



ISEG NEWS

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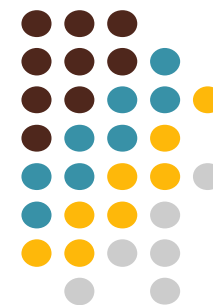
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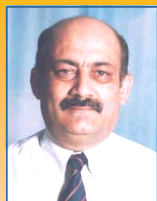
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EDITORIAL



Dear Members,

At the outset let me convey our heartfelt sympathies to the people of Nepal and neighboring states in India where considerable loss of life and property has taken place due to the earthquake on 25th April 2015 and again on 12th May 2015 as we were going to press. In this issue, we have an exclusive article on this subject from Dr. Prabhas Pandey, Addl. D.G. (Retd) GSI a well

known expert in this field. Additionally we have compiled information from various sources including IAEG regarding engineering geological aspects of the earthquake. We also have an interesting article about reservoir rim stability together with regular features and election notification for new body (2016-17). The Secretary has also updated the list of members of ISEG which is placed in this issue.

Another important subject being debated currently is how to conserve our environment in the backdrop of heavy energy demand. Way back in 1980s a paper was published in Bulletin of Engineering Geology and Environment "Who is winning?" where the author dealt with environmental issues. In the end he said "nobody". Well if you want one word answer, this is it.

.....Continued on Page 2

MESSAGE FROM SECRETARY



Dear Members,

Indian Society of Engineering Geology has been in service of nation by study of earthquakes besides Engineering Geology, Geotechniques and other natural hazards. Geoscientific studies of natural hazards are undertaken with a view to minimize losses caused by them. Notwithstanding that earthquakes can neither be prevented nor predicted, study of geological information and data both for the source region and site of interest will help their effects minimized to surmount the disastrous effects. In the process,

study of active faults (study of source region) and seismic microzonation (site of interest) of urban agglomerations in various geological domains of the country need prioritisation. Active Fault Mapping including seismotectonic assessment of some inter plate and intra plate faults underscores the relevance of studying the nature of source region of earthquakes. Behaviour of the fault and its recurrence interval provide crucial clues for understanding perspective scenario. Seismic microzonation is subdividing an area prone to earthquake hazard, into micro zones, which would

supposedly behave in a similar way in case of impending earthquake. Urban planning and building rules may be guided by the results of seismic micro zones for a safer society. When the state of Uttarakhand was struck by a natural disaster like landslides, ISEG took a lead and conducted a Workshop focussed on the subject. Similarly, as Nepal and a few parts of India were affected by the Major earthquake on 25th April, 2015, ISEG would do its bit by organising focussed studies in this regard very soon.

.....Continued on Page 3



www.egnmindia2015.org

LAST DATE FOR FULL PAPER SUBMISSION:
JUNE 30, 2015



BIANNUAL HIGHLIGHTS

November 2014 to April 2015

1. ISEG organized Geotechnical Orientation Program-2014 at Dehradun between 10th to 13th November 2014. Dr V. K. Sharma, Director, GSI, Dehradun was the Course-Coordinator for the above program.
2. The first meeting of the Executive Committee of International Conference on "Engineering Geology in New Millennium" (EGNM-2015) was conducted by ISEG under the Chairmanship of Shri R.N. Mishra, CMD, SJVNL and Convener, Executive Committee, EGNM at the office of SJVN Ltd, Saket, New Delhi on 10th February, 2015. The meeting took stock of the progress made on various front of organizing EGNM. Representatives from event manager for EGNM were also present.
3. ISEG conducted Second Executive Committee (Organizing Committee) meeting of EGNM-2015 on 25th April, 2015 at SJVNL office, Saket, New Delhi under the Chairmanship of Dr Gopal Dhawan, President, ISEG and Chairman of Organising Committee, EGNM-2015. Shri R. N. Mishra, CMD, SJVNL & Convener, Executive Committee, Shri Y. Deva, Vice President-Asia, IAEG & Co-Chair and Shri M. Raju, Organising Secretary of EGNM-2015 evaluated the progress of various committees of EGNM and desired all committee members should rededicate themselves and leave no stone unturned for the successful organization of the International Conference. Representatives of M&M, the Event Management company were also present.

4TH INTERNATIONAL SYMPOSIUM ON MEGA EARTHQUAKE INDUCED GEO-DISASTERS AND LONG TERM EFFECTS AT CHENDU, CHINA

Y. Deva
Vice President,
IAEG (Asia)

The State Key Laboratory of Geohazard Prevention and Geoenvironment Protection (SKLGP), Chengdu University of Technology and the China National Group of IAEG conducted their biennial 3-day International Symposium at SKLGP complex in Chengdu, China with 2-day post-symposium field excursions. The discussions revolved round advances in geo-hazard analysis, risk assessment and mapping; initiation and evolution mechanisms of geohazards; the disaster chain effects; evaluation

evaluation and control of geohazards (mitigation, prevention and protection strategies), geohazards and society (processes and impacts).

Amongst others, the inauguration was graced by Mr Zhiping Luo, Deputy Secretary-General of Sichuan Provincial People's Government and Mr Dong Liu, Director of Science & Technology Department of Sichuan Province.

.....Continued on Page 05

EDITORIAL

(Continued From Page 1)

We all know that energy demand is directly proportional to population growth as well as development and any system or market would look towards alternative forms of energy if the same is not available from one source. Whatever the reasons may be, right now hydro power has taken a back seat in power development scenario. The hydro development has seen a lot of activity in previous years but the technology in project development could have been more advanced by now. For a specific country or a region, various factors may play a role as to which form of energy causes least impact to the environment. One reason why hydro electric power projects have slowed down is due to their size which appears to be huge and has consequential environmental impacts. However, in a river valley scheme EIA can be done and environmental impact minimized or ameliorative measures taken. In other forms of energy development this may not be true actually. For example, power shortages in the country are leading to uncontrolled use of battery operated backups which are popularly called as inverters or diesel generating sets which are both smaller in size and do not attract attention. Nevertheless if their numbers are added and an assessment is done regarding their toxic waste disposal mechanism the overall environmental impacts shall be more clear. It would be interesting to have a study on these aspects also. Therefore, planned development of sources which are having minimal environmental impacts is the need of the hour.

Preparations for EGNM are in full swing. We have already sent 224 acceptance letters to prospective authors. The Chairman of the OC Dr Gopal Dhawan, CMD, MECL, Co-Chairman Shri Y. Deva and Organizing Secretary Shri M. Raju are leaving no stone unturned in making the program a success.

The encouragement and support given by Convener of Executive Committee Shri R.N. Mishra CMD, SJVNL is praiseworthy and will go a long way in making the conference a success. Recently the core team of EGNM had a meeting with Shri A.K. Pujari Secretary Mines, GoI. Shri Pujari who is also Chairman, Advisory Committee for EGNM gave valuable advice and encouragement for the event. We are getting full support from International Association of Engineering Geology also who are sponsors for the event.

As convener of Editorial Committee, I request all the authors to send their full papers by June 30th 2015 to make the event memorable. All are requested to visit our website www.egnmindia2015.org and see the updates.

I end with prayers for people affected by the earthquake. Our thoughts are with them.

With kind regards



Imran Sayeed
Editor



MESSAGE FROM SECRETARY (Continued From Page 1)

As all of you know that we are fast heading towards ISEG's Golden Jubilee Celebrations and as a part of it, the ensuing International Conference in Engineering Geology (EGNM), is scheduled on 27-29 October, 2015, at IIT Delhi, New Delhi. As a part of preparations to EGNM, we have developed an exclusive website for the International Conference www.egnmindia2015.org open to public with all updated and related information of EGNM, having a facility to submit Abstracts, Papers and Registrations online. Further, we have also revamped the existing webpage www.isegindia.org for its effective interaction with people. ISEG also developed an exclusive website www.joegindia.org for ISEG's Journal of Engineering Geology, which is linked to the main website of the ISEG. The exclusive website of Journal of Engineering Geology has facility for sending papers directly and have connections to editing and to other peer reviewers. ISEG News, which is a biannual Newsletter, ISEG's Journal of Engineering Geology, which is also biannual, were also revamped to meet the Golden Jubilee celebration of the Society. ISEG released two Circulars on the Conference and a Brochure for Sponsorships, inviting sponsorships, advertisements and other commercial related aspects. ISEG finalised Event Management Group, "Meetings and More", Gurgaon to conduct the event and to facilitate organising other related issues.

We intend to organise the International event under overall guidance of an Advisory body and accordingly, constituted an Advisory Council for the EGNM under the Chairmanship of Shri Anup K. Pujari, Secretary, MoM, Gol, with about 23 Members of very senior level managers and administrators associated with various organisations in the country, with their due consent. Further, ISEG also constituted its own Organising Committee constituting various dignitaries from different fields to organise the event. Though the Members of the Organising Committee are stationed at various places of the country, they are in touch with each other regularly through mails and formal meetings of the Committee were also conducted at Nagpur, Kolkata and New Delhi to discuss various issues in organising the Conference.

ISEG, which is a National Group of International Association for Engineering Geology and the Environment (IAEG), could obtain the consent of IAEG to sponsor the event. Further, IAEG has also agreed to organise their Executive meeting and annual Council meeting at the same venue, coinciding with the EGNM. It will help to enhance participation of a good number of foreign participants and experts in the discipline to join the Conference, which will certainly help to elevate importance of the Conference. The other main sponsors of the event could be Geological Survey of India, Mineral Exploration Corporation Ltd., SJVN Ltd., Mangdechhu Hydroelectric Project Authority, Thimpu, Bhutan, Jaiprakash Associates limited, Mangdechhu HE Project, Bhutan and NTPC. As the offer to sponsor the event is open, many others are expected to join the event very soon. As we propose big budget for the event and as the commitments obtained so far are very meager, it should be our sincere endeavour to garner adequate funds to meet the requirement.

On our invitation to Abstracts for EGNM, about 200 Abstracts were received, which were scrutinized by our Editorial Board, consisting of a panel of experts and conveyed their consent with required suggestions and they are now under the process of submitting full papers. The last date for submission of full papers is scheduled on 30th June, 2015. Keynote speakers / Invited lectures were identified from national and international experts and special requests were sent to them for their participation. On receiving their consent, about 24 Keynote speakers / Invited lectures were finalised, who will present their addresses during prime time of the Conference. It is proposed to bring out hard copy of publication of the Conference as priced volume. However, soft copy of the volume will be given to all participants of the Conference. It is proposed to bring out a Special Volume, to commemorate Golden Jubilee of the ISEG, which will highlight history and various anecdotes in the development of ISEG. Dignitaries, especially veterans associated with the ISEG since long, have been identified and requested them to contribute to this volume. It is also proposed to bring out a Souvenir during the Conference, which will accommodate advertisements, a few articles etc.

It is proposed that as a sequel to the Conference, Technical Excursions will follow in subsequent days of the Conference at an extra expense. Two such sites were identified, (i) Nathpa-Jhakri Hydroelectric Project, Rampur, Himachal Pradesh and (ii) Tehri Hydroelectric Project, Uttarakhand. Visits to both the projects will be organised simultaneously, so that the participants can choose and attend only one project. Excursion Guides were prepared for both the projects and posted in EGNM website.

And now, as the term of the present Council of ISEG comes to an end in December, 2015, nominations for the next Council (Term 2016-2017) are invited in the prescribed format along with supporting documents of the Nominee. A tentative time table is also proposed for electing the next Council of ISEG. All Members are requested to participate in electing the new Council and help to function the Council in a democratic way.

Yours sincerely,



(M. RAJU)

Secretary, ISEG.



LIST OF IAEG MEMBERS-2015

WITH BULLETIN

Sn	Name of ISEG member	Member-ship No
1	Sh. H.M. Dayal	LM-242
2	Dr. Gopal Dhawan	LM-340
3	Sh. Yogendra Deva	LM-201
4	Sh. M. J. Ahmed	LM-207
5	Sh. M. Raju	LM-664
6	Sh. R. N. Misra	LM-1349
7	Sh. Imran Sayeed	LM-1115
8	Sh. N.K. Mathur	LM-1112
9	Sh. Ashok Kumar	LM-831
10	Sh. K. Ravindra Nath	LM-919
11	Sh. A.K. Relan	LM-280
12	Sh. S. K. Kar	LM-1104
13	Dr. Saibal Ghosh	LM-1341
14	Sh. N. Gopalakrishnan	LM-1244
15	Sh. Rahul Khanna	LM-1296
16	Sh. Arindom Chakraborty	LM-1269
17	Sh. A.P. Dhurandhar	LM-1018
18	Sh. Niroj Kumar Sarkar	LM-1387
19	Dr. Arindom Basu	LM-1342
20	Sh. L. Gopi Kannan	LM-1271
21	Sh. Saikat Pal	LM-1236
22	Sh. D.S. Bist	LM-1377
23	Sh. Rajnish Ranjan	LM-1314
24	Sh. Vivek Sharma	LM-1370
25	Sh. Priya Darshan Singh	LM-1300
26	Dr. Pranay Vikram Singh	LM-1391
27	Sh. Venugopal K.	LM-1401
28	Dr. Sumit Dabral	LM-1369
29	Sh. Girish C. Kalita	LM-1313
30	Sh. N.K. Ojha	LM-1366
31	Sh. Amitabh Sharan	LM-1360

WITHOUT BULLETIN

1	Dr. Prabhas Pandey	LM-112
2	Sh. V.K. Gupta	LM-1076
3	Dr. Manoj Verman	LM-852
4	Sh. Prashant Mishra	LM-1179
5	Dr. Y.P. Sharda	LM-144
6	Sh. U.V. Hegde	LM-343
7	Sh. P.K. Gupta	LM-1113
8	Sh. D.C. Tripathi	LM-1266
9	Sh. S. Kannan	LM-1125
10	Sh. Bhuvnesh Kumar	LM-1121
11	Sh. V.K. Kaslival	LM-79
12	Sh. A. Bishwapriya	LM-1279
13	Sh. Jaydip Mukherjee	LM-1324
14	Sh. Shakti Prakash	LM-1359
15	Sh. Rahul Anant Joshi	LM-1364

Intelligence is the ability to adapt to change.

