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Situation Analysis of Rural Road Maintenance in Madhya Pradesh

Volume I: Strategy Elements and Options for Reforms

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Foreword

The Government of India is implementing a massive programme of village connectivity with the ultimate aim of connecting all habitations with population of 500 or more (250 in the case of hills, deserts and tribal areas). Investments of the order of Rs. 1,330 billion (US$30 billion) are envisaged.

Construction of rural roads brings multifaceted benefits to the rural areas by way of increases in agricultural production and the size of markets, better prices for agriculture produce, reduction in transport costs and the creation of off-farm employment opportunities. They also provide access to medical and educational facilities. Provision of rural roads is an effective element of a poverty reduction strategy.

Rural roads form a large share of the total road network. If these roads are not maintained, benefits disappear. Keeping them in a serviceable condition is crucial to the agricultural growth and affording means of access to millions of rural people to social facilities such as health and education.

Subsequent to a series of regional level workshops organised by the Ministry of Rural Development, and a series of overview studies supported by the World Bank on rural road maintenance in a few states, several areas for improvements in the delivery of maintenance have been identified. These include resource mobilisation, maintenance planning, technology, implementation, monitoring and capacity building of local workers.

The ILO ASIST AP was invited by the Ministry of Rural Development to share its experiences on this subject in early 2002. The maintenance of rural roads being a labour-based activity places it within the ILO's objective of Decent Work in construction. The Madhya Pradesh Rural Road Development Authority (MPRRDA) evinced interest and requested the ILO to undertake a detailed situation analysis of rural road maintenance in Madhya Pradesh.

Accordingly, the ILO undertook the study with the support of international and domestic experts in cooperation with the MPRRDA. The fieldwork was carried out in two blocks of two districts Dhar and Jabalpur in the state of Madhya Pradesh in late 2003 and early 2004.

The Report on the study is presented here in two volumes. Volume 1 covers strategy elements and options for reforms. Volume 2 provides more detail on

policy, institutional and financial aspects. The study has identified the technical, institutional and financial gaps that exist at various levels of the road agencies for effective maintenance of rural roads.

The ILO is privileged to share its experiences and to contribute to the better understanding of the institutional reforms including training that need to be pursued in the effective delivery of maintenance. It is hoped that the study will serve as a useful model and guide for not only the state of Madhya Pradesh but also for other states in their efforts to put maintenance of rural roads on a solid footing so that road assets being created at huge cost to the economy are preserved and the benefits fully accrue to the people.

Geoff Edmonds
ILO ASIST AP, Bangkok
November, 2005

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Abbreviations

ADB	-	Asian Development Bank
ADT	-	Average Daily Traffic
AE	-	Assistant Engineer
BOT	-	Build, Operate and Transfer
BPL	-	Below Poverty Line
BT	-	Black-Top (surfaced roads)
CBO	-	Community Based Organisation
CC	-	Cement Concrete
CE	-	Chief Engineer
CEO	-	Chief Executive Officer
CRF	-	Central Road Fund
CRRI	-	Central Road Research Institute
CV	-	Commercial Vehicle
CVD	-	Commercial Vehicle per Day
DFID	-	Department for International Development (UK)
DPR	-	Detailed Project Report
DRD	-	Department of Rural Development
DRDA	-	District Rural Development Agency
EAS	-	Employment Assurance Scheme
EE	-	Executive Engineer
E in C	-	Engineer in Chief
E&M	-	Electrical & Mechanical
FY	-	Financial Year (1st April to 31st March)
GOI	-	Government of India
GOMP	-	Government of Madhya Pradesh
Ha	-	Hectare
HR	-	Human Resource
IRAP	-	Integrated Rural Accessibility Planning
IRC	-	Indian Roads Congress
JGSY	-	Jawahar Gram Samrudhi Yojana
KRF	-	Kisan Road Fund
MDR	-	Major District Road
MLAs	-	Members Legislative Assembly
MMS	-	Maintenance Management System
MNP	-	Minimum Needs Programme
MORD	-	Ministry of Rural Development, Government of India
MOSRTH	-	Ministry of Shipping, Road Transport and Highways, Government of India
MP	-	Madhya Pradesh
MPRRDA	-	Madhya Pradesh Rural Roads Development Authority
MPs	-	Members Parliament

MS	-	Mix Seal (Surface)
NAASRA	-	National Association of Australian State Road Authorities
NABARD	-	National Bank for Agriculture and Rural Development
NH	-	National Highway
NHAI	-	National Highways Authority of India
NHDP	-	National Highway Development Project
NRRDC	-	National Rural Roads Development Committee
ODR	-	Other District Road
PC	-	Premix Carpet
PCU	-	Passenger Car Unit
PIARC	-	Permanent International Association of Road Congresses
PIU	-	Project Implementation Unit
PMGSY	-	Pradhan Mantri Gram Sadak Yojana (The Prime Minister's Rural Roads Programme)
PRDD	-	Panchayat and Rural Development Department
PRI	-	Panchayati Raj Institution
PWD	-	Public Works Department
RES	-	Rural Engineering Service
RIDF	-	Rural Infrastructure Development Fund
SC	-	Scheduled Caste
SD	-	Surface Dressing
SE	-	Superintending Engineer
S/E	-	Sub-Engineer
SFC	-	State Finance Commission
SGRY	-	Sampoorna Grameen Rozgar Yojana
SH	-	State Highway
ST	-	Schedule Tribe
TNA	-	Training Needs Assessment
TOR	-	Terms of Reference
TRL	-	Transport Research Laboratory (of UK)
UK	-	United Kingdom
VR	-	Village Road
WB	-	World Bank
WBM	-	Water Bound Macadam
$	-	US Dollar

Exchange rate used in this report:
$1.00 = Rs. (Indian Rupees) 43.50
"lakh" and "crore": The Indian unit "lakh" represents 100,000 and "crore" represents 10,000,000 (ten million or 100 lakh)

Executive Summary

Need for the Study

1. Roads are considered to be essential for economic growth, social development and poverty alleviation. The road network in the country today stands at 3.2 million km including 1.0 million km of earth tracks built under various employment creation and poverty alleviation programmes. The Indian Roads Congress assessed the current replacement value of the road network at Rs. 5,000 billion (equivalent of US$115 billion). However, due to lack of maintenance, these assets are deteriorating fast. In the case of rural roads, the position is particularly bad. About 20,000 km of rural roads are falling into disrepair every year due to lack of maintenance. The poor condition of these roads also results in an increase in the unproductive time spent on the transport of people and goods. Moreover the benefits created through the investments in access improvements for the rural population are being lost.

2. Through the Prime Minister's Rural Road Programme (PMGSY), the Government of India has launched a major rural road programme whose ultimate goal is to connect all villages in India having a population of more than 500 (250 in case of hills, deserts and tribal areas). Investments of the order of 45 billion rupees (US$1 billion per year) are being allocated for the programme. The Ministry of Rural Development administers the programme.

   Maintenance of the road assets being created has emerged as a key issue for sustaining investments in the road sector. Studies carried out with support from several international agencies, including the World Bank, have identified several areas where improvement in the maintenance of roads is required:

   - Resource mobilisation for maintenance
   - Maintenance planning
   - Implementation
   - Technology
   - Monitoring
   - Capacity building of local workers and productivity of gang labour.

3. The PMGSY itself has set out clear guidelines on maintenance. However the major concern is that whilst the PMGSY roads may indeed be maintained, at least for the five-year retention period, this will

divert funds away from the maintenance of the rest of the rural road network. An additional concern is the current capacity of the local authorities to maintain the existing network.

These concerns are reflected in the increased interest in rural road maintenance issues. For example, as part of the support and preparation work for a major loan to the PMGSY, the World Bank supported a series of regional workshops and overview studies on rural road maintenance in four states - Himachal Pradesh, Uttar Pradesh, Rajasthan and Jharkhand. The ADB provided a loan for the PMGSY in Madhya Pradesh and Chattisgarh and the development of a maintenance system is a condition of the loan. Other donors, such as DFID, have also shown interest in the issue. The NRRDA itself has identified maintenance as a key determinant of the success of the PMGSY.

Study Objective

4. The ILO ASIST AP (a regional programme of the Employment Intensive Investment Programme of the ILO) was invited to participate and share its experience in an international level workshop on rural roads organised by the World Bank and the Ministry of Rural Development in early 2002. The maintenance of rural roads is a labour intensive activity. As such, it fits into the ILO's objectives of Decent Work in construction viz. promotion of rights at works, employment, skills development, social protection and social dialogue. The Madhya Pradesh Rural Roads Development Authority evinced interest in the ILO undertaking a detailed situation analysis of maintenance of rural roads in the state. The objective of the study by the ILO was to focus on one state and provide a condition assessment and evidence on the actual scenario of rural road maintenance, and identify the technical, institutional and financial gaps that exist at various levels of the road agencies for effective maintenance of the rural road network. It was also hoped that the study could provide a model for use elsewhere in other states of India.

Organization of the Study

5. The study was undertaken by the ILO with the support of international and domestic consultants in cooperation with the MPRRDA. Detailed fieldwork was carried out to illustrate the existing condition of roads and traffic levels in two blocks of two districts, Jabalpur and Dhar. The report (in two volumes) brings out an assessment of the current situation and possible options for developing a sustainable maintenance strategy for rural roads in Madhya Pradesh.

Importance of Maintenance

6. It would not be out of place to recall that a World Bank study in 1988 demonstrated that spending one rupee on maintenance would have saved three rupees in rehabilitation. In the case of rural roads, the condition is still more serious as it affects the rural poor badly. Mobility to schools and primary health centers is affected. The poor condition of roads has a profound effect on vehicle operating costs and acts as a disincentive for agriculturists and fruit growers to increase their production, as more time is lost in evacuation of their products to markets. Some estimates put the replacement value of the existing rural road infrastructure in India at Rs 2,000 billion (US$ 46 billion). These assets are deteriorating every year. In comparison with the value of the assets, the annual cost of maintaining them is estimated to be some Rs 75 billion (US$1.7 billion) a mere 4% of the asset value.

   These huge national assets justify the application of sound asset management principles to achieve the public expectations. Since rural roads are basically a state subject, it is now critical that the State Governments undertake the required policy reforms for achieving sustainable maintenance of rural roads.

Key Issues

7. Any policy reform in this direction would need to address four key questions:

   - Who should own the rural roads in the state, and thus take on the responsibility for their maintenance?
   - How to prepare plans for maintenance interventions on different stretches of the network?
   - What role can the local panchayati raj institutions play in planning and implementing maintenance interventions and how can their capacity be strengthened?
   - Who will provide an adequate and steady source of funding and how would the resources be mobilized?

8. The detailed evidence from the two districts, Jabalpur and Dhar, has illustrated the overall conclusion that very little road maintenance has been possible due to lack of funds and a lack of proper policy and institutional framework. Weaknesses in the implementation capacity are hidden as the emphasis has been placed on the inadequacy of funds. While the need for adequate funds is not in doubt, more critical institutional issues needing attention are:

- Maintenance planning
- Maintenance management
- Effective delivery of maintenance works
- Accountability of expenditure in maintenance

Institutional Aspects

9. Currently, the organizations involved in rural roads are the Rural Engineering Service (RES) and the MP Rural Roads Development Authority (MPRRDA), both under the Panchayat and Rural Development Department (PRDD) at the state level. In respect of non-PMGSY rural roads, programmes at district level are administered by the District Rural Development Agencies (DRDAs). The RES is the technical implementation agency for rural development related construction works. There is no specific maintenance responsibility in RES units as of now. Although Panchayati Raj Institutions (PRIs) are expected to maintain rural roads, there are still some unresolved issues with respect to financial resources and the level of local government on which this responsibility should rest. The MPRRDA has been created for the purpose of implementing the PMGSY. Its role in maintenance is currently limited to the supervision of the roads constructed under the programme during the initial five years after construction.

10. Whilst there are several valid reasons for the present situation, the study shows that the maintenance of roads and in particular rural roads is generally not carried out to any substantial or effective degree. The result is that whatever funds that are available are used merely to deal with the most obvious and serious problems whilst the major part of the network is left to deteriorate.

11. The following major institutional issues have emerged from the study:

    (i) The control, coordination and planning capabilities needed for rural road maintenance are different from the administration of the various rural development and poverty alleviation programmes that DRDAs currently undertake.
    (ii) While there is a reasonably well resourced programme for maintaining PMGSY roads at the Zilla level, it is not clear how the remaining rural roads are going to be maintained particularly those belonging to the core network. Any maintenance strategy to be evolved has to look at the rural road network in its entirety.
    (iii) Implementation of maintenance requires attention to a number of technical and supervisory aspects including:

- an assessment of road condition and maintenance requirements,
- preparing programmes of maintenance at district level,
- productivity of labour,
- procurement of contractors and their supervision, and
- quality control of works.

The PRIs would need to establish effective working relationships with the RES. The RES itself would also need to build up its capacity to manage the technical and implementation aspects. Some of these tools already exist, however, rural roads maintenance does not have a clear institutional home and, therefore, these management tools are left in a void.

(iv) Capacity and involvement of local contractors to undertake maintenance is another issue. Some of the PMGSY construction contractors are reported to have shown reluctance to undertake routine maintenance contracts as the work is often geographically spread out in short stretches over large areas and over several years. Small contractors appear to be a feasible option but their capacity will need enhancement through training. Since road maintenance is a labour intensive activity, it offers opportunity for employment of local labour. The contractors and supervision staff will also need skills enhancement to improve productivity and quality in performance.

(v) The planning and implementation of rural road maintenance need to factor in the consultation and democratic processes enshrined in the panchayati raj system. At the same time, there should be no compromise on the objective and professional approach to identifying maintenance interventions and the definition of priorities between various stretches of the road network at the block and district levels and between through roads and link roads.

(vi) It is therefore important to set planning guidelines and standards and provide technical and managerial support to the PRIs to secure their effective performance.

(vii) The state is already on the path of having a unified sectoral agency for rural roads. What is needed is a comprehensive orientation not only for road improvement works but also for maintenance. The agency will need to consider several aspects for proper delivery of maintenance viz.

- administration,
- planning and programming of maintenance operations,
- procurement of maintenance works,
- supervision and monitoring of maintenance activities,

- supporting PRIs/DRDAs in capacity building,
- application of asset management principles (development of a simple maintenance management system), and
- internal auditing of expenditure incurred on maintenance.

Database Strengthening

12. Simple formats for inventory and road condition data have been evolved for adoption in the case of low volume roads that can help in planning and identification of maintenance interventions. It needs to be borne in mind that this system must be simple and should not involve much time and effort in data collection and analysis.

Funding

13. An analysis of the current financial scenario on road maintenance in the state of Madhya Pradesh reveals that there is a serious gap between the funds required and those allocated for rural roads. It is estimated that the funds available represent only 25% of that required. This reflects the level of importance attached by the government to the maintenance of roads. As a result, roads have been deteriorating fast and the backlog of periodic maintenance has been mounting.

14. Funds also have to be identified for bringing the existing roads - at least the core network - to the maintainable condition first. Otherwise, their rehabilitation costs will be very high and beyond the resources in sight. A time bound implementation plan for this is urgently required. Using part of the ADB loan assistance and CRF from the Government of India may be options for consideration. The State Government of Madhya Pradesh has recently taken up a laudable initiative of setting up a "Kisan Road Fund" (KRF) by earmarking 85 percent of the proceeds available from the levy of cess on agriculture produce. This fund is used exclusively for development and maintenance of Major District Roads (MDRs), Other District Roads (ODRs) and Village Roads (VRs). The current allocation to KRF is of the order of Rs. 1,000-1,200 million per year. The state government should reserve a larger share out of this fund for maintenance purposes rather than on new construction (the latter has the effect of increasing the maintenance burden).

15. Another financing issue that needs deliberation is ensuring the availability of funds for the maintenance of PMGSY roads after the responsibility of the contractors ceases five years after construction.

16. There is hardly any money available for maintenance of non-PMGSY rural roads. The issues relating to financing of the maintenance of non-PMGSY roads are:

    (i) The size, nature and condition of the non-PMGSY rural roads;
    (ii) Whether it would be appropriate for Gram, Janpad or Zilla Panchayats to have financial and operational responsibility;
    (iii) Funds that could be tapped out of GOI and GOMP allocations relating to employment generation, poverty alleviation and social welfare programmes. There appears to be recognition that maintenance of rural roads is a labour intensive activity and it would therefore fit within the criteria for and intentions of these programmes.

17. There are a number of non-PMGSY through-roads which are in a maintainable condition today providing access to social infrastructure (school, medical facilities) and economic infrastructure (market) and carrying relatively more traffic than the PMGSY roads. Some thought could be given to options such as through roads being entrusted to Zilla level panchayats and short link roads being left to Block or Gram Panchayats with some financial support of the government.

Funding Strategy

18. The study report also discusses briefly the practice of creating dedicated funds for road maintenance so as to provide a steady and stable source of funding maintenance. Examples of a few states in India are also given. Charges specifically identified as "user charges" e.g. levies on fuel, sale of agriculture produce, vehicle license fees are placed in a fund that is managed according to established and transparent procedures and criteria. Setting up such a fund requires political commitment and some legislative measures. Asset preservation needs to be the cardinal principle.

19. The issues for consideration may be:

    (i) Whether funds should be provided only for rural roads or other higher categories of roads as well;
    (ii) Whether funds should be provided for maintenance only or also for bringing roads to a maintainable condition;
    (iii) The procedures and criteria to be followed for allocation of funds to various categories of roads;
    (iv) Reporting, monitoring and auditing arrangements for the expenditure incurred on maintenance.

Salient features of such funds have been brought out in the study report. Since the State Government has already created a Kisan Road Fund, it should not be difficult to evolve some mechanism to put financing of rural road maintenance on a sustainable basis.

Capacity Building for Improved Maintenance Implementation

20. It bears repetition that in the matter of maintenance, funds alone will not do. Implementation is a much more critical issue. Clear lines of responsibility need to be established. Operational capacity of the road agencies has to be considerably improved and strengthened. Critical requirements are:

    (i) Strengthening the planning capacity to assess the condition of the road network and identify, design and prioritise maintenance activities;
    (ii) Improving the ability of the road agencies to manage the contracting process and supervise the work of contractors;
    (iii) Improving the capacity of small contractors and gang labour to undertake maintenance operations;
    (iv) Developing technical expertise to evaluate the effectiveness of current standards and practices;
    (v) Undertaking technical and financial reporting and auditing.

21. Operational capacity is needed within both the public sector agencies and the private sector contractors. In addition, some community-based organizations (CBOs) could also come forward for small-scale maintenance operations. The report has identified the main operational activities for maintenance and possible options for the institutional arrangements that could be put in place. Whatever option is adopted, the institutional arrangements would need to be judged against the criteria of clarity in management responsibility, ownership and capacity of the agencies to perform the functions. Table 1 below summarises the key functions and capacity building requirements.

Table 1: Functions and Capacity Building Matrix

Agencies	Functions and Capacity Building
DRDAs	*Institutional, staffing and equipment* ❖ Road maintenance management unit (size dependent on scope of activities) ❖ Finance, administrative and management staff ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Administrative, financial and project management ❖ Preparation of maintenance options (with RES support) and direction and supervision of implementation ❖ Contracting process and contractors management (if DRDAs are involved in these aspects)
RES	*Institutional, staffing and equipment* ❖ Maintenance management and implementation unit (staffing dependent on scope of activities e.g. whether DRDAs delegate some of the financial control and administrative functions to RES and the tasks assigned to consultants) ❖ Planning and technical staff (and financial control and administrative staff if DRDAs delegate some of these functions to RES) ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Contracting process and contractor management ❖ Planning and technical aspects of maintenance
Consultants	*Institutional, staffing and equipment* ❖ Planning and technical staff ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Road condition, and traffic surveys, ❖ Development of road inventory and updating of roads database, ❖ Use of a maintenance management system and preparation of annual maintenance requirements and plans ❖ Supervision and management of contractor operations
Contractors - small and medium sized (classes C, B, A-I and A-II) and community	*Institutional, staffing and equipment* ❖ Technical and supervisory staff ❖ Light equipment (with option to hire) *Functions and training requirements* ❖ Routine, emergency and periodic maintenance (including works and site management and reporting) ❖ Strengthening labour skills ❖ Estimating and bidding for contracts ❖ Managing small businesses

22. Capacity building of local contractors and road agencies in efficient and effective delivery of maintenance works is an important requirement. This represents both a challenge and an opportunity. The Panchayati Raj Institutions are the local level bodies in the process of delivering economic and social services (including maintenance of rural roads and village tracks) to people and communities. It is, therefore, critical to equip them with the necessary skills, training and technical support to accomplish the task of fulfilling the peoples' needs. The experience and expertise collected by the ILO on such aspects in some of the countries in Asia and Africa could be utilized by duly adapting the promising approaches to the conditions prevailing in the State. The ILO would be willing and happy to share these experiences.

Way Forward

23. The issues highlighted in the study would require deliberations among the key stakeholders in the State including the users. The state may launch a road maintenance initiative and put maintenance of rural roads on a sustainable basis. An indicative action plan is provided below.

Box 1: Indicative Action Plan for Rural Road Maintenance in Madhya Pradesh

Policy Framework

- Formulate a Road Policy covering both development and maintenance of rural roads
- Deliver awareness programmes to senior decision makers

Maintenance Funding

- Update road network database with a complete inventory of road assets and a detailed road condition inventory which can be used as a basis for estimating maintenance requirements
- Expert committee to work out realistic norms for maintenance. Formal approval of proposed revised maintenance norms
- Establish an adequate and sustainable funding mechanism dedicated to road maintenance, including sufficient allocations to cater for the needs of the rural road network.
- Provide increasing allocations for maintenance as per norms for the core road network
- Ensure timely availability of funds for maintenance
- Create road maintenance fund through existing and new resources
- Establish representative empowered committee to manage the road maintenance fund(s)
- Formulate and apply clear guidelines for collection, allocation and auditing of funds for rural road maintenance works.

Institutional Aspects

- Define clearly the roles and responsibilities of each level of government for road maintenance
- Evolve and apply performance indicators for department officers.
- Review cadre management to provide reasonable career path opportunities to Junior Engineers and Assistant Engineers.
- Undertake training needs assessment of road agencies staff and panchayati raj institutions (PRIs) at various levels and formulate a suitable training programme.
- Establish a training institute for engineers in the state and enhance capacity of Industrial Training Institutes (ITIs) for training of sectional supervisors and workers.
- Deliver training programmes to rural agencies and contractors

Maintenance Planning

- Establish and apply simple procedures for data collection on a sustainable basis.
  - Outsource as one time inventory and condition data collection
  - Compile data base of road network and computerize
  - Procurement of computers at divisional levels
  - Annual updating of inventory and condition
- Updating and generation of management reports at district level and state level.
- Establish and apply a simple maintenance management system to identify and prioritise maintenance interventions.

Execution of Maintenance Works

- Implement maintenance through contract and other innovative methods
- Undertake an in-depth assessment of costs and benefits of gang labour system and options for reform
- Enhance productivity of gang labour through improved work organization and management practices.
  - Undertake pilot projects to convert gang labour to micro-enterprises and labour cooperatives
  - Establish and strengthen the quality control system in construction as well as maintenance works.
  - Prepare and review existing documents to meet current needs in respect of maintenance manual, and road inspectors' manual
  - Refine use of labour based methods of maintenance with support of light equipment.

Chapter 1

Introduction

1.1 Background and Issues Examined

In 2000, the Government of India (GOI) launched PMGSY (Pradhan Mantri Gram Sadak Yojana), the Prime Minister's Rural Roads Programme, a major rural road[1] programme with the ultimate aim of connecting all rural "habitations" in India with a population of more than 500 (250 in case of hills, deserts and tribal areas). About 170,000 habitations have been identified for coverage in the country. This would require new construction of 369,000 km and upgradation of 368,000 km at a total cost of Rs.133,000 crore (as against earlier estimates of Rs.60,000 crore). About Rs 20,000 crore ($4.6 billion) are expected to be raised by the Central Road Fund (CRF) through an additional cess on diesel with the remaining amount being secured from external agencies (Asian Development Bank and World Bank), domestic lenders and revenues generated by the better off States. By the end of February 2005, project proposals estimated to cost Rs.14,782 crore (US$3.5 billion) have been approved covering about 37,000 habitations and 104,000 km of roads; works have been completed in a length of 63,000 km providing connectivity to about 18,000 habitations.

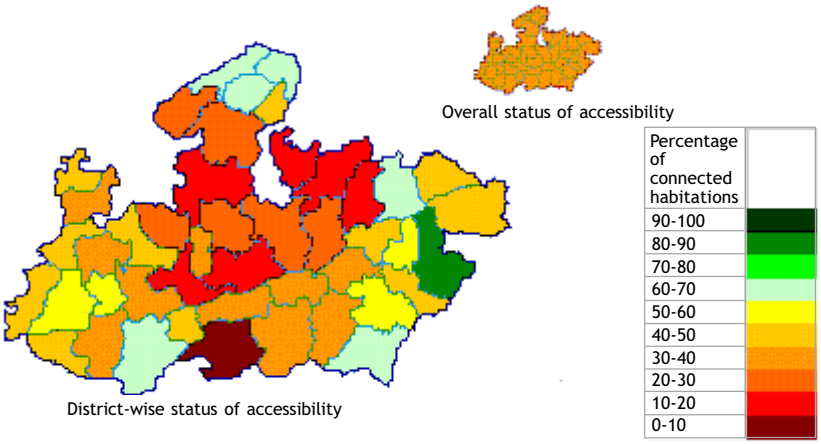
Madhya Pradesh (MP) has been identified as one of the States with the highest amount of road length required to connect the rural population on PMGSY criteria[2]. Figure 1.1 gives a district-wise status of accessibility in Madhya Pradesh. Overall accessibility to villages in the state is 38 percent. During the first four phases of PMGSY (2001-02, 2002-03, 2003-04 and 2004-05) in Madhya Pradesh, 12,182 km of roads were approved (cost Rs 2,090 crore or US$480 million) at an average estimated cost of just over Rs 17 lakh (US$40,000) per km. Of these, 7,885 km have been completed (cost Rs.1,477 crore or US$340 million). In total, it has been estimated that 60,264 km of

roads would need to be constructed to connect all the villages in MP with a population above 500 persons (250 persons in tribal areas) at a cost of Rs.12,199 crore (US$2.8 billion)[3]. In addition to the GOI allocation, a loan of $400 million from ADB to be shared between MP and Chhattisgarh has been secured (ADB, 2003). Under the ADB, works for a length of 515 km at an estimated cost of Rs.99 crore have been sanctioned upto May, 2005.

One of the key issues that has emerged during the implementation of PMGSY is the preservation of the infrastructure assets being created by the programme through effective maintenance. Studies carried out with support from the World Bank in a number of states have identified resources and capacity for planning and implementation of road maintenance as areas, which require improvement (Gupta, 2002, 2003a and 2003b; Merani, 2003).

For roads constructed under PMGSY, contractors are responsible for maintenance during the defect liability period of 5 years immediately after construction. This arrangement addresses the immediate maintenance needs for PMGSY roads, however, this should not be considered in isolation of the condition and maintenance options for the rest of the road network serving rural people. There are especially two aspects, which need attention:

Figure 1.1: Accessibility Status of Madhya Pradesh



[1] Identified as Other District Roads (ODR) and Village Roads (VRs). The other road categories are National Highways (NHs), State Highways (SHs) and Major District Roads (MDRs).

[2] The ten States identified as having the lowest level of connectivity are Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Bihar, Rajasthan, Orissa, West Bengal, Jharkhand, Assam and Himachal Pradesh.

[3] In addition, upgradation of another 37237 km at an estimated cost of Rs.5742 crore ($1.32 billion) is envisaged under the PMGSY programme.

(a) Typically the highest priority PMGSY roads are relatively short roads linking villages to the existing road network parts of which are in poor shape and virtually none of which receives adequate maintenance at present. While constructing short link roads under PMGSY will improve rural access, attention is also needed to the requirement of more important "through" routes which collect traffic from several link roads or serve several habitations. This gap has been recognised by GOI and the States. Even if through roads are not in very good condition, they provide a level of access and need to be maintainable and should therefore be included in a maintenance regime for rural roads.

(b) There will be some time before the PMGSY objective of connecting all villages with a population above 500 persons by all weather roads will be reached. Further, some villages may be excluded from the PMGSY or given a low priority because they already have a connection through a Black-Top (BT) or Water Bound Macadam (WBM) surfaced road. A strategy aimed at preserving or improving access for rural people should cover all rural roads including the PMGSY.

