

Final Report

WORKING GROUP ON
RURAL ROADS
IN THE 12th FIVE YEAR PLAN



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Planning Commission

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Executive Summary

Rural Connectivity becomes a critical component in the socio-economic development of rural people by providing access to amenities like education, health, marketing etc. It has been established that investments in rural roads lifts rural people above the poverty line. The evidence also indicates that as the rural connectivity improves, the rural poverty levels come down.

There had been imbalanced development of the rural road network in country. Some States provided cent per cent connectivity while some others did not have enough financial resources at their disposal and consequently connectivity remained at low levels. There were also problems of inadequate funds for maintenance, upgradation and rehabilitation of existing rural roads. A network approach and provision of sustainable accessibility with assured maintenance was virtually absent.

Some of the major constraints and bottlenecks in providing rural connectivity faced are insufficient funds with States for rural roads, inadequacy and unpredictability of funds for rural roads, inadequate maintenance of rural roads by many States due to inadequate funds, inadequate maintenance of MDRs resulting in pressure on rural roads, quality and specifications not strictly adhered to, layers of informal sub-contracting at the cost of quality, some roads constructed without bridges etc.

With this as backdrop, Government of India had launched Pradhan Mantri Gram Sadak Yojana in the year 2000 to provide connectivity to unconnected eligible habitations and upgradation of select existing roads to the standards. The system followed in implementation has several new aspects and is found to be acceptable for rural roads development.

The primary objective of the Programme was to provide connectivity by way of All-weather roads to unconnected habitations with population 1000 and above by 2003 and those with population 500 and above by 2007 in rural areas. In respect of Hill/ desert/ tribal areas, the objective is to link habitations with population 250 and above. Up-gradation of selected rural roads to provide full farm to market connectivity is also an objective of the scheme, though not central. The Programme has since been implemented by the Ministry of Rural Development, Government of India. A brief description of the implementation strategy adopted by the Ministry of Rural Development during 10th and 11th Plan period under PMGSY was decentralized planning, standards and specifications, Detailed Project Reports (DPRs) and scrutiny, institutional arrangements and HRD, procurement Process

Quality Assurance, maintenance, online Monitoring, Management and Accounting System operations manual and Programme Monitoring.

With a view to formulate the 12th Plan and improve the delivery mechanism for effective implementation of the Programme, the Working Group (WG) has been constituted under the Chairmanship of the Secretary Rural Development. Under this Working Group, seven sub-groups were formed to deliberate on issues of perspective planning for 12th Five Year Plan, mobilization of resources, to re-look into design of Scheme to propose sharing model, capacity building, maintenance management of rural roads, adopting GIS architecture in rural roads including R&D and environment, quality assurance in Rural roads, Grievance Redressal, Sevottam, Citizen Charter and CPGRAM in Rural Roads and development of LWE & IAP Area Rural Roads.

In the Year 2003-04, detailed District Rural Road Plans were made in every district of the country and Core Networks to ensure single connectivity to all habitations eligible under the programme were identified. Based on this Core Network data formulated on the basis of 2001 census, the position emerged that unconnected habitations were 1,70,594 numbers which required about 3,69,331 km new roads. Also upgradation of existing roads measuring 3,68,278 km was also estimated. Total requirement of funds was estimated as Rs.1,33,126 crore.

PMGSY is being implemented since the Year 2000. The projects for 1,09,010 habitations have been sanctioned out of total 1,36,464 eligible habitations by clearing the proposals for 4,20,637 kms roads. In order to achieve the targets, Rs. 84,731 crore were released upto March 2011 against the sanctioned projects of Rs. 1,18,949 crore. The balance requirement of funds has also been estimated as Rs. 1,85,438 crore for works yet to be sanctioned including projects for left out habitations, new habitations of 250+ LWE\IAP Schedule V, missing bridges, impact of increase in length of bridges to 75m, impact due to snow fall/ landslides, administrative expenses, repayment of NABARD loan, launching of PMGSY-II, connecting smaller IAP habitations (100-250 population), relaxation of norms for the Special Category States, in line with IAP districts etc. Funds available in year 2011-12 are Rs. 20,000 crore. Hence, net funds required during 12th FYP is Rs. 2,00,000 Crore.

The current source of funds for PMGSY works is cess on High Speed Diesel (Rs. 0.75 / litre), budgetary support, ADB funding, World Bank funding and NABARD loan. With present sources of funds, the project is not likely to be completed in time, therefore, an additional financial support would become necessary.

In order to supplement the resources, it is proposed to compliment the implementation of PMGSY through a few pilot projects mooted in the Public Private Partnership (PPP) mode. A few pilot projects of construction, up-gradation and

maintenance of rural roads can be taken up in willing States through the modified EPC mode. The possibility of next NABARD loan should also be explored. Resources to increase the financial position of State, the States may be asked to allocate some share out of Agriculture Mandi tax collected by State Govt, Mining royalty collected by State Govt, Road Tax on Vehicle collected by State Govt etc. for PMGSY/ rural road works.

In order to provide atleast minimum amount of funds for the sustenance of the cadre of engineers created, the Planning Commission may allocate special grants for such states to continue the programme of upgradation of Rural Roads which were shown as connected though the ground reality is otherwise with only eroded tracks left over.

During the last decade, the investments in road sector have increased many folds. To absorb the increased investments for creating efficient road infrastructure, it was required that the capacity of the implementing machinery as well as contracting industry should also increase in pace with the quantum of investment. The capacity of the road infrastructure agencies has enhanced in the last decade, however, the pace of increase could not commensurate with the pace of investment resulting in time and cost overruns of the road projects in the country. In case of rural roads, the challenge was more prominent because of the fact that the works are located in far flung interior rural areas, where, the constraints are multi fold. Capacity of implementing agencies as well as local contractors is relatively much lower compared to those operating in better locations.

Some of the suggestions like appropriate staffing of SRRDAs including attempts to introduce talent from private industry, methodical training needs assessment at all levels, periodical orientation progress for PIUs and field level staff, efforts to enhance efficiency of local contractors, establishment of equipment banks, conducting workshops for contractors and workman, development of consultancy organisations dedicated to rural roads, orientation of independent monitors to rural road building, quality control and rural roads health survey, strengthening of NRRDA and State Organisation through appropriate staffing, need based training and exposure to best practices in technology and management, institution of awards for outstanding contribution at all levels etc. have been given in the report.

Rural roads comprise over 85 % of the road network and their being kept in serviceable condition is crucial to the rural / agricultural growth and affording means of access to millions of rural people to social facilities viz. medical, education as also to market. Lack of maintenance affects the poor people badly as the time for access to markets and other social infrastructure is increased. There is potential danger, then, of these assets falling into disuse and eventual disintegration. Hence,

the challenge lies in both expansion of the network to provide road links to unconnected habitations and at the same time maintenance of the existing vast rural road network built at huge cost to the economy over the past over fifty years. The Thirteenth Finance Commission (FC) has also been more specific and agreed to provide maintenance funds for the core rural roads network including for PMGSY roads that have come out of their initial five-year maintenance contracts. Among several issues to be addressed for ensuring maintenance of rural roads on sustainable basis, the most critical one are need for Government Policy, dedicated funds, maintenance backlog, linkage to initial construction, Maintenance Management System, institutional reforms, contract maintenance, Panchayati Raj Institutions, modernization, experience sharing etc.

Proposed strategies for sustainable Rural Roads Maintenance has been discussed under the report. Some of the issues and strategies are Rural Road Management Act, rural roads as productive employment opportunity, funding for rural roads maintenance, dedicated maintenance funds and their management, institutional arrangements, involvement of the Panchayati Raj Institutions, sustainable road maintenance through convergence with MGNREGA, planning of maintenance works, Schedule of Rates for maintenance activities, construction / maintenance technology, relevance of tractor-bound technology for the use of local materials, use of mobile maintenance unit, adoption of labour-based technology, use of cold mix - emulsion technology, low-end technology, PPP initiatives etc.

GIS Architecture is an essential tool to be placed on comprehending the information of spatial and non-spatial data over a space and time. Rural Road Network comprises of group of nodes and links. The Network Configuration is a combination of these links with a directional orientation to the nodes which are the centre heads of the habitations spread over the space. As most of the features are static in nature there is a need to Geo-Reference permanently and the dynamic interactions in terms of planning, construction, maintenance can be visualized over a time on this spatial frame. To create the rural asset, GIS is a great supportive tool which connects advance technologies and the conventional practices on a common platform.

The Geo-Fenced map display system is essential for rural roads in order to identify the progress of PMGSY and other roads in reference to access and connectivity pattern for overall development of the rural areas, locate the habitations of different ranges be it Geo-referenced, which will helpful for policy making on connecting habitations over a time frame, avoid multi-connectivity among the habitations rather the basic objective of PMGSY scheme can be analysed, identify rural growth corridors and tracked the density of roads constructed per block / constituency / district / State which may be helpful for fund allocation with

justification and overlay the land use, terrain conditions and other obligatory aspects, a Geo-reference of map display system will be helpful for scientific and engineering design.

Research and Development is a continuous process and has its own importance at various stages of rural asset creation and maintenance. The characterization of material, optimal designs and type of maintenance with a proper privilege of monitoring the assets are some of the issues in the domain of research. At every stage the R&D approach should be sensitively taken into account for updating the conventional procedures. The R&D efforts should always be bridged between field engineers and the researchers with technology, concepts and approaches as connectors.

Environment is a transitional medium between infrastructure creation and traffic interactions and it should be visualized in a continuous process on the rate of change of environment with reference to infrastructure geometrics, road condition and traffic mobility. The overall objective is to minimize the Carbon Footprints. There is a need to plan environment pacifiers by creating plantations, noise barriers and vibration absorbers along the road. Mobility levels, accessibility, road geometrics and connectivity patters are some of the hidden characteristics which influence the environment in rural sector. The ultimate objective is to promote a good level of service to the road user and good environment to the non road user living in the neighbourhood areas. The environment sustained planning is possible with technology, software interface, spatial mapping and simulation of the traffic interactions before constructing the road. With the GIS interface, overlay of transect mapping on topographic sheets may further improve the road geometrics due to optimal locations of side drains, CD works and gradient fixation.

In most of the States, the quality control aspect in construction of Rural Roads is being monitored by two tier structure and the responsibility of both tiers of quality mechanism fully vests with the State Government. The first-tier is generally headed by an Executive Engineer who is actually executing the construction of Rural Roads and is at the work implementation level. At the second-tier there is an independent vigilance & quality control wing which randomly inspects the Rural Road works and issues observation memos regarding the quality of work. A three-tier quality mechanism is presently institutionalized under PMGSY. First Tier of Quality control is at Programme Implementation Unit (PIU) level by way of process control through mandatory tests of material and workmanship at the field laboratory. Second tier is the quality check of each work at three different stages during construction, by independent State Quality Monitors (SQMs) by way of structured inspections in the prescribed format. The responsibility of first and second tier of quality mechanism fully vests with respective State Governments. Third-tier is the

quality check by way of random inspections of selected works by Independent National Quality Monitors (NQMs) who are retired senior engineers deployed by NRRDA.

It has been suggested that the specifications prescribed for construction of Rural Roads under PMGSY programme should be uniformly followed for construction of all Rural Roads irrespective of the scheme through which it is being constructed. Also, it is suggested that the three tier quality monitoring system adopted for PMGSY works may also be adopted for construction of other Rural Roads in the State with State specific modifications. It is suggested that there should be a single agency in-charge for construction and maintenance of Rural Roads in the States for comprehensive planning, construction and maintenance of Rural Roads to be constructed under different schemes.

In some of the states the standard aggregates is not available even at the leads normally considered economical. However, material of marginally less strength are available a plenty and their use is to be exploited in the construction of Rural Roads. Similarly, there are typical local engineering practises in the use of available material either for the construction of the layers of the road or associated works like protection works. Examples can be given in this respect like the use of over burnt brick ballast in place of aggregates or use of aggregate available locally as found in states like Mizoram. However, it should be noted that in addition to the research carried out at premier research laboratories such as Central Road Research Institute (CRRI) and IITs, it is necessary that the research outcome is to be put into practise through pilot project in different areas with the use of locally available material, in order to develop scientific methodology for design and construction of rural roads under the existing soil, traffic and environmental conditions with full documentation.

There are different types of industrial wastes such as Fly Ash, Iron and Steel Slag, Marble Slurry Dust waste etc. that can be put to effective use in the construction of Rural Roads. The Rural Roads Manual needs to provide the properties and suitability of such material for road construction.

States implementing PMGSY have been informed to take roads as a Technology Demonstration Projects for assessing the performance of the accredited materials in the construction of rural roads that may lead to standardization and development of guidelines by IRC.

Incorporating appropriate safety design standards and features in the rural roads can enhance road safety to a great extent. In view of the lower levels of education in the rural areas, the engineering of roads to constrain users to follow safe driving and

behavioural standards may be necessary to Supplement Cautionary Signboard. Some of the engineering measures that should be in-built into the design of rural roads are scientifically designed horizontal curves, smooth transition curves, super-elevation, widening at curves, minimum stopping sight distance, suitable summit and valley curves, suitable vision berms, passing places, introduction of bus services, properly designed bus-bays, adequately designed road humps or rumble strips etc. The junction of rural roads with a main road is always a point of conflict and an accident-prone zone. Such junctions must be designed scientifically by providing minimum turning radii, flaring of the side road with taper, acceleration/deceleration lanes and adequate sight distances. Ramps must be provided where field paths and cattle crossings intersect the road. Traffic signage, incorporating warning and regulatory signs, can enhance road safety, especially near habitations and school zones, sharp curves, narrow bridges, junctions, submersible bridges and causeways. The design must incorporate these. Hazard markers like reflectorized delineators must be provided at dangerous locations. Submersible bridges and causeways should be provided with water depth gauges and guide-posts that shall remain at all times above the highest water level.

A Website (www.omms.nic.in) has been created to enable citizens lodge complaints, offer their comments or make a query about PMGSY. It has a menu-bar where “Feedback” appears prominently. The Feedback Module has three sections viz. Comment, Complaint and Query. This Module is accessible by all the citizens. Citizens can register their complaint, comment or query on the Website in the feedback module. A unique registration number is generated as soon as the citizen registers complaint which can be used to check the status of the lodged complaint, etc. Feedback received are being attended to on a daily basis and are replied at the earliest possible depending upon the response from concerned State agencies.

Left-Wing Extremism (LWE) in the country is not just a law and order problem, instead, the socio-economic dimensions of LWE are crucial and there is an urgent need to appropriately address them. The real objectives of the programme would be achieved only when one takes into account of the problems being faced by field functionaries in its implementations. The problems may be manifold. To name a few, it can be geography, terrain, border area problems, problems due to left wing extremism etc.

Special Dispensation has already been accorded to LWE Affected Areas/IAP Districts by Ministry of Rural development like all habitations in LWE Affected Areas/IAP Districts, whether in Schedule V areas or not, with a population of 250 and above (in 2001 Census) will be eligible for coverage under PMGSY. Cost of bridges up to 75 meters under PMGSY will be borne by Government of India as against 50 meters for other areas. The minimum tender package amount has been

reduced to Rs. 50 lakh to attract more response to bids. General approval under Section 2 of Forest (Conservation) Act, 1980 for diversion of forest land up to 5 ha for selected public infrastructure projects in 60 IAP districts has been given and orders have been issued.

The main recommendations of the group is that all habitations with population between 100 and 249 in these districts may also be covered. Estimated funds requirement is about Rs. 19,340 crore. A separate Scheme for Small and Minor bridges, not necessarily connected with PMGSY roads, needed for the IAP districts to connect all habitations over next three years. Rs. 500 crore would be required initially to launch the programme during 2012-13. Construction of critical Cement-Concrete (CC) Roads in highly affected blocks in the 60 districts may be permitted. Manual tendering may be allowed in some highly-affected blocks for a limited period of one year. Clustering of PMGSY roads for creating greater synergy from security point of view may be considered. Assessment criteria of bid capacity of contractors may be relaxed so that smaller contractors can also participate in PMGSY works. The time period of execution of road works in these districts may be enhanced from the existing 18 months to 24 months. Specific clauses may be added in the Standard Bidding document to provide for insurance coverage to machinery engaged in PMGSY works.

Abbreviations

AMPs	Annual Maintenance Plans
BMS	Basic Minimum Services
BOT	Built Operate and Transfer
BT	Black Topped
CC	Cement-Concrete
CDAC	Center for Development of Advance Computing
CD Works	Cross Drainage Works
CEO	Chief Executive Officer
CNCPL	Comprehensive New Connectivity Priority List
CPGRAMS	Centralized Public Grievance Redressal and Monitoring System
CRF	Central Road Fund
CRRI	Central Road Research Institute
CUPL	Comprehensive Upgradation Priority Lists
DPIU	District Project Implementation Unit
DRRPs	District Rural Roads Plans
DRRSO	District Rural Roads Safety Officer
EPC	Engineering, Procurement and Construction
FC	Finance Commission
GIS	Geographic Information System.
GPS	Global Positioning System
GRM	Grievance Redressal Mechanism
GSB	Granular Sub-base
HRD	Human Resource Development
HSD	High Speed Diesel
IAP	Integrated Action Plan
IITs	Indian Institute of Technologies
ILO	International Labour Organization
IRC	Indian Roads Congress
ITIs	Industrial Training Institutes
ITS	Intelligent Transport System
LWE	Left Wing Extremists
MDG	Millennium Development Goals
MDRs	Major District Roads
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoRD	Ministry of Rural Development
MORTH	Ministry of Road Transport & Highways

NABARD	National Bank for Agriculture and Rural Development
NHAI	National Highway Authority of India
NIC	National Informatics Center
NPRE	Non Plan Revenue Expenditure
NQMs	National Quality Monitors
NRRDA	National Rural Roads Development Agency
NRRDC	National Rural Roads Development Committee
OMMAS	On Line Management, Monitoring and Accounting System
PIUs	Programme Implementation Units
PMGSY	Pradhan Mantri Gram Sadak Yojana
POM	Performance Output Matrix
PPP	Public Private Partnership
PRC	Performance Review Committee
PRIs	Panchayati Raj Institutions
PWD	Public Works Department
R&D	Research & Development
RES	Rural Engineering Service
RFD	Results Frame Work Document
RRMs	Regional Review Meetings
SBD	Standard Bidding Document
SH	State Highway
SQCs	State Quality Coordinators
SQM	State Quality Monitors
SRRDAs	State Rural Roads Development Agencies
WBM	Water Bound Macadam

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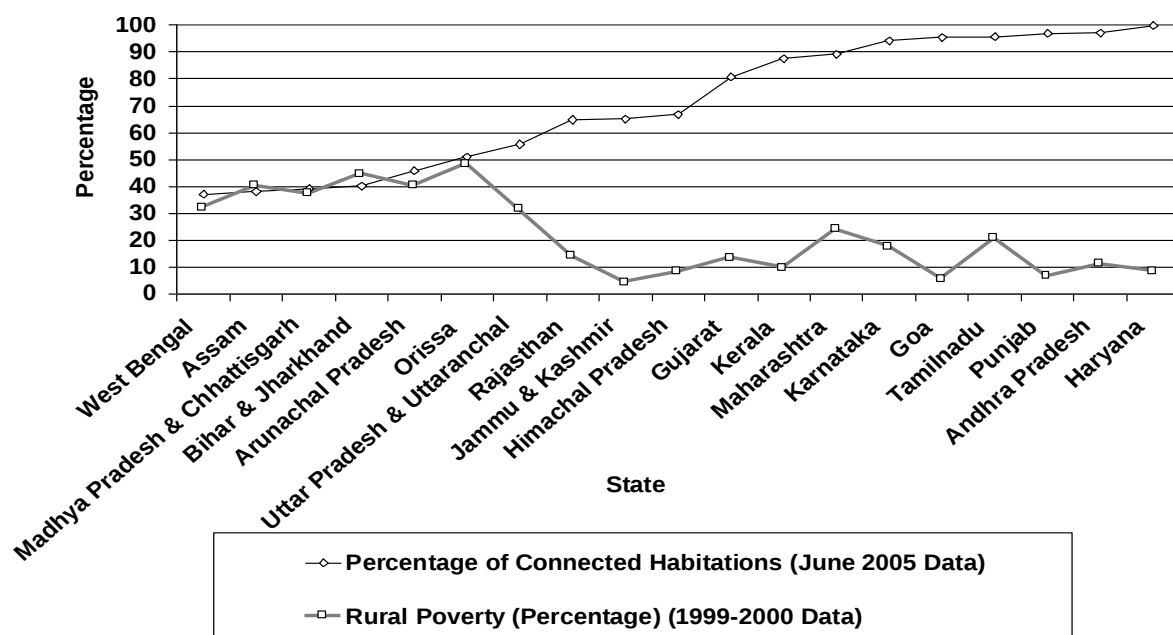
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Chapter 1

1.1 Introduction:

Rural development has become a matter of growing urgency for considerations of social justice, national integration, and economic upliftment and inclusive growth. For rural development, the provision of rural road network is a key component to enable the rural people to have access to schools, health centers and markets. Rural roads serve as an entry point for poverty alleviation since lack of access is accepted universally as a fundamental factor in continuation of poverty. As India launched the era of planned development in 1951, she had a reasonably good railway system, a few ports and around 400,000 kms of serviceable road network. Accessibility to villages was poor as only about 20 percent of them had all-weather road links. The Government laid down a framework for accelerated growth through investments in irrigation, power, heavy industry and transport. Side by side, stress was laid on provision of social infrastructure (education and health) and integrated rural development including agriculture. Rural roads act as a facilitator to promote and sustain agricultural growth, improve basic health, provide access to schools and economic opportunities and thus holds the key to accelerated poverty reduction, achievements of Millennium Development Goals (MDG), socio-economic transformation, national integration and breaking the isolation of village communities and holistic and inclusive rural development. A major thrust to the development of rural roads was accorded at the beginning of the Fifth Five Year Plan in 1974 when it was made a part of the Minimum Needs Programme. In 1996, this was merged with the Basic Minimum Services (BMS) programmes. The works of village tracks were also taken up under several employment creation and poverty alleviation programmes of the Central and State Governments.

