



Manual Maintenance Labour-Based Technology for Rural Road Works



**Don Bosco Foundation
Training Center in Comoro**

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Manual, Labour-based Technology for Rural Road Maintenance

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Foreword

Recognizing the enormous twin challenges of the need for infrastructure improvement and the need for job creation and, the Government of Timor-Leste is implementing a series of rural infrastructure works programmes using labour-based work methods as a means of building and maintaining quality infrastructure and at the same time providing jobs to unemployed people in the country.

Another government priority is to support the development of the domestic private sector contractors to ensure their capacity to produce quality works and enable them to contribute meaningfully to the development of the country. The new Secretariat of State for Support and Promotion of Private Sector (SEAPRI) is the key government institution in this regard.

A number of programmes have successfully demonstrated the viability of labour-based (equipment supported) work methods in Timor-Leste in order to provide good quality outputs and short-term employment opportunities for unskilled and semi-skilled workers in the rural communities. These programmes have contributed to employment generation, poverty reduction, economic growth and peace building and increased local capacity to plan and manage such programmes.

The continued effort to develop national and local capacities, both in public and private sector, to plan and implement routine road maintenance using labour-based methods is critical, and outsourcing implementation of works to local contractors and community groups increases the impact of rural infrastructure investments on poverty reduction, employment creation, crisis prevention and community-level social stability.

Don Bosco Training Centre is now providing technical training and national certification to local contractors in both rural road rehabilitation and maintenance approaches using labour based technology. The development and implementation of this training is supported by the International Labour Organization through the Enhancing Rural Access project (ERA), which is fully funded by the European Union.

The increased capacity amongst contractors and contract managers will be needed for planned investments in the rural roads sector, particularly through the Ministry of Public Works, and SEAPRI will continue to promote and support the involvement of certified private sector contractors in infrastructure works.

This Training Manual

The purpose of this training manual is to provide technical management staff and contractors with appropriate guidelines for the effective management of routine road maintenance works. This manual:

-  sets out some basic policies and standards on technical issues related to routine road maintenance;
-  describes in detail the management procedures for routine maintenance works;
-  provides guidelines on planning of works, work norms, organisation and how works are effectively measured and controlled, and;
-  provides a reference on contracting arrangements.

This Training Manual is based on the Maintenance Guideline developed for Timor-Leste, which in turn was based on the Rural Road Maintenance Management Manual originally prepared for the Ministry of Rural Development in Cambodia. The Timor-Leste Maintenance Guideline was prepared, under the TIM Works Project to reflect the local conditions in Timor-Leste. The management strategy has been further adopted for the routine maintenance training conducted by Don Bosco Training Centre to suit implementation by small scale contractors managing Community Maintenance Groups. It is hoped that this manual in combination with adequate training will provide sufficient guidance to technical staff carrying out routine maintenance of roads in Timor-Leste.

Father Antonio Transfiguração Pinto
Director Don Bosco Foundation, 2013

1 Introduction

1.1 The Road Network in Timor-Leste

The road network in Timor-Leste is estimated at 6,036 km in length, including 716 km of roads in Dili and several smaller regional towns. About 1,426 km of the network links Dili to the twelve district centres, and forms the national network. A length of 2,220 km provides essential connectivity for the nation, and includes national roads and 869 km of district road, providing links to large administrative centres. The remaining 3,025 km are rural access and feeder roads.

About 80% of the core road network is paved with approximately 317 bridges. While the road network is extensive, road standards are generally poor. Pavements are generally narrow (3.5 to 5.5 meters) and vertical and horizontal alignments commonly limit sight distance, restricting travel speeds, reducing the ability to overtake, and increasing the risk of accidents. Inadequate drainage exacerbates road damage. The quality of the road surface for a little over half of the core network is poor or very poor.

The overall condition of roads at district and rural level is very poor. A comprehensive inventory and classification exercise for rural roads is underway as well as the development of a rural roads policy and appropriate design standards for rural roads.

While rural feeder roads are largely unsealed, the majority are little more than tracks, and as such, are largely unmaintainable in their present state. The difficulty and expense of maintaining them will be significant given the adverse topology and climate seen in Timor-Leste.

For the district and rural road network there is currently no systematic routine maintenance taking place, however, the importance of routine maintenance is recognised by the Government and the Roads for Development Programme (R4D) under the Ministry of Public Works now attempts to introduce a nationwide system for routine maintenance.

1.2 The Importance of Good Access

The majority of the population of Timor-Leste lives in the rural areas. Their primary means of transport is through the use of an access road, linking into district roads before connecting to the national roads. Isolation is a fundamental characteristic of poverty and good access provides the way to reduce that isolation.

Currently, a large portion of rural communities do not have this access facility and despite the fact that several

Results of Poor Access

- Farmers are reluctant to grow marketable surplus crops because it cannot be sold or due to the difficulty and expense of transport significantly reduces the returns to labour;
- Agricultural productivity is low and there is a lack of innovation because extension information and inputs do not reach the farmers;
- School enrolment is low and absenteeism is high (among both teachers as well as children);
- Standards of health care are low because clinics are hard to reach and health workers cannot travel easily;
- Women's working days are long and arduous, largely owing to the time and effort required to reach water, fuel and other sources.

rural development programmes are involved in building local roads, the combined effect of an insufficient network and the lack of maintenance keeps the rural population isolated from the rest of society.

Lack of maintenance, therefore, is a major issue in financial terms given the loss of investment - in addition to the effects of reduced service levels. Of equal importance, in the case of rural roads, is the resulting lack of access and the implications for rural people. If rural roads are not maintained they finally deteriorate to levels making them impassable during long periods.

Lack of access has its effect at the most basic level of living. If there is poor access to health services, people will remain unhealthy, children will die, and any epidemic is likely to have catastrophic results. If there is poor access to clean water, again health will suffer. If there is poor access to basic information the household will be unaware of ideas and technology that might help lift their standard of living. And if there is poor access to education, children will in the future share the limitations confronting their parents today. In addition, lack of access to markets ensures that whatever potential that exists for marketing crops and participating in other economic activities are limited. In summary, the lack of maintenance is often a major impediment to the achievement of a country's poverty reduction goals.

All year round access requires a continuous road maintenance regime. When applying labour-based work methods its employment generation potential should not be underestimated. These employment opportunities, whether they are temporary or on a continuous basis, provide a significant cash injection into rural communities where subsistence farming constitute the mainstay of the economy. Cash for work schemes in Timor Leste have clearly demonstrated that road maintenance can generate much needed jobs and income for people living in rural areas. By establishing a permanent system for maintenance of the road network, employment opportunities can be sustained while at the same time maintaining the investments made in the country's road network.

Any development plan which has a poverty reduction objective needs to have within it the appreciation of the fundamental value of effective rural road maintenance for the achievement of those objectives. Rural road maintenance is not therefore just a financial and economic issue. It is also a humanitarian priority.

1.3 Strategy

Routine road maintenance can be effectively organised relying on in-country resources and minimising the use of imported goods and services, thereby boosting local economies and increasing employment opportunities. Casual labour combined with the use of hand tools is thus utilised to carry out all road maintenance operations providing a functional road network which responds to the dire demand for access to and within the rural areas.

Labour-based technology in rural infrastructure works optimises the use of productive labour and complements the use of labour with essential equipment necessary to meet the specified technical and engineering standards. Labour-based methods result in at least 5 times the number of jobs being directly created in rural roads construction and maintenance, as would be the case using conventional equipment based technology. Labour-based technology is therefore socio-economically ideal for use in Timor-Leste where there is relatively low cost of labour and high levels of available unemployed or under-employed labour.

The preferred approach to routine road maintenance includes the mobilization of small scale contractors who can sub-contract and manage small Community Maintenance Groups (CMG's), typically 5-10 persons, to carry out maintenance works based on simplified agreements and paid on the basis of measured completed works. The sub-contracts with the CMG's cover the costs of the labour inputs and management only, with tools and materials provided separately, included in the main contract with the client. The engagement of CMG's is based on community mobilization and standard task rates. The CMG's are allocated work on road sections of 5 to 7 km located in the vicinity of their villages.

Sub-contracts with Community Maintenance Groups and output based pay. Outputs levels are determined based on a task rate system, and agreed each month between the Contractor and the CMG Leader. CMG Members normally complete one task a day, individually or as a group, which equals one days pay. Task rates for various activities are based on previous experience from Timor-Leste and elsewhere. Daily tasks are set out and monitored by the CMG Leader. The Contractor and CMG Leader carry out a site inspection at the end of each month to determine the actual output and the amount of the payment to the CMG.

1.4 Project Management

Whilst roads principally are the domain of the Ministry of Public Works, Don Bosco is through the ERA Project providing training to small scale contractors and communities in routine maintenance and as part of this training also offering trial maintenance contracts. The objective is to train a pool of local contractors who can participate in works procured by the government, mainly through the Ministry of Public Works. The management arrangements in these guidelines refer to ERA Project as the client. However, ERA can simply be replaced with MPW and the ERA Maintenance Engineer with the MPW Supervisor whilst keeping the same management arrangements.

The ERA Maintenance Engineer identifies the roads to be included for maintenance (as a principle all recently rehabilitated roads and in coordination with Local Authorities and Public Works Supervisors) and carries out a detailed road condition survey to determine the amount of work (BoQ) and prepares the overall work plan.

The ERA Project prepares the maintenance contract based on those estimates and issue a contract to a trained contractor, either through direct award or through a bidding process. This contract stipulates that the contractor must engage communities and facilitate the establishment of Community Maintenance Groups (CMG's), and enter into a simple sub contracts with the identified CMG Leaders.

2 Road Maintenance

2.1 Purpose of Road Maintenance

The basic objective of road maintenance is to ensure that the road that has been constructed is maintained to the extent possible to its original condition. It is accepted that over the life of the road it deteriorates due to factors which maintenance activities need to address. By applying preventive maintenance, the deterioration of the road and all its components can be slowed down and thus postpone the need for costly investments in rehabilitation.

Maintenance is a preventive measure which starts from the day the road improvement works are completed. The effect of regular and timely maintenance is to ensure that the road remains serviceable or at least to sustain the life of the road by putting off the date at which it needs to be reconstructed. This has several benefits, the most important being that it stretches the period over which the benefits of the investment made are available and therefore provides a higher rate of return on the initial investment. In addition, it puts off the date when large investments are required for reconstructing the road. In the next turn, the maintenance works lead to the following benefits:

-  It lowers the cost of operating vehicles on the road by providing a smooth running surface;
-  The road can be kept open on a continuous basis as the maintenance prevents it from becoming impassable;
-  The reliable access provided on a continuous basis allows for social and economic benefits to be sustained.

The yearly cost of maintaining a road is a small fraction of the initial investment cost. Therefore the economic logic for effective preventative maintenance is undeniable. It can indeed be argued that the construction of roads, whilst consuming large amounts of money, is of limited importance if there is no effective maintenance.

2.2 Road Deterioration

The main causes of deterioration are the wear and tear from rainfall and traffic. This process is accelerated by overloaded traffic, inappropriate road designs or poor quality construction. Each factor affects the road structure in different ways:

-  rutting, potholes and deformation of the carriageway are mainly caused by traffic;
-  loss of gravel is caused by steep gradients or the combined effect of rainfall and traffic;
-  soil erosion in drains and other parts of the drainage system is caused by rainfall, and tend to be more critical where steep gradients are encountered;
-  silting of the drainage system is again a result of soil erosion taking place upstream, and is normally caused by excessive rainfall, flash-floods, commonly occurring at locations where the longitudinal gradients become less steep.

2.3 Definitions and Understanding of Maintenance

General Description

The purpose of maintenance is to ensure that the road remains serviceable until the end of its design life. All roads require maintenance as they are subjected to traffic and the forces of weather. Even with the highest possible quality of construction, maintenance is essential to get optimum service from the road structure during its life period. By applying preventive maintenance, the deterioration of the road and all its components can be slowed down and thus postpone the need for costly investments in rehabilitation.

Maintenance requirements depend upon a number of external factors such as traffic, terrain, soil types and climate. The need for maintenance is also very much determined by the original technical designs applied when the road was built and the quality of the works carried out during the construction stage. Depending on these parameters, it is possible to devise maintenance solutions and corresponding management systems which optimize maintenance costs and efforts.

No matter what technical designs are chosen, all roads, from major highways to local gravel roads, require regular and timely maintenance in order to secure a reasonable lifetime on the construction investment. Attempts to find technical designs which are maintenance-free are disillusion and in the long run only prove that lack of maintenance leads to accelerated rates of deterioration.

It is important to make a clear distinction between maintenance and repair works. Proper maintenance is clearly time linked, and to be efficient should be carried out before major damages take place. This involves activities relating to supervision and monitoring of the road assets even while they are still in good condition. It also requires that road authorities are sufficiently responsive and capable of taking action when it is necessary – as opposed to a response in terms of repairing the road after major damages have occurred and access has finally been cut off.

For timely and regular maintenance to take place sufficient funding needs to be secured before repairs and maintenance become an urgent issue. The most effective form of maintenance is achieved when an organisation is capable and prepared to carry out appropriate interventions at an early stage of deterioration and thus limit the extent of damages. This implies that the responsible authority is furnished with the necessary human and financial resources to effectively manage all facets of the maintenance works.

Classification of Maintenance

The effective organisation of maintenance is based upon the concept of damage control. With timely interventions based on regular supervision of the road network, works can be planned and carried out at an early stage to counter the detrimental effects of traffic and weather.

A central part of road maintenance works is to lead water away from the road structure as quickly and efficiently as possible. Effective measures against these forces need to be

installed at an early stage during the original design and construction of the road. With a well-designed road, a major function of the maintenance works is to ensure that the drainage system continues to operate effectively

Maintenance activities are commonly categorized in two distinct groups, depending on the location of the actual works. Off-carriageway works are mostly related to maintaining the drainage system and halting any damages to the road components outside the road surface. This means that the side slopes, all drains and cross drainage structures are kept in a good condition to permit free but controlled run off of water away from the road.

The second group of maintenance activities relate to road surface repairs. This work mainly consists of maintaining a good running surface on the road, free from any obstructions and damage and with the necessary cross-fall to secure proper surface drainage.

In terms of securing a long lifetime for the road, the most important type of maintenance is related to protecting the drainage system – most of which is found outside the carriageway. On highways, where traffic volumes are more intense, a substantial amount of resources are also used to maintain the roadway surface. Compared to highways, rural roads receive low levels of traffic and road surface works constitute a smaller proportion of the maintenance required. For rural roads, the maintenance priorities are clearly linked to the provision and upkeep of the drainage system.

2.4 Timing of Maintenance Inputs

Routine Maintenance

Careful timing of work inputs forms an important part of an efficient maintenance programme. The prime objective when scheduling maintenance works is to ensure that the works are carried out as preventive measures, at an early stage when the road deterioration and damage are still limited. The works are therefore scheduled at strategic intervals when it is expected that the need for action is essential. For this reason, the timing of regular or routine maintenance works are often related to the time of the year when rainfalls occur. The most common work activities are:

-  erosion control on shoulders and slopes;
-  clear drains to allow free passage of water;
-  clear culverts and other waterways;
-  minor repairs to culverts and retaining structures;
-  repair and replace scour checks;
-  repair, fill and compact potholes and ruts;
-  grass and bush clearing;
-  repair road signs.

Routine maintenance of rural roads is a widely dispersed activity, requiring small resource inputs over a large number of geographically dispersed locations. For this reason, this type of work is very well suited for labour-based work methods thereby relying to a high extent only on locally available resources.

Periodic Maintenance

In addition to the routine maintenance carried out each year, the road will need a more comprehensive overhaul after a certain number of years. This periodic maintenance involves more comprehensive and costly activities such as reshaping of the road surface, re-surfacing and major repair or reconstruction of cross-drainage structures. Depending on the quality of the road and the level of wear and tear, the periodic maintenance works would be scheduled at intervals of 3 to 7 years. ***More details in Chapter 6.*** Periodic maintenance includes activities such as:

-  major repairs to structures;
-  reshaping the road surface;
-  resurfacing of the entire road;
-  spot improvement/rehabilitation of failing sections;
-  installation of new culverts;
-  stockpiling gravel for use during routine maintenance.

Emergency Maintenance

Besides scheduled maintenance activities, road works agencies need to make provisions for the occurrence of unforeseen damage to the road network. This could be caused by excessive floods or rains, landslides or other freak conditions. By definition, emergency maintenance cannot be forecasted and therefore does not figure in annual work programmes. It is, however, possible to reserve a certain amount of funds for this purpose. Equally, the road authorities need to establish contingency plans for such incidences, thus allowing them to react in a timely fashion in order to reopen access on the road and limit the extent of the damages. ***More details in Chapter 7.*** Emergency maintenance involves activities such as:

-  repair or reconstruction of damaged cross-drainage structures due to excessive floods or over-weight vehicles,
-  repair or reconstruction of damaged road sections due to wash-outs, excessive erosion or floods,
-  repair or reconstruction of damages to erosion protection structures, resulting from excessive flows of water or landslides,
-  clear landslides, trees or rock from the road carriageway.

Maintenance Priorities

All road works agencies need to factor in budgetary limitations when planning their maintenance programme. Every engineer responsible for road maintenance faces the additional challenge that available funds are never sufficient. It is therefore necessary to assess the importance of the various work interventions to ensure that available resources are utilized in the most effective manner.

Among the three types of maintenance, emergency maintenance is obviously the most important as it relates directly to keeping the roads open to traffic. In terms of non-emergency related works, experience clearly show that it is the regular or routine maintenance activities related to preserving the drainage system which have the most significant effect in terms of extending the lifetime of a road. These works do not involve any sophisticated technology or skills. They can be carried out using manual labour and simple hand tools and are inexpensive. Despite this, they still require a sound management organisation to ensure that works are carried out at the right place and time.

3 Organising Routine Road Maintenance

3.1 Organisation

Routine maintenance of low traffic rural roads is a widely dispersed activity, requiring small resource inputs over a large number of widely separated points. The use of heavy construction equipment for such work therefore becomes ineffective and costly. For this reason, such work is very well suited for labour-based work methods, relying to a high extent only on locally available resources.

The amount of work needed to keep a length of road in good condition depends on several factors, such as type of road surface, traffic volume (number and size of vehicles), the severity of climatic conditions, especially rain fall, type of soil the susceptibility of the terrain and road gradients to erosion and the presence of bush and vegetation.

Common Routine Maintenance Tasks

- erosion control of shoulders and slopes,
- clean side drains and mitre drains to allow free passage of water,
- clear culverts and other waterways,
- minor repairs to culverts and retaining structures,
- repair and replacement of scour checks,
- repair, fill and compact pot holes and ruts,
- cut grass and bush,
- maintain road signs.

Different organisation methods are possible for the implementation of labour-based routine maintenance:

- ✚ *The lengthman system:* a worker is assigned to carry out all routine maintenance activities over a specific length of the road and throughout the year. He/she is solely responsible for his/her section and carries out all work as instructed.
- ✚ *Community contractors directly hired by the client:* a number of workers employed as a local "contractor" carry out all activities as a group, covering a longer road section. Each community contractor is responsible for a specific road section. The manager of the community contractor is responsible for hiring and supervising its workers according to the instructions issued by the Client.
- ✚ *Community maintenance groups sub contracted by a commercial small scale maintenance contractor:* The client enters into a contract with a local contractor who in turn sub-contracts works to Community Maintenance Groups (CMG's). The CMG is managed by the CMG Leader and the role of the CMG is similar to that of the community contractor above. This system places less burden on the client who only needs to manage the contractor.
- ✚ Another possibility is to have the lengthmen or petty contractors working only once or twice a year (for example before and after the rainy season) to carry out all necessary activities in one go. After works have been completed their employment is terminated, and must be re-employed before the next period.

Under average conditions, one full time worker should be able to cover the routine maintenance works each year of 1-2 km of a single lane gravel surfaced road with traffic of about 25-75 vehicles per day. This work is most effectively performed when workers

are recruited from communities located in the vicinity of the roads. Local workers are also under social pressure from their neighbours to do the job well. Former road construction workers are ideal maintenance workers, because they already have some training and experience in the work involved.

A Community Maintenance Group for routine road maintenance works can cover road sections of 5 to 7 kilometres, generally within the boundaries of one Suko. The contractor's supervisor can manage several CMG's and may cover up to 30 km of roads. Should the contract include a greater length of road, it is recommended that the contractor add supervisors to manage the works. This is the preferred strategy for routine maintenance in Timor-Leste and the approach referred to in this manual.

3.2 Technology Choice

As the capacity to construct roads already exists, the technical capacity to maintain roads should be available in the ensuing stage. The technology as such, relating to the individual work activities, is not different from common work activities used to construct and rehabilitate roads. Appropriate work methods and productivity rates can be established for this type of works in equal level of detail as for construction works. The management requirements are well known and effective procedures have been developed for the implementation of road maintenance. Without compromising the importance of maintenance, it is generally accepted that the technology is simple and easy to apply. Experience also shows that the technology and work methods can easily be disseminated to local contractors and government staff.

Road maintenance offers considerable scope for increasing efficiency by adopting work methods and approaches relying to a large extent on locally available resources. This not only includes the introduction of labour-based works technology but also by involving local construction firms and communities in works implementation.

A heavy reliance on the use of heavy equipment requiring high capital investments is not necessary in the case of road maintenance. The use of heavy equipment also increases the complexity of work operations with the result that work progress becomes more reliant on the steady supply of spare parts and repair services. Furthermore, equipment requires skilled operators, skilled mechanics and proper workshop facilities. If any of these items are not available, the equipment ends up standing idle and road maintenance is not carried out. It is not uncommon that work progress is disrupted due to lack of simple spare parts or repair services. Moreover, due to the high initial investments, small-scale local contractors are thereby barred from carrying out works contracts which could be carried out using alternative work methods.

By contrast, labour is practically always readily available and can be employed at a low cost. In addition, labour-based techniques are very well suited to a wide range of maintenance activities, particularly when the work force is properly managed, relying on an output-based payment system. However, labour-based approaches demand proper planning and skilled supervision.

Often, a combined use of labour and machines provide the most appropriate solution. Certain maintenance tasks can be carried out more effectively using machines, while others are best carried out relying on manual labour. The most appropriate technology depends on the nature of the work and the availability of labour and equipment in the area. The adjacent table shows which activities are best suited for labour and which require some use of equipment.

The choice between equipment and labour-based work methods affects the basic organisation of road maintenance. Relying to a high degree on the use of heavy equipment entails the involvement of larger contractors, whereas labour-based work methods favour more decentralised solutions based on the use of locally available resources.

Activity	Potential	
	Equipment	Labour
Ditch cleaning and reshaping	good ¹	good
Minor bridge and culvert repairs	poor	good
Building scour checks	poor	good
Repair of structures	poor	good
Grading un-paved surfaces	good	poor
Patching, sanding or local sealing of bituminous surfaces	poor	good
Filling of unpaved surfaces and slopes	poor	good
Grass cutting	good	good
Repairing and replacing traffic signs	poor	good
Road line markings	good	good
Stockpiling gravel	good	fair
Re-gravelling	good	fair
Producing chippings	good	fair
Surface dressings	good	fair

(1) Requires a V-shaped ditch.

In most cases, the choice between labour and machines is not an either/or situation - it is possible to find cost-effective solutions combining the two approaches. Moreover, past experience has shown that an innovative use of intermediate equipment can be cost-effective for excavation, compaction and hauling, provided that locally available skills and materials are drawn upon in an imaginative way.

Road maintenance is a continuous process. When applying labour-based work methods its employment generation potential should not be under-estimated. These employment opportunities, whether they are temporary or on a continuous basis, provide a significant cash injection into rural communities where subsistence farming constitute the mainstay of the economy. Cash for work schemes in Timor Leste have clearly demonstrated that road maintenance can generate much needed jobs and income for people living in rural areas. By establishing a permanent system for maintenance of the road network, employment opportunities can be sustained while at the same time maintaining the investments made in the country's road network.

4 Management of Routine Maintenance

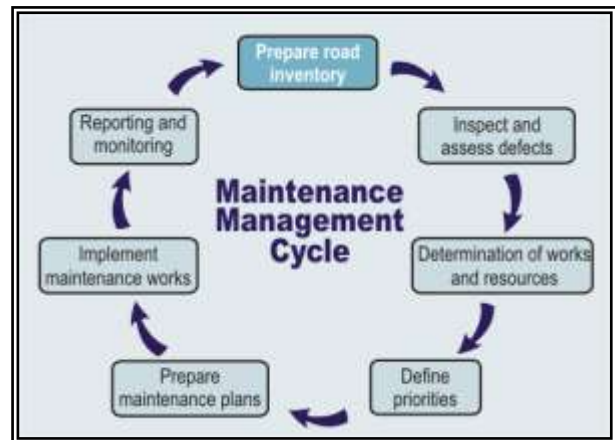
4.1 The Process

All maintenance operations require careful planning, supervision and control. Proper monitoring of outputs and the resources required to achieve these outputs provide the basic information needed for planning and estimating maintenance works.

Before the planning and implementation of work activities can commence there is a need to inspect the condition of the roads and assess the nature and extent of any damages.

This forms the basis for decisions made on which roads should be prioritised and all consecutive engineering inputs.

The following chapters summarise the main features relating to the various stages in the maintenance management cycle.



4.2 Road Inventory

The preparation of a road inventory forms the basis for a road maintenance programme. An inventory should list and describe all features of each individual road. The recorded data then form the basic reference for all subsequent inspections and plans.

Road condition inventories are required for all roads proposed for maintenance. This type of field surveys is also carried out as part of the planning and preparatory work for road construction and rehabilitation works. The information gathered when carrying out a road inventory is stored and later updated when future road maintenance assessment are carried out. A well established and maintained system comprises of two parts:

- ✚ a district/area inventory, and;
- ✚ a road condition inventory.

(i) District/Area Inventory

The area inventory can be a simple road map of the area showing all roads under maintenance. This map should provide information on:

- ✚ road classification and category,
- ✚ surface types,
- ✚ major structures,
- ✚ average daily traffic
- ✚ details of maintenance organisation, e.g. location of maintenance camps and divisions of responsibilities.

(ii) Road Condition Inventory

The road condition inventory contains all the details of each individual road in the network. The following information is recorded:

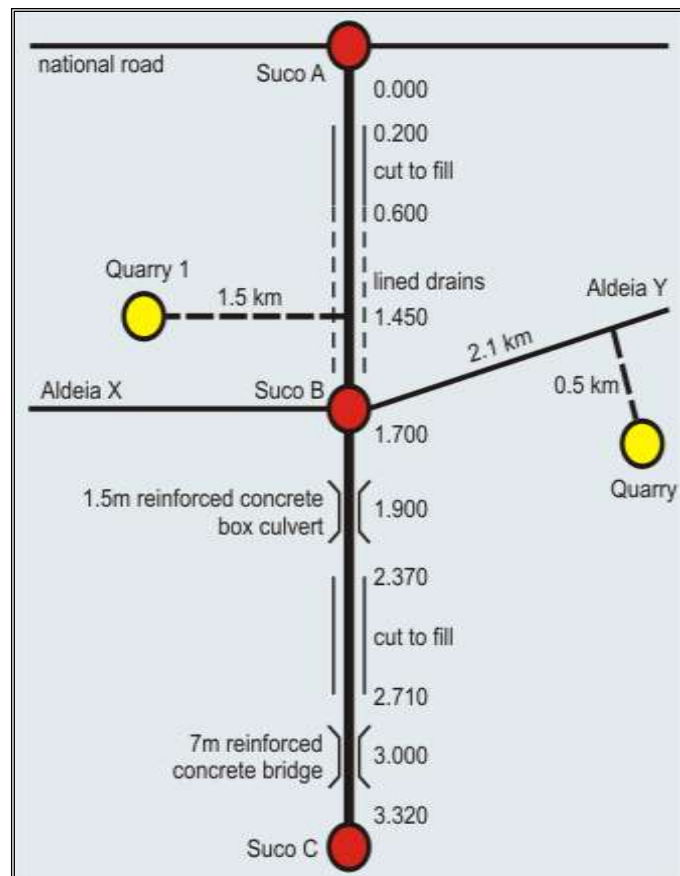
Geometry	- alignment - profile - cross-section
Pavement and sub-grade characteristics	- soil conditions - gravel or other surface dressing - Conditions
Drainage features	- culverts - drifts - mitre drains - catch water and cut-off drains
Structures	- type - size - location
Junctions	- location - type of connected road
Climate	- rainfall - flood patterns - adjacent water management schemes
Traffic	- annual average daily traffic
Maintenance	- details on routine maintenance, i.e. names of community contractors, - details on rehabilitation and urgent maintenance works, e.g. date, location

It is useful to supplement road inventories with simple drawings such as *strip maps*. These diagram maps are useful when preparing the operations plans. It helps management to see at a glance the whole situation of a particular road.

4.3 Road Condition Survey for Routine Maintenance

In order to assess the maintenance needs and to plan maintenance works, it is necessary to carry out road condition surveys. Such surveys should be done on a regular basis in advance of the start of the next working season.

Usually, an engineer or maintenance supervisor controls a large road network and with limited resources and time available, it is necessary to assess the roads in an accurate and time-saving manner as possible. It is therefore useful to concentrate on the identification of defects using a few well defined key indicators for the road condition. Such indicators must be defined for each programme, depending on local conditions and requirements. However, there are some features which need high priority on all roads:

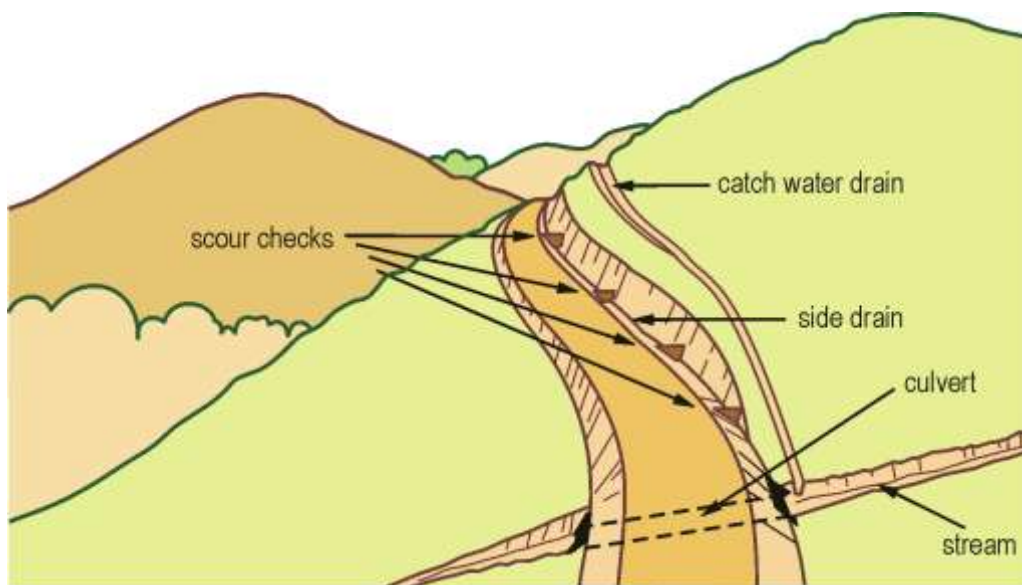


(i) Drainage

Proper drainage is undoubtedly the most important feature of any road. If this component of the road fails, serious damage will occur on the remaining parts of the road. Indicators for the condition of the drainage system can be defined as follows:

Item	Indicator
Culverts and drifts	degree of silting-up/blockage degree of functionality (correct dimensions)
Side drains and mitre drains	degree of silting-up/blockage degree of erosion
Catch-water and cut-off drains	degree of silting-up/blockage degree of erosion degree of functional length

To simplify work inspection, the degree of silting can be described using simple measurements, e.g. fully blocked - half silted - correct size - eroded. Such assessments allow the repair work required to be efficiently quantified on which basis the cost can easily be estimated.

