



Volume 6, Issue 3 & 4
July- December 2004

IGS News

A Bulletin of Indian Geotechnical Society, Chennai Chapter

www.igschennai.org

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Geotechnical Calendar

National

- National Conference on 'Geotechnics in Environmental Protection', **9-10 April 2005**, Allahabad Chapter of IGS at Motilal Nehru National Institute of Technology, Allahabad. email for details at rksciv@yahoo.com
- National Conference on Case Studies in Geotechnical Engineering, **25-26 July 2005** at IISc Bangalore. email for details; geopractice@civil.iisc.ernet.in
- Indian Geotechnical Conference - 2005, Indian Geotechnical Society, Ahmedabad & Baroda Chapters, at Nirma Institute of Technology, Ahmedabad during **17-19 December 2005**. E-mail: sandiptrivedi@hotmail.com
- Indian Geotechnical Conference - 2006, Indian Geotechnical Society, Chennai Chapter, at IIT Chennai during **14-16 December 2006**. E-mail: igschennai@igschennai.org

International

- Geo-Frontiers 2005, Geo-Institute of ASCE and Geosynthetic Materials Association, Austin, Texas, USA, **24-26 January 2005**.
- International Conference on Soil Structure Interaction, St Petersburg, Russia, **26-28 May 2005**. E-mail for details mbl@georee.spb.ru URL <http://www.georec.spb.ru/eng/conf/050524>
- Joint International Conference on Landslides Risk Management / 18th Annual Vancouver Geotech Society Symposium, Vancouver, Canada, during **31 May- 4 June, 2005**. E-mail: ohungr@eos.ubc.ca URL <http://www.cgs.ca/2005iclrn>
- 50 years of Pressuremeter Instrumentation Symposium, Paris, France, during **22-24 August 2005**. E-mail: bourganion@mail.enpe.fr
- XVI International Conference on Soil Mechanics and Geotechnical Engineering, ISSMGE and Japan Geotechnical Society, Osaka, Japan, **12-16 September 2005**. E-mail: secretary@icmge2005.org. URL: <http://www.icsmge2005.org>
- V International Conference on Environmental Geotechnics, ISSMGE of British Geotechnical Association, <http://www.gr.cf.ac.uk/5ices>
- 13th ARC will be held in 2007 December at Kolkata.

From the Editor's Desk ... Post Graduate Education in Geotechnical Engineering - Road Ahead

If you ask a civil engineering student doing his final year whether he will be pursuing a post graduate degree in geotechnical engineering, the answer in an overwhelming majority of the cases will be negative. This is true for not only geotechnical engineering but also for post graduate courses in engineering. In science and medicine, post graduate degrees are essential for wider employment opportunities and higher salaries. In engineering, except in teaching, post graduate degrees do not have that status. Actually there is a wide spread impression that only those engineering graduates who are not able to get jobs do join post graduate courses. Very rarely you see a B.Tech from IIT join the post graduate programme in IITs.

Added to this is the vigorous drive from IT companies who are willing to pay very attractive salaries with perks for bright undergraduate students (defined as any student from top engineering institutions in the country) irrespective of their branch.

On the other hand there is an urgent need for post graduate geotechnical engineers as India is just starting its development of its infrastructure. The golden quadrilateral is just the beginning. There will be massive construction activities as India strives to reach and surpass the quality of living standards of USA and Japan. Qualified geotechnical engineers will be needed to tackle the problems of taller and heavier structures founded on weaker soils. More research has to be performed as the new constructions will be in residual soils about which information is scarce. Doctoral research programmes will have to be reoriented towards the field problems encountered in India and their innovative solutions.

Now let us consider the motivating factors for a civil engineering graduate in India.

Higher salaries: In India, there are one to three advance increments for Master's or Ph.D. degrees.

Increased employment potential: The demand for geotechnical engineers is bound to increase in future. The increasing prosperity of the people, need for efficient transportation, increasing demand for drinking water, waste disposal problems, potential for natural disasters and decaying infrastructure all demand geotechnical engineers. Geotechnical engineers have a very important role to play in our quest to improve standard of living.

Challenging work assignments: Undoubtedly geotechnical engineers will deal with challenging problems. They have to be pioneers and innovators as they try to tackle the problems posed by the relatively unknown behaviour of residual soils. Unfortunately the student has a perception that geotechnical engineer merely log borings while the actual design of footing and retaining walls is done by structural engineer.

