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NRRDA
National Rural Roads Development Agency
Ministry of Rural Development

Maintenance of Rural Roads: Policy Framework

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Maintenance of Rural Roads: Policy Framework
Section A: Need and Challenges

1. Introduction

1.1 Importance: Rural roads comprise about 85 percent of the total road network. They are often treated as the last links in the transport networks. However, they are critically important in terms of providing access to social and economic services. Rural roads act as facilitators to promote and sustain agricultural growth, improve basic health, provide access to schools and economic opportunities. They, thus, hold the key to accelerated poverty alleviation, socio-economic transformation, national integration and breaking the isolation of village communities. Whist not mentioned specifically in the Millennium Development Goals (MDGs), rural roads contribute significantly to their achievements (Box 1).

Box 1: Sustainable Access by Rural Roads contribute significantly to achievement of MDGs

- Whilst rural roads are not mentioned specifically in the MDGs, it is clear that they contribute directly through the provision of access. To recall, the MDGs are:
  - Goal 1. Eradicate extreme poverty and hunger
  - Goal 2. Achieve universal primary education
  - Goal 3. Promote gender equality and empower women
  - Goal 4. Reduce child mortality
  - Goal 5. Improve maternal health
  - Goal 6. Combat HIV/AIDS, malaria and other diseases
  - Goal 7. Ensure environmental sustainability
  - Goal 8. Develop a global partnership for development
- It will be easily noted that access is a significant factor to the achievement of Goals 1, 2, 4, 5 and 6.
- It is not merely the construction of a rural road which provides access but effective maintenance which ensures sustainability of that access.

Source: ILO: Rural Roads Maintenance – Sustaining the Benefits of Improved Access by Chris Donnges, Geoff Edmonds and Bjorn Johannessen, SETP-19 (2007).

Maintenance of rural roads needs to be an integral part of poverty reduction strategies to enable our country to succeed in reaching the MDG's.

Maintenance of rural roads is, therefore, not simply a financial and economic issue but also a humanitarian priority.

1.2 Central Government Intervention

1.2.1 Constitutionally, rural roads is a state subject. Construction of these roads continues to receive attention of the states. Major thrust to their development was given at the beginning of the Fifth Five Year Plan in 1974 when it was made a part of the Minimum Needs Programme (MNP). However, several states lagged behind. In order to give a boost to rural connectivity, the Government of India launched in December 2000, the programme known as Pradhan Mantri Gram Sadak Yojana (PMGSY) with the objective of connecting all unconnected habitations having a population of 500 and above with all-weather roads. The population threshold is relaxed to 250 in case of hill states, tribal and desert areas. In departure from the earlier programmes, the PMGSY is a hundred percent funded programme of the central government in respect of construction. However, maintenance is the responsibility of the states. The PMGSY has packaged first five year routine maintenance with the construction/upgradation contracts to be undertaken by the same contractor. The implementation of this programme is entrusted to the Ministry of Rural Development (MORD). The National Rural Roads Development Agency (NRRDA) provides management and technical support to the programme. Actual execution of works is handled by rural engineering agencies and public works departments in the states through their respective State Rural Roads Development Agency (SRRDA).

1.2.2 The Government of India has launched PMGSY-II in May 2013 with the objective of upgradation of rural roads in view of the economic growth and traffic demand. In addition to hundred percent maintenance, the states will be required to share in the construction cost as well, normally 25 percent but in case of North-East states and tribal areas 10 percent, rest being funded by the Central Government.

2. Purpose of Maintenance: Why and who benefits?

The purpose of maintenance is to ensure that the road remains serviceable throughout its design life. Maintenance is important because it:

(i) Prolongs the life of the road by reducing the rate of deterioration, thereby safeguarding previous investments in construction and rehabilitation;

(ii) Lowers the cost of operating vehicles on the road by providing a smooth running surface;
(iii) Keeps the road open for traffic and contributes to more reliable transport services; and
(iv) Sustains social and economic benefits of improved road access.

The first purpose is primarily in the interest of the responsible government authorities. The other three are of more general interest to the inhabitants of the area traversed by the road and to the vehicle operators.

3. Asset Base

The current replacement value of the existing rural roads in the country defies precise estimation in view of virtual absence of the system of regular updating of inventory and condition surveys of road stretches, bridges, culverts, traffic control devices, etc. A broad assessment is given in Table 1.

Table 1: Replacement Value of Rural Road Assets
(Broad Assessment* as of 31 December 2013)

1.	PMGSY 390,000 km @ Rs.40 lakh/km	Rs. crore 1,56,000
2. (i)	Non-PMGSY Core Road Network 7,47,500 km @ Rs. 16 lakh/km	 1,19,600
(ii)	Non-core roads 21,12,162 km @ Rs. 10 lakh/km	 2,11,216
	Total	4,86,816
	Say	Rs.4,87,000 crore
These are huge assets and justify preservation		

* Assessment by D. P. Gupta, former DGRD and Additional Secretary, MORTH

Even if such an assessment could be open to debate, yet for a policy framework, there can be no two opinions that the scale of these assets is huge and to ensure sustainability of the benefits of rural road access being provided at huge cost to the economy, the states must preserve these assets. And, preservation would require adequate funding to ensure regular and timely maintenance.

4. Impact of Poor Maintenance

4.1 Loss of Assets: An investment of about Rs. 1,09,200 crore has been made so far (upto January 2014) under the PMGSY. Besides this, several states have been and are making their own investments in accelerating the rural connectivity in far flung areas. Annual expenditures in the range of Rs. 20,000 to 25,000 crore are now envisaged for connectivity by all-weather roads including the PMGSY and PMGSY II programmes. The resulting loss in value of road assets due to neglect in maintenance would be as high as Rs. 20,000 crore per year, equivalent of 50000 km of roads being eroded every year.

4.2 Loss of Agriculture Output: Rural roads often become impassable during the rainy season and agriculture output is affected.

4.3 Loss of Time: More working time is lost in travel and transport of people and agriculture produce to market.

4.4 Heavy Rehabilitation Costs: A large backlog of deferred maintenance is caused, resulting in 4 to 6 times the cost in restoration and rehabilitation. This will also put additional avoidable burden on transporting road aggregates from long distances resulting in increased carbon footprint due to pollution.

4.5 Dependence on Slow Vehicles: Due to poor condition, road users are compelled to continue to depend upon slow moving non-motorised vehicles rather than switch over to mechanised vehicles.

4.6 Vehicle Deterioration: Not only roads get deteriorated, even the life of vehicles is seriously eroded due to poor road conditions. Vehicle operating costs go up very high.

4.7 Loss of Image: Poor maintenance also reflects weak governance and does not present a good image of the road agencies.

5. International Practices

5.1 **Road Maintenance Initiative (RMI) in Africa:** India is not the only country where the roads are poorly managed and badly maintained. Several countries in Africa suffered similarly and, therefore, a Road Maintenance Initiative (RMI) was launched by the UN Economic Commission for Africa and the World Bank in late 1980's and early 1990's. An overview of the RMI in Africa is given in Annexes 1 and 2. A summary of the problem (symptoms and causes) extracted from the World Bank Paper No. 411 is given in Annex 3. The highlights of these initiatives are given below:

(i) Road Maintenance Initiative (Africa): The RMI originated in the need of African countries to halt and, it is hoped, to reverse the massive deterioration of the African road networks. It is based on two essential postulates:

(a) the core problem of road maintenance is not rooted in technical matters but is political and institutional,

(b) any change in policies, to be effective, must be rooted in a firm awareness, at the highest level of government, of the importance of road maintenance.

The first phase of the RMI consisted of six subregional policy seminars at which senior policy makers, including ministers, discussed road deterioration, and exchanged experiences and views on various policies, their appropriateness in the African context, and how best to introduce them through collaborative preparation of national action plans. Each Sub-Saharan African country sent a team responsible for road maintenance and rehabilitation programmes. The country teams were normally led by the minister or deputy minister responsible for road maintenance. Box 2 gives an idea of the issues discussed in these seminars.

Box 2: Range of Issues discussed under RMI (Africa)

(a) **Planning, Financing and Budgeting**
- Developing a network based framework for planning
- Collecting and disbursing funds
- Performance budgeting

(b) **Operations and Management**
- Reducing force accounts and increasing contracting
- Increasing use of labour-based operations
- Reducing publicly owned equipment fleets

(c) **Institutional Reform and Human Resource Development**
- Institutional reform
- Improving staff motivation and utilisation

The second part of the seminars was conducted following the approach of Policy Action Planning developed by a German team. The approach identified constraints and functional deficiencies faced by the sector, measures required to achieve the objectives and determination of

resources, responsibilities and timeframe for implementation. Phase II of the RMI covered preparation of policy reforms in a limited number of areas that are central to better management of road infrastructure and build up the capacity of selected training institutions.

(ii) Road Maintenance in African Countries (GTZ Study): The GTZ (Germany) studied the problem in the context of the RMI for Africa. The study highlighted the following organisational aspects:

(a) The replacement value of road networks in developing countries is 2 to 4 times higher than in industrialized countries if compared with their respective GDP.

(b) The road assets being huge should be handled under the special goal of Asset Management.

(c) Asset Management, to be effective, requires a separate Road Authority outside the ministerial administration. This Authority controls access, receives user fees, organises road maintenance.

(d) Along with the intention of decentralizing road administration at the state level, responsibility with regard to ownership is promoted at district and local levels.

(iii) As regards financing, it is recognised that effective asset management requires a stable source of funding of its own just as railway ticketing and rent for houses. Main instruments of financing advocated by this study were establishment of a Road Conservation Fund through a fuel levy and introduction of annual vehicle license fee, taxes on land development and real estate. It has been proposed that the fund be placed under special ownership of the Roads Authority.

5.2 **Managing Rural Transport Infrastructure** (World Bank Paper No. 411): This paper looked at the problem of managing and financing Rural Transport Infrastructure (RTI). It brought out five closely related symptoms of the problem:

- ***Symptom 1 – Unclear Responsibilities:*** Multiple agencies are involved in providing rural roads in most African countries. In addition, organisational structures are repeatedly changed. Legal framework regulating community ownership of roads is

lacking. Reliance on unpaid volunteer labour for regular maintenance of local roads is not sustainable.

- ***Symptom 2 – Disintegration of Planning System:*** Planning is often inconsistent and uncoordinated. Thousands of kilometers of roads constructed under agricultural projects, food-for-work schemes and by NGOs, timber companies, cocoa and cotton boards are lying without maintenance because of misallocation of resources where recurrent expenditures take a back seat.

- ***Symptom 3 – Insufficient and Uncertain Funding:*** The shortage of funds has been especially severe at the lowest levels of the road network (5 to 15 per cent of the requirements). The available funds barely cover staff costs, leaving little for maintenance on the ground.

- ***Symptom 4 – Inadequate Local Capacity:*** There is lack of incentives for road staff at the local level. They have fewer career prospects. Living conditions are sometimes harsh. Local bodies have little experience in contract management.

- ***Symptom 5 – Inappropriate Design Standards and Methods:*** The policy focus on providing conventional highways for use by motorised vehicles and designs are influenced by the requirements of industrialized countries that are more suited to motorised traffic. Inappropriate methods have also contributed to inefficient resource use.

The common thread running through these symptoms is weak local government and community institutions. Weakness is not confined only to roads but are generic to all sectors. Strengthening local institutions through effective decentralization is considered as the centre-piece of rural development.

5.3 As a result, several countries in Africa set up dedicated funds for maintenance (Annex 4). Similar funds were set up in Latin America (Annex 5).

6. Assured Funding

6.1 **Finance Commission Recommendations:** Our country has not received such intense attention towards maintenance of rural roads. The 12th Finance Commission considered the issue of maintenance of state roads and bridges by

the state government. To quote from the Commission's Report: *"It is far more important to ensure that assets already created are maintained and yield services as originally envisaged than to go on undertaking commitments for creating more assets. We notice that maintenance of roads and bridges has not been given adequate importance by the states. We are, therefore, recommending additional grants separately for maintenance of roads and bridges, and maintenance of buildings."* Similar central grants for maintenance were recommended by the 13th Finance Commission. This Commission also appreciated the importance of road infrastructure. To quote from its Report *"A proper road infrastructure is vital, not only for economic development, but also for better delivery of services such as education and health. There is evidence to show that road networks lead to, among other things, improved teacher attendance, quicker medical assistance and a greater number of institutional deliveries. We hope that the enhanced provisioning for maintenance, including the focus on the newly created Pradhan Mantri Gram Sadak Yojana (PMGSY) roads, will help in sustaining road connectivity".* This Commission provided grants-in-aid of Rs.19,930 crore for maintenance of state roads. The Commission considered the element of only Ordinary Repairs i.e. Routine Maintenance to the extent of 50 percent of the requirement assessed for non-PMGSY roads and 90 percent of the requirement assessed for PMGSY roads for four years starting 2011-12. These grants are over and above the states' budget and are subject to conditionalities. The conditionalities include allocation of Non-Revenue Expenditure under the Non-Plan Budget Head 3054. And, the approach to planning for road maintenance needs to show strong linkages between asset condition, maintenance requirements and funding allocation.

6.2 **MORD Guidelines:** An area of concern before the Ministry of Rural Development towards implementation of the PMGSY has been persistent lack of maintenance by the states as per the programme guidelines. As per information furnished by the SRRDAs for the year 2009-10 and even previous years, the MORD observed that funding towards the post construction five years maintenance is generally below the stipulated level and also even the funds made available are not being fully utilised for maintenance due to inadequate follow up in many states. This led the MORD to request the states to not only give an undertaking to ensure funding of maintenance but also to arrange that these funds are credited to the SRRDA programme fund accounts. (Refer Circular No. 1 of 2010, dated 9th September, 2010 by the MORD). There is also the issue of proper reporting of the use of maintenance funds in terms of well defined maintenance plans and activities for road stretches under the jurisdiction of each PIU.