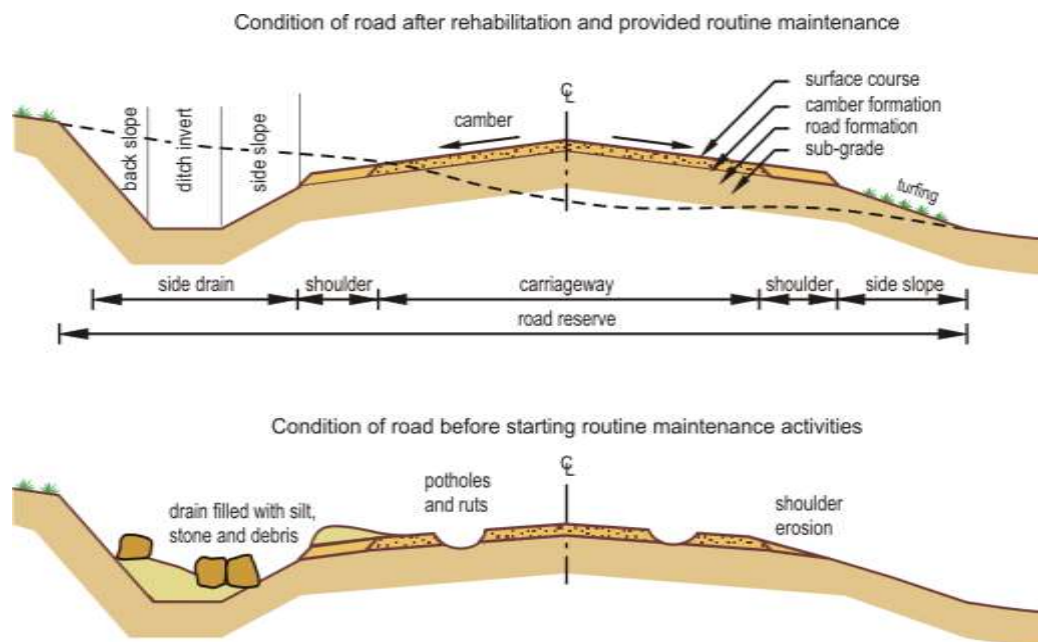


(ii) Running Surface

The most important feature of the surface of the road is the camber. The lack of a camber on the carriageway prevents rainwater from running off the road and leads to accelerated deterioration of the surface. For the user of the road, the smoothness of the running surface is the most important feature. Earth and gravel roads require continuous surface maintenance.

Surface	Indicator
Camber	degree of camber (slope gradient)
Condition	length of road section affected by potholes or ruts length of road section affected by corrugation thickness of gravel layer condition of gravel

The loss of gravel can be measured by digging small holes in the road surface until the sub-grade is reached. Measurements should be made at regular intervals along the road at the centre line, in the wheel ruts as well as at the road shoulders.



(iii) Structures

Inspection of structures should not only be carried out to assess their general appearance. Thorough inspection implies checking all elements of a structure. Elements which are not visible are usually the most important, such as foundations, beams and bearings. The table below provides a check-list of items which needs to be inspected on various structure elements:

Element	Defect	Element	Defect
Foundation	- o cracks - o erosion along and underneath	Approach	- o drainage - o visibility - o settlement
Head and wing walls	- o cracks - o blocked seepage holes - o erosion behind walls	Beams	- o cracks - o bends - o corrosion, rotting
Abutments and piers	- o cracks - o blocked seepage holes - o erosion behind abutments - o blocked drainage	Waterway	- o vegetation growth - o deposits of sand, silt or organic debris
Culverts	- o blocked or silted - o cracks - o uneven settlement	Banks	o eroded
Decking	- o deflection - o drainage	Road furniture	- o damaged - o missing - o faded paint
		Hand and guard rails	- o eroded - o missing

4.4 Setting Priorities

Often, the financial resources available for maintenance are insufficient to carry out all the work activities identified during the road condition survey. It is therefore necessary to prioritise certain maintenance activities and select the most important road sections.

First priority is usually given to urgent maintenance activities (i) to ensure that the road network remains passable and basic access is provided and (ii) to limit the extent of damage exerted to a road section. Critical elements of the drainage system, such as culverts and drains need particular attention and first priority should be given to the removal of obstacles blocking water passage. Small erosion channels should be repaired before the next rains deepen and widen them. Both these tasks require regular inspection.

Lowest priority should be given to those tasks requiring significant inputs and which produce limited results in terms of prolonging the lifetime of the road (i.e. grass cutting and bush clearing).

For each maintenance operation (routine, periodic and urgent) priority lists are established. They may differ from area to area according to the prevailing conditions.

When priorities are set, the climatic conditions must be considered. For example, grass cutting during the rainy season does not make sense when at the same time the ditches and culverts are left untouched and are becoming seriously silted. The following table provides a list of priorities for routine maintenance according to the climatic seasons:

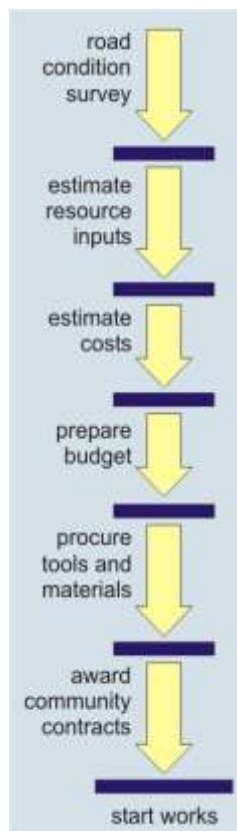
Season	Priority	Description
Before rains	1	clean culverts and drifts
	2	clean side and mitre drains
	3	repair side drain erosion and scour checks
	4	fill potholes
During rains	1	inspect and remove obstacles
	2	clean culvert and drifts
	3	clean side and mitre drains
	4	repair side drain erosion and scour checks
End of rains	1	fill potholes and ruts in carriageway
	2	repair erosion on shoulders, on back slopes and in drains
	3	reinstate scour checks
	4	reshape carriage way
	5	cut grass
Dry season	1	repair structures
	2	reshape carriage way
	3	clear bush

From the table above it is clear that the most important routine maintenance activities throughout the year is to keep the drainage system in good running order - any other activity is of secondary importance.

Urgent maintenance work requires immediate action. Priority should be given to those activities which make the road (even partially) passable. For example, a broken culvert may disrupt the whole road while a landslide only covers part of the carriageway, allowing the traffic to still pass the affected section.

It should be noted that sudden damages to the road may start as a minor defect, but if unattended to, can escalate and eventually cause serious damage to a road. For example, debris blocking the flow through a culvert can eventually lead to serious erosion of the adjacent road body, if the culvert is left unattended. Therefore, it is important that roads are regularly inspected during periods of heavy rains.

4.5 Planning and Estimating Works



For road maintenance, as for any civil works activities, it is advantageous to prepare a work plan. There are two major types of road maintenance plans, long-term and short-term plans.

Long term plans include an overall strategy for when both routine and periodic maintenance will be provided. These plans are developed by the Maintenance Engineer and approved by the relevant district authorities. On the basis of regular road condition surveys the maintenance requirements are determined for each road. Depending on the available funding, it is then possible to prepare an overall maintenance plan and budget. With the data from the road condition surveys, it is possible to forecast and plan the works according to the actual demand for maintenance.

Short term plans are the operational plans prepared prior to the execution of any specific works carried out on a road section. These plans are based on a detailed inspection of the road condition, thereby ensuring that the assessment of work requirements are accurate and that deviations from the work plan would be minor during work implementation. Short term plans, or monthly plans, also provide the basis for the activities to be carried out by the communities and the basis for payment at the end of the planning period. Short-term planning is carried out during the course of the works to ensure good

work organisation and ensuring that priority is given to the most important maintenance activities.

Preparatory stages

During the preparatory stage before contracts have been awarded, planning may cover a period of say 6-12 months covering each individual road section to which a series of CMG's are assigned. During works implementation, short term planning is carried out at the beginning of the period, and time of works inspection until the next site visit takes place, i.e. for a period of two to four weeks.

There are several stages of preparatory work before the maintenance works can commence. At first, it is necessary to establish the exact maintenance requirements. All maintenance planning is based on field surveys where the actual condition of the road is inspected in detail. Based on the damages and maintenance needs observed, work estimates are prepared and entered into a road maintenance condition inventory form as proposed maintenance interventions according to its location (form for condition survey below).

Form for Road Condition Survey and Proposed Maintenance

Routine road maintenance assessment and schedule of works																				From A-3								
District name:										Section of this contract Ch: to Ch:										Name of CMG Leader:								
Contract no:										Section length:										Page no: Pages								
Road name:										Date:																		
Item No	Routine road maintenance activities	Unit	Condition	Chainage																				Total Quantity	WD/Unit	Frequency per year	Total Annual WD	
				1+000					2+000					3+000					4+000									
				200	400	600	800	0	200	400	600	800	0	200	400	600	800	0	200	400	600	800	0					
RM-1	Road inspection and removing obstructions	WDs																						15 wds/month/km				
RM-2	Cleaning culverts incl. in/outlets	No	Light																					1				
			Medium																					2				
			Hard																					4				
RM-3	Clear debris from bridges, drifts and causeways	No	Light																					3				
			Medium																					7				
			Hard																					15				
RM-5	Cleaning lined drain & repairing side drains/ mitre drains	Km	Light																					25				
			Medium																					40				
			Hard																					50				
RM-6	Repair scour checks	No	Light																					0.25				
			Medium																					0.33				
			Replac																					0.5				
RM-8	Repair of erosion on shoulders	Km*	Light																					21				
			Medium																					27				
			Hard																					40				
RM-9	Filling potholes	M2																						0.10				
RM-10	Fill rut in carriageway	M2																						0.10				
			Light																					10				
RM-11	Grubbing carriage way	Km*	Medium																					13				
			Hard																					20				
RM-12	Rake excess gravel from shoulders in carriageway	Km*																						33				
			Light																					9				
RM-13	Clearing bush and cutting grass	Km*	Medium																					11				
			Dense																					14				
RM-14	Planting grass	M2																						0.10				
RM-15	Non-standard routine maintenance activities: The WD's to be recorderded under this activity include: clearing land slide etc.																											
Note:* If only 1 side of the road put 1 and both side put 2										Total Gavel in this page: (m3)										Total WDs in this page:								
										Gavel bring from previous page: (m3)										WDs bring from previous pages								
										Grand total Gavel (m3)										Grand total WDS								

Based on the assessment made in the road condition inventory, a summary of necessary labour inputs can be established and presented for each road and summarised per District (form for labour input estimate below).

Form for Estimated Labour Inputs

Annual Work plan and Report on Employment Generation														Form A-5	
District: _____ Road Name A: _____				Date from ____ / ____ / ____ To ____ / ____ / ____											
Contract No: _____ Road Name B: _____				Duration: _____											
Road Name C: _____															
Road section (chainage) and Suco	WD Total	Labour Cost incl superv.	WD Plan/ Actual	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Road Name A:															
			Planned												
			Actual												
			Planned												
			Actual												
			Planned												
			Actual												
Road Name B:															
			Planned												
			Actual												
			Planned												
			Actual												
			Planned												
			Actual												
TOTAL WD and Labour Cost															
Monthly and cumulative workerdays planned and actual	Planned														
	Actual														
	Planned Cumulative														
	Actual Cumulative														
Date: ____ / ____ / ____ Prepared by: _____ Signature: _____ (Maintenance engineer) Date: ____ / ____ / ____ Checked by: _____ Signature: _____ (Project Chief Engineer)															

Although labour constitutes the largest cost item for routine maintenance works, there are additional costs for tools, material and supervision – which need to be included in the estimates. Some work activities require the supply of gravel which needs to be stockpiled at regular intervals along the road. Hand tools need to be procured or replenished, and if the network under maintenance is expanded, then additional tools need to be purchased. The inputs of tools and materials and its costs need to be estimated in detail (form for cost estimate below). Equally, the works need to be packaged into appropriate size contracts detailing the costs of the various inputs required. It should be stressed that the maintenance plan needs to be carefully monitored and compared to the real needs of the road network during the course of the year. Unforeseen damages are likely to occur which may require revisions to the original plan.

Form for Cost Estimate

Bill of Quantity / Annual cost estimate for routine road maintenance per road												Form A-4	
District name:				Contract No:				From / / To / /					
Road name (A):.....Page 1				Road length:.....				Page No of Pages					
Road name (B):.....Page 2				Road length:.....									
Road name (C):.....Page 3				Road length:.....									
Item No	Road Name		Road A (3 CMGs)						Road A Total, Page No of Pages				
	Road section		Ch.....to Ch.....		Ch.....to Ch.....		Ch.....to Ch.....		Total Quantity	No. of WD Total	Unit rate. USD	AmountUSD	
	Description of works	Unit	Qty	WD	Qty	WD	Qty	WD					
	Labour cost												
RM-1	Road inspection and removing obstacles												
RM-2	Cleaning culverts incl. in/outlets												
RM-3	Clear debris from bridges , drifts and cause ways												
RM-5	Cleaning lined drain & repairing side drains/mitre drain												
RM-6	Repair scour checks												
RM-8	Repair of erosion on shoulders												
RM-9	Filling potholes												
RM-10	Fill rut in carriageway												
RM-11	Grubbing carriage way												
RM-12	Rake excess gravel from shoulders on carriageway												
RM-13	Clearing bush and cutting grass												
RM-14	Plant grass												
RM-15	None standard items												
	Supervision CMG Leader												
	Sub total												
II	Material, Tools and Equipment cost												
	Laterite		m ³										
	Hand tools		Ls										
	Equipment cost		Ls										
	Other materials cost		Ls										
	Sub total												
III	Indirect cost												
	Supervision cost		Month										
	Company overhead cost and profit		%										
	Contingency												
	Total Road A												
	Grand total all roads included in contract												

Date: / /
 Quantities prepared by:.....
 Costs prepared by:.....
 Signature:.....
 (Company's director)

Date: / /
 Approved by:.....
 Signature:.....
 (ERAs Project Chief Engineer)

4.6 Implementation

General

The technical standards and specifications for maintaining roads are basically the same as for road construction works. The supervision staff must be aware of these standards and the work methods used to achieve them.

Equally, the maintenance workers need to be properly instructed in how to carry out the maintenance works and the final quality standards to which the works should be performed. For this reason, Section 4.7 of this Manual contains a full description of each of the most common routine maintenance activities, how the work is performed, how it is measured and on which basis payment is carried out.

Work Activities and Task Rates

Routine road maintenance is a widely dispersed activity, requiring small resource inputs over a large number of widely separated locations. The amount of work needed to keep a length of road in good condition depends on several factors, such as type of road surface, traffic volume (number, type and size of vehicles), rain fall, soil types, the susceptibility of the terrain and road gradients to erosion, and the presence of bush and vegetation. Most work activities are well suited for manual labour.

Under average conditions, one full time worker should be able to cover the routine maintenance works each year of 1 - 2 km of a single lane gravel road, with traffic of about 25 - 75 vehicles per day (ref. table below). This type of work can be effectively performed by persons living in the vicinity of the roads. Local workers are also under social pressure from their neighbours to do the job well. Former road construction workers are ideal maintenance workers, because they already have some training and experience in the work involved. Former work gang leaders from previous road construction works have proven to be suitable community contractors, who can manage a group of workers and ensure the planned output for routine road maintenance works covering road sections of 5 to 15 kilometres.

Work output is based on task rates which have been established from experience in Timor Leste and elsewhere. Quantities are measured by the Maintenance Engineer and divided by the task rate for that particular activity to arrive at number of work days. Typical task rates are presented in the table below:

PRODUCTIVITY GUIDELINES FOR ROUTINE MAINTENANCE							
ACTIVITY		Unit	TASK DIFFICULTY				NOTES
			1	2	3	4	
R1:	Inspection 5.0 km/day						
R2:	Clean culverts + inlets and outlets	As shown	2 rows/wd 2wd/row	1 rows/wd 6 wd/row	2 wd/row 9 wd/row	4 wd/row	Difficulty = Silt depth in culvert 1. Up to ¼, 2. ¼-½, 3. ½-¾ 4. Over ¾ Tasks for 600 dia. culverts with 6 rings Tasks for 1000 dia. culverts with 6 rings
R3:	Clear debris from bridges	m ³ /wd	0.5	2.0			Difficulty = type of work 1. Removing loose debris, 2. Excavating silt
R4:	Clean mitre Drains	m ³ /wd	2.5	2.0	1.5		Difficulty = Soil condition 1. moist and loose 2. average 3. hard and dry
R5:	Clean side drains and lined drains	m ³ /wd	2.5	2.0	1.5		Difficulty = Soil condition 1. moist and loose 2. average 3. hard and dry
R6:	Repair scour checks	No/wd	6				
R7:	Side slope repair	m ³ /wd	2.0	1.5	1.0		Difficulty = Soil condition 1. moist and loose, 2. average 3. hard and dry
R8:	Shoulder repair	m ³ /wd	2.0	1.5	1.0		Difficulty = Soil condition 1. moist and loose, 2. average, 3. hard and dry
R9:	Patch potholes	m ³ /wd	1.5	1.2	1.0		Difficulty = Haulage distance to gravel 1. up to 50m, 2. from 50m - 100m 3. more than 100m
R10:	Fill ruts in carriage way	m ³ /wd	1.7	1.5	1.3		Difficulty = Haulage distance to gravel 1. up to 50m, 2. from 50m - 100m 3. more than 100m
R11:*	Grub edge of carriageway	m/day	200				
R12:*	Reshape carriageway to camber	m/day	20	15	10		Difficulty = Soil condition 1. moist and loose, 2. average, 3. hard and dry
R13:	Grass cutting and bush clearing	m ² /day	150 300	80 200			Difficulty = Denseness of vegetation 1. Light, 2. Dense
R14:	Grass planting	m ² /day	20	15	10		Difficulty = Haulage distance to grass 1. up to 10m, 2. from 10m - 50m 3. more than 50m

* All tasks measured in linear metres cover both sides of the road.

Section 4.7 below provides a full description of each of the above activities, including methods of measurement and payment.

Tools for Routine Maintenance Works

The table below shows the standard set of hand tools provided to the Community Maintenance Groups based on the road length and estimated number of workers employed.

Tool	Number of tools depending on road length		
	10km	15km	20km
Wheelbarrows	5	7	10
Shovels	12	16	25
Hoes	10	14	20
Pickaxes	10	14	20
Bush knives	10	14	20
Spreaders	5	7	10
Watering cans	3	3	3
Hand rammers	5	7	10
Axe	3	5	7

Note: The exact number of hand tools needs to be adjusted to the condition of road and the envisaged works.



4.7 Activity Descriptions

In order to achieve a uniform system of contracts management, the following section attempts to standardise the contents of each of the maintenance activities included in the community contracts.

It is also important to specify the exact method and unit of measurement of completed works before contracts are signed with the contractors. This may avoid any contention during measurement and payment of completed works. Finally, by standardising the units and methods of measurement, the monitoring of productivity and cost norms is improved, which in the next turn, provides better planning figures when estimating future maintenance works.

For the above reasons, it is strongly recommended that each work activity use the same unit of measurement when planning the works as well as for contracts award and payment purposes as provided in the follow section.

R1 General inspection and removing obstructions

Description of Work

This activity includes an inspection of the complete length of the road section covered by the contract, to ensure that no critical damages or obstructions exist. If critical damages have occurred, this needs to be reported immediately to the Maintenance Supervisor or the Sub-District Office.

Objects, such as fallen trees, rocks, boulders or bushes, blocking the carriageway or the drainage system should be removed and disposed of safely at a distance sufficiently far away from the road and its drainage system to avoid reappearing as an obstruction and damage to the road. Removal of soils due to erosion and silting should not be covered by this activity.

Measurement and Payment

The payment for inspection is made as a lump sum payment payable only once, based on a certain number of site visits estimated by the Maintenance Supervisor:

Inspection of road 5 km per workday

Removal of obstructions when they occur should be paid according to rates per cubic metre of materials disposed, at the following task rate:

Removal of Obstructions 0.5 m³ per workday

R2 Clean culverts, inlets and outfalls

Description of Work

This activity includes the removal of all silt, debris and other foreign matter from inside the culvert and the area next to the wing walls. Inlet and outlet drains at a minimum distance of 10 metres from the wing walls or as instructed by the Maintenance Supervisor should also be cleared of vegetation, silt and loose debris. Grass should be cut leaving the roots to provide soil erosion protection. All debris and other materials should be removed well clear of the road and the drainage system to prevent it from being washed back into the drains.

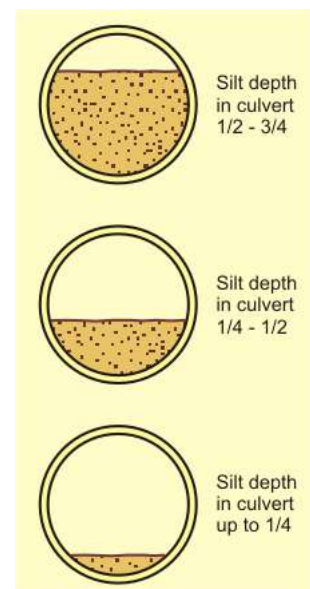
On completion of this work, the culvert, including the inlet and outlet drains, should allow for free and unhindered flow of water.

Measurement and Payment

Payments are based on the amount of material removed from each of the culvert pipes and measured by the degree to which the culvert pipes were blocked.

The following task rates are recommended for single and multiple row pipe culverts using 0.6 m and 1.0 m diameter culvert rings:

Diameter	Task Difficulty - Silt depth in culvert			
	Up to ¼	¼ to ½	½ to ¾	Over ¾
600 mm	3 rows/wd	1 row/wd	1 wd/row	2 wds/row
1000 mm	1 wd/row	2 wds/row	4 wds/row	5 wds/row
Tasks cover culverts with up to 6 rings (total pipe length = 6m)				



If the culvert pipe is longer than 6 metres, new tasks should be calculated on the basis of the above rates. Similarly, if other pipe diameters are used, new rates need to be calculated based on the internal area of the culvert pipe.

Tools: Use a hoe or a shovel with a long handle to reach the soils inside the culvert. All excavated soils should be disposed off at a safe location downstream from the culvert.

R3 Clear debris from bridges

Description of Work

The work shall consist of clearing of all silt, debris and other foreign matter from the structure, its abutments and piers for a minimum distance of 25 metres both upstream and downstream, thereby allowing water to flow freely and unhindered.

All debris and other materials shall be removed well clear of the river and the drainage system to prevent it from being washed back and once again obstructing the river flow.

Measurement and Payment

Payment is based on the volume of materials removed, at the following task rates:

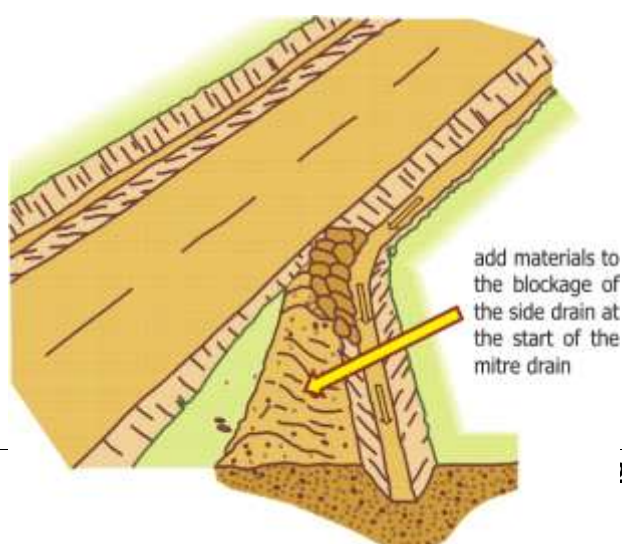
Removing loose debris such as boulders, branches, etc.	0.5 m ³ /wd
Excavating and removing silt	2.0 m ³ /wd

R4 Clean mitre drains

Description of Work

Mitre drains allow water from the side drains to exit safely from the road reserve. They need to be kept clean at all times in order for the other components of the drainage system to function properly.

Mitre drains are normally excavated and maintained to the same standards as the side drains. Their water carrying capacity should at the least be similar to the side drains. To avoid causing erosion at the discharge point, mitre drains should be provided as often as possible so that the accumulated water volume in each drain is not too high. Wherever possible, they should be located at intervals of 30 metres along the road alignment. Additional mitre drains may be installed where necessary on the direction of the Maintenance Supervisor.



Some of the excavated soils can be used to block the downhill side of the drain to ensure that the water do not spill over into the side drains. The remaining excess soils should be disposed well away from the drainage system, thereby avoiding excavated soils and debris to re-enter the drains.

Where the road is situated on a hill side, a catch water drain may have

been constructed above the road. These drains should also be cleaned and any erosion repaired under this activity using the same work methods, measurement and payment.

Measurement and Payment

Work is measured on the basis of cubic metres of materials removed. The normal task rates applied per cubic metre are as follows:

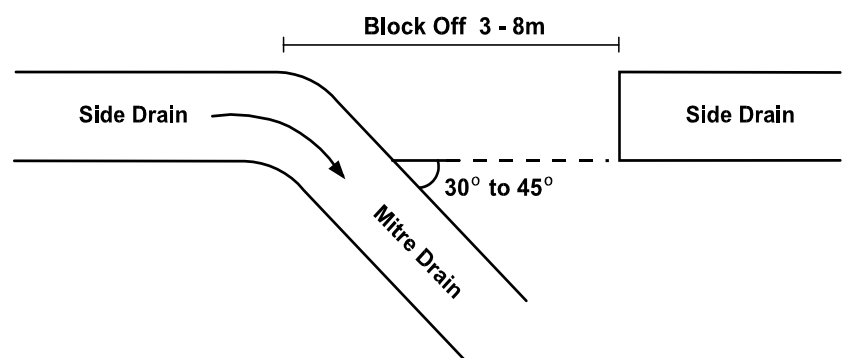
Task Difficulty - tasks apply to drained ditches without any standing water		
moist and loose soils	average soil conditions	hard and dry soils
2.5 m ³ /wd	2.0 m ³ /wd	1.5 m ³ /wd



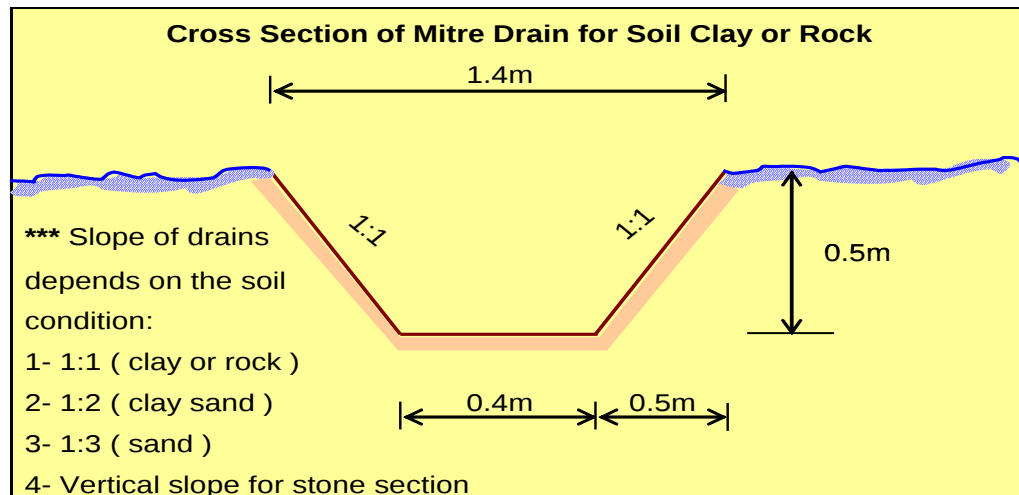
When constructed to the standard design used for side drains (ref. Section 3.3), the above task rates can be determined on the basis of linear metres of drains and required excavation depth (i.e. degree of silting).

silt depth	moist and loose soils	average soil conditions	hard and dry soils
10 cm	50 m/wd	40 m/wd	30 m/wd
15 cm	30 m/wd	24 m/wd	18 m/wd
20 cm	21 m/wd	17 m/wd	13 m/wd

** Mitre drain for clay soil or rock slope, 1:1 both sides and bottom width 0.4m as shown in picture below



The angle between the mitre drain and the side drain should never be greater than 45 degrees. An angle of 30 degrees is ideal.



R5 Cleaning side drains

Description and Execution of Work

Side drains are the most important part of the drainage system. Highest priority should be given to keeping the drains clean at all times. The drains should be kept free flowing throughout their length with no low spots which hold stagnant water. The drains should be maintained with a continuous gradient (slope) to avoid silting or erosion and have the prescribed depth and shape.

Attention should also be given to the drains and channels connecting to the drains to ensure that free flow of water is maintained.

