

**NRRDA-P011(11)/1/2021-JD(Tech) (E: 375653)**  
**National Rural Infrastructure Development Agency**  
**Ministry of Rural Development**

**Bhikaji Cama Place, New Delhi**  
**Dated 23.08.2021**

**MINUTES**

**Subject: Minutes of Meetings of PTAs/ STAs/ SRRDAs – discuss the various issues related to the functioning of PTAs/ STAs system - Regarding.**

Sir,

A copy of the Minutes of the Meeting of Zone Level Meetings held for South & North Eastern Zone on 13.05.2021, North & Central Zone on 17.05.2021 and East & West Zone on 19.05.2021 at 3.30 PM through Video Conference with PTAs/ STAs and SRRDAs to discuss the various issues related to the functioning of PTAs/ STAs system and measures to be taken to utilize the services of PTAs/ STAs for the effective implementation of PMGSY scheme is forwarded herewith for information and necessary action.

**Encl: Minutes of Meetings & copies of PPT**

**Yours sincerely,**



**(B.C. Pradhan)**  
**Director (Technical)**

**To**

1. All Coordinators, State Technical Agencies (STAs) of all the States.
2. All Coordinators, Principal Technical Agencies (PTAs).
3. The Chief Executive Officers / Engineer-in-Chief/ Chief Engineers of all the SRRDAs.

**Copy to**

1. Director/ Principal of PTA/ STA Institutes for kind information.
2. Copy to Prof. A. Veeraragavan, IIT-M, Chennai for kind information.
3. Copy to Director (P-I), Director (P-II), Director (P-III) & Director (F&A) for kind information.
4. Copy to PPS to DG NRIDA & JS (RC), MoRD for kind information.

**National Rural Infrastructure Development Agency  
Ministry of Rural Development,  
Government of India  
Bhikaji Cama Place, New Delhi, 110066.**

**Minutes of the three Regional Level Meetings with  
STAs, PTAs, and SRRDAs held on 13<sup>th</sup>, 17<sup>th</sup>, and 19<sup>th</sup> May 2021**

Three Regional Level Meetings with STAs, PTAs, and SRRDAs were held through video conferencing for South and North-East Zones, North and Central Zones, and Eastern and Western Zones on 13<sup>th</sup>, 17<sup>th</sup>, and 19<sup>th</sup> May 2021 respectively under the Chairmanship of Dr. Ashish Kumar Goel, JS (RC), MoRD and Director General, NRIDA and the convener of the meetings was Shri. B.C. Pradhan, Director (Technical), NRIDA. The meetings were attended by coordinators/ members of STAs & PTAs team of the concerned Zones, officials from the SRRDAs of the concerned Zones, and officials from the NRIDA.

The primary objective of the meetings was to discuss the various issues related to the functioning of the STAs/ PTAs system and measures to be taken to utilize the services of STAs & PTAs for the effective implementation of the PMGSY scheme.

The following presentations/ deliberation by the subject experts were common during the three Regional Level Meetings:

1	Presentation on planning Audit of PMGSY-III proposal	By Shri. Harsh Nisar, Data Scientist, NRIDA
2	Presentation on DPR scrutiny of road works	By Shri. U.K. Guruvittal, Chief Scientist, CRR
3	Presentation on DPR scrutiny of Bridge and CD works	By Dr. Rajeev Goel, HoD, Bridge and Structures, CRR By Dr. Surjit Kumar Sharma, Bridge Consultant of NRIDA
4	Presentation on performance evaluation of New Technology Works	By Prof. A. Veeraragavan, IIT-M, Chennai
5	Sharing of experience on scrutiny of DPRs at NRIDA	By Shri. P. Mohanasundaram, JD (Tech), NRIDA By Shri. Satyendra Prasad, JD (Tech), NRIDA

The broader overviews of the presentations/ deliberation on the above subjects are as follow:

**1. Planning Audit of PMGSY-III proposal by Shri. Harsh Nisar, Data Scientist, NRIDA**

- PMGSY-III profoundly relies on technology for the planning and selection of roads.
- 100% DRRP & habitations on GIS and PMGSY-III targeted facilities are Geo-tagged through the mobile app before proceeding for selection of Through Routes and Major Rural Links.

- The initial survey of rural facilities is conducted through the GEO-PMGSY app where geo-tagged photographs of facilities such as schools, hospitals are captured.
- The facilities data combined with the GIS based DRRP is then used to create "Trace Maps" which highlight the routes which are commonly used by villages to access their basic necessities of agriculture, health, education, and administration. "Trace Maps" is a custom algorithm developed by NRIDA which traces the shortest paths from each village to its nearest rural facilities.
- The algorithm utilizes existing GIS data, facility data, and open-source tools such as QGIS & GRASS. These maps are to be used as a suggestive tool for the District PIUs to identify the most suitable roads for up-gradation in PMGSY-III.
- Separate stage of Planning Audit to verify using satellite imagery and GIS technology to ascertain if guidelines have been adhered to while planning and selection of optimal roads. DPR preparation is given go-ahead only after completion of Planning Audit
- Use of Geo-SADAK for uploading and viewing proposed alignments against satellite imagery and 14+ additional layers such as habitations, facilities, water bodies, forests, etc.
- Geo-SADAK can be useful at the time of DPR scrutiny as well to understand site geography broadly.

## 2. **Scrutiny of DPRs of road works - by Shri. U.K. Guruvittal, Chief Scientist, CRR I**

Shri. Guruvittal informed that he has scrutinized the DPRs as PTA and has presented the common DPR observations identified during scrutiny of road DPRs by his team at CRR I. He has emphasized the role of PTAs and STAs in the scrutiny of PMGSY DPRs. As given in the PMGSY Operations Manual, 'The scrutiny by STAs of project reports shall be a thorough and detailed one in order to ensure that geometric and physical design is appropriate and economic, that the specifications are adequate and based on site conditions, that the estimation of quantities is accurate and reasonable'. As such STAs while scrutinising DPRs must:

- i. Ensure that mere time constraint does not interfere with proper scrutiny. They should liaise with PIUs to ensure proper phasing out of the process.
- ii. Ensure that each DPR is made on the basis of a thorough field investigation. If necessary additional data may be asked for.
- iii. Check that the basic parameters viz., traffic and CBR are properly estimated.
- iv. Determine that the design is really appropriate and there is no overdesigning.
- v. Investigate that all possible economies on use of materials, including soil stabilization measures, use of alternative material like fly ash/ industrial waste, etc., have been fully explored and proposed for use appropriately wherever possible.

The details were discussed in the meeting by Shri. Guruvittal, Chief Scientist, CRR I related to the scrutiny of road DPRs, Common DPR observations and points suggested improving the quality of DPRs are attached as **Annexure-I**. Further, he has suggested the following topics for research studies by STAs.

- District wise Soil properties determination (Gradation, Plasticity, Atterberg limits, Compaction and CBR). This study can be extended to soil stabilisation, locally available materials, etc
- Traffic count and composition, the extent of overloading, Traffic growth rate determination (6% cannot be assumed all over India), Traffic variation between harvesting and lean seasons
- Axle load studies, VDF for typical rural roads
- Development of model roads from road safety aspects

**3. Scrutiny of DPRs of Bridge and CD works - by Dr. Rajeev Goel, Head of Department, Bridge and Structures, CRRI**

Dr. Rajeev Goel explained the importance of hydraulic studies, rainfall data, Geotechnical investigations, Selection of type of foundation, selection of suitable superstructure based on span length, choice of bearing, and expansion joint, etc. He has requested the SRRDAs and STAs to use the latest IRC codes for the design of bridges and Limit State design shall be followed. Further, he has emphasized that certain existing CDs which are in good condition have been proposed for reconstruction. The conditions/ structural stability of existing CDs/ Bridges shall be properly investigated and due justifications shall be recorded for such reconstruction. The DPR observations discussed in the meeting by Dr. Rajeev Goel, CRRI related to Bridge/ CD work are attached as **Annexure-II**.

**4. Performance evaluation of New Technology Works - by Prof. A.Veeraragavan, Professor, IIT-M, Chennai.**

Prof. Veeraragavan, IIT-M, Chennai has informed that the following two projects are taken up by IIT- M on the request of NRIDA for performance evaluation on a Pan-India basis by involving the network institutions of different regions to study the performance in a unique manner.

- Waste Plastics in Wearing Courses**
- Cold Mixes in Wearing Courses**

He further detailed the importance and present need of New Technologies/ Green technologies/ alternate materials/ industrial wastes like Fly Ash/steel slag etc in road construction for sustainable roads. These new technologies not only reduce the aggregate consumption, conservation of natural resources, and protection of the environment, it is quite possible if these new technologies are properly constructed and implemented it will enable longer life, lower maintenance cost, faster construction and hence lower the life cycle cost. The benefits of being most sustainable are that reduced pavement life cycle cost, reduced energy from production, construction, and designed life cost, reduced noise, improved air quality, improved safety, improved riding quality of the road, and in way conservation of natural resources.

He has explained about the new technologies recommended and implemented by the NRIDA such as Cell filled Concrete and Short Paneled Concrete Pavements, Cement Stabilized Sub bases and Bases, Waste Plastic modified Bituminous mixes, Cold Bituminous Mixes, Geo-textiles it can be synthetic or natural, Coir, Jute which can

provide improved performance and longer life, Geo-Cells, marginal aggregates and industrial waste such as Steel slag which will reduce the natural aggregates.