In MP, the Panchayat Raj Institutions (PRIs)[4] are envisaged to be responsible for the maintenance of rural roads. The setting up of a sustainable maintenance regime will require:

- adequate resource mobilisation for maintenance;
- institutional arrangements for allocating resources and managing the road network;
- strengthening the institutions to undertake planning, design and implementation of maintenance interventions, and providing technical support to them;
- developing appropriate and workable maintenance planning and implementation systems.

PMGSY has highlighted the problem of rural road maintenance but this programme has also offered an opportunity to develop a strategy and effective implementation mechanisms for the maintenance of rural roads.

The ILO ASIST AP has identified development of capacity at the district level to effectively deliver rural road maintenance as one of the areas in which it can contribute. It has been agreed with the MPRRDA that an attempt would first be made (Phase-I) to identify the technical, institutional and financial gaps at various governmental levels for effective maintenance of the rural roads network. Thereafter, the work may be undertaken in two concurrent phases (Phase II and III) as under:

Phase II: A three year programme of work in selected districts to demonstrate the improvements possible in participatory planning, resource allocation, funding, training, capacity building, im-

proved techniques and work organisation, gang labour deployment strategies.

Phase III: In parallel with the second phase, dissemination of good practices within MP and in other states in the form of guidelines, manuals and training programmes.

1.2 Report Outline

The ILO undertook the study with the support of international and domestic consultants and the Madhya Pradesh Rural Roads Development Authority (MPRRDA). This Report is divided into two volumes.

Volume 1 brings out an overall assessment of the situation and possible options for developing a sustainable maintenance strategy for rural roads in Madhya Pradesh. It first sets out the context by explaining the nature of maintenance activities, the rationale for undertaking maintenance and the conditions required for effective maintenance. This is followed by an assessment of:

(i) the policy and legal framework,
(ii) institutional arrangements,
(iii) adequacy of funds and financial arrangements,
(iv) operational capacity, and
(v) situation analysis of the road network in the two sample blocks.

A summary of findings and options for effective maintenance is given at the end.

Volume 2 provides an assessment of the development of the road network, institutional and policy context for the maintenance of rural roads. Technical and operational aspects of road maintenance are also covered. To provide more detailed insights into the situation on the ground, road inventory and condition and traffic surveys were conducted in one block each of two districts (Jabalpur and Dhar). The data were processed and databases prepared for the two blocks.

The purpose of this study report is to provide a situation analysis and to indicate possible options that may be examined in the process of developing effective policies, institutions and implementation arrangements. A workshop on Rural Road Maintenance in Madhya Pradesh will take the process forward and contribute to the development of a plan of action and a time frame for the improvement of rural road maintenance capacity in the State in Phases II and III.

[4] Panchayat Raj Institutions were incorporated in the Indian Constitution in the early 1990s to provide democratic institutions at district and sub-district levels with the objectives of increasing the participation of rural people in development decision making and to make development initiatives responsive to local needs and priorities.

Chapter 2

Strategy Elements

2.1 Maintenance Objectives and Priorities

2.1.1 Definitions and Objectives

The Indian Roads Congress (IRC)[5] defines road maintenance as "routine work performed to upkeep pavement, shoulders and other facilities provided for road users, as nearly as possible in their constructed conditions under normal conditions of traffic and forces of nature". Maintenance is "essential to get optimum service from the pavement structure during its life period." NAASRA (National Association of Australian State Road Authorities) has defined road maintenance as "works of every description which are required for the preservation and upkeep of a road so as to prevent the deterioration of quality and efficiency to a noticeable extent below that which prevailed immediately after construction." In summary, a programme of maintenance is required to keep the road network in an acceptable condition, reduce lifetime costs and increase benefits (lower costs and better safety) for users. TRL (Transport Research Laboratory) of the UK sets out more specific objectives of maintenance (Box 2.1).

[5] The IRC is a society of highway professionals in the country from both public and private sector including academic institutions and set up under the aegis of the Ministry of Shipping, Road Transport and Highways, Government of India. This body is responsible for evolving standards, guidelines and codes of practice in design, construction and maintenance of roads in the country.

Box 2.1: Road maintenance objectives

Network Serviceability:

- Ensuring availability so that roads are not closed for unacceptably long periods.
- Maintaining reliability by providing a 'level of service' that meets users' needs for mobility.
- Enhancing quality of all aspects of the driving environment.

Network Safety:

- Complying with statutory obligations to provide minimum safety standards.
- Meeting user's needs by reducing safety risks to an acceptable level.

Network Sustainability:

- Minimising cost over time to both road users and the road administration.
- Maximising value to the community.
- Minimising environmental damage and maximising environmental contribution.

Source: Overseas Road Note 1, TRL (UK) 2003

2.1.2 Maintenance Operations and Activities

Maintenance activities are usually grouped in each country according to planning, organisational and funding arrangements. IRC (2002) makes a distinction between preventive and corrective maintenance. Road maintenance operations are further classified as:

(a) routine maintenance (described in IRC, 2002, as "ordinary repairs");
(b) periodic maintenance (described in IRC, 2002, as "periodical renewals");
(c) flood damage repairs / emergent repairs.

These categories are compatible with conventional international practice of dividing maintenance operations into Routine, Periodic and Emergency activities (Table 2.1). IRC (2002) distinguishes between 46 routine and 33 periodic maintenance activities for gravel and bituminous roads. Some of the main activities under each type of maintenance are given in Table 2.1.

Road users normally judge the quality of a road and maintenance effectiveness on the basis of the ride it offers and its appearance. The comfort with which users can travel and the speeds which can be achieved with safety are no doubt important aspects for maintenance. A number of maintenance activities in Table 2.1 (e.g. reshaping and grading unpaved surfaces, patching potholes, repairing traffic signs, road markings and other furniture and controlling vegetation) contribute to preserving comfort, safety and speed. However, for preserving roads as assets, there are other important activities such as clearing and repairing drainage structures and erosion control which would also reduce the incidence of emergencies requiring special repairs. The balancing of these routine maintenance activities along with a regular programme of periodic maintenance and prompt response to emergencies would make an effective maintenance programme.

Table 2.1: Maintenance Operations and Activities

ROUTINE ("Ordinary"): *(frequent)*	Activities required to be carried out once or more per year on a road section. These activities are typically small scale or simple, but widely dispersed, and mainly require unskilled labour under skilful supervision. The need for these can, to a large degree, be estimated and planned and can often be carried out on a regular basis.
	Activities include:
	• Inspection
	• Keeping the roadway clear of debris
	  ‣ Cleaning / excavating ditches and drains
	  ‣ Cleaning culverts (cross water drains), inlets and outlets
	  ‣ Minor repairs on drainage structures (mainly culverts)
	  ‣ Reshaping, grading, dragging unpaved surfaces
	  ‣ Patching potholes (both paved and unpaved surfaces)
	  ‣ Resealing minor cracked areas
	  ‣ Repairing traffic signs, road markings and other furniture
	  ‣ Repairing erosion damage and erosion control measures
	  ‣ Controlling vegetation
	• Reporting major damages to the road

PERIODIC: *(infrequent)*	Activities required on a road section at intervals of a few years. They are normally large scale and require specialist equipment and skilled resources. These activities are costly but can be planned well in advance. They include: • Regravelling • Resealing • Resurfacing • Major Structural Repairs
EMERGENCY ("special repairs" or "flood damage repairs / emergent repairs")	These are activities that are required from time to time–whenever sudden and unforeseen damage occurs, such as flood damage, major landslides and damage to structures. Emergency activities cannot be estimated based on the annual maintenance needs assessment and no advanced planning for specific cases may be made. However, it is necessary to reserve a certain proportion of the overall maintenance funds for emergency cases. Activities include: • Repair and rehabilitation of failed drainage structures • Repair and restoration after landslides and slips • Repair and restoration after washouts

Table 2.2 describes types of improvement activities to distinguish them from maintenance activities.

Table 2.2: Types of Road Improvement Activities

Rehabilitation	Operations to restore the original standard of a road, typically when maintenance has been neglected for many years
Improvement or upgrading	Improvement in the original standard of an existing road or track, for example, road widening, application of a gravel wearing course and construction of culverts for an earth road or paving an unpaved road.
Spot improvement	Rehabilitation or improvement of short deteriorated sections of roads which are otherwise in an acceptable condition. This can be effective on roads with low traffic volumes where short sections are restricting passage.
Reconstruction and new construction	Reconstruction is a major improvement of the original standard of an existing road, almost equivalent to new construction often as a result of no maintenance during a period of several years. New construction is a completely new road.

2.1.3 Priorities

Routine maintenance is normally given priority over periodic maintenance. It keeps overall road management costs down and preserve the benefits of roads. Routine maintenance (preventive activities) should start immediately after the construction or renewal of a section of road has been completed and not when the first defects appear. Road users and policy makers typically base their judgment of the quality of roads and effectiveness of maintenance on the quality of the road surface i.e. whether there are potholes and how smooth the surface is. While these aspects are important, routine maintenance activities which keep the drainage system open are equally critical and deserve even higher priority for prevention of structural damage to roads.

Seasonal priorities are usually established for routine maintenance activities to cater for the changing requirements and to ensure that resources are economically utilised. In this respect it is also essential to regularly assess the condition of roads and to plan activities to effectively respond to the particular requirements. In India, apart from the widely varying terrain and traffic conditions, routine and emergency maintenance activities should take account of the typical seasonal pattern of heavy rainfall in the monsoons and a prolonged dry spell.

2.2 Managing Rural Roads as a State Asset

International evidence shows that inadequate maintenance of roads has wasted resources invested in roads on a large scale. An early World Bank study (Harral and Faiz, 1988) demonstrated that spending $12 billion on maintenance in developing countries would have saved $45 billion of reconstruction expenditure. The road infrastructure is a major national and public asset requiring adequate management to preserve it for the public in a good operational condition. The asset management approach does not focus only on engineering aspects and construction and maintenance costs; but also takes into account the requirements of the users and costs imposed on them by poor roads.

The World Road Association (PIARC) has defined asset management as a systematic process of effectively maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing the tools to facilitate a more organised approach to making decisions that are needed to achieve the public expectations.

The illustration in Table 2.3 depicts a common scenario for rural roads. It demonstrates that rural roads are an asset which has to be kept in good condition through an appropriate maintenance regime to serve the users efficiently and to reduce the total lifetime cost of the asset. Under the "maintenance regime", there is annual routine maintenance and periodic maintenance. The investment shows an economic rate of return of 15.9 per cent and a positive net present value of benefits less costs. The lifetime costs of the road include the initial investment cost and the routine and periodic maintenance costs over the design life of the road.

Table 2.3: Comparing the benefits and costs of investment in a rural road with and without maintenance regime

	Option 1: maintenance regime	Option 2: No maintenance	Option 3: No maintenance and no reconstruction
Rehabilitation/Construction Cost ($/km)	15,000	15,000	15,000
Design life of road (years)	20	20	20
Annual routine maintenance ($/km)	300	Nil	Nil
Periodic maintenance every 5 years ($/km)	3,000		Nil
Reconstruction cost every 7 years ($/km)		15,000	Nil
Economic internal rate of return	15.9 %	-2. %	-28.8 %
Net present value of benefits less costs (discount rate 12%) ($)	4,360	-9,836	-9,193
Present value of lifetime cost of road (discount rate 12%) ($)	18,757	22,683	13,884

Under the two "no maintenance" cases, it is assumed that there is no routine and periodic maintenance and therefore the road would revert back to the pre-rehabilitation / construction state by the seventh year. The benefits to users of the initial construction would fall over the 7 years and disappear by year 7. Reconstruction of the road would be required at that stage. Two options are shown here.

Under Option 2, the road would be reconstructed every 7 years while under Option 3, no reconstruction takes place. Under both these options, the economic rate of return and net present value are negative because of lower benefits to users as a result of the deteriorating condition of the road. The lifetime cost is higher under Option 2 than under Option 1. Under Option 3, the lifetime cost is lower because no expenditure is incurred after the initial investment but the investment under both Options 2 and 3 is wasted because of lack of maintenance. Under Option 1, because of the continuing benefits, it would be possible and acceptable to recover costs from beneficiaries on the "users-pay" principle while under Options 2 and 3, such cost recovery is unlikely to be acceptable. Even on low traffic volume rural roads which cannot be justified on the basis of economic benefits only, continuing better access through maintenance will be valued by users for their ability to have continuity of access to social infrastructure and markets.

Establishment of asset management requires policy reforms to provide answers to three key questions concerning the institutional and financial arrangements for rural roads:

(a) Who should own the various levels of the network?
(b) How can local communities for managing and planning maintenance be mobilised or strengthened?
(c) Who will provide an adequate and steady source of funding?

The policy reforms required in the context of Madhya Pradesh are examined in Section 3. Box 2.2 sets out some of the salient features of asset management which are relevant for policy, institutional and funding arrangements.

Box 2.2: Asset management: features and process

Asset Management requires:

- Identifying the organisations and individuals responsible for managing the asset.
- Detailed lifecycle cost analysis.
- Institutional reforms to correct biases that favour new construction over maintenance of existing roads.
- Establishing routine and periodic maintenance schedules.
- Training and certifying operating and maintenance personnel.

A typical Road Asset Management process consists of the following elements:

- Assessing the road network needs and objectives of the road users.
- Taking stock of the road network (development of an inventory), and carrying out initial assessment of its condition (e.g. rapid assessment).
- Assessing the rate of deterioration in condition of the network.
- Estimating the capacity of the relevant funding sources to fund asset management of the road network, over a medium term, say 3 to 5 years.
- Listing available asset management options (e.g. physical treatments, traffic management, etc), their costs and their effect on the condition and performance of the network.
- Testing a range of affordable asset management options over the analysis period.
- Selecting most cost-effective option over the analysis period in progressing towards the achievement of objectives.

2.3 Impact on Poverty Alleviation and Employment Creation

The rationale for development of rural roads (including PMGSY) is that linking the poor to opportunities and services hitherto outside their reach has the potential to quickly and directly address poverty and ensure the flow of benefits from all those government programmes aimed at the poor and disadvantaged, which could not accrue to them in the absence of a road. The GOI initiative of PMGSY expects to set standards which will enable the growth and sustainable management of the entire rural road network. Poor access is a major contributor to rural poverty and well maintained roads play an important enabling role in improving living standards and reducing poverty through availability of access to markets, extension services for production, education and health services. Broader benefits are the integration of poorer remote habitations into the mainstream economic and socio-economic life of the country, and offering them better opportunities for employment as well as economic and social enhancement.

A macro level study in India (Fan, Hazell and Thorat, 1999) compared the impact of public expenditure on roads on growth and poverty reduction in rural areas with expenditure on irrigation, agricultural research and development, education, power, health, rural and community development and soil and water conservation and found that investment in rural roads had the greatest effect on poverty reduction. Micro level case studies and surveys related to PMGSY broadly confirm the impact of rural road investment on

poverty alleviation through growth in agricultural income because of better access to markets and increased opportunities for diversifying into cash crops, increased mobility leading to better employment opportunities and better access to health, education and extension services (ADB, 2003; NRRDA, 2004).

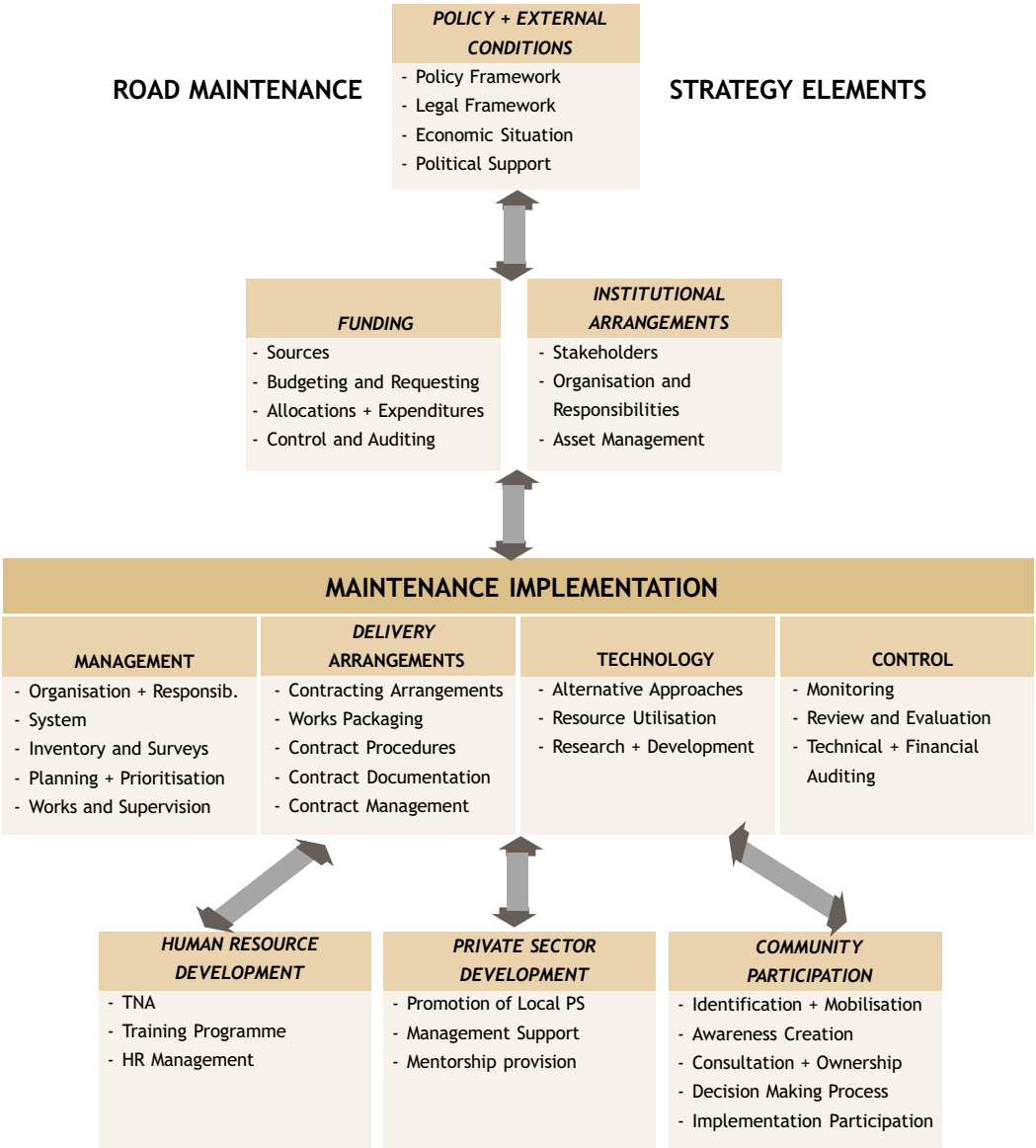
For the rural population to continue to benefit from improved roads and to preserve the road assets, it is necessary to maintain them. An ADB sponsored study in Bangladesh[1] found that providing all weather access for rural residents on minor roads through improved earthworks, bridges and culverts and assuring regular maintenance of the improved roads has a string impact on reducing poverty. Apart from the direct benefits of better roads, many maintenance activities can be undertaken by labour thus creating local employment opportunities.

2.4 Strategy Elements

While maintenance activities, and especially routine maintenance activities, are not technically advanced, they are often either neglected or given a low priority and insufficient funding because of a combination of reasons which include preference for more visible investment in new roads or rehabilitation of roads. Even where the importance of maintenance is recognised, effective maintenance as a regular and sustainable programme is difficult to establish because it requires a combination of policies, adequate funding, institutional arrangements and technical capacity (see Figure 2.1). The policy and legal frameworks based on an understanding of the nature of maintenance are essential conditions for setting up effective arrangements for financing, managing and implementing maintenance interventions. Setting up the necessary policy and legal frameworks requires political commitment and an economic environment which makes it possible to generate adequate resources.

[6] ADB: TA BAN-3508 study by the Louis Berger Group, 2002.

Figure 2.1: Policy, Institutional, Funding and Implementation Elements



Establishment of an effective maintenance strategy requires (Heggie and Vickers, 1999; Malmberg Calvo, 1998):

(a) clear assignment of responsibility for managing the network to agencies at the appropriate level (e.g. at the national level for national highways, at the state level for state roads and at the appropriate local government level for rural roads) ***(management responsibility aspect)***;

(b) ownership and ownership mode (e.g. the roads may be in public ownership but they are managed on commercial principles with service provision related to user charges and user representation in decision making) to ensure efficient use of resources ***(ownership aspect)***;

(c) adequate and steady financing, if necessary based on user charges ***(funding and funding management aspect)***, and

(d) effective planning and operation of maintenance activities ***(planning and operational capability aspect)***.

As Figure 2.1 indicates, appropriate arrangements for securing adequate and stable sources of funding (for example an earmarked levy on fuel), allocating the funds and control and auditing (for example through a road fund and a road fund board) require the appropriate policy framework. Establishing the institutional arrangements to ensure effective organisational structures, clear lines of responsibilities, opportunities for stakeholders to participate in decision making and ensuring an efficient role for maintenance in the management of roads as an asset also require policy decisions.

Funds alone will not do. Simultaneously, attention is required to be paid to the different aspects of implementation. Management includes planning, setting priorities and supervision of works. The operational capacity for maintenance does not all have to be within public sector agencies. Implementation of construction and rehabilitation of roads though contractors is a well established practice and programmes such as the PMGSY. For improving delivery of maintenance interventions, proper contracting procedures, documentation and supervision arrangements are required. Attention is also needed to appropriate technologies and control systems. Implementation capacity needs to be strengthened by way of human resource development within the public sector agencies, development of private sector contractors' capacity and ability of the potential beneficiaries and communities to participate in decision making and implementation where appropriate.

2.5 Problem Identification

Ineffective maintenance is usually a result of numerous smaller and bigger problems and obstacles. Experience in Kenya demonstrated the complexity of the road maintenance challenge. A systematic analysis revealed 165 problems or constraints hindering maintenance in Kenya and made it possible to identify a comprehensive suite of initiatives to deal with them.

During the study in Madhya Pradesh, it was not possible to carry out an in-depth problem analysis for all agencies concerned with the maintenance of all categories of roads and tracks. However, a selection of government officials, contractors, consultants and public representatives were requested to rank typical problem features in order of importance as perceived by them. A list

of problems was offered and respondents were invited to add any other problems. The results from the two surveys are summarised in Table 2.4. The ratings for the issues are based on the frequency of their appearance in the lists of respondents and their rankings.

Table 2.4 Problem identification and rating of major problem areas

	Ranking of issues	Problem	Jabalpur %	Dhar %	Average %
1	Funding	• Funding for road maintenance inadequate • Available funds poorly managed • Dedicated maintenance funds used otherwise • Inability to justify maintenance expenditures	30.7	27.5	**29.1**
2	Policy + Legal Framework	• Lack of adequate maintenance policies and strategies • Maintenance policies not effectively implemented • Shortcomings/constraints in legal framework • Stakeholders not aware of important issues	26.0	17.2	**21.6**
3	Maintenance Management	• Appropriate maintenance management system not developed and established • Inadequate maintenance data base • Insufficient works planning, supervision & inspection • Insufficient availability of maintenance equipment + materials	15.0	18.8	**16.9**
4	External Factors	• Economic, political and public demand for new roads rather than maintenance • Overloading by commercial vehicles • Adverse environmental and climatic conditions	12.8	16.6	**14.7**
5	Human Resource Development	• Insufficiently trained maintenance personnel • Insufficiently motivated and utilised personnel	8.0	11.2	**9.6**
6	Private Sector Capacity	• Underutilised private sector for maintenance activities • Underdeveloped private sector for maintenance activities	5.3	7.5	**6.4**
7	Maintenance Technology	• Maintenance technology in use is inappropriate	2.2	1.2	**1.7**
		Total	100.0	100.0	**100.0**

Issues 3, 5, 6 and 7 in Table 2.4 broadly represent implementation capacity problems while issues 1, 2 and 4 represent policy and legal problems, shortage of funds and poor road asset management. The sum for issues 3, 5, 6 and 7 of 35 per cent against a sum for issues 1, 2, 4 of 65 per cent indicates that according to the perceptions of respondents, the components in the top part of Figure 2.1 (the policy framework and funding and institutional arrangements) are the more serious obstacles which have prevented effective implementation of maintenance. However, it is possible that weaknesses in the implementation capacity are not getting surfaced at present because very little implementation has been possible due to the lack of funds, weak policy and institutional framework.

This analysis provides a starting point in examining the rural road maintenance problem in the State of Madhya Pradesh. Figure 2.1 is used as a framework for examining the rural road maintenance problem in a hierarchical and structured manner. Evidence on the condition of the road network in two representative blocks and examination of existing and proposed funding, institutional and implementation structures and processes has enabled a detailed assessment of issues and proposing possible strategies for ensuring maintenance of rural roads on a sustainable basis.

Chapter 3

Policy and Legal Framework

3.1 Policy Level Requirements

Conducive policy framework and external conditions have an overarching importance for adequate institutional, funding and implementation arrangements. Essentially, policies and the legal framework should cover the following:

(a) establishing clear ownership and responsibility for managing the road network;

(b) taking decisions and passing laws to ensure steady financing, and

(c) setting up institutional arrangements and providing for capacity building for effective planning and efficient delivery of maintenance operations.

3.2 Current Responsibility

Road network classification system in India is given in Table 3.1. *National Highways (NHs)* form the major arterial national road network linking the capitals of the states and other major links between states and regions of economic significance as also adjoining countries. *State Highways (SHs)* are the main roads within the state, linking headquarters of districts and may also include some links with neighbouring states. *Major District Roads (MDRs)* are the more important roads within a district, serving areas of production and markets and connecting them with each other and with the main highways.

Other District Roads (ODRs) are roads serving rural productive areas and providing them with outlet to market centres, tehsil (sub-district) headquarters, block development headquarters or other main roads. *Village Roads (VRs)* are roads connecting villages/habitations with each other or to the nearest road of a higher category. ODRs and VRs together constitute Rural Roads.

Table 3.1: Broad road system classification in India

Classification	Road Categories
Primary Road System	Expressways and National Highways (NH)
Secondary Road System	State Highways (SH) and Major District Roads (MDR)
Tertiary Road System	Rural Roads – Other District Roads (ODR) and Village Roads (VR)

The primary road system is the responsibility of federal authorities while responsibility for the secondary and tertiary roads rests with the States. In addition, roads required for specific purposes such as forestry, irrigation and electricity are managed by the relevant state departments. With respect to roads serving the rural population, a commonly used distinction is between "through" and "link" roads. "Through" roads collect traffic from several link roads or a long chain of habitations and lead to market centres either directly or through higher category roads. "Link" roads connect a single habitation or group of habitations to rural roads which serve as "through" routes or higher category roads leading to market centres. PMGSY uses the term "core network" to refer to the network consisting of some of the existing roads as well as all roads proposed for new connectivity under the programme to provide at least single access to all connected and eligible habitations.

Table 3.2 shows the breakdown of roads in different categories and surface type in the state of Madhya Pradesh. A distinction is made between "surfaced" and "unsurfaced"[7] roads but not on road condition. Out of the total network of 68,106 km (in 2002), a high proportion 85 per cent is "surfaced" (48 per cent is black-topped). As would be expected, a very high proportion of unsurfaced roads is in the ODR and VR category. The "unsurfaced" category includes gravel and earth roads. About 60 per cent of MDR length and 80 per cent of ODR and VR length are assessed to have deteriorated very badly and may require major rehabilitation largely because of lack of maintenance over the last 10 years. Table 3.2 also shows that between 2001 and 2002, there was a major reclassification of roads leading to a reduction of over 20,000 km of MDRs and an increase of over 18,000 km of ODRs.

[7] The term "surfaced road" refers to roads with black topped or bitumen (BT), cement concrete (CC) or water bound macadam (WBM) surface with remainder described as "unsurfaced" (usually gravel and earth roads).

Table 3.2: Road lengths by categories in MP State, 2000-2002

Road Category	Surface Type	2000		2001		2002	
		Length (km)	%	Length (km)	%	Length (km)	%
NH	BT	3,591	5.3	4,722	6.9	4,722	6.9
	WBM	0	0.0	0	0.0	0	0.0
	Total Surfaced	3,591	5.3	4,722	6.9	4,722	6.9
	Total	3,591	5.3	4,722	6.9	4,722	6.9
SH	BT	6,803	10.0	5,861	8.6	7,407	10.9
	WBM	575	0.8	557	0.8	579	0.9
	Total Surfaced	7,378	10.9	6,418	9.4	7,987	11.7
	Un-Surfaced	81	0.1	81	0.1	49	0.1
	Total	7,459	11.0	6,499	9.5	8,036	11.8
MDR	BT	16,403	24.2	16,567	24.3	9,273	13.6
	WBM	12,962	19.1	12,893	18.9	1,720	2.5
	Total Surfaced	29,365	43.3	29,460	43.3	10,993	16.1
	Un-Surfaced	2,296	3.4	2,056	3.0	121	0.2
	Total	31,660	46.7	31,516	46.3	11,115	16.3
ODR & VR	BT	3,254	4.8	3,560	5.2	11,529	16.9
	WBM	13,617	20.1	13,486	19.8	22,437	32.9
	Total Surfaced	16,872	24.9	17,046	25.0	33,966	49.9
	Un-Surfaced	8,162	12.0	8,322	12.2	10,268	15.1
	Total	25,033	37.0	25,368	37.2	44,233	64.9
Grand Total	**BT**	30,051	44.4	30,710	45.1	32,931	48.4
	WBM	27,154	40.1	26,936	39.6	24,736	36.3
	Total Surfaced	57,205	84.4	57,646	84.6	57,667	84.7
	Un-Surfaced	10,539	15.6	10,459	15.4	10,438	15.3
	Grand Total	**67,744**	**100.0**	**68,106**	**100.0**	**68,106**	**100.0**

Source: Road Statistics of Madhya Pradesh.

