

# Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups

Guide for Communications Bureaus

Asian Development Bank



# Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups

Guide for Communications Bureaus

Asian Development Bank

© 2012 Asian Development Bank

All rights reserved. Published in 2012.  
Printed in the Philippines

ISBN 978-92-9092-933-8 (Print), 978-92-9092-934-5 (PDF)  
Publication Stock No. TIM125224-3

#### Cataloging-In-Publication Data

Asian Development Bank.

Performance-based routine maintenance of rural roads by maintenance groups.  
Mandaluyong City, Philippines: Asian Development Bank, 2012.

1. Roads      2. Performance-based Maintenance      I. Asian Development Bank.

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

By making any designation of or reference to a particular territory or geographic area, or by using the term "country" in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

ADB encourages printing or copying information exclusively for personal and noncommercial use with proper acknowledgment of ADB. Users are restricted from reselling, redistributing, or creating derivative works for commercial purposes without the express, written consent of ADB.

#### Note:

In this report, "\$" refers to US dollars.

6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
Tel +63 2 632 4444  
Fax +63 2 636 2444  
[www.adb.org](http://www.adb.org)

For orders, please contact:  
Department of External Relations  
Fax +63 2 636 2648  
[adbpub@adb.org](mailto:adbpub@adb.org)

# Contents

Tables and Figures	iv
Foreword	v
Preface	vii
Acknowledgments	viii
Abbreviations	ix
<b>Routine Maintenance of Rural Roads</b>	1
Road Deterioration	1
Road Maintenance	3
Maintenance Activities	7
Tools, Safety Equipment, and Materials	10
<b>Maintenance Groups</b>	15
Rationale for Maintenance Groups	15
Group Size	17
Selection of Group Members	18
Registration of the Maintenance Group	20
Training of the Maintenance Group	21
<b>Performance-Based Maintenance</b>	23
Performance-Based Contracting	23
Performance Indicators	24
Monthly Inspection	25
Maintenance Planning and Organization	27
Payments	29
Maintenance Costs	31
Maintenance Funding	31
Maintenance Contract	32
<b>Annexes</b>	
1 Registration Form	33
2 Monthly Report	34
3 Cashbook	35
4 Inspection Form	36
5 Regulation	37
6 Maintenance Agreement	41

# Tables and Figures

## Tables

1	Seasonal Priority of Activities	28
2	Road Scoring for Determining Monthly Payments	29
3	Road Categories and Related Monthly Payments	30
4	Estimated Average Total Costs of Performance-Based Maintenance	31

## Figures

1	Road Deterioration	2
2	Corrective Maintenance	4
3	Preventive Maintenance	5
4	Impact of Routine Maintenance on Asset Value	6
5	Impact of Routine Maintenance on Overall Conservation Costs	6

# Foreword

**T**raditionally, rural road maintenance in Dehong Prefecture in the People's Republic of China is carried out through voluntary contributions from communities along the road during 1 or 2 days each year, complemented by provincial and local maintenance subsidies for the purchase of materials. In practice, the burden tends to fall disproportionately on women and the poor; and due to limited labor inputs and a lack of skills training, maintenance quality is suboptimal and roads continue to deteriorate.

Through a small-scale technical assistance pilot project linked to the Yunnan Integrated Road Development Project and the preceding Gender and Development Cooperation Fund pilot demonstration project, the Asian Development Bank (ADB) reached an agreement with the Yunnan Provincial Department of Transport and Dehong Prefecture Communications Bureau to allow a more flexible use of provincial maintenance subsidies, making it possible to finance the remuneration of maintenance groups that work year-round to keep the roads open and slow down deterioration. As well as resulting in improved road conditions, this provides a rare opportunity for off-farm employment in rural areas, especially for women and ethnic minority groups.

The small-scale technical assistance pilot project achieved the following:

- 250 kilometers of rural roads were successfully maintained by women's road maintenance groups, resulting in continued access throughout the rainy season and leading to improved road conditions, benefiting transport services and facilitating access to markets, schools, and health facilities.
- 129 women, mainly from ethnic minority groups, were provided with technical and management training and employed in rural road maintenance, with a total of over 11,500 person-days of employment created. The flexible and part-time nature of the performance-based payment system enabled the maintenance group members to easily combine this work with other household and farm responsibilities.
- With an average investment of CNY2,470 per kilometer, the piloted approach is in line with existing funding levels for routine maintenance of township and village roads (from provincial subsidies and local

budget allocations). More than 80% of this investment is in the form of wages; the remainder is spent on insurance, tools, safety equipment, and materials.

- Average daily wages under the project reached CNY44 per day, providing the maintenance group members with a little less than CNY4,000 per person per year on average. The wages obtained from the maintenance work have provided a major boost to household incomes, raising these beyond the official poverty line of CNY1,196 per capita and providing the women with greater decision-making power in their households.
- Under the project, a regulation was prepared regarding the implementation of routine maintenance of rural roads by maintenance groups. This was issued by the Dehong Prefecture Communications Bureau to regulate the use of the approach under the Yunnan Integrated Road Network Development Project. It is expected to be followed by a province-wide regulation to be issued by the Yunnan Provincial Department of Transport.

This approach to road maintenance by maintenance groups has potential for wider replication in the People's Republic of China and other developing countries. This guide and the complementary manual for maintenance groups provide a way to share the approach and methods used.



**Tyrrell Duncan**

Director, concurrently Practice Leader (Transport)

Transport and Communications Division, East Asia Department

# Preface

The physical condition of roads is critical to any transport network. However, unless roads are adequately maintained, they inevitably deteriorate, leading to higher road user costs and longer travel times. Routine maintenance is often delayed due to various factors, such as lack of funds or insufficient technical knowledge. When simple routine maintenance is postponed for long periods, there is often a need for more extensive rehabilitation, which is much more costly.

The purpose of this guide is to assist communications bureaus in Yunnan Province, People's Republic of China, in organizing and managing the routine maintenance of unpaved rural roads by maintenance groups.

The guide is the outcome of a small-scale technical assistance (SSTA) pilot project linked to the Yunnan Integrated Road Network Development Project. The SSTA pilot project built upon the experience of a previous pilot project on Community-Based Routine Road Maintenance by Women's Groups, which was financed by the ADB Gender and Development Cooperation Fund. The SSTA pilot project sought to improve the approach developed under the earlier pilot project by introducing performance-based payments with the aim of reducing the resources required for supervision and inspection. It also aimed to improve the financial sustainability of the approach by reducing the investments required and promoting policy changes regarding the use of road maintenance funding.

This guide describes the deterioration process of rural roads and the need for a proper system of routine maintenance to reduce costs and improve road conditions. It explains how to organize, train, and contract maintenance groups for routine maintenance of rural roads, based on the experience gained from the two pilot projects carried out in Dehong Prefecture, Yunnan Province. Special attention is given to performance-based contracting and the related performance indicators and monthly inspections. This guide serves as a basis for the replication of performance-based routine maintenance by maintenance groups under the Yunnan Integrated Road Network Development Project on 650 kilometers of rural roads over a 4-year period.



**Robert Wihtol**  
Director General  
East Asia Department

# Acknowledgments

This guide was developed as part of a small-scale technical assistance (SSTA) pilot project for the Yunnan Integrated Road Network Development Project funded by ADB. The SSTA pilot project was carried out in Dehong Prefecture, Yunnan Province, People's Republic of China. This guide is largely based on a guide developed under a previous pilot project funded by a grant from ADB's multidonor Gender and Development Cooperation Fund: *Community-based routine maintenance of roads by women's groups: Guide for communications bureaus*.

The task manager for the SSTA pilot project was Xiaohong Yang, lead transport specialist, Transport and Communications Division, East Asia Department. Overall guidance and support was provided by Tyrrell Duncan, director, Transport and Communications Division, East Asia Department, concurrently practice leader (Transport).

The contributions of the following people to this guide are acknowledged with gratitude: Serge Cartier van Dissel, international road maintenance specialist, for preparing the main text and structure; Dajiang Sun, national gender development expert, for the Chinese translation of the text; and Kasthamandap Art Studio for the drawings rendered.

The authors are also grateful to the Yunnan Provincial Department of Transport: Yang Yan, deputy director general; Xu Shaoneng, director, Planning Division; Zhan Xiaolin, deputy director, Planning Division; and Xu Caijian, director, International Financial Institution financed Project Office. The Dehong Prefecture Communications Bureau and Dehong Prefecture Traffic Bureau provided valuable guidance and institutional support: Yan Xintong, director; Jin Chu, director of Maintenance Division; and Yi Tiansong, deputy director of Maintenance Division.

# Abbreviations

- ADB – Asian Development Bank  
SSTA – small-scale technical assistance  
YIRNDP – Yunnan Integrated Road Network Development Project

## Currency Unit (as of 1 September 2012)

Currency unit	–	yuan (CNY)
CNY1.00	=	\$0.16
\$1.00	=	CNY6.33



# Routine Maintenance of Rural Roads

According to 2011 road data, there are 214,524 kilometers of roads in Yunnan Province, of which 102,982 kilometers are township roads and 37,100 kilometers are village roads. Of these township and village roads, less than 6% have either concrete or (simple) asphalt pavement; while just over 94% are classified as unpaved, including 3% with stone-paved surfaces (4% of township roads and 1% of village roads), 63% with gravel surfaces (72% of township roads and 37% of village roads), and 28% with earthen surfaces (17% of township roads and 58% of village roads). The unpaved township and village roads have a total length of 131,969 kilometers and comprise 62% of the total road network in Yunnan Province. The maintenance of these unpaved rural roads is, therefore, very important for ensuring continued access to the province's rural areas and for economic development in these areas. Many roads are currently impassable for a number of months each year, in part due to a lack of timely maintenance. This chapter looks at the deterioration process of these unpaved roads and identifies a suitable maintenance strategy to address this deterioration and ensure better road conditions as well as more continuous access.

