IGS CET STUDENTS CHAPTER
College of Engineering Trivandrum

ANNUAL REPORT

FY 2017-2018

The activity summary of IGS CET Students Chapter during the academic year of 2017-2018

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INTRODUCTION

The Indian National Society of Soil Mechanics and Foundation Engineering established in 1948. In 1970 the name Indian Geotechnical Society (IGS) was adopted. The society is affiliated to International Society from its inception. The First chapter in Kerala was formed in the year 2009. To promote closer interaction amongst geotechnical engineers spread all over the country, local chapters of the Society were introduced in 1968. IGS Thiruvananthapuram chapter is functioning under the leadership of chairman Dr. Krishnan Balan and Hon. Secretary Dr. N. Unnikrishnan.

In order to motivate students to give exposure to careers and opportunities in this area and also develop leadership skills among students which will help them in their career. Student chapters provide an opportunity for Bachelor Degree students of 2nd, 3rd and 4th year in Civil Engineering and Master's Degree students of Geotechnical Engineering program. Activities such as seminars/workshops/lectures conducted by student chapters under the guidance of faculty coordinators from the Institutions/colleges and the members of local chapters will significantly help the student community.

Thus students' chapters under IGS Thiruvananthapuram have been inaugurated officially on the 2nd Biennial Commemorative lecture in memory of Prof. T.S. Ramanatha Ayyar on 17.02.2018 The IGS-CET students chapter has the following key personnel,

- Dr. Bindu J - Mentor
- Dr. Sheela Evangeline Y - Mentor
- Ms. Linu Elizabeth Peter - President
- Mr. Tharun Thilak - Vice-president
- Mr. Manu K Sajan - Secretary
- Mr. Jibin Paily – Treasure

Field study at Life Science Park

The first activity which was organized under IGS-CET students chapter was the field visit to Life Science Park. The construction works are at its initial stages at the Bio 360, Kerala's first Life Science Park. The field study was intended to get familiarized with the soil exploration activities at the different locations of the site. The park will be of a cluster of research institutions, sci-tech academia and companies, working in the field of Biotechnology, Nano-technology and Life sciences. As there were multistoried buildings of larger built-up areas were going to be constructed a detailed soil exploration was necessary to study about the soil strata. The visit was guided by Dr. Arvee Sujil Johnson.

Soil exploration by standard penetration test the method of exploring undisturbed samples using split spoon sampler was clearly explained and demonstrated during the field visit. Furthermore, there had been a detailed study on conducting plate load test. Plate load test is done at site to determine the ultimate bearing capacity of the soil and settlement of the foundation under the loads for clayey and sandy soils. Thus this test will help in selection and design for foundation. To calculate the safe bearing capacity suitable factor of safety is applied. The procedure for plate load test includes a pit excavated in the ground at which the foundation is to be laid. The excavation depth was same as that of the proposed foundation depth. At the center of the excavated pit steel plate with "D_p" thickness was placed after removing the soil for the plate thickness. Then load was applied on the plate using hydraulic jack with reaction beam set up. Dial gauges were arranged at the bottom to record the settlement values at different time intervals as per standard procedure. The observations are made until the total settlement of 25mm has occurred. Some of the photographs taken during the field study is given below,


DIA OF TEST PILE
800mm
SAFE LOAD:165 MT
TEST LOAD:412.5 MT


TYPE KO8
0.01-25 mm
BAKER

Site visit to Municipality Landfill

The second field visit which was organized under IGS-CET students chapter was to the Municipality solid waste landfill at Attingal in Thiruvananthapuram. The Attingal municipality has made several strides in implementing waste management programs. In this sanitary landfill, waste is deposited in thin layers in a protected pit and compressed using machinery. Several layers of waste are placed inside and then compacted on top of each other to form a refuse cell. Finally, the refuse cell will be covered with thick soil. The visit was guided by Dr. Sheela Evangeline Y, Dr. Ajitha B Bhaskar and Dr. Bindu J.