The Public Works Department (PWD) is the main department for construction and maintenance of roads in MP. Construction of rural roads is being taken up by the Panchayat and Rural Development Department. An exclusive agency has been created under that Department for the PMGSY roads. In 1999, the State Government decided to transfer responsibility for maintenance of rural roads (ODRs and VRs) to the Panchayat Raj Institutions. This transfer has not been effective so far because this was not accompanied by transfer of resources and capabilities. The problem is made worse by changes in road classes implying a shift in the burden of maintenance from the PWD to the PRIs.

3.3 Recent Initiatives

At present, the State does not have a clearly laid down policy on the planning and management of the road network. There have, however, been a number of favourable development initiatives at the national and state levels in dealing with the poor state of the road infrastructure.

3.3.1 National Level Initiatives

Many of the initiatives have started at the national level and can be equally applicable at the State level. Therefore, they are summarised here.

(a) the establishment of a dedicated agency for the management of National Highways (National Highways Authority of India, NHAI);

(b) Central Road Fund as an assured source of funds for roads, and

(c) private sector investment in roads.

Dedicated Agency: NHAI was constituted in 1988 by an Act of Parliament, the National Highways Authority of India Act, to be responsible for the development, maintenance and management of National Highways entrusted to it. NHAI was operationalised in February, 1995. Currently, its main focus is on the implementation of the National Highways Development Project (NHDP) to upgrade the capacity of the "Golden Quadrilateral" (5,846 km connecting Delhi-Kolkata-Chennai-Mumbai), the "North-South and East-West Corridors" (7,300 km connecting Kashmir to Kanyakumari and Silchar to Porbandar) and other important high density routes such as links to major ports. Recently, NHAI has been mandated to take up widening of another 10,000 km of capacity expansion through public-private financing. Sources of funds are CRF, multilateral agencies, e.g. World Bank, ADB, the private sector as investors and managers of the asset (including maintenance) on a BOT basis and additional domestic borrowing.

Road Fund: The Central Road Fund (CRF) was initially set up to raise modest amounts of additional funds for investment in roads and related research and training. CRF was revamped by levying a cess of Rupee 1.00 per litre on petrol from June 1998 and Rupee 1.00 per litre on diesel from March 1999. These levies were increased by another half a rupee per litre since March 2003. The Budget proposals for 2005-06 envisage a further increase of half a rupee per litre. The CRF Act 2000 provides for 50% of cess from diesel to be allocated for development of rural roads and the remaining 50% of cess from diesel and the entire cess from petrol to be shared between: (a) development and maintenance of National Highways (57.5 per cent); (b) development and maintenance of State Roads (30 per cent), and (c) for improved crossings and bridges at road-rail crossings (12.5 per cent). PMGSY has been a laudable initiative made possible by the CRF. A dedicated fund like this has ensured sustainable financing of road development in the country. However, this needs to be supplemented further by mobilising additional resources at the state level, particularly for ensuring maintenance of the assets being created.

Private Sector Investment: The GOI has taken up several projects of capacity expansion of highways and spot improvements like bypasses and bridges through private sector financing on BOT basis and offered a number of financial incentives to investors besides providing an enabling legal framework for this purpose. Operation and management of such highways and projects becomes the responsibility of the private investor and to that extent, the government is relieved of the financial and management burden.

3.3.2 State Level Initiatives

It is heartening to see that the state government of Madhya Pradesh has also taken up several similar initiatives for road infrastructure development. Examples of such initiatives in the State include:

(i) allocation of funds from CRF for development and upgrading of SHs and MDRs;

(ii) funds from own budget for the "Fast Track Scheme" to render some SHs and MDRs passable in the short term;

(iii) levy of cess on agriculture produce and setting aside a major proportion (85 per cent) as the "Kisan (Farmer) Road Fund" and earmarked for the development and maintenance of MDRs and rural roads;

(iv) RIDF (Rural Infrastructure Development Fund) loans from NABARD (National Bank for Agriculture and Rural Development) for construction and upgrading of MDRs and rural roads;

(v) Bonded-BOT projects with subsidies upto 50 per cent for selected State Highways through the private concessionaires, being responsible for initial upgrading and widening and subsequent maintenance during the concession period of about 15 years;

(vi) ADB loan assisted project for upgrading selected State Highways and government commitment to the creation of a State Highway Authority and preservation of the network of state roads through a dedicated state level road maintenance fund, and

(vii) ADB loan assisted project for accelerating the PMGSY project in the state.

The BOT initiative requires the private sector concessionaire to be responsible for maintenance. The ADB assisted State highway project emphasises the development of public sector institutions for the management of State roads, establishment of State Highway Authority and dedicated funding for maintenance.

PMGSY project recognises the importance of asset preservation and attempts to develop a continuing maintenance policy. The construction contractors are required to maintain the roads during the first five years (after construction). Beyond this period, the State has been required to give undertakings to GOI (who created the programme, sets the policy and implementation principles and is the major provider of resources) and to ADB (which is providing substantial additional resources for implementation and capacity building) that MP State will provide adequate resources for maintenance and develop the requisite capacity at the district level.

3.4 Improving the Policy and Legal Framework

3.4.1 *Existing Strengths:*

The strengths and positives on which a rural road maintenance policy can be built up are:

(i) policy makers in the State now recognize the need for an asset management approach along with development and expansion of the road network.

(ii) policy makers in the State have been open to trying out a range of approaches to improving management and resource allocation for the roads sector, demonstrating a high degree of flexibility in developing and implementing policies;

(iii) a commitment to making resources available for rural roads, and especially for their maintenance, has been made and the sources of revenue are being identified, and

(iv) a policy decision has been taken on where the responsibility for maintenance of rural roads will lie (i.e. with the PRIs supported by RES[8] on technical matters).

3.4.2 *Grey Areas:*

However, there are a few grey areas.

(i) While a commitment has been made for the maintenance of PMGSY roads, the government position regarding maintenance of non-PMGSY roads is not clear. There is a danger that commitment to the maintenance of PMGSY roads is simply seen as a condition for obtaining federal funding for road construction. Maintenance of PMGSY roads beyond the defect liability period of 5 years after construction is also a grey area.

(ii) The focus on PMGSY roads ignores the need to preserve the overall rural road network in a reasonable condition. A clear policy is required on the management of the overall network.

(iii) A proper assessment of physical and financial requirements of maintenance of rural roads and funds needed to remove the backlog is not available.

(iv) A general statement has been made where the responsibility for maintenance of rural roads in general and PMGSY roads in particular will lie.

However, the capacity of these institutions for planning, design and implementation of maintenance operations is not assessed.

3.4.3 *Policy Reforms:*

Apart from setting out a policy on rural roads, a number of decisions will be required on development of capacity of the institutions undertaking maintenance. For example, the policy decision to make the PRIs responsible for the maintenance of rural roads needs to be followed up with arrangements to strengthen their capacity and capabilities. The aspects needing attention at the policy level are the establishment of institutional arrangements, sustainable financing and development of operational capacity to ensure:

(i) commitment to policy reforms in ensuring maintenance of rural roads side by side of expansion and development of the existing network both PMGSY and non-PMGSY.

(ii) adequate and steady level of funding and its management,

(iii) adequate planning, management and implementation capacity, local communities being recognised as important stakeholders, within the context of the democratic processes;

(iv) coordination with agencies managing the remainder of the network;

[8] RES (Rural Engineering Service) is the technical implementing agency for rural development related civil construction works under the Panchayat and Rural Development Department of the state.

Chapter 4

Institutional Arrangements

4.1 Features of Effective Institutional Arrangements

Institutional arrangements for maintenance of rural roads include:

(a) responsibilities of organisations involved in planning and implementation and relationships between them;
(b) funding organisations and their relationships with planning and implementation agencies;
(c) coordination with agencies responsible for other categories of roads;
(d) role of democratic and consultative processes in decision making (to ensure participation of relevant stakeholders), and
(e) role of the private sector in implementation, monitoring and supervision arrangements.

Clarity in the assignment of management responsibility, accountability and ownership are important institutional aspects and therefore are addressed in this Section. The financing and operational capacity aspects cannot be easily separated from management responsibility and ownership. Therefore, reference is made to them in this Section where necessary but they are examined in more detail in subsequent Sections 5 and 6.

For rural roads, planning and implementation are closely related activities which may be undertaken within the same organisation or organisations working closely with each other. The planning agency should take a network wide view of maintenance requirements and priorities, submit demand for funds based on the assessment of requirements and prepare a programme of

maintenance activities within the resources made available. Planning, therefore, requires an information base containing data on the condition of each road in the network, including maintenance requirements, the level of access it offers and the population it serves. If the technical implementation agency is not a part of the planning agency (e.g. an agency under the Jila panchayat may be the planning agency but a Rural Engineering Service (RES) unit may be the implementing agency), it would be appropriate for the technical implementation agency to be responsible for the assessment of the condition of roads and management of contractors and other technical aspects. Coordination is also required between the planning agency and other agencies responsible for other categories of roads and other transport infrastructure (e.g. PWD).

Democratic and consultative processes (through the Panchayats at the village, block and the district levels) have a role in the planning process, initially in the identification of needs, determining priorities and approval of the programme. Another institutional and operational aspect of importance is the balance between implementation of maintenance through private contractors and community contracting. In general, private contractors are appropriate for larger works requiring proper financial means, equipment and skilled labour. This applies to both strategic roads as well as the feeder and access roads. Community contracting can also be considered for routine maintenance for which very limited amount of equipment and technical skills are required.

4.2 Current Institutional Arrangements

4.2.1 Overview

The organisations involved in the roads sector are shown in Figure 4.1. PWD is responsible for maintenance of NHs, SHs and MDRs and also manages construction and upgrading of these roads implemented through contractors.

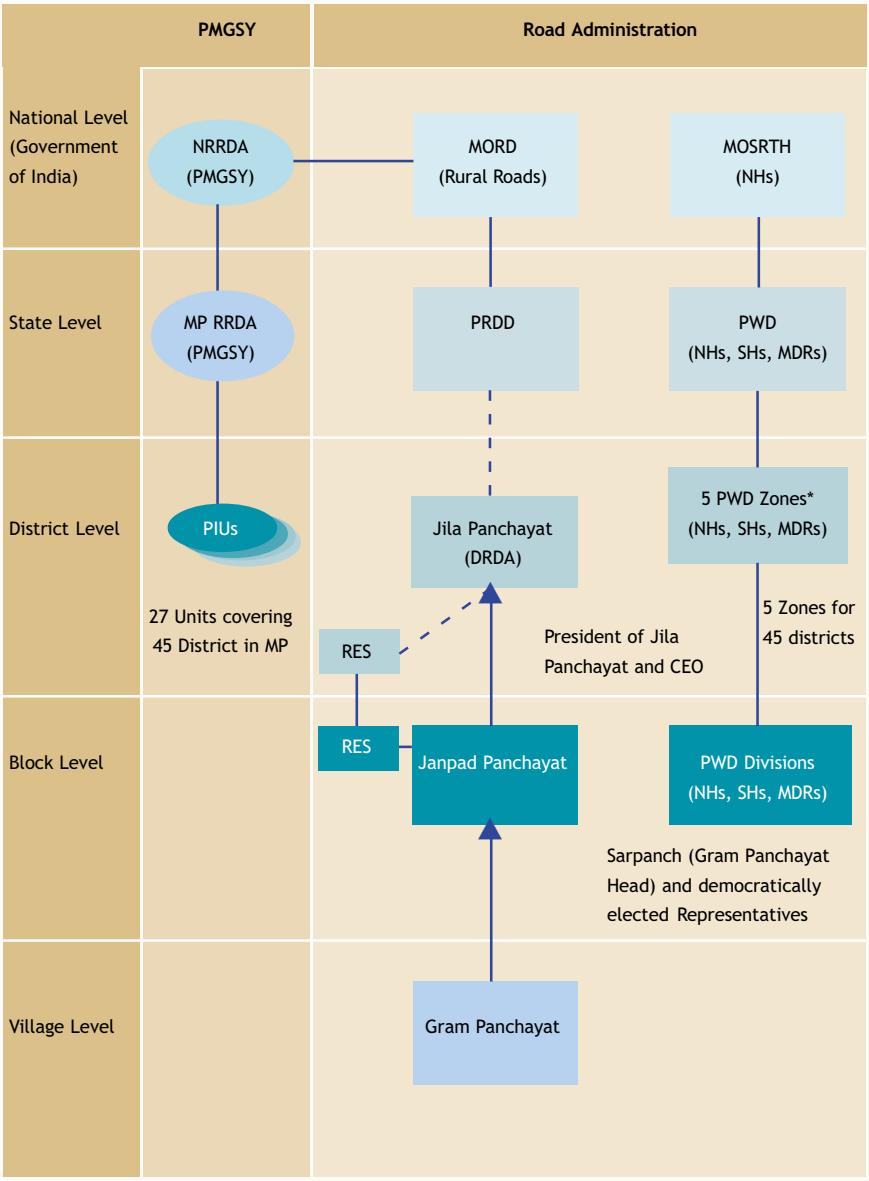
The Panchayat and Rural Development Department (PRDD) at the state level is responsible for rural development programmes (including rural roads). Ministry of Rural Development (MORD) at the federal level is responsible for rural development initiatives and programmes (such as the PMGSY). At the state level, these programmes are managed by the PRDD. At the district level, rural development programmes are administered by District Rural Development Agencies (DRDAs) which come under the line responsibility of PRDD. Formally, the DRDAs have been merged with Jila Panchayats and therefore, they have a dual role, as implementers of national and state level programmes and as providers of administrative and policy support for Jila Panchayats.

Rural Engineering Service (RES) is the technical implementation agency for rural development related civil construction works under the PRDD. It implements projects for the PRIs and others[9] and provides technical support for projects undertaken at the village level. Maintenance of rural roads (ODRs and VRs) is now formally the responsibility of the PRIs but there are some unresolved issues with respect to resources and the level of Panchayat Raj on which this responsibility should rest.

As noted earlier, PMGSY is a national level programme and is managed by the National Rural Roads Development Agency (NRRDA) at the national level and the MP Rural Roads Development Authority (MPRRDA) at the State level. The programme implementation is managed and supervised by 27 units in the state. The MPRRDA draws its technical officers from both the PWD and the RES. Notably, the management units of the PWD, RES and PMGSY are not necessarily organised by districts.

[9] For example, from funds allocated to MPs (Members of Parliament) and MLAs (Members of Legislative Assembly) for expenditure in their constituencies.

Figure 4.1 Agencies involved in road management and works in Madhya Pradesh



*It is understood that the state government has recently decided to re-establish the 'circles' between a zone and a division.

4.2.2 Public Works Department (PWD)

The PWD is the principal department for the roads sector. The Engineer-in-Chief is the technical head and professional advisor on policy formulation, planning, programme implementation and overall control to the Government through the Principal Secretary and the Secretary. Under the Engineer-in-Chief, the State is divided into five Zones, each headed by a Chief Engineer who is responsible for implementation of basic policy guidelines and supervision of the functioning of the department in respect of construction and maintenance of all categories of roads and other civil works and buildings. The Zones are divided into 83 Divisions and 264 Sub-divisions. Jabalpur district, for example, is covered by two of the Divisions in the Central Zone with each of the divisions headed by an Executive Engineer and there are 7 Sub-divisions and sectional offices within the District.

The PWD is responsible for managing the network of SHs and MDRs. The PWD also executes works of upgrading and maintenance on the NHs (other than those with the NHAI) within the State on behalf of federal Ministry of Shipping, Road Transport and Highways (MOSRTH). In principle, this management involves planning and implementation functions with respect to construction, upgrading, rehabilitation and maintenance. The planning functions include (a) assessing the condition of the existing network, (b) preparing proposals and budgets for maintenance, rehabilitation and upgrading, (c) identifying new road construction requirements, and (d) reclassifying roads to reflect changes in their functions (declaration of roads as NHs is however, with the MOSRTH). The implementation functions include construction, upgrading and rehabilitation through contractors and maintenance through directly employed gang labour for routine activities and through contractors for periodic surface renewals.

At the Zone and Division levels, where maintenance of NHs, SHs, and MDRs is managed, there is an annual exercise of assessing maintenance requirements based on financial norms for routine maintenance and emergency repair needs. Until recently, the PWD was also responsible for the maintenance of rural roads. The PWD can still undertake construction or rehabilitation of ODRs and VRs but responsibility for maintenance of these roads has been transferred to the PRIs.

Within the PWD, maintenance is not separated from construction of roads and other structures including buildings. It comes under the line management of the Chief Engineer at the Zone level, the Executive Engineer at the Division level and the Assistant Engineer at the Sub-division level. The PWD uses contractors of different sizes and classifications depending on the nature and size of works. For emergency repairs, small contractors (Class B and C with a capacity to undertake PWD contracts up to Rs. 4 lakh and Rs. 2 lakh respectively) are used. Typically they, operate with labour and hire light

equipment when necessary. However, PWD does not use contractors (or temporary workers) for routine maintenance activities. These are undertaken by labour gangs. The PWD has faced problems in maintaining roads effectively through labour gangs because (a) a high proportion of the allocated maintenance budget is consumed to pay labour, and (b) incentives and sanctions to improve their productivity are becoming difficult. The lack of effective maintenance management and planning have also been factors.

The PWD is a well structured organisation with competent and experienced staff. However, as an agency for managing the roads sector and especially maintenance, it has a few weaknesses which are summarised below:

(i) There is a history of inadequate and irregular funding for road construction, rehabilitation and maintenance.

(ii) Annual maintenance expenditure has been typically 20-30 per cent of the estimated requirements as per norms. The problem is made more serious by inefficient delivery of maintenance works out of the available funds.

(iii) Gang labour absorbs a relatively high proportion of the maintenance budget (50 percent or more of the maintenance budget since 1999). The productivity of gang labour is also an issue.

(iv) Management of available funds and planning procedures for road maintenance are poor with a weak database and inadequate use of information technology.

(v) Provisions for training and human resource development are meagre and progression of staff to higher positions is very slow.

These issues are currently being addressed with ADB support. Nevertheless, with respect to ODRs and VRs, the role of the PWD remains ambiguous.

Much of the new construction, upgrading and rehabilitation of ODRs and VRs is implemented by the PWD through contractors, for example from Kisan Road Fund and RIDF-NABARD but the PWD does not see itself as assuming ownership of this network or being responsible for its management for the reasons outlined below.

(i) The allocation of maintenance funds from the State budget to the PWD has been for MDRs, ODRs and VRs lumped together. Since these allocations have been very low in comparison with requirements, a large proportion of the available funds is being spent on the MDRs, very often for emergency works and rehabilitation of badly deteriorated roads, virtually starving rural roads.

(ii) As a part of the process of devolving the rural development to districts, responsibility for the maintenance of rural roads has been transferred to the PRIs.

The transfer of responsibility to PRIs has not been effective in practice since agreement could not be reached on the proportion of allocation for maintenance, equipment and other assets to be transferred to the PRIs for ODRs and VRs and whether the PRIs would have to take on responsibility for some of the PWD gang labour. In spite of this unresolved situation, the PWD considers the responsibility for maintenance of ODRs and VRs as having been transferred to the PRIs. In such a situation, such roads are getting neglected for maintenance and the backlog is mounting.

4.2.3 Rural Engineering Service (RES)

The RES is a technical agency under the PRDD. It provides technical support and guidance to the Panchayati Raj Institutions for construction of works of small size at the village, block and district levels, and executes works related to the development of rural infrastructure in the State as the construction wing of the Panchayat and Rural Development Department. Currently the RES does not undertake maintenance of rural roads.

RES directly undertakes rural works under the Employment Assurance Scheme (EAS) and provides technical support and supervision of works undertaken by the gram panchayats under the EAS and the Jawahar Gram Samrudhi Yojana (JGSY). Under the EAS, works costing up to Rs. 3 lakh are undertaken by the gram panchayats while works costing more than this amount are implemented by the RES. The rural works include small tanks, culverts, roads within villages and civic buildings. EAS and JGSY works must be undertaken by direct labour only (i.e. contractors are not permitted to implement these works) and a minimum of 60 per cent of the expenditure must be on labour.

The Chief Engineer is the technical head of RES. He reports to the Development Commissioner, who is also ex-officio Principal Secretary for PRDD. The Chief Engineer provides technical support to the Development Commissioner on policy formulation and guidelines regarding the construction activities performed by the PRIs and is also responsible for administration and control of construction works undertaken by RES. The RES has 7 Superintending Engineers (SEs), a level of administration between the Chief Engineer at the State level and the Executive Engineer at the District level. There is an RES Civil Works Division in every district headed by an Executive Engineer (EE). The EE is responsible to the District Panchayat for technical support on construction activities undertaken by the Panchayati Raj Institutions. However, in principle, he also reports to the SE on technical matters regarding the execution of works for the PRIs and others, though this reporting is not fully functional at present.

The Civil Works Divisions are supported by Sub Divisions headed by Assistant Engineers (AE). The AE is also responsible to the District and Block Panchayats for technical support on construction activities undertaken by the PRIs. The AE works under the direct administrative control of the EE but also reports to the block panchayat on day to day matters. The AE is supported by a Sub Engineer for the area of each block and the Sub-Engineer heads the road section in the same way as in PWD. The RES establishment makes provision for two Sub-Engineers per block to provide technical support and supervise the construction activities carried out by the gram and block panchayats.

RES has several strengths as a technical agency for managing the rural infrastructure. It has competent and experienced staff with exposure to a range of small scale rural works. There are also opportunities for training and promotion although these need to improve. Some of the RES staff is successfully seconded to MPRRDA for implementing the PMGSY.

However, there are also some weaknesses and issues that need to be addressed. These are:

(i) currently there is no specific routine maintenance responsibility in RES Units, though individual RES Units may have undertaken small emergency repairs and rehabilitation projects through contractors;

(ii) recent changes giving more autonomy to gram panchayats in implementing village projects have reduced the role of RES Units in providing technical advice and inspection of works undertaken by them, and

(iii) the staffing situation has been weakened with the demand for staff in the PMGSY.

Therefore, for the RES to be the executing agency for rural road maintenance, a substantial effort in building up its capacity will be required. It will also be necessary to consider its relationship with the PRIs and more specifically the division of responsibilities with respect to planning, budgeting and implementation.

4.2.4 Madhya Pradesh Rural Roads Development Authority (MPRRDA)

A new Rural Roads Development Authority (MPRRDA) has been created within the Panchayat and Rural Development Department (PRDD) to implement PMGSY. The Authority manages the process of procuring road construction and rehabilitation contracts in large parcels. The process of project preparation and supervision is being contracted out to private consulting companies. This approach has been adopted to take account of the need for speed in implementation and the shortage of capacity in the public sector.

PMGSY is a major programme initiated by the GOI in December 2000 to improve road access for the rural population. All districts are required to produce a master plan, District Rural Roads Plan, as a basis for planning, implementation and monitoring. It is recognised that access for villages does not depend on the roads which link them to the network but also on the quality of the road network itself. When all the villages are connected by all-weather roads, upgrading of through roads is the next highest priority.

In Madhya Pradesh there are 51,000 villages of which 43,000 are not connected by BT surface roads. The estimated cost of connecting villages / habitations with population in excess of 1000 persons for the whole of MP is Rs. 6,000 crore (US$1.38 billion). The total cost of securing connectivity for all villages / habitations with population in excess of 500 persons in MP is estimated to be Rs. 10,000 crore (US$2.3 billion). This investment increases the roads asset base and will increase maintenance requirements. It is, therefore, essential that adequate provision of resources and institutional arrangements are in place for maintenance.

The design of PMGSY also attempts to deal with inadequate maintenance capacity and expenditure on rural roads. Construction contractors are responsible for maintenance for the first 5 years after road construction. Thereafter responsibility for maintenance reverts to the implementing agencies. To ensure satisfactory maintenance, 10 per cent of the contract payment is held back until the end of the 5 years after construction.

MPRRDA's role is seen to be as an executing agency for the PMGSY. Its role in maintenance is limited to the management of maintenance of roads constructed under the programme during the initial five years after construction. As noted earlier, after the five years, the Panchayat Raj will be responsible for the maintenance of PMGSY roads, including periodic maintenance

which will require substantial resource commitments and technical and management capacity. However, GOI recognises the scale of the task involved in developing the capacity of the PRIs and technical agencies at the district level to manage road maintenance The executive agencies such as the MPRRDA may have to continue with the maintenance of rural roads till capacity building of the Panchayati Raj Institutions takes place. It may also be necessary to have an agency at the State level to support the Districts in the management of rural roads.

4.2.5 Panchayati Raj Institutions (PRIs)

Recognising the need to seek participation of the people for maintaining rural roads, the responsibility has been transferred to PRIs.

There have been a number of initiatives since Independence to strengthen and empower these Institutions. They are broadly based on the Gandhian doctrine of making rural people responsible for their own economic development and in response to the concerns that (a) the rural population has not benefited sufficiently from economic development, and (b) poor people have very little say in the development process. The 73rd Amendment to the Constitution of India[10] provided constitutional status to panchayats and required the states to set up a three tier panchayat raj system (village, intermediate and district) with panchayat members at all levels being elected.

The State of Madhya Pradesh has demonstrated a high level of commitment to establishing and empowering PRIs. The Madhya Pradesh Panchayati Raj Act to establish PRIs in line with the 73rd Amendment was passed in 1993 and since then the State has already completed two rounds of elections to the PR bodies. The three levels of Panchayats or bodies of elected representatives in MP are at the Gram (village), Janpad (Block), and Jila (District) levels[11] . In addition, there is the Gram Sabha (village meeting) where a quorum of 10 percent of the adult population is required. Table 4.1 summarises the formal functions, powers and authority to raise taxes of the PRIs and shows that at least in form, the governance structure is village focused. The functions and powers of gram panchayats are broadly equivalent to those of municipal authorities in urban areas. The gram panchayats also have the authority to collect a number of local taxes though available evidence (Behar and Kumar, 2002 and Mathur, undated) shows that these powers are not fully used, with most of the resources coming from transfers from the State budget and allocations from federal and state programmes.

[10] The 73rd Amendment Bill was passed by the national legislative bodies in December 1992 and ratified by 17 State Assemblies in 1993.

[11] The Gram panchayat may be for a single village or a cluster of villages. At the Janpad and Jila levels, in addition to directly elected members, there are some co-opted members (e.g. representing cooperatives and banks) and elected members of State and National legislatures.

Table 4.1: Distribution of function, power and tax imposition between the Gram Panchayat, Janpad Panchayat and Zila Panchayat in MP

Functions	Power	Taxes permitted
Gram (Village) Panchayats		
Sanitation; construction of sources of water; **construction of roads, buildings, bridges, latrines, wells;** lighting of village streets; **maintenance of public assets;** control over entertainment shows, shops, eateries; maintenance of *Panchayat* property; establishment and management of market and *melas*; prevention of contagious diseases; promotion of youth and property; prevention of contagious diseases; promotion of youth and family welfare, etc.	Providing public health facility, control on erection of building and such building; leving fines on offenders obstructing and encroaching upon public streets or open spaces; naming buildings and streets etc.	Property tax on land or buildings, tax on private latrines; lighting tax; professional tax; market fees; fee on registration of cattle sold in any market under the control of *Gram Panchayat*.
Janpad (Block) Panchayat		
Integrated Rural Development Programme (IRDP); agriculture; social forestry; cottage industries; family planning; sports; rural employment programme; provision for emergency relief in cases of fire, flood, drought, etc.; arrangement in connection with local pilgrimage and festivals; management of public ferries, public markets, melas, etc.; **any other function with the approval of the State government and the *Zila Panchayat*.**		*Janpad Panchayat* can impose tax on theatre and other public entertainment; fees for any licensee or permission granted by the *Janpad Panchayat* and for use and occupation of lands or other properties vested in or maintained by the *Janpad Panchayat*.
Jila (District) Panchayat		
The functions and powers of the *Zila Panchayat* are to: **Control, coordinate and guide the *Gram* and *Janpad Panchayat* within the district; coordinate and consolidate the *Janpad Panchayat* plans;** coordinate the demands for grants for special purposes received from the *Janpad Panchayats* and forward them to the State government; secure the execution of plans; projects, schemes or other works common to two or more *Janpad Panchayats* of the district; advise the State government on social forestry, family welfare, welfare of the disabled, destitute, women, youth and children; **exercise such other powers which the State government entrusts to it.**		

Source: Behar and Kumar (2002)

Formally, the role of the block panchayats is to implement the programmes of line ministries (e.g. the Integrated Rural Development Programme, rural employment programmes and agriculture and forestry sector projects) within the block and to deal with emergencies and public functions and events which fall outside the scope of villages. There are also certain tax raising powers at this level. The Jila panchayats do not have any tax raising powers at present. Their main functions and powers include "control, coordination and guidance" of the block and village panchayats and the coordination of plans for the district. The Jila panchayat controls and supervises the administration of the DRDA including all the functions and schemes assigned to the DRDA by the State government.