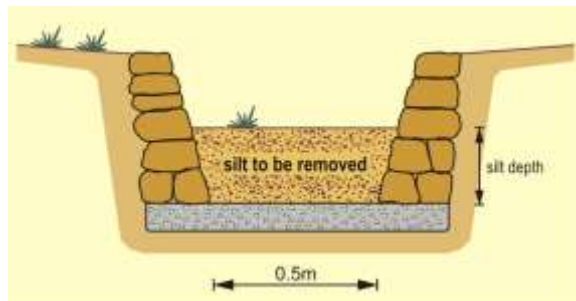
The work includes the removal of any material from the side drains to restore their profile to its original shape. Unlined side drains are maintained to the correct depth and profile with grass cover. If there is no erosion only grass cutting is required. Where the drains have silted more than 10 cm in depth, the vegetation and silt must be removed to the original depth and profile (with the exception of the areas close to scour checks where silting is normal).



Seriously eroded ditches are dangerous to traffic which can be trapped in them. The erosion can also cause damage to the road shoulders which may eventually collapse. Eroded ditches should be backfilled with compacted local material to the proper drain shape. Damaged or missing scour checks should be repaired or replaced.

The material removed should be disposed of away from the road unless the District Engineer gives specific permission for it to be used for road surface repair. The correct size and shape of a drain should always be maintained.

Measurement and Payment



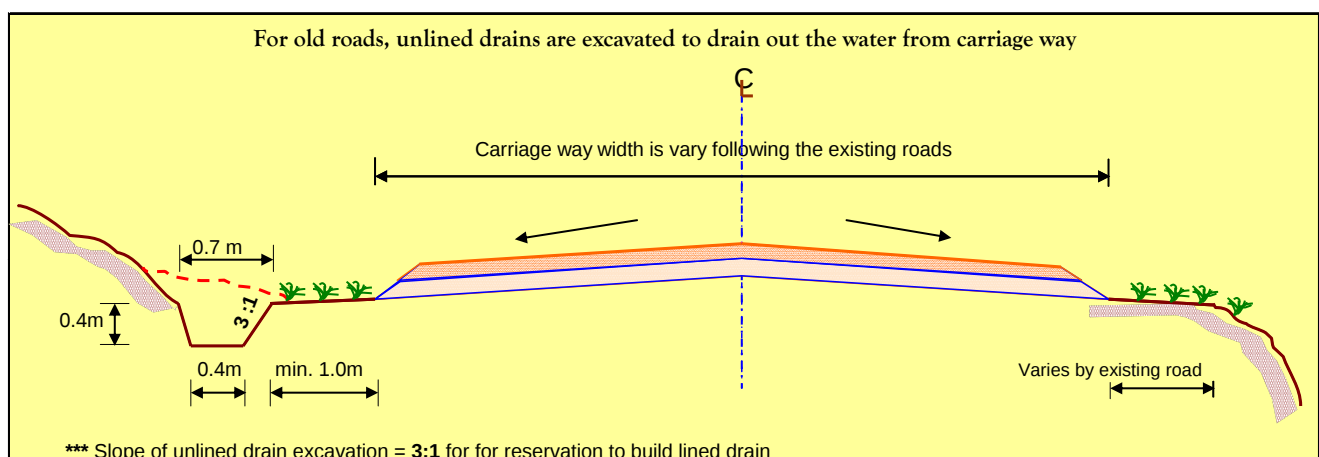
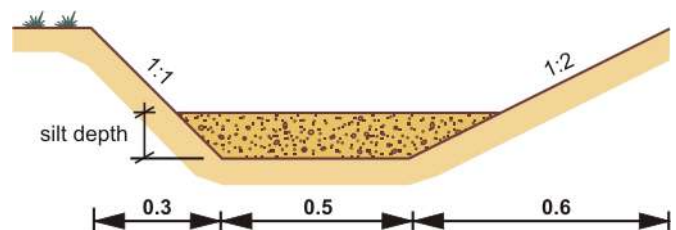
Measurement of works is based on the amount of materials blocking the drains.

Completed works are then measured on the basis of cubic metres of materials removed. The normal task rate applied per cubic metre is as follows:

When applying the standard design for side drains, the above task rates can be determined on the basis of linear metres of drains and required excavation depth (i.e. degree of silting).

Task Difficulty		
moist and loose soils	average soil conditions	hard and dry soils
2.5 m ³ /wd	2.0 m ³ /wd	1.5 m ³ /wd
these tasks relate to drained ditches without any standing water		

silt depth	moist and loose soils	average soil conditions	hard and dry soils
10 cm	50 m/wd	40 m/wd	30 m/wd
15 cm	30 m/wd	25 m/wd	20 m/wd
20 cm	22 m/wd	20 m/wd	15 m/wd



R6 Repair scour checks

Description of Work

In addition to mitre drains, the instalment of scour checks provides an efficient method for reducing soil erosion in side drains. The distance between scour checks depends on the longitudinal gradient of the drain. Steep gradients require more frequent scour checks, as shown in the adjacent table. There is no need for scour checks on roads with gradients less than 4 percent. This will encourage too much silting of the side drain, leading to damage to the road body.

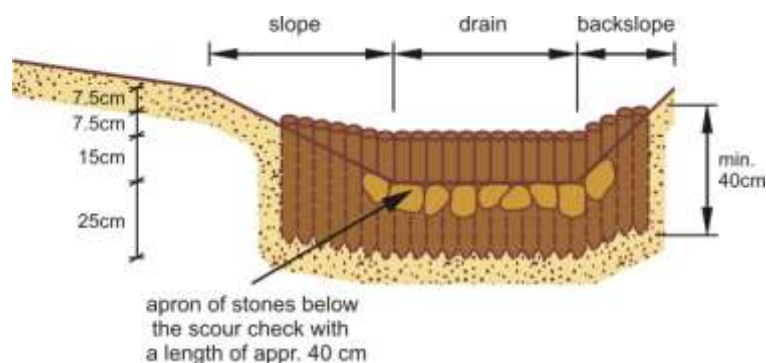
Road Gradient [%]	Scour Check Interval [m]
4	not required
5	20
6	15
7	10
8	8
9	7
10	6

During periods of heavy rains, it is important to ensure that all scour checks are in good condition. This includes replacing scour checks which have been washed away as well as repairing the damaged ones.

Once the basic scour check has been constructed, an apron is built immediately downstream using stones. Ensure that the stones have sufficient size to avoid them being washed away. The apron prevents any scouring below the scour check. Grass sods are placed against the upstream face of the scour check to prevent water from seeping through and to encourage silting to take place behind the scour check. The long term objective is to establish a complete grass cover over the silted scour checks to stabilise them.



The basic measurements for constructing a scour check are illustrated in the figure below:



Measurement and Payment

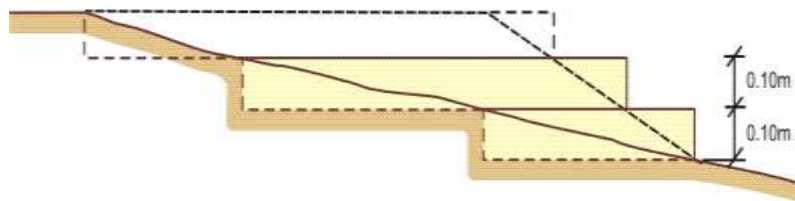
Measurement of works is based on the number of scour checks replaced or repaired, at the following task rate:

Repair scour checks 6 (no.) per workday

R7 Side slope repair

Description of Work

This activity includes the excavation of soils to establish a proper bench on to which new soils are added. Soils are excavated from nearby borrow pits and placed in layers not thicker than 0.10 metres and compacted with hand rammers at optimal moisture content. After final shaping of the slope, it is covered by grass to prevent future soil erosion (grass planting covered by a separate activity).



Measurement and Payment

Measurement and payment of works are based on the volume of soils added to the side slopes, at the following task rates:

Task Difficulty		
moist and loose soils	average soil conditions	hard and dry soils
2.0 m ³ /wd	1.5 m ³ /wd	1.0m ³ /wd

***Note: Surface side slope protection**

Newly formed slopes on fills are easily damaged by runoff surface water and animals. It is therefore necessary to protect the slopes as soon as they have been constructed. The erosion protection can be grass, or other types of deep-rooted vegetation or in some cases covering the surface with more durable materials such as stone.

A more expensive but effective method is to use retaining walls, gabions or stone for protection. Such measures are normally applied in steep terrain where the stability of the slope also needs to be improved.



Stone masonry for slope protection



Slope erosion repair by using gabions

R8 Shoulder repair and grass planting

Description of Work

Erosion gullies are formed by water running over the edge of the carriageway and road shoulders. These gullies need to be filled with gravel and properly compacted. Erosion gullies on the side slope can be repaired using soils borrowed from the adjacent areas next to the road.

Although no vegetation is allowed on the carriageway, grass should be established on the sloping shoulders to protect against erosion. After repairing shoulders, it is important that the slide slope is immediately covered with grass turfing.



Measurement and Payment

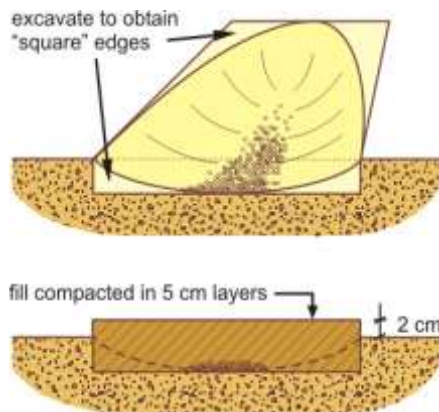
Measurement and payment of works are based on the volume of soils added to the shoulders and side slopes, at the following task rates:

Task Difficulty		
moist and loose soils	average soil conditions	hard and dry soils
2.0 m ³ /wd	1.5 m ³ /wd	1.0 m ³ /wd

R9 Patch potholes in carriageway

Potholes collect rainwater on the road surface and restrict it from draining off to the side off the road. Combined with traffic, this stagnant water accelerates the wear of the road surface. Finally, when the water penetrates the road surface layer, it reduces the bearing strength of the road base.





Description of Work

The area to be filled is excavated with squared off edges and to a minimum depth equal to the lowest point of the pothole or until firm and compacted materials are reached.

The excavated material together with other approved fill material is mixed together, watered and placed back into the excavated hole and compacted using hand rammers. Make sure that there is no water in the pothole when it is filled. If the pothole is deep, the materials should be filled and compacted in layers not thicker than 5 centimetres. Compaction is carried out using hand rammers.

The surface level of the filled hole after compaction should be a minimum of two centimetres higher than the adjacent pavement surface level.

Measurement and Payment

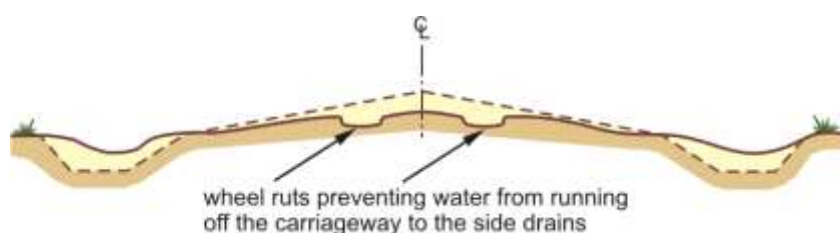
Measurement and payment of works are based on the volume of soils added to the potholes, at the following task rates:

Task Difficulty - Hauling distance to gravel		
Up to 100 m	100 m - 300 m	more than 300 m
1.5 m ³ /wd	1.2 m ³ /wd	1.0 m ³ /wd



R10 Fill ruts in carriageway

Ruts are caused when vehicles keep on passing in the same tracks made by vehicles before them. The weight of the vehicles and their speed push surface material to the sides of the road. This process eventually deforms the road surface camber. The ruts obstruct the water from exiting the surface. The stagnant water accelerates the wear of the surface when subjected to passing traffic.



Description of Work

This work normally comprises of raking excess materials from the road shoulder back on to the carriageway where the ruts have been formed.

In cases of more severe rutting, it may be necessary to bring in additional material to compensate for the gravel loss. The ruts should then be repaired using the same work methods as when filling potholes. The ruts are then excavated to form vertical edges and the fill material is placed, watered and compacted in layers. When using hand rammers for compaction, the thickness of each layer should not exceed 5 centimetres.

Measurement and Payment

If this activity only involves raking excess material from the road shoulders back onto the road carriageway, the work is measured on the basis of length of the road section to be improved, at the following task rate:

Repairing ruts using material from the shoulders:30m/wd

When additional materials are imported, applying the same methods as for pothole patching, measurement and payment of works are based on the volume of soils added to the ruts, at the following task rates:

Task Difficulty – Transport distance to gravel		
Up to 100 m	100 m – 300 m	more than 300 m
1.7 m ³ /wd	1.5 m ³ /wd	1.3 m ³ /wd

R11 Grub edge of carriageway

Grass growing on the edge of the carriageway can prevent rainwater from draining off the road surface. It can also start growing into the carriageway.

Description of Work

Grass and roots should be removed from the carriageway. A string line showing the exact position of the start of the side slope provides a good guidance when removing grass and grubbing the shoulders. Debris should be removed well away from the road to avoid the removed material being washed into the drainage system.

Measurement and Payment

The work is measured on the basis of length of the road shoulder improved, at the following task rate:

Grubbing of Road Shoulders:	200 m/wd
-----------------------------	----------

R12 Reshape carriageway

Over time, the camber of the carriageway is reduced due to the action of traffic and weather.

Description of Work

The camber is rebuilt by redistributing material from the edge of the carriageway to the crown of the road. To achieve the correct levels and camber the works need to be set out using pegs, strings and a line level.

Light reshaping of the carriageway is normally carried out relying entirely on excess materials from the road side. After placing the materials, they are compacted at optimal moisture content.

***Measurement and Payment***

The work is measured on the basis of length of the carriageway improved, at the following task rate:

Task Difficulty		
moist and loose soils	average soil conditions	hard and dry soils
20 m/wd	15 m/wd	10 m/wd

Tools: Excavating soils along the road shoulder can be carried out using hoes. Hoes and rakes are also useful for spreading soils. If the soils are hard, a mattock or pickaxe may be useful.

R13 Grass cutting and bush clearing***Description of Work***

Clearing works consist of removing grass, bush, other vegetation, rubbish and all other superfluous material including the safe disposal of all material resulting from the works.

The work comprises of cutting (not scarifying) all grass and bush on both sides of the roadway and for the entire width between the pavement edge and the top of the back-slope at the outer side of the side drain. The vegetation should be cut to a height not exceeding five centimetres. Where side drains exist on only one side of the roadway, grass and bush cutting on the fill slope should extend for a minimum distance of 2.5 metres from the pavement edge adjacent to the embankment slope. Where no side drains exist, i.e. on road embankments, the clearing works should cover the area from the pavement edge to the foot of the embankment or to the paddy water level on both sides of the roadway.

All bush and branches hanging over the road, shoulders, side drains, mitre drains and traffic signs should be cut down and safely disposed of.

When tree seedlings have recently been planted, it is important that they are not damaged when clearing grass and bush around the seedlings. Furthermore, when the seedlings are young, vegetation close to the trees should be removed to allow the trees good growing conditions.

Finally, trimming of planted trees should be included in this activity on a regular basis to ensure that they develop into healthy shapes and which do not interfere with the road traffic.

Measurement and Payment

The unit of measurement for clearing is square metres (m²). The quantity is taken as the area in square meters designated by the Maintenance Supervisor, and cleared in accordance with these specifications. Appropriate task rates are as follows:



Activity	Task difficulty density of vegetation	
	Dense	Light
Bush cutting m ² /wd	200	300
Cutting grass m ² /wd	100	150

Tools: The most common tool used for bush clearing is the bush knife. Grass cutting is best carried out using a slasher. Larger bushes may need an axe for felling the stem of the bushes. Branches of trees are cut using a saw or a bush knife.

R14 Grass planting**Description of Work**

This work consists of furnishing and planting turf and sods as required to give a healthy stable cover of grass which maintains its growth in any weather and prevents erosion of the material in which it is planted.

Grass should be of native species, harmless and inoffensive to persons and animals and not of a kind recognised as a nuisance to agriculture. It should be free of disease and noxious weeds, deep rooted and sufficiently rapid growing and spreading to give a complete cover of the planted area.

The term "grass" embraces turf and sods and, if the Maintenance Supervisor permits,



may include plants of other types capable of giving effective erosion protection.

The planting of sods or turf should give a continuous cover over the whole area. Turfs should be planted with their root system undamaged, well buried in firm material and packed with moist earth in which they have grown.

Grass should be planted at such time and done in such a way that at the time of final inspection the planted areas are substantially covered with healthy, well established, firmly rooted grass and free from erosion channels.

Surfaces to be planted should be trimmed in such a way that the ground surface after planting maintains the shape and slope as prescribed in the standard drawings.

If required the Contractor should maintain the grass at his expense until the issuance of the Payment Certificate. Maintenance consists of watering, preserving, protecting and replacing grass and such other work as may be necessary to keep it in a healthy condition with a dense and uniform appearance.

Measurement and Payment

The quantity measured for payment is the number of square metres (m²) of turfed or sodded surface. Appropriate task rates are as follows:

Task Difficulty - Transport distance to grass		
Up to 10 m	10 m - 50 m	more than 50 m
20 m ² /wd	15 m ² /wd	10 m ² /wd

Tools: Turf can be cut and removed from its original location using shovels. Head baskets are useful for transporting the turf to its new location. Watering cans are necessary for watering the newly laid turf.

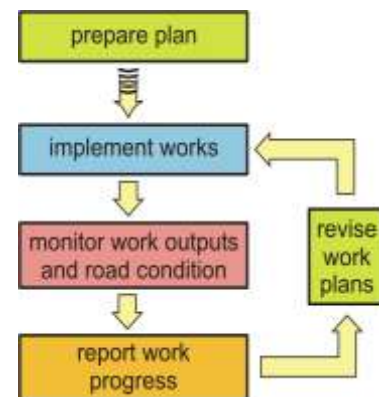
In steep and mountainous terrain, it may not be possible to maintain these gentle slope gradients. With good knowledge of the behaviour of local soils, it may be possible to increase the slope gradient. However, with too steep slope gradients the result is often added maintenance and repair works once the rainy season starts. Instead of pushing the limits of the soils, it is better to find other more sustainable solutions - such as building retaining walls or gabions. Such interventions are however, outside the scope of these guidelines.



4.8 Monitoring and Reporting

Monitoring

Works monitoring is necessary in order to (i) validate that work plans and budgets are adhered to, (ii) measure to what extent the planned progress is achieved, (iii) to adjust task rates to ensure these are fair and achievable and (iv) to ensure good working conditions and work organisation. As demonstrated in this section, monitoring and reporting form an integral part of the planning process. Based on work monitoring and the reported outputs and costs of works, plans can be revised on a regular basis, thereby ensuring that the original purpose and effect of the works carried out are obtained.



A basic concept in routine road maintenance is to preserve the road to its original performance standards to which it was originally constructed. In order to achieve this objective, there is a continuous demand for monitoring of the maintenance works carried out and how this work affects the quality of the road.

The most effective maintenance interventions vary depending on the prevailing weather conditions and traffic volume. By continuously updating the maintenance work plans based on the actual work outputs and the current condition of the road, it is possible to provide more effective maintenance and thus keeping the roads in good condition.

Reporting

The central objective of a maintenance reporting system is to provide management with an effective tool for monitoring work progress against approved plans and budgets.

The reporting system consists of several levels, starting at site level where the reports contain the most detailed information. The following information should be provided in project/site reports:

- ✚ description of road;
- ✚ chainage of road section;
- ✚ activities carried out;
- ✚ targets for each work activity;
- ✚ task rates used;
- ✚ workdays spent on each work activity;
- ✚ no of workers, their gender and age;
- ✚ materials used;
- ✚ tools provided.

At district level, the reports need to be less detailed, consisting of a summary of the information gathered from all the sites. The district reports would normally contain the following information:

- ✚ road names and numbers;
- ✚ total length of each road;
- ✚ total number of workers employed and cost of tools and materials for each road;
- ✚ labour input for the maintenance of the main features (culverts, drains, carriage way, road reserve), and;
- ✚ total workdays per kilometre for each road.

The following forms should be used for the management of the routine maintenance of rural roads using labour-based work methods carried out by Community Maintenance Groups. These forms also serve as a comprehensive reporting system.

(i) *Monthly Activity Plan and Inspection Report*

The Maintenance Engineer is responsible for preparing the annual work plan with the overall estimated scope of works. During the course of the contract, the Contractors Supervisor needs to assess which parts of the contracted works should be carried out as a first priority. These decisions are reflected in the monthly plans, detailing quantities of work and estimated labour input, which can be derived using the agreed task rates. Actual work output is measured at the end of the month, giving the basis for calculation of actual labour input.

Form Monthly Activity Plan and Inspection Report

Monthly Activity Plan/Site Inspection Report										Form A-9
District name:				Road name:				Suko:		
Contract No:				Section length:				Name of CMG Leader:		
Contractor:				Section of this contract Ch: to Ch:				Name of Supervisor:		
Monthly Activity Plan for the period: / / to / /										
Item No	Routine road maintenance activities	Output per WDs (work norm)	Quantity of works	Maintenance Length This Month		Additional information	WD planned	Percentage completed	Certification for work	
				From Ch	To Ch					
RM-1	Road inspection and removing obstacles									
RM-2	Cleaning culverts incl. in/outlets									
RM-3	Clear debris from bridges, drifts and cause ways									
RM-5	Cleaning lined drain & repairing side drains/mitre drain									
RM-6	Repair scour checks									
RM-8	Repair of erosion on shoulders									
RM-9	Filling potholes									
RM-10	Fill rut in carriageway									
RM-11	Grubbing carriage way									
RM-12	Rake excess gravel from shoulders on carriageway									
RM-13	Clearing bush and cutting grass									
RM-14	Plant grass									
RM-15	None standard items									
Supervision by GMG Leader										
Total WDs for this month										
Note: (a)=Total road length- km (b)= WDs/km/year						(c)=(a) x (b) /12 =Total average WDs available during the month. In dry season should be given less and more in rainy season				
Date: / /			Date: / /			Date: / /				
Agreed by:			Measure by:			Witnessed by:				
Signature:			Signature:			Signature:				
(GMG Leader)			(Contractor's Supervisor)			(ERA Maintenance Engineer)				

(ii) Report on Employment Generation

The Contractor is through the Agreement obliged to maintain a musterroll, keeping track of all workers engaged in the maintenance activities. This information is also captured by the Maintenance Engineer. The signed musterroll must be attached to the Payment Certificate including a summary of the employment created in terms of beneficiaries and total number of worker days, disaggregated by sex. The equivalent number of worker days is calculated based on the output and the established task rates. The actual number of people working and number of work days is also recorded on the annual work plan to compare actual inputs with planned inputs.

The musterroll also serves as payroll, and each member of the Community Maintenance Group should sign when receiving his or her payment for the month.

Form Musterroll/Payroll

Muster and Payroll															Form A-12														
District name:										Road Name:					Suko:														
Contract No:										Section of this contract Ch:					From / / To / /														
Contractor:										Name of CMG Leader					Page no: Of														
No	Full Name	Sex		Muster-Roll										Actual WD		C-Equivalent WD	Wage rate, USD	Payroll											
		M	F											M	F			Amount paid, USD	Signature/Finger Print										
Day->																													
1	Name of Gang leader																	1											
2	Name of member 1																	2											
3	Name of member 2																	3											
4	Name of member 3																	4											
5	Name of member 4																	5											
6	Name of member 5																	6											
7	Name of member 6																	7											
8	Name of member 7																	8											
9	Name of member 8																	9											
10	Name of member 9																	10											
11	Name of member 10																	11											
(a) = Total WDs planned for this month														300		Total													
(b) = Total actual WDs of this month														Total															
(C) = Equivalence WDs of each person				(C) = (a) / (b) * (actual WDs of each person)																									
Date: / /										Date: / /										Date: / /									
Name:										Name:										Name:									
Signature: (CMG Leader)										Signature: (Contractor's Supervisor)										Signature: (Contractor's director)									

(iii) Payment Certificate

At the end of the month, the Contractor needs to report on outputs and expenditure. Once again, this information is recorded in a standard form providing the detailed expenditure breakdown on labour, tools and materials for each road (see table below). This report should be checked and approved by the Maintenance Engineer to ensure that it has been prepared accurately.

The Monthly Payment Certificate should be prepared at the end of every month. It needs to be prepared in a timely manner so it can be used as an input for the overall reporting of all the maintenance works, covering the entire programme. It is based on the final musterroll and should also include the number of work disaggregated by gender.

Form Monthly Payment Certificate

PAYMENT CERTIFICATE FOR ROAD ROUTINE MAINTENANCE WORKS										Form A-10
District:					Contract No:					
Contractor:					Certificate No:					
Address:										
Duration of Contract From / / To / /					Period of Paymen Certificate From / / To / /					
This is to certify that the routine road maintenance works as detailed in the attached Site Inspection Report and referred to in the Bill of Quantities of the above mentioned Road Maintenance Contract have been completed and accepted to the satisfaction of the ERA Project in accordance with the terms and condition of the Contract.										
Road Section/ Chainage/ Composition of Team	Unit	Progress of work and worker-days till this month				Progress of Payment. (Amount USD)				
		Contract	Previous	This certificate	Total incl. this certificate	Value in Contract	Value all previous certificates	Value this certificates	Total (incl. this certificate)	
Road Name: A										
Section A (Suko A)	WD Leader									
0+000-5+000	WD Member									
M= F=	WD Women	>30%					%	%	%	
Section B (Suko B)	WD Leader									
5+000-10+000	WD Member									
M= F=	WD Women	>30%					%	%	%	
Section C (Suko C)	WD. Leader									
10+000-15+000	WD. Member									
M= F=	WD Women	>30%					%	%	%	
Road Name: B etc										
Section etc	WD Leader									
Chainage etc	WD Member									
M= F=	WD Women	>30%					%	%	%	
Worker Days and Amounts Totals										
Total=	WD Leader									
M=	WD Member									
F=	WD Women	>30%					%	%	%	
Hand tools										
Laterite M ³										
Supervision cost fixed monthly										
Overhead+profit fixed monthly										
Other materials etc	Description									
Advances	Description									
Contingency	Description									
Note: The Monthly Site Inspection Report and Musterroll, duly signed, shall be attached to this Payment Certificate					Total					
					Other deduction					
					Amount due					
Works inspected by ERA Maintenance Engineer					Signature:		Date: / /			
Agreed by Contractor's Director					Signature:		Date: / /			
Approved by ERA Project Chief Engineer					Signature:		Date: / /			

(iv) Hand tools and materials

The tools and materials inventory keeps track of all hand tools and materials which have been issued to the contractors. Information regarding type and amount of tools and materials to contractors should be entered every time they are issued. Since these tools are only on loan to the contractors, this information forms part of the overall tools inventory management in each district.

The Contractor is responsible for managing and maintaining the tools, and shall in turn prepare a tools inventory list when handing over tools and materials to the Community Maintenance Group. Cost of tools and materials is included in the payment certificate.

Form for Tools and Materials

Quantity and cost of hand tools required for the routine road maintenance works					Form A-5
District:		Contract Number:			
Number of CMG's:		Total Number of Workers:			
No	Hand tools	Unit	Quantity	Unit price. USD	Amount. USD
1	Shovel and handle	Pcs			
2	Hoe and handle	Pcs			
3	Pickax and handle	Pcs			
4	Axe and handle	Pcs			
5	Bush knife	Pcs			
6	Rake/Spreader	Pcs			
7	Basket	Pcs			
8	Watering can	Pcs			
9	Wheel barrow	Pcs			
10	Hand gloves	Pair			
11	Mask	Pcs			
12	Wooden peg	Pcs			
13	Sting line	Kg			
14	Measuring tape (5m)	No			
15	Measuring tape (30m)	No			
16	Hand rammer with handle	Pcs			
17	Other/materials				
18	Other/materials				
Total amount					
Not: The hand tools will be property of the project after the end of the maintenance contract The contractor is responsible to distribute these hand tools the CMG Leaders			Date: / / Name: Signature: Company director		

5 Contract Management

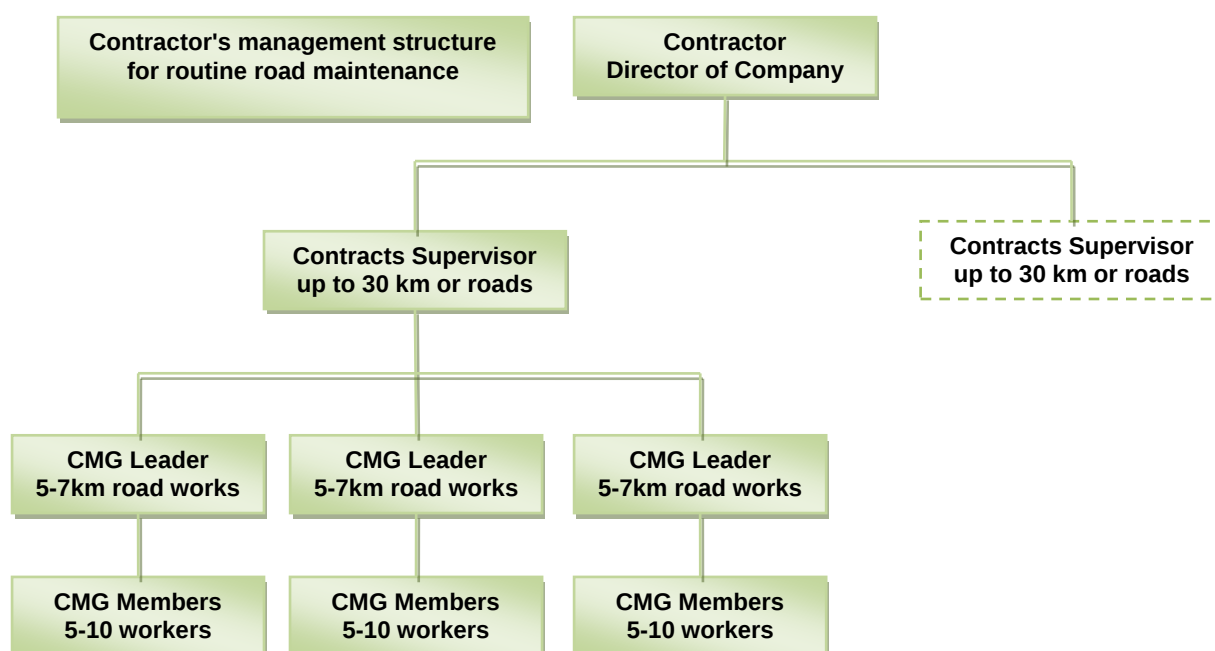
5.1 Overview

General Description

Routine maintenance of low traffic roads is an activity requiring small resource inputs over a large number of widely separated locations. For this reason, this activity is well suited for manual labour and the involvement of local communities. Under average conditions, experience from Timor-Leste show that an input of an average of 15 work days per month should cover the routine maintenance works of a 1 km road section, with traffic of about 25 to 50 vehicles per day.

