CSIR - Central Road Research Institute
केन्द्रीय सड़क अनुसंधान संस्थान

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सीएसआईआर–सीआरआरआई समाचार पत्रिका

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HIGHLIGHTS OF MAJOR R & D PROJECTS

R & D Studies on Performance Evaluation of Rigid Pavements on High Density Traffic Corridors Using Instrumentation Supported by Laboratory Tests

To validate and verify the actual relationships between various design parameters assumed in the theoretical design and those actually observed under the rigid pavements, R & D Studies on Performance Evaluation of Rigid Pavements on High Density Traffic Corridors Using Instrumentation Supported by Laboratory Tests has been carried out by CRRI under the sponsorship from Ministry of Road Transport and Highway.

Concrete pavement test sections were constructed at three different locations – near Silliguri on NH-31 in West Bengal, Allahabad by-pass on NH-2 in U. P., and near Kota on NH-76 in Rajasthan. These test sections were also instrumented, as per the details given below:

The sensors were embedded into concrete pavement slabs during construction of test sections at Allahabad by-pass on NH-2; at Kota, Rajasthan, on NH-76 and at Siliguri, on NH-31 in West Bengal and response of concrete slabs was noted through these sensors. Figure 1 illustrates various sensors embedded into concrete slabs for different purposes.

The following major conclusions have been drawn based on the analysis of results / data collected through the course of this study:

- Measurements of temperature and strain during hardening phase of concrete in pavement slabs have indicated that slabs get set under a negative temperature differential i.e. top surface of the slab being at lower temperature than the bottom surface of slab. The value of negative temperature differential was observed to be 10.6°C at Siliguri, 10.9°C at Allahabad and 4.3°C at Kota. Theoretical calculations of curling stresses, as per Westergaard analysis, which is based upon positive temperature differentials, do not take into account the negative temperature differentials under which the slabs

(a) Vibrating Wire Temperature Sensors (b) Resistance Type Dynamic Strain Gauges

Figure 1 : Sensors Embedded into Concrete Slabs

have been observed to have finally set. It is recommended that it should be considered while calculating the curling stresses.

- Concrete slabs remain under positive and negative temperature differentials for almost 12 hours each during the day time and night time respectively. The maximum positive and negative temperature differentials were observed between 1PM to 3PM in the afternoon and between 4AM to 6AM in the early morning respectively. Maximum positive temperature differential was recorded as 17.1 ^{o}C for 30 cm thick slab at Kota, 18.9 ^{o}C for 31 cm thick slab at Siliguri, and 19.2 ^{o}C for 32 cm thick slab at Allahabad. These values are slightly higher than the values recommended in IRC:58.
- Measured curling stresses were found to be considerably less than the theoretically calculated stresses as per IRC:58 by using modified Westergaard equation. It was estimated that measured stresses are approximately 50% to 65% of the theoretical stresses depending upon the value of Modulus of subgrade reaction (k).
- Load testing of tied edge and non-tied free edge of concrete slabs has indicated considerable contribution of tie bars in reducing the load induced strains and hence the load stresses at the edge of mid slab. Average reduction in load induced strains and hence the edge load stresses due to the presence of tie bars was observed to be of the order of 25%. Present thickness design methods of concrete pavements do not take into account the stress reducing effect of tie bars. It is recommended that the reduction of edge load stresses due to the presence of tie bars at longitudinal joint between lanes and between outer lane and tied shoulders should also be considered while calculating the edge load stresses.
- Comparison of strains developed at the mid-slab edge (when wheel loads were placed just over the free edge) with the strains that developed when wheel loads were placed 25 cm inside the free edge revealed significant reduction of strains in later case. Strain reduction was found to be in the range of 22 % to 40 % for different loads with an average reduction of 31.4 %, Figure-2 shows strain development under a moving single axle truck.