## Road Deterioration

Roads deteriorate over time, mainly through the forces of water and traffic. In unpaved roads, water is by far the more important of these two. Water can cause damage through erosion, where the flow of water removes material, resulting in rills in the road surface, cuts in the road shoulder, gullies in the drainage system, and undermining of the road structures. However, stagnant water can also cause damage by penetrating the road surface, road base, and slopes; resulting in potholes and muddy areas, slumping and landslides, or collapse of the road. Traffic also causes road deterioration through material loss and road deformation as a result of the forces of the tires, resulting in ruts, potholes, and corrugations. These two main causes of road deterioration aggravate each other, as a road weakened by water

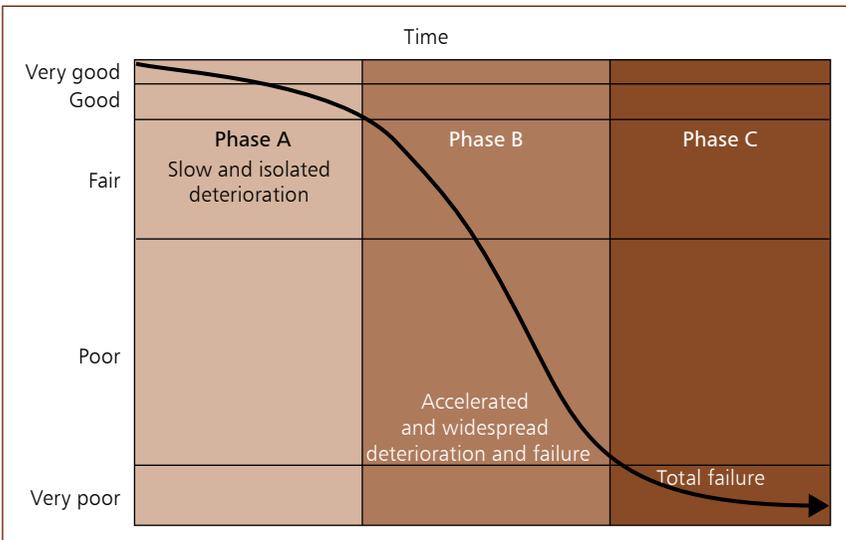
## 2 Performance-Based Routine Maintenance of Rural Roads

is more susceptible to damage by vehicles, and a road surface deformed by vehicles can prevent water from leaving the road, leading to increased erosion and weakening of the road.

Such road deterioration is generally slow at first (Phase A, Figure 1), as road conditions are generally good just after construction or rehabilitation. The road surface is not yet deformed and allows the water to easily flow off the road, while the drainage system is working properly and safely guides the water away from the road. With time, however, isolated damage to the road will start to appear as a result of general wear and tear and minor damage to the road. Deformation of the road surface by traffic appears in the form of potholes and ruts, and the drainage system may become partially blocked, limiting its ability to guide the water away from the road. During this initial deterioration phase, however, the road still appears to be in good condition and the road user tends not to notice the deterioration despite the gradual increase in isolated, minor failures. As a result, the deterioration may remain unchecked in this phase.

As these minor failures become more numerous and serious, the deterioration tends to accelerate (Phase B, Figure 1), mainly due to water flowing over the road or remaining on it. The deformation of the road surface prevents the water from flowing off the road and causes it to flow over the road causing erosion, resulting in rills, and exposing the road base. This is worsened by the blockage of the drainage system, which is no longer able to guide the water safely away from the road, and therefore causes the

Figure 1 Road Deterioration



Source: ADB Consultant.

water to flow over the road. Potholes cause water to remain on the road, weakening the road surface and road base, and making it more susceptible to damage by vehicles. The foundations of road structures, such as headwalls and retaining walls, also become affected, leading to their possible collapse. Although road damage is more localized at the beginning of this phase, it spreads until the entire road can be said to be in poor condition. During this phase, the road becomes more difficult to pass, and travel times and costs tend to increase significantly.

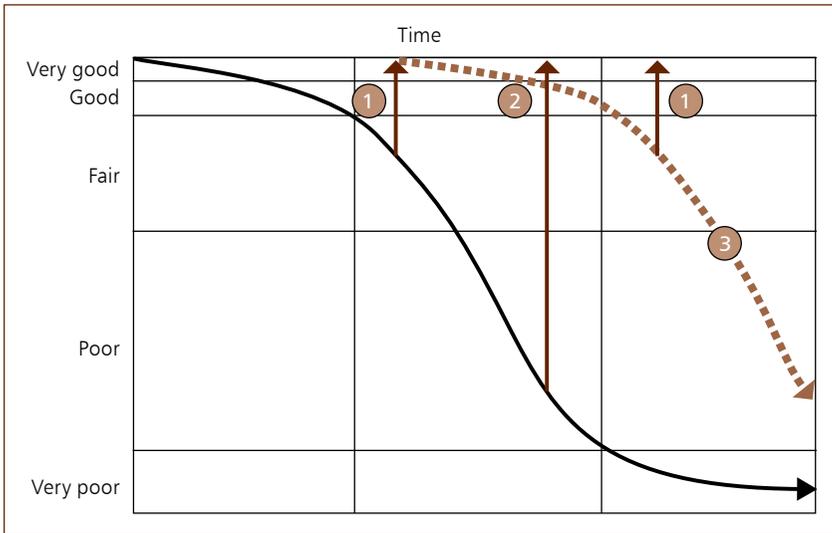
Once the road condition has become very poor, the deterioration tends to decrease in speed, because traffic levels decline severely and there is little road left to deteriorate (Phase C, Figure 1). At the end of this final stage of deterioration, the road becomes impassable and traffic ceases altogether.

## Road Maintenance

To counter the deterioration process, road maintenance is carried out. One type of maintenance is corrective maintenance, which aims to repair the damage that has occurred. Repairs are made to the road surface and shoulder, the drainage system, and the road structures, generally restoring the road to good condition. Improved road condition results in shorter travel times and lower transport costs, and a decrease in the speed of deterioration as the deterioration process starts from scratch. The more deteriorated the road is, the more intensive and thus costly the required repairs will be. While the road is still in fair condition, corrective maintenance may simply entail patching potholes, reforming the road surface, and undertaking minor repairs to the drainage system and road structures (arrow 1, Figure 2). If the road has already deteriorated to a poor condition, corrective maintenance will include complete resurfacing of large stretches of road, replacement or reconstruction of the drainage system and road structures, and possible reconstruction of the road base (arrow 2, Figure 2). Depending on the type of activities required, such maintenance is generally referred to as periodic maintenance (medium maintenance) or rehabilitation (major maintenance).

The distance from the black line, indicating the road condition, to the desired good or very good condition indicates the level of corrective maintenance required, and thus the cost of such maintenance. After restoring a road to good condition, the deterioration process starts anew (arrow 3, Figure 2), hence, corrective maintenance needs to be done repeatedly. Although corrective maintenance, carried out when the road is still in fair condition, will have to be repeated more frequently than when this is only done once the road is already in poor condition, this results in lower overall maintenance costs and better overall road condition.

Figure 2 Corrective Maintenance



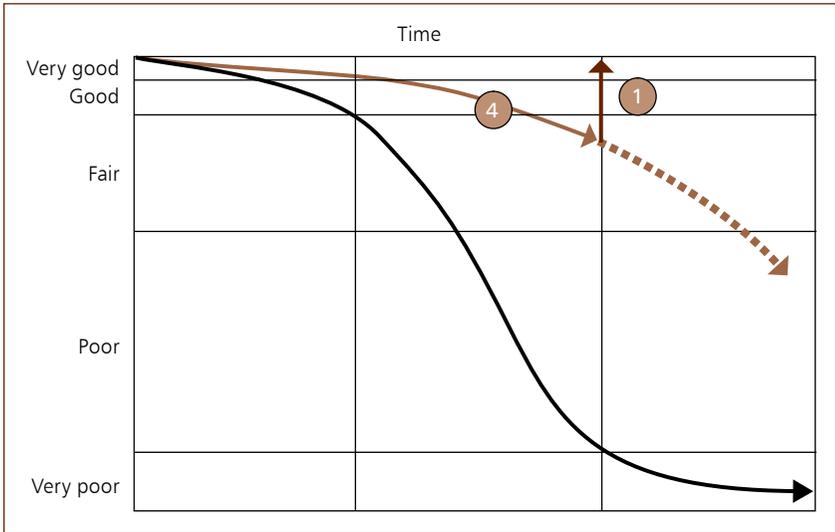
Source: ADB Consultant.

Maintenance can be corrective and undertaken once the road has already deteriorated; but it can also be carried out in a preventive manner to stop or slow down road deterioration. Preventive maintenance is generally carried out continuously throughout the year. This will ensure an effective and timely response to maintenance needs and will avoid (further) road damage. Preventive maintenance is generally referred to as routine maintenance (minor maintenance).

A significant part of preventive maintenance consists of cleaning and clearing of the road elements to ensure they work properly. The drainage system in particular receives special attention to avoid damage to the road by water. Through preventive maintenance, the deterioration process is slowed down considerably in (arrow 4, Figure 3).