Academic positions: In India Doctoral programmes are tailored to produce academicians who then conduct basic research. It is still unusual for Ph.D.s in geotechnical engineering to take up positions in industry. The situation is slowly changing; but there is need to accelerate this trend since all Ph.Ds cannot be accommodated in teaching profession.

Then how do we attract bright students to join post graduate programmes in geotechnical engineering?

Recognition of Masters and doctoral degrees in the form of higher starting salaries is necessary to attract graduate students to join graduate courses

Efforts must be made to change the perception that geotechnical engineering is merely soil investigation and reports. Selling geotechnical engineering as a profession to the students should be undertaken on a large scale. Students should be made aware of the role of geotechnical engineers in the design of foundations, pavements and earth structures and in the protection of environment. Students need to be convinced of the technically challenging opportunities if they are to view geo-engineering careers as interesting options.

There is need for a rethink on Doctoral programmes. Emphasis on research alone may not suffice if they have to be usefully employed by the industry and government organizations. The graduates should have a broader engineering perspective and wider range of skills. Courses in ethics, financial management, policy and strategy will be of help to graduates in understanding socio economic implications of large projects.

More attention need be paid to quality teaching. The present practice of evaluation by easily quantifiable items such as number of publications and research projects does not address the teaching competence. Classroom teaching is demanding and time consuming and it should also form part of evaluation process. **O**

IGS Election Results

Major General S.N. Mukherjee is elected President, IGS, for the term 2005-2006. Congratulations to all the elected members.

The National Executive Committee includes two distinguished members from Chennai, Prof. S.R. Gandhi and Prof. S.V. Ramaswamy. We request all the members to approach them with their suggestions for better functioning of IGS. You can contact Prof. S.R. Gandhi at srgandhi@iitm.ac.in and Prof. S.V. Ramaswamy at svrcv@hotmail.com or ramu@md4.vsnl.net.in

IGC - 2004 - Warangal

Annual session of IGS 'Ground Engineering – Emerging Techniques (GREET) was successfully conducted at Warangal by NIT Warangal and IGS Warangal Chapter. About 400 delegates enjoyed the proceedings of 17-19 December 2004. More than twenty delegates were from Chennai, most of them being Chennai Chapter members. Sessions on shallow and deep foundation and the one on professional practice were exceptionally active. Annual General Body meeting of December 17, 2004 was also very lively.

Speakers from Chennai included Prof. K. Ilamparuthi, Ms. Kalaiarasi, Prof. S.R. Gandhi, Prof. A. Boominathan, Dr. V. K. Stalin, Er. Ambazhagn, Dr. Doda Goudar and Er. Darga Kumar.

Prof. K. Ilamparuthi, Chairman, IGS Chennai Chapter and Prof. S.V. Ramaswamy, newly elected IGS executive committee member from Chennai, congratulated IGS Warangal team for their successful effort in conducting the annual session. **O**



Prof. S.V. Ramaswamy, Prof. K.J. Rao, Prof. A.V. Shrof, Mr. Sanjay Gupta, Dr. K.S. Rao, ... At the venue of IGC 2004



Prof. S.R. Gandhi, Prof. Boominathan, Prof. Anand J Puppala, Er. Srinivasa Rao

Snaps from IGC Warangal 2004

A visit to Kakathia Forte - Kalaiarasi, Prof. SR. Gandhi, Dr. K. Ilamparuthi, Er.I.V. Anirudhan, and Er. S. Murugesan



Welcome New Life Members

- 832 Mr. Venkaiah Cowdhary
- 833 Mr. R. Krishnan
- 834 Mr. T. Senthil Murugan

Personal Column

- 1 **Er. K. Rajamani**, (LM-88), Divisional Engineer (Designs), Office of the Chief Engineer (Investigation and Design), Highways Department, Guindy, retired from service on 30.6.2004
- 2 **Prof. S. Narasimha Rao**, (LM-11), retired as Professor, Department of Ocean Engineering, IIT Madras, in July 2004. He is presently Professor Emeritus in the same department and also a Director of Dredging Corporation of India.

Members are requested to write to the society about their activities and other personal achievements. Members may please send their email ID to vidya_ani@vsnl.net for better communication.

