



Newsletter

Volume – 29

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CBRI, (CSIR) Roorkee – 247 667

Research In Progress

Augmentation of Storage Capacity of Red Mud Pond at Renukut

Thermal power stations are using pulverized coal as fuel, producing enormous quantities of ash as a by product of combustion. Presently the country is producing ash to the tune of about 110 million tons

every year, out of which about 23% of ash is used. Still about 77% of ash is left out as unused solid industrial waste. Similarly large amount of red mud is left when bauxite is used as a raw material in the manufacturing of aluminum. Unfortunately red mud in this country like other countries does not find any use and is dumped as waste material. Use of ash and red mud as resource material for embankment construction not only reduces environmental pollution, it is also helpful in promoting sustainable development by avoiding unnecessary use of natural soil. For laboratory evaluation of engineering parameters both these major industrial wastes e.g. red mud and ash was collected by CBRI Roorkee from a large aluminium manufacturing industry. The samples were tested after mixing homogeneously different percentage of ash and red mud in the laboratory. The tests were carried out to determine the geotechnical parameters. e.g. consolidations, permeability, specific gravity, shear & index properties etc.

An experimental program was carried out to find the optimum mix of red mud and ash so as to utilize the same for the construction of embankment. Particle size analysis, Proctor density test, Direct Shear test, Permeability and Consolidation test were carried out in the laboratory. The Shear test and Consolidation test were carried out using red mud and ash in the ratios of Ash : Red mud :: 50% : 50%, 70% : 30%, 30% : 70%, 60% : 40% and 40% : 60%.

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The embankment design was checked against slope failure. Limit equilibrium and seismic stability analysis were carried out to check the stability of the embankment.

Huge quantity of red mud and ash could be gainfully utilised. Time and money for transporting good quality of soil and or rock fragments from the borrow pit area other wise required for raising the embankment height could be saved.

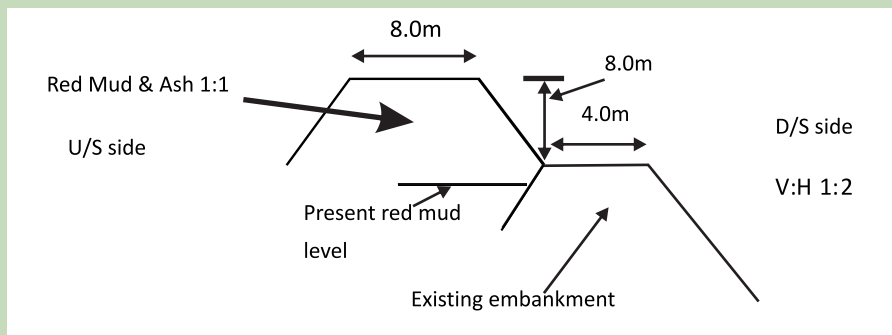


Fig. 1: Schematic diagram of red mud pond Embankment

Evaluation of Rock Discontinuities for Slope Instability Assessment

The present study deals with analysis of various discontinuity parameters of road cut slopes in Himalaya for slope stability assessment of rock slopes. Two rock mass classification systems Rock Mass Rating (RMR) and Geological Strength Index (GSI) were studied in detail for rock mass characterisation. GSI is generally used to obtain a first estimate of rock mass properties based on the engineering geological data which gives a range of GSI values. However, some modifications were suggested to the GSI system by several researchers in order to provide more quantitative basis for evaluating the GSI values. Application of GSI, which is based on blockiness of the rock mass and surface condition of discontinuities, is found to be very useful to classify rock mass in the field.

In the present study GSI for rock slopes were obtained using the original GSI chart (Hoek and Brown, 1997) and the modified quantitative GSI proposed by Sonmez and Ulusay (2002). It was found that the specific GSI values obtained using the modified approach lie well within the GSI range obtained using

the original GSI chart but there is no definite trend observed when specific GSI values were compared with corresponding GSI range. However, it is possible and advisable that along with a GSI range a precise GSI value should be assigned to a rock mass.

GSI values were compared with RMR values for the 50 slopes in which RMR_{basic} (i.e., without joint orientation) was considered with ground water condition equal to 0. The data shows that RMR is little higher than the GSI as suggested by the earlier workers. The relation between GSI and RMR obtained from the study is shown in the Fig. 2. From this relation GSI can be correlated with RMR as $GSI = RMR - 9$ for the road cut slopes in Himalayas. However, more case studies are needed to establish the relation. GSI can be used to estimate RMR and thus can be used to estimate rough approximation of cohesion and internal friction which provide important inputs for slope stability analysis tunnel designing.

From the specific GSI values obtained in the study, it can be inferred that in general GSI for disintegrated structure is <25, for blocky disturbed 25-45, for very blocky 45-65, for blocky 65-80 and for massive >80. Examples of types of rock mass structures are shown in the Fig. 3. However, there is a considerable scope for modification of GSI system based on more case studies.

