Ηφαίστειο Fudziama, Ιαπωνία

ΕΛΛΗΝΙΚΗ
ΕΠΙΣΤΗΜΟΝΙΚΗ
ΕΤΑΙΡΕΙΑ
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

Τα Νέα της Ε Ε Ε Ε Γ Μ

51

Αρ. 51 – ΝΟΕΜΒΡΙΟΣ 2012

Διαγωνισμός Καλύτερης Διπλωματικής Εργασίας Εφαρμοσμένου Ενδιαφέροντος για το έτος 2013

1. Ο διαγωνισμός απευθύνεται στους αποφοίτους των ελληνικών πολυτεχνείων και πολυτεχνικών σχολών οι οποίοι θα συγγράψουν στην ελληνική γλώσσα προπτυχιακή διπλωματική εργασία στην περιοχή της γεωτεχνικής μηχανικής.

2. Δικαίωμα συμμετοχής έχουν οι αποφοιτήσαντες κατά το ημερολογιακό έτος του διαγωνισμού, μετά από πρόταση από τον επιβλέποντα της διπλωματικής εργασίας και εφ' όσον η διπλωματική εργασία πληροί τις προδιαγραφές που περιγράφονται πιο κάτω στο σημείο 7. Κάθε επιβλέπων μπορεί να προτείνη μία διπλωματική εργασία ανά έτος.

3. Η αίτηση συμμετοχής στον διαγωνισμό κατατίθεται ηλεκτρονικά στην ΕΕΕΕΓΜ (president@hssmge.gr και secretary@hssmge.gr) εντός του μηνός Δεκεμβρίου του έτους του διαγωνισμού (δηλ. Δεκέμβριος 2013). Καθυστερημένες υποβολές δεν θα λαμβάνονται υπ' όψη.

4. Η αίτηση θα πρέπει να συνοδεύεται από:

   - Περίληψη 800-1000 λέξεων που θα περιγράφη α) το πρόβλημα που αντιμετωπίστηκε στην διπλωματική στο πλαίσιο της υπάρχουσας βιβλιογραφίας/βέλτιστης πρακτικής, β) τη μέθοδο που επιλέχθηκε για να αντιμετωπισθή το πρόβλημα, γ) τα αποτελέσματα/συμπεράσματα.

(συνέχεια στην σελίδα 3)

Π Ε Ρ Ι Ε Χ Ο Μ Ε Ν Α

Θερμές Ευχές
για Καλά Χριστούγεννα

(συνέχεια από την σελίδα 1)

- Επιστολή του επιβλέποντος που τεκμηριώνει την καινοτομία της διπλωματικής και τη χρησιμότητα των αποτελεσμάτων στην πράξη.

5. Οι αιτήσεις θα αξιολογηθούν από επιτροπή τεσσάρων (4) γεωμηχανικών της πράξης και ενός (1) από το διδακτικό προσωπικό μη ελληνικού πανεπιστημίου, οι οποίοι θα επιλέξουν τις τέσσερις (4) επικρατέστερες.

6. Η ΕΕΕΕΓΜ θα ειδοποιήση τους συγγραφείς των τεσσάρων διπλωματικών εργασιών έως το τέλος Μαρτίου, οι οποίες θα πρέπει να αποσταλούν στην ΕΕΕΕΓΜ σε έντυπη μορφή σε 2 αντίτυπα έως το τέλος Απριλίου. Η επιτροπή θα αποφασίση ποια διπλωματική είναι καλύτερη και τη σειρά των τριών επιλαχουσών σύμφωνα με τα πιο κάτω κριτήρια:

- Είναι το πρόβλημα που αντιμετωπίστηκε σημαντικό στην πράξη;
- Η μεθοδολογία που επιλέχθηκε για την επίλυση του προβλήματος μπορεί να εφαρμοσθή στην πράξη;
- Το περιεχόμενο της διπλωματικής εργασίας δείχνει την εις βάθος κατανόηση βασικών αρχών της γεωτεχνικής μηχανικής;
- Η διπλωματική εργασία έχει γραφτεί με μια λογική δομή; Είναι «φιλική προς τον αναγνώστη» (στρωτή γλώσσα, σωστή ορθογραφία, επεξηγηματικές «λεζάντες» πινάκων και σχημάτων, εύκολη αναζήτηση και εύρεση των βασικών παραδοχών & συμπερασμάτων);

7. Για να αξιολογηθή μια διπλωματική εργασία στο πλαίσιο του διαγωνισμού, είναι απαραίτητα τα πιο κάτω περιεχόμενα:

- Ελληνική περίληψη (1.5-2 σελίδες).
- Αγγλική περίληψη (1.5-2 σελίδες) & αγγλικός τίτλος.
- Κατάλογοι περιεχομένων, πινάκων και σχημάτων (με παραπομπή στις αντίστοιχες σελίδες).
- Ελληνοαγγλικό γλωσσάρι κύριων τεχνικών όρων που χρησιμοποιούνται στην εργασία.
- Κατάλογος συμβόλων.

Επί πλέον απαιτείται:

- Η έκταση της εργασίας να μην υπερβαίνη τις 200 σελίδες (εξαιρουμένων των παραρτημάτων τα οποία δεν αξιολογούνται).
- Όλα τα σχήματα και οι πίνακες πρέπει να είναι πρωτότυπα ή, σε αντίθετη περίπτωση, θα πρέπει να έχη ζητηθή και δοθή από τον εκδότη ειδική άδεια (που θα κατατεθή μαζί με τη διπλωματική).

Αν κάποια από τις επικρατέστερες διπλωματικές δεν πληροί τις προδιαγραφές, αποκλείεται από τον διαγωνισμό χωρίς περαιτέρω αξιολόγηση.

8. Το βραβείο είναι απονομή «πλακέτας» και τιμητική εγγραφή και τετραετής δωρεάν συνδρομή στην ΕΕΕΕΓΜ.

9. Τα αποτελέσματα του διαγωνισμού θα ανακοινώνονται μέσω ηλεκτρονικού ταχυδρομείου σε όλα τα μέλη της ΕΕΕΕΓΜ έως τα μέσα Ιουλίου του επόμενου έτους του διαγωνισμού (δηλ. Ιούλιος 2014), ενώ η επίσημη βράβευση θα γίνεται στο πρώτο πανελλήνιο συνέδριο της ΕΕΕΕΓΜ που ακολουθεί το έτος του διαγωνισμού.

ΣΕΙΣΜΟΥ L'AQUILA ΣΥΝΕΧΕΙΑ

Στο προηγούμενο τεύχος αναφερθήκαμε στην εξωφρενική καταδίκη έξι ιταλών σεισμολόγων για ανθρωποκτονία, επειδή δεν προειδοποίησαν έγκαιρα για το σεισμό που σημειώθηκε στην Ιταλία το 2009 στην περιοχή της L'Aquila. Παραθέτουμε στη συνέχεια την επιστολή διαμαρτυρίας που απέστειλε το ΕΤΑΜ στον Πρωθυπουργό της Ιταλίας κ. Mario Monti.

ΕΛΛΗΝΙΚΟ ΤΜΗΜΑ
ΑΝΤΙΣΕΙΣΜΙΚΗΣ ΜΗΧΑΝΙΚΗΣ
[ΕΤΑΜ]
Μέλος της Διεθνούς Ένωσης Αντισεισμικής Μηχανικής

To the President of the Italian Government, Mario Monti

cc. The President of the Republic of Italy
cc. The Greek Minister of Civil Infrastructure, Transportation and Networks

#07/ETAM/25-10-2012/ID

Thessaloniki, October 26th, 2012

Subject: Hellenic Association for Earthquake Engineering on the l'Aquila sentence

Your Excellency Mr. President,

It is with great regret that we have been informed regarding the primary conviction of seven Italian scientists, considered responsible for the loss of human life during the recent earthquake in L'Aquila.

We by no means attempt to interfere into internal affairs of a friendly country like yours. Nevertheless, with deep respect for each and every human life lost due to this natural disaster, please let us, with the scientific capacity of the Hellenic Society for Earthquake Engineering, note the following:

- It is commonly accepted within the scientific community worldwide, that there cannot be a short-term prediction of earthquakes, nor can it be an accurate determination of the space, time and intensity of a future seismic event. For this reason, it is practically impossible to take any essential precaution measures for the protection of citizens in an area that is sufficiently narrow and within a reasonably short period of time. Citizens and the State ought to know the limits of scientific knowledge and to accept the large uncertainties associated with the prediction of seismic activity, which is unfortunately still impossible to overcome. From a scientific point of view and in accordance with all international guidelines and state-of-practice, the Italian colleagues acted as any other scientist would have in a similar position.

- The criminalization of the inherent scientific inability to exceed the current state of knowledge is not only unjust for the persons in charge of the Italian National Commission for the Forecast and Prevention of Major Risks, who have contributed at a great extent in the mitigation of seismic risk. It is expected to inactivate all relevant Civil Protection Departments in Italy and worldwide, which will be reluctant to act in the future based on actual data. This phobic crisis management may also result into a seriously misleading assessment of the probabilistic nature of seismic hazard.

This fact alone may have severe consequences on the economic and social life of all regions exposed to seismic risk internationally. Most importantly, it raises serious questions regarding the way in which the State and society view the scientific progress as a whole.

Based on the above, we would like to express the full and unreserved support of the Hellenic Department of Earthquake Engineering to the convicted colleagues. We do hope that Your Excellency will beneficially assess the validity of our allegations.

Sincerely yours,

Prof. Kyriazis Pitilakis, Chairman of the HSEE
Assist. Prof. Anastasios Sextos Secretary of HSEE

Professionals fear fallout from quake convictions

Conviction in Italy of six scientists and geologists for manslaughter following the L'Aquila earthquake in 2009 has thrown into question the ability of professionals to act without fear of prosecution.

Italy's geology institute the Instituto Nazionale di Geofisica e Vulcanologia (INGV) led international condemnation of the court case which sought to establish blame for the deaths of 309 people killed when an earthquake struck the small town of L'Aquila on 6 April 2009.

Engineers added their voice to the criticism. "It sets a chilling precedent for every scientist. Not just those predicting earthquakes, but meteorologists, physicists, chemists or indeed any scientist working in any discipline where the exact result of every single action cannot be predicted with certainty," said Arup seismic specialist Ziggy Lubkowski.

"Who now will take responsibility for forecasting the risk of storms or floods or earthquakes when to make such a prediction is to risk your freedom? And where is the justice in

denying potential victims of the benefit of scientific expertise as we learn more about our environment in the future?

"Indeed, how will we drive learning if we cannot safely share ideas, theories and opinions in public? Science is based on the willingness of a great many people to state their opinion freely and fairly on the basis of the evidence."

Compromised

The British Geological Survey agreed with Lubkowski that the outcome of the L' Aquila trial "will inevitably compromise" the relationship of scientists concerned with natural hazards with the public. The International Association of Seismology & Physics and the Earth Interior, which exists to advance global seismic knowledge, also expressed its "deepest concern" for the verdict.

The six scientists convicted included INGV president Enzo Boschi and Italian National Earthquake Centre director Guilo Selvaggi. They, and a public official, were found guilty by a judge Marco Billi of manslaughter. L'Aquila's Prosecutor's Office had accused them of negligence for failing to communicate the risks of an earthquake properly.

INGV research director Alberto Michelini said the motive behind the prosecutions was political. "It was clearly a set up in some way to show the government was doing something," he said.

All seven received six year jail terms, but none of them has begun their sentences as they all plan to appeal. It is not yet known how Billi reached his verdict. Under Italian law a judge has up to 90 days to publish the "motivazione della sentenza" or reason for sentencing.

But it is believed prosecutors relied in court on a heavily disputed report, produced by the International Commission on Earthquake Forecasting for Civil Protection. It was commissioned by the Italian government following the disaster to assess the science community's capability when it comes to short-term prediction of earthquakes.

Report author and University Southern California earthquake director Tom Jordan said the scientists should have picked up the signs of an increased threat of an earthquake.

Using the most up to date seismic modelling, Jordan said there was probably a 1% chance of an earthquake and that that risk should have been communicated.

But Lubkowski doubted whether the scientists could have recognised the increased risk.

"Many seismologists around the world have already argued they would not have issued heightened risk warnings on the basis of the same evidence," he said.

(Declan Lynch / New Civil Engineer, 1 November, 2012, http://m.nce.co.uk/8637932.article, http://www.nce.co.uk/news/business/professionals-fear-fallout-from-quake-convictions/8637932.article)

ΠΡΟΣΕΧΕΙΣ ΕΚΔΗΛΩΣΕΙΣ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ

ΕΤΑΙΡΕΙΑ ΜΕΛΕΤΗΣ ΑΡΧΑΙΑΣ ΕΛΛΗΝΙΚΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

Τα Μαθηματικά φέρνουν το νερό στην Σάμο

Την Δευτέρα, 3 Δεκεμβρίου 2012, ο Ομότιμος Καθηγητής ΕΜΠ Θ.Π. Τάσιος θα παρουσιάση τη νέα εικονοκινητική ταινία των Θ.Π. Τάσιου, Ν. Μήκα, Γ. Πολύζου: «**Τα Μαθηματικά φέρνουν το νερό στην Σάμο**», σχετικά με την κατασκευή του Ευπαλίνειου υδραγωγείου.

Η ταινία παρουσιάζει ένα έργο του 6ου αιώνα π.Χ., μια σήραγγα υδραγωγείου μήκους 1000 μ. και διατομής 2,00 x 2,00 μ, η οποία διανοίχθηκε από τα δύο άκρα της συγχρόνως.

Η συνάντηση των δύο τμημάτων κάτω από την κορυφή του βουνού έγινε με αρκετή ακρίβεια, παρά το γεγονός ότι οι γεωλογικές συνθήκες ανάγκασαν τον μηχανικό Ευπαλίνο να εκτραπεί πολλές φορές από την ευθυγραμμία. Το θετικό αυτό αποτέλεσμα οφείλεται στην γνώση της ΘΕΩΡΗΤΙΚΗΣ ΓΕΩΜΕΤΡΙΑΣ. Το Υδραγωγείο συνέχισε την λειτουργία του για περίπου 1000 χρόνια.

Η παρουσίαση θα γίνη στην αίθουσα του ΜΟΥΣΕΙΟΥ ΤΗΣ ΠΟΛΕΩΣ ΤΩΝ ΑΘΗΝΩΝ, Παπαρρηγοπούλου 5-7, Πλατεία Κλαυθμώνος, με ώρα έναρξης 18.30.

ΣΠΜΕ **ΕΛΛΗΝΙΚΟ ΤΜΗΜΑ IABSE**

Διαδικασίες Ανάθεσης & Εκτέλεσης Δημοσίων Έργων στην Αρχαία Ελλάδα

Την Τρίτη 4 Δεκεμβρίου 2012 ώρα 18.00, με πρωτοβουλία του Ελληνικού Τμήματος της International Association for Bridge and Structural Engineering - IABSE (www.iabse.gr), ο Σύλλογος Πολιτικών Μηχανικών Ελλάδος (www.spme.gr) συνδιοργανώνει διάλεξη του Καθηγητή **Θεοδόση Τάσιου** με θέμα:

Διαδικασίες Ανάθεσης & Εκτέλεσης Δημοσίων Έργων στην Αρχαία Ελλάδα

Η διάλεξη θα παρουσιασθή στην Αίθουσα Εκδηλώσεων του Τ.Ε.Ε., Νίκης 4, 1ος όροφος, 10248 Αθήνα

Ε.Ε.Σ.Υ.Ε.
Ελληνική Επιτροπή Σηράγγων και Υπογείων Έργων

«Τα Έργα της ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε.
Η Κατασκευή των Μετρό Αθηνών και Θεσσαλονίκης»

Η ΕΕΣΥΕ διοργανώνει την Τετάρτη 5 Δεκεμβρίου 2012, στις 17:30 στην Αίθουσα Εκδηλώσεων του Κτιρίου Διοίκησης του ΕΜΠ (Πολυτεχνιούπολη Ζωγράφου), την ετήσια εσπερίδα της, η οποία φέτος είναι αφιερωμένη στα έργα της ΑΤΤΙΚΟ ΜΕΤΡΟ.

ΠΡΟΓΡΑΜΜΑ

17:30 – 17:50 Εισαγωγή – Χαιρετισμοί

17:50 – 18:10
Γενική παρουσίαση του έργου του Μετρό Θεσσαλονίκης (Γ. Κωνσταντινίδης)

18:10 – 18:30
Εφαρμογή Διαφραγματικών Τοίχων στο έργο του Μετρό Θεσσαλονίκης (Ε. Περγαντής / Γ. Νίκολης)

18:30 -18:50
Κατασκευή Σταθμού Αγ. Παρασκευής της Γραμμής 3 (Χ. Μαυρομμάτη / Ν. Μπούσουλας)

18:50 – 19:20 Διάλλειμα – Καφές

19:20 – 19:50
Μηχανική διάνοιξη σηράγγων στα έργα του Μετρό Αθηνών και Θεσσαλονίκης:

Α. Συνθήκες διάνοιξης (Ε. Ζαμπίρας / Ν. Μπούσουλας)
Β. Μηχανήματα ΤΒΜ (Σ. Κουκουτάς)

19:50 – 20:10
Οργάνωση και εξέλιξη Γεωμηχανικής και Δομητικής Παρακολούθησης στα έργα της ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε. (Μ. Νόβακ)

20:10 – 20:30
Ηλεκτρομηχανολογικά και Σιδηροδρομικά Συστήματα στα Έργα της ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε. (Γ. Λεουτσάκος)

20:30 – 21:00 Ερωτήσεις - Συζήτηση

ΠΡΟΣΚΛΗΣΗ ΣΤΗΝ ΗΜΕΡΙΔΑ ΝΕΩΝ ΕΡΕΥΝΗΤΩΝ ΤΟΥ Ε.Τ.Α.Μ.

Θεσσαλονίκη, 7 Δεκεμβρίου 2012
www.etam.gr

Αξιότιμα Μέλη/ Φίλοι του ΕΤΑΜ,

Το Ελληνικό Τμήμα Αντισεισμικής Μηχανικής (Ε.Τ.Α.Μ.) διοργανώνει, υπό την αιγίδα του Τμήματος Πολιτικών Μηχανικών της Πολυτεχνικής Σχολής του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης, ημερίδα που απευθύνεται αποκλειστικά και μόνον σε νέους ερευνητές, με τίτλο:

Η ΑΝΤΙΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ ΜΕΣΑ ΑΠΟ ΤΗΝ ΕΠΙΣΤΗΜΟΝΙΚΗ ΜΑΤΙΑ ΝΕΩΝ ΕΡΕΥΝΗΤΩΝ ΚΑΙ ΜΗΧΑΝΙΚΩΝ

Σκοπός της ημερίδας είναι η ανάδειξη και η διάχυση του έργου της νέας γενιάς ερευνητών και μηχανικών (μελών ή μη του ΕΤΑΜ), η γνωριμία καθώς και η ανάπτυξη σχέσεων συνεργασίας μεταξύ τους. Η ημερίδα απευθύνεται σε σπουδαστές (μεταπτυχιακούς, υποψήφιους διδάκτορες), σε διδάκτορες (έως και 6 χρόνια μετά την απόκτηση του τίτλου), καθώς και σε ερευνητές ή επαγγελματίες μηχανικούς κάτω των 38 ετών.

Η ημερίδα θα πραγματοποιηθεί στην Θεσσαλονίκη την 7η Δεκεμβρίου 2012 στο Κέντρο Διάδοσης Ερευνητικών Αποτελεσμάτων (ΚΕ.Δ.Ε.Α) του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης.

Λεπτομέρειες για την ημερίδα παρατίθενται στην ιστοσελίδα του ΕΤΑΜ και στο τεύχος 45, Μάιος 2012 των «ΝΕΩΝ ΤΗΣ ΕΕΕΕΓΜ».

ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΙΣΤΟΡΙΑΣ ΤΩΝ ΕΠΙΣΤΗΜΩΝ ΚΑΙ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

ΠΡΟΣΚΛΗΣΗ ΕΚΔΗΛΩΣΗΣ ΕΝΔΙΑΦΕΡΟΝΤΟΣ

Η Εταιρεία Μελέτης και Διάδοσης της Ιστορίας των Επιστημών και της Τεχνολογίας (ΕΜΔΙΕΤ) και το Τμήμα Μεθοδολογίας, Ιστορίας και Θεωρίας της Επιστήμης (ΜΙΘΕ) του Πανεπιστημίου Αθηνών διοργανώνουν Πανελλήνιο Συνέδριο Ιστορίας των Επιστημών και της Τεχνολογίας στις 28, 29 και 30 Μαρτίου 2013 στην Αθήνα.

Μετά το πρώτο επιτυχημένο συνέδριο νέων ερευνητών το 2011 στην Αθήνα, η ΕΜΔΙΕΤ σε συνεργασία με το ΜΙΘΕ αποφάσισε να καθιερώσει τη διοργάνωση συνεδρίου κάθε δύο χρόνια, αποσκοπώντας στην καλλιέργεια συνθηκών που θα φέρουν σε επαφή μεταξύ τους Έλληνες ερευνητές από τον χώρο της ιστορίας των επιστημών και της τεχνολογίας, καθώς και συγγενών κλάδων, που εργάζονται στην Ελλάδα ή το εξωτερικό.

Η κεντρική θεματική του φετινού συνεδρίου είναι «Ευρώπη - Επιστήμη - Τεχνολογία».

Όσοι ενδιαφέρονται καλούνται να υποβάλουν σχετική πρόταση για ανακοίνωση. Προτάσεις που δεν εμπίπτουν στη θεματική αυτή μπορούν επίσης να υποβληθούν. Σημειώνεται ότι ενθαρρύνονται ιδιαίτερα οι προτάσεις για την οργάνωση συνεδριών· για όλες προβλέπεται η ύπαρξη σχολιαστή. Τέλος, προγραμματίζεται η δημοσίευση των ανακοινώσεων μετά από διαδικασία αξιολόγησης.

Οι ενδιαφερόμενοι μπορούν να υποβάλουν τις προτάσεις τους ηλεκτρονικά με τα επισυναπτόμενα δελτία μέχρι τις 30 Οκτωβρίου 2012 στη διεύθυνση info@emdiet.gr.

2ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΦΡΑΓΜΑΤΩΝ ΚΑΙ ΤΑΜΙΕΥΤΗΡΩΝ

Σχεδιασμός – Διαχείριση – Περιβάλλον
Αθήνα, 7 - 8 Νοεμβρίου 2013
www.eemf.gr

Μετά το πολύ επιτυχημένο πρώτο συνέδριο στη Λάρισα το 2008, η Ελληνική Επιτροπή Μεγάλων Φραγμάτων (ΕΕΜΦ) διοργανώνει το **2ο Πανελλήνιο Συνέδριο Φραγμάτων και Ταμιευτήρων στις 7 & 8 Νοεμβρίου του 2013 στην Αθήνα, στην Αίγλη Ζαππείου**.

Η απαίτηση για ορθολογική διαχείριση του υδατικού δυναμικού είναι μεγαλύτερη παρά ποτέ. Στις αυξανόμενες ανάγκες για ύδρευση, άρδευση, ενέργεια και αντιπλημμυρική προστασία προστίθεται ολοένα και πιο επιτακτικά η ανάγκη για προστασία και επανατροφοδότηση των υπόγειων υδροφορέων και η αναβάθμιση και προστασία των ποτάμιων και λιμναίων οικοσυστημάτων.

Ο ρόλος των φραγμάτων και ταμιευτήρων είναι κομβικός για την αντιμετώπιση των ανωτέρω. Η χώρα μας, αν και καθυστέρησε σημαντικά στην εκμετάλλευση του υδάτινου δυναμικού, έχει κατασκευάσει τις τελευταίες δεκαετίες μεγάλο αριθμό φραγμάτων, και ταμιευτήρων, ενώ ένας μεγάλος αριθμός νέων έργων είναι τώρα σε φάση μελέτης ή υλοποίησης.

Τα φράγματα και οι ταμιευτήρες είναι πολύπλοκα έργα με πολλές συνιστώσες που δημιουργούν αυξημένες απαιτήσεις κατά το σχεδιασμό, την υλοποίηση και τη λειτουργία τους. Ο σεβασμός στο περιβάλλον, η ολοκληρωμένη διαχείριση των υδατικών πόρων, η χρήση νέων τεχνολογιών, η μακροχρόνια συμπεριφορά και ασφάλεια, η ευθύνη του κυρίου του έργου ή του διαχειριστή για την ασφαλή λειτουργία των έργων, είναι θέματα στα οποία θα επικεντρωθούν οι εργασίες του συνεδρίου.

Το συνέδριο στοχεύει στην παρουσίαση, ανάδειξη και συζήτηση των ανωτέρω ζητημάτων και απευθύνεται σε όλους όσοι με την μελέτη, κατασκευή και διαχείριση έργων φραγμάτων και ταμιευτήρων.

