

# A Case Study on Quality Assurance of Road Construction works under Madhya Pradesh Rural Connectivity Programme in Sagar District

Er. Parag Thakur<sup>1</sup>, Er. Sandeep Verma<sup>2</sup>, Er. Ragini Mishra<sup>3</sup>

<sup>1</sup>MTech Scholar BTIRT, Sagar

<sup>2</sup>Head of Department, Department of Civil Engineering, BTIRT, Sagar

<sup>3</sup>Assistant Professor, Department of Civil Engineering, BTIRT, Sagar

\*\*\*

**Abstract** - A major rural road programme known as Pradhan Mantri Gram Sadak Yojana (PMGSY) is being implemented since December 2000 by the Government of India through the Ministry of Rural Development (MORD). The National Rural Roads Development Agency (NRRDA), working under the aegis of the MORD, provides the overall administrative, technical and programme support to the states in the execution of works. The scheme envisages construction of good quality all-weather roads to provide connectivity to habitations with a population of 500 and above (250 and above in case of hills, deserts and tribal areas). Emphasis is being laid on planning, design, construction and maintenance of rural roads based on sound engineering principles, which conform to specifications, codes of practice and manuals of the Indian Roads Congress. A comprehensive document, IRC: SP:20 entitled Rural Roads Manual has been brought out in 2002 for adoption in case of all rural roads including works being carried out under the PMGSY programme. Subsequently, the NRRDA brought out its own Handbook on Quality Control for Road Works and Operations Manual for PMGSY works.

**Key Words:** PMGSY, NRRDA, Rural Roads, Quality Assurance, all weather Roads, MPRRDA

## 1. INTRODUCTION

The Government of India have recently reviewed the progress of the PMGSY and other schemes relating to rural development and have decided to undertake a bold initiative of building infrastructure in rural areas under an umbrella programme, known as 'Bharat Nirman'.

The PMGSY is one of the six components of the Bharat Nirman and the following targets have been set:

- (i) Provide all-weather connectivity to habitations of population above 1000 (500 in case of hills, deserts and tribal areas).
- (ii) The task would involve connectivity to 66,802 habitations.
- (iii) The work involves construction of over 140,000 km of new roads and upgradation of over 190,000 km of existing rural roads at an estimated cost of Rs 48,000 crore.

## 1.1 Quality Assurance

A three-tier quality management mechanism has been operationalized under PMGSY for ensuring that the quality of assets created conform to the prescribed standards. The first tier of quality management mechanism is in-house quality control at the level of the executing agencies whereas the second tier provides for quality monitoring through independent State Quality Monitors (SQM). Monitoring by independent National Quality Monitors (NQM) constitutes the third tier of this arrangement. Under this arrangement, it is the responsibility of the State Government to operationalize the first and the second tiers of the quality management structure.

## 1.2 MPRRDA

To implementation of Pradhan Mantri Gram Sadak Yojna in Madhya Pradesh, an agency called Madhya Pradesh Rural Road Development Authority (registered under the Societies Act, hereafter called the Authority) has been created. A Chief Executive Officer from the I.A.S cadre heads the Authority. 100 Project Implementation Units (PIUs) for fifty districts have been constituted to co-ordinate the works executed by the contractors and supervised by the consultants. The PIUs are headed by General Managers who are of the rank of Superintending/Executive Engineer. The Authority has a General Body, which is chaired by the Chief Minister. This body lays down the policy guidelines and monitors the programme.

There is an Empowered Committee under the chairmanship of the Chief Secretary. It is responsible for monitoring the progress of the project. It also takes the financial and administrative decisions. The project proposals are scrutinized and sanctioned by this committee. It also accords final sanction to the master plan/core network of the State. At the District level, the Programme is planned, coordinated, and implemented through the PIUs. All PIUs are manned by competent technical personnel from amongst the available staff or through deputations.

Master Plans are prepared at the block level, which are later synchronized at the district level. They indicate the habitations and the existing status of road connectivity, including the proposed new construction as well as roads requiring upgradation. The District Master Plans so prepared are subject to scrutiny to arrive at the most economical

alignment of the roads. It also indicates the priority of roads to be taken up for construction / upgradation in a phased manner. The Master Plans are approved by the Governing Body of the respective Zilla Panchayats, taking into account the views and suggestions of the local MLAs/MP. Thereafter, the District Planning Board gives approval to the Master Plan. For works to be taken up each year depending on the priority, Project Proposals are prepared and forwarded to the Empowered Committee for approval.