The main sources of funds for the PRIs are allocations from the State budget according to a formula and the GOI and GOMP financed employment creation and poverty alleviation schemes under the Sampoorna Grameen Rozgar Yojana (SGRY)[12] . Typically, the local taxes at the village and block levels raise small amounts of money. At all three levels, money received from all sources is held in a panchayat fund and used for local projects and activities or other approved expenses, though some money may be earmarked for specific activities. The funding issue is considered in more detail in Section 5 but it is worth mentioning at this stage that the available funds are typically small with many competing claims.

Three issues that policy makers have had to contend with in establishing the panchayat raj and making it effective are:

(a) overcoming the resistance of line ministries and their staff at the State, District and Block levels to the transfer of some of their functions and authority and related control on resources to the PRIs,

(b) finding an acceptable balance between local democracy and effective administration, and

(c) developing institutional arrangements to make local democracy effective.

Detailed examination of these aspects is beyond the scope of this study; however, it is important to consider the implications of the current institutional arrangements and their effectiveness for rural road maintenance.

[12] From the year 2000-01, the two ongoing schemes EAS (Employment Assurance Scheme) and Jawahar Gram Samrudhi Yojana (JGSY) were brought together under the umbrella of the Sampoorna Grameen Rozgar Yojana (SGRY).

The PRIs at the district and sub-district levels are formally responsible for the maintenance of ODRs and VRs as part of public assets. However, maintenance of roads has to compete with many other claims on limited funds and is rarely done systematically. Formally, project proposals of direct interest to a village (which could include road repairs) are generated by the gram sabha or panchayat and the gram panchayat is responsible for the management of small local projects.

It is understood that GOMP proposes to assign responsibility for maintenance of PMGSY roads to Jila panchayats after the first five years of construction (during which period the construction contractors will be responsible for maintenance), provide the necessary funding for maintenance to the Jila panchayats, and develop the capacity of the Jila panchayats and supporting technical agencies to manage maintenance.

At present, no change is envisaged in the arrangements for maintenance of the remaining rural roads. It is presumed that they will be left to the gram panchayats.

Maintenance of rural roads is proposed to be funded out of mandi cess on agricultural produce. To what extent these funds would be sufficient needs to be assessed, taking into account the length and condition of the network. The institutional structure under the panchayat raj at the district and sub-district level and the relationship of PRIs with line ministries is complex. It would be necessary to undertake a detailed assessment of the current capacity of PRIs to maintain rural roads and changes and support required to strengthen this capacity.

4.3 Restructuring and Capacity Building Requirements

Since the Jila panchayats will be responsible for maintaining the PMGSY roads and the DRDAs manage rural development programmes under the supervision of Jila panchayats, DRDAs will have an important part to play in the maintenance management of PMGSY roads. They also have a role in the control, coordination and planning of rural road maintenance at the district level. The issues which need deliberations in this respect are given below:

(a) The control, coordination and planning capabilities needed for road maintenance are very different from the administration of programmes that DRDAs undertake currently. The DRDAs' role with respect to roads is limited at present. DRDAs administer funds from the State budget and schemes such as the SGRY and distribute them to the lower level panchayats. It is believed that a substantial proportion of these funds is spent on road construction but very little on maintenance. Data on the distribution of expenditure by categories and the output resulting from the expenditure are not normally collected systematically.

(b) A reasonably well resourced programme for maintaining PMGSY roads managed at the Jila level but the remaining rural roads being left to the gram panchayats is a partial approach. The detailed situation analysis in two sample blocks of Dhar and Jabalpur districts in the state shows that 50 per cent or more of the rural roads not included in the PMGSY or yet to be improved under the PMGSY provides a reasonable level of accessibility and are in maintainable condition. Development of a maintenance strategy should start by looking at the whole network to assess the condition of rural roads as well their relative importance.

(c) Implementation of maintenance requires attention to a number of technical and supervisory aspects including making an assessment of road condition and maintenance requirements, preparing programmes of maintenance at district level, productivity of gang labour, procurement of contractors and their supervision and quality control of works. The PRIs will need to establish effective working relationships with a much strengthened RES. RES Units have been implementing public works for the DRDA. Potentially, they could be an appropriate agency to implement maintenance. It should be possible to strengthen their capacity to manage the technical aspects of rural road maintenance.

(d) Another institutional issue is the capacity and willingness of private contractors to undertake maintenance. Discussions with PMGSY construction contractors indicated that they were reluctant to undertake routine maintenance contracts on geographically spread out roads over a number of years. Some of them had informally outsourced mainte-

nance on PMGSY roads to small local contractors. Small local contractors are a feasible option for maintenance of rural roads. For link roads serving one or two villages, some form of community contracting can also be considered.

(e) Implicit in the panchayat raj system are the consultation and democratic processes. The planning, control and implementation of road maintenance must take account of evidence from local consultations and proposals arising at the village and block levels but take an objective and professional approach to establishing maintenance priorities. In addition, annual maintenance programmes and budgets prepared by the DRDAs and the criteria used in preparing the programmes would be subject to approval by elected Jila panchayats who may vote to amend the programme or decide to raise or allocate additional funds for maintenance. Panchayats at all levels are also forums where representatives may bring concerns about the poor road condition because of inadequate maintenance.

(f) A Rural Roads Agency at the state level could embrace the following functions:

(i) guide and support the Jila panchayats and technical agencies at the District level in capacity building, management, planning and operations;

(ii) communicate with the funding agency;

(iii) monitor the performance of districts and support them in improving performance;

(iv) recommend or set planning guidelines and standards, and

(v) research and development on management and operations.

(vi) Co-ordinate with agencies responsible for other categories of roads.

4.4 Possible Options

Three options for institutional arrangements and related capacity building requirements have been identified here. Under Option 1, the role of the Jila panchayats is limited to the maintenance of PMGSY roads. Under Options 2a and 2b, a more strategic approach to the planning and implementation of the rural road network would be taken. The difference between the two options 2a and 2b is the balance of management and planning responsibilities between the DRDAs and the RES.

Option 1

The role of the Jila panchayat / DRDA is simply to administer the funds for the maintenance of PMGSY roads. The procurement of contractors and their supervision would be undertaken by the RES as the technical agency. Under this option, the role of the Jila Panchayat with respect to maintenance of PMGSY roads would be to sanction payments upon satisfactory performance of contractors. Maintenance of the rest of the rural road network would remain the responsibility of the gram panchayats.

Even if the role of the DRDAs is limited to managing the finances and sanctioning payment for completed work, their capacities for these functions will have to be developed. Maintenance operations on PMGSY roads would be by contractors. The capacity of the technical agency to manage contracts, supervise operations and use a simplified maintenance management system (MMS) to assess the condition of roads and effectiveness of maintenance would have to be developed, though some of these functions could be outsourced to the private sector or undertaken by the RES. Maintenance of the remaining rural road network would remain poorly resourced.

A state level Rural Roads Agency could be considered for administration, planning, programming, coordination and monitoring of maintenance activities, supporting districts in capacity building, management, planning and operations, research and development on management operations (including development of an appropriate MMS), and maintaining effective communication with the departments or agencies providing funds for maintenance, on funding requirements, disbursements and maintenance performance.

Option 2a

The importance of developing a maintenance strategy for the rural road network within the district is recognised and Jila Panchayats/DRDAs are given responsibility for the management of the entire rural road network and related planning activities. The DRDAs would rely on the RES for technical aspects of planning and implementation such as maintaining a road condi-

tion inventory, making an assessment of maintenance needs, formulating maintenance programmes, procuring contractors and their supervision. The DRDAs and the technical agency would need to develop appropriate capacities which are non-existent at present.

Under this option, in addition to the capacities required under Option 1, the DRDAs would have to develop maintenance planning capacity needed to establish priorities and prepare maintenance plans and budgets. The DRDAs would need to rely on the RES for the technical input to the planning exercise (e.g. information on the state of the road network and maintenance requirements and costs obtained through an MMS). The RES would be responsible for managing maintenance operations through contracts as under Option 1.

Option 2b

The importance of developing a maintenance strategy for the rural road network within the district is recognised but the management of the road network and related planning activities as well as the implementation of maintenance are delegated to the RES.

The functions and capacity requirements for the DRDAs would be much the same as for Option 1. The planning and technical supervision and monitoring capacity would have to be developed in the RES.

Both Options 2a and 2b require development of a maintenance strategy for rural roads as a whole and therefore the role of the state level Rural Roads Agency would need to go beyond the functions set out under Option 1. Broadly, the Rural Roads Agency would be concerned with the policy and

legal framework, funding and its management and formulating policies and planning guidelines and advising GOMP on these aspects. The concept of asset management can be the guiding principle for the Rural Roads Agency in developing a strategy for rural roads.

Whatever option is adopted, the institutional arrangements need to be judged against the criteria of clarity in management responsibility, ownership and the capacity of the agencies to perform the functions. Transferring ownership and management responsibility to the Jila panchayats and committing funds achieve a degree of clarity in management and ownership. However, capacity development of both the RES and the DRDA at the district level still remains a challenge and needs to be addressed to preserve the assets being created at huge cost to the economy.

Chapter 5

Financing Aspects

5.1 Introduction

The state of Madhya Pradesh follows the financial and technical norms for maintenance fixed by the Ministry of Shipping, Road Transport and Highways (MOSRTH), Government of India in 1993 and revised in 1998.

Currently, the Public Works Department (PWD) is responsible for maintenance of all categories of roads including rural roads (Other District Roads and Village Roads), although staff of the PWD holds the view that sequel to the 73rd Constitutional amendment, rural roads are to be maintained by the Panchayati Raj Institutions (PRIs). So far no funds are reported to have been provided to the PRIs.

5.2 Allocation of Funds

The PWD submits the demand of grants for maintenance to the State Finance Department on the basis of the norms. The Finance Department allocates funds for maintenance in two heads of account – one for state highways and the other for MDRs, ODRs and VRs combined. Table 5.1 gives a broad picture of funds required as per norms, allocations approved by Finance Department and expenditure incurred on maintenance of the road network in the State.

Table 5.1: Broad picture of funding on road maintenance

Figures in Rs. Crore

Year	Funds required	Funds allocated	Expenditure incurred	Shortfall	
				Amount	Percent
1994-1995	495.03	211.78	246.04	248.99	51%
1995-1996	504.96	225.07	257.22	247.74	49%
1996-1997	555.45	248.48	293.52	261.93	47%
1997-1998	610.99	282.29	309.39	301.60	49%
1998-1999	672.08	272.96	312.02	360.06	54%
1999-2000	700.00	193.69	198.27	501.73	71%
2000-2001	600.00	224.99	193.99	406.01	67%
2001-2002	660.00	170.10	153.03	506.97	76%
2002-2003	720.00	136.10	150.17	569.83	79%

Discussions with the state officials revealed that hardly 10 to 15 percent of the funds allocated for MDRs, ODRs and VRs are spent on rural roads.

5.3 Messages Emerging from Financing Scenario

(i) There has been a drastic reduction in the allocation of funds for road maintenance. Against an allocation of Rs. 282.29 crore in 1997-98, it dropped to a meagre Rs.136.10 crore in 2002-03.

(ii) The Finance Department does not allocate funds for road maintenance as per norms. Shortfall is currently as high as 75 percent.

(iii) The shortfall in expenditure on road maintenance compared to funds required as per norms has been increasing over the last five years from a level of 50 percent in 1997-98 to 75 percent in 2002-03.

(iv) Obviously, the state does not attach the importance that the maintenance of roads would deserve.

5.4 Impact of Inadequate Funding for Road Maintenance

5.4.1 *Heavy investments required in rehabilitation:*

It has been assessed that because of inadequate funds for maintenance, 60 percent of the MDRs and 80 percent of rural roads (ODRs + VRs) have deteriorated to the point that they are not passable and will require huge

investments in their rehabilitation. Table 5.2 gives a broad idea for the state as a whole.

Table 5.2: Funds required for rehabilitation due to maintenance neglect

Category of road	Total length	Length requiring rehabilitation	Estimated amount of funds required for rehabilitation
SHs	8,036 km	4,000 km	Rs. 400 crore
MDRs	11,115 km	5,400 km	Rs. 354 crore
Rural Roads (ODRs+VRs)	33,966 km*	26,500 km	Rs. 1,330 crore
Total	53,117 km	35,900 km	Rs. 2,084 crore

* excludes unsurfaced roads.

It would be necessary to provide funds for rehabilitation of these roads in a time-bound plan to enable them to serve the intended purpose.

5.4.2 *Erosion of Assets*

As per a broad assessment carried out during this study, the replacement value of the existing state roads in MP works out to Rs. 12,230 crore. These are huge assets. Assuming a modest loss of just five percent, the erosion in asset value would be over Rs.600 crore a year. The loss is four times the current annual expenditure on maintenance. In case of village roads, the result is that they become almost impassable even for non-motorised traffic.

5.4.3 *Increase in Backlog of Renewal*

Due to shortfall in maintenance funding, it is not possible to provide renewal of road surface at the appropriate interval of time resulting in poor quality. Table 5.3 gives a broad analysis of the situation in one division of Jabalpur District in respect of SHs, MDRs and ODRs. It is reported that there is hardly any attention being given to renewal of road surface in respect of village roads.

Table 5.3: Backlog of Renewal in respect of SH, MDR and ODR

(Jabalpur District)

Year	Length required (km)	Length provided with renewal (km)	Shortfall	
			Length	Percent
1998-1999	107 km	16 km	89 km	85%
1999-2000	107 km	12 km	95 km	89%
2000-2001	107 km	4 km	103 km	96%
2001-2002	107 km	9 km	98 km	92%
2002-2003	107 km	Nil	107 km	100%

Obviously, the condition of roads has been worsening over the years and the backlog of renewal requirements has been mounting. Roads have thus to be brought to maintainable condition first by attending to the huge backlog.

5.4.4 *Social Impact*

Poor condition of roads, particularly for the rural inhabitants, hits them badly as it prevents them from accessing health care facilities in time and increase their time spent on daily chores like collection of fuel wood, drinking water thus reducing time available for productive work in farm activities. Obviously, agriculture output also gets affected.

5.5 Initiatives by the State

5.5.1 *Toll Based Maintenance of SHs*

Madhya Pradesh is the first state in the country to have taken the initiative of undertaking maintenance of some of their state highways through tolls. Table 5.4 gives a brief summary of some examples.

Table 5.4: Main features of toll-based maintenance

Particulars	State highway Bhopal-Dewas	State highway Jaora-Nayagaon
1. Length	143 km	103 km
2. Scope of work	Improvement of minor works like culverts, maintenance routine and periodic renewal of road by premix carpet on 28 km per year. Also construction of toll booths at two locations. Bring berms in proper condition	Improvement of culverts and other CD works, drains, etc. Routine and periodic maintenance. Toll booths at two locations. Renew riding surface as per approved programme. 30 km per year on average. Bring berms in proper condition.
3. Period of concession	6 months for improvement works and 3 years for maintenance (Already over)	1791 days (commenced early 2000)
4. Toll rates	Cars: Rs. 10 Buses: Rs. 25 Trucks: Rs. 35	Cars: Rs. 10 Buses: Rs. 25 Trucks: Rs. 35
5. Offer by entrepreneur (criteria of work award)	Rs. 446 lakh paid by entrepreneur to State government in 12 quarterly instalments spread over 3 years. Fixed concession period of three years and six months including time for completion of improvement works.	No grant by the State and no financial offer by the entrepreneur but work awarded on the basis of least concession period.
6. Transfer	Transfer in good condition to the State	Transfer in good condition to the State

This is a very good approach and the state PWD would do well to extend this model to many of the important SH corridors so that funds for maintenance of such roads are not a burden on the state exchequer.

5.5.2 *Bond-BOT Projects*

The state government has identified about 2000 km of state highways where widening and strengthening of these roads to proper two-lane standards is being undertaken on BOT basis. The estimated cost of upgrading is Rs.987 crore. The projects are being awarded to private investors on BOT basis with rights to collect toll on predecided distance based rates during the concession period. The concession period including the construction period is fixed as 5440 days and during this period, performance based maintenance is carried out by the investor. Generally, a grant of about 50 percent is being paid by the state government for upgrading works. The state is thus able to reduce its burden on initial construction by 50 percent. For maintenance, there is no burden on the state exchequer for such roads.

5.5.3 *Kisan Road Fund*

The state government decided to levy market cess on agriculture produce in the year 2001. Out of the proceeds, a major portion comprising 85 percent is kept as reserve known as "Kisan Road Fund" (KRF) and used exclusively for development and maintenance of MDRs, ODRs and VRs. An amount of about Rs.100 to 120 crore is collected every year. An expenditure of about Rs.647 crore has been approved for construction and upgrading of 5,841 km of roads. Thus much of the KRF is being spent in construction of more roads increasing the maintenance burden. It needs to be debated whether a certain minimum percentage of these proceeds should be earmarked for maintenance of rural roads serving the agriculture markets.

5.6 Funding Arrangements for Maintaining PMGSY Roads

MP is one of the States with the highest amount of road length required under the programme with an estimated 60,264 km of roads to be constructed at a cost of Rs. 12,199 crore or about US$2.8 billion. In addition, upgradation of 37237 km at an estimated cost of Rs.5742 crore (US$1.32 billion) is now included in the PMGSY. However, as per earlier projections an estimated length of 25,674 km of roads are considered as of priority under the programme and is used as the basis of projections for financing of maintenance. This position would need to be reviewed in the second phase. The programme is being funded by the federal government and is being supplemented by borrowing from ADB. GOMP has accepted financial responsibility for the maintenance of completed PMGSY roads to be carried

out by private contractors. For the first five years after construction, maintenance is being carried out by the construction contractors. The PMGSY guidelines require that States make adequate provision for meeting maintenance costs and set up effective arrangements. Furthermore, the state governments would need to take steps to build up capacity in the district panchayats and endeavour to devolve the funds and functionaries onto these panchayats in order to be able to manage maintenance for rural roads.

More precise details of GOMP's commitment to provide levels of annual financing and institutional arrangements required for sustainable maintenance, set out in the draft ADB Loan covenants are:

(a) GOMP will make annual budget allocations and also earmark its Mandi Cess for financing maintenance of all PMGSY roads, increasing from about Rs 30 crore (US$6.9 million equivalent) in 2006-07, to Rs 161 crore (US$37.0 million equivalent) in 2013-14 (see Table 5.5);

(b) Before the end of the initial five year maintenance period, responsibility for maintenance of PMGSY roads is assigned to Jila Panchayats[13] with assignment of State financing for PMGSY roads to them;

(c) Jila Panchayats will be required to enter into further maintenance contracts with competitively procured contractors to commence upon completion of the initial five-year period and to cover maintenance of all PMGSY roads for further period of not less than 5 years;

(d) Any increases in the costs of maintenance will be met by GOMP through additional budget allocations or increases in the Mandi Cess;

(e) GOMP should develop proposals for Jila Panchayats to collect a community contribution towards the cost of road maintenance, thus introducing a local "users pay" approach.

Table 5.5: GOMP commitment of funds for maintenance of PMGSY roads and estimated length of roads to be maintained by PRIs

Year	Amount in Rs. crore	Estimated total length (km) to be maintained by PRIs	Estimated length (km) transferred to PRIs
2004-2005	12	1,914	
2005-2006	21	3,349	1,435
2006-2007	30	4,784	1,435
2007-2008	39	6,219	1,435
2008-2009	81	12,917	6,698
2009-2010	116	18,498	5,581
2010-2011	135	21,528	3,030
2011-2012	145	23,123	1,595
2012-2013	153	24,398	1,276
2013-2014	161	25,674	1,276

Source: ADB (2003) and consultants' calculations.

[13] MPRRDA PIUs are required to hand over PMGSY roads to Jila Panchayats five years after construction.

Table 5.5 shows the increasing demand for funds maintenance (routine maintenance, emergency works and periodic maintenance) of PMGSY roads. The estimated allocations assume that the programme would be completed by the end of 2007-08 and therefore, the maintenance of all PMGSY roads would be transferred to the PRIs by 2013-14. Since the total estimated length of PMGSY roads is 25,674 km, the total allocation of Rs 161 crore (US$37.0 million) in 2013-14 implies a provision of Rs 62,709 (or US$1,450) per km. Based on this maintenance cost estimate, column 3 shows the total road length to be maintained by PRIs in each year and column 4 shows the roads to be transferred to PRIs in the given year[14].

Table 5.5 implies a rapidly growing programme of maintenance to be undertaken by districts, requiring the necessary funding and capacity to manage it. For an average district, the maintenance programme would grow from 43 km per district in 2004-05 to 287 km in 2008-09 and to 571 km in 2013-14. The requirement may undergo revision depending upon the actual progress achieved under the PMGSY.

An alternative estimate of maintenance cost[15] for rural roads in MP is based on the assumption that routine maintenance and emergency repairs costs would increase from about Rs 12,000 per km in the first year after construction, upgrading or rehabilitation to about Rs 25,000 in the fifth year (Rs 14,000 in the second year, Rs 16,000 in the third year, Rs 20,000 in the fourth year) giving an annual average of Rs 17,000 per km. Periodic maintenance would be required every 6 years and would cost about Rs 3 lakh per km or an annualised periodic maintenance cost of Rs 50,000 per km. The annual maintenance cost on this basis is about Rs 67,400 (or US$1,550) per km. This estimate is somewhat higher than the one used in the GOMP commitment.

The lower figure of Rs 62,709 is used for making estimates of maintenance cost in this report but with some reservations. Traffic in terms of daily commercial vehicles on rural roads is likely to be much lower than the assumed range of 500 to 1,500. In Sihora and Dhar Blocks daily commercial vehicles were found to be 60 and 122 respectively. Further, no maintenance cost estimates were available for gravel roads. There is clearly a need to undertake more in-depth studies of maintenance costs for rural roads to make more realistic assessment of funding requirements.

As increasing funds are required for maintenance of PMGSY roads, it is assumed that they will be provided for this purpose through the normal GOMP budget allocation procedures via PRDD to the Jila Panchayats who will be required to submit annual plans for maintenance activities and estimates of required funding. Since the annual revenue from Mandi Cess allocated to the Kisan Road Fund is between Rs 100 to 120 crore, there should be sufficient funds from this source for maintenance until 2009-10 (see Table 5.5), assuming there are no other demands on these funds and the

necessary inflation adjustments are made. Beyond 2010, the cess on agriculture produce would have to be increased or other sources of funds identified.

5.7 Funding Arrangements for non-PMGSY Rural Roads

For the maintenance of non-PMGSY roads, the funding arrangements remain unsatisfactory. Following the transfer of responsibility for maintenance of rural roads to PRIs in 1999, operational and financial responsibilities for their maintenance have been left with the Gram Panchayats. No specific provision was made for meeting the cost of maintenance. Nevertheless, PRIs have a number of sources of funds which could be made available for road maintenance. These are considered later in this section following estimates of costs of maintaining non-PMGSY roads.
Three issues which need to be addressed in considering the financing of the maintenance of non-PMGSY roads are:

(a) the size, nature and condition of the non-PMGSY road network;

(b) whether it would be appropriate for Gram, Janpad or Jila Panchayats to have financial and operational responsibility for them, and

(c) funds for road maintenance available to Gram, Janpad and Jila Panchayats from GOI and GOMP allocations and their own ability to raise funds through local charges.

The total length of non-PMGSY rural roads in the state is somewhere between 18,500 and 44,200 km. This uncertainty arises because it is not clear whether all PMGSY roads are completely new roads or tracks excluded from the previously estimated length of ODRs and VRs. The PMGSY roads observed by the consultants in the field appeared to be existing roads or tracks which were included or likely to be included in the list of ODRs and VRs. The Block level inventories in Dhar and Jabalpur (see Section 7) confirm this assessment[16]. Another uncertainty is the classification of roads since a large number of MDRs were reclassified as ODRs or VRs in 2002 and a fully updated database of roads does not exist.

[14] Based on the assumption that roads are transferred to PRIs in the sixth year after the year of construction.
[15] Study by domestic consultant P Katare.
[16] About 88 and 83 percent respectively of PMGSY roads in Sihora and Dhar blocks respectively have a rural road classification (i.e. ODR or VR and MDR in one case in Sihora).

Data on non-PMGSY roads needed for planning and financing arrangements are (a) their functions (e.g. whether they are link roads or through roads), (b) surface type (e.g. BT, WBM or gravel) and (c) their condition (i.e. the level of access they provide and whether they are maintainable). Their functions have an important bearing on whether it would be appropriate for Gram Panchayats to have responsibility for maintenance financing and/or operations (with Janpad and Jila level support) or whether maintenance should be financed and managed at the Jila or Block levels.

Some non-PMGSY roads may be important through roads in a maintainable condition, providing access to a number of villages and carrying relatively more traffic. Based on the function of such roads, the population they serve and the traffic they carry, they may justify a higher priority for maintenance than some short PMGSY link roads connecting single villages. Under current and proposed arrangements, maintenance of such non-PMGSY roads is left to the Gram Panchayats of villages through which they pass. Since such through roads serve a much larger and dispersed population, the Panchayats of the villages through which they pass are unlikely to have the commitment, resources or the capability to maintain them. Management and financing of such roads would be more appropriate at the Block or Jila level. Conversely, for very short non-PMGSY (and PMGSY) link roads serving one or two villages, operations could be left to Gram Panchayats with some financial and technical support and guidance from the Block and Jila levels.

The above discussion has identified the option of removing the distinction between PMGSY and non-PMGSY roads and taking an overall rural road network approach for developing a coherent maintenance strategy for rural roads at the district level incorporating financial and operational aspects. There is insufficient information at present to estimate the size of the non-PMGSY rural road network, its condition and whether it consists entirely of short link roads to villages or also includes through roads[17]. For a broad initial assessment of the current funding situation for maintaining non-PMGSY roads, it is assumed that its size is in the range of 18,500 to 31,300 km. The range is based on alternative assumptions about the proportion of PMGSY roads which are new. The lower estimate assumes that all PMGSY roads are existing roads or tracks included in the 2002 estimate of ODRs and VRs (Table 3.2) while the higher estimate assumes that 50 percent of PMGSY roads are new and therefore additional to the estimated length of ODRs and VRs.

In the absence of better information, in this preliminary assessment, it is assumed that half of non-PMGSY roads are maintainable or partially maintainable. Maintenance is limited to maintainable or partially maintainable roads since there is no benefit from attempting to maintain roads in unmaintainable condition. This condition also applies to PMGSY roads before they are constructed. It is possible that some roads to be included in the PMGSY programme may not be completed by 2007. Under the network

maintenance strategy, they would be included in a maintenance programme only if they are maintainable.

Further, about 30 percent of the maintainable or partially maintainable roads are assumed to be short link roads (i.e. 3 km or less) with the remainder being longer link roads or through roads to be maintained at the Block or Jila level. Based on these assumptions and the maintenance cost of Rs 62,709 (or $1450) per km assumed for PMGSY roads, Table 5.6 estimates the total cost of maintaining the maintainable or partially maintainable non-PMGSY rural roads to be in the range of Rs 58 to 98 crore ($ 13.3 to 22.5 million) or between 36 and 61 percent of the maintenance cost of Rs 161 crore ($37 million) for PMGSY roads. The table also shows the split in costs of maintaining short link roads and the rest of the road network.