7. Organisational Aspects

There is a multiplicity of agencies handling the work of rural roads. A broad picture of the current situation of rural roads maintenance in respect of seven participating states which are recipient of the World Bank assistance is given in Annex 6. It is seen that main agencies are Public Works Departments, Rural Engineering Organisations and Panchayati Raj Engineering Departments. SRRDAs have come up at the state level mirroring the central agency viz NRRDA. Ideally, the SRRDA could be made responsible for overall policy, planning and management of all rural roads in the state. However, every state may have its own institutional structure at present. In states where there are more agencies handling the work of rural roads, it would help if one of the main agencies is made responsible for coordination and integration of various programmes of construction and maintenance.

8. Key Challenges

It needs to be recognized that the problem of rural road maintenance is not merely the lack of finance. There are also technical and institutional issues which require careful consideration. Further, the measures required to improve the situation are often under-estimated. These include the scale of support, capacity development and the lead time required by the road agency to provide regular and timely maintenance to the roads within its jurisdiction. Box 3 captures the key challenges facing the road agencies in attending to the maintenance of rural roads.

Box 3: Rural Road Maintenance: The Key Challenges

(Based on situation analysis of maintenance in a few states)

A. Policy Framework

- Effective road sector strategy.
- Lack of proper integration of rural roads under jurisdiction of several agencies.
- Lack of appreciation for value of rural road assets.
- Near absence of regulatory provisions to preserve and manage the rural road assets.

B. Maintenance Funding

- Inadequate funding for maintenance.
- Weak integration of resources made available.
- Effective management of maintenance funds.

C. Maintenance Planning

- Weak data collection and analysis: inventory, condition, traffic.
- Out of date asset database.
- Near absence of rational planning for ensuring routine maintenance and prioritizing periodic maintenance.
- Lack of emphasis on special requirements of landslides management, mitigation measures against slope instability etc in hill areas.
- Preparation of Annual Maintenance Plans.

D. Institutional and Technical Capacity

- Poor career management of ground level technical personnel.
- Inadequate quality and quantity of training in maintenance operations for road agencies and contractors.
- Low productivity of gang labour.
- Weak quality audit of maintenance works.
- Primitive technologies in maintenance execution.
- Inadequate incentives to contractors.

- Inadequate supervision, inspections.

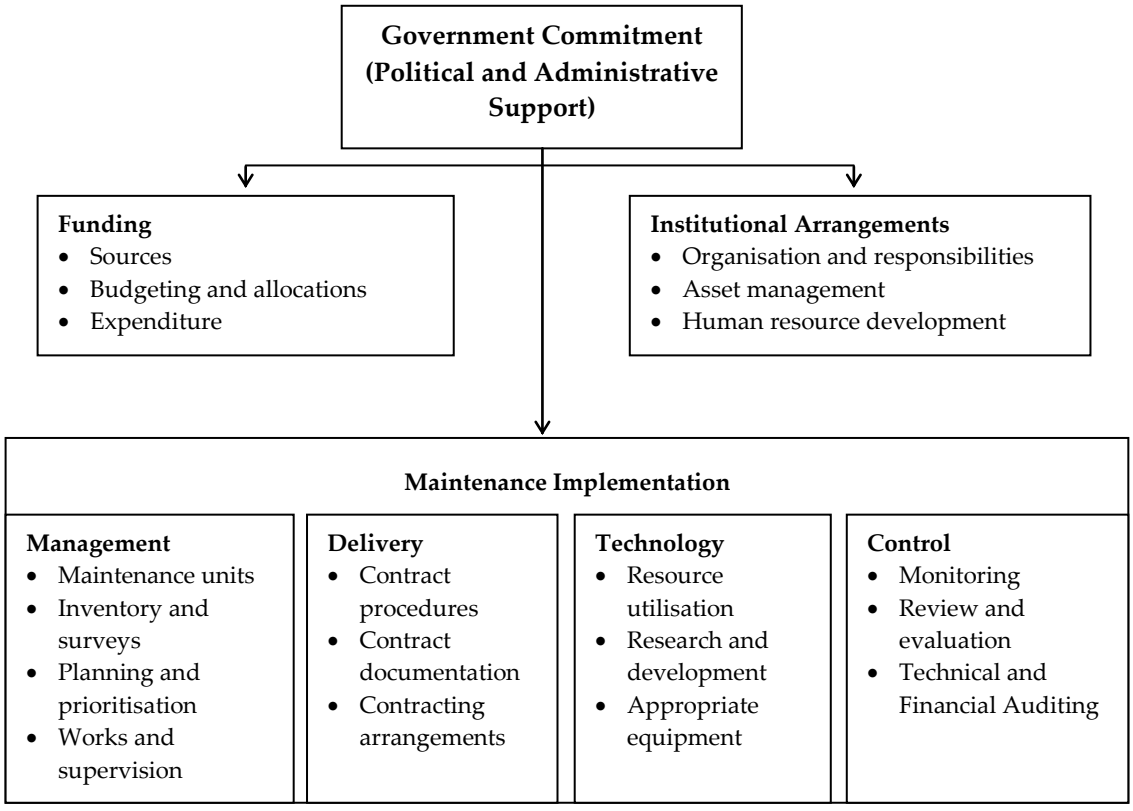
Source: Situation Analysis of Maintenance of Rural Roads in the states of Himachal Pradesh, Uttar Pradesh, Bihar, Arunachal Pradesh (2003, 2006, 2007). Studies sponsored by NRRDA, World Bank.

Section B: Proposed Strategies and Policy Framework

9. Policy Framework

There is growing recognition by the state governments to provide reasonable amount of funds for maintenance of roads. However, to improve the situation, particularly in respect of rural roads including PMGSY, the states need to provide commitment as a policy not to compromise on investment in maintenance and ensuring proper management of rural roads assets. Keeping in view the good national and international promising practices, strategy elements for policy framework would be government commitment, adequate and assured funding, institutional arrangements, maintenance planning and prioritisation; and operational capacity for implementation to the prescribed technical, managerial and accounting standards. Figure 1 gives a broad framework of such a policy.

Figure 1: Policy Framework – Institutional, Funding and Implementation Elements



10. Key Ingredients

The key ingredients of policy for maintenance of rural roads on sustainable basis can be broadly divided into the following groups:

(i) Government commitment

(ii) Adequate funding

(iii) Institutional reforms
(iv) Implementation efficiency

The proposed strategies for each of these are given in the succeeding paragraphs.

11. Government Commitment

11.1 **Increased Focus:** The state governments have been relieved of a considerable burden of plan expenditure for construction of all-weather roads for new connectivity and upgradation of existing rural roads under the PMGSY and PMGSY II as also on account of central grants being awarded by the Finance Commission towards maintenance of roads. They need to focus equally on maintenance and upkeep of existing rural roads by providing adequate funds for maintenance and establishing sustainable policies for planning and execution of maintenance works.

11.2 **Rural Road Management Act:** To give adequate powers to the SRRDAs to preserve and manage the rural roads in the states, a Rural Road Management Act be introduced in each state. Box 4 gives a broad range of aspects that may be covered by such an Act.

Box 4: Rural Road Management Act

The Act should:

- define the powers, functions and obligations of the road authority
- require a register of all roads in each block being kept with the Zilla Panchayat.
- lay down serviceability standards to be adhered to
- govern the regulation of rural roads
- require that an asset management system be instituted
- mandate that the Annual Report of the organization in exercising the functions be tabled in the State Legislature.

Source: Rural Road Development Plan: Vision 2025, Ministry of Rural Development, May 2007

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

11.3 Maintenance Economics: The principles for utilization of available funds should rely on preservation and protection of investment of plan funds for development and expansion of the rural roads. The maintenance cycle should be

in harmony with the design life of the road. There is need to strike a balance between:

- Expansion of existing road network
- Upgradation of existing roads including rehabilitation resulting from maintenance neglect
- Maintenance of existing roads including those being added to the network
- Strengthening of pavement of roads required at the end of their design life.

Consideration should be given to allocating funds for maintenance in the following itemized priorities as far as possible:

(a) Routine maintenance of roads which are in good and maintainable condition including requirements to ensure safe movement of vehicles, cyclists and pedestrians.

(b) Routine and periodic maintenance of roads which are in fair condition.

(c) Removing backlog of maintenance including rehabilitation of existing roads which are in very poor condition. Funds for removal of backlog should ideally be met out of plan funds. Thereafter, ensure routine maintenance of such rehabilitated roads and timely periodic maintenance.

11.4 **Realistic Norms:** The state government should work out its own norms as the currently prescribed norms by the MORTH for rural roads appear to be somewhat on the higher side. A more detailed study of funds required for maintenance of rural roads on realistic basis is needed with clear break up for routine and periodic maintenance for earth, moorum, brick paved, water-bound macadam, black-top and cement concrete roads in different traffic and climatic conditions prevailing in the state. The norms should consider the frequency of various maintenance tasks required. Only a few states have formulated their own norms for maintenance of rural roads. The NRRDA has taken lead in formulating engineering standards, specifications, manuals for preparation of DPRs, contract documents, etc. It may consider providing guidance to the states in working out such norms. Norms should cover requirements of routine maintenance, preventive and periodic maintenance, special repairs and emergency repairs. Consideration may be given to constitution of a High Level Committee by the MORD comprising NRRDA officers, a few Secretaries and Chief Engineers of the states, national level experts to prepare a template of norms for rural roads.

11.5 **Awareness Raising:** A systematically designed Awareness Programme needs to be prepared bringing out value addition in terms of agricultural output, spin off effects in terms of employment opportunities and the consequences of inadequate and deferred maintenance and put before the politicians, the administrators and the engineers of the state.

12. Adequate Funding

12.1 Funding Sources

Several states are adopting the practice of pooling various sources of funds for maintenance of roads. Such sources include:

(i) Government budget: Non-Plan Head 3054
(ii) Central Grants from Finance Commission awards
(iii) Market Committee Funds (levy on agricultural produce)
(iv) Additional sales tax on petrol and diesel
(v) Part proceeds from royalties on mining

Examples of dedicated funds for road maintenance from Africa and Latin America are given in Annexes 4 and 5.

It may not be out of place to mention the initiative taken by the State Government of Uttar Pradesh in creating a dedicated fund intended exclusively for maintenance of roads sometime in 1998 through levy of additional sales tax on fuel (petrol and diesel). As mentioned earlier, the Finance Commission have also now been recommending central grants for maintenance of roads to supplement the state resources under the Budget non-Plan Head. What is perhaps needed is the proper allocation out of such resources for rural roads so that there is reasonable balance between the funds allocated for various classes of roads viz.

- State highways
- Major district roads
- Rural roads
  - Rural roads under PMGSY
  - Rural roads under PMGSY II
  - Remaining rural roads under the Core Road Network
  - Non-core rural roads

The conventional economic wisdom would suggest that due to the value addition effect of rural roads, they should receive funding for maintenance in direct proportion to their asset value and level of traffic they support, i.e.

importance of roads in terms of accessibility to social and economic services. First charge on available funds should be on regular routine maintenance as it helps in reducing the burden of periodic maintenance and rehabilitation.

12.2 Management of allocated funds for maintenance

A mechanism needs to be put in place by the states for ensuring proper management of the funds allocated for maintenance of rural roads so that resources are put to efficient use and there is accountability for outcomes and delivery on the ground. Box 5 gives suggestive elements concerning management of funds.

Box 5: Elements concerning management of funds for maintenance of rural roads

- Create a common pool of funds for maintenance of rural roads from various sources.
- Set up a Board or empowered Committee to manage the fund.
- Members of Board/Committee are selected from concerned departments of the State, PRIs and User Groups.
- Establish a strong but lean secretariat for management of the fund.
- Establish guidelines to manage and administer the fund including allocations and disbursement to various districts and PIUs.
- Establish technically sound methodology for planning and implementing road maintenance interventions.
- Establish systems and procedures to ensure accountability and transparency in the management of the fund including technical and financial auditing (and even social auditing viz rural community feedback.)
- Consider setting up committees on financial and technical aspects.

12.3 Making roads maintainable

There is growing recognition in the government that even rural roads have to be properly designed and need to follow proper standards laid down by the IRC. Such roads would require less maintenance efforts. An Action Plan should, therefore, be drawn to remove the maintenance backlog and bringing roads to maintainable condition in a time bound manner. It is proposed that funds for such a purpose should be tapped out of Plan funds and not allocated out of non-Plan budget. The state governments would do well to arrange a realistic assessment of the total funds required and formulate the strategy to remove the backlog in a phase-wise programme depending upon the availability of funds under the Plan head. It could be a five to ten year rehabilitation plan in respect of rural roads.

13. Institutional Reforms

13.1 Strengthening Accountability

There is need for a clear demarcation of functions relating to policy and planning from those relating to direct execution of works of construction and maintenance. There is merit in the state government nominating one nodal agency which should be responsible for overall planning, budgeting and programming of maintenance works. Accountability of the road agencies responsible for maintenance can be improved by establishing a system of annual performance evaluation. Some of the important performance indicators that can be considered for this purpose are:

- Percentage of rural road network that received routine maintenance;
- Percentage of core road network actually subjected to periodic maintenance;
- Percentage of core road network in good condition;
- Unit cost of routine / periodic maintenance;
- Percentage of maintenance expenditure compared to the amount required as per norms.

Performance audits should relate financial flows and physical performance indicators to the condition of the roads. Internal accountability among the technical officers at various levels needs to be strengthened.