The State Level Empowered Committee forwards the approved proposals to the Central Government for administrative sanction and release of funds. On clearance of the Project proposals by the Central Government, the relevant projects are executed by the PIUs and completed within a period of 9 months. The well-established procedure for tendering, through competitive bidding, is followed for all projects. The projects are tendered in packages of appropriate size (between Rs. 1 crore to Rs. 5 crore).

## 2. ANNUAL TARGETS

The Union Minister for Rural Development, Panchayati Raj and Mines Shri Narendra Singh Tomar today reviewed the progress of Pradhan Mantri Gram Sadak Yojana, PMGSY here and directed the senior state officials to speed up the execution of rural roads to achieve full rural connectivity by March, 2019. 1,78,184 eligible habitations with 500 populations in plain areas and 250 in hilly areas had to be connected by all weather roads. As of March, 2014, 97838 such habitations (55%) were connected. Today 1,30,974 habitations have been connected under PMGSY and another nearly 14,620 habitations have been connected through State Government Programmes, bringing the total habitations connected to 82%. This has been possible by speeding up the pace of road construction and habitation connectivity over the last 3 years, reaching 130 KM per day construction (highest in the last 7 years) in 2016-17. Work is in progress in all but 1700 remaining habitations. The remaining 1700 habitations will also be approved by end December, 2017. It is likely that we will be very close to 100% connectivity of eligible habitations by March, 2019.

The major challenge lies in Assam, Jammu & Kashmir and Uttarakhand on account of the difficult terrain. In Chhattisgarh, Malkangiri district of Odisha and LWE areas of Jharkhand, challenge is on account of Left Wing Extremism. Bihar and West Bengal which also have large connectivity to achieve and therefore, require speedy implementation. The Ministry is constantly following up with all these States to ensure achievement of targets by March 2019. Funds are not a constraint and States have been forthcoming with their State share.

To further enable ease of decision making, monitoring and transparency, the Department is committed to complete GIS mapping of all rural roads of the country by 2018. Today, we are soft launching the GIS mapping of 10 States which have already completed the process. These are Odisha,

Uttarakhand, Haryana, Himachal Pradesh, Sikkim, Madhya Pradesh, Karnataka, Telangana, Chhattisgarh and Meghalaya.

The Department has also made concerted efforts for adoption of green and innovative technology and a target of 10000 KM of such roads, is likely to be completed in the current financial year. At the time of approval, States are opting for a minimum 15% roads with green technologies like use of waste plastic, fly ash, copper and iron slag, geo textile, cold mix, panelled cement concrete, cell filled concrete. Nano Technology products are also being used for stabilization of roads, so far 3,426 KM roads have been constructed in the current financial year, using these technologies. The Department in partnership with States is fully geared to go beyond the achievements of 2016-17 by completing 51000 KM at the rate of 140 KM per day in the current financial year.

## 3. THREE TIER QUALITY CONTROL MECHANISM FOR RURAL ROAD CONSTRUCTION UNDER PMGSY SCHEME

The Pradhan Mantri Gram Sadak Yojana envisages a three-tier Quality Control & Quality Monitoring mechanism.

1. The first tier shall be with the PIU/senior Engineer of the PIU in charge of the work. The Contractor shall establish Quality Control laboratories and get the contractually stipulated tests conducted. The test results shall be recorded in the prescribed Quality Control Registers. All the concerned officers shall record their observations in the Quality Control Registers.
2. The second tier shall comprise periodic inspection by the State Quality Control Coordinator (SQC) and his staff engaged by the Nodal Agency, independent of the PIUs
3. The third tier shall comprise National Quality Monitors (NQMs) appointed by the NRRDA for the purpose, who shall be retired Senior Engineers from State/Central organizations. These NQMs will carry out Quality testing of PMGSY works on random sampling basis from the prioritizing list, mainly in order to confirm that the programme implementation and State Quality Control System is working satisfactorily. The NQMs are expected to make constructive suggestions relating to procedural aspects in addition to locating problems at individual work level. The SQC will be responsible for reporting compliance on the issues raised by NQMs and observations of NRRDA in this regard.

