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National Rural Roads Development Agency  
Ministry of Rural Development

# **Managing Maintenance of Rural Roads**

## **Guidance Note for States**

**October 2014**

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# Managing Maintenance of Rural Roads: Guidance Note for States

## 1. Context

1.1 Rural roads comprise about 85 per cent of total road network. They act as facilitators to promote and sustain agricultural growth, provide access to schools, health care facilities and other services; and thus holds the key to socio-economic uplift. They are an entry point for poverty alleviation. For provision of access to our rural masses on a sustainable basis, maintenance of rural roads is essential (Box 1).

1.2 Both the 12<sup>th</sup> and 13<sup>th</sup> Finance Commission appreciated the importance of road infrastructure, especially rural roads and awarded central grants for maintenance of state roads including both PMGSY and non-PMGSY rural roads. This grant is in addition to state budget under the Non-Plan Revenue Head 3054.

### Box 1: Importance of Rural Road Maintenance

- Reduces rate of road deterioration
- Safeguards investments in construction and upgradation
- Enhances safety on roads
- Lowers the cost of vehicle operation
- Improves reliability of transport services
- Sustains social and economic benefits of access

1.3 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 programme guidelines. As per situation analysis carried out by the ILO Team in the World Bank funded states, it is noted that funding for maintenance of rural roads is generally below the stipulated level. Even the funds made available are not being utilized optimally due to inadequate maintenance management systems in place. There is also the issue of proper use of maintenance funds in terms of well defined maintenance plans, operating procedures and activities for road stretches under the jurisdiction of each Project Implementation Unit (PIU)/Division. However, there is growing evidence of increased awareness and commitment to maintenance of rural roads by the states in the recent years. The tempo needs to be built up and a simplified maintenance management system for rural roads should be put in place by the states.

## 2. Types of Maintenance

2.1 There are four categories of maintenance as under:

- (i) **Routine Maintenance:** These are routine activities to be performed on a regular basis throughout the year. It consists of both off-carriageway and on-carriageway activities.

Most common routine maintenance activities are as under:

- Filling potholes, patching surface and repair edges of pavement
- Repair shoulders and side slopes
- Clear drains, allowing free passage of water
- Clear culverts and other water crossings
- Remove debris from roadway and drains
- Cut grass and bushes
- Maintain road signages and pavement markings

- (ii) **Periodic Maintenance:** Periodic maintenance covers renewal of road surface. Normally on rural roads, it may be required at 5 to 6 year intervals depending upon the initial construction standards and quality, traffic and weathering effect. It needs to be borne in mind that if routine maintenance is regularly carried out, particularly attending to timely patchwork on the pavement, maintenance of camber/superelevation and side drains, the requirement of periodic maintenance can be postponed.
- (iii) **Special Repairs:** This is required when road structures such as culverts and bridges have suffered serious distress and damage requiring major repairs or even replacement. Major repairs of protective works such as breast walls, retaining walls may also be treated as special repairs.
- (iv) **Emergency Works:** This is required when unforeseen events occur such as landslides, floods, earthquakes, etc. The immediate requirement is to re-open the safe passage on the rural road and subsequently plan for and provide for restoring the road to its former or better condition.

### 3. Maintenance Management Principles

#### 3.1 Introducing Management Principles

It is necessary that maintenance management principles are introduced by the states at both the Headquarter and the field levels. These important principles are:

- Conducting inventory and condition surveys
- Planning and economics of maintenance
- Timing of maintenance interventions
- Estimating and budgeting
- Works preparation and programme
- Reporting

This will help in optimal, efficient and effective utilization of funds allocated for maintenance. In the first instance, the states may adopt the principles in respect of PMGSY rural roads in case there are constraints to upscale the same for the entire rural road network. The states are already in the process of formulating their own policy for maintenance of all rural roads (both PMGSY and non-PMGSY). On its finalization, the states can then proceed with adoption of the maintenance management principles.