Further, he has explained about the importance and benefits of Full Depth Reclamation (FDR) technology in up-gradation works under which the existing pavement layers can be stabilized in-situ using cement or any other commercial stabilizers resulting in a stabilized mixes. It leads to a reduction in crust thickness and also improved the quality of the base course. A well set base course will enable longer life and lower maintenance costs. On the other hand, this technology helps in avoiding rising road levels, using new aggregate, removing existing materials, and replacing new materials. The existing pavement materials are milled, crushed, pulverized, and stabilized with cement or any stabilizers with 300 mm thick and over which thin bituminous surfacing will work and in this case, 100% of materials can be reused. Similarly, new construction also the stabilized sub-base and base shall be explored to reduce aggregates consumption and thickness of pavement layers. Also, explained the use of Geo-textiles in pavements and its benefits in terms of cost reduction, durability, life cycle cost reduction, and lesser maintenance cost. He explained the issues and concerns in adopting new technologies and detailed the role of STAs in the selection of suitable and appropriate technology based on materials characterization, working out rate analysis, quality checks during construction, and monitoring the evaluation of the performance of such new technology after construction.

Further, he explained the objective and scope of performance evaluation of roads using Waste Plastics in wearing course and using Cold Mix technology. The field and lab studies conducted, work plan, interim findings/ observations, deliverables, and way forward. Apart from monitoring the performance evaluation of roads constructed using new technologies, he has requested the STAs to extend their helping hand to the implementing agencies right from DPR preparation, choice of appropriate materials/ technologies, materials testing/ Mix design, quality checks, and construction process. The STAs play a vital role in selecting location/ place and appropriate new technology to be implemented based on the availability and properties of suitable materials.

#### **5. Sharing of experience on scrutiny of DPRs at NRIDA-by Shri. P. Mohanasundaram, JD (Tech), and Shri. Satyendra Prasad, JD (Tech), NRIDA**

Shri. P. Mohanasundaram, Joint Director (Technical), and Shri.Satyendra Prasad, Joint Director (Technical) of NRIDA briefly shared their experiences regarding the common DPR deficiencies noticed during scrutiny at NRIDA in the said zone-wise meetings.

The issues highlighted by Shri.P. Mohanasundaram, JD (Tech) are as follows:

- a. Before preparation of DPR by the PIUs, a combined Pre-DPR preparation meeting shall be conducted by the concerned STAs and PTA of the State with the SRRDA/PIUs/Consultants to discuss the common errors in the DPR and other nitty-gritty based on past experiences as to minimize the correction at final DPR scrutiny stage.
- b. PMGSY – III are mostly Up-gradation. In some cases, provisions are like new construction without giving appropriate credit to the existing crust. For certain DPRs

- we found the Sub-grade CBR of 2 to 4%. The majority of the proposed roads are existing BT roads and hence the sub-grade might have been naturally consolidated over a long period of time. The reported CBR may not be correct based on the photographs attached with the DPR, as there is no extensive damage in the existing surface. In such cases, STA may re-examine the CBR value at the STA laboratory.
- c. In certain cases, Physical DPRs scrutinized by the STAs and Online scrutiny has not been taken place. Online scrutiny may be completed within 3 to 4 days from physical scrutiny.
  - d. In some cases, the length indicated in the DPR does not match with the proposed length entered on OMMAS. Also, in certain cases, the name of the road/ LSB uploaded on OMMAS under the proposal module are different from the STA signed Proforma C.
  - e. Choice of new technology is important. In some cases, stabilization proposed for higher sub-grade CBR and also cost benefits is not analyzed.
  - f. Validation of CD structure proposed (Hume Pipe Culvert, box, slab, etc) as per site requirement with proper Hydraulic calculations, toposheet, and photographs attached in the DPR.
  - g. Bridge DPRs are scrutinized without conducting Joint Inspections of bridge sites by STAs and SE or CE and SE. This shall be carried out before physical scrutiny of DPRs so that providing linear waterway/ type of bridge structure required can be decided.
  - h. PTA online scrutiny should be done before issuing a clearance. After issuance of clearance, it is difficult to do scrutiny on OMMAS. The honorarium calculation is linked with online scrutiny of proposals.
  - i. In some STAs, only coordinator is doing DPRs scrutiny without involving other team members (member who is scrutinizing the DPR should also sign the proforma C along with the STA coordinator). If an existing member is retired, a new member needs to be included in the team with the approval of NRIDA to improve the scrutiny process.

The issues highlighted by Shri. Satyendra Prasad, JD (Tech) are as follows:

- a. Since PIUs are the 1<sup>st</sup> tier in the preparation of DPR, their role in the preparation of correct DPR is very important. As we know that most of the states are outsourcing the preparation of DPRs by hiring DPR consultants. In this situation, the responsibility of PIUs becomes more important. What we have observed is that the involvement of PIU is lacking in planning i.e. Detailed survey, investigation, design, and technical choice of design.
- b. We had also scrutinized DPRs in the presence of PIU team. The PIU team was unable to explain the reasons if any major discrepancies are noticed in the DPRs. Finally, they come with consultants to explain the queries raised by NRIDA.
- c. We have noticed that the aim of the consultant is to prepare an inflated DPR with richer specifications. This attitude is not correct. Actually, PIU should prepare DPRs as per the ground survey, and not on the basis of average cost per km by curtailing or including the provisions.
- d. We also request the SRRDA to check a few DPRs at random to know the quality of DPRs prepared by PIUs. Presently the involvement of SRRDA in DPR scrutiny is missing.
- e. We have observed that many states in the East / North-east like Bihar, Assam, North/ East states are highly affected due to flood / High rainfall/ landslides. During the planning of roads, these states may adopt the climate resilient design. But we have noticed that they are submitting the proposals by adopting conventional designs. These states may adopt various technological measures rather than a

single technology to reduce the impact of natural disasters on road proposed. For this, they may take the help of STAs in preparation of climate resilient design.

- f. The coordination between the PIUs and STAs is important. SRRDA/ PIUs should inform the STAs regarding the submission of the proposals well in advance and even required preliminary coordination meeting with STAs may be arranged.

He further requested all the STAs to enforce the checklist while scrutiny of DPRs and guide the PIUs on DPR's discrepancies.

### **Discussions held during the three Regional Level Meetings zone-wise:**

During the 3 meetings, the coordinators/ members of STAs & PTAs team and officials of SRRDAs were requested to share their experience/ views during the process of scrutiny of DPRs and how to proceed ahead with New Technology. The detailed deliberations held during the 3 meeting are as below:

#### **13<sup>th</sup> May 2021 (South and North-East Zones)**

At the outset Director (Technical), NRIDA welcomed Dr. Ashish Kumar Goel, Joint Secretary (RC), MORD and DG, NRIDA under whose initiative this meeting has been organised. Director (Technical) further welcomed all the STAs of concerned States / UTs, all the Chief Executive Officers, Engineer-in-Chief, and Chief Engineers of the respective States, Shri. Guruvittal, Dr. RajeevGoel, Prof A Veeraragavan, IIT-M, and Dr. Surjit Kumar Sharma, Bridge Consultant of NRIDA who has been kind enough to participate in the meeting despite their busy schedule. He welcomed all his colleagues from NRIDA who were present in the event.

Director (Technical), then informed regarding the purpose of the meeting. He raised the following issues:

- Everybody knows about the PMGSY scheme which a well-structured programme is involving all the processes required for the successful implementation of a programme starting from planning to completion of the project in a very systematic and scientific manner.
- In the process of implementation of PMGSY works, there are many processes flows like planning, preparation of DPRs, Scrutiny of DPRs by STAs/ PTAs/ NRIDA, sanction of the proposals, award of the works, progress monitoring of each work, quality checks by adopting three-tier quality mechanisms, etc. All these activities are captured and monitored through well-known software called OMMAS. The focus of the meeting will be on the involvement and activities of our most important partner of the programme State Technical Agencies (STA)/ Principal Technical Agencies (PTAs).
- The sustainability of a project to serve up to an expected design period with utmost satisfaction of the users depends upon how qualitatively the detailed project report (DPR) has been prepared. To improve the quality of DPRs, the system of scrutiny of DPRs prepared by the PIUs through domain experts of reputed technical institutes and engineering colleges of the country called STA has been introduced since the inception of the programme. As a result of which the PMGSY programme has become one of the successful programmes run by GOI for more than two decades.
- With the progress in time, a lot of changes have happened so far as the codes of practice, specifications, various publications of NRIDA, technologies used in road

construction, etc. are concerned. Also, we have learned/gained rich experiences on the way.

- Despite gaining vast experience over the last 2 decades, some common and minor omissions or deficiencies are observed in DPRs while finalizing the proposals framed by the States and scrutinized by the concerned STAs.
- Improvement is a process; which would be discussed in detail as to how it can make the proposals more qualitative and sustainable with the help of esteemed technical partners, STAs/ PTAs.
- To encourage adoption of New/Green Technology as far as possible depending upon material availability and suitability with site conditions.
- To have an appraisal meeting with the SRRDA involving DPR consultants before preparation of DPRs
- To get themselves involved in performance evaluation of roads using New Technologies/Materials.