Awards Presented During IGC 2004

IGS- AFCONS biennial prize for the best paper on "Case Histories" was awarded to **Prof. K. Ilamparuthi** and **Er. V. Balakumar** for their paper titled 'Settlement Behaviour of Piled Raft – A Case Study' published in the proceedings of IGC 2002.

IGS- Smt. Indra Joshi biennial prize for the best paper was awarded to **Prof. S.R. Gandhi** for his paper titled



'Design and Performance of a 15m deep Excavation for Wagon Tippler' published in the proceedings of 12th ARC, Singapore.

Obituary

We condole the sad demise of Prof. E.C. Chandrasekharan on June 16, 2004.

Prof. Chandrasekharan, who did his Masters from Princeton USA, was Chief Engineer, Highways & Rural Works of Tamil Nadu for ten years. He served as UN expert to Syria & United Arab Emirates and was Professor in Soil Mechanics and Foundation Engineering, College of Engineering, Guindy

Retrofitting BIS Code 2911 - Personal Experience

(A summary of **Terzaghi Lecture** delivered on October 2, 2004 by **Dr. S.V.Ramaswamy** is given below. Details of the function are published elsewhere in the issue)

The lecture described the research and consultancy works of Ramaswamy pertaining to expansive soils in various parts of the world during the past three decades which induced him to persuade the geotechnical fraternity on the need for deleting Table 1 titled "Safe Load for Vertical Bored Cast In Situ Under Reamed Piles In Sandy and Clayey Soils including Black Cotton Soils" in IS Code 2911 on under reamed piles and for including important factors such as depth of zone of moisture content change and uplift resistance and uplift force acting on the pile in the design of underreamed bored piles. The continued efforts resulted in the revision of code incorporating the suggestions. The lecture also stressed the fact that in an era of rapid development of technology, codes may sometimes be a deterrent to the utilization of latest methods since it takes an extraordinarily long time to modify the outdated information in the codes.

At the outset, Ramaswamy cited his experience in Ethiopia during 1997 and 1999 to highlight the importance of moisture equilibrium and climatic conditions on the behaviour of foundations on expansive soils. Though the soil at Addis Ababa was highly expansive (PI about 70), the distress of structures due to swelling of soil is mitigated by the uniform weather conditions, the average temperature being about 20 deg C throughout the year.

He then recalled his experience with structures at Central Institutes of Technology and Technical Teacher Training Institute campuses from 1971. The soil profile consisted of stiff expansive clay 1 to 2 m thick, underlain by 3 to 5 m of soft clay of very low strength which rested on soft rock. The one and two storey buildings constructed during early seventies had footing foundations, based on trial pits of about 1 m depth. Though the danger posed by soft clay underneath was then pointed out, it was not given due attention. A number of buildings in the area showed distress in subsequent years. Initially the problem was analyzed as a bearing capacity failure and later it was realized that the damage may also be due to the swelling and shrinkage of soil. Some of the building damages were also attributed to the influence of vegetation. The present practice is to recommend pile foundations resting on rock in the area. It is to be noted that the transported expansive soil profile found in the area is different from the residual expansive soil profiles described in literature. An underreamed bored pile foundation will not be suitable in the area and will be harmful since the bulb (if at all it can be constructed) will be in soft clay.

He stated that his consultancy work on the failure of machinery due to long term heave of the floor of cotton mill founded on black cotton soil and the study of the damages in one storey buildings due to moisture difference between different parts of the structure during his tenure at Coimbatore during 1975 and 1978 convinced him of the importance of taking into account the heave in the design of foundations on swelling soils.



The assignments and projects done by the students of Ramaswamy during 1981 to 1983 at College of Engineering, Guindy made it evident that the carrying capacity of bored piles in different soils cannot be determined by geometric dimensions of the pile alone as was given in Table 1 in IS code 2911. His suggestions that the Table 1 needed extensive modification did not then evoke much response from his colleagues.