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1. **Φράγματα και Ολοκληρωμένη Διαχείριση Υδατικών Πόρων**
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   - Ταμιευτήρες πολλαπλού σκοπού
   - Αντιπλημμυρική προστασία
   - Τεχνικο-οικονομικά κριτήρια υλοποίησης νέων φραγμάτων
   - Ο ρόλος των φραγμάτων στον ενεργειακό σχεδιασμό - Σύγχρονες τάσεις και τεχνολογικές εξελίξεις

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- Εκτίμηση, επιλογή και αναθεώρηση πλημμυρών σχεδιασμού
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- Εξελίξεις στον αντισεισμικό σχεδιασμό
- Εξελίξεις στον Η/Μ εξοπλισμό

3. Ασφάλεια Φραγμάτων και Ταμιευτήρων

- Κανονισμοί μελέτης, κατασκευής και λειτουργίας φραγμάτων
- Η πρόταση της ΕΕΜΦ για την σύνταξη εθνικού κανονισμού ασφάλειας φραγμάτων
- Αποτίμηση της διακινδύνευσης φραγμάτων (risk assessment)
- Δημόσιοι και ιδιωτικοί φορείς εμπλεκόμενοι στη διαχείριση φραγμάτων – θέματα οργάνωσης και τεχνικής ικανότητας
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- Απαιτήσεις παρακολούθησης συμπεριφοράς
- Ασφάλεια ταμιευτήρα (ευστάθεια πρανών, εκτεταμένες διαρροές κτλ)
- Αναλύσεις θραύσης φράγματος και επιπτώσεις
- Μακροχρόνια συμπεριφορά, γήρανση των έργων και εργασίες αποκατάστασης
- Κίνδυνοι οφειλόμενοι σε αστοχίες Η/Μ εξοπλισμού
- Παρουσίαση πρόσφατων συμβάντων ή περιστατικών
- Φράγματα, ταμιευτήρες και δημόσια ασφάλεια
- Ασφαλής παροχέτευση εκτάκτων πλημμυρικών παροχών κατάντη – απαιτήσεις οριοθέτησης της κοίτης

4. Φράγματα, Ταμιευτήρες και Περιβάλλον

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- Περιορισμός υδρομορφολογικών αλλοιώσεων και αισθητική αποκατάσταση περιβάλλοντος
- Αρχιτεκτονικός σχεδιασμός φραγμάτων και συναφών κατασκευών
- Τα φράγματα ως μέρος της πολιτιστικής κληρονομιάς
- Εμπλουτισμός και αποκατάσταση υπόγειων υδροφορέων - Δημιουργία υγροβιότοπων κ.λπ.
- Χρονική εξέλιξη των ποιοτικών χαρακτηριστικών των ταμιευτήρων - Διατήρηση και βελτίωση ποιότητας υδατικών πόρων
- Φερτές ύλες

5. Παρουσίαση έργων

Κρίσιμες ημερομηνίες για την αποστολή εργασιών:

- Υποβολή περιλήψεων: **15 Δεκεμβρίου 2012**
- Αποδοχή περιλήψεων: **15 Ιανουαρίου 2013**
- Υποβολή πλήρους κειμένου: **30 Απριλίου 2013**
- Αποδοχή πλήρους κειμένου: **30 Ιουνίου 2013**

Οδηγίες για την αποστολή των περιλήψεων θα βρείτε στη ιστοσελίδα της ΕΕΜΦ www.eemf.gr.

Οι περιλήψεις θα αποστέλλονται ηλεκτρονικά στην διεύθυνση της ΕΕΜΦ eemf@eemf.gr.

ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ, μέσω ΔΕΗ – ΔΥΗΠ, Αγησιλάου 56-58, 104 36 ΑΘΗΝΑ, τοτ. 210 - 5241223, Η/Δ : eemf@eemf.gr, www.eemf.gr

ΑΡΘΡΑ

The profit in risk

Haldun Kahyaoglu, *Qatar Rail*

Many if not all underground construction projects involve unforeseen ground condition claims in spite of all efforts. These efforts are mainly directed to stop or manage claims. The main issue is still the perception of uncertainty and risk.

Underground projects all over the world draw attention from the public and the media not only for their complexity and high profile; but more importantly for the reservations surrounding the cost of the projects.

It is not a myth that underground projects generally suffer from cost and time overruns.

It does not, however, necessarily follow that a project suffering from cost overrun must also suffer from time overrun or vice versa.

Researchers, authors, public agencies, investors and investment banks have studied the subject of overruns in publicly funded projects including underground projects. An extensive literature on this subject exists and it expands over time as cost and time difficulties increase too.

It is therefore important to examine the cases from the literature in order to gain an understanding of the level of the overruns and the reasons for them.

Many, if not all, construction projects suffer from cost and time overruns in one way or another. There are many reasons ranging from ground conditions to escalation of material prices, changes in specifications to changes in legislation. Flyvbjerg, et. al. (2002) assert that high-speed rail is the most prone to cost underestimation, followed by urban and conventional rail respectively. Similarly, cost underestimation appears to be more frequent for tunnels than for bridges. This suggests that the complexities of technology and geology might have an effect on cost underestimation. Hence, it is clear that the first criteria to check in claiming for an overrun are the estimations or budgets allowed for a particular project. Although, many government agencies and investment bodies have different and complex estimation structures for estimating and budgeting the projects.

Large numbers of agencies, contractors, consultants and experts are involved at all stages of the project and have extensive experience in their fields. A large number of cost and time estimates are carried out before the contract is signed. The client and his experts and consultants, or the contractors, carry out estimates for the same project using all available tools such as historical data, local experience, methodologies, schedules, productivities, innovative solutions, commercial and also any business incentives.

And yet projects frequently run over time and over budget. Flyvbjerg, et. al. (2002) state:

a. In nine out of 10 transportation infrastructure projects, costs are underestimated.

b. For rail projects, actual costs are on average 45 per cent higher than estimated costs

c. For fixed-link projects actual costs are on average 34 per cent higher than estimated costs

d. For road projects, actual costs are on average 20 per cent higher than estimated costs

e. For all project types, actual costs are on average 28 per cent higher than estimated costs

f. Cost underestimation exists across 20 nations and five continents; it appears to be a global phenomenon.

g. Cost underestimation appears to be more pronounced in developing nations than in North America and Europe (data for rail projects only).

h. Cost underestimation has not decreased over the past 70 years. No learning that would improve cost estimate accuracy seems to take place.

i. Cost underestimation cannot be explained by error and seems to be best explained by strategic misrepresentation, i.e. lying.

j. Transportation projects do not appear to be more prone to cost underestimation than are other types of large project.

Table 1, below shows several transportation projects from Europe. The table clearly shows cost overruns between eight per cent and 116 per cent. However, it also shows that unit cost for three railway projects, the Paris to Lille TGV, the Madrid to Seville AVE and the Lyon to Marseilles TGV are between EUR 8.57M (USD 10.8M) and EUR 11.82M (USD 14.94M); In contrast for the ICE Frankfurt to Cologne line is EUR 33.98M (USD 43.8M). Although the cost difference may be due to many other factors, the effect of the ratio of tunnel length to total length (the ICE Frankfurt to Cologne line is 12.3 per cent and while the other three projects range between 3.2 per cent and 3.6 per cent) may also impact on total cost.

Table 1. Forecasts and actual costs (in Million Euro) for some projects in Europe (Modified after Florio, 2009)

Project	Length of Project (km)	Total Length of Tunnel (m)	Tunnel Type	Total construction costs		Cost Overrun (%)
				Forecast	Actual	
ICE Frankfurt - Cologne	177	21722	Bored	2784	6015	116
Madrid - Seville AVE	470	16030	Bored	3263	4029	23
Lyon - Marseilles TGV	367	13187	Bored	4015	4338	8
Paris – Lille TGV	333	10700	Cut and cover	2666	3334	25
Eurotunnel	50	50000	Bored	2702	4568	69
Oeresund Fixed Link	7.85	4050	Immersed	1795	2924	63
Magdeburg Waterway Crossing	0.918	0		2064	2435	18

Florio (2009) lists the main causes of errors in cost estimation, which include delays in implementation, as changes in project specification and design, changes in quantity and prices, technological risks, underestimation of expropriation costs, changes in safety requirements and changes in environmental requirements. Although geological risk or overruns due to unforeseen conditions are not included in the main causes of errors in this classification, both of these are mentioned as major factors in Flyvbjerg, et. al. (2002).

Another example is from the Neue Eisenbahn-Alpentransversale (NEAT) project in Switzerland, which involves extraordinary tunnels such as Gothard Base Tunnel, Ceneri Base Tunnel and Lotscherg Tunnel. The project also suffered from cost overruns of 53 per cent of which nine per cent is accounted for by geology according to a report published by Swiss Office of Transport (2009).

Figure 1 shows the cost overruns for the tunnels in Seattle Area. According to a report by the Straightline Institute one in four recent tunnels in the Seattle area was completed within budget. The report concludes that the savings for the Mount Baker Tunnel can be attributed largely to two factors. First, labour and materials were cheaper than expected because the US economy experienced a recession after the project costs had been estimated. Second, the soil conditions were relatively well understood in advance of the cost estimates, in part because an adjacent tunnel (the roadway for the original Interstate 90) had already been dug beneath the Mount Baker neighbourhood in 1940.

Figure 1. Cost overruns for tunnels in the Seattle area, USA

Many other examples regarding cost overruns can be provided but they all lead to same question: why are the same mistakes are being continually repeated? There are three main possible reasons (Flyvbjerg, et. al. 2003): Inadequate data on which the project is based, optimistic bias, and cost analyses are systematically and significantly deceptive. The discussion up to this point has only been about comparisons between the original budgets prepared by the clients and the final cost after the project completion. When the project is tendered and the bids received from the contractors, prices may be over or under that which is allowed. However, this is only a temporary situation and the most important is the price at the final completion of the project. The difference between the initial and final price and the reasons for this difference will further be analysed in this paper.

Further discussion on the low budgets allowed by the clients is not within the scope of this project. However, the following factors should also be taken into account when low budgets prepared by the clients are discussed:

a. Clients may intentionally approve tight and low budgets and schedules in order to make the consultant and the contractor believe that funds are more limited.

b. Clients, particularly those influenced by politicians, may try to minimise the budget and schedule in order to secure the approval of the project.

c. Historical data may be highly biased since the prices for each contract is based on the current economical situation when the bid price is placed, economical situation of the wining contractor, competition, business decisions and fluctuations in the material prices.

Romero, et. al. (1997) pointed out that the differences between the 'cost' as calculated by the consultants and the clients and the 'price' as calculated by the contractors are the constructability issues, risk and competition since cost estimation based on production type calculations should not differ. However, it is the author's opinion that there should be other factors that mainly drive the differences between the cost and the price. The main factor is uncertainty, which causes either excessive or insufficient figures when preparing budgets, or changes project price based on different perceptions.

Uncertainty and different perceptions of Uncertainty

Many famous and 'scary' terms are involved in underground work contracts such as unforeseen, unforeseeable, foreseeable, uncontrollable, unpredictable, disclaimer and risk. They are all the end products of uncertainty which is generally unavoidable in geology and geotechnics. Uncertainty is categorised as either epistemic or aleatory. Der Kiureghian, et.al (2007) provides definitions for those terms:

The word aleatory derives from the Latin alea, which means the rolling of dice. Thus, an aleatoric uncertainty is one that is presumed to be the intrinsic randomness of a phenomenon. Interestingly, the word is also used in the context of music, film and other arts, where a randomness or improvisation in the performance is implied. The word epistemic derives from the Greek episteme, which means knowledge. Thus, an epistemic uncertainty is one that is presumed as being caused by lack of knowledge (data).

Epistemic uncertainty and aleatory uncertainty can be referred as subjective uncertainty and randomness respectively. According to Der Kiureghian, et. al (2007) uncertainties are characterised as epistemic, if the modeller sees the possibility of reducing them by gathering more data or by refining models. However, if this possibility does not exist, uncertainties are categorised as aleatory.

Examples of an aleatory uncertainty are: the uncertainty in timing of activation or movement of a fault or landslide (regardless of their locations are whether known or not); the exact profile of the tunnel after blasting (regardless the geology and blasting technique); the exact number and size of boulders along the tunnel alignment; the fluctuation in the cost of construction materials, and changes in legislation. Examples of epistemic uncertainty include the uncertainty in the dip and strike of a fault crossing the tunnel (which may become known if further investigation is carried out); the amount of water discharged into the tunnel when a water bearing strata is penetrated (the amount can be identified if permeability is known accurately); excessive rates of corrosion due to groundwater chemistry (due to improper or missing testing). It is clear that more knowledge, information and data reduces the epistemic uncertainty whereas the same does not apply to aleatory uncertainty. Other factors in reducing epistemic uncertainty are the probability of occurrence and the scale effect.

Although there are many controversial opinions regarding the distinction between uncertainty, and that risk and uncertainty have been used as if equal terms for many years,

many researchers have separated the terms. Brooke, (2010) commented on one of the well known but disputed works by Frank H. Knight (1921) on risk and uncertainty.

According to Brooke, (2010); Knight's commonly accepted definition is that risk refers to outcomes that can be insured against, and uncertainty to outcomes that cannot be insured against. Brooke, (2010) also adds that uncertainty refers to all instances where only subjective estimates of future outcomes are possible.

According to Luce, et. al. (1957), reproduced after Riabacke (2006), 'risk' occurs where each action leads to one of a set of possible specific outcomes, each outcome occurring with a known probability whereas 'uncertainty' occurs when actions may lead to a set of consequences, but where the probabilities of these outcomes are completely unknown. A risky situation is thus a situation where the outcome is unknown to the decision-maker. Although they are used interchangeably in practice, the terms risk and uncertainty will be used as separate terms, and as defined by Luce, et. al. throughout this paper. The main reason for this is that the risks can be defined since they exist as a probability, while uncertainty cannot be measured in terms of probability.

An example of this is that probabilistic analysis of a TBM project under certain conditions can provide probabilistic information and knowledge about a new project for the contractor. Hence, certain aspects of the new project are risky but not uncertain. Conversely, perched aquifers over a tunnel which is constructed by conventional methods are an uncertainty since the behaviour and impact of perched aquifers based on their potential occurrence, size, location and extent are unknown by the contractor. However, uncertainty can be interpreted with a certain 'degree of belief' or subjective probability based on experience. Degree of belief, however, does not imply being arbitrary but should be based on some knowledge. Figure 2 provides examples to visualise the difference among the terms since the perception of uncertainty is the core subject of this paper.

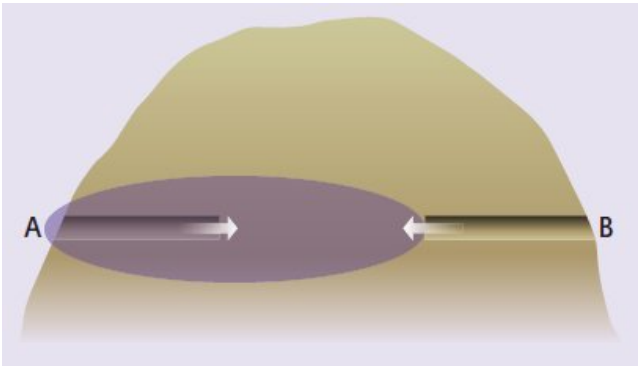
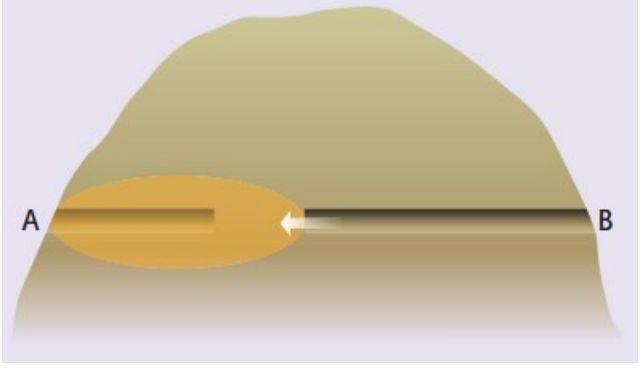
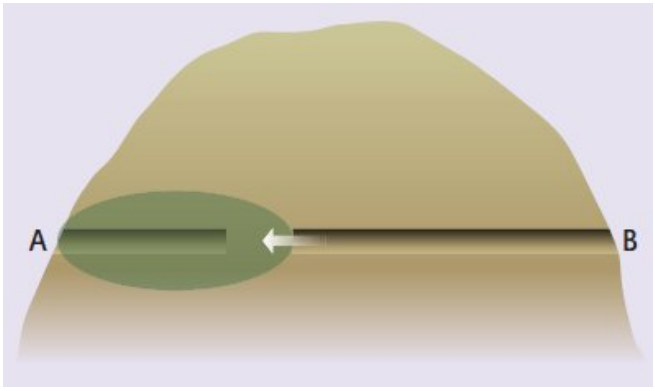


Figure 2a. Known unknowns and unknown unknowns in the tribal example



Figures 2b. Known unknowns and unknown unknowns in the tribal example



Figures 2c, known unknowns and unknown unknowns in the tribal example

Assume that two tribes named A and B living on either side of the mountain decide independently (since they do not have any form of communication and they are unaware of each other) to tunnel the mountain to reach the other side. They start at the same time and drive tunnels in opposite directions as shown in 2a. Although they do not know that the mountain has a syncline, they are able to record and track the geology as they keep driving. Hence, based on already completed sections of the tunnel, Tribe B recognises that cyclically encountered strike and dip of the strata will continue in the rest of the tunnel and they can identify the risks based on that knowledge, although it is a total uncertainty.

The risk area which is actually an uncertainty is shown as hatched area in Figure 2a. Now assume that Tribe A temporarily stops tunnelling while Tribe B continues and hits the centre of the structure where they probably faced water, then continues and observes that a strike and dip of the same strata changes in a way that indicates they may be connected as Figure 2b. At this point, Tribe B has a degree of belief in the strike and dip of the strata as well as excavation conditions and behaviour of the rock mass for the remaining tunnel length. When Tribe B continues excavation further (Figure 2) they observe and confirm that their belief has been correct and the rest of the tunnel length becomes a risk which can be identified and quantified. Interestingly, for Tribe B this has become an area of risk based on data, information and knowledge, but for Tribe A, it remains an uncertainty. Therefore, it is clear that someone's uncertainty can be another's risk. This is the essential point in the perception and pricing the projects. Higher profits are earned where there is uncertainty and conventional profit margins are earned where there is risk. This theory has been established by Frank H. Knight (1921), reproduced by Brooke (2010), who stated that "if the future is risky, no profit can be earned if all the alternative possibilities are known and the probability of occurrence of each can be accurately ascertained". Hence, the contractors first try to identify the uncertainties and the risks when they obtain the contract documents including geological and geotechnical reports.

Aleatory uncertainties remain aleatory for every party. However, epistemic uncertainties are further analysed by the contractors based on their knowledge, past projects, data available to them and local experience. As a result, some epistemic uncertainties become risks according to the degree of belief for the contractors; and they use that advantage in pricing the project.

Interdependence of geological and geotechnical parameters

The initial stage for checking the tender documents for a tunnel is obviously the contract delivery method and contract conditions because these two items affect the whole process. The next stage is to consider all geotechnical re-

ports, which may include geotechnical factual reports, geotechnical design reports, geotechnical interpretive reports and geotechnical baseline reports. Either some or all of these may be provided as part of the contract documents. However, it is not unusual to encounter tenders with only a simple geological summary and a bill of quantities. The contractors may choose to get the reports checked, interpreted and evaluated by external consultants in addition to their own in-house checks. If the construction method has not been defined by the client in the tender documents, the contractor's first action is to identify a resemblance between the new project and previous projects. This process is considerably less difficult if the contractor has worked in the same geography and geology in previous projects. This initial conceptual stage also guides the process of analysing the reports with respect to the importance and complexity of parameters which vary for different methods of construction.

Although there are many parameters involved in geological and geotechnical reports for any underground project, some of them have more weight than others in terms of method selection and costing. All models and parameters will be used to calculate the productivities as well as any short and long term effects. However, this is not an easy task since the parameters are interrelated and complex. Furthermore, different methods will require different parameters to be checked. As an example, particle size distribution is important for a tunnel excavated by slurry machine whereas it has much less importance if the same tunnel is excavated by conventional methods. Another example is the effect of strain bursting which can be controlled by using the distressing effect of blasting in a rock tunnel whereas this approach may not be that easy when a TBM is used.

Table 2 shows the development of productivity based parameters together with the parameters that have long term effects. This is only one example showing some possible parameters but a range of other parameters and models may differ for each case. It only shows where parameters are originating from and which parameters directly affect the productivity, with long term risks. The meaning of the table's letters are given below:

A. Related with geology

B. Related with geotechnical parameters and rock mass classification

C. Related with excavation and support system

D. Directly affects productivity

E. Directly affects long terms risks

It is clear from the table that while some parameters have direct impact on productivity, others only have indirect effects. Therefore, the cost estimation will mainly be based on the productivities (directly affected by those parameters) and a premium will be allowed for long term affects if those effects are not offset either by insurance or by the client.

The example in Table 1 shows only the main part of the process. Method and procedures adopted during investigation stage, scale effect, inherent pitfalls and limitations of classification systems were also analysed as part of this process.

Case Studies

Several case examples are summarised in this article in order to show how geological and geotechnical reports are processed, and uncertainties and risks are identified by the contractors during the tender and project execution stages. Names and details including costs of the projects have been intentionally modified. Two case studies in this paper explain the concepts of uncertainty, degree of belief and risk. There are many other projects in the literature that may be analysed with the same concept. Riemer (2006) reports that Q-rating to the phyllites of the Kali Gandaki headrace tunnel in Nepal had given a rating of $2<Q<50$ for 84 per cent of the tunnel and led the engineer to consider an unlined tunnel which was rejected by the owner on the basis of experience with other tunnels in similar rock. Eventually, rock mass performance observed during construction of the tunnel mainly corresponded to a rating in the range of $0.4<Q<1.0$.

Table 2. Relationships of different parameters with origin and effect on productivity

Item	Description	A	B	C	D	E
1	Lateral extent ofgeological features	x		x	x	
2	Lithology	x		x	x	x
3	Strike and dip of discontinuities	x		x		
4	Presence of water	x	x	x		
5	Total discharge	x	x	x	x	
6	Groundwater regime	x		x		
7	Permeability	x		x		
8	Presence of gas	x			x	
9	Water chemistry	x				x
10	Behaviour in fault zones	x		x		
11	Stress condition	x		x	x	
12	Cavities	x			x	x
13	Fault zones	x			x	
14	Weathering	x	x	x	x	
15	RQD	x	x	x	x	
16	Extent of temporary support	x		x	x	
17	Groutability	x	x		x	
18	Drillability	x	x		x	
19	Ripability	x	x		x	
20	Distribution and description of rock mass classes	x	x	x	x	
21	Overbreak	x	x	x		
22	Contaminated soil or water	x			x	x
23	Assessment of pumping rates	x			x	x

(continues in next page)

This example also shows the importance of the understanding of epistemic uncertainty and degree of belief.

The geological environment in which the tunnel was constructed was modelled by the designer, with certain classification but the degree of belief of the client based on its past experience led to decision to line the tunnel which proved to be the correct decision during tunnel construction.

Table 2. Relationships of different parameters with origin and effect on productivity (continued)

Item	Description	A	B	C	D	E
24	Face stability		x	x	x	
25	Failure modes		x	x	x	
26	Stiffness of materials		x	x	x	
27	Particle size distribution		x	x	x	
28	Round lengths		x	x	x	
29	Stand up time		x	x	x	
30	Shear strength		x	x	x	
31	Shotcrete stickiness		x	x	x	
32	Cutting operation (TBM, D/B) mode		x	x	x	
33	UCS		x		x	
34	Moisture content		x		x	
35	Unit weight		x		x	
36	Presence of boulders, sizes, etc.	x			x	
37	Impact on buildings		x		x	x
38	Settlement on the surface		x		x	x
39	Degradation of materials when exposed			x	x	x
40	Behaviour of rock in response to excavation method			x	x	x
41	Swelling and squeezing capacity			x	x	x
42	Support system			x		
43	Presence of timber, shells, etc.			x	x	
44	Quartz content	x			x	
45	Abrasivity	x			x	
46	Bulking factor	x			x	

Case one: project RT-01

This is a motorway project with a cost of more than USD 220M which includes two NATM tunnels with twin bores and each carrying three traffic lanes. Excavation cross sections range between 120m^2 and 150m^2 depending on the use of invert. The client undertook the preliminary design and geotechnical report. However, the contractor who was very experienced with similar tunnels was responsible for completing the design of the portals as well as shop drawings for the tunnels. The client provided rock mass classification, based on ÖNORM B 2203 (Austrian Norm). However, Q and RMR systems were also used by the designer to validate the distribution. The project used a measure and value contract and the rock mass classifications needed to be signed off by representatives of the engineer after an inspection with the contractor.