Stephen Hawking



ISEG ORGANISES GEOTECHNICAL ORIENTATION PROGRAMME (GOP)- 2014 AT DEHRADUN

Dr. V.K. Sharma
Director, GSI, Dehradun
Course Coordinator, GOP-2014



Photograph 1 : Inauguration function of GOP-2014

Geotechnical Orientation Programme, an initiative of Indian Society of Engineering Geology was organised at Dehra Dun (Uttarakhand) during 10th to 13th November 2014 aiming to impart basic knowledge of common geotechnical aspects to young professionals engaged in engineering geological/ geotechnical and civil engineering works. This short orientation course conducted by the society in 'Doon Valley' for the first time elicited good response and was attended by 24 working professionals from different Public Sector organizations viz. Singareni Collieries, Kothagudem (Telangana State); Chenab Valley Power Projects (CVPP); Jammu, Sutlej Jal Vidyut Nigam Ltd (SJVN), Shimla; National Thermal Power Corporation, Noida; Tehri Hydro Development Corporation, Rishikesh and NEEPCO, Shillong; engaged in the fields of power and infrastructure development. The Society, in an attempt to dissipate information presented a book on '*Hydropower for common understanding*' by Sh. S. C. Mittal, published by M.R. Foundation, Gurgaon and 'A field guide book' to each participant.

The inauguration of the programme was held on 10th November 2014 at Hotel Pacific located at the heart of the city. Dr. V.K. Sharma, Director, GSI, Dehradun and Course Coordinator of GOP-2014, welcomed dignitaries present on the dais S/Sh. H.K. Upreti, Engineer-in-Chief, PWD, Government of Uttarakhand, Prof. A.K. Awasthi, Pro-Vice Chancellor, Graphic Era University, Dehradun, Dr. P.C. Nawani, Former President, ISEG and distinguished guests and all the participants from different corners of the country for their interest in the GOP and to the city of Dehradun- situated in the foothills of the Himalayan and Siwalik ranges, nestled between the rivers Ganges and Yamuna.

The inaugural address was delivered by Mr. H.K. Upreti, Engineer-in-Chief, Public Works Department (PWD), Government of Uttarakhand, Dehradun. Mr. Upreti in his address emphasized revitalization of geotechnical investigations and improvements in civil design and construction process for sustainable infrastructure projects especially in Himalayan geo-environment. He stressed that engineering geological evaluation is going to play a pivotal role in major infrastructural projects. Such evaluation, has a vital influence on the progress of a project since any unexpected or unexplored sub-surface geological condition may delay the schedule of the project. The disasters that happened in Uttarakhand



Photograph 2 : Sh. M. Raju, Sh. R.N. Mishra, Dr. Gopal Dhawan, Dr. Prabhas Pande, Dr. V.K. Sharma, Sh. Y. Deva, Sh. Ashok Kumar and Dr. R. Rath (left to right) along with participants of GOP-2014.

during June 2013 have impacted the infrastructure developmental models. There is an urgent need to understand the actual causes of such catastrophes and revisit technology of infrastructure development in Himalayan Region. As such the role of geology and geotechnique in massive reconstruction and rehabilitation in general and repairs of road network, realignment of critical road stretches and other infrastructure facilities has become essential. The above challenges clearly indicate that re-thinking and changes desired in most of the geotechnical endeavor. He hoped that lectures during GOP by eminent engineers, professional geologists and academicians from reputed institutes of the country would enrich the knowledge of the participants coming from different parts of the country.

Prof. A.K. Awasthi, Pro-Vice Chancellor, Graphic Era University, Dehradun highlighted that engineering geology is an applied science in which the principles of geosciences to engineering practice for the purpose of assuring that the geologic factors affecting the location, design, construction, operation and maintenance of Civil engineering works are recognized and adequately provided for. He opined that the realm of the engineering geologist is essentially in the area of earth-structure interactions, or investigation of how the earth or earth processes impact human made structures and human activities. Dr. P.C. Nawani, President (Hydro), Jindal Power Ltd. and Former President of ISEG, the guest of honor for the function delivered inaugural lecture on an overview of historical development of the engineering geology and emerging trend of technological frontiers to address the critical issues of underground civil structures.

The GOP-14 had Six technical sessions, excursion and visit to National Geotechnical Facility (NGF) at Dehradun. The technical sessions covered the practical application of Soil Mechanics, Rock mechanics, rock cut slopes, engineering geological guidelines for preparation of DPRs for hydroelectric projects, engineering geological mapping, seismo-tectonic studies, underground structures in rock etc by eminent engineers and geologists from IITs, GSI, ISEG and various public sector/private organizations. The field demonstration of some typical landslides and determination of rock mass properties were explained by the faculty.

4TH INT.SYMP. ON MEGA EARTHQUAKE, CHENDU, CHINA

Contd.... from page 02



Photograph 1 : Inauguration, IAEG Symposium Chengu



Photograph 2 : Welcome Banquet

Speaking on the occasion, while referring the recent Nepal Earthquake, Mr Yogendra Deva, Vice President of IAEG for Asia, drew attention of the audience to the impact of mega earthquakes in the Himalaya on India, China and other countries sharing it, and invited IAEG to initiate regionally coordinated studies on the effects and mitigation of earthquake induced geo-disasters. The technical sessions of the symposium, selectively conducted in parallel, had 14 Keynote Lectures, 22 Invited Lectures and 29 presentations of submitted abstracts. The main focus of discussions remained on co-seismic landslides, slope failures and debris flows. The "International Journal of Geohazards and Environment" was also inaugurated on the occasion. The Journal is available at the IJGE website <http://ojs.library.dal.ca/ijge>.

ISEG ORGANISES GOP - 2014 AT DEHRADUN

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Prof. Yudhbir, former professor of Soil Mechanics, IIT Kanpur, deliberated upon the application of Soil Mechanics and dealt with soil classification, behavior and failure criteria of soils and explained how shear strength and stiffness of soil determines soil stability or deformations. Prof. S. Mittal of IIT-Roorkee gave a presentation on technological development in stability of slopes and slope cuts and showed case studies of soil nailing techniques. Dr. R.K. Goel of CIFR, Roorkee explained various aspects of rock mass classification and characterization using Q-system. He also took hand-on tutorials/ practice session of rock parameter determination. Sh Prashant Mishra, Director, GSI, Kolkata explained at length about the engineering geological investigations for preparation of DPR for Water Resource Development projects. He presented various case studies on hydroelectric projects. The participants were taken to National Geotechnical Facility (NGF) - a DST laboratory, and shown the procedures for geotechnical testing of rock and soil. Dr Vikram Gupta, Scientist, Wadia Institute of Himalayan Geology (WIHG) gave a field demonstration of Ground Penetrating Radar (GPR).

Dr. V.K. Sharma, Director, GSI, Dehradun delivered lectures on Engineering Geological Mapping (EGM) on various scales for planning and design of major civil engineering projects. Dr. Prabhas Pande, Former ADG, GSI elaborated on seismo-tectonic investigations with respect to hydroelectric projects. Sh. Y. Deva, ICCS, New Delhi and former Director of GSI, gave a presentation on geological imponderables in tunnel investigations and gave account of case studies of various projects where geological surprises affected the project planning. Sh Ashok Kumar, Director, GSI, Lucknow delivered lecture on underground structures in rock: geological influence, exploration and excavation. A technical presentation with case studies and state-of-the-art practices on 'Underground Caverns' was given by Dr R. Rath of Engineers India Ltd., New Delhi.

Dr. Gopal Dhawan, CMD, MECL and President ISEG shared his vast experience on hydro project and gave an overview on geotechnical explorations for hydro and mining projects in Indian context. Sh. Rajeev Vishnoi, GM (Design), THDC, Rishikesh gave presentation on the design of rock cut slopes with special references to Himalayan conditions. Sh. H. Bahuguna, UJVNL, Dehradun delivered a lecture on geotechnical problems of reservoirs with reference to Tehri dam. A lecture on geological explorations for WRD projects and associated geological surprises was given by Sh. B.M. Gairola, Director, EPE Division, GSI, New Delhi.

Dr. Prabhas Pande, Former ADG, GSI was the Chief guest and Sh M. Raju, Dy. D.G and National Mission Head, M-IV, GSI, Kolkata graced the occasion as guest of honor in valediction function of GOP-2014 held on 12th November, 2014. The programme ended with a 360° evaluation with an all round positive notes given by the participants and distribution of certificates by the Chief Guest.

ADVERTISEMENTS ON ISEG WEBSITES

Advertisements are invited from related organizations to be published on the ISEG website

RATE

An amount of Rs 20,000/- will be charged to this service for a total period of 5 years.

**Add US\$ 20 for overseas advertisements

NOTE

1. The advertisement would be carried for five year from the date of its posting on the website.
2. The advertisements would be posted as abridged version, i.e. logo and tagline.

ADVERTISEMENT MATERIAL

The material may be sent as soft copy along with a hard copy in colour.

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The fee is non-refundable, may be paid directly to the ISEG account as per details given below.

- (a) Demand Draft, drawn in favour of the 'Indian Society of Engineering Geology', payable at UCO Bank, Lucknow.

- (b) Payments may also be made through Bank Transfer on line as detailed below.

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Account Name: "INDIAN.SOC.OF.ENG";

Account No.: 90330200000045

IFSC Code No. : UCBA0002024

Logos will also be displayed in all subsequent issues of ISEG News during the period of validity.



Photograph 3 : GOP deliberations in progress



Photograph 4 : Valediction



Photograph 5 : Distribution of certificates

PRESIDENT OF INDIA PRESENTED NATIONAL GEOSCIENCE AWARDS-2013

President of India Shri. Pranab Mukherjee presented National Geoscience Awards (NGA)-2013 at the Rashtrapati Bhawan in New Delhi on 6th April, 2015. The annual awards are presented to honour individuals and teams of geo-scientists for their outstanding contributions in the field of fundamental or Applied Geosciences, Mining and Allied areas. The Awards are given in sixteen fields under four broad sections viz., 1: Mineral Discovery and Exploration; 2: Mining, Mineral Beneficiation and Sustainable Mineral Development; 3: Basic Geoscience; 4: Applied Geoscience.

For the year 2013, Dr. Indra Bir Singh, Professor of Geology at Lucknow University, was conferred with the highest honour "*National Geoscience Award for Excellence*" for his outstanding contributions in the field of Sedimentology. Along with him, 22 other Geo-scientists from various organisations viz., GSI, CGWB, ISM, CSIR-CIMFR, UCIL, IIT-Kharagpur, etc. were also awarded at the ceremony.



National Geoscience Awards 2013 : Award Ceremony held at Rashtrapati Bhawan, New Delhi

Dr. Gopal Dhawan, President, ISEG and CMD, MEC Ltd also attended the award ceremony held at Rashtrapati Bhawan, New Delhi on 6 April, 2015.

TENSIONED ROCK BOLTS: A FEW LESSONS

Imran Sayeed
Editor, ISEG

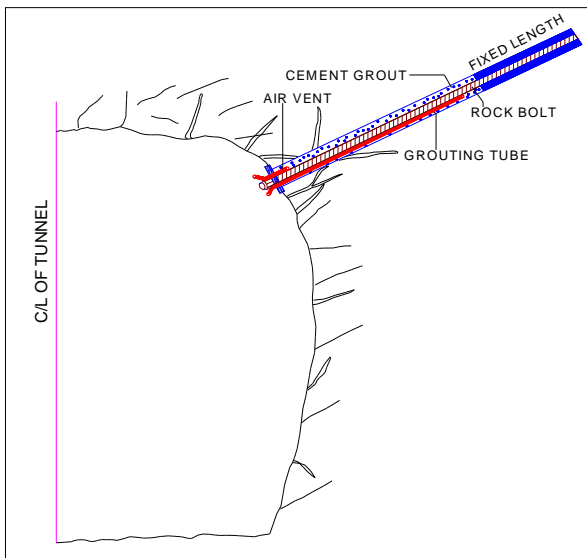


Figure 1 : Tensioned Rock Bolt

1.0 BASICS

Tensioned rock bolts are defined as simple rock bolts anchored at one end which are tensioned always after installation. A base plate and nut ensures transfer of load suitably. It is important to ensure proper tensioning so that all the components are in contact and a positive force is applied to rock says Dr. E. Hoek (refer Rocscience, Canada). The amount of tension to be given may vary from 50% to 70% of the capacity of the bolt. The calculation for total capacity of the bolt is taken from the yield capacity of steel used and

diameter of the steel rod. In India Fe 500 grade of steel is generally used. Generally 1/3 length of the rock bolt is kept as fixed length. The idea is to keep the same pasted to rock mass so that it does not rotate or gets loosened on tensioning. Therefore, the fixed length anchorage should be greater than the capacity of the bolt itself. Other areas of failures are the threads and nut which have to take the load and need to be of high precision and quality.

Corrosion and rusting are the primary causes of failure of rock bolts in the long term, it is important that annular space between the rock bolt and circumference of the hole in balance 2/3 free length is grouted apart from anti-corrosion protective coating. This grouting also helps in firmly keeping the bolt in the middle of the hole. We have experimented with water cement ratios ranging from 0.32 (thick paste) to 0.6 in the field depending on rock mass condition. For effective grouting the mix should not be too fluid with a water cement ratio 0.4 to 0.5 as suggested by Dr. Hoek.

2.0 DISCUSSION

The fixed length can be secured by mechanical shell or resin cartridges but



ISEG MEMBERSHIP

- **Admission fee (one time)**
New Members : Rs. 1000/-
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(i) Annual Membership : Rs. 500/-
(ii) Life Membership
For age < 35 years : Rs. 5000/-
For age 35-50 years : Rs. 4000/-
For age > 50 years : Rs. 3000/-
- Membership forms available at www.isegindia.org

IAEG MEMBERSHIP

Indian Society of Engineering Geology (ISEG) is affiliated to International Association of Engineering Geology and the Environment (IAEG). Membership for IAEG is annual. Any ISEG Member, who wishes to join IAEG with bulletin, may pay the required fee 29 Euros and without bulletin the fee would be 4 Euros.

In order to become IAEG Member, ISEG Members may pay the membership fee in ISEG Bank Account through online Bank Transfer and fill the Registration Form available on ISEG website www.isegindia.org indicating payment details and mail to the undersigned.

Payments may be made through Bank Transfer as detailed below:

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Name of account: 'INDIAN.SOC.OF.ENG.'
Account Number: 90330200000045
IFSC Code No. : UCBA0002024

Regards

M. RAJU,
Secretary, ISEG

IAEG ANNUAL MEMBERSHIP

Members with Bulletin : 29 Euros
(Receive Newsletter also)
Members without Bulletin : 4 Euros
(Receive Newsletter only)
Associate Members : 150 Euros
(Receive Bulletin + Newsletter)

FEES FOR THE YEAR 2015

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ELECTION NOTIFICATION TO THE ISEG EXECUTIVE COUNCIL FOR THE TERM 2016-2017

LAST DATE FOR RECEIVING NOMINATIONS IS 31st JULY 2015

As the term of the present Council comes to an end in December, 2015, nominations for the next Council (Term: 2016-2017) are invited in the prescribed format along with supporting documents of the Nominee and IAEG Membership dues (if not already paid). The nominations should be duly proposed and seconded by ISEG Members of good standing i.e., Life Members or those Members (M, IM & AM) who have paid their annual subscription upto the year 2015. The acceptance of the Nominee may also be obtained on the Nomination Form itself or sent separately. List of ISEG Members is placed in the ISEG News for reference. The Nominees are requested to go through the following information pertains to election.