Activities - July - December 2004

ANNUAL TERZAGHI LECTURE 2004

Annual Terzaghi Lecture 2004 was conducted to mark respect to the father of soil mechanics on his birthday October 2, 2004. **Dr. S.V. RAMASWAMY**, Professor of Civil Engineering (Retd.), College of Engineering, Guindy, delivered this year's lecture, "**RETROFITTING IS CODE 2911 - PERSONAL EXPERIENCE.**" **Prof S. Narasimha Rao**, IIT Madras, paid a rich tribute to Terzaghi through his ten minutes power point presentation. **Prof. A. Varadarajan** also spoke on the occasion. **Prof. B. Ramanathan** presented a memento to the speaker. Prof. K. Ilamparuthi, IGS Chennai Chapter Chairman, welcomed the gathering and Er. Anirudhan proposed vote of thanks.

LECTURES

Dr. C.F. LEUNG, Associate Professor, Dept. of Civil Engg., National University of Singapore gave a lecture, "**STUDY OF GEOTECHNICAL FAILURES THROUGH PHYSICAL MODELING**", on September 6, 2004



Prof. SHAMSHER PRAKASH, University of Missouri Rolla, USA, presented a talk on "**GEOTECHNICAL EARTHQUAKE ENGINEERING AND INFRASTRUCTURE DEVELOPMENT**", on November 16, 2004



Extensive field data have been gathered by Jordan Building Research Institute and Building Research Station, UK on moisture content and heave variations with depth during their investigation on damages to buildings in Irbid and Amman due to vegetation. They were available to Ramaswamy during his tenure at Yarmouk University at Jordan from 1983 to 1986. It was evident that the depth of active zone varied from place to place depending on climatic and other environmental conditions. So the length of under reamed bored pile has to vary from place to place since the bulb has to be located below the active zone. Based his experience in Jordan and India Ramaswamy presented a paper in IGC - 86 at New Delhi which evoked a good response. The major conclusions were:



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**Another New Year Unfurls
holding within it the promise of a fresh start
The year 2005**



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Growth of Geotechnical Wisdom

Continued from page 3 Retrofitting IS 2911

Under reamed pile should be used with great care in coastal expansive soils. They should be designed to resist uplift forces caused by expansive soil in the active zone and the downward loads imposed by the structure. The contribution of the expansive soil in the zone of water content change should be ignored in both the cases. They should be extended into the non-expansive zone for generating sufficient resistance against uplift and vertical downward loads.

After his return to India, Ramaswamy had further interaction with the geotechnical fraternity and presented a paper at IGC - 91 at Surat, "A Review of IS Code on Under Reamed Piles". The major conclusions were:

Appropriate sections regarding suitable soil profiles, estimation of depth of active zone, determination of uplift force acting on the pile and of uplift resistance of the pile, limitation of field testing and calculation of carrying capacity have to be included in the IS Code 2911 and that Table 1 giving the carrying capacity of the piles is to be entirely deleted.



IGC 2006 at Chennai
IGC 2006 will be held at Chennai during 14-16 December 2006. Prof. K. Ilamparuthi, Chairman, Chennai Chapter, made a presentation of the preliminary steps taken towards organisation of IGC 2006.

By this time a number of consultants and field engineers were demanding revision of the code. Bureau of Indian Standards, after heated

and prolonged discussions, entrusted to Indian Geotechnical Society, Chennai Chapter the responsibility of installing, testing and exhuming an under reamed bored pile in sandy soil. The programme was conducted at Thiruvanniyur, Chennai during July - August 1992, in the presence of a large number of engineers from all over India. It was found that the bulb was not properly formed in the exhumed pile and that the pile was able to carry the load given by the Table 1 for the given dimensions by skin friction alone. After due deliberations, the committee recommended that the Table 1 should be deleted and that under reamed bored piles should not be installed in sands. These recommendations and other suggestions regarding length of pile, depth of active zone etc have been incorporated in the revised code. **0**

"Soil Mechanics arrived at the borderline between science and art. I use the term "art" to indicate mental processes leading to satisfactory results without the assistance of step-for-step logical reasoning...To acquire competence in the field of earthwork engineering one must live with the soil. One must love it and observe its performance not only in the laboratory but also in the field, to become familiar with those of its manifold properties that are not disclosed by boring records..."

Karl Terzaghi 1957

Dr. S.V. Ramaswamy receives a memento from **Dr. B. Ramanathan** after delivering Terzaghi Lecture 2004, on 2.10.2004

Prof. A. Vardarajan and **Prof. S. Narasimha Rao** speaking on the occasion of Terzaghi Lecture 2004



IGS Chennai Chapter wishes its Members and families a prosperous New year and A Happy Pongal