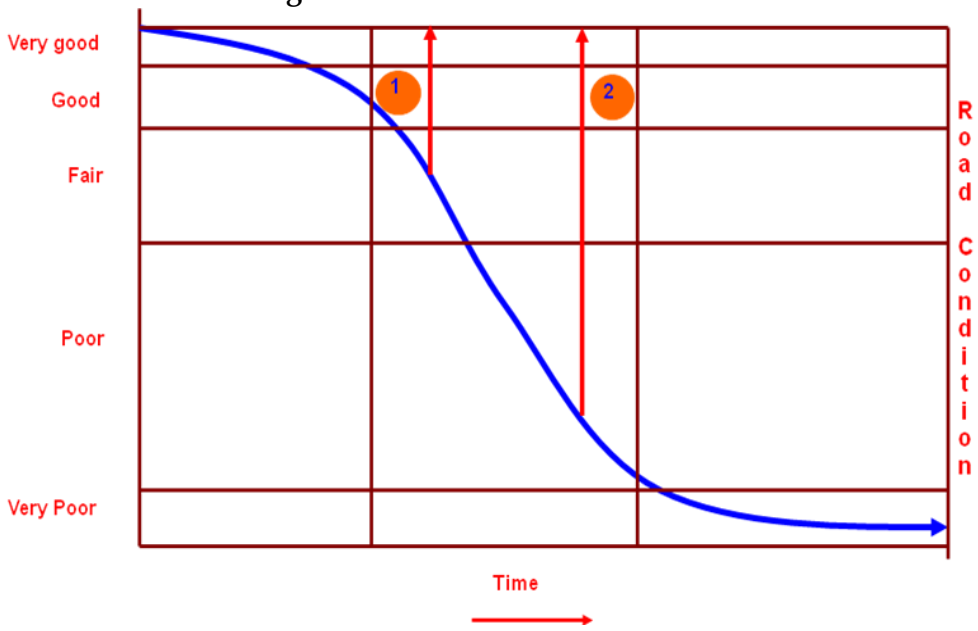
The planning and scheduling of various maintenance operations of rural roads is being undertaken by the Executive Engineer for the roads under his charge. He gets it approved by his Superintending Engineer who is normally responsible to ensure its compliance within the available budget.

13.2 Asset Management System

(i) A simplified Asset Management System (AMS) needs to be evolved by each state building up from the current arrangements for collection and analysis of data. The system should enable maximising the benefits of the available (allocated) maintenance funds. Such a system should also help in assessing impact on deterioration of roads in enabling the empowered fund management committee of the state to decide on mobilising additional funds to avoid the need for much higher investments later in rehabilitation or reconstruction. Figure 2 gives a typical road deterioration curve. Preventive treatment during

the phase when road is in fair condition is much less costly compared to intervention in poor condition when the road has fallen apart. (see the ordinate at (1) which is much less than the ordinate at (2). This is a surrogate of the cost involved in the two stages).

Figure 2: Road Deterioration Curve



(ii) It may also be appreciated that if a regular system of sample data collection and analysis is adopted for all roads, it will provide an immense empirical knowledge base for scientific assessment of rate of deterioration over time capturing the impact of traffic and weather (environment). This in itself will help in refining the proposed Asset Management System (AMS).

(iii) Essential data needs for a simple AMS could be road inventory, road condition through visual inspection, traffic counts, quantity standards and unit costs for various maintenance activities based on practical work methods. Annex 7 gives a broad idea of the road deterioration cycle and Annex 8 gives an example of how to undertake the task of road inventory and condition survey (based on situation analysis of maintenance of rural roads in Madhya Pradesh by ILO a few years back).

The output expected from the AMS would be:

- Road Inventory
- Network condition, pavement condition index
- Need based priorities based on deterioration prediction models
- Annual Maintenance Plan for a given budget

- Impact on deterioration of roads due to gap between funds required and funds made available.

A few states have already instituted road maintenance management system. The NRRDA could consider preparing a template of AMS for rural roads. This will help the states to institute such a system.

(iv) Arrangements to collect, store, retrieve and analyze the data. The output of database systems and prediction models should be available on-line (computer network) in the form of comprehensive charts, graphics and maps for use of various levels of management. GIS would be very helpful in this regard. The challenge is to arrive at a balance between complexity and functionality of the system so that the whole exercise becomes regular and sustainable.

(v) Annual Maintenance Plans need to be prepared for the entire rural roads network both as bottom up approach from block to district to state based on the AMS guidelines. To be able to even begin to plan, the engineers and technicians need to have an understanding of the road network. This implies that key data on inventory condition, traffic levels are known with some degree of confidence. This will help in developing scientific understanding to project a coherent demand by the PIUs. This will then need to be refined as a top down approach based on allocation of available funds for actual implementation by the PIUs. Box 6 summarises the tools considered appropriate for asset management of rural roads.

Box 6: Asset Management System: Essential Tools

- Means and procedures for establishing and maintaining road inventory, providing detailed information about the road assets;
- Established procedures for and logistical means to carry out regular inspection of the network;
- Road standards to provide guidance on how and when maintenance works should be carried out including procedures on how priorities are set for selection of where maintenance should first be carried out;
- Programming and budgeting procedures for the preparation of master plans, periodic plans and annual plans;
- Works implementation procedures: guidelines on choice of technology, use of the private sector and contracting arrangements;
- Skilled staff to carry out planning and works supervision;
- Logistical means to oversee the performance of the network and inspection of works;
- Financial and administrative support services to ensure effective budgetary and expenditure control.

Source: ILO: Rural Roads Maintenance – Sustaining the Benefits of Improved Access by Chris Donnges, Geoff Edmonds

13.3 Human Resource Development

Another area of critical concern is the human resource development of the staff at various levels in the road agencies responsible for rural roads. The Ministry of Rural Development has been investing significantly in this effort, thanks also to the support being provided by the World Bank and the Asian Development Bank. To keep pace with the technological developments within the country and abroad, the engineers of the states at various levels need to have exposure on regular basis through study tours within the country and abroad. The states may formulate a 5-year training calendar for its staff which should include courses on maintenance planning, management, procurement and supervision of works on the ground. Every Junior Engineer and Assistant Engineer need to spend at least ten days in participating in such training courses.

13.4 Devolution to Panchayati Raj Institutions

In the long-term, maintenance of rural roads could be devolved to the PRIs. For successful devolution, the PRIs need to have backing of funds and functionaries. Suggestive role and functions as recommended by the MORD: Rural Road Development Plan – Vision 2025 are as under:

- District Panchayat: Maintenance of through roads of the Core Road Network
- Block Panchayat: Maintenance of Link Roads of the Core Road Network
- Gram Panchayat: Maintenance of roads within the villages and non-core rural roads.

For effective delivery, these PRIs need to be provided with adequate technical and financial support. The Gram Panchayats can be easily involved in routine maintenance works with a little technical guidance. Works being executed under the MNREGS give confidence that there is potential to harness their strength. Being beneficiaries, they are likely to respond to this task better. Every state may consider taking up pilots for routine maintenance of non-core rural roads in the first instance with backing of technical officers for quality execution of maintenance works on the ground. It needs to be realised that reliance on unpaid volunteer labour for regular routine maintenance is not sustainable. Based on experience from such pilots, there could be steadily enhanced devolution of maintenance of rural roads to panchayats.

14. Implementation Efficiency

14.1 Basic Technical Activities: Road maintenance has a poor record of transparency, appearing as a seemingly bottomless pit of funding. It is essential to carry out the work of maintenance in a transparent and well documented manner. We have an example of PMGSY before us. While road maintenance is not a complicated technical issue, it still requires some basic activities to be carried out. The operational capacity to implement maintenance works on the ground requires:

- planning capacity to assess the condition of the road network and plan, design and prioritise maintenance activities;
- ability to manage the contracting process and supervise and monitor the work done by contractors;
- technical expertise to evaluate the effectiveness of current standards and practices and test and develop alternative approaches,
- provision for monitoring and evaluation, and
- technical and financial reporting and auditing.

14.2 To ensure effective use of the contractors for rural road maintenance, it is necessary to have management and monitoring procedures to ensure that the work is being carried out to the required standard. This is 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 training of Class C and Class D contractors and community organisations and putting in place effective supervision and monitoring arrangements suitable for small scale maintenance operations. Such programmes could also access funds by getting linked to the schemes of National Rural Livelihood Mission and National Skill Development Programme.

14.3 Several innovations are taking place on improving the techniques of maintenance treatment. An example of quick patch repairs on blacktop roads developed in UK is given in Annex 9. Live demonstration can be seen at the website www.nu-phalt.com. Annex 10 gives example of a road mobile maintenance unit in Bihar. Microsurfacing and use of emulsions in renewal and sealing of bituminous surfaces are other promising options. The states need to engage in field trials on demonstration basis of such innovative techniques and materials and later upscale those which are found to be cost-effective.

14.4 It is being appreciated by several states that the initial standards and the quality control culture for PMGSY roads in the state also reduces the burden on maintenance at least for a few years. The technical officers would also have a sense of pride and satisfaction in their effort and outcomes. The same can be easily upscaled to cover even the non PMGSY roads. The quality control system can also be strengthened in view of the base already being created through PMGSY. The IRC standards for rural roads are common to both PMGSY and non-PMGSY and states are already imbibing these standards and practices for their rural roads.

14.5 Encouraging creation of dedicated maintenance contractors: There is need for creating a dedicated band of maintenance contractors. For this, performance based and community contracts would need to be piloted and conscious efforts made to enhance the capacity of local small contractors and communities.

14.6 Development of Manuals, Guidelines: The NRRDA has developed documents relating to core road network planning, procurement, financial accounting, operational manuals, book of specifications, design of roads and bridges, at the national level for implementation by the states. This has helped in providing the much needed uniformity in achieving standards. Comprehensive maintenance manuals, technical guidelines, audio-visual aid for maintenance work methods and introduction of small vibratory rollers, mobile maintenance units may be developed to support maintenance efforts of the states.

14.7 Technology Initiatives and Knowledge Development: Recently the NRRDA has issued directions to the states for implementation of guidelines on the proven and potential technologies. Such technologies include those required for maintenance as well. However, there is immediate need for the MORD to invest in the following two areas which are of direct relevance to maintenance:

(i) Pavement preservation and performance
(ii) Identifying potential ultra thin micro surfacing options to reduce costs in sealing of gravel roads and preventive maintenance treatments

The Standing Group on technology initiatives set up by the NRRDA should meet regularly to identify and steer the implementation of R&D schemes by the academia and research agencies.

15. Forward Path

The draft of this broad policy framework for sustainable maintenance of rural roads has now been finalised based on feedback from the states and discussions at the national level workshop organised by the NRRDA and the ILO in January 2014. The policy framework suggested herein may be utilised by the states to lay down their own policy and strategy together with a time-bound Action Plan to achieve perceptible improvements in the maintenance of rural roads and thereby to protect and preserve the huge asset base of rural roads.

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Annex 1

The Road Maintenance Initiative
Building Capacity for Policy Reform

Volume I. Report on the Policy Seminars
(Steve Carapetis, Hernan Levy, Terje Wolden)

Overview of the Seminars

This book reports on the first phase of the Road Maintenance Initiative (RMI), a project under the Sub-Saharan Africa Transport Program (SSATP). The SSATP is a joint program of the World Bank and United Nations Economic Commission for Africa (ECA) and is sponsored by a number of bilateral financing agencies. The objectives and modus operandi of SSATP are:

- An emphasis on policy responses to key transport sector issues and on strengthening capabilities for policy development at the national and regional level.
- Implementation through a series of discrete components (each defined in terms of specific outputs) in partnership with development agencies and African institutions, with participation by African experts and advisors
- A light management structure with flexible arrangements for participation and each component defined up to closure with specific outputs.

Activities of the SSATP are closely coordinated with the preparation of the UN Second Transport and Communications Decade for Africa, 1991-2000.

Within the general framework and objectives of the SSATP, the Road Maintenance Initiative (RMI), focuses on road maintenance. The RMI originated in the need of African countries to halt and, it is hoped, reverse the massive deterioration of the African road networks. The critical situation is illustrated by the following facts:

About half the region's paved roads and 70% of its unpaved roads are in only fair to poor condition and require substantial repairs.

The region's losses in increased road transport costs, caused by lack of maintenance, are estimated at $ 1.2 billion a year.

According to World Bank estimates, the cost of overcoming Sub Saharan Africa's road maintenance backlog is US$ 5 billion, and about US$ 1.15 billion will be needed annually over 10 years to reconstruct priority roads to good condition and to provide routine and periodic maintenance for good roads to prevent them from further deterioration.

The RMI's program is based on two essential postulates:

(a) The core problem of road maintenance is not rooted in technical matters but is political and institutional.
(b) Any change in policies, to be effective, must be rooted in a firm awareness, at the highest level of government, of the importance of road maintenance.

The aim of the RMI is to facilitate policy change. The lack of success with externally initiated or directed reforms, highlights the need for alternative approaches that African governments can use to improve their capacity to deal with complex policy reforms themselves. The RMI addresses this need through a more structured, multiphase program over 5 years, to be closely coordinated with programs and projects financed by international and bilateral lending agencies in order to maximize effectiveness.

The first phase of the RMI consisted of six subregional policy seminars at which senior policy makers, including ministers, discussed road deterioration, and exchanged experiences and views on various policies, their appropriateness in the African context, and how best to introduce them through collaborative preparation of national action plans. Each Sub-Saharan African country sent a team of road maintenance and rehabilitation programs. The country teams were normally led by the minister or deputy minister responsible for road maintenance.

The seminars were preceded by careful preparation over a two-year period. A survey of the road maintenance and road deterioration situation in each country was carried out, and materials were prepared: eight Policy Issue Papers that addressed the main issues, focusing on the nature of the issues and the relevant policy options; several case studies illustrating African examples of successful of policy reform; a module on Policy Action Planning, with guidelines and examples for developing action plans for policy and institutional reform, and, for each country, a Country Review and Analysis that country team could use to identify the key policy issues and assess the relevance and applicability of policy options. The seminars themselves consisted of two parts. The first concentrated on a discussion of key policy issues with the aim of building commitment to policy change. The second presented an approach to Policy Action Planning and gave country teams an opportunity to explore and apply it to their national situations.

The issues covered in the seminar, grouped under three themes, and the participants' reactions, are summarized below.

A. Planning, Financing and Budgeting:

Developing a network-based framework for planning. Currently, in most countries, planning and programming road expenditures is divided between new investments and maintenance. This hampers efficient allocation of scarce resources and has resulted in a significantly lower allocation of total road expenditures for road maintenance than required and economically justified. Participants agreed that the lack

of a unified, or network-based, framework for planning made it difficult to allocate resources rationally. Even in Senegal, which is devoting 80% of road funds to maintenance, available finance is spread thinly among highways, and as a result, few, if any, of the roads receive the attention they need,

Collecting and disbursing funds. Not only must the total level of funding be adequate, but it is also vital that resource flow be regular and dependable. When budget mechanisms consistently fail to provide the amount required in a dependable manner, the setting up of a Road Fund, rigourously managed and monitored and funded with earmarked resources, may be the best option. Participants generally favoured this approach, although in some cases national budgetary procedures did not allow for the earmarking or creation of special funds, and in other cases such funds were not deemed necessary. Participants also pointed out that fairness, and effieciency in cost recovery, posed questions regarding the imposition of tolls or special taxes on trucks with heavy axle loads – which are especially destructive of pavements – in both national and international transit traffic.