There is growing empirical evidence that links transport investment to the improved well being of the poor. A study (Fan, Hazel and Throat, 1999) carried out by the International Food Policy Research Institute on linkages between government expenditure and poverty in rural India has revealed that an investment of **Rs. 10 crore (at 2009-10 prices)** in roads lifts 16,500 persons above the poverty line. **Figure-1.1** attempted from data from the Ministry of Rural Development, Government of India, depicts graphically the relationship between connectivity and poverty. States having low connectivity had higher poverty levels. Provision of good roads in rural areas also changes the characteristics of rural transport. With people tend to travel more, the ownership of vehicles increases. There is a shift from non-motorized vehicles to motorized ones and the cost and time of travel get reduced.



Source: Rural Road Development Plan: Vision 2025

Figure 1.1: Relationship between Connectivity and Rural Poverty

Progress of rural roads accessibility achieved as a result of investments in the road sector has been established till the commencement of PMGSY and is depicted in **Table 1.1**.

While the targets envisaged in terms of length were achieved, there grew imbalanced development of the rural road network. Some States provided cent per cent connectivity while some others did not have enough financial resources at their disposal and consequently connectivity remained at low levels. There were also problems of inadequate funds for maintenance, upgradation and rehabilitation of existing rural roads. A network approach and provision of sustainable accessibility with assured maintenance was virtually absent.

Table 1.1: Progress of Rural Road accessibility till launching of PMGSY.

Year	Accessibility with all-weather roads		Average distance of a village from a road
	Percentage of villages with population above 1000	Overall village accessibility	
1950-51	32%	20%	10 km
1960-61	36%	22%	8 km
1970-71	40%	25%	5 km
1980-81	46%	28%	4 km
1990-91	73%	44%	3 km
2000-01	90%	54%	2 km

Update on Rural Roads Scenario:

For development of roads, the long-term 20-year plans viz Nagpur Plan (1943-61), Bombay Plan (1961-81), Lucknow Plan (1981-2001), Road Development Plan Vision : 2021 formulated by Chief Engineers in-charge of roads under the aegis of the Indian Roads Congress has served as sound reference framework for the Central and State Governments to formulate their successive Five Year Plans. As a result, the road network now stands at 3.3 million kms. Of this, rural roads comprise around 2.7 million kms, i.e. about 85 percent. Overall village accessibility stood at 54 percent in the year 2000, although position in respect of accessibility to large size habitations has been much better. The share of different types of roads in India are given in **Figure 1.2**.

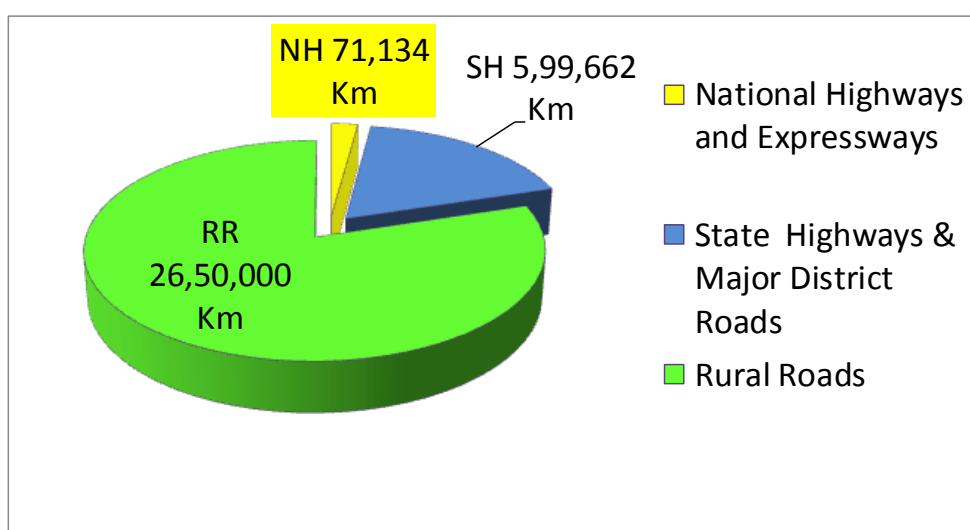


Figure 1.2: Share of different categories of roads

1.2 Pradhan Mantri Gram Sadak Yojana:

As an effective poverty alleviation strategy, “Pradhan Mantri Gram Sadak Yojana” (PMGSY) was launched in the year 2000, as a centrally sponsored Programme and a onetime special intervention. **The primary objective of the Programme was to provide connectivity by way of All-weather roads to unconnected habitations with population 1000 and above by 2003 and those with population 500 and above by 2007 in rural areas. In respect of hilly/ desert/ tribal areas, the objective is to link habitations with population 250 and above. Up-gradation of selected rural roads to provide full farm to market connectivity is also an objective of the scheme, though not central.** The Programme has since been implemented by the Ministry of Rural Development, Government of India. The basic time frame for completion of the Programme was perceived to be 2007, however, because of constraints of capacity of implementation in the States and availability of

funds, the targets of the programme have not been achieved so far. A brief description of the implementation strategy adopted by the Ministry of Rural Development during 10th and 11th Plan period under PMGSY is given below:

(a) Decentralized Planning: The programme has implemented the model of decentralized network planning for rural roads. The District Rural Roads Plans (DRRPs) have been developed for all the districts of the country and Core Network has been drawn out of the DRRP to provide for at least a single connectivity to every target habitation. For prioritization of the yearly project proposals, the Comprehensive New Connectivity Priority List (CNCPL) and Comprehensive Upgradation Priority Lists (CUPL) are used. The CNCPL and CUPL have been developed from the core network data. This planning exercise has been carried out with full involvement of the three tier Panchayati Raj Institutions.

(b) Standards and Specifications: Before the PMGSY, rural roads in India were being constructed on the basis of the specifications prescribed for the roads catering to the requirements of heavy traffic such as SH and MDRs etc. Separate specifications for the low volume/rural roads were not available, therefore, large scale revision of Rural Roads Manual, IRC SP: 20 were carried out by IRC at the special intervention of Ministry of Rural Development. This Manual has established the standards for construction of Rural Roads under this programme. As envisaged in the programme guidelines, later a dedicated Book of Specifications for Rural Roads was developed by IRC. A Standard Data Book to enable the States to prepare Schedules of Rates based on specifications has also been developed by IRC. The specifications form the part of the contract agreement and the Schedule of Rates developed by States on the basis of prescribed Standard Data Book is being used for preparation of bill of quantities in a uniform manner. These publications enabled the executing agencies to implement the programme with confidence based on technical parameters.

(c) Detailed Project Reports (DPRs) and Scrutiny: As an important step to the quality output, for every road under the programme proper survey and adequate investigations are insisted. Detailed Project Report (DPR) is a pre-requisite for project clearance. Independent scrutiny of the project proposals to ensure the adequacy of designing and project preparation is carried out by over 50 prominent institutions of Engineering and Technology in the country, identified as State Technical Agencies.

(d) Institutional Arrangements and HRD: Ministry of Rural Development is the nodal Ministry for implementation of the programme at Central level and National Rural Roads Development Agency has been constituted to provide technical and

managerial support. At the State level, nodal departments have been identified for management and State Rural Roads Development Agencies have been constituted to implement the programme. District level Programme Implementation Units (PIUs) have been set up for implementing the programme. Reputed Technical Institutions have been identified as Principal Technical Agencies and State Technical Agencies to provide support to the programme in matters of project scrutiny, training and R&D. Central Roads Research Institute, Indian Roads Congress and other premier institutions have also joined hands with NRRDA and the Ministry to provide support on matters relating to standards, technology and other relevant aspects.

The programme has adequate provisions for providing large scale training not only to managers and engineers involved in programme implementation but also to the field level functionaries like skilled workmen, roller drivers and machine operators.

Dedicated and specialized institutions with clear responsibility at every level have provided focused attention to the programme implementation. The HRD interventions have given opportunity to the personnel at the field as well as management level to develop better understanding about various aspects associated with the programme which has ultimately helped the programme implementation.

(e) Procurement Process: The States are responsible for execution of works under the programme but it was found that the procurement process prevalent in some of the States were not in tune with the requirements in particular reference to quality and timely completion of work. When the programme is centred on quality, it is very essential that a transparent procurement process should be in place which could ensure timely completion of work with defined quality standards. Therefore, Standard Bidding Document based on best national and international practices has been developed for procurement of works under the PMGSY. All the works under the programme are tendered on the basis of the Standard Bidding Document. In addition to distinct advantages, this process has enabled the executing agencies in taking up works from qualified Contractors with adequate capacity and has helped in ensuring quality by deployment of appropriate machinery, technical manpower and testing laboratories.

(f) Quality Assurance: A three tier quality mechanism has been operationalised to ensure quality of road works during construction. The first tier quality standards are enforced through in-house mechanism by establishing field laboratories and carrying out mandatory tests. NRRDA has developed Quality Control Handbook to help the field staff in ensuring proper field and laboratory testing. It was felt that mere carrying out prescribed tests is not enough but the recording of results and making them available to the supervisory officers is also important. For this purpose, Quality

Control Registers have been prescribed to ensure systematic recording of test results under this tier.

The independent monitoring of quality at the State level has been prescribed under the second tier, where-in the States are required to monitor the quality of works by deployment of quality monitors, independent of the executing machinery. The works are required to be inspected at three stages of construction, i.e., formation, pavement construction and finishing or completion stage.

The Third tier is an independent monitoring mechanism at the Central level. Under this tier, the retired senior engineers termed as National Quality Monitors (NQMs) are engaged for inspections of road works. The works for inspection are selected at random. The basic objective of this tier is to identify systemic issues and bring it to the notice of the executing agency to enable them to take appropriate steps so that the issues are not only addressed for the work inspected but the systemic improvements are also brought in the working of PIUs. The reports of NQMs are closely monitored for action at all levels. The intervention of the senior retired officers has contributed considerably in bringing about the consciousness on quality through experience sharing by these officers. At-site guidance provided by these officers has helped field staff in better understanding of specifications and good construction practices.

(g) Maintenance: The contract provides for defect liability for 5 years after construction along with routine maintenance for 5 years by the same contractor. There is a provision of two bills of quantities, one for construction and another for routine maintenance on lump-sum basis amount every year for 5 years and the contractor is required to offer not only for construction but also for maintenance separately. This provision is to help in delivery of better quality roads because if the quality of road is compromised by the contractor during construction, much more money would be required during the routine maintenance rendering the contract uneconomical for the contractor.

(h) Online Monitoring, Management and Accounting System: A web based online monitoring, management and accounting system has been developed under the programme. The online system and website is being managed and maintained in collaboration with NIC and CDAC. This online system is being used as decision support tool for the various levels of functionaries and adequate information about the programme is readily available to the citizens which are providing clear transparency in programme implementation.

(i) Operations manual and Programme Monitoring: All the operations starting from planning to maintenance have been systematically laid down in a 'Operations Manual'. The Operations Manual has helped the implementation agencies in sorting out day to day problems and has proved a ready reference. Monthly monitoring of physical and financial progress is carried out. A well developed quarterly monitoring is also done on the critical parameters like contract management, quality management and financial management. To understand the emerging issues and to ensure effective interaction with the executing agencies and the other partners in programme implementation, regional review meetings are organized at different State headquarters.

The targets of the Programme and present progress (June, 2011) are given below in **Table-1.2***:

Table-1.2

Item	Target	Cleared under the Programme	Completed
Number of Habitations	1,36,464	1,09,010	79,281
Length of New Connectivity Roads (Km)	3,67,673	2,56,425	1,95,692
Up-gradation Total 3,74,844 km. Upgradation (60%) and Renewal (40%) by the States	2,24,000	1,64,212	1,32,516

*Source National Rural Roads Development Agency

The Programme will continue to be implemented during the 12th Plan period also.

1.3 Working Group on Rural Roads under Transport for Formulation of 12th Plan:

With a view to formulate the 12th Plan and improve the delivery mechanism for effective implementation of the Programme, the Working Group has been constituted under the Chairmanship of the Secretary Rural Development with following members :-

- (1) AS/FA, Ministry of Rural Development
- (2) Sr. Consultant (Tpt.), Planning Commission
- (3) Advisor (Tpt.), Planning Commission
- (4) Director, Central Road Research Institute, CRRI, New Delhi
- (5) Directors, National Rural Roads Development Agency (NRRDA), New Delhi
- (6) Representative from Department of Expenditure, Ministry of Finance.
- (7) Representative from Ministry of Road Transport & Highways (MORTH)

- (8) Representative from NABARD
 - (9) Representative from DONER
 - (10) Principal Secretary, PWD, Government of Gujarat
 - (11) Engineer in Chief, PWD, Government of Haryana
 - (12) Engineer in Chief, PWD, Government of West Bengal
 - (13) Engineer in Chief, PWD, Government of Mizoram
 - (14) Engineer in Chief, PWD, Government of Karnataka
 - (15) Engineer in Chief, PWD, Government of Rajasthan
 - (16) Engineer in Chief, PWD, Government of Maharashtra
 - (17) Engineer in Chief, PWD, Government of Jammu & Kashmir
 - (18) Engineer in Chief, PWD, Government of Bihar
 - (19) Engineer in Chief, PWD, Government of Arunachal Pradesh
 - (20) Engineer in Chief, PWD, Government of Tamil Nadu
 - (21) Joint Secretary (Commerce), Ministry of Commerce
 - (22) Professor, IIT, Delhi
 - (23) Professor, IIT, Roorkee
 - (24) Professor, NIT, Jorhat, Assam
 - (25) Representative, State Technical Agency (STA)
 - (26) Representative, Science & Technology Mission.
 - (27) Directors (Road Connectivity), Department of Rural Development, Ministry of Rural Development.
 - (28) Former Director (Tech), NRRDA – Co-opted Member
 - (29) Former Director (PIII), NRRDA – Co-opted Member
 - (30) Joint Secretary (Road Connectivity), Department of Rural Development, Ministry of Rural Development
-
- Convener**

The Terms of Reference for the Working Group are given below:

1. To critically review the financial and the physical progress of the development of the rural road network during the first four years of 11th Five Year Plan, highlighting the constraints faced and the remedial actions required to be taken in the context of the preparation of the 12th Five Year Plan.
2. Keeping in view the experience acquired from PMGSY and launch of Bharat Nirman, recommend a policy framework for the development of rural roads in the 12th Five Year Plan and a perspective for the next decade beyond 12th Plan-Vision 2021-taking cognizance of various issues, including *inter-alia* the following:
 - (i) Need for providing connectivity with a view to improving accessibility;
 - (ii) Need for enhancing the capacities of various implementing agencies in order to achieve time targets;

- (iii) Prioritization of development work in view of a large number of deficiencies in the existing rural roads network with a view to consolidating the network;
- (iv) Need for maintenance and preservation of existing assets;
- (v) Need for creating an environment conducive to public private partnerships, in view of the increasing role of private sector;
- (vi) Need for upgradation of technology in order to improve quality of construction of rural roads and reduce construction time;
- (vii) Energy conservation and environment protection.

3. To formulate a programme for development of rural roads for the 12th Five Year Plan indicating monitorable physical targets, financial outlays and their year-wise phasing during this Plan period. While formulating the Plan, various aspects should be examined including *inter-alia* the requirement to provide essential road links to rural areas in the country in a cost effective manner, existing deficiencies of road system and remedial measures and the need for integrating backward and remote areas particularly the north-east and tribal areas with the rest of the country.
4. To review the existing arrangements, including the availability of resources from Central Road Fund, for funding the development of rural roads and suggest innovative measures for augmentation of resources both for construction and maintenance of rural roads.
5. To review the existing norms and criteria for maintenance and repairs for rural roads, assess progress of funds spent during first four years of 11th Plan and assess actual requirement of funds for the Twelfth Plan and recommend measures to meet such requirements.
6. To review the type of machinery and material presently being used in rural road construction and maintenance and suggest improvements, including steps needed for growth of road equipment industry in the country in order to deliver quality output in a time bound manner.
7. To review the existing manpower training arrangements at the Central and State Level and suggest improvements, keeping in view the need for construction of quality rural roads in a time bound manner.
8. To review the status of various implementing agencies involved in the development and maintenance of rural roads in terms of their capability to deliver timely outputs and to recommend measures, including outsourcing and institutional for enhancing capacities of the States.
9. To suggest measures for effectively monitoring the progress of construction and maintenance of rural roads. Also to evolve a mechanism to ensure that funds allocated for maintenance of roads in the 12th Finance Commission are optimally utilized.

10. To review the status of domestic construction industry in terms of its capability to absorb, utilize and augment the technology being presently used timely for rural road construction.
11. Integrated Planning of Roads having different functionality and Inter-model coordination.
12. Study on connectivity status of the roads constructed under different schemes with reference to All Weather and its structural entity.
13. Developing integrated system of GIS survey.
14. Planting of fruit bearing trees along rural roads and suggesting working model for Vriksha Rojgar Yojana.
15. To examine any other matter considered important by the Working Group.

In its Meeting dated the 7th July, 2011, the working group decided to constitute seven Sub-Groups on following important issues relating to completion of targets set under PMGSY vide Ministry's OM No. P-17035/1/2011-RC dated 23rd June, 2011.

1. Perspective planning for 12th Five Year plan, Mobilization of Resources and to re-look into design of Scheme to propose sharing model
2. Capacity building for SRRDAs, Contractors, Engineers , Training Institutions etc.
3. Maintenance Management of Rural roads
4. Adopting GIS architecture in Rural roads including R&D and environment
5. Quality Assurance in Rural roads(Other than GIS)
6. Grievance Redressal, Sevottam, Citizen Charter and CPGRAM in Rural Roads
7. Development of LWE & IAP Area Rural Roads

The Reports of each Sub-Group, along with recommendations are given in subsequent Chapters.

Chapter- 2

Perspective Planning

2.1 Introduction:

A Sub-Group -1 on “Perspective Planning for 12th Five Year Plan, Mobilization of Resources and to re-look into design of Scheme to propose sharing model” is formed vide Ministry’s OM no. P-17035/1/2011-RC dated 23rd June, 2011 having the following members:-

1. Dr. Manoj Singh, Advisor (Transport), Planning Commission,
2. Sh. S R Meena, Director, Min of Rural Development
3. Sh. Rohit Kumar, Director, Min of Rural Development
4. Sh. Prabha Kant Katare, Chief Engineer, MGNREGA, Madhya Pradesh
5. Sh. Piyush Srivastava, Director , D/o Expenditure, Ministry of Finance
6. Representatives from Kerala, Tripura and West Bengal
7. Sh. N.C. Solanki, Director (P-I), NRRDA – Convenor

Sub-Group Meeting was held on 8th July, 2011 at Conference Hall, NRRDA.

2.2 The Past Developments:

National Rural Roads Development Committee (NRRDC) constituted by Government of India in the year 1999 made the following assessment of the requirement of construction of rural roads for providing all weather connectivity to unconnected villages of India.

Total Number of Unconnected Villages	2,90,480
Villages with population 1000 and above	13,852
Villages with less than 1000 population	2,76,628
Length of road required to be constructed	11,62,000 km
Requirement of funds	Rs. 93,000 crore

In the Year 2003-04, detailed District Rural Road Plans were made in every district of the country and Core Networks to ensure single connectivity to all habitations eligible under the programme were identified. Based on this Core Network data formulated on the basis of 2001 census, the following position emerged:

- Total number of Eligible Habitations: 1,70,594

- 1000+ Category: 59,844
- 500-999 Category: 81,054
- 250-4999 Category: 29,696
- Length of Roads required: 3,69,331 km.
- Length of roads requiring Upgradation: 3,68,278 km.
- Requirement of Funds: Rs.1,33,126 crore

Subsequently, in the year 2004-05, some modifications were made as given below:

Length of Core Network to be covered under PMGSY	
New Connectivity (km)	3,67,673
Up-Gradation (km)	3,74,844
(a) UG per se- to be done by GoI (km)	2,24,000
(b) Renewal to be done by State Govt. (km)	1,50,844

Current Status

PMGSY is being implemented since the Year 2000 and the present position of cleared projects and balance is given below:

Habitations	
Eligible	1,36,464
Sanctioned	1,09,010
Balance to sanction	27,454
Connected	79,281
Length New Connectivity (km.)	
Eligible	3,67,673
Sanctioned	2,56,425
Balance	1,11,248
Upgradation (km.)	
Eligible (60% of 3,74,844)	2,24,000
Sanctioned	1,64,212
Balance	59,788

2.3 Assessment of funds Required :

- (a) As per the current price levels, the following is the requirement of funds for completion of works sanctioned and in progress:

- Value of cleared proposal - Rs. 1,18,949 crore
- Amount released upto March 2011 - Rs. 84,731 crore
- Funds required for completion of works already sanctioned - Rs. 34,218 crore

(b) Assessment of funds required for works yet to be sanctioned under PMGSY is given below in **Table-2.1**:

Table-2.1

(Rs. in crore- at 2010-11 prices)

S.No.	Activity(s)	Amount	Justification
(i)	Funds required for works yet to be sanctioned	79,539	New connectivity- Rs.55,624 crore. Upgradation – Rs. 23,915 crore.
(ii)	Impact of left out Habitations	8,000	6670 habitations @ 3 km/ habitation * 0.40 crore/km = Rs. 8004 crore.
(iii)	NABARD Loan	17,600	Repayment of Loan
(iv)	NABARD Loan servicing (Interest part)	6,059	Payment of Interest on NABARD Loan.
(v)	New habitations of 250+ LWE\IAP Schedule V	16,000	40 districts * 200 habitations @ 4 km/ habs. * 0.50 crore/ km = Rs. 16,000 crore
(vi)	Missing Bridges	8,000	Lump sum provisions (Maharashtra and Assam States submitted proposal for approx. Rs. 800 crore each State. So considering provisionally 10 States in this category)
(vii)	Impact of increase in length of bridges to 75m	2,400	Lump sum (cost of missing bridges of LWE districts).
(viii)	Impact due to snow fall/	5,000	Proposed cost in Hilly areas is

	landslides		approx. Rs. 20,000 crore and 25% cost increases due to these reasons.
(ix)	Administrative Exp. Including for States, Quality Monitoring etc.	1,000	Based on last years average expenditure.
(x)	Funds required for launching of PMGSY-II in last two year of 12th Five Year Plan	6,000	Lump sum
(xi)	Funds required for providing connectivity to habitations having population of 100 to 249 in IAP districts (A separate scheme is under preparation)	19,340	Estimates based on reports from the 9 IAP States
(xi)	Funds required for Small and Minor bridges, not necessarily connected with PMGSY roads, needed for the IAP districts to connect all habitations over next three years. (A separate scheme is under preparation)	2,500	Lump Sum
(xi)	Funds required for providing connectivity to left out habitations in the core network in 60 IAP districts	10,000	Rough approximation
(xi)	Funds required for relaxing the PMGSY norms for Special Category States (Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttarakhand) similar to IAP districts	4,000	Broad estimates for additional population to be covered and additional length of bridges to be funded
Funds needed		1,85,438	

(c) Net funds required for completion of balance PMGSY projects including two years of projection of PMGSY-II –

- Funds required for completion of works already sanctioned - Rs. 34,218 crore
- Funds required for balance sanctions –Rs 1,85,438 crore
- Total funds needed - Rs. 2,19,656
- Funds available in year 2011-12 –Rs 20,000 crore
- **Net fund required during 12th FYP (at 2010-11 prices)-Rs.1,99,656 crore**
Say - Rs. 2,00,000 crore

(d) Current source of funds: The following are the current sources of funds:

- (i) Cess on High Speed Diesel (Rs. 0.75 / litre)
- (ii) Budgetary Support
- (iii) ADB funding
- (iv) World Bank funding
- (v) NABARD Loan

With present sources of funds, the project is not likely to be completed in time, therefore, a additional financial support would become necessary.

