CSIR - CENTRAL ROAD RESEARCH INSTITUTE, NEW DELHI

MINUTES OF 126th VIRTUAL MEETING OF CSIR-CRRI RESEARCH COUNCIL

Date	15th & 16th January, 2021
Time	9.30 AM -2 PM
Mode	MS Teams online Platform

The following attended the meeting:

Chairman
Prof. P. K. Sikdar, Former Prof. IIT Bombay and Director, CSIR-CRRI, Advisor -IRF and President-M/s. ICT, Pvt. Ltd.

Members
Prof. K. Sudhakar Reddy, Department of Civil Engineering, IIT Kharagpur
Prof (Mrs) G Madhavi Latha, Department of Civil Engineering, IISc Bangalore
Prof. M. Parida, Deputy Director, Department of Civil Engineering, IIT Roorkee
Prof. Swagata Basu, Department of Civil Engineering, IIT Mumbai
Sh. S. K. Nirmal, ADG (MoRTH) and Secretary General IRC, New Delhi.
Dr. D. T. Thube, Chief Engineer, MMRDA, Mumbai
Dr. (Mrs) Esther Malini, GM, L&T infrastructure Development Projects Ltd., Chennai
Dr. N. Gopalakrishnan, Director, CSIR-Central Building Research Institute, Roorkee
Sh. Mayank Mathur, Principal scientist, CSIR Technology Management, Directorate (II)
Prof. Satish Chandra, Director, CSIR-Central Road Research Institute, New Delhi

Secretary
Dr Vasant G Havanagi, Chief Scientist, CSIR-Central Road Research Institute, New Delhi

Invitees
All Scientists of CSIR-CRRI

Item 1 – Welcome Address by the Director CSIR-CRRI

Prof. Satish Chandra, Director CSIR-CRRI welcomed the Chairman, Members of RC and the scientists to the 126th meeting of RC, which is also the first meeting of newly constituted Research Council. He mentioned that, it would have really been a great occasion for him, had it been possible to welcome all the members of RC in CRRI with a bouquet of flowers. But due to COVID pandemic and the necessity to follow

Government of India Guidelines, this meeting is being conducted in online mode. However, he would definitely like to conduct the next meeting at CSIR-CRRI and host all the honorable members. After introducing himself, he requested chairman RC to start the proceedings and for his opening remarks.

Item 2 – Opening Remarks by the Chairman

Prof.P.K.Sikdar, Chairman RC, thanked Director CRRI, and welcomed all RC members to the 126th meeting. Prof. Sikdar, after briefly introducing all the members, informed the members of their coveted role and honor in guiding the R&D activities of CSIR-CRR, both in the area of basic and industrial research for the next three years. The review, guidance and new ideas of members would definitely act as catalyst to improve the R&D activities of CRRI to reach a certain level of success. Also, he was of the opinion that, there is a need to encourage the scientists for basic and Industrial research which are path breaking, marketable and socially relevant. He requested the RC members to give their expert comments and suggestions in the planned presentations (Ongoing projects/New projects) by scientists on various topics. The comments and suggestions will go a long way in raising the research profile of the Institute.

Item 3 – Confirmation of the Minutes of the 125th RC Meeting

Dr Vasant G Havanagi, Secretary RC, informed that the minutes of the 125th RC Meeting held on August 25th- 26th, 2020 were circulated to all RC members. As there were no comments from members, the minutes were taken as approved.

Item 4 – Suggestions of last RC and Compliance

Dr Vasant G Havanagi, Secretary RC, presented the **"**Suggestions of last RC and their compliance**"** made during 125th Meeting of RC. It was indicated that, every efforts would be made by the Institute to comply with the RC comments and suggestions.