ELIGIBILITY CRITERIA

- The Nominee must be a Life Member of the ISEG.
- The Nominee must be a Member of IAEG (International Association for Engineering Geology and the Environment) for the year of commencement of ISEG term for which the election is being contested. Therefore, the IAEG dues of the Nominee (with bulletin) for the year 2016 must stand cleared on or before submission of the Nomination Form.
- IAEG Annual Membership fee with bulletin, worth 29 Euros may be paid through Bank Transfer as detailed below.

Name of the Bank: UCO Bank, GSI Branch, Aliganj, Lucknow

Name of account: 'INDIAN.SOC.OF.ENG.'

Account Number: 90330200000045

IFSC Code No. : UCBA0002024

SUPPORTING DOCUMENTS

The nominee must attach his brief bio-data, photograph and mailing details (including email id and telephone number) with the Nomination Form. The brief bio-data may not exceed 100 words and must include information on organizational affiliation, designation, date of birth, academic qualification with year and institution and professional experience.

NOMINATION VALIDITY

The nominations will be invalid if:

- The Nomination Forms submitted are incomplete.
- The Nomination Forms are not accompanied by supporting documents.
- There is nomination of the same person for more than one post.
- Nomination(s) is/are not accompanied by the acceptance of the Nominee.
- In case of outstation Nominees, the acceptance may be sent separately but must reach the Secretary, ISEG on or before the due date of submission of Nomination Form. This must also be mentioned in the Nomination Form.
- The Nomination form do not attach the IAEG Annual Membership fee (with bulletin) for year 2016.

KEY DATES

31st July, 2015	:	Last date for receiving nominations
31st August, 2015	:	Acceptance of nominations
15th September, 2015	:	Last date for withdrawal of nominations, if any
30th September, 2015	:	Declaration of final list of Nominees for various posts (to be published in October, 2015 issue of ISEG News)
30th November, 2015	:	Last date for receiving duly filled in voting slips
December, 2015	:	Declaration of Election Results during AGM of ISEG (Exact date will be announced subsequently)

NOMINATION SUBMISSION

Duly filled in Nomination Form of the Nominee, along with supporting documents and payment of IAEG dues (if not already paid) is to be sent by Registered Post, or in person to the address mentioned below. The nominees may also submit scanned copy of their Nomination Form to ISEG email at india.seg@gmail.com

**The Secretary, ISEG,
C/o Dy. Director General & HoD,
Geological Survey of India, Eastern Region,
Bhu Bijnan Bhawan,
DK-6, Sector-II, Salt Lake, Kolkata-700 91.
Mobile: 09432672087**



**(M. RAJU)
Secretary, ISEG**

Indian Society of Engineering Geology

ELECTION TO THE ISEG EXECUTIVE COUNCIL FOR THE TERM 2016-2017

NOMINATION FORM

(The duly filled in form must reach the Secretary, ISEG on or before 31st July, 2015.)

I,, ISEG Membership No. hereby nominate the under mentioned members for election.

S.No.	Post	Vacancy	Name of Nominee	Membership Number	Signature of the Nominee in token of his acceptance of nomination*
1	President	1			
2	Vice President	3			
3	Secretary	1			
4	Jt. Secretary	2			
5	Treasurer	1			
6	Editor	1			
7	Council Member(s)	10			

*If the acceptance is sent separately, please indicate so.

Enclosure:

Nominee's brief bio-data, photograph and mailing details
(Email id and telephone number)

I,, ISEG Membership Number, hereby second the above nominee.

.....
Signature of Proposer
ISEG Membership Number

.....
Signature of Secunder
ISEG Membership Number

COMPLETE LIST OF ISEG MEMBERS (UPDATED APRIL 2015)

*INCLUDING DEASED **, RESIGNED ^ AND THOSE MEMBERS WHOSE MEMBERSHIP HAS EXPIRED **

Membership No	Name	Station	Membership No	Name	Station	Membership No	Name	Station	Membership No	Name	Station
LM 1	Alok, B.K.	Dehradun	M 101	Mohanti, A.K.*		LM 201	Deva Yogendra	Noida	M 301	Moghri, A.*	
LM 2	Agarwal, Y.K.		M 102	Mokashi, S.L.*		M 202	Satyanarayan, G.C.		LM 302	Agarwal V.K.	Lucknow
LM 3	Aich, B.N.	Kolkata	M 103	Mukhopadhyay, M.S.		LM 203	Rawat, J.S.	Dehradun	M 303	Saxena, K.R.*	
LM 4	Andotra, B.S.		LM 104	Mukhopadhyay, U.S.	Kolkata	M 204	Lokras, K.V.*		LM 304	Hemmady, A.K.R.	Mumbai
LM 5	Ashraf, Zamir	Lucknow	LM 105	Mullick, B.B.		LM 205	Mehrotra A.	Lucknow	LM 305	Narsimham, C.V.L.	
M 6	Bahadur, A.K.*		LM 106	Murti, N.G.K.**		LM 206	Chepe, A.B.	Nagpur	LM 306	Devatia, Miss. E.	New Delhi
LM 7	Balasundaram, M.S.**		M 107	Nanda, Kailashnath*		LM 207	Ahmed, M.J.	Bhubaneswar	LM 307	Agarwal, K.K.	Jaipur
LM 8	Bandopadhyay, M.**		M 108	Naruvkar, P.H.*		LM 208	Patil, A.R.		LM 308	Joshi, V.K.	Nainital
LM 9	Bandopadhyay, M.R.**		LM 109	Natu, S.V.	Mumbai	M 209	Sen, Aloke*		M 309	Jhala, H.P.*	
LM 10	Banerjee, K.	Kolkata	LM 110	Nautiyal, S.P.**		LM 210	Singh, Pratap**		LM 310	Nayak, A.K.	
LM 11	Bansode, R.B.**		LM 111	Obbron, Dr. L.E.		LM 211	Gupta, Dr. U.P.	Dehradun	LM 311	Sinha, Dr. A.K.	Lucknow
LM 12	Basu, A.R.	Kolkata	LM 112	Pande, Prabhas	Lucknow	LM 212	Dhar, Y.R.	Dhanbad	M 312	Prakash, N.D.*	
LM 13	Kumar, Asim	Kolkata	LM 113	Pant G.	Lucknow	LM 213	Prakash, Indra	Gandhinagar	M 313	Subramaniam, Dr. S.*	
LM 14	Basu, Sanat Kumar	Kolkata	LM 114	Parthasarathy, B.	Bangalore	LM 214	Rao, J.S.R. Mohan	Hyderabad	LM 314	Bhattacharya, A.K.	Kolkata
LM 15	Basu Chowdhary, S.		LM 115	Patil, B.B.		LM 215	Anabalagan, R.	Roorkee	LM 315	VACANT	
LM 16	Bery, M.N.	New Delhi	M 116	Pattanaik, K.M.*		M 216	Basauraj, A.*		LM 316	Jha, V.K.	
M 17	Bhagat, R.K.*		LM 117	Phukan, S.N.		LM 217	Basavraj, R.	Ganeshgudi	M 317	Shah, M.M.*	
M 18	Bhandari, R.C.*	Noida	LM 118	Pradhan, S.R.	Nagpur	LM 218	Devraj, Char		LM 318	VACANT	
M 19	Bhandari, Dr R.K.*		M 119	Prakash, Munendra*		M 219	Ramaswamy, V.S.*		M 319	Rao, N. Subba*	
M 20	Bhatia, S.K.*	Pune	LM 120	Prakash, Dr. Samsher		LM 220	Ketkar, D.J.	Mumbai	AM 320	PRO, NHPC	Faridabad
LM 21	Bhat, B.T.		M 121	Rahman, M.A.*		LM 221	Chikodi, D.G.		LM 321	Patel, Dr. P.P.	Vadodara
LM 22	Biswas, S.R.N.		M 122	Rai, R.A.*		M 222	Valdiya, K.S.*		IM 322	CSI, Calcutta*	
LM 23	Borwankar, A.N.	Bhopal	LM 123	Raichur, A. Ramchandra		LM 223	Singh, Santosh Kumar		LM 323	Ametha, Dr. S.S.	Chittorgarh
M 24	Chakravarty, D.C.*		LM 124	Rajagopalan, G.	Chennai	LM 224	Gupta, Sudhindra	Kolkata	LM 324	Avasthy, R.K.	Lucknow
LM 25	Chakraborty, R.B.	Kolkata	LM 125	Raju, K.C.C.	Hyderabad	LM 225	Didwal, Dr.R.S.	Jammu Tawi	LM 325	Sharma, Kumud	Lucknow
LM 26	Chandra Ramesh		LM 126	Rao, Dr. R.V.		LM 226	Singh, Alam	Jaipur	LM 326	Kumar, L.V.^	
LM 27	Chatterjee, Dr. Barin	Kolkata	LM 127	Ramachandran, B.**	Chennai	M 227	Phukan, C.N.*		LM 327	Gupta, I.C.	
LM 28	Char, A.K.		LM 128	Ranade, S.G.		LM 228	Raha, L.C.		LM 328	Punj, S.K.	New Delhi
LM 29	Chatterjee, B.		LM 129	Ranganathswamy, A.P.	Hyderabad	LM 229	Parial, B.N.		LM 329	Jatana, B.L.	Agra
LM 30	Chatterji, G.C.**		LM 130	Rao, G. Ram Mohan		LM 230	Kaistha, G.K.	New Delhi	LM 330	Mukherjee, Dipak	New Delhi