Although the deterioration process is slowed down by preventive maintenance, it is not stopped, and corrective maintenance will still be required (arrow 1, Figure 3). However, the need for such corrective maintenance will be less frequent as can be seen by comparing Figures 2 and 3. Such maintenance can be carried out periodically as depicted in the graph, but some corrective activities may also be included as part of the routine maintenance to prevent or slow down deterioration. Such minor repairs not only aim to restore the road to a better condition, but also specifically try to avoid more serious damage by ensuring that the different

Figure 3 Preventive Maintenance



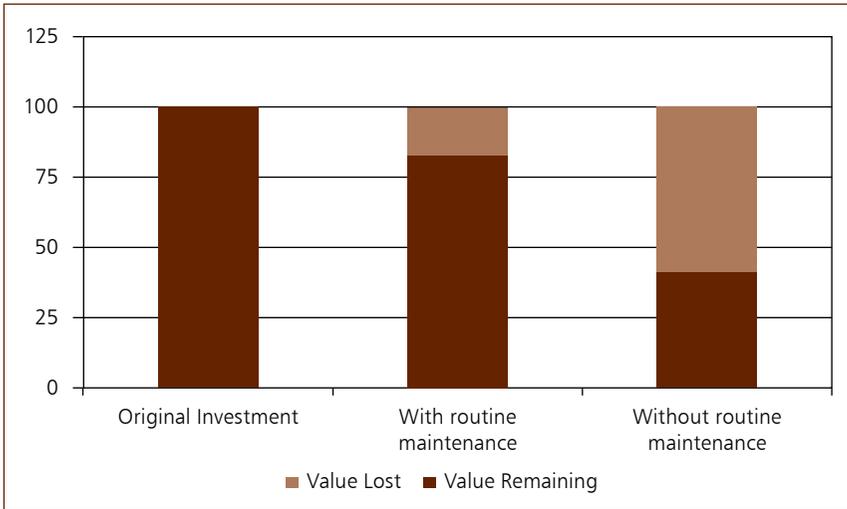
Source: ADB Consultant.

road elements work properly, resulting in reduced overall maintenance costs and better average road conditions.

Examples of minor repairs include patching of potholes and filling of ruts and rills to ensure that water can easily flow off the road, repairs to the drainage system so the water can be guided safely away from the road, and fixing of road structures so they do not collapse. Where possible and required, such repairs are combined with additional basic protection measures to prevent the damage from recurring, especially where damage is caused by water (e.g., the creation of a side drain to guide water away from the road and avoid it flowing over the road). By doing so, the road is restored to a better condition and the deterioration process is further slowed down.

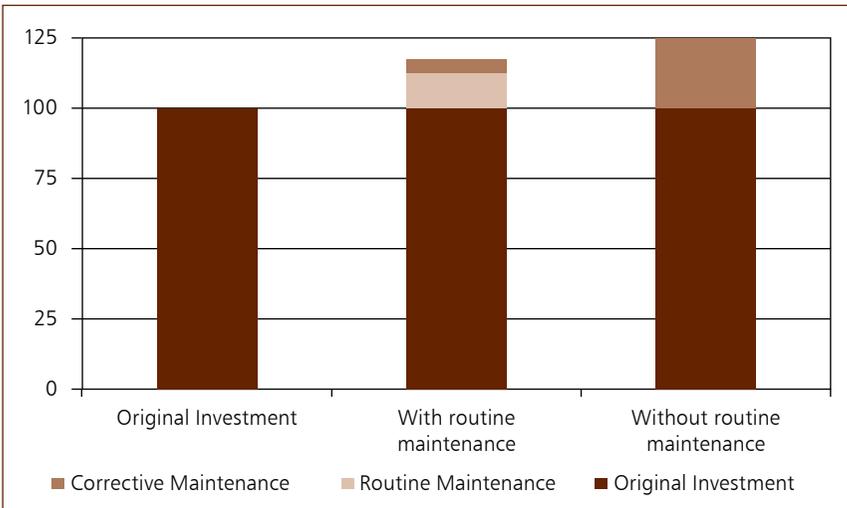
Despite combined efforts, the road's deterioration will at some stage be such that more intensive corrective maintenance will be required. This is especially the case for roads with improved road surfaces, where regravelling or a rehabilitation of stone pavement may be required. Where road structures have collapsed, these may also require more intensive corrective maintenance to restore them to good condition. However, for unpaved roads, routine maintenance—consisting of preventive maintenance, minor repairs, and additional protection measures—will result in a significant decrease in the loss of asset value or investment, and the corrective maintenance required to restore the road to its original condition will be significantly less costly (Figure 4).

Figure 4 Impact of Routine Maintenance on Asset Value (%)



Source: ADB Consultant.

Figure 5 Impact of Routine Maintenance on Overall Conservation Costs (%)



Source: ADB Consultant.

The additional costs of continuous routine maintenance are generally more than compensated by the cost savings resulting from the postponement of more intensive and costly corrective maintenance. As a result, the overall conservation costs tend to be lower, while at the same time ensuring a better average road condition (Figure 5).

## Maintenance Activities

This guide focuses on the routine maintenance of unpaved rural roads, especially the unpaved township and village roads of Yunnan Province that make up 62% of its total road network. Carrying out routine maintenance on a continuous basis prevents needless aggravation of road deterioration. Since protection measures in Yunnan Province's rural roads are often inadequate, this guide includes under the rubric of routine maintenance the creation of additional basic measures to protect the roads, especially from water. The three categories of routine maintenance activities are clearing road elements, repairing road elements, and creating protection measures. It is important to note that in this definition, routine maintenance does not include the removal of large landslides or the reformation or regravelling of extensive stretches of road, which would significantly increase the costs. (In the first ADB pilot project these were included and made up over half the total maintenance costs.)

### Clearing Road Elements

The first type of routine maintenance activity involves clearing road elements to ensure that roads function properly. As the most basic type of routine maintenance, this is included in almost all routine maintenance systems. It includes the following activities:

1. **Clearing landslides.** Any landslides or other obstacles blocking the road surface, road shoulder, or side drains are removed. (Large landslides are treated separately as emergency maintenance.)
2. **Clearing side drains.** Any earth, stones, vegetation, garbage, or other material in side drains are removed, and the drains are restored to their proper shape so water can flow through them easily.
3. **Clearing culverts.** Any earth, stones, vegetation, garbage, or other material inside culverts or at their inlets and outlets are removed so water can flow through them easily.
4. **Clearing bridges.** Any earth, rocks, branches, vegetation, garbage, or other material under or near bridges are removed so water can flow easily underneath them.
5. **Clearing vegetation.** Any vegetation that hinders visibility, traffic, or the flow of water away from the road and through the drainage system, or that is damaging the road elements, is removed.

### Repairing Road Elements

The second type of maintenance activity aims to repair minor road damage that has occurred, restoring the different road elements to good condition. This set of routine maintenance activities seeks to avoid more serious damage and ensures that the different road elements work properly. This type of activity is not always included in routine maintenance systems and is sometimes referred to as recurrent maintenance. For unpaved township and village roads, the following activities are included:

6. **Repairing unpaved roads.** Any ruts, rills, and potholes in the road surface of earthen or gravel roads are repaired by filling in the deformations, ensuring that protection measures are in place to avoid further damage (*see also activities 11, 12, and 13*). Extensive road surface repairs should be treated as periodic maintenance (medium maintenance) or rehabilitation (major maintenance) and carried out before applying routine maintenance.
7. **Repairing stone pavements.** Any loose or missing stones are replaced, and the road shoulder is filled to avoid stones becoming loose again, ensuring that protection measures are in place to avoid further damage (*see also activities 11, 12, and 13*). Extensive road surface repairs should be treated as periodic maintenance (medium maintenance) or rehabilitation (major maintenance) and carried out before applying routine maintenance.
8. **Repairing the road shoulder.** Any cuts or depressions in road shoulders are filled and compacted, ensuring that protection measures are in place to avoid recurrence of the damage (*see also activities 11, 13, 14, and 15*).
9. **Repairing the drainage system.** Any erosion and other damage to side drains, culverts, and bridges is repaired, ensuring that protection measures are in place to avoid further damage.
10. **Repairing retaining walls.** Any loose or missing stones in retaining walls are replaced, using cement or gabion wiring where needed, and weep holes are cleared.

### Creating Protection Measures

The third type of maintenance activity aims to create additional road protection measures where these are insufficient, further protecting the road from damage. Often, this is done in combination with repairs, to ensure that the damage does not happen again. This set of maintenance activities is not commonly included in routine maintenance systems, but experience has

shown that its application is very helpful in unpaved roads with insufficient road protection measures, especially if damage due to water is widespread. By creating basic road protection measures, the deterioration process can be significantly slowed down, resulting in much less need for repairs and overall maintenance.

11. **Creating side drains.** Where water flowing along a road is causing damage to the road surface or shoulder, side drains are constructed to guide the water safely away from the road.
12. **Creating water bars.** Where water is flowing through ruts and rills in a road, water bars are constructed across the road to guide the water away from the road surface as a temporary measure until road surface repairs can be carried out.
13. **Creating paved crossings.** Where water flowing across a road is causing damage to the road surface or shoulder, stone-paved splashes are constructed to protect the road surface from damage.
14. **Creating retaining walls.** Where a slope is very unstable or is severely eroded by water resulting in cuts or landslides, dry-stone retaining walls are constructed to stabilize the slope.
15. **Planting vegetation.** Where a slope is mildly unstable or lightly eroded by water, vegetation is planted to protect the soil.

Together, these 15 routine maintenance activities ensure that road deterioration is decreased, and that the road condition is continuously good to fair. Additional activities may be required in emergencies, for instance when a river is cutting away the road (also known as a “washout”). However, this type of maintenance is treated separately from routine maintenance and tends to be addressed on a case-by-case basis. Although maintenance groups can be involved in emergency maintenance, this type of maintenance tends to also require significant inputs from the communications bureaus.

Despite continued routine maintenance of the road, there will be deterioration beyond the scope of these routine maintenance activities, which will need to be addressed through corrective maintenance at certain intervals. The level of corrective maintenance and the frequency with which it is required will be significantly reduced because of routine maintenance activities, thus reducing overall maintenance costs, while at the same time ensuring better average road conditions.

## Tools, Safety Equipment, and Materials

The 15 maintenance activities described are mostly labor based, requiring very little material input or use of equipment. Generally, only hand tools and safety equipment are required; and for some of the activities, only basic materials are needed. This section looks at the tools, safety equipment, and materials that are required to carry out routine maintenance activities.