In the present study Slope Mass Rating (SMR) is employed to assess slope stability which uses RMR and discontinuity orientation data. It is observed that in some slopes SMR is very low even if RMR and GSI are considerably high which shows that even if the slopes have considerable good rock mass quality but

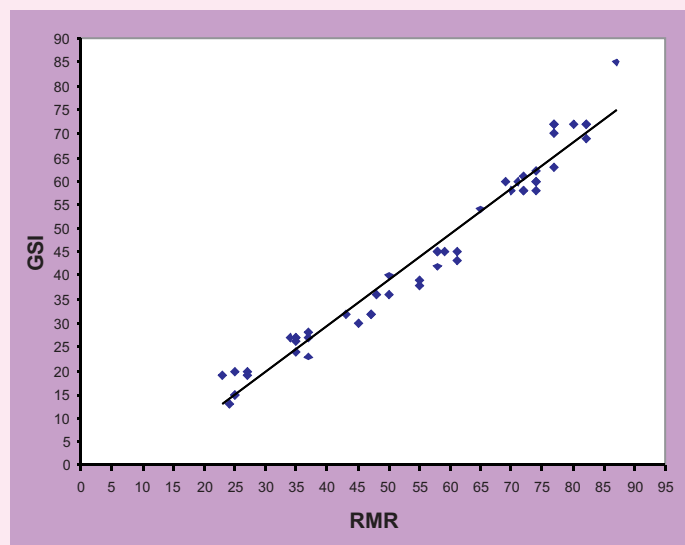
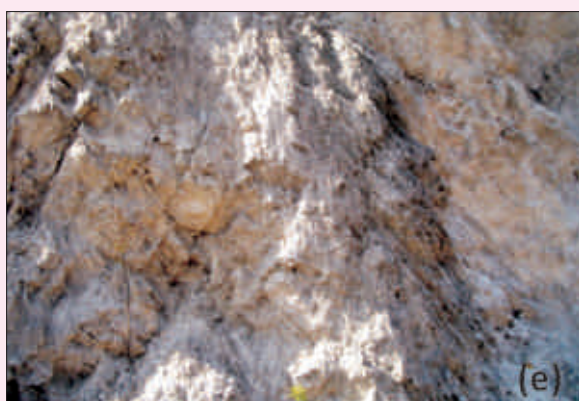


Fig. 2 : RMR and GSI for 50 road cut slopes



- (a) Massive structure
- (b) Blocky structure
- (c) Very blocky structure
- (d) Blocky disturbed structure
- (e) Disintegrated structure

Fig. 3: Types of Rock Mass Structures considered in the Study
due to unfavorable discontinuity orientation their could be potential for slide. This indicates how joint orientation governs stability of rock slopes. For the unstable rock slopes among the studied slopes, a few possible protection measures has been suggested.

High Capacity Gypsum Calcinator for Small Scale Industry

The Institute has done pioneer work in the field of development of gypsum calcinator in the country. The batch type gypsum calcinator developed few years back with the primary aim of replacing the traditional open pan method with an energy efficient system using fossil fuel having capacity of producing of 8 tonnes plaster of Paris per day (8TPD). Techno-economic feasibility of this calcinator has been found to be well established. A large number of these calcinators have been successfully installed in different parts of the country & producing plaster of Paris based on CBRI know-how.

There is a need to design a gypsum calcinator for production of gypsum plaster of consistent quality using the ground gypsum (natural/by-product gypsum) having higher capacity. To meet the requirements of small scale industry a gypsum calcinator having 20 TPD capacity has been designed which utilizes heat efficiently from flue gases passing over the sides of pan, by providing broken transverse ribs on the periphery of the pan. The designed system shall produce 20 TPD gypsum plaster of consistent quality and is of modular type (Fig. 4). The calcinator consists of following components :