LM 31	Chatterjee, P.K.	Kolkata	LM 131	Rai, M. Gopal		LM 231	Swamy, M.M.	Bangalore	LM 331	Krishan, Hari	
LM 32	Chaturvedi S.N.	Lucknow	M 132	Rao, N.S.*		LM 232	Goswami, P.C.		LM 332	Khan, P.A.	
LM 33	Chhibber, I.B.	Nagpur	LM 133	Rao, K.R. Narayan		LM 233	Sharma, V.S.		M 333	Bamzai, J.L.*	Jammu
LM 34	M.A. Chitale, M.A.		LM 134	Roy, B.C.*		LM 234	Kumar, Vinai	New Delhi	M 334	Bali, J.S.*	
LM 35	Chopra, B.R.		M 135	Sah, Radheyshyam*		M 235	Singh, R.P.*		M 335	Acharya, J.P.*	
M 36	Chopra, C.R.*		LM 136	Sahasrabudhe, Dr. Y.S.	Pune	M 236	Lal, A.K.*		LM 336	Dhaundial, D.P.	Dehradun
LM 37	Chopra, M.R.**		LM 137	Sain, Dr. Kanwar		M 237	Iyer, R.V.*		LM 337	Sehgal, M.N.	
LM 38	Choubey, V.D.	Noida	LM 138	Sanganeria, J.S.	Jaipur	LM 238	Chauhan R.P.S	Lucknow	LM 338	Pancholi, D.N.	Vadodara
LM 39	Choudhary, A.K.	Kolkata	M 139	Sarangi, B.B.*		LM 239	Srivastava MS	Lucknow	LM 339	Parikh, B.C.	Vadodara
LM 40	Chowdhary, A.K.**		LM 140	Sensharma, S.B.	Kolkata	LM 240	Anand, S.K.**	Lucknow	LM 340	Dhawan, Gopal	New Delhi
LM 41	Colback, P.S.B.		LM 141	Seth, N.N.^		M 241	Behra, P.N.*		AM 341	AFCONS*	
LM 42	Cook, Dr. J.B.		LM 142	Shah, K.N.		LM 242	Dayal H.M.	Lucknow	IM 342	MERI*	
LM 43	Das, A.L.**		LM 143	Shah, S.D.	Mumbai	M 243	Purushothama, Gonella*		LM 343	Hegde, U.V.	New Delhi
M 44	Das, M.L.*		LM 144	Sharda, Dr.Y.P.	New Delhi	LM 244	Eswaraiah, H.V.		LM 344	Shukla, U.Z.	Gandhi Nagar
LM 45	Gupta, Praful Kumar Das		M 145	Sharma, M.C.*		M 245	Sharma, S.P.*		LM 345	Soni, P.H.	Vadodara
M 46	Datye, K.R.*		LM 146	Sharma, Dr. V.M.	New Delhi	M 246	Gupta, N.K.*		LM 346	Mahendra, A.R.	
LM 47	Desai, S.D.		LM 147	Shenoi, R.S.		M 247	Bhattacharya, B.B.*		LM 347	Bhutani, M.L.	
LM 48	Deuskar, V.R.*		LM 148	Shome S.K.	Lucknow	M 248	Laxamanan, T.V.*		LM 348	Raju, V.S.N.	
LM 49	Dey, A.K.		LM 149	Sinha, Dr. B.N.	Bangalore	LM 249	Agarwal, A.N.**		LM 349	Nathani, J.K.	
M 50	Day, S.B.*		M 150	Sinha, G.S.*		LM 250	Upadhyay, V.S.		LM 350	Gupta, D.B.	Muzaffar Nagar
LM 51	Dhanota, A.S.		M 151	Sinha, P.N.*		M 251	Balasubranabuanm K.*		M 351	Srivastava, A.K.*	
LM 52	Dixit R.S.	Lucknow	M 152	Sinha, R.G.*		M 252	Manjunatha, H.*		M 352	Chabra, S.*	
M 53	Dubey, R.K.*		LM 153	VACANT		M 253	Krishnan, K.*		LM 353	Singh Dr. G.	Chandigarh
LM 54	Datta, B.	Guwahati	LM 154	Sinha Roy, P.T.	Kolkata	LM 254	Nag, R.B.	Jaipur	LM 354	Bhambri, G.C.	Chandigarh
M 55	Datta, N.P.*		LM 155	Sinha Roy, R.N.	Kolkata	LM 255	Khar, P.N.		LM 355	Reddy, S.R.M.	
M 56	Engineer, M.N.*		LM 156	Singh, Chandrama		LM 256	Bhat, M.L.	Faridabad	LM 356	Choudhary, R.N.	Jodhpur
LM 57	Gangopadhyay, Dr. Suvinoy	Kolkata	M 157	Singh, J.P.*		M 257	Sreerangaraju, L.V.*		LM 357	Patel, V.P.	
LM 58	Ghosh Dr. D.K.	Lucknow	LM 158	Singh R.P.	Lucknow	M 258	Nagraj, M.S.*		M 358	Patel, A.R.*	
LM 59	Ghosh, S.K.		LM 159	Singh V.P.	Lucknow	M 259	Shreedhara, K.T.*		LM 359	Joshi, D.K.	Faridabad
M 60	Godboli, R.V.*		LM 160	Sohoni, S.B.		M 260	Kalyanshetty, V.M.**		LM 360	Desai, V.R.	Bharuch
LM 61	Gupta, D.N.		LM 161	Sondhi S.N.	Lucknow	M 261	Jayaxaju, S.*		LM 361	Patel, B.B.	
M 62	Gupta, Ram Nivas*		LM 162	Sreenivasiah, P.V.		LM 262	Mallickarajuna, P.R.	Bangalore	LM 362	Patel, V.B.	Vadodara
M 63	Gupta, S.D.*		LM 163	Srinivasan, P.B.	Chennai	M 263	Balagurumurthy, S.T.*		LM 363	Patel, D.T.	
LM 64	Gupta, S.K.	Lucknow	M 164	Srinivasan, V.*		LM 264	Shukla S.D.	Lucknow	M 364	Joshi, Y.S.*	
LM 65	Gupte, R.B.	Pune	LM 165	Srivastava Arun Kr.**	Lucknow	M 265	Chandra, Prakash*		LM 365	Joshi, C.P.	Vadodara
M 66	Gulati, Satindra (Aimil)*		LM 166	Srivastava J.P.	Lucknow	LM 266	Madhvan, K.		LM 366	Lattoo, P.S.	Vadodara
LM 67	Doscher, Dr. Hans		LM 167	Srivastava, K.N.**		LM 267	Mittal, B.P.		LM 367	Patel, J.R.	
LM 68	Harkauli, A.N.	New Delhi	LM 168	Srivastava L.S.**		LM 268	Kulkarni, P.S.		LM 368	Parikh, M.M.	Vadodara
LM 69	Hazra, P.C.**		LM 169	Srivastava V.B.	Lucknow	LM 269	Guru Rao, S.N.	Bangalore	LM 369	Bulsara, D.H.	Valsad (Gujrat)
M 70	Hebli, C.S.		M 170	Subramaniam, S.N.*		LM 270	Agarwal, L.N.		LM 370	Bhatt, R.M.	Vadodara
LM 71	Hukku, B.M.	Lucknow	LM 171	Subrahmaniam, V.		LM 271	Rajvanshi, P.S.	Dehradun	LM 371	Bansode, U.V.	Vadodara
LM 72	Jalote P.M.	Lucknow	LM 172	Sundaram, R.K.		LM 272	Mahajan, J.L.		LM 372	Joshi, A.N.	Vadodara
LM 73	Jalote S.P.	Lucknow	M 173	Swarup, Ajay*		LM 273	Senapaty, A.M.		LM 373	Krishnani, R.P.	Vadodara
M 74	Jangle, J.T.*		LM 174	Thomas, K.C.	Trivendram	M 274	Natrajan, P.*		LM 374	Pophali, P.M.	Vadodara
LM 75	Joshi, N.G.		LM 175	Tikku, A.K.	Noida	LM 275	Basauraj, B.M.**		M 375	Patel, K.G.*	
LM 76	Judd, Dr. William		LM 176	VACANT		LM 276	Virdi, N.S.		M 376	Vyas, D.V.*	
M 77	Kant, B.*		LM 177	Tewary, G.P.	Varanasi	M 277	Radhakrishnan, K.G.*		LM 377	Desai, N.D.	Vadodara
M 78	Kar, R.N.*		M 178	Tiwari, R.L.*		LM 278	Bhatia, S.K.	Pune	LM 378	Ahluwalia, P.P.	Ahmedabad
LM 79	Kasliwal, V.K.	Jaipur	M 179	Tripathi, B.N.*		LM 279	Goswami, S.C.	Dibrugarh	LM 379	Mahendra Kumar, C.	Vadodara
M 80	Kaul, P.N.*		LM 180	Tripathi, Jagannath		LM 280	Relan, A.K.	Faridabad		Doshi	
M 81	Krishnamurthy, J.G.*		LM 181	Tripathi, S.C.	Bhubaneswar	LM 281	Seshagiri, D.N.	Chennai	LM 380	Misri, B.L.	
LM 82	Krishnamurthy, K.S.	Bangalore	LM 182	Vardan, V.K.S.**		M 282	Raju, D.V.*		LM 381	Vaidya, Piyush H.	Vadodara
LM 83	Krishnaswamy, V.S.		M 183	Vasudeva, S.N.*		LM 283	Chari, Dr. K.V.R.**		LM 382	Munshi, R.N.	Gandhi Nagar
LM 84	Kulkarni, V.N.**		LM 184	Venkataramaiah, P.		LM 284	Parathasarathy, K**		M 383	Oza, H.S.*	
M 85	Kumar, Arun*		LM 185	Venkataraman, A.R.		LM 285	Mazumdar, N.		LM 384	Prasad, S.N.	Patna
LM 86	Kumar, Surendra	Dharamshala	LM 186	Verma, Harish Chandra		M 286	Vishwanadham, A.*		M 385	Sinha, P.	
LM 87	Lovas, Dr. L.		LM 187	Verma, Dr. P.N.	Greater Noida	M 287	Kameshwar, D.R.*		M 386	Rajan, S.	
LM 88	Madhavan, M.N.	Patna	LM 188	Vyavaharkar, D.A.	Mumbai	LM 288	Murty, G.S.		M 387	Sinha, R.P.	
LM 89	Mahajani, H.V.	Bhopal	LM 189	West, W.D.**		LM 289	Rao, S.L.		LM 388	Desai, B.I.	
LM 90	Mahalik, N.K.	Bhubaneswar	LM 190	Ali, Hamzah**		M 290	Kumaraswamy, M.*		LM 389	Modhwadia, K.E.	Ahmedabad
LM 91	Maitra, B.		LM 191	Anand, D.B.	New Delhi	LM 291	Rao, G.S.M.	Pune	LM 390	Shah, M.F.	
LM 92	Mazumdar, A.K.		LM 192	Vaidyanath, L.N.	Bangalore	LM 292	Rama Rao, V.	Hyderabad	LM 391	Suthar, R.M.	
LM 93	Mane, P.M.**		LM 193	Niyogi, B.N.**		M 293	Dharmraj, A.*		LM 392	Pancholi, D.I.	Vadodara
LM 94	Mathew, Kurien**		LM 194	Malbarna, B.D.	Jammu	LM 294	Tiwari, M.	Lucknow	LM 393	Mistry, J.F.	Vadodara
M 95	Mathur, P.C.*		LM 195	Ray, Sukanta		LM 295	Subrahmanayam, P.**		LM 394	Singha, D.R.	Greater Noida
LM 96	Mathur, S.K.	New Delhi	LM 196	Srivastava K.K.	Lucknow	M 296	Paul, Chinnoy*	Kolkata	LM 395	Prasad, Har	Greater Noida
LM 97	Mehta, D.N.		LM 197	Narula, P.L.	Faridabad	M 297	Verma, D.K.*		LM 396	Gupta, R.K.	
LM 98	Mehta, P.N.**		LM 198	Varma R.S.**	Lucknow	LM 298	Shah, C.S.	Vadodara	LM 397	Sharma, M.L.	
LM 99	Misra, K.L.		LM 199	Parathasarathy, A.		IM 299	Director, CDO, M.P.*		LM 398	Kotai, R.L.	
M 100	Misra, V.N.*		LM 200	Kamble, D.T.**		LM 300	Mandwal N.K.	Lucknow	LM 399	Jindal, S.K.	
									LM 400	Rana, G.S.	