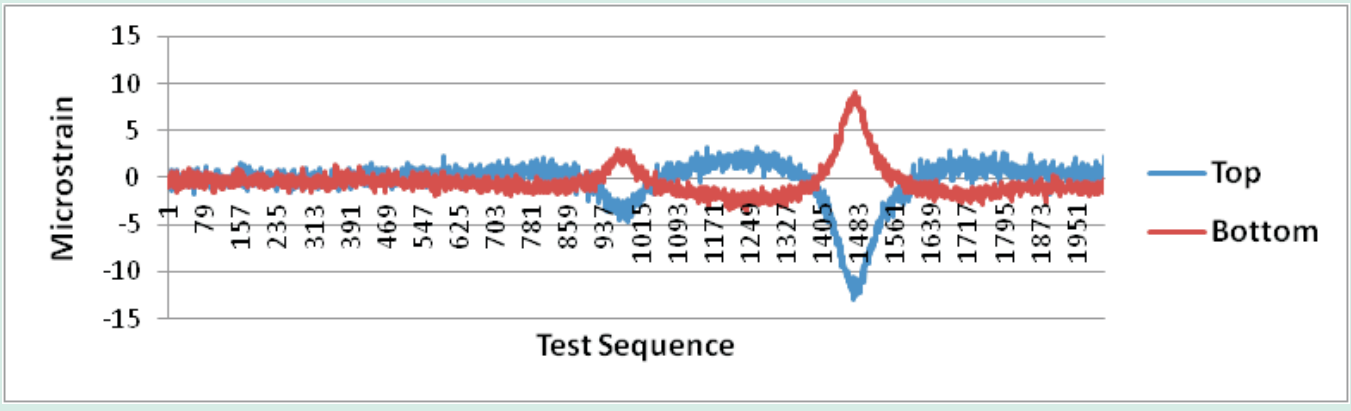

Figure 2 : Strain Development Under Moving Single Axle Truck

12th Five Year Plan Projects

Development and Application of Technologies for Sustainable Transportation - SUSTRANS (Sponsored by the Planning Commission)

The need for sustainable transportation is evident since global warming has caused significant challenges for cities worldwide (transport sector alone accounts for about 24% of CO2 emissions). Moreover, sources of natural aggregates are depleting at a faster rate due to massive infrastructure development programs and road construction activities going on in India which are consuming huge quantities of materials and enormous amount of energy. There is thus an urgent need to develop not only the technologies which can utilize waste and marginal materials but also

Figure 3 : Selected Road Network of Delhi to implement the Pilot Study

Figure 4 : Accelerated Pavement Testing Facility at CRRI

innovative designs to reduce pavement thickness using high performance materials. CSIR-CRRI has taken up the 12th Five Year Plan Projects by networking with Participating Laboratories of CSIR-NAL, Bangalore; CSIR-CSIO, Chandigarh; and CSIR-CLRI, Chennai.

The primary objectives of the present study are formulated under two different modules:

- Transportation Module
  - Design to develop Sustainable Integrated Mass Transportation System and Sustainable Non-motorized Transport (NMT) System by applying appropriate Intelligent Transport System (ITS) technologies.
  - Design and Development of Desktop Indigenous Car Driving Simulator.
- Road Module
  - Design to develop Sustainable Roads through innovative technologies by utilization of waste and marginal materials; improved design methods and high performing materials/ mixes, to reduce pavement thickness and attain long lasting pavements.

The scope of work under Transportation Module is to collect extensive data in the small / selected road network in the city of the Delhi for its use in the implementation of a pilot study, as shown in Figure 3. In case of Road Module, the scope of work would be the construction of test tracks within CRRI; characterization of road materials / mixes using Accelerated Pavement Testing Facility (APTF) available at CRRI as shown in Figure 4 and development of new Design standards/ specifications.

Draft State of Art Report (SOAR) has been finalized and some pilot studies have been carried out. Planning for field surveys (site selection, questionnaire design, work award etc.) is currently under process.

In addition to the above, CSIR-CRRI as participant laboratory with other CSIR laboratories is contributing to the following 12 FYP Projects:

- Probing the changing Atmosphere and its impacts in Indo-Genetic Plain (IGP) and Himalayan Region.
- Innovative Technologies for Health Assessment and Damage Mitigation of Structures: Landslides hazard information system and design of innovative measures for landslide control.
- Autonomous Underwater Robotics for inspection of Bridge Structures.
- Engineering of Disaster Mitigation and Health Monitoring for Safe Built Environment.
- CSIR Knowledge Gateway and Open Source Private Cloud Infrastructure.
- Zero Emission Research Initiative for Solid Wastes from Leather.
- Clean water-Sustainable Options: Assessment of pollution loads in Road runoff.