2.4 Availability of funds in last 11 years.: Under PMGSY, the position of availability of funds and release is as given below **Table-2.2:**

Table-2.2

(Figures in Rs. in crore)

S. No.	Year (s)	Allocation (CESS)	Allocation (WB/ADB)	Release for Programme	Release for Admin. Exp.	Release under ADB assistance	Release under WB assistance	Release out of NABARD Loan	Total Release
1	2000-01	2,375	-	2,435	0				2,435
2	2001-02	2,375		2,493	7				2,500
3	2002-03	2,340		2,497	3				2,500
4	2003-04	2,220		2,299	26				2,325
5	2004-05	2,220		2,111	37	93	220		2,461
6	2005-06	4,235		3,770	40	193	218		4,220
7	2006-07	3,726		3,770	40	193	218		4,220
8	2007-08	3,900	2,600	3,834	66	1,950	650	4,500	11,000
9	2008-09	4,530		5,380	151	2,000	250	7,500	15,280
10	2009-10	4,183		10,390	140	800	10	6,500	17,840
11	2010-11	4,434	-	21,325	185	800	90	-	22,400
	Total	36,538	2,600	60,303	693	6,028	1,656	18,500	87,181

2.5 Proposed PPP mode

It is proposed to compliment the implementation of PMGSY through a few pilot projects mooted in the Public Private Partnership (PPP) mode. A few pilot projects of construction, up-gradation and maintenance of rural roads can be taken up in willing States through the modified EPC mode, which if successful, can be scaled up in other States.

The proposed methodology is described below:

- a) Rural road-works aiming at either providing new connectivity or up-gradation or a combination of the two in a specific area which could be a block or a group of blocks, under PMGSY can be given on a concession basis to a private partner (hereinafter referred to as the Concessionaire) in an economically viable package of about Rs. 75-100 crore. The contracting would be based on the principles of EPC, which would include the following:
 - i. Financing of construction, up-gradation and maintenance for seven years (two-year construction period and five-year period for routine maintenance),
 - ii. Construction, up-gradation or renewal of selected roads (hereinafter referred to as project roads), and
 - iii. Maintenance as per pre-determined performance parameters or service-level standards during the period of the concession.
- b) The bidding parameter would be the lowest annuity sought. A periodic escalation clause to factor inflation would be in-built in the financial design.
- c) The Concessionaire may be given an opportunity to carry out detailed investigations pertaining to traffic, soil and material, required for designing the road for a period of 10 years as per PMGSY guidelines. The State Government may prepare a DPR on the basis of the PMGSY guidelines that can be used as the public sector comparator.
- d) The concession should be formulated in such a way that the Concessionaire would have to guarantee the performance of the roads in the package for the period of 10-year traffic for which it has been designed.
- e) The payment of annuity will be performance based, i.e. linked to the maintenance standards, usability and availability of the road for the users. These will be monitored by an Independent Engineering firm and payment will be made on the 'assured lane km' available for the period of operations, on a model of payment similar to the one adopted by NHAI in its BOT annuity road projects. The assured lane km will be calculated on the lane km available for the period of payment and an assured quality of the riding surface (roughness index).
- f) NRRDA would develop construction standards and service-level standards based on which maintenance performance would be validated periodically by an

Independent Engineering firm. These would be based on IRC standards and would form a part of the concession document.

- g) The Concessionaire would be selected on the basis of a single stage two-part transparent competitive bidding process; the selection would be based on the evaluated lowest rate of anticipated equated annuity amount for the package quoted by the technically qualified bidders.
- h) The anticipated equated annuity amount, i.e., the amount required to build new roads as well as to up-grade the rural road network as per PMGSY guidelines and norms (2001 population census), would be extended by the Ministry of Rural Development over a period of seven years. The financial burden would be shared by the Central and the State Government in the ratio of 93:07, which broadly reflects the respective shares of the Centre and State Governments under PMGSY.
- i) An appropriate mechanism for the payment of annuity to the Concessionaire will be worked out to ensure that the project gets funds on time through various streams.
- j) This model may adversely impact small contractors as they may not have the capacity to invest nor borrow at competitive rates for funding the construction costs. This may push up the cost of project in certain remote areas. In order to address this risk, the option of part funding the project during the construction period to the extent of 40%-60% of the cost of construction paid on completion of specific milestones and the rest paid through an annuity, may be explored. In this model, a fixed grant will be stated by the bidding authority at the time of project bidding and the lowest annuity amount would be quoted by the bidder.

Action by the State Governments: The State Governments would be encouraged to consider the above proposal and methodology for PPPs in rural roads through modified EPC contracts.

2.5.1 Year-wise funds required, if projects are to be completed by year 2017

2012-13	-	Rs. 40,000 crore
2013-14	-	Rs. 40,000 crore
2014-15	-	Rs. 40,000 crore
2015-16	-	Rs. 40,000 crore
2016-17	-	Rs. 40,000 crore

2.6 Exploring new NABARD Loan

- NRRDA has taken a total amount of Rs. 18,500 crore as loan from NABARD for meeting the commitments of Bharat Nirman. While taking the loan a Tripartite Agreement has been signed on 27-09-2007 between Ministry of Rural

Development (MoRD), National Rural Roads Development Agency (NRRDA) and National Bank for Agriculture and Rural Development (NABARD provides that:

- NRRDA shall make the payment of interest to NABARD on quarterly basis and shall repay the loan in 5 equal annual instalments within 7 years from the date of each withdrawal as per the agreement.

There are two possible options for the drawal of loan from NABARD:-

- a) Draw a loan of Rs. 6,500 crore during the current financial year on the existing terms and conditions viz. Loan is repaid in equal annual installments within **7 years** from the date of drawal, including a grace period of 2 years at the rate of 6.5% per annum.
- b) Draw a loan of Rs.18,000 crore staggered in four years @ Rs.4,500 crore in the years 2011-12, 2012-13, 2013-14 and 2014-15 on the existing terms and conditions viz. Loan is repaid in equal annual installments within **7 years** from the date of drawal, including a grace period of 2 years at the rate of 6.5% per annum.

However, it needs to be ascertained that enough cess be available for repayment of loans in either of the options.

2.7 Steps required for inclusion of new eligible Habitation, as per 2011 Census

Regarding inclusion of left out new habitations and habitation come in preview of PMGSY Guidelines due to current census 2011, it is suggested that after completion of original PMGSY projects as per previous declaration, separate PMGSY –II scheme can be launched.

2.8 Suggestions for funding:

- (i) Cess on High Speed Diesel (HSD)

In initial stage, it is decided that Rs. 0.75 / litre Cess may be imposed for PMGSY funding. At that time cost of Diesel was approx. Rs.17 / litre. The trend in the growth of Diesel price during 2002 to 2011 is depicted below as a graph (**Figure-2.1**).

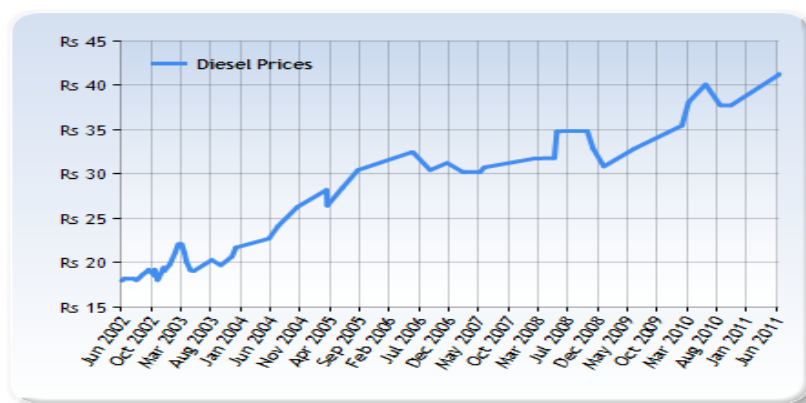


Figure-2.1

Source: <http://www.mypetrolprice.com/diesel-price-chart.aspx>

After review of current scenario, it is proposed to move fixed Cess to percentage of the cost of the HSD as *ad velorem* Tax which will enable to generate higher resources for the implementation of the programme.

- (ii) Budgetary Support – looking at the quantum of expenditure that is needed if one is to complete the programme by 2017, the budgetary support need to be increased considerably in the coming year as well as the current year.
- (iii) Similar Cess may also be imposed on Petrol prices.
- (iv) Exploring the probability of PPP mode of project implementation.
- (v) Due to infrastructure development of Rural Roads, the resources of State Governments are increased. So it is proposed that for completion of these projects some share from State Government may also be taken. After completion of first phase of PMGSY, it is proposed that Phase-II of the PMGSY named as PMGSY-II can be launched in which Central share of 50% and State share of 50% may be kept. A relaxation for the Hill States (*North-East, Sikkim, Himachal Pradesh, Jammu & Kashmir and Uttarakhand*), Desert Areas as identified by the Desert Development Programme as well as Tribal (*Schedule V*) areas and LWE/IAP districts identified by Ministry of Home Affairs may be considered. In these areas, Central share may be 80% and State share may be 20%.
- (vi) After completion of Bharat Nirman, States may be allowed to open a second window for population between 900-999 and then 800-899 and so on. For this the proposals from the States may be called.
- (vii) Resources to increase the financial position of State. The States may be asked to allocate some share out of following taxes for PMGSY/ rural road works.
 - (a) Agriculture Mandi tax collected by State Govt.
 - (b) Mining royalty collected by State Govt.
 - (c) Road Tax on Vehicle collected by State Govt.

It is noteworthy to bring the fact that some of the states have achieved total connectivity of all eligible habitations under PMGSY framework and also completed the targets fixed under upgradation. However, such states have created institutional arrangements for carrying out the PMGSY programme which now are left with inadequate work load, inspite of part of the personnel are re-deployed for other programmes.

In order to provide atleast minimum amount of funds for the sustenance of the cadre of engineers created, the Planning Commission may allocate special grants for such states to continue the programme of upgradation of Rural Roads which were shown as connected though the ground reality is otherwise with only eroded tracks left over. This special allocation is in addition to what is contemplated for programme completion in the article 2.5.1.

2.9 Specific problems for implementing PMGSY in North-Eastern States in view of difficult terrain and difficult working conditions.

In the North-Eastern States construction of roads to improve the accessibility and mobility is a challenging task because of multiple reasons. The issues related to habitation configuration and existing road density are really challenging as the habitations are sparsely located and major road connectivity is deficient in reference to higher functional roads. In order to promote minimum access to all the habitations there are certain challenging issues related to alignment fixation, terrain conditions and drainage mapping etc. These roads are required to be constructed with specific attention on safety, economy, and environment sustenance. It is observed and expressed by the field engineers and people living in those areas on the need of modifications on specifications and designs of supportive infrastructure, geometric specification changes, changes in pavement structure, procurement specifications of certain materials and technology. By considering various issues related to implementation of PMGSY in North-Eastern States, a number of recommendations have been suggested as follows:

- On roads subjected to heavy snow fall and landslides, where regular snow or debris clearance is done over long period to keep the road open to traffic, roadway width is being increased by 1.5 m .
- States are being permitted to provide 50 mm thick Bitumen Bound Macadam in place of 75 mm thick WBM Gr III .
- States are being permitted to provide adequate length of cement concrete drains along slopes to reduce the damage to roads.
- States are being allowed to provide requisite number of CD works keeping in view the terrain, snow fall and deposition of snow in high altitudes areas.
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2.10 Launching of PMGSY-II in last year of 12th Five Year Plan

It is expected that the current mandate of PMGSY will be accomplished by the end of 12th Five Year Plan. During the current Phase of PMGSY, the MoRD had been receiving demand from the States in various categories. These aspirations of the States could not be fulfilled due to limitations of the programme. On completion of the current phase of PMGSY, it is recommended that PMGSY-II should be launched. In this Phase, it is proposed to cover all Habitations becoming eligible as per 2011 Census on cost sharing basis. The broad sharing of investment by Centre and the State can be broadly decided on following principles:

- a) For Plain areas – 70:30 (Centre:State)
- b) For Hill States, Desert Areas, Tribal (Schedule V areas) and LWE/ IAP districts – 80:20 (Centre:State)
- c) For International Border Blocks in Hilly States – 90:10 (Centre:State)

As regards demand for upgradation of roads, it should be linked to road asset length constructed per 1000 population. Sharing of funding may be on 50:50 basis.

A new Scheme is proposed to construct critical bridges/culverts below PMGSY eligibility norms on cost sharing basis between Centre and States – 50:50 basis as construction of bridges will at least provide some connectivity to distributed populations.

An additional fund of Rs. 1,000 crore should be earmarked to launch the programme in last year of the 12th Five Year Plan. This whole planning of PMGSY-II in advance is highly critical to continue the momentum of PMGSY in States who have created strong infrastructure for constructing rural roads.

2.11 Relaxation of PMGSY norms for Special Category States

There has been demand from the States like J&K, Assam and other NE States to relax the norms for PMGSY roads similar to relaxations given to IAP districts. Accordingly, the Ministry would submit the matter to the Cabinet for relaxing the norms for 11 (eleven) Special Category States (Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttarakhand) similar to IAP districts. The broad requirement of funds as been estimated as Rs. 4,000 crore and included in the funds requirements for 12th Five Year Plan, though better estimates would be made in consultation with the concerned States.

Chapter 3

Capacity building for SRRDAs, Contractors, Engineers, Training Institutions etc

3.1 Introduction:

A Sub-Group -2 on “Capacity building for SRRDAs, Contractors, Engineers , Training Institutions etc” is formed vide Ministry’s OM no. P-17035/1/2011-RC dated 23rd June, 2011 having the following members:-

- | | | |
|----|--|-----------|
| 1. | Shri Y.S. Dwivedi, Director (RC), MoRD | -Convenor |
| 2. | Representative from Assam | - Member |
| 3. | Representative from Gujarat | -Member |
| 4. | Representative from NITHE | -Member |

During the last decade, the investments in road sector have increased many folds. To absorb the increased investments for creating efficient road infrastructure, it was required that the capacity of the implementing machinery as well as contracting industry should also increase in pace with the quantum of investment. The capacity of the road infrastructure agencies has enhanced in the last decade, however, the pace of increase could not commensurate with the pace of investment resulting in time and cost overruns of the road projects in the country. In case of rural roads, the challenge was more prominent because of the fact that the works are located in far flung interior rural areas, where, the constraints are multi fold. Capacity of implementing agencies as well as local contractors is relatively much lower compared to those operating in better locations. Capacity building for Rural Road Infrastructure development can be broadly discussed in two categories of Quantity and Quality. Though, it is challenging to achieve the quantity with quality, the need of the hour is to provide road infrastructure of good quality in time bound manner.

3.2 Institutions and Required Capacity Building Interventions :

The institutions that are responsible for development of rural road infrastructure have been identified as given below:

- State Rural Road Development Agencies (SRRDAs) and State Government Departments.
- Programme Implementation Units and Junior Engineers
- Contractors

- Consultancy Organisations
- Training Institutes and
- NRRDA

3.2.1 Strengthening SRRDAs

Under PMGSY, the SRRDAs were created to implement the programme at State level. The SRRDAs are responsible for implementation of the Scheme at the State level. SRRDAs are generally thinly staffed with experienced officers of Engineering Departments of the State. The SRRDs have been staffed adequately with proper decentralisation of powers in some States resulting in better implementation of PMGSY, however, in some other States, the staffing of these institutions could not be done by the States as efficiently as was desired. Depending on the work load, appropriate staffing of SRRDs should be ensured with proper decentralisation of powers at all stages for quick decision making. The introduction of talent from private industry could also be attempted for better professional management exposure.

3.2.2 Capacity Building of PIUs and Junior Engineers:

For implementation of PMGSY, PIUs have been created at every district. These PIUs are generally headed by executive engineer level officer and are supported by Assistant Engineers and Junior Engineers. This official machinery is basically responsible for implementation of rural road projects. Under PMGSY efforts have been made to provide training to various officers through reputed institutions and the results have been quite encouraging. However, it has been observed that the staff of PIU are not continuously and persistently trained in works management, contract management and quality management. Regular training of the PIU staff should be imparted on various subjects after appropriate training needs assessment. The need based training programmes should be conducted under properly equipped faculty at the district level, at the regional levels and at the state and central level for officers of all categories ranging from chief engineers up-to junior engineers.

3.2.3 Capacity Building of Contracting Industry and Workmen:

The following constraints are being faced by the contracting industry in rural road sector:

- (a) Due to scattering of works in rural interiors, large contractors do not find it financially viable to work for rural roads.

- (b) Local small and medium contractors with relatively smaller capacities work on rural road projects. These contractors have limitations of technical qualifications and financial constraints. Therefore, non formal sub-contracting has been prominently noticed.
- (c) Due limited financial capacity, the contractors have excess to a very limited equipment and machinery. Adequately trained workmen and machinery operators are also not available to such contractors in rural areas.
- (d) The contractors lack in professional management of finances and have limited capacity to make assessments about the work resulting in unfair cut-throat competition for winning the contracts. This severely undermines the quality of output.

The rural road programme implementation units have large quantum of works and are facing the constraint of availability of limited contractors with required qualifications and capacity

In view of the above problems the following steps may be taken to develop the contracting industry.

- (a) Local contractors may be provided training in financial management and works management through local institutions such as IITI's and polytechnics.
- (b) Efforts should be made to establish equipment banks for enabling the contractors to hire machinery at reasonable rates.
- (c) The implementing agencies should be trained for professional contract management and development of economically viable packages for better output.
- (d) The quality of skilled or semi-skilled workers including operators of equipments like dozers, pavers, heavy vehicles, dumper, batching plants, laboratory equipment, etc. engaged on the road-work has been of greater concern for proper execution of works. In order to enhance the proficiency of workers, the proper training institutes with sufficient capacity shall be established in all the zones in the country. The model of "National Academy of Construction, Hyderabad" can be adopted all over the country. The country can be divided in different zones and the training institutes shall be established intelligently to cover the desired manpower to be trained in different region. The capacity of existing institutes can also be built up to cater for the requirement of training personnel on rural road sector.

- (e) The existing Industrial Training Institutes (ITIs) can develop courses for training personnel for rural road sector. Also, a specialized trade for rural roads can be introduced in these institutes.

3.2.4 Development of Appropriate Consultancy Organisations and Independent Quality Monitors:

The consultancy organisations working in road sector have started developing interest in rural roads and the consultants have taken up the works for DPR preparation, supervision and quality control etc. It has been observed that big names in consultancy organisations take up the consultancy work in rural road sector, however, the work is sub contracted to small time professionals who are not qualified and capable to handle the consultancy. There is a need to develop consultancy organisations dedicated to rural roads. The implementing machinery also required to be trained in managing and controlling the consultancy organisations.

The concept of independent quality monitoring was introduced in PMGSY. The experience of independent monitors has shown that there is a need to orient independent monitors to the requirements of rural roads because many times the independent monitors have been found to possess knowledge about higher order roads but they were not fully oriented to handle quality monitoring aspects of rural roads.

3.2.5 Strengthening National Rural Development Agency (NRRDA) and State Road Works Department :

These Agencies provide technical and administrative support to Government to implement the rural roads programmes. There is a need for institutional strengthening of these institutions. A methodical training needs assessments should be carried out for functionaries in NRRDA and State departments and focused training programmes and exposure visits to best practices around the growth should continuously be organised. The focus of the training of functionaries at top management level should be in the fields of result oriented IT applications, programme management, openness in adoption of best practices with respect to technologies and management practices.

3.2.6 Award and Appreciation

The State Rural Road Development Agencies (SRRDAs) /other State agencies have been made responsible for proper implementation of the Scheme. These agencies and

their teams need to ensure that the scheme is implemented in right earnest. To accomplish the objectives of quality rural connectivity, it will be necessary to encourage State and field formations. It is therefore recommended to institute Awards at various levels for outstanding contributions.

3.3 Recommendations

The recommendations of Sub-Group is as under:

- a) Appropriate staffing of SRRDAs including attempts to introduce talent for private industry.
- b) Methodical training needs assessment at all levels.
- c) Periodical orientation progress for PIUs and field level staff.
- d) Efforts to enhance efficiency of local contractors through:
- e) Establishment of equipment banks.
- f) Conducting workshops for contractors and workman.
- g) Development of consultancy organisations dedicated to rural roads.
 - Employment of independent monitors.
- h) Orientation of independent monitors to rural road building, quality control and rural roads health survey.
- i) Strengthening of NRRDA and State Organisation through appropriate staffing, need based training and exposure to best practices in technology and management.
- j) Institution of awards for outstanding contribution at all levels.