### 3.2 *Inventory and Condition Surveys*

To plan for funding and undertaking maintenance, the first requirement is knowledge about the status of the road network. The following strategies should be adopted:

- (i) Establish a regular system of inventory and condition survey of various road assets such as embankment, pavement, drains, culverts, bridges, road signs, other traffic control devices and protective works by each PIU and Division and its consolidation at district and state level. These surveys should be carried out every year. Annex 1 provides an illustrative format.
- (ii) Carry out three-day traffic counts once a year on the road network during the harvest (peak) season.
- (iii) Based on these surveys, each PIU should prepare strip maps for the roads within their jurisdiction. With the increasing application of GIS, it is possible to put the entire data collected by the PIUs on GIS-platform.
- (iv) The road pavement should be graded as good, fair and poor on the basis of parameters such as pavement condition index, potholes, cracks, patching, raveling, etc. (Refer IRC 82). Table 1 gives the indicative range of distress being considered by the Indian Roads Congress based on literature search by the CRRI. For each parameter, depending upon the level of distress, the treatment required should be decided and provided.

**Table 1: Rating of Pavement for Rural Roads**

Sl. No.	Parameter	Range of Distress (per cent)		
		Good	Fair	Poor
1.	Potholes	Upto 0.5	From 0.5 to 1.0	Above 1.0
2.	Patching	Upto 5	From 5 to 20	Above 20
3.	Cracking	Upto 10	From 10 to 20	Above 20
4.	Raveling	Upto 10	From 10 to 20	Above 20
5.	Pavement Condition Index	4 to 5	2 to 3	1
Note: Refer to PMGSY Operations Manual for determination of the Pavement Condition Index				

- (v) Apart from pavement, the PIU should look at off-carriageway requirements such as drainage and shoulders, performance of cross drainage structures (causeways, culverts, bridges), road signs, pavement markings, traffic control devices, stretches subjected to flooding, side slope erosion, safety hazard spots, sight distance/visibility at road intersections, particularly the meeting points with main roads (SHs, NHs). Table 2 provides a checklist of items relating to structures that should be inspected.

**Table 2: Inspection of Structures**

Item	Defect/Damage	Item	Defect/Damage
Foundation	• cracks	Approaches	• drainage
	• erosion along and underneath		• visibility
Head and wing walls	• cracks		• settlement
	• blocked seepage holes	Beams	• cracks
	• erosion behind walls		• bends
Abutments and piers	• cracks		• corrosion
	• blocked seepage holes		• rotting
	• erosion behind abutment	Waterway	• vegetation growth
Culverts	• blocked drainage		• deposits of sand, silt or debris
	• blocked or silted	Road furniture	• damaged
	• cracks		• missing
Decking	• settlement cracks		• faded paint
	• loose	Banks	• eroded
	• drainage	Guard rails	• damaged
	• missing		

- (vi) The inventory and condition surveys should be utilized to provide the rationale for planning of maintenance interventions and their prioritization taking into account the traffic and importance of road (population served, linkage with market, health care facilities and schools, colleges, etc.). Box 2 gives a system of road asset management in Himachal Pradesh, which is worthy of adaptation by the states in their own milieu.

### **Box 2: Road Asset Management in Himachal Pradesh**

- The priorities applied in road maintenance in Himachal Pradesh clearly demonstrate a healthy approach to road asset management based on the condition of the roads. The Public Works Department carries out regular condition surveys of the road network as part of its annual programming and budget exercise.
- First priority is given to allocating sufficient budgets for routine maintenance of all roads in good condition. Secondly, periodic maintenance is provided on the roads in fair condition, where the life of pavements and other road elements have been depleted, i.e. resurfacing works, strengthening pavements, major repairs to drainage structures.
- Roads in poor condition are not included in the maintenance programme but instead placed in the capital investment programme for reconstruction or improvement works.
- The clear distinction between maintenance and investment activities (non-plan and plan budgets) is not only important in terms of ring-fencing maintenance budgets for its intended purpose, it also clearly identifies the part of the network that should be included in the investment programme.

### **3.3 Planning and Economics of Maintenance**

The guiding principles for planning and economics of maintenance interventions may be as under:

- (i) First priority should be given to allocation of sufficient budgets for routine maintenance of all roads in good condition. This strategy would prevent or at least delay further deterioration of these roads. Equally, it is critical to attend to maintenance of all safety features and ensuring that all roads are kept continuously open to traffic (Box 3).