A distinction is made between short link roads and the rest of the roads since in a network approach, maintenance of longer link roads and through roads would be managed at the Jila or Block level while short link roads mainly serving particular communities could be left to Gram Panchayats or maintained through community contracting. The distinction is also important when considering the financing of maintenance. The 30:70 split between shorter and longer roads is an approximation in the absence of more precise

Table 5.6: Estimate for maintaining non-PMGSY rural roads

	Lower estimate	Higher estimate
Non-PMGSY road length (km)	18,500 km	31,300 km
Maintainable (or partially maintainable) non-PMGSY roads (50% of total)	9,250 km	15,650 km
Maintainable (or partially maintainable) non-PMGSY through roads and link roads longer than 3 km (70% of all maintainable or partially maintainable)	6,475 km	10,955 km
Maintainable (or partially maintainable) non-PMGSY link roads 3 km or less in length (30% of maintainable)	2,775 km	4,695 km
Cost of maintaining through and longer link roads	Rs.41 crore	Rs.69 crore
Cost of maintaining short link roads	Rs.17 crore	Rs.29 crore
Total cost of maintaining rural non-PMGSY roads	Rs.58 crore	Rs.98 crore

information based on the situation analysis in the two Blocks which shows that about 30 percent of maintainable rural road length was on roads 3 km long or less.

[17] See Section 7 for a pilot road condition assessment in two blocks and some preliminary results in road conditions and maintainability.

Most of the maintainable or partially maintainable non-PMGSY roads have WBM or gravel surfaces. In the absence of cost estimates for maintaining these roads, the estimates for BT surfaced PMGSY roads have been used in the estimates in Table 5.6. This is a reasonable first approximation. The routine maintenance and emergency works costs may be somewhat higher for gravel and WBM roads but the periodic maintenance costs are likely to be lower than for BT surfaced roads though periodic maintenance may be required more frequently for WBM and gravel roads. There are also uncertainties with respect to the cost of maintaining partially maintainable roads. The necessity of making such rough approximations highlights the importance of further data collection and studies to assess the level of accessibility offered by the present road network and establishment of priorities with respect to road maintenance and improvement.

Evidence from the two sample Blocks studied in detail suggests that the above estimates of length of non-PMGSY roads and maintenance costs may be too high. In Sihora and Dhar respectively, the length of maintainable (but excluding partially maintainable) non-PMGSY rural roads is 9.3 and 23 percent of all maintainable rural roads on the assumption that all the PMGSY roads are constructed and maintainable. The costs of maintenance of non-PMGSY roads would also be about 9.3 and 23 percent of the total maintenance costs in Sihora and Dhar respectively. In the following discussion therefore it is assumed that the lower estimates of the total length of non-PMGSY roads in MP and maintenance cost are more plausible (i.e. total length of 18,500 km of which half are maintainable or partially maintainable and cost of maintenance of maintainable non-PMGSY roads of Rs 58 crore or US$13.3 million).

To develop a maintenance strategy option for the rural road network encompassing PMGSY and non-PMGSY roads, it is necessary to consider other actual and potential sources of funds for maintenance. Sources of funds for PRIs are:

(a) GOMP allocations from the consolidated budget,

(b) GOI and GOMP allocations of funds from development, employment and welfare schemes and initiatives,

(c) GOI contribution to the administration costs of DRDAs,

(d) tax raising powers, currently mainly at the Gram Panchayat level, and

(e) Kisan Road Fund. A detailed assessment of the financial situation of the PRIs is beyond the scope of this report. However, a preliminary assessment of some of the major sources of finance considered relevant

for rural road maintenance for the year 2002-03 has been carried out here (Table 5.7).

After the acceptance of the State Finance Commission's (SFC) recommendation in 1997, GOMP transfers 2.91 percent of the total income of the state to the Panchayats. The distribution of the grant (in line with recommendations of the 10th Finance Commission) between the levels of Panchayat Raj are 3.44 percent to Jila Panchayats, 8.04 percent to Block Panchyats and 88.52 percent to Gram Panchayats. The total state revenues in 2002-03 were Rs 14,178 crore (or US$3260 million). The estimated percentage allocations for Panchayats at the Jila, Block and Gram levels for 2002-03 are shown in the first row in Table 5.7. The total GOMP allocation for Gram Panchayats is substantial (Rs 366 crore or US$84 million), though given the large number of Gram Panchayats (about 22,000 in MP), the allocation per Gram Panchayat is small, about Rs 165,800 or US$3,810 (see Table 5.8).

Table 5.7: Some sources of PRI funds of relevance for road maintenance, 2002-3

(Figures in Rs. crore)

	Jila	Block	Gram	Total
1. Allocation from GOMP budget	14	33	366	413
2. GOI allocation for DRDA administration	10			10
3. Local tax revenues (Gram Panchayat)			407	407
4. SGRY I (GOI and GOMP)	52	78		130
5. SGRY II (GOI and GOMP)			117	117
6. Total	**76**	**111**	**890**	**1,077**
7. Possible amounts for road maintenance	**21**	**31**	**124**	**176**

Table 5.8: PRI funds: Allocation per average administrative unit

	Jila (45) Rs	Block (313) Rs	Gram (22,029) Rs
Allocation from GOMP budget	3,163,112	1,059,790	165,789
GOI allocation for DRDA administration	2,222,222		
Local tax revenues (Gram Panchayats)			184,918
SGRY I (GOI and GOMP)	11,555,556	2,492,013	
SGRY II (GOI and GOMP)			53,112
Total	**16,940,890**	**3,551,803**	**403,819**
Possible amounts for road maintenance	**4,622,222**	**996,805**	**37,824**

Note: Number of units for Zila, Block and Gram given in bracket.

Jila and Janpad Panchayats have very limited resources and powers to impose taxes and collect duties. Much of their allocation from the GOMP state budget is required for meeting staff costs leaving very little for local development initiatives. The poor resourcing of Jila Panchayats / DRDAs is recognised by GOI and since DRDAs are responsible for administering rural development and welfare initiatives on behalf of GOI, the latter makes an

annual grant to the States under the "DRDA Administration Scheme" (Row 2 in Table 5.7). These allocations of funds for Jilas and Blocks are shaded to indicate that no part of these funds would be available for road maintenance.

Gram Panchayats have the powers to generate revenues through compulsory and optional taxes. The compulsory taxes include water tax, property tax, light tax, professional tax, market tax and animal registration fee. Optional taxes are levied on bullock carts, bicycles and lodges. Other sources of revenue are lease of ponds/lakes and extraction rights of minor minerals. GOMP may also fix targets for revenue recovery for PRIs and award an incentive grant to units which exceed their revenue targets.

Nevertheless, according to Behar and Kumar (2002), Gram Panchayats find it difficult to levy taxes because Panchayat representatives feel that basic services (roads, light, drinking water facilities and drainage) provided by the State are inadequate and therefore the community would be unwilling to pay higher taxes. Moreover, Sarpanches and Panchayat members do not want to become unpopular by raising taxes. The management capacity of Panchayats to use resources properly and effectively has also to be improved. As a consequence, a large proportion of Panchayat funds are from GOMP budget allocation and GOI and GOMP grants tied to specific programmes. Behar and Kumar (2002) found that for a sample of Gram Panchayats in 1998-99, 45 percent of Gram Panchayat funds were from sponsored programmes and 26 percent from GOMP budget allocations. The remainder (about 29 percent) were mostly from local taxes and charges. Based on this finding, Row 3 in Table 5.7 shows the estimated average revenue from local taxes and charges[18] though other evidence (Mathur, undated) shows that there are large variations between Gram Panchayats in locally raised revenues.

Other important sources of PRI funds are GOI and GOMP sponsored development and welfare programmes. Because of its infrastructure orientation and size, the Sampoorna Grameen Rozgar Yojana (SGRY) could be a possible source of funds for rural road maintenance and therefore SGRY allocations of cash for MP (MORD allocations and matching MP funds) are included in Rows 4 and 5 in Table 5.7.

The overall objective of SGRY is to provide paid employment on infrastructure development projects for the poorest members of the rural population. The primary objective is employment generation and food security, especially for the disadvantaged sections of the rural population, and infrastructure development (roads and other works such as water tanks, small irrigation schemes, schools and other community buildings) is the secondary objective. Expenditure on roads is thought to be the largest component but the breakdown of expenditure by types of infrastructure is not available.

SGRY is by far the largest scheme of the Ministry of Rural Development in

GOI. It was created in 2001 by consolidating two schemes, EAS (Employment Assurance Scheme) and JGSY (Jawahar Gram Samrudhi Yojana). The allocation of resources was also increased substantially. To enable this increase, surpluses of grains built up by the Food Corporation of India (FCI) are being released to supplement cash payments. In 2002-03, the total national expenditure on SGRY was Rs 4,444 crore (about US$ 1020 million), about 45 percent of the total outlay on all schemes. In comparison, for the same year, the Ministry of Rural Development's allocation for PMGSY was Rs 2,500 crore (about US$ 575 million).

SGRY is split into two equal streams of cash and food grains. Tables 5.7 and 5.8 show the cash part of SGRY only.

SGRY I is implemented at the district and block panchayat levels with 40 percent of the allocation provided to Jila Panchayats and 60 percent to Block Panchayats. At the Jila and Block levels respectively, DRDA and the Block Development Office manage SGRY projects (with technical implementation by RES Unit) but decisions about project selection are taken by the Jila and Block Panchayats. For funds allocated through development blocks, project proposals from the Gram Sabhas and Panchayats are considered by the Janpad Panchayats. In selecting projects for schemes aimed at poverty alleviation, the proportion of BPL (below the poverty line) population is an important consideration.

SGRY II is implemented at the Gram Panchayat level. Formally, project proposals are generated through a bottom-up approach. All villagers have a right to participate in this process. The proposals are generated at Gram Sabhas (village meetings) convened by the Sarpanch , the democratically elected leader of the Gram Panchayat.

While the infrastructure orientation of SGRY makes it a potential source for road maintenance, there are a number of policy, institutional and implementation constraints, which prevent such use at present. At the national policy level, there are two major problems:

(a) the primary objective of SGRY is employment creation rather than effective use of labour in creating or preserving useful assets[19], and

(b) with respect to the infrastructure, the emphasis is on creating new assets rather than on preserving assets.

[18] The total Gram Panchayat revenue has been estimated by using the GOMP allocation being 26 percent for the sample. Local taxes and charges are calculated as 29 percent of the total revenue.

[19] Because of this primary objective, information on the assets created is not readily available. Reports on the level of expenditure, the proportion of allocated funds spent and employment created are available.

The need for maintenance is recognised but an upper limit of 15 percent of SGRY allocation is put on maintenance expenditure.

PRIs are clearly constrained in taking an asset preservation approach when using SGRY funds because of the upper limit on the proportion that can be spent on maintenance. Further, the incentives or controls to improve the effectiveness of funds in creating or preserving assets are weak since the primary objective is employment creation. Although up to a maximum of 15 percent of SGRY resources can be spent on maintenance, in practice the proportion of resources devoted to maintenance is much lower and maintenance activity is limited to emergency works. Reasons for the preference of construction over maintenance are the general absence of a maintenance culture, lack of incentives for preserving assets and lack of the relevant capabilities and resources. Observations during field visits of roads built under Gram Panchayat funds support the view that roads are unmaintainable.

It is hoped that greater orientation of SGRY towards maintenance of roads (and preservation of other infrastructure assets) would be possible and therefore SGRY could be considered a possible source for maintenance of non-PMGSY roads. The necessary policy change would have to be complemented by an asset preservation approach in decision making at the Jila, Block and Gram levels. Some of the conditions required for the development of this approach in the context of PRIs are discussed in Section 6.

There are a number of other rules relating to the use of SGRY resources which may affect their use in road maintenance. These are:

(i) a minimum proportion of expenditure in localities with scheduled caste / scheduled tribe (SC/ST) populations;

(ii) a minimum proportion of women and persons from "below poverty line" (BPL) households to be employed on SGRY projects;

(iii) at least 60 percent of expenditure in SGRY projects should be payment to labour, and

(iv) no private contractors permitted on SGRY projects

Rules (i) and (ii) above do not pose serious problems for the use of SGRY funds for maintenance. SGRY resources can be directed to SC/ST localities to the extent necessary and funds from other sources can be used in other localities. Routine maintenance is by nature labour intensive and therefore 60 percent or more of operational expenditure is likely to be on labour and therefore rule (iii) is likely to be fully satisfied.

The rule preventing private sector contractors may need consideration. May be only petty contractors could be permitted on the condition that they use local labour and adhere to minimum wage regulations. The use of community contracting for short local roads could be another option.

The following assumptions are made to arrive at an indication of PRI funds which could be available for road maintenance:

(a) none of the allocations from the GOMP budget for the Jilas and Blocks and the GOI allocation for DRDA administration will be available for road maintenance because of poor resourcing at these levels;

(b) 10 percent of the GOMP budget allocation for Grams and 10 percent of revenue from local taxes and charges will be available for road maintenance, since administrative costs are low at this level and roads are probably the most valuable local public asset, and

(c) 40 percent of SGRY I and II funds are allocated for rural road maintenance.

Assumption (c) is justified on the grounds that investment in roads is thought to take up a higher proportion of SGRY resources than investment in other infrastructure and if the asset preservation principle is accepted, all spending on roads from SGRY would be devoted to maintenance.

Based on the above assumptions, Table 5.7 shows the amounts which could be available for the maintenance of non-PMGSY roads from currently available resources. The total amount is Rs 176 crore (or US$40.5 million)

which is well in excess of the range of costs of maintaining non-PMGSY roads estimated in Table 5.6. The lower cost estimated in Table 5.6 (assumed to be more realistic based on evidence from the sample Blocks) is about 33 percent of the available amount estimated in Table 5.7. Alternatively, the cost of maintaining non-PMGSY rural roads cost is about 5.4 percent of the GOMP budget allocation for the PRIs, estimated local taxes and charges (at the Gram level only) and the SGRY allocation for MP state.

The cost of maintaining non-PMGSY roads in MP is about 5.7 percent of the estimated PRI funds identified in Table 5.7. There are clearly many claims on the relatively limited resources of the PRIs. However, since roads are among the most important public assets, a contribution of 5.7 percent of the identified resources towards their preservation is not unreasonable. From another perspective, the estimated non-PMGSY maintenance cost is about 23.5 percent of the SGRY allocation of cash in MP. Since investment in roads is thought to be the largest component (though the exact proportion is not known), using SGRY resources currently used for road construction on road maintenance is unlikely to be at the expense of expenditure on other rural infrastructure.

Table 5.7 also shows that the distribution of available funds in aggregate is in favour of Gram Panchayats with Rs 124 crore or just over 70 percent of the assumed available funds for maintenance being at this level. However, the specific situation at the individual Gram Panchayat level is more complex. Table 5.8 shows that if the estimated amount available from the income of Gram Panchayats is averaged out, the amount per Gram Panchayat is small (Rs 37,824 or US$870), possibly enough to pay for routine maintenance on 2-3 km of rural road. However, for some villages on NHs, SHs MDRs or through roads, maintenance on a road to preserve access may not be necessary. For other villages relying on VRs and ODRs for access, a higher proportion of the budget may be required. In determining Gram level contributions to the cost of maintenance and setting up community contracts, a District level strategy to deal with the different resource, access and maintenance cost situations faced by different villages is required.

5.8 Need for a Dedicated Fund for Maintenance

It is seen that there is huge gap between the funds required and those currently available for maintenance of rural roads in the state. Options such as increasing the Kisan Road Fund and some allocations out of SGRY funds have been discussed above. Needless to assert that maintenance requires a stable and sufficient level of funding. Sources of funds for road maintenance and arrangements for their allocation include:

(a) an allocation from the general government consolidated budget;

(b) an allocation by the government from earmarked taxes which may be more or less directly related to road use (e.g. tax on fuel, vehicle licence fees or a tax on farmers' sale of produce), and

(c) charges specifically identified as "user charges" (e.g. levies on fuel, vehicle licence fees, road tolls and farmers' sale of produce) to be placed in a fund to be managed separately from government budgets and to be used only for roads according to established and transparent procedures and criteria.

In many countries, allocation of funds for road maintenance from the general government consolidated budget has been found to be unsatisfactory. It often leads to an unreliable and inadequate level of funding especially where increased expenditure on road maintenance is a new additional commitment. There are many existing competing claims on the budget and therefore finding additional funds at the expense of other activities would be difficult. Further, if the government finds itself in financial difficulties, it may look for cuts in areas such as maintenance where the implications of the cuts are not immediately apparent. Paradoxically, governments sometimes borrow money for investment in new roads leading to higher maintenance commitments in the future while cutting maintenance expenditure.

At first sight, the distinction between earmarked taxes and "user charges" i.e. alternatives (b) and (c) above appears to be superficial. There are nevertheless some very important differences between them. Additional earmarked taxes to fund road sector improvements and maintenance clearly show a medium- to long-term commitment on the part of the government. Alternative (b) is sometimes referred to as a "first generation road fund". Such funds, essentially earmarked streams of tax revenues put at the disposal of roads depart-

ments, were created in some countries between the 1950s and 1990s[20]. Earmarked taxes often continue to be treated as part of the general government revenue. Therefore allocations for road maintenance remain uncertain and subject to fluctuations. They are liable to be siphoned off for other purposes or cut back if the government runs into financial difficulties. The allocation procedures may also be less transparent. Further, for road users, a clear link is not established between the additional tax and its use in improving and maintaining the road network.

Alternative (c) is referred to as a "second generation road fund". The revenues of such funds are obtained from levies and surcharges designated as "user charges" which should be:

(i) easily recognisable as being related to road use;

(ii) clearly separated from other taxes, and

(iii) easy to collect with low administrative costs and not vulnerable to widespread evasion, avoidance or leakage.

The main types of user charges are vehicle licence fees, levies on transport fuels, heavy vehicle fees, international transit fees and tolls. For rural roads, other suitable forms of charges may also be used. A levy on farmers' sales of produce[21] may be one such charge for rural roads. However, if a significant proportion of road users are not farmers or providers of transport services to a predominantly farming population, such a charge may not be considered fair.

For rural roads under local government management, the options are allocations from centrally collected charges or locally levied charges. Generally, it is administratively less costly to collect the charges centrally but this approach clearly reduces the discretion at the local government level to raise additional charges for road maintenance if a higher level of such expenditure is necessary or preferred because of local circumstances. A possible solution is to raise the bulk of the charges centrally and allocate them to the local authorities and to leave some charges (e.g. on licensing of selected vehicles and market fees) at the discretion of local authorities.

A second generation fund is kept separate from general government accounts and is managed and administered by a secretariat under the direction and supervision of a board on which road users are represented. Ideally, the road fund board should have a high degree of independence and power to increase user charges when necessary. In practice, the degree of independence varies and road fund boards make recommendations on road user charges but the final decision on charges is made by the government.

Setting up a road fund requires a policy decision and a legislative act to separate funding of roads from general government expenditure and provide autonomy to a road fund board. The issues which need attention in setting up a road fund are:

- whether provide funds for a specific road category (e.g. rural roads) or different categories of roads,
- whether funds would be provided for maintenance only or also for rehabilitation and new construction;
- procedures for allocation; and
- reporting, monitoring and auditing arrangements for the expenditure.

Asset preservation should be an important principle in establishing the scope, allocation procedures and monitoring and auditing arrangements. Some road funds are set up specifically for maintenance. In such cases, rehabilitation and new construction are undertaken from the development budget. In line with the asset management model, the additional maintenance commitment such investment would require and how it would be financed must be specified. If the road fund provides funding for maintenance, rehabilitation and construction, priority must be given to maintenance since preserving, maintaining and maximising the operations of the existing road network provides higher benefits than investment in more roads which also add to future maintenance commitments. When a new fund is being set up for rural roads on which maintenance has been neglected for some time, the road fund should be limited to financing maintenance only to avoid the pressure to direct funds to upgrading or new construction.

Procedures for allocation of funds by boards may be rules based or needs based. A 'rules based' approach, which is normally subject to government approval, would be based on criteria such as the size of the road network and the population served. A 'needs based' approach requires the use of a standardised MMS by all the local administrations. The MMS needs to be a simple system to enable rational prioritisation within a given budget. Whatever procedures and criteria are used, clarity in the statement of the rules and transparency in their application are paramount. For a road fund providing resources for different classes of roads, a decision has to be made on the broad allocation between them. For rural roads under local administration, allocation between areas can be a contentious issue.

[20] New Zealand, Japan and USA set up such funds in the 1950s, followed by numerous countries in Africa, Asia and Latin America in the 1970s and 1980s, often when facing financial crises, and East European countries in the 1990s (Heggie, 1995).

[21] Such as the Mandi Cess in MP.

Effective reporting, monitoring and auditing are essential for ensuring proper use of funds and adherence to the asset management principle. Disbursement procedures play an important role in monitoring and auditing. Three commonly used approaches (Heggie, 1995) are:

- disbursement of funds directly to road agencies on a regular basis and auditing ex post;
- issuing approval of the work to be done and then reimbursement to the road agency after the work has been completed, or
- payment to contractors directly, but only after certification that the work has been completed satisfactorily.

Box 5.1 sets out the main features of second generation road funds managed by road fund boards with a degree of independence. Box 5.2 gives an example of the Kerala road fund board which has a number of features of the road fund model outlined in Box 5.1. It differs from the standard model in two important respects. The first is that the board is heavily dominated by government representatives and there are no users' representatives on it. The second is the motivation for setting up the fund and the board is to generate external funds for investment in the sector, though maintenance has a higher priority than upgrading and construction.

Box 5.1 Features of second generation (or commercially managed) *Road Funds*

Essential features
The required revenues are generated by a road tariff putting roads on a fee-for-service basis and depositing the proceeds into a commercially managed *Road Fund* (users pay concept). Road users should be involved not only in the financing of the *Road Fund*, but also in its management. Road financing problems cannot be solved without the strong support of road users. This support cannot be won without ensuring that resources are used efficiently. This requires clearly defined managerial responsibilities and accountability.

Legal status of a *Road Fund*
- Best practice is to set up a *Road Fund* under its own, separate legislation.
- If it is set up under existing legislation (like the Finance Act), or using simple decrees, there should be a sunset clause to determine when it would be regularized by passing basic legislation, or closed down.
- The legislative instrument opening the *Road Fund* should be supported by published financial regulations or procedures. These may either be published as legal regulations in the official gazette, or published by the *Road Fund Board*.
- The legal document creating the Road Fund should state clearly which items the *Road Fund* can finance and should give some indication of relative priority. The usual priority ranking is:
  a) maintenance;
  b) cost of *Road Fund* administration;
  c) low cost/high impact road safety projects;
  d) counterpart funding to donor-financed road rehabilitation projects;
  e) counterpart funding to donor-financed small-scale road upgrading projects, and
  f) counterpart funding to donor-financed improvement projects.

An independent road fund agency
- A *Road Fund* may finance trunk roads, provincial roads, urban roads, and the rural road network (including unclassified roads) and thus provide funds to more than one *Implementing Road Agency* (including local governments). In that case, the *Road Fund* should be managed through a separate *Road Fund Agency* independent of any of the implementing agencies, to avoid any conflicts of interest between *Implementing Road Agencies* and to channel funds in an even-handed way.
- Responsibilities of the *Road Fund Agency* are to:
  a) collate the programmes of Implementing Road Agencies;
  b) endorse them;
  c) prepare and endorse the Road Fund Budget, which allocates funds to the approved programmes;
  d) endorse the resulting works contracts;
  e) disburse funds after certification of work is done by consultants, and
  f) hire independent auditors.

The road fund board
- The *Road Fund* should be managed by a *Road Fund Board* on which stakeholders are represented. The majority of members should be representatives of road users, nominated by the constituencies they represent, and an independent *Chairperson* of the Board should be elected by the members.

- *Road Fund Board* responsibilities are:
  a) to recommend to the Minister of Finance, for inclusion in the Government's Annual or Supplementary Budget, the level of road user fees and road user charges that constitute the *Road Tariff* [if a Road Fund has powers to set its own tariff within an annual Framework Agreement negotiated with the Ministry of Finance, 'recommend' to be replaced by 'establish'];
  b) to approve arrangements for collecting all the fees and charges assigned to the *Road Fund* and to minimize avoidance and evasion;
  c) to establish and publish the criteria used to allocate financing between the *Implementing Road Agencies*;
  d) to prepare the *Road Fund Budget* on the basis of elements prepared by the *Implementing Road Agencies* and approve it;
  e) to institute an integrated and coordinated approach to the planning of road works by establishing the form and content of the *Annual Road Programme*, and
  f) to establish procedures for disbursing funds for works forming part of the approved *Road Fund Budget* and approved *Annual Road Programme*.

Box 5.2 The Road Fund in Kerala

The Kerala Road Fund was created to demonstrate greater commitment to the development and maintenance of the PWD road network and to mobilise greater non budgetary resources (user charges, private sector involvement and external funding). It was constituted under the Kerala Road Fund Act 2001 which became law on 23rd November 2001. The purpose of the Road Fund is to finance:

- routine recurrent and periodic maintenance of PWD roads;
- development of existing road network system including upgrading of roads maintained by the PWD;
- construction of new roads wherever necessary;
- such road safety projects as are found essential for safe and smooth traffic;
- research related to maintenance and development of roads, and
- any cost-sharing, donor-funded projects intended for all or any of the purposes mentioned above.

Projects under the Road Fund can be taken up in association with private entrepreneurs or financing institutions on a cost and benefit sharing basis. If proposed projects are not considered rewarding enough to attract private participation, incentives in the form of a share of the costs involved. The Road Fund shall consist of:

(a) all moneys received from the Central Road Fund established under the Central Road Fund Act, 2000;
(b) the contribution made by the Government;
(c) all fees, fines and other amounts collected by the Government according to the provisions of the Kerala Highway Protection Act, 1999;
(d) all payments made by the concessionaire as per the concession agreement;
(e) all amounts standing to the credit of the Bridges Fund established under section 12 of the Kerala Tolls Act, 1976;
(f) the user fees collected by the Government agency or the statutory body under the Kerala Road Fund Act;
(g) grants or loans or advances made by GOI, Government of Kerala or other institutions;
(h) all returns on investments made by the Road Fund Board directly or through a Government agency or statutory body;
(i) any amount borrowed by the Road Fund Board, and
(j) any other amount authorised for credit to the Fund under the provisions of the Road Fund Act or rules made thereunder or any other law for the time being in force.
(k) the government shall contribute to the Fund every year an amount equal to 10 percent of the tax collected by them in the previous year under the provisions of the Kerala Motor Vehicles Taxation Act, 1976, and the said amount shall be charged on the Consolidated Fund of the State.

The Board shall consist of the following members:

- Chief Minister-ex-officio, who shall be the Chairman of the Board
- Minister in charge of Public Works - ex-officio, who shall be the Vice-Chairman of the Board
- Minister in charge of Finance - ex-officio
- Minister in charge of Transport - ex-officio
- Principal Secretary to Government in charge of Public Works Department - ex-officio, who shall be the Member Secretary of the Board
- Law Secretary - ex-officio
- Chief Engineer, Roads and Bridges - ex-officio
- Three persons nominated by the Government from among the heads of financial institutions engaged in the business of infrastructure
- Scheduled banks or technical or engineering personnel working in National level institutions.

There shall be an executive committee consisting of (a) Minister in charge of Public Works (Chairman of the Executive Committee), (b) Principal Secretary to Government in charge of Public Works Department (Vice Chairman of the executive committee), (c) Finance Secretary to Government, (d) Law Secretary, (e) Chief Engineer, Roads & Bridges, and (f) Two members nominated by the Board from among the nominated members of the Board.

Box 5.3 gives an example of state road fund for maintenance set up by the Government of Uttar Pradesh in 1998.

Box 5.3: State Road Fund by Uttar Pradesh, 1998	
Purpose:	Maintenance of state roads including rural roads
Source:	Increase in sales tax on diesel/petrol
Accruals:	Amount Rs. 232 crore in 1999-2000 currently around Rs.400 crore.
Management:	A committee of 22 members chaired by Minister Public Works and representatives of government departments (public works, rural development, industries, tourism, urban, finance), public men (MPs, MLAs, Chairman Zilla Parishads) and private sector Serviced by office of Engineer-in-Chief Rules and regulations framed by the state PWD.

In view of the State Government of Madhya Pradesh having already created a Kisan Road Fund, it should not be difficult to evolve some mechanism to put financing of road maintenance on sustainable basis.

Chapter 6

Operational Capacity

6.1 Features of Effective Operational Capacity

Operational capacity is essentially the capacity to implement maintenance works on the ground and requires:

(a) planning capacity to assess the condition of the road network and plan, design and prioritise maintenance activities;
(b) ability to manage the contracting process and supervise and monitor contractors;
(c) technical expertise to evaluate the effectiveness of current standards and practices and test and develop alternative approaches,
(d) provision for monitoring and evaluation, and
(e) technical and financial reporting and auditing.

The operational capacity does not all have to be within public sector agencies. Appropriate use of the private sector can supplement to achieve improvement in operational efficiency, more effective management of operations through contract conditions, and overcoming capacity constraints faced by public sector agencies.