Director (Technical) requested DG, NRIDA to Chair the meeting with his opening remarks.

Director General, NRIDA welcomed the eminent subject experts, PTAs/ STAs, and SRRDA officials and informed them about the importance of Academic partnership in the successful implementation of the PMGSY programme. DG, NRIDA informed that this is a troubling period and the field activities are greatly affected. He further informed that the purpose of this meeting is not to find fault, it is an exercise of stock taking and how to improve it further and urged participants to take this in the right spirit.

DG, NRIDA emphasised the following

- a. STAs are important stakeholders in the implementation of the PMGSY programme, the contribution of STA's/ PTA's, their opinion, and suggestions are essential to improve the programme and find new ways for better design, planning, and implementation of PMGSY. The DPR scrutiny is not just checking of estimate. There are certain deficiencies in DPRs preparation and its scrutiny by STAs. The points presented in this webinar are kept in mind while scrutinising the DPRs and the quality of DPRs will improve.
- b. The use of new technologies as many new/ green technologies are more economical and the roads constructed using new technologies require less maintenance and have better riding comfort. The STAs should take lead in the advancement and facilitation of new technologies implementation and they have to interact with SRRDAs and PIUs in choice of technology, selection of the appropriate location of road to implement suitable technology, materials characterisation, cost-benefit analysis in term of improved design, cost, reduced construction time, the longevity of the road and reduced maintenance cost, etc.
- c. STAs should actively participate in performance Evaluation of roads constructed using new technologies. STAs may submit their proposal for performance evaluation of roads constructed using new technologies and NRIDA will finance for the same.
- d. Further, STAs may submit R&D proposals directly related to the field of PMGSY and NRIDA is happy to sanction funds for such R&D proposals for effective implementation and betterment of the programme.
- e. Other expectation from the STAs is to involve M.Tech and PhD students in PMGSY scheme related research activities and allocate their study/ research entitled with PMGSY and their findings will be beneficial and added advantage to the betterment of the programme.
- f. In some STAs, the Coordinator only involving the scrutiny of DPRs and there is a need to access how the works allotted be divided among all the STA team members and suggested to involve postgraduate and research scholars in the DPR scrutiny



process so that they can learn and get practical experience during their course work.

- g. DG, NRIDA further, suggested that the honorarium received for this purpose may be distributed in an equitable and fair manner among the STA members and Students who are involved in the scrutiny process, based on their contribution.
- h. The STAs/ PTAs are requested to freely send their views, suggestions, issues and concerns if any to Director (Technical). NRIDA will answer all those queries.

Director (Technical), NRIDA informed that NRIDA has developed a scientific system for the selection of the right works for the sanction. It is important that the planning aspect should be checked before the finalisation of the proposal by SRRDA and the DPRs should be scrutinised at the SRRDA level before sending them to STAs for scrutiny. Director (Technical) further clarified that the purpose of this meeting is to involve STAs in the planning aspect and the proposal is in the right direction in terms of planning and technical aspect.

Dr. S. Moses Santhakumar, Professor, NIT Trichy, opined that ATCC is a challenge as it is difficult to lay high-tech gadgets. For traffic of more than 2 MSA, axle load survey or video-graphic survey can be adopted. He further opined that R&D proposals must not be limited to 15% of total proposal technology once proven can be directly implemented. He raised the issue regarding the deduction of TDS and payment of GST along with the amount of Honorarium to STAs/ PTAs for scrutiny of proposals. He further informed that the Transportation Research Group of India and the National Institute of Technology, Tiruchirappalli (NITT) are jointly organizing the 6<sup>th</sup> Conference of Transportation Research Group of India (CTRG-2021) from 14<sup>th</sup> to 17<sup>th</sup> December 2021 and requested support and cooperation to the conference in the form of sponsorship.

Director (Technical) informed as per NITI Ayog, the percentage of new technology works should be at least 1/3<sup>rd</sup> of the annual proposals and STAs must come forward for evaluation of new technologies which are accredited by IRC so that proven technologies can be used by implementing agencies. With respect to the TDS query, Director (Technical) informed that as per GFR rules TDS has to be deducted at source. In respect of GST, a circular in this regard has already been issued by NRIDA and available under the circular head of [www.pmsgsy.nic.in](http://www.pmsgsy.nic.in).

Prof K.M. Lakshmana Rao, STA, JNTU, Hyderabad suggested that timeline of online record with Chief Engineer office on various interventions related to DPR preparation of each work such as right from identification of proposed road, transect walk, pits for materials characterization, surface condition, visual and structural condition with relevant technologies, 3<sup>rd</sup> dimension and two dimensional survey data, condition audit on supportive infrastructure these should be recorded by PIUs/SRRDA members like trade commission of international world how they identify projects of visited country and brief to their country business plans. In the same way Chief Engineer, EE of each District, STA should witness this record in a time frame of web registering. A dedicated team should visit in the process of data collection or witness with due photographs. Timeline of a gap be naturally established between DPR scrutiny and DPR preparation and will be of importance to improve quality

A water mobility plan with third dimension sensitivity is essential to identify the optimal location of culverts and expression on the need of bridges with confirming on the linear waterway.

Online computation of traffic volume with classified traffic with computer vision using Artificial Intelligence (AI) and image processing should be established on every road proposed to construct with T8 or T9 traffic category and the roads constructed under PMGSY and traffic volume get enhanced and roads get deteriorated because of heavy loads. Such roads are to be put up with this technology which will recommend for structural treatment or to take a decision on surface treatment for the future. The data collected will be processed with AI tanned data like identifying the axles or vehicle types and connect to web link on display of number of heavy loaded vehicles with time and pictorial proofs.

Road safety audit prior to DPR and post audit after opening to traffic of the constructed road should be witnessed by STA either both or certainly after the road opened to traffic beyond the implementation of DPR. This is missing in the process as STA has approved technical specifications it should be checked whether constructed as per DPR guidelines. However, this can be synchronized with state level and National level auditors on quality [NQMs and SQMs].

When curves and junctions are treated or not untreated with their functionality of connectivity in case of junction curves should be put up with Intelligence Transportation System (ITS) signal operating with sensor or image processed technology, it should alert and flash on type of black spot come forward in a short distance of travel to the road user. This should function with alternative energy and operate for 24 hours. This should be important when vertical or horizontal curves or junctions of typical for every road.

Dr. C.S.R.K. Prasad, NIT, Warangal informed that they have conducted a performance evaluation of low-volume roads in Andhra Pradesh in two projects. He stated that the DPR scrutiny of 10% DPRs by PTA is a welcome feature. He informed that engineers bring all the DPRs more or less within a short duration and pressurize them for scrutiny of proposals. There was no agreed schedule for the submission of DPRs by the PIUs. There are many cases preferring SDBC or BM etc as surface course deviating the IRC code of practice. Geometrics, especially curves are not designed for design speeds due to lack of adequate land width. The soil investigation report in many cases is not authentic with no signature or stamp and is just produced on letterhead. He informed that Road safety experts are not available as per the requirement. He further opined that the present rate of honorarium is very much low in comparison to the amount of time spent in the scrutiny of proposals by PTAs.

Director (Technical) replied that the honorarium has already been increased 1.5 times of the earlier but NRIDA is unable to release the same due to the conditions imposed by IFD that the amount will be released subject to performance evaluation of the STAs.

Prof Rajesh Kumar from NIT, Warangal informed that in some cases, it is noticed that despite the bridge structure being in healthy condition, reconstruction is proposed by the implementing agency. There is a need to create a unique id and name of bridges based on latitude and longitude. He suggested that there is a need to monitor bridge site, HFL level before proposing for construction, and precast technology may be used in the construction of bridges,

Prof. M.V.L.R. Anjaneyulu, NIT Calicut informed that the quality of DPRs is not up to the mark and last-minute pressure for scrutiny of DPRs is high. Also, some PIU personnel have newly joined and there is a need for training of new PIUs. Director (Technical) informed that sufficient time should be given to STAs for scrutiny and SRRDA should monitor the PIUs in the submission of compliance to the observations of STAs/PTAs in time. There is no need to pressurize the STAs for scrutiny of DPRs and proper time shall be given to them and if there is extraordinary pressure from SRRDA/ PIUs, STAs should feel free to contact NRIDA.

Prof. Kumar Molugaram, STA Coordinator, Osmania University, Hyderabad informed that majority of DPRs are not properly prepared and PIUs mostly depend on DPR consultants. Also, some new engineers and even few seniors in PIUs who have joined recently are not having adequate knowledge of DPR preparation. Soil testing reports producing from private laboratories (not registered one). There is a need for rigorous training for DPR preparation, soil testing and traffic surveys. He further informed that there is a shortage of Road Safety Auditors in Telangana. He also shared that based on the joint inspection of bridges, majority of roads passing through the village portion do not sufficient width (less than 3m only) and there is no scope for further expansion. Spending more money on construction of bridges without sufficient road width in village portion is not advisable or some alternate route shall be suggested by the concern village officials.

Prof R. Anil, STA Kerala suggested that even though the new technologies suggested were used by SRRDA but proper documentation was not happening in PIUs and the performance evaluation procedure was not known to PIUs. Also, there is a need that new technologies/ materials used in PMGSY roads across the country are to be documented as and when it is implemented/ evaluated and these data to be made available in PMGSY domain for reference.