### **Box 3: Enhancing Safety through Maintenance**

High priority needs to be accorded to ensuring maintenance of all safety features provided on the road. Particular attention needs to be paid to the following:

- Maintaining functionality of road signs, pavement markings and other traffic control devices so that they are clearly visible from a distance. This would involve pruning/trimming of tree branches, repairs/replacement of damaged signs, worn out markings and traffic control devices.
- Ensuring visibility of cautionary signs particularly near speed breakers, road junctions and pedestrian crossings.
- Taking corrective measures at locations where sight distance is seen to be compromised.
- Ensuring that the road remains open to movement of traffic at all times as far as possible.

- (ii) Secondly, priority should continue to be given to off-carriageway maintenance of roads which are in fair and poor condition. This applies particularly to clearing/cleaning of drains and drainage structures. There shall be no compromise on keeping the drainage system in good working condition. This strategy would reduce the financial burden of pavement treatment significantly.
- (iii) Thirdly, periodic surface renewal should be provided when the roads are in fair condition (see Table 1). This will help avoid accelerated deterioration of road pavement requiring rehabilitation and reconstruction which would be far more costly. In fact, each state may undertake an exercise to work out the backlog of surface renewal and formulate a time bound programme to remove such a backlog.
- (iv) It is recommended that a portion, say 15 to 20 per cent, of total budget allocated for maintenance should be made available for special repairs such as major repairs to drainage structures and protective works, and emergency maintenance works such as those arising from unforeseen breaches, landslides, flooding/cyclones and other natural disasters.
- (v) Roads in poor condition would require major rehabilitation or reconstruction. Currently, these activities might be consuming a high proportion of maintenance budget in several states because of lack of adoption of maintenance management principles. Such requirements should be met out of the plan funds and should not form part of maintenance programme except for off-carriageway maintenance and making the road just traffic-worthy. It is essential to break the vicious cycle of build/reconstruct, neglect and rebuild. The maintenance budget needs to be ring-fenced so that it is available largely for routine and periodic maintenance. Only such a preventive approach would halt accelerated deterioration of the road network. Of course, some allocation may be reserved for special repairs and emergency maintenance.

### 3.4 *Timing of Maintenance Interventions*

Table 3 gives the recommended priorities for maintenance interventions depending upon the nature of damage/deficiency. The key considerations should be (i) safe and unobstructed movement of traffic (both motorized and non-motorized); and (ii) preventive maintenance to avoid any further deterioration.



**Table 3: Recommended Timing of Maintenance Activities**

Damage	Criteria	Action	Priority
<b>Features concerned with safety of traffic</b>			
Breaches or blockages in the roadway	Any type of breach, that endangers safety of traffic or obstruct flow of traffic	Remove blockages and repair cuts	Urgent
Tree branches at height less than 4.5m over the roadway		Cut branches in order of lower ones first	Special attention
<b>Carriageway and crust condition</b>			
Cracking without rutting	Cracking in local areas less than 25% of the total area	Local sealing or filling of cracks	Routine
	More than 25% of total area		Special attention
Stripping	Less than 25% of total area	Apply local sealing	Routine
	Exceeding 25% of total area	Apply surface dressing	Special attention
Bleeding	Less than 25% of total area	Sand the surface	Routine
	Exceeding 25% of total area	Apply surface dressing	Special attention
Rutting	Less than 50mm depth with limited cracking	Prime and fill with bituminous mix	Routine
	Less than 50mm with severe cracking		Special attention
	More than 50mm depth with severe cracking	With surface dressing over cracks Overlay required	Special attention
Potholes	As soon as they develop	Patching	Special attention
Reflection cracks	Widely spaced	Crack Sealing	Recurrent
	Closely spaced	Apply surface dressing	Special attention
Edge subsistence and rutting	Any extent	Patch road edge and repair shoulder	Recurrent
Deficient camber	Any extent	Reconstruct camber	Special attention
Undulations	Any extent	Investigate and rectify	Special attention
Loss of material on unpaved road	Any extent	Regravelling	Special attention
<b>Shoulders and side drains</b>			
Deformation or scouring of shoulders	Any extent	Fill and compact to restore camber	Routine
Silting of side drains	Any extent	Clean the drains	Routine
Scouring in side drains	Any extent	Reconstruct to desired shape. Install scour checks and mitre drains	Special attention
<b>Cross drainage works</b>			
Causeways: Potholes in paved surface, erosion of inlets, outlets and guide posts		Patching, repair and replace	Special attention
Culverts: Silting, erosion of inlets and outlets, and settlement cracks		Remove silt, repair erosion and cracks	Special attention
<b>Other works</b>			
Vegetation control		Remove bush and cut grass	Routine
Road furniture and signs dirty, corroded or missing		Clean, repair and replace	Routine