However, to ensure effective use of the private sector for rural road maintenance, it is necessary to develop local private sector capacity and have management and monitoring procedures and incentives to ascertain that

work to the required standard is being carried out. This may be particularly challenging for routine maintenance of rural roads since traditional larger contractors may not be willing to undertake such works in small quantities on geographically dispersed roads. There is good scope for using small local contractors or some form of community contracting in such situations. However, this will require capacity building of small contractors and community organisations and putting in place effective supervision and monitoring arrangements suitable for small scale maintenance operations.

6.2 Current Situation: Public Sector Agencies

It is evident from the discussion of the current institutional situation (Section 4) that operational capacity for managing road maintenance at the District and sub-District levels is quite limited. This is understandable because responsibility for maintenance has been given to the PRIs recently and the necessary funding and support have not been forthcoming. There is, however, a base of relevant capabilities, experience and existing guidelines and national level norms[22] which provide a foundation for developing the capacity to manage maintenance operations. Implementation of construction and rehabilitation of roads through contractors is a well established practice in MP and there is a pragmatic and flexible approach to the use of the private sector to supplement public sector capacity (e.g. the use of private consultants for project preparation and supervision on PMGSY). This in turn would put a demand on the public sector to develop management and technical capacity to monitor the private sector performance and outputs.

Section 4 outlines the current institutional structure and shows that there are a number of options for developing the necessary capacity in the public sector. The current operational capacity and development requirements (including the role of the private sector) are considered in this context. Table 6.1 identifies the main operational activities for maintaining rural roads and briefly describes (i) the norms and standards where they exist, (ii) current practice and capacity, and (iii) options for future maintenance operations. The operational norms and standards have been set out in IRC (2002) and cost norms are specified by MOSRTH. The operational norms are useful as a general guide, however, they need to be operationalised in the context of the physical, technical, resource and institutional conditions in the state.

[22] For example, see IRC (2002).

Table 6.1 Maintenance operations for rural roads	
1. Operation: Inspection of Roads	
Description	Detect urgent maintenance and traffic safety hazards to identify emergency maintenance actions to ensure safety, to check condition of surface, shoulders, side drains and cross drainage works.
Norms and standards (based on IRC (2002))	A minimum of 2 inspections, one before the monsoons and one after, are recommended *"to keep the road surface trafficable during the rainy season and after the rains"*.
Current practice and capacity	No regular arrangements in place at present. Ad hoc reporting of the most severe situations to be dealt with by the Gram Panchayats and Sarpanches with technical support from RES. It is assumed that for PMGSY roads, routine inspection will be included in maintenance contracts but precise forms of contracts and management and monitoring arrangements have not been determined. For non-PMGSY roads, the status quo (i.e. no regular arrangements) would remain. This is not sustainable. It will be necessary to include them in the new maintenance strategy.
Options - institutional arrangements and practice	*Both Options below could be for PMGSY roads only (i.e. Institutional Option 1) or for all maintainable rural roads (i.e. Instutional Options 2a and 2b) set out in Section 4.3.* **Option 1:** Regular inspections according to norms (or modified norms) by RES staff and procedure for reporting emergencies by the community and their representatives (Gram Panchayats and Sarpanches). Necessary maintenance works by contractors. **Option 2:** Maintenance contracts to include routine inspection and procedures for reporting emergencies by the community and their representatives (Gram Panchayats and Sarpanches) to contractors or RES. Under Option 2, need for monitoring by RES if contract includes inspection and repair work. The form of monitoring would vary depending on the contract (two possible alternatives being (a) a standard inclusive rate for inspection and normal emergencies (additional payment for exceptional problems) or (b) payment for routine inspection with additional payment for the necessary work).
2. Road Condition, Traffic Surveys and Road Inventory	
Description	Procedures for conducting rapid road inventories and condition surveys appropriate for rural roads. Development and updating of an MMS based on data from the inventory and condition surveys. Traffic count data or proxy indicators (e.g. population served) for assessing maintenance requirements and priorities.
Norms and standards (based on IRC (2002))	There is some guidance for conducting road inventories and the need for an MMS, no models appropriate for rural roads are available. The pilot surveys in this study (see Section 7) provide a basis for condition surveys which can be linked to an MMS. Maintenance cost norms are related to traffic.
Current practice and capacity	There is no system of data collection at present on the condition of rural roads though there is a classification by road surface. Evidently, there is no capacity to undertake road inventories and establish an MMS.There is no system in place for collecting traffic data on rural roads.

Options - institutional arrangements and practice	**Option 1:** RES Unit to be responsible for these activities with the requisite capacity development. **Option 2:** Activities to be outsourced to the private sector with the requisite capacity development. *Performance monitoring needed in both cases on the accuracy of data. Under Option 2, the private sector agency should be independent of maintenance contractors to avoid problem of conflict of interest.*
3. Maintenance Planning and Selection of Maintenance Treatment	
Description	Assessment of maintenance requirements and costs (routine, emergency and periodic) based on road inventory and condition surveys and MMS. Recognising priorities (e.g. between routine and periodic maintenance), selecting appropriate treatments, estimating input requirements and costs and prioritising within the available budget.
Norms and standards (based on IRC (2002))	There is guidance for maintenance planning and there are cost norms but the procedures and cost estimates need to be adapted and operationalised by linking them with the MMS. Studies of actual maintenance operations on rural roads to assess their effectiveness and costs (to be undertaken by RES/PWD/MPRRDA) will be essential for improving maintenance planning and developing the MMS.
Current practice and capacity	No maintenance planning for rural roads at present and no capacity exists. For PMGSY roads, the need for maintenance planning and capacity building for planning are recognised but the precise location of capacity and the possible role of the private sector are not clear.
Options - institutional arrangements and practice	**Option 1:** RES and DRDA to be responsible for maintenance planning with DRDA mainly responsible for the planning and budgeting and RES for the technical aspects (e.g. selection of maintenance treatment) with the requisite capacity development. **Option 2:** Maintenance planning to be outsourced to the private sector with the requisite capacity development.
4. Procurement of Maintenance Works and Management of Contractors	
Description	Procedures for selecting contractors for maintenance works, preparation of bidding documents, bidding, preparation of contracts and bid evaluation). Management of contractors involves site supervision, quality and quantity control, handling claims, approval of works for payment and other contractual matters, keeping records and reporting on physical and financial progress. A formal monitoring and evaluation system would be useful.
Norms and standards (based on IRC (2002))	Established procedures and formats for procuring civil works are used by the PWD and RES but contractors are not usually permitted to undertake routine maintenance. MPRRDA uses standard procedures and documents for PMGSY road construction, prepared at the national level.
Current practice and capacity	The practice of employing contractors for road construction, upgrading and rehabilitation is well established and used by the PWD and RES (for small scale works). Management of contractors is undertaken by PWD and RES staff. MPRRDA employs contractors for constructing PMGSY roads. Some aspects of contract management, notably site supervision, quality control tests and reporting progress have been outsourced to private consultants.

	Contractors are at present specifically excluded from routine road maintenance (with the exception of PMGSY roads where construction contractors are responsible for maintenance for five years after construction and the proposed use of contractors for maintaining PMGSY roads after the first five years).
Options - institutional arrangements and practice	*For PMGSY and non-PMGSY roads, procedures and formats for routine maintenance contracting and management of contractors need to be developed.* **Option 1:** DRDA with RES technical support to be responsible for procurement of contractors with the requisite capacity development. RES to be responsible for the management of contractors with the requisite capacity development. **Option 1a:** Same as Option 1 but with part of contractor management outsourced to private consultants. **Option 2:** RES to have overall responsibility for procurement and management of contractors with the requisite capacity development. **Option 2a:** Same as Option 2 but with part of contractor management outsourced to private consultants. For capacity development, training of RES staff and small contractors is essential to strengthen their skills. *Attention is also needed to the types and size of contractors and hence the qualification conditions and forms of contracts since large contractors may be inappropriate for rural road maintenance contracts. Community contracting may also be appropriate for some roads. Some demonstration projects can be attempted.*
5. Budgeting, Financial Control, Accounting and Reporting	
Description	Preparation of budgets based on maintenance planning, financial control and accounting of operational expenditure and reporting to funding agencies.
Norms and standards (based on IRC (2002))	There are norms for (i) costs of routine, periodic and emergency maintenance, and (ii) frequency of periodic maintenance.
Current practice and capacity	The PWD has procedures for preparing annual maintenance budgets based on norms and a broad assessment of the condition of the road network (in the absence of an MMS) and for financial control. There are no such procedures for preparation of maintenance budgets for roads under PRIs but the DRDAs and Block level administrations have basic systems for financial control and reporting for funds allocated by GOMP and GOI for rural development, welfare and employment schemes. (For PMGSY roads, the need for budgeting and financial control and related capacity building are recognised but the precise location of capacity and the possible role of the private sector are not clear).
Options - institutional arrangements and practice	**Option 1:** Jila Panchayats are responsible for PMGSY roads and therefore DRDAs are the appropriate agencies to undertake budgeting and financial control based on the maintenance planning input of the technical agencies. Budgeting along with other responsibilities for non-PMGSY roads could be left to the Gram Panchayats. **Option 2:** Jila Panchayats take responsibility for the rural road network and therefore DRDAs are responsible for budgeting and financial control. If responsibility for maintenance of less important roads is delegated to Blocks and villages, the related budgeting and financial control would also need to be delegated to these levels requiring development of systems and capabilities.

6.3 Current Situation: the Private Sector

6.3.1 Contractors and Consultants in MP

Context:
Implementation through private sector contractors is the accepted mode of operations for infrastructure construction and rehabilitation[23] and the use of contractors for maintenance of PMGSY roads is already in place. This section starts with a rough estimate of the size of the road construction, rehabilitation and maintenance market, description of the classification of contractors and their estimated number in MP State. Since the use of private sector consultants to support the RES and DRDAs in managing maintenance is an option, the availability of consultants is then considered. This is followed by an assessment of the types of contractors and consultants and contracting arrangements appropriate for rural road maintenance and a district level case study of contractors availability in Jabalpur.

Contractors:
The road construction and rehabilitation market for contractors in MP is large and growing, though it is not exclusively limited to contractors in MP since larger contractors at national level and those from other states also compete for large size projects. The MPPWD and MPRRDA are the two major public sector agencies which receive substantial funding through GOMP and GOI under various programmes and initiatives. The total annual expenditure on roads in the state is approximately Rs 2000 crore (or US$460 million) at present. The amount is expected to grow as both GOMP and GOI give higher priority to improvement of the road infrastructure.

[23] The exceptions are works under SGRY which are by direct labour.

Table 6.2 sets out the requirements for registration of civil works contractors in MP State and their classification. PWD is the main body which classifies and registers contractors and sets conditions for upgrading to a higher class. Classification of contractors in classes A-I to A-V is based on the value of contracts in recent years and currently in hand, financial soundness, equipment ownership and qualifications of staff. For retired PWD staff wishing to register as contractors, their experience and grades are taken into account in determining their classification. In order to qualify for road construction or maintenance work on small projects, there is no requirement that contractors should have undertaken work on roads. Any civil works are assumed to be sufficient qualification. A substantial number of larger contractors (classes A-IV and A-V) are registered with MPPWD though some of them may be national companies or contractors from other states. There are also numerous small contractors operating at the Zone, District and sub-District levels.

The PWD classes of contractors are recognised by other public agencies (e.g. RES, DRDA and municipalities). In addition, small contractors (classes B and C) may also be listed directly with other agencies. There are no active contractors' associations in the state at present. There have been some associations in the past but they were not officially recognised. Contractors are not permitted to sub-contract PWD projects, though work executed on behalf of contractors on a task rate basis is not considered to be sub-contracting.

Table 6.2 Contractors in MP: Requirements for registration and estimated numbers

Class of contractor	Average value of works executed during last 3 years (Rs. Lakh)	Value of work in hand (Rs. Lakh)	Upper limit of value of works (Rs. Lakh)	Estimated number of contractors registered in MP	Level of registration
C	Site experience	Not specified	2	Numerous	District or municipality
B	4		4	Numerous	Zone (PWD)[24]
A-I	10	2	10	Numerous	Zone (PWD)
A-II	50	10	50	Numerous	Zone (PWD)
A-III	100	25	100	257	MP State (PWD)[25]
A-IV	400	80	400	251	MP State (PWD)
A-V	1,500	100	Unlimited	157	MP State (PWD)

No separate registration is required for contractors to bid for PMGSY works. Contractors registered by any state government or central government agencies are qualified to undertake PMGSY contracts within their financial capacities. About 150 contractors of various categories registered in MP and outside the state are currently working on PMGSY roads in MP. However, since the contract packages on PMGSY are in the Rs 5 to 10 crore range (US$1.15 to 2.3 million), large contractors only (in PWD Class A-V or equivalent) are likely to have the experience and financial capacity to under-

take these contracts. There is some scope for smaller contractors also since MPRRDA permits sub-contracting up to 25 percent of contract value for constructing PMGSY roads as long as prior permission is obtained.

Consultants:
Consultants are increasingly being used to provide planning, management and supervision services on programmes such as the PMGSY. Consultants in the road sector are empanelled by MOSRTH at the national level in six

Table 6.3 Categories of consultants approved by MOSRTH

Category of consultant	Types of undertakings
I A	All types of highway projects.
I B	Smaller (up to 20 km) highway projects.
II A	All types of bridge projects.
II B	Bridge inspection and rehabilitation projects.
III	Traffic and transport study projects.
IV	Geo-technical investigations.

categories (Table 6.3).

(In addition, consultants have also been empanelled by the MPRRDA to undertake work on PMGSY roads in two categories:

(a) Category I consultants approved for preparation of Detailed Project Reports (DPRs[26]), and
(b) Category II consultants approved for supervision and quality control of works and preparation of DPRs.

Forty consultants in MOSRTH category I A, 26 in MOSRTH category I B and 24 consultants empanelled by MPRRDA under its categories I and II are entitled to take up supervision and quality control and preparation of DPRs in MP. About 40 consultants have worked for the PWD and MPRRDA. Until recently, consultants have been working for large projects sponsored by ADB and World Bank in MP. In an attempt to improve effectiveness, MPRRDA introduced the use of consultants to prepare DPRs and for supervision and quality control of works for PMGSY roads.

[24] There are five geographical PWD Zone offices headed by Chief Engineers in MP (Gwalior, Jabalpur, Rewa, Indore and Bhopal). Contractors registered at the Zone level can undertake projects in Districts within the Zone.
[25] Registered at the office of the Engineer-in-Chief. Contractors registered at this level can undertake projects throughout the State.
[26] DPRs prepared for each PMGSY road set out the technical specifications to be included in the tender offers.

Construction packages for supervision and quality control consultancy assignment on PMGSY range between Rs 20 and 40 crore (about US$ 4.6 to 9.2 million). The highest rate of consultancy fee approved is 3.5 percent of the cost of project put to tender, while the lowest is 1.2 percent. The initial teething problems such as acceptance of consultants by PIU staff of the MPRRDA and willingness of consultants to work in dispersed rural areas seem to have been overcome. The advantages of using consultants include (a) lower staffing requirements in the public sector and possibly lower overall costs, (b) timely and good quality DPRs, and (c) supervision and quality control support to the public sector.

Following the positive experience on PMGSY, the market for consultancy services is expected to grow. The PWD has followed the example and introduced a similar system for quality control of some road construction projects. ADB has endorsed the increased use of consultants on PMGSY and State Highway projects. A condition of the ADB (2002) loan is the reduction of PWD staff by 30 percent.

Most of the consultants are large national or international firms, though PMGSY has encouraged the emergence of some consultants within the State. There is no consultants' association within the State. There is need for an assessment of the size and type of consultants required in the state for rural road construction and maintenance, which will depend upon the choice of institutional arrangements adopted by the state.

6.3.2 Contractors and Consultants for Rural Road Maintenance

Contractors in MP have virtually no experience of routine road maintenance since the state road agencies use gang labour for such maintenance, though some contractors have experience relevant for periodic maintenance. Routine maintenance activities on rural roads are geographically dispersed small works which may not be of interest to larger contractors. Therefore it is necessary to consider the questions of (a) the types of contractors appropriate for rural road maintenance, (b) the packaging of maintenance contracts, (c) the types of contractors who would be willing to undertake such projects, and (d) the effective utilisation of the gang labour employed by PWD.

Table 6.4 shows the overall size of the rural road maintenance market in MP. It may range between Rs 161 and 219 crore depending on whether it is limited to PMGSY roads only or also includes maintainable non-PMGSY roads. While the overall expenditure levels are substantial, the amount of expenditure per district on an average is only in the range Rs 3.58 to 4.87 crore (or about US$ 0.8 to 1.1 million).

Table 6.4 Rural road maintenance market in MP

Rs. crore

Category of rural roads	Total cost	Average per district
PMGSY roads (25,674 km)	161.00	3.58
Maintainable non-PMGSY roads (9,250 km)	58.00	1.29
Total	219.00	4.87

Groups of contractors working on PMGSY projects were interviewed in Bhopal and Jabalpur. They represented large national and State level firms. Their main interest was in large construction projects and generally found the maintenance commitment during the defect liability period cumbersome. By and large, these contractors did not show an interest in routine maintenance contracts at a later stage. Some PMGSY contractors intended to sub-contract maintenance to local small contractors.

It is surmised that smaller contractors established at district and sub-district levels could have an interest in maintenance works. Availability of contractors in Jabalpur District and their capability and working methods were reviewed earlier (Vaidya, 2002a). Table 6.5 shows that there are numerous small to medium sized contractors in Jabalpur district, though none in classes A-III to A-V. Classes C and B are small contractors while classes A-I and A-II broadly represent medium sized contractors. The small and medium sized contractors undertake minor road drainage and irrigation works as well as building construction and repairs for the PWD, RES, urban local bodies and other clients. They also act as sub-contractors for larger contractors.

Table 6.5 Classification of contractors and estimated numbers in Jabalpur district

Class	Upper limit on contract value	Qualification	Estimated number in Jabalpur District
C	Rs 2 lakh	Site experience	80 to 100 according to PWD but according to contractors interviewed, much larger number, about 350, appear to be registered with Jabalpur municipality
B	Rs 4 lakh	Rs 4 lakh of contracts as Class C contractor within the last 3 years	25 to 30 (according to PWD)
A-I	Rs 10 lakh	Rs 10 lakh of contracts as Class B contractor within the last 3 years and a member of staff with a civil engineering qualification	25 to 30 (according to PWD)
A-II	Rs 50 lakh	Rs 25 lakh of contracts as Class A-I contractor within the last 3 years, evidence of solvency and income tax clearance certificate.	About 3 in Jabalpur but more in Central Zone (according to PWD)

Source: PWD Central Zone Office supplemented by RES and interviews with contractors.

Small and medium sized contractors typically do not own much equipment. Workers are employed as and when needed and the equipment is hired. Since equipment can be readily hired and labour is easily available at a reasonable cost, small and medium sized contractors are likely to be suitable for routine maintenance contracts, which require hand tools and possibly some light equipment (e.g. hand bitumen sprayer and vibrating pedestrian roller) which can be readily hired as and when required. Because of lack of previous maintenance experience, a tailor made training programme would be required to develop the technical and management capacity to cope with routine maintenance and small repair contracts. The utilisation of gang labour by converting them into micro-enterprises to take up routine maintenance will be another issue requiring deliberation and some demonstration project in due course.

By their nature, most of the routine maintenance activities are labour-based. Evidence from field visits and discussions with contractors, RES and the MPRRDA officials indicates that because of the economics of labour and equipment operation, small and medium sized contractors use a pragmatic labour-based approach and therefore increased rural road maintenance will contribute to employment generation.

Critical factors for the successful use of small and medium sized contractors are:

- a simple and effective maintenance management system,
- clearly defined maintenance activities,
- simple contract documents and procedures; and
- a comprehensive programme of training and mentorship.

6.4 Current Situation: Community Involvement in Road Maintenance

There are at least three interrelated community involvement aspects. The first is the participation of the community in decision making, which involves making the community aware of the choices (e.g. expenditure in roads vs other forms of expenditure and the choice between maintenance expenditure and new construction), express their preferences and have them taken into account in a transparent decision making process. The second is the contribution as users towards the cost of maintenance. This contribution could be in the form of user charges labour for the maintenance effort. The third is the participation in the maintenance activity through a community contract. The contract may consist of community contribution complemented by a cost contribution and technical support from higher level agencies responsible for implementation and funding of maintenance.

These aspects are considered here in the institutional context of the Panchayat Raj in MP and the institutional and funding options set out in earlier sections. Some options for enhancing the role of community participation in rural road maintenance are set out here.

For example, under the Institutional and Funding Option 1 (i.e. Jila Panchayats/DRDAs take responsibility for PMGSY roads only and funding is provided through conventional methods), maintenance by contractors managed at the Jila level is proposed and therefore community involvement is limited to representations on the effectiveness of maintenance at the Gram Sabhas, Gram Panchayats and Panchayats at the Block and Jila levels. The monitoring of maintenance effectiveness could be enhanced by canvassing the views of representative bodies.

Under Institutional and Funding Option 2 (with Jila Panchayats / DRDAs taking responsibility for the rural road network and dedicated funds provided by a road fund board), there is a strategic approach to the maintenance of the rural road network (PMGSY and non-PMGSY roads) and potentially much greater scope for community involvement. Initially, in determining maintenance priorities, these options should involve informed choices at the Gram Sabha and Panchayat levels which are then taken into account in developing the overall maintenance strategy and programme. Informed choice would require:

(a) assessment of local problems and priorities (especially with respect to access),
(b) setting out the available choices within the limited resources (in the context of improved awareness of the importance of maintenance), and
(c) making choices or ranking options.

A systematic and objective approach is needed to examine options and make choices. Integrated Rural Accessibility Planning (IRAP) (Dixon-Fyle, 1998 and Edmonds et al, 1994) is one such tool developed by the ILO, which could be used to introduce local participatory planning. IRAP plans describe the present accessibility situation, the value of the existing key local assets and the interventions that will have the greatest impact on local accessibility. It recognises the need to manage rural assets in such a way that investments are always increasing the overall asset value. The plans prioritise investments, and include cost estimates for both maintenance and construction. Therefore an important additional contribution of this tool would be to introduce the asset management approach as the basis for maintenance planning.

Without anticipating the precise outcome of local planning, it is possible to outline some possible implications for the overall maintenance strategy. The first is the distinction between roads in the network which should be maintained through contractors at a higher level (Block or Jila) and those which

could be undertaken through community contracting. As noted earlier, maintenance of through roads and longer link roads should be managed and funded at the Jila or the Block level and implemented through small or medium sized contractors. Some local charges may be introduced to supplement the funding if local priorities indicate that more funds should go into maintenance. Local participatory planning would be useful in setting priorities if choices with respect to maintenance levels have to be made between through roads because of limited funds.

For link roads, there should be much greater responsibility at the Gram Panchayat level. Participatory planning would establish the relative importance of the maintenance of a given road and willingness to contribute to the cost of maintenance. The contribution could be a combination of labour, additional local charges and allocation from the Gram budget. As mentioned earlier, SGRY might be another possible source of funds. Greater participatory planning at the Gram level and a shift in emphasis in the SGRY to asset preservation could greatly enhance the effectiveness of the maintenance of rural roads.

A precondition for community contracting is the formation of recognised community organisations that could be legally contracted to carry out small contracts. Simple contract documents and procedures would be required. The contracts could have varying levels of local contributions in cash or kind. The agency responsible for maintenance should meet some of the costs and provide training, technical support, tools and materials. Monitoring of performance is essential for effective implementation. An extension of community contracting is where a number of nearby villages form an association to undertake maintenance for a number of link roads and possibly local through roads.

In MP, since PRIs are well established as local government institutions with the potential of popular participation in decision making and implementation, the Jila Panchayats / DRDAs as the agencies responsible for the maintenance of rural roads could enter into community contracts[27] with Gram Panchayats or Gram Sabhas. Initial training for acquiring the required work skills and to manage small contracts/work agreements would have to be provided.

6.5 Operational Options and Capacity Building Requirements

The options with respect to each group of operational activities have been identified in Table 6.1. Two operational options which emerge clearly are shown in Table 6.6. These are (a) keeping the management of operations within the public sector (i.e. RES and DRDA) with the requisite development

of capacity, (b) an increased role for private consultants in managing maintenance. However, within each of the options there are further choices to be made. The most important of these under both options are (a) whether and to what extent the DRDAs would be involved in procuring and managing contractors, and (b) the division of responsibilities between the DRDAs, RES and consultants in "budgeting, financial control accounting and reporting".

Table 6.6 Summary of operations options

Activity	Operation Option 1	Operation Option 2
1. Routine inspection	RES (and local reporting)	Contractor
2. Road condition, traffic surveys and road inventory	RES	Consultant support
3. Maintenance planning and selection of maintenance treatment	RES / DRDA	RES with consultant support
4. Procurement and management of contractors	RES / DRDA	RES / DRDA with consultant support
5. Budgeting, financial control, accounting and reporting	DRDA / RES	DRDA / RES with consultant support

Both these options are compatible with the institutional options set out in Section 4 i.e. whether Jila Panchayats / DRDAs take responsibility for PMGSY roads only or for the whole rural road network. There would however be some differences in operations depending on the institutional options set out in Section 4. Condition survey and planning activities would be limited to PMGSY roads under Institutional Option 1. Under both the institutional options, implementation would be through contractors but under Institutional Options 2a and 2b, the scope for using smaller local contractors and community contracting would be greater.

Major capacity development efforts will be required in virtually all aspects of operations whether they are undertaken entirely within the public sector or involve the support of the private sector. A more detailed study to assess the current situation and the scope of activities would be required to set out specific capacity building requirements, However, the training requirements have been identified in general terms in Table 6.7.

The capacity of the RES units to manage maintenance will have to be developed and will need state government support. The size and scope of RES Units will depend on the functions delegated to the RES by the DRDAs and the level of support required from private sector consultants.

[27] Alternatively, community contracting could be delegated to the Block level.

Table 6.7 Operational responsibilities and functions and capacity building

Agencies	Functions and Capacity Building
DRDAs	*Institutional, staffing and equipment* ❖ Separate road maintenance management unit (size dependent on scope of activities) ❖ Finance, administrative and management staff ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Administrative, financial and project management ❖ Preparation of maintenance options (with RES support) and direction and supervision of implementation ❖ Contracting process and contractors management (if DRDAs are involved in these aspects)
RES	*Institutional, staffing and equipment* ❖ Separate maintenance management and implementation unit (staffing dependent on scope of activities e.g. whether DRDAs delegate some of the financial control and administrative functions to RES and the tasks delegated to consultants) ❖ Planning and technical staff (and financial control and administrative staff if DRDAs delegate some of these functions) ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Contracting process and contractors management (necessary even if aspects delegated to consultants) ❖ Planning and technical aspects of maintenance (necessary even if aspects delegated to consultants)
Consultants	*Institutional, staffing and equipment* ❖ Planning and technical staff ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Road condition, and traffic surveys, ❖ Development of road inventory and updating of roads database, ❖ Use of MMS and preparation of annual maintenance requirements and plans ❖ Supervision and management of contractor operations
Contractors - small and medium sized (classes C, B, A-I and A-II) and community	*Institutional, staffing and equipment* ❖ Technical and supervisory staff ❖ Light equipment (with option to hire) *Functions and training requirements* ❖ Routine, emergency and periodic (including works and site management and reporting) ❖ Strengthening of skills of labour ❖ Estimating and bidding for contracts ❖ Managing small businesses

6.6 Forward Path

(i) The discussion on the use of consultants on PMGSY works shows that their use has filled the capacity gap in the public sector. However, consultants on PMGSY have been relatively large firms. For rural road maintenance, consultants will have to be willing to undertake smaller assignments, possibly in a number of districts. Some large consultants may be willing to take on contracts but the actual work is likely to be off loaded to smaller consultants. Therefore, it will be necessary to develop small scale consultants within the state side by side and encourage them to procure the works directly. Training for them would also be needed.

(ii) Maintenance works will be executed by small scale contractors, their capacity in the technical aspects of maintenance, bidding and running businesses will also have to be developed. Where maintenance is done by community contracting, the communities will also need technical support to be provided by RES staff.

(iii) Capacity building of small scale contractors and road agencies in efficient and effective delivery of maintenance works is an important requirement for consideration of the state government. The experience and expertise collected by the ILO on such aspects in some of the countries in Asia and Africa could be utilised by duly adapting the promising approaches to the conditions prevailing in the state to put maintenance of rural roads on a sound footing.

Chapter 7

Condition of Rural Roads: Situation Analysis in Sample Blocks

7.1 Methodology

A situation analysis of the network is essential for examining the options and related resource requirements and developing an effective maintenance strategy. As noted in Section 6, a sound maintenance programme for rural roads would require (a) a database of roads with information on road surface, condition, function for all blocks and districts and (b) linking of the database to an MMS.

