The Centre for Soft Ground Engineering (CSGE) organised two seminars in February to publicise the results of their on-going research activities.

Earthquake Engineering for Singapore Conditions

On 21 Feb 1998, a seminar on earthquake engineering issues in Singapore was held. This seminar was attended by over 80 participants. The seminar kicked off with an opening address by A/Prof Yong Kwet Yew, the Head of Department. Prof Yong emphasized the importance of such joint seminars to ensure that industry benefits from any research conducted at the University. The first presentation from Dr Chew Soon Hoe (CSGE) was on the seismicity of the Sundra Arc which covers Singapore and Sumatra. This forms the background for a better understanding of seismicity in the region. This was followed by a presentation by A/Prof Tan Thiam Soon (CSGE) on “Theoretical aspects of far-field modelling”, which is applicable to a place like Singapore which is far away from the likely epi-centres in Sumatra. Mr Lim Tian Kuay, the Deputy Director of the Meteorological Services of Singapore then gave a glimpse of the monitoring network in Singapore and how it fitted into the international network to provide quick and reliable information on earthquakes occurring in the region. This was followed by a presentation by A/Prof Lee Fook Hou (CSGE) on preliminary analysis of data collected from our own monitoring network. A clear message was that correlations from overseas might not be applicable to the local situation due to the different

(Cont’d on pg 2)

P & E Consultants Pte Ltd signs Licence Agreement For Two Equipment

On 2 March 1998, P & E Consultants Pte Ltd signed a licence agreement with NUS for the right to manufacture and market two pieces of equipment: (a) Drainage test apparatus for porous road mixes, and (b) Field permeability apparatus for porous asphalt road mixes. These two equipment are the results of a 3-year research project under taken by Dr Tan Siew Ann and A/Prof Fwa Tien Fang, both of the Department of Civil Engineering. The agreement was signed by Mr Wee Leong Seng, Director of P & E Consultants Pte Ltd and A/Prof Chou Siaw Kiang, Director of INTRO, NUS. A/Prof Chan Eng Soon, Deputy Head (Research) of the CE Dept, and the two inventors were also present at the signing ceremony.

As the products are the first such equipment designed to measure the basic engineering drainage properties of porous asphalt mixtures, P & E Consultants Pte Ltd immediately expressed their interest in acquiring the licence when INTRO first publicise the availability of the product in 1996. Discussions have been held between the NUS research team and the company to package the two equipment for efficient operations in actual projects and for the commercial market. The equipment would offer a useful evaluation tool for highway agencies, road consultants and contractors involving in porous asphalt road construction and maintenance.

Department Joins Prestigious Regional Structural and Geotechnical Engineering Group

Five staff members from the Department presented papers in Structural Engineering at the KAIST-KU-NTU’s (Korean Advanced Institute of Science & Technology, Kyoto University, & National Taiwan University) 7th Trilateral Seminar/Workshop on Structural and Geotechnical Engineering held in Kyoto from 1-3 Dec 1997. The Dept has joined this prestigious group comprising top engineering institutions in the Far East as its fourth member and will be organising the next seminar on 30 Nov and 1 Dec 1998.
Traffic management has been a major focus of transportation policy in Singapore. One of the most important tools in traffic management is the Urban Traffic Control Systems (UTCS).

In spite of wide-spread applications of UTCS in major cities throughout the world, the placement of traffic sensors within and around the intersections is yet to be perfected. Another area that needs refinement is the collection of good quality traffic data that accurately represent the traffic conditions. An example of the latter is the measurement of occupancy and speed only during green time, instead of the complete cycle used in conventional operations. With good quality data, more accurate information will be provided to the controller which could in turn achieve a better control of intersections.

A major hurdle in this area of research is the lack of computer simulation models capable of modeling individual vehicle movements within intersections, and mimic sensor operations in detail. This research project attempts to address these issues by first developing an intersection-based microscopic traffic simulation tool by means of object oriented programming, and using this as a testbed to study the nature and quality of data by placing traffic sensors at various locations at an intersection. In the later stage of this project, the use of distributed computing paradigm to coordinate and control several intersections in a network will be explored.

A grant of $45,300 has been awarded for this 2-year project. The multi-disciplinary research team includes Dr Cheu Ruey Long and Dr Chan Weng Tat (both from the CE Dept), as well as Dr. Chew Ek Peng (Dept of Industrial & Systems Engineering) and Dr Ong Chong Jin (Dept of Mechanical Engineering).

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(Cont’d from pg 1)

geological and seismological conditions. Finally, Mr Niu Jian Xin, a former Research Scholar at the CSGE presented his research findings from dynamic centrifuge tests evaluating the effect of soft soil conditions on seismic ground motion.