Source: *Manual for Maintenance of Roads, IRC 1989*

### 3.5 *Estimating and Budgeting*

- (i) Realistic cost estimating is essential for planning of the required road maintenance interventions. At the initial stage, estimates can be based on general cost norms for road maintenance and applicable schedule of rates. The Ministry of Rural Development (MORD) has recently constituted a Committee comprising senior officers from state and the National Rural Roads Development Agency (NRRDA) to deliberate and recommend maintenance norms for rural roads. The cost norms for maintenance need to be updated regularly at the state level.
- (ii) When works are planned in detail, proper estimates and contract documents are required to be prepared by the PIU/Division based on detailed field surveys. Table 4 provides a sample of how an estimate for routine maintenance can be prepared.

**Table 4: Cost Estimate (sample) for Routine Maintenance**

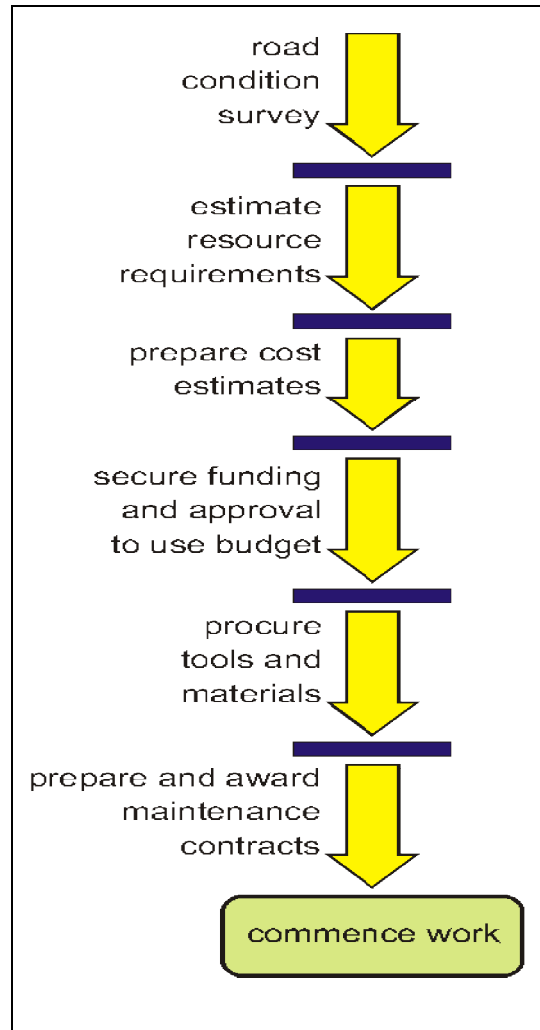
District		Ri-Bhoi			Division		Umsning
Sub-Division		BhoiRymbong			Road Category		ODR
Road Name		Khapmar - Pynthor			Length		8.00 km
No.	Activities	Unit	Quantity	Unit Rate	Amount	Time/year	Total (Rs.)
1	Pothole patching	m <sup>2</sup>	9.6	600	5,760	1	5,760
2	Crack Sealing	m	22	30	660	1	660
3	Sealing coat	m <sup>2</sup>	430	70	30,100	1	30,100
4	Thin overlay 20 mm	m <sup>2</sup>	185	200	37,000	1	37,000
5	Clear side drains	m	6200	15	93,000	2	186,000
6	Clear mitre drains	m	45	15	675	2	1,350
7	Lower berm	m <sup>2</sup>	1150	15	17,250	1	17,250
8	Shoulder repair	m	42	30	1,260	1	1,260
9	Side slope repair	m	35	30	1,050	1	1,050
10	Clear culvert/bridge	m <sup>3</sup>	21	98	2,058	2	4,116
11	Bush clearing	m <sup>2</sup>	11000	1	11,000	2	22,000
12	Repair Road Signs	no.	12	400	4,800	1	4,800
<b>TOTAL</b>							<b>311,346</b>
		Average cost per km					<b>38,918</b>
Date		Date		Date			
Prepared by		Checked by			Counter signed by		