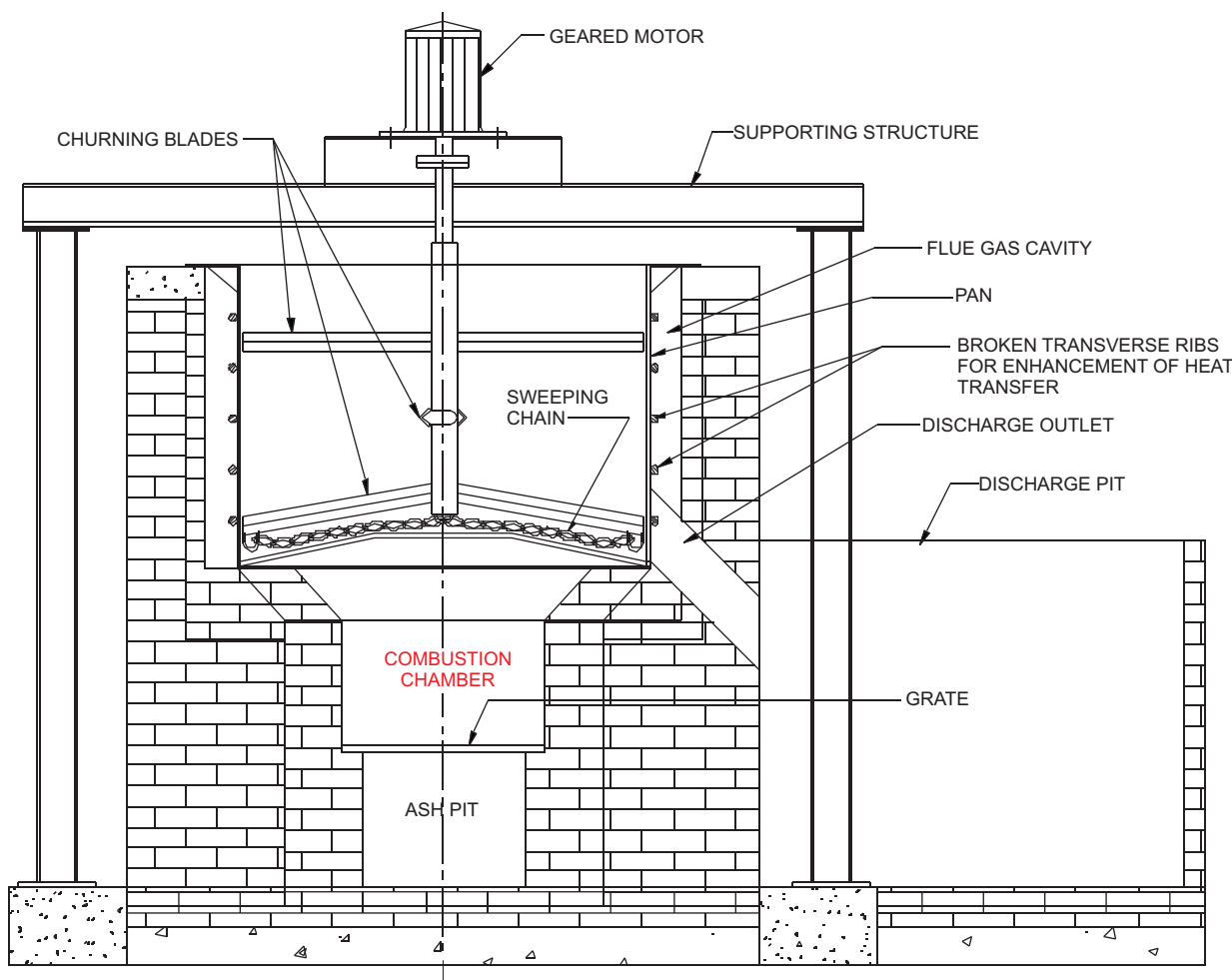


Fig. 4: Sectional View of Calcinator

Furnace for liquid fuel/gaseous fuel firing
 Pan with the broken transverse ribs at its periphery
 Power operated churning mechanism
 Temperature sensing and monitoring device
 Supporting structure for mounting shell, churning mechanism.

Salient Features

- ❖ Low fuel consumption as compared to conventional methods
- ❖ Temperature control ensures uniform quality plaster

- ❖ Power churning maintains uniform temperature of charge during calcination.
- ❖ Design of calcinator suitable for coal, liquid and gaseous fuel
- ❖ Dustless automatic discharge of hot calcined gypsum
- ❖ Suitable for calcining gypsum for building, pottery, ceramic & surgical grade plaster.

The envisaged impact of the outcome of the R & D work is to provide technology for 20 tons per day capacity gypsum calcinator to produce Plaster of Paris.

Numerical Investigation of the Lateral Response of Pile Groups under Combined Loading

Piles have been one of the oldest and versatile foundations used in variety of soil conditions. In general, these foundations are the most preferred in weak soils or in heavily loaded structures (Fig. 5). Larger lateral loads may act on foundations of structures such as transmission line towers, over head water tanks, bridge abutments, high-rise buildings, coastal and offshore structures. Based on the specific

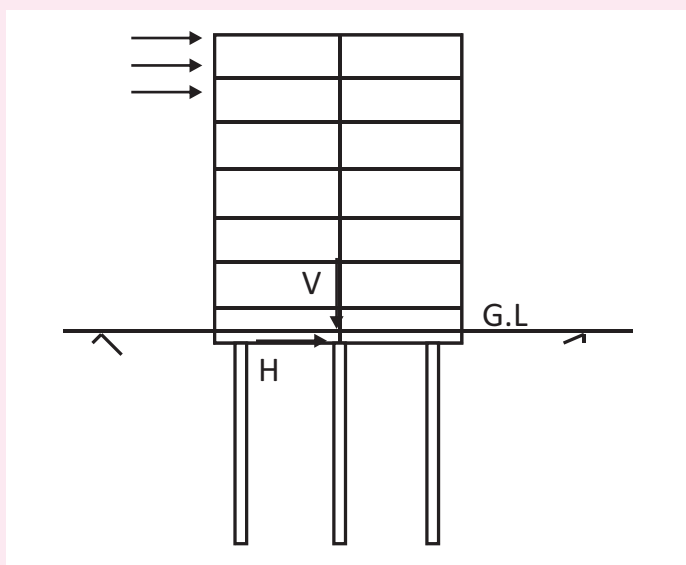
application, these piles are subjected to loading conditions of different magnitudes and in different directions. The loads could be in the form of self weight of the super structure, uplift pressures beneath and from the surrounding soils, wind loads, seismic loads, loads due to waves and currents, differential water and earth pressures etc. The loading on the pile foundations may be predominantly vertical, predominantly lateral or

combination of vertical and lateral loads. In view of this, most of the pile-supported structures are subjected to the combined action of vertical and lateral loads rather than pure vertical or pure lateral loads.

