

EXPERIENCES OF ACADEMIC INTERVENTIONS IN DPR PREPARATION FOR RURAL ROADS UNDER PMGSY

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ABSTRACT

The Pradhan Mantri Gram Sadak Yojana (PMGSY) has been launched in December 2000, with the objective of providing connectivity, through good All-weather roads, to all unconnected Habitations, with a population of more than 500 persons, by the year 2007. The District Panchayat will finalize the list of road works to be taken up under the PMGSY each year. Then, it will prepare the Detailed Project Report (DPR) for each proposed roadwork. The State Technical Agency (STA) will scrutinize these proposals. The National Rural Road Development Agency (NRRDA), Ministry of Rural Development has identified reputed Technical Institutions as STAs for technical scrutiny of proposals.

The Transportation Division, Department of Civil Engineering of NIT, Warangal is one such STA to scrutinize proposals prepared by Panchayat Raj Engineering Department of Andhra Pradesh state. In its capacity as STA, it has scrutinized several DPRs of rural roads for the last three years. Because of the intervention of NIT Warangal, the standard of DPR preparation has improved. Further, the knowledge of field engineers has increased many folds. There are many occasions, where the cost of proposal was reduced with better and optimum design. Further, full connectivity to habitations was established, which is the heart of PMGSY scheme. An attempt is made in this paper to share some of these experiences.

I. INTRODUCTION

1.1 General

Rural Road connectivity is not only a key component of Rural Development by promoting access to economic and social services and thereby generating increased agricultural incomes and productive employment opportunities in India, it is also as a result, a key ingredient in ensuring any sustainable Poverty reduction Programme (Ministry of Rural Development, 2003). There is a close link between Rural Connectivity and Growth, Employment, Education and Health care. A nation-wide network of All-weather roads in the rural areas is a critical link for progress. About 40 percent of the Habitations in the country are still not connected by All-weather roads. With a view to redressing the situation, Government of India has launched the Pradhan Mantri Gram Sadak Yojana (PMGSY) on 25th December 2000. The National Rural Road Development Agency (NRRDA) is the nodal agency, coördinating this scheme.

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1.2 Objectives of PMGSY

The primary objective of the PMGSY is to provide Connectivity, by way of an All-weather Road with necessary culverts and cross drainage structures, which is operable throughout the year, to the unconnected Habitations in the rural areas, with the following order of priority.

- I. Providing new connectivity to unconnected habitations with a population of 1000 + (500 + in case of Hill states, etc.)
- II. Providing new connectivity to unconnected habitations with a population of 500-999 (250-499 in case of Hill states, etc.)
- III. Upgradation of through routes in the core network
- IV. Upgradation of link routes

The programme further envisages that habitations with a population of 1000 persons and above are covered in three years (2000 – 2003) and all unconnected habitations with a population of 500 persons and above by the end of the Tenth Plan period (2007).

2. PROJECT PROPOSALS

2.1 Preparation

A core network is that minimal network of roads that is essential to provide basic access to essential social economic services to all eligible habitations in the selected areas through at least single all-weather road connectivity. The core network would constitute the basis for preparation of project proposals under the PMGSY. The District Rural Roads Plan would indicate the existing road network system in the District and also clearly identify the proposed roads for providing connectivity to Unconnected Habitations. The list of road works to be taken up under the PMGSY will be finalised each year by the District Panchayat in accordance with the allocation of funds communicated to the district by the state government. After approval by the District Panchayat, the proposals would be forwarded through district Programme Implementation Unit (PIU) to the State Level Standing Committee. The State Level Standing Committee would scrutinise the proposals to see that they are in accordance with the Guidelines. After scrutiny, the PIUs will prepare the Detailed Project Report (DPR) for each proposed roadwork. The preparation of DPR requires collection and analysis of data required for the design of pavement and cross drainage works such as inventory and engineering surveys, soil investigations, hydraulic data, etc.

2.2 Details

DPR of each proposed road link should consist of the following information.