### Tools

The basic tools listed below are required for excavation, cutting, transport, spreading, and compaction. These should be provided by the communications bureau and should be of good quality and available in sufficient numbers for the maintenance workers to ensure high productivity. The tools should be regularly sharpened and repaired to ensure continued high productivity.

It is also important that workers use the right tool for the job at hand as the proper use of tools can lead to significant productivity increases. For instance, baskets are useful tools for transporting material over short distances; however, for longer distances, wheelbarrows are more appropriate; and for large quantities over long distances, two-wheeled tractors and trailers or trucks are more efficient. Similarly, a hoe can be very useful for excavation; but for hard, stony materials, a pickaxe may be more efficient and effective; while for very loose materials, a shovel can be more appropriate.

- **Pickaxe**—to loosen hard or stony material
- **Hoe**—to loosen or excavate soft material
- **Shovel**—to excavate and throw soft or loosened material
- **Rake**—to spread out loose material
- **Bush knife**—to cut vegetation
- **Earth rammer**—to compact material in a small area
- **Watering can**—to spread water before soil compaction
- **Basket**—to transport material over a short distance
- **Wheelbarrow**—to transport material over a medium distance
- **Tractor and trailer**—to transport material over a longer distance (alternatively, use can be made of a pickup or a truck, which can be hired)

## Safety Equipment

Safety equipment ensures the safety and health of the maintenance workers and should be used at all times. Safety equipment should be provided by the communications bureau.

- **Safety vests** ensure drivers can clearly see the maintenance workers and so avoid accidents. These should be worn by all maintenance workers at all times.
- **Safety cones** warn drivers that people are working on the road and so avoid accidents. These should be placed at a distance of 100 meters on each side of the working area.
- **Warning signs** are positioned to adequately warn drivers of the ongoing maintenance or dangerous situations and avoid accidents. These should be used during maintenance work that lasts more than 1 day, and should be placed at a distance of 250 meters on each side of the working area.
- **First-aid kits** are used to treat minor injuries incurred during maintenance work and to avoid infection. The kit should contain disinfectant soap, adhesive bandages, sterile gauze, bandages and clamps, scissors, alcohol wipes, antiseptic solution (iodine or similar) and/or cream, tweezers, and painkillers (e.g., paracetamol or ibuprofen). Minor injuries should be washed with soap and water, treated with antiseptic cream, and covered with plasters or bandages. For more serious injuries, a doctor should be consulted.

## Materials

Some of the maintenance activities require materials, especially during repairs and when adding basic road protection measures. These can often be obtained locally, but in some cases they may have to be transported. If transport distances are short, the maintenance workers can use wheelbarrows or hire two-wheeled tractors, trailers, or trucks (in case of hiring transport, the maintenance groups should receive compensation). Where distances are long, however, it is recommended that the communications bureaus are responsible for organizing the transport, leaving stores of the required materials along the road for further distribution by the maintenance workers.

## 12 Performance-Based Routine Maintenance of Rural Roads

The materials required for the routine maintenance of unpaved rural roads include the following:

- **Gravel**—for repairs to roads with a gravel surface. In some cases, this can be obtained locally, but often it will have to be transported to the road.
- **Paving stones**—for repairs to roads with a stone surface. It is recommended to ensure the provision of suitable pre-cut paving stones for easy repairs to stone-paved roads.
- **Stones**—for repairs to retaining walls, the drainage system, and as a base for repairs to road surface and shoulder and for making stone-paved crossings and retaining walls. Generally, these can be obtained locally, although transport will often be necessary.
- **Cement**—for repairs to concrete or cement mortar retaining walls and other road structures. It is recommended that this is provided to the maintenance workers where required.
- **Binding wire**—for repairs to gabion walls. It is recommended that this is provided to the maintenance workers where required.



Photo credit: Serge Cartier van Dissel

Provision of materials by communications bureau



Photo credit: Serge Cartier van Dissel

Xiangguantang group cutting vegetation and clearing culvert



# Maintenance Groups

**T**he routine maintenance activities described in the previous chapter are best carried out on a continuous basis throughout the year. This will ensure that maintenance needs are addressed in a timely manner, decreasing the costs involved and limiting the loss of asset value to the road. This approach also results in minimal road deterioration and improved overall road conditions, leading to lower travel costs and shorter travel times, and resulting in increased access and development of the rural areas.

The maintenance activities listed earlier are labor-based and quite simple in nature, and can be implemented by unskilled labor after receiving some basic training. These aspects of routine maintenance make it very suitable for implementation by members of the communities located along the road, who are able to do maintenance work on a continuous basis and generally have ample experience with agricultural activities that are very similar to the routine maintenance activities.

This chapter focuses on the formation, registration, and training of the community-based maintenance groups that will be responsible for the routine maintenance activities.

## Rationale for Maintenance Groups

Some routine maintenance activities are already being carried out by the community members along the road. However, this is currently done on a voluntary basis, which has a number of drawbacks.

First, due to its voluntary nature, the supply of labor is governed more by its availability than by the need for it. As a result, much of the maintenance work is not carried out on a timely basis due to insufficient labor. Road maintenance is generally carried out only once or twice a year; and for the rest of the year, little or no attention is given to the road, while the deterioration process continues unchallenged.

Second, the voluntary nature of the maintenance work tends to result in the poor and the women carrying out the maintenance activities, with all-women groups being common under such a system. Their degree of motivation is limited and their aim is mainly to restore the road to a passable condition or to provide the minimum contribution required.

Third, the persons providing the voluntary labor contributions generally lack the required skills and tools, resulting in lower quality work.

Although the costs of such a voluntary system to the communications bureau are very low, the benefits in terms of improved road conditions are also very limited.

In many countries, there is therefore a tendency to formalize the implementation of routine road maintenance through contracted and remunerated maintenance workers for a more timely response to maintenance needs. These workers also receive basic training and tools to improve the quality of their work, and they are selected from interested candidates according to predetermined selection criteria to ensure fairness. Apart from ensuring better maintenance, this approach also leads to income and employment generation, which contributes to poverty alleviation and general development of the rural areas. The maintenance workers spend at least 70% of their incomes locally, creating additional indirect employment opportunities.

There have been different experiences with the organization of such maintenance workers, ranging from individual “length workers” to formalized maintenance microenterprises. In the case of length workers, each maintenance worker is responsible for a specific length of road. This system has lost ground, however, due to the high administrative requirements; problems in balancing the workloads between workers; and the lack of effective response to larger, localized maintenance needs. There is now a greater tendency to work with group-based systems, whereby the groups can be formalized to different degrees and managed either individually or associatively. The most significant experience is that of Latin America, where in the majority of the countries a system of associative microenterprises exists in which the workers are co-owners (managers) of the microenterprises. These microenterprises are formally registered as associations, cooperatives, or even limited liability companies.

This guide, however, focuses on less formal, associative maintenance groups. In the People’s Republic of China, and especially the rural areas in Yunnan Province where many ethnic minority groups live, there is little entrepreneurial experience, and the registration and management of enterprises would therefore present a serious difficulty. To avoid this problem, the pilot project adopted the less formal approach of registering the maintenance workers with the communications bureau.

The maintenance groups remain associative, and although the workers' individual skill levels may be low, collectively they generally have the basic skills required to undertake the maintenance activities and manage the group. The use of open-ended maintenance groups was also chosen so that additional maintenance workers can be contracted when needed, spreading the benefits of employment and income generation, and allowing the labor input to vary significantly in different months in response to the maintenance demand.

## Group Size

The size of the maintenance group depends on the length of the road to be maintained and the number kilometers that can be maintained by each person. The number of kilometers that can be maintained by each person depends mainly on the maintenance activities included under the responsibility of the maintenance workers and the characteristics of the road. Unpaved roads, roads in steep terrain, roads with high traffic levels, and roads in areas with high vegetation growth require a higher level of inputs than paved roads, roads in flat terrain, roads with low traffic levels, and roads in areas with low vegetation growth.

Based on the experiences of the ADB-funded pilot projects, it is recommended to base the group size on one person for every 2 kilometers of road. This group size will mean that maintenance group members will need to spend approximately half of their time on road maintenance, allowing them to combine the maintenance work with other household activities and agricultural responsibilities, and spreading the income over a greater number of households. Women in rural areas generally have multiple responsibilities, including caring for the household, the family, livestock, and agricultural land, which prevent them from engaging in full-time employment. Working part-time will therefore greatly facilitate the participation of women who have very few other income-earning opportunities.

With the proposed group size, each group member will be required to work between 80 and 120 days a year. The exact number of days each group member works will depend on the road characteristics (especially the road condition, the topography, and the road surface type). The group is responsible for deciding which days they work and whether they work full days or half days, as long as they ensure that all the required maintenance activities are carried out (in some seasons they will need to work more days than in others). As the ADB pilot projects clearly demonstrated, the part-time nature of the work and the flexibility in the choice of working days and hours makes it very suitable to the participation of women.

In determining the group size, very small groups should be avoided if possible. This can be achieved by including roads close together in one package to be maintained by a single maintenance group. This will facilitate contract administration and will also result in larger groups that tend to perform better. In case of very long roads, it may be necessary to split these up and give the sections to different maintenance groups. This will also avoid the maintenance group having to travel very long distances to cover the entire road.