One way of managing road maintenance in a district is to utilise local contractors who engage or sub contract communities to implement the works. These locally based contractors will be tasked with the planning and supervision of the works carried out by the local communities. The responsibility of the contractor is then hence to instruct and supervise the leader of the community maintenance groups, and to provide these groups with the necessary resources to carry out the works. A contract, which may cover several roads and many communities, is awarded to a local contractor, this reduces the administrative burden on the client, as it delegates the direct supervision of each group of community workers to the contractor. Such approach will also promote the development of small scale district based contractors, as this is work which require a minimum of equipment and and therefore is an appropriate entry level for emerging contractors.

Each Community Maintenance Group (CMG) is assigned to a specific road section of approximately 5-7 km and is headed by the CMG leader who recruits and manages the group of workers, normally 5-10 persons, from the nearby communities.



The contractor shall enter into an agreement with the CMG leader and should ensure that this person is someone who is respected in the community, who can read and write and preferably has been involved in previous road works activities.

Simple but appropriate and good quality hand tools and necessary materials need to be provided to the CMG by the contractor. The CMG leader is then responsible for the proper caretaking and maintenance of the tools and other materials provided by the contractor. The CMG leader is expected to return the tools to the contractor upon completion of works, however the CMG leader and the groups should ideally be kept for the next round of contracts. The figure below shows the contractor's organisation for routine maintenance.

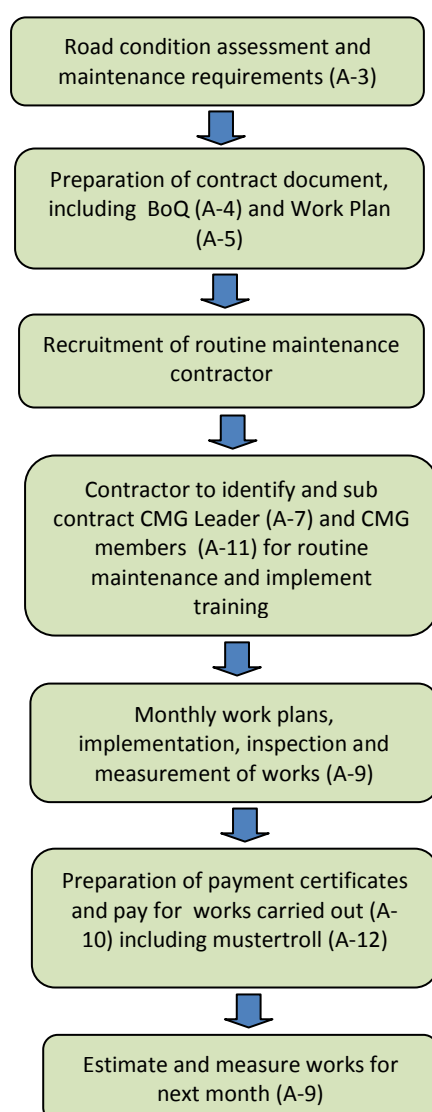
Summary procedure of ERA routine maintenance management

The management procedure for routine maintenance contracts is summarised in the adjacent figure. Reference is made to forms included in the Sample Contract in Section 5-9. Basically, it starts with the ERA maintenance engineer carrying out a general road condition survey to prepare the overall workplan and the annual cost estimate. This

forms the basis for the routine maintenance contract document, which may include several roads.

A trained maintenance contractor is thereafter either appointed directly by ERA or awarded a contract through a bid process to carry out the maintenance work up to one year. The contractor, together with the local leadership, identifies CMG leaders who will be responsible for suitable lengths of road, typically 5-7 km. The CMG leaders in turn recruit the CMG members based on the information provided by the contractor. The contractor and the CMG leader enters into an agreement which spells out the roles and responsibilities of the parties. The CMG leader also prepares employment contracts for each staff member. The contractor and the CMG will be trained by ERA to manage the works effectively

The contractor and the CMG leader agree on a time schedule for the execution of the works and at agreed intervals, the works completed are inspected and paid for. Usually this is done on a monthly basis. It is particularly important that the roads are frequently inspected during the rainy season to ensure that the drainage system is operating properly, thereby (i) avoiding damages to the road body, and



(ii) if any erosion is occurring, these problems are rectified at an early stage thus limiting the damages.

Following the inspection, the contractor and the CMG leader agrees on the achieved outputs and sign the Site Inspection Report. The number of worker days and the signed musterroll is prepared by the CMG leader. The contractor collates all this information and prepares the claim for all the maintenance work and submits this claim to ERA for payment. The contractor is responsible for paying the CMG leaders and shall also follow up to make sure that all CMG members are paid in accordance with the musterroll. If the work has been carried out to satisfaction, the contractor and the CMG leader agree on the next months workplan.

The matrix in Section 5.8 describes the exact use of the various documents as listed above, how they are prepared, by whom, filing and approval procedures, etc. Finally, samples of the above documents, including sample forms, have been included in **Section 5.9 Sample Contract**.

5.2 Selection of Roads for Routine Maintenance

Eligible roads for routine maintenance are all maintainable roads in a given project area. Obviously, all newly constructed or rehabilitated roads should be placed under routine maintenance.

A maintainable road is essentially a road which at some stage was designed and constructed according to common engineering principles, including the installation of a drainage system, adequate river crossings and a proper pavement structure – as opposed to a basic trail or track which do not contain such features. When managing a network of roads which has received limited maintenance, some road sections may have endured some severe damages to the extent that there is no longer any point of providing maintenance. Instead, the appropriate action would be to reconstruct or carry out extensive rehabilitation works before the road is once again included in a maintenance scheme.

Typically, roads where the average traffic speed can be maintained above 20 km per hour are considered maintainable. Contracts should be divided into suitable packages for coand generally follow the overall criteria below

-  the road should be in a maintainable state;
-  the road is not maintained by any other donor or project, inclusive of roads under rehabilitation and maintained by a contractor;
-  the road should connect to the national, district or rural road network, either directly or via intermediary all-year passable roads;
-  one contract normally covers an entire road or several roads with CMG's sub contracted for stretches of 5-7 km;
-  each CMG sub contract should be confined within the borders of one Suko.

5.3 Timing of and Prioritization of Maintenance Inputs

Routine Maintenance

In order to prepare the annual and monthly workplans the ERA maintenance engineer and the contractors supervisors should know when the different activities should be carried out over the year, taking account of the varying need for these activities. Certain activities have to be carried out at specific time in the year. For instance clearing of the drainage structures, is an activity which is important just before the rainy season starts and for the duration of the rains, ensuring that they allow the free flow of runoff water. In the dry season, the drainage system is of less importance, and priority should be given to other activities like filling potholes. In general, the period just before and during the rains requires more work than the dry period, as this is when the drainage system needs to be cleared, water damage to the road needs to be repaired, landslides need to be removed and the fast growing vegetation needs to be controlled. The figure below indicates activities have priority in different periods of the year.

TIMING OF ROUTINE MAINTENANCE ACTIVITIES

Item No	Road routine maintenance activities	Rainy season				Dry season						Rainy season	
		J	F	M	A	M	J	J	A	S	O	N	D
RM-1	Road inspection and removing obstructions												
RM-2	Cleaning culverts incl. in/outlets												
RM-3	Clear debris from bridges, drift and causeways												
RM-5	Cleaning lined drain & repairing side drains/mitre drain												
RM-6	Repair scour checks												
RM-8	Repair of erosion on shoulders												
RM-9	Filling potholes												
RM-10	Fill rut in carriageway												
RM-11	Grabbing carriage way												
RM-12	Rake exceeded gravel from shoulders in carriageway												
RM-13	Clearing bush and cutting grass												
RM-14	Planting grass												
RM-15	None standard item												
High Priority													
Low Priority													

Emergency Maintenance (see also Chapter 7)

Besides scheduled maintenance activities, road works agencies need to make provisions in the budget for the occurrence of unforeseen damage to the road network. This could be caused by excessive floods or rains, landslides or other freak conditions. By definition, emergency maintenance cannot be forecasted and therefore does not figure in annual work programmes. It is, however, possible to reserve a certain amount of funds for this purpose, as a contingency in the contract. The contractor needs to know

how to access the contingency budget for such incidences, thus allowing them to react in a timely fashion in order to reopen access on the road and limit the extent of the damages.

5.4 Identification of Contractor Routine Road Maintenance

The routine maintenance of a road or a number of roads in a district is contracted out to trained local contractors, generally on an annual basis. This can be done either by direct award to a contractor who has successfully carried out rural road rehabilitation or maintenance works or awarded to a contractor through a local competitive bidding process.

Each selected contractor must have a trained maintenance supervisor who will plan and supervise the maintenance work. The contractor shall also have supervision vehicles or motorbikes and preferably own a truck. Each maintenance supervisor supervises up to 30 km roads, which will cover several communities and several CMG sub contracts. If roads covered by a contractor longer than 30 km then additional supervisors are required.

The maintenance contract, which normally is for one year, is prepared by the ERA Project and following the identification and award process, the maintenance contract is signed between the ILO ERA Project and the successful contractor. The contract will be witnessed by the sub-district Administrator. Copies of the signed contract will be issued to the contractor, the sub-district administrator and the ERA maintenance engineer.

The contract will stipulate that the works shall be carried out using labour-based methods and involve communities as sub-contractors (CMG's). The ERA Project will provide initial training to the contractor and the CMGs and will carry out on the job training and overall monitoring of the works. The ERA Project will help socialize the maintenance activities in each Suko, explaining the roles and responsibilities of each party, and support the process of identifying the CMG leader and CMG members.

A sample of the contract is attached in Section 5.9.

5.5 Selection Community Maintenance Group (CMG)

Once the road maintenance contract is signed, the contractor will mobilize the CMG to carry out the maintenance activities. Each CMG is responsible for maintenance of a road section between 5-7 km. It is important to keep the CMG leader and members even when a new contractor is selected.

Before commencing selection of the CMG leader and group members, the size of the maintenance group needs to be determined. In principle, each road section should have its own maintenance group, and longer roads may have more than one group. In general the number of members in the CMG depends on length of the road section and the amount of work to be done under the sub contract.

The group should usually consist of between 5-10 members to cover maintenance of a road section of between 5-7 km of roads. It is important to note that cost of the routine road maintenance work per km vary according to the road characteristics. Steep roads

having more drainage works, higher traffic volumes and a large road reserve requiring more worker days for the same road length and so on.

Once the amount of work has been established and the required number of group members determined, the process of identifying the CMG leader can begin. The CMG leader is then responsible for selecting his/her own group.

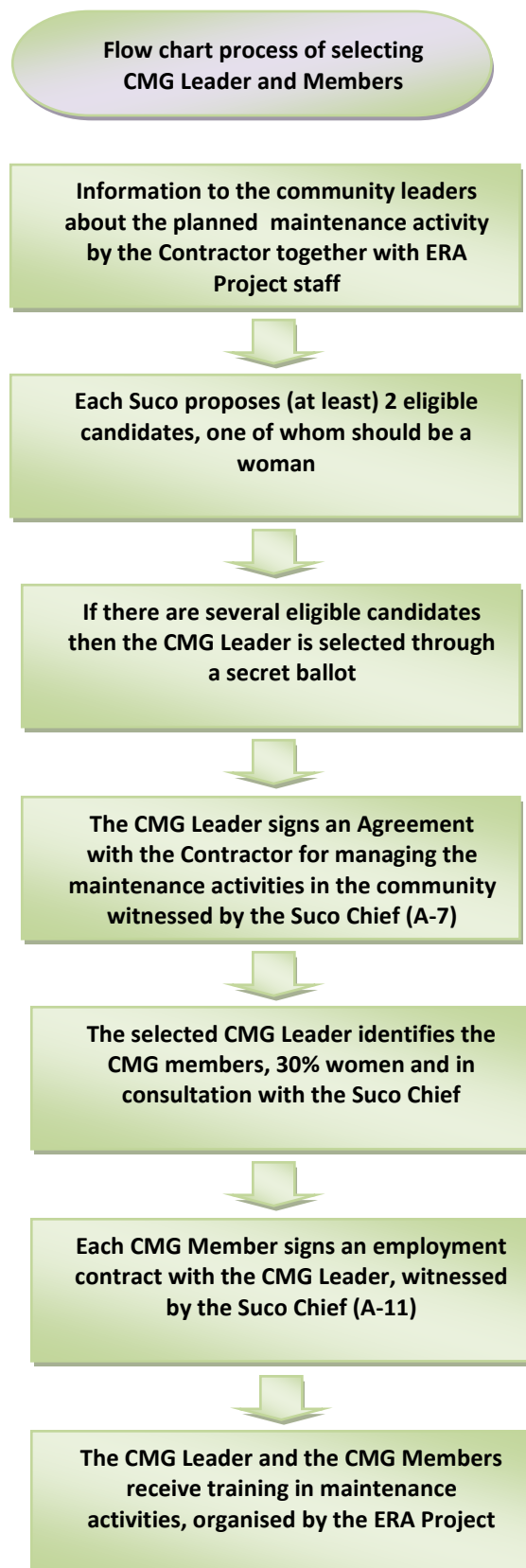
Selection CMG Leader

The CMG leader should be identified by the contractor in consultation with Suco Chiefs and local leaders to ensure effective partnerships between local communities and the contractor, and the CMG leader should be identified from the communities in the vicinity of the roads. This is a bottom up contractual approach to routine maintenance, empowering the communities in choosing their road maintenance group leader.

Whilst the selection of CMG leader is discussed with the community leaders, the minimum requirements for the CMG leader are as follows, he or she:

- ✓ can read and write;
- ✓ has completed secondary education;
- ✓ lives along the road to be maintained;
- ✓ has a good standing in his/her community;
- ✓ preferably has some experience from road maintenance, rehabilitation or construction works;
- ✓ can commit to the responsibility and does not have any conflicting assignments.

The process of selecting the CMG leader and the principles for selecting CMG members should be discussed and decided in agreement with the Suco Council. Where a road passes through several sukos, each road section, or CMG sub contract, should be confined within the boundaries of one Suco.



If there are several Aldeias along the road section to be maintained by the CMG, the selection of CMG leader must be discussed and agreed with the Suko Council. The Suko Council may also provide some guidelines for the recruitment of CMG members, although this is the responsibility of the CMG leader. The selection of CMG leader (who must meet the set criteria) may be done through casting of secret ballot as shown in the figure to the right.

Selection of CMG members

Once the CMG leader is selected, he or she will be informed about the objective and scope of the works, the management responsibilities and how many group members to recruit. The CMG leader has a very important responsibility in choosing a well balanced team, which should be endorsed by the Suko Council, with team members who are able to work as much and as hard as necessary and who will work in harmony with each other. The CMG should comprise of at least 30% women.

Once the maintenance group members have been selected and the names provided to the contractor and to ERA's maintenance engineer they should not be changed, unless in exceptional cases where a group member does not perform or where a group member decides to discontinue the work. The CMG leader is responsible for managing the group and should report any changes to the contractor.

Agreement between the contractor and the CMG Leader (sub-contract).

After finalizing selection of the CMG leader the contractor prepares a maintenance agreement for the CMG, represented by the CMG leader. Once all parties have agreed on the contents of the agreement, the CMG leader and contractor will sign the agreement with the Suko Chief and ERA's maintenance engineer as witnesses. Copies of the signed agreement will be provided to all signatories. The conditions of the agreement outlining the duties and responsibilities of the CMG is attached in an Annex 7.

After signing the agreement with the contractor, the CMG leader offers a simple employment contract to all the maintenance group members. The employment contract should be witnessed by the Chief Suko. Copies of the signed employment contract is issued to the individual CMG member, the CMG leader, Chefe Suko the contractor and ERA maintenance engineer. The CMG leader should also complete the registration form for all CMG members and forward this information to the contractor. The conditions of the employment contract including the duties and responsibility of the maintenance member is attached in Annex 11.

5.6 Road Maintenance Training

When a maintenance contractor has been identified and CMG's have been established they will receive technical and management training, allowing them to execute the maintenance works effectively. It is important to make the maintenance training obligatory for all CMG members, in order to ensure (i) the maintenance workers know how the maintenance activities are carried out and (ii) that they understand the conditions of work.

Training is provided to contractors director and supervisor, to Public Works supervisors, ERA supervisors, CMG leaders and CMG members. This training is carried out before commencing the maintenance activities and will be divided into two types targeting the different categories of maintenance personnel. The following two types of training are planned for the ERA Project:

Maintenance Management Training for the Contractor

This training will be done both in classroom and as practical exercises. The training is provided to the contractors directors and supervisors, ERA supervisors and PW's technical staff. The training aim is to provide management skills and technical know-how required to ensure the proper management of the maintenance contract with the ERA Project and how to manage the agreement with the CMG's.

The contract management training includes different aspects, such as understanding how to prepare the bid and the rights and obligations in the contract. The training include planning and budgeting, supervision skills, problem solving and reporting activities required by the ERA project.

The contractor will learn about various maintenance tasks, how to carry out road condition assessment, productivity rates, how to establish unit rates, and how to prepare a budget and plan for the various routine maintenance activities. How to prepare monthly plans and monthly inspection reports and how to prepare and submit payment claims.

The contractor will also learn how to establish and manage sub contracts with community groups, including how to work with the community leadership in identifying suitable CMG Leaders.

Maintenance Management Training for the CMG

This training will be conducted at a suitable venue in one of the villages situated along the road to be maintained. One or more CMGs along this road will participate in this training.

The technical training for the CMG aims to provide the group members and their leaders with the technical skills and know-how required to carry out the different activities included in their routine maintenance agreement. The CMG leader will learn how to prioritize activities, how to measure and set out tasks, and how to allocate the works to the CMG members. This training is carried out both in the class room and in the field. After the class room training the CMG will be trained in how to practically carry out various activities in the field. The CMG is coached on the job during the initial period of operation (generally 6 months to one year) by the contractor's supervisor and by ERA's maintenance engineer. It is recommended to include some other additional workers in the initial training, in order to create a pool of trained people who can assist the CMG when needed, or join the group should a vacancy arise.

The CMG leaders will be trained specifically in how to manage his or her obligations under the agreement with the contractor. This include, planning and allocation of resources based on the monthly plans, registration and management of workers,

managing the muster roll and preparation of the monthly claim and payroll for submission to the contractor.

The contractor's supervisor and ERA maintenance engineer will participate in this training as resource persons.

5.7 Roles and Responsibilities of Contract Parties

ERA maintenance engineer is responsible for drafting the bid documents for the maintenance contract. The information, such as annual work plans, bill of quantities etc will be checked and verified by the ERA Project Chief Engineer. The successful maintenance contractor must have a full understanding of the contents of the contract. The contractor is then responsible for identifying and contracting CMG leaders who will recruit the CMG members. The ERA Project provides initial training followed up with on the job training and overall monitoring of the works.

The contractor will together with the CMG leader prepare monthly plans. Supervision of the maintenance agreement with the CMG includes assessing whether the CMG has met the works specification and schedule of works that was agreed in the monthly maintenance plan. This task is carried out by the contractor's maintenance supervisor, at times accompanied by the ERA maintenance engineer.

The contractor's maintenance supervisor is required to inspect all road elements, work quantities and compare their condition to the desired standards and functions of the road. The supervisor shall visit the road based on a schedule agreed with the CMG leaders, however, the maintenance supervisor shall visit each maintenance group at least once a week. The maintenance supervisors shall at the end of each month, together with the CMG leader, prepare the monthly payment claim and prepare work plan for the following month.

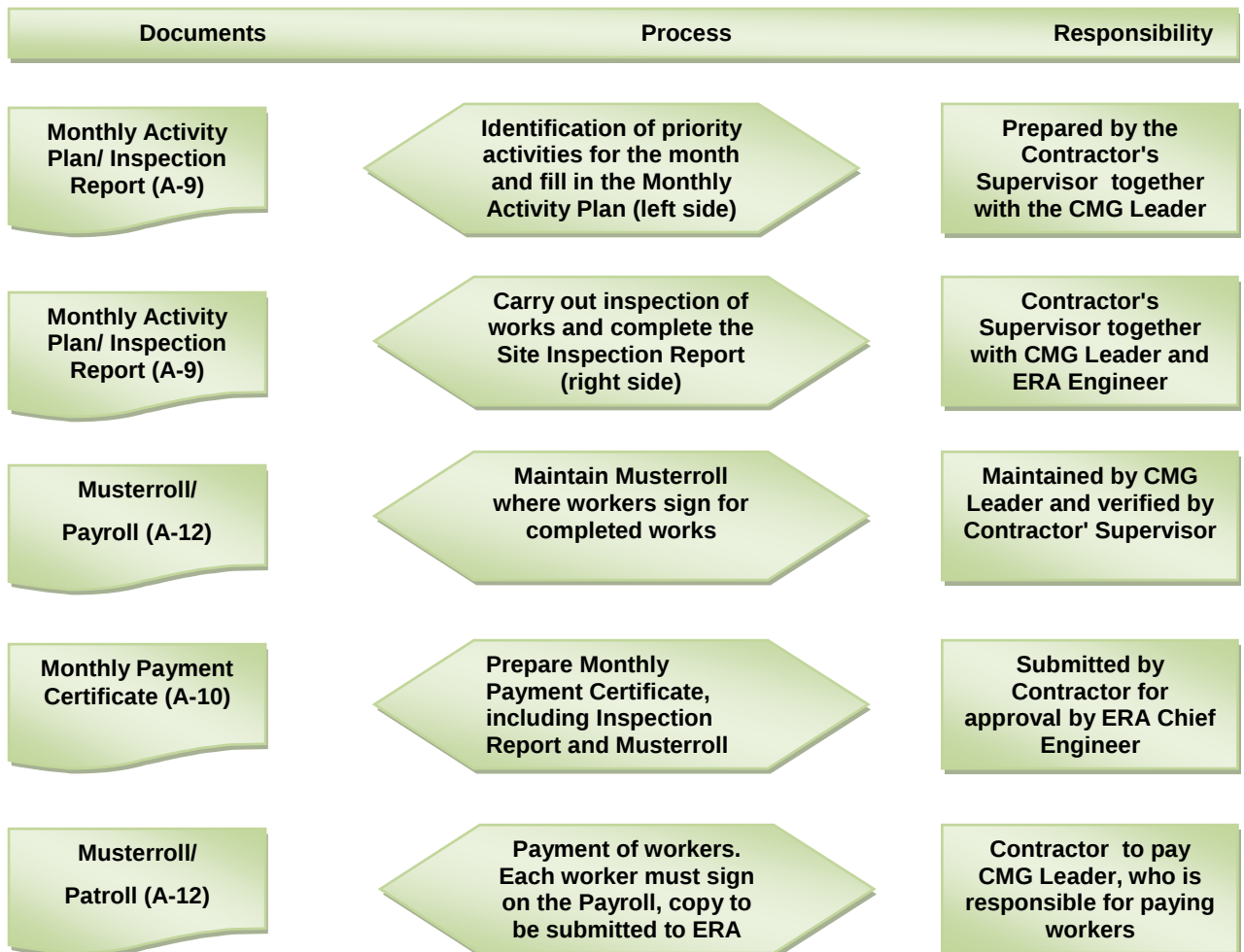
Apart from these regular visits, the maintenance supervisor also carries out random visits as well as follow up visits in those cases work has not been completed according to the desired requirements, in order to check if the deficiencies have been corrected.

In addition to the supervision by the contractor's supervisor, the ERA's maintenance engineer regularly visits the road, at least once a week, and always prior to certify payment request by the contractor. The ERA maintenance engineer will combine monitoring with the on-the-job training to the maintenance group. In certain cases, unannounced visits are also carried out, as well as interviews with road users and the local community to obtain their assessment of the road conditions.

Inspection and Payment

ERA's maintenance engineer inspects the completed works on a monthly basis and assists the maintenance supervisor with the preparation of the monthly payment certificate for payment of the work approved for that month. Based on the payment certificate, which includes the musterroll, the contractor will be responsible for paying the CMG. This should be done in the presence of the ERA's maintenance engineer. Each member of the CMG shall sign on the musterroll when receiving the payment,

The figure below indicates process of planning, inspection and payment for routine maintenance.



Monthly Activity Plan and Site Inspection Report

The Monthly Activity Plan and Site Inspection Report (Form A-9) is the key instrument for effective management and administration of the routine road maintenance works. It serves a number of very important functions including:

- ✓ The planned activities for each month are listed in the left section. The monthly plan, which is based on the annual plan, is prepared out by the contractors supervisor together with the CMG Leader. The plan will indicate type and location of activities and the number of worker days required to complete those. If any tools or materials is provide to the CMG this should also be indicated in the plan. The contractor's supervisor and the CMG leader sign off on the plan.

- ✓ At the end of the month the contractor's supervisor together with the CMG leader inspect the works and compare this to the planned works and instructions given at the beginning of the month. The contractor will following the field inspection establish the percentage completed for each activity. The contractors supervisor and the CMG Leader will sign off on this inspection report, which forms the basis for the contractors claim.
- ✓ The next months work is planned in conjunction with this inspection and activities not completed may be continued and new activities identified.

In order to facilitate site inspection activities and ensure efficiency and transparency of the procedure, the template for the Monthly Activity Plan - Site Inspection Report is produced as a pre-printed A4 size book. When the Monthly Plan has been completed (the left half of the form) signed copies should be forwarded to (i) the CMG Leader (ii) ERA maintenance engineer. Once the form has been completed (the inspection carried out and results included on the right hand side of the form) signed copies should again be forwarded to (i) the CMG leader and (ii) ERA maintenance engineer. A signed copy of the completed Monthly Activity Plan - Site Inspection Form should also be included in the Monthly Payment Certificate.

Monthly Payment

The contractor is responsible for preparation of the Monthly Payment Certificate. The Monthly Payment Certificate is based on the Site Inspection Report which is completed together with the CMG Leader, and the musterroll completed by the CMG Leader, and verified by the contractor. The ERA's maintenance engineer will support the contractor to prepare the Monthly Payment Certificate. The contractors claim, the **Monthly Payment Certificate** must include:

- ✓ Cover with contract info and dates and number of claim
- ✓ Monthly Payment Claim Form, signed by the Contractor and the ERA Maintenance Engineer
- ✓ Activity Plan/Inspection Report, signed by the Contractor and the CMG Leader
- ✓ Musterroll, signed by the Contractor and the CMG Leader

Monthly Payment Claim Form

The contractor completes the Monthly Payment Claim Form, each month. This form includes information on advances, totals of previous payments, and the monthly claim based on the Site Inspection Report. Claims will be done for actual work done, including for labour, tools and materials and contractors costs. This Monthly Payment Claim Form should be checked and signed by the ERA maintenance supervisor.

Advances on Payment

An advance payment will be provided to the contractor upon signature of the contract. The advance is provided to enable the contractor to procure tools and payment of the first months wages. The advance payment will be paid back over the duration of the contract in proportion to the monthly claim. Additional monthly advances can also be

considered if there is specific work that needs to be done. Such advances should be repaid at the end of the month in the following Monthly Payment Certificate.

Final Payment

The final payment is made at the end of contract following the same process of the interim/monthly payment. However, before the final payment will be released, the contractor is responsible to account for the tools and materials, and prove that all outstanding obligations have been met, in particular wage payments to the CMG. Tools and materials will be returned to the ERA Project for use in the subsequent maintenance contract. If there are unreasonable losses of tools or materials or if there are outstanding payments by the contractor, the ERA project may deduct the corresponding amount from the final payment and may also decide to settle outstanding payments directly.

Activity Plan Inspection Report

The Monthly Activity Plan and Site Inspection Report is covered by one form (*Form A-9*) where the plan is prepared on the left hand side and the actual quantities marked on the right hand side following the monthly inspection. The plan and the inspections is prepared by the Contractor's Supervisor together with the CMG Leader. This form should be signed by both and included in the Monthly Payment Certificate. The ERA Maintenance Supervisor will provide overall guidance on the planning and inspection process.

Musterroll

The Musterroll, which also serves as the Payroll (*Form A-12*) is managed and updated daily by the CMG Leader and summarised on a monthly basis to form part of the Payment Claim. This document is provides information about who worked and the number worker days used to achieve the actual output, which was measured and agreed with the Contractor during the site inspection. Note, the number of worker days in the musterroll should correspond to the actual workerdays necessary to achieve the actual output.

5.8 Standard Contract Documents

Overview

The maintenance contract is prepared for a trained maintenance contractor. The contract is signed between the contractor and the ERA project. As stipulated in the contract, the contractor needs to identify community maintenance groups (CMG) to carry out the maintenance activities, one for each road section of 5-7km,. Each CMG is headed by the CMG Leader who signs an agreement with the contractor.

A standard format for routine maintenance contract has been developed in order to establish a uniform practices for all routine road maintenance works. Contracts documents for routine road maintenance works comprise of:

Contents of routine maintenance contract	
Maintenance Contract (Conditions Annex1, Specs. Annex 2)	The main document including standard clauses, specific instructions and technical specifications (contract between the maintenance contractor and the ERA project)
Annex 3	Road Condition Assessment (Form A-3)
Annex 4	Bill of Quantity and Cost Estimates (Form A-4)
Annex 5	Annual Work Plan (Form A-5)
Annex 6	List of Tools and Materials (Form A-6)
Annex 7	Sample Agreement between contractor and CMG Leader (Form A-7)
Annex 8	Sample Form: List of tools and materials from contractor to CMG (Form A-8)
Annex 9	Sample Form: Monthly Activity Plan/Site Inspection Report (Form A-9)
Annex 10	Sample Form: Monthly Payment Certificate (Form A-10)
Annex 11	Sample Employment Contract CMG Leader and Members (Form A-11)
Annex 12	Sample Form: Musterroll/Payroll (Form A-12)

The matrix below describes these forms in more detail, their purpose, who is responsible for preparing them, timing and key information. The forms are all included in the 'Sample Routine Road Maintenance Contract' in section 5.9 below.