Item 5 – Director's Report

Prof. Satish Chandra, Director CSIR-CRRI presented brief information about vision of CRRI, organizational set up, spectrum of R&D activities carried out in various divisions, activities of supporting divisions etc. After this brief introduction about the Institute, Prof. Satish Chandra presented the progress of the institute since last RC meeting. The presentation included brief of the new projects taken up titled ''Delhi Research Implementation and Innovation (DRIIV)'' sponsored by the office of PSA, Govt. of India, Participation of CRRI in Vaibhav Summit; Development of new software like "Kisan Sabha" app and "Arogyapath" app. Different ingoing sponsored projects in the Institute, viz. Rehabilitation of damaged roads, Kerala; Structural safety audit of bridges and structures; Development of Road and Airport maintenance management system; Soil nailing technique for underpass construction were also the part of presentation. RC members were also informed about the visit of Parliamentary Committee on official

language and other activities carried out at CRRI in Hindi language. Director's report also included training programs conducted in the Institute, new facilities added during the period, research publications of the scientists and AcSIR activities. CSIR Foundation Day, Vigilance Awareness Wweek; Communal Harmony; New Year celebration, etc were also highlighted during the presentation.

The council congratulated the Director CSIR-CRRI and expressed its satisfaction on the work done by CRRI since the last RC Meeting.

Item 6 – Remarks by Research Council (RC) Members

Chairman Prof. P.K.Sikdar expressed his happiness about the expansion of Research collaborations with CSIR/IIT/NIT's and Industries; New sponsored research projects taken up; Research publications and other activities carried out by CRRI. It was emphasized to take up more number of sponsored research projects as compared to consultancy projects. Prof. Sikdar desired that each scientist shall publish 1 or 2 research papers in SCI/SJR ranking journals every year and would like to see gradual shift of R&D activities towards frontline research.

Prof. Sudhakar Reddy expressed his satisfaction about the ongoing work of CRRI; however he desired to see further improvement in R&D activities. Prof. Reddy sought some clarifications regarding uploading of Research Reports in the CRRI website. Prof. Satish Chandra clarified that, only the Executive summary is being uploaded. Prof. Reddy enquired about the mode of collaboration and MoU's with other Institutes/organizations. **Prof Satish Chandra** gave some examples how the Institute is collaborating with NIT, Tripura and NIT, Manipur in some of the projects for mutual benefit. It was clarified that, the Institute is open to all types of collaborations. Prof. Reddy enquired about upgradation of skills of scientists in material characterization, numerical analysis, simulation etc. It was emphasized that there is a need to identify the requirements of skill development for each division.

Prof. Madhavi Latha expressed her happiness to be part of Research Council and said she would look forward to more knowledgeable interaction.

Prof. Manoranjan Parida appreciated the comprehensive report presented by Prof. Satish Chandra. He recalled his long association with CRRI in doctoral thesis collaborations and informed that, very soon IIT Roorkee will sign a MoU with CSIR-CRRI for collaborative Research. Prof. Parida indicated that considering the complex process involved in transportation planning, there is a need of simplified tools/software for analysis. Some of the areas suggested by him for the scientists to take up research included Smart City/Sustainable Mobility/ Bicycle programs; Development of TOD oriented Mass Rapid Transit System; Service Quality analysis of Metro Services; Machine Learning / Artificial Intelligence/ Deep Data Learning Techniques; and Urban noise pollution and modeling.

Dr. D. T. Thube informed about frequent failures of bridges in Maharashtra and emphasized the need to develop a simplified methodology/mechanism for inspection and identification of distress for timely maintenance of bridges and such other structures. Development of a manual would definitely help the Field Engineers for timely action and preventing failures. Also, he emphasized the need to develop Pavement Management System suitable for State Highways and Major District Roads. These two areas are important as all State Governments are allocating huge budget in these areas.

