

CSIR - CENTRAL ROAD RESEARCH INSTITUTE, NEW DELHI
MINUTES OF 127th VIRTUAL MEETING OF CSIR-CRRI RESEARCH COUNCIL

Date	27 th & 28 th August, 2021
Time	9.30 AM -4.30 PM
Mode	MS Teams online Platform

The following attended the meeting:

Acting Chairman

Prof. K. Sudhakar Reddy, Department of Civil Engineering, IIT Kharagpur
(Prof. P. K. Sikdar, Chairman, could not attend the meeting due to medical emergency and therefore Prof. Reddy was requested to Chair the RC meeting.)

Members

Prof. M. Parida, Deputy Director & Professor, 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, Secretary, Mukhya Mantri Gram Sadak Yojana, Rural Development Department, Government of Maharashtra.
Dr. N. Gopalakrishnan, Director, CSIR-Central Building Research Institute, Roorkee.
Sh. Mayank Mathur, Principal Scientist, CSIR-Central Planning Directorate (CPD)
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

Regrets

Prof (Mrs) G Madhavi Latha, Department of Civil Engineering, IISc Bangalore & Dr. (Mrs) Esther Malini, GM, L&T infrastructure Development Projects Ltd., Chennai could not attend the meeting due to some urgent engagements.

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 127th meeting of RC, which is also the second meeting of the newly constituted Research Council. He mentioned that, though he desired to conduct the meeting in a hybrid mode, but considering the present COVID pandemic and the

need to exercise caution, and after discussion with the Chairman, it was decided to conduct the meeting in an online mode. However, he emphasized that, meeting in online mode does not in anyway undermine the importance, as there are number of presentations planned for the next two days. He requested RC members to give their advice/suggestions that will definitely lead to quality improvement in the research activities of scientists. He then requested the Chairman RC to start the proceedings and for his opening remarks.

Item 2 – Opening Remarks by the Acting Chairman

Prof. Sudhakar Reddy, thanked the Director CRRRI, and welcomed all RC members and scientists to the 127th meeting. He recalled his long association and involvement in CRRRI Research activities for several years. He advised the scientists to properly identify the gaps in their respective area of research before formulating the proposal. The in-depth R&D should lead to new technology/code/guidelines or development of new equipment. He suggested that depending on the need, brain storming sessions must be held in the Institute for identifying such gaps and further pursuing the research activities in those areas. He also appreciated the presentations scheduled for two days in different areas.

Item 3 – Confirmation of the Minutes of the 126th RC Meeting

Dr Vasant G Havanagi, Secretary RC, informed that the minutes of the 126th RC meeting held during 15- 16, January 2021 were circulated to all RC members. As there were no comments from the members, the minutes are taken as approved.

Item 4 – Presentation of Action Taken Report

Dr Vasant G Havanagi, Secretary RC, presented the “Action Taken Report” prepared based on the comments and suggestions made by RC members during 126th Meeting. This included general suggestions and specific comments on some R&D projects (not scheduled in this meeting), which were presented in the last RC meeting. It was assured that, every effort would be made by the Institute to comply with the comments and suggestions. Prof Sudhakar Reddy, Chairman appreciated the detailed reply to comments made during the last RC.

Item 5 – Director’s Report

Prof. Satish Chandra presented the progress of the Institute, since last RC meeting. The presentation included important R&D activities taken up after the last RC meeting like; Collaborative project on application of Artificial Intelligence for Road Safety in Nagpur city; Bloomberg initiative of global Road Safety Survey-Case Study of Delhi; Collaborative offer of project with 3M (India) for setting up of dark room for road safety retro reflectivity demonstration at CRRRI; Design and stability analysis for Red Mud disposal pond; Investigation and evaluation of UP PWD project roads funded by World Bank; Distress investigation of Gundugolanu-Diwancheruva-Siddhartham NH-16 road

section; Development of comprehensive mobility plan for Surat city; Structural safety audit of bridges. He also covered in his presentation, other important activities carried out, viz. Meeting with Secretary, MoRD to mainstream the cold mix technologies in PMGSY programs; a draft MoU with BRO to be signed, for developing the specifications and guidelines for road construction with cold mix technology by laboratory and field studies; Planned MoU for consultancy services for detailed feasibility study and conceptual design of bridges in Bangladesh; Meeting with secretary PWD Maharashtra, to discuss the possible solutions to the damages caused to roads by heavy rainfall; Landslide; Sinking of roads and damages to bridges. He also informed the RC members about signing of MoU with Bihar State Road Development Corporation Limited (BSRDC Ltd.) for mentoring and development of Bihar Road Research Institute at Patna.