Performance budgeting. Efficient and transport budgeting procedures require the establishment of quantifiable objectives and quality controls and the implementation of institutional changes to make possible financial as well as technical audits of road maintenance works. Participants agreed that, in general , ministries of public works were not organized for or concerned with the efficient use of allocated resources. Performance budgeting could increase accountability and provide an important image of effective planning and good use of resources, thus increasing the likelihood of attracting higher levels of funding.

B. Operations and Management:

Reducing force accounts and increasing contracting. Almost exclusive reliance on public sector force accounts operations has led to over-staffing, lack of incentives for capable staff, and rigid controls and rules that inhibit staff initiatives in adopting cost effective management solutions. Governments accepted that, in situations of labour shortage and huge backlogs of road maintenance, the increased use of contract maintenance could be a viable option. Domestic contracting and construction industries, however, are often underdeveloped and would require assistance and encouragement to strengthen the industry. Key factors in the development of the industry would be stable markets and supportive policies, training programs, simplified procurement and contract procedures, timeliness and reliability of payment procedures and, possibly joint ventures with international firms. Such a transition would have to be planned and phased over time and requires serious commitment and a long term view. A combination of direct labour and contract work, with the proportion of contract work increasing over time, is indicated. Local contractors rarely have the capital for equipment but in some cases governments have leased them equipment. Many road departments may lack the necessary skills mix for this type of arrangement and would need to address this in their staff development and recruitment programs.

Increasing use of labor-based operations. Constraints on resources and the availability of under-employed or unemployed labour that can be mobilized for up to $ 4.00 daily often makes the adoption of labor intensive maintenance techniques economic. Several countries reported positive results, including reduced costs and increased maintenance effectiveness. Success depended on terrain, population density and climate. Labour based approaches, however, also require the decentralization of supervision, administration, contracting, and payment authority, as well as technical assistance and staff training. Participants concluded that this may be the only feasible approach under the conditions of extreme resource constraint. Further, they agreed that there were considerable economic and social advantages, including savings in foreign exchange. Also, it could provide for the use of rural and communal groups in the execution of the work.

Reducing publicly owned equipment fleets. Maintenance managers have been overburdened by the need to keep up huge – and often incompatible – equipment fleets. Availability and utilization is very low; in some countries only about 20% of the national road maintenance fleets is in working condition. The results are fleets with unnecessarily high operating costs. This represents a large wasted investment, much of which is in foreign exchange. Smaller fleets with higher availability and utilization rates would save money while raising productivity and reducing unit costs and management overheads. The reforms indicated include autonomous agencies responsible for equipment management, commercially run equipment pools, centralized spares purchase, and contracting out equipment maintenance (as well as road maintenance tasks as mentioned above). The lack of standardization emerged as a major concern of participants, who also saw the potential for addressing this issue through modified policies of external aid agencies and better planning and packaging of their programs for external aid.

C. Institutional Reform and Human Resources Development:

Institutional reform. Most road authorities in Sub Saharan Africa inherited institutional structures, procedures, and systems from pre-independence days, and these are now in urgent need of review and revision to make them more directly relevant to current circumstances. As referred to above, the delivery of parts of the road maintenance program through contractors would help achieve desirable changes. Also, some of the institutional systems such as local procurement procedures are in need of streamlining. Participants acknowledged the need for changes that are tailored to the specific situations and needs of countries. They felt that such changes should aim at progressive reduction of the role of the state, with the emphasis on a leaner and more efficient government organization. Separate, autonomous road authorities seemed to be necessary, at least during the coming decade while road systems pass through a crisis period.

Improving staff motivation and utilization. Apart from the issues relating to institutional organization and structure, participants agreed that human resources development is one of the most critical factors in addressing road maintenance. At present, constraints on personnel utilization and development caused by inappropriate

and inflexible public employment policies result in serious problems; lack of staff accountability; difficulties in retaining competent staff; loss of good staff to private sector; lack of on the job development and motivation; lack of application of previously learned skills; stagnation, and waste of expensive education and training; and generally low levels manpower productivity. One advantage of autonomy in road agencies is that they can avoid becoming financially overburdened with unneeded staff and thus increase funds applied to operations, supplies and equipment. They can also promote staff on merit and can remove non-performers. Creating a personnel unit and strengthening line managers are key to this issue. Line managers will need skills in setting objectives, allocating work, delegating, setting standards, establishing accountability, and providing on the job training, recognition, and feedback.. Participants also identified as other important contribution to improved staff performance: giving staff greater responsibility, increasing motivation, establishing productivity bonuses, and improving opportunities for training. Regarding training, they endorsed the idea of reinforcing national training programs, if necessary, creating regional training structures. Participants concluded that before defining their needs for technical assistance, they should make full and efficient use of qualified and experienced local staff and, to the extent possible, deploy them in key planning and decision making roles. Expatriates should be assigned to temporary short term positions with clear terms of reference, measurable and monitorable objectives, and strong incentives for training local staff.

A. Policy Action Planning

The second part of the seminars was conducted by country teams of Policy Action Planning (PAP), following the approach developed by the Carl Duisberg Geselleschaft. The approach consists essentially of three stages:

- Road maintenance constituencies identify the constraints and functional deficiencies the sector faces. From this analysis, priorities are determined and then transformed into concrete objectives.
- Participants define the measures needed to achieve the objectives. These measures are critically screened taking into account financial, human, and institutional constraints. An action agenda is established.
- Responsibilities, resources, and the time frame for implementation are determined.

By bringing out the agendas of all the constituencies involved and showing the areas of possible conflict, the PAP process ensures that both the resource-allocating agencies and the line agencies have a realistic framework for seeking compromise and consensus.

The seminars were successful in introducing the Policy Action Planning concept and demonstrating its value in policy formulation and decision making. Participants found PAPs focusing and consensus-building attributes extremely valuable; the process was also praised as a powerful tool for bringing issues to the surface and making choices between them explicit. The PAPs cross-ministerial structure was also found particularly valuable. Participants suggested that the PAP as presented would benefit from full-scale

testing in a Sub-Saharan African country and that one aim would be to find ways to streamline and simplify the process.

The participants found a surprising level of commonality in the road maintenance problems each country faced and in their priorities in ranking these problems. In the Anglophone seminars, those countries more committed to maintenance, with better institutions and financial resources, tended to identify planning, programming, and budgeting, and improvement of staff capabilities and skills as the overriding issues; countries at the other extreme of the spectrum, particularly the poorest countries, appeared to focus more on the level of funding as the main issue. In the francophone seminars, the pattern was less well defined. The better-off countries focused on the planning and use of funds, while at the other extreme priorities were diffused over a larger number of issues.

B. Follow-up

The follow-up phase (Phase II) of the RMI will support the preparation of policy reforms in a limited number of areas that are central to better management of road infrastructure. That phase will also build up the capacity of selected training institutions, such as ESAMI, to provide process assistance to policy reform in road administration and management.

Phase II would be:

- Driven by country initiatives under the aegis of an inter-ministerial committee or steering group.
- Targeted at a limited number of important policy issues requiring action by several departments or agencies.
- Closely coordinated with ongoing and planned programs by external financiers.
- Designed in harmony with the priorities established by the National Coordinating Committee that will be responsible for the preparation of the country's contribution to the Second Transport and Communications Decade.

The start-up of Phase II involves invitations to pre-selected countries and joint studies by the World Bank and lead bilateral agencies to assess the country requests and make a decision. Burkina Faso, Cameroon, Madagascar, Mozambique, Nigeria, Rwanda, Sierra Leone, Tanzania, Uganda, and Zimbabwe have been identified as candidates for Phase II.

Annex 2

Financing Road Maintenance

A study of organizational and financial conditions for securing road assets in developing countries with case studies from West and Central Africa, a complete set of Roads Fund Legislation and World Tables on fuel prices 1995/96 - by GTZ

Executive Summary

Due to lack of road maintenance, the losses of existing roads during the past number of decades were greater than all financial commitments even of the World Bank in this sector designed to reverse this negative trend. Also the European Union as the most important donor in the African roads sector called for a RADICAL CHANGE OF APPROACH.

Particularly in Africa, inadequate road maintenance has proved to be the major obstacle to national and economic growth.

In the context of the Road Maintenance Initiative for Africa (RMI), this problem has been addressed and it has been shown that financing and organizing road maintenance are to be considered as the core problem.

Based on the extensive commitments and experience of German Co-operation, the present study focuses on the financing of road maintenance and its organization, with special regard to the detailed findings from the following 12 West and Central African countries: Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Central African Republic, Chad, Niger, Burkina Faso, Mali, and Sierra Leone.

A. The most important results for organizing and financing road maintenance in African countries:

1. Organizational aspects:

(a) Surprisingly, the replacement value of road networks is 2 to 4 times higher in African developing countries than in industrialized countries –if compared to the respective Gross Domestic Product (GDP). The replacement value:

Amounts to: 30 to 60% and, in some cases, even up to 125% of GDP in African countries, and only to: 15% to 25% of GDP in European countries (18% in Germany).

Because of its size alone, this huge asset value of road networks in developing countries must be considered a "SPECIAL ASSET". It should be handled outside the State Budget under the special goal of ASSET MANAGEMENT.

The approach of asset management for this precious infrastructure is being introduced in Europe only recently: it does not exist neither in the former socialist countries nor third world countries, where indeed it might be needed most due to the deficiencies in the public accounting system. In some countries – such as former socialist countries like Tanzania or Ethiopia – even the use of depreciation figures for state property may be forbidden by law.

(b) Asset management for roads basically follows the same principles as those familiar from the private housing building sector, using fixed depreciation rates as well as fixed percentages of the invested value for securing the maintenance and for up-keeping the initial replacement values.

(c) Asset management, in order to become effective and to be protected against undue political interference, required in most cases a separate organization outside the ministerial administration, a so-called ROADS AUTHORITY. This roads authority exercises all ownership rights over roads: it controls access (especially with regard to heavy axle loads), receives user fees, organizes road maintenance, etc. It presents annually – like hitherto the separately organized Railway Authority – its actual property status on assets and liabilities and is subject to control by independent auditors.

(d) Along with the intention of decentralizing road administrations at provincial and district level, responsibility with regard to ownership must be promoted at local level. This might be – in the same way as with private house owners – achieved by means of a REGIONAL ROADS REGISTER as well as REGIONAL ROADS REVENUE REGISTER, which graphically displays the road map of the region as well as its maintenance conditions, the maintenance programme and the revenue sources.

2. Financial Aspects

a) On the financing side, effective asset management requires a stable source of funding of its own, i.e. road transport taxation as a levy for road use (comparable to railway ticketing and rent in the building sector). This stable source of sufficient funding for road maintenance does not yet exist in most African countries, although in some countries a formal road fund or road maintenance fund does exist, such as Sierra Leone, Ghana, Central African Republic and Chad.

b) The following are to be regarded as the financial instruments for road maintenance:

- The adoption of a general road financing law based on the principles of "TRANSPORT finances TRANSPORT" and aimed at levying cost-covering road use fees through fuel taxation, annual vehicle license fees, axle and transit charges for trucks, road tolls, etc.

- The establishment by law of a Road Conservation Fund to ensure targeting of specific expenditure for road maintenance and its allocation among various road categories for national, rural and urban roads. Such road funds "of the second generation" differ from the first generation of road funds, which were often misused for new road construction or even for financing expenditures outside the road sector; they already exist in one third of the African countries.
- Creation of an annual road conservation budget amounting to an average of 2.5% of the re-establishment value of the existing road network of the African countries.
- Introduction of a fuel levy, at an average rate of 10 US cents per liter for diesel and petrol, to be applied as a charge on the normal fuel price for the exclusive maintenance of roads, this fuel levy being the main source for Road Conservation Fund. The required level of fuel taxation for road maintenance is that of Value Added Tax (VAT), i.e. 20% of the average fuel selling price of 50US cents per litre (+10 US cents). The present very low level of fuel levies channeled into the Road Conservation Fund (for example, 0.7 US cents per liter fuel in Togo, 1.6 cents in Ghana and Zambia) is in most cases not adequate: a mere "Road Penny" does not solve the problem of financing road maintenance.
- African governments have to realize that – after reaching fuel prices of at least the present average in world developing countries of nearly 50 cents per litre – the :First Value Preservation Tax" on fuel (i.e. 20% of VAT on 50 cents = 20 cents) has to be reserved to the Road Authority for road maintenance and only after that, a second Value Added Tax of the same size may be allocated to the government's budget in the normal manner.
- However, the position in African countries shows that the actual sales prices for fuel vary between
  - 3 US cents per litre diesel (Nigeria, Nov. 1995)
  - 98 US cents per litre petrol (Uganda, Nov. 1995)

  110 US cents being the average West European sales price.
- This demonstrates that within the African continent fuel prices vary by more that 30 fold and require an urgent co-ordination within regional organizations such as UDEAC, ECOWAS etc. It is worth mentioning that the fuel bought on the world market including transport, but without fuel levy and special taxes, is about 25 US cents per litre.
- Placement of the Road Conservation Fund under special ownership legislation within the Roads Authority. Indeed, mainly due to widespread government ownership of the Fund, the Road Conservation Fund in most countries shows only minimal contributions, amounting often only to a mere 2% (such as in Togo or Ghana) of the selling price of the fuel, whereby all other fuel taxes are channeled into the general budget. Thus the question of ownership of the road conservation fund remains a key issue to be solved.
- Introduction of an annual vehicle license fee of approximately 1% of the vehicle import value (but at least 75 US$ per passenger car per year)

particularly for covering the infrastructure costs linked to the parked traffic in towns and cities and going therefore to the township. This represents on average no more that the value of one fuel tank's filling of 50 litres once every 4 months.