- (iii) All expenses incurred on maintenance are monitored for budget control. This also enables the road agency to update their cost norms for future planning and budget demand.

### 3.6 Works Preparation and Programme

- (i) **Works Preparation:** There are several stages of preparatory work before a maintenance works programme can commence. First, an inventory and road condition survey, followed by planning and budget demand estimation. Thereafter, prepare work estimates and secure funding and budget approval. For works to be executed by departmental labour, the tools and materials need to be procured. Otherwise, tendering process needs to be carried out well in advance to ensure that actual execution can take place at the right time of the year.

- (ii) **Works Programme:** The works programme for a particular road includes details of all work activities, their respective inputs and a schedule indicating the timing of start and finish of each activity. It would be useful to break down the programme into weekly plans and then monitor adherence to the intended schedule.



### 3.7 Reporting

- (i) Reporting is essential to provide the senior and top management with feedback on actual work progress against approved plans and budget and as to how such works have impacted on maintaining the quality and serviceability of the road network for the road users. For effective tracking of expenditure for maintenance works, the formats

given in Annex 2 may be adopted by the states and direct each PIU/Division to furnish the required information to SE/CE and administration.

- (ii) The Rural Road Agency should establish a performance evaluation system of the maintenance funds as an annual exercise. The recommended indicators for such an evaluation are:
- Percentage of rural road network that received routine maintenance
  - Percentage of PMGSY roads subjected to periodic maintenance
  - Percentage of Core Road Network in good condition
  - Percentage of maintenance expenditure compared to the amount required as per norms.

#### **4. Implementation Arrangements**

##### **4.1 Road Agencies**

- (i) Headquarters Level: Like construction, efficient implementation of rural road maintenance works require technical and managerial skills. Main tasks are planning, programming and budgeting, procurement of works, their supervision, performance control and monitoring. The maintenance treatments need to follow technical standards and specifications laid down by the Indian Roads Congress and the MORD. Financial and administrative support services are equally vital to ensure effective budgetary and expenditure control. The accountability of field units needs to be strengthened together with provision of adequate inspection infrastructure and availability of funds in a timely manner. Just as for construction, maintenance also justifies establishment of a proper monitoring system to exercise check on effective utilization of the funds allocated for maintenance to each PIU/Division. The state road agencies may consider creating a dedicated Maintenance Wing at the Headquarters for proper planning and asset management of rural road network under their ownership. Such a unit can be headed by an SE level officer with appropriate supporting staff. See Box 4 for indicative functions of Maintenance Wing.

#### **Box 4: Tasks of Maintenance Wing**

**Inventory:** Arrange for recording all components of the road network, their main characteristics and current condition from the PIUs and consolidation at state level

**Inspection:** Arrange for examination of the road network, measuring and recording its condition at field level and consolidation at state level

**Determination of maintenance requirements:** Analysing effects, their causes and specifying what maintenance activities are needed to rectify and delay any further deterioration.

**Resource estimation:** Deciding the work that has to be done and which works take precedence if resources are limited.

**Work scheduling and implementation:** Timing and controlling the works implementation, directing the PIUs for preparing contracts, award and supervision of works.