Overview of Contract Contents (sample forms)

Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
AGREEMENT including Special Conditions (Annex 1) and TOR/Technical Specifications (Annex 2) <i>Prepared by ERA</i>	Standard Agreement, including Technical Specifications for routine maintenance between ERA and a trained maintenance contractor. When contracting out periodic maintenance, procedures established for road construction works should be applied.	The ERA Maintenance Engineer is responsible for dividing the maintenance works into suitable sub sections and for preparing the estimates and annual work plans. It should be checked by the Project Chief Engineer	A new Agreement is prepared every time maintenance works is contracted out, usually for 6-12 months.	The Agreement is the most essential part of the contract documents, and needs to be duly filled out and signed for by all parties.	The Agreement is signed between the ILO/CTA the authorised representative of the Contractor and witnessed, for example by the Sub-District Administrator. All contract parties should keep one signed copy of the Agreement	Contract Number Name of the Contractor District, sub-district(s) road name(s) Scope of works (km) Conditions of Contract Instructions and technical specifications, methods of measurement and payment Amount (USD) Dates
Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
ROAD CONDITION SURVEY Annex 3 <i>Prepared by ERA</i>	To record the actual condition of the road as a basis for determining the scope of routine maintenance work.	The ERA Maintenance Engineer is responsible for carrying out physical road condition assessment. It should be checked by the Project Chief Engineer .	The Road Condition Survey should be prepared once in a year and before engaging the maintenance contractor.	The road condition survey template lists all the maintenance activities. The estimated quantities are filled in for each 200 metres of the road. With the established task rates and the necessary frequency, the total number of Annexworker days can be established. If a road section is longer than four kilometres, it is necessary to utilise several copies of this form.	The information will be checked and approved by the Project Chief Engineer. The road condition survey will be included in the contract and should be signed by the contractor. The Contractor will also provide one copy to the CMG Leader for information.	District, sub-district road name Activity Chainage Quantity Task rate Frequency Total No of Worker Days

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Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
BILL OF QUANTITIES AND COST ESTIMATES Annex 4 <i>Prepared by ERA</i>	The Bill of Quantity forms a basis for cost estimates and pricing, It provides details of all the work items included in the maintenance contract (quantities, unit costs, frequency and total costs). In addition to labour costs, the BoQ will include: Cost of handtools; Material costs; Supervision costs; Company costs; Contingencies;	The ERA Maintenance Engineer is responsible for preparing and calculating the Bill of Quantity / cost estimate based on the result of the road condition survey. It should be checked by the Project Chief Engineer	The BoQ and annual cost estimate should be prepared once in a year and before engaging the maintenance contractor.	The BoQ template lists all the maintenance activities. Based on the road condition survey the quantities and corresponding worker days for each road are filled in for each activity. The quantities and worker days are then summed up for all roads included in the contract. All routine maintenance activities and how they are measured are described in detail in the Technical Specifications and the Road Maintenance Management Manual.	The BoQ and Cost Estimates should be checked and approved by the Project Chief Engineer. The quantities and rates should also be agreed with the Contractor before he or she signs the contract. It should be noted that quantities may vary and that payments are based on actual quantities and the agreed rates in the Bill of Quantities.	Contract Info Activity Quantities Worker days Unit rates Labour Cost Cost of hand tools Cost of materials Supervision cost Overhead Contingency Total Costs
Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
ANNUAL WORK PLAN Annex 5 <i>Prepared by ERA</i>	This form provides the details of the number of work days, amount and location of each item of the routine road maintenance works to be carried out during the year for each section to be maintained (for each CMG).	The ERA Maintenance Engineer is responsible for preparing the annual work plan for the each section of the road. It should be checked by the Project Chief Engineer	The Annual Work Plan should be prepared once in a year and before engaging the maintenance contractor.	The annual work plan is based on the road condition survey. The template lists all the maintenance activities, The estimated amount and number of worker days should be filled in for each month. This should be done for each sub contract and summarised by road and by contract.	The Annual Work Plan should be checked and approved by the Project Chief Engineer. The timing of activities should also be agreed with the Contractor before he or she signs the contract. It should be noted that actual labour input may be different over the year depending on actual conditions.	Contract Info Activity Quantities Worker days per month for the total duration separated for each sub contract

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Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
LIST OF TOOLS AND MATERIALS Annex 6 <i>Prepared by ERA</i>	To ensure that the CMG's have access to the necessary materials and proper hand tools (sufficient in number and of good quality) to enable them to successfully complete the road maintenance activities.	The ERA Maintenance Engineer is responsible for estimating the quantity of materials and hand tools to be used for the entire duration of the contract. The list should be checked by the Project Chief Engineer	The quantities of material, eg laterite, and type and number of hand tools needs to be prepared every time a new contractor is engaged	The quantity and cost of materials and hand tools should be determined for the entire contract. The cost can either be negotiated by the Project or included by the contractor in his or her bid. The contractor shall agree and sign on this list and is responsible for purchasing and distributing materials and tools in sufficient numbers and of good quality to the CMG's	The list of materials hand tools should be checked and approved by the Project Chief Engineer. The procedures for distributing and controlling the tools should be agreed with the Contractor before he or she signs the contract.	Contract Info Type of materials or other inputs and quantities Type and number of hand tools Cost (quality) Accountability
Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
SUB-CONTRACT AGREEMENT BETWEEN CONTRACTOR AND CMG Annex 7 <i>Prepared by the Contractor</i>	This is the simple Agreement to be used for sub-contracting each individual CMG. The Agreement will be signed between the Contractor and the CMG Leader. This Agreement outlines the roles and responsibilities of each party.	The Contractor will prepare and negotiate the Agreement with the CMG Leader. The Agreement is witnessed by the ERA's Maintenance Engineer and the Suco Chief.	A new Agreement needs to be prepared once in a year before engaging the CMG.	A CMG Leader should be identified and contracted for each section of the road. The contents of the Agreement should be discussed and negotiated with the CMG Leader to ensure that the community understands their obligations and rights	The Agreement is signed between the Contractor and the CMG Leader. ERA Maintenance Supervisor and the Suco Chief will witness the Agreement	Agreement ID Number Name of Contractor and Name of CMG Leader District, sub-district and Suco Road Name and chainage Scope of works (km) Conditions of Agreement Amount (USD) Dates

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Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
LIST OF TOOLS AND MATERIALS FOR CMG Annex 8 <i>Prepared by the Contractor</i>	To ensure that the CMG's have access to proper hand tools (sufficient in number and of good quality) to enable them to successfully complete the road maintenance activities. Other input to be provided as necessary.	The Contractor is responsible for estimating the quantity of materials and hand tools to be used for each CMG, which will depend on actual conditions and workload. A list should be prepared each time tools or materials are handed over to the CMG Leader.	The type and number of hand tools needs to be prepared every time a new CMG is engaged, and then added as necessary during the course of the contract. Materials and other inputs will be supplied as per agreed needs.	The Contractor is responsible for providing sufficient numbers and of good quality tools to each CMG. The contractor and the CMG Leader shall agree and sign on the list of tools. Tools and or other materials should be added as needed and as justified by the CMG Leader.	The procedures for distributing and controlling materials and tools should be agreed with the CMG Leader before he or she signs the contract.	Agreement Info Type and number of hand tools Materials or other inputs Accountability
Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
MONTHLY ACTIVITY PLAN/ INSPECTION REPORT Annex 9 <i>Prepared by the Contractor</i>	Based on the annual work plan, prioritise and plan the work for each month and to measure actual work at the end of the month <i>The signed Monthly Activity Report must be included in the contractors monthly claim</i>	The Contractor is responsible for preparing the monthly activity plan. This should be done together with the CMG Leader. The Contractor and the CMG Leader will measure the actual work completed at the end, which will form the basis for payment. The ERA Maintenance Supervisor will monitor the planning and participate in inspections.	The monthly plan should be prepared before the work starts and the measurement of work actually completed at the end of the month.	The Contractor and the CMG prioritises the activities which need to be done for the month and estimate quantities. The number of worker days can be calculated. This information is inserted as the plan. At the end of the month the Contractor and the CMG Leader inspects the work and agree how much has been completed and can be paid for.	The monthly plan and inspection should be prepared and approved by the Contractor	Name of the CMG Leader and Name of the CMG Member District, sub-district and Suco Road Name and chainage Period (month) Planned outputs, work norms, worker days and costs Actual output worker days and costs

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Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
PAYMENT CERTIFICATE Annex 10 <i>Prepared by the Contractor</i>	The monthly payment claim, including certified cost for the month, based on actual output/worker days, materials etc. The Payment Claim also shows the cumulative payments made to the contractor <i>The signed Payment Certificate must be included in the contractors monthly claim</i>	The Payment Certificate should be prepared by the Contractor and signed by the ERA Maintenance Supervisor and finally approved by the ERA Project Chief Engineer	Monthly after the physical site inspection has been completed.	The information with regards to outputs, worker days and other costs from the site inspection which was conducted together with the CMG Leader will be transferred to the Payment Certificate	The Payment claim should be checked and approved by the ERA Project Chief Engineer	Contract Information Progress of work and worker days for each sub-contract Progress of payment for each sub-contract Other costs Cumulative progress and payment on the contract
Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information
EMPLOYMENT CONTRACT BETWEEN CMG LEADER AND CMG MEMBERS Annex 11 <i>Prepared by the CMG Leader</i>	This is the Employment Contract between the CMG Leader and the CMG Members. This should be prepared for each member of the group to spell out rights and obligations by the parties. The registration form annexed to this employment contract will provide a profile of the CMG Members	The CMG Leader is responsible for preparing the Employment Contracts. The contract is witnessed by and the Suko Chief and a copy should be provided to the ERA Maintenance Supervisor.	Registration and Employment Contracts should be prepared each time a new group member is recruited, and a copy should always be forwarded to the ERA Maintenance Supervisor.	The CMG Leader will identify CMG members in accordance with the instructions provided by the Contractor. The contents of the Employment Contract should be explained to each individual member so that he or she understands his or her obligations and rights	The Employment Contract is signed between the CMG Leader and each individual CMG member, and shall be witnessed by the Suco Chief.	Name of the CMG Leader and Name of the CMG Member District, sub-district and Suco Road Name and chainage Conditions of Contract Registration capturing key biodata Amount (USD) Dates
Document	Purpose	Responsibility	Timing	Procedure	Approval	Key Information

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MUSTERROLL/ PAYROLL Annex 12 <i>Prepared by the CMG Leader</i>	To control the number of worker days and to have records for the payment. <i>The signed Musterroll must be included in the contractors monthly claim</i>	The CMG Leader is responsible for preparing the musterroll. The musterroll should be checked and countersigned by the Contractor	The musterroll should be prepared monthly and should be updated on a daily basis. Each individual should sign for work completed and also upon receipt of payment.	All the members of the CMG including the CMG Leader should be listed on the musterroll. The CMG Leader will monitor that work has been completed as planned and request members to sign for each day of work completed. The number of worker days must correspond to the claim	Musterroll should be prepared by the CMG Leader and signed by the Contractor.	Name of the CMG Leader and District, sub-district and Suco Road Name and chainage List all members of the CMG, gender No of days worked by individuals, Wage rate, amounts
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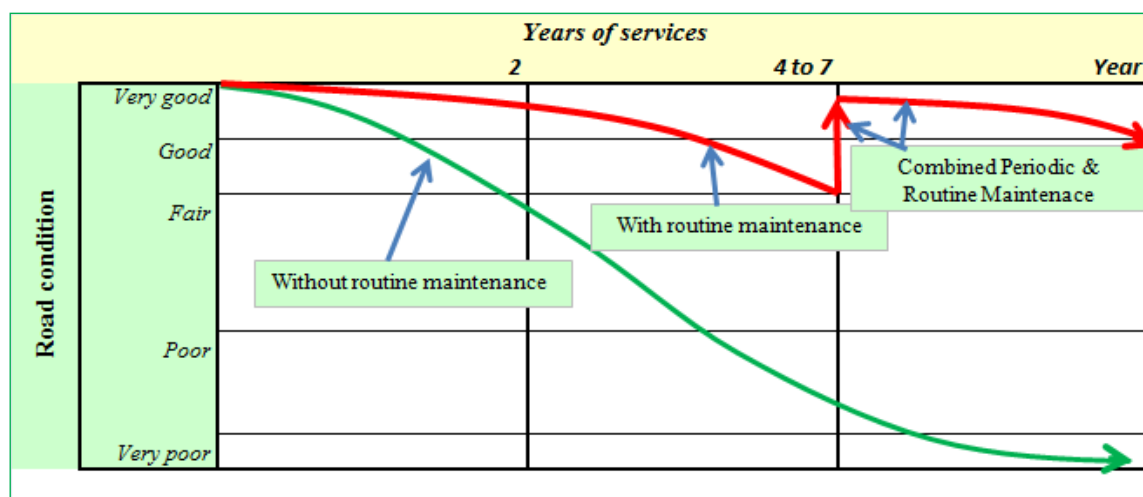
6 Periodic Road Maintenance

6.1 Introduction

Deterioration of the road can be significantly slowed down if routine maintenance is applied immediately after completion of the construction or rehabilitation works. Routine maintenance thus plays important role in maintaining the road in good condition. However, after a certain amount of time, the road will have deteriorated to a point where routine maintenance is no longer enough. A more comprehensive type of maintenance needs to be implemented, for example application of a new gravel surface layer. We call this type of maintenance Periodic Road Maintenance, which is generally done every few years for rural gravel roads.

Repairs through periodic maintenance are made especially to the road pavement or surface and to the drainage system. The more the road has deteriorated the more costly is the periodic maintenance. The periodic road maintenance should therefore be implemented when the road condition is assessed as fair rather than to wait until the road has deteriorated too far and there is a need to carry out full road rehabilitation which is a much more costly operation. Although periodic road maintenance will have to be repeated more often than rehabilitation, it results in lower overall costs and better overall road conditions.

To reduce average yearly costs of periodic maintenance a combination of routine maintenance with timely periodic maintenance is applied. The roads can be continuously kept in a fair to very good condition, and overall maintenance costs can be minimized. The following chart illustrates the impact of an appropriate combination of routine and timely periodic maintenance can have on the overall maintenance costs.



6.2 Activities and Priority for Periodic Road Maintenance

Periodic road maintenance is defined as a medium term maintenance intervention that is carried out in situations where the condition of the road has already deteriorated to a point where the road pavement/surface or other road components require serious repairs. Periodic road maintenance is carried out every few years (normally 4 to 7 years), whereby the time period depends primarily on the climate, the traffic, the original condition of the road, and whether or not it is receiving routine maintenance.

Periodic road maintenance involves more comprehensive and costly activities such as reshaping of the road surface, re-surfacing and major repair or reconstruction of cross-drainage structures. Such works could be organised in the same way as rehabilitation and new construction works, contracted out to small-scale contractors (with access to some equipment) or through force account.

Depending on degree of the road deterioration, periodic maintenance works would require the same type of resources as prescribed for rehabilitation or construction works. Tasks and resources required for these works therefore would be assessed, estimated, calculated, planned and carried out the works in the same way as road rehabilitation or construction works. Periodic road maintenance includes activities such as:

Priority	Descriptions
1	- Reconstruction of existing drainage structures at new level - Major repairs to structures
2	Stockpiling gravel for use during routine maintenance
3	- Reshaping prior to resurfacing - Re-gravelling - Filling rut

6.3 Technology Choice

Periodic road maintenance can, similarly to road rehabilitation works, be done using different operational and organisational approaches. Some of these approaches include;

-  use of equipment intensive methods (conventional methods)
-  use of labour intensive methods
-  a combination of an appropriate mix of equipment and labour - labour-based methods

Similarly to the discussion with regards to routine maintenance in section 3.2 above, it is important to assess alternative approaches that could be used for the periodic road maintenance and to ensure that they are efficient and cost effective.

6.3.1 Use of equipment-based methods

The use of heavy equipment requires high initial capital investments. In addition, the use of heavy equipment is generally a big drain on scarce foreign exchange resources, since most machines, their spares and fuel have to be imported. Cases of under utilisation of machines have been observed due to lack of even minor spare parts and high running costs. Moreover, due to the high initial investments, small-scale domestic contractors have difficulty to purchase or even access such equipment.

The lack of equipment is often a major constraint when carrying out road works. Equipment is expensive, consumes fuel and lubricants, and requires spare parts which may have to be imported. Equipment also requires skilled operators, skilled mechanics and proper workshop facilities. If any of these items are not available, the equipment stands idle and road maintenance is not carried out properly.

6.3.2 Use of labour-intensive approaches

On the other hand, labour is practically always readily available and can be employed at a low cost. In addition, labour-intensive approaches are very well suited to a large range of maintenance activities, particularly when labour are well managed. A proper use of labour for simple routine maintenance works will also create extra jobs out of farming and finally stimulate local economic activities, such as hand tools production and fresh cash circulated within the community. However, labour-intensive approaches demand intensive and good quality planning and skilled supervision and for more advanced operations quality and productivity of labour-intensive method are often questioned.

6.3.3 Combined use of equipment and labour

In most cases, a combined use of labour and machines provide the most appropriate solution. Certain maintenance tasks can be carried out more effectively by machines while others are best carried out using labour. The most appropriate technology will therefore depend on the nature of the work and the availability of labour and equipment in the area. The following table below provides a comparison between the use of equipment and labour.

Combined Use of Equipment and Labour

Activity	Potential	
	Equipment	Labour
<i>Re-shaping</i>	<i>Good</i>	<i>Good</i>
<i>Grading surfaces</i>	<i>Good</i>	<i>Poor</i>
<i>Re-gravelling</i>	<i>Good</i>	<i>Good</i>
<i>Repair drainage structures: bridge, drift and culvert</i>	<i>Poor</i>	<i>Good</i>
<i>Stock piling gravel</i>	<i>Good</i>	<i>Fair</i>
<i>Filling rut</i>	<i>Good</i>	<i>Good</i>

6.3 Carry out Reshaping Activities

The surfacing material of gravel roads is worn away by traffic, eroded by rain and blown away as dust. Before all the gravel surfacing has worn away the road requires re-gravelling. The road to be re-graveled should be brought to its original cross section or shape before re-gravelling activity is commenced. The activity will include re-establishment of road camber (cross-fall), shoulders and slopes to enable the water to drain off easily. Opportunity must be given to correct other necessary drainage works such as side drains, mitres drains, culverts and scour checks.



Depending on the degree of deformation or damage to the above elements (camber, slopes, drains) the reshaping may be described as **light or heavy**. Reshaping can be done by labour-based methods or grading by equipment. The choice of technology depends on the viability in respect of cost. In this guidelines the reshaping activity is carried out by using Labour-based method.



a Required resources: The minimum resources required for the reshaping activities using labour-based approach are listed in the below table.

Required equipment		Required hand tools		Labour
Items	Quantity	Items	Quantity	
Roller (Capacity: 700 kg to 8 tons)	1	✓ Hoe ✓ Pick axe ✓ Rake/spreader	Vary based on number of labour and capacity of the	The gang size will depend on level of the reshaping

Water bowzer (capacity 3,000 liters-5,000 liters)	1	✓ Ditch and slope templates ✓ Shovel ✓ Wheel barrow ✓ Hand rammer ✓ Line ✓ Profile board ✓ Temporary road signs	available roller	activity There must be the right number of labourers to achieve daily a length equal or more to that planned for gravelling per day.
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b. Light Reshaping

Light reshaping can be carried out as a routine maintenance activity. The task is to restore the shape of the camber by returning material from the road sides and shoulders towards the centre of the road. This will enable water to drain off easily. A road with a flat surface will collect water, and traffic will quickly cause potholes and rough spots. It may also be necessary to carry out work on the side drains, mitre drains and culverts to ensure that water can drain away from the reshaped camber.



Execution of the work

The warning signs are placed either side of the worksite.

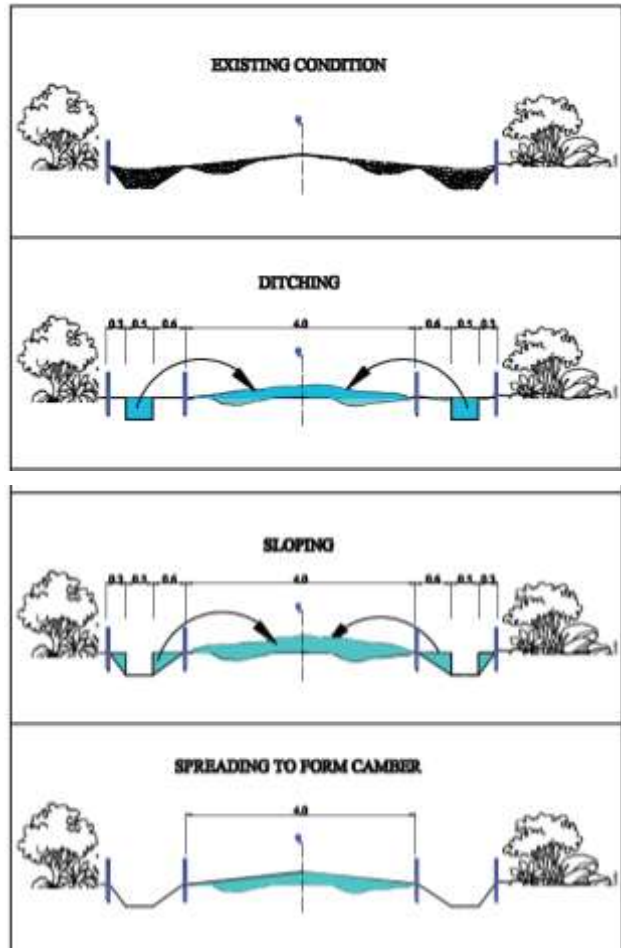
-  All tools and safety items delivered to the site checked and placed respectively by the supervisor.
-  Setting out road cross section with cross fall (camber) 8%. Using pegs and string line to control level of the road during execution of the works
-  Any vegetation from the carriageway or shoulder is removed using a hoe, rake removed and dumped out on the lower side of the road.
-  Trimming the surface material with hoe or pick axe to restore the road surface shape, brining the materials from the sides to the centre and forming to the required camber cross-fall.
-  Spraying water to the optimum moisture content and compaction using roller or hand rammer to the required strength.

c. Heavy Reshaping

Heavy reshaping will normally be carried out as a road rehabilitation activity. On low traffic volume roads (less than 50 vpd) it is often appropriate to use labour-based methods for reshaping.

Execution of the work

- ✚ The warning signs are placed either side of the worksite.
- ✚ All tools and safety items delivered to the site checked and placed respectively by the supervisor.
- ✚ Setting out road vertical alignment to ensure road will be in required level,
- ✚ Setting out cross section with cross fall (camber) 8%. Setting out cross section should be carried out for every 10 m interval
- ✚ Any vegetation from the carriageway or shoulder is removed using a hoe, rake removed and dumped out on the lower side of the road.
- ✚ Re-excavate and clean side drains. If the material excavated from the drains is of good quality, it is spread on the road surface otherwise it is spoilt.
- ✚ Spread the material and form camber to the required cross fall (8%)
- ✚ Spraying water to the optimum moisture content and then provide compaction using roller to the required strength.



6.4 Carry out Re-gravelling Activities

Re-gravelling is normally a Periodic Maintenance task. It is done to correct the loss of surfacing material. When the sub grade material is exposed on the road surface re-graveling is required. Such exposure can be seen especially in ruts, pot holes, and depressions. It is important that the Maintenance



Engineer plans re-gravelling work well in advance so that work is carried out before serious defects appear. The re-gravelling activity can be carried out once the existing road shape has been restored to the required camber and drainage system has been improved. If this is not done, the new gravel surface will deteriorate very quickly. Re-gravelling activity is normally carried out with additional gravel layer of 12- 15 cm compacted thickness. Usually a continuous layer of gravel is laid on the existing surface.

Required resources

The re-graveling activity can be carried using a by labour-based approach, supported by light equipment. It is important that the size of labour force matches the available capacity of supporting equipment, especially roller and water bowser. Table below shows the minimum requirement for light equipment and hand tools and material



Execution of the work

The re-graveling activity shall be done follow same step of graveling activity such as selection of gravel quarry, load, haul and unload gravel, spread gravel, watering and compaction.

Required equipment		Required hand tools		Material
Items	Quantity	Items	Quantity	
Roller (Capacity: 700 kg to 8 tons)	1	✓ Spreader ✓ Hoes ✓ Shovel ✓ Pick axe ✓ Axe	Vary based on number of labour	Lateric gravel or river gravel. Characteristics of the material referred to the specifications
Water bowser (capacity 3000 liter- 5000 liter)	1	✓ Set of setting out tools(profile board, line level, hammer) ✓ Hammer		
Dump truck	1	✓ Wheel borrow ✓ Safety equipment ✓ Pegs ✓ String line		

- ✚ Whenever possible during re-graveling, a diversion should be opened for traffic and routine safety measures should be taken, such as putting up traffic signs etc.
- ✚ Gravel should be obtained from the quarry as near as possible. It should be ensured that the gravel is of good quality, taken from the right place as identified by the engineer.
- ✚ Initially the road surface must be graded to obtain a firm regular surface to work upon. Camber for this activity should be maintained as original shape (about 8% compacted camber).

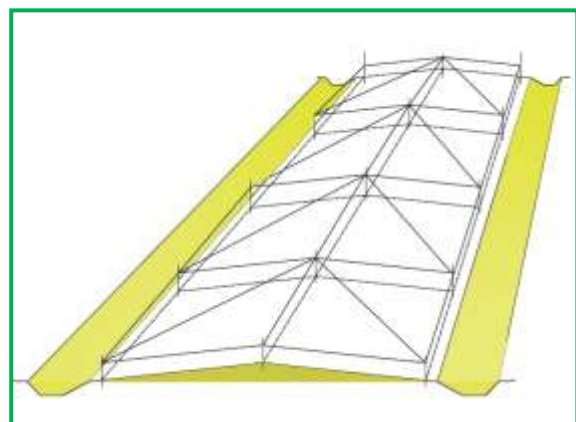
Spreading gravel

After the existing road is shaped to the required cross fall (camber), gravel can be delivered on the road. Once the gravel is delivered, gravel spreading can start. Spreading of gravel should ideally start immediate after unloading the gravel to make use of the natural moisture in the gravel. If the gravel is stock piled along the road for a period of days before spreading, it will dry out and will then require that water is added to achieve full compaction.

Work method



- ✚ Set out center line and edge of each box and ensure the cross fall is 8%. Length of box should not be more than 5 m.
- ✚ Peg to be set at the edge and center line for every boxes
- ✚ Tighten string line at the center line, edge and cross fall.
- ✚ Spread the gravel within the set box. The gravel should be spread to the level of the set string line.
- ✚ Work from the centre line towards the shoulder, and spread one side of the centre line at the time. Keep some gravel beside each box after completing the spreading.
- ✚ Compact of the spread gravel lightly. Add the remaining gravel where in low spots appear during the compaction.



Watering and compaction of gravel

The best compaction of the gravel can be achieved at the Optimum Moisture Content (OMC). If the gravel is too dry, friction between particles tends to resist close packing. If the gravel is too wet, the water between the particles prevents close packing. Control of moisture during compaction is very important and can be carried out through a simple field test by tightly squeezing a sample of the material in the hand. The material should be moist enough to stick together without any visible sign of water coming out of the sample. If the material disintegrates, it is probably too dry for compaction. If the soil sticks to the hand, it is too wet. If the gravel is wet enough you can form a ball in your hand, it contains the optimum moisture and is suitable for compaction.



Remember: *If the gravel is too dry you must add water to achieve Optimum Moisture Content (OMC)*

6.5 Major Repairs to Drainage Structures

Periodic road maintenance activities normally include major repairs such as replacing culverts, rebuilding retaining walls, repair of scoured apron of culverts, bridges, fixing gabion, etc. Remember that defect in the bridges, culverts, drifts and causeways should be detected early and repaired promptly. If they are neglected, the resulting damage will require more extensive repair later, or even lead to collapse. In order to properly remedy a structural defect, its cause must be assessed. Only when the cause is known, is it possible to successfully cure the problem.

a. Inspect structure for defects

All major defects must be brought to the attention and inspected by an engineer. They will inspect the structure and arrange for appropriate remedies. The following points could serve as a checklist:

- ✓ retaining wall defective
- ✓ river bed scour
- ✓ settle or scour of apron of culvert, drift, causeway
- ✓ gabion defects
- ✓ structural timber decay, splitting or insect attack

- ✓ bulging masonry
- ✓ crack concrete or stone masonry
- ✓ exposed or corroding reinforcement or pre-stressing steel
- ✓ seriously corroded structured steel works
- ✓ damaged structural steel works
- ✓ crack structural steel works
- ✓ settlement of deck, pier or abutments
- ✓ damp patches on the concrete

b. Repair to culverts

Culverts are provided to convey water from the upstream side of the road to the downstream side. In this case, silting, choking by debris or structural collapse will usually result in over-topping and damage to the road. Maintenance comprises keeping the waterway clear, controlling scour and repairing structural damage. Erosion of outlet channels from culverts is a common problem and if not dealt with promptly is likely to result in damage to the culvert and the road.

This is caused by high discharge velocities from the outlet, and solutions which do not take account of this are not likely to be permanently effective. If the discharge velocity cannot be reduced by increasing the area of cross-section of the culvert and reducing its gradient, perhaps with a drop inlet, then some type of energy-dissipating outlet should be used. As a first step, an apron at downstream constructed with masonry or concrete. Gabions or mattresses downstream of the outlet may be a cheap alternative. Drop outlets are good, but on many sites there is insufficient height to construct these.



Broken culverts are also common defects. This may be due to poor workmanship when construction of the culverts, poor quality of concrete or insufficient overfill. To reinstall/reconstruct the culverts the following steps should be taken in to consideration:

Identify where culverts are required: In some cases, culverts have just not been constructed where they are required. The wet season will reveal where culverts are missing. These are critical spot of the road network.

Construct culvert at correct level: In the case mentioned above, it is necessary to reconstruct the culvert. Excavate and replace broken or wrongly culverts with new culvert and right dimensions of the culverts and right level of the culvert bed. Bed level of the culvert should be constructed as same level of the channel bed. If the culvert reconstruction is done using concrete pipe culverts, the backfill of the culvert should not be less than 3/4 of diameter of the diameter of the pipe ring.

c. Repair to drift and causeway

Drifts and Causeway are often used on lightly traffic roads at watercourses with seasonal flows. They may be covered by deep water for short periods when traffic may not be able to pass, or by shallow water for longer periods. For much of the year they may be dry. Maintenance of drifts and causeway should be carried out after flooding. Crossing should be checked to ensure that the carriageway has not scoured or washed out, and any damage should be repaired. Erosion downstream of the drifts and causeways is a common problem and, if necessary, a masonry or concrete apron should be constructed. An alternative may be to use gabions or mattresses. Any silt or debris must be cleared from the carriageway.