WORKSHOPS / MAJOR EVENTS

Workshop cum Training Programme on Fire Safety Issues

On the occasion of Fire Safety Week, a Workshop cum Training on fire safety issue was organized in the Institute on April 18, 2013. The workshop was conducted by Delhi Fire Service Department, which also included live demo of fire fighting equipments.

Inaugural session of workshop on Fire Safery Issue

Live demo on Fire Fighting Equipment by Delhi Fire Service Department

Training cum Workshop on MS Excel

As a part of HRD training to CRRI Staff, a two days hands on training cum workshop on MS Excel for Beginner was organized by M/s. Heromind Mine Ltd., Gurgaon, for Gr. II, III & IV Staff on April 22-23, 2013, which was attended by a total of 30 Scientists/ Technical Officers.

The training for second batch on Basic MS Excel was further organized on June 26-27, 2013, which was also attended by thirty staff members from Administration and the R&D Divisions.

Dr. S. Gangopadhyay, Director, CRRI speaking on the occasion of Training Programme on MS Excel

Workshop on Advanced Geo-spatial Solution

A National Workshop on Advanced Geo-spatial Solution for Transportation was organized on May 8, 2013 jointly by CSIR-CRRI and M/s. Intergraph SG & I India Pvt. Ltd., Gurgaon. The workshop was inaugurated by Dr. S. Gangopadhyay, Director, CSIR-CRRI, which was attended by about twenty five participants. The workshop included demonstration of key capabilities of Geo-spatial Solutions for transportation sector covering following application areas:

- Roadway Information Management and Asset Management
- Construction Progress Monitoring
- Oversize/ Overweight Vehicle Routing
- High Precipitation and Water Logging Areas for Storm Water Planning
- Road Safety Management
- Identification of Potential Landslide Zones on Hill Roads.

National Technology Day

11th May is observed as National Technology Day each year all over India. To commemorate the technological breakthrough made by India. The Institute celebrated National Technology Day on May 10, 2013.

Shri T.K. Amla, Head, ILT gave a brief background of National Technology Day Celebration while Dr. S. Gangopadhyay, Director, CSIR-CRRI introduced the Chief Guest and delivered the welcome address.

Dr. Subrato Chowdhury, Head (R&D), Aditya Birla Group delivering National Technology Day Lecture

Welcome address by Dr. S. Gangopadhyay, Director, CRRI

Dr. Subrato Chowdhury, Head, Research & Development, Central R & D, Aditya Birla Group, Mumbai graced the occasion as the Chief Guest and delivered a lecture on "Concrete and Sustainable Transport-Some Emerging issues". Prizes were given away by the Chief Guest to the winners of the Competition organized earlier for the Students of Post Graduate Research Programme in Engineering (PGRPE).

National Workshop on Sustainable Concrete Pavements – Practices, Challenges and Directions

One day National Workshop on "Sustainable Concrete Pavements – Practices, Challenges and Directions" was organized jointly by the Indian Concrete Institute, Kochi Centre and CSIR-CRRI at Kochi, Kerala on June 1, 2013. The workshop was attended by over 150 delegates. Which was inaugurated by Dr. S. Gangopadhyay, Director CSIR-CRRI followed by inaugural speech. Two presentations on "Design, Construction and Quality Control Aspects for Concrete Pavements" and "Maintenance and Repair of Rigid Pavements" were made by Sh. Binod Kumar, Scientist and Sh. J.B. Sengupta, Head, Rigid Pavement Division respectively. Certificates of participation were distributed to all the delegates.

Lighting of Lamp by Director, CRRI

Inaugural Address by Director, CSIR-CRRI

MEETINGS

CSIR-CRRI Research Council

The 112th Meeting (Special Meeting) of CSIR-CRRI Research Council, under the chairmanship of Prof. D.V. Singh, was held on April 29, 2013. The Meeting was convened primarily to discuss the Vision Document of CRRI and the issue of renaming of CRRI. Discussions were held on the zero draft of the vision document which was presented by Shri B.M. Sharma, Chief Scientist.