Shri. SanjeevRao (E-in-C, Telangana) asserted that most of the claims of STAs/PTA are true and accepted. Scrutiny of DPR shall not be done in a pressurised situation and more time shall be given for its scrutiny. He also said that the Road Safety Auditors (RSA) is very less in number which is forcing the DPR scrutiny without the RSA report.

Shri Rajesh Kemprai, Commissioner and Spl. Secretary, Assam said that the state is looking for adopting bailey bridges as per geographic conditions and the state is adopting PMGSY norms in all the works. He further informed that all the STAs of Assam are cooperative and sorted out the issues raised from time to time.

Director (Technical) informed that as per Operations Manual, before the commencement of the preparation of the DPRs, Pre DPR meeting should be conducted with all concerned Engineers of PIUs and STA(s)/ PTA shall be convened by the SRRDA under the Chairmanship of the Chief Engineer (PMGSY) to discuss the issues and the data requirements for the preparation of DPR. At this stage, STA/ PTA shall take initiative in guiding implementing agencies for adopting designs with New Materials where it is possible. If needed, they will associate in investigations of special nature. The Engineers also will be apprised of the need for appropriate Designs with respect to Geometrics, Pavement Crust, Surface Drainage, CD Works as well as the measures for Environmental Conservation. The date of pre DPR meeting and a copy of the minutes shall be sent to NRIDA. The Director (Technical) informed that an advisory will be issued in this regard

reiterating the above points and minutes of Pre DPR meeting should be the part of proposals submitted by the State.

DG, NRIDA in his concluding remarks stated that STAs need to encourage the PIUs for the adoption of new materials/ Technologies. STAs shall undertake field visits to guide the PIUs and also for sharing of knowledge among PIUs. Also, there is a need to conduct Pre DPR meeting among the PIUs, DPR Consultants and SRRDA as per the guidelines before the preparation of proposals and all the issues should be discussed in detail. The Pre DPR conference will reduce the scrutiny time and also advised that the SRRDAs should give sufficient time to STAs for scrutiny of DPRs. Further, DG, NRIDA stressed that there is a need for the involvement of M.Tech and PhD students in performance evaluation of new technology works as per the directions received from PMO.

Meeting ended with a vote of thanks to the chair.

### **17<sup>th</sup> May 2021 (North and Central Zones)**

At the outset Director (Technical), NRIDA welcomed Dr. Ashish Kumar Goel, Joint Secretary (RC), MOR and DG, NRIDA under whose initiative this meeting has been organised. Director (Technical) further welcomed all the STAs of concerned States / UTs, all the Chief Executive Officers, Engineer-in-Chief, and Chief Engineers of the respective States, Shri. Guruvittal, Dr. Rajeev Goel, Prof A Veeraragavan, IIT-M, and Dr. Surjit Kumar Sharma, Bridge Consultant of NRIDA who has been kind enough to participate in the meeting in spite of their busy schedule. He welcomed all his colleagues from NRIDA who were present in the event.

Director (Technical) requested DG, NRIDA to Chair the meeting with his opening remarks.

DG welcomed the eminent subject experts and participants. He stated that STAs have a very important role in PMGSY and correct DPR is the foundation of a good construction project. DG suggested putting in the requisite effort in the preparation of DPR to be free from any technical defect. The Director (Technical) has conveyed the common DPR observations to STAs and I have also written a general letter soliciting better scrutiny of DPRs. In some cases the STA coordinator alone scrutinising the DPRs without involving the STA team members. STAs are requested to distribute works among STA team members, M.Tech, and PhD students. If team members are not contributing, STAs are requested to propose a new member to include in the STA team. DG, NRIDA emphasized that topics directly related to PMGSY may please be given on research study to M.Tech and PhD students and further suggested to do the R&D research study for NRIDA and that we would be happy to receive such projects for funding under PMGSY. DG NRIDA desired that PIUs be encouraged to adopt new technologies and requested STAs to submit the proposal for performance evaluation of roads constructed using new materials/ technologies in their respective districts/ states. Before starting the preparation of DPRs there should be a Pre-DPR conference among PIUs, DPR consultants, STAs, and PTA for understanding each other's concerns, and a minimum of 15 days should be given to STAs for scrutiny of DPRs. STAs should undertake field inspection of such DPRs where the abnormalities found in the DPRs, higher traffic projected and has a very high average cost/km.

Dr. M. S. Mir, NIT Srinagar informed that they have, in UTs of Kashmir and Ladakh, implemented two new technologies namely Waste Plastic and Nanotechnology as pilot projects with the objective of ascertaining success or otherwise of these new

technologies. The Waste Plastic Technology has performed well in cold weather conditions and performance of Nanotechnology roads is being studied. Uptilt now all the applications have been for complete road stretches, irrespective of length of the roads. There are certain roads taken which are around 12 kms and 18 kms and entire lengths have been constructed using new technology. Dr. Mir said that 12km or 18 km lengths of roads are being used to test for one condition of Traffic, soil and weather. It would have been possible to get 12 or 18 data points with measure of performance in 12 or 18 different conditions had one km each been taken at different locations with varying conditions. It would not only have been possible and easy to compare the performances of New and Conventional Technologies under similar conditions but also even to model the performances of these New Technologies for different conditions of Traffic, soil and weather. These models could then be used to predict the performance of a New-Technology road in a given set of conditions. He has suggested that instead of proposing technology on complete lengths of roads, the technologies can be implemented in parts of lengths of different roads to study the performance in varied Traffic, soil and weather conditions. It is also important to develop facilities for correct implementation of these new technologies like making available and using machinery to get Waste Plastic material of size 2.36 mm to 600 micron and customized HMPs to prepare the Waste Plastic bituminous mix as per codal requirements.

Dr. Praveen Kumar, IIT Roorkee informed that DPRs are prepared by consultants, not by PIUs, and officials coming along with DPRs for STA's scrutiny are not much aware of the provisions made in DPR. It is suggested that the official coming for DPR scrutiny should have complete knowledge of provisions made in the DPR before submitting the same to STA for scrutiny. In the case of bridge DPRs also, the basic parameters like hydraulic studies, geotechnical investigations, and design of bridge components are missing in the DPRs, unless the STAs are not having the full field particulars in the DPRs, it is difficult to scrutinize the same in a qualitative manner.

Dr. Siddhartha Rokade MANIT Bhopal has suggested that sufficient time should be given for DPRs scrutiny.

Dr. Brind Kumar, BHU has informed that PIU does always complain of inadequate funds for DPR preparation and material testing. He also said that the DPR preparation cost should be at par with the average project cost. Director (Technical) replied that the DPR preparation cost for road and bridge works is already hiked and communicated to the States/ UTs vide NRIDA's circular no. Lr.No. NRIDAP010(21)/1/2018-Technical dated 19.03.2020 and will be further enhanced if required.

Dr. Rajesh Tripathi, NIT Raipur, informed that Chhattisgarh PWD submitted the long span bridge DPRs under RCPLWE programme without proper hydraulic studies, Geotechnical investigations, and structural design calculations. They are submitting the bridge DPRs based on the old Bridge Design of some other projects. Sometimes they do not even change the name of the bridges. It was also told in the meeting that most of the bridges they have provided the pile foundation with a very high length of piles without any technical and geotechnical considerations. With all these provisions, the cost of bridges is very high. It was also reported that provisions of higher protection work and longer approach roads are made without proper justification. Some PIUs are reluctant to approach the STA, only junior staff is visiting STA and they are unable to answer the queries raised by the STA team. Compliance is also very slow and incomplete. Due to this,

a lot of STA time is wasted in checking the same DPR multiple times. Pre-DPR meetings were never arranged and DPRs are submitted in a random and haphazard manner. Further, he has informed that they have prepared line estimates since the funds for the preparation of bridge DPRs are not available and DPRs with proper hydraulic studies, geotechnical investigations, and structural design will be done only after the sanction of proposals by the Ministry. DG, NRIDA has directed the STA, NIT, Raipur to write a letter to NRIDA in this regard. Further, DG has directed NRIDA to take-up this matter with Additional Chief Secretary, PWD, Chhattisgarh.

DG, NRIDA in his concluding remarks informed that STAs need not be forced to scrutinize the DPRs within a short span of time. Required time shall be given to the STAs for scrutiny of DPRs and DG requested the State officials to prepare a timeline for the activities involved in the preparation of DPRs and its scrutiny. Further, DG NRIDA suggested that whichever states are now coming for PMGSY-III they should have a Pre DPR conference with PIUs, DPR consultants, STAs/PTA and SRRDA officials before starting preparation of DPRs, in which CEOs/ CE should be present. The officials from NRIDA may also attend the Pre-DPR conference in the future. The SRRDA should send a copy of the Minutes of Pre DPR conference along with the proposal and this will be reviewed in the Pre-EC meeting. He further emphasised that frequent seminars should be conducted with STAs, PIUs, DPR Consultants, and SRRDAs for the preparation of good quality DPRs of both roads and bridges.

Meeting ended with a vote of thanks to the chair.