Dr. (Mrs) Esther Malini enquired whether CSIR-CRRI can play a role in resolution of disputes in Road/Highway Projects, as an arbitrator. Dr Malini also supported the idea of Dr Thube on the need of development of manual for early detection of distress in bridges and structures. Also, she suggested that, as the accident rate is high in the country, CRRI should collect the data available in the country, carry out accident analysis and come out with solutions for reduction of accidents. **Prof. Sikdar**, endorsed that CSIR-CRRI shall collaborate with different Institutes/private organizations and collect the accident data to carry out detailed accident analysis to come out with causes of accidents in the country. **Prof. Satish Chandra** replied that arbitration is not actually the mandate of CSIR-CRRI; the subject is with no research component and also is time consuming. However, CRRI intermittently gets involved in resolution of disputes and gave one example of solving the dispute in the case of ‘’Signature bridge” construction at Delhi. **Sh. S. S. Gaharwar**, Senior Principal Scientist clarified that a study was taken up to review the technical contractual issues (related to design & construction) for the construction of signature bridge. It was informed that, the review was successfully completed and the report was accepted by the State Government. **Prof. Sikdar** was of the view that such studies can be taken up, but shall be limited to technical aspects only.

Prof. Swagata Basu appreciated the presentation of Prof. Satish Chandra and was glad to know different types of R&D works being carried out in CSIR-CRRI. Prof. Basu emphasized the importance of Mobile Bridge Inspection Unit developed by CRRI for inspection of bridges, which is important for developing National Bridge Inventory and for development of Indian Bridge Management System. She also emphasized the importance of traffic projection, as this would affect the performance of bridges over a period of time. There is a need to predict the progress of distress in bridges with traffic growth.

Sh. S. K. Nirmal thanked CSIR-CRRI for its significant contribution in the formulation of new or revision of codes/guidelines in different R&D areas published by Indian Roads Congress. Sh. Nirmal emphasized the need of R&D studies on durability aspects of cement/chemical stabilization and there is a need to develop deterioration models to predict the long term performance behavior of such roads. **Prof.Sikdar** supported this idea and asked the scientists to make a progress in this field, in the new project sponsored by NHAI. **Prof. Satish Chandra** informed that CRRI is working on a project from UP PWD to evaluate the variation of M_R (Resilient Modulus) value with time for different types of stabilized roads.

Dr. Gopalakrishnan also supported the need of R&D for evaluating the reasons for structural failures, and traffic accidents by modeling studies. The importance of computational mechanics for suitable outcome was emphasized. Dr. Gopalakrishnan also indicated that CSIR-CBRI can collaborate with CRRI for research in the areas of precast concrete panels and Geopolymers.

Sh. Mayank Mathur welcomed the Chairman and members of RC on behalf of CSIR-Headquarters and requested for the support of RC in guiding the scientists to target visionary research in the next three years. He also requested that the RC shall define the path to achieve the deliverables in different R&D projects. Mr Mathur complimented Prof.Satish Chandra for good progress made in the last 4 months and the Institute was able to make significant contribution even during pandemic by developing ‘’Kisan Sabha” App’ widely being used in the country. Mr Mathur was also of the view that scientists shall take up R&D projects related to ‘’Atmanirbhar Bharat’’ concept of Government of India. He suggested that young scientists, apart from R&D, they should know the purchase procedures, GFR rules, and CSIR business development guidelines, which are necessary to achieve their research objectives in time. Mr Mathur extended the help of CSIR Head quarters for training in these areas.

Item 7 – Presentation of Sponsored Research Projects

S. No.	Project Details	Comments/Suggestions of the RC members
7.1	Application of cold bituminous based eco-friendly road building technology for the special featured Himalayan regions Presentation by Dr Siksha S Kar	➢ Possibility of installation of roller in the fabricated mobile mixing plant. ➢ Performance parameters for field evaluation ➢ Need to lay the 500 m test section with variable length having different mix parameters; mixing method adopted; and emulsion content, etc.
7.2	Estimation of Modulus of Resilience by volumetric/performance properties of asphalt mixes by Presentation by Dr Ambika Behl	➢ In ITS test, whether it is possible to fabricate an energy based equipment to measure the horizontal strain. ➢ The study shall clarify the reasons for lower value of M_R for modified binders as compared to conventional bituminous mixes. ➢ The study shall also come out with M_R values for bituminous mixes with RAP. ➢ ITS test is carried out under a monotonic load, is it feasible to develop a correlation with M_R value, which is determined by dynamic loading? ➢ While validating the M_R value by field