The causeways have culverts passing under them. These can cause the deposition of silt up-stream of the causeways which tends to block the entrance to the culvert, making it inoperative. If culverts are used in causeways, they should be large enough and steep enough to be self-cleaning.

d. Repair to bridge

Bridge inspection and maintenance requires an engineer knowledge and skills, some of which will only be held by a qualified bridge engineer. The maintenance of large bridges is beyond the scope of this guidelines. However, some repairs to small bridges can be accomplished by a small company. The maintenance of the waterways under bridges involves the same principles as that



for culverts. The main operations involve keeping the water way clear, controlling scour and repairing structural damage. Maintenance methods are similar to those described under the maintenance of causeways, drifts and culverts. Debris should be removed as soon as possible after floods, and eroded and scoured areas should be repaired. These should be filled and compacted with selected soil or gravel and then protected with rip-rap, concrete or gabions if resource is available. Deposits of silt and sand should be removed where necessary to restore the original channel.

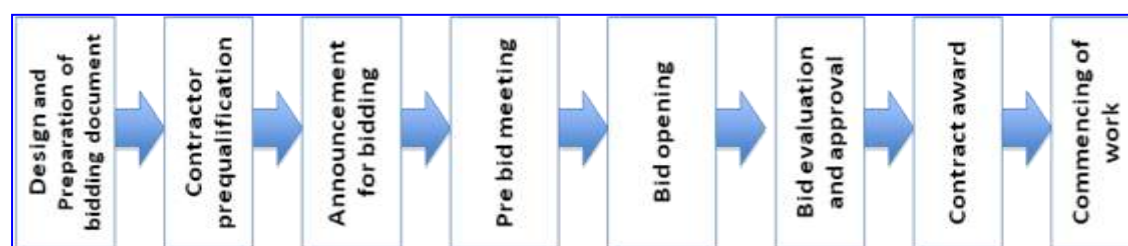
6.6 Supply and Stockpile of Gravel for Routine Maintenance

Routine maintenance activities of gravel road require additional supplies of laterite / gravel, which are stockpiled at regular intervals along the road. Estimated quantities of laterite / gravel is about 10-15 m³/ km-road for 1 year for roads with low traffic. The stockpile should be prepared for every 200 to 300 m along the road length making it easy for the routine maintenance team to carry out pothole patching, shoulder repairs or other repairs. Good quality laterite / gravel is usually obtained from an identified quarry some distance away. Haulage and stockpile of gravel can be done by local contractors who has accessed to trucks.

6.7 Contract Management for Road Periodic Maintenance

The periodic road maintenance is carried out through the involvement of selected local construction companies. Involvement local companies who have been trained in LBT would be a good option for this operation. The use of local contractors for the periodic road maintenance has several advantages. These companies are already trained and operating in the area where their services are required with established supply lines for materials, tools and equipment as well as skilled and unskilled labour.

Transparency and fairness in procurement is a key issue in contracting. As scopes and items of the works for the periodic maintenance are similar to the scopes and items of work for road rehabilitation such as reshaping, regravelling, re-constructing / re-installing new drainage structures, these works are suited to be carried out by local contractors trained in the use of labour-based technology through national competitive bidding. FIDIC short form contract document is being used for road rehabilitation under the ERA project, it is recommended that the FIDIC contract short form is used for the Periodic road maintenance works as well. Contracting process for the road periodic maintenance work is as follow.



Note: Details of the contracting process is described in Contract Management Guidelnes for LBT for rural road works.

7 Emergency Road Maintenance

7.1 Emergency Road Maintenance

Emergency road maintenance is given the highest priority compared to other forms of maintenance activities because it is important to keep roads open to vehicles for social and economic reasons. Tracks and paths used for pedestrians are usually not so crucial, as alternative routes are quickly devised by users. As a consequence, emergency maintenance is mainly concerned with keeping roads open to vehicle access.

Emergency maintenance operations can not be planned or foreseen. An example is a section of road that has been washed away due to excessive rainfall. Action must be taken as soon as possible, otherwise the initial damage can worsen rapidly. This reaction form of maintenance is based on inspections or reports from the general public.

7.2 Types of Emergency Maintenance

Although emergency maintenance cannot be predicted, an appropriate maintenance plan and organisation is required to respond to this emergency damage occurrence. Therefore at the time of occurrence it is important to identify all damages, causes of the damages and prepare an action plan to respond to the emergency situation in an appropriate manner.

Examples of situations where emergency maintenance is necessary:

-  Damage to culverts and other water crossings due to floods and heavy rain
-  Landslide along a road section
-  Bad damage to road carriageway due to floods and heavy rain.
-  In order to respond quickly to emergency maintenance needs, immediate action must be taken to:
 - Estimate the required resources needed (labour, materials, equipments and tools)
 - Estimate the cost and secure the required funds
 - Quickly assign responsible personnel
 - Quickly carry out the work in order to open the traffic without unnecessary delay.

7.3 Reconstructing Culverts and Water Crossings

Heavy rains may cause damage. It is difficult to forecast emergency maintenance operations. Heavy rain can lead to flood conditions which can severely damage or destroy important structures such as culverts, bridges or drifts etc. If a cross drainage structure is damaged or washed away due to excessive rainfall, it will be important to take action as soon as possible to keep the road open to traffic. Bigger structures can also be washed away and may need temporary emergency solutions for example a

temporary log bridge or identification of an alternative route in order to keep the road open before more comprehensive repair works can be carried out.

Check the water crossing's design. Identify short comings in the original culvert or other drainage structures to try to avoid it happening again. Check for incorrect siting or level, inadequate flow capacity, poor construction or inadequate maintenance. The capacity of the water crossing may need to be increased or it may need to be relocated. Consider also necessary erosion control measure.

Rebuild the structure. In many cases, the structure will have to be completely rebuilt, which require the engineer to prepare specific details, including drawings, specification, cost estimate, and plan the process of contracting for construction and monitoring.

7.4 Clearing Landslides

Landslides are often caused by a combination of poor ground conditions, water and unstable material. To following are the required appropriate measures to correct this problem.

Reopen the road as soon as possible: The first priority is to quickly remove the landslides and reopen the road to traffic as soon as possible. Ensure a safe working environment for both the labour force and road users as removal of the material can sometimes lead to further slides. At the same time, it is also important to identify the cause of the landslides in order to undertake measures to prevent it from happening again.



Identify the cause of landslides: Remedial measures might include reducing the angle of the slope, surcharging the base of the slope, erecting gabion walls or retaining walls, or improving the drainage system. Bio-engineering solutions should be considered as they are very often effective both in terms of costs and results.

7.5 Reconstructing Short Road Sections

Identify cause of the problem: Severe flooding may wash away parts of the road, and a short section may need reconstructing. Identify the cause of the damage and take action to prevent it from happening again. However, finding the cause is often not an easy task and requires detailed engineering assessment. Note that, often observations from members of the public in the area can prove to be very useful.

Reconstruct the road: The road section should be reconstructed to its original design, in accordance with the guidelines containing in the construction manual.

Miscellaneous work: It may from time to time be necessary to carry out urgent emergency work to safeguard the road or road users. These activities may include removal of fallen trees or branches, removal of other debris, and flood protection during heavy rains etc. Necessary resources must be allocated for road maintenance to swiftly deal with such emergency works.

Sample Contract

ILO Contact name : (Contractor's name and address)
Tel :
Fax :
Email :
Date :
Our Reference :
Your Reference :

Currency and Net Amount	:Currency	Amount
VAT Amount	:Currency	[0.00]
Total Amount	:Currency	Amount
Payment terms	:30 Days	

Please confirm your acceptance of this Purchase Order (PO) by returning one (1) original, signed and stamped, by mail to the ILO Contact indicated above, within 7 days. Failure to do so may delay payment of your invoice.

Receipt by the ILO of the original signed PO, Contractor's written confirmation order, or initiation of performance under this PO by the Contractor will constitute acceptance of the PO by the Contractor, including all terms and conditions herein contained or otherwise incorporated by reference. Any additional or different terms and conditions proposed by the Contractor are rejected unless expressly approved in writing by an authorized representative of the ILO.

Contractor :
 [Representative's name]

International Labour Office:
 [ILO Official's name]

Signature :

Signature :

Date :

Date :

Place :

Place :

I. The contract is composed of the following documents listed in their order of precedence :

- This PO including any specific conditions.
- Annex 1 : Terms and Conditions applicable to ILO Contracts for Services.
- Annex 2a: Terms of Reference Specific Conditions applicable to this Contract
- Annex 2b: Terms of Reference Instructions and Technical Specifications for Rural Road Maintenance

II. SPECIFIC CONDITIONS

1. The Contractor will perform the services as follows :
2. The Contractor will commence performance by [start date] and such performance will be completed not later than [end date].
3. Upon completion of the performance of the services, a final report will be submitted to the ILO within 40 days unless otherwise specified in the TOR.
4. On all matters arising from the Contract (including submission of reports), the Contractor will deal in the first instance with [ILO Contact Name], unless otherwise specified in the TOR.
5. The ILO will the Contractor the Total Amount of [**CURRENCY AND AMOUNT (amount in words) + VAT Amount 0.00 (Zero) = CURRENCY AND AMOUNT (amount in words)**] as follows:
 - (a) 20% of the Contract price as advance payment, after 14 days receipt by ILO of the countersigned Contract, in this contract amounting to [Insert amount]. The advance payment will be deducted from the amount due under each Monthly Payment Certificate in the proportion of the value of the MPC certified by ERA Project Chief Engineer to the Contract Price, starting at the first MPC;
 - (b) Progress payments upon submission of Monthly Payment Certificate and after satisfactory execution of the planned activities.

Advance payments as per 5(a) will be subject to deductions from the amount due under each interim payment certificate in the proportion of the value stated in the certificate and approved by the ERA Project Chief Engineer until the total amount of the advance payment is reached.

Payments as per 5(b) will only be made against invoices/payment statements, which state the portion of the Work that has been completed and based on actual completed.

6. Billing address :

In accordance with paragraph 3.2 of the Terms and Conditions applicable to ILO Contracts for Services (Annex 1) the Contractor will submit **invoice(s) for payment** indicating the number of the PO that it relates to, the invoiced amount and the date of completion of the services.

Invoices must be addressed to:

International Labour Office
United Nations, Orogado Barracks
Caicoli, Dili
Timor-Leste

ANNEX 1: TERMS AND CONDITIONS APPLICABLE TO ILO CONTRACTS FOR SERVICES

1. THE PARTIES

1.1. **LEGAL STATUS OF THE PARTIES:** The International Labour Organization, represented by the International Labour Office (ILO) and the Contractor (referred to individually as a "Party" and together as the "Parties" have the following legal status:

- 1.1.1. The International Labour Organization has full juridical personality, including the ability to contract and enjoys such privileges and immunities as are necessary for the independent fulfilment of its purposes pursuant to the *Constitution of the International Labor Organisation*. Nothing in or related to the Contract will be deemed a waiver of any of the privileges and immunities of the International Labour Organization recognized in the Convention on the Privileges and Immunities of the Specialized Agencies (1947), and relevant national and international law.
- 1.1.2. The Contractor is an independent contractor. Nothing contained in or relating to the Contract will be construed as establishing or creating between the Parties the relationship of employer and employee or of principal and agent.

2. CONTRACT DOCUMENTS AND VALIDITY

2.1. NATURE OF THE CONTRACT:

- 2.1.1. The Contract constitutes the complete and exclusive agreement between the Parties. It supersedes all proposals, verbal or written arrangements or agreements, and any other communications by one of the Parties or between the Parties relating to the Contract.
- 2.1.2. The Contract is composed of the following documents listed in their order of precedence:
 - 2.1.2.1. **Purchase Order/Contract Document**, including any specific conditions;
 - 2.1.2.2. Terms and Conditions applicable to ILO Contracts for Services (**Annex 1**); and
 - 2.1.2.3. Any other document explicitly listed in the Purchase Order/Contract Document and attached to it (i.e., **Annex 2, 3**, etc).
- 2.1.3. Unless otherwise included in any of the documents listed in paragraph **2.1.2.**, the terms of business, conditions of contract, general reservations published or issued by the Contractor or written in any correspondence or documents emanating from the Contractor will not form part of the Contract.
- 2.2. **VALIDITY:** The Contract will expire upon fulfillment by the Parties of their respective obligations or otherwise in Accordance with its provisions.
- 2.3. **NON-EXCLUSIVITY:** The ILO may contract for works or services (referred together to as "**Services**") of the same or similar kind and quality described in the Contract from any other source at any time.
- 2.4. **COMMUNICATIONS:** Communications (e.g., notices, documents) will be addressed to:

INTERNATIONAL LABOUR OFFICE
Procurement Bureau (PROCUREMENT)
4 Route des Morillons
CH 1211 Geneva 22
Switzerland
Facsimile: + (41)(22) 798 85 29
Phone: + (41)(22) 799 76 02
e-mail: procurement@ilo.org

3. PRICE AND PAYMENT

3.1. **PRICE AND CURRENCY:** The price and currency specified in the Contractor's offer are firm and not subject to revision.

The ILO's financial liability under the Contract is restricted to the price and currency indicated in the Purchase Order/Contract Document.

3.2. **PAYMENT:** Upon receipt of the Contractor's written invoice and any related supporting documentation, the ILO will effect payment, normally within thirty (**30**) days, by bank transfer (the ILO will not pay through letters of credit or bank draft).

The written invoice will be sent to the addressee specified in the Purchase Order/Contract Document and will contain the:

- 3.2.1. number of the Purchase Order/Contract Document that it relates to;
- 3.2.2. invoiced amount (without the rounding of currency decimals and exclusive of VAT, duties or charges); and
- 3.2.3. date of the completion of Services.

In no event will complete or partial payment by the ILO, in and of itself, constitute acceptance of the Services.

- 3.3. **TAX EXEMPTION:** The International Labour Organization, as a United Nations Specialized Agency, enjoys a special tax status in Switzerland and in other member States. Except with the prior written authorization of the ILO, invoices will be submitted exclusive of any amount representing taxes (including value added tax), duties or charges. Where such authorization has been provided, the Contractor will provide the ILO with written evidence that payment of such taxes, duties or charges has been made. In the event any government authority refuses to recognize the ILO's exemption from such taxes, duties or charges, the Contractor will immediately consult with the ILO to determine a mutually acceptable procedure.

4. PERFORMANCE

- 4.1. **ITEMS FURNISHED BY THE CONTRACTOR:** The Contractor is solely responsible for the arrangement, provision and operation of all equipment, supplies, related support services and personnel (including any related costs so incurred) necessary for the performance of the Contractor's obligations under the Contract.
- 4.2. **ITEMS FURNISHED BY THE ILO TO THE CONTRACTOR:** Where goods and equipment (referred together as "Goods") are funded or provided by the ILO to the Contractor to support the performance of the Contractor's obligations under the Contract, the following terms apply:
- 4.2.1. The Contractor acknowledges and agrees that the ILO hereby disclaims any and all warranties regarding the functionality or installation of such Goods. The Contractor is solely responsible for the installation (including any personnel, tools, materials or other Goods necessary for installation), maintenance and functioning of all the Goods funded or provided by the ILO under the Contract.
- 4.2.2. The Contractor will promptly report to the ILO each loss, damage or theft of such Goods.
- 4.2.3. Title to the Goods that may be funded or provided by the ILO to the Contractor will be retained by the ILO. The Contractor will not cause or permit any lien, claim or other encumbrance to be attached to any or all such Goods, or to any other item that is the subject matter of the Contract.
- 4.2.4. Upon the termination or expiration of the Contract, all such Goods will be returned to the ILO in the same condition as when delivered to the Contractor, excluding normal wear and tear. The return of such Goods, or other disposal as the ILO may direct, will be at the Contractor's expense. Upon termination or expiration of the Contract, the Contractor will take all reasonable measures to avoid any loss of or deterioration to such Goods. The Contractor will compensate the ILO for actual costs of any loss of, damage to or deterioration of such Goods that is beyond normal wear and tear.
- 4.3. **INSTALLATION, MAINTENANCE, TRAINING:** Where installation, maintenance (ongoing or as specified in the Purchase Order/Contract Document) or training is required, the following terms apply:
- 4.3.1. The Contractor, in a timely manner, will arrange for and provide all equipment, supplies, related support services and personnel necessary to complete the installation, maintenance or training.
- 4.3.2. All costs related to the installation, maintenance or training will be borne by the Contractor.
- 4.3.3. The ILO and the Consignee will be permitted to monitor the installation or maintenance work, as well as to oversee the training.
- 4.3.4. In addition, where training is required the Contractor will train any persons identified by ILO or the Consignee in the installation, operation, maintenance, etc. of the Services described in the Contract.
- 4.4. **ACCESS:** If some or all of the contractual obligations will be performed on ILO premises, the ILO will facilitate access to its premises in line with requirements for such performance. The Contractor will comply with ILO security requirements and any other relevant ILO rules, regulations and guidelines while on ILO premises, as well as with the instructions given by designated ILO officials.
- 4.5. **RESPONSIBILITY FOR PERSONNEL:**
- 4.5.1. The employees, officials, representatives, staff or subcontractors (**Personnel**) of either of the Parties will not be considered in any respect as being the employees or agents of the other Party.
- 4.5.2. Each Party is solely responsible for the professional and technical competence of its respective Personnel, which will permit that Party to effectively perform its obligations under the Contract.
- 4.5.3. Without prejudice to any other right or remedy available under the Contract, the ILO reserves the right to request at any time, in writing, the withdrawal or replacement of any of the Contractor's Personnel and such request will not be unreasonably refused by the Contractor.
- 4.5.4. Each Party is solely responsible for all claims arising out of or relating to the engagement of its respective Personnel.
- 4.5.5. All expenditures related to the assignment of the Contractor's Personnel, including allowances, insurance, cost of travel arrangements and local transport will be borne by the Contractor. All expenditures related to the assignment of the ILO's Personnel, including allowances, insurance, cost of travel arrangements and local transport will be borne by the ILO.

4.6. **INSURANCE:**

- 4.6.1. The Contractor, for the duration of the Contract, any extension thereof or any period following any termination of the Contract and reasonably adequate to deal with losses, will insure its Personnel against the consequences of the following risks:
- 4.6.1.1. illness, injury and death; and
 - 4.6.1.2. incapacity to work due to accident and sickness either during normal working hours or outside working hours.
- 4.6.2. Time lost as a result of the occurrence of the risks identified in subparagraphs **4.6.1.1** or **4.6.1.2** will not be chargeable to the ILO.
- 4.6.3. The Contractor for the duration of the Contract, any extension thereof or any period following any termination of the Contract and reasonably adequate to deal with losses, warrants that it is insured with a coverage for a sufficient amount for the use of any vehicles, boats, airplanes or other transportation vehicles and equipment, whether or not owned by the Contractor, as well as that it carries comprehensive civil liability insurance with regard to third-parties, including the ILO and its Personnel, in respect of physical injury, damage to property or theft, as well as the direct or indirect effects thereof, including the unavailability of premises and loss of production.
- 4.6.4. Where required by the ILO and as specified in the Purchase Order/Contract Document (except for the workers' compensation insurance or any self-insurance program maintained by the Contractor and approved by the ILO), the Contractor's insurance policies will:
- 4.6.4.1. name the ILO as an additional insured under the liability policy/policies, including, if required, as a separate endorsement under the Contractor's policy/policies;
 - 4.6.4.2. include a waiver of subrogation of the Contractor's insurance carrier's rights against the ILO; and
 - 4.6.4.3. provide that the ILO will receive written notice from the Contractor's insurance carrier not less than thirty (30) days prior to any cancellation or material change of coverage.
- 4.6.5. The Contractor will take out any other insurance required by the ILO and as specified in the Purchase Order/Contract Document.
- 4.6.6. Upon written request by the ILO, the Contractor will provide the ILO with a copy of the general and specific conditions of the insurance policy/policies required under the Contract.

4.7. INDEMNIFICATION:

- 4.7.1. The Contractor is solely responsible for any claim or damage resulting from the negligence, acts, or omissions of its Personnel.
- 4.7.2. The Contractor will indemnify and hold the ILO harmless from and against any direct or indirect responsibilities, complaints, claims (including intellectual property rights infringement), suits, judgments, damages and losses, including costs, fees and related expenses, in respect of any physical injury, damage to property, theft, or economic or other prejudice suffered by the ILO, its Personnel or third-parties which may result from the performance of the Contractor's obligations under the Contract or the Contractor's acts or omissions or those of the Contractor's Personnel.
- 4.7.3. The Contractor will immediately notify the ILO upon becoming aware of any direct or indirect responsibilities, complaints, claims (including intellectual property rights infringement), suits, judgments, damages and losses, including costs, fees and related expenses, in respect of any physical injury, damage to property, theft, or economic or other prejudice suffered by the ILO or which could adversely affect the ILO.

5. ASSIGNMENT AND SUBCONTRACTING

- 5.1. **ASSIGNMENT:** The Contractor may not assign, transfer, pledge or make any other disposition of the Contract, of any part of the Contract, or of any of the rights, claims or obligations under the Contract except with the prior written authorization of the ILO. Any such unauthorized assignment, transfer, pledge or other disposition, or any attempt to do so, will not be binding on the ILO.
- 5.2. **SUBCONTRACTING:** In the event that the Contractor requires the services of any subcontractor, the Contractor will obtain the prior written authorization to subcontract and the approval of the ILO of the subcontractor selected. The authorization and approval by the ILO of such a subcontractor does not relieve the Contractor of any of its obligations under the Contract and the Contractor is solely responsible for the Services provided by a subcontractor in the framework of the Contract, including their quality. The Contractor, to the same extent as for its own Personnel, will be liable for a subcontractor and its Personnel who are performing any part of the Contractor's obligations under the Contract. The terms of any subcontract will be subject to and be in conformity with the provisions of the Contract. Except with the prior written authorization to subcontract and the approval of the ILO of the subcontractor selected, the Contractor will ensure that its subcontractor(s) do not subcontract, assign, transfer, pledge or make any other disposition of the Contract, of any part of the Contract, or of any of the rights, claims or obligations under the Contract. The provisions of this paragraph apply to any subcontractor who, in turn, requires the services of a subcontractor.

6. INTELLECTUAL PROPERTY RIGHTS AND CONFIDENTIALITY

6.1. PROPRIETARY ITEMS AND INTELLECTUAL PROPERTY RIGHTS:

- 6.1.1. All documents (including drawings, estimates, manuscripts, maps, plans, records, reports, recommendations) and other proprietary items (including data, devices, gauges, jigs, mosaics, parts, patterns, photographs, samples, and software) (jointly referred to as **Proprietary Items**), either developed by the Contractor or its Personnel in connection with the Contract or furnished to the Contractor by or on behalf of the ILO to support the performance of the Contractor's obligations under the Contract, are the exclusive property of the International Labour Organization; and, will be used by the Contractor and its Personnel solely for the purposes of the Contract.
- 6.1.2. All intellectual property rights and all other proprietary rights (including copyrights, patents, trademarks, source codes, products, processes, inventions, ideas, know-how) with regard to any materials (jointly referred to as **Intellectual Property**), either developed by the Contractor or its Personnel in connection with the Contract or furnished to the Contractor by or on behalf of the ILO to support the performance of the Contractor's obligations under the Contract, are the exclusive property of the International Labour Organization; and, will be used by the Contractor and its Personnel solely for the purposes of the Contract.
- 6.1.3. During the course of development, Proprietary Items and Intellectual Property developed or utilized by or furnished to the Contractor will be made available for use and inspection by the ILO, upon request at reasonable times and in reasonable places.
- 6.1.4. Such Proprietary Items and Intellectual Property will be delivered only to ILO authorized officials on completion of the Contract.
- 6.1.5. The Contractor will disclose, throughout its performance, to the ILO's authorized officials full particulars of all source codes, products, processes, inventions, ideas, know-how, documents and any other materials developed or conceived by the Contractor, alone or jointly, in connection with the Contract.
- 6.1.6. At the request of the ILO, the Contractor will take all necessary steps to execute all necessary documents and generally assist the ILO in securing intellectual property rights and all other proprietary rights in compliance with the requirements of applicable law.
- 6.1.7. To the extent that any Intellectual Property due to the ILO under paragraph **6.1.2** includes any intellectual property:
 - 6.1.7.1. of the Contractor that: (i) pre-existed the performance by the Contractor of its obligations under the Contract; or (ii) it may develop or acquire, or that may have been developed or acquired, independently of the performance of the Contractor's obligations under the Contract; or
 - 6.1.7.2. of a third-party; the Contractor grants to the International Labour Organization a perpetual, royalty-free license to make unrestricted use of such intellectual property. The International Labour Organization will not claim any ownership interest in the intellectual property described in subparagraphs **6.1.7.1** or **6.1.7.2**.
- 6.1.8. The Contractor undertakes to obtain, at its own expense, permission to use any third-party protected rights that are necessary for the performance of the Contract and, if requested, provide the ILO with evidence of such permission.
- 6.1.9. In the event that any Proprietary Items or Intellectual Property provided to the ILO by the Contractor are for some reason enjoined or found to infringe any rights of a third-party, or in the event of a settlement, are enjoined, limited or otherwise interfered with, then the Contractor, at its sole cost and expense, will promptly:
 - 6.1.9.1. procure for the ILO the unrestricted right to continue using such Proprietary Items and Intellectual Property provided to the ILO;
 - 6.1.9.2. replace or modify the Proprietary Items and Intellectual Property provided to the ILO, or part thereof, with the equivalent or better Proprietary Items and Intellectual Property, or part thereof, that are non-infringing; or,
 - 6.1.9.3. refund to the ILO the full price paid by the ILO for the right to have or use such Proprietary Items and Intellectual Property or part thereof.

6.2. CONFIDENTIAL NATURE OF AND RESPONSIBILITY FOR PROPRIETARY ITEMS, INTELLECTUAL PROPERTY AND OTHER INFORMATION:

- 6.2.1. Unless otherwise made public with the authorization of the ILO, Proprietary Items, Intellectual Property and other information, irrespective of what form they are, developed, collected, known, marked or received by the Contractor, will be treated by the Contractor as confidential and be used only for the purposes of the Contract.
- 6.2.2. The Contractor will not communicate at any time to any other person, government or entity external to the ILO, any Proprietary Items, Intellectual Property or other information known by reason of its association with the ILO, which has not been made public, except with the authorization of the ILO; nor will the Contractor at any time use such information for private advantage or in any manner prejudicial to or incompatible with the interests of the ILO. Where the Contractor is required by law to disclose such Proprietary Items, Intellectual Property or other information, it will give the ILO sufficient prior notice of the request to disclose in order to allow the ILO to have a reasonable opportunity to take protective measures or such other action as may be appropriate.

6.2.3. The Contractor will be responsible for such Proprietary Items, Intellectual Property and other information. In case of loss of or damage to any Proprietary Items, Intellectual Property or other information the Contractor may be required to:

6.2.3.1. replace or repair the lost or damaged Proprietary Items, Intellectual Property or other information; or

6.2.3.2. provide compensation to the ILO for the cost of replacing or repairing the lost or damaged Proprietary Items, Intellectual Property or other information.

6.3. PUBLICITY AND USE OF THE NAME, EMBLEM OR OFFICIAL SEAL:

6.3.1. The Contractor may neither disclose the terms and conditions of the Contract nor advertise or otherwise make public the fact that it is a Contractor to the ILO.

6.3.2. The Contractor may not use or reproduce the name, emblem or the official seal of the International Labour Organization or of the International Labour Office, including their abbreviations, in connection with the Contractor's business or otherwise.

6.3.3. In reporting its procurement activities, the ILO may publish (e.g., on the internet) the Contractor's name and amount of the Contract.

7. ETHICAL CONDUCT

7.1. **LABOUR CLAUSES:** The Contractor undertakes to respect, at all times and in all circumstances relevant to the performance of the Contract and in relation to all its Personnel, and to ensure that its subcontractors respect:

7.1.1. The following principles concerning international labour standards of the International Labour Organization:

7.1.1.1. the freely-exercised right of workers, without distinction, to organize, further and defend their interests and to bargain collectively, as well as the protection of those workers from any action or other form of discrimination related to the exercise of their right to organize, to carry out trade union activities and to bargain collectively;

7.1.1.2. the prohibition of forced or compulsory labour in all its forms;

7.1.1.3. equal remuneration for men and women for work of equal value;

7.1.1.4. equality of opportunity and treatment in respect of employment and occupation without discrimination on grounds of race, colour, sex, religion, political opinion, national extraction or social origin and such other ground as may be recognized under the national law of the country or countries where the performance, in whole or in part, of the Contract takes place;

7.1.1.5. the prohibition of the employment of children below fourteen (14) years of age or, if higher than fourteen (14), the minimum age of employment permitted by the law of the country or countries where the performance, in whole or in part, of the Contract takes place, or the age of the end of compulsory schooling in that country or countries, whichever is higher;

7.1.1.6. the prohibition of the employment of persons under the age of eighteen (18) for work that, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of such persons;

7.1.1.7. the payment of wages in legal tender, at regular intervals no longer than one month, in full and directly to the workers concerned. The Contractor shall keep an appropriate record of such payments. Deductions from wages are permitted only under conditions and to the extent prescribed by the applicable law, regulations or collective agreement, and the workers concerned must be informed of such deductions at the time of each payment.

7.1.1.8. the provision of wages, hours of work and other conditions of work not less favourable than the best conditions prevailing locally (i.e., as contained in: (i) collective agreements covering a substantial proportion of employers and workers; (ii) arbitration awards; or, (iii) applicable laws or regulations, whichever offers the best working conditions), for work of the same character performed in the trade or industry concerned in the area where work is carried out;

7.1.1.9. the need to ensure, so far as is reasonably practicable, that the workplaces, machinery, equipment and processes under their control are safe and without risk to health, and that the chemical, physical and biological substances and agents under their control are without risk to health when the appropriate measures of protection are taken; and provide, where necessary, adequate protective clothing and protective equipment to prevent, so far as is reasonably practicable, risk of accidents or of adverse effects to health; and

7.1.2. All applicable laws or regulations concerning terms of employment and conditions of work, any collective agreements to which it is party, or any other related measure with which it must comply.