Chapter 4

Maintenance Management of Rural Roads

4.1 Introduction:

A Sub-Group -3 on “Maintenance Management of Rural Roads” is formed vide Ministry’s OM no. P-17035/1/2011-RC dated 23rd June, 2011 having the following members:-

- | | | |
|----|---|------------|
| 1. | Prof. B.P. Chandrasekhar, Former Director (Tech), NRRDA | - Convenor |
| 2. | Shri S.R. Meena, Director (RC), MoRD | - Member |
| 3. | Representative from Arunachal Pradesh | - Member |
| 4. | Representative from Madhya Pradesh | - Member |
| 5. | Representative from Maharashtra | - Member |
| 6. | Representative from Punjab | - Member |

Rural Roads Maintenance Challenges and Need : Rural roads comprise over 85 percent of the road network and their being kept in serviceable condition is crucial to the rural / agricultural growth and affording means of access to millions of rural people to social facilities viz. medical, education as also to market. Lack of maintenance affects the poor people badly as the time for access to markets and other social infrastructure is increased. There is potential danger, then, of these assets falling into disuse and eventual disintegration. Establishing new connectivity is also going to become more difficult as many of the easier habitations have already been connected. Increasingly the new roads will be serving communities in more remote and difficult terrain requiring special considerations with respect to planning and program implementation. There will also have to be a greater emphasis on the States that have lagged in implementation performance. The connectivity that has already been created will also require much more attention in terms of its long term maintenance. In addition to routine maintenance there is a need to upkeep roads built through periodic maintenance. The responsibility for maintenance rests with State governments. However, in many States there is still a lack of clarity over the long term arrangements for the management of the network, sustainable and reliable finance for maintenance, and the organization setup for effective execution of maintenance activities. For ensuring access on sustainable basis, there is no escape for the States from attending to the maintenance needs of the rural road network. The current replacement value of the rural road network in the country is broadly assessed as under (**Figure-4.1**):

(i) PMGSY (2011)		
–	Total length constructed (new connectivity plus upgradation)	= 320,000 km
–	Per km cost of replacement	= Rs 0.4 crore
–	Total Asset Base (PMGSY)	= Rs 320,000 x 4.0 x 10 ⁶
		= Rs. 128,000 crore (A)
(ii) Non-PMGSY (2011)		
–	Total length	= 2,550,000 km
–	Per km cost of replacement	= Rs 0.12 crore
–	Total Asset Base (Non-PMGSY)	= Rs 2,550,000 x 1.2 x 10 ⁶
		= Rs 306,000 crore (B)
	Total Asset Base (A+B)	= Rs 434,000 crore

Figure-4.1

Assuming an erosion of asset due to neglect in maintenance at 5 percent of the total value, annual loss would be easily Rs. 21,700 crore. This is equivalent to 54,250 km of new construction at current rate of Rs. 0.4 crore per km. This also implies that what PMGSY is achieving currently is being lost by way of neglect in maintenance for the country as a whole.

4.2 The Challenge

The challenge lies in both expansion of the network to provide road links to unconnected habitations and at the same time maintenance of the existing vast rural road network built at huge cost to the economy over the past over fifty years. A balance between road building and road maintenance has to be achieved. Timely upkeep and maintenance would help in availability of roads for passage of traffic continuously particularly in monsoon, reduce time of travel besides reducing rate of deterioration and adding to safety of road users. Availability of funds is one of the major constraints in preserving the assets. The Central Government is already

contributing a major share of funds in construction of new roads and upgradation of core network. The State governments need to attach high priority to maintenance and provide reasonable allocations for maintenance so as to ensure serviceability of the network. Needless to add that good maintenance also enhances image of the government. For sustainable maintenance of the road assets, strong political will backed with administrative and technical support is required. There is evidence of increasing awareness and commitment to maintenance by the States in the recent years. The tempo needs to be built up and continued.

4.3 Finance Commissions' Recommendations:

The Twelfth Finance Commission sent the first signal that government wanted to place far greater emphasis on maintenance. The 12th Finance Commission considered the issue of maintenance of State roads and bridges by the State governments. To quote from the Committee Report: "It is far more important to ensure that assets already created are maintained and yield services as originally envisaged than to go on undertaking commitments for creating more assets. We notice that maintenance of roads and bridges has not been given adequate importance by the States. We are, therefore, recommending additional grants separately for maintenance of roads and bridges, and maintenance of buildings."

The Thirteenth Finance Commission (FC) has also been more specific and agreed to provide maintenance funds for the core rural roads network including for PMGSY roads that have come out of their initial five-year maintenance contracts. The FC will provide grants-in-aid for roads maintenance to the extent of 50 percent of the requirement assessed for non-PMGSY roads on the core rural roads network and 90 percent of the requirement assessed for PMGSY roads for four years starting 2011-12. The total amount of the grants awarded is Rs 19,930 crore for period of four years 2011-12 to 2014-15 (Page No. 475 Annex 12.16 of 13th Finance Commission Report, December, 2009). While making the award the commission has set preconditions for release of the awarded grants indicating that the revised estimate should not be less than the projected Non Plan Revenue Expenditure (NPRE) for the year under consideration and the revised estimate net of grant should not be less than the projected NPRE for the previous year for all the 4 years of the award. Further, it is indicated that the actuals net grants should not be less than the projected NPRE for the year previous to that. The commission is of the opinion that the award is a supplementary effort to the funds mobilized by the respective states from their budgets set apart for maintenance of roads and bridges with a view that the total amount so accrued with adequately served the requirements of maintenance of the total system of roads and bridges to avoid loss of assets created.

4.4 Issues in Rural Roads Maintenance

Among several issues to be addressed for ensuring maintenance of rural roads on sustainable basis, the most critical are:

- **Need for Government Policy:** A firm policy and commitment of the government in the States to maintain the rural roads to serviceable levels all the year round. Preservation of existing road assets has become a matter of critical importance. The State governments would need to provide full funds under non-plan for maintenance as per recommendations of the Finance Commission from time to time.
- **Dedicated Funds:** A dependable and adequate flow of funds on continuous basis to enable the road agencies to effectively plan and implement their maintenance programmes.
- **Maintenance Backlog:** Finding ways and means of phased removal of the backlog of periodic maintenance and bringing the roads to maintainable situation.
- **Linkage to Initial Construction:** Ensuring proper design and quality construction in the first instance as this would reduce the maintenance burden subsequently.
- **Maintenance Management System:** Improving maintenance planning and accountability through creation of road registers, setting up database and simplified maintenance management systems so as to optimize use of allocated funds and prioritize maintenance interventions, with first charge on the core road network.
- **Institutional Reforms:** Strengthening institutional arrangements through productivity improvement of gang labour, tightening supervision and monitoring and auditing arrangements, training of personnel to improve local skills.
- **Contract Maintenance:** Introducing innovative ways of execution of maintenance works such as encouraging creation of micro-enterprises and labour cooperatives and community contracting.
- **Panchayati Raj Institutions:** Building up the capacity and capability of Panchayati Raj Institutions to undertake the maintenance of rural roads. Providing technical support to these institutions.
- **Modernization:** Modernization of maintenance operations, introducing low cost equipment for pothole repairs, grading and use of modern materials.
- **Experience Sharing:** Regular awareness programmes of what works and what does not work. Documentation of successful strategies and dissemination through publications, workshops at State and National levels.

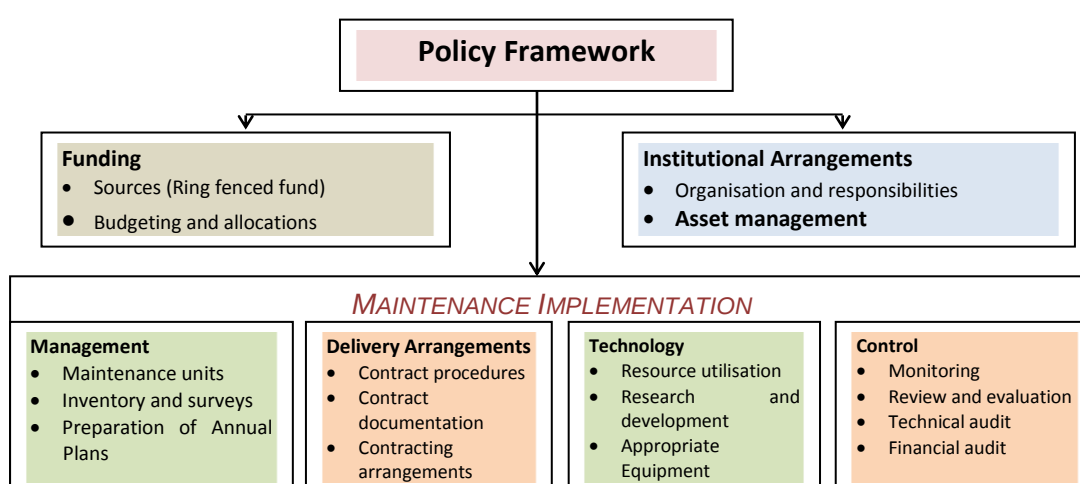
4.5 Proposed Strategies for Sustainable Rural Roads Maintenance

Planning for development of the road network has to account for and include its maintenance so as to ensure availability of access to our rural people on a sustained basis. Thus maintenance strategy would need to be adopted by the States as integral part of development. **Figure-4.2** gives a broad framework of the major elements of the maintenance strategy. In view of the current scenario and evidence-based practices in the country and elsewhere, the following strategies are recommended for adoption by the States for sustainable maintenance of rural roads.

Figure-4.2

Policy, Institutional, Funding and Implementation Elements

Source: ILO Study on Rural Roads Maintenance in Madhya Pradesh, India



4.6 Policy Framework - Rural Road Management Act

There is growing recognition that even rural roads have to be properly designed and need to follow proper standards laid down by the Indian Roads Congress. Such roads would require less maintenance efforts. An Action Plan should, therefore, be drawn to remove the maintenance backlog and bringing roads to maintainable position in a time bound manner. To give adequate powers to the departments in charge of rural roads, it is recommended that a Rural Road Management Act, as adopted in National Highways be introduced, which clearly:

- defines the powers, functions and obligations of the road authority
- requires a register of all public roads in each block being kept with the Zilla Panchayat.
- lays down serviceability standards to be adhered to
- governs the regulation of rural roads
- requires that an asset management system be instituted
- mandates that the Annual Report of the State Rural Road Authority in exercising the functions be tabled in the State Legislature.

The NRRDA (MoRD) may take the lead in preparing a draft Model Act.

4.7 Policy Framework – Rural Roads as Productive Employment Opportunity

Access to gainful employment is an essential condition for citizens to exercise their economic rights in a market democracy. Jobs for All would naturally be an important goal. India has taken a major initiative of launching the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA).

Maintenance of rural roads is more employment intensive and may be considered as one of the target activity of the MGNREGA initiative. The lessons learnt out of the employment-focused programme should be utilized in ensuring that productive assets are created and decent work opportunities are provided to the unemployed persons. There is possibility of synergies between the MGNREGA and the PMGSY project as the latter contributes to the creation of durable infrastructure and improves accessibility to social facilities like education, health care, etc. This can be achieved as per the guidelines provided by Ministry of Rural Development from time to time.

The proportion of materials, labour and equipment in road works depends upon the technology chosen. **Table-4.1** below gives a broad assessment.

Table-4.1

Technology chosen	Proportion of			
	Materials	Labour	Equipment	Total
Purely labour-oriented*	60	35-40	5	100
Labour oriented, but with selective use of light equipment (Intermediate technology)	60	25-30	10-15	100
Highly equipment oriented	60	5-10	30-40	100

Rural roads should be constructed by adopting the Intermediate Technology. An expenditure of Rs.1 crore in rural roads is likely to create 20,000 man-days of employment (taking an average wage rate of Rs. 150 per day). But the employment potential for the maintenance of rural roads is much higher than the construction activities.

Majority of the job opportunities will be provided by the local contractors engaged in construction and maintenance of rural roads. By the very nature of such works, the employment would be in informal sector. This would call for attention to aspects like occupational health, safety of workers, social protection and timely payment of wages, non-discrimination due to gender, etc. as per the various labour laws and guidelines issued by the Ministry of Labour and Employment. Being a member country of the United Nations, the guidelines and Acts on labour related aspects by

the Ministry of Labour and Employment incorporate various objectives of the ILO viz promotion of rights at work, employment, social protection and social dialogue. The Standard Bidding Document on PMGSY works finalized by the NRRDA stipulate strict adherence to such requirements by the contractors during execution of rural road projects on the ground. There is need to monitor proper implementation of such guidelines from the point of view of assuring decent work opportunities and labour welfare.

Creating better awareness among the contractors through periodic seminars by the rural road agencies with the support of the State level labour departments, polytechnics, Industrial Training Centres, Construction Industry Development Council, etc. would also help in this process.

There are many spin-offs that can be expected from the rural road programmes that can lead to the creation of additional jobs. These will be:

- creation of better avenues for self-employment;
- on-farm employment opportunities due to shift from food grains to cash crops and multiple cropping;
- non-farm opportunities like grocery shops, tea stalls, small businesses and cottage industries;
- expansion of health, education and agro-based industries.

However, it is to be noted that continued spin-off benefits will accrue only if the Rural Road assets are well maintained and are not allowed to deteriorate. In fact, investment in maintenance is most cost- effective for job creation.

4.8 Funding for Rural Roads Maintenance

Realistic Norms: A more detailed study of funds required for maintenance of rural roads on realistic basis is needed with clear break up for routine and periodic maintenance for earth, gravel, water-bound macadam, black-top roads in different traffic, terrain and climatic conditions prevailing in the country. The norms should consider the frequency of various maintenance tasks required. The States should spell out minimum essential requirements. **Table-4.2** below shows an estimation of annual funding needs for the maintenance of rural roads.

Table-4.2

S.No	ITEM	Length km	Unit Rate	Amount, Rupees
1	PMGSY Roads			
	Routine Maintenance	3,20,000	Rs.20,000 /km/year	640 crore
	Periodic Maintenance once in 5 years	3,20,000	Rs.5,00,000/km/ 5 Year	3,200 crore
	Sub-Total PMGSY / Year			3,840 crore
2	NON-PMGSY Roads (Core Network)			
	Routine Maintenance	1,100,000	Rs. 12,000/km/year	1,320 crore
	Periodic Maintenance once in 5 years	1,100,000	Rs. 200,000/km/5 Year	4,440 crore
	Sub-total Non-PMGSY /Year			5,760 crore
	Total PMGSY + NON-PMGSY / YEAR			9,600 crore
	Add for Emergency Repairs / Year			400 crore
	Estimated Grand Total / Year			10,000 crore

Dedicated Maintenance Funds and their Management: The States should set up dedicated funds for maintenance by transferring funds from various sources – government budget, grants recommended by the Finance Commission, any additional levies like cess on agricultural produce, additional sales tax on petrol and high speed diesel. A proper management system of the fund should be set up by the States for planning, implementation and monitoring of the maintenance works.

4.9 Institutional Arrangements

4.9.1 Involvement of the Panchayati Raj Institutions: The ambitious programme for construction of rural roads and in fact all rural infrastructure and the provision of basic services to the rural poor, **cannot succeed merely with the availability of adequate funds. Equally important is the existence of an effective delivery mechanism, and its capability to absorb and utilize the funds in a cost-effective manner.** An effective and responsive grass-root level organisation with a high degree of commitment, motivation, professional competence, and above all, integrity is the *sine qua non* for the success of any rural development programme. Having

been constitutionally conferred statutory status, the PRIs have to evolve themselves in a healthy manner over the coming years.

The objective of transferring full responsibilities for management of the rural roads network to PRIs in most States is a long-term objective. Significant capacity building and resource transfer will have to happen for this to take place. Many routine maintenance functions can be carried out at the PRI/community level but will need technical expertise, equipment and finance from outside. In the meantime greater attention needs to be placed with the existing Public Works Departments (PWD) and Rural Engineering Service (RES) to improve maintenance functions. It will also be important for partnerships to be developed between PWD/RES and the PRI/local communities to gradually build capacity.

The States may apply their resources to the core road network and in the first phase, the non-core roads may be devolved to the Panchayati Raj Institutions for maintenance through community participation. An incentive-based system for non-core roads may be evolved where the State government could give partial subsidy. The road agencies should assist these local bodies by providing the needed technical support and developing their skills in undertaking maintenance operations. The road agencies themselves would need capacity building through training.

Over the time, maintenance of even core rural road network can be undertaken by the PRIs. The Panchayats can be provided with equipment such as light compactors of walk-behind-type, drum mixer, bitumen spraying equipment and basic tools. The District administration could also make available the material resources required for maintenance such as small quantity of stone metal, chips, bitumen, etc. Identified villagers in the area served by the road could be imparted training in the various maintenance tasks of minor nature such as repairs to pot holes and short damaged stretches of road, maintenance of berms, cleaning of drains and culverts. It is felt that involving the people living in habitations where connectivity has been provided would stimulate a sense of ownership and pride in maintaining the roads in good condition. Payment of wages to the workers involved in maintenance activities could also be considered based on the actual days on which they were engaged on specific activities, integrating the expenditure on these activities with other schemes such as the Rural Employment Guarantee Scheme, Sampoorna Grameen Rozgar Yojana, etc. The role and functions of PRIs can be allotted as per **Table-4.3** under:

Table No-4.3 : Role and Functions of PRI

Level of Panchayat	Role and Functions to be devolved	Issues to be addressed
1. District Panchayat (at the district level)	1. Ownership of all Rural Roads 2. Construction of all Rural Roads 3. Planning of maintenance of Rural Roads 4. Prioritization of Rural Road Improvement Programme 5. Conducting Traffic Surveys and Road Condition Surveys 6. Coordination with District Planning Committee 7. Maintenance of Through Roads	1. Obtaining technical support from PWD/RES, etc. 2. Contract Management 3. Quality Control 4. Financial Accounting and Audit 5. Updating Land Ownership Records 6. Use of IT for all Rural Road activities 7. Maintenance management
2. Intermediate Panchayats (at the Block level)	1. Network Planning at Block level 2. Maintenance of Link Roads under Rural Road Category 3. Road Safety of all Rural Roads 4. Preservation of Environment on all Rural Roads	1. Maintenance Management 2. Technical support from PWD/RES
3. Gram Panchayat (at the village level)	1. Selection of Alignment 2. Grievance Redressal 3. Local Road Safety 4. Maintenance of Roads within villages and non-core roads	1. Voluntary land transfer or land acquisition with full compensation 2. Watchdog function on quality and timely delivery of Rural Road works 3. Local participation in alignment selection

International Experience – Road Maintenance through Local Community Participation

In several developing countries such as China, Philippines, Cambodia and Indonesia, the participation of beneficiary communities has successfully been tried out. For example, in China, rural road construction is a joint effort of the local community and the government, in as much as the local villagers construct a road with assistance of the government who provide materials like bitumen, cement and steel, etc. The villagers, who carry out routine maintenance works on rural roads, are given a subsidy by the local government. In Finland, local communities are motivated to maintain the rural roads through financial incentives by forming a ‘Road Cooperative’, which serves as a private road maintenance organisation. The Road Cooperatives get 30 to 80 percent of maintenance costs as a subsidy; the communities along the road according to pre-defined portions share the costs.

Periodically, a technician from the engineering department visits a rural area for rendering the needed technical advice on maintenance problems to the cooperatives and also to monitor the quality of maintenance works. There are about 18,000 Road Cooperatives receiving subsidies from the government towards rural road construction and maintenance. In Austria, the local communities form associations, which are responsible for the construction and maintenance of rural roads, the financial assistance being provided by the federal and provincial governments.

The practice of villagers living along the access roads forming 'road cooperatives' for construction and maintenance of rural roads, subsidised by the local government may be given a fair trial in the Indian context also.

Way Forward

The government should fund capacity building of District Panchayats so that they take over functions like maintenance management and road safety for the rural roads.

4.9.2 Sustainable Road Maintenance through Convergence with MGNREGA

Convergence of inter-sectoral programmes such as PMGSY with MGNREGA will enable better planning and effective investments in rural areas. Convergence also brings synergy between different government programmes and /or schemes in term of their planning, process and implementation.

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) has also provision to take up rural connectivity to provide all weather access. More than 16% of MGNREGA works currently relate to rural connectivity. In February 2009, the MoRD has issued guidelines for the convergence between MGNREGA and PMGSY. Convergence between MGNREGA and PMGSY is mutually beneficial. The PMGSY guidelines acknowledge the critical importance of the institutional framework for effective maintenance and call for the ultimate devolution of PMGSY roads management and ownership to local governments and the Panchayati Raj Institutions (PRIs). Therefore, road maintenance projects will be prepared accordingly. Works required and covered under MGNREGA will be selected under MGNREGA. Works not allowed under MGNREGA but permissible under PMGSY will be selected under PMGSY.

Maintenance is one of the main challenges yet to be overcome under PMGSY implementation nearly ten years since its inception. Under the program, the contractors are required to maintain the roads built for five years after completion of investment. The States are expected to provide funding both for the initial five year maintenance contract and the subsequent road maintenance activities. Efforts have been made to ensure regular maintenance, but the results are far from adequate. A PMGSY audit of maintenance activities estimated that only 30 percent of

maintenance requirements are met for the network as a whole and even under the five-year maintenance contracts surveys reveal that many roads are not receiving proper maintenance.

Joint monitoring and supervision of activities should be planned. Baseline assessment, concurrent appraisal and documentation and evaluation of impact of PMGSY and MGNREGA on a set of indicators for eco-restoration as well as for local community needs could be initiated. Quantification of benefits of works undertaken could also be taken up.

This is a substantial increase in funding for most States and the challenge now is how these funds can be effectively utilized. The PMGSY program was set up as a capital works program and the institutional arrangements have served it well. However, in many States the long-term institutional arrangements for maintenance and management of the network are still to be fully defined. The PMGSY guidelines acknowledge the critical importance of the institutional framework for effective maintenance and call for the ultimate devolution of PMGSY roads management and ownership to local governments and the Panchayati Raj Institutions (PRIs). However, the guidelines also recognize that PRIs lack the managerial, financial and technical capacity commensurate to this new responsibility and ascribe interim maintenance responsibilities to the Project Implementation Units (PIU) under the SRRDA. Although the PIUs are better equipped with technical resources they still lack the specific skills and procedures to effectively manage the maintenance of the network.