### 3.1 First Tier Quality Control

Head of Programme Implementing Unit (PIU) or the Executive Engineer is responsible for Quality Control of the works under his charge. He is responsible for all mandatory Quality Control tests. The Contracts as per Standard Bidding Document of PMGSY provides for establishment of field

laboratories by the contractor. The following process is suggested for the first tier Quality Control

a) The official responsibility for proper Quality Control Tests is at Programme Implementing Unit level (PIU). If the Contractor is responsible for infrastructural arrangements for Quality Control Tests, then the following check mechanism may be prescribed.

i. All the tests should be conducted by the designated qualified staff of the Contractor and the Quality Control Register Part-I should be maintained by him.

ii. 50% of the tests should be conducted in the presence of the in-charge JE of the work and the JE should record his observations in the Quality Control Register Part-I.

iii. 20% of the tests should be conducted in the presence of the in-charge AE of the work and the AE should record his observations in the Quality Control Register Part-I.

iv. 5% of the tests should be conducted in the presence of the in-charge EE/ PIU of the work and the EE/PIU should record his observations in the Quality Control Register Part-I. The EE/PIU will also ensure that the Non-Conformance reports are issued in time and the Contractor takes action in time through a mechanism described in Para (b) below.

v. The Superintending Engineer (SE), during his visits to the work will oversee the Quality Control Tests and record his observation in the Quality Control Register Part-I. The SE will monitor that the non-conformance reports are issued in time and the Contractor takes action in time.

vi. The Chief Engineer (CE), during his visits to the work will review the Quality Control Test Register and records his observation on Quality Control Register Part-I. The CE will also review that the Non-Conformance reports are issued in time and the Contractor takes remedial action in time.

b) The monthly return of the tests will be submitted in the prescribed Performa by the Assistant Engineer to the Executive Engineer in the first week of every month. The Executive Engineer will review this return regularly to see that the Quality Control tests are being performed at the desired frequency and with required accuracy. The EE will also see that the Non-Conformance reports are issued by the AE whenever Non - Conformance occurs and the Contractor promptly takes actions on Non - Conformance reports. The payment of the Contractor should be regulated as per the returns of the Quality Control Tests.

Pradhan Mantri Gram Sadak Yojana										
Quality Monitor - Work Wise Details Report										
State: Madhya Pradesh District: Sagar From Month: March From Year: 2018 To Month: March To Year: 2018										
Note: All Length in Kms.										
Sr.No.	District	Block	Sanction Year	Package No.	Road Name	Road Length	NQM* Inspection Count	NQM* Grading	SQM# Inspection Count	SQM# Grading
1	Sagar	Banda	2015-2016	MP3396	LD47-807 to Jagadheda	0.750	0 --		1	Satisfactory
		Khurai	2009-2010	MP3367	Khurai - Singpur Narodha Khera	15.500	0 --		1	Satisfactory
			2016-2017	MP33118	LD17-T-02 Khurai-Narodha road to Mubli Khurd	1.000	0 --		1	Satisfactory
		Walthon	2016-2017	MP33124	LD39-NH-26 to Jujharpura	1.650	0 --		1	Satisfactory
		Shahgarh	2016-2017	MP33132	L104-L103 to Sewra Kakhat	2.400	0 --		1	Satisfactory
					LD49-T004 to Bamhori Shahgarh	1.400	0 --		1	Satisfactory
					LD42-LD40 to Bai	1.450	0 --		1	Satisfactory
				LD47-LD46 to Pureshahgarh	1.300	0 --		1	Satisfactory	
Total						25.450	0		8	

NQM\* : National Quality Monitor SQM# : State Quality Monitor

**Table -1:** Quality monitor report Sagar District PMGSY

### 3.2 Second Tier Quality Control

The first tier of quality management has the primary function of quality control through enforcement of technical standards and quality control requirements through regular testing, close supervision and inspection. Function of the second tier of independent quality management is to ensure that the Quality Management System at the site is functioning satisfactorily and suggest possible improvements where required. For this, they may be required to carry out and report:

a) Independent quality tests to verify that the quality management system achieving its intended objectives.

b) Systemic flaws in the quality control process and action to improve the process.