### **19<sup>th</sup> May 2021 (Eastern and Western Zones)**

At the outset Director (Technical), NRIDA welcomed Dr. Ashish Kumar Goel, Joint Secretary (RC), MORD and DG, NRIDA under whose initiative this meeting has been organised. Director (Technical) further welcomed all the STAs of concerned States / UTs, all the Chief Executive Officers, Engineer-in-Chief, and Chief Engineers of the respective States, Shri. Guruvittal, Dr. Rajeev Goel, Prof A Veeraragavan, IIT-M, and Dr. Surjit Kumar Sharma, Bridge Consultant of NRIDA who has been kind enough to participate in the meeting in spite of their busy schedule. He welcomed all his colleagues from NRIDA who were present in the event.

Director (Technical) requested DG, NRIDA to Chair the meeting with his opening remarks.

DG, NRIDA welcomed the participants and experts. In his opening remarks, DG emphasized that STAs are important stakeholders in the implementation of the PMGSY programme and can guide the PIUs on the adoption of new technologies which are sustainable, cost-effective, environment friendly, and faster in construction. He further emphasized that certain deficiencies were found in DPRs and the common deficiencies found during the examination of Road and Bridge DPRs will be explained by Shri. U.K. Guruvittal and Dr. Rajeev Goel from CRRRI. STAs must take a lead in the advancement of new technologies at appropriate location and place which is sensitive and save time and increase the life of a road. He further suggested that the STAs may submit the proposal for performance evaluation of roads constructed using new technology. DG, NRIDA suggested that before starting preparation of DPRs there should be a Pre DPR conference among PIUs, DPR Consultants, STAs, PTA, and SRRDA officials for the understanding of each other concerned.

Dr. U.C. Sahoo, IIT Bhubaneshwar also made a presentation on Observations in DPR Scrutiny by STAs/ PTAs. He presented the following observations:

- a. Many Consultants are not competent enough to prepare good quality DPRs. Some of them are not aware of the IRC guidelines to be followed for preparing DPRs. Therefore, the empanelment of consultants should be done as per the NRIDA/ OM guidelines.
- b. PIUs do not involve themselves much in the survey and DPRs preparation.
- c. Neither consultant's engineer nor PIU's engineer finds time to visit the road in a few cases, specifically when a huge number of DPRs are to be submitted in a short span of time. This scenario needs improvement.
- d. In some cases, it has been observed that drawings and photographs of other roads are attached to the DPR.
- e. Traffic survey reports have been found to be manufactured as per the need. In some cases, the same traffic report was in different DPRs. PIUs should be more responsible in this regard.
- f. Road Safety Audit (RSA) is a specialised job. Most of the consultants and even a few of the STAs don't have enough knowledge of RSA. Necessary RSA training should be imparted to the PIU engineers, consultants, and STA members.
- g. Planning of New Technology implementation is not done judiciously. For upgrading roads, specific new technologies should be identified, which can be applied considering the practical difficulties in the field.
- h. All STAs may not very conversant with different types of new technologies and alternative materials. Facilities for testing materials are also not available in some of the laboratories. In such cases, it becomes difficult for some of the STAs to help the PIUs in new technology implementation.
- i. NRIDA may ensure the availability of ATCC and Axle Load Survey equipment for traffic surveys, as it has been made mandatory in PMGSY III for certain traffic categories. Alternatively, indirect traffic estimation methods through traffic forecasting may be used
- j. Before starting the new schemes (such as PMGSY-III), a meeting with the STAs/PTAs to discuss the salient features of the scheme is necessary.
- k. Enough time should be given for STA/ PTA scrutiny.
- l. NRIDA should devise a mechanism for the selection of DPRs (minimum 10% length) to be scrutinised by PTAs using the AI based sampling technique.
- m. NRIDA should involve the STAs/PTAs in more R&D activities and performance evaluation of new technologies.
- n. NRIDA should devise a format for PTA scrutiny (one page) similar to STAs for comments and approval.
- o. NRIDA should devise a mechanism for the selection of DPRs (minimum 10% length) to be scrutinised by PTAs using the AI based sampling technique.

Dr. G.J Joshi, SVNIT Surat opined that the time availability of STA in DPR scrutiny is an important issue. Practically, Pre DPR meeting is not conducted by SRRDA. There is no scrutiny at any level of implementing agency before sending the DPRs to STAs. The raw DPR prepared by the consultants directly submitted to STA without any scrutiny done by either PIU level or Superintending Engineer level and such raw DPRs are to be scrutinised by STA in a hurried manner. They don't have an RSA report with roads of more than 5 km in length. There is a need of Road Safety Auditor, NRIDA should take initiative to appoint more Road Safety Auditors and more training shall be organised for PIUs, SRRDAs, and STAs on Road safety. Under New Technology initiatives, 21 roads in south Gujarat were

constructed using Fly Ash & Lime, and performance Evaluation were done for some roads during 2014-16. The performance evaluation report along with the final result was shared with GSRRDA and NRIDA. For Traffic estimation, there is a need to build the indigenous model. Good model roads with different technologies and road safety provisions should be constructed in each state and monitored, such model roads can be used as a demonstration project for the entire state.

Dr. R.M. Damgir, Govt. College of Engineering, Aurangabad suggested that the use of new technology should not be limited to 15% and it should be increased to maximum length of the annual proposals.

The Chief Engineer (PMGSY), Odisha sought a solution/ improvement measure for some of the CC roads in Odisha, which are suffering from ravelling with poor riding quality, much before its design life.

Director (Technical) replied by saying that the rigid pavements are designed for 20 years, the poor-quality pavement or the reasons for such distress may be due to the poor W/C ratio, improper gradation, or poor mix design at the time of construction.

Dr. U. C. Sahoo, IIT Bhubaneshwar opined that a thin bituminous surface layer for improving the riding quality, if the pavement is structurally sound. However, where there is expected moisture related damage due to poor drainage, a 100 mm thick overlay using interlocking blocks/ cell filled concrete can be adopted.

Dr.Guruvittal opined that if many roads are distressed in this manner, then a detailed investigation is required. Different option is there to rectify it as reasons of failure may be different.

Prof. K. S. Reddy, IIT Kharagpur opined that if there are cracks or other structural problems, guidelines are already there to replace the distressed slabs. He also supported Dr.Sahoo's suggestion for providing a thin bituminous surfacing such as OGPC or surface dressing, if it's a functional failure.

Shri. Bhagwat Ram BRRDA requested a write up on Interlocking concrete block pavement from CRR. He also suggested for separate traffic estimation for flexible and rigid pavements as the design life for both the pavements are different.

Shri. Dipanjan Bhattacharyya, WBSRRDA informed that they had conducted Pre DPR meeting with STAs, PIUs and DPR consultants before the start of preparation of PMGSY-III DPRs and STAs have explained the common deficiencies in the DPRs. Now, the majority of the DPRs have been prepared and scrutiny of STAs is in underway. Due to the Covid pandemic and intensive lockdown in the State, the process is getting delayed. The Director (Technical) informed that the soft copy DPRs received from the State is under scrutiny and the NRIDA observations will be communicated within week time.

Director (Technical) in his concluding remarks thanked all the participants for the fruitful discussions held during the meeting and opined that observations pointed out by the experts on the scrutiny of DPRs will help SRRDAs in preparing good quality DPRs. Further, Director (Technical) emphasized the importance of Pre-DPR meeting with PIUs, DPR consultants, and STAs and this will help in reducing time at all levels during the scrutiny of DPRs. Also, STAs are requested to guide the PIUs in the adoption of new materials/ technologies which are sustainable, economical, faster in construction, and environment



friendly. STAs are also requested to take up the performance evaluation of the roads constructed using new materials/ technologies for wider use.

Meeting ended with a vote of thanks to the chair.

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**Note on Scrutiny of PMGSY–III DPRs (Road Works)**  
**Shri. U.K.Guruvittal**  
**Chief Scientist, CSIR – Central Road Research Institute**  
**New Delhi – 110025 (vittal.crri@nic.in)**

**Scrutiny of PMGSY DPRs**

Scrutiny of Pradhan Mantri Gram Sadak Yojna (PMGSY) project proposals (Detailed Project Reports – DPRs) by State Technical Agencies (STA) and Principal Technical Agencies (PTA) has been a distinguishing feature of this program since its inception. As given in the PMGSY Operations Manual, 'The scrutiny by STAs of project reports shall be a thorough and detailed one in order to ensure that geometric and physical design is appropriate and economic, that the specifications are adequate and based on site conditions, that the estimation of quantities is accurate and reasonable'. As such STAs while scrutinising DPRs must:

- vi. Ensure that mere time constraint does not interfere with proper scrutiny. They should liaise with PIUs to ensure proper phasing out of the process.
- vii. Ensure that each DPR is made on the basis of thorough field investigation. If necessary additional data may be asked for.
- viii. Check that the basic parameters viz., traffic and CBR are properly estimated.
- ix. Determine that the design is really appropriate and there is no overdesigning.
- x. Investigate that all possible economies on use of materials, including soil stabilisation measures, use of alternative material like fly ash/ industrial waste, etc., have been fully explored and proposed for use appropriately wherever possible.