### Selection of Group Members

Once the required size of the maintenance group has been determined based on the road length to be maintained, the group members are selected from interested candidates. The selection criteria generally include technical requirements (those with the most experience and best skills), as well as social objectives (to provide income and employment for certain underprivileged groups). Based on the experience from the ADB pilot projects, the use of the following selection criteria is recommended:

- **Interest**—Candidates must be actively interested in joining.
- **Age**—Candidates must be between 18 and 55 years old.
- **Residence**—Candidates must live near the road.
- **Gender**—Female candidates are given preference and at least 60% of selected candidates should be female.
- **Ethnic Group**—Candidates from ethnic minority groups are given preference and at least 40% of selected candidates should be from ethnic minority groups.
- **Poverty**—Candidates from poor households (below the poverty line of CNY1,160 per capita) are given preference and at least 50% of selected candidates should be from poor households.
- **Leadership skills**—Candidates with leadership experience are given preference.
- **Other skills**—Candidates with basic reading, writing, and math skills are given preference.

It may be noted that the first three criteria are eligibility criteria that all applicants must comply with; while the remainder are preferential criteria, where preference is given to some candidates by virtue of their gender, ethnicity, economic status, or skills, sometimes with a quota on the final makeup of the group. Although it is recommended to use these

selection criteria, they may be adapted for other areas or merged with other objectives. It is strongly recommended, however, to formalize the selection criteria in order to keep the process transparent.

Information on the employment opportunities should be disseminated as widely as possible before maintenance workers are selected. Mass media such as radio or television, or simple methods such as flyers and posters can be used, and local leaders and organizations need to be informed. It is important to make an effort to inform vulnerable groups—especially women, the poor, and ethnic minority groups—who generally have less access to common means of communication and information. By ensuring that they are informed, their chances of being able to participate in the selection process and of obtaining employment are increased significantly.

Dissemination of information regarding the employment opportunities should include details of the activities to be carried out, expected working hours, remuneration levels, and means of payment. It is important to consider the reality of the target groups, indicating clearly that vulnerable groups are also requested to apply, and that the required experience and skills are within range of most persons (e.g., by stating that experience in agriculture is considered sufficient and that experience in road maintenance is not required).

Also, the working hours or days can influence the participation of certain groups. For instance, women are generally unable to participate in full-time employment due to their numerous other responsibilities, while some ethnic minority groups may prefer not to work on certain days. The participation of such groups can be significantly increased by clearly indicating that part-time and flexible working hours and working days are allowed.

Details on how to apply for the position should be indicated, as well as the date and manner in which the final selection will be made public. An application form indicating all relevant information for each candidate allows the objective selection of the best candidates. However, a simpler system where the interested candidate simply informs a local leader or organization, who may already know them, can be just as effective and can greatly simplify the selection process. In selecting the group members, for instance, the village committee and women's organizations at the village level can be of great help.

## Registration of the Maintenance Group

Once the group members have been selected, the next step is to register the group so it can enter into a contract with the communications bureau. Because of the group's lack of entrepreneurial, legal, and organizational experience, in addition to high costs and other requirements involved in formal registration, it is recommended to simply register the maintenance group with the communications bureau. For this purpose, a simple form can be used (Annex 1), listing the different members and their signatures (or fingerprints), and witnessed by a representative of the communications bureau. It is important to note, however, that informal registration has some drawbacks, such as inability to open a bank account in the name of the group.

The registration form also identifies the leader and the treasurer of the group, who need to be elected by the group members. The group leader will represent the maintenance group and is responsible for its overall management, making sure that the agreed work is completed each month and that the work is distributed to the different workers and subgroups. In addition, the group leader is responsible for filling in a monthly report (Annex 2) recording the days worked by each member and any additional workers and the payments made to them.

The group treasurer is responsible for managing the group's money. He or she keeps track of all the payments to the group and all the expenditure on salaries and other costs using a cashbook (Annex 3). These responsibilities and requirements should be made clear before the election of these individuals. It is preferable that the group leader and the treasurer are able to read and write.

After registration, the next step is to open a bank account to receive the payments for the maintenance work. Given the informal nature of the group, it is generally not possible to open a bank account in the group's name; hence, the account should be opened in the name of individuals, and where possible in the name of both the group leader and the treasurer.

## Training of the Maintenance Group

Before the maintenance group starts work, they need to undergo basic training. This training looks at both the technical aspects on how to properly implement the maintenance activities, and the managerial aspects on how to manage a maintenance group and plan and organize the work. The initial training needs to be followed up by a regular on-the-job training to further improve the workers' skills.

### Technical Training

The technical training consists of a theoretical part and a practical part. The theoretical part explains the causes of road deterioration and the need for road maintenance, while introducing the different maintenance activities and explaining the role they play in slowing down or even halting the different types of deterioration. A better understanding of the deterioration process and the purpose of the road maintenance activities will enable the maintenance group members to better respond to the different needs in a timely manner. This theoretical training is done in a classroom context using a PowerPoint presentation showing pictures and videos of the different road elements, the types of deterioration, and the different maintenance activities. Theoretical training takes half a day and aims to promote a discussion between the group members by asking questions regarding deterioration and maintenance based on pictures.

The objective of the practical training is to enable the group members to practice implementing the different maintenance activities. This is done along the road, preferably the stretch assigned to the maintenance group. It is recommended that trainers should identify beforehand suitable sites along the road where the different maintenance activities can be practiced. It is preferable to choose a site with visible deterioration that needs to be repaired. It is important to have sufficient tools for the different activities so all group members can have hands-on practice without waiting too long. (It is, however, not necessary to have a full complement of tools.) For each activity, the different tasks involved must be explained, and the proper use of the tools and safety equipment should be demonstrated. Ideally, this practical training will take one full day, but it can be compressed into half a day if necessary. The training should be carried out shortly before the start of the maintenance contract.

### Managerial Training

The managerial training focuses on how to plan for and organize the work, and how to manage the maintenance group. It first looks at the planning of activities based on regular surveys of the road, determining what needs

## 22 Performance-Based Routine Maintenance of Rural Roads

to be done each week and preparing a weekly work plan to be carried out. It also emphasizes the importance of the monthly report for recording the number of days worked by the different group members and by any additional workers. The data from the monthly report does not have any effect on the monthly payments, but only serves to monitor whether the monthly payments are adequate or not. The monthly inspection form is also introduced, explaining how the road conditions are compared to the performance indicators during the inspection, how any deficiencies that exceed the allowances are recorded, and how the payment deductions are calculated. This training portion also includes lessons on the management of the group, explaining the roles of the group leader and treasurer, and providing training in the recording of workdays and wage payments in the monthly report and of income and expenditure data in the cashbook. More information on these managerial aspects can be found in the next chapter and in the *Manual for Maintenance Groups*.

### On-the-Job Training

Although the initial training provided at the beginning of the contract will equip the maintenance group with the basic skills required to undertake the maintenance activities and to manage the work and the maintenance group, on-the-job training is highly recommended to encourage continuous improvement in the team's skills and to correct beginners' errors. This can be done during the monthly visits when the inspection is carried out, although initially it would be beneficial to arrange for more frequent visits.

On-the-job training focuses on the efficient and effective execution of the maintenance activities, ensuring that the productivity of the maintenance team is sufficient and that the quality of the work is acceptable. The central issues to be addressed are the use of appropriate tools, the proper use of these tools, the efficient organization of the maintenance workers, the monitoring of work progress, and the use of the performance indicators. The weekly planning of activities will also require specific attention, as this has proved to be a weak area for new maintenance groups. Special attention should be given to discussing the proposed activities to be carried out each month or even each week, training the maintenance group to decide which activities are required and how to prioritize them.

Attention should also be given to monitoring the proper use of the monthly report for recording the workdays and wage payments and of the cashbook for recording the incomes and expenditures of the maintenance group. Additional training should be provided where required. Although these are internal matters to the maintenance group, their proper implementation will ensure the group's continued existence, prevent internal conflicts, and lead to higher levels of efficiency and effectiveness.

# Performance-Based Maintenance

This chapter looks at the contracting arrangements involved in the performance-based routine maintenance of rural roads by maintenance groups. It starts by looking at the core aspect of this maintenance system: performance-based contracting and the performance indicators. It then goes on to discuss the regular inspections to check if the work is being carried out properly, and the payments to the maintenance groups. The final section looks at the financing of the maintenance groups and the contract document.

## Performance-Based Contracting

Routine maintenance of rural roads by maintenance groups involves a large number of small contracts. This number is already much reduced by the practice of having contracts cover groups of workers instead of individual length workers, and it can be further reduced by packaging shorter roads that are close together and contracting out their maintenance to one group of workers. However, there are still many small contracts to administer and manage, and this requires a lot of resources for supervision and inspections.

The solution is to apply performance-based contracting, where payments are based on the performance of the maintenance group (i.e., the resulting condition of the road) rather than on the number of days the workers spend on the job (the input) or the volume of work they carry out (the output). The use of performance-based contracts greatly simplifies the supervision and inspections, with monthly inspections only looking at the resulting road conditions, without the need to measure the volume of work completed or to monitor the number of days worked and the related productivity of the workers. It is also no longer necessary for the communications bureaus to prepare work plans, as the planning of activities becomes the responsibility of the maintenance groups.

The planning and budgeting process is also made easier because the budget is based on fixed payments per kilometer per year (with the exact size of these payments depending on the specific characteristics of the road). The monthly payment procedures are also easier, as the monthly payments are in fixed amounts that only vary when deductions are made if the performance of the maintenance group is found to be poor.

The application of a performance-based system can thus greatly simplify the communications bureau's task of managing a large number of contracts. This was demonstrated in the performance-based ADB small-scale technical assistance pilot project, where the resources required for supervision and inspection were found to be one-third of those required in the preceding Gender and Development Cooperation Fund pilot project, which was output-based.

Performance-based contracting is also very logical for road maintenance. To keep a road in good condition, it makes sense to have the payment to the maintenance workers depend on the outcome (good road condition) rather than on the required input or output. This system has been seen to result in more efficient and effective work by those responsible for doing the maintenance—be they maintenance groups or larger contractors—because they can plan their activities more efficiently in an effort to minimize their inputs and thus their costs.

