igs
INDIA

Training Courses on
Applications of Geosynthetics

Indian Chapter of International Geosynthetics Society

C/o Central Board of Irrigation and Power
Plot No. 4, Institutional Area
Malcha Marg, Chanakyapuri
New Delhi 110 021

1. ABOUT INDIAN CHAPTER OF IGS

In the year 1985, Central Board of Irrigation and Power, (CBIP) as part of its technology forecasting activities identified geosynthetics as an important area relevant to India's need for infrastructure development, including roads. After approval of IGS Council for the formation of Indian Chapter in October 1988, the Indian Chapter of IGS was got registered under Societies Registration Act 1860 of India, with its Secretariat at Central Board of Irrigation and Power.

The activities of the Society are governed by General Body and Executive Board.

1.1 Executive Board of Indian Chapter of IGS

President

Dr. G.V.S. Suryanarayana Raju, Former Engineer-in-Chief, Roads & Buildings Department, Government of Andhra Pradesh

Vice-President

Mr. M. Venkataraman, Geotechnical and Geosynthetic Consultant

Immediate Past President

Dr. K. Rajagopal, Professor, Department of Civil Engineering, IIT Madras

Hon. Member

Dr. G.V. Rao, Former Professor, Department of Civil Engineering, IIT Delhi

Members

- Mr. C.D. **Athul Raj**, Business Development Manager, Charankattu Coir Mfg. Co. (P) Ltd.
- Mr. Shahrokh **Bagli**, Chief Technical Officer, Strata Geosystems (India) Pvt. Ltd.
- Dr. K. **Balan**, Dean (PG & Research), Rajdhani Institute of Engineering and Technology, Trivandrum (Kerala)
- Dr. R. **Chitra**, Joint Director, Central Soil & Materials Research Station
- Ms. Minimol **Korulla**, Vice President, Maccaferri Environmental Solutions Pvt. Ltd.
- Mr. T. **Kulkarni**, Vice President-Marketing, Sales & Designs, Garware-Wall Ropes Ltd.
- Dr. Jimmy **Thomas**, Consultant (Geosynthetics), Kochi (Kerala)
- Mr. Saurabh D. **Vyas**, Head-Technical Services, Techfab (India) Industries Ltd.

Member Secretary

Mr. V.K. Kanjlia, Secretary, Central Board of Irrigation & Power

Treasurer

Dr. G.P. Patel, Director (WR), Central Board of Irrigation & Power

1.2 Past Presidents

- Dr. R.K. Katti, Director, UNEECS Pvt. Ltd. and Former Professor, IIT Bombay
- Mr. H.V. Eswaraiah, Technical Director, Karnataka, Power Corporation Ltd.
- Dr. G.V. Rao, Professor, Department of Civil Engineering, IIT Delhi
- Dr. D.G. Kadade, Chief Advisor, Jaiprakash Industries Ltd

In the year 1985, the Central Board of Irrigation and Power (CBIP) as part of its technology forecasting activities identified geosynthetics as important and relevant to India's need for infrastructure development.

2. MEMBERSHIP OF INDIAN CHAPTER OF IGS

2.1 Membership Categories and Subscriptions

Individual Members for 01 Calendar year	Rs. 2,500.00
Individual Members for 05 Calendar years	Rs. 12,500.00
Individual Members for 10 Calendar years	Rs. 25,000.00
Institutional Membership for 01 Calendar year	Rs. 25,000.00
Institutional Membership for 02 Calendar years	Rs. 45,000.00
Institutional Membership for 03 Calendar years	Rs. 60,000.00

2.2 Benefits to Members

2.2.1 *Institutional Members*

- 4 representatives to be made individual members of Indian Chapter and IGS, free from payment of individual membership fee of Indian Rs.2,500/- per member.
- one copy each of the publications brought by the Indian Chapter during the period of membership
- discount in registration fee to each of the representatives in each event to be organised by the Indian Chapter
- right of using the Indian Chapter logo at exhibitions and in promotional literature
- priority (by seniority) at all exhibits organised by Indian Chapter
- possibility of joining a specific international committee in order to discuss topics of common interest
- Promotion of activities through Indian Journal of Geosynthetics and Ground Improvement

2.2.2 *Individual Members/Representatives of Institutional Members*

- IGS NEWS, published three times a year, and Indian Journal of Geosynthetics and Ground Improvement, published two times a year;
- information on current test methods and standards
- preferential treatment at conferences organised by IGS (India) and IGS or under its auspices;
- Possibility of being granted an IGS award.