Presently PMGSY-III program is under implementation nationwide. The objective of PMGSY-III program is upgradation of existing through routes and major rural links based on providing connectivity to critical/ important facilities like rural markets, educational and health amenities. CSIR-Central Road Research Institute (CRRI) as Principal Technical Agency (PTA) has been taking up scrutiny of PMGSY-III DPRs for different states. Important observations emanating from this exercise are explained in following paragraphs. This article exclusively focuses on issues related to road works. Bridges and culverts have not been included, since they require a separate similar article. The common issues observed during DPR scrutiny have been classified as technical issues and procedural issues. But this classification is for convenience, and is not a strictly water tight classification. Some of the issues overlap in both the categories.

**Technical Issues Found During DPR Scrutiny**

**1. Even in sections where black top is in good condition, removal of black top proposed for entire length of the project road**

Many of the PMGSY-III proposals are being taken up for road links of considerable length, some times more than 10 km and even up to 15 km, since the objective of PMGSY-III program requires such as approach. But, the usual practice has been to take up upgradation works in a uniform manner over this entire length of the project road. This has resulted in proposals where in even road sections having pavement in 'good' condition, with negligible amount of distress are being proposed for scarification of black top and a part of base course layers. To overcome this handicap, strengthening measures can be

selected judiciously section wise. Provision may be made in the guidelines for upgradation of road sections having better pavement condition at a later date.

**2. Material/soil testing reports are incomplete, basic soil test reports (Gradation, Plasticity, Compaction and CBR) are invariably required. Only some of these test results get included in some DPRs.**

Unless all the requisite tests (Gradation, Plasticity, Compaction and CBR) are conducted on subgrade soil samples, it would not be possible to judge its suitability. The frequencies of these tests (number of tests to be conducted) have also been clearly specified in IRC SP: 72. In a similar manner, tests should be conducted on GSB and aggregates, which are proposed to be used in that road works. State authorities should ensure that all these tests are conducted in a correct manner and the results are presented in all the DPRs.

**3. Bituminous macadam layer not to be provided below T9 category traffic (more than 1.5 msa).**

IRC SP: 72 clearly state that bituminous macadam (BM) layer is to be adopted only when design traffic is more than 1.5 MSA. However, in many DPRs it has been observed that even when design traffic is much lesser than 1.5 MSA, BM layer has been provided in upgradation works. In some cases, BM was specified in lieu of a WBM layer required in the widening portion. Using a costlier material like BM is not justified for traffic less than 1.5 MSA. At least two layers of granular base course (totaling to 150 mm minimum) are required for all roads.

**4. Cement stabilisation to be encouraged, lime quality may not be good or soil may not be suitable for lime stabilisation; mechanical stabilisation using a material like pond ash alone may not improve soil much. Laboratory test reports on stabilised soil should form part of DPR.**

Among different traditional methods of stabilisation, cement stabilisation can be adopted for a wide variety of soils except clayey soils. Cement stabilisation has other advantages like ready availability at competitive prices, factory made material with a quality certification conforming to IS standards, etc. Quality of lime available in the market is always a suspect, since it is not a factory made material. Even in case of clays, where lime is preferred, a combination of lime and cement would work better than lime alone. Mechanical stabilisation cannot match the improvement in strength properties which can be achieved from cement stabilisation.

**5. Instead of RCC retaining walls, less costly masonry retaining walls to be adopted. Length and height of retaining walls to be kept minimum, retaining walls of continuous length 800 m provided in plain areas.**

In many DPRs, RCC retaining walls have been provided as protective works. However, other cheaper alternatives like gabion wall, masonry retaining wall, etc., can be adopted instead of RCC retaining wall. In this regard, IS 14458 can be referred to for selection of retaining structure type. Also, in plain and rolling terrains, the length of retaining walls should be kept minimum and they should be provided only where it is absolutely necessary. Gentle side slopes of the embankments can also be adopted to minimise necessity for a retaining wall.

**6. Rigid overlay over concrete pavement should be provided as 'Short paneled concrete pavement' of 100 mm (Min) thickness. Other better option would be to provide 80 mm thick ICBP as overlay over existing cement concrete pavement.**

Providing a rigid overlay over a rigid pavement is not an easy task, and it leads to failures when correct procedure is not adopted. Great care should be taken to ensure that longitudinal and transverse joints of overlay pavement and existing pavement should match while constructing cement concrete overlay. Also, any panel of existing pavement having full depth structural cracks should be replaced before overlaying. It is advisable to provide rigid overlay over concrete pavement as 'Short paneled concrete pavement' of 100 mm (min) thickness. Better alternative can be 80 mm thick 'Interlocking Concrete Block Pavement (ICBP)' as overlay over existing cement concrete pavement. Very good PMGSY road pavements using ICBP have been constructed in North-East. It should also be kept in mind that, while flexible (black top) pavements have a design life of 10 years; design life is 20 years for cement concrete pavements.

For construction of new pavements also, short paneled concrete pavement (100 mm thickness) and ICBP can be better and economical options rather than conventional cement concrete pavement.

**7. ESAL for HCV and MCV are wrongly calculated in some of the reports. Proper VDF values as per IRC SP:72 to be taken and VDF has to be separately applied for loaded, unloaded and overloaded vehicles**

In some DPRs, Vehicle Damage Factor (VDF) values considered are different from indicative VDF values given in IRC SP: 72. Computation of VDF values should be made separately for loaded, unloaded and overloaded commercial vehicles, and IRC SP: 72 provides detailed explanation regarding VDF values suggested for adoption. In case PIU has carried out axle load survey and derived the VDF values, those values can be used for ESAL calculation. Otherwise, the indicative VDF values suggested in IRC SP: 72 should be adopted. Further during traffic survey, the percentage of loaded, unloaded and overloaded commercial vehicles should be estimated and recorded. Adopting wrong VDF values leads to errors in ESAL calculation.

**8. History of the existing road pavement – Crust details (layer wise and thickness), construction dates, overlay details if any, should be provided. In the absence of such details, it is difficult to say whether the concerned road can be taken up for upgradation or not.**

PMGSY-III guidelines stipulate that only those road pavements which have completed 10 years of service life can be taken up for upgradation. However, history of road pavements is found to be missing in DPRs. Details like date of construction of the road pavements, dates of providing overlays if any, should form part of PMGSY-III DPR. In some DPRs only total crust thickness of existing pavement is reported without giving details of pavement layers. Pavement crust details (pavement layer type and its thickness) derived from test pit observations should be included in DPRs.

**9. A very small test pit of about 15 to 20 cm diameter made to determine the existing pavement crust details. Pavement layer details cannot be accurately known through such small pits.**

Test pit observation is invariably required for determining existing pavement crust details. However, as seen in photographs enclosed in DPRs, circular test pits of 15 to 20 cm diameter have been made for this purpose. It would be very difficult to determine crust details in such small pits. It is suggested that square sized test pits of minimum size 50 cm x 50 cm should be made for noting the pavement layer details. Information about what type of pavement layers make up the existing pavement (layer type and thickness) and

chainage at which test pits were excavated should be given in DPR. Collection of subgrade soil sample for testing can be made from such test pits.

**10. Road Safety Audit (RSA) Report should be part of DPR. Detailed drawings showing location (chainage) of road safety measures (traffic signs, markings, delineators or other special treatment) proposed for the road and provision in estimates should be included in DPR.**

As per NRIDA guidelines, independent Roads Safety Audit (RSA) is to be carried out during the design stage of the roads when project road length is more than 5 km. Road Safety Audit is a mandatory requirement while preparing the DPR and project road shall be audited by a certified road safety auditor. RSA report should be enclosed as a part of the DPR. However, many of the DPRs are submitted for scrutiny without RSA report, with an explanation that RSA report is under preparation and would be submitted later. Implementing RSA findings would involve making suitable provisions for road safety measures and road furniture such as traffic signs, markings, delineators or other special treatment in project cost estimates. Without RSA report, adhoc provisions cannot be made in project cost estimates. Eventually, when RSA report is ready, estimate may have been already approved for execution and it would be very difficult to incorporate changes in the estimate to accommodate the road safety measures.

**11. The Action Taken Report (ATR) from PIU regarding road safety audit should be more specific with regard to findings of RSA.**

As a follow up after receiving RSA report, PIUs must prepare an Action Taken Report for compliance of audit findings, which will also be a part of DPR. ATRs sometimes state that 'Being existing village road it is not possible to remove all obstructions. However necessary safety precautions are taken in DPR'. Instead, it is suggested that, PIUs should put efforts to remove such obstruction in association with Gram Panchayats and record clearly the efforts made to improve road safety. What are those safety provisions which are being implemented to overcome issues pointed out in RSA should be clearly spelt out in the ATR.

**12. The radius of the curves provided for horizontal alignment at many locations is inadequate for design speed. Traffic speed at such sharp curves has to be restricted to 25 kmph or less.**

PMGSY programs do not make any fund provision for land acquisition. Requisite land has to be made available by state authorities, who largely depend on voluntary contribution of land. As a result, alignment usually follows existing track and roads are being built accommodating sharp curves. Ruling design speeds for rural roads is 50 kmph in plain terrain and 40 kmph in rolling terrain. Minimum design speeds rural roads in these two types of terrains are 40 and 35 kmph respectively. However, in some of the DPRs where in PMGSY-III roads are located in plain or rolling terrain, very sharp curves having design speed as low as 20 to 25 kmph have been provided. Such curve locations will be perennially unsafe spots for traffic operations. These curves have to be redesigned, in case land acquisition can be made to accommodate a gentler curve. Where ever it is absolutely not possible to improve the geometrics, adequate road safety measures like informatory sign boards restricting the operating speed, speed breakers, etc., should be provided. A relook on policy issues related to land acquisition may be necessary to work out a solution.