Table 2 shows the rock mass distribution provided in the contract, as estimated by the contractor and the as-built situation for a 500m long tunnel. It is worth noting that a major part of the client's estimate was based on a class whereas the contractor's was mainly based on B class, which proved to be the case during construction. The reason for the designer's inaccurate estimate was mainly due their site investigation and interpretation of site results. Since the tunnel was under a hill and rock mass was exposed in outcrops, no borehole were made. This was also partly due to access issues in the densely forested land. The information gathered from out crops alone was enough to make an assessment. Q and RMR values have never been reassessed based on the effect of excavation. The behaviour of the rock mass was not considered and index based rock mass classifications (i.e. Q and RMR) were used only to assess ÖNORM B 2203 classes which are mainly behaviour based. The contractor visited the site and made visual investigations, collated all data together with the methodology and made its own estimation. Although the contractor estimated that the dominant class would be B1 (fractured rock with low deformations and loosening), actual rock conditions were more on class B2. The lineament observed was believed to be a fault zone by both the designer and the contractor and classified as C1 and C2. However, it was classified as B3 during the excavation. This example shows that the uncertainty was not in the parameters or the information used but rather it was the evaluation of those parameters and the information and the perception of the rock mass behaviour based on the past experience in similar tunnels.

Case two: project WS-01

Four pipeline tunnels with a cross section of about 40m^2. Total length is more than 4,000m. Tunnels were mainly located in metabasalt, metagraywacke, schist and marble. However, the last tunnel was mainly within granite and granodiorite. The client did no site investigation but provided geotechnical profiles with the distribution of excavation classes. Excavation and support was designed by the client with three different classes. The contract was measure and value and the standard contract clause shifted all risk for the changes in the distribution of support classes to the contractor. Excavation and support were paid separately per linear metre of the tunnel in any particular support class. The design and construction was mainly following NATM. While Support Class One (SC1) has only rock bolts, wire mesh and shotcrete (out of cycle), SC2 has the same support only the number of bolts and shotcrete thickness increases while round length decreases about 35 per cent. However, SC3 is heavily supported using rock bolts, shotcrete, wire mesh and steel sets. Tunnel excavated in SC3 should also have an invert and forepoling as temporary support. SC3 represents 10 per cent of all tunnel length and mainly assigned to zones at either end of the tunnels and SC1 and SC2 represents 57 per cent and 33 per cent of the total tunnel length respectively. Approximate RMR values for the support classes have been shown in Table 3 in order to give an idea about the rock mass quality. It may be expected that different rock support classes will have different prices. Table 3 shows that the contractor allowed a significant premium to his prices in order to level prices for different support classes. One factor was the geology. The contractor visited the site and observed extensive jointing, folding and faulting which would affect the excavation and the progress. Hence, the contractor had the opinion that SC1 and SC2 do not differ practically. Due to the rock conditions, the contractor also estimated that the overbreak would be significant and this will not only increase his direct cost but would also have direct impact on shotcrete quantity and time since the specification called for a final shotcrete layer. The necessity of concreting the invert, leaving a rough surface would also lead to cost increases. Access conditions were also a factor.

The most important lesson is the necessity of having a complete geological and geotechnical report, which should identify areas with potential problems and include an evaluation of the rock mass behaviour. The pricing struc-

ture should allow contractors to address concerns without adding large premiums.

Table 3. Pricing for support classes project WS-01

Rock Class	Contract	Contractor's Estimate (%)	As-buit (%)
A1	0.3		
A2	54.4	2.7	
B1	36.5	65.3	
B2	5.3	23.0	80.7
B3			19.3
C1	2.5	3.5	
C2	1.0	5.5	

Conclusion

Although this paper cannot address all possible causes of time and cost overruns, it may be helpful to consider another perspective of costing tunnel projects from the point of view of the contractors, the mostly silent party.

Although there are very standard conclusions that are known to the industry such as realistic geotechnical reports, good site investigation, risk sharing, no disclaimer clauses and partnership, the following factors should also be considered:

a. Clients should disclose past project experiences to the bidders and should not hide the risks.

b. Parameters and information in the reports should be classified according to their effects on productivity considering potential construction methods. This will assist in providing more knowledge and data.

c. Clients should give the bidders an opportunity to comment on the gaps, omissions and insufficiencies in geotechnical reports.

d. Commentary on possible rock zones should be provided.

e. If excessively high baselines compared to available data are selected, the bidders will think that either the tests are faulty or the client has certain information that it does not want to disclose. This will cause the bidders to add premiums on their prices.

f. If rock mass classification systems such as RMR and Q are used, it is important to provide all data used to calculate the index values rather than reporting the index value only.

g. Commentary on rock mass behaviour is very important.

h. Baselines should be measurable and verifiable otherwise they will not have significant bearing on pricing

i. If unconventional techniques are proposed as a part of the project a detailed description including risks and potential construction techniques should be provided.

j. A bill of quantities or pricing should be selected in a way to reflect the complexity of the geology. Single pricing under one rock class with a wide range rock mass quality will lead to a higher price than narrow ranged rock mass classification.

k. Scale effect should always be considered even evaluating the response of the tunnel to excavation.

l. Clients should take into account other factors, such as market conditions, business drivers and competition when tendering the projects.

All efforts should be directed to change the attitude of 'your uncertainty is my risk' to 'we share risks'. It is important to know that a greater amount of information will help to reduce epistemic uncertainty

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Stress and positive reinforcement

Jean Launay, *Vinci Construction*

In order to see how a tunnel rock arch reinforced by fully grouted rock bolts and shotcrete is working, the functioning of vertical and horizontally reinforced soils should be explored first.

While the vertical and horizontal reinforcement of soils has developed following the use of fully grouted bolts to reinforce a tunnel carrying rock arch, they should be described as their functionality is similar to that of the reinforced rock arch and shotcrete, and is easier to understand.

Vertical reinforcement

Vertical soil reinforcement was studied (Combarieu) between 1975 and 1985. It was later formalised in case of stone columns by a recommendation (RFG number 111 2eme trimestre 2005).

The theoretical works of Combarieu showed the functioning of soil reinforced by vertical inclusions. The inclusions are considered as friction piles, or friction and end bearing piles.

The transfer of the loads brought about by a fill or a general foundation slab to a soil reinforced by inclusions occurs through an arching effect between the inclusions. The loading of the inclusions takes place along a transfer length where the strain of the soil and the inclusions are equal, and where the shear strength capacity of the soil-inclusion contact is sufficient. This shear strength value may be the critical condition for the inclusions spacing. The capacity of shear strength development along the inclusion is linked to the soil horizontal stress (see Figure 1).

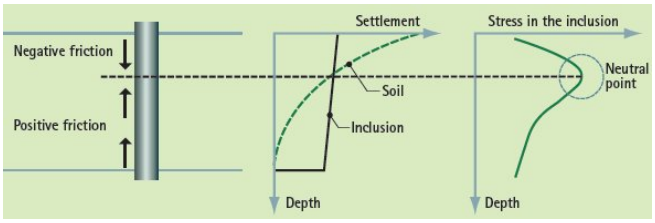

Figure 1. Inclusions functioning

The upper portion of the inclusion is in compression and is loaded along the transfer length (negative friction) while the lower portion behaves as a friction pile and returns the load to the surrounding soil located between the inclusions. This load transfer is valid if the modulus of the soil located below the tip of the inclusion is of the same magnitude as the modulus of the soil where the inclusions are embedded. In case the modulus of the soil below the inclusion tip is higher, a portion or the total load will be carried to the tip (see Figure 2).

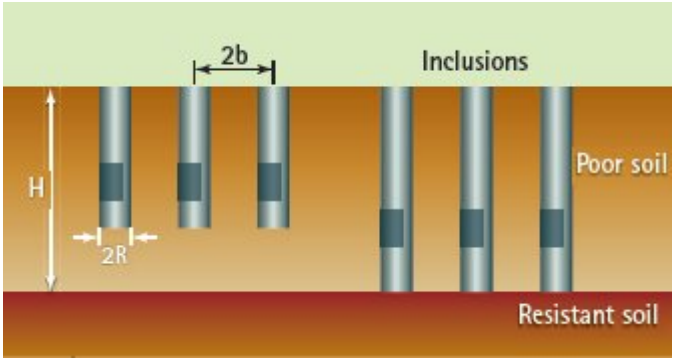

Figure 2. Various inclusion functionings

The bearing capacity of the reinforced soil is made up of two capacities:

- Internal capacity: the bearing capacity of very inclusion is Estimated
- Outer capacity: the bearing capacity of the reinforced soil is estimated based on the Terzaghi approach for a piles group, or by computing the bearing capacity of a surface foundation slab resting on a soil with an improved cohesion. This last approach is similar to a circular rupture of the cohesive foundation soil.

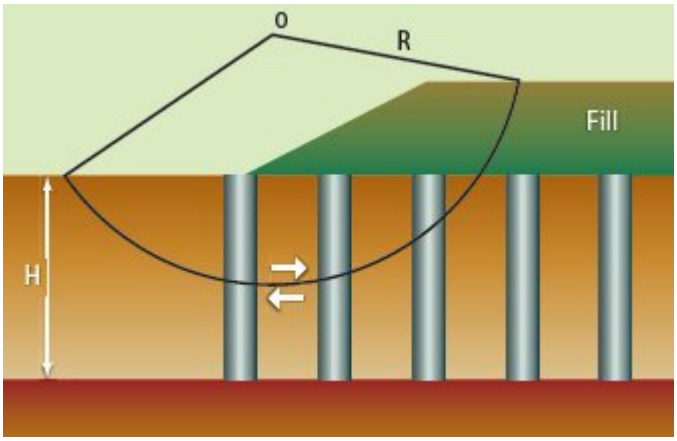

Figure 3. Computation of the bearing capacity on the reinforced soil

Soil nailing

The nailing of excavation slopes was developed in France between 1972 and 1974 on temporary slopes at the enlargement of a railway line in Versailles by the contracting joint venture of Bouygues and Solétanche (Rabesajet, Toudic 1974). And for stabilising tunnel entrances at the A8 motorway construction site by Campenon Bernard (Launay, 1974). In the latter case, the principles of NATM were applied for stabilisation of the slopes.

The nailing computation was done assuming that each nail was bringing a stabilising force on the least stable circular circle. The nails were working against the sliding forces. As with the NATM, the carrying capacity of the shotcrete skin was considered as limited to the loosened zone between four nails. The zone was loosened during the excavation phase.

Contrary to vertical reinforcement, the inclusions, or nails, are in tension. The first Clouterre guideline of 1991 considered the shotcrete skin as a floor resting on four poles (the nails) loaded by the horizontal active pressure, which is proportional to depth. The 2002 update following FEM modelling of the soil behaviour between the nails recommended considering a skin pressure much lower than that proposed in 1991.

The maximum pressure is encountered at the nail (equal to the nail tension force) and to zero at the centre of the shotcrete plate. It is interesting to emphasise the fact that reinforced earth has a similar approach.

In the two editions of the Clouterre guideline the overall stability of the reinforced slope is performed using the modified Bishop method taking into account the nails working in tension. The shear line crosses the reinforced soil mass and the nails are locally loaded as a pile under a horizontal force located at its upper end.

Rock arch design

The design of a tunnel rock arch taking into account the stabilising effects of the fully grouted bolts is a challenging task. Several methods are at the disposal of the designer. Among those approaches the following ones are available:

- Modelling of the bolts section and length by means of special elastic beam elements within an F.E.M model. The link between the bolt and the soil/rock has the same strain.

- Model the reinforced rock arch zone in increasing the cohesion of the rock arch area in accordance with the theory of homogeneity as proposed by E. Greuel, 1993 for cohesive soil or K. Gharbi 1994 for cohesive and friction soil.

The two models, and particularly the former, are limited as they do not completely reproduce the behaviours and the measurements encountered on sites. They give too much of a weighting to the shotcrete shell in the carrying capacity of the provided support (including bolts) contrary to the stresses measured within shotcrete shell.

Backgrounds

At the time of development of NATM between 1962 and 1975, Kastner, Pacher and Rabcewicz proposed to estimate the reinforced rock arch carrying capacity based on shear lines through the entire support and the appearance of arching effect between the radial grouted bolts and the soil-rock. This would be based on model tests, theoretical approaches and results of measurements in tunnels under construction.

The phenomenon of the transfer of the load towards the bolts, described above for vertical reinforcement of soil and nailing of slopes, is also encountered in a tunnel arch reinforced by grouted bolts. These results have been described in Rabcewicz (1964, 1965, 1969, 1971) and Rabcewicz et al (1972, 1973).

Modelisation

The transfer of overburden load towards the grouted bolts was more or less intuitive until now. In order to analyse and describe its functioning, it was decided to use the most up to date three dimensional FEM program, which has sufficient computation power to model in details the behaviour of the reinforced rock arch. The results obtained were described in detail in the master paper of Lelong (2009).

The studied section has a 6m radius; the support is composed of 6m long, 20mm diameter fully grouted bolts every square meter of arch. The rock has a Mohr-Coulomb elastic-plastic law.

The initial isotropic geostatic stress at axis of tunnel is equal to 0.9MPa. The utilised FEM model is the three dimensional CESAR program of LCPC. In order to avoid the usual inaccuracies it is necessary to model each bolt and its connection with the soil/rock. It requires a very precise modelling which involves many nodal points. The final model includes 100,000 nodes, 30,000 volumetric elements as well as 1,800 connection nodes, it was later simplified to 55,000 nodes.

Two major points must be underlined that fit the model to reality:

- The outer ends of the bolts are not allowed to sustain tension.

- The stress between the bolt and the surrounding soil/rock is a Mohr Coulomb relationship.

The tunnel excavation is modelled by a 30 per cent deconfining coefficient before placement of the bolts. In a first approach the shotcrete shell was not modelled. It will later be introduced to check the results of the modelling with measurements in a tunnel under construction where the NATM was applied. Finally the bolts were modelled with and without anchor plates.

Results

Internal deformation of the reinforced arch

Figures 4a and 4b show the distribution of the deformations between the bolts in three dimensions. In spite of the absence of support between the bolts at tunnel excavation periphery there is no failure of the soil/rock and the displacement is limited (2 to 3mm). The shape of the equal displacement curves shows the build up of arching effect (vertical section at mid-distance between two rows of bolts and along a section through the row of bolts).

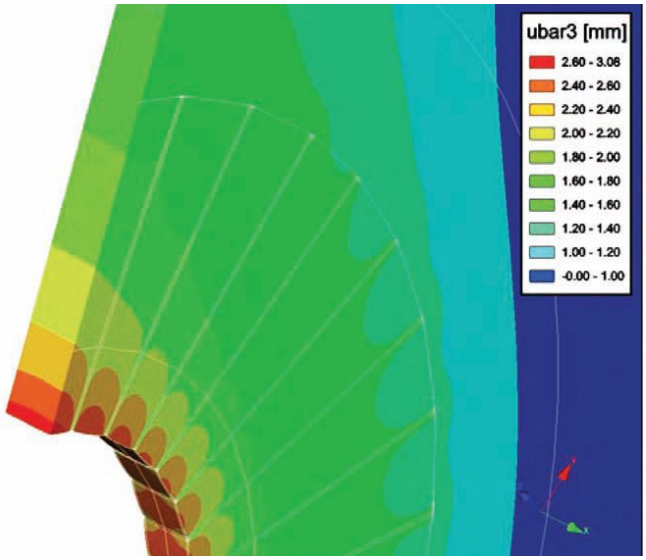

Figure 4a. Deformations between two rows of bolts

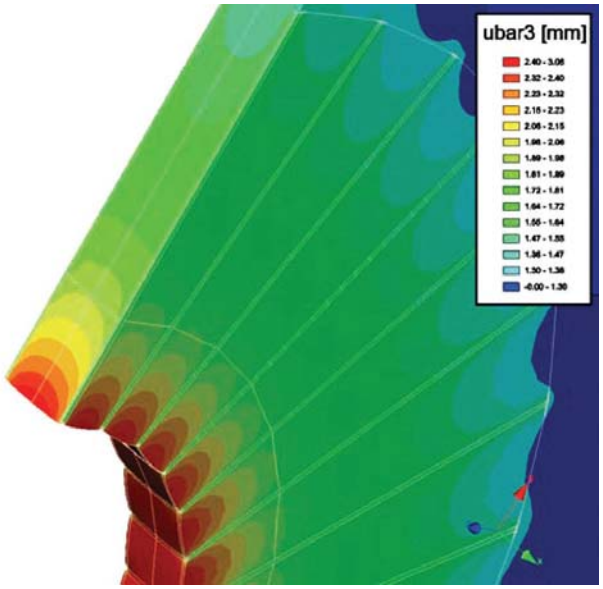

Figure 4b. Deformations within a row of bolts. ubars are displacement (mm)

As described by (Rabcewicz 1972 and 1973) the radial stress applied to the reinforced arch is transferred as well by friction in the bolts (tension) and into the reinforced arch by compression (see figure 5). The green zone is in tension and will therefore be carried by the shotcrete shell which

can be associated to the reinforced arch. The weight of this zone is very limited and therefore the shotcrete shell can be thin. It must be mentioned that the FEM results given have been obtained by means of a two dimensional modelling.

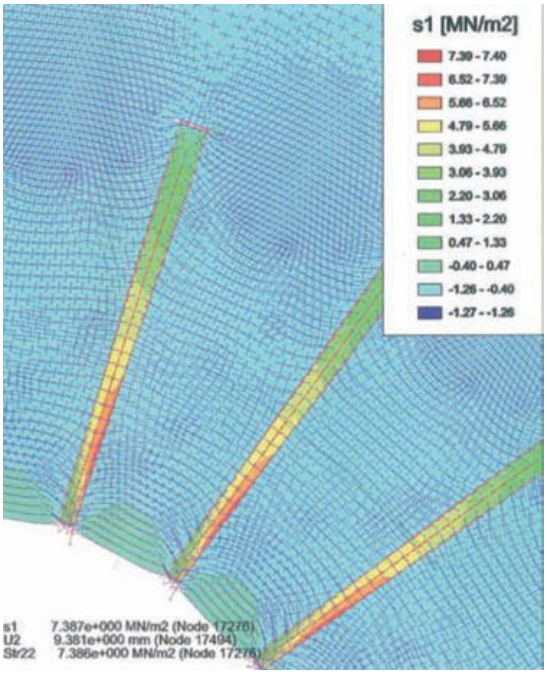

Figure 5. Stress field between two rows of bolts

Stresses within the reinforced rock arch

When designing the support of a tunnel, the radial and tangential stresses applied to the support must be known. Based on the results of the model and taking into account the progressive de-confinement taking place after placement of the bolts, it is possible to make the following conclusions:

a. As far as the radial stress is concerned, it is 'maintained' within the reinforced arch at a higher value than without reinforcement. The radial stress value corresponding to the deconfinement ahead of the excavation face (30 per cent in the assumed case) is located 2m within the reinforced arch. With regards to the deformations it means that smaller deformations will occur outside the reinforced zone or smaller settlements at the ground surface in case of a shallow tunnel. At the tunnel excavation periphery the radial stress is nil.

b. The most important result is the displacement of the maximum tangential stress location (plastic radius) away from the reinforced arch with deconfinement increase (equivalent to time) as well as a large decrease of the tangential stress at the tunnel excavated periphery. The stresses are pushed away from the tunnel. This fact can be very useful in the sequences of tunnel excavation when stages excavations are required. For example the placement of the bench support will be more flexible in terms of time allowance.

The tangential stress distribution loads the reinforced arch in a manner similar to the soil weight in case of an outdoor soil nailed excavation or a vertically reinforced soil.

Stresses distribution within bolts without anchoring plate

As introduced earlier, the bolts have been introduced in the model without plates or shotcrete shell. The stresses distribution along the bolt is shown on Figure 6.

Figure 6. Stress distribution along a bolt

The bolt length origin is at the edge of the tunnel excavation. A loading tension zone appears on a 4m length and an unloading tension zone on a 2m length. The point of maximum tension is located at the point of maximum tangential stress. In a similar manner as the tangential stress, the tension within the bolt will build up progressively with deconfinement or time until it reaches its maximum value.

The maximum friction between the bolt and the ground must be compatible with the compressive stress around the bolt-grouted zone and the available shear stress between the bolt and the ground. Combarieu's idea of negative friction along an inclusion is confirmed.

Stresses distribution within a bolt with anchoring plate

The introduction of anchoring plates (200 by 200mm) changes slightly the distribution of stresses and deformations between the bolts heads (toward the plates). The unsupported surface is smaller, but away from the periphery of the tunnel excavation the totally de-confined zone has a similar extent compared to the case without plates.

The tension stresses distribution along the bolt is different from what was encountered without plate (see Figure 7). It shows that when a 'stiff' support component relative to the ground stiffness is introduced it 'catches' the loads. This distribution of stresses is to be compared to the one described in the soil nailing (Clouterre additive, 2002).

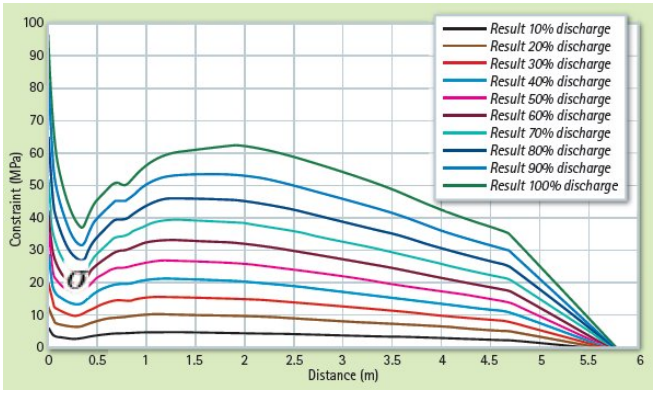

Figure 7. Stresses distribution along a bolt with plate with deconfinement (every curve corresponds to a deconfinement step)

As far as the radial and tangential stress field is concerned in a plan at mid distance between two rows of bolts it is similar to what is founded with plates.

Examples of measured stresses in bolts in various tunnels

The three examples described are tunnels where the support was composed of fully grouted bolts and a thin shotcrete shell. The examples (see Figure 7) were given by Louis (Le soutènement par boulonnage et béton projeté) at the 1977 AFTES meeting in Paris.

They show that the stresses distribution along bolts may vary a lot from one bolt to the next one even when the ground conditions is homogenous (Marl at the Las Planas tunnel A8, 1975) or slightly heterogeneous at Marseille (Marl and limestone).

The example (see Figure 8) is the connecting chamber of the Sèvres-Achères sewage system. The crown of the chamber has been excavated within the plastic clay of Paris. It can be seen that the stresses distribution along the bolts is also changing from one bolt to the other.

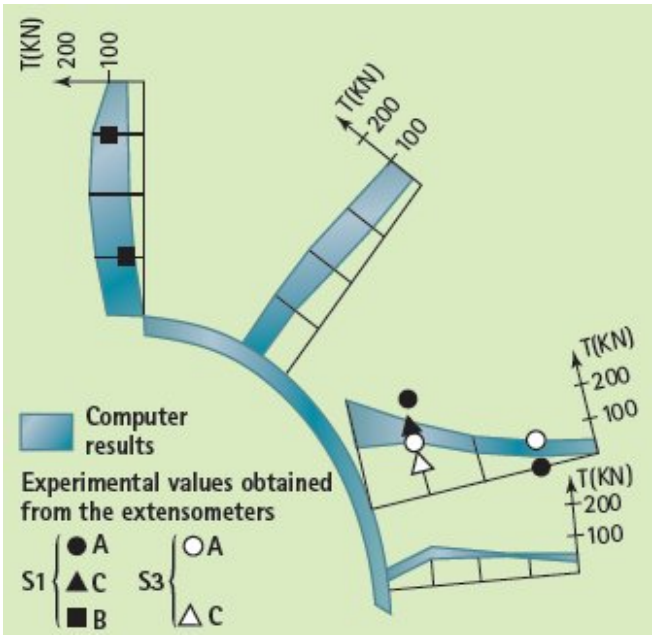

Figure 8. Stress of the bolts changes from one to another

Conclusions

The modelling approach, with examples, shows that the distribution of the stresses along a fully grouted bolt is heterogeneous.

It is linked to the relative stiffness of the support that can be provided on the periphery of the tunnel excavation; anchoring plate and/or shotcrete shell. Dependent on the proper placement of the plate against the ground and/or the connection of the shotcrete to the ground the distribution will vary. But most important, the arching effect in between the bolts will in any case develop and therefore determine the functioning of the reinforced arch.

Shotcrete shell

A shotcrete shell has been used in a 13m diameter tunnel excavated in Phylite (GSI=25; C=250 kPa; φ=32°; E_{rm}=370MPa). The support is composed of a 100mm thick shotcrete shell and 20mm diameter 5m long fully grouted bolts every square meter. The overburden height is equal to 100m at tunnel axis (σ_o=2,500kPa).

The loading of the bolts, development of arching and a very small load on the shotcrete have been founded in the FEM model results. Symmetrically, on both sides of the tunnel axis, appears a zone where the pressure is higher (r=130-150kPa). These areas correspond to the maximum deformation points (13mm). The pressure on the remaining portion of the shotcrete shell varies between 50 to 100kPa. The pressure is low and roughly equal to two to four per cent or the initial radial stress. This example has also been modelled without any shotcrete. The equilibrium has been obtained with a convergence of 16mm. The shotcrete shell has limited the convergence but does not change the functioning of the reinforced arch.