- However, the reality in African countries shows that the annual vehicle license fee ranges between:
  - 0 US$ (Burkina Faso, Togo, Nov. 1995)
  - and 20 US$ (Rwanda) for small passenger cars while the corresponding fee for the same car amounts to 193 US$ per year in Central European countries such as Germany.
- Introduction of taxes on land development and real estate property (as well as on the commercial turn-over in the Central Business District), which should be exclusively earmarked for roads and infrastructure investment in urban areas. Such taxes are still lacking in most African countries (and specifically in the cities for the financing of modern residential roads, which cannot be financed out of general funds. They may even include some provision – in the range of 20% - for the financing of roads in squatter areas of the towns).
- The financing of the rural roads network (or parts of it specifically on the areas of subsistence agriculture), whose construction and maintenance may often not be justified if compared to the revenues from the motorized traffic carried by them, may be secured by cross-subsidization from the General Road Fund (allocating approximately 20% of the Road Funds revenues to rural roads). By this way the social aspects of road network development may be taken into account also; and the famous 20% recommendations for the social share of expenditure – as laid down in the Rio Charter of 1994 – are to be put into practice.

Annex 3

Options for Managing and Financing Rural Transport Infrastructure

By Christina Malmberg Calvo

World Bank Technical Paper No. 411

Extracts: Chapter 3. The Problem: Its Symptoms and Cause

In the past few decades attempts to improve rural transport in Africa have not created a sustainable network of rural roads. Frequently, the wrong facilities were provided in the wrong places using the wrong technology. By focusing on the construction of roads rather than the improvement of access, problems were accentuated. This chapter looks at five closely related symptoms and the principal underlying cause of this state of affairs.

FIVE SYMPTOMS

SYMPTOM 1: UNCLEAR RESPONSIBILITIES

Responsibilities are fragmented at the central government level. Multiple agencies are involved in providing rural roads in most countries of Sub-Saharan Africa. In addition, many countries have repeatedly changed the organizational structures of central government agencies overseeing local government roads, shifting responsibility from one Ministry to another, often producing little more than confusion. For example, in Ghana, until Ministry of Roads and Highways was created in 1981, no fewer than five central sector ministries had responsibility for rural roads. In making changes, governments hoped to improve living conditions in rural areas by providing more and better roads. But the frequency of change, and the many sector ministries involved in rural road construction, resulted in a situation in which no one knew who was really in charge of rural roads.

Sub-Saharan African countries lack a legal framework regulating community ownership of roads and paths. Efforts to create a "sense of community ownership: of roads, that is, a willingness to maintain roads, have often been erratic and typically have not included a clear definition of communities' legal rights and responsibilities. While in some countries ownership of roads by non-government entities is illegal, rural communities have, often by default, been assigned responsibility of maintaining both designated and undesignated rural roads. The lack of a legal framework for private or community ownership of roads may result in all rural roads being designated as the responsibility of the local government, even when the local government does not have the capacity to assume this responsibility. In Tanzania, the commitment of communities to maintain the access road they built themselves when the government officially took over maintenance responsibilities but failed to meet its obligations.

Local communities have often been asked, ad hoc, to contribute to improving and maintaining roads constructed and improved through government, NGO, and donor

programs. In principle, nothing is wrong with this. In fact, local acceptance of responsibility is encouraged (see Chapter 6). But community contributions should not be mistaken for commitment to maintenance or assumption of ownership responsibilities. Very rarely have communities been consulted on and agreed to their responsibilities and those of the rural roads agency for maintenance. Experience in Malawi and elsewhere shows that communities are more forthcoming with in-kind contributions, including labour, for a construction of a bridge or a road than for maintenance. In Zambia donor programs paid communities (in cash and food) to improve roads and tracks, which they were subsequently expected to maintain on a voluntary basis. But communities are unlikely to perform tasks for nothing if they were once paid to do so. Reliance on unpaid volunteer labour for regular maintenance of local government roads is not sustainable and leads to confused responsibilities.

SYMPTOM 2: DISINTEGRATION OF THE PLANNING SYSTEM

Even though local governments are often the legally constituted road authority for the designated rural roads in their area, many roads are planned at the central level without local governments involvement. Central government agencies have repeatedly acted without consulting or coordinating with each other or local governments, even though local authorities are expected to maintain the roads. For example, in Nigeria two high level agencies, the Agriculture Development Programs and the Federal Directorate of Food, Roads and Rural Infrastructure, build rural roads, leaving maintenance to local governments. Several roads were constructed in the same local government jurisdiction by different agencies. Many roads did not correspond to local priorities, or maintenance responsibility was not transferred to a competent road agency. As a result, many of these roads do not have effective owners and receive no regular maintenance.

Planning is often inconsistent and uncoordinated. The lack of a comprehensive planning system for assessing overall client demands means, in practice, that many of the basic access needs of rural households go unaddressed. While RTI facilitates the delivery of various services, individual ministries deal with the needs of their specific client subgroup and provide the roads their client requires. Thousands of kilometers of roads in rural Africa have been constructed by agricultural projects, food-for-work schemes, NGOs, timber companies, and cocoa and cotton boards without a consistent national policy and strategy framework and without consulting with the road agencies that are eventually supposed to maintain these roads. For example, a Zambian NGO built thousands of kilometers of roads during the first half of the 1990s as part of a food drought relief effort; now, no one is legally responsible for overseeing many of these roads, and they are rapidly deteriorating. In theory, rural households are a constituency aided under the rubric of infrastructure development. In practice, their needs are addressed only peripherally by the state and haphazardly by others.

Financial resources are not allocated economically. Planning processes in Sub-Saharan Africa fail to allocate resources efficiently, largely because the key actors respond to biased incentives. Capital and maintenance expenditures fall under separate budgets, between which fungibility is limited. Capital budgets are typically supported by donors and have also been favored by local politicians. Erosion of recurrent budgets

has turned planning for maintenance into an exercise in futility. Funds are allocated for capital works, while regular planning of recurrent activities and expenditures (previously a key part of the planning process) is neglected. Road maintenance is not glamorous, and full rehabilitation is preferred over spot improvements, even though most road agencies are aware that maintenance is highly cost-effective and that improving trouble spots can enable all-season access at a lower cost than rehabilitation. Road works are favored over footbridge and path improvements. Thus existing resources are sub optimally allocated between capital and maintenance expenditures and between roads and simpler RTI improvements.

SYMPTOM 3: INSUFFICIENT AND UNCERTAIN MAINTENANCE FUNDING

There is an overall shortage of maintenance funds. Most government allocations to road maintenance fall short of the amount needed for network preservation. The shortage has been especially severe at the lowest levels of the network – allocations for maintaining local government roads commonly have been only 5-15 percent of requirements. In many countries recurrent budgets have withered to the point at which they barely cover staff and administrative expenses and a few emergency repairs – little is left for maintenance. Donors were initially part of the problem in that they primarily supported the capital budget. But now they are not willing to finance rehabilitation projects without viable arrangements for road maintenance.

Further, central government funding allocations to local governments are unpredictable and irregular. Local governments are generally given an estimate of the budget resources they will receive in the next fiscal year so that they can make realistic plans. Unfortunately, actual receipt nearly always fall short of original estimates. Even in countries with road funds (which should facilitate more regular and programmable allocations), funding can be highly irregular and unreliable, particularly during a fund's early years. In Tanzania, for example, local district councils were not told of expected funding levels from the local government road fund, turning planning and programming of works into a futile exercise.

SYMPTOM 4: INADEQUATE LOCAL CAPACITY

There is a lack of incentives for road staff at the local level. Civil servant salaries – inadequate when compared with private sector salaries – have adversely affected the technical capacity of road agency staff, leading to high vacancy rates and poor motivation. Poor remuneration has inadvertently encouraged road agency staff to supplement their incomes through moonlighting, daylighting and pilfering. A study on terms and conditions of service for road staff in Tanzania found that "salaries are below the minimum living wage and do not enable the road staff to meet the basic expenses of living. This means the road staff in Tanzania have to struggle for extra income from elsewhere in order to bridge the gap between the income from the salary and what is required to pay for the basic expenses of living" (Sabai 1995). This situation is at its worst at the local government level. Local government employees have fewer career prospects and opportunities for training than staff working for a strong central sector ministry. Furthermore, living conditions are often harsh. Many district works

departments are, therefore, headed by under qualified and indifferent staff, and have unfilled positions. But having a competent cadre of local road officials would make little sense if they command few resources.

Private sector involvement in rural roads is marginal. Many countries are in the process of moving from executing works in-house (force account) to using private contractors. Countries have considerable experience with using private, often foreign, contractors for large capital works on rural roads. The contracting process itself is usually handled by the responsible ministry in the capital city. Local governments, though, have little experience with formal contract management. They rarely use local consultants in planning and supervising rural transport infrastructure works, partly because of the small size of the contracts that local governments can offer – making it unattractive for experienced firms to mobilize in rural areas – and partly because of local governments' and communities' lack of experience and the resultant lack of contracts act as powerful brakes to the involvement of both local consultants and small scale contractors in the road sector.

In addition, centralized administration and poor communications between urban and rural areas have perpetuated an urban bias in allocating both human and financial resources. In some countries this dualism is profound. Policy makers tend to respond first to see what they see close at hand. They live in urban areas, thus they tend to first address the more visible urban problems. Central governments have inadvertently accelerated rural-to-urban migration by failing to better respond to the needs of rural areas and build up local capacity. The bias toward urban areas may become increasingly pronounced in Sub-Saharan Africa as second and third generation leaders are more likely to come from cities than from villages.[1]

SYMPTOM 5: INAPPROPRIATE DESIGN STANDARDS AND METHODS

Transport policy and programs in rural Africa have focused on providing conventional highways for use by motorized vehicles. This is the case, in part, because engineers have been trained using curricula and educational materials influenced by the requirements of high-wage industrial countries. Many foreign technical assistants have also encouraged the use of design standards that are more suited to the levels of motorized traffic they are accustomed to in their home countries. Inappropriate methods have also contributed to inefficient resource use. The issues of standards and methods have already been treated extensively in previous publications and are covered in Stock and de Veen (1996). They will not be further discussed here.

THE UNDERLYING CAUSE

The common thread running through the five symptoms described above is weak local government and community institutions. African governments have been highly

[1] The plight of rural areas has been eloquently captured by Julius Nyerere, the first President of Tanzania: "While the great powers are trying to reach the moon, we are trying to get to the village. While the great powers have been to the moon and are now even trying to communicate with the stars, we are still trying to reach the village and the village is getting even further remote."

centralized. The central government often has representatives not only at the central and regional levels but at the district, sub-district, and village levels. Most ministries and parastatals (government enterprises) are vertically structured, with decision making and financial authority vested at the center.

Because central sector ministries control resources at the local government level, local governments are virtually absolved of accountability for rural infrastructure and other local services. Planning for roads has been carried out by central government agencies with minimal local involvement, effectively marginalizing local stakeholders and road users. Donor intervention has accentuated centralized provision of rural roads. Donors have typically reacted to institutional weaknesses at the local level by channeling their support through central government sector agencies. As a result, they have bypassed local governments and unintentionally contributed to the weakening of local institutional capacity.

These issues must be resolved along with the broader questions of rural development. Provision of RTI is clearly only one of many rural development activities and must be viewed in the broader context of rural services delivery. Most of the manifestations of weak local institutions are directly related not only to roads, but are generic to all sectors. An arbitrary shift of responsibility for rural roads to weak local governments is unlikely to enhance service delivery or respond to the priority demands of rural communities. In this sense, much of what this paper proposed by way of community empowerment may apply to other sectors as well.

Strengthening local institutions through effective decentralization is the centerpiece of rural development. (see Box 3.1). It implies building local capacity in both the public and private structures, democratic control of local governments, and trained and motivated people is needed. The primary issue is cross-sectoral – the need for a sound framework for rural development. The secondary issue is sectoral – in the case of RTI, the lack of coherent institutional and financial arrangements to make sustainable improvements. A dual approach that addresses both the primary and secondary issues is essential to promoting the development of services that meet the priority needs of the rural population.

Box 3.1: Devolution

After decades of highly centralized systems of governance, many countries in Sub-Saharan Africa are moving towards decentralization. Effective decentralization (devolution) hinges on a balance of political, institutional and fiscal responsibilities. Allocation and control of finances lie at the root of decentralization. Many decentralization efforts are, however, partial: administrative responsibilities are assigned to local governments whereas central governments remain in control of fiscal instruments. Partial decentralization of risks perpetuating weak local governments and forces the central government to take back or temporarily assume local government responsibilities because of poor performance.

Source: Jerry Silverman (1992)

Annex 4

Road Funds in Africa*

I. Management of the Road Fund In Ghana

Background

The total road network in Ghana is about 48,900 km. It is managed by three road agencies:

- Ghana Highway Authority (GHA): responsible for 14100 km of trunk roads;
- Department of Feeder Roads (DFR): responsible for 32600 km of rural; roads. Around 60 percent of the network is in maintainable condition;
- Department of Urban Roads (DUR): responsible for 4200 km of city roads in the urban area.

There are about 1428 km of Asphalt roads, 7100 km of bitumen surface roads, 24,500 km gravel roads and rest of the network – 15,872 km, is earth roads. About 40 percent of the network is in poor condition and requires rehabilitation. Roads carry 98 percent of freight and 97 percent of passenger traffic.

At the time of independence in 1957, Ghana road network was in good condition. In the 1960's the road budget declined and maintenance suffered. By the 70's, roads were breaking faster than they could be maintained. The road network was in very poor condition. During this period the roads were under Ministry of Works and Housing. In 1982 Ministry of Roads and Highways was created to (i) formulate road sector strategy and policy, (ii) co-ordinate and monitor performance of GHA, DFR and DUR, and (iii) improve the condition of roads. However, the creation of new organization did not solve the resource problem. In 1996, Ministry of Roads and Transport (MRT) was created. The Government objective is to clear the large backlog of maintenance on the road network while concurrently maintaining roads that have been rehabilitated and to put financing of maintenance on a sustainable basis. MRT does not have offices in the regions but operates through GHA and DFR, which has regional offices. There are ten regions and 130 districts.