## Performance Indicators

The condition of the road is evaluated using performance indicators. These specify the allowable defects for each road element. If the defects to the different road elements are less than stated in the performance indicators, then the road is considered to be in good condition. If the defects to certain road elements are more than stated in the performance indicators, then the road is not considered to be in good condition and a deduction is made from the monthly payment.

The performance indicators should be simple and easily measurable in order to facilitate the inspection process and allow maintenance groups to monitor their compliance with the performance indicators. They should focus mainly on connectivity and accessibility to ensure that the road is open and passable all year round. The recommended performance indicators are as follows:

1. **Road surface.** In gravel or earthen surfaces there are no potholes larger than 30 centimeters and no ruts or rills deeper than 5 centimeters, and water does not flow over or remain on the road. Repairs to gravel

surfaces have been made using suitable gravel material. In stone-paved surfaces there are no loose stones, and newly formed holes are filled with new or recovered stones.

2. **Road shoulder.** There are no depressions or cuts larger than 30 centimeters in diameter, the road shoulder is not more than 3 centimeters below the road surface (stone-paved roads) and there are no banks on the road shoulder.
3. **Side drains.** Less than one-quarter of the cross section at any point in the side drain is blocked, the side drain is at least 20 centimeters below the road surface, water can flow freely through the side drain, and there is no scouring of the side drain.
4. **Culverts.** Less than one-quarter of the culvert height at any point in the culvert is blocked, the inlet and outlet are clear, water can flow freely through the culvert, and there is no erosion at the inlet or outlet.
5. **Bridges.** Less than one-tenth of the cross section of the bridge is blocked, the areas 5 meters on either side of the bridge are clear of obstructions, water can flow freely under the bridge, and there is no erosion of the bridge structure.
6. **Vegetation.** Vegetation within 1 meter of the road is less than 30 centimeters high (except trees), vegetation protruding over the road is at least 2.50 meters above the road surface, and the flow of water away from the road is not restricted. Vegetation on slopes is not removed, only cut short.
7. **Landslides.** There are no small landslides (less than 3 cubic meters) or other obstacles on the road surface, road shoulder, or side drains. In the case of large landslides (more than 3 cubic meters), these have been reported to the communications bureau. Vehicles are able to pass at all times and water does not flow over the road surface.
8. **Retaining walls.** There are no loose stones in the retaining walls, and weed holes are clear.

## Monthly Inspection

At the end of each month, the road condition is inspected by the communications bureau and compared to the performance indicators. Any defects that exceed the allowances defined by the performance indicators are noted on an inspection form (Annex 4). This is done for each of the performance indicators, and separately for each 1-kilometer section of road. If any 1-kilometer section does not comply with one or more of the performance indicators, the relevant box(es) are checked on the inspection form.

The inspection is conducted by driving along the road and stopping to measure the defects that are considered to exceed the allowances defined in the performance indicators. If the defects are judged to be within the allowances, there is no need to stop and measure them. This approach allows the inspections to be carried out in a relatively short time.

The number of person-days spent by the group members and any additional workers in implementing the maintenance activities is also recorded on the inspection form. This allows the total person-days for each group to be monitored and compared to the payments, ensuring that payments are not too high or too low.

### Payment Deductions

After the inspection of the whole road has been completed, the length of the different road sections found to be noncompliant with the performance indicators is added up for each performance indicator. For these noncompliant road sections, a deduction is applied to the monthly payment.

The deduction is calculated by multiplying the length of noncompliant road for each performance indicator (C) by the deduction percentage for that indicator (D), and multiplying the result by the total monthly payment per kilometer (B). Once this has been done for each of the performance indicators, the different deductions for each indicator (E) are added up in order to calculate the total deduction for that month (F). Lastly, this total deduction is subtracted from the total monthly payment (equal to the monthly payment per kilometer (B) multiplied by the total length of the road (A)), in order to calculate the approved payment for that month (see Annex 4).

## Maintenance Planning and Organization

Under performance-based contracting, the planning of the maintenance activities is the responsibility of the maintenance groups, reducing the burden for the communications bureaus. The maintenance groups will require training in the weekly or monthly planning and organization of maintenance activities, and they will need additional assistance during the first couple of months. This can be done during the inspections, by providing some time to assess the activities carried out in the previous month and those to be carried out in the next month. The ADB performance-based pilot project showed that the maintenance groups are capable of doing this on their own after a couple of months.

Table 1 shows when the different maintenance activities should be given priority. Different maintenance activities are carried out in different seasons, with a focus on drainage systems just before and during the rainy season, and on the other repairs at the end of the rainy season and during the dry season.

As long as the maintenance groups ensure that they complete the maintenance activities required to comply with the performance indicators, they are free to decide how many days, which days, and what hours to work. The fact that the work is part-time with flexible working hours—allowing work to be done early in the morning or late in the afternoon, or even on alternate days—will enable the maintenance workers to combine the work with their other responsibilities. In the ADB pilot project, this was mentioned by the women to be an important aspect facilitating their participation.

Table 1 Seasonal Priority of Activities

Activity	Month	Seasonal Priority of Activities											
		J	F	M	A	M	J	J	A	S	O	N	D
1. Clearing landslides						High Priority							
2. Clearing side drains		Low Priority	Low Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority
3. Clearing culverts		Low Priority	Low Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority
4. Clearing bridges		Low Priority	Low Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority
5. Clearing vegetation		Low Priority	Low Priority	High Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority	Low Priority	High Priority	High Priority	Low Priority
6. Repairing unpaved roads		High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	High Priority	High Priority	High Priority
7. Repairing stone pavement		High Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority
8. Repairing the road shoulder		High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	High Priority	High Priority	High Priority
9. Repairing the drainage system		Low Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority
10. Repairing retaining walls		High Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	High Priority
11. Creating side drains		High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority
12. Creating water bars		Low Priority	Low Priority	Low Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority
13. Creating paved crossings		High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority
14. Creating retaining walls		High Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority	Low Priority
15. Planting vegetation		Low Priority	Low Priority	Low Priority	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority	Low Priority	Low Priority	Low Priority

High Priority
  Low Priority
  Rainy Season
  Dry Season

Source: ADB Consultant.

## Payments

Under a performance-based system, a fixed monthly payment is agreed between the communications bureau and the maintenance group. In exchange for this payment, the maintenance group has to ensure that the road is in the agreed condition at all times, in accordance with the performance indicators.

### Monthly Payments

The level of the monthly payment should be sufficient to cover the inputs of the maintenance group to carry out the required maintenance activities for an average month (actual required inputs will be higher in some months and lower in others). In the ADB pilot projects, an average input of 50 person-days per kilometer per year was used, and this input was remunerated at a daily wage rate of CNY40. The resulting monthly payment was therefore CNY2,000 per kilometer per year.

The ADB pilot projects also determined that the number of person-days required per kilometer per year depended on the specific characteristics of the road. The most influential characteristics are the road surface type, the initial road condition, and the topography. Steep earthen roads that are in poor condition require significantly more inputs than flat stone-paved roads that are in good condition, and the monthly payment should therefore be adjusted accordingly. Based on the results of the ADB performance-based pilot project, it is recommended to use the scoring system in Table 2 to determine a suitable monthly payment for a specific road.

**Table 2 Road Scoring for Determining Monthly Payments**

Characteristic	Type	Points
Surface type	Stone-paved	1
	Gravel	2
	Earthen	2
Topography	Flat	1
	Moderate	1
	Steep	3
Initial condition	Good	1
	Fair	2
	Poor	3

Source: ADB Consultant.

Two road categories were distinguished in the pilot project roads based on the number of person-days required. Using these input levels, adjusted monthly payments were recommended for each category (Table 3).

**Table 3 Road Categories and Related Monthly Payments**

Category	Points	Average Person-Days/km	Suggested Person-Days/km	Adjusted Payment (CNY/km/year)	Adjusted Payment (CNY/km/month)
I	≤5	44.7	45	1,800	150
II	>5	49.1	50	2,100	175

≤ = less than or equal to, > = more than, km = kilometer.

Source: ADB Consultant.

This categorization was based on workday data for a limited number of roads over a limited period of time, and it is therefore recommended to adjust the categories and scoring system where necessary as more data becomes available. The number of categories may also need to be increased, but no more than three categories should be used.

During implementation, the number of person-days worked by the maintenance group (as reported in the inspection form) should be compared to the total monthly payment (not taking into account deductions), to determine whether the payment is in line with the required inputs. Actual average daily wages should not be significantly higher or lower than the recommended rate of CNY40 per day. It is important to carry out this comparison over an extended period of time (preferably 1 year) to avoid distortion due to the fact that the required inputs are lower in some months and higher in others.

Where the deviation from the recommended wage rate is significant, adjustment of the monthly payment should be considered. This analysis should be done at the end of the first contract year and at the end of each subsequent contract year (as road conditions and required inputs change). For the first year, it is recommended to apply the payment rates given in Table 3.

As a result of the inspection, deductions may be applied to the monthly payment. Once the inspection form has been signed and the final monthly payment has been approved, the payment can be transferred to the maintenance group's bank account or paid directly through a check. The experience of the ADB pilot projects has shown that these payments are generally very quick and the maintenance workers do not experience delays in receiving their monthly payments.

## Maintenance Costs

In addition to the monthly payments, the communications bureau is responsible for providing the maintenance groups with tools and safety equipment at an average cost of CNY150 per kilometer per year. The communications bureau is also responsible for obtaining accident insurance for the maintenance workers at an average cost of CNY75 per kilometer per year (assuming 1 person for every 2 kilometers). In addition, the costs of transporting materials to the roadside are borne by the communications bureau. In the ADB pilot project, CNY200–CNY300 per kilometer per year was spent on average for transporting these materials. The amount required by other road maintenance projects will depend on the type of road surface and the availability of suitable materials nearby.