- ⌚ Maps showing existing road network in District and mandal along with the proposed road link
- ⌚ Type and Condition of Existing Road / Track
- ⌚ Road Land Width
- ⌚ Engineering Survey Data – Alignment, LS, CS
- ⌚ Geometric Design Particulars
- ⌚ Soil Investigation Results – Gradation, OMC, CBR
- ⌚ Hydraulic Data
- ⌚ Base year Traffic Data, Growth Rate, Projected Traffic Data
- ⌚ Pavement Design with a sketch of layers
- ⌚ Design Details of CD Works
- ⌚ Estimation of BOQs
- ⌚ Estimation of Cost as per Standard Data Analysis and SSR

The above information will be prepared in standard format i.e. Proforma F-1 to F-8, as suggested by NRRDA.

3. STATE TECHNICAL AGENCIES

3.1 General

Ministry of Rural Development has identified, in consultation with State Governments, reputed Technical Institutions to scrutinise the project proposals prepared by the State Governments, provide requisite technical support to the State Governments, and undertake Quality Control tests upon specific request. These are being referred to as the State Technical Agencies (STA).

3.2 Responsibility of STA

The role and responsibility of STA, as prescribed by NRRDA, are presented below.

- ⌚ Verification of the District Rural Roads Plan prepared by the District Programme Implementation Unit
- ⌚ Post scrutiny of the Core Network
- ⌚ Scrutiny of the Detailed Project Reports for road works prepared by the District Programme Implementation Units
- ⌚ Ensuring Economy with Excellence
- ⌚ Provision of requisite technical support to the State / District units

- ☒ Undertaking normal tests of parameters for road design and Quality control tests for District Programme Implementation Units and State Quality Control Mechanism
- ☒ Training of Field engineers
- ☒ R&D Monitoring
- ☒ Technical advice

The main activity of a STA is technical scrutiny of DPRs. The PIU will forward the DPRs to the STA for scrutiny of the design and estimates. The DPRs are to be scrutinised by the STA in the light of the PMGSY Guidelines, IRC specifications as contained in the Rural Roads Manual (IRC SP20, 2002) and the applicable Schedule of Rates. The NRRDA will thereupon scrutinise the proposals from the State Level Agency (Panchayat Raj Engineering Department) to ensure that the proposals have been made duly keeping in view the Programme Guidelines and that they have been duly verified by the STAs.

3.3 NIT Warangal – STA

The Transportation Division of Department of Civil Engineering, NIT, Warangal has been appointed as STA for the state of Andhra Pradesh to scrutinise project proposals of the following ten districts.

Adilabad	Karimnagar	Warangal	Khammam	Srikakulum
Vijayanagaram	Visakhapatnam	East Godavari	West Godavari	Krishna

It has scrutinised the proposals submitted by the Panchayat Raj Engineering officers of the above ten districts for the last three consecutive years. The experiences of the division during scrutiny of proposals and the impact of its intervention on engineers in general and quality of proposals in particular are presented in the subsequent articles.

4. STA INTERVENTIONS

4.1 Land Availability

As per PMGSY guidelines, a certificate that land is available must accompany the proposal for each roadwork. The PMGSY does not provide funds for Land acquisition. In one of the proposal from Krishna District, there exist sharp horizontal curves in village portion. The STA has suggested change of alignment, which requires acquisition of land. The concerned engineer has convened the village people and their representatives and explained the situation. The villagers came forward to donate the land to accommodate the alignment changes.

In another proposal from Visakhapatnam district, partial road length was proposed under the pretext that required land width is not available and road is passing through costly agricultural fields. Then, the concerned engineer was suggested either to drop the proposal or to submit the proposal for full length. Subsequently, the engineer has appraised the village people about the situation and convinced them to donate required land, which enabled him to take up full length.

4.2 Full Length Connectivity

During the scrutiny of Phase III proposals, all the district PIUs were requested to submit district Core Network documents, for verifying the length of proposed road links. Many times, proposals for partial road lengths were prepared in order to cover many road links with an objective of covering many habitations. However, after insistence, proposals were resubmitted with full connectivity. Some of the proposals with partial road lengths were dropped. All the proposals, where a population criterion was not satisfied, were rejected out rightly.