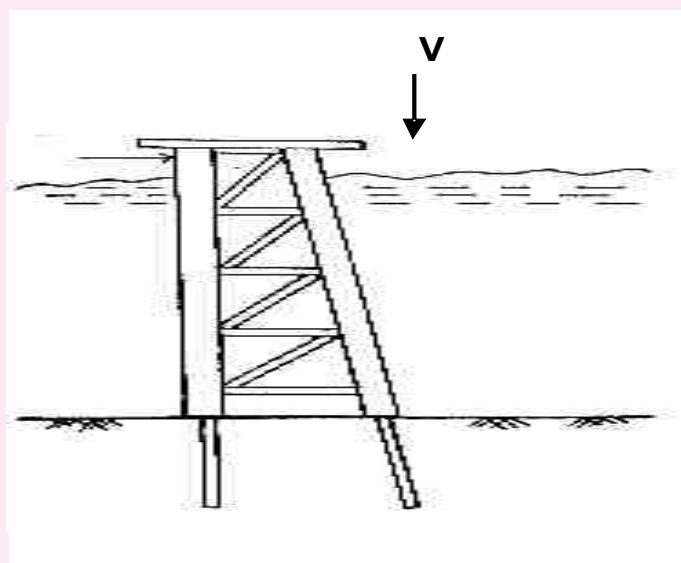
According to the current practice, the pile foundations are independently analyzed for the vertical loads to determine their bearing capacity and settlement and for the lateral loads to assess their flexural behaviour. In situations where the lateral loads are significantly high; the interaction effect due to the combined action of vertical and lateral loads can become critical. As such, no reliable or rational method is available for analyzing the lateral response of piles under combined vertical and lateral loading.

In field practice, pile foundations are generally grouped together with two or more piles in different

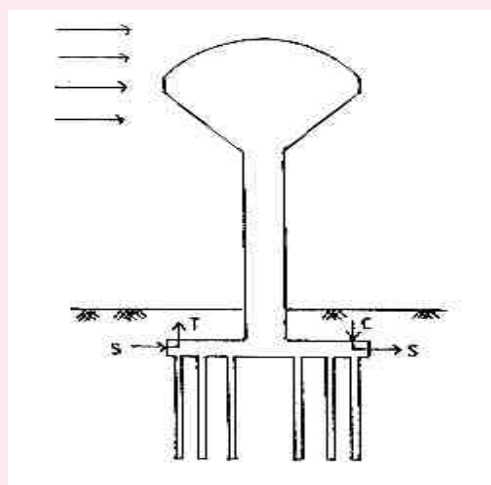
configurations. The lateral load capacity of pile group is dependent on the c/c spacing between the piles and the type of soil. Piles are grouped with different configurations in such a manner that optimal performance of the group can be achieved. The c/c spacing between the piles to achieve the optimal performance of the group is defined as critical spacing. Several investigators have studied the critical spacing to achieve optimal performance of the pile group under pure lateral loads. However, there are very limited investigations on the pile groups subjected to combined vertical and lateral loading. Since piles are not often structurally designed to resist lateral loads, the lateral response of piles is more critical and interesting for design engineers. Accordingly, this study was aimed to investigate the lateral response of pile groups under combined loading by arriving at an improved design procedure.



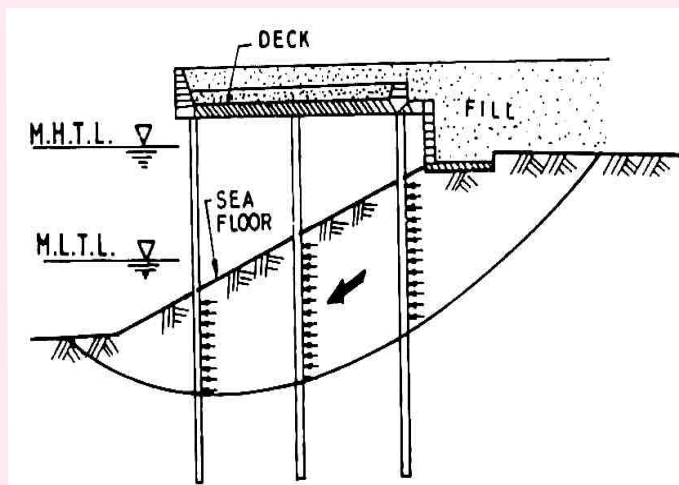
High rise buildings



Offshore structure



Over head water tank



Berthing Structure

Fig. 5: Typical field cases of piles subjected to combined vertical and lateral loads

A series of 3-dimensional FEM analysis have been performed to study the response of pile groups under pure lateral loads as well as under the influence of combined vertical and lateral loading. The analysis was performed in two stages. In the first stage, vertical loads on the pile group were applied. Then in the second stage, the vertical loads were kept constant and equal lateral deformations were applied to the nodes on the pile top surface. During this phase, the vertical deformations of the pile head nodes were kept constant to prevent the rotation of the pile cap. This process of analysis corresponds to a rigid fixed pile cap that does not rotate during lateral translation.

Fig. 6 shows the typical lateral load – deflection curves of pile groups in sand with respect to two different pile

configurations such as piles in series and piles in parallel arrangements within the group. In general, it can be seen from the figure that the lateral load corresponding to specific lateral deflection level of pile group increases with the increase in vertical load levels. Further, it can be seen that the influence of combined loading is more significant in the case of parallel arrangement of the piles than in the case of series arrangement of the piles within the group. The outcome from the study would leads to new understanding of the laterally loaded behaviour of pile groups. Also, it would be useful for the development of new design guidelines of pile groups by incorporating the influence of combined loading, which is currently not followed in practice.