Design of the support (grouted bolts and shotcrete)

The functioning of a reinforced arch was outlined previously with regards to inner and outer deformations, distribution of the radial and tangential stresses around and inside the reinforced arch and distribution of the stresses along bolts with or without anchoring plate. The following conclusions can be drawn:

a. The appearance of an arching effect between the bolts is true. It allows the built up of reinforced arch around the tunnel excavation within which the tangential stress is high away from the tunnel excavation and low at the border.

b. The loading of the reinforced arch is progressive and develops with time and convergence.

c. The distribution of stresses along the bolts is related to the provision of a shotcrete shell and/or of anchoring plates. The relative stiffness of the shell or of the anchoring plate has an influence on the stress distribution along the bolts.

d. Providing a thin shotcrete shell (100mm) has a similar effect as an anchoring plate.

e. It must be emphasised that with or without shotcrete shell or anchoring plate, the reinforced arch (including radial bolts) is able to carry the greatest portion of the overburden load with limited convergences.

These conclusions allow a design of the tunnel support to be proposed based on a shear surface through the reinforced arch and the shotcrete shell in a manner similar to what is done in case of soil nailing.

The shape of this surface cannot be circular due to the shape of the tunnel excavation surface. The surface or shear line will be a logarithmic spiral as the normal to the bolts will have a constant shear angle with the shear line. This shear angle is computed on the Mohr circle based on the normal and shear stress along the shear line.

Along this shear line, the principal stresses are $\sigma_1=\sigma_\theta$ =tangential stress and $\sigma_3=\sigma_r$=radial stress. The values of these two stresses vary within the reinforced arch. If in order to compute the shear angle the values at the periphery of the excavation are used, the estimated value will be on the conservatively safe side.

The location of the shear surface must be assumed taking into account the original stress field and/or the sequences of excavation. This surface is described by Rabcewicz (1969) and by Rabcewicz and G. Golser (1973). It is related to the confining effect of the shotcrete shell, the bolts and steel arch and to the geotechnical characteristics of the ground.

When computing the carrying capacity of the support in accordance with his approach, the weight of the reinforced arch is correctly estimated and it allows a decrease to the overall cost of the support without jeopardising the safety of the tunnel stability. It is easy to use and it allows a quick and correct estimate of the support capacity but, as its authors have always strongly recommended, it must not be

put in practice without continuous convergence measurements and therefore follow up of the behaviour of the support with time.

This method has been utilised in numerous projects for the last 10 years under low and high overburden, in elastic or plastic ground conditions with success.

Conclusions and applications

The reinforced arch with fully grouted bolts model presents a certain number of conclusions that are important in the way to implement grouted bolts and shotcrete shell.

1. The bolt loading is triggered by tunnel convergence. This convergence must not be counteracted by a too stiff shotcrete shell which would limit the loading of the bolts and the built up of the reinforced arch.

2. If convergence measurements do not show stabilisation, an increase of the support will be necessary using grouted bolts and shotcrete. The bolts must be placed first and the shotcrete extra thickness in a second stage. As a matter of fact, if the new shotcrete is placed first, the stiffness of the total shotcrete shell will be higher and it will limit the new convergence avoiding as a consequence the development of the assumed carrying capacity of the newly placed bolts. It should be pointed out that this reasoning must take into account the overburden height as the tangential stress must be sufficiently high to 'squeeze' every bolt.

3. The squeezing of the bolts by the ground has an important consequence on the request by many technical specifications on the pull out tests of bolts. As a matter of fact, the pull out tests results will depend on the actual convergence of the tunnel periphery. When the reinforced arch will have completely developed it will be impossible most of the time to pull out the bolt and it will break at the level of the screw thread of the bolt head.

4. The development of the tangential stress with convergence and therefore time. It shows that its value decreases at the tunnel periphery and that, when the total carrying capacity of the bolts is obtained, this value is low and in fact close to zero. Then, when a two stage excavation is performed in a tunnel, the bench excavation will take place with a tangential stress value above the excavated sidewall very low as the higher values have been pushed away from the sidewall. The stability of the sidewall has improved a lot and the risk of landslide before placement of the support has decreased. The use of grouted bolts as support has improved the safety of the works.

5. The location of the anchoring plate versus the excavated surface does not change the efficiency of the bolts as with or without the plate, the tension capacity of the bolt is similar and the reinforced arch is mobilised in the same manner.

6. The load that is carried by the shotcrete shell is limited as much as the relative stiffness of the shell is low, with reference to the ground one. This functioning is equivalent to the transfer of the load at the ends of the piles.

7. The shear line computation proposed by Rabcewicz and Golser which is similar to the computation of a nailed wall is a correct approach to modelling the functioning support (composed of a reinforced arch and shotcrete shell). Relatively simple to put into practice it allows estimation of its carrying capacity. It outlines the 'weight' of the reinforced arch and therefore the capacity of the ground to support itself with rather little support materials.

8. It is then finally necessary to remember that the observations of convergences, and the follow up actions all along the works, are the basis for security of the support. It is especially clear when keeping in mind all the unknowns that exist within the geotechnical parameters, and also in the stress field in the original ground.

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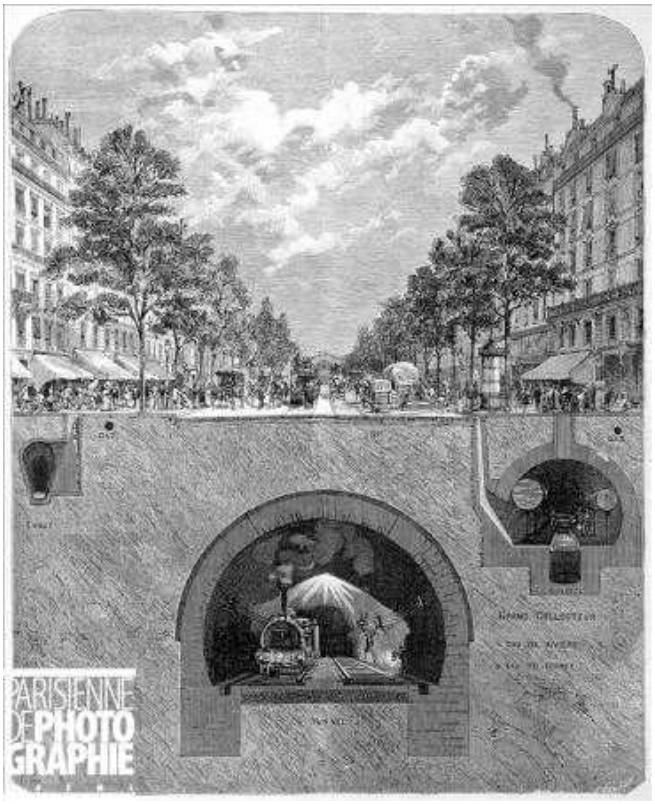
(Tunnels & Tunnelling International, November 2012, pp. 40-45, http://www.tunnelsonline.info/features/stress-and-positive-reinforcement, http://viewer.zmags.com/publication/cd6aadee#/cd6aadee/1)

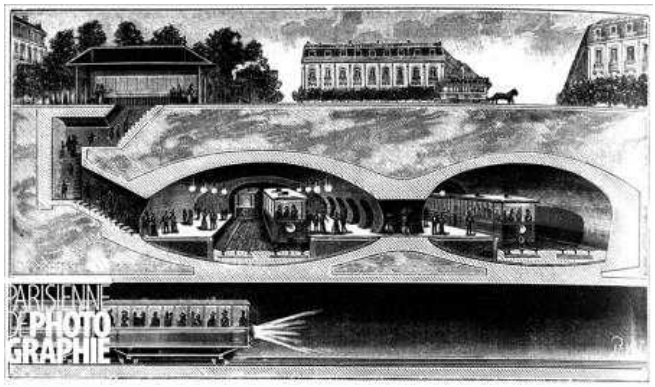
Construction du métropolitain à PARIS
(φωτογραφίες από την κατασκευή των σηράγγων)

12 avril 1895 Premier plan, prévisionnel, du Métro

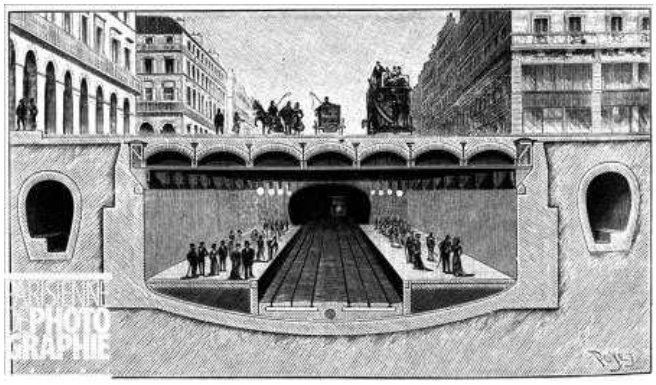
1890-1898 étude de projet ligne n° 1



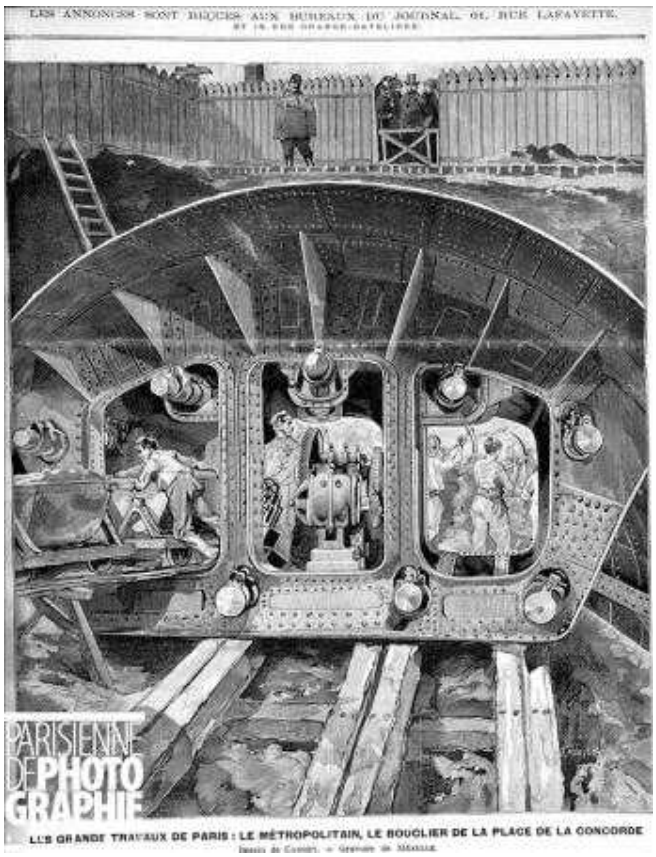
1890-1898 Etude pour le boulevard Sébastopol



1899 - Etude pour la station Etoile



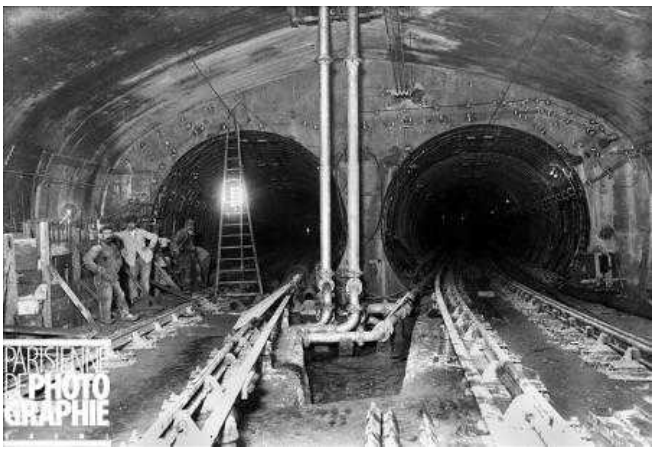
1899 – Etude pour le passage sous la rue de Rivoli



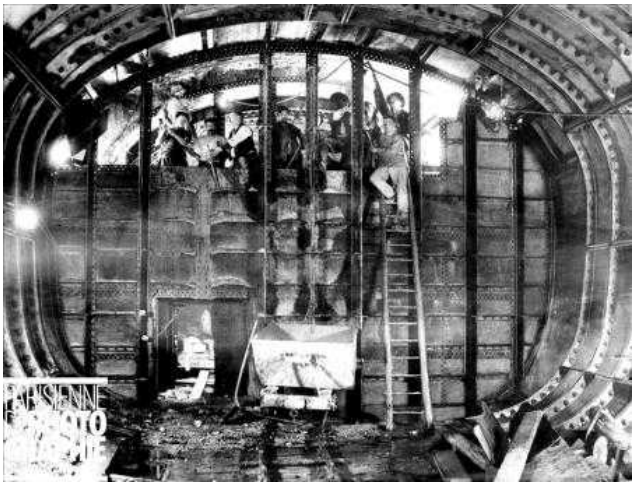
1899 le bouclier place de la Concorde

1900 Etude pour le passage sous la rue du Faubourg Saint-Antoine

1899 Congélation artificielle de la Seine pour creusement et enfouissement d'un caisson

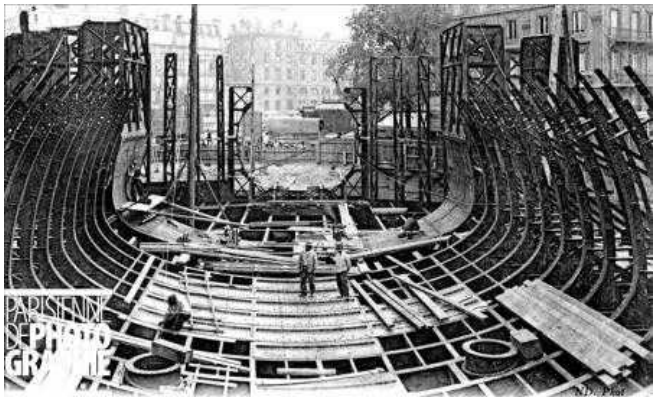


1900 Construction de la voûte nord-sud sous la place de la Concorde

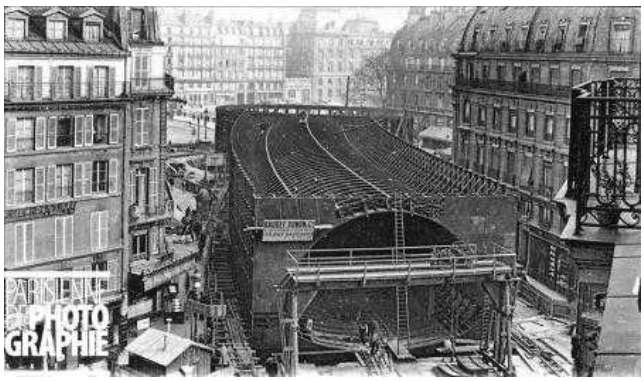


1900 Construction d'un caisson pour traverser la Seine

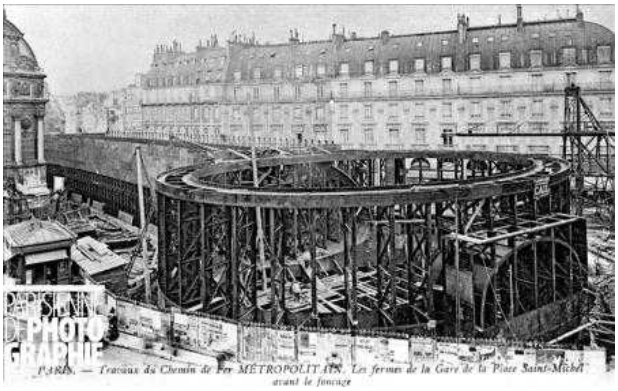
1900 Chantier sous les Batignolles



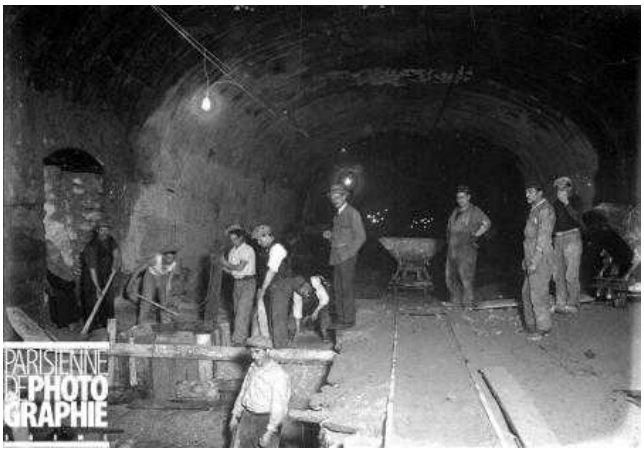
1900 Montage du caisson pour la station Saint-Michel



1900 – 1905 Assemblage final du caisson destiné à être enfoui place St-Michel



1900-1905 Préparation du coffrage pour la station St-Michel

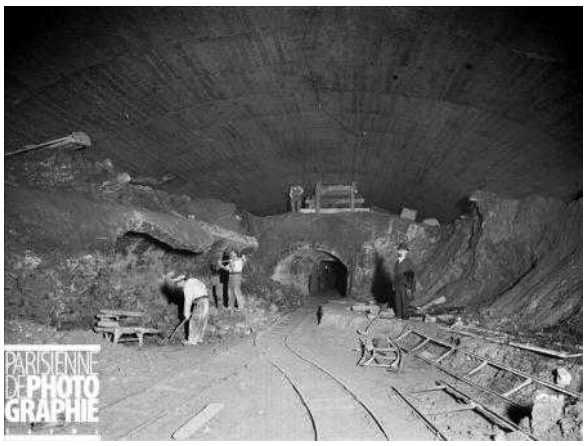


1900-1905 Travaux dans un tunnel

1901 Chantier de la station Nation

Février 1902 Chantier place de la Nation

Mars 1902 Construction de la station Place Clichy

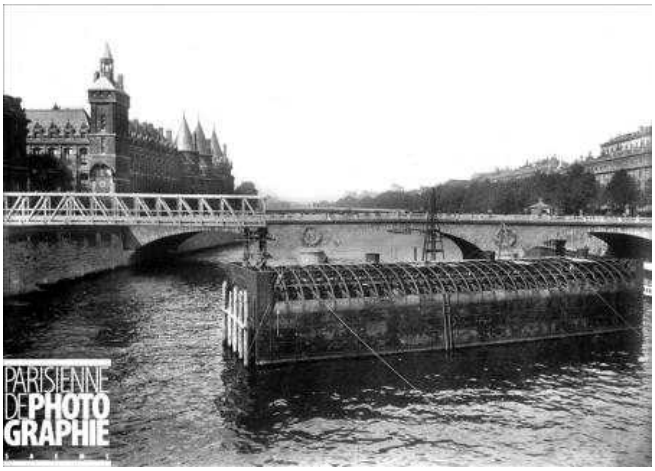


Mars 1902 Chantier de la station Place Clichy, coupée par l'aqueduc de ceinture

Mars 1902 Chantier rue de Rome

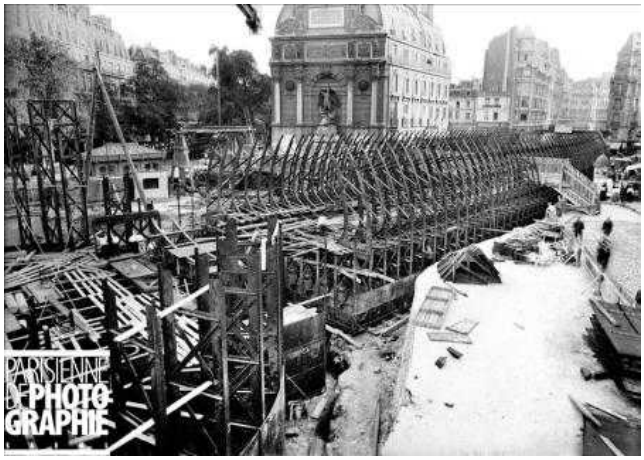
Mars 1902 Chantier station Anvers

1905 Ligne n° 4, enlèvement de la terre et des gravois



1905 – Immersion du caisson pour la ligne Clignancourt-Porte d'Orléans

1905 Percement de la ligne n° 4



Juillet 1906 chantier place Saint-Michel

Août 1906 Caisson en attente d'enfouissement place Saint-Michel

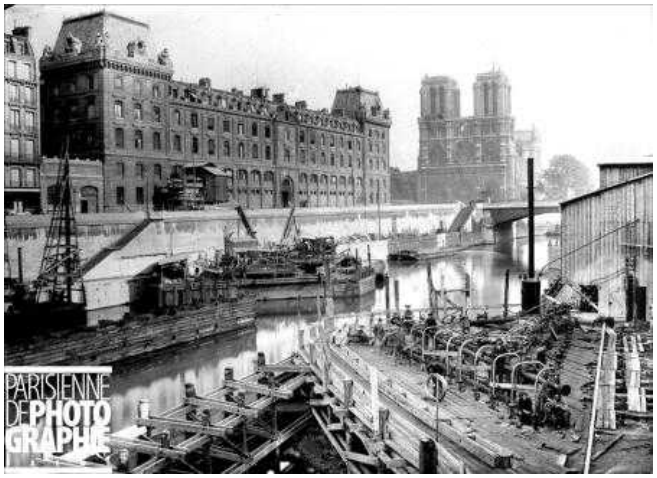
Juin 1906 Découverte de vestiges Gallo-Romains sous le marché aux fleurs de l'Île de la Cité

Juillet 1906 Travaux gare de l'Est

Juillet 1906 Chantier place de la République

Août 1906 Chantier rue Auber

Août 1906 Travaux rue Saint-Quentin

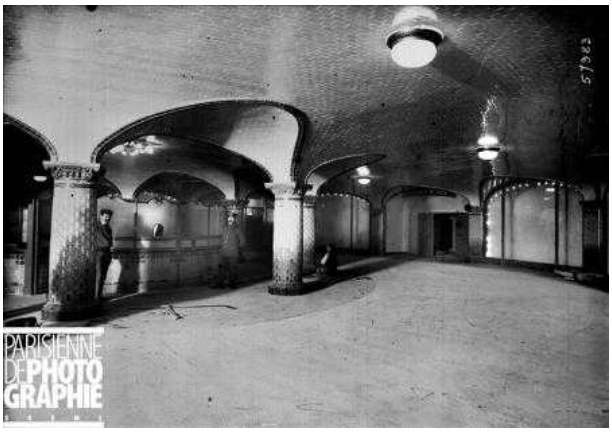


1906-1907 Congélation du petit bras de la Seine

1907 Creusement de la station Île de la Cité

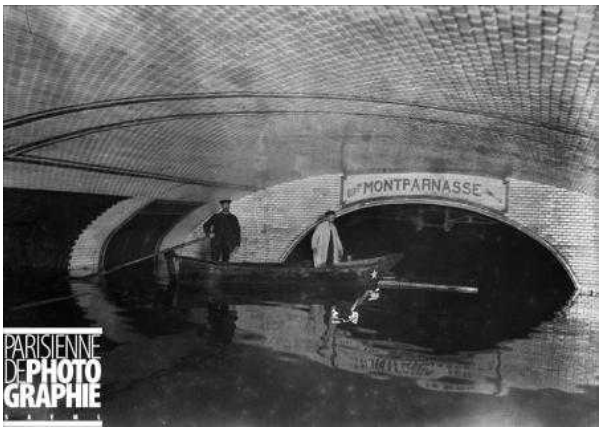
1907 Sac à air permettant aux ouvriers souterrains de respirer

1908 Sacs à air Île de la Cité



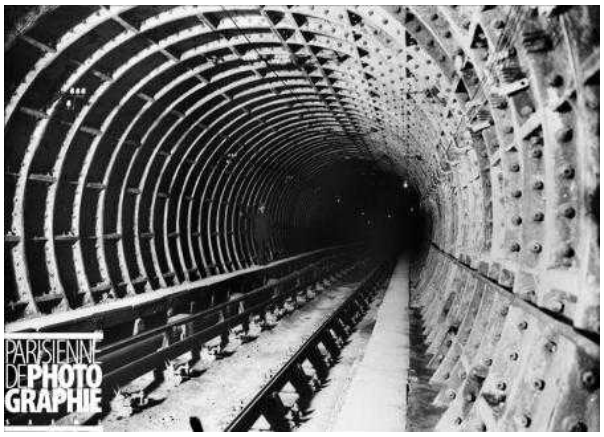
1910 Couloirs de la ligne Nord-Sud à Saint-Lazare

1900-1910 Travaux avenue de l'Opéra



Janvier 1910 crue de la Seine station Montparnasse

Janvier 1910 Crue de la Seine station Madeleine

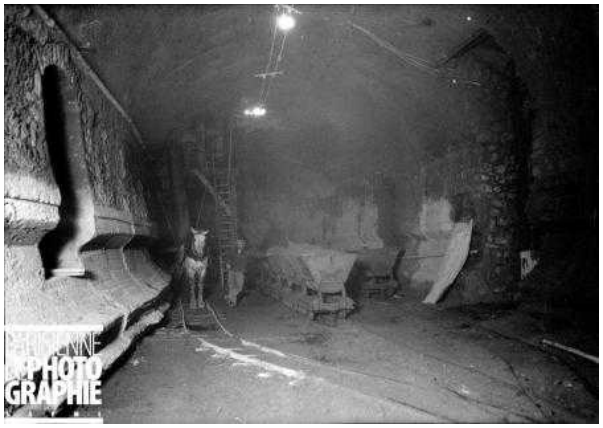


1910 Tube étanche pour passage sous la Seine

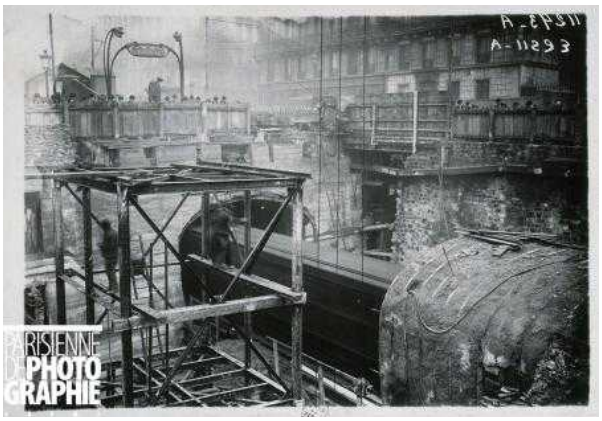
Décembre 1912, jonction avec l'aqueduc de l'Ourcq, direction Nation

1914 creusement d'une galerie

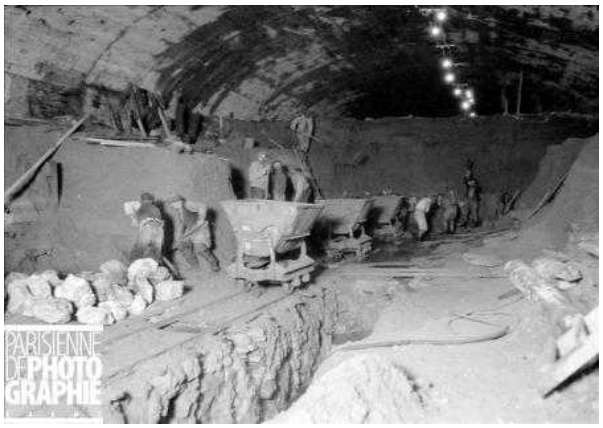
Voûte du métro défoncée par une bombe lancée d'un Zeppelin pendant la guerre de 1914-1918



1928 percement de la ligne 7 (Porte de la Villette – Porte d'Italie)



1923-1925 démolition du tunnel des Batignolles



1928 percement de la ligne 7 (Porte de la Villette – Porte d'Italie)

1925-1930 Reconstruction de la station Hôtel-de-Ville

1928 Stockage des voussoirs Quai Henri IV

1925-1930 rue de Rivoli - reconstruction de la station Hôtel-de-Ville

FIN

ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ ΓΙΑ ΓΕΩΤΕΧΝΙΚΟΥΣ ΜΗΧΑΝΙΚΟΥΣ

ARUP

Opportunities in Geotechnics

Recruiter : ARUP
Posted : 25 October 2012
Location : UK wide
Sector : Civil, Geotechnical, Structural, Transport & Highways
Category : Civil Engineer, Geotechnical Engineer
Job Type : Permanent
Salary : Competitive + Benefits

Our business is growing everyday – and our geotechnical teams have never been busier.