COMPLETE LIST OF ISEG MEMBERS (UPDATED APRIL 2015)
INCLUDING DESEASED **, RESIGNED ^ AND THOSE MEMBERS WHOSE MEMBERSHIP HAS EXPIRED *

Membership No	Name	Station	Membership No	Name	Station	Membership No	Name	Station	Membership No	Name	Station
LM 401	Singh, A.P.	Greater Noida	LM 501	Singh, Harpal		M 601	Ravendra, Nath*		LM 701	Srivastava, B.S.**	
LM 402	Rajvanshi, U.S.		LM 502	Chandra, Dinesh		M 602	Wadhwa, R.S.		LM 702	Gupta H.	Lucknow
LM 403	Khanna, M.M.L.		LM 503	Agarwal, C.K.	New Delhi	LM 603	Raina, B.N.	Agra	M 703	Nayar, K.M.*	
LM 404	Aggarwala, A.K.		LM 504	Arora, Brij Mohan	Lucknow	M 604	Venkatappa, Rao, G.*		M 704	Munerudrappa, N.*	
LM 405	Thakkar, A.K.		LM 505	Arova, J.S.		LM 605	Ramamurthy, T.	New Delhi	M 705	Parthsarthy, N.*	
LM 406	Chaudhary, S.G.	Vadodara	LM 506	Agarwal, H.G.		M 606	Gokhle, V.L.**		M 706	Bose, R.N.*	
LM 407	Patel, S.I.		M 507	Gupta, R.M.*		LM 607	Diwanji, S.N.	Nasik	M 707	Kakoty, I.S.*	
LM 408	Patel, N.I.		LM 508	Madan, S.K.		M 608	Seshgiri, Rao, K.*		LM 708	Bhattacharya, A.	
M 409	Joshi, M.R.		LM 509	Giri, S.C.	Lucknow	LM 609	Bhatnagar, Shashank	Jammu Tawi	M 709	Phadke, N.K.*	
M 410	Desai, K.D.		LM 510	Pujji, J.S.	New Delhi	LM 610	Dalela I.K.	Lucknow	M 710	Sharma, H.H.**	
LM 411	VACANT		LM 511	Gupta, J.C.		M 611	Sarkar, V.K.*		M 711	Sangewar, C.V.*	
LM 412	Patel, Nalin M.	Vadodara	LM 512	Gandhi, P	Kolkata	LM 612	Nagrajan, R.	Mumbai	M 712	Basu, D.L.*	
M 413	Tamhankar, A.D.		LM 513	Raina, Chamanlal		M 613	Singh, A.*		M 713	Chattopadhyay, B.*	
M 414	Desai, Miss. J.K.		LM 514	DasfyorM Sujit		M 614	Singh, H.*		M 714	Ravindran, K.V.*	
M 415	Mehta, Smt. D.Y.		LM 515	Sharma, L.K.		LM 615	Sharma, L.D.		M 715	Biswas, R.K.*	
M 416	Shah, P.N.		LM 516	Rathi, A.K.		LM 616	Srivastava Ashwini K	Lucknow	M 716	Singh, K.N.*	
LM 417	Joshi, H.M.	Vadodara	517	VACANT		M 617	Garg, J.M.*		M 717	Sogari, K.C.*	
LM 418	Chauhan, M.F.		LM 518	Monde, O.D.	New Delhi	M 618	Bhargava, S.K.*		LM 718	Shenolikar, A.K.	
M 419	Tapilavala, V.C.		LM 519	Jain, K.K.		LM 619	Prasad, V.		M 719	Malhotra, A.N.*	
LM 420	Patel, A.C.	Vadodara	LM 520	Research Officer*	Vadodara	LM 620	Waza, J.L.**		M 720	Mukherjee, N.K.*	
LM 421	Patel, B.J.		M 521	Sharma, D.K.*		M 621	Agarwal, B.M.*		M 721	Srivastava, V.C.*	
LM 422	Patel, A.P.		M 522	Dava Sonam*		M 622	Kumar, Rishi*		LM 722	Bagchi, A.	Kolkata
LM 423	Patel, N.M.	Gandhi Nagar	M 523	Vedanti, U.D.*		M 623	Singh, T.*		LM 723	Agarwal, P.D.	
LM 424	Patel, B.P.		M 524	Patel, Bharat*		M 624	Srivastava, H.K.*		LM 724	Singh, V.	New Delhi
LM 425	Patel, Y.L.		LM 525	Pathak, S.C.		M 625	Chandra, Mahesh*		M 725	Roy, A.K.*	
LM 426	Soni, D.J.		LM 526	Geologist-I*		LM 626	Roy Chowdhary, M.K.		M 726	Kumar, S.*	
LM 427	Desai, J.T.		LM 527	Dhebar, N.I.		LM 627	Malpathak, Ganesh	Pune	M 727	Bajpai, S.*	
M 428	Patel, M.R.		LM 528	Govil, B.K.		LM 628	Singh, Y.P.		M 728	Nath, S.K.*	
M 429	Suthar, K.A.		LM 529	Guha, S.K.	Pune	M 629	Dungrakoti, B.D.*		M 729	Mathur, S.C.*	
LM 430	Patel, B.C.		LM 530	Patel, H.J.		M 630	Wadhwani, G.T.*		LM 730	Jaitley G.N.	Lucknow
M 431	Khatri, M.P.		LM 531	Negi, R.S.	Chandigarh	M 631	Patel, G.D.*		M 731	Upadhyay, B.M.*	
M 432	Saiyad, A.M.		LM 532	Khorana, T.R.		M 632	Gokhale, K.V.G.K.*		M 732	Kumar, S.K.*	
M 433	Patel, B.R.		LM 533	Yadav, S.K.		M 633	Soni, S.K.*		LM 733	Mangla, Bhoj Prakash	Ghaziabad
M 434	Shridhaxani, A.		LM 534	Dawar, Y.N.		LM 634	Rau, A.N.		IM 734	KIRI, S.E.*	
M 435	Shuka, D.C.		LM 535	Khorana, R.K.	Faridabad	LM 635	Iyengar, M.V.S.	Bangalore	M 735	Surya, V.J.*	
M 436	Singh, L.P.		M 536	Yupandran, R.*		M 636	Chakraborty, K.N.*		LM 736	Agarwal, Padam, P.	
M 437	Singh, K.M.		LM 537	Kumar, S.V.	Lucknow	M 637	Chada, B.K.*		LM 737	Srivastava, K.L.	Jodhpur
M 438	Mathur, N.K.		M 538	Singh, R.B.*		M 638	Goela, R.K.*		LM 738	Singh, K.P.	
M 439	Sharma, R.K.		LM 539	Sampath, P.	Bhopal	M 639	Narain, K.*		M 739	Rai, Awadh Bihari*	
M 440	Singh, G.S.		LM 540	Chandra, M.S.	Mysore	M 640	Tiwari, K.C.*		LM 740	Hayat, Abdul	Patna
LM 441	Jambusaria, Dr. B.B.	Vadodara	M 541	Dixit, J.P.*		M 641	Gupta, B.K.*		IM 741	GSi, C.R.*	
LM 442	Patel, Nalin, H.		LM 542	Jain, B.R.	Ghaziabad	M 642	Gupta, M.L.*		LM 742	Goyal, D.P.	Ghaziabad
LM 443	Patel, P.M.		LM 543	Jahangirdar, M.L.	Ganeshgudi	M 643	Mehta, P.*		M 743	Rayal, Y.B.*	
M 444	Virmani, R.G.	Vadodara	LM 544	Sanwal, R.K.	Lucknow	LM 644	Chalapathi Rao, R.V.	Hyderabad	LM 744	Agarwal, R.C.	
M 445	Shah, M.R.		LM 545	Srivastava, V.K.	Dhanbad	M 645	Debnath, B.*		LM 745	Kadkade, D.G.	New Delhi
LM 446	Patel, D.N.		M 546	Lakshmikanthan, C.B.*		M 646	Upadhyay, R.K.*		M 746	Das, Arun*	
LM 447	Shirke, Dr. J.M.**		M 547	Poddar, A.K.*		LM 647	Panda, P.K.		M 747	Hussain, Altaf*	
LM 448	Bhavsar, S.V.*		LM 548	Shah, K.B.	Bhopal	LM 648	Barman, G.		LM 748	Prakash, Gyan	Aligarh
LM 449	Srivastava, V.N.**		LM 549	Gupta, B.N.	Hardoi	LM 649	Rai, S.M.		M 749	Gupta, Shrikrishna*	
M 450	Patel, P.H.*		M 550	Gupta, R.L.*		M 650	Madhav, Rao, M.R.*		LM 750	Mishra, V.N.	
M 451	Desai, A.K.K.*		LM 551	Sinha, Purnendu	Lucknow	M 651	Srivastava, V.C.*		LM 751	Keshavayya, P.	
452	VACANT		LM 552	Papalal, S.		M 652	Prabhakar, Rao, P.*		LM 752	Kumar, Harsh	
LM 453	Sangamnerkar, C.D.R.	Vadodara	M 553	Tiwari, R.P.*		M 653	Majumdar, S.K.*		M 753	Sinha, Amalendu*	
LM 454	Mody, D.C.*		M 554	Veerbhadrappa, S.M.		M 654	Shukla, R.*		IM 754	Geologist(I) Narmada^	
455	VACANT		M 555	Selvan, T.A.*		M 655	Srivastava, A.K.*		LM 755	Tahilyani D.R.A.	Lucknow
LM 456	Vartak, R.G.		M 556	Joshi, A.*		M 656	Mishra, S.P.*		LM 756	Singh, Ranivr	
M 457	Khan, M.G.*		M 557	Rama Rao, A.P.*		M 657	Badri, Narain, S.*		LM 757	Arora, P.K.	
LM 458	Sharma, D.P.		LM 558	Solanki, J.C.**		M 658	Sharma, R.P.*		LM 758	Sharma, V.K.	Lucknow
M 459	Singh, Bagh*		M 559	Godre, R.K.*		M 659	Rao, G.R.M.*		M 759	Sinha, Aalok Kumar*	
M 460	Singh, Prakash*		M 560	Dass, A.*		LM 660	Agarwal, N.K.	Lucknow	LM 760	Siddique, Dr. M.A.	
M 461	Srivastava, A.K.*		M 561	Agarwal, R.C.*		M 661	Hazaria, P.C. **		M 761	Nagania Arshad, Zamil* Saud	
M 462	Mittal, V.K.*		M 562	Singh, R.P.*		LM 662	Hunday, A.^		M 762	Nair, Unnikrishnan*	
M 463	Chhabra, S.K.*		LM 563	Gupta, S.K.		LM 663	Kapoor, A.K.	Lucknow	LM 763	Srivastava, V.P.	Kanpur
M 464	Tayal, R.A.*		M 564	Basu, S.*		LM 664	Raju, M.		M 764	Thakur, B.N.*	
M 465	Agarwal, K.K.*		LM 565	Lavania, Dr. B.V.K.	Roorkee	M 665	Barua, A.K.*		M 765	Khired, Parida,*	
M 466	Gupta, R.G.*		LM 566	Alam, J.M.**		M 666	Balachandran, V.*		M 766	Kukreja, R.K.*	
LM 467	Gupta, V.K.		LM 567	Ramaswamy, R.		M 667	Venkatesh, V.*		LM 767	Srivastava, L.P.	Patna
LM 468	Yadav, V.K.		LM 568	Singh, Narendra		M 668	Karimuddin, M.*		M 768	Prasad, Buniyad*	
M 469	Sharma, S.K.*		LM 569	Dhawan, A.K.	New Delhi	LM 669	Srivastava, Dinkar	Lucknow	M 769	Much, U.S.*	
M 470	Bansal, L.R.*		LM 570	Mathur, R.S.		LM 670	Dua, K.J.S.*		M 770	Mehta, S.V.*	
LM 471	Nim, H.K.*		LM 571	Joshi, A.B.**		M 671	Garg, R.L.		LM 771	Samsuddin, Dr. A.K.	Sindri
LM 472	Nanda, M.M.		M 572	Chakravarty, A.*		M 672	Mukhopadhyay, S.K.*		M 772	Singh, B.P.*	
M 473	Saxena, G.C.*		M 573	Singhal, H.S.S.*		M 673	Singh, J.*		M 773	Goel, A.K.*	
LM 474	Sharma, K.L.		M 574	Gupta, Dr. M.V.*		M 674	Ramamurthy, S.*		LM 774	Sood, N.K.	Gurgaon
M 475	Singhal, Om Kumar*		LM 575	Agarwal, P.N.	Roorkee	LM 675	Srivastava, S.C.	Lucknow	LM 775	Nunundappa, G.	Kadra
M 476	Gupta, R.K.*		M 576	Kanungo, S.C.*		M 676	Srivastava, M.C.*		M 776	Roy, Chandradip*	
M 477	Singh, Raghubir*		LM 577	Agarwal P.P.	Lucknow	M 677	Chandok, G.J.*		LM 777	Agarwal, L. Narayan	
LM 478	Kumar, Manindra Nath		LM 578	Deshpandi, G.R.		M 678	Rajal, B.*		LM 778	Chatterjee, Tustibrata	Kolkata
M 479	Subhash*		M 579	Goyal, B.B.L.*		M 679	Arur, M.*		LM 779	Sharma, R.P.S.	Muzzafarpur
M 480	Saxena, S.M.*		M 580	Banerjee, O.*		M 680	Subramanian, C.S.*		M 780	Flora, G.S.*	
M 481	Goyal, T.K.*		M 581	Mallik, D.K.*		M 681	Bhargava, D.N.*		IM 781	Supdt. Engineer Pat.*	
M 482	Garg, D.S.*		LM 582	Jain, A.K.	Dehradun	M 682	Tiagi, S.S.*		M 782	Charyalu, M.B.V.*	
M 483	Shah, A.G.*		LM 583	Singh, B.K.		LM 683	Puri, S.N.	Hyderabad	M 783	Aziz, Anwar*	
M 484	Sharma, B.K.*		LM 584	Manhas G.S.	Lucknow	LM 684	Awasthy, S.C.		M 784	Pant, V.K.	
M 485	Sharma, K.P.*		LM 585	Murthy, Y.K.	New Delhi	M 685	Verma, K.K.*		LM 785	Rawat, U.S.	Dehradun
M 486	Narayan, K.S.*		LM 586	Sahay, B.K.		M 686	Mehta, H.S.**		M 786	Sachan, M.*	
M 487	Gupta, V.K.*		LM 587	Chowdhuri, A.K.		LM 687	Murthym G.S.S.N.*		M 787	Sharma, R.K.*	
M 488	Sinha, B.P.*		LM 588	Roychodhary, J.	Kolkata	LM 688	Natrajan, T.K.	Chennai	M 788	Sharma, M.S.*	
LM 489	Nagyan, V.K.	Faridabad	LM 589	Jain, P.K.		M 689	Pangtey, T.S.*		M 789	Singh, Kaplan*	
M 490	Sadashivan, M.C.*		LM 590	Sharma, Brijendra K.	New Delhi	LM 690	Saran, R.B.	Faizabad	LM 790	Suhane, H.S.	Jabalpur
M 491	Hussain, R.*		IM 591	CWC*		LM 691	Ghildiyal, S.K.	Dehradun	LM 791	Sharma, U.C.	Bhopal
LM 492	Kumar, Sushil	Lucknow	M 592	Srivastava, S.P.*		M 692	Prasad, L.M.*		M 792	Banerjee, Amit	
M 493	Agarwal, S.L.*		LM 593	Ulthaje, Dr. A.V.	Varanasi	M 693	Jyyar, D.S.N.*		M 793	Arora, N.D.	Faridabad
M 494	Sharma, C.P.*		M 594	Misra, S.*		M 694	Dhawan, H.K.*		M 794	Jain, Subhash Chand	
M 495	Patel, J.H.*		M 595	Bathula, Anjaiah*		LM 695	Kumar, P		LM 795	Mallick, H.K.	
LM 496	Srivastava S.K.	Lucknow	M 596	Jain, V.K.*		M 696	Ramaswamy, S.K.*		LM 796	Sharma, Purshottam Das	
M 497	Aggarwal, V.P.*		LM 597	Singh R.I.		M 697	Ahmed, M.*		LM 797	Singh, Virendra Pal	
LM 498	Mallik, S.K. **		M 598	Gupta, J.P.		M 698	Chandrasekhar, H.*		LM 798	Chandra, Sukhmal	
LM 499	Bajpai O.N.	New Delhi	M 599	Agarwal, R.K.*		M 699	Parthsarthy, T.N.*		LM 799	Jain, Arun	New Delhi
LM 500	Srivastava, N.K.		LM 600	Singh, S.K.		M 700	Verma, N.K.R.*		LM 800	Chourasia, Dr. L.P.	

COMPLETE LIST OF ISEG MEMBERS (UPDATED APRIL 2015)