Road Fund

Road fund was established in 1985 under an Executive (military) Decree. The objective was to secure adequate and stable funding for routine and periodic maintenance of roads. Revenue sources were: (i) fuel levy; (ii) bridge, road and ferry tolls; and (iii) vehicle examination fees. The Road Fund was managed by the Minister of Finance, Minister of Roads and Transport and Comptroller and Accountant General. Ghana Highway Authority, Department of Feeder Roads and Department of Urban Roads. Road Safety Commission and Drivers Vehicle Licensing Authority are the five

* Papers by Kavita Mathur, World Bank, February 1999.

agencies entitled to receive funds from the Road Fund. Funds were nominally divided between the three road agencies in the ratio of 40:30:30 respectively.

The road fund was besieged with problems. Even though Minister of Finance, Minister of Roads and Transport and the Comptroller and Accountant General were involved in management of Road Fund, no one was really responsible. The day-to-day management of Road Fund was inadequate. The Road Fund was simply a bank account. There was no Oversight Board. Although the levy was periodically revised, by 1995 the revenue from Road Fund was covering less than 50 percent of maintenance requirements. Funds were collected in the regions and paid into local treasuries and transferred to the road fund account. There were delays in transfers and leakage of funds. There was no accounting system in place. There was no way of knowing whether the Road Fund was receiving all the revenue attributable to it. Audit reports regularly complained about the accuracy and reliability of Road Fund balances. There was no consistent procedure for dividing funds between Ghana Highway Authority (GHA), Department of Feeder Roads (DFR) and Department of Urban Roads (DUR). Allocations ranged from 50 to 70 percent for GHA; 30 to 10 percent for DFR and 15 to 30 percent for DUR. The withdrawal procedures were cumbersome. This mismanagement of Road Fund continued for ten years.

Restructuring of Ghana Road Fund

By 1995 it was realized that the Road Fund was not working i.e. it was not providing adequate and sustainable funds for road maintenance. In 1995 the government proposed wide-ranging changes for the roads sector:

- Establishment of public-private Board to oversee management of Road Fund;
- Establishment of secretariat to manage the day to day operations of Road Fund according to sound commercial principles;
- Comprehensive legal framework for 'Establishment of Road Fund' and 'Management of Road Fund'.

Management Board

It is interesting to note that the members of the Board, as proposed by draft law, were approved and had their first sitting on January 31, 1997, six months before the Road Fund Law became effective. The Road Fund was restructured to become a commercially managed road fund by the Road Fund Law in August 1997.

The Board consists of thirteen members and is private sector driven as eight members are from the private sector and five are from public sector. The private sector members who are in the majority are nominees of road users:

1. Association of Road Contractors
2. Ghana Private Road Transport Union
3. Ghana Private Enterprise Foundation
4. Ghana Road Haulage Association
5. Ghana Institute of Engineers
6. Ghana Association of Farmers and Fishermen

Two other private sector persons nominated by the Minister.

The public sector members represent relevant Government Ministries:

1. Roads and Transport
2. Finance
3. Mines and Energy
4. Local Government and Rural Development
5. Accountant General

The Chairman is the Minister of Roads and Transport. Ghana would have preferred to have a private sector member chair the Board but agreed for the Minister of Roads and Transport to be the chair as a strategic move. To get the Roads Board moving they had to compromise. Minister being the chair provides comfort to the Government. Also, this has an advantage -- Minister has access to the top persons in the government and can get work done quickly. This may change in future and the Chairman may come from the private sector.

The main functions of the Board are:

- arrange for collection of funds and improve arrangements for collection of revenues to reduce evasion and avoidance;
- recommend level of fuel levy and other road user charges;
- review annual budgets of road agencies;
- establish certification procedures to ensure that work is completed according to specifications; and
- prepare and publish procedures for disbursement

With the setting up of Roads Board, all arrears to contractor for maintenance work which were carried from 1997 were paid within two months.

Secretariat

Consists of a Director, Engineer, Accountant, Secretary and two drivers. The staff is paid competitive market rate. Currently, the staff of the secretariat is paid from the road fund. Secretariat manages the day to day affairs of the Road Fund.

Financing

The Road Fund Law defines the spending priorities clearly:

- first, routine and periodic maintenance;
- second, upgrading and rehabilitation of roads;
- third, road safety activities.

Of the Road Fund revenues, 93 percent comes from fuel levy, 4 percent from tolls and 3 percent comes from road user fees. In Ghana, there exists a clear arrangement for separating the fuel levy from general taxes. The fuel levy is collected by Ghana National Petroleum Company and deposited directly into road fund account. Licensing and examination fees are collected by Ministry of Roads and Transport. Road, bridge and ferry tolls are collected by GHA. The road fund does not pay these agencies any collection fees.

Revenues in 1997 were US $ 47 million, expected to be US $ 75 million in 1998 and planned to increase to US $ 105 million in 2000 and US $ 148 million in 2003. There

is no contribution from the consolidated budget for maintenance. Railways and Power are exempted from fuel levy. The allocation from the road fund to three agencies GHA, DFR and DUR was 60%, 25% and 15% respectively in 1999 has changed to 40%, 30%, and 30% respectively in 2004. This allocation is not based on any criteria or formula. It reflects the government priority which right now is rural development. The priority of government can change and so would the allocation between DFR and DUR.

The staff form GHA, DFR and DUR are very happy with the Road Fund and Roads Board even though the Board has imposed stringent guidelines on the road agencies for disbursement of funds. For the road agencies, the major constraint for maintenance was lack of resource. With the establishment of Roads Board to oversee allocation and disbursement of funds, the agencies are getting money for maintenance on time. The backlog is so huge that it will take time for all maintenance needs to be met. People are seeing results and have stopped complaining.

On their side, the road agencies are required to submit roads programs which is reviewed by the secretariat and approved by the Board. Maintenance Performance Budgeting System (MPBS) is used to pick all roads which are in maintainable condition. The road agencies prepare the budget and prioritize the roads according to their maintenance needs. Money from the Road Fund is disbursed only for goods and services that form the Annual Expenditure Program. The secretariat performs financial and technical audits of the work done.

Overloading is a serious problem in Ghana and the Ministry is proposing to set up a separate division to tackle the problem of overloading.

Capacity

About 90 percent of road works are executed by private contractors (Ministry policy). Government owns limited equipment for emergency road maintenance operations. Equipment for road construction is primarily owned by private contractors. Apart from the staff for the road agencies, consultants are also used for planning, design and supervision of road works. In feeder roads, labor based methods are frequently used. In 1981, there were 5000 workers in the DFR and most of the work was done by force account. Currently, there are 700 workers and 90 percent of the work is contracted out.

The main weakness is that districts do not have capacity for planning and supervision.

Contracts are awarded as per the New Procurement Act passed by the government. This Act has established entirely procurement committees and fixed the ranges of values of contract that can be awarded by each tender committee/entity.

II. Managing the Road Fund in Zambia

Background

Zambia is a landlocked country surrounded by eight neighboring countries. Zambia has road network of 37,000 km of various classes of gazetted roads. Of this 21,000 km of roads are the responsibility of the Roads Department, whilst the remainder 16,000 km are under the jurisdiction of the District Councils. In addition there are about 30,000 km of ungazetted roads administered by local authority.

In 1987 about 40% of the primary road network in Zambia was in good condition. By 1990 the percentage of the good roads had declined to 20%. The value of the Zambian road network was initially assessed at US $2.3 billion. It has during recent years declined by more than US$400 million due to neglect of maintenance. Road maintenance and other expenditures were financed from general tax revenues and the competition from other sector resulted in a decline in maintenance funds. Maintenance allocations declined to only about 15% of requirements.

Inadequate funding was further complicated by the poor institutional framework within which roads were managed. Poor conditions of service, lack of clearly defined responsibilities, ineffective and weak management structures and lack of managerial accountability have all contributed to poor use of the meagre funds available. Consequently, the Roads Agencies suffer from lack of suitable qualified and experienced staff to plan, programme, organize, monitor and regulate work undertaken by own forces as well as by private Consultants and Contractors. It is very clear that the problem of road maintenance is not one of engineering but of policies and management.

At the recommendation of Road Maintenance Policy Seminar, February 1993, a road user charge in the form of a fuel levy was introduced from May 1, 1993. Initially it was about US$ 0.01 per litre but has now been increased to 15 percent of the wholesale price of fuel which is around US$ 0.07 per litre.

Management Board

After the fuel levy was instituted, there was no Board for one and a half years. There was a National Task Force under the Ministry of Public Works to administer the funds. Chair of the Task Force was the Deputy Minister and 60 percent of the funds were misused. They were used for the purchase of vehicles, office equipment, payment of hotel and telephone bills, etc. The Audit queries have still not been cleared. The setting up of National Roads Board (NRB) as the Board to manage the Road Fund took longer to be instituted than fuel levy, but was eventually done through a Statutory Instrument in October 1994. One of the notable features of the Board is that it is private sector driven as seven members are from the private sector and four are from public sector. The private sector members have the right to vote whereas the public sector members have the right to participate without the right to vote. The private sector members who are in the majority are nominees of road users:

1. Chamber of Commerce
2. Automobile Association
3. Chartered Institute of Transport
4. Transporter's Association
5. Farmers
6. Engineering Institute of Zambia
7. Copperbelt University

The four public sector members represent relevant Government Ministries:

1. Communications and Transport
2. Works and Supply
3. Local Government and Housing
4. Finance

Chairman and Vice Chairman are elected by the Board from among private sector representatives and not handpicked. The present chairman is the representative of the Chartered Institute of Transport. The road user dominated Board represent a major change of policy in the institutional structure of the roads sector. It is also a deliberate attempt by the Government to hand over ownership of the roads to the private sector as well as to create a partnership between the private and public sector for the management of roads. Roads in Zambia were always perceived as the responsibility of the Government. With the institution of Roads Board, this perception is changing slowly.

For the Board to be effective, Board members

- should be people of integrity and honesty
- should have close relation with their constituents i.e. they should give and get feedback from their constituents
- from private sector should be united
- Chairman should have access to the top person - i.e. the President.
- The board conducts effective public relation programs such as Radio Programs and Monthly Press Releases
- enhance the sense of the ownership among road users.

How does the Board operate?

The first task of the board was to institute policy guidelines to manage and administer the Road Fund. The next step for the Board was to establish systems and procedures to ensure total transparency and accountability in the management of the Road Fund. This included:

- System for receipt of money
- Banking System
- Internal Control System
- Auditing Systems

Another innovative institutional structure was to set up Committees which provide opportunities for participation by various stakeholders and key players and thus involve interested groups in the management of roads:

- Technical Committee
- Finance Committee
- Road Sector Investment Program (ROADSIP) Co-ordinating Committee
- Transport Engineering and Technical Assistance (TETAP) Steering Committee

The most important are the Technical and Finance Committee.

Finance Committee: meets at least once a month and comprises of three members of the Board, a representative from Auditor General's office and a financial expert from the Secretariat. The Committee is chaired by the representative from the Ministry of Finance. Other Board members are selected on the basis of their expertise. The finance committee makes recommendations of where the road fund money should be held. This is very important decision as a number of banks have gone under in the last few years. The finance committee monitors the liquidity of the banks where the money is held, and at the first sign of problem withdraw the money and move to another bank. The decision of which bank to use is reviewed annually through a tendering process to ensure that services are competitive. Facilities offered by the Banks include attractive interest rates, honoring of checks throughout the country, minimal or no charges on services offered etc.

Technical Committee: is the "think tank" of the Board. It meets at least twice a month and comprises of three members of the Board, a representative from Engineering Institute of Zambia, representative of the Roads Department, representative of the Ministry of Local Government and Housing and a technical expert from the Secretariat. The committee is chaired by the Vice Chairman of the Board. The committees main responsibility is to get "No Objection" from the Board for the Annual Road Maintenance Program. It also undertakes site visits to roadworks to ensure that road users get 'best value for money' from Road Fund. Not all members of Technical Committee are technical experts. The National Roads Board by law is an advisory Board but overtime has evolved into an Executive Board.

Secretariat

The secretariat of the Road Fund is the strength of the Board as it manages the day to day operations of the Road Fund. Staffing of the secretariat is critical. The ability to deliver goods lies in the capacity, capability and creativity of the staff. The Secretariat started with just three staff members. It has taken on additional responsibilities and has grown considerable with highly skilled staff. It consists of an Executive Secretary, Engineer for Quality Assurance, Highway Engineer for Management Support Team, Co-ordinator For Procurement, and Accountant. There are three experts who work part time – Financial Analyst, Transport Economist and Human Resource person. The functions of the secretariat are to prepare: (i) policy guidelines to manage the fund; (ii) procedures to administer the fund, and (iii) financial regulations and systems to account for the fund. It makes payments only after technical and financial audits are done. The secretariat has set up a small engineering unit because the Board perceived that it needed sound technical basis for deploying its resources.

National Program of Road Maintenance

Another step taken by the Board was to establish a National Program of Road Maintenance. All 72 District Councils and 9 Provincial Road Engineers were required to submit a program of road maintenance, which included the selection criteria for roads and the type of maintenance intervention recommended, and the costs for the consideration of the Board. There was no capacity at the council level and provincial road engineers. Private Sector Consultants were appointed to assist the Councils and Provincial Road Engineers in drawing up, implementing, auditing, as well as certifying the payments to the Board. The Board paid Contractors and the Consultants directly for work done. The Road Fund is assisting in building the capacity. As a result, the number of Private Sector Consultants has come down from nine to just three. Provincial Road Engineers and Directors of works in the councils are also being trained to plan, program, supervise road works and certify payments to promote total quality management of contracts.

Capacity Building

The government has adopted a deliberate policy to move from force account to using private sector contractors. Earlier 94 percent of work was done by force account. Now 90 percent is done by contract. The main reason for this is that by using contract account, there is more transparency and accountability. Also, under force account, only 15 percent of equipment was under good condition. Funds were required for maintenance of the equipment.