We design innovative and technically creative solutions that drive forward the possibilities in geotechnical engineering. We are currently delivering some of the most exciting and challenging projects, including:

- HS2 and Crossrail
- Metro and large building projects all over the world
- Designing innovative off-shore platforms to support wind farms in the North Sea

Arup is a place like no other – our clients are world renowned, our projects are iconic, the people are friendly, the environment is relaxed and everyone takes great pride in what they do. Working here is not just about your day-to-day job. When we hire you, we have your long-term professional career in mind. And you will be supported by our entire global skills network.

We encourage you to follow your passion – by learning new skills, working across different disciplines or moving into new challenges. Join us and let us help you take your career where you want it to go.

Requirements

We are looking to recruit inquisitive and motivated geotechnical design engineers to join our teams in London, Cardiff, Glasgow, Leeds and Solihull.

You will have proven design experience in geotechnical engineering, together with a degree in civil engineering or a relevant degree in another geotechnical discipline.

Reward and Benefits

- Competitive salary and one of the best benefits package in our sector
- UK Healthcare Plan (private medical insurance)
- Life Assurance & Accident Insurance
- Income Protection Cover
- Flexible Benefits Fund

What's more, as a member of Arup, you own part of the business and get a share in the profits we make. It's our way of saying 'thank you'.

We are committed to equal opportunities.

How to apply

If you would like to find out more and apply, visit our recruitment portal by clicking on apply button (http://www.ncejobs.co.uk/job/2540322/opportunities-in-geotech-nics/?LinkSource=HomePage&utm_source=mktemail&utm_medium=NCEemail&utm_campaign=NCE_mktemail_all).

Graduate Geotechnical Engineer – Nottingham

Recruiter : Penguin Recruitment
Posted : 01 November 2012
Ref : MT012/10/GradGeotNot
Contact : Matt Thompson
Location : Nottingham
Sector : Civil, Geotechnical
Category : Civil Engineer, Geotechnical Engineer
Job Type : Permanent
Salary : £18000 - £22000 per annum

We are urgently seeking a junior geotechnical engineer for a leading engineering contractor based near Nottingham. This is an excellent opportunity to join an award winning organisation and develop a career in geotechnical design and site investigation management.

Suitable candidates will have a Civil Engineering academic background and ideally with MSc in Geotechnical Engineering or Engineering Geology. A sound understanding of design principles for piles, foundations, retaining walls and earthworks is essential.

Reporting to senior members of staff the successful candidate will be involved with an array of challenging geotechnical design and build projects. Excellent prioritisation and communication skills are essential as this role will require client liaison, project management, design work, site investigation supervision and technical report writing.

The position offers a competitive salary together with benefits such as a private health care scheme, contributory pension, life insurance and a personal development scheme.

Interested in this role please send your CV to matt.thompson@penguinrecruitment.co.uk or call 01792 365002 for an informal chat.

Chartered Geotechnical Engineer – Bristol

Recruiter : Penguin Recruitment
Posted : 13 November 2012
Ref : LR/NOV/13.2
Contact : Lee Rimell
Location : Surrey
Sector : Geotechnical
Category : Geotechnical Engineer
Job Type : Permanent

Salary : £35000 - £45000 per annum

We have an excellent opportunity for a Chartered Geotechnical Engineer to manage a wide range of engineering projects within the Civil Engineering division of a leading Engineering Consultancy in Surrey.

The role will require a high calibre candidate with an extensive knowledge of design of deep excavations, earthworks, piled foundations and retaining walls. You will also be required to have a strong understanding of numerical modelling.

Candidates are expected to have gained Chartered status with a recognised professional body and have over 10 years industry exposure leading Geotechnical Projects from inception through to practical completion. You will have excellent interpersonal skills to communicate at all levels and represent the consultancy in site meetings.

The position carries a high degree of responsibility working closely with multiple engineering divisions such as structures, rail, highway and marine. The role will offer a very competitive salary and excellent benefits to suit.

To apply for the role please send your CV to lee.rimell@penguinrecruitment.co.uk or alternatively call Lee Rimell on 01792 365105.

Graduate Geotechnical Engineer - Farnham

Recruiter : Penguin Recruitment
Posted : 16 November 2012
Ref : HM2012/110/ggeF
Contact : Hannah Meredith
Location : Farnham
Sector : Geotechnical
Category : Geotechnical Engineer
Job Type : Permanent
Salary : £17000 - £21000 per annum

A specialist geotechnical and environmental consultancy is currently looking to recruit a Geotechnical Graduate to join them in their new offices based near Farnham. This is an excellent opportunity for someone fresh out of university to join a growing company of talented engineers spanning the South East.

We are looking for a high-calibre Civil Engineering or Geology Graduate to join the team, it would also be highly advantageous for you to have an MSc in Geotechnical Engineering or another closely related discipline. You should also have excellent interpersonal skills, experience in field work and a full UK driving license, in order to travel to sites around the UK.

In this position you would be expected to be involved in a wide range of geotechnical site investigations, including soil and rock core logging, preparation of desk studies, foundation design, slope stability assessments, etc. You would also be expected to liaise with clients and project managers on a regular basis, as well as writing factual and interpretive geotechnical reports.

You will receive a highly competitive salary, along with an impressive benefits package including; generous annual leave, private healthcare, pension contributions.

Commutable from: Basingstoke, Godalming, Winchester, Waterlooville.

Interested in this or other roles in Geotechnical Engineering? Please do not hesitate to contact Hannah Meredith on hannah.meredith@penguinrecruitment.co.uk or call 01792 365005. We have many more vacancies available on our website. Please refer to www.penguinrecruitment.co.uk.

Engineering Geologist / Geotechnical Engineer – Castleford

Recruiter : RSK Group plc
Posted : 16 November 2012
Location : Castleford
Sector : Civil, Geotechnical
Category : Geotechnical Engineer
Job Type : Permanent
Salary : £15k basic, plus overtime and company pension

The successful candidate will ideally need to have between 3-5 years experience and be happy to spend a significant proportion of their time managing site investigation work. Other duties will include:

- undertaking preliminary risk assessments (phase 1 desk studies) and intrusive site investigations
- managing fieldwork activities and subcontractors
- organising and managing projects in the following sectors: house builders, commercial property developers, public sector bodies, manufacturing and industrial
- undertaking project management duties, including assisting with the preparation of health and safety documentation, scheduling analysis of soil and water samples and writing reports

Desired experience

- Previous site work experience an advantage (including trial pitting and drilling supervision)
- Excellent written and communication skills
- Prepared to work as part of a team or as an individual
- Knowledge of contaminated land and planning legislation an advantage
- Full, clean driving licence essential
- BSc degree level qualified in geology/civil engineering or a related environmental subject essential
- MSc in a geotechnical/civil engineering or environmental discipline preferable, but not essential

Salary - £15k basic, plus overtime and company pension.

All candidates applying for positions with RSK Group must be eligible to work in the UK/European Economic Area. Candidates should confirm this when applying with their CV and covering letter.

(http://www.ncejobs.co.uk/job/2541678/engineering-geologist-geotechnical-engineer-castleford)

Graduate Geotechnical Engineer – Bristol

Recruiter : Penguin Recruitment
Posted : 16 November 2012
Ref : HM2012/11/ggeB
Contact : Hannah Meredith
Location : Bristol
Sector : Geotechnical
Category : Geotechnical Engineer
Job Type : Permanent
Salary : £18000 - £22000 per annum

We are urgently looking to fill a vacancy we currently have for a Graduate Geotechnical Engineer with an international, multidisciplinary engineering consultancy in their Bristol offices. This is a fantastic opportunity for a recent graduate to begin their career with a well respected and world-renowned firm.

We are looking for a high-calibre Civil Engineering Graduate, ideally with an MSc in Geotechnical Engineering or another related discipline. You should have excellent interpersonal skills, a sound knowledge of geotechnical principles and a full UK driving license, in order to travel to sites around the UK.

In the position of Graduate Engineer your duties will include:

- Carrying out design calculations for geotechnical structures on a variety of projects.
- Compiling desk study reports.
- Interpreting geotechnical site investigation data.
- Site supervision.
- Liaising with clients on regular basis.

You will receive a highly competitive salary, along with an impressive benefits package including; generous annual leave, private healthcare, pension contributions.

Commutable from: Bath, Newport, Cardiff, Gloucester.

Interested in this or other roles in Geotechnical Engineering? Please do not hesitate to contact Hannah Meredith on hannah.meredith@penguinrecruitment.co.uk or call 01792 365005. We have many more vacancies available on our website. Please refer to www.penguinrecruitment.co.uk.

Ground Investigation Engineers

Recruiter : BAM Nuttall Ltd
Posted : 19 November 2012
Ref : BAM
Location : Wigan
Sector : Civil, Geotechnical
Category : Civil Engineer, Geotechnical Engineer
Job Type : Permanent
Salary : Competitive

BAM Ritchies is one of the UK's leading ground engineering contractors with projects across the UK and overseas. Part of BAM Nuttall Ltd (an operating company of Royal BAM Group nv), we offer an excellent working environment for highly motivated, technically able Engineers and Geologists who enjoy tackling challenges and who thrive within a multi-skilled team.

We are expanding part of our ground investigation operation based in Wigan and require high calibre, enthusiastic geotechnical engineers and senior geotechnical engineers to carry the business forward.

As a geotechnical engineer you will be mainly site based with short periods in the office for reporting investigations. As a senior engineer you will be mainly office based providing support to both to managers and less experienced engineers and contributing to their development. From time to time you may be required to undertake the role of site agent on larger projects. Engineers at all levels will be responsible for delivering investigations from award to completion, including commercial aspects.

The Wigan regional office covers work mainly in the North West of England. Occasionally, the successful applicant may be required to work in other regions so mobility, flexibility and commitment are absolute requirements. In return, successful applicants will receive a competitive employment package that includes industry-leading training and career support.

Qualifications, Skills and Experience:

- A demonstrable enthusiasm for geotechnical engineering.
- Qualified to degree level or equivalent in a geotechnical discipline.
- Successful experience at geotechnical engineer / senior geotechnical engineer level.
- Member of an appropriate professional body at Chartered level or equivalent knowledge (senior geotechnical engineer) / Technician or Incorporated level or equivalent knowledge (geotechnical engineer).
- Ability to communicate effectively at all levels.
- Sound working knowledge of ground investigation specifications, procedures, techniques, standards and codes of practice.
- Strong working knowledge of health and safety / environmental legislation and codes of practice.
- Demonstrable commercial and contractual knowledge.
- Be able to use Microsoft Office to create spreadsheets and written documents for effective reporting, communication, record keeping and numeric analysis. Able to use Holebase or similar AGS software package to produce or amend logs and associated data.

Basic use of AutoCAD desirable but not essential.

- Previous contracting experience advantageous.

Please email your application via the "Apply now" link http://www.ncejobs.co.uk/apply/2541782/ground-investigation-engineers/?LinkSource=JobDetails

Περισσότερες προσφορές δουλειάς σε γεωμηχανικούς σε διάφορα μέρη του κόσμου παρουσιάζονται στην ιστοσελίδα http://www.ncejobs.co.uk/jobs/geotechnical/?utm_source=NCEemail&utm_medium=mktemail&utm_campaign=NCE_mktemail_wk4&utm_source=mktemail&utm_medium=NCEemail&utm_campaign=NCE_mktemail_all

ΑΝΑΣΚΟΠΗΣΗ ΓΕΩΤΕΧΝΙΚΩΝ ΕΚΔΗΛΩΣΕΩΝ

Την Τετάρτη, 21 Νοεμβρίου 2012, διοργανώθηκε από το Τεχνικό Επιμελητήριο Ελλάδος εσπερίδα για την παρουσίαση της «Τράπεζας Εδαφοτεχνικών Δεδομένων» (ΤΕΔ), η οποία δημιουργήθηκε από Ομάδα Εργασίας του ΤΕΕ στα πλαίσια του «Εθνικού Προγράμματος Αντισεισμικής Ενίσχυσης Υφισταμένων Κατασκευών (ΕΠΑΝΤΥΚ)» και θα φιλοξενείται στην ιστοσελίδα του ΤΕΕ.

Την εκδήλωση χαιρέτισαν ο Πρόεδρος του Τεχνικού Επιμελητηρίου Ελλάδος Χ. Σπίρτζης, ο Γενικός Γραμματέας του Συλλόγου Πολιτικών Μηχανικών Ι. Κοτζαμπασάκης και ο Πρόεδρος της Ελληνικής Επιστημονικής Εταιρείας Εδαφομηχανικής και Γεωτεχνικής Μηχανικής Χ. Τσατσανίφος. Ο κ. Τσατσανίφος αναφέρθηκε στην προφανή χρησιμότητα της ΤΕΔ και ως εκ τούτου στην συμμετοχή μελών της Εκτελεστικής Επιτροπής της ΕΕΕΕΓΜ στον αρχικές συσκέψεις, τον Ιανουάριο και Φεβρουάριο 2006, για την δημιουργία της, εξέφρασε, όμως, το παράπονο ότι, μετά την τελευταία σύσκεψη της 27ης Φεβρουαρίου 2006, ουδεμία ενημέρωση είχε η ΕΕΕΕΓΜ επί της προόδου των εργασιών της Ο.Ε., παρά τα συμφωνηθέντα στην σύσκεψη αυτή, και εκλήθη να παρουσίαση τις απόψεις της επί της δημιουργηθείσας ΤΕΔ σε μια ανοικτή εκδήλωση.

Στη συνέχεια ο Ομότιμος Καθηγητής ΕΜΠ και Επιστημονικός Υπεύθυνος του ΕΠΑΝΤΥΚ Θεοδόσης Τάσιος έκανε μια εισαγωγή στις δράσεις του ΕΠΑΝΤΥΚ και στην Τράπεδα Εδαφοτεχνικών Δεδομένων, ο Δρ. Ανδρέας Αντωνίου παρουσίασε στοιχεία για το παρελθόν και τις σύγχρονες τάσεις για Βάσεις Γεωτεχνικών Δεδομένων, ο Γιάννης Φίκιρης έκανε γενική παρουσιάση της ΤΕΔ και αναφέρθηκε στις χρήσεις της και τα εξ αυτής οφέλη, καθώς και στις δυνατότητες και σε παραδείγματα εφαρμογής. Τέλος, ο Δρ. Πέτρος Φορτσάκης αναφέρθηκε σε τεχνικά θέματα της ΤΕΔ.

Ακολούθησαν ερωτήσεις και σύντομη συζήτηση.

ΕΕΜΦ
GCOLD

ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ
ΑΞΟΝΟΣΥΜΜΕΤΡΙΚΑ ΦΡΑΓΜΑΤΑ ΣΚΛΗΡΟΥ ΕΠΙΧΩΜΑΤΟΣ

Την Τρίτη, 6 Νοεμβρίου 2012, διοργανώθηκε από την ΕΕΜΦ εσπερίδα με θέμα «ΑΞΟΝΟΣΥΜΜΕΤΡΙΚΑ ΦΡΑΓΜΑΤΑ ΣΚΛΗΡΟΥ ΕΠΙΧΩΜΑΤΟΣ.

Στην εσπερίδα, την οποία παρακολούθησε πολυπληθές ακροατήριο, παρουσιάσθηκαν οι βασικές αρχές σχεδιασμού των αξονοσυμμετρικών φραγμάτων σκληρού επιχώματος, καθώς και εμπειρίες από την κατασκευή τους στην Ελλάδα.

Πιο αναλυτικά, ο Δρ. Νίκος Μουτάφης, Λέκτορας ΕΜΠ, έκανε την γενική παρουσιάση και τις αρχές σχεδιασμού των Αξονομετρικών Φραγμάτων Σκληρού Επιχώματος. Στη συνέχεια ο κ. Βαγγέλης Γκίκας, Μελετητής Υδραυλικών Έργων, παρουσίασε την μεθοδολογία και τις λεπτομέρειες της μελέτης των αξονοσυμμετρικών φραγμάτων σκληρού επιχώματος και εμπειρίες από την εφαρμογή στα φράγματα του Ελληνικού χώρου (το κείμενο της παρουσίασης συνέταξε σε συνεργασία με τον κ. Γιάννη Δαούτη). Ακολούθησε ο κ. Οδυσσέας Καρασαχινίδης, Προϊστάμενος Κατασκευών Εγγειοβελτιωτικών Έργων του Υπουργείου Αγροτικής Ανάπτυξης και Τροφίμων, ο οποίος παρουσίασε το πρόγραμμα του Υπουργείου για τα Αξονοσυμμετρικά Φράγματα Σκληρού Επιχώματος και η πρώτη συνεδρία έκλεισε με την παρουσίαση του κ. Marco Bacchielli, της εταιρείας Carpi, για εναλλακτική μέθοδος στεγανοποίησης αξονοσυμμετρικών φραγμάτων σκληρού επιχώματος με χρήση μεμβράνης.

Μετά το διάλειμμα ο Δρ. Δημήτρης Κούμουλος, Τεχνικός Σύμβουλος Ποιοτικού Ελέγχου, παρουσίασε τις εμπειρίες του από την κατασκευή των φραγμάτων της Μυκόνου Μαράθι και Άνω Μερά, ο κ. Στέλιος Φελέκος, Τεχνικός Σύμβουλος Ποιοτικού Ελέγχου, τις εμπειρίες του από την κατασκευή των φραγμάτων Στενού Σερίφου και Λιθαίου Τρικάλων, ο κ. Ευάγγελος Μαμαγκάκης, Πολιτικός Μηχανικός στον Οργανισμό Ανάπτυξης Δυτικής Κρήτης (ΟΑΔΥΚ) και Επιβλέπων Κατασκευής, τις εμπειρίες του από την κατασκευή του φράγματος Βαλσαμιώτη στην Κρήτη (η παρουσίαση συντάχθηκε σε συνεργασία με τον κ. Μιχάλη Στεφαδούρο, ΔΕΗ / Τεχνικό Σύμβουλο Ποιοτικού Ελέγχου και τον κ. Γεώργιο Χαραρά / Εργοταξιάρχη), και, τέλος, ο κ. Χαράλαμπος Γκούβας / Τεχνικός Σύμβουλος Ποιοτικού Ελέγχου τις εμπειρίες του από την κατασκευή του φράγματος Φιλιατρινού στην Πελοπόννησο (η παρουσίαση συντάχθηκε σε συνεργασία με τον κ. Παναγιώτη Αναγνωστόπουλο / Εργοταξιάρχη).

Ακολούθησαν ερωτήσεις και συζήτηση.

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

ACUUS 2012 13th World Conference of the Associated Research Centers for the Urban Underground Space Underground Space Development – Opportunities and Challenges, 7 – 9 November 2012, Singapore, www.acuus2012.com

International Symposium on Earthquake-induced Landslides November 7-9, 2012, Kiryu, Japan http://geotech.ce.gunma-u.ac.jp/~isel/index.html

GEOMAT2012-KL, MALAYSIA Second International Conference on Geotechnique, Construction Materials and Environment, November 14-16, 2012, Kuala Lumpur, Malaysia, http://geomat2012.webs.com

Middle East Tunnelling, 18-20 November 2012, Doha, Qatar, www.middleeasttunnelling.com/homepage.asp

Tunnelling 2012, 20 November 2012, London, UK, www.ncetunnelling.co.uk

32. Baugrundtagung with exhibition "Geotechnik", Mainz, Germany, 26 – 29 November 2012, www.baugrundtagung.com

GEOSYNTHETICS ASIA 2012 (GA2012) 5th Asian Regional Conference on Geosynthetics, Bangkok, Thailand, 10 - 14 December 2012, www.set.ait.ac.th/acsig/igs-thailand

First International Congress FedIGS, 12 – 15 November 2012, Hong Kong – China, www.fedigs.org/HongKong2012

2012 Forum on Urban Geoenvironment & Sustainable Development, 4-7 December 2012, Hong Kong, CHINA, www.civil.hku.hk/ugsd2012/en/

GA2012 - Geosynthetics Asia 2012 5th Asian Regional Conference on Geosynthetics, 13 - 16 December 2012, Bangkok, Thailand, www.set.ait.ac.th/acsig/GA2012

Forensic geotechnical engineering
www.editorialmanager.com/feng

Fourth International Seminar on FORENSIC GEOTECHNICAL ENGINEERING, January, 10-12, 2013, Bengaluru, India, Prof. G L Sivakumar Babu, isfge2013@gmail.com

Geotechnical Special Publication, ASCE "Foundation Engineering in the Face of Uncertainty". Abstracts to Mohamad H. Hussein at: MHussein@pile.com.

Geotechnical Special Publication, ASCE "SOUND GEOTECHNICAL RESEARCH TO PRACTICE", http://web.engr.oregonstate.edu/~armin/index_files/HoltzGSP

Themed Issue on Geotechnical Challenges for Renewable Energy Developments, Geotechnical Engineering 2013, ben.ramster@icepublishing.com

Pam-Am UNSAT 2013 First Pan-American Conference on Unsaturated Soils, 19-22 February 2013, Cartagena de Indias, Colombia, panamunsat2013.uniandes.edu.co

ICGE'13 3rd International Conference on Geotechnical Engineering New Developments in Analysis, Modeling, and Design, 21-23 February 2013, Hammamet, Tunisia www.icge13.com

XXXVI Winter School of Rock Mechanics and Geoengineering
11-15 March 2013, Kudowa Zdroj, Poland
www.zsmgig.pwr.wroc.pl/?home,11

Objectives of conference:

- provide a forum for engineers, researchers and students,
- integration of industry professionals and scientific research communities,
- creating opportunities to update and improve knowledge,
- presentation of most recent contributions in the area of rock mechanics and geoengineering.

Scope of conference:

- the problems of stability of geotechnical structures,
- constitutive models of geomaterials,
- numerical methods in geotechnics,
- theoretical and practical aspects of geoengineering structures,
- dynamic phenomena of rock mass,
- experimental studies in the area of mining and geotechnics,
- forecasting and mitigation of natural hazards in mining and geotechnics,
- new materials and technologies in geoengineering,
- the application of SIP / GIS in geoengineering.