While some States have reasonable institutional arrangements for maintenance in place an overarching strategy is required to cover institutional arrangements, finance and management of the entire State road networks, including all rural roads and not just PMGSY roads. In many States, the current multiplicity of agencies and schemes involved in construction and maintenance leads to a lack of clarity on who owns the network and therefore who is responsible for its maintenance. The lack of road inventory and condition data also creates problems in that no one is really sure of the size of the maintainable network, its extent of deterioration and demand for maintenance. National programs, such as PMGSY, are governed by program objectives and procedures that often run parallel to State level implementation procedures, with the result that subsequent network management arrangements are not addressed.

Given the significant employment opportunities available to rural people for the maintenance of rural infrastructure projects, consideration is being given to international models for mobilizing and organizing community labour. One possible model is the formation of community level petty contractors which have been found to be effective when combined with support from PWD/RES. The government has a

number of other rural development programs that are aimed at reducing rural poverty by creating off-farm employment opportunities either through self-employment or through guaranteed labour schemes. There is interest within the rural roads sector in developing links with these programs and particularly with the National Rural Employment Guarantee Act (MGNREGA).

At the moment, MGNREGA mostly provides employment for the creation of new assets but discussions are on-going on whether the scope of the scheme could be broadened to include maintenance activities. If this were the case, there would be the double advantage of employment generation while at the same time maintaining productive assets.

4.10 Paradigm Shift in Maintenance Implementation

Though investment in maintenance is extremely cost effective in comparison to having to build the entire road all over again; management, accounting and policy systems all tend to constrain investment in construction rather than in maintenance. Unless modern, transparent and scientific maintenance practices are evolved with clearly measurable indicators, the situation is not likely to change. The NRRDA in collaboration with other partners needs to bring out a detailed Maintenance Manual prescribing technical, management and accounting standards and evolve efficient and workable maintenance service procurement procedures in order to give effect to a Rural Road Management System. It is further suggested that all SRRDAs be asked to deploy dedicated personnel at appropriate level for maintenance both at PIU level and SRRDA level.

4.10.1 Planning of maintenance works

A simplified maintenance planning and management system may be instituted by each State for carrying out inventory and visual condition surveys. It is now quite convenient to set up database on GIS platform. The concept of Pavement Condition Index has already been introduced for PMGSY roads. The system will help in identifying and prioritising maintenance interventions for the core network in each district. Annual maintenance plans should be drawn up on that basis and formally submitted for approval of the District level Panchayati Raj Institution and thereafter of the standing committee on rural roads under the chairmanship of Chief Secretary. Expenditure incurred for maintenance should be subjected to both technical and financial audits to improve transparency and performance. A system could be evolved by the States where the value of the road assets in each block could be worked out every year based on road inventory and visual inspection and results published in the media. The dedicated engineer for maintenance at SRRDA shall collect appropriate data for preparing the realistic Annual Maintenance Plans (AMPs) in order to seek the required funding from the respective Governments,

since maintenance is the responsibility of the State Governments for the Rural Roads.

4.10.2 Schedule of Rates for Maintenance Activities

The current Schedule of Rates for road construction have been evolved using normal productivity of labour and machines and are basically meant for the new road construction / rehabilitation. Many States use the same Schedule of Rates for the road maintenance activities and the contractors do not find them realistic as the productivity of labour and equipment is rather very low for the maintenance works such as patching of potholes on bituminous roads. As a result, there are not many bidders and there is low interest and enthusiasm amongst the road maintenance contractors.

In order to overcome this situation and in the interest of preservation of the road assets, it is proposed that separate and more realistic Schedule of Rates for road maintenance should be evolved in each State so that there is enthusiasm, competition and interest amongst the contractors. This would greatly enhance the road maintenance service delivery at the field level.

4.10.3 Construction / Maintenance Technology

The prevailing technology for construction and maintenance of rural roads needs a review. The current practices for the construction and maintenance of rural roads continue to be traditional in as much as the use of hard stone metal is being insisted upon, in the form of WBM layers and a bituminous surface treatment is being preferred even on low volume link roads. Although there is an increasing awareness regarding the need for maximized use of locally available materials, adoption of soil stabilization techniques and relevance of unsealed gravel roads for the low volume traffic conditions, such cost-effective practices have not yet found favour in many States.

The deployment of equipment/plant, both for construction and maintenance/rehabilitation is, by and large, the same as is being adopted for higher category roads like Major District Roads and State Highways. For example, bituminous hot mix plants for the production of premixed materials and asphalt pavers for laying thin carpets are commonly used. For excavating earth from borrow areas, the use of excavators in combination with dumpers is also quite common.

The formulation of Specifications for Rural Road works and a Standard Data Book by the MORD/ NRRDA has been a welcome step. This has facilitated the adoption of uniform practices throughout the country. These documents should be periodically reviewed and updated based on the feedback from the field Engineers, Contractors

and Consultants. In updating these, it should be ensured that the construction technology is “Intermediate” and not “equipment-intensive”.

4.10.4 Relevance of Tractor-bound Technology for the Use of Local Materials

One of the reasons being put forward for not being able to maximise the use of locally available materials and for not adopting the highly cost-effective soil stabilisation techniques is the non-availability of proper construction equipment required for the implementation of these techniques. It is important to adopt such construction technologies, which do not rely on unnecessarily sophisticated and expensive machinery. This approach will also allow local contractors to compete effectively for such works and utilise locally available knowledge and skills with some training.

In the rural areas, all over the country, there are increasing numbers of agricultural tractors, which are used for about 100 days in a year for agricultural purposes and for the rest of the time, they can be utilized for rural road development works. In some countries abroad, notably in China, a number of implements, towed by an agricultural tractor, have been designed for performing a variety of tasks, both for the construction and maintenance of unsealed roads as also sealed roads with bituminous surface treatment. Some of the typical tractor-towed equipment are :

- Tractor-towed disc-harrow for pulverisation of clay clods
- Tractor-towed rotavator for mixing soil with stabiliser
- Tractor-towed water sprinkler
- Tractor-towed bituminous emulsion sprayer
- Tractor-towed blade grader
- Tractor-towed trolley for conveying soil and other road building materials
- A small excavator attached to an agricultural tractor
- Tractor-towed bituminous road maintenance mobile unit
- Tractor-towed roller.

Thus, most works of rural road construction and maintenance can be accomplished with tractor-based implements. The use of tractor-based implements does not necessarily mean higher cost or dispensing with labour. In rural road construction, lower cost and higher employment can be achieved. Studies by CRRI in India have shown that:

- Savings of the order of 15-25 per cent can be effected in items of earthwork, mechanically stabilized and lime stabilized construction layers.
- The labour component of items of work such as earthwork and mechanically stabilized courses using semi-mechanized methods is in the range of 30-40 per cent of the total cost; on the other hand, if fully mechanized construction

techniques are employed for these items of work, the labour component is as low as 5-10 per cent.

The mechanical stabilisation technique is commonly adopted all over the world for the unsealed gravel road construction and maintenance. It may be pointed out here that a good percentage of the rural road network connecting habitations with population less than 500 belongs to the category of low volume rural roads for which gravel base with gravel surfacing can be suitable and economical. Adopting simple equipment like tractor-towed rotavators can significantly bring down the cost of Grave/Soil-Aggregate roads. Also, such tractor-towed equipment can be deployed for the Granular Sub-base (GSB) in lieu of WBM Grade I, bringing economy in construction.

Apart from tractor bound technology of construction, there are several low-end and low cost technology machines that perform equally well as the heavy road construction equipment and as such their use can be encouraged in the construction of the rural roads.

4.10.5 Use of Mobile Maintenance unit

Rural Road maintenance is currently being carried out by the gang labour system. The gang labour can be reorganized and its efficiency improved by the use of low cost, small capacity, mobile unit towed by tractor or other prime mover. Mobile Maintenance Unit may include the following items of equipment as per **Table-4.4** under:

Table-4.4

Item of Equipment	Number Required in one Unit
Prime Mover	1
Trailer	1
Blader Attachment	1
Cold Mix Plant 3-5 tonne/hr	1
Cold Emulsion Sprayer (200 litre)	1
Air Compressor (125 cfm)	1
Pavement Breaker	1
Plate Compactor (180 kg) / Portable Roller	1

One mobile unit may cost around Rs 30 Lakh . It can look after the maintenance of 200 km of roads. An area wide approach can be adopted depending upon the density of rural roads.

Alternatively, a cadre of small scale contractors / community contractors could be trained and developed at the district level to undertake rural roads maintenance through Mobile Maintenance Units in a holistic manner.

4.10.6 Adoption of Labour-Based Technology

As the rural population grows in the coming years, off-farm employment opportunities need to be created to contain migration of rural population to towns and cities. Road construction and maintenance using labour-based technology promises to be a good avenue for creating employment potential while building productive assets. Many of the operations involved in a rural road, like excavation, embankment construction, cross-drainage works, soil-stabilisation, gravel roads, light-surface dressing, maintenance operations like trimming of berms and cutting grass and weeds, are easily amenable to be undertaken by manual means with support of light equipment. Provision of better tools to enhance the productivity of labour and training of the work-force will help in the process. International experience from China and several African countries suggests that most of the operations involved in the construction and maintenance of Rural Roads can be efficiently performed by labour, aided by simple implements to increase its productivity.

4.10.7 Use of Cold Mix - Emulsion Technology

In remote rural areas of the country, it is difficult to observe requirements of heating of bitumen and aggregates to the specified temperature, and ensuring that the mix is produced, transported and laid at the correct temperature. This is especially true of maintenance requirements like pothole filling and patches repairs. As a result, the quality of work is often sub-standard. Also, in the high rainfall areas dry season period is very short to carry out any bituminous pothole patching. Use of cold mix emulsions allows patching works even during the rainy season. Also, use of cold mix emulsions does not require any high skills and can be easily used by low skilled workers at the district / block and village level.

The adoption of cold emulsion technology for operations like surface dressing, preparation of premix patch repair materials and preparation of premix materials for thin carpet can ensure that the works are done to the correct specifications and the final product is as per the requirements. Surface dressing using emulsions should gradually replace premix carpet using hot bitumen, say in a span of 5 years. Suitable low-cost equipment like sprayers and mixing plants should be developed for the use of cold emulsion technology.

4.10.8 Low-end Technology

The equipment industry also needs to focus on production of low-end technology machines, which can be used cost-effectively by the local contractors in construction and maintenance of rural roads. Pedestrian road rollers, chip-sealing machines, simple equipment for spraying emulsions, cold-mix plants of small capacity, pot-hole repairing kit are some of the promising items of equipment that need to be developed. For this, demand needs to be generated in the first instance and this can be done through mandating appropriate work methods. Demonstration of best practices using equipment like agricultural tractor towed blade graders, rippers, rotavators, water sprinklers, disc harrows and rollers in operations like clearing and grubbing, borrow area excavation, embankment construction, cement/lime-soil stabilisation, gravel road construction and maintenance of embankment shoulders will lead to building confidence among engineers and contractors.

When the equipment manufacturing industry comes out with suitable models, the financial burden of contractors in procuring them may be eased by firms leasing the equipment. A healthy equipment leasing industry may come up in the private sector.

Equipment, even though of low end technology, needs to be handled with care and expertise. For this, a whole army of operators, foremen and mechanics need to be trained.

The Indian Roads Congress with the support of CRRI and the Ministry of Rural Development may draw up a matrix of various work items involved in construction and maintenance of rural roads and the appropriate work methods that can maximise use of local skills and local materials with light machinery, and restricting the heavy machinery to such items, which are necessary to ensure high quality. The IRC can network with the ILO and IFG, etc. in accessing the techniques found successful in construction of rural roads in other countries and then identify promising techniques for our country.

4.10.9 PPP Initiatives

It may be worth exploring the possibility of introducing Public Private Partnership models in provision and maintenance of rural roads for even 15 to 20 years concession period. To attract interest of investors, the roads in the block / district can be packaged into sizes of say Rs.80 to Rs.100 crore. The Concessionaires can be given incentives to innovate in design as is being permitted on National Highways projects. A few pilots can be tried in 2-3 States and if found successful, this has the potential of ensuring maintenance on a long term basis.

4.11 Action Plan

Based on discussions of various issues regarding the maintenance of rural roads, an Action Plan Matrix is given in **Table-4.5**.

**Table-4.5 Development / Maintenance of Rural Roads
Action Plan Matrix**

Issue	Strategy Proposed	Time Horizon
A. Government Commitment		
Development policy (including maintenance)	1. Formulate and adopt rural road development and maintenance policy addressing key issues with learning from PMGSY	Short term
	2. Draft a Rural Road Management Act and have it passed by the State legislature	Medium term
	3. Establish high level committee for ensuring availability of adequate funds for balanced expansion of network and maintenance of existing roads	Short term
	4. Promote convergence with MGNREGA especially for maintenance of rural roads	Short term
B. Financing Aspects		
Inadequate funds	1. Establish dedicated road fund at State level by mobilization of additional resources through measures such as fuel levy, fee on motorized vehicles, one- time tax on tractors, trolleys, cess on agricultural produce, additional royalty on minerals, cess on industrial produce, cess on spares and tyres, and levy at tourist places. (To supplement CRF)	Medium term
	2. Enhance allocations from the government budget to fully meet the essential requirements.	Short term
	3. Ring fencing of additional funds recommended by the Finance Commission for maintenance	Regular basis
Management of funds	1. Establish empowered committee for management of the road fund recommended above and enact suitable legislation to ensure efficient use and tracking of the road funds for the intended purpose and to avoid diversion of funds for other purposes.	Medium term
	2. Evolve technical and financial auditing procedures	Medium term
C. Institutional Reforms		
Monitoring Arrangements	Set up a small but independent asset management unit in the State Headquarters (consolidating and updating inventory on regular basis, maintenance requirements from field staff, resource estimation, budget demand, identification of priorities, broad scheduling and monitoring)	Short term

Explore PPP Models	Undertake pilot projects for provision and maintenance of rural roads in 2-3 different districts in the country on PPP basis covering a concession period of 15-20 years.	Medium Term
Capacity Building	1. Continue regular training programs for various categories of staff including the contractor staff with financial support from NRRDA 2. Networking with and obtaining support of international/national/State level institutions and road agencies for exposure to good practice examples and technology transfer. Study tours (domestic and international).	Regular basis Regular basis
D. Planning Aspects		
Master Plans	Review and refine the District Rural Roads Plans to provide accessibility to all habitations (both PMGSY and Non-PMGSY)	Medium term
Maintenance Planning	Establish simple procedures for data collection keeping the data requirements to the minimum essential for the Maintenance Management System (MMS). System of Road Registers in each Block and District.	Short term
Prioritisation	Develop priority index depending upon traffic, importance of roads (access to school, medical centres, market) and their condition for maintenance intervention.	Short term
E. Operational Capacity		
Staff Deployment	Evolve work norms and duties for different levels of staff and ensure deployment of adequate staff for maintenance.	Medium term
Development of Small Scale Maintenance Contractors	Develop a cadre of small scale contractors including community contractors for dedicated and sustainable maintenance of rural roads	Short term
Develop Capacity of PRIs to undertake road maintenance	Institutional strengthening / development of cadre of technicians in the PRIs to effectively plan, design and execute the road maintenance on sustainable basis.	Short term
Develop separate Schedule of Rates for Road Maintenance	Schedule of Rates based on realistic output of labour and equipment should be developed to attract and encourage small scale contractors.	Short term
Launch Pilot Schemes on road	Pilot test some of the innovative and evidence-based MMS and evidence based international practices.	Short term

maintenance using innovative strategies and appropriate Maintenance Management Systems (MMS).		
Quality Procedures	1. Focus on adequate quality at initial construction stage to reduce the future maintenance requirements for non-PMGSY roads. 2. Upscale quality procedures covering quality control, quality assurance, quality audit, etc. for non-PMGSY roads as being achieved on PMGSY roads.	Short term Medium term
Supervision	Strengthen existing supervision arrangements for implementation of rural road programs including maintenance works.	Short term
Research and Development	Identify areas for further R&D for modernization of execution of works, enhancing use of local and marginal materials, pavement evaluation, cost-effective maintenance treatments, low cost surface sealing, dust control treatments and undertake R&D work.	Regular basis

It may be noted here that while the States are vested with the responsibility of rural roads maintenance, the 13th Finance Commission awarded Rs. 19,930 crore as grant in aid for the maintenance of the roads and bridges during 2011-2015 for supplementing the resources of the States. However, the Finance Commission, while awarding the grant in aid for maintenance of roads and bridges imposed certain conditions for utilization of the grants. Fulfilment of the conditions requires States' initiative in providing adequate grants of their share, in order to effectively get the grant in aid and utilize the same, as recommended. This could be possible only when the States follow the strategies suggested in the action plan matrix above.

Chapter 5

Adopting GIS Architecture in Rural Roads including R&D and Environment

5.1 Introduction:

A Sub-Group -4 on “Adopting GIS Architecture in Rural Roads including R&D and Environment” is formed vide Ministry’s OM no. P-17035/1/2011-RC dated 23rd June, 2011 having the following members:-

- | | | |
|----|--|------------|
| 1. | Dr. K.M.L. Rao, Director (Tech) | - Convenor |
| 2. | Shri Y.S. Dwivedi, Director (RC), MoRD | - Member |
| 3. | Dr. Ravindra Kumar, Scientist, CRRRI | - Member |
| 4. | Representative from IRC | - Member |
| 5. | Representative from Nagaland | - Member |
| 6. | Representative from Rajasthan | - Member |
| 7. | Representative from Tamil Nadu | - Member |

GIS Architecture is an essential tool to be placed on comprehending the information of spatial and non-spatial data over a space and time. Rural Road Network comprises of group of nodes and links. The Network Configuration is a combination of these links with a directional orientation to the nodes which are the centre heads of the habitations spread over the space. As most of the features are static in nature there is a need to Geo-Reference permanently and the dynamic interactions in terms of planning, construction, maintenance can be visualized over a time on this spatial frame. To create the rural asset, GIS is a great supportive tool which connects advance technologies and the conventional practices on a common platform. There is a need to decide the type of architecture which matches to the rural asset creation for display, reciprocate interactions, updating, data schema attachment and interfacing with advanced technologies.

Research and Development is a continuous process and has its own importance at various stages of rural asset creation and maintenance. The characterization of material, optimal designs and type of maintenance with a proper privilege of monitoring the assets are some of the issues in the domain of research. In addition, the construction phase, type of technology, composition of materials and 3-D mapping are some of the interactive research fields for handling economic, environment sustain and operational mobility of the traffic.

Environment is a transitional medium between infrastructure creation and traffic interactions and it should be visualized in a continuous process on the rate of change

of environment with reference to infrastructure geometrics, road condition and traffic mobility. The overall objective is to minimize the Carbon Footprints. There is a need to plan environment pacifiers by creating plantations, noise barriers and vibration absorbers along the road.

5.2 Terms of Reference and terms wise discussions

5.2.1 Role of GIS in Planning, Designing, Maintenance and Monitoring of Activities of PMGSY/ Bharat Nirman.

GIS is a graphical interface relates all the attribute data of influencing factors with its characteristic values for a node, link, path, network and area. This is important to identify the spatial spread of the road network over a time. It improves the transparency, accountability and gives a lead for future development of the roads, with reference to accessibility, connectivity and mobility. PMGSY scheme is a time bound and related with the habitation coverage of different ranges clustered over the geographical space. PMGSY scheme is also bounded with Single All Weather Connectivity and is also a scheme given a lead on Upgradation for certain roads by considering the characteristic features of the road.

In this scenario there is a need to develop a spatial mapping with vectorized display of habitations, linkages, through routes and the Core Network of the area. In the course of progress, there is also a need of seeing the compatibility of Core Network with the neighbourhood Non Core-Network and other functional roads. In addition, there is a need on analysis of the Core Network with the change of scenario over a time on population density of different habitations. By considering these issues into account, a GIS map display system having user friendly / Menu driven and its compatibility with different source of information should be identified.

5.2.2 GIS architecture and its compatibility to PMGSY and Bharat Nirman schemes.

There are different types of GIS systems which address the problem of spatial and non-spatial data at analysis level. For PMGSY/ Bharat Nirman schemes the issues to be addressed are related to Core Network configuration, road alignment, land use display and display of material characteristics and the habitations coverage with neighborhood link connectivity.

As PMGSY scheme is controlled on the attribute data like population density and history of the road with a display of node, link and path. It is advisable to use vectored GIS system having the compatibility of layer concept, zooming, panning,

attachment of video-graphic data, upgrading of graphical and non-graphical data of the study area. In addition, the area bounded display of data like block-wise, State-wise, constituency-wise and National level display of roads should be facilitated. Further, the system should accommodate software interface for characteristic analysis of spatial and non-spatial data.

A customized GIS Mapping should facilitate the following features:

- a) Menu driven software to every block for updating the social, demographic, land use, road and traffic data.
- b) Overlay of topo-sheets, cadastral maps and addition of attribute data, transect walk mapping should be displayed for every road.
- c) Capable to conduct the network analysis on display of road of different phases and surfaces, display of different habitation sizes, user preferred path generations, drainage mapping surrounding to the road, Geo –Referencing of road condition with reference to patches and pot holes and Geo-Referencing of Quality Control tests under three tier Quality control system.
- d) Interfacing the video graphic data with road in a Geo-Referenced way.
- e) GPS control GIS Mapping.

5.2.3 Role of GIS at various stages on Rural Roads

GIS in Rural Roads is having a multifaceted application at various stages in planning, designing, construction, maintenance and monitoring of the rural assets. There is a need for generating a transparent approach which is founded on topographic sheets, ground truth verifications, cadastral maps and satellite enabled mapping either by GPS or satellite. The common approach is given below:

The Geo-Fenced map display system is essential because of the following reasons-

- a) To identify the progress of PMGSY and other roads in reference to access and connectivity pattern for overall development of the rural areas.
- b) To locate the habitations of different ranges be it Geo-referenced, which will be helpful for policy making on connecting habitations over a time frame.
- c) To avoid multi-connectivity among the habitations rather the basic objective of PMGSY scheme can be analyzed.
- d) To identify rural growth corridors and tracked the density of roads constructed per block / constituency / district / State which may be helpful for fund allocation with justification.

- e) To overlay the land use, terrain conditions and other obligatory aspects, a Geo- reference of map display system will be helpful for scientific and engineering design.

By considering the above entities as mandatory for PMGSY and other schemes, the following procedural steps are suggested for generalization of the approach.

Step 1: Procurement of consistent topographic sheets like 1:50,000 and scan them with the defined resolution suggested. Digitize them with a defined zoom level such that all the features can be digitized in number of layers.