The landfill is one of the crucial components in scientific solid waste management. As per Solid Waste Management Rules, all civic bodies should have a landfill under their command to dispose of non-biodegradable waste. Attingal generates close to 15 tonnes of waste a day of which five to six tonnes is non-biodegradable. The bottom of the landfill has a clay base over which the polythene sheets are placed to minimize the environmental impacts through seepage. As the garbage decomposes, gas would be generated which would be tapped through pipes and used as fuel. The landfill is also provided with a pipe for collection of leachate, gas monitoring system, and surface drainage system. A major part of the waste would decompose as days passed. Some of the photographs taken during the site visit is given below,

2nd Biennial Commemorative lecture in memory of Prof. T .S. Ramanatha Ayyar

Prof. T. S. Ramanatha Ayyar was born on 8th October 1932 in Nagarcoil in Tamil Nadu. He obtained his B.Sc. (Eng.) in Civil Engineering with First Rank in all years from College of Engineering Trivandrum in the year 1953 and M.Sc. (Eng.) from College of Engineering Guindy in the year 1959 with first rank among all branches. He completed his Ph.D. in the year 1967 from University of Roorkee. He was the first person to complete Ph.D. in two years in the country and that was the first Ph.D. conferment in Geotechnical Engineering in the Country. He joined the Technical Education Department of Kerala as a lecturer in Civil Engineering in the year 1955 and adorned positions such as Professor, Principal, Joint Director and Director of Technical Education. Subsequently he served as Emeritus Professor in IIT Madras in the year 1988 and continued up to 1992. When he was offered the same, for the first time in the history, UGC/AICTE allowed him to choose the institute among IIT Bombay, IISc Bangalore and IIT Madras. He was a post-doctoral fellow of the Norwegian Geotechnical Institute during 1971-72. During the stay, he worked with Dr. Laurits Bejerrum, the famous researcher consultant in Geotechnical Engineering. He was a visiting professor in University of Zambia and Bayers University, Kano. He again blessed the College of Engineering Trivandrum with treasure of knowledge by accepting position as Emeritus Professor during 1998-2000. He has contributed immensely in the study of Physico Chemical Behavior of Soft Clays and also in the study of Laterite formations. Prof. TSR was a great visionary who initiated the industrial consultancy activities of the CET. Presently CET has grown in to a formidable force in providing consultancy services in the country. As a consultant and guru, he always upheld the principles of ethics which his disciples are carrying forward. He has served as a consultant to several industries and departments throughout his life. He has authored books that are unique to the domain of Geotechnical Engineering and has contributed several research publications in the international levels. For the deep knowledge of the subject and the carefree dissemination of the same, the geotechnical fraternity considers him not just as the Geotechnical Guru but as the Geotechnical God. Indian Geotechnical Society Thiruvananthapuram Chapter organized TSR biennial lecture in his fond memory. Some of the photographs taken during the event are given below,


RETIRED
FACULTY


RESERVED

ASCENDIO quiz competition

Ascendio 2018 was the first edition of the annual Civil Engineering Quiz Competition was conducted by the student chapter of Indian Geotechnical Society at College of Engineering Trivandrum on 5th of April 2018. Students from different engineering colleges in Trivandrum have participated in the quiz event. All the participants showcased their talent on a day full of exhilarating questions and the winner took home the coveted "Visvesvaraya Ever Rolling Trophy". The theme for the inaugural edition of Ascendio was *"Engineering the future we want.* Think box was kept for all those who attended the function to share their transformative ideas and win a prize money of one thousand rupees.

A maximum of four teams were allowed from each college with each team comprising of two members. Six numbers of quiz finalists were selected from the preliminary written test with twenty-five questions in a time frame of thirty minutes.

The first prize winners were from Rajadhani Institute of Science & Technology, who grabbed the sum of five thousand rupees and the prestigious Visvesvaraya Ever Rolling Trophy. College of Engineering Trivandrum won the second place with a cash prize of two thousand rupees.