The conference will include invited key lectures presented by distinguished researchers or/and engineers from the field of mining and geotechnics. These will be complemented by presentations given by the Conference participants. Additional time will be provided for formal and informal discussions.

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Telephone: +48/71/3203228
Fax: +48/71/3284814
E-mail: zsmgig@pwr.wroc.pl

International Conference on«Landslide Risk» ICLR13, 14 – 16 March 2013, Draham, Tunisia, http://www.iclr13.com

TU-SEOUL 2013 International Symposium on Tunnelling and Underground Space Construction for Sustainable Development, March 18-20, 2013, Seoul, Korea www.tu-seoul2013.org

International Conference on Installation Effects in Geotechnical Engineering, 24-27 March 2013, Rotterdam, The Netherlands, http://geo-install.co.uk

ice Fifth International Conference on Forensic Engineering

Informing the Future with Lessons from the Past
16-17 April 2013, London, UK
http://www.ice-conferences.com/Upcoming-events/Fifth-International-Conference-on-Forensic-Enginee

The investigation of the fundamental causes of failures during the life of buildings, tunnels, bridges, foundations, etc. is crucial in optimising the construction and management of our built environment.

The Fifth International Conference on Forensic Engineering is maintaining a 150 year tradition pioneered by Telford, Brunel and Stephenson by discussing how lessons learned from failures lead to the development of improved design, construction and management practice.

Following a successful call for papers campaign, **Informing the Future with Lessons from the Past** will focus on six key areas of forensic engineering:

- Forensic investigation case studies focussed on bridges, foundations and below ground works
- Education and continuing professional development in forensic engineering
- Implications of forensic engineering on litigation, contract and learning
- Building failures from wear and extreme events
- Failure in temporary structures
- Material failures

The presentation of peer reviewed papers on all aspects of the Forensic Cycle will provide a catalyst for discussion of how we can deliver a better and more sustainable infrastructure.

Topics

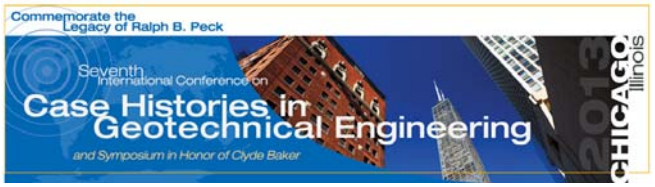
- Forensic investigation case studies - techniques, procedures and requirements
- Structural failures from extreme events
- Identifying deterioration and risks of failure in existing assets
- Structures which are not fit for purpose or cost effective
- The influence of contract or other procedures on failure risks
- Risk management – identification of risk, legal issues and appropriate actions
- The role of engineers in dispute resolution and litigation
- Education and continuing professional development in forensic engineering

Register or get in contact:

- Register online
- Call us on+44 (0)20 7665 2226
- Email the Events Team
- Download event to calendar

EURO:TUN 2013 Computational Methods in Tunneling and Subsurface Engineering, 17-19 April 2013, Bochum, Germany, www.eurotun2013.rub.de

From geological conditions to numerical modeling of underground excavations, 3rd International Conference on Computational Methods in Tunneling and Subsurface Engineering (EURO:TUN 2013), 17-19 April 2013, Ruhr-University Bochum, Germany, http://minelab.mred.tuc.gr/



Conference to Commemorate the Legacy of Ralph B. Peck, 7th International Conference on Case Histories in Geotechnical Engineering & Soil Dynamics and Symposium in Honor of Clyde Baker, Chicago, USA, 29 April – 4 May, 2013, http://7icchge.mst.edu

IGS-Incheon 2013 - 5th International Symposium on Geotechnical Engineering, Disaster Prevention and Reduction, and Environmentally Sustainable Development, May 15-17 May 2013, Incheon, South Korea, www.geochina-cces.cn/download/2013_5th_Dsiaster_prevention_Bulletin_1.pdf

HF2013 Effective and Sustainable Hydraulic Fracturing - an ISRM Specialized Conference, 20-22 May 2013, Brisbane, Queensland, Australia, http://www.csiro.au/events/HF2013

Experimental Micromechanics for Geomaterials Joint workshop of the ISSMGE TC101-TC105, 23 - 24 May 2013, Hong Kong, owlam@hku.hk

18th SouthEast Asian Geotechnical & Inaugural AGSSEA Conference, 29 – 31 May 2013, Singapore, www.18seagc.com

Second International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites
30 -31 May 2013, Napoli, Italy
www.tc301-napoli.org

The conservation of monuments and historic sites is one of the most challenging problems facing modern civilization. It involves a number of factors belonging to different fields (cultural, humanistic, social, technical, economical, administrative), intertwining in inextricable patterns. In particular, the requirements of safety and use appear (and often actually are) in conflict with the respect of the integrity of the monuments. In almost all countries of the world the conservation is looked after by an official trained in Art History or Archaeology. He has generally the control of any action to be undertaken, and imposes constraints and limitations that sometimes appear unreasonable to the engineer. The engineer, in turn, tends to achieve safety by means of solutions which appear unacceptable to the official in charge of conservation, sometimes mechanically applying procedures and regulations conceived for new structures. It is evident that some equilibrium has to be found between the safe fruition of a monument and the respect of its integrity. The former task belongs to the know-how of any well trained and experienced engineer, while the latter one is more difficult, being the same concept of integrity rather elusive.

The difficulty of the problem is increased by the lack of a general theory, universally accepted and guiding the behaviour of the actors involved as the Mechanics does with the structural engineer. The possibility of finding in practice an acceptable equilibrium is linked to the development of a shared culture. The International Society of Soil Mechanics and Geotechnical Engineering contributed to this development by an ad hoc Committee (TC 19 – Conservation of Monuments and Historic Sites), that has been promoted over 25 years ago by French and Italian engineers (Jean Kerisel, Arrigo Croce). A number of international and regional symposia have been organised, always with large audience and lively discussions. A Lecture dedicated to Jean Kerisel will be given for the first time at the next International Conference on Soil Mechanics and Geotechnical Engineering to be held in 2013 in Paris. In this framework, the Technical Committee (now TC301) is organising the 2nd International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, which will be held in Napoli on May 2013. Its aim is that of comparing experiences, presenting important achievements and new ideas, establishing fruitful links.

The contributions to the Conference should focus on the following main themes:

1. Geotechnical aspects of historic sites, monuments and cities;
2. Past design criteria and traditional construction methods;
3. Techniques to preserve ancient sites and constructions;
4. Rehabilitation of heritage;
5. Role of geotechnical engineering in preservation of cultural and historical integrity.

Scientific secretariat

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info@tc301-napoli.org

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Emilio Bilotta (phone: +39 081 76 83469; email: emilio.bilotta@unina.it)

WTC 2013 ITA-AITES World Tunnel Congress and 39th General Assembly "Underground – the way to the future", Geneva, Switzerland, May 31 to June 7, 2013. www.wtc2013.ch

First International Conference on Rock Dynamics and Applications (RocDyn-1), 6-8 June 2013, Lausanne, Switzerland, www.rocdyn.org

BIOT-5

5th Biot Conference on Poromechanics
10-12 June 2013, Vienna, Austria
http://biot2013.conf.tuwien.ac.at

After two Biot conferences in the USA (University of Oklahoma 2005 and Columbia University 2009), the premier Poromechanics conference series will return back to Europe (where the first Biot conference took place in Biot's Alma Mater in Louvain, Belgium, in 1998, followed by the second one in Grenoble in 2002).

The 5th BIOT Conference on Poromechanics (BIOT-5) will be held at Vienna University of Technology (TU Wien), Vienna, Austria, July 10-12, 2013. In 2013 it seems appropriate to commemorate the "grandfather" of poromechanics, Karl von Terzaghi (1883-1963), the founder of consolidation experiments and theoretical soil mechanics in general, who, from 1929 to 1939, had his "home base" as a full professor of the Vienna University of Technology.

The first Biot conference on Poromechanics was held in 1998 at the Université catholique de Louvain (Belgium), the Alma Mater of Maurice Anthony Biot (1905-1985), the founder of the field that is commonly referred to as Biot theory of poroelasticity, a field with unparalleled impact on a wide variety of disciplines, including civil and biomedical engineering, geophysics, acoustics, and materials science. This first conference, with its truly multidisciplinary nature, was so successful that the Poromechanics community con-

tinued to meet and exchange ideas in a four-year interval, 2002 at Université Joseph Fourier (Grenoble, France), 2005 at Oklahoma University (where the Biot centennial was celebrated), before BIOT-4 was hosted, in 2009, by Columbia University (New York, USA) where Biot, as the Professor of Mechanics, wrote his seminal 1941-paper on "General theory of three-dimensional consolidation", which made him the Father of Poromechanics.

As the year 2013 approaches, it seems appropriate to commemorate the "Grandfather" of Poromechanics, Karl von Terzaghi (1883-1963), the founder of consolidation experiments and theoretical soil mechanics in general. We will do so at the Vienna University of Technology (TU Wien), the first university who granted Terzaghi, in 1929, a full professorship on the topic, and the place where Terzaghi established the, at that time, largest and most comprehensive soil mechanics laboratory in the world. Following the great examples of Terzaghi and Biot, our focus will be on the beneficial interaction of experiment, theory, and computation, and the merging of often over-specialized disciplines into a unified natural science viewpoint, jointly driven forward by scientists and engineers. It is in this spirit that we cordially invite colleagues working on the mechanics and physics of porous media, from the atomistic to the kilometer scale, to join us in Vienna, in 2013, at the 5th BIOT conference on Poromechanics - dedicated to the 50th anniversary of Karl von Terzaghi's death.

Vienna University of Technology
Institute for Mechanics of Materials and Structures
Karlsplatz 13/202
A-1040 Vienna, Austria
Telephone: (++43 1) 588 01-20211
Fax: (++43 1) 588 01-920211
E-mail: biot2013@tuwien.ac.at

Strait Crossing Norway 2013 : Extreme Crossings and New Technologies, 16-19 June 2013, Bergen, Norway www.sc2013.no

SINOROCK 2013 Rock Characterization, Modelling and Engineering Design Methods, an ISRM Specialized Conference, 18-20 June 2013, Shanghai, China, www.sinorock2013.org

STREMAH 2013 13th International Conference on Studies, Repairs and Maintenance of Heritage Architecture, 25 – 27 June 2013, New Forest, UK, carlos@wessex.ac.uk

TC215 ISSMGE - International Symposium on Coupled Phenomena in Environmental Geotechnics (CPEG) - "From theoretical and experimental research to practical applications", 1 - 3 July 2013, Torino, Italy, www.tc215-cpeg-torino.org

ICEPR 2013
3rd International Conference on Environmental Pollution and Remediation
July 15-17 2013, Toronto, Ontario, Canada

http://icepr2013.international-aset.com

Environmental pollution is considered the most important threat to human being and other creature lives. Every day at different places, thousands of various types of pollutants and chemicals from different sources are exposed to the environment. These sources include industries, vehicles, and even human activities like cooking. Pollutants affect different environmental resources such as air, water, soil, and generate serious danger to the ecosystem. These encountered problems require immediate scientific attention to find appropriate and cost effective solutions.

ICEPR is a series of international conferences held yearly. These conferences focus on all aspects of Environmental Science, Engineering, and Technology. After successfully holding the second ICEPR in Montreal (Canada), International ASET Inc. will be hosting this conference in Toronto this year.

ICEPR is an acronym for **International Conference** on **Environmental Pollution** and **Remediation**.

The aim of ICEPR'13 is to bring together the Canadian and International community working in the field of environmental sciences, engineering, and technology, and to foster an environment conducive to present advances in this field. This conference will also provide a golden opportunity to develop new collaborations and gather world experts on the different topics including pollution detection, environmental remediation, and pollution prevention. Through the 3rd conference a great opportunity to share knowledge and expertise will be created taking advantage from the synergy of the 1st and 2ndconference. The ICEPR'13 program will include invited keynote talks, oral presentation sessions, and poster sessions.

ICEPR'13 will cover a wide range of environmental related topics such as:

- Air pollution and treatment
- Biofuels
- Desalination
- Energy Management
- **Environmental Education Programs**
- **Environmental Protection**
- **Environmental Risk Assessments**
- **Environmental Safety Regulations**
- **Environmental Sustainability and Development**
- Green Manufacturing and Technologies, Pollution Prevention
- Greenhouse Effect, Global Warming, and Climate Change
- **Groundwater Issues**
- Impact of Industrialization on the Environment
- Nanotechnology Impacts on Environment
- Oil Spills
- Pollution and Health Issues
- Renewable and Non-Renewable Energies
- **Soil Pollution and Treatment**
- Wastewater Management and Treatment
- Water Pollution and Treatment

Contact:

Mail : ICEPR2013@International-ASET.com
Tel. : +1-613-695-3040
Address : International ASET Inc.

Unit No. 215, 1376 Bank St.
Ottawa, Ontario, Canada
Postal Code: K1H 7Y3

The 6th International Symposium on Rock Stress, 20-22 August 2013, Sendai, Japan, http://www2.kankyo.tohoku.ac.jp/rs2013

18th International Conference on Soil Mechanics and Geotechnical Engineering "Challenges and Innovations in Geotechnics", 1 – 5 September 2013, Paris, France www.paris2013-icsmge.org

13th International Conference of the Geological Society of Greece, September 5-8 2013, Chania, Greece, www.ege13.gr

Géotechnique Symposium in Print on Bio- and Chemo-Mechanical Processes in Geotechnical Engineering, www.elabs10.com/content/2010001471/SIP%202013.pdf

EUROCK 2013 ISRM European Regional Symposium "Rock Mechanics for Resources, Energy and Environment", 21-26 September 2013, Wroclaw, Poland www.eurock2013.pwr.wroc.pl

VAJONT 2013 - International Conference Vajont, 1963 – 2013 Thoughts and Analyses after 50 years since the catastrophic landslide, 8-10 October, 2013, Padova, Italy, http://www.vajont2013.info/vajont-pd

International Symposium on Design and Practice of Geosynthetic-Reinforced Soil Structures, 14-16 October, 2013, Bologna, Italy, www.civil.columbia.edu/bologna2013

10th International Symposium of Structures, Geotechnics and Construction Materials
26-29 November 2013, Santa Clara, Cuba
ana@uclv.edu.cu, quevedo@uclv.edu.cu

Conference Themes:

- Soil Mechanical and rocks. Geology.
- Methods of Design in the Civil Engineering. Method of States Limits.
- Application of the Security in the structural and geotechnical design.
- Design of Foundations and Soils Structures.
- Modeling Structures and Soil.
- Analysis, design and optimization of structures.
- The Advanced Mathematics and the computing applications in the Engineering.
- Sustainable Constructions. Construction Materials and Technologies.
- Pathology of the Structures. Diagnose, Analysis and Conservation.
- Vulnerability of constructions and administration of risk against to natural disasters.
- Teaching of the civil engineering

Organizer: Facultad de Construcciones, Universidad Central de Las Villas

Secretary: Contact person: Dra. Ana Virginia González - Cueto Vila
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8th International Conference
Physical Modelling in Geotechnics 2014
The University of Western Australia
14–17 January 2014 Perth, Australia

http://icpmg2014.com.au

The Organising Committee on Physical Modelling of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE TC104) is pleased to announce the 8th International Conference on Physical Modelling in Geotechnics (ICPMG2014).

The conference will continue the successful series of conferences initiated in 1988 in Paris and most recently held at ETH Zurich in 2010. ICPMG2014 will disseminate and communicate the latest developments in all aspects of physical modelling to both the academic and practitioner communities.

The conference will be hosted by The University of Western Australia (UWA) in Perth over 4 days during January 2014. UWA has a long-standing and well-known involvement in physical modelling research, with two geotechnical centrifuges having been established within the Centre for Offshore Foundation Systems (COFS) in 1989 and 1999. Researchers using 1g and gravity-enhanced modelling facilities are strongly encouraged to submit papers to the conference and come to Perth to visit the UWA physical modelling facilities, share their latest research outcomes and enjoy the cooling waters of the Indian Ocean.

The conference will include many opportunities to meet and have discussions with colleagues from all around the world, via the main technical programme and the eclectic range of social events. The programme will also include sessions for engineers and technicians operating physical modelling facilities, building on the successful scheme at the 7th ICPMG in Zurich.

The COFS team at UWA is looking forward to welcoming you to Perth in January 2014 for four days of lively discussion under the beautiful Australian sunshine.

Themes

- Physical Modelling Facilities and Technology
- Similitude and Scaling
- Education
- Shallow and Deep Foundations
- Excavation and Retaining Structures
- Slope Stability
- Dams and Embankments
- Ground Improvements and Reinforcement
- Offshore Geotechnics

- Geohazards
- Soil Behaviour
- Geoenvironmental Engineering
- Earthquake Engineering

Conference Manager

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ANDORRA 2014 14th International Winter Road Congress 2014, 4-7 February 2014, Andorra la Vella (Andorra), www.aipcrandorra2014.org

World Tunnel Congress 2014 and 40th ITA General Assembly "Tunnels for a better living", 9 - 15 May 2014, Iguassu Falls, Brazil, www.wtc2014.com.br

EUROCK 2014
ISRM European Regional Symposium
Rock Engineering and Rock Mechanics: Structures in and on Rock Masses
26-28 May 2014, Vigo, Spain

Contact Person: Prof. Leandro Alejano
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8th European Conference "Numerical Methods in Geotechnical Engineering" NUMGE14, Delft, The Netherlands, 17-20 juni 2014, www.numge2014.org

Second European Conference on Earthquake Engineering and Seismology, 24-29 August 2014, Istanbul, Turkey www.2eceesistanbul.org

TC204 ISSMGE International Symposium on "Geotechnical Aspects of Underground Construction in Soft Ground" - IS-Seoul 2014
25-27 August 2014, Seoul, Korea

This symposium will be organized by TC204 of ISSMGE and Korean Geotechnical Society. Technical Committee of TC204 "Underground Construction in Soft Ground" of the ISSMGE was first established in 1989 as TC28 and has a major commitment towards collecting information concerning the geotechnical aspects of the design, construction, and analysis of deep excavation, tunnels and large underground structures in urban environment. The first symposium was held in New Delhi in 1994 and six more symposia were held in London (1996), Tokyo (1999), Toulouse (2002), Amsterdam (2005), Shanghai (2008), and Rome (2011).

The 8th symposium will be held in Seoul, Korea with the themes in line with the terms of reference of Technical Committee of TC204 such tunnelling in soft ground, deep excavations, field monitoring, physical and numerical modelling and mitigation measures. This symposium will act as a platform to disseminate the most recent research and field advances in the design and construction of underground excavations in soft ground through keynote lectures and technical presentations.

Secretary: Prof. Chungsik Yoo
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IAEG XII CONGRESS Torino 2014 Engineering Geology for Society and Territory, IAEG 50th Anniversary, September 15-18, 2014, Torino, Italy, www.iaeg2014.com

10th International Conference on Geosynthetics – 10ICG, Berlin, Germany, 21 – 25 September 2014 www.10icg-berlin.com

ARMS 8 - 8th ISRM Rock Mechanics Symposium, 15-17 October 2014, Sapporo, Japan www.rocknet-japan.org/ARMS8/index.htm

13th ISRM International Congress on Rock Mechanics
Innovations in Applied and Theoretical Rock Mechanics
10 – 13 May 2015, Montreal, Canada

The Congress of the ISRM "Innovations in Applied and Theoretical Rock Mechanics" will take place on 29 April to 6 May 2015 and will be chaired by Prof. Ferri Hassani.

Contact Person: Prof. Ferri Hassani

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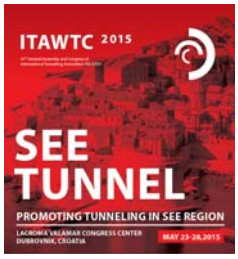

World Tunnel Congress 2015
and 41st ITA General Assembly
Promoting Tunnelling in South East European (SEE) Region
22 - 28 May 2015, Dubrovnik, Croatia
http://wtc15.com

Contact
ITA Croatia - Croatian Association for Tunnels and Underground Structures
Davorin KOLIC, Society President
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Croatia
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16th European Conference on Soil Mechanics and Geotechnical Engineering
"Geotechnical Engineering for Infrastructure and Development"
13 - 17 September 2015, Edinburgh, UK
www.xvi-ecsmge-2015.org.uk

The British Geotechnical Association (BGA) is pleased to announce that it will be hosting the 16th European Conference on Soil Mechanics and Geotechnical Engineering at the Edinburgh International Conference Centre from 13th to 17th September 2015. The conference was awarded by a meeting of the European Member Societies on 13th September 2011 at the 15th European Conference on Soil Mechanics and Geotechnical Engineering in Athens, Greece.

You can view the BGA bid document at the following link: http://files.marketingedinburgh.org/bid/ECSMGEELECTRONICBID.pdf

The conference website will be updated regularly as arrangements for the conference progress. Please bookmark it and visit regularly.

We look forward to welcoming you all in Edinburgh, one of Europe's truly great cities, in September 2015.

Dr Mike Winter
Chair of the Organising Committee
mwinter@trl.co.uk

EUROCK 2015
ISRM European Regional Symposium
64th Geomechanics Colloquy
7 – 9 October 2015, Salzburg, Austria

ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Hetch Hetchy project uses freezing technique

Deep under San Francisco Bay there is a massive construction project underway to secure the safety of the region's water supply. Part of that project includes digging a massive hole in Newark. ABC7 News got an exclusive look at the icy way they did it.

Nearly nine-stories below sea-level welders are working to shore-up a massive hole at the edge of the San Francisco Bay. The shaft will ultimately provide millions of people in the Bay Area with fresh, clean water. Digging the hole in unstable mud and water presented project engineers with unique challenges.

How do they keep the mud and groundwater from refilling the tunnel while they dig? And do it in an environmentally sensitive area? The answer -- freeze the ground.

"The way we achieved that was by installing 47 pipes around the shaft, and then in through the shaft which are called freeze pipes, we drilled them down into a 110 feet," said project engineer Ed Whitman.

You can see how it works in photos and videos provide by the San Francisco Public Utilities Commission. The process is similar to how your freezer at home works. Coolant was pumped through pipes which then froze the ground, creating a massive cylinder of frozen earth.

"It's like having a glass underground. You have solid walls and a solid bottom, which gives you the stability you need to excavate the shaft," said Whitman.

It took about eight weeks to freeze the ground, then work began on excavating the shaft. Every five feet, workers reinforced the walls with wood and steel so that concrete can be poured. It took four days to install each section.

The frozen shaft is where a massive tunneling machine will exit. It is currently under the San Francisco Bay. When completed the five-mile long tunnel will be the longest ever built under the bay. And unlike the transbay tube which lies at the bottom of the bay, like a giant straw, the new tunnel is actually carved out of the earth.

The new tunnel will replace old pipes built in 1925 and 1936. Engineers say the old pipes won't survive a major earthquake. A failure would jeopardize the water supply for millions of people from the East Bay to San Francisco who get water from the Hetch Hetchy Reservoir in Yosemite National Park.

But the new bay tunnel is designed to withstand a major quake on either the San Andreas or Hayward faults.

"We hope to be holing through to this retrieval shaft by early next year," said Maureen Barry from the SFPUC.

The San Francisco Public Utilities Commission is the agency is responsible for the Hetch Hetchy water system. In 2002, voters approved a $4.6 million bond measure to overhaul the aging system.

"We're actually about 83-percent finished with the tunneling. We got about 5,000 feet to go, which is a very exciting point. We can actually say, because of this project and the one's we've been able to accomplish in the last year, that the system is seismically a lot stronger than it was even a year ago," said Barry.

Work on the Hetch Hetchy seismic upgrade project is expected to be completed in March 2015.

(Dan Ashley / KGO-TV (San Francisco), 31.10.2012, http://abclocal.go.com/kgo/story?section=news/assignment_7&id=8869303)

Τσουνάμι στη Λίμνη της Γενεύης
Σύμφωνα με στοιχεία, συνέβη ανάμεσα στα τέλη του 4ου και τις αρχές του 7ου αιώνα

Τον έκτο αιώνα, ο ιστοριογράφος Γρηγόριος της Τουρ αναφέρει ένα εξαιρετικά ενδιαφέρον γεγονός που συνέβη στον τόπο που σήμερα αναγνωρίζουμε ως Ελβετία, εκεί όπου ο Ροδανός χύνεται στη Λίμνη της Γενεύης. Το 563 μ.Χ., λέει, συνέβη μεγάλη κατολίσθηση βράχων. Ογκόλιθοι έπεσαν στον Ροδανό, στο στόμιό του, και μια μεγάλη μάζα ύδατος ανασηκώθηκε και πλημμύρισε τις όχθες μέχρι την πόλη της Γενεύης.

Λάδι τα νερά της λίμνης της Γενεύης, προσφέρουν στους επιβάτες του σκάφους γαλήνιο ταξίδι. Δεν ήταν, όμως, πάντα έτσι, λένε Ελβετοί ερευνητές. Εναποθέσεις ιζήματος στο βαθύτερο σημείο της λίμνης μαρτυρούν ότι τον έκτο αιώνα, μία κατολίσθηση βράχων προκάλεσε τρομερό τσουνάμι, ύψους 8,5 μέτρων, που κατέστρεψε τις παράκτιες περιοχές.