*INCLUDING DEASED**, RESIGNED ^ AND THOSE MEMBERS WHOSE MEMBERSHIP HAS EXPIRED**

Membership No	Name	Station	Membership No	Name	Station	Membership No	Name	Station	Membership No	Name	Station
LM 801	Guha, Kallol	Kolkata	LM 901	Jagannathan, V.		M 1001	Kansara, J.P.		LM 1102	Raval, C.J.	Panchmahal
LM 802	Dhar, Gautam**		LM 902	Sarkar, Shekhar	Pune	M 1002	Dave, N.B.*		LM 1103	Pandit, Smt. S.R.	Ahmedabad
LM 803	Biswas, S.R.**		LM 903	Tyagi, Vinod Kumar	Meerut	M 1003	Dandiwalla, M.C.*		LM 1104	Kar, S.K.	Lucknow
LM 804	Shandilya, A.K.*		M 904	Mahmood, Gauhar**		M 1004	Patel, R.H.*		LM 1105	Kumar, Naresh	Sunder Nagar
LM 805	Baruah, S.		M 905	Joshi, Y.C.**		M 1005	Patel, B.B.*		LM 1106	Srivastava Dr. A.K.	
LM 806	Das, N.C.		LM 906	Sinha, Suresh Chandra		M 1006	Patel, T.J.*		LM 1107	Surenranath, V.	
LM 807	Baruah, S.A.R. Haque	Imphal (Manipur)	LM 907	Suri, Rajiv Kumar*		M 1007	Gandhi, J.M.*		LM 1108	Kaul, Surender	
LM 808	Singh, L. Angau		LM 908	Patel, G.P.	Gandhi Nagar	M 1008	Patel, D.P.*		LM 1109	Sharma, Brig B. D.	
LM 809	Barma, Chintamani		LM 909	Katti, G.B.		M 1009	Patel, M.H.*		LM 1110	Unial, K.C.	Tehri
LM 810	Gogoi, H.P.	Guwahati	LM 910	Subramanyan, Dr. V.	Thane (West)	LM 1010	Mahalingachari, A.C.	Bangalore	LM 1111	Jindal, Harsh Kumar	
LM 811	Bansal, L.K.	Rishikesh	LM 911	Murthy, B.S.N.	Bangalore	LM 1011	Sengupta, Pradeep	Kolkata	LM 1112	Mathur, N.K.	New Delhi
LM 812	Nageswaran, B.		LM 912	Misra, Sarvesh	Faridabad	LM 1012	Basak, Badri Narayan	Kolkata	LM 1113	Gupta, Pradeep Kumar	Faridabad
LM 813	Das, Swapan Kumar		LM 913	Manikanda, Mahesh Babu	Hyderabad	M 1013			LM 1114	Virmani, R.G.	Faridabad
LM 814	Raju, K.B.	Kolkata	LM 914	Reddy, K.K.		LM 1014	Kandpal, G.C.	Lucknow	LM 1115	Sayed, Imran	Faridabad
LM 815	Sood, A.K.	Gurgaon	LM 915	Harendranath, L.	Hyderabad	LM 1015	Gopalkrishnan, M.	New Delhi	LM 1116	Pant, Sanjay	
LM 816	Chadha, A.K.	Simla	LM 916	Chakradhar, Mariserla	Hyderabad	LM 1016	Mukhopadhyay, S.C.	Kolkata	LM 1117	Joshi, K.C.	Gangtok
LM 817	Verma, R.P.	Sarabai, Bhuntar	LM 917	Boliseti, Satyanarayana	Hyderabad	LM 1017	Detir, U.D.	Vadodara	LM 1118	Sanwal, Rajendra	Lucknow
LM 818	Sharma, K.S.	Ghaziabad	LM 918	Hashimi, S.		LM 1018	Dhurundhar, A. P.	Nagpur	LM 1119	Gairola, B.M.	Dehradun
M 819	Chauhan, V.P.S.**		LM 919	Ravindranath, K.	Secunderabad	LM 1019	Sharma, H.K.	New Delhi	LM 1120	Rana, Chandra Singh	Rishikesh
M 820	Sharma, J.K.*		M 920	Raman, M.S.*		LM 1020	Joshi, Sudhir Yeshwant		LM 1121	Kumar, Bhuvnesh	Noida
M 821	Keira, Dr. H.*		M 921	Kanse, A.B.*		LM 1021	Chaddha, Dr. D.K.	New Delhi	LM 1122	Patil, S.N.	Jalgaon
LM 822	Boni, O.N.		M 922	Vyas, A.B.*		LM 1022	Thatte, C.V.	Pune	LM 1123	Nemad, P.D.	
LM 823	Walvekar, Ashok S.	Faridabad	M 923	Dave, P.M.*		LM 1023	Soni, Arvind Keshavlal	Vadodara	LM 1124	Prabhakar, Gote Atul	
M 824	Patel, C.K.*		M 924	Shaikh, J.J.*		M 1024	Shaikh, M.A.*		LM 1125	Kannan, S.	Bangalore
M 825	Shah, I.N.*		LM 925	Srivastava, A.K.		M 1025	Shaikh, G.G.*		LM 1126	Kakoty, I.S.	
M 826	Upadhyay, R.K.*		LM 926	Mehta, M.V.	Rajkot	M 1026	Vyas, H.J.*		LM 1127	Kumar, S.	New Delhi
M 827	Patel, R.M.*		LM 927	Sahu, C.P.	Jabalpur	LM 1027	Littoria, P.K.		LM 1128	Yelsetty, Srinivasulu	Hyderabad
LM 828	Lal, Kuver Nath	Patna	M 928	Kumar, Manoj**		LM 1028	Deekshatulu, B.L.	Hyderabad	LM 1129	Pathak, S.K.	Indore
LM 829	Ali, Mashooq		LM 929	Prasad, Kasturi R.K.	Hyderabad	LM 1029	NRSA(Lib), Hyderabad*		LM 1130	Soni, C.K.	Indore
LM 830	Naik, M.F.	Vadodara	LM 930	Rao Suresh Kant Anand		LM 1030	Garg, Madan Murari		LM 1131	Haridas, R.	
LM 831	Kumar, Ashok	Lucknow	LM 931	Ali, Akram		LM 1031	Rastogi, Daya Nand K.		LM 1132	Gupta, M.C.	
LM 832	Prasad, Bharat	Patna	LM 932	Gopalaunni, M.		M 1032	Goel, Virendra Kumar*		LM 1133	Srivastava S.S.	Lucknow
LM 833	Sinha, H.P.		LM 933	Ghosh, D.K.	Kolkata	LM 1033	Shah, L. Mohanlal	Vadodara	AM 1134	M/s Gemat, New Delhi*	
M 834	Dasgupta, A.*		LM 934	Chatterjee, Kamlesh	Kolkata	LM 1034	Deudeja, Dinesh Kumar		LM 1135	Singh, R.K.	Lucknow
M 835	Gupta, P.K.**		LM 935	Chetty, G.L. Nagraja		LM 1035	Director, AMD, Hybd*		LM 1136	Mohan, Aditya	
LM 836	Rai, Anil	Faridabad	LM 936	Satish Kumar, H.B.		LM 1036	Upadhyay, R.K.		LM 1137	Tiwari, R.P.	Aizwal
M 837	Tripathi, D.C.*		LM 937	Rao Mullapudi Venkat		LM 1037	Rao Ande Ganeshwara		LM 1138	Shanker, Ravi	Lucknow
M 838	Rahut, A.K.*		LM 938	Reddy, V. Venkata Subba		LM 1038	Patel, M.M.	Vadodara	LM 1139	Muthu, R. Pitchai	Karur
M 839	Sayed, Imran*		LM 939	Rajuddin, S.M.		LM 1039	Sudhakar, A.M.		LM 1140	Mehta, O.P.	New Delhi
LM 840	Prabhakaran, B.*		LM 940	Dave, Chandresh, G.		M 1040	Sumar, N.M.*		LM 1141	Tripathi Kripa Shanker M.	Lucknow
LM 841	Varshney, Dr.R.S.	Ghaziabad	LM 941	Murti, Ramdenu Srinivas		M 1041	Purohit, A.B.*		LM 1142	Bid, Nripendra Chandra	Nagpur
M 842	Singhal, J.B.*	Jabalpur	LM 942	Chebbi, S.M.		LM 1042	GSJ, NER, Shillong*		LM 1143	Prasad, G.M.	Rishikesh
M 843	Gupta, Raju*		LM 943	Jagannath, Jetty	Hyderabad	LM 1043	Chatterjee, Amresh	Jaipur	LM 1144	Singh, Shailendra	Rishikesh
M 844	Neelkanthan, J.*		LM 944	Geologist(I) NMC *		LM 1044	Rathore, Gopal C.	Vadodara	LM 1145	Singh, Gurcharan	S.A.S.Nagar
LM 845	Verma, Dinesh Chandra		LM 945	Mitra, Shyamal Kumar		M 1045	Patel, J.K.*		LM 1146	Joshi, Y.C.	Lucknow
LM 846	Patel, B. Dhulabhai*		LM 946	Bhattacharya, Dipendra N.	Kolkata	M 1046	Patel, A.R.*		LM 1147	Siddiqi M.A.	Lucknow
LM 847	Khanduri, H.C.	Hyderabad	LM 947	Roy, Sivaji Basu	Kolkata	M 1047	Soni, D.J.*		LM 1148	Bisht, B.S.**	Dehradun
LM 848	Sah, Lalgee		LM 948	Bhatnagar, A.K.		M 1048	Patel, K.G.*		LM 1149	Khare, Rakesh	Rishikesh
M 849	Singh, Virendra Kumar*		LM 949	Patel, A.S.		LM 1049	Desai, A.B.	Vadodara	LM 1150	Narang, J.L.	Rishikesh
LM 850	Saini, G.S.		LM 950	Bhalja, S.S.	Vadodara	M 1050	Oza, H.S.*		LM 1151	Vishnoi, R.K.	Rishikesh
LM 851	Dr. Goel, R.K.	Roorkee	LM 951	Lad, D.M.	Veraval	LM 1051	Dahiya, B.S.		LM 1152	Verma, A.S.	Rishikesh
LM 852	Verman, M.K.		LM 952	Raval, C.J.		LM 1052	Pradhan, N.C.		LM 1153	Lath, J.P.	Tehri
LM 853	Mukherjee, Shyamal	Roorkee	M 953	Suchde, J.V.*		LM 1053	Srivastava, A.K.	Lucknow	LM 1154	Sharma, Arjun Kumar	Gangtok
LM 854	Choube, Rabindra Nath	Gurgaon	M 954	Patel, S.C.*		LM 1054	Verma S.K.	Lucknow	LM 1155	Bhunia, Tserin Tashi	Gangtok
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WILLIAM SMITH

FATHER OF ENGLISH GEOLOGY

BIOGRAPHY

William Smith (23 March 1769-28 August 1839) was known as the "Father of English Geology" for collating the geological history of England and Wales into a single record. William Smith, known as 'Strata Smith', was a surveyor who made connection between fossils and the layer of rocks they were in, and used this to create the first geological map of England and Wales. He became known as the 'Father of Stratigraphy' and 'Father of English Geology'. At the time his map was first published he was overlooked by the scientific community. Consequently his work was plagiarised, and it was only much later in his life he Smith received recognition for his accomplishments.

Mr. Smith was born in the village of Churchill, Oxfordshire, the son of blacksmith John Smith. His father died when he was just eight years old, and he was then raised by his uncle. He received little formal education, but from an early age took an interest in exploring and collecting fossils in his native Oxfordshire in England. At the same time, he learned geometry, surveying, and mapping; at the age of eighteen he became an assistant surveyor, learning his trade from the master surveyor Edward Webb. Surveying required him to travel all over England; in 1794 he toured the entire country, and then he began to supervise the digging of the Somerset Canal in southwestern England, a job that lasted six years. The job of surveying canal routes required detailed knowledge of the rocks through which the canal was to be dug. This led him to examine the local rocks very carefully. While doing this, he observed that the fossils found in a section of sedimentary rock were always in a certain order from the bottom to the top of the section.

Mr. Smith worked at one of the estate's older mines, the Mearns Pit at High Littleton, part of the Somerset coalfield and the Somerset Coal Canal. As he observed the rock layers at the pit, he realised that they were arranged in a predictable pattern and that the various strata could always be found in the same relative positions. Additionally, each particular stratum could be identified by the fossils it contained, and the same succession of fossil groups from older to younger rocks could be found in many parts of England. Furthermore, he noticed an easterly dip of the beds of rock-small near the surface (about three degrees), then bigger after the Triassic rocks. This gave him a testable hypothesis, which he termed The Principle of Faunal Succession, and he began his search to determine if the relationships between the strata and their characteristics were consistent throughout the country. He was continually taking samples and mapping locations of various strata, and displaying vertical extent of strata, and drawing cross-sections and tables of what he saw. This would earn him the name "Strata Smith".

As a natural consequence, Smith amassed a large and valuable collection of fossils of strata he had examined himself from exposures in canals, road and railway cuttings, quarries and escarpments across the country. He also developed methods for identification of deposits of Fuller's earth to the south of Bath. Today, it is accepted that looking at fossils is the most accurate way of comparing sedimentary rocks and answering questions of geological time. In his practical, matter-of-fact way, William Smith had shown the way to read history of the Earth.

In 1799 Smith produced the first large scale geologic map of the area around Bath, Somerset. Previously, he only knew how to draw the *vertical* extent of the rocks, but not how to display them *horizontally*. However, in the Somerset *County Agricultural Society*, he found a map showing the types of soils and vegetation around Bath and their geographical extent. Importantly, the differing types were coloured. Using this technique, he could draw a geological map from his observations showing the outcrops of the rocks. He took a few rock types, each with its own colour. Then he estimated the



**William Smith
(1769-1839)**

YEAR 2015 MARKS THE BICENTENARY OF THE WILLIAM SMITH'S GEOLOGICAL MAP



In 1815 William Smith published the first edition of his Geological Map of England and Wales. Smith's map made a seminal contribution to the understanding of the ground beneath our feet and by showing the location of coal, iron ore, clays and other raw materials quite literally fuelled the industrial revolution.

The Geological Society of London which is the oldest Geological Society in the World has displayed a copy of William Smith's Geological Map that has been described in Simon Winchester's book as "*The Map that Changed the World*". It has been re-stored and re-framed by the Society. The map now hang at the foot of the east staircase of the Society apartment, Burlington House, Piccadilly, London, U.K.

Geological Society, London

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WILLIAM SMITH

.....Continued from page 13

boundaries of each of the outcrops of rock, filled them in with colour and ended up with a crude geological map. Mr. Smith was not the first to make geologic maps, but he was the first to use fossils as a tool for mapping rocks by their stratigraphic order, and not necessarily by their composition. Previous mapmakers had attempted to use the composition of rocks as indicators of their position in the stratigraphic column.

In 1801, he drew a rough sketch of what would become "The Map that Changed the World". This map was not the first work of this kind. In 1815 he published the first geological map of Britain. It covered the whole of England and Wales, and parts of Scotland. While this was not the world's first geological map, (William Maclure's map of the United States predates by six years) Smith's map was the first geologic map covering such a large area ever published. Conventional symbols were used to mark canals, tunnels, tramways and roads, collieries, lead, copper and tin mines, together with salt and alum works. The various geological types were indicated by different colours; the maps were hand coloured. The map was on a scale of five miles to an inch and consisted of 15 sheets. Published by the mapmaker John Cary to Smith's topographic specifications, it was meticulously hand coloured using 20 tints to represent the different strata, and shading to represent depth. The map was a work of art as well as a scientific innovation. Approximately 400 copies were issued and many (although not all) bear a number and are signed by William Smith himself. The map was offered in six different forms and cost from five guineas to twelve pounds. The modern geological map of Britain is based on Smith's original work, his map being displayed at the Geological Society in London. Nevertheless, the map is remarkably similar to modern geological maps of England. He also published his *Delineation of the Strata of England* in the same year. In another of his books *Strata Identified by Organized Fossils* (London 1816-1819) he recognized that strata contained distinct fossil assemblages which could be used to match rocks across regions. In 1817 he drew a remarkable geological section from Snowdon to London. Unfortunately, his maps were soon plagiarised and sold for prices lower than he was asking. He went into debt and finally became bankrupt.

On 31 August 1819 he was released from King's Bench Prison in London, a debtor's prison. He returned to his home at 15 Buckingham Street to find his home and property seized. Mr. Smith then worked as an itinerant surveyor for many years until one of his employers, Sir John Johnstone, recognized him and took steps to gain for him the respect he deserved.



Geological map of England and Wales created by William Smith

Between 1824 and 1826 he lived and worked in Scarborough, and was responsible for the building of the Rotunda, a geological museum devoted to the Yorkshire coast. The Rotunda was re-opened as 'Rotunda – The William Smith Museum of Geology', on 9 May 2008 by Lord Oxburgh.

Compiled By:

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TENSIONED ROCK BOLTS: A FEW LESSONS

Contd... from page 06

using cement cartridges in the free length is not advisable and should be discouraged. After the tensioned rock bolts are installed and anchored, the tensioning is done. Instantly the bolts start acting and secure the rock mass. However, grouting of free length can be done subsequently after a time lag for which a maximum limit is specified. However, if resin and cement cartridges are used together the tensioning process becomes difficult. Hydration reactions start soon after mixing with water giving rise to stiffening just after ten minutes. When resin and cement cartridges are used together, it has to be ensured that resin has set fully before tensioning but cement has not set. Alternatively there are procedures of fast and slow setting resin cartridges being used in tandem. In such a situation highest quality control standards are necessary to ensure proper timing of tensioning.

Alternatively, if conventional grouting by cement is done for the free length, some beneficial objectives can be achieved which are as follows:

- (i) Sufficient time is available to do the tensioning of rock bolts after which cement grouting through the tube (see figure 1) can be completed.
- (ii) Grouting by pumped cement mix ensures that the adjacent fractures which have opened due to blasting are filled which is a very significant gain in jointed or disturbed rock mass or cases of poor blasting.

Both the factors are very relevant to the typical site conditions and more useful when blasting damages are significant but not easily discernible or visible to naked eye.

RESERVOIR RIM TREATMENT AT TEESTA-III HYDRO ELECTRIC PROJECT, SIKKIM

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F.I.E.

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The Teesta III HE project (1200MW) is located in the Himalayan State of Sikkim and is part of six stage cascade development of Teesta Basin. The project is under active construction and is slated for commissioning by March 2016. The reservoir and its surrounding areas in this fragile Himalayan geologic formations is susceptible to occurrences like bench settlements slides, slips, damage to settlement etc. especially during operation of reservoir. Reservoir Rim Treatment was evolved by supplementing the conventional geo-synthetic techniques. This paper highlights the rim treatment measures and gives details on the application of geo-synthetics in the form of nets, mats, blankets, meshes and mechanically stabilized reinforced gabion walls for long term slope stabilization measures.