- discount rates:
  - for any document published in the future by IGS and IGS (India)
  - at all international, regional or national conferences organised by IGS (India) and IGS or under its auspices
  - for the subscription of the journal "Geotextiles and Geomembranes"
  - for the subscription of the journal "Geosynthetics International"

3. SOME IMPORTANT PUBLICATIONS OF INDIAN CHAPTER OF IGS

- Use of Geosynthetics – Indian Experiences and Potential – A State of Art Report (1989)
- Use of Geotextile in Water Resources Projects - Case Studies (1992)
- Role of Geosynthetics in Water Resources Projects (1993)
- Monograph on Particulate Approach to Analysis of Stone Columns with & without Geosynthetics Encasing (1993)
- An Introduction to Geotextiles and Related Products in Civil Engineering Applications (1994)
- Ground Improvement with Geosynthetics (1995)
- Geosynthetics in Dam Engineering (1995)
- Erosion Control with Geosynthetics (1995)
- Bibliography – The Indian Contribution to Geosynthetics (1997)
- Waste Containment with Geosynthetics (1998)
- Case Histories of Geosynthetics in Infrastructure Projects (2003)
- Geosynthetics – Recent Developments (Commemorative Volume) (2006)
- Geosynthetic Reinforced Soil Structures - Design & Construction (2012)
- Applications of Geosynthetics in Railway Track Structures (2013)
- Silver Jubilee Celebration (2013)
- Directory of Geosynthetics in India (2013)
- Three Decades of Geosynthetics in India – A Commemorative Volume (2015)
- History of Geosynthetics in India - Case Studies (2016)
- Coir Geotextiles (Coir Bhoovastra) for Sustainable Infrastructure (2016)

4. APPLICATIONS &FUNCTIONS OF GEOSYNTHETICS

4.1 Applications

Over last three decades, extensive dissemination of information regarding use of geosynthetics in civil engineering in India was made through publications and training courses/seminars, both at National and International levels.

Geosynthetics are now being increasingly used the world over for every conceivable application in civil engineering, namely, construction of dams, embankments, canals, approach roads, runways, railway embankments, retaining walls, slope protection works, drainage works, river training works, seepage control, etc. due to their inherent qualities. Some of the functions of Geosynthetics are:

Geosynthetics in Hydraulic Projects

Geosynthetics can increase the stability of the hydraulic structures. For hydraulic structures, geosynthetics can be used to reduce or prevent water infiltration through the use of geomembranes, reduce or prevent bank erosion of canals through the use of geomembrane liners, provide drainage and/or filtration through the use of geotextiles and geonets and provide reinforcement for the structure's foundation or the structure itself by using geogrids.

Geosynthetics in Slopes over Stable Foundations

Layers of geosynthetic reinforcement are used to stabilize slopes against potential deep-seated failure using horizontal layers of primary reinforcement. The reinforced slope may be part of slope reinstatement and (or) to strengthen the sides of earth fill embankments. The reinforcement layers allow slope faces to be constructed at steeper angles than the unreinforced slope. It may be necessary to stabilize the face of the slope (particularly during fill placement and compaction) by using relatively short and more tightly spaced secondary reinforcement and (or) by wrapping the reinforcement layers at the face. In most cases the face of the slope must be protected against erosion. This may require geosynthetic materials including thin soil-infilled geocell materials or relatively lightweight geomeshes that are often used to temporarily anchor vegetation.

Geosynthetics in Reinforced Soil Structures

Horizontal layers of geosynthetic reinforcement can be included with retaining wall backfills to provide a reinforced soil mass that acts as a gravity structure to resist the earth forces developed behind the reinforced zone. Reinforcement types are geogrid, woven geotextile and polyester strap. The local stability of the backfill at the front of the wall is assured by attaching the reinforcement to facing units constructed with polymeric, timber, concrete or metallic wire basket materials comprised of a variety of shapes. In North America it has been shown that reinforced soil walls can be constructed at 50% of the cost of conventional gravity wall structures.