		cores, the study should consider important parameters, viz. gradation, binder content and void ratio. ➢ The R&D shall come out with significant parameters affecting the M_R value.
7.3	Travellers Trip Patterns and its Implications on Intermediate Public Transport Services in Imphal, Manipur Presentation by Dr. S. Padma.	➢ Quantitative/Subject variables can be fixed for the stated preference survey ➢ Tablet based survey data collection may be preferred ➢ Instead of using binary based logit models, various soft computing techniques/ANN based AI models can be explored ➢ Sustainable modes such as cycles, bike sharing may also be considered for their trip analysis
7.4	Development of Trip Generation Manual for Indian cities (TripGen) Presentation by Dr Ravi Sekhar.	➢ In the SOAR (all other studies relating to the CRRI and other Institutions from 1969 may be included) to show the various trip patterns ➢ Considering the dense development, mixed land use developments shall be considered for the trips generation ➢ Some of the Smart Cities data can be included in the study ➢ Localised trip generation spots like, holiday spots, etc. may be considered in the trip generation analysis ➢ Pre-metro /post-metro scenarios may be included ➢ Considering the huge variations among the 35 cites in India, data shall be appropriately classified/analysed
7.5	Development of pre-fabricated plastic panels for road construction Presentation by Sh. Gagandeep Singh.	➢ Needed more clarification on size and type of structure of the panel; panel to panel load transfer; connection strength etc. ➢ Is plastic panel placed directly on subgrade? ➢ Is fiber reinforced plastic can be used in the development of panels? ➢ Type of plastic to be used, viz. thermoset

		or recycled plastic? ➢ Need to take care of lateral load transfer; interlocking arrangement, while carrying out FEM modeling/analysis ➢ Can grout material be used in the hollow cells for proper contact with lower layers? ➢ UV radiation effect needs to be considered for long term durability of roads with plastic panel.
7.6	Microscopic traffic simulation model for mixed traffic conditions (MiTrans) Presentation by Dr Madhu Errampalli	➢ Driver behaviour characteristics from the real field location can be studied and incorporated. ➢ Data Cleaning Techniques shall be used, to build realistic field representation of traffic behavior.
7.7	Development of design guidelines and specification for utilization of steel slag in road construction Presentation by Sh. Satish Pandey	➢ What are the parameters for ensuring the aging? Methodology of aging? ➢ What are the mechanical testing properties that have been planned for the steel slag aggregates? ➢ What are the studies that have been planned during field R&D? Need to carry out structural evaluation of each layer? ➢ Nuclear radiation of steel slag aggregates? ➢ Need to develop specifications for high volume roads ➢ Need to carry out cost benefit analysis ➢ Possibility of recycling of pavement constructed with steel slag aggregates?
7.8	Preparation of Integrated Transport Network Development Plan (ITNDP) for Meghalaya. Presentation by Dr Ravinder Kumar	➢ How to develop the Travel Demand Forecasting models, that needs to include the land use and other aspects ➢ How to suggest the various phase wise development plans? ➢ How the role of different modes of transport will be considered? ➢ Entire Meghalaya state may be considered for considering the rapid development of the State in traffic forecasting & travel demand estimation.

Item 8. Presentation on In-House Research Project

S. No.	Project Details	Suggestions of the RC members
8.1	Development of magnesium oxychloride based repair materials for concrete Roads by Presentation by Dr Rakesh Kumar	➢ What will be the thickness of developed repair material? Significant mechanical properties considered during development? ➢ Is there any comparison with the conventional repair material? ➢ Relative performance of SBR and the developed material? Any field trials done with the developed material?