1.0 INTRODUCTION

The Teesta – III HE project is a run of the river scheme located in Chungthang village 400m downstream of the confluence of Lachen chu and Lachung chu, the two limbs of Teesta river. The project comprises of 60m high Concrete Face Rock fill Dam (CFRD), about 14.2km long and 7.5m diameter head race tunnel, 160m deep 13m dia surge shaft, two steel lined pressure shafts of 4.0m diameter feeding six units of pelton turbines 200MW each housed in an underground Power House to generate 5228MU of energy in a 90% dependable year. The construction of dam near Chungthang village will result in a creation of reservoir of gross capacity of 5Mcum and is expected to extend 1.15km along Lachung chu and 1km upstream along Lachen chu from the confluence. The Chungthang village situated between Lachen chu and Lachung chu upstream of the confluence is inhabited by more than 1100 people along with Army camp and workshop area at left bank of Lachen and ITBP camp and local administration establishment on the right bank of Lachung chu. The reservoir rim was critically reviewed and a comprehensive rim treatment plan was evolved to ensure that the area remains trouble free during operation of the project.

2.0 RESERVOIR GEOLOGY

The project area like most of the Himalayan region is prone to landslides mainly owing to immature topography, deep weathering profile, young mountains with soft rock mass and further accentuated by relatively high rainfall of more than 3000mm in Teesta project area. Generally, the reservoir area is lined on both the banks by stable slopes comprising intact and competent rock exposures constituted by quartzites interbedded with gneisses of the Chungthang Series. However, there are stretches wherein the upper part of the reservoir area is covered with thick unconsolidated slope wash material as the top thick riverine terrace deposits. The left bank of Lachen and right bank of Lachung chu are lined by riverine terraces which are partially consolidated, and these in turn are overlain by colluvial debris formed by gravity transport. The upper area matching the reservoir fluctuation level i.e. between FRL and MDDL are geologically unstable due to partially unconsolidated river borne material on the slope. During operation of the reservoir the zone especially above EL 1665m (MDDL) may get destabilized and may initiate slides.



Photograph 1 : Concrete Face Rock Fill Dam-U/S View

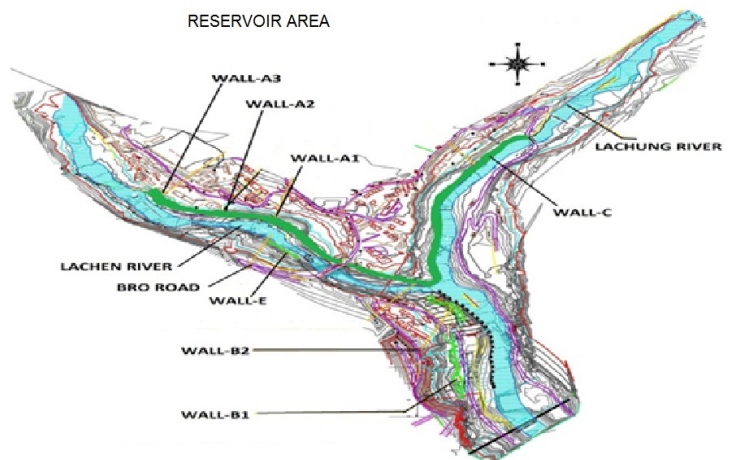


Figure 1 : Reservoir Area

3.0 RESERVOIR RIM TREATMENT

The formulation of reservoir rim treatment method involves engineering, geology, soil mechanics and above all cost considerations vis-à-vis the particular site and in most cases the past failures and success rates experienced at other projects has a bearing on the final solution. The main objective of the rim treatment has been to arrest soil erosion and prevent landslides and to ensure that adjacent structures are safe. Therefore this treatment was planned to account for prevention of loose soil mass due to water erosion, allowing passage of water without uncontrolled passage of soil particles and at the same time have a retaining wall which can resist earth pressure and prevent deformation in hill slope mass. The percolation of water and heavy surface flows make the slopes slide-prone leading to formation of wedges or slip circles which tend to separate the overlying soil from the main body of the earth mass/ rocks. After a detailed discussion with Engineers & project Consultants, M/s Maccaferri design was found suitable for long term measure. The retaining structures constructed with gabions and geogrids are relatively flexible structures and are comparatively economical, faster to construct and get better with environment and surroundings. Geogrids laid in horizontal layers provide reinforcement to the slopes by intercepting potential failure surfaces and also provide horizontal anchorage to the sliding mass. The high tensile strength provided by the geogrids make them ideal reinforcing material resistant to even very tough environmental conditions.

Contd... on Page 16

4.0 MATERIAL SELECTION

The Rim treatment work has been planned and designed in consultation with M/s Maccaferri Environmental Solutions Pvt. Ltd. using geo-membrane and geo-fabric materials. The specialized materials used in Rim treatment are:

4.1 TERRAMESH SYSTEM AND GABION BASKETS

The terramesh is used for soil reinforcement in mechanically stabilized gabion walls and slopes. It is a fabricated soft tensile, heavily galvanized and PVC coated double twisted steel wire mesh. The steel wire used for manufacturing gabions is heavily zinc coated soft temper steel. A PVC coating with nominal thickness of 0.50mm is applied to provide added protection for use in polluted environments where soil or water is acidic or to take care of risk of corrosion.

4.2 PARALINK

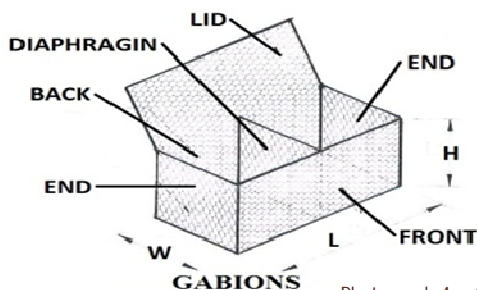
It is a high strength geo-composite and is primarily used on structure that require very high strength reinforcement like basal reinforcement over piles or soft soil. It is being used in combination with other Maccaferri products like Terramesh and Terrawall to form hybrid structures. Paralink geogrids are planar structures consisting of monoaxial array of composite geosynthetic strips.



Photograph 2 : Terramesh (Galvanized and PVC Coated)



Photograph 3 : Paralink

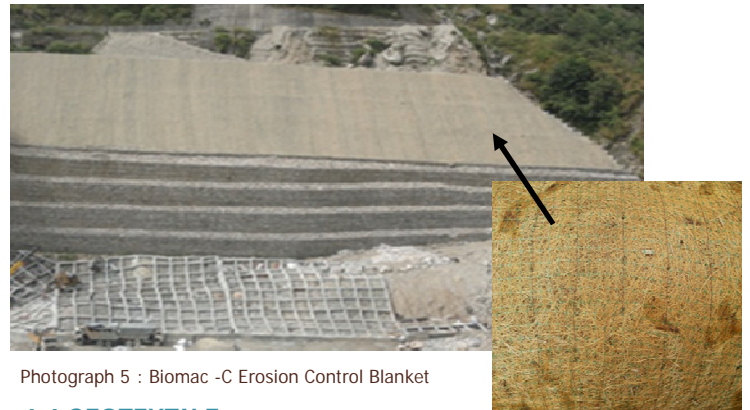


Photograph 4 : Gabions

Each single longitudinal strip has a core of high tenacity polyester yarns tendons encased in a polyethylene sheath. The single strips are connected by nonresistant cross laid polyethylene strips which give a grid like shape to the composite. The tensile strength of single longitudinal strip is more than 36KN for Paralink 200 and 54 KN for Paralink 300.

4.3 BIOMAC

It is a range of biodegradable blankets used for temporary erosion control. This roll erosion control product (RECP) act as a reinforced mulch protecting the seeds and soil from erosion. It is made from variety of biodegradable materials like Biomac-C from coconut fiber only. It is 6 mm thick with minimum mass per unit area of 270gm per sq m. Each Biomac type has a different degradation period in relation with the environment. The Biomac-C provides erosion control and high moisture retainment to facilitate vegetation and the poly propylene netting provides initial reinforcement at the early stage of vegetation establishment as well.



Photograph 5 : Biomac -C Erosion Control Blanket

4.4 GEOTEXTILE

Non-woven Geotextile (Terram 1000) is provided as separator at the rear end of the Terramesh and gabion units. Terram 1000 is a permeable textile for filtering and radially draining media with a high permeability of 100L/m²/s. Its unit weight is 125gm per sqm. and having a tensile strength of 8KN/m. for each strip.

5.0 SLOPE TREATMENT AT RIGHT BANK OF LACHEN CHU

The hill slope of the reservoir rim beyond the Power intake and upstream in the right bank is generally covered with the slope wash material with rolled boulder/ colluvium material on the top of the thick river terrace deposits of boulders, gravels, pebbles embedded in a semi consolidated matrix of sandy silt. The slope mass has little silt and loose rock and has a tendency to roll down. Also the area being near the power intake and flushing tunnel shall be subjected to high velocity during complete draw down condition in monsoon season during operation stage and hence it was decided to have suitably designed geo-synthetic solutions for slope treatment with Maccaferri material. The typical slope treatment design as adopted at site is furnished in figure 2.

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The true laboratory is the mind, where behind illusions we uncover the laws of truth.

— J. C. Bose, Physicist

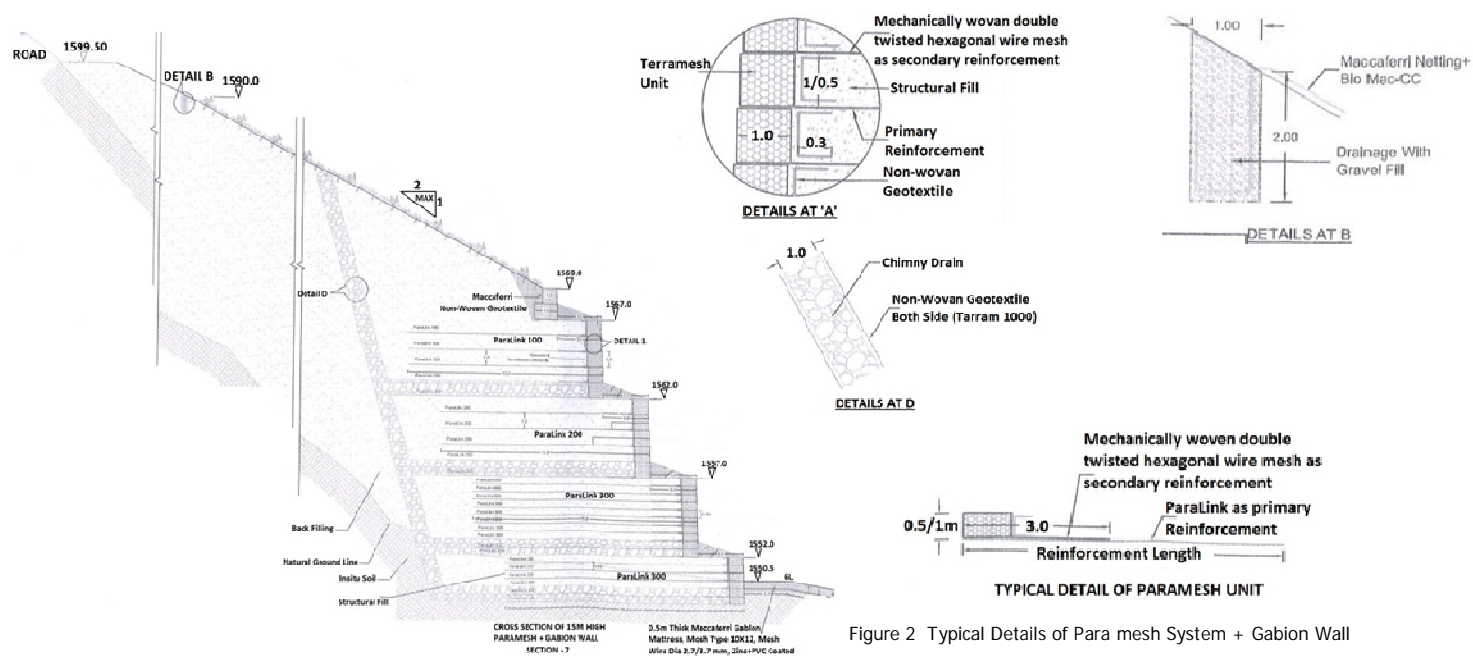


Figure 2 Typical Details of Para mesh System + Gabion Wall

The retaining structure was constructed with 2m x 1m x 0.5m size gabions with Paralink of varying length and size as primary reinforcement. The Paralinks 100/200/300 are strip bonded geogrids with polyester core with thickness of reinforcement strip as 1.4mm & 1.8mm and its width being 85mm & 88mm respectively. The mechanically woven double twisted hexagonal wire mesh are provided to reinforce the gabions as secondary reinforcement. Gabions are baskets and are filled with stones at the site to form flexible, permeable and monolithic structure to act as retaining walls. These gabions are divided into cells by means of diaphragms positioned at approximately one meter centers and to reinforce the structure all mesh panel edges are selvedged with a 3.4/4.4mm diameter wire. Such gabion structures having almost 30% voids, offer free drainage and thus providing better bank protection. The U-pins 4mm diameter at a spacing of 1m c/c upto a depth of 200mm was used to nail down netting and Biomac-C C to the slope. After construction of gabion walls, the backfilling with structural fill material was done behind the gabion walls and paralink as well as double twisted hexagonal wire mesh are provided as horizontal anchors. The chimney drain has been provided by way of non-woven Geotextile on both side and filled with gravel with stones varying from 100mm to 300mm laid behind the gabion structure as shown in figure 2. The backfill soil is compacted in layers and structural filling is done simultaneously. The backfill is compacted to 95% maximum dry density. The Structural fill (fill-material used for construction of Paramesh reinforced soil structure) is a free drainage granular material and shall satisfy following requirements:

The Terram 1000, a thermally bonded, non-woven with a composition of 70% polypropylene and 30% polyethylene was found suitable because of its high strength, high separation and high reinforcement properties. It has a permeability of 10×10^{-2} m/sec with a pore size of $150 \mu\text{m}$. The Maccaferri DT 10x12 mesh type with netting 2.7mm/3.7mm, duly galvanized and PVC coated was laid over the fill slope together with Biomac-C as surface protection and to enhance vegetation.