Geosynthetics in Road Engineering

Geosynthetics can be effectively used to reduce or avoid reflective cracking, work as a barrier to avoid pumping of soil fines, reduce asphalt cap thickness, reduce pavement thickness and increase the lifetime of the pavement.

It can also be used in drains and filters, in addition or substitution to granular materials, as Geosynthetics are easier to install in comparison to granular materials.

Geosynthetics in Embankments on Soft Soils

The use of geosynthetics to improve embankment stability is one of the most effectives and well-tried forms of the soil reinforcement technique.

Geosynthetics in Erosion Control

Geosynthetics can be used for erosion control in works such as Slope Protection, Waterways, Shoreline Protection, Scour Protection, Weirs and Embankments, etc.

Geosynthetics in Railways

Geosynthetics may perform functions of filtration, drainage and soil reinforcement in new track construction or rehabilitation. In railroad construction, geosynthetics may be installed within or beneath the ballast or sub-ballast layers.

4.2 Functions

Filtration: The geosynthetic acts similar to a sand filter by allowing water to move through the soil while retaining all upstream soil particles.

Drainage: The geosynthetic acts as a drain to carry fluid flows through less permeable soils. For example, geotextiles are used to dissipate pore water pressures at the base of roadway embankments. For higher flows, geocomposite drains have been developed. These materials have been used as pavement edge drains, slope interceptor drains, and abutment and retaining wall drains. Prefabricated vertical drains (PVDs) have been used to accelerate consolidation of soft cohesive foundation soils below embankments and preload fills.

Reinforcement: The geosynthetic acts as a reinforcement element within a soil mass or in combination with the soil to produce a composite that has improved strength and deformation properties over the unreinforced soil. For example, geotextiles and geogrids are used to add tensile strength to a soil mass in order to create vertical or near-vertical changes in grade (reinforced soil walls).

Reinforcement enables embankments to be constructed over very soft foundations and to build embankment side slopes at steeper angles than would be possible with unreinforced soil. Geosynthetics (usually geogrids) have also been used to bridge over voids that may develop below load bearing granular layers (roads and railways) or below cover systems in landfill applications.

Fluid/Gas (barrier) containment: The geosynthetic acts as a relatively impermeable barrier to fluids or gases. For example, geomembranes, thin film geotextile composites, geosynthetic clay liners (GCLs) and field-coated geotextiles are used as fluid barriers to impede flow of liquid or gas. This function is also used in asphalt pavement overlays, encapsulation of swelling soils and waste containment.

Erosion control : The geosynthetic acts to reduce soil erosion caused by rainfall impact and surface water runoff. For example, temporary geosynthetic blankets and permanent lightweight geosynthetic mats are placed over the otherwise exposed soil surface on slopes. Geotextile silt fences are used to remove suspended particles from sediment-laden runoff water. Some erosion control mats are manufactured using biodegradable wood fibres.

Others: Geotextiles are also used in other applications. For example, they are used for asphalt pavement reinforcement and as cushion layers to prevent puncture of geomembranes (by reducing point contact stresses) from stones in the adjacent soil, waste or drainage aggregate during installation and while in service. Geotextiles have been used as daily covers to prevent dispersal of loose waste by wind or birds at the working surface of municipal solid waste landfills. Geotextiles have also been used for flexible concrete formworks and for sandbags. Cylindrical geotubes are manufactured from double layers of geotextiles that are filled with hydraulic fill to create shoreline embankments or to dewater sludge.

5. TRAINING COURSES

CBIP and Indian Chapter of IGS are organizing the training courses, for the specific needs of the concerned organizations.

The courses can be conducted as per the convenient location of the user agency.

The training courses are of minimum of two days' duration, starting with Introduction to Geosynthetics, and covering the topics like Materials Used for Manufacture of Geosynthetics and Related Products; Properties, Testing and Evaluation, Classification of Geosynthetics, Multiple Applications of Geosynthetics, and Safety Aspects of Structures with Geosynthetics

5.1 Topics Proposed for Training

5.1.1 Hydraulic Structures

5.1.2 Ground Improvement

5.1.3 Slope Stability

5.1.4 Erosion Control

5.1.5 Reinforced Soil Structures

6. CONTACT PERSON AT INDIAN CHAPTER OF IGS

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