Ιστορικοί και επιστήμονες ανέκαθεν πίστευαν ότι ο Γρηγόριος περιέγραφε ένα τσουνάμι στη Λίμνη της Γενεύης, το οποίο κατέστρεψε μέρος της πόλης και παράκτιες κοινότητες. Μέχρι σήμερα, ωστόσο, δεν υπήρχαν αποδείξεις που να επιβεβαιώνουν τη θεωρία.

Ερευνητές του Πανεπιστημίου της Γενεύης αναφέρουν ότι διαθέτουν στοιχεία για το τι συνέβη. Όλα μαρτυρούν διαδοχικές εναποθέσεις ιζημάτων που εντοπίστηκαν στο κέντρο της λίμνης. Η μελέτη, που δημοσιεύθηκε στο Nature Geoscience, υποδεικνύει την αλληλουχία γεγονότων που προκάλεσαν το τσουνάμι. Η κατολίσθηση των βράχων έπληξε το δέλτα στην εκβολή του ποταμού, με αποτέλεσμα να διοχετευτεί στη λίμνη τεράστια ποσότητα νερού από το ποτάμι.

Εντελώς τυχαία

«Στην πραγματικότητα ήταν σαν να ρίχνεις βότσαλα στη λίμνη», εξηγεί ο συντάκτης της μελέτης Γκάι Σίμπσον, λέκτορας στο τμήμα Γεωλογίας και Παλαιοντολογίας του Πανεπιστημίου της Γενεύης. Ο δρ Σίμπσον εξηγεί ότι τα στρώματα ιζήματος, που εντοπίσθηκαν σε βάθος μεγαλύτερο των τριακοσίων μέτρων στο βαθύτερο τμήμα της λίμνης, βρέθηκε εντελώς τυχαία, όταν η Κατρίνα Κρέμερ, φοιτήτρια που έκανε το διδακτορικό της, έψαχνε λεπτά στρώματα ιζήματος τα

οποία θα μπορούσαν να αποκαλύψουν ένα παρελθόν με μεγάλες πλημμύρες. «Βρήκαμε, αντιθέτως, τη συγκεκριμένη δομή», εξηγεί ο δρ Σίμπσον.

Οι ερευνητές προχώρησαν στη λήψη δειγμάτων και με διάφορες τεχνικές χρονολόγησαν την οργανική ύλη (υπολείμματα φύλλων και τμήματα ξύλου) προκειμένου να διαπιστωθεί πώς δημιουργήθηκαν οι διαστρωματώσεις. Ετσι κατέληξαν ότι το τσουνάμι συνέβη ανάμεσα στα τέλη του τέταρτου και στις αρχές του εβδόμου αιώνα. Εκτός από την κατολίσθηση βράχων, δεν έχει καταγράφει άλλο αξιοσημείωτο γεγονός εκείνη την περίοδο, εξηγεί ο δρ Σίμπσον.

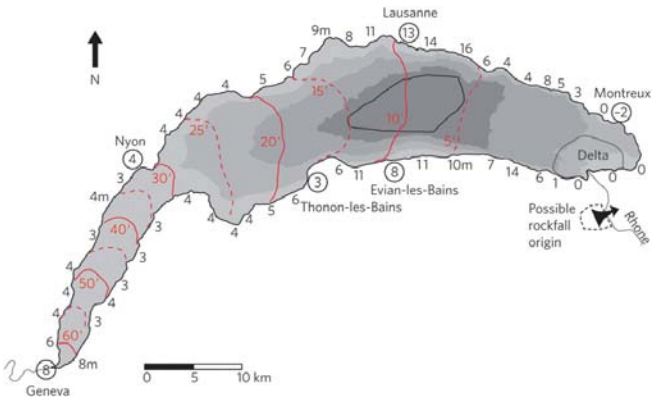
Οι ερευνητές υπολόγισαν ότι οι διαστρωματώσεις έχουν μήκος 9,6 χιλιόμετρα, πλάτος 4,8 χιλιόμετρα και πάχος κατά μέσο όρο 5,3 μέτρα. Υστερα από τη δημιουργία μοντέλων προσομοίωσης, υπολόγισαν πως η μετατόπιση αυτού του όγκου από το στόμιο του Ροδανού ήταν δυνατό να προκαλέσει τσουνάμι στη Λίμνη της Γενεύης με κύματα ύψους 8,5 μέτρων. Τα κύματα θα έφταναν στις όχθες της λίμνης έπειτα από 70 λεπτά και θα ενισχύονταν όσο προσέγγιζαν τις όχθες. Τι ακριβώς προκάλεσε την κατολίσθηση των βράχων παραμένει άγνωστο, αλλά οι επιστήμονες πιστεύουν ότι ευθύνεται κάποια σεισμική δόνηση.

(The New York Times/Η ΚΑΘΗΜΕΡΙΝΗ, 21 Νοεμβρίου 2012, http://news.kathimerini.gr/4dcgi/_w_articles_world_1_21/11/2012_502399)

Giant Lake Geneva tsunami in AD 563

Katrina Kremer, Guy Simpson & Stéphanie Girardclos

Following the recent tsunamis in Indonesia (2004), Chile (2010) and Japan (2011), the risks associated with tsunamis have come into focus. Most tsunamis occur in the marine realm and are associated with large earthquakes. However, landlocked communities in regions without mega-earthquakes are not exempt from their destructive effects. Tsunamis have been recorded in lakes as a result of earthquakes and seismogenic landslides, rockfalls and volcanic flank collapses, but have rarely affected large populations. Here we present a seismic survey of Lake Geneva along with sediment core analyses suggesting that, in AD 563, a large tsunami caused considerable destruction around the lake.



In AD 563, a tsunami was triggered by a catastrophic mass movement of sediment, following a rockfall in the eastern part of the lake in the sublacustrine Rhone delta area (black dashed line). The amplitude of the first recorded wave varied along the shoreline (black numbers, in metres), as the wave propagated (red contours; red numbers indicate the time after the event in minutes). Water depth is indicated in grey shades (100 m intervals). The mass movement deposit (black contour) is located in the deepest part of the lake.

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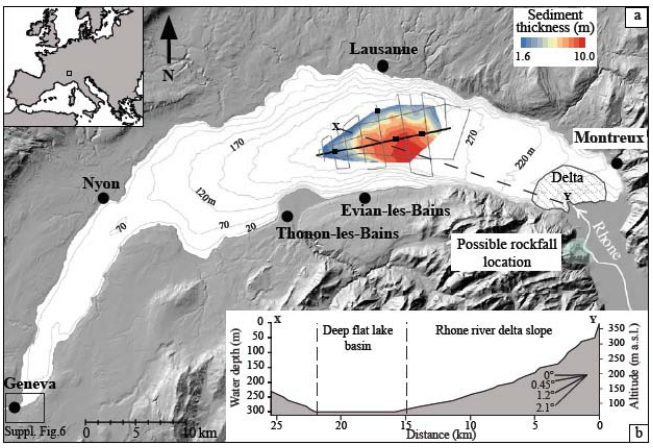
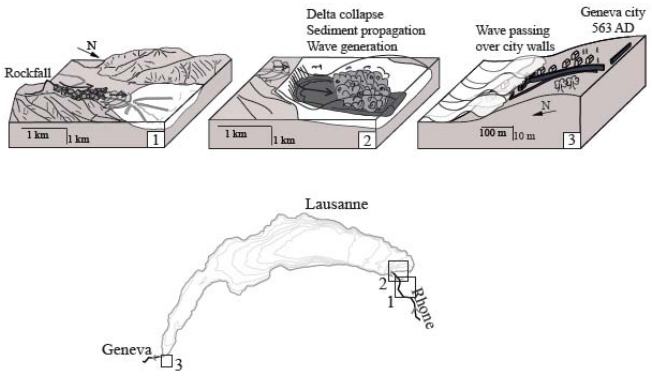
Nature Geoscience **5**, 756–757 (2012)
doi:10.1038/ngeo1618
(http://www.nature.com/ngeo/journal/v5/n11/full/ngeo1618.html)

Supplementary information

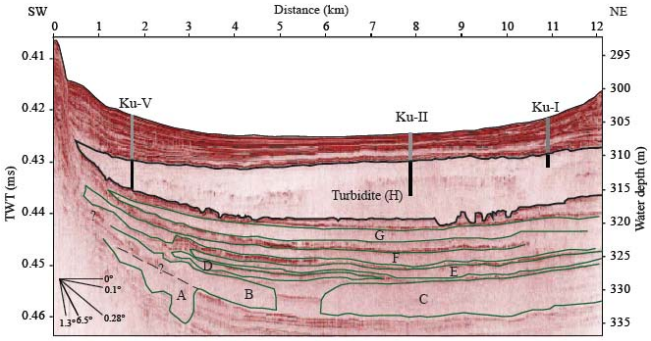
(http://www.nature.com/ngeo/journal/v5/n11/extref/ngeo1618-s1.pdf)



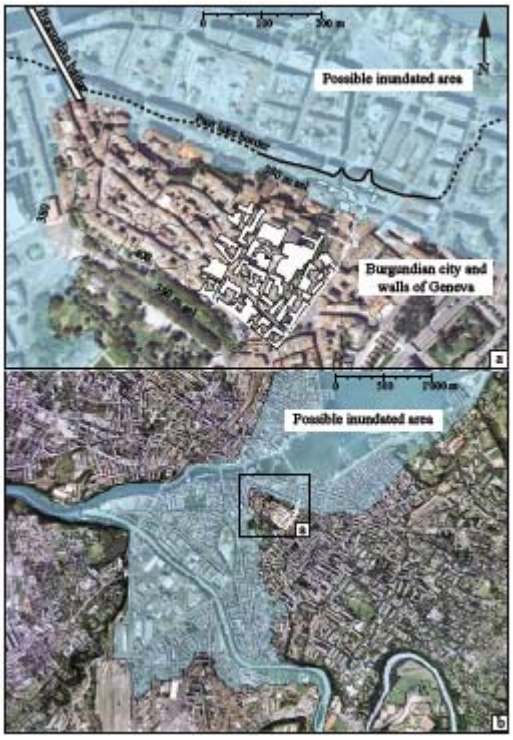
Supplementary Figure 1
Lake Geneva location map and bathymetry
a, Shaded relief map (Swiss Federal Office of Topography) of the region surrounding Lake Geneva with the location of major settlements. Water depth within the lake is indicated with grey contour lines. The thickness of the 563 AD turbidite is shown with a colour shaded scale. Seismic reflection survey is indicated with dark grey lines. The solid black line represents the location of seismic profile in Supplementary Figure 3, the black squares are locations of sediment cores, and the dashed line shows the position of the bathymetric profile in **b**. True slope angles are shown in the inset.



Supplementary Figure 2
Summary of the chain of events in 563 AD
Sketch of the geological and limnogeological process describing the main phases of the 563 AD event similar to the scenario that has been previously proposed1, from the aerial rockfall in the Rhone valley (1) to the sublacustrine Rhone delta collapse, followed by turbiditic and debris flow propagation with wave generation (2), ending with water wave passing over the old city walls of Burgundian Geneva (3).



Supplementary Figure 3
Seismic profile
High resolution seismic reflection (3.5 kHz) profile shows the turbidite as a lens-shaped unit (H) with chaotic facies. The position and length of the sediment cores are marked with vertical bars. The black part of the cores is described in Supplementary Figure 4. True slope angles are shown in the inset. Though our study focuses on the largest and most recent mass movement deposit (outlined in black, unit H), we note that there are at least seven more mass movement untis (A-G) deeper in the basin that are recognized on the basis of their chaotic to transparent seismic signals and overall lens shape (outlined in green).



Supplementary Figure 6
Possible inundated zone in Geneva for an 8 m wave
Aerial photographs (SITG Geneva) of Geneva showing regions that would have been submerged by an 8 m tsunami. Inundated regions were estimated taking account of the first arrival wave height (at the lake shore) and the current topography. **a**, 6th century reconstruction of the city of Geneva with Burgundian buildings, walls and bridge (in white) and the past lake border3,4,5 (thick black line). **b**, location of the Burgundian city within modern Geneva showing possible zone of inundation.

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ

Calif. city building a "tsunami-resistant" port

CRESCENT CITY, Calif. (AP) — It doesn't matter if the earth sways in Chile, Alaska or Japan, the formation of the sea floor along the U.S. West Coast generally aims any tsunami surges at the tiny California port town of Crescent City. Churning water rushes into the boat basin and then rushes out, lifting docks off their pilings, tearing boats loose and leaving the city's main economic engine looking as if it has been bombed.

That's what happened in March 2011, when a Japanese earthquake sparked a tsunami that sank 11 boats, damaged 47 others and destroyed two-thirds of the harbor's docks.

Port officials are hoping that tsunami is among the last of many that have forced major repairs in Crescent City, a tiny commercial fishing village on California's rugged northern coast. Officials are spending $54 million to build the West Coast's first harbor able to withstand the kind of tsunami expected to hit once every 50 years — the same kind that hit in 2011, when the highest surge in the boat basin measured 8.1 feet and currents were estimated at 22 feet per second.

Officials are building 244 new steel pilings that will be 30 inches in diameter and 70 feet long. Thirty feet or more will be sunk into bedrock. The dock nearest the entrance will be 16 feet long and 8 feet deep to dampen incoming waves. The pilings will extend 18 feet above the water so that surges 7 ½ feet up and 7 ½ feet down will not rip docks loose.

Crescent City was not the only West Coast port slammed by the tsunami, which was generated by a magnitude-9.0 earthquake in Japan. The waves ripped apart docks and sank boats in Santa Cruz, Calif., and did similar damage in Brookings, Ore., just north of Crescent City. But their geographical location doesn't make them as vulnerable to multiple tsunamis.

"Normally, Crescent City takes the hit for all of us," said Brookings harbormaster Ted Fitzgerald.

Since a tidal gauge was installed in the boat basin in 1934, this small port has been hit by 34 tsunamis, large and small. It typically suffers the most damage and the highest waves on the West Coast, said Lori Dengler, professor of geology at Humboldt State University.

The sea floor funnels surges into the mouth of Crescent City's harbor, and the harbor's configuration magnifies them, experts say.

A wave generated by an earthquake in Alaska on Good Friday, 1964, killed 11 people and wiped out 29 city blocks. That was 10 years before the boat basin was even built.

When the waves hit in 2011, the port was still repairing damages from a tsunami that hit in 2006. Officials already had a plan for dealing with future tsunamis, said Ward Stover, owner of Stover Engineering in Crescent City, which put together the plan.

With no tsunami building codes, Stover said the state of California and Crescent City decided to prepare for the kind of tsunami expected to hit every 50 years. They rejected as too expensive building a tidal gate to close off the mouth of the harbor or trying to survive a powerful tsunami like the one that hit in 1964. Instead, they planned to make the docks strong enough to ride out the most likely surges.

"It's tsunami-resistant, not tsunami-proof," Stover said.

Construction has been marked by one delay after another. Government funding was slow, and a custom-built drill bit for installing the extra-strength pilings deep in bedrock broke. So authorities switched to installing temporary docks the old-fashioned way, by pounding in the pilings, to get them through the winter. Many of the 60 commercial fishing boats based in Crescent City are still mooring in the outer harbor. Others have to make do without water or electricity.

The March 2011 tsunami was a wake-up call for communities up and down the West Coast. Many improved tsunami evacuation plans and held mock evacuations.

But some experts say the West Coast is still not taking the threat seriously enough.

"Many ports on the West Coast are in denial as to their tsunami hazard," said Costas Synolakis, professor of civil and environmental engineering and director of the Tsunami Research Center at the University of Southern California.

(Jeff Barnard / Associated Press, 23 November 2012, http://www.google.com/hostednews/ap/article/ALeqM5hUUS-2enJ8erzg3FkD1oVzzE474g?docId=cda3b862302d425799f9a9f713343394)

Major Earthquakes Can Trigger Faraway 'Slow' Quakes

Major earthquakes might set off incredibly slow earthquakes thousands of miles away, new research suggests.

These findings, detailed online Sept. 11 in the Journal of Geophysical Research-Solid Earth, shed light on how earthquake zones might communicate with each other over large distances, scientists added.

The cluster of devastating earthquakes that rocked the globe during the past decade from Japan to Sumatra to Haiti is one reason why scientists are investigating whether temblors in different parts of the world are linked to one another. Although research to date suggests that major quakes aren't likely to trigger other massive quakes around the globe, they can set off tremors worldwide.

Now researchers find that large quakes might also trigger mysterious slow earthquakes thousands of miles away. One kind of slow earthquake known as a slow-slip event can last for weeks, shifting the Earth as much as an ordinary earthquake of magnitude of 7 would in mere moments.

The investigators focused on the magnitude 8.8 Maule earthquake that struck Chile in 2010. They found it generated surface waves that, within hours, set off tremors in the Guerrero region of southwestern Mexico 4,140 miles (6,660 kilometers) away. Data from GPS stations also revealed the earth there began moving southward at the same time tremors there began.

The tremors and movements of the GPS stations lasted for about six months after the 2010 Chile quake.

"Such an observation may indicate that the Maule earthquake triggered a slow-slip event in Guerrero," said researcher Dimitri Zigone, a seismologist at the University of Southern California in Los Angeles.

Near Guerrero lies a subduction zone, where a tectonic plate under the Pacific Ocean is diving under the continental North American plate. The seismic energy from Chile apparently increased the stress in the segment of the subduction zone near Guerrero, which may explain the resulting slow-slip event.

"The fact large quakes can have effects so far away could be important because it may change the recurrence time between earthquakes in a specific location," Zigone told OurAmazingPlanet. "Usually we assume that the seismic cycle — the recurrence between earthquakes — is regional, on a single fault system orat a plate boundary, for example. If these large-scale interactions exist, it may indicate that even at large distances, a mega-earthquake can modify the conditions in another region."

(Charles Q. Choi / OurAmazingPlanet Contributor, Nov 27, 2012, http://www.ouramazingplanet.com/3813-major-earthquake-trigger-slow-earthquake.html)

ΕΝΔΙΑΦΕΡΟΝΤΑ – ΠΕΡΙΒΑΛΛΟΝ

New paving system uses recycled plastic

Reams of plastic milk jugs and yogurt containers rinsed out by conscientious consumers could find new life on a highway.

The City of Vancouver on Thursday unveiled a warm-mix paving application that uses recycled plastic – the kind collected in the city's blue box program – to make asphalt.

The North American road building sector has been experimenting with warm-mix systems, which mix paving materials at lower temperatures than conventional hot-mix methods, for about a decade, building on methods developed primarily in Germany.

Vancouver says its method is the first to use recycled plastic, adding another green feature to a technology that can significantly reduce energy use and greenhouse gas emissions.

The city expects its warm-mix system to cut gas use by 20 per cent and to provide the same reduction in carbon dioxide emissions. Currently, the system is 3 per cent more expensive than a hot-mix system, but that premium is expected to shrink or disappear as fuel costs continue to rise.

Pilot projects have shown fuel savings in the range of 10 to 15 per cent and increased lifespans for pavement, says Todd Strynadka, technical services manager with Terus Construction, a road construction group that operates in British Columbia and Yukon.

Warm-mix systems also reduce emissions to which workers are exposed. "Safety-wise for the workers, it's a lot better – and they're finding added benefits in terms of longer life of the pavement as well, because you're not heating the material quite as much," Mr. Strynadka said.

Pilot projects suggest warm-mix asphalt lasts longer, but those results are from projects that are less than a decade old, he added.

"The real test is in 20 years to see how much better it has performed."

(Wendy Stueck / THE GLOBE AND MAIL, Nov. 15 2012, http://www.theglobeandmail.com/news/british-columbia/new-paving-system-uses-recycled-plastic/article5360821)

Το νερό επιστρέφει
Τεχνητές πλημμύρες αποκαθιστούν την οικολογική ισορροπία στο Γκραν Κάνιον

Εκατομμύρια κυβικά μέτρα νερού γέμισαν τις τελευταίες ημέρες την κοίτη του ποταμού Κολοράντο στο Γκραν Κάνιον, σε μια σειρά από τεχνητές πλημμύρες που έχουν στόχο την ανανέωση του οικοσυστήματος της περιοχής.

Το απότομο άνοιγμα των υδατοφρακτών έστειλε ζωογόνο λάσπη σε απόσταση έως και 160 χιλιομέτρων

Έπειτα από 16 χρόνια μελέτης και σχεδιασμών, το αμερικανικό υπουργείο Εσωτερικών ανακοίνωσε τον περασμένο Μάιο σχέδιο για το περιοδικό άνοιγμα των υδατοφρακτών στο φράγμα Γκλεν Κάνιον.

Το φράγμα εμποδίζει τη φυσική ροή ιλύος, η οποία λειτουργεί σαν λίπασμα για τη βλάστηση της περιοχής και δημιουργεί νησίδες άμμου, οι οποίες αποτελούν από μόνες τους σημαντικά οικοσυστήματα.

Περίπου μισό εκατομμύριο τόνοι λάσπης εκτιμάται ότι απελευθερώθηκαν στο φαράγγι στη διάρκεια της τεχνητής πλημμύρας, η οποία ξεκίνησε στις 19 Νοεμβρίου και ολοκληρώθηκε αυτή την εβδομάδα.

Το εγχείρημα φαίνεται ότι πέτυχε, καθώς οι ερευνητές της αμερικανικής γεωλογικής υπηρεσίας (USGS) εντόπισαν νέες νησίδες άμμου σε απόσταση 160 χιλιομέτρων από το φράγμα.

Παρόλα αυτά, η υπηρεσία θα συνεχίσει τις έρευνες πεδίου για να βεβαιωθεί ότι δεν υπάρχουν σοβαρές παρενέργειες. Στις δοκιμαστικές πλημμύρες του 1996, του 2004 και του 2008, στις οποίες πάντως το νερό απελευθερώθηκε σταδιακά και όχι απότομα, παρατηρήθηκε αύξηση στον πληθυσμό ενός είδους πέστροφας που είχε εισαχθεί στο ποτάμι από τον άνθρωπο.

Το σχέδιο που παρουσίασε ο υπουργός Εσωτερικών Κεν Σαλαζάρ προβλέπει περιοδικές τεχνητές πλημμύρες κάθε άνοιξη και φθινόπωρο. Προκειμένου να μεγιστοποιηθεί η ροή ιλύος, το φράγμα θα παραμένει εντελώς ανοιχτό μέχρι και 96 ώρες, με τη ροή του νερού να φτάνει μέχρι τα 1.300 κυβικά μέτρα ανά δευτερόλεπτο.

Ελάχιστα μεγάλα ποτάμια στον πλανήτη κυλούν σήμερα ανενόχλητα μέχρι τις εκβολές τους στη θάλασσα -σχεδόν

πάντα υπάρχουν φράγματα που εμποδίζουν τη ροή της ζωογόνου λάσπης.

(Newsroom ΔΟΛ, 28 Νοεμβρίου 2012, http://news.in.gr/science-technology/article/?aid=1231224166)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

La légende des sciences

«Ο θρύλος των επιστημών» είναι μια σειρά 12 βραβευμένων γαλλικών ταινιών τεκμηρίωσης (documentaires) του Γάλλου φιλοσόφου και συγγραφέως Michel Serres, παραγωγής 1996, με τίτλο «Arte». Το 4ο επεισόδιο «Η ΓΕΝΝΗΣΙΣ» (NAÎTRE) αναφέρεται στο θαύμα των Ελλήνων, στην έκκρηξη των γνώσεων και των επιστημών, από τον 6ο π.Χ. μέχρι τον 4ο π.Χ. αιώνα, στο μικρό ηλιόλουστο κομμάτι γης, την Ελλάδα, όπου γεννήθηκαν οι επιστήμες που εξακολουθούν να μας οδηγούν έως σήμερα,

«Σε όποιο σημείο της ιστορίας και αν βρισκόμαστε, σε όποια κοινωνία, σ' έναν φοβερά εξελιγμένο πολιτισμό ή σε μια πρωτόγονη φυλή, μπορούμε να επισημάνουμε, πριν την ανάπτυξη της επιστήμης, μια κάποια γνώση. Σχεδόν πάντα υπάρχουν αριθμοί, σχήματα, ταξινομήσεις ζώων και γιατροί. Η απαρχή της επιστήμης δεν βρίσκεται ακόμα εκεί. Γιατί; Γιατί σε κάποιες στιγμές της ιστορίας συμβαίνει κάτι πολύ περίεργο: Όλες οι μορφές γνώσης προχωρούν μαζί. Τα πάντα μεταβάλλονται και τα πάντα γεννιούνται. Και, παραδείγματος χάρη, σήμερα τα πάντα αλλάζουν: Οι τεχνικές της γνώσης, φυσικά, η παιδεία, τα μαθηματικά, η φυσική, η αστρονομία, η χημεία, η ιατρική κ.λπ. Ξαφνικά το σύνολο της γνώσης μοιάζει να προχωρεί σαν τεράστιο ποτάμι, σαν τεράστιος κορμός. Πότε λοιπόν ξεκίνησε η επιστήμη και πού; Θα πει κανείς πως είχε κάποιες απαρχές στην Κίνα, κάποιες στις Ινδίες, στη Βαβυλώνα, στην Αίγυπτο. Αλλά σ' εκείνες τις χώρες και σ' εκείνες τις εποχές δεν σημειώθηκε ακριβώς αυτή η μεγάλη πρόοδος. Όμως τον 6ο και 5ο π.Χ. αιώνα στη χώρα των Ελλήνων σημειώθηκε αυτή η τεράστια πρόοδος. Και από τότε που ξεκίνησε αυτό το γεγονός θεωρούμε πηγή μας δηλαδή, σε κάποια πράγματα, είμαστε ακόμα παιδιά των Ελλήνων…»

(με ελληνικούς υποτίτλους).

http://www.youtube.com/watch?v=dkCPuRqqs2Y

National Geographic Rio Antirio Bridge in Greece

Ταινία τεκμηρίωσης της National Geographic για την γέφυρα Ρίου – Αντιρρίου με τις μελετητικές και κατασκευαστικές προκλήσεις που αντιμετωπίστηκαν επιτυχώς (με ελληνικούς υποτίτλους).

http://www.youtube.com/watch?v=dmwIjpjcPv0

Η Σχετικότητα καταδύεται

Ο Άινσταϊν και τα ατομικά ρολόγια στη μελέτη του εσωτερικού της Γης

Η θεωρία της Γενικής Σχετικότητας και τα ατομικά ρολόγια υψηλής ακρίβειας σύντομα θα επιτρέπουν στους γεωλόγους να χαρτογραφούν το υπέδαφος σε μεγάλα βάθη, εκτιμούν ερευνητές στην Ελβετία.