Photograph 6 & 7 : Lachen chu Right Bank Maccaferri Treatment

DESCRIPTION	REQUIREMENT
Maximum Particle Size	Less than or equal to 40mm
Above primary/secondary reinforcement	
Intermediate layers	Less than or equal to 40mm
Percent passing 75 microns	Less than or equal to 10%
Coefficient of uniformity	Greater than 2
Plasticity Index	Less than 6%
Angle of Internal friction	Greater than or equal to 32°



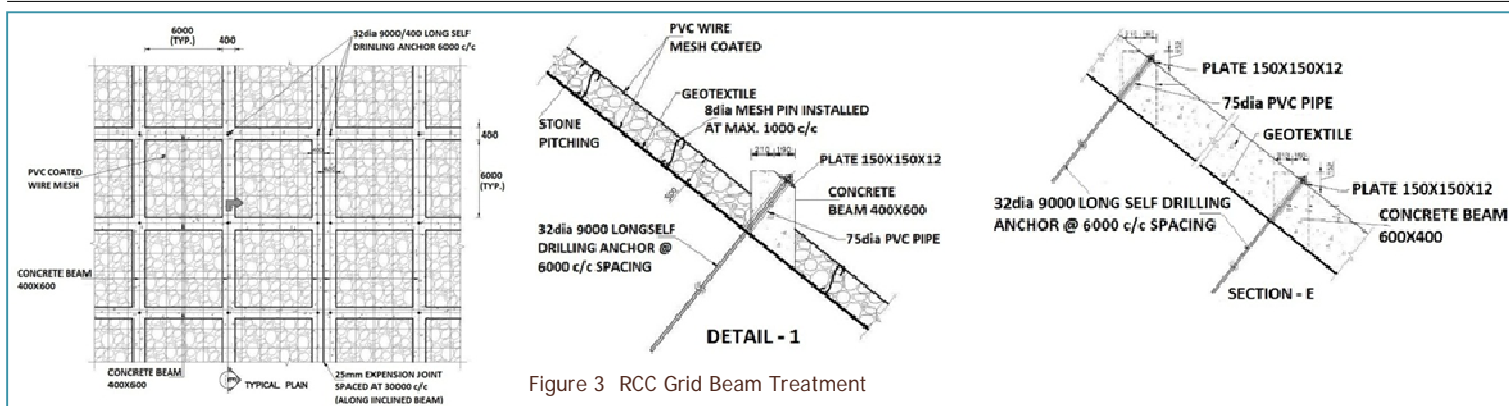


Figure 3 RCC Grid Beam Treatment

6.0 SLOPE TREATMENT OF LACHUNG RIGHT BANK

The confluence points of Lachen and Lachung river area and the right bank of Lachung is generally covered with slope wash material with rolled boulder / colluviums material up to EL- 1580m. The area between EL- 1580 m to 1590m and above is again a slope wash material dotted with boulders with slope getting vertical to sub vertical which makes this zone vulnerable to slides. Since the terrace at this area is inhabited by ITBP camps & offices of local administration, and thus hardly a land available for easing of slope, the slope treatment by way of RCC grid beams with stone filling and duly anchored with 9m long 32mm diameter self-drilling bolts were as furnished in figure 3.

The 600X600 RCC beam has been provided over the slope surface in a grid of 6mx6m. The stones laid in the grid have been encased in PVC coated wire mesh to ensure that the stones are in place during the reservoir fluctuation or during reservoir flushing when velocity of flowing water could be high. The total length of about 515m is being covered through this treatment. Also this RCC grid beam treatment has been carried out for a length of 140m near the power intake area below the wall B1 as well.



Photograph 8: RCC Grid Beam Treatment on Lachung Right bank

7.0 CONCLUSION

The Environment friendly M/s Maccaferri design for Rim Treatment has been a unique feature in Teesta-III project. The application and use of geo-synthetics woven or non-woven, Paralink and other Maccaferri materials has been quite innovative and a big step in the course of sustainable project management and shall act as a benchmark for the hydropower construction industry. The successful implementation of such works depend largely on the correct laying procedure of materials and therefore it is essential that supervising engineers and work supervisors understand the basic mechanism and functionability as well as efficacy of the complete arrangement. The successful implementation is key to success of such new techniques.

ACKNOWLEDGEMENT

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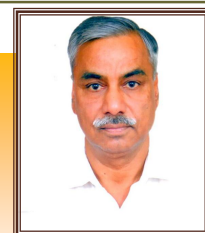
Detailed Project Report and other technical reports and drawings of Teesta- III project.

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CONGRATULATIONS

*National Disaster Management Authority, Ministry of Home Affairs, Government of India, New Delhi has commended **Shri B. D. Patni, Chief (Geology), NHPC Ltd.** for outstanding professional competence displayed in discharge of duties in connection with Disaster Response Operation at Zaskar Sub Division of Kargil during the clearance of blockage on River Phuktal during February and March 2015. ISEG family congratulates Shri Patni!*



25th APRIL 2015 NEPAL EARTHQUAKE: SOME SCIENTIFIC FACTS

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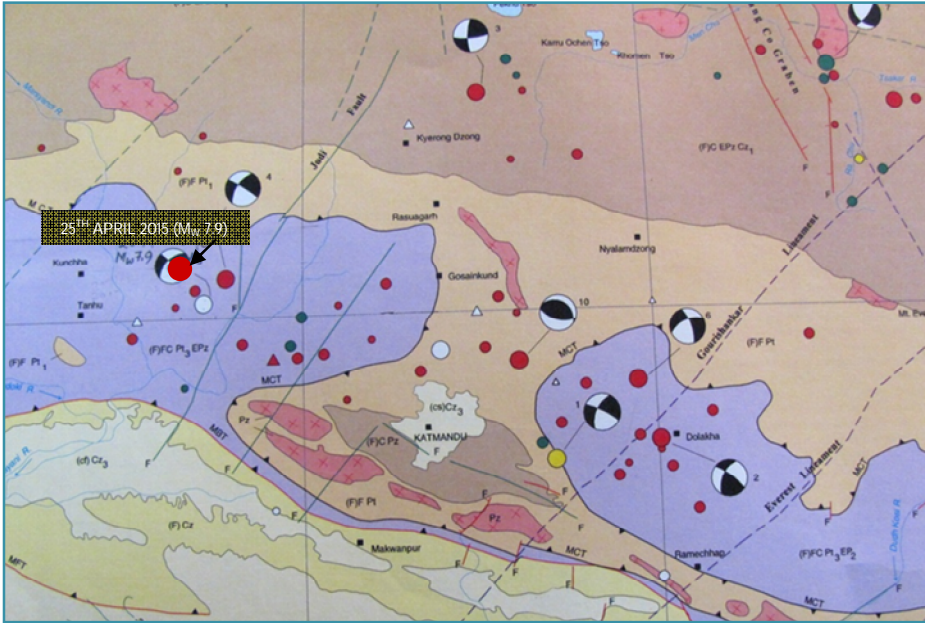


Figure 1: 25th April 2015 Nepal (Gorkha) Earthquake of Mw 7.9
(Seismotectonic Base: SEISAT, 2000)

Earthquake, a phenomenon occurring a thousand times a day somewhere or the other in the world, as powerful as the cumulative energy of thousands or more of nuclear devices exploding together, as unpredictable as the strike of a ruthless terrorist group, and repeating itself nauseatingly in different measures since time immemorial, though of great concern for the safety of the society, is understood only in patches and pieces. A hundred or so years ago, it was generally believed that earthquakes were free to happen anywhere and everywhere, regardless of any principles as far as their distribution in time, space and size were concerned. However, with advancement in our geological knowledge and more and more instrumental data getting available, it has been established that this abstract menace is an integral part of the earth's evolutionary process and obeys the laws of nature rather faithfully. The Indian subcontinent, responsible for some 5% of the global seismicity, has been a seat of several destructive earthquakes and the April 2015 Nepal event, christened by some as "Gorkha Earthquake", has become one among them.

The 25th April earthquake recorded a moment magnitude of 7.9 and occurred within a, so called, 700 km long seismic gap between the epicenters of 1905 and 1934 Great earthquakes of the Himalayan mobile belt, 77 km northwest of Kathmandu in Gorkha District. In fact, several researchers, including Prof. Roger Bilham, had made a prediction that a large earthquake was due in this region on the basis of strain budgeting. This earthquake, occurring around the surface trace of the Main Central Thrust (MCT) at a depth of 15 km shows a purely thrust type mechanism where the nodal planes strike WNW-ESE and one of the planes dips @ 10° towards north (Figure 1). This is much like most of the larger Himalayan earthquakes that have been found originating along a detachment surface. During 1975 and 1978, two earthquakes of magnitude +5 have been recorded around the same area.

The USGS site shows the peak accelerations in the epicentral zone as of the order of more than 0.4g where the seismic intensity could be X on the MSK scale. The peak spectral acceleration corresponding to 1 second period (resonance frequency of taller structures), has been shown as 0.1g near Gorakhpur and Muzaffarpur, nearly same as that at Kathmandu. However, the Kathmandu valley has repeatedly been subjected to heavy damage by earthquakes and in this regard the events of 1255, 1408, 1810, 1833, 1934 and the 2015 are significant. The reasons behind these accentuated damages are both geological and anthropogenic in nature, thriving in a high seismic hazard domain. The valley is composed of a thick pile of unconsolidated deposits of lacustrine and fluvial origins where certain frequency components of seismic waves

tend to get amplified and reverberate for a longer duration, and so induce stronger shaking. On top of it, the building typology and town layout are such that the vulnerability has increased manifold.

The geo-seismological studies of this mega-seismic event are yet to be initiated in the higher intensity zones where the human fatalities are reported to be around 10,000 with damage to nearly 5,00,000 housing units. The casualty figures have been less mainly because the main shock occurred at 11.41AM when most of the people were outside their dwellings. The co-seismic landslide and avalanche activity has been profuse and is yet to be mapped and assessed. We have, so far, not come across any report of ground rupture or tectonic deformation manifested on the surface. The pattern of aftershocks suggests that the rupture has propagated towards southeast direction with respect to the epicenter.

In certain sections of the Press it has been propounded that the worse, that is a still higher magnitude earthquake, is still to come in this area. I denounce such statements with all conviction. The large magnitude earthquakes are not daily affairs. It takes centuries for rocks to get strained to a level where it can give rise to an earthquake of this proportion on rupture of the locked fault surface. So, in this segment of the Himalaya, which could be of a length of 300 km or so, the activity will keep on tapering till it attains the ambient seismic level and the seismotectonic unit once again enters into the pre-seismic phase of strain accumulation from the post seismic phase, i.e. of the aftershocks. It is most natural for a magnitude 7.9 earthquake to give rise to prolific aftershock activity, which could last for a year or more. In the initial days following the main shock, the number of aftershocks could run into hundreds and quite a few could be of +6 and many of around 5 in magnitude.

Lately, we have started thinking in terms of scenario earthquakes. That is to say what would happen to the high population density habitations situated in the Indo-Gangetic plains in case of a Great Himalayan earthquake? The April 2015 Nepal earthquake, to our great relief, has unequivocally demonstrated that the seismic intensities would be attenuated substantially while travelling a distance of around 300 km and would get bereft of any such energy that could cause significant damage. My appeal to all, particularly those who are in positions to influence, is to understand the basics of earthquake science and help in mitigating the effects of the hazard.



ISEG NEWS

(A Biannual Newsletter of ISEG)

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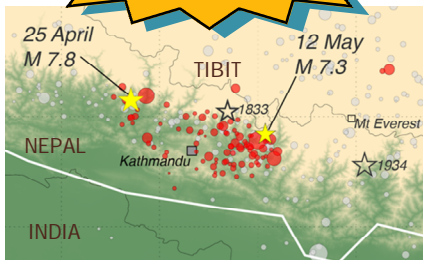
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EARTHQUAKE UPDATE



Another powerful earthquake occurred in Nepal on 12th May, 2015. As per the USGS earthquake hazard report published immediately after the earthquake on its website www.earthquakes.usgs.gov, it has a magnitude of 7.3 with epicenter located at 18.5km depth. This earthquake occurred about 150km east of April 25th event. Up to 12th May, 2015, there have been 94 aftershocks of the Gorkha earthquake having magnitude 3 or above and three of these have occurred since the M 7.3 May 12 event, which is the largest aftershock so far. Most of the aftershocks have occurred towards south east of the main event (refer above picture from USGS).

This region of Nepal has a history of large earthquakes. The earliest known is 1833 earthquake which occurred very close to present one. Bihar-Nepal Earthquake of 1934 of 8.0 magnitude occurred south-east of present earthquake.

ENGINEERING GEOLOGICAL ASPECTS OF NEPAL EARTHQUAKE

IAEG has put up a report **"A Quick Report on the 2015 Gorkha (Nepal) Earthquake and its Geo-engineering Aspects"** authored by Prof. Ömer Aydan, University of the Ryukyus, Dept. of Civil Engng. & Architecture, Okinawa, Japan and Prof. Resat Ulusay, Hacettepe University, Dept. of Geological Engg., 06800 Beytepe, Ankara, Turkey.

It is interesting to note from the report that estimated magnitude of the earthquake varies from 7.7 to 7.9 depending upon the institutes. USGS assigned the moment magnitude of the 2015 Gorkha (Nepal) earthquake as 7.8. The epicenter of the earthquake is located in Gorkha district near Barpak village 77 Km north-west of Kathmandu. Barpak village has been completely destroyed. However, the epicenter as estimated by Harvard is very close to Kathmandu. The rupture plane it appears has travelled from Gorkha district towards east and hence the intensity maps show more damage in the eastern side from epicenter. The preliminary intensity maps on MMI scale report intensity VIII for Kathmandu while it may be IX or X near epicenter when more information from Gorkha district emerges. According to the report Kanti-Path (Kathmandu) recorded the maximum ground acceleration of 0.164g. As Kathmandu valley is full of alluvium it is also likely that the same has contributed in amplification and shaking of the valley floor. While it may be early to comment, according to USGS, the Peak Ground Acceleration (PGA) in the epicentral area was about 0.35g. However, these values are subject to further confirmation.

According to report by Prof. Aydan and Prof. Ulusay, a number of mass movements have taken place in Nepal destroying many habitations and cultivated land. Some liquefaction occurrences are also indicated from Kathmandu valley. However detailed studies are awaited in this regard. There are many damages reported to roads also. Two bridges in Kathmandu city, a simple double span reinforced concrete structure and single span truss bridge in Gorkha district have remained intact and are in fact functional.

No damage to dams in Nepal has been reported as yet although two casualties are reported at under construction *Rasuwagadhi* hydropower dam due to falling of rocks. NHPC has two projects in Sikkim *Rangit* and *Teesta V* with concrete gravity dams of 45m and 87m height respectively. No damages are reported to these structures which are about 375-390km from the epicenter.

The damage to buildings and ancient structures in Kathmandu are well known and have been described in detail in the report by IAEG. They are available elsewhere in the media also.

The above facts indicate that engineered structures with adequate seismic safety provisions have either suffered no or minimal damage. Detailed reports are, however, awaited from Nepal.

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Editorial Team, ISEG