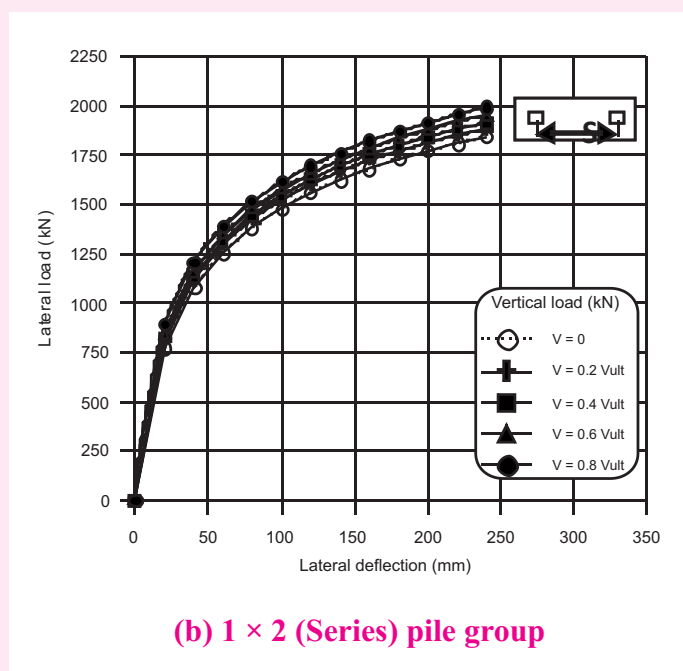
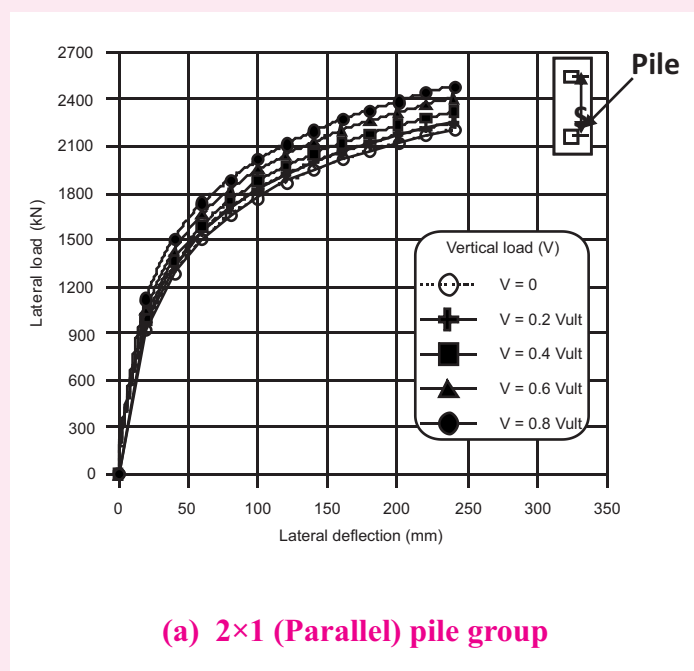


Fig. 6 (a-b) : Lateral load – deflection curves of pile groups in sand with respect to two different arrangements of piles within the group

CBRI launched POST GRADUATE COURSE on Engineering of Infrastructure (Buildings/ Roads) and Disaster Mitigation

In consonance with the approval of the Govt. of India accorded to Council of Scientific and Industrial Research (CSIR) for setting up an Academy named 'Academy of Scientific and Innovative Research (AcSIR)' for conducting Post Graduate courses, the Central Building Research Institute (CBRI) along with the Central Road Research Institute (CRRI) launched a two years long Post Graduate course on "Engineering of Infrastructure (Buildings/Roads) and Disaster Mitigation" (EIDM) on 9th August 2010 at CBRI Roorkee campus.

The course is appropriate, relevant and timely because of the growing demand in the area of Infrastructure &

Disaster Mitigation. The course focuses on the engineering of basic infrastructure e.g. Building and Road. In view of the huge shortage of housing in the country and the growth in the surface transportation sector, the course is appropriate and will help in developing the required kind of human resources to address the complex problems of disaster mitigation and engineering of basic infrastructure. The course will also address effects of earthquake, landslide, cyclone and fire disasters on infrastructural systems and the remedial measures. The course is so designed that it is unique and no other Institutions in the country offer such programmes. The programme will benefit



programme for the students was held on 9th August 2010. The basic philosophy of launching the Post Graduate Research Programme in Engineering (PGRPE) by CSIR and the course on EIDM by CBRI was elaborated by the Director of the Institute, Prof. S. K. Bhattacharyya. While welcoming the students in the campus, he reminded them about their duties and responsibilities. A brief about the Institute was presented by Mr. A. Ghosh, Dean of the PG Programme and subsequently the divisional activities were presented by the Scientist Co-ordinators of different divisions. Scientists from the Central Road Research Institute (CRRI), New Delhi joined the orientation programme through video conferencing. The presentations were followed by laboratory visit and an interactive session with the students.

The day long programme was concluded in the evening and the regular classes have commenced from 10th August 2010.

immensely because of the available facilities and expertise in the two laboratories of CSIR, namely CBRI and CRRI.