The number of Contractors increased from 4 in 1994 to about 45 by the end of 1996 and to 120 by end of 1998. Consequently, the pricing for some road works also declined by about 40%. The Board is assisting in development of contractors. For this purpose, the Road Training school is being revamped and reorganized to train and develop contractor capacity with greater thrust on labor based road works. Payments to contractors are certified by consultant and implementing agency i.e. Council or Provincial Road Engineer. Similarly payments to consultants are certified by implementing agency and the relevant ministry. By this internal control system the Board is able to ensure accountability of Road Fund and value for the money spent. Contractors are pre-qualified only in case of large contracts.

Financing

Road Fund is dedicated to road maintenance. So far, the only source of revenue for the road fund is fuel levy contributed by road users. The fuel levy has increased from K10 per liter in 1994 to K30 per liter in 1995 to K40 per liter in 1996, and to 15% of wholesale price of fuel in 1997, with the support of road users. The revenues of the road fund has risen from about K3 Billion in 1994 to K30 Billion in 1998. In order to broaden the revenue base, the Board has proposed that revenues from transit tolls, weighbridge charges, traffic fines, and motor vehicle licensing fees, should go to the road fund. A Cabinet Memo has been circulated and should be effective in the near future.

Funds are only disbursed for approved road maintenance programs and the division between road type is clearly determined - 40% for Main Roads, 20% for Council Roads (Urban) and 40% for District Council/ Feeder Roads. The revenues from fuel levy

are not enough (around 60%) to cover the entire maintenance needs. The gap is still funded by the government.

The fuel levy is routed through the oil companies to the Zambian revenue Authority which deposits it into MOF account. MOF then issues a check to NRB. NRB is expected to remit the levy every ten days. Initially, when the Board was set up, there were problems. The fuel levy was in arrears as civil servants sat on the money. For the last year the fuel levy has been paid on time. This can become a problem again. For the fuel levy to be deposited into Road Fund Account, the Revenue Act has to be amended. This will take a long time.

The contractors are generally paid on time, within 30 days of receiving the certification. The payment is on 'first in first out' basis. There are no exemptions for fuel levy. To compensate the farmers, NRB allocates more funds for the feeder roads. Railways are asking for exemption as they feel that by paying the fuel levy for maintenance of roads, they are funding competition.

Policy Guidelines on Road Fund Disbursements

1. Road Fund shall be disbursed on the recommendation of the National Roads Board, and approved by the Committee of Ministers on Road Maintenance Initiative.

2. Road Fund shall be disbursed for road maintenance only and not for road rehabilitation, road reconstruction or new road construction.

3. Road Fund shall be disbursed for a programme of road maintenance undertaken with the approval of the National Roads Board/the Committee of Ministers on Road Maintenance Initiative.

4. Road Fund shall not be disbursed for procurement of Capital Expenditure items, as these should be done through the Budget allocation.

5. Road Fund shall not be disbursed to meet traveling and subsistence allowances or pay for Hotel bills and meet any administrative/overhead expenditure.

6. Road Fund shall not be paid to meet outstanding debts as these were budgeted for and were not undertaken on the initiative and approval the National Roads Board/the Committee of Ministers.

7. Road Fund shall not be disbursed to pay for counterpart funding as it should be budgeted and hence paid from budget allocation.

8. Road Fund shall be disbursed for road maintenance in the following proportions: Main/Trunk Roads = 40%; Council Roads = 20%; District Council/Feeder Roads = 40%

9. Road Fund loaned to Ministries to meet budgeted road works should be reimbursed before further loans could be considered.

10. No person shall direct payment to be made from Road Fund without the approval of the National Roads Board and Committee of Ministers on Road Maintenance Initiative.

Auditing

Road Fund accounts are audited on a quarterly basis by external auditors – Deloitte & Touche. Auditor General also audits the books once a year. The Financial statements are submitted to Parliament and also published in major newspapers. They are also available on NRB web page. NRB accountant performs thorough Financial Audit. Technical Audits is done for only a small sample of projects which are flagged during Financial Audit. Only 27 out of 119 projects got direct supervision from Road Fund. This is the main weakness of NRB.

Annex 5

Road Funds in Latin America*

1. ***Honduras:*** Legislation to create dedicated road maintenance fund was passed in 1999. The principal source of fund is levy on motor vehicle fuels in the form of a dedicated tax. The fund is used for routine and periodic maintenance of road network excluding urban roads. Upto 10 percent of fund can be disbursed for rehabilitation work. The Road Board has executive functions and has seven members. The Minister of Transport and Public Works is its Chairman. The Board includes three members from the private sector (Chamber of Commerce, Association of Transport Enterprises and College of Engineers) Administrative cost of managing the fund is restricted to 2.5 percent. The level of financing is reported to be stable since the year 2000. The coverage of the road network maintained is gradually increasing. It was 34 percent in 2001 and is expected to be 100 percent in 2009. Diversion of funds in the past to the extent of 40 percent for other purposes is also reported but the position is improving now. All works and services are contracted out to private sector.

2. ***Guatemala:*** Guatemala passed a law in 1996 increasing taxes on motor fuel and dedicating this increase and part of the existing fuel taxes to a special fund exclusively for road maintenance and improvement. The body governing this fund was created by a government decree in 1997. The Board has six members of which three are from private sector. The administrative cost is restricted to 2 percent of the annual turn over. Prior to creation of dedicated fund, only 11 percent network received maintenance. This increased to 49 percent by 1999 (paved roads received almost 100 percent coverage). Condition of paved roads improved substantially – partly of course, due to road rehabilitation works funded by government and external lending agencies. In the year 2000, when a new government assumed power, the performance of the fund dropped considerably. The position is reported to be retrieved with the intervention of the World Bank, the Inter-American Bank and the GTZ. All works and services are contracted out to private sector.

3. ***Costa Rica:*** Costa Rica created its National Road Fund in 1998 with fuel levy as the main source. The fund is used for maintenance, rehabilitation and improvement of the road network with priority to routine and periodic maintenance. The fund is managed by a Board which has seven members (three being from private sector). All works and services are contracted out to private sector.

4. ***El Salvador:*** El Salvador created its Road Maintenance Fund (FOVIAL) in 2000. A fuel levy of US$0.20 per litre was written into the Law. The FOVIAL has enjoyed a stable budget since then. It has received 100 percent of the dedicated fuel taxes and seems to be the most effective and efficient Road Maintenance Fund in Central America covering 100 per cent of the paved roads and 96 percent of unpaved roads. FOVIAL is managed by a Board having two members from Central Government, three members representing

* Source: UN-ESCAP Bangkok (2005), Road Maintenance Funds, Transport and Communications Bulletin No. 75.

indirect road user and two members representing direct road users. FOVIAL maintains an excellent public relations programme. Besides use of internet, there are daily news releases and advertisements informing the public on the works undertaken and the benefits of such works.

5. ***Brazil:*** Four Brazilian states (Mato Grasso in 1999, Mato Grosso do Sul and Parana in 2000, Goias in 2001) have created autonomous road funds. Several other states are in the process of creating similar funds. Main source of fund is levy on motor vehicle fuel. The funds are used primarily for maintenance and rehabilitation. In two states, viz Mato Grosso and Mato Grosso do Sul, funds were used for expansion of rural roads and the financial base of fund was broadened through levies on agriculture produce. Road funds are managed by Road Boards which have a few members from private sector also.

Annex 6

Broad Picture of Rural Roads Maintenance in States

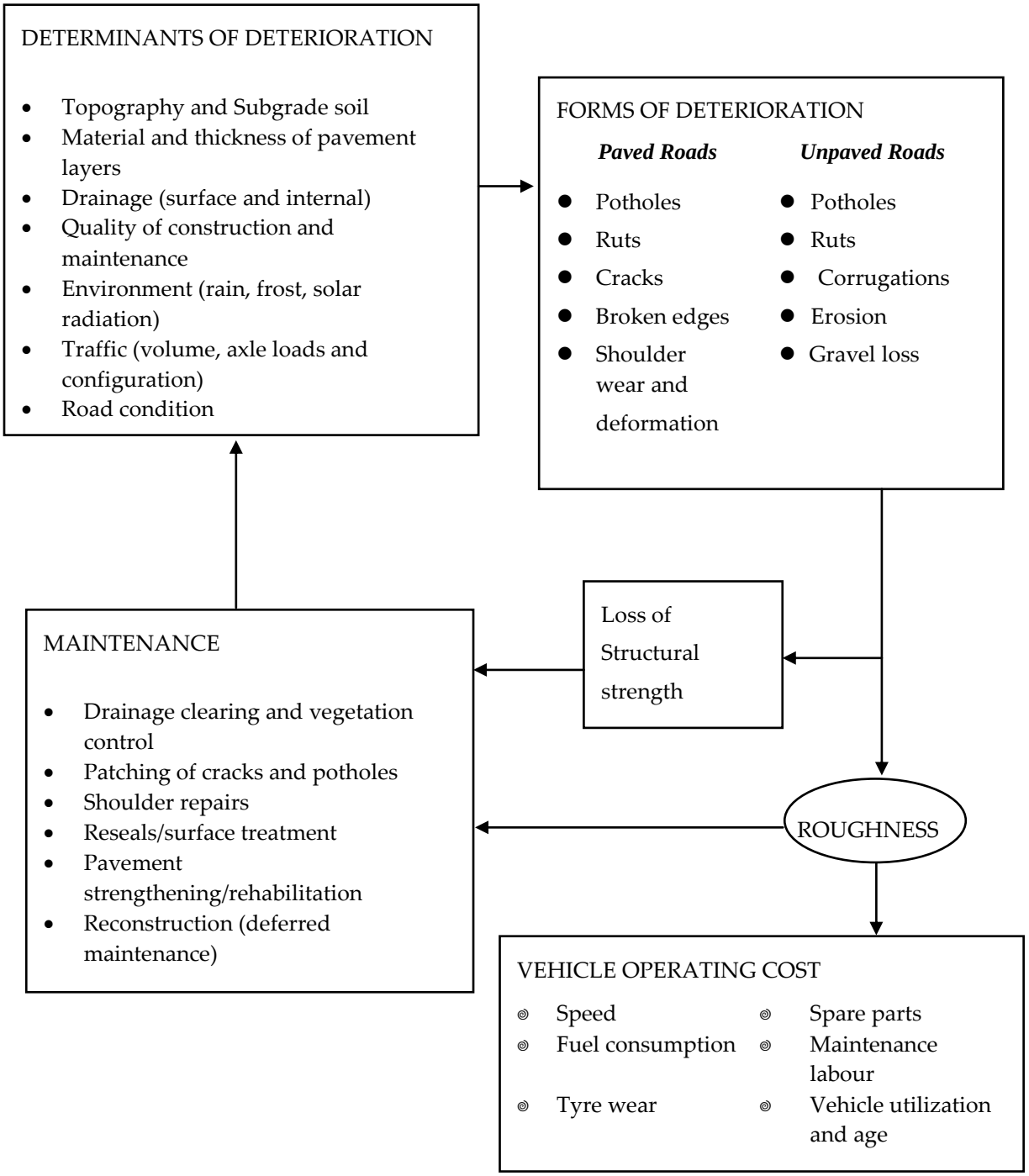
Sl No.	Particulars	Himachal Pradesh	Jharkhand	Meghalaya	Punjab	Rajasthan	Uttar Pradesh	Uttarakhand
1.	***Length (km)*** ***All rural roads*** ***PMGSY***	 27,790 km 10,067 km	 49,300 km 8,052 km	 6,119 km 1,018 km	 61,916 km 4,607 km	 87,961 km 48,939 km	 329,215 km 39,971 km	 25,448 km 4,298 km
2.	***Ownership***	PWD – 26790 km PRIs – 1000 km	SRRDA – 25,000 km RWD – 24,300 km	PWD Only a few roads about 10 percent are with PRIs	PWD: 33,966 km Mandi Board: 27,950 km	PWD – 86,723 km PRIs – 1,238 km	PWD – 174,251 km SRRDA -20,824 km RES – 5,654 km MandiParishad ZilaParishad GannaAyukt (SugacaneDeptt.)	PWD (about 70%) BRTF PRI Irrigation Forest Cane Deptt.
3.	***Funds availability***	• Lack of funds for rural roads	• Lack of funds for rural roads • MLAs can recommend upto 10 km in a year	• Lack of funds for rural roads • Some increase in last 2 years	• Lack of funds for rural roads	• Lack of funds • Some increase in last 2-3 years	• Lack of funds for rural roads. • Provision around 30% of requirements	• Lack of funds • Some increase in last 2-3 years
4.	***Planning for maintenance***	• Road Information System established • However need for regular updating of inventory and condition data	• Priorities are based on PCI surveys for PMGSY roads • For other roads: no planning	• No system of data collection	• No system of data collection	• Road information system established • However need for regular updating of inventory and condition data	• Draft maintenance management system prepared but pending approval of the government.	• No system of planning, priorities fixed on ad-hoc basis • However, state has a road inspection register and maintenance carried out accordingly •
5.	***Norms for maintenance***	• Norms exist • Might require revisit for rural roads	• No norms exist for maintenance	• No norms exist for maintenance.	• Norms exist • Might require revisit for rural roads	• Norms exist • Might require revisit for rural roads	• No norms are laid down	• Rates updated as per 1984 Manual

	Particulars	Himachal Pradesh	Jharkhand	Meghalaya	Punjab	Rajasthan	Uttar Pradesh	Uttarakhand
6.	***Schedule of rates for items of maintenance***	• SOR for maintenance items available • May need review to address concerns of contractors	• SOR for maintenance items available • May need review to reflect market rates	• SOR for maintenance items available • May need review to address concerns of contractors	• SOR for maintenance items available • May need review to reflect market rates.	• SOR for maintenance items available • May need review to address concerns of contractors	• SOR for maintenance items available and updated regularly • Contractors expressed concern over their reasonableness.	• SOR for maintenance items available • May need review to address concerns of contractors
7.	***System of execution of maintenance works***	• Routine maintenance 80% by gang labour, rest by contractors • Special Repair and emergency work 50% by gang labour and departmental machinery, 50% by contractors. • Periodic Renewal 100 percent by contractors. • Low productivity of gang labour	• No gang labour • Maintenance works undertaken through contractors	• Routine maintenance 26% by gang labour, rest by contractors • Periodic and emergency works: all through contractors • Low productivity of gang labour	• No gang labour • Maintenance works undertaken through contractors • Output based maintenance works introduced for higher order roads.	• No gang labour for rural roads • All works of maintenance through contractors	• No gang labour for rural roads • Contractors are engaged for routine, periodic and emergency maintenance • State possesses some equipment but deployed mostly on higher order roads.	• Routine maintenance 10% through gang labour and 90% through contractors • Periodic and emergency works: all through contractors • Serious problems due to land slides
8.	***Role of PRIs***	• No role in maintenance of rural roads	• No role in maintenance of rural roads	• No role in maintenance of rural roads	• No role in maintenance of rural roads	• Practically no role in maintenance of rural roads	• No role in maintenance of rural roads	• PRIs maintain roads within their jurisdiction
9.	***Contractors concerns***	• Realistic SORs • Weak capacity • Lack of training facilities	• Stone aggregates have to be procured illegally • Lack of training facilities	• Realistic SORs • Weak capacity • Lack of training facilities • Equipment availability	• Contractors available • Lack of training	• Realistic SORs • Lack of training facilities	• Realistic SORs • Lack of training facilities	• Realistic SORs • Lack of training facilities
10.	***Past effort on maintenance delivery***	• MMS reported to be functional • Road funding action in hand	• Draft Maintenance Action Plan prepared a few years back	• Work on data collection initiated	• Policy for output based maintenance • Road policy	• Road policy in place • Maintenance Action Plan	• Pilot MMS for three districts • Broad policy 14 years back	• Road policy drafted

					drafted	drafted		

Annex 7

The Road Deterioration Cycle



Source: Road Deterioration in Developing Countries, Causes and Remedies, World Bank (1988).