4.3 Soil Investigations

Interactions with Panchayat Raj engineers revealed that soil investigations were rarely carried out, while preparing estimates for rural roads taken up under different schemes. This situation was attributed to:

- ☒ Meagre or no allocations for investigations
- ☒ Partially equipped laboratories in the department
- ☒ Less time given for project preparation
- ☒ Partial allocation of funds for road construction

Perhaps, these reasons might have driven engineers to assume important soil parameters like CBR, without realising their significance in pavement design. The same tendency was continued initially, while preparing DPRs for roads under PMGSY. The engineers were appraised the importance of soil investigations and their role in design and performance of roads. In the soil survey, generally a detailed investigation is required both physically as well as by way of testing samples from each kilometre of the alignment. This may result to different crust thicknesses along alignment, resulting to significant cost savings.

The physical significance of PI (≤ 6) and sieve analysis of soils is also being explained to the engineers. The soil or gravel having higher PI retains water, which has adverse affect on performance of pavements. So, by adding locally available admixtures, the PI value has to be brought down to below 6. Sieve analysis data of soil enable to obtain soaked CBR value from a nomograph. This is handy, where CBR apparatus are not available, or time restrictions exist for preparation of DPRs.

4.4 Traffic Estimation

The significance of traffic data and its projection to horizon year (design life of 10 years) was explained to the concerned officials at different occasions. Many times traffic data was assumed. The engineers were insisted to conduct traffic studies for duration of 3 days continuously. The role of Commercial Vehicles in pavement thickness determination was discussed with examples. However, it was observed that traffic on road links connecting habitations with population under 1000 persons is negligible, many times. Gravel roads might be cost effective solution for such habitations.

4.5 Alignment and Geometrics

The longitudinal and cross sectional details of the existing roads or earthen track under consideration were collected using instruments like compass and dumpy levels. Subsequent utilisation of this data in alignment fixation and geometric computations was observed to be ineffective. The following shortcomings were observed in almost all DPRs.

- ❖ Grade line was simply fixed at about 0.2m to 0.6m above the existing ground surface, without taking into consideration ruling gradient and the need for maintaining uniform gradient, wherever possible.
- ❖ Data about High Flood Level (HFL), which is essential for fixing formation level, was not collected
- ❖ No attempt was made to design vertical curves
- ❖ Earthwork computations were appeared to be arbitrary in some of the proposals
- ❖ Horizontal curve designs were incomplete or inappropriate, many times not included
- ❖ Extra widening at horizontal curves was not considered
- ❖ Sharp horizontal curves were observed in some of the roads. No attempt was made to correct the alignment by providing large radii horizontal curves to satisfy design criteria

Most of the field engineers were under the impression that geometrics are not essential for rural roads. Many of them have poor knowledge about road geometrics. During several interactions, significance of road geometrics was explained and design calculations were discussed. Some improvement was observed especially in design of horizontal curves. However, little improvement was observed in design of other parameters. There appears to be little change in their attitude. This situation emphasises for rigorous training to the engineers involved in PMGSY works.

4.6 Pavement Design

In many proposals, pavement was over designed by boosting traffic volume. Some of the other limitations observed in pavement design are listed below.

- ❖ No attempt to stabilise weak soil subgrade
- ❖ No attempt to use industrial waste like fly ash
- ❖ No attempt to judge the suitability of Moorum / gravel as GSB

Engineers appeared to be lacking confidence and technical know how in stabilisation of weak subgrade soil and usage of fly ash. Probably, orientation courses focussing on these issues will make them confident in adopting appropriate construction techniques. Based on the experimental work carried out at research laboratory of R&B department at Vijayawada, the Liquid Limit and Plasticity Index of Moorum / gravel can be reduced by adding sand / stone dust at varied quantities as admixture. This know how was transferred to Panchayat Raj engineers, who are adopting these specifications in their design estimates.

5 SUMMARY

Various shortcomings in preparation of DPRs for Rural Roads under PMGSY programme, which were observed during their technical scrutiny by NIT Warangal, were highlighted in this paper. Some of these shortcomings were eliminated by educating / creating awareness among the Panchayat Raj engineers. However, an effective and focussed training is essential to update the knowledge of engineers to enable them to design, construct and maintain the rural roads efficiently with least cost using local materials and industrial wastes.

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