**13. Latest versions of the design codes should be adopted. Are the solid wheel bullock carts still in vogue?**

In some of the DPRs it is observed that while designing flexible and rigid pavements, IRC codes referred for design would be the older editions of such codes. IRC codes and guidelines are updated periodically hence the latest versions of the IRC codes and guidelines should be adopted.

In IRC SP:72 (2015), designing flexible pavement considering solid wheel bullock cart was deleted, since it was felt that such bullock carts are no longer seen in Indian roads. However, in some of the states, DPRs have reported such bullock carts in their traffic count, and even while designing the pavement, they have considered solid wheel bullock cart traffic. This should be clarified by concerned states, so that IRC/ NRIDA can issue suitable corrections.

**14. Dividing total quantity of excavated material into soil, soft rock, hard rock requiring blasting and hard rock where blasting is prohibited, to be made based on earlier project experiences in that area.**

The rates payable for different categories of materials such as excavated soil, rock, etc., vary. Hence when the total quantity of excavated material is calculated (based on land survey and alignment design details), it would have to be divided into different categories of materials for estimate preparation. A rational approach based on the topography of the area, frequency and depth at which rocks are normally encountered in that area, type of rocks, etc., should be adopted based on past experiences and these details should be mentioned in the DPR. This should form the basis for classifying the excavated material into different categories for estimate preparation. Later, a clear picture about quantities of different of excavated material would emerge during execution. Data obtained during project implementation should form the basis for DPR preparation in subsequent years.

**15. GSB material need not be restricted to MORD Specifications clause 401, it can be from clause no. 402 or 408 also, and most economical type of material to be selected.**

For constructing any pavement layer, MORD Specifications provide a choice of specifications (different types of materials) which can be adopted. Instead of adopting uniformly a particular clause (in other words same type of material) everywhere, state authorities can examine different options available; materials found in that area, and thereby decide about the most economical type of material that can be adopted for that road. These details should be provided in DPR.

**Procedural Issues Found During DPR Scrutiny**

This section relates to shortcomings in DPRs which are mainly concerning to procedural issues, and they have been listed below.

- i. DPRs not signed by PIU Officers or STA, or signed even when parts of the DPR are missing.

- ii. Transect walk photos do not show participation of villagers. Transect walk photos taken in such a way that they show sky for a large part of the photo, or the slate showing chainage. Pavement and road side condition could not be seen properly.
- iii. Quality of the images shown in transect walk should be maintained well to assess the road condition. Chainages have to be invariably mentioned in these photos. These photos should be taken at specified interval, i.e., at every 100 m and at CD locations.
- iv. There is no need to repeat the write-up or explanation given in PMGSY-III DPR Template, only relevant parts must be included in the project DPR. If some sections do not apply to that project DPR (example: New Technology or New Materials) a line indicating that such sections do not apply would suffice.
- v. The reports should be prepared with proper page numbers, cross-references and standard text size and styles. Check lists should be properly filled.
- vi. In these DPRs whether 'Calculation of material and energy consumption for the project' is required or not may be examined by NRIDA.
- vii. Items like usage diesel, kerosene, etc., are in-built in the project estimates and hence they cannot be independently assessed. For road projects, 'Timber' is not required. Energy consumption for transportation of construction materials would be difficult to compute if material is sourced from different locations. As a result, these tables have been left blank/ filled up improperly in DPRs. NRIDA may suitably consider these aspects.
- viii. Drawings showing 'Road Safety Features' along with chainages should form part of DPR. Many times, the cost estimates did not have provision for road safety signs / markings. 'Junction design drawing' found to be missing in most of these DPRs, even though many of these PMGSY roads are starting from State Highways.
- ix. NRIDA may consider issuing typical junction design drawings which can be followed by the states.
- x. Development of alternate routes involving earthen tracks under PMGSY-III.
- xi. In some of the DPRs, a part of the proposed project is earthen track, in which new pavement would be constructed. These sections can be considered similar to bypass road sections of highway constructed to ease traffic congestion in existing road. Hence, such road sections can be considered under PMGSY-III provided they are fulfilling main objective of connectivity to market centres/ education or health facilities. As such roads involve green field construction; geometric elements of alignment should be properly designed after ensuring adequate right of way (ROW). Another issue would be estimation of design traffic. Traffic studies for such roads are based on traffic count for "Parallel Road". In such a scenario, points to be clarified are (a) An estimate of how much traffic in the parallel road will be diverted to this new road (b) Necessity of providing parallel roads (c) Reason for not taking up upgradation of parallel existing road.
- xii. Pavement cross section drawings and dimensions considered for estimation should match.
- xiii. Some DPRs which are very poorly prepared (transect walk photos not included, soil test results showing obvious errors, length of the road not correctly mentioned, separate pavement designs proposed for each km length of the road based on CBR value for that km, etc) included for scrutiny. SRRDAs should exercise adequate quality checks to weed out such poor quality DPRs.
- xiv. Rates for few of the items need to be reviewed by some states. Uniformity in rate analysis across different states needs to be ensured.
- xv. Cost of barrow soil shown as Rs.539/- per cum, Cost of stone dust as Rs.526/- per cum, and cost of 22.4 mm down aggregates as Rs.618/- per cum. Such high cost of barrow soil needs to be justified. In another instance, GSB cost was more than (almost double) WMM cost. Adopt WMM if it is economical than WBM, Cost of WMM was shown to be lesser than WBM by about Rs.500/- per cubic m.

### **Third party traffic survey using ATCC and Axle load survey if design traffic is more than 1 MSA.**

NRIDA has issued a circular making it mandatory to conduct third party traffic survey using Automatic Traffic Counter and Classifier (ATCC) and also Axle load survey if design traffic is more than 1 MSA. Reports from these surveys should be part of the project DPR for roads having traffic more than 1 MSA. However, the DPR template for PMGSY-III states that third party traffic survey using ATCC is required if design traffic is more than 1 MSA, and it stipulates axle load survey would be required if design traffic is more than 2 MSA. This point may be clarified.

Presently different types of technologies are available for traffic survey. Installation, operation and interpretation of ATCC findings require skilled personnel. ATCC may not be available with many STAs. Hence, in consultation with STAs and PTAs, these issues may be further clarified.

### **Points for Improving DPR Quality**

The following points are suggested for bringing improvement in the DPRs. Accomplishing these tasks would also provide reliable data for design and estimate preparation and minimise ad-hoc assumptions.

#### **1. Preparation of database of subgrade soil properties (Gradation, Plasticity, Compaction and CBR strength) district wise, which can be extended to other road construction materials.**

Subgrade soil properties vary. However, some degree of generalisation can be made regarding type and property of soil in a limited area, say a particular district. STAs and PTAs have a good understanding of engineering properties and type of soils available in and around the districts where they are situated. They can be involved to test few representative samples for districts located near their campus, and this data collected across the country would form a valuable database for interpreting and checking the subgrade soil properties. Relationships (equations) between grain size, plasticity and CBR strength available in IRC SP: 72 can be further improved using such database, which in turn can help to arrive at CBR strength of subgrade soil quickly and accurately in future works. In the next stage, this work can be further extended to stabilisation of poor soils, identification and characterisation of locally available materials and industrial wastes. All these data can be integrated in GIS platform created by NRIDA and this would vastly improve the manner in which DPRs are being prepared.

#### **2. Traffic and axle loading related aspects database**

Many of the issues related to road traffic in our rural roads are based on conventions that are being followed since many decades. For example a uniform traffic growth factor of 6 per cent is assumed all over the country as suggested in IRC SP: 72:2015. There is no reliable database of traffic volume and its classification for our rural roads. In a similar manner, increase in traffic on rural roads during harvesting season is also based on assumptions. No studies have been conducted to determine VDF of commercial vehicles operating on our rural roads. By developing this kind of a database, veracity of the traffic count and classification being carried out for DPR preparation can be easily established.



### **3. Development of model roads from road safety aspects**

There is a pressing need to train and sensitise PIU engineers regarding various aspects of Road Safety issues in rural roads. Developing model or demo roads implementing required road safety features can help in this regard.

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**Note on Scrutiny of PMGSY–III DPRs (CD works and Bridge Works)**

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The common observations noticed during the scrutiny of Bridge DPRs and CD works proposed under PMGSY/ RCPLWE programme are noted below.