The data requirements and the MMS should be appropriate for the specific conditions, i.e. rural road networks to be managed at the district level within the constraints of the available management and technical capacity. The information requirements and the MMS should not be over-elaborated and technically complex. It should also be possible to obtain most of the information by visual inspection so that the information can be initially collected and regularly updated with speed and at relatively low cost.

In order to assist in the development of the necessary database, a situation analysis has been carried out in two sample blocks, Sihora Block in Jabalpur District in East-Central part of MP and Dhar Block in Dhar District in the West of MP (see Figure 7.1). In summary, the situation analysis in the two pilot blocks:

(a) shows what data are needed and how they can be collected;
(b) tests the feasibility of the necessary data collection;
(c) is used as a basis for making recommendations on the type of database required, and
(d) demonstrates, to some extent, how the database can be used[28].

Jabalpur represents one of the more populous, though poor districts in MP while Dhar has a relatively large proportion of ST (scheduled tribe) population and a relatively underdeveloped road infrastructure. The two blocks chosen for the exercise were relatively well developed in relation to the rest of the district. The objective of the exercise was not to gain a representative overview of the actual rural road network in MP but to provide a basis for developing appropriate district level databases and MMS and demonstrate their use in maintenance planning. The District Master plans prepared for PMGSY and other available data and maps provided a starting point. However, the Master plans were based on their own numbering system which was not matched with the road numbers previously given to VRs and ODRs. They also did not include information on road condition and traffic.

The block level summary databases and related maps have attempted to match these as far as possible and assigned numbers to the remaining tracks surveyed. Digitised road maps are not yet available and there is an urgent need for a standardised classification of rural roads. Paying attention to these aspects would be an important task for the MPRRDA.

Figure 1: Madhya Pradesh (District Map)

[28] A full demonstration would require the linking of the data with an MMS, which would be an essential element in the next phase.

7.2 Surveys and Other Data Collection

The situation analysis covered roads and tracks in the blocks. Data were collected on (a) classification, surface type and length of roads and tracks, (b) level of accessibility the roads and tracks provide and their maintainability, (c) traffic levels, and (d) estimated population served by the roads and tracks.

The road condition and maintainability surveys were carried out with the aim of developing an overall picture of the road and track networks in the two blocks and their present physical condition. In the absence of a comprehensive road inventory and maps, the study had to establish its own inventory. An assessment of the accessibility and maintainability (see Table 7.1 for definitions) was carried out road by road. The collected data also enables an assessment of maintenance requirements for each road. The relatively simple forms used for data collection could be easily integrated into a district based MMS at a later stage.

Table 7.1 Definitions of accessibility and maintainability levels

Accessibility Levels	Description
No Access	Impassable or very difficult for most prevailing means of transport all the year round
Partial Access	Passable for prevailing means of transport during dry seasons, impassable during wet seasons
Basic Access	Reliable all-season passability for the prevailing means of transport, with limited periods of impassability
Full Access	Reliable and high quality passability for all means of road transport
Maintainability levels	**Description**
Unmaintainable	A road, or a section of road, is in an unmaintainable condition if full rehabilitation or reconstruction of drainage and road formation is required. ➢ *from condition assessment: all, or most, components are defective over a given length of the road*
Partially maintainable	A road, or road section, that has some components that can still be effectively maintained with routine maintenance and/or smaller repair activities, and thus create partial access (e.g. reinstatement of drainage system, repair of water crossings). ➢ *from condition assessment:* *carriageway defect free over long sections,* *drainage over long sections*
Maintainable	A road, or a section of road, that serves the needs of the road users and has only minor defects which can be rectified using routine and/or periodic maintenance. ➢ *from condition survey: only minor and occasional defects*

Road inventory, road condition and maintainability data were collected by travelling along all the roads and tracks identified in the block. This included NHs, SHs and MDRs also. Assessment of road condition, maintainability and level of access provided by roads was by visual inspection based on guidelines for making the assessments and recording of data on a

standardised form. The surveys were conducted by two teams of two persons each working together. Each team used a motorcycle with a functioning trip-meter with 100 metre readings, essential for the survey. The need to identify the local road and track network also meant that it was highly desirable for at least one of the surveyors to have local knowledge. The PMGSY district master plans indicated that there are about 325 and 450 km of roads and tracks to be surveyed in Sihora and Dhar blocks respectively. The surveyors found that on an average 10 km of roads can be surveyed per day. Therefore, a period of 80 days in addition to training days was required for the surveys in the two blocks**.** The initial survey provides a baseline for assessing maintenance requirements. A functioning maintenance programme would require annual inspections, though the resource requirements would be lower because (a) after the initial data collection, subsequent surveys would normally be more rapid, and (b) an agency responsible for rural roads would not need to survey National Highways, State Highways and Major District Roads.

Visual inspection based on clear guidelines is an appropriate method for rapid condition assessment of rural roads. Nevertheless, the approach is susceptible to inconsistencies because of the subjective element in the assessment. A training period of one week before the surveys, where the teams worked together in applying the guidelines was intended to reduce these inconsistencies. The data problems were overcome by some recalibration of the evidence and repeat surveys where necessary. The lesson for establishing a maintenance programme is the need for more rigorous and practice oriented introduction training and monitoring of surveyors. Details of data collection procedures are included as Annex III.

In addition, traffic counts were conducted on almost all the roads (excluding tracks) and data from the counts were recorded in the database. Traffic volume data are required for engineering, economic and socio-economic reasons[29]. The engineering reasons are the assessment of wear and tear and damage to roads and implications for road design and maintenance treatment. The economic and socio-economic reasons are the assessment of benefits and potential for raising revenue for maintenance from users. Traffic counts used the standard form currently in use in MP.

Data were also collected on the population served by each road or track directly and indirectly. The population of a village was assumed to be served directly by a road or track if the village was on it. A village was assumed to be served indirectly by a road if it was not on the road but was provided access for it to centres providing economic, social and administrative amenities and the rest of the road network. This could be for a village (a) which has no existing road or track at present but is the closest to the road in question, or

[29] If reliable traffic counts are expensive or difficult to collect, proxies for traffic volume based on indicators such as local population should be considered.

(b) which is on a road or track which links with the rest of the network or amenities through the road in question.

7.3 Road Condition Survey Results

7.3.1 Overview of road network characteristics in Sihora and Dhar

Table 7.2 presents the road network overview undertaken for study in the two blocks.

Table 7.2 Dhar and Sihora Blocks: Situation analysis overview

District	Jabalpur	Dhar
Block	**Sihora**	**Dhar**
Population	122,509	71,573
Area (km^2)	440	579
Population density (persons per sq. km)	278	124
Total length of roads and tracks (km)	303.1	454.5
NHs, SHs and MDRs (km)	68.6	89.8
NHs, SHs and MDRs (% of total)	22.6	19.8
ODRs and VRs (km)	212.6	158.0
ODRs and VRs (% of total)	70.1	34.8
Tracks (km)	21.9	206.7
Tracks (% of total)	7.2	45.5
Surface type		
All roads / tracks - BT (%)	34.5	20.8
All roads / tracks - WBM (%)	30.4	29.6
All roads / tracks - Gravel / Earth (%)	36.2	49.3
Accessibility level		
All roads / tracks - full access (%)	39.7	31.4
All roads / tracks - basic or partial access (%)	60.3	60.6
All roads / tracks - no access (%)	0.0	8.0
NHs, SHs and MDRs - full access (%)	85.1	93.7
NHs, SHs and MDRs - basic or partial access (%)	14.9	6.3
ODRs and VRs - full access (%)	20.3	37.2
ODRs and VRs - basic or partial access (%)	79.7	62.8
Tracks - full access (%)	86.3	0.0
Tracks - basic or partial access (%)	13.7	82.3
Tracks - no access (%)	0.0	17.7
Road densities		
Road density per 100 sq. km	64	43
"Good" roads density per 100 sq. km	27	25
Road density per lakh persons	230	350
"Good" roads density per lakh persons	100	200

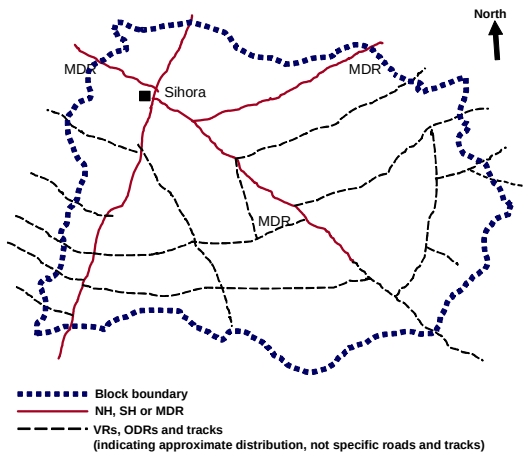
In Sihora and Dhar respectively, 63 and 116 roads and tracks were surveyed. Table 7.2 shows that Sihora is a smaller block in area with a much higher population and population density[30] but lower overall road and track length. The proportions of NHs, SHs and MDRs in the road networks at 22.6 percent and 19.8 percent respectively for Sihora and Dhar are broadly similar. By implication, the proportions of the remaining road network (ODRs, VRs and tracks) are also broadly similar.

Figures 7.2 and 7.3 provide schematic overviews of the road networks in Sihora and Dhar. In Sihora, the major road links (NH 7 and MDRs) are in the east with the remainder of the block mainly served by ODRs, VRs and tracks, though a high proportion of the population is located in the better connected eastern part of the block. In Dhar, the major roads (NH 59, NH 79, SH 31 and MDR) traverse the block North-South and East-West much more uniformly with a network of ODRs, VRs and tracks linking with them.

About 35 and 21 percent respectively of roads in Sihora and Dhar are paved (BT surface). These are mostly NHs, SHs, MDRs and rural roads completed under PMGSY. WBM roads are about the same proportion (30 percent) of all roads and tracks in the two blocks. They are mainly ODRs and VRs with some tracks. Gravel and earth surface types have been combined.

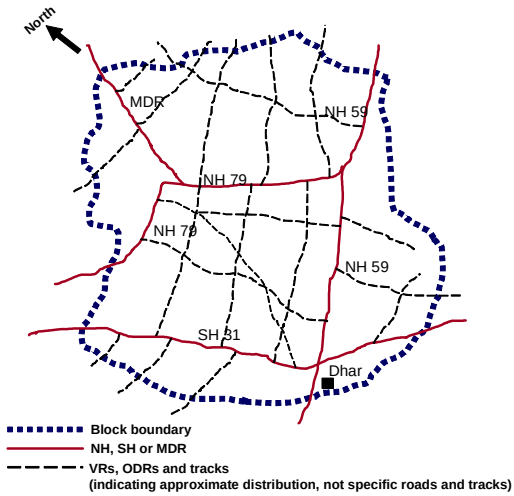
Table 7.2 also summarises data on the level of access provided by roads in the blocks though the access level data for Sihora had to be adjusted. The initial result of the survey shows a very high proportion of roads in Sihora (about 92 percent) providing full access. This outcome is inconsistent with the consultants' field study observations and the assessment of pavement and drainage conditions discussed in the following sections. The high proportion of roads assessed to provide full access is most probably because of the interpretation of accessibility definitions by the survey team. This clearly raises an issue to be addressed in developing a methodology to ensure consistency and accuracy in developing the district level rural roads databases.

Figure 7.2 Schematic diagram of the road network in Sihora Block



[30] The population for Dhar is for 2001 (population census). For Sihora, the 2001 population is estimated by applying the inter-censal growth factor of 22.59% for Jabalpur to the 1991 population estimate of 99,934).

Figure 7.3 Schematic diagram of the road network in Dhar Block



Broadly, fully maintainable roads tend to offer full access while partially maintainable or unmaintainable roads usually have defects which limit access. Therefore, for this exercise, an approximation of accessibility for Sihora has been obtained by assuming that if a road is fully maintainable it provides full access and if it is partially maintainable or unmaintainable, it provides basic or partial access[31]. After the adjustment for Sihora, the evidence shows that about 40 and 31 percent respectively of all roads and tracks in Sihora and Dhar provide full access.

As would be expected, high proportions (85 and 94 percent respectively) of NHs, SHs and MDRs provide full access while 20 and 37 percent of ODRs and VRs in Sihora and Dhar respectively provide full access. For Dhar, there is a breakdown of roads providing basic and partial access which is not shown in Table 7.2. Overall, 15.1 percent of the network provides basic access while 45.5 percent provides partial access only. About 40 percent of ODRs and VRs in Dhar provide basic access, i.e. they provide "reliable all-season passability for the prevailing means of transport, with limited periods of impassability" (see Table 7.1). The small number of tracks surveyed in Sihora provide a reasonable level of access while the much larger number of tracks in Dhar provide poor access.

The road density in terms of area in Dhar is above average for MP but much lower than for India[32] while the Sihora density is higher than the MP average. The road density in terms of population is lower in Sihora than in Dhar because of the higher population density in the former. The "good" road densities (defined here as densities of roads providing full access) are much lower. The low road densities and poor connectivity to villages in MP create

pressures for more road construction but equally important challenges are a sustainable maintenance programme for maintainable roads, and rehabilitation of existing roads.

The evidence from the two blocks shows that a number of rural roads do provide a level of access which should be preserved by an appropriate level of maintenance. For small populations and low traffic volumes, maintaining basic access may be adequate and appropriate while for larger populations and traffic volumes, full access and a denser network may be justified. One of the roles of the MPRRDA would be to conduct studies and tests on appropriate levels of access and maintenance and support districts in incorporating the findings in their rural roads maintenance planning.

The GOI guidelines provide for preparation of Master Plans at block and district levels with full involvement of PRIs. The role of the MPRRDA here would be to support the PRIs in developing consultative and local planning processes at the Gram, Block and Jila levels to assess the existing level of access and developing options for maintaining and improving access.

7.3.2 Maintainability of the Rural Road Networks in Sihora and Dhar

This section starts with a summary of data on the maintainability of the rural road networks in the two blocks (Table 7.3 and 7.4) and draws out the maintenance issues. Since the maintenance options being considered are (a) to focus on completed PMGSY roads only, or (b) to develop a strategy for the whole rural road network, the Tables present the results separately for PMGSY and non-PMGSY roads. The last row in Table 7.3 shows that about 42 percent of the network is in "good" and therefore maintainable condition in Sihora. The proportion of maintainable rural roads is lower since the NHs, SHs and MDRs under PWD have all been assessed to be fully maintainable. The total length of NHs and MDRs (there are no SHs in Sihora) in Table 7.3 is lower than in Table 7.2 since it appears that two of the roads identified as MDRs during the survey are included in the PMGSY programme as through roads, possibly having been reclassified as ODRs in 2002. The length of non-PMGSY tracks surveyed is also lower than in Table 7.2 since the remaining tracks have been included in the PMGSY programme.

[31] A number of unmaintainable roads or tracks may provide no access but it is not possible to make an assessment of this in the absence of better information.

[32] The MP state road density is 45 km per 100 sq km while that for India is 75 km per 100 sq km.

Table 7.3 Sihora Block: Overview of maintainability and condition

Road Category	Total length	Maintainable "Good" condition		Partially maintainable or unmaintainable "Fair - Poor" condition	
	km	km	%	km	%
PMGSY Core Network Roads	195.6	79.4	40.6	116.2	59.4
PMGSY Completed (Phases I to IV)	21.4	21.4	100.0	0.0	0.0
Remaining PMGSY	174.2	58.0	33.3	116.2	66.7
NHs, SHs and MDRs under PWD	28.2	28.2	100.0	0.0	0.0
Non-PMGSY ODRs and VRs	75.6	17.3	22.9	58.3	77.1
Tracks surveyed (non-PMGSY)	3.7	2.7	73.0	1.0	27.0
Non-PMGSY ODRs, VRs and tracks (km)	79.3	20.0	25.2	59.3	74.8
Total	**303.1**	**127.6**	**42.1**	**175.5**	**57.9**

The total length of 195.6 km of PMGSY "Core Network" roads in Sihora is longer than that in the district Master plan since there have been some recent adjustments. About 41 percent of PMGSY core network roads are maintainable. These include about 11 percent (21.4 km) of the core network length of roads completed under PMGSY Phases I to IV (2000 to 2004) which are all fully maintainable. Of the remaining PMGSY roads about 35 percent are maintainable. In addition to the PMGSY roads, there are 79 km of rural roads and tracks (i.e. an additional 40 percent of rural roads) of which 20 km or about 25 percent are maintainable[33].

Table 7.4 Dhar Block: Overview of maintainability and condition

Road Category	Total length	Maintainable "Good" condition		Partially maintainable or unmaintainable "Fair - Poor" condition	
	km	km	%	km	%
PMGSY Core Network Roads	137.5	101.1	73.5	36.4	26.5
PMGSY Completed (Phases I to IV)	15.6	15.6	100.0	0.0	0.0
Remaining PMGSY	121.9	85.5	70.1	36.4	29.9
NHs, SHs, MDRs under PWD	89.8	89.8	100.0	0.0	0.0
Non-PMGSY ODRs and VRs	43.2	41.8	96.8	1.4	3.2
Tracks surveyed (non-PMGSY)	184.0	0.0	0.0	184.0	100.0
Non-PMGSY ODRs, VRs and tracks (km)	227.2	41.8	18.4	185.4	81.6
Total	**454.5**	**232.7**	**51.2**	**221.8**	**48.8**

The last row in Table 7.4 shows that about 51 percent of the network in Dhar is in "good" maintainable condition. The proportion of maintainable rural roads is lower since the NHs, SHs and MDRs under PWD have all been assessed to be fully maintainable as in Sihora. The length of non-PMGSY tracks surveyed is also lower than in Table 7.2 since some tracks have been included in the PMGSY programme.

The total length of PMGSY "Core Network" roads in Dhar is 137.5 km. About 73.5 percent of PMGSY core network roads are now maintainable.

These include about 11 percent (15.6 km) of the core network length of roads completed under PMGSY Phases I to IV (2000 to 2004) which are all fully maintainable. Of the remaining PMGSY roads about 70 percent have been assessed to be maintainable. In addition to the PMGSY roads, there are 227 km of rural roads and tracks. Of these, only about 43 km are ODRs and VRs, the rest being tracks. There is also a clear demarcation between ODRs and VRs and tracks in terms of their maintainability with virtually all ODRs and VRs assessed to be maintainable while none of the tracks are maintainable. There are about 42 km of maintainable non-PMGSY roads in the block, about 30 percent of all rural maintainable roads at present though this proportion will fall as more PMGSY roads are completed.

While the above discussion provides an overview of network maintainability in the two blocks, more careful assessment of the situation would be required in at least two respects, network defects and treatment of partially maintainable roads. The road condition survey collected information on road drainage defects (silting of side drains and culverts) and surface problems (potholes and camber). Table 7.5 summarises this information for the two blocks and shows that there are drainage system defects on 69.3 and 51.2 percent of the networks in Sihora and Dhar respectively and carriageway defects on about 63.3 and 48.8 percent of the networks respectively. As would be expected, the rates of defects are much higher on rural roads than on NHs, SHs and MDRs. It is likely that even on some of the rural roads which have been assessed to be maintainable, some initial remedial work on the drainage system and surface may be required.

Table 7.5 Defects in the Sihora and Dhar road networks

Road Category	Total length km	Drainage system defective		Carriageway defective	
		km	%	km	%
Sihora					
PMGSY Core Network Roads	195.63	145.0	74.1	117.0	59.8
NHs, SHs, MDRs under PWD	28.2	0.4	1.4	9.1	32.3
ODRs and VRs - non-PMGSY	75.6	61.0	80.7	63.2	83.6
Tracks surveyed - non-PMGSY	3.7	3.7	100.0	2.5	67.6
Total Sihora	303.13	210.1	69.3	191.8	63.3
Dhar					
PMGSY Core Network Roads	137.5	101.1	73.5	36.4	26.5
NHs, SHs, MDRs under PWD	89.8	89.8	100.0	0	0.0
ODRs and VRs - non-PMGSY	43.2	41.8	96.8	1.4	3.2
Tracks surveyed - non-PMGSY	184	0	0.0	184	100.0
Total Dhar	**454.5**	**232.7**	**51.2**	**221.8**	**48.8**

[33] Even if the Jila Panchayat takes responsibility for the whole road network, some of the non-PMGSY roads may have lower priority on the basis of the population they serve and other socio-economic functions to be included in the maintenance programme.

Tables 7.3 and 7.4 show that 58 and 49 percent respectively of all roads in Sihora and Dhar are partially maintainable or unmaintainable. However, it was not possible to clearly define the difference between unmaintainable and partially maintainable roads in all cases. More detailed assessment would be required to make this distinction to identify partially maintainable roads on which routine maintenance activities would become effective if some rehabilitation work is carried out first. Rehabilitation of some partially maintainable roads and their inclusion in the maintenance programme may be justified if they are of sufficient importance.

7.3.3 Lessons for a Maintenance Programme from Block Level Assessments

As noted above, about 11 percent of PMGSY roads have been completed in each block during Phases I to IV. PMGSY has been gathering momentum and therefore a much larger proportion of the core network may be completed and therefore fully maintainable by the end of the 10th Plan in 2007. However, it is clear that some proportion of the PMGSY programme would go beyond 2007.

This clearly has implications for the development of the maintenance strategy and programme. Under Institutional Option 1, discussed in Section 4 the expansion of the maintenance programme would be slower than envisaged. All completed PMGSY roads would be maintained and therefore the need to establish priorities does not arise unless the funds for maintenance are not forthcoming and implementation capacity is limited. Under Institutional Options 2a and 2b, the completed PMGSY roads as well as the maintainable but not completed PMGSY roads and the remaining maintainable rural roads and tracks would be maintained. The programme under Institutional Options 2a and 2b would have to be phased alongwith the capacity development and availability of resources.

In developing a programme under Institutional Options 2a and 2b, it will be necessary to establish priorities. Tables 7.6 and 7.7 rank the maintainable rural roads in Sihora and Dhar respectively according to the population served per km of road. This is a rough but reasonable rule for establishing priorities in such a way that a given amount of resources preserve access for the largest number of people[34]. In Sihora (Table 7.6) there are 25 maintainable roads with a total length of just under 103 km. Of these, 20 km (about 19.5 percent) are non-PMGSY roads. The table shows maintainable PMGSY roads only (the highlighted roads in the two tables show PMGSY roads completed under Phases I to IV). As more PMGSY roads (which are currently partially maintainable or unmaintainable) are completed and included in the maintenance programme, the proportion of non-PMGSY roads in Sihora would fall further (to about 9.3 percent of all maintainable roads).

The two roads ranked first and second in Table 7.6 according to population served are very short non-PMGSY tracks which could be left to be maintained by the local community, possibly with community contracting with technical support. However, if resources are limited, very short roads (e.g. below 0.5 km in length) could be left entirely for the local community to maintain. The last three roads in the ranking are non-PMGSY roads serving small populations and could therefore be excluded from the maintenance programme. In general, a cut off point would have to be set. The remaining roads should be incorporated in the maintenance programme, though their inclusion does not make a major impact on the overall programme in Sihora.

As Table 7.7 shows, the situation in Dhar is somewhat different. There are 42 maintainable roads with a total length of about 143 km. Of these, nearly 42 km (about 29 percent) are non-PMGSY roads. As more PMGSY roads are completed and included in the maintenance programme, the proportion of maintainable non-PMGSY roads would fall further (to about 23 percent of maintainable roads if and when all PMGSY roads are completed). A number of non-PMGSY roads have high priority rankings according to the populations they serve. The highest ranked road is non-PMGSY and roads ranked 5th to 9th are also non-PMGSY.

The evidence from the two blocks shows that the implications of including non-PMGSY roads in the maintenance programme situation are likely to differ substantially between blocks and districts. For example, in Sihora the impact of including non-PMGSY roads in the maintenance programme would be smaller than in Dhar.

[34] The underlying assumption is that the cost of maintaining each km of road is about the same. If this is not the case, maintenance cost estimates would be required and the roads would be ranked according to the population served for a given unit of expenditure. Other criteria may be included in the MMS and the maintenance would be subject to approval by the Panchayats who may want other criteria to be taken into account. IRAP tool developed by the ILO is another approach to establish priorities. These can be subject of next phase of study.

Table 7.6 Ranking of maintainable roads by population served in Sihora Block

	Road Status	PMGSY No	Road Class No	Road Name (from- to)	Road length (km)	Direct pop. served	Indirect pop. served	Direct pop. per km	Total pop. per km	Surface Type
1	TRS		TRS-08	Mohatara to NH-7	0.30	813	0	2,710	2,710	WBM
2	TRS		TRS-07	Nunjha to Majhagwan Rd.	0.40	778	0	1,945	1,945	WBM
3	PL	L/060	TRS-11	NH-7 TO Dharampura	2.00	2,063	0	1,032	1,032	WBM
4	VR		VR-27	PWD Road Tikariya to Ranital	2.50	2,274	0	910	910	WBM
5	PC	L-053	ODR(10)	Agaria to Barne Tiraha	15.70	10,771	0	686	686	BT
6	PL	L-067	ODR (09)	Ghat Simariya to Ramkhiriya	5.75	3,757	0	653	653	WBM
7	PT	T02	MDR(06)	Sihora to Majhagwan - Silondili	30.20	19,585	20,797	649	1,337	BT
8	PL	L072	TRS(02)	NH-7 to Gunharu	1.20	688	0	573	573	WBM/ Gravel
9	PC	L-048	TRS-10	NH-7 to Deonagar	2.20	1,246	0	566	566	BT
10	PL	L-042	TRS-05	Bhandra to Majhagwan Rd.	3.90	2,192	0	562	562	WBM
11	VR		VR-026	PWD Road Khini to Ghorakoni	1.40	677	0	484	484	Gravel
12	PC	L059	TRS(03)	NH-7 to Hirdenagar	3.50	1,676	0	479	479	BT
13	TRS		TRS-09	Ramkhiriya to Khamariya	2.00	901	0	451	451	Gravel
14	PL	L-049	TRS-04	Deonagar to Midhasan	2.00	862	0	431	431	Gravel
15	PL	L-039	VR-35	Majhagwan Road to Javelly	1.70	691	0	406	406	WBM
16	PL	L-029	VR-33	Sehora Silondi to Dabu	0.80	315	0	394	394	Gravel
17	VR		VR-29	Ramkhiriya to Deori	2.00	641	0	321	321	Gravel
18	PL	L-070	TRS-06	NH-7 to Kurro	3.40	907	0	267	267	WBM
19	PL	L056	VR-28	Agaria Road Pondikhurd to Ghutna	4.20	952	0	227	227	WBM
20	PL	L-074	VR-30	Gughra to Darouli	1.30	270	0	208	208	WBM/ Gravel
21	PL	L-044	VR-32	Deori to Kirhani Kalan	5.00	1,019	0	204	204	WBM
22	VR		ODR (07)	Umariypan to Kumhi Satdhara	3.60	676	0	188	188	WBM
23	VR		ODR (08)	Kirhani to Anterved	4.50	580	0	129	129	WBM
24	VR		VR-34	Sehora Silondi to Riwanhjhi	0.65	49	0	75	75	WBM
25	VR		ODR(07)	Sihora Simariya to Kharda	2.65	145	0	55	55	BT/WBM

Table 7.7 Ranking of maintainable roads by population served in Dhar Block

Road Status		PMGSY No	Road Class No	Road Name (from- to)	Road length (km)	Direct pop. served	Indirect pop. served	Direct pop. per km	Total pop. per km	Surface Type
1	VR		01 (ODR)	Kesur to Depalpur	2.0	4,283	0	2,142	2,142	WBM
2	PL	L-046	0202(VR)	Dedla to SH-31	1.7	3,200	161	1,882	1,977	BT
3	PC	L-033	(VR)	NH-59 to Sejawa	1.1	2,059	1,190	1,872	2,954	BT
4	PL	L-021	0206(VR)	NH-79 to Khairod	0.8	1,450	0	1,813	1,813	WBM
5	VR		03 (ODR)	Nh-79 to Lebarchouki	0.8	1,232	0	1,540	1,540	WBM
6	VR		0223(VR)	Tisgoan to Pinjaraya	1.3	1,890	0	1,454	1,454	WBM
7	VR		0234(VR)	Kalamkhedi to Utawad	2.4	2,501	434	1,042	1,223	WBM
8	VR		0224(VR)	Ranipura to Dedla	3.4	3,361	3,361	989	1,977	WBM
9	VR		0233(VR)	Kalamkhedi Uttarashi	1.0	982	207	982	1,189	WBM
10	PL	L-063	0215(VR)	SH-31 to Pipliya	1.0	879	0	879	879	WBM
11	PL	L-058	0221(VR)	SH-31 (Anarad) t o Saktali	2.1	1,741	1,406	829	1,499	WBM
12	PL	L-040	0229(VR)	Sirsoda to Gunawad	3.2	2,649	2,649	828	1,656	WBM / Earth
13	PL	L-036	0218(VR)	Kalsada khurd to NH-59	1.2	990	0	825	825	WBM
14	VR		02228(VR)	Gunawad to Bagiriya	4.9	3,587	0	732	732	WBM
15	PL	L-044	0247(VR)	Bagriturk to Jamukheri	1.7	1,235	548	726	1,049	WBM
16	PL	L-023	02 (ODR)	Nh-79 to Junawada	0.5	337	587	674	1,848	WBM
17	VR		0211(VR)	Ekalduna to Sadalpur	4.2	2,830	737	674	849	WBM
18	PL	L-055	0216(VR)	Umariyabada to SH-31 (Approach Rd.)	1.3	806	935	620	1,339	WBM
19	PC	L-065	0205(VR)	Gardabad to Ahu	2.8	1,703	694	608	856	BT
20	PL	L-042	0237(VR)	Baikheda to Utawad	4.2	2,486	0	592	592	WBM
21	PL	L-045	0226(VR)	Dharawara to SH-31 (Approach Rd.)	1.2	671	207	559	732	WBM
22	VR		0227(VR)	Lebarchowk to Nekpur	3.4	1,896	0	558	558	WBM
23	PL	L-022	0214(VR)	NH-79 to Antarai	1.6	883	0	552	552	WBM
24	VR		0246(VR)	Kilol to Ekalduna	2.8	1,240	664	443	680	WBM
25	VR		0210(VR)	Bagri turk to SH-31	2.8	1,028	207	367	441	WBM
26	PC	L-027	(VR)	Kesur to Bijur	4.7	1,721	308	366	432	BT
27	PL	L-031	0220(VR)	NH-79 to Sukera	2.0	726	972	363	849	WBM
28	PL	L-041	0230(VR)	Utawad to Sirsoda	3.1	1,047	194	338	400	WBM
29	PL	L-057	0209(VR)	SH-31(Anarad) to Pacholalna	6.2	2,083	800	336	465	WBM
30	PL	L-062	0219(VR)	Pinjarya to Chappar	2.6	855	466	329	508	WBM
31	PL	L-056	0217(VR)	Lasuriya to SH-31	4.6	1,166	1,166	253	507	WBM
32	VR		0249(VR)	Baggad to Lohari Bujura	4.4	1,087	598	247	383	WBM
33	PL	L-029	0239(VR)	NH-79 to Machakada	2.4	520	987	217	628	WBM
34	PL	L-052	0235(VR)	Tiwadi to SH-31	11.4	2,470	519	217	262	WBM
35	PL	L-024	0241(VR)	Kaisur to Baaditai	3.7	777	441	210	329	WBM
36	PT	T-02	0201(VR)	Sadqalpur to Kaisur	3.0	618	6,100	206	2,239	BT
37	VR		0240(VR)	Jamanda to Jamanda Fata (NH-79)	2.8	491	629	175	400	WBM
38	PC	L-064	0208(VR)	Labrawad to Dhar	7.0	1,186	1,703	169	413	BT/WBM
39	PL	L-054	0238(VR)	Kalukheri to Tornod	4.4	675	800	153	335	WBM
40	PL	L-032	(VR)	NH-59 to Nekpur	13.8	1,985	1,024	144	218	BT
41	VR		0245(VR)	Kadola Bujurg to Jamanda	5.6	781	630	139	252	WBM
42	PL	L-060	0225(VR)	Karadia to Biloda	7.8	309	3,155	40	444	WBM

Key to notation in Tables 7.6 and 7.7:

PC - PMGSY road completed in phases I to IV
PL - PMGSY link road awaiting completion
PT - PMGSY through road awaiting completion
ODR - Other district roads
VR - Village Roads (not included in PMGSY)
TPW - NH, SH or MDR - through road under PWD
TRD/TRS - Track Roads Dhar / Sihora
BT - Bitumen
WBM - Water Bound Macadam

Tables 7.6 and 7.7 exclude partially maintainable roads which should arguably be included in developing priorities and an MMS should be used to examine all maintainable and partially maintainable roads to make recommendations on priorities. The positions of partially maintainable roads in the 20 highest ranked roads (according to population served) have been considered here to illustrate the need to take account of partially maintainable roads in developing a maintenance strategy.