Research Council Meeting in progress

Surveillance Audit

The Surveillance Audit of all the infrastructure division was carried out by Sh. V.K. Seghal, BIS Auditor on June 6-7, 2013. (The R&D Divisions had already been audited earlier). The purpose of surveillance audit is to whether the ISO System in place is being implemented effectively and efficiently. The auditor recommended the continuation of the license till the next renewal audit which is likely to be held sometimes in Oct./Nov. 2013.

MEMORANDUM OF UNDERSTANDING (MOU)

1. MoU was signed on April 25, 2013 between the CSIR-CRRI and School of Planning and Architecture, New Delhi, to encourage interactions between the Scientists, Research Fellows, Faculty Members and Students of both the organizations.

Signing of MOU between CRRI and SPA

2. MoU was signed on April 30, 2013, between the Volvo Construction Equipment Division, Volvo India Pvt. Ltd. and CSIR-CRRI to establish working relationships amongst CSIR-CRRI and Volvo in the areas of road construction equipment & technology and skill development of manpower so as to achieve improvement in overall productivity for road construction industry.

Signing of MOU between CRRI and Volvo India Pvt. Ltd.

3. MoU was signed on May 22, 2013 between the CSIR-CRRI and Bombay Textile Research Association to establish close linkage and functional coordination between the two organizations and to work collectively in Geosynthetic area particularly the Geotextiles for road and transportation sector.

Signing of MOU between CRRI and BTRA

TRAINING PROGRAMMES/COURSES CONDUCTED

The Institute organised regular training programme on "Bridge Diagnostics, Performance Evaluation and Rehabilitation" from June 17-21, 2013 which was attended by fifteen engineers from BRO, ICT Ltd., RITES Ltd. and PWDs etc.

Participants of Training Programme

आगन्तुक

1. प्रो. इडरिस्सा बी. म्सहोरो (उप कुलपति, आरधी विश्वविद्यालय, तंजानिया) के नेतृत्व में पांच सदस्यीय उच्चाधिकार तंजानिया प्रतिनिधि मंडल ने 1 अप्रैल 2013 को संस्थान का दौरा किया तथा सीएसआईआर–सीआरआरआई के साथ संयुक्त सहयोग प्रारम्भ करने की संभावनाओं का पता लगाने के लिए अनुसंधान एवं विकास प्रभागों के प्रमुखों के साथ चर्चा की।

सीआरआरआई में तंजानियन प्रतिनिधिमंडल

2. मैसर्स एफएआरओबीईएल (स्पेनी कंपनी) के श्री फ्रांसिसको जेवियर फरनान्डेज ने "ज्वाइंट्स बिटवीन कंक्रीट स्लैब्स कैपेबल ऑफ शियर ट्रांसफर" विषय पर दिनांक 28 मई 2013 को एक प्रस्तुतीकरण दिया।

सीआरआरआई में श्री फ्रांसिसको जेवियर फरनांडेज द्वारा प्रस्तुति

Workshop on Technologies for North East Region and Implementation Framwork (TIF) September 6-7, 2013

Objective:

- To deliberate on technologies that are suitable for North-East region
- To discuss the Framework as to how such technologies can be adopted by the Departments, so that new and better technologies can be easily implemented at the grass root level.

Who will attend:

The attendence is through invitation only. Key policy makers/ decision maker/ Planner Researchs, Key Professionals from Govt. and Private Agencies.

For more details:

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स्टॉफ समाचार

अनुसंधान एवं विकास प्रभागों की पुनर्संरचना/स्थानान्तरण (दिनांक 1 अप्रैल, 2013)

1. डॉ. राजीव गर्ग, वरिष्ठ प्रधान वैज्ञानिक ने सेतु एवं संरचनाएं (बीएएस) प्रभाग के प्रमुख के रूप में कार्यभार ग्रहण किया।
2. डॉ. एस. वेलमुर्गन, प्रधान वैज्ञानिक ने टीईएस, प्रभाग प्रमुख के रूप में कार्यभार ग्रहण किया।
3. डॉ. (श्रीमती) अनुराधा शुक्ला, मुख्य वैज्ञानिक को सलाहकार (अनुसंधान एवं विकास मामले) के रूप में नियुक्त किया गया।