Step2: Conducting the GPS survey for all the ground control points of every district on the known roads / important places to a minimum number of 25-50 per district.

Step 3: Geo-fenced that topographic and mosaic them with the administrative boundaries of the district and the State by taking the output of Step 2. This leads to a resolution correction to a length of plus or minus 5 m.

Step 4: By using the GPS instrument all the habitations are to be Geo- coded with the minimum number of satellite linkages of 9-10 number.

Step 5: By using the navigational mode of GPS or by static GPS record all the curves and road length of each road with a specific record of culverts, village starting and end points, starting and end points of type of road and all other obligatory features of the road. This survey will give alignment, villages covered, the type of surface covered and length of the road to precision.

Step 6: Use software inter-phase which should be the common interface matching to the national level mapping and to display all the spatial and attribute data about - the road, habitation, support infrastructure and land use, administrative/ constitutional boundaries of the State.

Step 7: The outcome of this study will give a straight answers with graphical accuracy to the most frequently asked questions by everyone in the Nation.

The scope of the work involves the display of the roads with updating of the link characteristics and visualizing the display of road network of Core Road Network. This output will be useful for the following reasons like:

- a) Core Network verification.
- b) Planning of New Connectivity and Prioritization of Upgradation

- c) Identifying the rural growth corridors.
- d) Neighbourhood network analysis with Core Network.
- e) Analyzing the Non-Core Network
- f) Geo-Referencing with the topographic sheets, facilitating the contour mapping with reference to the road, consequentially to drainage mapping for CD work and side drain locations.
- g) Mapping the rural road network scenario at the National level
- h) Display of all the habitations ranging from 100+ to 1000+.

The updating of Core Network is very much essential to visualize from the network characterization in vector form.

The physical progress and the characterization of the network developed by this scheme with left out habitations or newly eligible habitations are required to be spatially mapped for future transparency in sanctioning the roads

In order to develop a deliverable lead to the future Plan, Geo-Fencing of the nodes, linkages, paths and network is essential. Display of these features with different habitations clustered; linkages in configurations of different phases and types of surfaces; the left out linkages and their conditional entities; and left out or newly qualified habitations are required to map for some directional guidance in the future Plan. In addition, mapping of Transect Walk, area based planning bounded with administrative units, political boundaries may further improve the transparency on roads get constructed over different geographical areas.

Identification of high access roads to the different production and attraction centers; rural growth corridors; inter-transport networks; and roads for inter modal coordination will always improve the road transport. There is a need to study on network analysis with non-core network and other functional roads by considering the land use, socio-economic and environment scenarios into account for overall planning of Rural Roads.

The integration of backward and remote areas with the developed areas is made possible by an effective Transport Planning on Rural Roads. By geo referencing the total road network and analyzed with following entities.

- a) Identification of missing linkages as Transitional roads between rural, regional and urban areas.
- b) Identification of missing links among the rural areas where the constructions are taken place in different schemes like in Core Network and Non-Core Network.

- c) Identification of overlap size of every common node (junction) and the habitation in the process of spatial planning of user preferred paths with different gateways where social and economic interactions are taken place. These gateways can be at the State level, District level, entry levels. If an approach is developed for optimal spacing of rural growth corridors in par with national and State grid pattern of roads like National Highways, State Highways and Major District Roads, the total rural area will be homogeneously developed.

To make a transparent insight on planning of roads for future the following are essentials for rural development:

- a) The network characteristic analysis with GIS Mapping.
- b) Rural Road asset creation by a Transect Walk with GPS Technology.
- c) Every technical person be trained with updating of spatial, structural and topographical features of the area with GPS enabled mapping and these technical personnel should be facilitated with the menu driven indigenous software.
- d) Technology enabled monitoring of the traffic to know the usability of the road by On Line system.
- e) Tracking the commercial, heavy loaded vehicles with the vehicle navigation tool for internal revenue generation.
- f) A proper approach to declare the functionality of the road over a time for improving the road links as subset for higher functional roads.
- g) A clear monitoring system on planning and tracking the transitional changes in the Rural Roads and suggesting the approaches to convert the rural growth corridors as regional roads for Public Private Participation projects.
- h) Identifying the important gateways, junctions and transitional road linkages and conduct a road safety audit for minimizing the road accidents.
- i) Conducting different impacts with the technology, a GPS enabled mapping of the neighbourhood land use of the road like trees, change of drainage patterns and the functionality of the CD work over a time.
- j) Development of low cost approach with GPS Technology for mapping the land use scenario, drainage pattern, habitation cluster along with the constructed and proposed road for improving the life of the road with a proper supportive infrastructure of the road.

5.2.4 Role of R&D in Rural Roads.

Research and Development is an important process in planning, construction, designing and maintaining the roads in rural sector. At every stage the R&D

approach should be sensitively taken into account for updating the conventional procedures. The R&D efforts should always be bridged between field engineers and the researchers with technology, concepts and approaches as connectors.

There is a need to interface the practices at various stages in the rural sector with different hubs like technology hub, interface hub, operational hub, monitoring hub and maintenance hub. These hubs are coordinated with the spatial display systems of every State and the R&D efforts will be generalized on the basis of the study and approaches.

Problems like tracking of heavy loaded vehicles, tracking of traffic scenario, new materials and their intervention for economic construction of road, technology enabled mapping for optimal alignment and fixing the geometrics of the road, technology for faster construction, interface treatment for better strengths are some of the areas which are to be addressed for research. Across the National and at International level lot of research is going on and there is a need to interact with the researchers and develop the information system with a proper interpretation to the Indian conditions. There is a need to develop an Interface Hub with the functionality of collection of research findings, interactions, interpreting the approaches with experts and promoting the test projects on Indian roads.

Further, R&D is also essential to assess the bridge condition and functionalities of support infrastructures with reference to quality, location and its characteristics compositions. In rural roads sector there is a great need on research with reference to premature failures, non functional use, non -reciprocate roads for the future projections. In this way there is a need for interfacing the mathematical models, simulating softwares for effective planning and implementation on the roads. As a part of the research, every road should be monitored regularly to identify the deficiencies and track the failures for effective planning, designing and maintaining the Rural Roads. In this connection, the following audits are required to conduct on different surfaces, categories and functionalities of the road for effective decisions on sustaining the life of the pavement and its functionality.

- a) Surface condition audit.
- b) Structural conditional audit
- c) Sub-grade condition audit
- d) Material characterization audit
- e) Traffic audit
- f) Land use audit
- g) Geometric audit
- h) Environmental audit

- i) Economic audit
- j) Operational audit

Road safety is of the great concern on Rural Roads where accidents are occurring due to multifaceted reasons. Accidents are occurring in rural roads because of improper treatment of junctions when connecting Rural Roads to Higher Order Roads; deficiency of road information systems; improper driving skills; land use impacts on the roads; geometric deficiencies; structural conditions of the road; and composition of slow moving vehicles. There is a need for the research enabled solutions through simulating the spatial features of the road at the junctions, curves and at mid blocks with different templates like braking distance, sight distance, sight triangle, turning path, glare recovery, perceptual reactions and peripheral visibilities etc. Solution can be generated from the perspective of Planning, Engineering, Maintenance, Monitoring, Tracking, Training and Counselling on these problematic roads.

Technology Hub and Monitoring Hubs are essential to track the failures on the road, risk generators of the traffic and tracking of the heavy loaded vehicles which may improve the functionality of the road and the Rural Roads will be subjective to the more safety and good level of service in traffic mobility.

5.2.5 Environment.

Mobility levels, accessibility, road geometrics and connectivity patterns are some of the hidden characteristics which influence the environment in rural sector. The ultimate objective is to promote a good level of service to the road user and good environment to the non road user living in the neighbourhood areas. The environment sustained planning is possible with technology, software interface, spatial mapping and simulation of the traffic interactions before constructing the road. In the process of Transect Walk, GPS enabled mapping of the road with the band width of 50 m collecting the information on land use of obligatory, soil conditions, terrain conditions and the lead parameters may suggest deviations in fixing the alignment.

With the GIS interface, overlay of transect mapping on topographic sheets may further improve the road geometrics due to optimal locations of side drains, CD works and gradient fixation.

Technology enabled database on material characteristics, land use and geometric parameters and their interventions will improve the traffic mobility with less emissions of pollutants. Further, the optimal locations for tree plantations, noise

barriers and controlling measures for land slides may further improve the transport environment in the rural sector.

5.2.6 Tree plantation along the Rural Roads:

PMGSY Programme Guidelines provide for plantation of fruit bearing trees along the rural roads constructed under the scheme. However, the cost of this item of work is to be borne by the States. In this context, it would be suggested to the States to use the provisions of other Rural Development programmes for tree plantation and management. The help of Social Forest dept can also be explored in this regard.

5.3 RECOMMENDATIONS RELATED TO GIS

The consolidated recommendations are as per **Table-5.1** under:

Table-5.1

Sl.No	Issues	Recommendations
1.	GIS Architecture	Spatial framing of nodes and links with Geo-reference is essential to understand access patterns, connectivity patterns and levels of mobility and the functional configurations of the rural road network with habitations.
1.1	GIS Mapping	Vectorized GIS Mapping facilitating high resolution network characteristics with module addition, customized and menu driven system should be developed. It should be compatible in accommodating different spatial and non-spatial data structures with a provision for attaching technology enabled monitoring, 3-D mapping, video-graphic mapping and cadastral / topographic maps.
1.2	GIS Enabled Network Characterization	Display of Core Network and non Core Network with all their characteristic information over a time and space and surface like different phases, functionality and types of roads. Identification of through routes with link overlap, node overlap and fractal dimensional over a time and space should be displayed.

Sl.No	Issues	Recommendations
		Facilitating the mathematical modeling effort on neighborhood network analysis, an internal Core Network analysis for identifying the optimal links to track higher utility roads for future planning. Software interface to identify missing links and junctions to be improved for planning the PPP based road constructions in the future.
2	Research and Development	Research and Development is a continuous process to be focused on characterization of the materials and the utility in the road construction. Optimal designs, maintenance approaches, ITS architecture for monitoring the assets, traffic mobility and 3-D Mapping are essentials for handling operational, economic and environment sustain rural infrastructure.
2.1	Research and Development for tracking of Heavy Load Vehicles, Traffic intensity and Bridge condition assessment.	NDT equipment, on- line communication systems, sensor enabled tracking on information should be developed for identifying the links of importance to the multipurpose traffic, tracking the change of traffic intensity and safety aspects on bridge structural and operational condition.
2.2	Prioritization of Rural Roads for Maintenance	Surface condition, structure condition, sub-grade condition, material characterization, traffic land use, geometric, environment, economic and operational audits are to be conducted on different roads coming under maintenance beyond the contractor obligatory period. An interface with multi-criteria evaluation in decision support system should be developed to prioritize the roads for sanctioning the maintenance fund over a time and space.
2.3	Road safety	Accidents and risk generations are the black spots in the rural road network should be properly treated with

Sl.No	Issues	Recommendations
		different template like braking distance, sight distance, sight triangle, turning path, glare recovery, perceptual reactions and peripheral visibilities. In addition, the land use audit, driver counselling and non road user counselling, vehicle condition analyzers should also be considered under mobile based interactions between rural departments and the society.
3	Environment	It is a transitional medium varies with reference to change in land use, infrastructure construction and traffic interactions. The temporal impact caused due to traffic mobility by virtue of road geometrics, traffic loading and composition of traffic should be properly monitored to minimize Carbon Footprints. Environment sustenance should be assessed with quantity estimation of pollutants and reciprocative environment pacifiers with reference to their quantity and locations.
4	Hubs for interfacing rural roads society and engineering departments	Technology hub, Interface Hub, Operational hub and Monitoring Hub are essential to operate at regional or central level for effective communication and transparency in implementing the rural roads planning, construction, maintenance and operational activities.

Chapter 6

Quality Assurance in Rural Roads (Other than GIS)

6.1 Introduction:

A Sub-Group -5 on “Quality Assurance in Rural Roads (Other than GIS)” is formed vide Ministry’s OM no. P-17035/1/2011-RC dated 23rd June, 2011 having the following members:-

- | | |
|---|------------|
| 1. Dr. D.T. Thube, Director (P-III) | - Convenor |
| 2. Shri Y.S. Dwivedi, Director (RC), MoRD | - Member |
| 3. Shri Ravi Gupta, SQC, PMGSY, J&K | - Member |
| 4. Representative from Bihar | - Member |
| 5. Representative from Haryana | - Member |
| 6. Representative from Jammu & Kashmir | - Member |
| 7. Representative from Karnataka | -Member |

Members discussed the agenda items and also sought the views of State Quality Coordinators (SQCs) and NQMs.

6.2. Terms of Reference:

6.2.1 Review of Existing Quality Assurance System for Rural Roads:

- (i) **Rural Roads Constructed under PMGSY Scheme-** A three-tier quality mechanism is presently institutionalized under PMGSY. First Tier of Quality control is at Programme Implementation Unit (PIU) level by way of process control through mandatory tests of material and workmanship at the field laboratory. Second tier is the quality check of each work at three different stages during construction, by independent State Quality Monitors (SQMs) by way of structured inspections in the prescribed format. The responsibility of first and second tier of quality mechanism fully vests with respective State Governments. Third-tier is the quality check by way of random inspections of selected works by Independent National Quality Monitors (NQMs) who are retired senior engineers deployed by NRRDA.
- (ii) **Rural Roads Constructed under Non-PMGSY Schemes-** In most of the States, the quality control aspect in construction of Rural Roads is being monitored by two tier structure and the responsibility of both tiers of quality mechanism fully vests with the State Government. The first-tier

is generally headed by an Executive Engineer who is actually executing the construction of Rural Roads and is at the work implementation level. At the second-tier there is an independent vigilance & quality control wing which randomly inspects the Rural Road works and issues observation memos regarding the quality of work. However, the major drawback of this system is that inspection of works at different stages of construction is not mandatory. The inspections are done at random basis and each work is not mandatorily inspected. The inspection of works and its frequency is generally guided by the provisions of works manual of respective States.

6.3 Recommendation of the sub-group regarding improvement in Quality Assurance system in construction of Rural Roads-

In view of experience in construction of rural roads in the past, a three tier quality management mechanism was adopted under PMGSY. The emphasis on quality through this mechanism has yielded good results and by and large, roads constructed under the programme have been found to be of good quality.

6.3.1 Quality assurance system for Rural Roads constructed under Non-PMGSY scheme-

(i) Uniform specifications for all Rural Roads:

It is suggested that the specifications prescribed for construction of Rural Roads under PMGSY programme should be uniformly followed for construction of all Rural Roads irrespective of the scheme through which it is being constructed.

(ii) Introduction of three tier Quality System:

It is suggested that the three tier quality monitoring system adopted for PMGSY works may also be adopted for construction of other Rural Roads in the State with State specific modifications.

(iii) Single Agency for Rural Roads:

It is suggested that there should be a single agency in-charge for construction and maintenance of Rural Roads in the States for comprehensive planning, construction and maintenance of Rural Roads to be constructed under different schemes.

6.3.2 Quality Assurance System in PMGSY Scheme-

- (i) Need for review of third tier of quality mechanism
- (ii) Need for Review of grading system in NQM/SQM inspection formats:

There is a need for development of detailed inspection format for inspection of cross drainage works / bridges for SQM/NQM inspections similar to the one prescribed for different items in detail in the construction of PMGSY road works.

It emerged that the procedure for grading of certain items example WBM. Grain size of coarse Aggregate as provided in NQM/ SQM guidelines needs to be reviewed. The grading requirement of coarse aggregate derived from the compacted layer of WMB, after construction, also needs to be separately prescribed. Presently, the grading requirement prescribed for WBM item in the MoRD Specifications for Rural Roads, 2004 is that the specified graded coarse aggregate material to be used in WBM. Post WBM construction, with the use of rollers for compaction, the percentage of aggregates on lower sieves is bound to increase and will not ultimately match with the gradation prescribed for aggregate material in the specifications. Besides, the gradation found in 1 or 2 test pits of 50cm X 50cm size, during NQM inspection may not be the representative of the entire WBM layer as the WBM itself is not a uniform or homogenous mix of aggregates.

- (iii) **Methodology for evaluation of the quality of completed works:**

It emerged that after construction, the evaluation of the quality of PMGSY road works should be based upon various performance based indicators rather than inspecting the completed works in the prescribed existing NQM inspection format, after years of construction. It was also suggested by States that there may be failure at a few specific location/ stretches in a road and the cause of failure should not only be attributed to the poor quality of material used or workmanship, but there could be other reasons also for the failure.

- (iv) **Review of non-rectifiable defects provision:**

There is a need to review the existing provisions regarding notification of non-rectifiable defects. The States were of the opinion that the defects

identified at specific locations of a road can always be rectified/strengthened with available technologies and therefore, it is not justified to deduct the entire amount spent on the road work, if the completed road is graded as ‘unsatisfactory’ on the basis of a single NQM inspection. It was further suggested that an “Appellate Committee” may be constituted for considering the State’s contention on non-rectifiable works before taking a final decision for deducting the entire amount spent on work from future release of Programme fund admissible to the concerned State.

(v) Involvement of Independent Engineers:

A possibility to involve Independent Engineers to supplement the existing Third Tier Quality Control Mechanism may be explored.

(vi) Deployment of a dedicated Superintending Engineer for construction of concrete roads in LWE/IAP States:

It is suggested to deploy dedicated Superintending Engineer level officer in charge for construction of concrete roads in each SRRDA of LWE/IAP States.

6.3.3 Quality assurance system for Rural Roads constructed under Non-PMGSY scheme

(i) Uniform specifications for all Rural Roads:

It is suggested that the specifications prescribed for construction of Rural Roads under PMGSY programme should be uniformly followed for construction of all Rural Roads irrespective of the scheme through which it is being constructed.

(ii) Introduction of three tier Quality System:

It is suggested that the three tier quality monitoring system adopted for PMGSY works may also be adopted for construction of other Rural Roads in the State with State specific modifications.

(iii) Single Agency for Rural Roads:

It is suggested that there should be a single agency in-charge for construction and maintenance of Rural Roads in the States for

comprehensive planning, construction and maintenance of Rural Roads to be constructed under different schemes.

6.4 Strengthening the second tire of quality mechanism

It has been observed that some States had not taken the second tire of quality mechanism as seriously as was desired, however, of late, improvements were noticed. It is recommended that the states should not only ensure proper implementation of second tire of QM but also introduce the process of performance evaluation of independent State monitors and rigorous and continuous action on observations of these monitors.

6.5 Modifications requirement in the sub-contracting clause of SBD prescribed under PMGSY to ensure good quality of construction and maintenance of Rural Roads:

It has been observed that the sub-contracting of works results in the deterioration of overall quality of works. In order to curb this malpractice of informal sub-contracting by the contractors, the following modifications in the sub-contracting clause of SBD are recommended:

- a) It is recommended that no sub-contracting (except for material procurement) be allowed for which necessary changes be made in the SBD.
- b) While inspecting the works, all departmental Supervisory Officers as well as NQMs/SQMs should specifically look into the aspect of any sub-contracting.
- c) Strict action against delinquent contractors is recommended including forfeiture, recovery, blacklisting, penal etc. and its publicity.

With above remedial actions, it is expected that only genuine contractors will come forward to quote for tenders.

6.6 Management of over loaded trucks :

The problem arising out of plying of over loaded trucks is not a unique situation in the rural roads, but is universal on the total road network. Normally, the RTA is to check the loading of trucks on random basis and impose penalties, when the truck is found over loaded.

In addition to the above, involvement of the community can be taken up for containing the menace. After creating a sense of ownership to the community, particularly on link roads, the trucks found to be over loaded can be stopped through erecting of barriers, as is being done in some of the countries. This requires the

cooperation of the community and Gram Sabha can tackle the problem. This arrangement may not be possible for ODRs. On such roads, levying penalties is necessary through check posts erected at critical points on the road, where the over loading problem is noticed, by the competent Govt. departments.

6.7 Facilitation of disabled road users:

The problems faced by the disabled road users on urban roads are generally non-existent on rural roads, such as crossing a busy road and negotiating obstruction like steps etc. Even in the built up areas, the traffic intensity is less and adequate gaps in the traffic stream would be available for the disabled people to cross the road. Further, the embankments are not high and even the disabled road users can easily negotiate the gentle slopes provided on rural roads, except in hilly areas. To facilitate the disabled persons, when the embankment is marginally high, gentle slopes are proposed on either side of the embankment at the critical stretches, which can be used for them to cross the road from one side to the other.

Road over bridges/flyovers are not provided on rural roads generally and where they are investable, appropriate treatment is to be done for facilitating the disabled roads.

Chapter 7

Use of Marginal Aggregates, New Materials and Industrial Waste.

7.1 Background

Rural roads are being constructed as per the IRC recommended specifications developed exclusively for Rural Roads during 2004 after the launch of PMGSY. Rural Roads specifications indicate the type and quality of materials to be used for each layer of the Rural Road namely sub-grade, sub-base, base-course and surface-course. However, the use of standard recommended material may pose problems of their availability in the vicinity of the road being constructed. When such material is to be brought from far away places the total cost of material enormously increases due to the lead involved in transportation. The net effect is increased cost per unit length.

The standard materials recommended are better needed in the higher order roads where the intensity of traffic is more and the strength required from the crust of the road is much higher compared to rural roads where the traffic intensity are generally low, while providing access to smaller habitations. Therefore, there is a need to conserve standard materials in the use of rural roads where alternatives can be explored with the use of marginal aggregates, industrial wastes and locally available and new materials, if available in reasonable leads in the construction of rural roads.

7.2 Use of marginal aggregate and other locally available material.

In some of the states the standard aggregates is not available even at the leads normally considered economical. However, material of marginally less strength are available a plenty and their use is to be exploited in the construction of Rural Roads. Similarly, there are typical local engineering practises in the use of available material either for the construction of the layers of the road or associated works like protection works. Examples can be given in this respect like the use of over burnt brick ballast in place of aggregates or use of aggregate available locally as found in states like Mizoram. However, it should be noted that in addition to the research carried out at premier research laboratories such as Central Road Research Institute (CRRI) and IITs. It is necessary that the research outcome is to be put into practise through pilot project in different areas with the use of locally available material, in order to develop scientific methodology for design and construction of rural roads under the existing soil, traffic and environmental conditions with full documentation. The performance of such roads is to be monitored for determining the efficacy in the

use of locally available material. Having satisfied with the performance the results of experimentation can be shared with Indian Roads Congress (IRC) in order to standardize the design and construction procedures and issuance of guidelines for general use. One important issue to be kept in view is that when local and marginal materials are being used there should not be a compromise on quality, performance and sustainability.