**Monitoring:** Sample checking of quality, progress and effectiveness of works.

- (ii) Some states do have departmental labour and work charged establishment to carry out routine maintenance activities. Although, over time, because of ban on recruitment, the system of gang labour is on the wane, some amount of such labour can prove useful for emergency maintenance works at short notice.
- (iii) Field Level: For execution of works of maintenance at the field level, the states may feel free to adopt any model such as having dedicated maintenance Assistant Engineers and Junior Engineers with support staff or combined construction and maintenance responsibilities at these levels so long as senior management can ensure that duties expected towards maintenance planning, preparation of estimates, supervision and control during execution by contractors or departmental labour does not suffer. Box 5 provides a snapshot of a typical rural road maintenance management team at PIU/Division level. See Annex 3 for main responsibilities of a Junior Engineer in charge of maintenance.

#### **Box 5: Staff Cadre for Maintenance Management at PIU/Division Level**

- An *Executive Engineer* in charge of overall planning, procurement and supervision of all rural road works including the maintenance in a district. His/her duties would include overseeing the preparation of cost estimates, work programmes and budgets, contract preparation and tendering and ensuring that works are carried out on time and adequately supervised.
- *Assistant Engineers* assigned to manage the routine and periodic maintenance works in a given cluster or geographical area, providing oversight of work supervision as well as random inspection, measurement and quality control.
- *Junior Engineers* in charge of the detailed programming and implementation of road maintenance for a sub-cluster of roads. These tasks should be combined with the preparation of road condition inventories.
- *Work Supervisors*, where available, support the Junior Engineers in the regular road condition surveys as well as the inspection and supervision of local contractors or labour gangs engaged on routine maintenance works.
- A *Finance Officer* supports the technical team. He needs to process payments for maintenance works, keep proper accounts, process budgetary allocations and exercise financial control.
- *Administrative and logistical support staff* such as drivers, secretaries and office assistants need to be provided in addition to inspection vehicles and office equipment.

## 4.2 **Contractors**

- (i) It is recognized that maintenance of rural roads is a dispersed activity requiring small resource inputs at numerous locations covering a wide geographical area. Routine maintenance is even more dispersed than periodic maintenance and is well suited for manual labour. The rural road maintenance offers unique opportunity to the states for creating a dedicated bank of small local contractors. Several states have introduced performance based maintenance contracts and area-wise item rate contracts for routine and periodic maintenance of rural roads.
- (ii) The states may consider supporting the small local contractors in acquiring small mobile maintenance units to carry out both on-carriageway and off-carriageway routine maintenance works.
- (iii) There is scope for convergence of schemes like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) for routine maintenance of rural roads particularly for off-carriageway activities since these activities are largely manual. Funds could also be accessed by getting linked to schemes of National Rural Livelihood Mission for women groups and National Skill Development Programme for youth to develop cadre of dedicated maintenance workers and entrepreneurs. Pilots may be

experimented towards involving community participation in off-carriageway routine maintenance.

## 5. Training

5.1 Many of the aspects brought out in this Guidance Note will require certain element of training to build up skills and capacity of PIUs in efficient planning, monitoring and delivery of maintenance programmes. It is important that the staff concerned is properly instructed in conducting inventory and condition surveys, preparation of annual maintenance plans, estimates and contract documents. See Box 6 for major areas of training. Training provides a good opportunity for raising awareness about maintenance management principles. It would, thus, help in ensuring that the prescribed procedures are put into practice in a uniform and consistent manner.

### **Box 6: Important Areas of Training**

- Undertaking inventory and condition surveys of roads, bridges and culverts, etc.
- Assessing the condition of the road network and plan, design and prioritise maintenance operations.
- Managing the procurement process and supervision of the work done by the contractors
- Undertaking performance evaluation of maintenance expenditure under different subheads (routine maintenance, periodic surface renewal, emergency works including special repairs and minor works)
- Undertaking financial management of funds allocated

5.2 Most states have established regular collaboration with institutions at both state and central level for providing training to the staff of their road agencies. Such institutions should also be requested to deliver short-courses at district level and in the field.





3. The states may like to adopt the same. The format provides separate sections for inventory and necessary works on the carriageway (pavement) and both sides of the carriageway as also other works such as drainage structures, road signs and other traffic control devices and other items.