पदोन्नति

निम्नलिखित स्टाफ सदस्यों को वरिष्ठ प्रधान वैज्ञानिक के पद से मुख्य वैज्ञानिक के पद पर पदोन्नत किया गया।

1.	डॉ. किशोर कुमार	03.09.2011
2.	डॉ. अनुराधा शुक्ला	03.12.2011
3.	डॉ. पी. लक्ष्मी	01.01.2012
4.	डॉ. अशोक कुमार	01.02.2012
5.	श्री टी.के. आमला	01.04.2012
6.	डॉ. रेनु माथुर	19.08.2012
7.	श्री जय भगवान	01.12.2012
8.	डॉ. अनिल सिंह	06.02.2013

सीआरआरआई में कार्यभार ग्रहण करने का स्वागत

निम्नलिखित स्टाफ सदस्यों ने सीआरआरआई में कार्यभार ग्रहण किया है। संस्थान कार्यभार ग्रहण करने वाले नए स्टाफ का स्वागत करता है।

1.	श्री सुधांशु कुमार	अनुभाग अधिकारी	11.4.2013
2.	सुश्री रचना कुमारी	सहायक ग्रेड–II	24.6.2013

सेवानिवृत्त/स्थानान्तरण/पदत्याग

स्टाफ वेलफेयर कमेटी, सीआरआरआई ने निम्नलिखित स्टाफ सदस्यों को उनके सेवानिवृत्त/स्थानान्तरण होने पर भावभीनी विदाई दी।

1.	श्री बी.के. सिंह (स्थानान्तरण)	प्रशासन अधिकारी	6.5.2013
2.	श्री फरीद मोहम्मद (स्थानान्तरण)	कार्यकारी सहायक	14.6.2013
3.	श्री नरेन्द्र सिंह (सेवा निवृत्त)	सहायक (सा.)	30.6.2013

International Course on Dissemination of HDM-4

September 16-27, 2013

Central Road Research Institute shall conduct the 16th HDM-4 program at CRRI
[Already announced in CRRI website (http://crridom.gov.in/training.html)]

Highway and Transport Professionals (Engineers, Planners and Economists) working in Government and Private Sectors are welcome to attend this course. Participants should be at least Assistant Engineers or above with good experience in MS Excel, Word etc. and be associated with Highway construction and maintenance projects or Traffic & Transport Demand Estimation or Economic analysis of Highway projects. Pavement maintenance management and Economic evaluation of road projects are disseminated through this course. Over 280 professionals, who have participated in such programmes in the past from India and abroad have benefitted from this course. The duration of course is 10 days. Foundation lectures on HDM-4 data collection, road deterioration, pavement maintenance methods, simulation models, pavement management, traffic estimation, asset management and economic evaluation etc. will be delivered for the first two days by the experts, which are the basic requirements for using HDM-4. Next eight days will be devoted for the development of operational skill in HDM-4 and case studies through brief presentations, spreadsheet analysis, hands-on, tutorials and one to one interaction. Special topics such as model calibration, strategy and program analysis will also be covered. Features added in version 2 of HDM-4 will be explained and demonstrated during the training programme.

Willing professionals may register by sending an e-mail or letter to the Course Organizer (T.K. Amla, Chief Scientist and Head, Information, Liaison & Training Division) or Course Coordinator (Dr. Devesh Tiwari) latest by 10th September, 2013. Admission will be confirmed after receiving the course fee on first come first served basis. Program schedule will be sent to the registered persons.

FEE STRUCTURE

For Indian Participants	For Candidates from SAARC Countries	For Candidates from Other Country	For Engineering Students (Must be introduced by their Head of Department)
INR Rs. 30,000/- + 12.36 % S.T.	**USD 700** + 12.36 % S.T	**USD 750** + 12.36 % S.T.	**INR 25,000/-** + 12.36 % S.T.

Fee includes computer facility, internet browsing, course material, tea and lunch in working days, technical tour(s) and does not include the cost of boarding and lodging. Guest House / Hostel facility at CRRI may be booked for the confirmed participants (if requested in advance) by the organizer on first come first serve basis during course duration and the charges are as per prevailing rule of CSIR. The course fee may be sent through Demand Draft drawn in favour of "Director, Central Road Research Institute", payable at New Delhi, India.

Contact address for sending nomination :

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