Eight students from different corners of the country have joined the programme. The orientation

Technical Training for Entrepreneurship Development on Low Cost Housing Technologies

A Technical Training for Entrepreneurship Development on Low Cost Housing Technologies from 5th to 9th July, 2010 was organised for 25 trainee students of diploma in Civil Engineering who had registered for six weeks EDP training with National Entrepreneurship Development Institute (EDI), Roorkee

The programme was inaugurated by Prof. S.K. Bhattacharyya, Director, CBRI, Roorkee and attended by Sh. Chanchal K. Singh, Project Officer & Sh. S. Sharma (EDI, Roorkee), Er. S.G. Dave, Scientist 'G' & Course Coordinator and other faculty Scientists of CBRI, Roorkee. In his remarks, Director, CBRI informed the contribution of CBRI in R&D on housing technologies & also expressed that such training will help the students to improve their skill and also in better understanding of newer technologies for proper implementation in field and escalation in entrepreneurship opportunities.

Er. S.G. Dave, the course coordinator informed the trainees about R&D achievements of CBRI & highlighted the technologies successfully exploited at commercial level. He also briefed on mission CSIR : 800 and its objectives and achievements so far.

Sh. Chanchal K. Singh briefed on objectives of the Training cum Entrepreneurship Development Program as to develop skilled & trained manpower confident of implementing the low cost construction technologies in field and also to promote



development, production, and large-scale application of cost-effective innovative building materials and construction technologies in housing construction.

CBRI Faculty included Er. S.G. Dave, Ar. R.K. Garg, Er. S.K. Singh, Er. Ajay Chourasia, Dr. L.P. Singh, Sh. Nadeem Ahmad, Scientists and Sh. K.L. Chhabra & Shri Rajeev, Technical Officers for presentation & demonstration of several technologies including Low Cost Housing and Sanitation Technologies, Improved Brick Production Technologies, Prefabricated Building Technologies, Disaster Resistant Housing Technologies, Ferro-cement Products & Application and Quality Assurance Control and Technologies available for commercial exploitation by the entrepreneurs.

In a problem solving session open discussion among trainees and faculty took place & trainees were quite enthusiastic and exchanged several queries from the

CBRI Scientists. The trainees sought full details on the various areas.

While Chairing the concluding session, Er. S.G. Dave informed that future of Civil Engineers is bright in both entrepreneurship and service sector. The engineer entrepreneurs can serve the nation, his



family and a society by creating good employment opportunities in the region and also by making significant contribution in making construction of good quality, economy, durability using optimal resources and appropriate technologies. The organizers extended their thanks to the Director & faculty members of CBRI and praised for devotion of their time for this noble cause.

Independence Day



The Independence Day was celebrated at the Institute on August 15, 2010. Prof. Sriman Kumar Bhattacharyya, Director unfurled the National Flag and addressed the members of the staff. The CBRI staff club distributed sweets on the occasion.



Hindi Week

Hindi Week was celebrated in CBRI, Roorkee from 8th to 14th Sept.'10. Dr. Sudha Rani Pandey, Vice Chancellor, Uttarakhand Sanskrit University, Haridwar graced the occasion as Chief Guest on Inauguration & the Celebration was presided over by Prof. S.K. Bhattacharyya, Director, CBRI.

During the Week, Hindi Noting & Drafting Competition was held on 9th September and another competition of Hindi Essay Writing on **"Rajbhasha: Hindi Hi Kyon?"** on 10th Sept 2010. In the series of competitions, Hindi Vocabulary & Usages of Hindi Words competition was organized. S/Shri Aman Kumar, Alok Sharma, Arpan Maheshwari, HC Madan, PKS Chauhan, Sudhir Kumar, S.K. Senapati & Rajinder Kumar won the prizes in these Hindi Competitions.

On 14th Sept. 2010, Hindi Week was concluded and

Prof. Col. Swatantra Kumar, Vice-Chancellor, Gurukul Kangri University, Haridwar graced as Chief Guest & the function was Chaired by the Director, Prof. SK Bhattacharyya. The entire celebration of the Hindi Week was very successfully organised under the Chairmanship of Dr. B. Singh, Scientist F & Convener Shri R.C. Saxena, Sr. Hindi Officer.



CSIR Foundation Day

The Institute observed 'Open Day' on September 26, 2010 to commemorate the Foundation Day of Council of Scientific and Industrial Research. The Institute was kept open to the public and invitations were sent to schools to send their children to interact freely with the scientists of the Institute.

Padam Shree Prof. K.L. Chopra, Former Director, IIT Kharagpur graced the occasion as Chief Guest and congratulated scientists and staff members of the Institute for carrying out various R&D programmes concerning with the Building Science & Technology. The R&D work of CBRI has benefited the society, particularly the rural people of the country. He emphasized that the research should be in consultation with the need of masses and environmental friendly. He also showed his concern towards the ethical values diminishing in the area of scientific research. Prof. Prem Krishna, Chairman, Research Council, CBRI, Roorkee graced the occasion as Guest of Honour and drew attention on the problem of Global Warming. He also emphasized that the scientists in the Institute should choose a few areas and work towards excellence in those.

In his Presidential address, Prof. S.K. Bhattacharyya, Director, CBRI welcomed the Chief Guest and Guest of Honour and highlighted the Institute's R&D activities, after explaining the importance of CSIR in the Country's need since its inception. He mentioned that our former leaders had envisioned the need of scientific research and several scientific research establishments were established in the country including CSIR. He informed that a PGRPE course on **"Engineering of Infrastructure (Buildings/Roads) and Disaster Mitigation"** has been started from this year in the Institute and eight students have been enrolled.