7.2. PERSONNEL NOT TO BENEFIT:

7.2.1. The ILO requires bidders and contractors to observe the highest ethical standards during the procurement process and the execution of contracts. In order to ensure the respect of these obligations, the ILO provides the following definitions:

- 7.2.1.1. "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, another to obtain a financial or other benefit or to avoid an obligation;
- 7.2.1.2. "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of any advantage, in order to influence improperly the actions of another
- 7.2.1.3. "conflict of interest" is a situation that gives rise to an actual, potential or perceived conflict between the interests of one party and another.
- 7.2.1.4. "collusive practice" is any conduct or arrangement between two or more bidders or contractors, designed to achieve an improper purpose, including to influence improperly the actions of another or to set prices at an artificial level or in a non-competitive manner;
- 7.2.1.5. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, another or the property of another to influence improperly the actions of another.
- 7.2.2. The Contractor will not (and will ensure that its Personnel do not) place itself in a position that may, or does, give rise to a conflict between its interests and the ILO's interests during the procurement process or the execution of the Contract.
- 7.2.3. If during any stage of the procurement process a conflict of interest arose or during contract execution a conflict of interest arises, or appears likely to arise, the Contractor will immediately notify the ILO in writing, setting out all relevant details, including any situation in which the interests of the Contractor conflict with the interests of the ILO, or in any situation in which any ILO official, employee or person under contract with the ILO may have, or appears to have, an interest of any kind in the Contractor's business or any kind of economic or personal ties with the Contractor. The Contractor will take such steps as the ILO may reasonably require resolving or otherwise dealing with the conflict to the satisfaction of the ILO.
- 7.2.4. Without prejudice to any other right or remedy available under the Contract, the ILO reserves the right to disqualify the Contractor for a specified or indefinite period from participating in the procurement process of the ILO or contracting with the ILO, if it is shown that the Contractor has, directly or indirectly, employed fraudulent, corrupt, collusive or coercive practices or failed to disclose a conflict of interest.

8. FULL DISCLOSURE

- 8.1. **FULL DISCLOSURE:** The Contractor warrants that it has made and will make full and proper disclosure to the ILO of all relevant information relating to its business activities, financial condition and ownership, prior to entering into this Contract and for its duration, including that it is not identified on or associated with¹ any individual, groups, undertakings and entities identified on the list established by the United Nations Security Council Resolution 1267 (**1267 Consolidated List**)²; and that it is not, nor has been, subject to any sanction or temporary suspension imposed by any organization within the United Nations System including the World Bank.

9. DELAY, FORCE MAJEURE AND LIQUIDATED DAMAGES

9.1. DELAY:

- 9.1.1. Should the Contractor encounter conditions that do not constitute *Force majeure* and which impede or are likely to impede timely performance of the Contract (**Delay**), the Contractor will immediately notify the ILO in writing with full particulars of the Delay, including its likely duration, and its cause. At the ILO's request, the Contractor and the ILO will consult as soon as practicable after receipt of such notice, to evaluate any available means of mitigation or appropriate remedies provided under the Contract.
- 9.1.2. In addition to any other right or remedy available under the Contract, upon receiving notice of Contractor's Delay (or likely Delay) in performance, the ILO will have the right to:
 - 9.1.2.1. suspend the Contract, in whole or in part, and notify the Contractor not to proceed further with its performance which has been subject to (or will be subject to) Delay;
 - 9.1.2.2. withhold and/or deduct payment to the Contractor for the portion of the Contract subject to Delay; and
 - 9.1.2.3. procure all or part of the Services which the Contractor fails to provide in a timely manner.
- 9.1.3. Without prejudice to any other right or remedy available under the Contract, the Contractor will be liable for any increase in the price payable by the ILO resulting from the procurement of the Services from other sources and the ILO may apply such additional costs incurred, by deduction or otherwise, against future amounts owed by the ILO to the Contractor.
- 9.1.4. Upon receipt of notice of any decision by the ILO to suspend the Contract under subparagraph **9.1.2.1** and with respect to the suspended portion of the Contract, the Contractor will take immediate steps to reduce expenses to a minimum and will not undertake any further obligations; provided, however, that the ILO and the Contractor will continue performance of the Contract to the extent that it is not suspended or cancelled.

9.2. FORCE MAJEURE:

- 9.2.1. Neither Party will be liable to the other Party for failure to perform its respective obligations, if such failure is as a result of an unforeseeable and irresistible event, act of nature (including fire, flood, earthquake, storm, hurricane, epidemic or other natural disaster), any act of war (whether declared or not), invasion, revolution, insurrection, terrorism, or any other acts of a similar nature or force, (**Force Majeure**) provided that such acts arise from causes beyond the control and without the fault or negligence of the invoking Party.
- 9.2.2. The defaulting Party will notify, as soon as possible after the occurrence of the *Force Majeure* event, the other Party in writing with full particulars of the *Force Majeure* event, including its likely duration, the estimated expenditures that will likely be incurred for the duration of the *Force Majeure* event, and any other conditions which threaten to interfere with the defaulting Party's performance of the Contract.
- 9.2.3. Without prejudice to any other right or remedy available under the Contract, if either Party is rendered unable, in whole or in part, by reason of *Force Majeure* to perform its obligations and meet its responsibilities under the Contract and where the Force Majeure event exists beyond sixty (60) days then that Party will have the right to suspend or terminate the Contract with a period of written notice of seven (7) days.
- 9.3. **NOTICE OF DELAY AND FORCE MAJEURE:** If notice is not received by a Party in accordance with paragraphs 9.1.1 or 9.2.2, the Party who fails to notify of the Delay or *Force Majeure* event will be liable for damages resulting from such nonreceipt, except where the Delay or *Force Majeure* event also prevents transmission of the notice.
- 9.4. **LIQUIDATED DAMAGES:** Without prejudice to any other right or remedy available under the Contract, the Parties agree that if the Contractor breaches the Contract, including a Delay in performance of the Contractor's obligations under the Contract, it will be impractical or difficult to quantify the damages suffered by the ILO. The Parties, therefore, agree that in the event of such a breach by the Contractor, the Contractor will pay to the ILO, as liquidated damages, a sum equal to three-tenths of one (0.3) per cent of the Contract price for each day of delay until actual delivery or performance, up to a maximum of ten (10) per cent of the Contract price. Each Party acknowledges and agrees that the liquidated damages amount specified herein are intended to reasonably compensate the ILO and not intended to punish the Contractor. Without prejudice to any other right or remedy available under the Contract, the ILO reserves the right to recover such liquidated damages by deduction or otherwise, against future amounts owed by the ILO to the Contractor.

10. TERMINATION

10.1. TERMINATION BY THE ILO:

- 10.1.1. Without prejudice to any other right or remedy available under the Contract and without the authorisation of a court or any other authorisation, the ILO may terminate the Contract immediately by written notice in the event that the Contractor:
- 10.1.1.1. is found to have made any material or fraudulent misrepresentation in the making of or performance of the Contract regardless of when the misrepresentation is discovered;
 - 10.1.1.2. becomes bankrupt, otherwise insolvent, or the ILO reasonably determines that the Contractor has become subject to a materially adverse change in its financial condition that threatens to substantially affect the ability of the Contractor to perform any of its obligations under the Contract;
 - 10.1.1.3. fails to perform contractual obligations or to satisfy any guarantees or warranties it has made under the Contract and does not rectify such failure within sixty (60) days following receipt of a written notice by the ILO;
 - 10.1.1.4. is declared undesirable by the government where the Contractor is to perform any of its obligations under the Contract.
 - 10.1.1.5. is the subject of any sanction or temporary suspension imposed by any organization within the United Nations System including the World Bank; or
 - 10.1.1.6. the ILO's activities are curtailed or terminated.
- 10.1.2. Upon receipt of notice of termination by the ILO, the Contractor will take immediate steps to bring any Services to a close in a prompt and orderly manner, will reduce expenses to a minimum and will not undertake any further obligations from the date of receipt of notice of termination.
- 10.1.3. If the Contract should be terminated by the ILO, the ILO will make all payments which may be due up to the effective date of termination for any Services satisfactorily delivered or performed and accepted by the ILO.

10.2. TERMINATION BY THE CONTRACTOR:

- 10.2.1. Without prejudice to any other right or remedy available under the Contract and without the authorisation of a court or any other authorisation, the Contractor may terminate the Contract immediately by written notice in the event that the ILO:
- 10.2.1.1. fails to make payments which are due under the Contract and the ILO does not rectify such failure within a period of sixty (60) days after receipt of the Contractor's written notice of default; or

- 10.2.1.2. fails in its contractual obligations so as to make it unreasonable for the Contractor to proceed with the performance of its obligations under the Contract and the ILO does not rectify such failure within a period of sixty (60) days after receipt of the Contractor's written notice of default.

11. WARRANTY

11.1. WARRANTY OF SERVICES:

- 11.1.1. The Contractor warrants that any Services provided in accordance with the Contract will meet the specifications, timeframes and related requirements set forth in the Contract. All materials and workmanship utilized in performing the Services under the Contract will be of the respective kind(s) described in the Contract and free from defects.

Materials not conforming to the specifications in the Contract will not be used in performance of the Services without prior written approval of the ILO.

- 11.1.2. If the Services do not meet the requirements referred to above, the Contractor will, at its sole expense, either by repair or replacement, correct, promptly modify or change any faulty workmanship materials, parts and equipment supplied by it to the extent necessary to satisfy the above warranty.

- 11.1.3. If any defect or failure in the Services cannot be rectified by remedial measures within the period agreed by the ILO and the Contractor, the Contractor will be considered to be in default and in addition to exercising any suspension or termination rights set forth in the Contract, the ILO has the right to independently replace or repair the Services and the Contractor will be obligated to reimburse the ILO for all the additional costs so incurred, including by deduction or otherwise, against future amounts owed by the ILO to the Contractor.

12. MISCELLANEOUS

- 12.1. **CHANGE ORDERS:** The ILO may, by written notification, increase or decrease the scope of Services of the Contract provided the stage reached in the performance of the Contract so allows. If any such changes increase or decrease the cost of and/or the time required for the performance of any part of the Contract, an equitable adjustment will be made in the Contract's price or time schedule, or both, and the Contract will accordingly be amended. Any request for consultation or claim for adjustment under this paragraph will be asserted by the Contractor within thirty (30) working days from the date of receipt of ILO's change order.
- 12.2. **AMENDMENTS:** The Parties may by mutual agreement amend the Contract. Amendments will be effective only if in writing and when executed and delivered on behalf of the ILO and the Contractor by persons duly authorized to do so.
- 12.3. **NON-WAIVER OF RIGHTS:** Termination of the Contract in whole or in part by a Party or the failure by either Party to exercise any rights available to it, will not affect the accrued rights or claims and liabilities of either Party to the Contract.
- 12.4. **SURVIVAL:** The obligations contained in paragraphs 4.6 (Insurance); 4.7 (Indemnification); 6.1 (Proprietary Items and Intellectual Property Rights); 6.2 (Confidential Nature of and Responsibility for Proprietary Items, Intellectual Property and Other Information); 6.3 (Publicity and Use of the Name, Emblem or Official Seal); and 11.1 (Warranty of Services) survive the termination or expiration of the Contract.
- 12.5. **LIMITATION ON ACTIONS:** Irrespective of their nature, any dispute, controversy, or claim arising out of the Contract or the breach, termination, or invalidity thereof (other than obligations enumerated in paragraph 12.4) must be asserted within six (6) months after the termination or expiration of the Contract.

13. SETTLEMENT OF DISPUTES

- 13.1. **AMICABLE SETTLEMENT:** The Parties will use their best efforts to amicably settle any dispute, controversy, or claim arising out of the Contract or the breach, termination, or invalidity thereof by direct informal negotiations, including, where agreed, by referral, to an executive level of authority within the Parties. Where the Parties wish to seek such an amicable settlement through conciliation, the conciliation will take place in accordance with the Conciliation Rules then prevailing of the United Nations Commission on International Trade Law (UNCITRAL) or according to such other procedure as may be agreed between the Parties in writing.
- 13.2. **ARBITRATION:** Unless settled amicably under paragraph 13.1, within sixty (60) days, after receipt by one Party of the other Party's written request, any dispute, controversy or claim arising out of the Contract, or the breach, termination or invalidity thereof, will be settled by arbitration in accordance with the UNCITRAL Arbitration Rules then prevailing. In addition:
- 13.2.1. the place of arbitration will be Geneva;
- 13.2.2. the decisions of the arbitral tribunal will be based on general principles of international commercial law;
- 13.2.3. the arbitral tribunal will have no authority to award punitive damages; and

13.2.4. the Parties will be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of any such dispute, controversy, or claim arising out of the Contract, or the breach, termination or invalidity thereof.

13.3. **LANGUAGE:** The conciliation and the arbitration proceedings will be conducted in the language in which the Contract is signed provided that it is one of the three working languages of the ILO (English, French and Spanish). In the event the Contract is in a language other than English, French or Spanish, the conciliation or the arbitration proceedings will be conducted in English, French or Spanish.

1 United Nations Security Council Resolution 1617 defines “associated with” and it is available at <http://www.un.org/sc/committees/1267/resolutions.shtml>.

2 The 1267 Consolidated List is available at www.un.org/sc/committees/1267/consolist.shtml.

Annex 2a Terms of Reference Specific Conditions of Contract

DETAILS OF WORK IMPLEMENTATION

- 1.1 The Contractor shall commence the Work on [Insert start date] and complete it by [Insert end date].
- 1.2 The Work will be executed in [Insert district and sub district, road name, and no of km] in Timor-Leste.
- 1.3 The Director of the Contractor, [Insert name of director], shall be the responsible official for the Contractor.
- 1.4 The personnel of the Contractor is under the exclusive responsibility of the Contractor. Without limiting and further to Section 3 of ILO Conditions for Service Contracts (**Annex 1**), the Contractor shall be fully responsible and liable for, and the ILO shall not be liable for (i) any action, omission, negligence or misconduct of the Contractor or its personnel, (ii) any insurance coverage which may be necessary or desirable for the purposes of this Contract, or (iii) any costs, expenses, or claims associated with any illness, injury, death or disability of the Contractor's personnel. The obligations under this provision do not lapse upon expiration or termination of this Contract.
- 1.5 The Contractor shall be responsible for providing all the necessary equipment and machinery; materials, utilities, skilled and unskilled labour, and any other logistic support and other requirements necessary for the execution of the Work, as mentioned in the Terms of Reference. ILO shall not be responsible for any logistic support, human resources and material resources, what so ever they may be, except its financial liability mentioned in the clause 4.1.
- 1.6 Accordingly, the Contractor shall be responsible for all expenditures in connection with the assignment of personnel, including allowances, insurance, the cost of travel arrangements, local transport, etc.
- 1.7 All contracts for the Contractor's personnel and sub-contracts shall provide that the ILO is not liable to any such personnel under any such contract or for any reason.
- 1.8 The Contractor shall ensure that its personnel and sub-contracted personnel have received appropriate instruction to carry out the tasks entrusted to them. The Contractor is entirely responsible for managing and paying the personnel and sub-contractors under this Contract and shall engage sufficient number of personnel to meet the planned outputs. The Contractor shall facilitate registration of personnel and keep daily attendance records, as indicated in the Terms of Reference (**Annex 2**).
- 1.9 The Contractor shall be fully responsible for acts and omissions of its own personnel. The Contractor shall comply and ensure that its own personnel and those of any subcontractors comply with the applicable laws and regulations of the country concerned by the implementation of this Contract respecting the protection of workers and the environment. The Contractor shall take responsibility for the consequences of any action by the personnel which is liable to reflect adversely on the ILO or its relations with the country Government, or with any other local or international institution. The Contractor shall replace any member of its personnel who in the opinion of the ILO jeopardizes the proper implementation of the Work or requirements relating to the protection of workers or the environment.
- 1.10 The Contractor would be the sole responsible to resolve all the disputes related to the local community, governmental or non-governmental organizations in relation to the execution of the Work.
- 1.11 No person engaged by the Contractor in relation to the implementation of any obligation provided for in the contract shall be deemed to be an agent or employee of the ILO.

- 1.12 The Contractor undertakes to notify to the ILO immediately and in writing any occurrence which may cause a delay in the work plan Annex 3. Where the ILO accepts the reasons for the delay, the parties shall establish in writing an amended work plan, which shall be attached to the Contract.
- 1.13 The Contractor undertakes to carry out the Work in accordance with good engineering practice and expert opinion and to guarantee the time schedules and the cost of the Work, in compliance with the terms of this Contract and its annexes.
- 1.14 The surveillance of the Work by the ILO shall not dispense the Contractor from its responsibility for surveillance nor shall it diminish in any way the responsibility of the Contractor for the proper implementation of the Work and the various obligations of the Contractor in relation to the protection of persons and property.
- 1.15 In principle, the Contractor shall carry out all the Work adjudicated through the services of its own company and approved sub contractors. The Contractor is under the obligation to declare sub contractors when signing the present Contract or, at the very least, before the commencement of the Work concerned. Prior approval of the subcontractors by the ILO shall be necessary in all cases.
- 1.16 The Responsible official from the Enhancing Rural Access Project will assist the Contractor during the course of the Work. The ILO reserves the right to designate at any time another natural or legal person to discharge these assistance functions. In such a case, it will duly notify the Contractor.
- 1.17 The Contractor is entirely responsible for obtaining all necessary licenses or authorizations etc. and for paying all taxes, fees, duties, etc. in relation with this Contract.
- 1.18 The Contractor shall draw to the attention of the ILO in writing and without delay any circumstance, including any error, that it may note in the Contract, in the plans and documents provided by the ILO or in the instructions received from the ILO, which may be such as to compromise the proper execution of the Contract. In particular, the work norms relating to the Work set out in the specifications, and BoQ and work plan annexed to the present Contract must be verified by the Contractor's representative.

2. REPORTS

- 2.1 All Monthly Payment Certificates (Interim Statements) shall be submitted in the first week of following month.
- 2.2 Upon completion of the Work, a final report shall be submitted to Mr. Tomas Stenstrom, ILO ERA Project Chief Engineer, within 30 (thirty days).
- 2.3 All reports shall be submitted to:
Mr. Tomas Stenstrom, ILO ERA Project Chief Engineer, The Office of the ERA Project located at Don Bosco Training Center, Comoro, Dili, Timor-Leste.

3. COMMUNICATION

- 3.1 On all matters arising from this Contract, the Contractor shall deal in the first instance with the Project Chief Engineer of the ILO ERA Project.
Written communications on technical issues shall be addressed to:
The Project Chief Engineer of ERA Project, Don Bosco in Dili, with a copy to: Mr. Roberto Pes, Head of Mission, ILO Dili, Timor-Leste.
- 3.2 Written communications on issues connected with the provisions of the present Contract, its interpretation or any legal aspects related to it, shall be sent to the address given in the ILO Conditions for Service Contracts set out in Annex 1.

Annex 2b Terms of Reference INSTRUCTIONS AND TECHNICAL SPECIFICATIONS FOR RURAL ROAD MAINTENANCE

Instructions, reporting and financial arrangements

The Contractor has received basic training in labour-based routine road maintenance and has been provided with the Routine Road Maintenance Management Guideline.

The Contractor willingly agrees to carry out further training to community workers using labour-based work methods on the assigned road(s) according to the agreed annual work plan and is responsible for the routine maintenance of the road as defined in this contract, will undertake the duties and responsibilities as described in these Terms of Reference.

The Contractor shall enter into a sub contract with the communities along the road by identifying and contracting a Community Maintenance Group Leader for each identified section of the road and facilitate the establishment of the maintenance group. Whilst the CMG's are responsible for the direct implementation of the maintenance activities, the contractor is responsible for supervision of the activities of the CMGs. The contractor shall together with the CMG Leader prepare monthly plans and shall at the end of each month prepare the Site Inspection Report together with the CMG Leader.

The contractor must be able to plan his/her work to suit other commitments that he/she may have without affecting the performance of the duties and responsibilities under this contract. As long as the minimum acceptable standards of maintenance are achieved working hours and working days are flexible. The contractor must however be available on assigned inspection days and pay days. These days will be agreed with the ILO ERA maintenance engineer.

The contractor shall procure hand tools and materials as stipulated in the contract and shall distribute to the CMGs as necessary. The contractor is expected to monitor the use of these hand tools and materials to take all reasonable precautions against damage or loss. Hand tools which are worn out through normal use may be replaced by the Client upon production of the item originally issued. All items of hand tools are to be returned to the ERA Project upon completion of the contract or for any reason this contract is terminated.

The Contractor is entirely responsible for managing and paying the CMGs under this contract and shall monitor that the CMG Leader engages sufficient number of workers to meet the planned outputs, that the CMG is entering into employment contracts with the CMG members and that the CMG Leader is keeping daily attendance records. The CMGs shall engage a minimum of 30% women for the works (no children below the age of 15). ***The Contractor is responsible for ensuring safe and sound practices on site and shall provide the CMG's with necessary safety equipment and a first aid kit.***

Reporting and Financial Arrangements

 The Contractor Monthly Payment Certificate constitute contractors reporting requirement under this contract. The MPC shall include (i) Covers (ii) Payment Claim, including the summary of employment generated, and any advances (iii) Monthly Activity Plan and Site Inspection Report (iv) Musterroll.

- ✚ Upon satisfactory completion of the Services, the Client, in accordance with the provisions below, shall pay the Contractor up to the ceiling amount mentioned in the Contract, representing the total contract price and the maximum financial liability under this Contract.
- ✚ Payment is made on a monthly basis, based on the contractors MPC. Payment for satisfactory completed work is based on the monthly work output (total number of work-days), which is based on the Monthly Activity Plan and actual outputs as verified in the Site Inspection Report (but not exceeding the monthly planned output), in **Annex 9**. Payment Certificates will also include payments for tools, materials, contractors fee, advances and any deductions. Payment will be executed within two weeks of inspection by the ILO ERA maintenance engineer.
- ✚ The contractor is responsible for paying the CMG's in full and on time, on a monthly basis, and shall pay the CMG Leader for daily inspection of the road and clearing of any obstacles, works planning and supervision and for labour management at a rate of US\$ 5 per day (ie 30 days x US\$ 5.00 = US\$ 150 per month) and US\$ 4.50 per day for unskilled labour in accordance with the approved musterroll (normalised in relation to agreed task rates and actual achieved physical output).
- ✚ The contractor may estimate an overhead cost at the rate of 12% of the approved direct costs. For managing the road maintenance works. The contractor shall be paid monthly based on actual work completed.
- ✚ If the ILO ERA maintenance engineer after inspection decides that the contractor is not producing work to the required standard (if warnings are not effective) the ERA Project may withhold the payment from the contractor concerned. Depending upon the circumstances, a written warning letter may be given to the Contractor explaining the reason for withholding payment. Mention will also be made on the pay sheet of the amount deducted (if any) and the reason for it. The relevant section of work will be re-inspected the following month and if the standard of works is satisfactory, the Contractor will resume full payment (but not back payment) of his/her entitlement. If the standard of work remains unsatisfactory then the contract may be terminated and a replacement appointed.
- ✚ The ILO ERA maintenance engineer or his authorised representative shall have the power to inspect the employment records and pay sheets of the Contractor's labour force, at any reasonable time, without prior notice to the Contractor. The ILO ERA maintenance engineer may suspend works where it is found that workers are not engaged in accordance with the labour law and regulations of Timor-Leste; women and men workers are not paid equally on the principle of equal pay for work of equal value; and workers are being paid less than the established minimum wage. In the event of default by the Contractor in paying the workers (or other services) after not more than one month, the ILO shall have the power to directly pay the outstanding wages and allowances (if any) and in accordance with the pay sheet records (and settle other costs due by the Contractor) and to deduct the corresponding amount from any monies due to the Contractor. Continuing default by the Contractor may be a cause for suspension of work under the conditions of the Service Contract stated in annex 1.

Description of Maintenance Activities

Detailed descriptions of the various work activities are contained in the Routine Road Maintenance Management Guideline and in the Technical Specifications below. These descriptions also prescribe how quantities of works are measured, on which basis payments are made.

Initial repair works

Initial work activities should be carried out by the contractor in accordance with the BoQ attached in Annex 4 and as per site instructions provided by the ILO ERA maintenance engineer. Appropriate haulage and compaction equipment should be provided by the Contractor.

Special Maintenance During Rains

Inspect all roads during rainy periods and divert all flood waters away from pavements toward natural drainage and culvert systems by digging shallow drains, where necessary. Ensure that all culverts and bridges are cleared of any debris. Divert traffic likely to damage any structures.

Undertake immediate works to repair damages to shoulders or the pavement caused by water erosion. Immediately report any major damages to the District Engineer.

Emergency Action

Where serious road damage has occurred, the contractor is responsible for traffic safety by diverting traffic around damaged sections and placing simple locally available vegetation or materials on the road to mark the diversion. Serious damages must be immediately reported to the ERA maintenance engineer and to Public Works district supervisor who will decide if the road should be closed to vehicular traffic.

Technical Specifications

Below is a list of rural road maintenance terminology followed by the descriptions of each work item, and the categories light, medium and hard, which should be used to complete the road assessment form and to execute the work activities.

Rural road maintenance terminology

Road Terms	
Cleared Width	<i>The fully cleared width of the road as required in the Technical Specifications</i>
Formation Width	Full width of the road including side drains and embankments
Roadway	Full width of the road including the shoulders
Carriageway	Paved / gravelled width of the road
Road Centre-line	The centre-line of the roadway
Shoulders	Paved / unpaved width of road between the edge of the carriageway and the edge of the ditch / embankment slope

Camber	Cross-fall of the carriageway and shoulders facilitating efficient drainage of rainfall from the roadway into the road side drains
Gravel Course	Layer of compacted gravel forming the surface of the carriageway
Road Side Drains	Drains running alongside and parallel to the roadway to collect water running off from the roadway
Ditch Slope	Inside slope from the shoulder to the road side drain
Back Slope	Outer slope of the road side drain
Mitre Drains	Drains leading water away from the road side drains to areas of safe dispersal
Scour checks	Dam-like structures, built with timber or hand-packed stone to slow down the flow of water in road side drains, mitre drains and catch-water drains
Drainage Terms	
Drift	Low-level drainage structure allowing water from natural streams, roads side drains and catch-water drains to safely cross the roadway
Vented Drift	Medium-level drainage structure combining both the features of a standard drift and those of a multiple pipe culvert allowing provision for the normal seasonal flow of water to pass safely under the roadway, yet at the same time allowing for un-seasonal flows during periods of heavy rain to pass safely under and over the structure
Culvert	Medium-level drainage structure built under the roadway to collect and drain water from the road side drains to areas of safe dispersal; the culvert opening(s) may be single or multiple lines of concrete pipes, steel pipes or concrete boxes
Inlet/Outlet	Openings in a culvert that safely direct water into and out of the structure
Bridge	Medium to high-level drainage structure allowing large volumes of water to pass safely under the roadway

RM 1 - Road inspection and Removing Obstructions

The work includes daily inspection of the whole of the road section(s) included in the Contract, including identification and removal of all obstructions including standing water from the roadway, road side drains, mitre and other drains, inlets and outlets of drifts, culverts and other structures, including their waterways, and the safe disposal thereof outside the road formation width.

The performance standard required shall be that all obstructions and standing water are continuously removed.

The method of measurement on the day of site inspection shall be that all obstructions have been removed from the whole of the road section(s).

RM-2 Cleaning culverts including in/outlets

The work includes clearing all culverts of all debris, silt and vegetation together with the safe disposal thereof outside the formation width and to maintain the culverts in a clean and free-draining condition at all times. This work also includes the clearing from all culvert inlets and outlets for a minimum of 10 m from the end of the pipes or boxes and all debris, silt and vegetation together with the safe disposal thereof outside the formation width.

The performance standard required shall be culverts including their inlets and outlets are cleared and free-draining at all times.

The method of measurement on the day of site inspection shall be that all those culverts included for clearing during the month preceding the site inspection are cleared and free-draining.

Recommended productivity norm:

The diameter of the pipe culvert and the height and width of a box culvert will be a maximum of 100 cm (1.0m). Any larger culverts will be calculated separately.

RM-2	Light	One culvert up to half full with soft soil	One culvert up to quarter full with hard soil	1 WD/culvert
	Medium	One culvert three quarters full with soft soil	One culvert half full with hard soil	2 WD/culvert
	Hard	One culvert full with soft soil	One culvert more than half full with hard soil	4 WD/culvert

RM-3 Clear debris from bridges, drift and Causeway

The work includes clearing all bridges, drifts, causeway and other structures (not culverts) including their inlets and outlets of all debris, silt and vegetation together with the safe disposal thereof outside the road formation width and to maintain the structures and their inlets and outlets in a clean and free-draining condition at all times.

This work also includes the clearing of all waterways, for a distance not less than 25 metres both upstream and downstream unless directed otherwise by the maintenance Engineer. All debris and other materials shall be removed well clear of the river and the drainage system to prevent it from being washed back and once again obstructing the river flow.

The performance standard required shall be all structures (not include culvert) including their inlets and outlets and waterways are cleared and free-draining at all times.

The method of measurement on the day of site inspection shall be that all those structures included for clearing during the month preceding the site inspection are cleared and the waterways free-draining.

Recommended productivity norm:

The table below provides the worker-days specifically of the clear debris from the bridges, drifts and cause ways. As bridges, drift and causeway come in various shapes and sizes, the volume of work must be calculated for each case. *Volume = height x length x width (m³)*

RM-3	Light	clearing up to 5 m ³ of debris	3 WD/bridge
	Medium	clearing more than 5m ³ up to 10 m ³ of debris	7 WD/bridge
	Hard	clearing more than 10m ³ up to a maximum of 20 m ³ of debris	15 WD/bridge

Note: Where the clearing more than 20 m³ then the number of worker-days should be increased and calculated accordingly.

RM-5 Cleaning lined drain & clearing side drains/mitre drain

The work includes clearing all road side drains(earth drains), lined drain, catch-water drains and mitre drains of all debris, silt and vegetation together with the safe disposal thereof outside the formation width and to maintain all the drains in a clean and free-draining condition at all times. In areas where houses line the edge of the roads, the material from the drains shall be taken to a nearby dump site identified by the maintenance Engineer no further than 200m from the road site. This work includes maintaining and restoring the drains to their original dimensions of width and depth.

The performance standard required shall be all drains cleared and free-draining at all times.

The method of measurement on the day of site inspection shall be that all those drains included for clearing during the month preceding the site inspection are cleared and free-draining

Recommended productivity norm:

The table below provides the work-days specifically for clearing and excavation within the road drains. It is assumed that the soil condition is in soft to medium.

RM-5 Cleaning lined drain & clearing side drains/mitre drain	Light	Silt up to 10 cm thick	25 WD/Km
	Medium	Silt up to 15 cm thick	40 WD/Km
	Hard	Silt up to 20 cm thick	50 WD/Km

Note: The productivity norm is estimated only for one side of the road. If the work is to be done two sides of the road the productivity norm shall be multiplied by 2.

RM 6 Repair / replace scour checks

The works includes repairing / replacing existing scour checks to the correct shape and size. This activity may also include installing new scour checks as directed by the maintenance Engineer.

The performance standard required shall be that scour checks are repaired/replaced/installed to the correct shape and size and fully functioning.