The resulting average total costs of performance-based routine maintenance of rural roads by maintenance groups are listed in Table 4. It is again recommended to adjust these total costs based on the adjustment of the monthly payments according to the analysis of the workday data.

**Table 4 Estimated Average Total Costs of Performance-Based Maintenance (CNY per kilometer)**

Category	I	II
Monthly payments	1,800	2,100
Tools and safety equipment	150	150
Accident insurance	75	75
Transport of materials	225	225
<b>Total</b>	<b>2,250</b>	<b>2,550</b>

Source: ADB Consultant.

## Maintenance Funding

Funding for rural road maintenance comes from the provincial maintenance subsidy and allocations from prefecture, county, township, and village governments. The provincial subsidy is a fixed allocation from the fuel tax of CNY7,000 per kilometer per year for county roads, CNY3,500 per kilometer per year for township roads and CNY1,000 per kilometer per year for village roads. As a result of the ADB pilot projects, the percentage of this subsidy that may be used for routine maintenance has been increased from 20% to 50% in the case of county and township roads, and to 100% in the case of village roads. The remainder of the provincial subsidy is to be used for medium and major maintenance.

## 32 Performance-Based Routine Maintenance of Rural Roads

In order to receive the provincial subsidy, local authorities have to ensure an allocation from local funding sources equal to 40% of the provincial subsidy (this percentage is higher for richer counties and lower for poorer counties). This allocation is to be used for routine and emergency maintenance.

Under the ADB performance based pilot project, a regulation was developed regarding the implementation of routine maintenance of rural roads by maintenance groups, which sets minimum allocations to routine maintenance from the total of provincial subsidy and local funding (Annex 5). For county roads the minimum allocation is CNY3,500 per kilometer per year, for township roads it is CNY2,000 per kilometer per year and for village roads it is CNY1,000 per kilometer per year. These amounts are slightly lower than the foreseen costs for township and especially village roads; but through a more equal distribution of funds between the different road types, it is likely that the expected costs can be covered.

### Maintenance Contract

The contracting arrangements explained in the previous sections are reflected in the contract document that is signed between the communications bureau and the maintenance group. A sample road maintenance agreement is in Annex 6.

The maintenance agreement defines the road section to be maintained and the duration of the contract. It also specifies the performance indicators that need to be complied with; the monthly payments to be received by the maintenance group, as well as the arrangements for tools and safety equipment, accident insurance, and transport of materials; the monthly inspections and deductions to be applied in case of poor performance; and termination procedures and other matters.

# Annex 1: Registration Form

## Registration of Road Maintenance Group

This is the form used to register a road maintenance group. It serves to identify the members of the maintenance group and its representatives (leader and treasurer). It must be signed by all members of the maintenance group and witnessed by the communications bureau.

Name of maintenance group:

Name of district or county:

Name	Signature
1. ....(Leader)	.....
2. .... (Treasurer)	.....
3. ....	.....
4. ....	.....
5. ....	.....
6. ....	.....
7. ....	.....
8. ....	.....
9. ....	.....
10. ....	.....
11. ....	.....
12. ....	.....
13. ....	.....
14. ....	.....
15. ....	.....
16. ....	.....
17. ....	.....
18. ....	.....
19. ....	.....
20. ....	.....

Communications Bureau

Maintenance Group

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:





# Annex 4: Inspection Form

Inspection Form General information																			
Road name and length (A)	Guangxi road – 11.50 km				Monthly payment per km (B)	CNY175/km													
Inspection period (month)	June				Date of inspection	31 June 2012													
Name of inspector	Zhou Wen				Group leader's name	Li Ying													
Inspection Results (mark if deficient)																			
Kilometer segment	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Total km deficient (C)	Deduction rate (D)	Deduction (E = B x C x D)	Problems to be corrected
Segment length				0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Road surface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.20		The deduction is calculated here based on the deficiencies found.				
Road shoulder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.50	0.15	39.40					
Side drains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.15						
Culverts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.15						
Bridges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.15						
Vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.10	17.50					
Landslides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.00	0.15	52.50					
Retaining walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.10						
Conclusion																			
Deduction (F = Sum of E)	CNY109.40				The total deduction and resulting payment are mentioned here.														
Approved monthly payment (A x B - F)	CNY1,903.10																		
Total person-days spent	Group members: 45				The number of person-days worked is written here.														
Signature inspector	Zhou Wen																		
Signature group leader	Li Ying																		
Additional workers: 0																			

Source: ADB Consultant.

## Annex 5: Regulation

### Regulation for the Implementation of the Rural Road Maintenance Component of the Yunnan Integrated Road Network Development Project

Circulated on 29 September 2012

*Article 1* This regulation aims to provide guidance on the further reform of rural road maintenance management in the implementation of the Yunnan Integrated Road Network Development Project (YIRNDP), specifically regarding funding and implementation procedures for minor maintenance of rural roads. It builds upon the regulation issued by the State Council regarding the Rural Road Maintenance Management Reform Program (国办发2005 - 49号); the subsequent circular issued by the Ministry of Communication, National Development and Reform Council, and the Ministry of Finance regarding the further improvement of rural road maintenance management (交公路发2006 - 400号); the notice issued by the Yunnan Provincial People's Government regarding the Rural Road Conservation Management Reform Program (云政办发2007 - 172号); the regulation issued by the Yunnan Provincial Department of Transport regarding road maintenance in rural areas in Yunnan Province; and other relevant laws and regulations. It also builds upon two Asian Development Bank pilot projects carried out in Dehong Prefecture in the preparation of the rural road maintenance component of the YIRNDP.

*Article 2* This regulation focuses on the implementation of minor maintenance of unpaved roads (stone-paved, gravel, or earthen) by community-based maintenance groups. It serves to define the implementation procedures for the rural road maintenance component of the YIRNDP. It will also serve as the basis for a future province-wide regulation regarding minor maintenance of rural roads in Yunnan Province to be prepared before the completion of the rural road maintenance component of the YIRNDP.

*Article 3* To ensure that rural roads are in good condition, safe, and smooth, and to provide better services for economic and social development, proper maintenance of rural roads is required. This regulation focuses on routine maintenance, which forms an important part of proper maintenance (other maintenance types not covered under this regulation include medium, major, and emergency maintenance).

*Article 4* Routine maintenance includes maintenance activities aimed at reducing damage to the road as well as small repairs aimed at keeping the road in good condition and reducing the need for more costly medium and major maintenance. It also includes limited emergency maintenance

aimed at keeping the road open and ensuring access to rural villages (mainly removal of small landslides and repair of small washouts). Proper routine maintenance will result in better road conditions and reduce costs of medium and major maintenance, ultimately reducing overall maintenance costs and transport costs and increasing accessibility throughout the year.

*Article 5* In line with the government policy of separation of responsibility for management and for implementation, the promotion of market-based road maintenance, and creating employment and incomes for people in rural areas, the implementation of minor maintenance of rural roads in the YIRNDP will be contracted out to local people living near the roads to be maintained. These local people will not be contracted on an individual or household basis, but will be organized into maintenance groups and a contract will be signed with the maintenance group.

*Article 6* The members of these maintenance groups will be selected by the village committee together with the county communications bureau, from among the local people who are interested in carrying out road maintenance work. Priority will be given to women, ethnic minorities, people from poor households, and other underprivileged groups. Detailed procedures on the formation of a maintenance group and the selection of its members are provided in the *Guide for Communications Bureaus on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups*.

*Article 7* These maintenance groups will be provided with basic training regarding the programming and implementation of the maintenance activities as well as continuous on-the-job support to improve their performance. They will receive a set of tools and safety equipment as well as accident insurance. For training purposes and during implementation, use will be made of the *Manual for Maintenance Groups on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups*.

*Article 8* The maintenance groups will be contracted on a part-time basis and will be jointly responsible for carrying out the minor maintenance for a specific section of road. The payment will be based on performance and the maintenance groups will be required to keep the road in good condition as defined by specific performance indicators that identify the allowable defects to the different parts of the road. These performance indicators are defined in the *Manual for Maintenance Groups on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups* and are also included in the contract to be signed with the maintenance group.

*Article 9* The number of people to be selected for the maintenance group, the number of days they work, and the amount of the monthly payment will depend on the specific characteristics of each road, especially the topography, the road surface type, and the road condition. More details are provided in the *Guide for Communications Bureaus on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups*.

*Article 10* The maintenance groups will be responsible for all minor maintenance activities in the unpaved roads under their contract, including but not limited to repairs to the road surface and shoulder, maintenance of the drainage system, clearing of landslides, vegetation control, and the creation of basic road protection measures such as side drains and retaining walls. A detailed description of the different maintenance activities under the responsibility of the maintenance groups is provided in the *Manual for Maintenance Groups on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups*.

*Article 11* In line with government policy to establish proper mechanisms for the monitoring and evaluation of rural road maintenance, the responsible local government institutions will arrange for monthly inspections of the minor maintenance work.

*Article 12* These inspections will look at the condition of the different parts of the road and compare any identified defects to the allowances for these defects as defined by the performance indicators included in the contract. Where the road conditions are found to be in order, the full monthly payment will be made to the maintenance group. Where road conditions are found to be below the required level with defects exceeding the allowances as defined by the performance indicators, a deduction will be applied to the monthly payment. The allowable defects and the applicable deductions in case of exceeding these defects are defined in the *Guide for Communications Bureaus on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups*.

*Article 13* An inspection report will be filled in each month identifying the road condition and any defects resulting in deductions to the payment. Immediately after the inspection, the payment as approved in the inspection report will be made in to the bank account opened by the maintenance group for this purpose. The inspection report will also mention the number of person-days worked by the maintenance group members for monitoring purposes. For the inspections, use will be made of the *Guide for Communications Bureaus on Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups*.