Annex 8

Road Inventory and Condition Survey
(Example of Methodology followed by ILO in Study of Rural Roads Maintenance in Madhya Pradesh)

Road inventory, road condition and maintainability data were collected by traveling along all the roads and tracks identified in the Block. The surveys were conducted by 2 teams of 2 persons 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 surveyors found that on an average 10 km of roads can be surveyed per day. The initial survey provided a baseline for assessing maintenance requirements. 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, when the teams worked together in applying the guidelines, was intended to reduce these inconsistencies. The resulting data problems were overcome by some recalibration of the evidence and repeat surveys where necessary.

For ease of data collection and recording, any road longer than 5 km was divided into sections of 5 km length (or less for the last section). On each road, inventory and condition data collection sheet, there was a diagrammatic representing of a 5 km road as a strip with space to put in the data. The data collected were compiled into a pre-designed computer database and strip maps for all roads were prepared. Formats for data inputs are enclosed (Attachments A, B and C).

ROAD INVENTORY

DISTRICT: _____ BLOCK: _____

ROAD CLASS + NO.: _____ ROAD NAME (from - to): _____

ROAD LENGTH: _____ km SECTION NO.: _____ SECTION LENGTH: _____ km

ACCESSIBILITY LEVEL: ☐ No ☐ Partial ☐ Basic ☐ Full

MAINTENANCE LEVEL: ☐ Unmaintainable ☐ Partially Maintainable ☐ Maintainable

TOTAL PUPULATION SERVED BY ROAD:

DS	IS

SURFACE TYPE:

☐ Bitumen ☐ Gravel

☐ Water Bound Macadam ☐ Earth

PRINCIPAL SUBSOIL TYPE:

☐ Friable Clay ☐ Stony / Natural Gravel

☐ Black Cotton / Expansive Clay ☐ .....

☐ Sandy Soil ☐ .....

GRADIENT:

% OF SECTION LENGTH

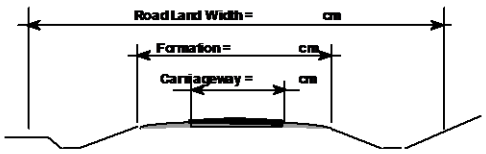
_____ % Flat/Undulating: 0 - 3%

_____ % Medium: 3 - 6%

_____ % Hilly: > 6%

100 % TOTAL

AVERAGE FORMATION WIDTH:



AVERAGE DAILY TRAFFIC:

☐ 0 - 25 ☐ 51 - 100 ☐ 200 - 500

☐ 26 - 50 ☐ 100 - 200 ☐ > 500

Symbols of Strip Map:

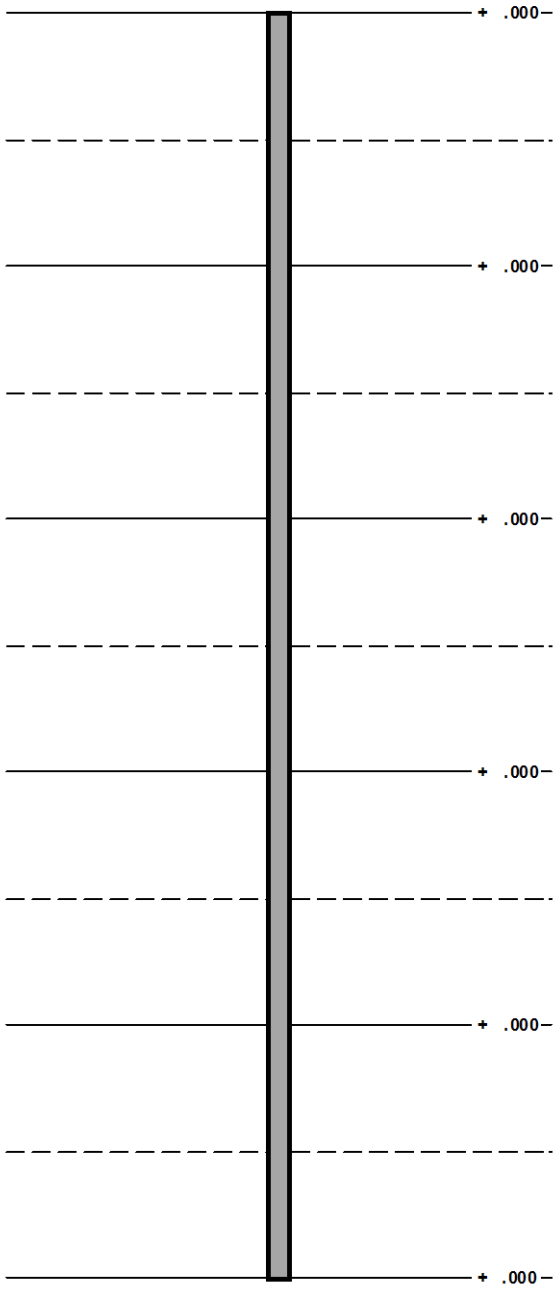
● Village A Admin. Centre

Cross Drainage M Market

S School R/H Religious or Heritage Monument

HC Health Centre Quarry: S = Stone G = Gravel

STRIP MAP:



Inventory recorded by:

Name: Signature:

Date:

Interpretation of Accessibility Levels:

LEVELS OF ACCESSIBILITY	**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 passability
Full Access	Reliable and high quality passability for all means of road transport

Interpretation of Maintenance Levels:

LEVELS OF MAINTENANCE	*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 not fully defective over longer sections,* • *drainage not fully and throughout defective (fully silted or not existent)*
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*

CONDITION AND MAINTENANCE NEEDS ASSESSMENT

DISTRICT: _____ BLOCK: _____

ROAD CL + NO.: _____ NAME (from - to): _____

ROAD LENGTH: _____ km SECTION NO.: _____ SECTION LENGTH: _____ km

KM	LEFT					CARRIAGEWAY					RIGHT					OTHER		
	VEGETATION TO BE CUT	SIDE / LATERAL DRAINS		SHOULDER		POTHOLES	CAMBER DEFECTIVE / RUTS / CORRUG. / GULLIES	GR	WBM	BT	SHOULDER		SIDE / LATERAL DRAINS		VEGETATION TO BE CUT	CULVERTS / INLET / OUTLET SILTED (NO)	EMERGENCY / SPOT IMP. REQUIRED / OTHER	REMARKS
		1/2 SILTED	FULLY SILTED / ERODED	RESHAPE	BT/ WB NEEDS GRAVEL OR FILL			EXISTING GRAVEL THICKNESS MM	DISLODGED METAL, DEPRESSIONS	CRACKED: REQUIRES RESEAL	BT/ WB NEEDS GRAVEL OR FILL	RESHAPE	FULLY SILTED / ERODED	1/2 SILTED				
4.500 - 5.000																		
4.000 - 4.500																		
3.500 - 4.000																		
3.000 - 3.500																		
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2.000 - 2.500																		
1.500 - 2.000																		
1.000 - 1.500																		
0.500 - 1.000																		
0.000 - 0.500																		
SECTION TOTALS	M A	M B	M C	M D	M E	M F	M G	X	M H	M J	M K	M L	M M	M N	M P	NO. Q	For details may use sep. sheet	

ASSESSOR _____

DATE OF ASSESSMENT Day _____ Month _____ Year 2 0 0 _____

ENTERED ON INVENTORY Day _____ Month _____ Year 2 0 0 _____

BT = BITUMEN SURFACE, WB/WBM = WATER BOUND MACADAM, GR = GRAVEL SURFACE

Annex 9

An Example of Innovative Patch Repair System on Bituminous Roads

1. The nu-phalt, UK have developed an infrared tarmac heater for localized pot-hole repairs and patch work.
2. The system recycles existing in-situ asphalt materials making its removal and disposal completely unnecessary.
3. The system forms a monolithic bond with the surrounding structure thus guarding against joint failure.
4. The operation is simple and can be completed at site within 30 minutes. A small hand operated compactor is sufficient to compact the patch and complete the repair.
5. The heater itself is manufactured by using high quality stainless steel and incorporates an NIT burner (produced from yarn made from metal fibres). With the unique Fecralloy material of the yarn having an oxidized surface of Yttrium, it is capable of withstanding very high temperatures and also capable of cooling back rapidly. These heaters come in sizes of 1.0m x 1.0m and 1.0m x 2.0 m.
6. The equipment can be easily carried in a light commercial vehicle. (Actually a small maintenance mobile unit can be tailor-made to suit the requirements of the road agencies).
7. The country needs to encourage use of such innovations. Possibility of some more innovations in such maintenance treatments would be round the corner.

Source: www.nu-phalt.com (Live demonstration can be seen at the website).

Annex 10

A DAY IN THE LIFE OF
LAKSHMI BIND, 35, foreman, road ambulance in Bihamoida

Highway patrol

A road ambulance in Patna, first of 76 to be deployed across state, roams the streets, fixing potholes

SANTOSH SINGH

ROAD Number 3, Malahi Pakdi, Kankerbagh. People gather around a pothole near the market, curious about the vehicle that has just driven round the corner. It's not often that a pothole gets this kind of attention and it's up to Lakshmi Bind, the man in charge of the GPS-enabled vehicle, to clear the air. "It's a road ambulance. We are going to fix this pothole," he says.

This road ambulance is the first of 76 such vehicles that are being deployed to maintain 9,064 km of Bihar's district roads and state highways, part of a plan by the state government to patrol roads under the state's new Road Maintenance Policy. Bind works for a company that has been given a five-year contract to maintain roads in the Patna town area — a 20-km stretch from Mahatma Gandhi Setu to Jadgeo Path.

the lane in his "*mohalla*". Bind ignores the wisecracks and goes about his work.

He asks for the back door of the road ambulance to be opened and a stair slides out. Bind uses a chalk and marks out the pothole. Workers deploy the road cutter and within 20 minutes, the affected portion is cut and dug up. An air compressor does the rest of the job and sucks in loose tar and mud. Bind now asks one of the workers to spray the emulsion mix over the patch.

Soon, New Patna Division Sub-Divisional Officer B K Sahay turns up at the spot along with junior engineer Jainul Abdeen Khan. They are here to inspect the quality of work, after which they turn in a compliance report.

"Make sure the concrete doesn't jut out," says Sahay. Bind nods and calls for the plate vibrator. The machine rolls over the now-shiny black patch. One of the

RAVI S SAHANI

The ambulance has an air compressor, a road cutter and a modified road roller

The state government's Road Construction Department has a multi-layered system to monitor the road ambulance — from the junior engineer right up to the department secretary. "Before we start our rounds, we get briefed by Division Executive Engineer C M K Mishra," says Bind.

It's already 10.30 am and Bind and his team of eight get down to work straight away. Driver Santosh Kumar 'Chhotu' inspects the vehicle. Bind, the team leader, sports a white helmet and a fluorescent green jacket while the rest of the team is in bright orange.

The ambulance is a mean machine, a compact unit that has containers for sand and stone, an air compressor, a road cutter, a machine to mix stone chips and emulsion and a plate vibrator that is a modified road roller. "Since we cannot carry molten coal-tar in road ambulances, we use emulsion that works on cold technology," says Bind. The vehicle also has a stretcher in case they come across an accident and need to take someone to hospital.

By now, there are enough people crowding around the ambulance to cause a minor traffic jam. Someone in the crowd says, "Oh, this is just a coolie", drawing a few laughs and sniggers. Another man wants to know if the ambulance can drive up to his house and fix workers sprinkle some sand and it's all done. The entire exercise takes over an hour and a half. Bind shouts out to the team, asking them to get all the machines back into the ambulance. The traffic on the road begins easing a bit.

By now, their curiosity satiated, the crowd turns cynical. "I have never seen something like this. But there are bigger potholes in the town that need to be fixed," says Shanker Ram, a resident of Kankerbagh. "*Bhai, chunav ka samay hai, isliye aesa chakachak machine dekh rahe ho* (They have got this shiny vehicle out because it's election time)," says an elderly man who walks away without stopping to give his name.

Bind says the traffic snarls and the crowd slow them down, so they prefer to work at night. "Ever since we started operations last month, we have repaired over a hundred potholes near the airport and at several places along Bailey Road. On an average, we repair 15-20 potholes in a day," he says.

The team has at least five more potholes to fix in the area and Bind says he won't finish before late evening.

RCD secretary Pratyaya Amrit says, "Road maintenance has been a big problem for years. We wanted to put in place a policy in which a construction company or contractors can be made accountable for maintaining roads round the year."