1. There are no Index and page numbers given in the DPR due to which it becomes difficult to locate the Topic/Drawing/Figure. All pages must be numbered and duly filled under heading page number in the list of Chapters, paragraphs, sub-paragraphs, figures, formats, and annexures, etc.
2. Some of the DPRs are not being prepared as per the standard Template.
3. Package no and Bridge Chainage/RD should be written at front page followed in other chapter/ Proforma etc., in DPR.
4. Hydraulic survey/ Hydraulic data such as L-section, X-sections are not found attached to some of the DPRs. Without calculation of Catchment Area by gathering local information and topographical survey data and other important data, hydraulic design parameters viz. Discharge, Velocity, Scour Depth, Linear Waterway, Afflux, Foundation Levels, Height of abutment and piers, etc cannot be calculated. Hence, calculation of catchment area from levels/ topo-sheet and detailed hydraulic design as per IRC 5:2015 and IRC SP: 13:2004 shall be carried out and included in the DPR.
5. The latest rainfall data of the region shall be used in hydrological studies/computing discharges shall be included in the DPRs.
6. In some of DPRs, higher numbers of CD works are proposed without any justification. Based on computed run-off, number and location of culverts/bridges shall be assessed. All existing culverts/bridges shall be assessed for sufficiency in size and strength and their capability of taking loads of relevant IRC vehicle class. If required, tests to assess residual concrete strength, reinforcement cover sufficiency, reinforcement corrosion, soil properties should be undertaken. Based on this, decision for reconstruction / strengthening of existing culverts/bridges shall be taken. Condition of all existing CD structures shall be included in DPR. Detailed justification for replacement of existing CD structure with new one shall be given. Further, the reasons for not repairing/strengthening of existing CD structure shall also be given in the DPR.
7. Insufficient number of boreholes is made for geotechnical investigation in abutment and pier locations in some of the DPRs. One borehole for each abutment and pier location should have been made for better representation of soil. The location plan for boreholes needs to be attached with the DPR. Hence, detailed investigation of the soil is required to be made based on more Boreholes.
8. Geotechnical Investigation Report is incomplete/ missing. There are no recommendations for the Safe Bearing Capacity (SBC) and type of foundation with levels. Also, in some cases, different type of foundation is selected for construction in place of recommended type in the soil investigation report. However, the reasons for the same have not been recorded in the DPR. In some cases SBC indicated in the soil investigation report does not match with the SBC mentioned in design and everywhere in the DPR.
9. Complete design and drawings of all structural components of the bridge including bearing pedestals, seismic arrestors, reaction block, crash barrier etc., shall be enclosed. Design shall be done using Limit state method.
10. In some cases, the Standard Design & Drawings of MoRTH is attached with the DPRs. These drawings are based on IRC21:1966 or IRC21:2000 using Working

State Method. Also, at many places, IRC:6:2010 & IRC:6:2014 are referred. After the publication of IRC 112-2011 Code for the Design of RCC and PSC Bridge, IRC 21 is withdrawn by IRC, hence the design and drawings as per IRC:21 are not valid. In the old design based on IRC 21, the Depth of Girders taken is very high resulting in misuse of materials viz. concrete as well as steel, resulting in high cost of the bridge. In view of this, the design and drawing using all provisions of IRC 112-2011 & IRC 6-2017 and other latest codes shall be made using proven bridge design software. Modelling of structure and all assumptions shall be clearly appended/ mentioned in the DPR.

11. The design of Deck Slab is not found attached with some of the DPRs. It must be done separately and appended.
12. In some of the DPRs, designs and drawings of bearings and expansion joints are found missing. Selection of any particular type of bearing (based on the type of superstructure, support conditions, loads transferred from superstructure, etc.), Jacking Pads, Expansion Joints, Railing, Wearing Coat and other Appurtenances shall be done judiciously duly following the relevant codes. The design and drawings of these items shall be done as per relevant codes and included in the DPR.
13. In some cases, Pot-PTFE bearings are proposed in design and drawings. As per code and MoRTH guidelines, elastomeric bearings should be used for minor bridges. These, elastomeric bearings should be designed using the latest IRC 83-2018, Section IX, Part II, for the loads, transferred from the superstructure.
14. Steps involved in installation of bearings especially PoT-PTFE should be given in the drawings. Positioning of the hydraulic jacks with load capacity should be shown in drawings for the replacement of bearings.
15. For ULS, the value of  $E_{cm}$  shall be taken from Table 6.5, IRC 112-2011. However, before selecting  $E_{cm}$  from Table 6.5, selection of the type of aggregate to be used for the construction is essential as  $E_{cm}$  depends upon the type of aggregate too (Notes under Table 6.5). For SLS, the value of  $E_{cm}$  shall be modified as suggested in IRC 112-2011, cl. 6.4.2.5. However, this was not followed in some of the DPRs.
16. The Seismic Zone of the location of the bridge has not been mentioned in DPR. If the location of the proposed bridge is in Zone III or more, ductile detailing should be designed as per relevant codes i.e. IRC: SP:114:2018 and shown in drawings.
17. In some of the DPRs, the span length of the selected type of superstructure is either more or less than the range in which a particular type of superstructure is economical. The particular type of superstructure shall be selected, based on the site condition, aesthetics, ease in construction, the economy in construction cost, etc. Long span bridges are generally found economical and shall be adopted in lieu of small span bridges. Reasons for selecting the particular type of superstructure shall be recorded in the DPR.
18. Pre-cast culverts and high-level bridge (RCC Solid Slab for < 15 m spans, RCC T Beam Slab for 15 m to 20 m spans, and PSC Girder with RCC Slab for > 20 m Spans) or any other innovative bridge-type viz. voided slab, continuous bridges, etc. should be preferred based on detailed design and economy in consideration.
19. Due attentions should be given while selecting bridge carriageway width as 2-lane or intermediate lane considering the expected traffic growth in future as the bridges are designed for 100 years service life.
20. Bailey bridges are mostly being used in Hilly areas. In some of the DPRs, details are not given about their design, drawings, the basis for a cost estimate, etc. Certified design, drawings, and copies of approved rates for Bailey bridge shall be included.
21. In some of the DPRs, the recommendation given by STA has not been incorporated. These recommendations shall be duly addressed and incorporated in the DPR.
22. The Schedule of rates, used in the cost estimation is not given in some of the DPRs. Copy of Schedule of rates, used in the cost estimation and approved rate analysis of all non-scheduled items shall be included in the DPR.

23. Authentic details of quarry for various construction materials shall be given and distance between the quarry and construction site shall be shown in the maps which shall be certified by the Engineer-in-Charge.
24. Adopted grade of Concrete/steel shall be at least equal to minimum grades of these materials, specified in the relevant codes.
25. In some of the DPRs, there are mismatch in the details given in the report, design and drawings. Even different grade of Concrete is taken in Cost estimate then considered during structural design / mentioned in the drawings. Hence, a system of proper checking of DPR shall be established at the initiation stage itself so that such types of mistakes did not occur.
26. Uses of waste material such as fly ash/plastic are not being used. The use of fly ash will not only save precious topsoil but also utilize the waste products of thermal power plants. For the construction of bridge approach embankments, it is advised to use fly ash as per clause 306 of 'MORD Specifications for Rural Roads'. Similarly, the possibility of the use of plastic and other waste material shall be explored.
27. In the title of some of the DPRs, the Phrase "Major Bridge" has been used for bridges of length less than 60m. The proper nomenclature of the bridge shall be used in the title of the DPR.
28. In some of the DPRs, following are the observations on the drawings: a) print not clear, b) font size very small, c) RD/chainage not mentioned in GAD, d) missing details about grades of various materials used / clear cover to steel reinforcement / details of welds in steel structures, etc., e) Unsigned drawings. Drawings should have good readability and signed by concerned officials; all the relevant details such as grades of various materials, clear cover to steel reinforcement, details of welds in steel structures, safe bearing capacity, etc.; and RD/chainage of the bridge in GAD. All drawings and NOTES therein shall be properly drawn, checked, and duly signed by the DPR Consultant and departmental officers.
29. In some of the DPRs, Formats and Drawings are not found signed and certified. All the Formats and Drawings shall be signed and certified by PIU officials. In some of the DPRs, there is a mismatch in the details given in the report, design, and drawings.
30. In design, Fe415 has been used. Use Fe500 as Fe415 is no more available.
31. In many places, more quantity of steel is provided than the required. This should be avoided.
32. River Training Works viz. protection works, apron with curtain /cut off wall with necessary pressure relief holes need to be provided with proper design as per IRC: 89:2019, IRC:5:2015, and IRC SP:13:2004.
33. Clear Covers for various components of the Bridge are not mentioned anywhere in the Drawings. Further, details in the NOTES should have related to that particular drawing.
34. Details of Cut off Walls and Pressure Relief Holes in the Raft Foundation required to be shown as per Article 21 "Raft Foundation" given on pp. 81 & 82 of IRC SP 13-2004.
35. Design of Dirt wall, Return Wall, Seismic Restrainers/Blocks/ Jacking pads, bearing pedestals, Crash Barriers, Expansion Joints (including mandatory post-installation tests) is required to be conducted by the Contractor, as per the guidelines of MoRTH).
36. Provision of Acceptance load testing of one span of bridge as per IRC :SP:51-2015 and other relevant codes shall be made before opening to traffic.
37. Many mandatory Proformas are incomplete and not signed by the Competent Departmental Officials and STA. These formats are required to be filled and duly signed.
38. In some cases, Joint Inspection of bridge site by STA & SE or CE & CE is not conducted before preparation of DPRs. The details indicated in the inspection format do not match with the relevant details in the DPRs. This needs to be checked and corrected.

39. Environmental Impact Assessment on the selected alignment should be carried out as per the guidelines of the Ministry of Environment & Forests.
40. Unforeseen items considered in General abstract are not permissible by NRIDA.

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