RC members were also informed about the visit of different dignitaries to the Institute; MoU's with Industries and State Governments; Theses and dissertations guided by the scientists; Honours and awards; Hindi language activities carried out at CRRRI etc. Director's report also included training programs conducted in the Institute, Civil works/new facilities added during the period, Research publications of the scientists and ECF generated during the period. Other activities, viz. JIGYASA program of CSIR; National Science day; CRRRI foundation day; Azadi ka Amrut Mahotsav were also highlighted during the presentation.

Item 6 – Remarks by Director General- CSIR

Dr. Shekhar C Mande Director General, CSIR expressed his happiness about the progress report of CSIR-CRRRI in the last six months in spite of pandemic. He appreciated CRRRI about the Industry connect and recognition of CRRRI by different government departments. However, he emphasized that further efforts should be made for developing larger Industry Connections. He also suggested that, it is the need of the hour to scale up the Artificial Intelligence studies across different cities in the country. He mentioned that role of RC is very crucial to give definite direction to the R&D activities of the Institute.

Item 7 – Remarks by Research Council members

Prof. Sudhakar Reddy expressed his satisfaction about the progress made in the last 6 months by CRRRI under the prevailing critical conditions. He emphasized that even in consultancy projects there should be at least one research objective to be achieved. He expressed his happiness about internal funding for in-house projects scheduled for presentations before the RC.

Prof. Manoranjan Parida appreciated the improved trend in CRRRI to publish research in high impact Journals. He appreciated the collaboration of CRRRI with Industry and different government departments. This would give a platform and exposure to younger scientists and they can also interact with senior scientists while handling the project. Lot of data is collected in different projects and he was of the view that, this should lead to

publications or revision of IRC guidelines. He also suggested that Directors report shall also include contribution made by CRRI scientists in the modification/development of new IRC guidelines. He appreciated the Artificial Intelligence project taken up for Nagpur city and he suggested that more in-house projects be taken up in this area and its application in different other areas. He suggested that, considering the government initiatives to develop smart cities at different locations in the country, a dedicated research cluster may be formed at CRRI to carry out research activities in this area.

Sh. Mayank Mathur welcomed the Chairman and members of RC on behalf of CSIR-Headquarters. He appreciated the progress made by CRRI in the last six months and especially complimented the generation of 30% ECF from the Industries. Considering the available huge opportunity, he also suggested that a dedicated team may be formed for working in the Artificial Intelligence and data sciences area.

Prof. Swagata Basu appreciated the progress made by CRRI and was glad to know the different types of R&D works being carried out in CSIR-CRRI. Prof. Basu emphasized that all the R&D works should lead to research publications.

Dr. D. T. Thube was satisfied with the progress report of CRRI and appreciated the publication of manual on pavement evaluation, as it is the need of the hour. He suggested that CRRI should carry out research on climate resilient rural roads. He also opined that, under present climate change scenario, CRRI should work in the area of Bridge Hydraulics.

Dr. Gopalakrishnan appreciated the progress report specially in terms of Publications; Buoyant ECF; Projects on Artificial Intelligence; Airfield pavement and R&D on Precast pavement. He mentioned that, CBRI can associate with CRRI for coming out remedial measures for road failures due to landslides in the state of Maharashtra. He suggested that accident prevention is very important and more work on Artificial Intelligence and data analytics should be carried out. CBRI and CRRI can join hands to solve the environment related problems related to carbon capturing.

Item 8 – Presentation of Sponsored Research Projects

S. No.	Project Details	Comments/Suggestions of the RC members
8.1	Application of cold bituminous based eco-friendly road building technology for the special featured Himalayan regions. Presentation by Dr Siksha S Kar	<ul style="list-style-type: none"> ➤ Validation of laboratory outcomes viz. Effect of filler/mixing technique needs to be studied in the planned experimental test track evaluation. ➤ Low modulus value of cold mix samples at 35°C and its implication should be explained.
8.2	Travellers Trip Patterns and its Implications on Intermediate Public Transport Services in	<ul style="list-style-type: none"> ➤ Need to improve the accuracy of the binary built up; non built up land use data using ground truth process of remote