The event was sponsored by Thiruvananthapuram District Mercantile Co-operative Society Limited in association with CIVILIANZ. The event was organized under the guidance of technical advisors Dr. Ajitha B Bhaskar, Dr. Bindu J and Dr. Sheela Evangeline Y. The event had become a great success and the efforts put forward by the leading personalities Ms. Linu Elizabeth Peter (President IGS- CET Students Chapter) and Mr. Tharun Thilak (Vice- President IGS-CET Students Chapter) were specially mentioned in the IGS Thiruvananthapuram executive committee meeting. A few photographs of the event are given below,


ASCENDIO 2K18


EXIT
ASCENDIO 2K18

Talk on Geosynthetics

An informative talk session had been conducted on Geosynthetics by veterans Mr. M. Venkataraman (Vice President – Indian Chapter of International Geosynthetics Society) and Dr. G. Venkatappa Rao. (former president - Indian Chapter of International Geosynthetics Society). Mr. Venkataraman obtained B. Tech – Civil Engineering in 1969 and obtained M. Tech – Soil Mechanics and Foundation from IIT, Madras in 1971.

Dr. G.V. Rao has a distinguished career of over three decades (1975 – 2007) at the Indian Institute of Technology, Delhi. during which he served as Head, Civil Engineering Department and Dean (Student Affairs). He guided 24 Ph.D.'s and over 100 M.Tech. Theses, while authoring over 200 research papers, many of which have won awards for Best Theses and Best Papers internationally.

The talk focused on the use of geotextiles and the related products in civil engineering applications in India. The talk also highlighted the fundamental functions and applications of geosynthetics. Geosynthetics are synthetic products used stabilize terrain. They are generally polymeric products used to solve civil engineering problems This includes geotextiles, geogrids, geonets, geomembranes, geosynthetics clay liners, geofoam, geocell and geo composites. The polymeric nature of the products makes them suitable for use in the ground where high levels of durability are required. They can also be used in exposed applications.

Geosynthetics are available in wide range of applications and are currently used in mainly civil, geotechnical, transportation, geo environmental, hydraulics and other such fields. The primary functions of geosynthetics such as separation, reinforcement, filtration, drainage and containment were described elaborately in the session. Furthermore, the samples of wide varieties of geosynthetics were demonstrated. The session was conducted in two days.

Site visit to NCRMI

A two-day site visit had been conducted to the National Coir Research and Management Institute (NCRMI) during the summer vacations in the year 2018. The program had provided exposure to the ongoing research facilities in the field of coir geotextiles. Coir is the fiber obtained from the husk of coconut is one of the strongest natural fibers. When reinforced additives coir enables the production of various types of permeable fabric which when used in association with the soil have the ability to separate, filter, reinforce, stabilize, protect or drain. These textiles could be woven as well as non- woven. Coir geotextiles can be effectively employed as an environment friendly mulching material for various vegetable as well as perennial crops. The method of application depends on the design and construction. However, there are some steps that many constructions have in common. When constructing a bank, wind erosion control measures or slope where natural vegetation will grow.

Cellular confinement systems add the third dimension to geosynthetics, which open up more avenues of applications, ranging from providing strength to geosystems, to protection against erosion. Agri-coir cells are excellent for erosion control and vegetation establishment on steep slopes devoid of top soil. Once placed and secured on slope, the geocell can be filled with soil.

Mulching is the technique of safe guarding crops from weed growth. Most of the traditional mulching technique include synthetic materials like polythene which are not eco-friendly. Coir geotextile stands to benefit the soil as it is organic and does not create any environmental hazards. There are no organic materials to restrict the growth of weeds which grow fast amidst agricultural crops other than geotextiles. Enveloping soil with polythene sheets for the purpose ultimately becomes a threat to soil and environment. The photographs that describes the aforementioned materials and their applications are given below.