Prof. S.K. Bhattacharyya apprised that the Scientist of CBRI and other CSIR labs are facing a great challenge to keep pace with the development in different parts of the globe and it is indeed a matter of



great satisfaction that our country is now considered as one of the greatest resources of the world market as the Scientists of this country have proved their worth. CBRI is one of those labs which is directly concerned and connected with the upliftment of common people because shelter is considered as one of the basic needs. CBRI has always played a vital role in finding appropriate solutions for providing houses and buildings to meet the aspirations of the people of this country.

On this occasion the citations were distributed to the persons who retired during the year and the employees who have completed 25 years service in CSIR. The meritorious wards of CBRI staff were rewarded. An



essay competition for CBRI wards was organized in different groups and the selected ones were awarded. The prizes were also given to the winners of different events organized for Foundation Day.

The programme was anchored by Shri Y. Pandey, Scientist 'F' and the vote of thanks was given by Controller of Administration, Shri S C Tyagi.

At a later session, Prof. K. L. Chopra delivered the first lecture of the Distinguished Institute Lecture Series on **'Application of Solar-Photovoltaics in Buildings'**. The lecture was well appreciated by the audience. In the evening a **'Cultural Programme'** was also organized in the Institute auditorium, in which the PGRPE students, scientists, staff and the wards of CBRI family participated.



First Distinguished Institute Lecture on Application of Solar-Photovoltaics in Buildings



On the occasion of CSIR Foundation Day Padma Shri Prof. K.L. Chopra, Former Director, IIT Kharagpur & Founder Thin Film Laboratory, IIT Delhi delivered First Distinguished Institute Lecture on **Application of Solar-Photovoltaics (SPV) in Buildings** at CBRI Roorkee on 26th Sept. 2010. In his lecture, he explained the concept of solar energy, solar cell, solar cell technologies, thin film solar cells, Global and Indian scenario of SPV etc. He also explained the advantages of Solar voltaics along with its attractive features such as Green and pollution free energy, long life (upto 25 years for Si cells) under all climatic conditions. Applications of SPV such as solar lanterns, street lighting systems and solar PV water pumps etc were also emphasized. Prof Chopra also informed that an important application of SPV, as a stand-alone or grid connected system, is in a variety of requirements for powering electrical devices in buildings. When the

modules are integrated into a building as a functional building material with some advantageous features as beautification, relatively cheaper material, weather-proofing, thermal insulation, EM and sound-proofing, the system is termed as **"Building Integrated Photo voltaics (BIVP)"**. Some BIVP Projects installed at various places were also apprised. The issue before any society is not a choice of conservation, or coal, or nuclear, or renewable resources; rather it is our willingness to use conservation and coal and nuclear and renewable resources such as SPV. We do not enjoy the luxury of selecting from these alternatives, Our policy should be: **"Let All Flowers Bloom"**! remarked Prof Chopra.

Sadbhavna Diwas

The Institute observed **Sadbhavna Diwas** on **August 20, 2010** with a view to promote harmony amongst people of all religions, languages and states and goodwill towards everyone.

Prof. S. K. Bhattacharyya, Director, **CBRI** administered the **Sadbhavna** pledge to all the staff members of the Institute.

Colloquium

1st July 2010, CSIR-800 at CBRI: Potential & Achievements

Shri S G Dave, Scientist 'G', CBRI Roorkee

6th July 2010, Slope Stability Analysis of Chenab & Anjikhad Bridge Abutment

Prof. K S Rao, IIT, Delhi

14th July 2010, Planning for Life after Retirement

Shri S C Tyagi, COA & Shri P K Bhargava, Sc. 'F', CBRI

26th July 2010, Investigation, Testing & Remediation of Steel Reinforced Concrete

Dr George Sergi,

Technical Director, Vector Corrosion Technologies

29th July 2010, Solar Photovoltaic Power Plant

Shri R K Jain, AGM, CEL, Sahibabad

4th August 2010, Impact of Different Technologies on Energy Conservation in Buildings

Dr. B M Suman, Technical Officer, CBRI

11th August 2010, Seismic Response of an Unreinforced Brick Masonry Building

Dr. Navjeev Saxena, Scientist, CBRI

17th August 2010, Introduction to Structural Engineering for Fire Resistance

Dr. Martin Gillie, Lecturer, Structural Fire Safety Engineering Institute for Infrastructure and Environment, University of Edinburgh, UK

25th August 2010, Plant Cost Estimation and Feasibility

Dr. S. P. Agrawal, Scientist 'F', CBRI

1st September 2010, Glass : A Versatile Modern Building Material (Use of Glass in Buildings)

Shri Ashok Kumar, Scientist 'E-II', CBRI

8th September 2010, Fire Safety Engineering and Structures in Fire

Dr. Suvir Singh, Scientist 'F', CBRI

14th September 2010, LEH: Cloudburst Devastation & Construction Practices

Shri Y. Pandey, Scientist 'F',

Shri S K Negi, Scientist 'E-II'

Shri A K Sharma, Scientist 'E-II'