The role of second tier in monitoring the quality of the work is of crucial importance during construction stage and therefore the State Quality Monitors are required to carry out inspections at appropriate stages of work under progress. The independent Quality Management Division of the executing agency may function as the second tier. The State Rural Roads Development Agency will frame suitable guidelines for proper functioning of second tier.

### 3.3 Third Tier Quality Control

The National Rural Roads Development Agency shall prescribe the guidelines for the third tier from time to time. The objective of this third tier of quality mechanism is to monitor the quality of road works executed by the States with a view to ensuring that the road works under the programme conform to standards and to see whether the quality management mechanism in the State is effective. The role of this tier is to provide guidance to State implementation machinery and the field engineers rather than 'fault finding'.

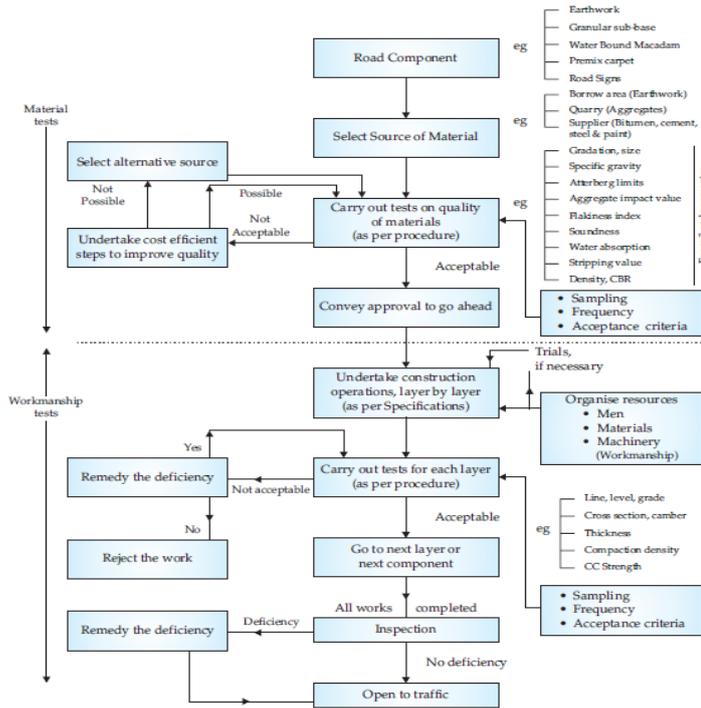


Fig -1: Typical Flow chart for quality control in road works

### 3. CONCLUSION

PMGSY has succeeded in providing connectivity to some of the most deserving habitations although the pace of implementation in most of the selected States is rather slow. Selection of these road works seem to be justified, unless one gives a high weightage to the opportunity cost in terms of road works forgone in other Districts/other States. All the implementing States have designated an implementing agency as the nodal agency. All the selected implementing States have more or less adhered to the PMGSY guidelines as far as selection of habitations, project proposals and clearance are concerned. Quality of PMGSY roads has been found to be generally good. PMGSY roads provide connectivity to important places such as School/College, Market Centre, and Block Office etc. It has improved the accessibility of beneficiary villagers and resulted in higher income in the form of better price for agricultural produce, new employment avenues etc. The cost of providing connectivity for some of the habitations in States like Himachal Pradesh is very high due to difficult terrain. But for PMGSY, no road would have been taken up in these sparsely populated habitations.

### REFERENCES

1. Quality Assurance Handbook for Rural Roads Volume-1, Quality System and Quality Control Requirements Management May 2007 Ministry of Rural Development Government of India.
2. Planning commission report in 11<sup>th</sup> FIVE YEAR PLAN Ministry of Rural Development November 2016

3. Pradhan Mantri Gramin Sadak Yojna Online Management, Monitoring and Accounting System (OMMAS)
4. National Rural Roads Development Agency (2011), National Rural Roads Development Agency- Annual Report 2010-2011, Ministry of Rural Development, Government of India
5. Ministry of Rural Development (2012), Pradhan Mantri Gram Sadak Yojana Programme Guidelines, Government of India.