Laying of coir geotextile

Comparison of Agri-coir geocell and control plots

Coir Geocell

Brinjal is cultivated in the geocell

Mulching done at the site of NCRMI

Field study on slope stabilization work

A field study has been conducted at the National Highway construction site where the geotechnical company Maccaferri was executing the slope stabilization works using soil nailing method. Soil nailing is a construction remedial measure to treat unstable natural soil slopes or as a construction technique that allows the safe over-steepening of new or existing soil slopes. The technique involves the insertion of relatively slender reinforcing elements into the slope – often general purpose reinforcing bars (rebar) although proprietary solid or hollow-system bars are also available. Solid bars are usually installed into pre-drilled holes and then grouted into place using a separate grout line, whereas hollow bars may be drilled and grouted simultaneously by the use of a sacrificial drill bit and by pumping grout down the hollow bar as drilling progresses. Kinetic methods of firing relatively short bars into soil slopes have also been developed. Bars installed using drilling techniques are usually fully grouted and installed at a slight downward inclination with bars installed at regularly spaced points across the slope face. A rigid facing (often pneumatically applied concrete, otherwise known as shotcrete) or isolated soil nail head plates may be used at the surface.

With the design complete, construction is the next step. Most soil nail wall construction follows a specific procedure. First a cut is excavated and temporary bracing is put in place if necessary. This is done with conventional earth moving equipment and hydraulic drills. Next, holes for the soil nails are drilled at predetermined locations as specified by the design engineer. The equipment used for this step is dependent on the stability of the material in which the soil nail wall is supporting. Rotary or rotary percussive methods using air flush or dry auger methods can be used with stable ground. For unstable ground, single tube and duplex rotary methods with air and water flush or hollow stem auger methods are used. With the holes drilled, the next step is to install and grout the nails into place. After all nails are inserted, a drainage system is put into place. Bearing plates are installed before a final facing is put in place to complete the soil nail wall. A layer of thickly grown grass is being seeded on the final surface. The photographs of the site visit are given below.

Workshop on designing with geosynthetics

A three days' workshop session was conducted on designing with geosynthetics in association with IGS CET Students chapter. The workshop was focused on the concept of mitigation of the impacts due to the devastating flood in Kerala. Various issues have been raised by different departments and a solution to these issues were put forward by a panel of experts who were experts in the field solutions to geotechnical problems.

The Summer monsoon rains began to fall in Kerala last May. In the months following, storm after storm brought 2.4 meters of rain to the state in just 87 days. The highland areas like Idukki lies within the Western Ghats, a mountain range draped with tropical forests that stretches along the west coast of India. The heavy rain from the monsoon had saturated hillsides of the Ghats during the summer months, triggering more than 1,000 landslides according to initial reports that the government received. Those estimates indicated that in Idukki alone, the slides buried 161 structures and damaged roughly another 2,000. The natural cause of the landslides was the simple reality of steep terrain being bombarded with too much water. When the torrential rain bore down on the slopes of the Western Ghats, the water percolated under the surface of the soil and tried to flow downhill. In certain areas, subsurface "pipes" formed, carving water channels under the soil. These pipes either quickly drained subsurface water, destabilizing hillslopes, or became clogged, creating a backlog of water that grew larger and larger until the entire slope gave way.

The top leading geosynthetics manufactures and implementers have presented various solutions that could be more economical and feasible solution in reconstructing the landslide areas without much disturbances to the nearby structures. The photographs of the event are given below.

Field study on soil strengthening by geogrids

The field study was conducted for getting familiarized with the procedures involved in laying geogrids for soil stabilization. The location chosen was at the extension works being conducted on NH 66 bypass at Muttathra junction flyover construction. The design of the geogrids were such that the geogrids were laid at different heights in different lengths. After laying each layer of geogrid the soil is compacted using 10-ton single drum roller. The soil used for the filling was imported from the nearby site which was then sieved to required gradation before compacting. The field density tests were conducted at regular intervals for verifying whether the compacted density at the site has achieved a least of 96% of the MDD value. The main function of Geogrids is reinforcement. Depending on the application under consideration, Reinforcement could either be uniaxial (strength in one direction) or biaxial (strength in all directions). With geogrids the amount of usable land on a site is increased because it enables construction of steep slopes or walls, enabling construction of a road over poor ground conditions or decreasing the thickness of fill required to construct a road. The manufacturing process produces a hexagonal geogrid structure consisting of high strength junctions and stiff ribs forming equilateral triangular apertures. The ribs present a thick square leading edge to the aggregate, which allows the geogrid ribs to get a good grip on the aggregate particles beneath, resulting in an extremely effective mechanical interlock. This ultra-efficient interlock helps to control lateral movement and dilation of aggregate particles, so that a highly effective angle of shearing resistance is achieved. This effect is also referred to as confinement because interlock efficiently confines and restrains the aggregate particles. Some of the photographs taken during the field study are given below.