Ranking of maintainable and partially maintainable roads and tracks according to the population served shows that in Sihora, 58 roads and tracks were assessed to be maintainable or partially maintainable (27 maintainable, the rest partially maintainable). Among the 20 roads and tracks ranked highest according to the population served per km, 7 are partially maintainable and provide basic or partial access. Of these, 4 are PMGSY and therefore will eventually be reconstructed and included in the maintenance programme. The remaining 3 (ranked 5th, 15th and 16th) could be considered for inclusion in the maintenance programme depending on the initial cost of rectifying the defects.

In Dhar, 47 roads and tracks were assessed to be maintainable or partially maintainable (42 maintainable, the rest partially maintainable). Among the 20 roads and tracks ranked highest according to the population served per km, only 2 are partially maintainable and provide basic or partial access. One of these is a PMGSY road and therefore will eventually be reconstructed and included in the maintenance programme but the other road (ranked 5th) could be considered for inclusion in the maintenance programme depending on the initial cost of rectifying the defects.

The need for technical support and local contribution to maintenance costs were discussed in Section 6.

Chapter 8

Summary of Findings and Options for Effective Maintenance

A. Findings

8.1 In 2000, the Government of India (GOI) launched PMGSY (Pradhan Mantri Gram Sadak Yojana), a major rural road programme with the ultimate aim of connecting all rural 'habitations' in India with a population of more than 500 (250 in case of hills, deserts and tribal areas). About 170,000 habitations have been identified for coverage in the country. This would require new construction of 369,000 km and upgradation of 368,000 km at a total cost of Rs.133,000 crore, US$30.6 billion (as against earlier estimates of Rs.60,000 crore). This does not include the cost of 5-year maintenance of link roads and 10-year maintenance of through routes taken up under the PMGSY.

In Madhya Pradesh there are 51,000 villages of which 43,000 are not connected by blacktop surfaced roads. The cost of connecting villages / habitations with population in excess of 500 (250 in tribal areas) is estimated to be Rs. 12,199 crore (US$2.8 billion).

One of the key issues that has emerged during the planning and initial implementation of PMGSY is the preservation of the infrastructure assets being created by the programme through effective maintenance. Construction

contractors are responsible for maintenance for the first 5 years after road construction. Thereafter responsibility for maintenance reverts to the implementing agencies.

8.2 International evidence shows that inadequate maintenance of roads has wasted resources invested in roads on a large scale. An early World Bank study (Harral and Faiz, 1988) demonstrated that spending $12 billion on maintenance in developing countries would have saved $45 billion of reconstruction expenditure. Globally, there has been a shift from constructing new roads to preserving, maintaining, and maximising the operations of the existing road network. However, effective maintenance as a regular and sustainable programme is difficult to establish because it requires a combination of policies, adequate funding, institutional arrangements and technical capacity.

8.3 Madhya Pradesh has taken up several initiatives for road infrastructure development. Examples of such initiatives include:

(i) Allocation of funds from CRF for development and upgrading of SHs and MDRs;
(ii) Funds from own budget for the "Fast Track Scheme" to render some SHs and MDRs passable in the short term;
(iii) Levy of cess on agriculture produce and setting aside a major proportion (85 per cent) as the "Kisan (Farmer) Road Fund" and earmarked for the development and maintenance of MDRs and rural roads;
(iv) Loans from NABARD for construction and upgrading of MDRs and rural roads;
(v) Bonded-BOT projects with subsidies upto 50 per cent for selected State Highways through the private concessionaires.
(vi) ADB loan assisted project for upgrading selected State Highways.
(vii) ADB loan assisted project for accelerating the PMGSY programme.

8.4 A situation analysis of roads was carried out for Sihora block in Jabalpur district and Dhar block in Dhar district, where 63 and 116 roads/tracks were respectively surveyed. Sihora is a smaller block in area with a much higher population and population density but lower overall road length. The proportions of NHs, SHs and MDRs in the road networks at 22.6 percent and 19.8 percent respectively for Sihora and Dhar are broadly similar. By implication, the proportions of the remaining road network (ODRs, VRs and tracks) are also broadly similar. About 40 and 31 percent respectively of all roads and tracks in Sihora and Dhar provide full access.

As would be expected, high proportions (85 and 94 percent respectively) of NHs, SHs and MDRs provide full access while 20 and 37 percent of rural roads (ODRs and VRs) in Sihora and Dhar respectively provide full access.

Of the total length of 196 km of PMGSY "core network" roads in Sihora, 41 percent roads are maintainable. These include about 21.4 km completed under PMGSY Phases I to IV (2000 to 2004). In addition to the PMGSY roads, there are 79 km of rural roads and tracks of which 20 km are maintainable.

Of the total length of 138 km of PMGSY "core network" roads in Dhar, 73 percent roads are maintainable. These include 15.6 km completed under PMGSY Phases I to IV (2000 to 2004). In addition to the PMGSY roads, there are 227 km of rural roads and tracks. Of these, only 43 km are ODRs and VRs, the rest being tracks. There is also a clear demarcation between ODRs and VRs and tracks in terms of their maintainability with virtually all ODRs and VRs assessed to be maintainable while none of the tracks are maintainable.

The evidence from the two blocks shows that the implications of including non-PMGSY roads in the maintenance programme situation are likely to differ substantially between blocks and districts.

8.5 There has been a drastic reduction in the allocation of funds for road maintenance in Madhya Pradesh. Against an allocation of Rs. 282.29 crore in 1997-98, it dropped to a mere Rs.136.10 crore in 2002-03. Funds for road maintenance are not allocated as per norms. The shortfall in expenditure on road maintenance compared to funds required as per norms has been increasing over the last five years from a level of 50 percent in 1997-98 to 75 percent in 2002-03. Obviously, the state does not attach the importance that the maintenance of roads would deserve.

In case of village roads, the result is that they become almost impassable even for non-motorised traffic. Poor condition of roads, particularly for the rural inhabitants, hits them badly as it prevents them from accessing health care facilities in time and increase their time spent on daily chores like collection of fuel wood, drinking water thus reducing time available for productive work in farm activities. Obviously, agriculture output also gets affected.

As per a broad assessment carried out during this study, the replacement value of the existing state roads in MP works out to Rs. 12230 crore. These are huge assets. Assuming a modest loss of just five percent, the erosion in asset value would be over Rs.600 crore a year.

8.6 Madhya Pradesh has a total road network of 68,106 km (2002). About 85 percent of the total length is surfaced (blacktop/water bound macadam) and 15 percent is unsurfaced (gravel/earth). It has been assessed that because of inadequate funds for maintenance, 60 percent of the MDRs and 80 percent of rural roads (ODRs + VRs) have deteriorated to the point that they are not passable and will require huge investments (of the order of Rs. 2000 crore) in their rehabilitation. It will, therefore, be necessary to increase the allocations for road maintenance.

8.7 Funds alone will not do. Simultaneously, attention is required to be paid to planning and implementation aspects. Implementation of construction and rehabilitation of roads through contractors is a well established practice for programmes such as the PMGSY. For improving delivery of maintenance interventions, proper contracting procedures, documentation and supervision arrangements are required. Attention is also needed to appropriate technologies, control systems, human resource development within the public sector agencies, development of private contractors' capacity and communities to participate in decision making and implementation where appropriate.

8.8 The organisations involved in the roads sector are the PWD and the RES under the PRDD. PWD is responsible for maintenance of NHs, SHs and MDRs and also manages construction and upgrading of these roads implemented through contractors. The Panchayat and Rural Development Department (PRDD) at the state level is responsible for rural development programmes (including rural roads). At the district level, rural development programmes are administered by District Rural Development Agencies (DRDAs) which come under the line responsibility of PRDD.

Rural Engineering Service (RES) is the technical implementation agency for rural development related civil construction works under the PRDD. It implements projects for the PRIs and provides technical support for projects undertaken at the village level. Maintenance of rural roads (ODRs and VRs) is now formally the responsibility of the PRIs but there are some unresolved issues with respect to resources and the level of Panchayat Raj on which this responsibility should rest.

As noted earlier, PMGSY is a national level programme and is managed by the National Rural Roads Development Agency (NRRDA) at the national level. At the State level, the MP Rural Roads Development Authority (MPRRDA) has been created under the PRDD to implement PMGSY. The programme implementation is managed and supervised by 27 units. The MPRRDA draws its technical officers from both the PWD and the RES.

8.9 The PWD is a well structured organisation with competent and experienced staff. However, as an agency for managing the roads sector and especially maintenance, it has a few weaknesses.

(i) There is a history of inadequate and irregular funding for road construction, rehabilitation and maintenance.

(ii) Annual maintenance expenditure has been typically 20-30 per cent of the estimated requirements as per norms. The problem is made more serious by inefficient delivery of maintenance works out of the available funds.

(iii) Gang labour absorbs a relatively high proportion of the maintenance budget (50 percent or more of the maintenance budget

since 1999). The productivity of gang labour is also an issue.

(iv) Management of available funds and planning procedures for road maintenance are poor with weak database and inadequate use of information technology.

(v) Provisions for training and human resource development are meagre and progression of staff to higher positions is very slow.

8.10 The RES also has competent and experienced staff with exposure to a range of small scale rural works. There are also opportunities for training and promotion although they need to improve. However, there are also some weaknesses and issues that need to be addressed. These are:

(i) Currently the RES units have no responsibility for routine maintenance, though individual RES Units may have undertaken small emergency repairs and rehabilitation projects through contractors.

(ii) Recent changes giving more autonomy to gram panchayats in implementing village projects have reduced the role of RES Units in providing technical advice and inspection of works undertaken by them.

(iii) Staffing situation has been weakened with demand for staff for PMGSY by the MPRRDA.

Therefore, for the RES to be the executing agency for rural road maintenance, a substantial effort in building up its capacity will be required. It will also be necessary to consider its relationship with the PRIs and more specifically the division of responsibilities with respect to planning, budgeting and implementation.

8.11 MPRRDA is seen as an executing agency for the PMGSY. Its role in maintenance is limited to the initial five years after construction. However, it may have to continue with maintenance activity till capacity building of the Panchayati Raj Institutions and the RES units takes place.

8.12 In 1999, the State Government decided to transfer responsibility for maintenance of rural roads (ODRs and VRs) from the PWD to the Panchayat Raj Institutions (PRIs). This transfer has not been effective so far because this was not accompanied by transfer of resources and capabilities. The problems of clarity on ownership and responsibility and lack of resources are made worse by major changes in road classes implying a shift in the burden of maintenance from the PWD to the PRIs.

Since the DRDAs manage rural development programmes under the supervision of Jila panchayats, they may have a role in the control, coordination and planning of rural road maintenance at the district level. The institutional structure under the panchayat raj at the district and sub-district level and the relationship of PRIs with line ministries is complex. It would be necessary to

undertake a detailed assessment of the current capacity of PRIs to maintain rural roads and then support measures required to strengthen this capacity.

B. Need for Sustainable Financing

8.13 To develop a maintenance strategy option for the rural road network, it is necessary to consider potential sources of funds for maintenance. Sources of funds are (a) GOMP allocations from the consolidated budget, (b) GOI and GOMP allocations of funds from development, employment and welfare schemes and initiatives, (c) GOI contribution to the administration costs of DRDAs, and (d) tax raising powers, currently mainly at the Gram Panchayat level (e) Kisan Road Fund created out of levy on agricultural produce.

In addition, the Sampoorna Grameen Rozgar Yojana (SGRY) is another scheme of the Ministry of Rural Development, Government of India. It was created in 2001 by consolidating two existing schemes, EAS (Employment Assurance Scheme) and JGSY (Jawahar Gram Samrudhi Yojana). Greater orientation of SGRY towards maintenance of roads (and preservation of other infrastructure assets) may be possible and therefore SGRY could be considered a possible source for maintenance of non-PMGSY roads.

8.14 There is huge gap between the funds required and those currently available for maintenance of rural roads in the state. Needless to assert that maintenance requires a stable and sufficient level of funding. A dedicated road fund for maintenance may be created for this purpose.

8.15 Setting up a road fund requires a policy decision and a legislative act to separate funding of roads from general government expenditure. The issues which need attention in setting up a road fund are:

- whether it is to cover all categories of roads;
- whether it is to cover maintenance only or also rehabilitation and new construction;
- procedures for allocation;
- reporting, monitoring and auditing arrangements for the expenditure; and
- management board/empowered committee to manage the fund.

Asset preservation should be an important principle in establishing the scope, allocation procedures and monitoring and auditing arrangements. Some road funds are set up specifically for maintenance. In such cases, rehabilitation and new construction are undertaken from the development budget. In line with the asset management model, the additional maintenance commitment such investment would require and how it would be financed must be specified.

If the road fund provides funding for maintenance, rehabilitation and construction, priority could be given to maintenance since preserving, maintaining and maximising the operations of the existing road network provides higher benefits than investment in more roads which also add to future maintenance commitments.

C. Management Options

8.16 There are a few institutional issues which need deliberations to improve implementation of maintenance of rural roads. These are:

(i) Implementation of maintenance requires attention to a number of technical and supervisory aspects including making an assessment of road condition and maintenance requirements, preparing programmes of maintenance at district level, productivity of gang labour, procurement of contractors and their supervision and quality control of works. The PRIs will need to establish effective working relationships with a much strengthened RES. RES Units have been implementing public works for the DRDA. Potentially, they could be an appropriate agency to implement maintenance. It should be possible to strengthen their capacity to manage the technical aspects of rural road maintenance.

(ii) Another institutional issue is the capacity and willingness of private contractors to undertake maintenance. Small local contractors are a feasible option for maintenance of rural roads. For link roads serving one or two villages, some form of community contracting can also be considered.

(iii) Implicit in the panchayat raj system are the consultation and democratic processes. The planning, control and implementation of road maintenance must take account of evidence from local consultations and proposals arising at the village and block levels but with an objective and professional approach to establishing maintenance priorities. In addition, annual maintenance programmes and budgets prepared by the DRDAs and the criteria used in preparing the programmes would be subject to approval by elected Jila panchayats who may vote to amend the programme or decide to raise or allocate additional funds for maintenance. Panchayats at all levels are also forums where representatives may bring concerns about the poor road condition because of inadequate maintenance.

(iv) A Rural Roads Agency at the state level could embrace the following functions:
- ❖ guide and support the Jila panchayats and technical agencies at the District level in capacity building, management, planning and operations;
- ❖ communicate with the funding agency;
- ❖ monitor the performance of districts and support them in improving performance;
- ❖ recommend or set planning guidelines and standards;
- ❖ research and development on management and operations; and
- ❖ co-ordinate with agencies responsible for other categories of roads.

8.17 Three options for institutional arrangements and related capacity building requirements have been identified. Under Option 1, the role of the Jila panchayats is limited to the maintenance of PMGSY roads. Under Options 2a and 2b, a more strategic approach to the planning and implementation of the rural road network is taken. The difference between the two options 2a and 2b is the balance of management and planning responsibilities between the DRDAs and the RES.

Option 1

The role of the Jila panchayat / DRDA is simply to administer the funds for the maintenance of PMGSY roads. The procurement of contractors and their supervision would be undertaken by the RES as the technical agency. Under this option, the role of the Jila Panchayat with respect to maintenance of PMGSY roads would be to sanction payments upon satisfactory performance of contractors. Maintenance of the rest of the rural road network would remain the responsibility of the gram panchayats.

Even if the role of the DRDAs is limited to managing the finances and sanctioning payment for completed work, their capacities for these functions will have to be developed. Maintenance operations on PMGSY roads would be by contractors. The capacity of the technical agency to manage contracts, supervise operations and use a simplified maintenance management system (MMS) to assess the condition of roads and effectiveness of maintenance would have to be developed, though some of these functions could be outsourced to the private sector or undertaken by the RES. In this option, the maintenance of the remaining rural road network would remain poorly resourced.

A state level Rural Roads Agency could be considered for administration, planning, programming, coordination and monitoring of maintenance activities, supporting districts in capacity building, management , planning

and operations, research and development on management operations (including development of an appropriate MMS), and maintaining effective communication with the departments or agencies providing funds for maintenance, on funding requirements, disbursements and maintenance performance.

Option 2a

The importance of developing a maintenance strategy for the rural road network within the district is recognised and Jila Panchayats/DRDAs are given responsibility for the management of the entire rural road network and related planning activities. The DRDAs would rely on the RES for technical aspects of implementation such as maintaining a road condition inventory, making an assessment of maintenance needs, formulating maintenance programmes, procuring contractors and their supervision. The DRDAs and the RES would need to develop appropriate capacities which are non-existent at present.

Under this option, in addition to the capacities required under Option 1, the DRDAs would have to develop maintenance planning capacity needed to establish priorities and prepare maintenance plans and budgets. The DRDAs would need to rely on the RES for the technical input to the planning exercise (e.g. information on the state of the road network and maintenance requirements and costs obtained through an MMS). The RES would be responsible for managing maintenance operations through contracts as under Option 1.

Option 2b

The importance of developing a maintenance strategy for the rural road network within the district is recognised but the management of the road network and related planning activities as well as the implementation of maintenance are delegated to the RES.

The functions and capacity requirements for the DRDAs would be much the same as for Option 1. The planning, technical supervision and monitoring capacity would have to be developed in the RES.

Both Options 2a and 2b require development of a maintenance strategy for rural roads as a whole and therefore the role of the state level Rural Roads Agency would need to go beyond the functions set out under Option 1. Broadly, the Rural Roads Agency would be concerned with the policy and legal framework, funding and its management and formulating policies and planning guidelines and advising GOMP on these aspects. The concept of asset management can be the guiding principle for the Rural Roads Agency in developing a strategy for rural roads.

Whatever option is adopted, the institutional arrangements need to be judged against the criteria of clarity in management responsibility, ownership and the capacity of the agencies to perform the functions. Transferring ownership and management responsibility to the Jila panchayats and committing funds achieve a degree of clarity in management and ownership. However, capacity development of both the RES and the DRDA at the district level still remains a challenge and needs to be addressed to preserve the assets being created at huge cost to the economy.

D. Operational Capacity

8.18 Operational capacity would also need to be developed. This requires:

(a) planning capacity to assess the condition of the road network and plan, design and prioritise maintenance activities;
(b) ability to manage the contracting process and supervise and monitor contractors;
(c) technical expertise to evaluate the effectiveness of current standards and practices and test and develop alternative approaches,
(d) provision for monitoring and evaluation, and
(e) technical and financial reporting and auditing.

The Table below summarises the functions and capacity building required for various road agencies, contractors and consultants to improve the operational capacity for implementation of maintenance works on the ground.

Operational responsibilities and functions and capacity building	
Agencies	**Functions and Capacity Building**
DRDAs	*Institutional, staffing and equipment* ❖ Road maintenance management unit (size dependent on scope of activities) ❖ Finance, administrative and management staff ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Administrative, financial and project management ❖ Preparation of maintenance options (with RES support) and direction and supervision of implementation ❖ Contracting process and contractors management (if DRDAs are involved in these aspects)
RES	*Institutional, staffing and equipment* ❖ Maintenance management and implementation unit (staffing dependent on scope of activities e.g. whether DRDAs delegate some of the financial control and administrative functions to RES and the tasks assigned to consultants) ❖ Planning and technical staff (and financial control and administrative staff if DRDAs delegate some of these functions to RES) ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Contracting process and contractors management ❖ Planning and technical aspects of maintenance
Consultants	*Institutional, staffing and equipment* ❖ Planning and technical staff ❖ Computers with necessary management software and accessories and other office equipment *Functions and training requirements* ❖ Road condition, and traffic surveys, ❖ Development of road inventory and updating of roads database, ❖ Use of MMS and preparation of annual maintenance requirements and plans ❖ Supervision and management of contractor operations
Contractors - small and medium sized (classes C, B, A-I and A-II) and community	*Institutional, staffing and equipment* ❖ Technical and supervisory staff ❖ Light equipment (with option to hire) *Functions and training requirements* ❖ Routine, emergency and periodic (including works and site management and reporting) ❖ Strengthening of skills of labour ❖ Estimating and bidding for contracts ❖ Managing small businesses

8.19 The implementation of PMGSY in the state shows that the use of consultants has filled the capacity gap in the public sector. For rural road maintenance, consultants will have to be willing to undertake smaller assignments, possibly in a number of districts. Some large consultants may be willing to take on consultancy assignments but the actual work is likely to be off loaded to smaller consultants. Therefore, it will be necessary to develop small scale consultants side by side and encourage them to procure the assignments directly. Training for them would also be needed.

8.20 Capacity building of small-scale contractors and road agencies in efficient and effective delivery of maintenance works is an important requirement for consideration of the state government. The ILO would be glad to share the experiences and expertise gained on such aspects in some of the countries in Asia and Africa during the last over two decades of working. The issues highlighted in the study would require deliberations among the key stakeholders in the state including the users and an Action Plan formulated for efficient and effective delivery of rural road maintenance.

References

ADB (2002) *Madhya Pradesh State Roads Sector Development Project,* ADB Loans 1958-IND and 1959-IND, December

ADB (2003) *Report and Recommendations of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to India for the Rural Roads Secor I Project.* Manila

Behar, A and Kumar, Y (2002) *Decentralisation in Madhya Pradesh, India: From Panchayat Raj to Gram Swaraj (1995 to 2001),* Overseas Development Institute Working Paper 170, London

Cook, C C, Somchai Jitsuchon, Sharma, A K and Wu Guobao (2003) *Assessing the impact of transport and energy infrastructure on poverty reduction,* RETA 5947 (Draft Final Report) for the Infrastructure Division, South Asia Regional Department, ADB

Dixon-Fyle, K (1998). *Accessibility Planning and Local Development*. RATP. No. 2, ILO, Geneva.

Edmonds, G, Donnges, C and Palarca, N (1994). *Guidelines on Integrated Rural Accessibility Planning: Planning for Peoples' Needs*, ILO/DIGL, Manila.

Edmonds, G and Johannessen, B (2003) *India: Mission Report, May 26th to June 4th*, ILO ASIST AP, Bangkok

Fan, S, Hazell P and Thorat, S (1999) "Government Spending, Growth and Poverty in Rural India", *American Journal of Agricultural Economics,* Vol 82, No 4

Gupta, D P (2002) *Maintenance of rural roads: Issues and recommendations for policy dialogue,* Base paper prepared for Regional Level Workshops organised by the Ministry of Rural Development and the World Bank, September

Gupta, D P (2003a) *Maintenance of rural roads: developing policy and implementation plan for Himachal Pradesh*, The World Bank and Ministry of Rural Development (Government of India), Delhi

Gupta, D P (2003b) *Maintenance of rural roads: developing policy and implementation plan for Uttar Pradesh*, The World Bank and Ministry of Rural Development (Government of India), Delhi

Harral, C and Faiz, A (1988) *Road deterioration in developing countries,* Washington D.C,: World Bank

Heggie, I (1995) *General road management issues: Managing roads like a business, not like a bureaucracy,* Rural Transport Knowledge Base, Rural Travel and Transport Programme 2001, DFID and World Bank

Heggie, I and Vickers, P (1999) *Commercial management and financing of roads,* World Bank Technical Papers No 409, Washington D.C.: World Bank

IRC (Indian Roads Congress) (2002) *Rural Roads Manual*, IRC (SP 20-2002), New Delhi

Ivarsson, S and Malmberg Calvo, C (2003) *Private-public partnership for low volume roads: the Swedish Private Roads Associations*, World Bank (Web source)

Louis Berger Group (2002) *Impact of roads on poverty reduction,* ADB TA BAN-3508 (Draft Final Report)

Malmberg Calvo, C (1998) *Issues of local level management,* Rural Transport Knowledge Base, Rural Travel and Transport Programme 2001

Mathur (Undated) *India's experiment with decentralisation: A review*, Web source.

Merani, N V (2003) *Rural road maintenance assessment for Jharkhand,* The World Bank and Ministry of Rural Development (Government of India), Delhi

Ministry of Rural Development (2001) *Pradhan Mantri Gram Sadak Yojana: Manual for preparation of District rural roads plans*, Government of India.

Ministry of Rural Development (2003) *Pradhan Mantri Gram Sadak Yojana: Guidelines*, Delhi

NRRDA (2004) *PMGSY Briefing Book and Annexes,* New Delhi

Vaidya, K (2002a) *Strategy Document for a Labour-based Programme in Jabalpur District, Madhya Pradesh*, ILO ASIST-AP, Bangkok

Vaidya K (2002b) *Benefit Monitoring and Evaluation (BME): RIIP final report and recommendations for continuing activities within MRD,* for the Royal Government of Cambodia, the Asian Development Bank and IT Transport, Phnom Penh, June.

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