	<p>Imphal, Manipur.</p> <p>Presentation by Dr. S. Padma.</p>	<p>sensing or by changing the sampling process.</p> <ul style="list-style-type: none"> ➤ Use of tablets needs to be encouraged for conducting household surveys. ➤ Choices in the household survey design needs a revised look. ➤ How the planned objective is achieved through the development of the binary land use map. ➤ Need of social indexing and whether it is subjective? ➤ Orthogonality criteria for the household survey format. ➤ Suggestion for looking into Gram–Schmidt process for orthogonality.
8.3	<p>Development of Trip Generation Manual for Indian cities (TripGen).</p> <p>Presentation by Dr Ravi Sekhar.</p>	<ul style="list-style-type: none"> ➤ Concept of selection of cities for the study? ➤ Responsibility for selection of size of the sample to be given to Regional Institutes. ➤ Outcome should be user friendly with Nomogram/software.
8.4	<p>Development of pre-fabricated plastic panels for road construction.</p> <p>Presentation by Sh. Gagandeep Singh.</p>	<ul style="list-style-type: none"> ➤ How the plastic panel structure performs under thermal and traffic loading? ➤ During inter-locking of plastic panels, what is the kind of movement that is proposed/permitted?. ➤ Need to look into concept of Plate on Winkler Foundation, while carrying out the analysis.
8.5	<p>Microscopic traffic simulation model for mixed traffic conditions (MiTrans).</p> <p>Presentation by Dr Madhu Errampalli</p>	<ul style="list-style-type: none"> ➤ Data may be further cleaned removing all the anomalies. ➤ The traffic models need to be developed considering different traffic management measures such as prohibiting the heavy vehicles, provision of bicycle lanes etc. ➤ If possible, HCM data can also be used.
8.6	<p>Development of design guidelines and specification for utilization of steel slag in road construction.</p> <p>Presentation by Sh. Satish</p>	<ul style="list-style-type: none"> ➤ What is the methodology to be adopted for structural evaluation of steel slag experimental test section and the type of instrumentation proposed? ➤ Need to protect the IPR ➤ Results of field evaluation tests should

	Pandey	be presented in the next RC meeting.
8.7	<p>Collaborative Research Project-Delhi Cluster- “Delhi Research Implementation and Innovation” (DRIIV)- Theme :Sustainable mobility- WP5: Measuring Sustainable Integration Index (SII) among PT Modes.</p> <p>Presentation by Dr. E.Madhu.</p>	<ul style="list-style-type: none"> ➤ The methodology to be developed considering transferability across different cities of NCR. ➤ Online data collection methods and digital data collection methods using tablets or smartphones etc. can be adopted considering present prevailing conditions.
	<p>Collaborative Research Project-Delhi Cluster- “Delhi Research Implementation and Innovation” (DRIIV)- Theme: Solid waste Management- WP6: Use of construction & demolition wastes, incinerated residues in road construction.</p> <p>Presentation by Ms Mariya Dayana</p>	<ul style="list-style-type: none"> ➤ Considering the variability, generalization of design parameters is required for utilization of C&D waste as road embankment material. ➤ As Delhi falls in seismic zone 4, is there any cyclic load tests planned for the study?
8.8	<p>Creation of test facility for bridge expansion joints at CSIR-CRRI.</p> <p>Presentation by Dr Lakshmy Parmeswaran.</p>	<ul style="list-style-type: none"> ➤ What are the capacity of hydraulic cylinders of various test rigs used for fabrication and their calibration aspects.
8.9	<p>Development of high strength fast curing cementitious stabilized base layer.</p> <p>Presentation by Sh. Manoj Kumar Shukla</p>	<ul style="list-style-type: none"> ➤ Is new stabilizer developed in the laboratory? or available commercial stabilizers are used in the study?. ➤ Applicability of conventional durability tests for the polymer modified stabilizer used in the study? ➤ Fatigue equations need to be developed. ➤ What are the field evaluation tests planned for monitoring the stabilized base layer?
8.10	<p>Hill Road widening using Light weight Geofoam Block-An alternative to earth cutting and filling.</p> <p>Presentation by Ms.Parvati G.S.</p>	<ul style="list-style-type: none"> ➤ Need to fast track the project considering its practical applicability. ➤ Cost economics as compared to conventional widening. ➤ Utility of the material for vertical retaining wall?