7.3 Use of Industrial Waste.

There are different types of industrial wastes such as Fly Ash, Iron and Steel Slag, Marble Slurry Dust waste etc. that can be put to effective use in the construction of Rural Roads. The Rural Roads Manual needs to provide the properties and suitability of such material for road construction. It is evident that whenever such local materials are employed for road construction, a detailed material characterization is to be done in order to understand implications of using such material in the design and the expected performance of the roads constructed with them. It is to be brought out here that while lot of research has been carried out at different centres including CRRI, New Delhi there is a limitation in translating the findings of research on to the field due to fear of failures and subsequent departmental punishments.

7.4 Use of New Materials.

The Indian Roads Congress, the standards setting body for roads in India has taken up accreditation of new materials for use in the road construction. The materials characteristics their application in road construction and the performance of the roads constructed with the new materials are duly examined by a panel of experts at Indian Roads Congress (IRC) before giving accreditation. The range of materials accredited includes soil modifiers for increased strength, materials for providing water proofing, binders that lead to low absorption of water and such materials for stabilization of poor soils. The industrial wastes such as furnace slag, metallurgical slag, copper slag etc have also been accredited by IRC.

In addition to the above materials, IRC accreditation has been given for the use of Jute Geo Textiles and Coir Geo Textiles both for using in the construction of Rural Roads as well as side slope protection for higher embankments and deep cuts.

States implementing PMGSY have been informed to take roads as a Technology Demonstration Projects for assessing the performance of the accredited materials in the construction of rural roads that may lead to standardization and development of guidelines by IRC.

7.5 Reservations in the use of new / local materials.

The state departments implementing PMGSY programme normally do not come forward in using the new materials for which standard specifications have not been developed by IRC for fear of possible failures and subsequent departmental enquires/ punishments. Unless the engineering fraternity comes forward for experimentation the gap between laps to land remain the same and fruits of research cannot be shared by the community. Therefore, it is suggested that the roads taken under Technology Demonstration/ Research and Development should be given a special status and the safety net is to be provided by appropriate mechanism to those engineers involved against possible failures during or after experimentation, for rural roads. This will enable the engineers to come forward and adopt new and innovative technologies which will help in optimal design and economy in the rural roads construction.

Chapter 8

Road Safety

8.1 Background

The traffic on most existing earthen tracks and substandard existing links consists mainly of bicycles, some two-wheelers, some animal-drawn vehicles and a few agricultural tractors. The construction of new links to hitherto unconnected habitations and upgradation of existing links will generate a considerable amount of motorised traffic on Rural Roads.

The sudden influx of high speed motorised vehicles to the rural roads can severely endanger the safety of road users, particularly of vulnerable road users like children (going to the schools), women carrying headloads of agricultural produce, cyclists etc. The problem gets aggravated because all the road users utilise the same narrow road width of a single lane, where crossing and overtaking becomes very difficult. Moreover, drivers of agricultural tractors, jeeps, light commercial vehicles, two-wheelers and buses in the rural areas are not always given to adequate observance of driving rules and traffic signs. It is thus expected that as the rural roads get constructed and upgraded, road safety will be an issue requiring serious consideration. When accidents do take place, trauma care and other facilities available in hospitals of towns and cities are not within the easy reach of the accident victims. Under these circumstances, preventive measures, both engineering and social, must be taken up to the extent feasible.

8.2. Engineering Measures in the Design phase.

Incorporating appropriate safety design standards and features in the rural roads can enhance road safety to a great extent. In view of the lower levels of education in the rural areas, the engineering of roads to constrain users to follow safe driving and behavioural standards may be necessary to Supplement Cautionary Signboard. Some of the engineering measures that should be in-built into the design of rural roads are enumerated below. These issues should also be considered at the time of the transect walk (See chapter 5) so that the local community alerts the engineers at design stage itself to local traffic and pedestrian movement patterns that may have road safety implications.

- Rural roads have to necessarily have a tortuous path, keeping in view the narrow land width available. All the same, the horizontal curves should be designed scientifically, conforming to the selected design speed and terrain.

The horizontal curves must be provided with smooth transition curves and super-elevation. The pavements should be widened at curves.

- The vertical profile of the road should be designed such that the required minimum stopping sight distance is available. Suitable summit and valley curves should be provided.
- In hill roads, blind curves are a safety hazard. Suitable vision berms may be cut at such locations.
- Passing places must be provided at convenient locations particularly on hill roads.
- The provision of rural connectivity leads to the introduction of bus services. Properly designed bus-bays must be provided at bus stop to ensure that the buses do not hamper the normal traffic.
- Where the roads pass through habitations and school, it is necessary that the motorized vehicles travel at low speeds. This can be ensured by providing adequately designed road humps or rumble strips.
- The junction of rural roads with a main road is always a point of conflict and an accident-prone zone. Such junctions must be designed scientifically by providing minimum turning radii, flaring of the side road with taper, acceleration/deceleration lanes and adequate sight distances.
- Ramps must be provided where field paths and cattle crossings intersect the road.
- Traffic signage, incorporating warning and regulatory signs, can enhance road safety, especially near habitations and school zones, sharp curves, narrow bridges, junctions, submersible bridges and causeways. The design must incorporate these.
- Hazard markers like reflectorized delineators must be provided at dangerous locations.
- Submersible bridges and causeways should be provided with water depth gauges and guide-posts that shall remain at all times above the highest water level.
- 300mm dia ducts should be provided in the embankment to enable cultivators to thread agricultural wise pipes for irrigating their fields lying on both sides of the road.

8.3. Safety during Construction and Maintenance Operations.

Construction zones create an environment where the road user is confronted with sudden obstacles and unfamiliar conditions. Safety in construction zones must be enhanced by:

- i. Warning the road users (in the appropriate language) clearly and sufficiently in advance
- ii. Providing safe and clearly marked lanes for guiding road users

- iii. Providing safe and clearly marked buffer zones and work zones
- Barricades, drums, traffic cones, cylinders and signs around work zones
 - Flagmen with red flags positioned to regulate and warn the road users.
 - Using construction machinery carefully and parking such machinery at locations where they are not traffic hazards.
 - Stacking construction materials such that only the quantity needed for one operation is stacked along the road, and obstruction to road users is minimised.
 - Providing well designed temporary diversions as necessary so that the essential traffic moves with the least hindrance. The Contractor shall be asked to provide these as part of his work. The bidding document and specifications shall elaborate these requirements.

8.4. Road Safety During Use

The Head of PIU will be the District Rural Roads Safety Officer (DRRSO). To ensure operational safety the DRRSO shall ensure that

- Routine maintenance of rural roads are regularly carried out.
- All safety issues out of maintenance inspection are properly addressed.
- In all cases of accidents and inquiry/investigation thereof, safety issues are resolved, and a report is made to the SQC for examination whether standard design features need to be incorporated in other rural roads.
- All resolutions of Panchayats regarding safety issues are acknowledged and action proposed/taken intimated to the Panchayat.
- Road safety awareness camps are organised involving Panchayats, School, Rural road users (inhabitants as well as drivers), in accordance with programmes drawn up by the State Quality Coordinator.

The State Quality Coordinator will be the State Rural Road Safety Officer and shall ensure:

- Adequate coordination with the State Road Safety Council and road safety programmes.
- Formulation of rural road safety awareness programme proposals (for funding under PMGSY).
- Implementation and coordination of rural road safety awareness programmes in the field.
- Hold quarterly meeting with DRRSO and take feedback for improving safety standards.

8.5. Institutional Arrangement.

In order to enhance road safety, coordination shall be maintained with the Road Safety Mission of the MORT&H. At the State level, SQCs and DPIUs shall ensure coordination with the State Government's Road Safety Programme, in particular through membership of the State Road Safety Council and District Road Safety Committees, created as per provisions of Section 215 of the Motor Vehicles Act, 1988 (Act No. 59 of 1988). For this purpose, the SQC may be nominated to the State Road Safety Council. For each district, the Executing Agency shall designate the Head of the DPIU or a senior engineer as the District Rural Road Safety Officer (DRRSO). The State Government shall nominate the DRRSO to the District Road Safety Committee. The State Government shall also nominate the Panchayati Raj Institutions designated to take over maintenance to the District Road Safety Committee. As part of the Rural Road development and maintenance programmes, the State Government shall ensure road safety audit of construction and maintenance works along with quality monitoring.

Chapter 9

Grievance Redressal, Sevottam, Citizen Charter and CPGRAM in Rural Roads

9.1 Introduction:

A Sub-Group -6 on “Grievance Redressal, Sevottam, Citizen Charter and CPGRAM in Rural Roads” is formed vide Ministry’s OM no. P-17035/1/2011-RC dated 23rd June, 2011 having the following members:-

- | | | |
|----|--|------------|
| 1. | Shri R. Chauhan, Director (F&A), NRRDA | - Convenor |
| 2. | Shri S.R. Meena, Director (RC), MoRD | - Member |
| 3. | Representative from Himachal Pradesh | - Member |
| 4. | Representative from Uttar Pradesh | - Member |
| 5. | Representative from Uttarakhand | - Member |

9.2. SEVOTTAM Frame work:

9.2.1 Frame work:

For assessing the service delivery, the following integrated model containing three modules and nine criteria has been prescribed as per **Table-9.1** under:

Table-9.1

Modules	Criteria
1.Citizen Charter	1.1 Implementation
	1.2 Monitoring
	1.3 Review
2. Public Grievance Redress	2.1 Receipt
	2.2 Redress
	2.3 Prevention
3. Service Delivery Capability	3.1 Customers
	3.2 Employees
	3.3 Infrastructure

9.2.2 Framework is mandatory:

The Administrative Reforms Commission has recommended that this framework should be mandatory for all the organizations having public interface.

9.2.3 Current focus:

The current focus of the Results Framework Document (RFD) policy is on the first two components viz Citizen Charter and Grievance Redressal Mechanism (GRM).

9.3 Milestones achieved so far:

9.3.1 SEVOTTAM implementation :

- Initially Draft Citizen Charter & G.R.M were developed taking into consideration the Guideline issued in this regard.
- Informing about the availability of the Sevottam Guidelines on design and implementation of Citizen's Charter and GRM on the Ministry's website (www.rural.nic.in), the two documents were circulated amongst the Stake holders including SRRDAs; Nodal Departments of the State; Directors in RC Division, MoRD and Directors of NRRDA inviting their comments.
- The draft documents were placed on the Website of NRRDA also in the public domain for inviting comments from the citizens.
- Held a brain storming session with the Stakeholders. The session began with a Power point presentation on Sevottam. Subsequently a series of meetings were held by the Ministry(MoRD). Suitably incorporated the views and suggestions in the draft Citizen Charter & GRM.
- The Citizen Charter and GRM of NRRDA (**Annexure-)** were placed on the website (www.pmgsy.nic.in) in the public domain .
- The SRRDAs have also been requested in meetings at different fora for preparation of their own Citizen's Charter and GRM.

9.3.2 Steps taken to strengthen GRM:

Grievance received on the website:

- (a) A Website (www.omms.nic.in) has been created to enable citizens lodge complaints, offer their comments or make a query about PMGSY. It has a menu-bar where "Feedback" appears prominently. The Feedback Module has three sections viz. Comment, Complaint and Query. This Module is accessible by all the citizens.

- (b) Citizens can register their complaint, comment or query on the Website in the **feedback module**. A unique registration number is generated as soon as the citizen registers complaint which can be used to check the status of the lodged complaint, etc.
- (c) Feedback received are being attended to on a daily basis and are replied at the earliest possible depending upon the response from concerned State agencies.

Complaints received through other modes:

Complaints forwarded by Ministry or received directly in NRRDA are examined and disposed of by the concern Division(s).

However, P-III Division in NRRDA is exclusively attending to the complaints relating to implementation of PMGSY with quality of the road works in focus. The Division deputes National Quality Monitors(NQMs), where considered necessary for inspecting the quality of the road works under construction or completed and takes/recommends to States for the necessary follow up action for corrective and preventive measures.

9.4. The Task ahead:

9.4.1 Spreading awareness among citizens:

- (a) To publish the two documents, namely, Citizen's Charter and GRM in leading newspapers in Hindi and local languages.
- (b) Association of Gram Sabha for spreading awareness about the two documents with PMGSY in focus.
- (c) Identification of representative citizen groups for associating with SEVOTTAM implementation.

9.4.2 Familiarization of frontline staff / Service delivery units :

- (a) To circulate these documents among frontline staff, service delivery units and clients and
- (b) To organize workshops of all concerned on implementation of the two documents
- (c) Hold meetings with them for effective implementation.

9.4.3 SEVOTTAM implementation review meetings with PMGSY in focus :

- (a) In house identification of the gaps between the commitments and services actually delivered with regard to delivery and quality of services.
- (b) Review of Sevottam compliance in meetings of the PRC, RRM, Empowered Committee, etc.
- (c) To conduct self assessment in terms of the SEVOTTAM guidelines and the objectives involving Stakeholders and representatives citizen groups.
- (d) A New module of SEVOTTAM to be added in OMMAS to enable SRRDAs develop and review their own documents.

9.4.4 Other steps:

- (a) To provide SEVOTTAM-RFD Linkage:

OBJECTIVE	ACTION	SUCCESS INDICATOR
Improving internal efficiency/responsiveness/ service delivery of Ministry/Department	Implementation of SEVOTTAM	Create a SEVOTTAM compliance to implement, monitor and review Citizen's Charter
		Create a SEVOTTAM compliant system to redress and monitor public grievances
		Independent Audit of implementation of Citizen's Charter
		Independent Audit of implementation of public grievances redress system

- (b) To incorporate in POM and RFD holding of regular review meetings and the decisions/recommendations from these meetings as a part of the organisation's mainstream service delivery improvement initiatives.
- (c) To analyse the "Feed Back" received on OMMAS and in other modes and formulate FAQs and their replies. To upload these on the website.

9.5. Strategy to achieve the objectives of SEVOTTAM

(i) Citizen's Charter

- (a) To spread awareness about SEVOTTAM through print, audio-video and electronic media.
- (b) Awareness campaigns at Gram Sabha level through the representatives of concerned PIU.

- (c) Wide publicity of SEVOTTAM through display in the local language (wall painted or otherwise) at prominent locations at Gram Sabha, PIU and SRRDA offices.
- (d) PIUs to participate in local fairs/ Programmes on Tehsil/Kisan Mela Diwas, etc to spread awareness about SEVOTTAM, highlighting the PMGSY achievements made by the PIUs and their future plans.

(ii) Grievance Redressal Mechanism

- (a) To suitably associate Gram Sabhas in GRM relating to a PIU. Government employee associated with the working of Gram Sabha to be part and parcel of the Grievance Redressal System under SEVOTTAM.
- (b) Submission of a monthly summary of ATRs on such grievances to SRRDA under intimation to NRRDA.
- (c) Grievance having quality complaints to be got attended, depending upon the need therefore, by quality monitors within the defect liability period of the contract.
- (d) Preparation of a data base of the grievances/complaints received and information asked for frequently – to analyze these to chalk out the preventive action needed and prepare the FAQs & their replies.

9.6. Centralized Public Grievance Redressal and Monitoring System (CPGRAMS)

9.6.1 Grievances received through CPGRAMS portal:

Grievances relating to PMGSY received in the Ministry's CPGRAMS account are forwarded to NRRDAs CPGRAMS account. The drill prescribed in the life cycle of the grievance redress operation is strictly being followed for disposal of the grievances received through the CPGRAMS Portal.:

9.6.2 Milestones achieved so far :

- Ministry has allotted to NRRDA the Login ID and Password.
- The grievance received are immediately examined and forwarded to concerned Division(s) in NRRDA/ SRRDA in accordance with the nature of the grievance for necessary action at their end.
- Depending upon the nature of the grievance NQMs or SQMs are also deputed for inspections of Road works.

- The position of grievances forwarded by the Ministry to NRRDA is regularly reviewed at the highest level.

9.6.3 The Task Ahead:

- To open CPGRAMS account for SRRDAs also to avoid paperwork and delays .
- Grievances received on OMMAS to appear with some alert for State concerned for action by them.
- Monitoring of disposal of grievance in the PRC/RRC.
- To develop a mechanism for ascertaining the level of satisfaction of grievance redress seeker.
- An item on CPGRAMS to be included in the RFD / Performance Output Matrics(POM) of both MoRD / NRRDA and States.
- To facilitate GRM, a day of the week (say Wednesday) to be observed as a meeting-less day . Three hours (10:00 hours to 13:00 hours) on this day may be set apart for grievance redressal when the Director of Grievances and other officers remain in their offices and will receive and hear public grievances.
- The system of regular dialogue with user and citizen groups on grievance redress mechanism and service delivery reviewed at regular intervals and strengthened.

9.7. Necessary Capacity Building:

- To outsource the work relating to Grievance Redressal to the extent it is possible.
- Deployment of retired senior technical officer and Computer operator for effective handling of Grievance Redressal Mechanism.
- Provision for suitable honorarium to government employees assisting Gram Sabha in regard to Grievance Redressal System.
- Provision of adequate funds for implementation of SEVOTTAM/CPGRAMS objectives which includes expenditure on awareness campaign ,training and workshops, deployment of additional manpower, etc.

Chapter 10

Development of LWE & IAP Area Rural Roads

Background:

Left-Wing Extremism (LWE) in the country is not just a law and order problem, instead, the socio-economic dimensions of LWE are crucial and there is an urgent need to appropriately address them. In order to get an in-depth understanding of the overall development scenario in LWE affected/IAP districts, it was decided by the Ministry of rural development to constitute a Sub-Group on ‘Development of LWE/IAP Area Rural Roads’ under the Working Group on “Rural Roads” for formulation of Twelfth Five Year Plan (2012-17).

10.1 Constitution of the Sub-Group on ‘Development of LWE/IAP Area Rural Roads:

The Sub-Group on ‘Development of LWE/IAP Area Rural Roads’ under the Working Group on “Rural Roads” for formulation of Twelfth Five Year Plan (2012-17) was constituted under the Convenership of Shri Rohit Kumar, Director (Rural Connectivity), vide Ministry of Rural Development’s Office Memorandum No. P.17035/1/2011-RC dated 23rd June, 2011, to suggest measures to be taken up for effective development of Rural Roads in LWEaffected/ IAP districts, with its members as below:

- | | | |
|----|--|-------------------|
| 1. | Shri Rohit Kumar, Director (RC) | - Convener |
| 2. | Shri S.R. Meena, Director (RC) | - Member |
| 3. | Representatives from States of Chhatisgarh | - Member |
| 4. | Representatives from States of Jharkhand | - Member |
| 5. | Representatives from States of Orissa | - Member |
| 6. | Shri N.C. Solanki, Director (P-I) | - Special Invitee |

10.2 Objective of formation of a sub-Group:

Rural Connectivity is a key component of rural development and contributes a lot in alleviation of poverty in India. Rural Roads provide accessibility for the rural habitations to market and other facility centers. In order to give a boost to rural connectivity, Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25th December 2000 as a 100% Centrally Sponsored Scheme to provide road connectivity in rural areas of the country. The programme envisages connecting all habitations with a population of 500 persons and above in plain areas, 250 persons and above in Hill States, the tribal (Schedule V), the desert (Desert Development Programme)

areas and in the districts identified as LWE affected/implementation of Integrated Action Plan as identified by the Ministry of Home Affairs and Planning Commission.

The real objectives of the programme would be achieved only when one takes into account of the problems being faced by field functionaries in its implementations. The problems may be manifold. To name a few, it can be geography, terrain, border area problems, problems due to left wing extremism etc.

The objective for the formation of this Sub-Group on “**Development of LWE & IAP Area Rural Roads**” was to discuss and identify the problems which are being faced by the Programme Implementation Units (PIU) and other field functionaries in 60 LWE affected/IAP districts and to suggest measures to be taken to address those problems for smooth implementation of PMGSY in those areas.

10.3 Meetings/Video Conferencing/Interaction of the Sub-Group:

The meeting of the Sub-Group was held on 6th July, 2011 at Krishi Bhawan, New Delhi. The following Members attended the meeting:

1. Shri Rohit Kumar, Director (RC)
2. Shri S.R. Meena, Director (RC)
3. Shri N.C. Solanki, Director (P-I), NRRDA, New Delhi.
4. Smt. P. Anjana Devi, Chief Engineer, Jharkhand State Rural Road Development Agency, Ranchi

The issues relating to the problems being faced by PIU in LWE/IAP districts were discussed in detail and a Draft Report was prepared. The Draft Report was thereafter, e-mailed to the State Rural Road Development Agencies of all the nine LWE/IAP States in the country to seek their comments.

Subsequently, a Video-Conference was held on 18th July, 2011 with the Principal Secretaries/Chief Engineers of States in which Officers from Andhra Pradesh, Chhatisgarh, Madhya Pradesh, Maharashtra and Orissa participated. The Draft Report and other issues relating to LWE/IAP districts were discussed in detail, views were exchanged and their feedback were obtained. The draft report was also discussed with JS(RC), Director (RC-YSD), Director (P-III) and sh. B. P. Chandrasekhar Ex- Director (Tech), NRRDA. In addition to this, the issues were also discussed with District magistrates over telephone.

Planning Commission has recently conducted a study of some LWE/IAP districts. This Sub Group has also gone through that report and has incorporated some of the observations from those studies.