Short-Term Course on Earthquake Resistant Design & Construction Practices

Natural disasters in the form of earthquake have become a global phenomenon, and there is a need to safeguard our building structures against such calamities. The important components highlighted for ensuring safe construction are: Public awareness, Legal framework, Technical Competence, Professional ambience, Enforcement and Research & Development. As a reactive society, need is felt to inculcate earthquake education to the practicing engineers and CSIR-Central Building Research Institute (CBRI) in association with The Institution of Engineers (I), Roorkee Centre jointly organized a course on Earthquake Resistant Design & Construction Practices during September 21-24, 2010 at Roorkee. The course in all had 28 technical lectures covering wide spectrum of topics related to earthquake engineering right from Engineering seismology; soil and structural dynamics, earthquake resistant design principles & philosophy; performance based design, seismic qualification, geotech-earthquake engineering, seismic up-gradation, sustainable precast construction, quality control in construction and failure analysis with case studies. The course was attended by 48 participants from various government, public & private sector organizations.

While welcoming the Chief Guest, Guest of honour and participants, Prof. V.K. Agarwal, Chairman, IE(I) highlighted the importance of the course. Prof. S.K. Bhattacharyya, Director, CBRI, Roorkee, in his presidential address emphasized the need to propagate the awareness and message of seismic resistance to all structural designers/architect so that while conceiving the project they ensure that the measures are adopted during construction so as to save lives & properties in future earthquakes. He also mentioned that it needs whole hearted support of all stake holders namely, the owner, the planner, the designers and the builders, which can be achieved by systematic initiatives to change the mindset of professionals and generate awareness



regarding earthquake preparedness & mitigation, while highlighting the contribution of CBRI towards the subject. The Chief Guest of the inaugural function Shri P. G. Dhar Chakrabarti, Director, NIDM, New Delhi stressed the need on synergizing the theoretical concepts on earthquake engineering with practice by organizing such kind of courses.

The short-term course of four days duration was organized in a highly scientific & professional manner. Participants, very actively interacted with faculty during the entire programme. Faculty members drawn mainly from CBRI, Roorkee and IIT Roorkee includes Prof. S.K. Bhattacharyya, Prof. D.K. Paul, Prof. Swami Saran, Dr. Yogendra Singh, Prof. M.L. Sharma, Prof. A.K. Jain, Dr. B.K. Maheshwari, Dr. Satyendra Mittal, Er. Ajay Chourasia, Er. Sanjeev K. Singh, Dr. Achal Mittal, Dr. Shantanu Sarkar & Dr. A.K. Pandey. The renowned experts from field Dr. Shailesh Agarwal, Executive Director, BMTPC, New Delhi and Mr. Yogesh Kajle, Executive (Planning & Design), B.G. Shirke Construction Technology, Pune also shared their experiences.

The valedictory function of the course was held on September 24, 2010 where in Prof. S.K. Bhattacharyya, Director, CBRI, Roorkee and Dr. Shailesh Kr. Agrawal, Executive Director, Building Materials & Technology Promotion Council (BMTPC), New Delhi addressed the gathering and distributed the certificates to participants. On this occasion, movie on 'Full scale testing of prefabricated RC frame structure, carried out at CBRI Roorkee for evaluation of beam-column junctions; was also screened. Prof. S.K. Bhattacharyya, Dr. Shailesh Agrawal and the participants appreciated the efforts made by the coordinators of the programme, Er. Ajay Chourasia and Er. Sanjeev Kr Singh, in organizing the event and hoped that long lasting bond created through such short-term courses between organizers, faculty/speakers and participants will pave a way to make earthquake resilient India.



Forthcoming Events

S. N.	Organising Secy.	Duration	Conference/Workshop/Course	Venue
1.	Dr. Achal Mittal	Dec. 3-8, 2010	Workshop cum Training Course on Introduction to Seismic and Wind Resistant Design of Building Structures Followed by International Advance School in Wind Engineering (IAS 7)	CSIR Science Centre New Delhi
2.	Dr. L.P. Singh	Dec. 14-15, 2010	INDO-US Workshop on Nanotechnology in the Science of Concrete	CBRI Roorkee
3.	Sh.Y. Pandey	Jan. 27-28, 2011	National Workshop on Vulnerability of Heritage sites against changing Climate & Natural Disaster	CBRI Roorkee
4.	Sh. A.Ghosh	Feb. 10-12, 2011	Conference on Landslide Hazard: Consequences and Challenges	CBRI Roorkee
5.	Dr. Pradeep Kumar	Feb. 24-25, 2011	National Conference on Recent Advances in Ground Improvement Techniques	CBRI Roorkee

Staff News

Appointments
on Ad-hoc Basis

Dr. Amrit Kumar Roy
Scientist 'Fellow'
16.07.2010



Subhas Chandra Bose Gurram
Scientist 'Fellow'
09.08.2010



Saroj Kumar Panda
Scientist 'Fellow'
16.08.2010



Manojit Samanta
Scientist 'C', Gr.IV (2)
13.08.2010



Soju Joseph Alexander
Scientist 'C', Gr.IV (2)
13.08.2010



Ravindra Singh Bisht
Scientist 'C', Gr.IV (2)
16.08.2010



Soumitra Maiti
Scientist 'C', Gr.IV (2)
16.08.2010



Srinivasarao Naik B.
Scientist 'C', Gr.IV (2)
26.08.2010



Subham Dastidar
Scientist 'C', Gr.IV (2)
27.08.2010



Nagesh Babu Balam
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