## Financial Progress of Routine Maintenance

Name of Division:						
Name of Sub- Division:						
Name of road	Length of road (km)	Budget Allotment (Rs. lakh)	Routine Maintenance			Remarks
			Expenditure up to previous Quarter (Rs. lakh)	Expenditure during the Quarter under review (Rs. lakh)	Cumulative Expenditure during the year (Rs. lakh)	
1	2	3	4	5	6	7

## Physical and Financial Progress of Periodic Maintenance

Name of Division: -											
Name of Sub-Division: -											
Name of Road	Job No.	Sanctioned Length (km)	Sanctioned Amount (Rs. lakh)	Achievement upto previous Financial Year		Target for current Financial Year		Achievement during the year upto previous quarter		Achievement during the quarter	
				Physical (km)	Financial (Rs. lakh)	Physical (km)	Financial (Rs. lakh)	Physical (km)	Financial (Rs. lakh)	Physical (km)	Financial (Rs. lakh)
1	2	3	4	5	6	7	8	9	10	11	12

Cumulative Achievement during the year		Overall upto date Achievement		Likely date of Completion	Remarks
Physical (km)	Financial (Rs. lakh)	Physical (km)	Financial (Rs. lakh)		
13	14	15	16	17	18

## Physical and Financial Progress of Special Repairs/Flood Damage Repairs

Name of Division: -											
Name of Sub-Division: -											
Name of Road	Job No.	Type of Repair	Sanctioned Amount (Rs. lakh)	Achievement upto previous Financial Year		Target for current Financial Year		Achievement during the year upto previous quarter		Achievement during the quarter	
				Physical (km/no.)	Financial (Rs.lakh)	Physical (km/no.)	Financial (Rs. lakh)	Physical (km/no.)	Financial (Rs.lakh)	Physical (km/no.)	Financial (Rs. lakh)
1	2	3	4	5	6	7	8	9	10	11	12

Cumulative Achievement during the year		Overall upto date Achievement		Likely date of Completion	Remarks
Physical (km/no.)	Financial (Rs. lakh)	Physical (km/no.)	Financial (Rs. lakh)		
13	14	15	16	17	18

## Job Description – Junior Engineer (incharge of Maintenance)

### General:

The *Junior Engineer* is in charge of providing and timely maintenance of rural roads. This involves inspection of roads, preparation of budgets and work plans, work supervision, on-the-job training and work guidance, inspecting and certifying completed works, following established technical, administrative and financial procedures.

### Main responsibilities:

- inspection of all maintainable roads, inventorising deficiencies and estimating remedial maintenance works,
- estimate annual rural road maintenance budgets and prepare annual maintenance work plans based on field surveys,
- prepare detailed work plans and cost estimates,
- prepare contracts documents for maintenance works,
- estimate required inputs and costs of tools and materials for maintenance,
- assist in procurement of tools and materials,
- identify potential local contractors in close proximity to the roads,
- assist in awarding routine maintenance contracts,
- distribute appropriate hand tools to labour gangs,
- monitor and supervise the implementation of works by contractors and labour gangs,
- measure and issue payment certificates for completed works,
- maintain physical progress and cost records of all maintenance works, including labour inputs, tools, materials, and other costs,
- continuously monitor the effect of on-going works as compared to the condition of the road network, and when required submit requests for revisions to work plans,
- monitor the effect of intensive rainfalls or other extreme wear and tear to the road network, and submit request for emergency maintenance measures as and when required,
- monitor and evaluate the effectiveness of work methods, system and procedures, and if necessary propose changes which further improve the efficiency of the system,
- liaise with local authorities and villagers on administrative matters relating to the maintenance works (e.g. safety, use of borrow pits, maintaining road furniture, stockpiling materials, etc.),
- liaise with local authorities and the road users on the proper operation of the roads (speed and weight limitations, reporting, importance of emergency maintenance, etc.)
- other administrative or technical work as directed by the Assistant Engineer.

### Reporting:

The Junior Engineer reports to the Assistant Engineer.