Item 9. Presentation of Sponsored Consultancy Projects

Sl. No.	**Project details**	**Remarks of RC Members**
9.1	Development of Airfield Pavement Management System Presentation by Dr. Pradeep Kumar	➢ Can deterioration models be developed with a planned frequency of data collection? ➢ Is it possible to take more frequent observations? ➢ Can performance models be developed from the study?
9.2	Road Safety Audit of Major District Roads, Other District Roads and Village Roads in the state of Uttar Pradesh Presentation by Dr A. Mohan Rao	➢ Apart from recommendation, any designs are being developed for black spots? ➢ The outcome of the study shall be shared for improvement of document on blackspot study being prepared by IRC.
9.3	CRRI"s experiences in investigation of distressed bridges in the country Presentation by Sh.G.K.Sahu	➢ Need to include the data collected in the national data base which will help for quick structural evaluation of bridges without going for FEM analysis ➢ Need to catagorise high risk bridges from the collected data. ➢ The data from instrumented bridges shall be collected on real time basis using sensors and communication link to the designated server.

9.4	Design of Soil Nailing for the Stabilisation of embankment for construction of Rail Underpasses at Pragati Maidan, New Delhi. Presentation by Dr Kanwar Singh	No comments

Item 10. RC Meeting with Scientists

The Chairman welcomed all scientists and said that he has been part of this Institute earlier and knows many of senior scientists. He also said that given the conditions that each employee is getting good salary, accommodation close to the office, research facilities in abundance, good freedom of work, and many more facilities, it is expected that each scientist will provide the best output. He also observed that there was no research presentation from BES Division and suggested for a brainstorming session in the division to discuss and identify research areas that can be developed in the project form for submission to some funding agencies. He also advised all scientists to learn good practice of making smart and effective presentation of their work in a given time. He then asked scientists from different age groups to present their views on any matter related to their work and the facilities available, etc. Mr. Ashish Walia, Mrs. G. S. Parvathi, Dr. Naveet Kaur, Dr. Ch Ravi Sekhar and Mr. Manoj Kumar Shukla spoke.

Prof. K. Sudhakar Reddy was pleased to see that the trend of the work in CRRI has changed from “only consultancy work” to “Sponsored Research Work”. He suggested that the research component in all the projects should be enhanced by the project leaders. Attempt should also be made to convert a small part of field related (consultancy) projects into a research problem. In projects where funding agencies have restricted time of field performance to 1-2 years, the Project Leader, should continue monitoring the test section even after project is over to get some more insight of the performance of the material or technology, as monitoring for 1-2 years may not give the true picture of the performance. Scientists of CRRI should also take up collaborative research works with faculty of other good Institutes to increase their publication portfolio.

While agreeing with the views of Prof. Reddy, **Prof. Parida** suggested that help of AcSIR students must also be taken to get research output from a consultancy project. He also suggested for interdisciplinary research rather than restricting the scientists to Civil Engineering only.

Shri S. K. Nirmal mentioned that Ministry is now keen for field application of new technologies and new materials, and CRRI can play an important role in achieving this goal. He suggested for preparation of a state wise and zone wise database on availability of local and marginal materials and their application in road construction. He also asked the scientists to complete all externally funded projects in time.

Dr. (Mrs) Esther Malini emphasized on collaboration with industry and suggested that in addition to basic research there must be research outputs which can be implemented in field and can also lead to patents. She expressed her desire to have collaboration between L & T and CSIR-CRRI in several areas.

Dr. D. T. Thube said that research is going on in different parts of the country on different topics and lot of good data is being collected. State PWDs and NHAI have also collected data of pavement performance and traffic on regular basis. There must be some effort to create the repository of this data so that it can be used for research purpose.

The Chairman suggested that this type of repository can be either in the Ministry or in the CRRI.

The meeting ended with a vote of thanks proposed by the Director, CSIR-CRRI