*Article 14* At county level, a database will record the workdays spent and payments made each month for each rural road, allowing monitoring of inputs and expenditure. The monthly inspections will be complemented by the normal inspection of road conditions according to the regulation on road maintenance in rural areas in Yunnan Province and the defined timing and standards. These complementary inspections will serve to confirm the monthly inspections and provide more details on existing road conditions.

*Article 15* In line with the government policy to establish sustainable funding mechanisms for rural road maintenance, the rural road maintenance component of the YIRNDP will make use of provincial subsidies for rural road maintenance from the fuel tax complemented by allocations to rural road maintenance from local (prefecture, county, township, and village) resources.

*Article 16* The provincial subsidy for all rural road maintenance from the fuel tax will be at least CNY7,000 per kilometer for county roads, CNY3,500 per kilometer for township roads, and CNY1,000 per kilometer for village roads. This subsidy must be fully used for rural road maintenance and may not be used for other purposes. Of this subsidy, only 50% may be used for minor maintenance and emergency maintenance in the case of county roads, 50% in the case of township roads and 100% in the case of village roads. In the case of poor counties, higher percentages may be defined by the Yunnan Provincial Department of Transport. The remaining provincial subsidy will be used for medium and major maintenance and in exceptional cases to complement the funding required for emergency maintenance.

*Article 17* The funding allocation to rural road maintenance from local government budgets will be according to annual targets to be set by the Yunnan Provincial Department of Transport. These funding targets will be defined as a specific percentage of the provincial subsidy for rural road maintenance, and will need to be met in order to become eligible to receive the provincial subsidy. For 2013, local governments will be required to provide an average of 40% of the provincial subsidy for rural road maintenance from their own budget. For poor counties a lower percentage may be defined by the Yunnan Provincial Department of Transport, while for richer counties the percentage may be increased. The local funding allocation to rural road maintenance will be fully used for minor maintenance and emergency maintenance. Only in the case of remaining funds may these be used for medium and major maintenance.

*Article 18* The combined allocation from the provincial subsidy and from local government budgets to minor maintenance of rural roads will be at least CNY3,500 per kilometer for county roads, CNY2,000 per kilometer for township roads and CNY1,000 per kilometer for village roads. These are minimum allocations for minor maintenance, and richer counties are expected to allocate more funds. For unpaved roads these allocations to minor maintenance will be used specifically for the contracting of maintenance groups as described in this regulation. For minor maintenance of paved rural roads, other contracting modalities will be applied in light of the necessary skills, equipment and materials required for pavement repairs.

*Article 19* This regulation comes into effect starting 1 October 2012.

## Annex 6: Maintenance Agreement

### Road Maintenance Agreement

This is an agreement between the communications bureau of .....  
 .....(Name of county or district), represented by .....  
 .....(Name of representative, position held by representative)  
 with identity document .....(Number of identity  
 document), hereinafter referred to as the **Communications Bureau**; and the road  
 maintenance group, .....(Name of maintenance group),  
 represented by .....(Name of representative, position  
 held by representative) with identity document .....  
 (Number of identity document), hereinafter referred to as the **Maintenance Group**.

Under this agreement, the Maintenance Group is contracted by the  
**Communications Bureau** to carry out the routine maintenance of the road segment  
 from ..... (Start of road segment) to  
 ..... (End of road segment), with a total length  
 of ..... (Length in kilometers).

#### Clause 1 Terms of Agreement

- 1.1 The term of the agreement is from ..... (Start date) to  
 ..... (End date).
- 1.2 When the agreement expires, if the two parties agree, the agreement can  
 be extended.

#### Clause 2 Scope of Work

- 2.1 The **Maintenance Group** will ensure that the condition of the different road  
 elements complies with the performance indicators as described in Table 1 for  
 the entire road segment under their responsibility, unless otherwise indicated  
 by the **Communications Bureau**.
- 2.2 The **Maintenance Group** will be responsible for deciding which maintenance  
 activities to carry out and where and when to do so.
- 2.3 The **Maintenance Group** will record the person-days worked by the group  
 members and any additional workers in the Monthly Report and provide this  
 data to the **Communications Bureau** at the moment of the inspection.
- 2.4 The **Communications Bureau** will organize technical and managerial training  
 for the **Maintenance Group** according to the requirements of the road  
 maintenance work.

**Clause 3 Compensation**

- 3.1 The planned monthly compensation for the **Maintenance Group** will be ..... (*Monthly Payment amount*) for each kilometer of road maintained.
- 3.2 Any transport of materials to the road from further away will be carried out by the **Communications Bureau**.
- 3.3 Upon signing the contract, tools and safety equipment will be provided to the **Maintenance Group** by the **Communications Bureau**.
- 3.4 The **Communications Bureau** will obtain accident insurance for all members of the **Maintenance Group**.

**Clause 4 Work Discipline and Penalties**

- 4.1 The **Communications Bureau** will inspect the road segment each month and assess the condition of the road elements according to the performance indicators in Table 1.
- 4.2 If the work carried out by the **Maintenance Group** in a specific kilometer section does not comply with the performance indicators as stipulated in Clause 2, a deduction will be made from the monthly compensation for that kilometer section in line with the deduction rates in Table 2. Each kilometer section will be inspected separately and the relevant deductions will only apply to the compensation for the kilometer section concerned.
- 4.3 The **Maintenance Group** should follow the relevant safety regulations while working on the road.

**Clause 5 Agreement Variation, Termination, and Repeal**

- 5.1 Both parties should perform the obligations of the agreement. Neither party can vary the agreement by itself.
- 5.2 When the agreement expires, or the promissory termination condition appears, the agreement will terminate.
- 5.3 If the **Communications Bureau** ceases to exist, the agreement will be terminated.
- 5.4 The agreement will be terminated when the two parties agree on the termination.
- 5.5 The **Communications Bureau** may terminate the agreement under the following conditions:
  - i The **Maintenance Group** repeatedly disobeys the **Communications Bureau's** regulations and guidance.
  - ii The quality of the road maintenance is assessed to be below standard in three monthly inspections during the contract period.

Table 1 Performance Indicators

1. <b>Road surface.</b> In gravel or earthen surfaces there are no potholes larger than 30 centimeters (cm) and no ruts or rills deeper than 5 cm, and water does not flow over or remain on the road. Repairs to gravel surfaces have been made using suitable gravel material. In stone-paved surfaces there are no loose stones, and newly formed holes are filled with new or recovered stones.
2. <b>Road shoulder.</b> There are no depressions or cuts larger than 30 cm in diameter, the road shoulder is not more than 3 cm below the road surface (stone-paved roads) and there are no banks on the road shoulder.
3. <b>Side drains.</b> Less than one-quarter of the cross section at any point in the side drain is blocked, the side drain is at least 20 cm below the road surface, water can flow freely through the side drain, and there is no scouring of the side drain.
4. <b>Culverts.</b> Less than one-quarter of the culvert height at any point in the culvert is blocked, the inlet and outlet are clear, water can flow freely through the culvert, and there is no erosion at the inlet or outlet.
5. <b>Bridges.</b> Less than one-tenth of the cross section of the bridge is blocked, the areas 5 meters (m) on either side of the bridge are clear of obstructions, water can flow freely under the bridge, and there is no erosion of the bridge structure.
6. <b>Vegetation.</b> Vegetation within 1 m of the road is less than 30 cm high (except trees), vegetation protruding over the road is at least 2.50 m above the road surface, and the flow of water away from the road is not restricted. Vegetation on slopes is not removed, only cut short.
7. <b>Landslides.</b> There are no small landslides (less than 3 cubic meters) or other obstacles on the road surface, road shoulder, or side drains. In the case of large landslides (more than 3 cubic meters), these have been reported to the communications bureau. Vehicles are able to pass and water does not flow over the road surface.
8. <b>Retaining walls.</b> There are no loose stones in the retaining walls, and weep holes are clear.

Source: ADB Consultant.

Table 2 Deduction Rates (CNY)

Road Element	Deduction rate
Road surface	0.20
Road shoulder	0.15
Side drains	0.15
Culverts	0.15
Bridges	0.15
Vegetation	0.10
Landslides	0.15
Retaining walls	0.10

Source: ADB Consultant.

### Clause 6 Other Matters

- 6.1 Other related matters not covered in this agreement will be solved based on negotiations between the two parties.
- 6.2 This agreement will be signed in three copies, the **Communications Bureau** will keep two copies, the **Maintenance Group** will keep one copy. The agreement will be effective after the two parties have signed it.

Communications Bureau

Maintenance Group

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:



Photo credit: Serge Cartier van Dissel

Yunmao group removing a landslide



Photo credit: Serge Cartier van Dissel

Hexinchang group creating a side drain

## **Performance-Based Routine Maintenance of Rural Roads by Maintenance Groups** Guide for Communications Bureaus

This guide is for communications bureaus responsible for the management of maintenance groups carrying out the routine maintenance of rural roads using performance-based contracting and the related performance indicators.

It was developed as part of a small-scale technical assistance (SSTA) pilot project linked to the Yunnan Integrated Road Network Development Project of the Asian Development Bank (ADB). The SSTA pilot project aimed to build on the experiences gained from a previous pilot project supported by the ADB Gender and Development Cooperation Fund by introducing performance-based payments to reduce the resources required for supervision and inspection. The SSTA pilot project also improved the financial sustainability of the approach by reducing the investments required and by promoting policy changes regarding the use of road maintenance funding. In addition, it increased the capacity of the county communications bureaus in Dehong Prefecture to implement the approach, allowing it to be replicated under the Yunnan Integrate Road Network Development Project on 650 kilometers of rural roads over a 4-year period.

This guide is complemented by a manual for maintenance groups that was developed under the same SSTA pilot project.

### **About the Asian Development Bank**

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.7 billion people who live on less than \$2 a day, with 828 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

Asian Development Bank  
6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
[www.adb.org](http://www.adb.org)