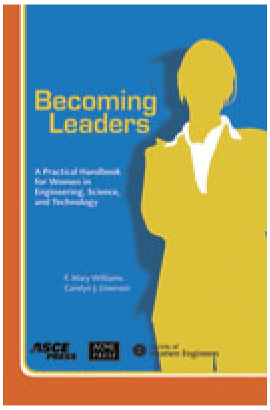
Contents:

- Sedimentation and Consolidation
- Models and Analogy
- Characterization of Physical Properties and Mineralogy of the Soil
- Compression Tests with Large Scale Consolidometer
- Compression Test on Slurry with Small-Scale Consolidometer
- Compression Tests on Ultra-Soft Soil with Hydraulic Consolidation Cell
- Continuous Loading Tests on Ultra-Soft Soil
- Constant Rate of Strain Test on Ultra-Soft Soil
- Verification of Proposed Formulae and Models with Laboratory Measurements

- Case Study

Readership: Graduate students, academics, researchers, engineers, and contractors in civil engineering, coastal engineering and geotechnical engineering.

(ISBN 978-981-277-188-9, 981-277-188-3, April 2008)



Becoming Leaders: A Practical Handbook for Women in Engineering, Science, and Technology

F. Mary Williams
Carolyn J. Emerson

You are a woman pursuing a successful career in engineering, science, or technology, and you are prepared to work hard for this. But you must also work "smart". *Becoming Leaders* is about working smart – and about making the choices that are right for you, your talents, and your life, wherever you are in your career.

Williams and Emerson consulted the best research on a wide range of topics of interest to women in different stages of their careers. They present important, timely information alongside practical tips. Chapters can be read in any order, with roadmaps for students, career women, faculty, and managers. Written both to support career success and to encourage leadership self-awareness, *Becoming Leaders* is a book you'll turn to again and again, for advice, for information, and – most of all – for inspiration.

(2008, American Society of Civil Engineers, ASME Press, and Society of Women Engineers)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

www.issmge.org

Κυκλοφόρησε το Τεύχος V. 2 / I. 2 του ISSMGE Bulletin (Ιούνιος 2008) με ενδιαφέρουσες πληροφορίες για τις δραστηριότητες των Technical Committees της ISSMGE και για όλα τα θέματα της γεωτεχνικής μηχανικής.

www.isrm.net

Κυκλοφόρησε το Τεύχος 2 του ISRM Newsletter (Ιούνιος 2008) με ενδιαφέρουσες πληροφορίες για τις δραστηριότητες των Technical Committees της ISRM και για άλλα θέματα βραχομηχανικής.

www.geoengineer.org

Κυκλοφόρησαν τα Τεύχη #41 και #42 του Newsletter του Geoengineer.org (Μάιος και Ιούνιος 2008) με πολλές χρήσιμες πληροφορίες για όλα τα θέματα της γεωτεχνικής μηχανικής. Υπενθυμίζεται ότι το Newsletter εκδίδεται από τον συνάδελφο και μέλος της ΕΕΕΕΓΜ Δημήτρη Ζέκκο (secretariat@geoengineer.org).

International Journal of Geoengineering Case Histories

casehistories.geoengineer.org

As of June 2008, **the International Journal of Geoengineering Case Histories (IJGCH) is the official journal of the International Society for Soil Mechanics and Geotechnical Engineering.**

The International Journal of Geoengineering Case Histories has a number of characteristics that collectively make it a unique publication and a valuable tool for the geoengineers:

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- Access to the published professional papers is available at no cost guaranteeing maximum exposure to the paper.
- Papers include colored figures to better document the case history.
- Papers are published in each issue individually as soon as they are accepted by the reviewers. Thus, time from submission to publication is minimized.
- Data presented in the paper are also provided in accompanying excel spreadsheets, so that they can be used by the readers of the paper.
- All case histories are geographically positioned in a Google Earth map that is available to all readers.
- Additional unlimited web space can be provided for the accepted papers to supplement information
- The publication of the journal is not profit based. It is purely intended to serve the geoengineering profession.

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Πολυτεχνειούπολη Ζωγράφου
15780 ΖΩΓΡΑΦΟΥ

Τηλ. 210.7723434
Τοτ. 210.7723428
Ηλ-Δι. geotech@central.ntua.gr
Ιστοσελίδα www.ntua.gr/civil (υπό κατασκευή)

«ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΓΜ» Εκδότης: Χρήστος Τσατσανίφος, τηλ. 210.6929484, τοτ. 210.6928137, ηλ-δι. pangaea@otenet.gr

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