Η νέα προσέγγιση βασίζεται στο γεγονός ότι ο χρόνος τρέχει πιο αργά όταν η δύναμη της βαρύτητας αυξάνεται -ένα φαινόμενο που ονομάζεται «βαρυτική διαστολή του χωροχρόνου» και αποτελεί βασικό συμπέρασμα της Γενικής Σχετικότητας του Αϊνστάιν, η οποία περιγράφει τη δομή του χωροχρόνου.

Αυτό σημαίνει ότι, αν κανείς συγχρονίσει δύο ρολόγια μεγάλης ακρίβειας, και στη συνέχεια κατεβάσει το ένα από αυτά στο φρεάτιο μιας γεώτρησης, το ρολόι στην επιφάνειας θα πηγαίνει μπροστά σε σχέση με το ρολόι στο υπέδαφος, το οποίο βρίσκεται πιο κοντά στο κέντρο της Γης και επομένως δέχεται ισχυρότερη βαρυτική έλξη.

Αυτός, εξάλλου, είναι ένας από τους λόγους για τους οποίους οι δορυφόροι του GPS είναι εξοπλισμένοι με ατομικά ρολόγια και συνυπολογίζουν τα σχετικιστικά φαινόμενα ώστε να δίνουν ακριβές στίγμα.

Πλέον, η ακρίβεια των ατομικών ρολογιών έχει φτάσει τα επίπεδα που απαιτούνται για να παρατηρηθεί το φαινόμενο στη Γη: «Το 2010, ατομικά ρολόγια υπερυψηλής ακρίβειας μέτρησαν τη διαφορά του χρόνου ανάμεσά τους, με το ένα ρολόι να βρίσκεται τοποθετημένο 33 εκατοστά πάνω από το άλλο» αναφέρει η Ρουξάντρα Μπονταρέσκου, επικεφαλής των ερευνητών στη Ζυρίχη.

Εκτιμά μάλιστα ότι η μέτρηση της χρονικής διαφοράς ανάμεσα σε δύο ρολόγια με υψομετρική διαφορά μόλις ενός εκατοστού «βρίσκεται εντός των ορίων της τεχνολογίας των ατομικών ρολογιών».

Η ιδέα είναι ότι οι γεωλόγοι θα συγχρονίζουν δύο ρολόγια στο επίπεδο της επιφάνειας της θάλασσας και στη συνέχεια θα μεταφέρουν το ένα από αυτά στο έδαφος της περιοχής που θέλουν να μελετήσουν. Οι τυχόν διαφορές στο ρυθμό του χρόνου θα αποκάλυπταν τι κρύβεται στο υπέδαφος αυτής της περιοχής.

Αν για παράδειγμα το υπέδαφος κρύβει τον άδειο χώρο μιας μεγάλης σπηλιάς, το βαρυτικό πεδίο θα είναι τοπικά πιο ασθενές, οπότε το ρολόι πάνω από τη σπηλιά θα τρέχει πιο γρήγορα. Αν αντίθετα κρύβεται στο υπέδαφος ένα μεγάλο κοίτασμα σιδήρου, ο οποίος έχει μεγάλη ειδική μάζα και αυξάνει τοπικά τη βαρύτητα, ο χρόνος θα τρέχει ελαφρώς πιο αργά.

Σύμφωνα με τις εκτιμήσεις των ερευνητών, οι οποίες δημοσιεύτηκαν στο Geophysical Journal International, ατομικά ρολόγια υψηλής ακρίβειας, τα οποία μπορούν να δείξουν τη χρονική διαφορά ανάμεσα σε δύο σημεία με υψομετρική διαφορά ενός εκατοστού, θα μπορούσαν να εντοπίσουν μια σφαιρική δομή με διάμετρο 1,5 χιλιομέτρου θαμμένη σε βάθος δύο χιλιομέτρων. Για να γίνει αυτό, όμως, η διαφορά στην πυκνότητα της σφαίρας και των γύρω υλικών θα πρέπει να υπερβαίνει το 20%.

Τα υπερ-ακριβή ατομικά ρολόγια στα οποία αναφέρεται η μελέτη είναι αρκετά ογκώδη, στο μέλλον όμως θα μπορούσαν να μικρύνουν αρκετά ώστε να χρησιμοποιηθούν σε έρευνες πεδίου.

(Newsroom ΔΟΛ / 13 Νοε. 2012, http://news.in.gr/science-technology/article/?aid=1231221880)

Στη Ρωσία δημιούργησαν σούπερ-μπετόν

Ρώσοι επιστήμονες έχουν εφεύρει ένα είδος μπετόν το οποίο δεν φοβάται οποιεσδήποτε καιρικές συνθήκες. Δεν είναι μόνο πιο ισχυρό από τις άλλες μάρκες μπετόν αλλά και σκληραίνει πιο γρήγορα. Αυτό είναι ιδιαίτερα σημαντικό για την επείγουσα επισκευή χαλασμένων γεφυρών, υδατοφραχτών και δρόμων. Και τα έργα αποκατάστασης μπορούν τώρα να διεξάγονται υπό οποιεσδήποτε καιρικές συνθήκες.

Εκ πρώτης όψεως είναι όλα όπως πάντα: άμμος, χαλίκια από γρανίτη, τσιμέντο. Όμως, αντί νερού στο μίγμα προσθέτουν ειδικό πολυμερές υγρό, το οποίο προσδίδει στο μπετόν μοναδικές ιδιότητες, λέει ο Αλεξάντρ Νικιτιούκ, ανώτερος επιστημονικός ερευνητής του Ρωσικού Χημικο-Τεχνολογικού Ινστιτούτου Μεντελέγιεφ:

- Είχαμε περιπτώσεις, όταν εργαζόμασταν σε αρκετά χαμηλές αρνητικές θερμοκρασίες, μέχρι και -28 βαθμών Κελσίου υπό το μηδέν. Δοκιμάσαμε το μπετόν και σε καταρρακτώδη βροχή και ακόμη και κάτω από το νερό.

Το ειδικό πολυμερές υγρό περιβάλλει όλα τα συστατικά, τα συνθέτει μεταξύ τους, και ταυτόχρονα τα προστατεύει από τις χημικές επιδράσεις. Αυτό φαίνεται ιδιαίτερα όταν τοποθετούμε τα δείγματα σε οξύ, λέει η Ελένα Πισαρένκο, η επιστημονικός ερευνητής του Ρωσικού Χημικο-Τεχνολογικού Ινστιτούτου Μεντελέγιεφ:

- Εάν πάρουμε ένα κομμάτι απλού μπετόν και το τοποθετήσουμε σε υδροχλωρικό οξύ, το μπετόν από τα πρώτα δευτερόλεπτα θα αρχίσει να καταστρέφεται. Εάν όμως κάνουμε το ίδιο με το νέο μπετόν, δεν θα υπάρξουν ενδείξεις της αντίδρασης.

Σύμφωνα με τους κατασκευαστές, αυτή η ιδιότητα θα είναι χρήσιμη κατά την επιδιόρθωση των βιομηχανικών εγκαταστάσεων, γεφυρών και άνω διαβάσεων, όπου συνεχώς εφαρμόζονται καυστικά υγρά και χημικά προϊόντα, όπως για παράδειγμα τα αντιψυκτικά διαλύματα για τους αυτοκινητόδρομους.

Άλλη μια σημαντική ιδιότητα του νέου μπετόν είναι η ταχύτητα πήξης. Είναι αναντικατάστατο για την κάλυψη των κενών σε υδατοφράχτες, ή στους διαδρόμους απογείωσης στα αεροδρόμια. Για να αποκτήσει δύναμη, το απλό μπετόν θα χρειαστεί έναν μήνα, ενώ η νέα μάρκα του μπετόν πήζει σε μιάμιση ώρα και θα είναι πιο ισχυρό από το απλό μπετόν σχεδόν κατά δύο φορές. Το σύνθετο μπετόν κάνει για όλα. Μπορεί εύκολα να αντικαταστήσει τα ήδη υπάρχοντα υλικά. Και όπως υποστηρίζουν οι επιστήμονες, δεν θα είναι πιο ακριβό από το συνηθισμένο τσιμέντο.

(Η ΦΩΝΗ ΤΗΣ ΡΩΣΙΑΣ / 13.11.2012, http://greek.ruvr.ru/2012_11_13/94427844)

SeaWalk Port Skjolden

Δείτε στην παρακάτω ιστοσελίδα μια πολύ καλή και οικονομική ιδέα για κατασκευή προσέγγισης μεγάλων «κρουαζιεροπλοίων» σε λιμάνια χωρίς τις αντίστοιχες λιμενικές εγκαταστάσεις. Ευρίσκεται στο λιμάνι Skjolden της Νορβηγίας και αφορά στην προσέγγιση του γιγαντιαίου «κρουαζιεροπλοίου» Queen Elizabeth.

http://www.youtube.com/watch?v=Sm6_fR_Oc3Q&feature=youtube_gdata_player

Απαλλοτριώσεις...

Οι απαλλοτριώσεις στην Κίνα έχουν μεγάλο ενδιαφέρον τα τελευταία χρόνια. Για να χτιστούν οι μοντέρνες πόλεις και έργα υποδομής έχουν απαλλοτριωθεί ολόκληρα χωριά, κάποιες φορές μένει ένας μοναχικός ιδιοκτήτης που αρνείται να εγκαταλείψει το σπίτι. Το αποτέλεσμα μιας τέτοιας πρακτικής αποτυπώνει το κτίριο της φωτογραφίας. Ο ιδιοκτήτης του ακινήτου στην Wenlling της επαρχίας Zheijang θεώρησε ότι τα χρήματα που του έδιναν ώς αποζημίωση δεν ήταν αρκετά να καλύψουν τα έξοδα για το χτίσιμο ενός νέου σπιτιού και αποφάσισε να μην το εγκαταλείψει, η κατασκευαστική εταιρία από την άλλη προχώρησε στην κατασκευή του δρόμου και ιδού το αποτέλεσμα.

(Η ΚΑΘΗΜΕΡΙΝΗ, 23-11-2012 / REUTERS/China Daily, http://sup.kathimerini.gr/xtra/files/Fotogr/231112/fotograf2.htm)

The Red Sea… in Australia?

The crimson tide: Tourists in Australia flee as Bondi Beach turns into the 'Red Sea' because of rare algae bloom

A mother and her child look out over the 'Red Sea' of Sydney's Clovelly beach. Despite health warnings a number of defiant swimmers were seen venturing into the water

- **Beaches closed over health fears but some swimmers are braving the water**
- **Phenomenon caused when tiny plants flourish due to unusual conditions**
- **They can appear in various colours often with spectacular results**
- **Algae is high in ammonia which can cause skin rashes and eye irritation**
- **Large numbers of fish are believed to have perished**

Tourists heading for world-famous Bondi Beach were left high and dry today after a rare natural phenomenon turned the water blood red.

Bondi was among several popular beaches in and around Sydney, Australia, which had to be closed after a huge algae bloom transformed the sea into something resembling a scene from a Jaws movie.

But despite the warnings a number of intrepid beachgoers were seen venturing into the water and swimming through the red surface, Ten News Sydney reported.

Bloodbath: An intrepid swimmer heads towards a patch of red algae bloom off the coast of Sydney, Australia, where the rare natural phenomenon has turned the water the colour of blood

Closed: A red wave breaks off Sydney's Bondi Beach, one of several around Sydney which had to be closed due to the rare algae bloom

The natural phenomenon is caused when algae, a plant-like organism flourishes and large groups of the miniscule plants, which can appear in various colours, gather together often with spectacular results.

Known as Nocturnal Scintillans or sea sparkle it has no toxic effects but people are still advised to avoid swimming in areas with discoloured water because the algae, which can be high in ammonia, can cause skin irritation.

High and dry: Several popular beaches around Sydney including Bondi and Clovelly (pictured) had to be shut after the algae, known as Nocturnal Scintillans or sea sparkle, flourished

Tomato soup: While the red algae has no toxic effects people are still advised to avoid swimming in areas with because it can be high in ammonia which can cause skin irritation

British tourists were among large groups of visitors who were told by lifeguards not to enter the water until the all-clear was given because the algae can irritate the skin and cause other health problems.

Ken Roberts, 23, from Birmingham, England said: 'Perhaps I'm just in the wrong country – I thought the Red Sea was somewhere in Asia.'

Tourists and locals are hoping that the algae will have dissipated by the weekend, when temperatures are expected to reach 40c

Local lifeguard Bruce Hopkins said: 'It has quite a fishy smell to it.

'It makes the water look like it has a coating of tomato-sauce coloured oil.'

The algae has already disappointing thousands who had headed to the coast to cool off as the summer Down Under finally gets under way of a prolonged cold period.

The New South Wales (NSW) Office of Water has been carrying out a series of tests to discover what caused the bloom.

One theory is that it was caused by an upwelling of colder nutrient-rich water.

A gull stands in the discoloured water of Clovelly Beach. Large numbers of fish are believed to have perished from the effects of the algae

A swimmer sticks to the safety of a pool after the algae transformed the surrounding sea. Tests are underway to find out what caused the phenomenon

A spokesman said that the blooms, sometime referred to as 'red tides', are more common around spring and autumn when the water temperature is higher and there are greater movements in ocean currents.

Large numbers of fish are believed to have perished from the effects of the algae.

A spokesman for the local council said red algae could be dangerous to some humans exposed to it.

'There are some possible risks to human health including skin rashes and eye irritation and for this reason the beach will remain closed until the algae dissipates,' he said.

Tourists and locals are hoping that the algae will have dissipated by the weekend, when temperatures are expected to reach 40c.

(Daniel Miller and Richard Shears / The Daily Mail, 27 November 2012, http://www.dailymail.co.uk/news/article-2239040/Crimson-tides-Tourists-flee-Bondi-Beach-Red-Sea-rare-algae-bloom-turns-water-colour-blood.html ή http://www.dailymail.co.uk/news/article-2239040/Crimson-tides-Tourists-flee-Bondi-Beach-Red-Sea-rare-algae-bloom-turns-water-colour-blood.html#ixzz2Dh1DUXvb)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ

Editor's Choice: Geosynthetics International - Free online papers

As a benefit to the geosynthetics community ICE Publishing has arranged for free access to three papers from both the 2010 and 2011 volumes of *Geosynthetics International*. These papers have been identified by the Editor of the journal as major contributions to the discipline.

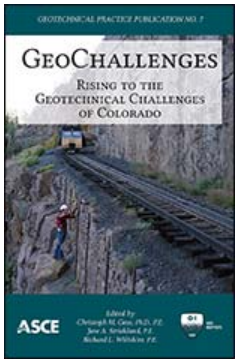
The three papers from 2010 are:

- Geosynthetic capillary barriers: current state of knowledge, by Zornberg, J. G., Bouazza, A. & McCartney, J. S. (2010)
- Time histories of tensile force in geogrid arranged in two full-scale high walls, by Kongkitkul, W., Tatsuoka, F., Hirakawa, D., Sugimoto, T., Kawahata, S. & Ito, M. (2010)
- Influence of structural and material properties of GCLs on interface flow in composite liners due to geomembrane defects, by Mendes, M. J. A., Touze-Foltz, N., Palmeira, E. M. & Pierson, P. (2010).

The three papers from 2011 are:

- Geosynthetics applications for the mitigation of natural disasters and for environmental protection, by Brandl, H. (2011).
- Geomembrane damage due to static and cyclic shearing over compacted gravelly sand, by Fox, P.J., Ross, J.D., Sura, J.M. and Thiel, R.S. (2011)
- GCL hydration under simulated daily thermal cycles. by Rowe, R.K., Rayhani, M.T., Take, W.A., Siemens, G. and Brachman, R.W.I. (2011)

These papers can be found online at: www.icevirtuallibrary.com/info/EdChGeoI.



GeoChallenges

Rising to the Geotechnical Challenges of Colorado

C. M. Goss, J. A. Strickland and R. L. Wiltshire (Editors)

Geotechnical Practice Publications (GPP) GPP 7

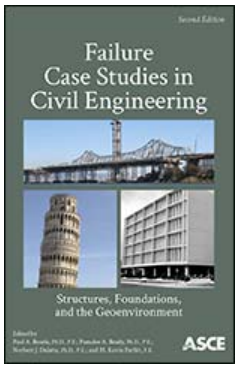
Proceedings of the 2012 Biennial Geotechnical Seminar held in Denver, Colorado, on November 9, 2012. Sponsored by the Geo-Institute Chapter of the Colorado Section of ASCE; the Rocky Mountain Section of the Association of Environmental and Engineering Geologists, and the Colorado Association of Geotechnical Engineers.

This Geotechnical Practice Publication contains 16 papers that address the complex geotechnical challenges in geologic hazards, nondestructive evaluation, geo-construction, and the ground itself.

Topics include: debris flow assessment and mitigation; rockfall rating systems; dam sinkhole evaluation; seismic imaging for landslide remediation; photogrammetry for mapping discontinuities, river morphology, and concrete damage; mine subsidence under levees; laramie formation claystone behavior; underdrains for construction on expansive soils; reinforced soil structures; bedrock settlement under dams; energy foundations; drilled shaft foundations; and tunnel rehabilitation.

This Geotechnical Practice Publication focuses on Colorado and the Rocky Mountain West's specific geotechnical practice and experience. It will be valuable to anyone in geotechnical engineering, especially those working in Colorado or similar geologic settings.

(ASCE, 2013)



Failure Case Studies in Civil Engineering

Structures, Foundations, and the Geoenvironment, Second Edition

P. A. Bosela, P. A. Brady, N. J. Delatte & M. K. Parfitt

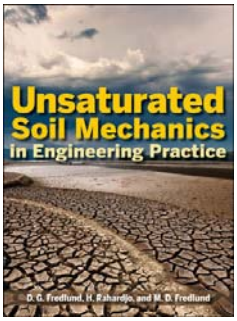
Failure Case Studies in Civil Engineering: Structures, Foundations, and the Geoenvironment, Second Edition, provides short descriptions of 50 real-world examples of constructed works that did not perform as intended. Designed for classroom use, each case study contains a brief summary, lessons learned, and references to key sources. This new edition, which replaces the 1995 classic edited by Robin Shepherd and J. David Frost, offers expanded descriptions, additional photographs and diagrams, and updated references. It also includes new case studies, such as the Alfred P. Murrah Federal Building, the Charles de Gaulle Airport Terminal, and the North Battleford, Saskatchewan, Water Treatment Plant.

Topics include:

- foundation failures;
- embankment, dam, and slope failures;
- geoenvironmental failures;
- bridge failures; and
- building failures.

This book supplies valuable resource material on typical failures that can be integrated into undergraduate engineering courses. Engineering professors and their students will use this book as the basis for class discussions, a starting point for further research, and a demonstration of how each failure leads to improved engineering design and safety.

(ASCE, 2013)



Unsaturated Soil Mechanics in Engineering Practice

D. G. Fredlund, H. Rahardjo and M. D. Fredlund

This book builds upon and substantially updates Fredlund and Rahardjo's publication, Soil Mechanics for Unsaturated Soils, the current standard in the field of unsaturated soils. It provides readers with more thorough coverage of the state of the art of unsaturated soil behavior and better reflects the manner in which practical unsaturated soil engineering problems are solved. Retaining the fundamental physics of unsaturated soil behavior presented in the earlier book, this new publication places greater emphasis on the importance of the "soil-water characteristic curve" in solving practical engineering problems, as well as the quantification of thermal and moisture boundary conditions based on the use of weather data.

Topics covered include:

- Theory to Practice of Unsaturated Soil Mechanics
- Nature and Phase Properties of Unsaturated Soil
- State Variables for Unsaturated Soils
- Measurement and Estimation of State Variables
- Soil-Water Characteristic Curves for Unsaturated Soils
- Ground Surface Moisture Flux Boundary Conditions
- Theory of Water Flow through Unsaturated Soils
- Solving Saturated/Unsaturated Water Flow Problems
- Air Flow through Unsaturated Soils
- Heat Flow Analysis for Unsaturated Soils
- Shear Strength of Unsaturated Soils Shear Strength Applications in Plastic and Limit Equilibrium
- Stress-Deformation Analysis for Unsaturated Soils
- Solving Stress-Deformation Problems with Unsaturated Soils
- Compressibility and Pore Pressure Parameters
- Consolidation and Swelling Processes in Unsaturated Soils

Unsaturated Soil Mechanics in Engineering Practice is essential reading for geotechnical engineers, civil engineers, and undergraduate- and graduate-level civil engineering students with a focus on soil mechanics.

(SOILVISION SYSTEMS, July 24, 2012, http://www.soilvision.com/usmep)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

http://www.issmge.org/attachments/article/529/ISSMGE_Bulletin_October_2012_4r.pdf

Κυκλοφόρησε το Τεύχος 5 του 6ου Τόμου του ISSMGE Bulletin (Οκτωβρίου 2012) με τα παρακάτω περιεχόμενα:

- A Note from TC203 – Earthquake, Prof. Kyriazis Pitilakis, Chairman
- President's Reports, J.-L. Briaud, ISSMGE President
- News from Technical Committee TC104 on Physical Modeling in Geotechnics, Christophe Gaudin, Andy Take, Prof. Dave White
- News from Technical Committee TC304 on Engineering Practice of Risk Assessment and Management, K. K. Phoon, Gordon Fenton, Jianye Ching
- TECHNICAL ARTICLE «Effects of Geotechnical Interest Caused by the Nicoya Peninsula Earthquake, Costa Rica September 5th, 2012», William Vargas Monge
- TECHNICAL ARTICLE «Distributed FIBER-OPTIC Sensors in Geotechnical Engineering Monitoring», M. Iten, D. Hauswirth, F. Fischli, M. Puzrin
- News on Recent Conference: 12th Baltic Sea Geotechnical Conference, Rostock, Germany, K. Laackmann, D. Busch
- News on Recent Conference: 9th International Conference on Testing and Design Methods for Deep Foundations, Kanazawa, Japan Tatsunori Matsumoto
- News on Recent Conference: 4th Central Asian Geotechnical Symposium, Samarkand, Uzbekistan Zokhir Khasanov
- News on Recent Conference: 22nd European Young Geotechnical Engineers Conference, Gothenburg, Sweden, Fanny Deckner, Sara Johansson, Jorge Yannie
- News on Recent Conference: 7th Asian Young Geotechnical Engineers Conference, Tokushima, Japan, Ryosuke Uzuoka
- Participants Report To ISSMGE Foundation 7th Asian Young Geotechnical Engineers Conference, Tokushima, Japan Mohsin, Usman Qureshi, Erdi Myftaraga, Ching Hung
- News On Recent Conference : International Workshop on Advances in Multiphysical Testing of Soil and Shales, L Sitld
- News on Recent Conference : International Geotechnical Seminar on Recent Developments, Construction, Challenges and Forensic Investigation of Geotechnical Works, Singapore, T.S. Chua, Askar Zhussupbekov
- Reminiscence: Prof. Tsutomu Kimura received the Japan Academy Prize in the presence of His Majesty, the Emperor of Japan, Ikuo Towhata, Akihiro Takahashi
- News : National Youth Award 2012 of Mexico
- Event Diary
- Corporate Associates
- Foundation Donors
- Invitation to ISSMGE's International Journal of Geoengineering Case Histories
- From the Editor - Call for articles

www.geoengineer.org

Κυκλοφόρησε το Τεύχος #94 του **Newsletter του Geoengineer.org** (Νοέμβριος 2012) 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).

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