10.4 Report of the Sub-Group

Based on the deliberations held in the meeting, Video-conferencing and discussions with DMs and other senior officers, a final Draft Report of the Sub-Group has been prepared and submitted as under:

A. Funds Requirement Analysis (Table 10.1):

Table-10.1

Sl. No.	Subject	Remarks
1	Total number of States having LWE affected/IAP districts	9
2	Total Number of LWE affected/IAP districts	60
3	Total number of eligible habitations under PMGSY (up to March'2011)	32,120
4	Total number of habitations connected under other Schemes (up to March'2011)	3,053
5	Net eligible habitations (3) – (4)	29,067
6	Funds needed to connect these 29,067 habitations including funds needed to provide Cement Concrete roads in difficult and selected stretches of areas, would be Rs. 27,054 crore (approx.), say,	Rs. 27,000 crore
7	Total number of habitations connected under PMGSY(up to March'2011)	12,078
8	Expenditure incurred up to March'2011	Rs. 11,216 crore
9	Balance habitations to be connected (5) – (7)	16,989
10	Total funds needed to complete the balance - Rs.15,784 crore (6) – (8) say,	Rs. 16,000 rore

B. Special Dispensation accorded to LWE Affected Areas/IAP Districts by Ministry of Rural development:

- a. All habitations in LWE Affected Areas/IAP Districts, whether in Schedule V areas or not, with a population of 250 and above (in 2001 Census) will be eligible for coverage under PMGSY. Notably, earlier

habitations with population 500 and above only were eligible under PMGSY in non – Schedule V areas in LWE Affected Areas/IAP Districts.

- b. In IAP districts, cost of bridges up to 75 meters under PMGSY will be borne by Government of India as against 50 meters for other areas. For longer bridges, pro rata costs beyond 75 meters for other areas, if any, would be borne by the State Government. Cost of causeways, however, irrespective of their length, will be fully borne by the Government of India.
- c. In case of IAP districts, the minimum tender package amount has been reduced to Rs. 50 lakh to attract more response to bids.
- d. LWE Affected Areas/IAP Districts have been included in the categories of proposals which are presently mainly being considered for clearance (as per Advisory issued on 12th June 2009) as under:
 - i. Residual new connectivity coverage envisaged under Phase – I of Bharat Nirman.
 - ii. Projects to be taken up with the assistance of WB/ADB
 - iii. **New habitation connectivity in identified LWE affected (now enlarged to 60 LWE affected/IAP) districts**
 - iv. Special road connectivity packages announced for the border areas

C. Special Dispensation accorded to LWE Affected Areas/IAP Districts by Ministry of Environment and Forest:

- a. General approval under Section 2 of Forest (Conservation) Act, 1980 for diversion of forest land up to 5 ha for selected public infrastructure projects in 60 IAP districts has been given and orders have been issued.

D. Key Observations:

i. Pace of implementation – Mixed response:

The pace of implementation of PMGSY scheme has been mixed in these districts. The value of the projects cleared (upto June' 2011) in these 60 IAP districts is Rs. 17,646 crore. The expenditure incurred (upto June' 2011) is Rs. 11,663 crore. The average percentage of expenditure as per the value of projects sanctioned in these 60 LWE/IAP districts has been 66% (upto June' 2011). On one hand, districts like Adilabad (Andhra Pradesh), Kawardha, Korea (Chhatisgarh), Anuppur, Dindori, Mandla, Singrauli, Umaria (Madhya Pradesh), Gondia (Maharashtra), Bolangir,

Kalahandi, Mayurbhanj, Nuahapara, Sonepur (Orissa), Sonbhadra (Uttar Pradesh) have shown expenditure more than 80%, whereas on the other hand, districts like Bijapur (4%), Narayanpur (11%)-Chhatisgarh, Lohardaga (22%), Gumla (26%) – Jharkhand, and Malkangiri (22%) – Orissa have shown very low expenditure trend.

ii. **Impact of implementation of PMGSY programme:**

- a. Enhancement of employment opportunity (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- b. better health and educational facilities (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- c. Easier for the farmers to move their agricultural products to the mandis/haats on bullock carts and even on tractors (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- d. Taxi services are being started on PMGSY roads that in-turn has made it possible for the villagers to visit the health centers in relatively short time thereby decreasing the health-related problems for the villagers (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- e. PMGSY roads have allowed them to send their children to the schools situated in other villages on the route of the new road (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- f. With increasing numbers of commuters on these roads, lots of road side shops and markets have also come up that have further opened up new employment opportunities to large number of villagers (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- g. Large numbers of people have gained employment in their native villages and this has in effect contributed towards stopping the problem of migration of villagers in search of better opportunities (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar**)
- h. The rural people of the sample villages have benefited in many ways, especially in terms of increased economic opportunities. (**Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar, Sonbhadra, UP**)

- i. Due to increased availability of local transport, it has become less time consuming in reaching a health facility in case of medical emergencies. Undoubtedly the rural connectivity has had a positive impact upon the overall well-being of the rural people. **(Studies by Planning Commission in IAP district of Aurangabad, Jehanabad and Arwal, Bihar)**

E. Recommendations of the Sub Group:

The issues related to implementation of PMGSY programme were analysed by the sub-group. Accordingly, strategies to overcome the problem, activities to be taken in this regard and changes in norms/guidelines were suggested. The main recommendations of the sub-group are at **Annexure-I**.

10.5 Workshop on “Appropriate Development Strategies for effective implementation of the schemes of Rural Development in IAP Districts”

A Workshop on “Appropriate Development Strategies for effective implementation of the schemes of Rural Development in IAP Districts” was also held by the Ministry of Rural Development and the Planning Commission on 13th September, 2011 to which Principal Secretaries / Secretaries dealing with Rural Development Programmes of all the nine IAP States and District Collectors / CEO Zila Panchayats/PD DRDAs of all the 60 IAP Districts were invited in addition to the Secretaries of various Ministries / Departments of Government of India and Experts from various fields. Hon’ble Prime Minister of India was the Chief Guest of the Workshop and was attended by Hon’ble Union Home Minister, Hon’ble Union Minister of Road Transport & Highways, Hon’ble Union Minister of Rural Development and Drinking water & Sanitation, Hon’ble Minister for Tribal Affairs and Panchayati Raj, Hon’ble Deputy Chairman, Planning Commission and other dignitaries. In the Workshop, the issues relating to IAY Districts were discussed in detail.

i. Recommendations of the Workshop on PMGSY

Based on the deliberations held in the Workshop held on 13.9.2011, the broad recommendations on PMGSY were as under:

- (i) PMGSY as currently structured covers habitations with population of 250+. Estimated funds requirement to cover unconnected habitations in these 60 districts is about Rs. 15,300 crore. This may be completed in next three years. Additional funds may be allocated by Planning Commission for IAP districts.

- (ii) In addition, all habitations with population between 100 and 249 in these districts may also be covered. Estimated funds requirement is about Rs. 19,340 crore. This may be completed in next three years. Detailed Proposal may be sent for new Scheme.
- (iii) A separate Scheme for Small and Minor bridges, not necessarily connected with PMGSY roads, needed for the IAP districts to connect all habitations over next three years. Rs. 500 crore would be required initially to launch the programme during 2012-13. Detailed Proposal may be sent for new Scheme.
- (iv) Construction of critical Cement-Concrete (CC) Roads in highly affected blocks in the 60 districts may be permitted. (The Difference in cost of BT and CC road may be shared by Centre and States on 90:10 basis).
- (v) Manual tendering may be allowed in some highly-affected blocks for a limited period of one year.
- (vi) Clustering of PMGSY roads for creating greater synergy from security point of view may be considered.
- (vii) Assessment criteria of bid capacity of contractors may be relaxed so that smaller contractors can also participate in PMGSY works.
- (viii) The time period of execution of road works in these districts may be enhanced from the existing 18 months to 24 months.
- (ix) Specific clauses may be added in the Standard Bidding document to provide for insurance coverage to machinery engaged in PMGSY works
- (x) National Rural Roads Development Agency (NRRDA) may examine use of modern ground improvement techniques and use of pre-fabricated bridges to expedite construction.

Final Recommendations

With a view to formulate the 12th Five Year Plan and improve the delivery mechanism for effective implementation of the programme, the Working Group has been constituted under the Chairmanship of Secretary, Rural Development with members from different organizations and subject experts. The Working Group, in turn constituted sub-committees on different aspects of rural roads. The sub-committees, after series of deliberations, submitted reports, along with recommendations as under:

Achieving social justice, national integration, and economic upliftment and inclusive growth through rural connectivity

- Rural development has become a matter of growing urgency for considerations of social justice, national integration, and economic upliftment and inclusive growth. For rural development, the provision of rural road network is a key component to enable the rural people to have access to schools, health centers and markets. Rural roads serve as an entry point for poverty alleviation since lack of access is accepted universally as a fundamental factor in continuation of poverty. Hence, objective of providing all-weather rural connectivity should be paid special attention by Central and State Governments.
- During 12th Five Year Plan, the basic objective should be to achieve the targets of PMGSY fully including relaxations given to LWE/IAP districts etc. Also the planning for the PMGSY-Phase-II, as proposed in report , should be completed.

Funds Related – Recommendations

Some of the recommendations for funds resources are as under:

- Instead of Cess as a specific duty (per litre), it should be made *ad valorem to make it buoyant* (Cost of HSD increased from Rs 17 per litre to nearly Rs. 44 per litre)
- Share in Cess on Petrol be also made available for rural roads
- Budgetary Support needs to be increased considerably in the coming years.
- PPP mode- BOT Annuity Model on a pilot basis.

- On completion of the current phase of PMGSY, PMGSY-II should be launched on cost sharing basis between Centre and State (Lower State share for the Hill States, Desert Areas, Tribal (Schedule V areas) and LWE/ IAP districts, and further lower share for International Border Blocks in Hilly states).

Capacity building for SRRDAs, Contractors, Engineers, Training Institutions etc.

- a) Appropriate staffing of SRRDAs including attempts to introduce talent for private industry.
- b) Methodical training needs assessment at all levels.
- c) Periodical orientation progress for PIUs and field level staff.
- d) Efforts to enhance efficiency of local contractors through establishment of equipment banks.
- e) Conducting workshops for contractors and workman.
- f) Development of consultancy organisations dedicated to orientation of independent monitors to rural road building, quality rural roads.
- g) Control and rural roads health survey.
- h) Strengthening of NRRDA and State Organisation through appropriate, need based training and exposure to best practices in technology and management.
- i) Institution of awards for outstanding contribution at all levels.

Suggested Institutional Reforms for Maintenance

Some of the institutional reforms required for maintenance of rural roads are recommended as under:

- SRRDAs to set up Maintenance Management System
 - Inspections and Inspection Reports- Road Health Surveyors
 - Data base
 - Outputs
 - Network condition
 - Road inventory, CD works
 - Annual maintenance plan
 - NRRDA may assist in setting up system
- Contract maintenance strategies
- Performance based approach
- Output based approach
- Community contracting
 - Development of Micro enterprises
 - Capacity building of local bodies
 - Preparation of Manuals on Maintenance planning and management in local languages.

Adopting GIS Architecture in Rural Roads including R&D and Environment

In order to develop a deliverable lead to the future Plan, some recommendations are as under:

- Geo-Fencing of the nodes, linkages, paths and network is essential.
- Display of these features with different habitations clustered; linkages in configurations of different phases and types of surfaces;
- The left out linkages and their conditional entities; and left out or newly qualified habitations are required to be mapped for directional guidance in the future Plan.
- In addition, mapping of Transect Walk, area based planning bounded with administrative units, to further improve the transparency for roads constructed in different geographical areas over time.

Research and Development

Some of the recommendations regarding role of R&D in Rural Roads is as under:

- Research and Development is to be focused on characterization of the materials and the utility in the road construction.
- Optimal designs, maintenance approaches, ITS architecture for monitoring the assets, traffic mobility and 3-D Mapping are essentials for handling operational aspects in rural infrastructure.
- NDT equipment, on- line communication systems, sensor enabled tracking on information are to be developed
- Surface condition, structure condition, sub-grade condition, material characterization, traffic land use, geometric, environment, economic and operational audits are to be conducted on different roads

Environmental

- The temporal impact caused due to traffic mobility by virtue of road geometrics, traffic loading and composition of traffic should be properly monitored to minimize Carbon Footprints.
- Environment sustenance should be assessed with quantity estimation of pollutants and reciprocative environment pacifiers with reference to their quantity and locations.
- Technology hub, Interface Hub, Operational hub and Monitoring Hub are essential to operate at regional or central level for effective communication and transparency.

Quality Assurance

- a) Some recommendations for Quality Assurance System in PMGSY Scheme is as under :

- Need for detailed inspection format for CDs and bridge works
- Methodology for evaluation of the quality of completed works:
 - Need for evaluation of the quality of PMGSY road should be based upon various performance based indicators rather than inspecting the completed works in the prescribed existing NQM inspection format
- Review of provisions for roads classified under non-rectifiable defects category:
 - There is a need to review the existing provisions regarding notification of non-rectifiable defects.
 - It is suggested that an “Appellate Committee” may be constituted for considering the State’s contention on non-rectifiable works before taking a final decision for deducting the entire amount spent on work from future release of Programme fund admissible to the concerned State(s).

b) Suggested Quality assurance system for Non-PMGSY Rural Roads:

- Broad specifications for all Rural Roads:
 - The specifications prescribed for construction of Rural Roads under PMGSY programme may be adopted with local modifications irrespective of the scheme through which it is being constructed.
- Introduction of three tier Quality System:
 - A three tier quality monitoring system be adopted for construction of other Rural Roads in the State with State specific modifications
- Single Agency for Rural Roads:
 - There should be a single agency in-charge for construction and maintenance of Rural Roads in the States for comprehensive planning, construction and maintenance of Rural Roads to be constructed under different schemes.

c) Use of modern technology in monitoring quality of Works:

- Use of GIS for Quality Monitoring: A robust Geographical Information System (GIS) should be developed for monitoring near real time quality of construction of Rural Roads.
- Uploading photographs of works with GPS tagging: The core network should be geo-referenced and the provision to upload the real time photographs of the road works, taken from GPS enabled camera should be made in the geo referenced core network.

Sub-contracting under PMGSY

- The sub-contracting of works more than the prescribed limits in the Standard Bidding Document (SBD) results in the deterioration of overall quality of works. In view of above, the prescribed provisions relating to sub-contracting of works in the SBD need to be followed strictly during execution of Rural Roads. While inspecting the works, all departmental Supervisory Officers as well as SQMs/ NQMs should specifically look into the aspect of unauthorized sub-letting. Strict action against delinquent contractors including forfeiture, recovery, blacklisting etc. and its publicity.

Use of Marginal Material, Industrial Waste and Innovative Materials

Some of the recommendations for using alternative material are as under:

- Roads are being constructed as per specifications developed by IRC.
- Use of only recommended material may deplete materials required for roads with high traffic intensity and increase the cost due to higher leads.
- Use of marginal material and industrial waste is to be explored on large scale.
- Innovative materials are to be used in improving in-situ soil and reduce the cost.
- A safety net for engineers involved in implementing Technology Demonstration and R&D Projects

Road Safety

Some of the recommendations for increasing the road safety of rural areas is as under:

- Road accidents can be minimized by taking adequate care at design stage, during construction/ maintenance operations and during the use of the road by both pedestrians and vehicle drivers.
- Creation of appropriate awareness is to be taken on priority with necessary institutional arrangements.

Task ahead to achieve the Sevottam Objectives

- Circulation of the Citizen's Charter and Grievance Redressal Mechanism among clients and frontline staff / service delivery units
- Identification of representative citizen groups
- A new module of SEVOTTAM to be added in OMMAS
- To monitor the progress made by SRRDAs in respect of preparation and implementation of their own Citizen's Charter and Grievance Redressal Mechanism.

- Formulation of FAQs and their replies. To upload these on the website. Communication and rectification of the identified gaps to /by service delivery units-in various languages

Recommendations for NE States

- Carriage-way width-3 metres and road width-6 metre recommended. It can be more than 3 metres and 6 metres respectively at curves.
- “Heavy snowfall and landslides” to be modified as “Heavy snowfall or landslides.

LWE/IAP Districts - Recommendations

Recently, a workshop on “Appropriate Development Strategies for effective implementation of the schemes of Rural Development in IAP Districts” was organised and final recommendations were finalised. Accordingly recommendation of Working Group is as under :

- PMGSY as currently structured covers habitations with population of 250+. Estimated funds requirement to cover unconnected habitations in these 60 districts is about Rs. 16,000 crore. This may be completed in next three years. Additional funds may be allocated by Planning Commission for IAP districts.
- In addition, all habitations with population between 100 and 249 in these districts may also be covered. Estimated additional funds requirement is about Rs. 19,340 crore (not covered in total funds requirement). This may be completed in next three years. A new Scheme needs to be formulated and submitted to Cabinet.
- A separate Scheme for Small and Minor bridges, not necessarily connected with PMGSY roads, needed for the IAP districts to connect all habitations over next three years. Rs. 500 crore would be required initially to launch the programme during 2012-13. The Scheme needs to be formulated and submitted to Cabinet.
- Construction of critical Cement-Concrete (CC) Roads in highly affected blocks in the 60 districts may be permitted. (The Difference in cost of BT and CC road may be shared by Centre and States on 90:10 basis).
- Manual tendering may be allowed in some highly-affected blocks for a limited period of one year.
- Clustering of PMGSY roads for creating greater synergy from security point of view may be considered.
- Assessment criteria of bid capacity of contractors may be relaxed so that smaller contractors can also participate in PMGSY works.
- The time period of execution of road works in these districts may be enhanced from existing 18 months to 24 months.

- Specific clauses may be added in the Standard Bidding document to provide for insurance coverage to machinery engaged in PMGSY works
- National Rural Roads Development Agency (NRRDA) may examine use of modern ground improvement techniques and use of pre-fabricated bridges to expedite construction.

Annexure-I

Recommendations of Sub-Group-10 relating to Implementation of PMGSY in LWE/IAP districts.

Sl. No.	Issues related to implementation of PMGSY programme	Problems faced in implementation of the scheme	Strategies to overcome the problem/ Action to be taken in this regard/suggested changes/norms/guidelines
1	Poor response to bid for works.	a. Naxals discourage construction of all weather access to the interior areas (Hard Core) b. They are also resisting the BT work c. Frequent interruptions in construction due to operation of multiple naxal groups in the same area. d. Lack of security e. Other issues	a. While doing the Calculation of bid of a contractor, the multiplication factor may be increased to 3 (presently M=2) would improve the participation of contractors for the bidding. (e.g., suppose a contractor has done work of Rs. 1 Crore in 2010-11, then he is eligible to execute work worth Rs. 2 Crore (if M=2)/ Rs. 3 Crore (if M=3) in the year 2011-12 minus the work in hand. b. Effective technical training to be imparted to the contractor's, engineers and personnel at the district level.
2	Duration of completion period of projects	Since there are inherent problems in execution of road works in LWE affected areas, therefore it takes longer time to complete the works.	a. The time period of execution of road works in LWE affected areas should be enhanced from the existing 18 months to 24 calendar months. b. Bonus (modalities to be framed) should be given to contractors for timely completion of works by the State Government.
3	Limit of project proposals to be sent to GOI	Recently, a circular has been issued where the States have been asked to send a proposal of Rs. 40-50 Crore per PIU in LWE affected/IAP districts. This limits the scope of the State Government to send proposals of value more than Rs. 50 Crore .	Number of PIUs in a district should not be related to the volume of project proposals to be sent to GOI. The State Government can send proposals of value more than Rs. 50 crore irrespective of the number of PIUs present in a district. But they have to give an undertaking to GOI that before the execution of works, they would depute 1 PIU for every Rs. 50 Crore of works in execution in the district. The circular issued earlier should be amended accordingly.
4	Field Laboratory	Since the package size has been reduced to Rs. 50 lakh, the contractors are finding it less remunerative to establish a field laboratory, because, establishing a field lab costs them around Rs.	Setting up of field laboratory in small packages is a must. At the most, list of the equipment can be pruned. The costlier equipment should be provided by the State Government/DPIU.

		4 lakh to Rs. 5 lakh	
5	Involvement of District Magistrate/Collector, Superintendent of Police and District Forest Officer in PMGSY programme	In execution of PMGSY roads, land availability, security arrangement and forest clearances are major bottlenecks. Involvement of DM, SP and DFO is a must.	a. The District Magistrate/Collector be made the Chairperson of DPIU. b. A committee of Magistrate/Collector, Superintendent of Police and District Forest Officer, District Superintending Engineer/XE (for implementation of IAP pattern) to look into the issues of land availability, security arrangement, forest clearances and to supervise and monitor the implementation of programme on a monthly basis.
6	Security arrangement	Because of lack of security especially in the hard core areas, officials and contractors are scared to work because of lack of security arrangements.	a. Security must be provided in the LWE affected areas as per the assessment/decision of the Security Committee.
7	Forest Clearance	Usually lot of time is being taken in forest clearance which delays the completion of projects	The aforesaid committee may resolve the issues at district level on a monthly basis
8	e-tendering		e-tendering should be promoted in the LWE affected districts.
9	Use of GIS		GIS mapping of core network should be done. Uploading of GPS based digital photographs on the website should be done.
10	Use of modern ground improvement techniques	Seeing the security problem, one needs to finish off the construction work in shorter duration of work. Therefore, there is a need to use those techniques which can save time in construction of roads.	Use of modern ground improvement techniques/measures, pre fabricated structures which can speed up the construction without compromising on the quality may be explored.
11	Lack of sufficient staffs	Availability of sufficient staff is a problem in LWE affected areas	a. State Government should take into account the existing vacancy. b. More number of PIUs should be created. c. Cash incentives should be given to officials posted in LWE areas by the State Government. d. Additional insurance coverage (at least the police personnel deployed) should be given to officials posted in LWE affected areas by the State Government.

12	Proper rehabilitation	It has been seen that at times the families of the deceased officials (victims of LWE outfits) posted in LWE affected areas are not timely and adequately compensated.	A Committee of DM, SP, District Social Welfare Officer, Police personnel, other officials, who have been killed in a naxal, evolve a method of rehabilitation of those families and take up this matter with the Government. They should continue such honorable rehabilitation families in future as well.
13	Unit to identify LWE affected areas/for IAP	District has been taken a unit for identification of LWE affected areas/for implementation of IAP. It came from discussion with few collectors of such districts that LWE activities are concentrated in few Blocks instead of the entire district. Moreover, by taking district as a unit, there are chances that the benefit of the relaxation of norms/guidelines would be availed more by non-LWE affected blocks in such districts instead of the LWE affected blocks.	Instead of district, block should be taken as unit for implementation of IAP
14	Delay in land acquisition process	Delay in land acquisition by State Government is a main hurdle for timely completion of projects	The Committee headed by Collector should review this on a monthly basis