		<ul style="list-style-type: none"> ➤ What is the relevance of CBR value and reasons for low modulus value?. ➤ Relevance of moisture and density parameters in the study? ➤ Geofoam material may be visualized as a part of pavement structure, during its characterization studies. ➤ Tyre load and its location even on shoulders may be considered for material characterization.
8.11	<p>Bloomberg initiative of Road safety (BIGRS) survey- Case study of Delhi.</p> <p>Presentation by Dr Velmurugan S</p>	<ul style="list-style-type: none"> ➤ Conduct a workshop with the local government and between all the stakeholders to sensitize about the methodology of the project, for awareness of the government and road user about the road safety. ➤ Use tablet or smartphone based data collection instead of paper-based data collection

Item 9. Presentation on Sponsored consultancy Project

Sl. No.	Project details	Remarks of RC Members
9.1	<p>Investigation of distressed three-cell skew bridge at ch. 53+005 on nh-11, Bikaner-Phalodi highway".</p> <p>Presentation by Dr Naveet Kaur</p>	<ul style="list-style-type: none"> ➤ Measures to be taken to fix the cracks in the walls. ➤ What are different factors which contributed to the distress in the bridge

Item 10. Presentation of In-house Laboratory Research Projects

Sl. No.	Project details	Remarks of RC Members
10.1	<p>Tribological approach to characterize the warm mix binders.</p> <p>Presentation by Dr. Rajiv Kumar</p>	<ul style="list-style-type: none"> ➤ Which warm mix additives are going to be used for this study?. ➤ What is the relevance of different parameters planned for study for different warm mix process?
10.2	Development of Pavement	➤ It is suggested that for the development

	<p>Structural Health Index for Network-level Evaluation of Flexible Pavements.</p> <p>Presentation by Dr Aakash Gupta</p>	<p>of the structural health index, the data collected by CRRI in past projects can also be utilized.</p> <ul style="list-style-type: none"> ➤ A document/code of practice needs to be prepared after the successful development of the structural health index.
10.3	<p>Development of simplified Approach for deflection analysis of Flexible pavements.</p> <p>Presentation by Sh. Ashish Walia</p>	<ul style="list-style-type: none"> ➤ Title of the project needs to be changed ➤ More literature review needed.
10.4	<p>Application of Fly ash based fiber reinforced Geo-polymer Rubcrete (FFRGPR) for crash barrier.</p> <p>Presentation by Sh. Kumar Shashi Bhushan.</p>	<ul style="list-style-type: none"> ➤ Need of Numerical investigation and the boundary conditions to be considered. ➤ List out the Parameters for the study. <p>Further comments as received after the meeting from Prof. Swagata Basu are given below;</p> <p>Worldwide research is currently going on to explore potential applications of Fiber-reinforced Geo Polymer Rubcrete (FFRGPR) in transportation infrastructure components. The proposal under consideration neither provided enough detail of the research problem, nor it outlined a definite plan to address such problems during the course of the proposed project. The proposal presentation included a literature review and listed laboratory experiments for material characterization. However, no numerical and experimental methodologies to investigate the performance of crash barriers were outlined. A well-defined work plan was also missing in the proposal. In the absence of a well-defined plan for numerical and experimental investigations, this RC member suspects that the proposed work may not yield any new knowledge for the interest of CRRI. Therefore, it is suggested that the proposal may be revised with relevant details that must include (i) specific research question(s) to address, (ii) definite methodology for achieving the research goals, and (iii) possible research outcomes in view of the potential practical applications.</p> <p>Funding recommendation: Deferred for the next RC meeting</p>
10.5	<p>Study of flexural behavior of RC</p>	<p>Detailed comments from Prof. Swagata</p>

	<p>Beams strengthened using CFRP strand sheet under cyclic loading.</p> <p>Presentation by Dr Rajeev Goel</p>	<p>Basu after the meeting is as follows.</p> <ul style="list-style-type: none"> ➤ CFRP strengthened beams have been tested extensively over the last several decades under both static and cyclic loadings. Observations from past research always suggested a significant enhancement of shear and/or flexural capacity of strengthened beams when compared to that of an as-built beam. Similar observations are expected for fatigue load as well. Hence, the question is whether the proposed set of tests will be innovative enough to generate new knowledge in this area. If so, how? The proposal did not address this concern. ➤ For RC bridges, fracture due to traffic-induced fatigue is less likely unless a bridge is structurally deficient in carrying traffic due to gradual deterioration (from chlorination or carbonation), design/construction error, or sudden loss in capacity owing to extreme hazards (such as earthquakes). Such structurally inadequate bridges would anyway require repair or rehabilitation to enhance their traffic carrying capacity. Consequently, applied rehabilitation technique will improve bridge performance under fatigue. Thus, to examine enhanced flexural capacity of CFRP strengthened beams under fatigue loading, appears to be a premature research idea with a very little scope for generating new knowledge. The proposal may be revised to identify specific research need(s) and presented in the next RC meeting. ➤ Funding recommendation: Deferred for the next RC meeting
10.6	<p>Development of High Strength Pervious Concrete for Urban Low Volume Roads.</p> <p>Presentation By Sh.Yatin Chaudhary</p>	<ul style="list-style-type: none"> ➤ Title should be modified so as to make the research applicable for both urban and rural roads. ➤ Is there possibility for any experimental test track after the laboratory study? ➤ Coefficient of thermal expansion test included in the scope? ➤ Ways to increase the strength of the pervious concrete, shall be included in the scope. ➤ What are the target strength values to be achieved? ➤ Maintenance aspects of pervious concrete to reduce clogging of pores?