Carrier guidance

The objective of interactive session was to provide an overview about how to grab PhD scholarships in top institutes. The experiences of the speakers who were alumnus of CET made it clear to the students that with a dedicated mind every dream could come true. Some key points shared by the speakers includes the ways to get into IITs for PhD. Forms for Ph.D. in IITs are available two times in a year. One is winter session and another is summer. Form filling starts from October-November for winter admission and from March-April for summer. If we talk about crowd, then it is high during summer because number of students clearing their Masters in corresponding field is higher during that period as compared to winter. Lesser people apply for admission during winter time. Having a good GATE score card also helps you a lot in admission but not necessary always. Different IITs have different criteria's. Some require 60% in Masters and some 65% but overall it doesn't go over 65%. They have certain% criteria in bachelor's degree also. Most of the IITs now a days conduct written exam first followed by interview. Sometimes it includes presentation as well. And final list is prepared based on all percentage, written, interviews and any other criteria's. If you have any good proposal, then you can contact with a professor who you want as your guide. The speaker also shared her views on the topic "women in geotechnical engineering" which showcases the hurdles that have to be faced by women form conservative family backgrounds to achieve their dreams. Some of the photographs taken are given below.


IGC-2018
DIVYA P.V.
ASSISTANT PROFESSOR
GEOTECHNICAL ENGINEERING
IIT PALAKKAD


SHARP
Notevision

Motivational talk by Krish Dhanam

In many ways, Krish Dhanam is the epitome of the American Dream. A native of India, he arrived in the United States with nine dollars in his pocket and a vision of promise in his heart. In a practical and informative way, Krish showcases how the American Dream is still alive and well. He tackles the issues of faith, freedom, discipline, dignity, pride, possibility, work ethic and relationships with word pictures that will resonate with readers long after they put this book down. The advice Krish offers will stir you to the foundation of your belief in this great and awesome land. Krish Dhanam was born in the coastal town of Vizag, in Andhra Pradesh, India. In 1984 he finished his MBA at the Institute of Management Technology and migrated to the United States in 1986. The road Krish Dhanam took to becoming one of the most dynamic speakers in America began in southeast India with the dream of moving to America. He arrived in New York City in 1986 with nine dollars in his pocket and a burning desire to achieve the levels of success he'd seen in the American-made movies he viewed as a child.

He is the author of The American Dream from an Indian Heart, From Abstracts to Absolutes and contributing author to the book Top Performance written by Zig Ziglar. His latest book Hard Headed Soft Hearted co-authored with Rick Belluzzo (former President of Microsoft) is being used as culture-transformation curriculum globally.

Throughout the session he emphasized that much has been written about the psychology of achievement and still more about the need to motivate oneself. He also pointed out that in the world today everyone believes that success or failure can be determined the effort we put out and the results we want. The opinions and suggestions outlined in the session were aiming to give a survivalist instinct to anyone who wants to achieve excitement, success, enthusiasm and a powerful work ethic. In a nutshell the talk had encouraged everyone to take the canvas of hope and the brush of a glorious vision and paint their own portrait of excellence. Some of the captured moments between the session are included below.

Conclusion

The activities conducted by IGS-CET Students Chapter during the academic year of 2017-2018 has been included in this report. The key personnel organizing all the aforementioned activities have done a remarkable job. While there was much to celebrate in this year the chapter focuses to address the challenges and opportunities that come forth in organizing on various activities to facilitate wider reach for the objectives of IGS.