Deep Excavation – Field, Centrifuge and Numerical Studies

On 28 Feb 1998, the CSGE organised a Joint NUS-PWD-TIT Seminar on “Deep Excavation – Field, Centrifuge and Numerical Studies”. Nearly 100 participants attended this seminar. This seminar was a direct outcome of a tripartite collaborative research agreement signed in May 1993. This collaboration has been very effective in providing synergy among the three partners. In opening the seminar, A/Prof Yong Kwet Yew again noted the tradition of CSGE to involve its research partners in publicising joint research outcomes. A plaque was also given out by Prof Yong to each of the two organisations. The seminar kicked off with a presentation by Mr Quan of PWD who also worked on this topic during his final year at NUS. Mr Quan explained the observed behaviour at the Immigration Building and his efforts at back analysis. This was followed by a presentation by A/Prof Jiro Takemurra of Tokyo Institute of Technology who shared his experience on conducting centrifuge experiments. An interesting aspect of his talks concerned the attempt to get leading Japanese numerical workers to provide “Class A” predictions of the controlled centrifuge experiments. The preliminary outcome is that numerical solution still needs to be further improved to provide accurate prediction. The last presentation was made by A/Prof Tan Thiam Soon who discussed some issues concerning the use of 2-D FEM analysis.
Porous pavement layers have been used in road and airfield pavement structures to reduce wet skidding hazards, and to serve as a drainage layer. Achieving high drainability is a major consideration in the design and construction of porous paving mixes is of importance in their design, construction and maintenance. Currently, permeability values are often estimated from ranges recommended by the literature or design manuals because there does not exist a convenient means for their determination.

Dr S A Tan and A/Prof T F Fwa have developed a laboratory and a field apparatus for speedy and easy-to-conduct permeability determination of in-service pavements. Patent applications have been filed for both apparatus. The laboratory apparatus is designed to measure the vertical permeability of a cylindrical specimen using the principle of falling-head test. A theoretical solution has been derived to compute the permeability based on the relationship between measured hydraulic gradient and the rate of conduct for common porous paving mixes. Setting up of the apparatus can be completed within about 2 hours.

The field apparatus also makes use of the principle of falling-head test. As flow in both the vertical and horizontal radial directions takes place in a field test, an elaborate analytical procedure was developed to derive the effective permeability for the porous pavement surface layer. The apparatus can be easily set up at any point on an in-service pavement within a few minutes, and the test results are computed immediately on a portable PC. Verification tests on the permeability test results of the two apparatus have been performed using the conventional constant-head test procedure.

Submitted by A/Prof T F Fwa (cvewfatt@nus.sg cvewfatt@edu.nus.sg) and Dr S A Tan (cvetansa@edu.nus.sg)
PUBLICATIONS
(October to December 1997)


He, X.Q., C.M. Wang and K.Y. Lam, “Analytical bending solutions of elastica with one end held while the other end portion slides on a friction support”, Archive of Applied Mechanics, 67(8), 1997, 543-554.


Department Deputy Heads

A/Prof Chan Eng Soon, Chow Yeuk Khoi and Som sak Swaddiwudhipong have been recently appointed as the department deputy heads for research, administration and academic matters, respectively.

Forthcoming International Conferences and Workshops

<table>
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<tr>
<th>Date</th>
<th>Conference/Workshop</th>
<th>Contact Person</th>
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<tbody>
<tr>
<td>2-4 Dec 1998</td>
<td>Second International Conference on Thin-Walled Structures</td>
<td>Dr Richard J Y Liew  (e-mail: <a href="mailto:cveljy@nus.edu.sg">cveljy@nus.edu.sg</a>) Tel: 874 2154)</td>
</tr>
<tr>
<td>5 Dec 1998</td>
<td>International Workshop on Recent Developments and Future Trends in Thin-Walled Structures</td>
<td>Dr Richard J Y Liew (e-mail: <a href="mailto:cveljy@nus.edu.sg">cveljy@nus.edu.sg</a> Tel: 874 2154)</td>
</tr>
<tr>
<td>15-17 Dec 1999</td>
<td>Fourth Asia-Pacific Conference on Computational Mechanics for the Next Millennium</td>
<td>Dr K K Ang (e-mail: <a href="mailto:cveangkk@nus.edu.sg">cveangkk@nus.edu.sg</a> Tel: 874 2570)</td>
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</table>
Under the auspices of the Faculty’s Professional Activities Centre, the Department has conducted three advanced level public short courses jointly given by CE staff members and experts from overseas.

In Jan 1998, two geotechnical engineering courses were offered. A/Prof Y K Chow of NUS and Prof Fred H Kulhawy from Cornell University, USA and a visiting professor of the department conducted a course on “Design and Construction of Drilled Shaft (Bored Pile) Foundations”. The course was attended by over 60 practising engineers and postgraduate students. Favourable feedback was received from the course participants. A participant commented that the course was very interesting and had enhanced her knowledge on the design of bored piles and the interpretation of pile capacity using dynamic method of testing. Another geotechnical engineering course on “Advanced Geotechnical Analysis using SAGE CRISP” was jointly conducted by A/Prof F H Lee from CE Dept. and Dr Roger Chandler from SAGE Engineering Ltd., UK. The course attracted over 10 participants.

In Feb 1998, an environmental engineering course on “Wastewater Treatment” was jointly conducted by Dr M A Aziz from CE Dept. and Dr Peter Bliss from the University of New South Wales, Australia. Altogether, 16 practising engineers attended the course. They commented that the course was practical with emphasis on applications of the theories on wastewater treatment.