10.7	<p>Analytical and experimental investigation on the structural behavior of high skew bridge after rehabilitation.</p> <p>Presentation by Sh. Durga Prasad Golla</p>	<ul style="list-style-type: none"> ➤ Revise the title of the proposal to make it consistent with proposed work. ➤ How do you differentiate the rehabilitation measures in normal bridges and the skew bridges. <p>Further comments as received after the meeting from Prof. Swagata Basu are given below;</p> <ul style="list-style-type: none"> ➤ The proposal may be of some interest to the bridge engineering community in India, particularly because there is a recent case presented by Dr. Kaur in which a newly constructed skew box bridge developed cracks due to inappropriate construction and poor quality control during construction. However, the title of the proposal is broad considering that Sh. Golla plans to focus on a specific type of skew bridge. Thus, it is recommended to revise proposed scope of the work and the title of the proposal to make it consistent with the proposed work. Additionally, developed numerical model of the skew bridge should be validated with a real-life scenario such as the one presented by Dr. Kaur. Undertaken research methodology should be modified accordingly. ➤ Funding recommendation: Funding with revised scope and methodology.
------	---	--

Item 11 : RC meeting with Director

There were no items for discussion

Item 12. RC Meeting with Scientists

Prof Satish Chandra requested the acting Chairman and other members of the RC to give guidance and suggestions to the scientists.

Prof. Sudhakar Reddy expressed his happiness on the presentations made during RC meeting on various topics of research. He suggested that young scientists, should inculcate in their R&D activities, the practice of looking at and discussing the laboratory results carefully and appropriately. They shall acquire more knowledge related to statistical methods and Finite element analysis, which would help them to analyse the data for more precision conclusions. He also suggested, that young scientists should devote more efforts in formulation of research proposals. He is of the view that, a blend of junior and senior scientists is a necessity and seniors should guide the juniors in

formulation of research proposals and also help them in increasing their presentation skills.

Prof. Swagata Basu was happy to see a number of presentations, especially with respect to practical aspects. She suggested that both the laboratory and field results should be analysed carefully and in detail, which would then lead to good research publications.

Prof. Manoranjan Parida mentioned that CRRI collects huge data from the field for their sponsored research projects and there is a great scope to further innovate and to use this data effectively. He suggested that the scientists should expand the scope of research beyond what is defined and analyse/utilize the data efficiently. This process will definitely lead to quality publications. It should be tried that, for every project, there should be one high impact publication. He also suggested that CRRI shall continue their participation in high value large National Projects. Prof. Parida, also suggested CRRI to organize a webinar with some subject experts for the Bridge Engineering Division to identify specific areas for Research.

Sh. Sanjay K. Nirmal expressed his happiness to hear presentations from younger scientists and suggested that, the scope of the research shall be extended depending upon the requirements/need of all the stakeholders including different Ministries. He appreciated the project titled “Hill Road Widening using light weight Geofam Block fills” sponsored by NHIDCL, as it is more relevant to present situation prevailing in hilly areas. He mentioned that premature-failures before the design life is observed in Pavements and Bridges in the country, though they are built after proper design and with approved specifications. He suggested that the, scientists need to select such case studies for their R&D and come out with suitable solutions/remedial measures. The knowledge gained can be utilized in revising the codes and guidelines. He appreciated all the presentations that were made in the RC meeting.

Dr. D. T. Thube expressed his happiness about the various presentations that were made during the two days and found them very useful and also relevant in the present context. He cited various topics that were presented in different areas. viz. Hill Rods; Pavement Management System; Bridge Distress; Skew Bridges; Porous Rigid Pavement and Road Safety. He suggested scientists to continue carrying out their research activities in these important areas.

Prof. Satish Chandra concluded the 127th RC meeting by his vote of thanks to Chairman, RC members, RC Secretary, Staff of CCN division and all the participating scientists and technical officers of the Institute.