A number of CE Staff members have contributed two chapters to the Handbook of Structural Engineering edited by Prof W F Chen of Purdue University and published by CRC Press in December 1997. The handbook is a comprehensive reference work and resource book covering a broad spectrum of structural engineering. Chapter 2 on Structural Analysis was co-authored by Dr Richard J Y Liew, A/Prof N E Shanmugam and Dr C H Yu, all from the CE Dept. Chapter 12 on Multistorey Frame Structures was co-authored by Dr Richard J Y Liew and A/Prof T Balendra from CE Dept. and Prof W F Chen from Purdue University.

**Visitors to Department**

**29 Dec** A team of seven academics led by Prof Wang Chun-Tsung from National Taiwan University visited the Hydraulics and Structures Laboratories of the Department on 29th December 1997. Members of the delegation specialise mainly in Ocean Technology and Shipbuilding.

**30 Dec** An eight-member delegation led by Dr ABD Latif Bin Saleh from Universiti Technologi Malaysia.

**15 Jan** Dr Prof Magnus Langseth, Dept of Structural Engineering, Norwegian University of Science and Technology and Mr Arnfinn Janssen, Scientific Adviser, Norwegian Defence Construction Service.

**9 Feb** Dr Feng Wen, University of California, Berkeley, USA.

**19 Feb** Prof Michael Davies, University of Dundee.

**27 Feb** Dr M F Yeo, University of Adelaide, Australia.
New Appointments

VISITING PROFESSOR
Prof Fred H Kulhawy,
Professor of Civil and Environmental Engineering, Cornell University, USA, January 1998

Professor Hideo Sekiguchi,
Head, Research Centre for Disaster Environment, Disaster Prevention Research Institute, Kyoto University, Japan, January 1998

RESEARCH FELLOW
Dr Fan Xiaojun, 29 December 1997
Ms Wong Sook Fun, 15 January 1998

RESEARCH ASSISTANT
Mr Khu Soon Thiam, 2 February 1998

RESEARCH SCHOLARS
Mr Li Rongqing, 8 December 1997
Ms M Dhanalakshmi, 8 December 1997
Mr A S K Naidu, 13 December 1997
Mr Su Cheng Yi, 24 December 1997
Mr Ajit Achuthan, 26 December 1997
Ms P Sulapha, 29 December 1997
Mr Wang Lu, 30 December 1997
Mr E Nixon, 31 December 1997
Mr Gong Yi Bin, 31 December 1997
Ms Natalie Erin Jette, 31 December 1997
Ms Yu Li, 31 December 1997
Mr Yang Lei, 5 January 1998
Mr Shen LinWei, 12 January 1998
Mr Md Shahab Uddin Khaled, 2 February 1998
Ms Ning Ying, 23 February 1998

LABORATORY TECHNOLOGISTS
Mdm Annie Tan, 13 January 1998
Mr Liang Choon Chun, 16 February 1998

Seminars held January – March 1998

8 Jan Evaluation of Static Soil Properties in Geotechnical Design Practice, Prof Fred H Kulhawy, Cornell University, USA. (Visiting Professor, NUS)
13 Jan From Casagrande’s Calculated Risk to Reliability-Based Design in Foundation Engineering, Cornell University, USA. (Visiting Professor, NUS)
21 Jan Wave-Induced Liquefaction of Sands Beds, Prof H Sekiguchi, Disaster Prevention Research Institute, Kyoto University, Japan.
4 Feb Deep Excavation involving Jet Grouting, Prof S L Lee, National University of Singapore.
9 Feb Resonant Generation of “MUD” Waves by A Surface Water Wave, Dr Feng Wen, University of California, Berkeley, USA.
21 Feb Seismicity of the Southeast Asian region with emphasis on Western Sumatra/Sunda Arc region, Dr Chew Soon Hoe, NUS.

Theoretical Modelling of Far-Field Earthquake Effects, A/Prof Tan Thiam Soon, NUS.

Singapore’s Seismological Network, Mr Lim Tian Kuay, Meteorological Service Singapore.

Lesson Learnt from Field Data to Date, A/Prof Lee Fook Hou, NUS.
Effect of Local Soft Soil Conditions on Seismic Ground Motions – Lessons from Centrifuge Model Tests, Mr Niu Jian Xin, Former Research Scholar, NUS.

Towards a Rational Earthquake Design Framework for Singapore, A/Prof Lee Fook Hou, NUS.

28 Feb Geotechnical Aspects of the Deep Excavation for Immigration Building, Mr Kevin Quan, PWD.

Centrifuge Study of Deep Excavation, A/Prof Jiro Takemura, Tokyo Institute of Technology.

Review of 2-D FEM Analysis of Deep Excavation, A/Prof Tan Thiam Soon, NUS.


19 Mar Analysis of Surges in Sewage Pumping Systems, Prof Cheong Hin Fatt, NUS.

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Editorial Committee: Dr H C Chin (Chairman), A/Prof M A Mansur, Dr J Y Richard Liew and Dr V Thevendran

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