The method of measurement on the day of site inspection shall be that all those scour checks included for repair/replacement/installation during the month preceding the site inspection are repaired/replaced/installed.

Recommended productivity norm:

The table below provides the productivity norm of repairing scour checks. The productivity norm depends on level of the work as described in the below table

RM 6 Repair / replace scour checks	Light	Minor repair less than 50% and cleaning the scour checks.	0.25 WD/Scour check
	Medium	<i>Repair more than 50% of damage of the scour</i>	0.33 WD/Scour check
	Hard	Replace new scour check	0.5 WD/Scour check

RM 8 Repair of erosion on shoulders

The work includes the removal of spoilt soil and the filling of the eroded areas with good soil, watering and compacting of the new soil to recover the shoulder shape and height and the slope shape.

The performance standard required shall be shoulders repaired to their original shape using approved material and free draining at all times.

The method of measurement on the day of site inspection shall be that all those shoulders included for repair during the month preceding the site inspection are repaired to their original shape and slopes using approved material.

Recommended productivity norm:

The table below provides the worker days specifically for repairing of erosion on the shoulder.

RM 8 Repair of erosion on shoulders	Light	Slight erosion or vehicle damage of the road.	21 WD/km
	Medium	Deeper erosion or vehicle damage up to a depth of 15 cm.	27 WD/km
	Hard	Extensive damage requiring new soil not available at the edge of the road,	40 WD/Km

Note: The productivity norm is estimated only for one side of the road. If the work is to be done two sides of the road the productivity norm shall be multiplied by 2.

RM 9 Filling potholes in carriage way

Includes the excavation of all unsuitable/degraded material to a minimum depth of 15 cm. The excavated material together with other approved filling material is mixed together, watered and placed back into the excavated hole and compacted using hand rammers. Make sure that there is no water in the pothole when it is filled. If the pothole / severe rut is deep the materials should be filled and compacted in layers not thicker than 5 centimetres. Compaction is carried out using hand rammers. The surface level of the filled hole after compaction should be a minimum of two centimetres higher than the adjacent pavement surface level.

The performance standard required shall be that potholes have been filled with suitable approved materials and unsuitable/degraded materials disposed.

The method of measurement on the day of site inspection shall be that all those potholes included for filling during the month preceding the site inspection are filled with suitable approved materials which have been fully compacted and unsuitable/degraded materials disposed.

Recommended productivity norm:

The table below provides the productivity norm of the filling pothole and severe rut in carriageway activity

RM 9 Filling potholes	<i>For filling potholes: up 20 potholes / WD. Maximum size of the pothole 0.5 m²</i>	<i>Or 0.1 WD/m²</i>
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RM 10 Fill rut in carriageway

Where in the area of severe rutting, it is treated as pothole which the activity is also treated using the same work methods as when filling potholes. The ruts should then be excavated to form vertical edges and the fill materials need to be placed, watered and compacted in layers. When using hand rammers for compaction, the thickness of each layer should not exceed 5 centimetres.

The performance standard required shall be that the severe ruts have been filled with suitable approved materials and unsuitable/degraded materials disposed.

The method of measurement on the day of site inspection shall be that all those severe ruts included for filling during the month preceding the site inspection are filled with suitable approved materials which have been fully compacted and unsuitable/degraded materials disposed.

Recommended productivity norm:

The table below provides the productivity norm of the filling severe ruts in carriageway activity

RM 10 Fill rut in carriageway	<i>0.1 WD/m²</i>
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Rut filling should only be over short distances as major repairs to the road surface cannot be included in routine maintenance, but must be done separately with a separate budget. The length of road where ruts need repairing should not exceed 10% of the road length or a maximum of 350m² in each kilometre.

RM 11 Grubbing carriage way

Grass growing on the edge of the carriageway can prevent rainwater from draining off the road surface. It can also start growing into the carriageway.

Grass and roots should be removed from the carriageway. A string line showing the exact position of the start of the side slope provides a good guidance when removing grass and grubbing the shoulders. Debris should be removed well away from the road to avoid the removed material being washed back into the drainage system. In areas where houses line the edge of the roads, the material from the drains will be taken to a nearby dump site identified by the maintenance Engineer no further than 200m from the road site.

The performance standard required shall be grubbing in strict accordance with the instructions of the maintenance Engineer including limits and disposal.

The method of measurement on the day of site inspection shall be that all that grubbing work included during the month preceding the site inspection has been undertaken in accordance with the limits of width and waste materials suitably disposed.

Recommended productivity norm:

The table below provides the productivity norm of the Grubbing carriageway activity

RM 11 Grubbing carriage way	Light	Average width of grass area to be grubbed is not greater than 30 cm (0.3m)	10 WD/km
	Medium	<i>Average width of grass area to be grubbed is greater than 30cm and less than 1.0m</i>	13 WD/km
	Hard	Average width of grass area to be grubbed is more than 1.0 m	20 WD/Km

Note: The productivity norm is estimated only for one side of the road. If the work is to be done two sides of the road the productivity norm shall be multiplied by 2.

RM 12 Rake excess gravel from shoulders in carriageway

This work normally comprise of raking excess gravel from the road edges and road shoulders back on to the carriageway where ruts have been formed. After re-placing the materials they are compacted at optimal moisture content by using hand rammer.

The performance standard required shall be that the exceed gravel at the shoulders and road edges have been cleared and light ruts have been filled by the material from the raking and compacted.

The method of measurement on the day of site inspection shall be that all exceeded gravel at the road shoulders and road edges are cleared and levelled included

The method of measurement on the day of site inspection shall be that all exceeded gravel at teh road shoulders and the light ruts included during the month preceding the site inspection are cleared and the ruts are filled.

Recommended productivity norm:

The table below provides the productivity norm of the raking excess gravel from road shoulders and road edges

RM 12 Rake excess gravel from shoulders in carriageway	33 WD/Km
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Note: The productivity norm is estimated only for one side of the road. If the work is to be done two sides of the road the productivity norm shall be mulplied by 2.

RM-13 Clearing bush and cutting grass.

Grass and Bush growing on the carriageway, shoulders, drain slopes and drain floor shall be cut (not grubbed) to a height not exceeding 10 cm and for a width of minimum 1 m outside of the side drain. On curves, the width may be increased to improve 'sight-distance' on the instruction of the maintenance Engineer.

Where the width limits require trees to be cut, this work shall only be undertaken following approval by the local community and on instruction from the maintenance Engineer.

The performance standard required shall be grass and/or bush cut to the height and width limits as instructed by the maintenance Engineer.

All debris removed from the road, ditches and slope will be cleared away from the road. In areas where houses line the edge of the roads, the material from the drains will be taken to a nearby dump site identified by the supervisor no further than 200m from the road site.

Recommended productivity norm:

The table below provides the worker-days specifically of the clearing bush and grass cutting. The productivity norm depends on condition of the bush and grass to be cleared as given below table:

RM-13 Clearing bush and cutting grass.	Light	9 WD/Km
	Medium	11 WD/Km

	Dense	14 WD/Km
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Note: The productivity norm is estimated only for one side of the road. If the clearing is to be done two sides of the road the productivity norm shall be multiplied by 2.

Description of the Bush and Grass:

<i>Light:</i> low	Very few low bushes and shrubs. And little grass with gaps between, and growing
<i>Medium:</i> taller	Thicker bush and shrubs with a height up to 1.5m. And denser grass and stronger with hardly any gaps
<i>Hard:</i>	Really thick and overgrown area with tall bushes and shrubs. And really thick and tall grass

The clearing width is vary between 0.5 m to 2 m. Where the clearing width is very small < 0.5 m then the number of worker days should be reduced. Where the clearing width is greater than 2 m then the number of worker-days should be increased.

RM 14 Planting grass

This work consists of prepare bedding, hauling, watering and planting. The grasses should be planted to give continuous cover over the whole area and their root system substantially undamaged, well buried in firm material, and packed around with moist earth in which they have grown. The species of the grasses should be approved by the maintenance Engineer prior to commencing the activity. Surfaces to be planted should be trimmed in such a way that the ground surface after planting should be as shown in good level.

The performance standard required shall be that the grass is planted and grown grass to give continuous cover over the whole area.

The method of measurement on the day of site inspection shall be that all those grasses included for planting during the month preceding the site inspection are planted and grown.

Recommended productivity norm:

The table below provides the productivity norm of grass planting. The productivity norm depends on hauling distance. Where the grass is available and ready with hauling distance up to 50 m to plant the following task rates apply.

RM 14 Planting grass	0.1 WD/m²
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Where the hauling distance is more than 50 m the WDs needs to be increased. The extrat WDs should be calculated accordingly.

RM 15 - Non-standard routine maintenance activities:

These activities which may include minor repairs to culvert headwalls, removal of land slide shall be clearly defined and performed by the Contractor only as and when instructed to do so by the maintenance Engineer and agreed workdays to complete the work.

The method of measurement on the day of site inspection shall be that the agreed works have been satisfactorily completed.

Annex 3 Road Condition Assessment, Section 1 1/3

Routine road maintenance assessment and schedule of works

From A-3

District name: Emmara					Sub-section of this contract Ch: 0+000 to Ch: 7+000										Suko: Raliaco Cratic								
Contract no: ERA-ERM-721-RM-2013-001					Section length: 7 km										Page no: 1/3								
Road name: Lihu-Samaleten 13.8km					Date: 01 March 2013																		
Item No	Routine road maintenance activities	Unit	Condition	Chainage														Total Quantity	Weight	Frequency	Total Annual W/O		
				1+000					2+000														
				200	400	600	800	0	200	400	600	800	0										
RM-1	Road inspection and removing obstacles	WDs																3.75		3	23		
RM-2	Cleaning culverts incl. inlets/outlets	No	Light															5	1	1	5		
			Medium															2					
			Hard															4					
RM-3	Clear debris from bridges, drifts and causeways	No	Light															1	3	1	3		
			Medium															7					
			Hard																15				
RM-5	Cleaning lined drain & repairing side drains/ mitre drains	Km	Light															2	25	1	50		
			Medium															40					
			Hard																50				
RM-6	Repair scour checks	No	Light															10	0.25	1	3		
			Medium															0.33					
			Replac																0.5				
RM-8	Repair of erosion on shoulders	Km	Light																21				
			Medium															27					
			Hard															40					
RM-9	Filling potholes	M2																0.10					
RM-10	Fill rut in carriageway	M3																286	0.45	1	129		
RM-11	Grubbing carriage way	Km	Light																10				
			Medium															13					
			Hard															20					
RM-12	Rake excess gravel from shoulders in carriageway	Km																33					
RM-13	Clearing bush and cutting grass	Km	Light																9				
			Medium															11					
			Dense																14				
RM-14	Planting grass	M2																0.10					
RM-15	Non-standard routine maintenance activities: Removal of unsuitable mtrl on roadway	M3																54	0.75	1	41		
Note: If only 1 side of the road put 1 and both side put 2					Total Gavel in this page (1/5): (m3) 286										Total WDs in this page (1/5): 252								
					Gavel bring from previous page: (m3) 0										WDs bring from previous pages 0								
					Sub-total Gavel (m3) 286										Sub-total WD 252								

Road Condition Survey Section 1 2/3

Routine road maintenance assessment and schedule of works																				From A-3						
District name: Ermera										Sub-section of this contract Ch: 0+000 to Ch: 8+000										Suko: Railaco Graic						
Contract no: ERA-ERM-721-RM-2013-001										Sub-section length: 8 km										Page no: 2/3						
Road name: Lihu-Samaleten 13.8 km										Date: 01 March 2013																
Item No	Routine road maintenance activities	Unit	Condition	Chainage															Total Quantity	WD/Unit	Frequency	Total Annual WD				
				3+000					4+000					5+000												
				200	400	600	800	0	200	400	600	800	0	200	400	600	800	0								
RM-1	Road inspection and removing obstacles	WDs																	3.75		3	34				
RM-2	Cleaning culverts incl. inlets/outlets	No	Light																5	1	1	5				
			Medium																2							
			Hard																4							
RM-3	Clear debris from bridges, drifts and causeways	No	Light																3							
			Medium																7							
			Hard																15							
RM-5	Cleaning lined drain & repairing side drains / mitre drains	Km	Light																25		1	120				
			Medium																3	40						
			Hard																50							
RM-6	Repair scour checks	No	Light																10	0.25	1	3				
			Medium																	0.33						
			Replac																	0.5						
RM-8	Repair of erosion on shoulders	Km +	Light																21							
			Medium																27							
			Hard																40							
RM-9	Filling potholes	M2																	0.10							
RM-10	Fill rut in carriageway	M3																	34	0.45	1	15				
RM-11	Grubbing carriage way	Km +	Light																10							
			Medium																13							
			Hard																20							
RM-12	Rake excess gravel from shoulders in carriageway	Km +																	33							
RM-13	Clearing bush and cutting grass	Km +	Light																9							
			Medium																11							
			Dense																14							
RM-14	Planting grass	M2																	0.10							
RM-15	Non-standard routine maintenance activities: Removal of unsuitable mtl on roadway	M3																	0.75							
Note: * If only 1 side of the road put 1 and both side put 2										Total Gavel in this page (2/3): (m3) 34										Total WDs in this page (2/3): 177						
										Gavel bring from previous page (m3) 286										WDs bring from previous pages 242						
										Sub-total Gavel (m3) 320										Sub-total WD 419						

[Insert Agreement Number]

110

[Insert Budget Code]

Road Condition Survey Section 1 Sheet 3/3

Routine road maintenance assessment and schedule of works

From A-3

District name: Ermera										Sub-section of this contract Ch: 0+000 to Ch: 8+000										Suko: Rallaco Cratic																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Contract no: ERA-ERM-721-RM-2013-001										Sub-section length: 8km										Page no: 3/3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Road name: Lihu-Samaleten 13.8km										Date: 01 March 2013																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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				200	400	600	800	0	200	400	600	800	0	200	400	600	800	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
RM-1	Road inspection and removing obstacles	WDs																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

Road Condition Survey Section 2 1/2

Routine maintenance assessment and schedule of works																		From A-3													
District name: Ermera				Sub-section of this contract Ch: 8+000 to Ch: 13+800												Suko: Rallaco Leten															
Contract no: ERA-ER-M-721-RM-2013-001				Sub-section length: 5.8km												Page no: 1/2															
Road name: Lihu-Samaleten 13.8km				Date: 01 March 2013																											
Item No	Routine road maintenance activities	Unit	Condition	Chainage															Total Quantity	Wd/Unit	Frequency	Total Annual Wd									
				9+000					10+000					11+000																	
				200	400	600	800	0	200	400	600	800	0	200	400	600	800	0													
RM-1	Road inspection and removing obstacles	WDs																													
RM-2	Cleaning culverts incl. inlets	No	Light																												
			Medium																												
			Hard																												
RM-3	Clear debris from bridges, drains and causeways	No	Light																												
			Medium																												
			Hard																												
RM-5	Cleaning lined drain & repairing side drains / mite drains	Km	Light																												
			Medium																												
			Hard																												
RM-6	Repairs scour checks	No	Light																												
			Medium																												
			Replac																												
RM-8	Repair of erosion on shoulders	Km	Light																												
			Medium																												
			Hard																												
RM-9	Filling potholes	M2																													
RM-10	Fill rut in carriageway	M3																													
RM-11	Grubbing carriage way	Km	Light																												
			Medium																												
			Hard																												
RM-12	Rake excess gravel from shoulders in carriageway	Km																													
RM-13	Clearing bush and cutting grass	Km	Light																												
			Medium																												
			Dense																												
RM-14	Planting grass	M2																													
RM-15	Non-standard routine maintenance activities: Removal of unsuitable mtrl on roadway	M3																													
Note: If only 1 side of the road put 1 and both side put 2				Total Gravel in this page (1/2): (m3) 20										Total WDs in this page (1/2):										213							
				Gravel bring from previous page: (m3) 0										WDs bring from previous pages:										0							
				Sub-total Gravel (m3) 20										Sub-total WDs										213							

Road Condition Survey Section 2 2/2

Routine road maintenance assessment and schedule of works																							From A-3	
District name: Emmera										Sub-section of this contract Ch: 8+000 to Ch: 13+800										Suko: Railaco Leten				
Contract no: ERA-ER-M-721-RM-2013-001										Sub-section length: 5.8km										Page no: 2/2				
Road name: Lihir-Samaleten 13.8km										Date: 01 March 2013														
Item No	Routine road maintenance activities	Unit	Condition	Chainage															Total Quantity	WD/Unit	Frequency	Total Annual WD		
				12+000					13+000					14+000										
				200	400	600	800	0	200	400	600	800	0	200	400	600	800	0						
RM-1	Road inspection and removing obstacles	WD's																		5	wd's/month/km	3	45	
RM-2	Cleaning culverts Incl. Inlets	No	Light																	5	1	1	5	
			Medium																	2				
			Hard																	4				
RM-3	Clear debris from bridges, drifts and causeways	No	Light																		3			
			Medium																	7				
			Hard																		15			
RM-5	Cleaning lined drain & repairing side drains/ mitre drains	Km	Light																	3	25	1	75	
			Medium																	40				
			Hard																	50				
RM-6	Repair scour checks	No	Light																	10	0.25	1	3	
			Medium																	0.33				
			Replac																	0.5				
RM-8	Repair of erosion on shoulders	Km ⁺	Light																		21			
			Medium																	27				
			Hard																	40				
RM-9	Filling potholes	M2																		0.10				
RM-10	Fill rut in carriageway	M3																		286	0.45	1	129	
RM-11	Grubbing carriage way	Km ⁺	Light																		10			
			Medium																	13				
			Hard																	20				
RM-12	Rake excess gravel from shoulders in carriageway	Km ⁺																			33			
RM-13	Clearing bush and cutting grass	Km ⁺	Light																		9			
			Medium																	11				
			Dense																	14				
RM-14	Planting grass	M2																			0.10			
RM-15	Non-standard: Removal of unsuitable mtr on roadway (50m3) Slide 600m (\$99m3)	M3																		649	0.75	1	487	
Note: * If only 1 side of the road put 1 and both side put 2				Total Gavel in this page (2/2): (m3) 286										Total WDs in this page (2/2): 743										
				Gavel bring from previous page: (m3) 20										WDs bring from previous pages 186										
				Grand Total Gavel (m3) 306										Grand Total WD 929										

Annex 4 Bill of Quantity and Cost Estimate Page 1/2

Bill of Quantity / Annual cost estimate for routine road maintenance per road										Form A-4
Contract No: ERA-ERM-721-RM-2013-001			District: Ermera				From: 01/03/13-31/05/13			2 Pages
Road name: Lihu-Samaleten 13.8 km			Sub-district: Railaco				Suco(s): Railaco Craic 0-8km, Railaco Leten 8-13.8km			
Item No	Road Name		Road Lihu-samaleten (2 CMGs)				Road Lihu-Samaleten Total			
	Suco		Railaco Craic		Railaco Leten		Total Quantity	No. of WD Total	Unit rate. USD	Amount.USD
	Road section		Ch 0+000 to 8+000		Ch 8+000-13+800					
	Description of works	Unit	Qty	WD	Qty	WD				
	Labour cost									
RM-1	Road inspection and removing obstacles (CMG Leader, 3 months)	Km	8.00	90.00	5.80	90.00	13.80	180.00	5.00	900.00
RM-2	Cleaning culverts incl. in/outlets	No	15.00	15.00	10.00	10.00	25.00	25.00	4.50	112.50
RM-3	Clear debris from bridges , drifts and cause ways	No	1.00	3.00	0.00	0.00	1.00	3.00	4.50	13.50
RM-5	Cleaning lined drain & repairing side drains/mitre drain	Km	8.00	290.00	5.80	195.00	13.80	485.00	4.50	2,182.50
RM-6	Repair scour checks	No	30.00	9.00	20.00	6.00	50.00	15.00	4.50	67.50
RM-8	Repair of erosion on shoulders	Km	0.00	0.00	0.00	0.00	0.00	0.00	4.50	0.00
RM-9	Filling potholes	M2	0.00	0.00	0.00	0.00	0.00	0.00	4.50	0.00
RM-10	Fill rut in carriageway	M3	354.00	159.00	306.00	169.00	660.00	328.00	4.50	1,476.00
RM-11	Grubbing carriage way	M2	0.00	0.00	0.00	0.00	0.00	0.00	4.50	0.00
RM-12	Rake excess gravel from shoulders on carriageway	Km	0.00	0.00	0.00	0.00	0.00	0.00	4.50	0.00
RM-13	Clearing bush and cutting grass	Km	0.00	0.00	0.00	0.00	0.00	0.00	4.50	0.00
RM-14	Plant grass	M2	0.00	0.00	0.00	0.00	0.00	0.00	4.50	0.00
RM-15	None standard items removal of unsuitable mtrls and slide	M3	54.00	41.00	649.00	487.00	703.00	528.00	4.50	2,376.00
	Sub total			607.00		957.00		1,564.00		7,128.00

Bill of Quantity Page 2/2

II	Material, Tools and Equipment cost									
	Laterite (supplied and compacted)	m³	354.00		296.00		640.00		14.70	9,408.00
	Hand tools	Ls	1.00		1.00		2.00		350.00	700.00
	Equipment cost N/A	Ls	0.00		0.00		0.00		0.00	0.00
	Contractor's Establishment	Ls	1.00		1.00		2.00		200.00	400.00
	Other materials cost OSH+First Aid	Ls	1.00		1.00		2.00		100.00	200.00
	Sub total									17,836.00
III	Indirect cost									
	Supervision cost	per month	50%		50%		3		500.00	1,500.00
	Company overhead cost and profit	12%								2,140.32
	Total Maintenance Road Lihu-Samaleten									21,476.32
	Grand total all roads included in contract									21,476.32
Date: / /					Date: / /					
Quantities prepared by.....					Approved by by:.....					
Costs prepared by:.....										
Signature:..... (Company's director)					Signature:..... (ERA's Project Chief Engineer)					

Annex 5 Annual Work Plan (3 months)

Annual Work plan and Report on Employment Generation (3 months, March-May 2013)														Form A-5	
District: Ermera						Date from 01/03/13-31/05/13									
Contract No: ERA-ERM-721-RM-2013-001						Duration: 3 Months									
Road Name: Lihu-Samaleten 13.8km															
Road section (chainage) and Suco	WD Total	Labour Cost incl superv.	WD Plan/ Actual	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Road Name A:															
Railaco Craic 0+000-8+000	607	2,776	Planned			390	109	108							
			Actual												
Railaco Leten 8+000-13+800	957	4,352	Planned			390	390	177							
			Actual												
TOTAL WD and Labour Cost	1564	7,128													
Monthly and cumulative workerdays planned and actual	Planned					780	499	285							
	Actual														
	Planned Cumulative					780	1,279	1,564							
	Actu Cumulative														
Date: / /						Date: / /									
Prepared by:						Checked by:									
Signature: (Maintenance engineer)						Signature: (Project Chief Engineer)									

Annex 6 Proposed List of hand tools

Quantity and cost of hand tools required for the routine road maintenance works					Form A-5
Tools to be procured by the Contractor and list submitted to the ERA project (LS indicated in contract)					
District: Ermera			Contract Number: ERA-ERM-721-RM-2013-001		
Number of CMG's: 2			Total Number of Workers: 10-20 per group		
No	Hand tools	Unit	Quantity	Unit price. USD	Amount. USD
1	Shovel and handle	Pcs			
2	Hoe and handle	Pcs			
3	Pickax and handle	Pcs			
4	Axe and handle	Pcs			
5	Bush knife	Pcs			
6	Rake/Spreader	Pcs			
7	Basket	Pcs			
8	Watering can	Pcs			
9	Wheel barrow	Pcs			
10	Hand gloves	Pair			
11	Mask	Pcs			
12	Wooden peg	Pcs			
13	Sting line	Kg			
14	Measuring tape (5m)	No			
15	Measuring tape (30m)	No			
16	Hand rammer with handle	Pcs			
17	Other/materials				
18	Other/materials				
Total amount					
Not: The hand tools will be property of the project after the end of the maintenance contract The contractor is responsible to distribute these hand tools the CMG Leaders			Date: / / Name: Signature: Company director		

Annex 7 Sample Routine Road Maintenance Agreement between [Insert Contractor] and [Insert CMG Leader]

District:	Contract Code:
Sub-District:	Road link:
Suko:	Section and km:
Dates:	CMG Leader:

[Insert Name of Company] (hereinafter referred to as “the Contractor”) agrees to sub contract one road section of routine maintenance works in connection with its contract with the ILO, [Insert Contract No and Name] to be carried out by the Community Maintenance Group (CMG) of [Insert Name of Suko] in the sub District of [Insert Name of Sub District] in the District of [Insert District], under the leadership of [Insert Name of CMG Leader] hereinafter referred to as “CMG Leader” who has accepted to execute such works according to the following terms and conditions, including Annexes:

Purpose and starting date of activity

The purpose of the activity is to carry out routine maintenance on road [Insert Name of Road Link], section [Insert From/To Section], [Insert Number of Km] km of road, in [Insert Suko] with a starting date of [Insert Start Date] and a finishing date of [Insert End Date].

Number of team members: [Insert No of CMG Members]

Total duration of the agreement: [Insert Number of Months]

Total ceiling cost of the routine maintenance agreement: US\$ [Insert Total Cost of Contract]

The payments for the routine maintenance will be disbursed on a monthly basis timed from the starting date, based on an agreed monthly plan and paid based on actual work done but not exceeding the contract sum mentioned above.

The Contractor and the CMG Leader inspect the works together and sign on the Monthly Site Inspection Report for work actually done. This report will also be verified by the ERA maintenance engineer.

The attached Terms of Reference in Annex A forms an integral part of this Agreement. Sample forms have been included for (i) Employment Contract in Annex B (ii) Tools and Materials in Annex C (iii) Musterroll in Annex D (iv) and Monthly Activity and Site Inspection Report in Annex E

for the Contractor:

.....
 [Insert Signature]

 [Insert Name of Contractor]

 [Insert Place and Date]

Witnessed by:

.....
 [Insert Signature]

 [Insert Name of Suko Chief]

 [Insert Place and Date]

for the Community Road Maintenance Group:

.....
 [Insert Signature]

 [Insert Name of CMG Leader]

 [Insert Place and Date]

Attachments:

Annex A: Terms of Reference
 Annex B: Sample of Employment Contract
 Annex C: Sample of List of Tools and Materials Issued
 Annex D: Sample of Musterroll
 Annex E: Sample of the Monthly Activity

Schedule and Inspection Report

Annex A Terms of Reference, instructions, reporting and financial arrangements

The CMG Leader and the CMG Members have received basic training in labour-based routine road maintenance and has been provided with the Routine Road Maintenance Management Guideline, which include detailed descriptions of the various work activities.

The CMG Leader willingly agrees to carry out further training to community workers using labour-based work methods on the assigned road section according to the agreed work plan and is responsible for the routine maintenance of the road as defined in this agreement, will undertake the duties and responsibilities as described in these Terms of Reference.

The CMG Leader must engages sufficient number of workers to meet the planned outputs. The CMG Leader shall recruit members of the CMG and shall enter into an employment contract with each member. The CMG Leader shall keep a daily attendance records, a musterroll. The CMG Leader shall engage a minimum of 30% women for the works (no children below the age of 15).

The CMG Leader shall together with the Contractor prepare monthly plans and shall at the end of each month prepare the Site Inspection Report together with the Contractor.

The CMG must be able to plan the work to suit other commitments that members may have without affecting the performance of the duties and responsibilities under this agreement. The CMG Leader is responsible for managing the CMG workers on a daily basis. As long as the minimum acceptable standards of maintenance are achieved working hours and working days are flexible. The CMG Leader contractor must however be available on assigned inspection days and pay days. These days will be agreed with the Contractor.

The CMG Leader must inspect the whole road section every day, especially during the rainy season, and ensure that all culverts and bridges are cleared of any debris. Undertake immediate works to repair damages to shoulders or the pavement caused by water erosion, and immediately report any major damages to the Contractor, and divert traffic as necessary for safety or to protect the road from further damages.

The Contractor will provide the necessary hand tools and materials to the CMG. The CMG Leader will sign for this and is expected to monitor the use of tools and materials to take all reasonable precautions against damage or loss. Hand tools which are worn out through normal use may be replaced by the Contractor upon production of the item originally issued. All items of hand tools are to be returned to the Contractor upon completion of the agreement or for any reason this contract is terminated.

The Contractor is responsible for paying the CMGs in full and on time according to the agreed monthly inspection report. The payment will be to the CMG Leader who shall pay the workers according to the signed musterroll. This payment process will be overlooked by the ERA maintenance engineer

Reporting and Financial Arrangements

- ✚ Payment is made on a monthly basis, for satisfactory completed work is based on the monthly work output (total number of work-days), which is based on the Monthly Activity Plan and actual outputs as verified in the Site Inspection Report (but not exceeding the monthly planned output), Payment will be executed within two weeks of approval of payment by ERA Project.
- ✚ The contractor is responsible for paying the CMG's in full and on time, on a monthly basis, and shall pay the CMG Leader for daily inspection of the road and clearing of any obstacles, works planning and supervision and for labour management at a rate of US\$ 5 per day (ie 30 days x US\$ 5.00 = US\$ 150 per month) and US\$ 4.50 per day for unskilled labour in accordance with the approved musterroll (normalised in relation to agreed task rates and actual achieved physical output).
- ✚ If the ERA maintenance engineer after inspection decides that the CMG is not producing work to the required standard (if warnings are not effective) the ERA Project may withhold the payment from the contractor concerned. The relevant section of work will be re-inspected the following month and if the standard of works is satisfactory, the Contractor will resume full payment (but not back payment) of his/her entitlement. If the standard of work remains unsatisfactory then the contract may be terminated or the CMG reconstituted.

Annex 8 Sample Form, list of tools and materials to be handed over to CMG

Hand tools to be handed over to the CMG			Form A-8	
District name:		Suko:		
Contract No:		Road Name:		
Contractor:		Section:		
No	Hand tools	Unit	Quantity	Condition of tools(new/used)
1	Shovel and handle	Pcs		
2	Hoe and handle	Pcs		
3	Pickaxe and handle	Pcs		1 pickaxe for 3-4 people
4	Axe and handle	Pcs		1 axe for 3-4 people
5	Bush knife	Pcs		
6	Rake/Spreader	Pcs		
7	Basket	Pcs		
8	Watering can	Pcs		
9	Wheel barrow	Pcs		1 wheel borrow for 3 or 4 people
10	Hand gloves	Pair		
11	Mask	Pcs		
12	Wooden peg	Pcs		
13	Sting line	Kg		
14	Hand rammer with handle	Pcs		1 hand rammer for 3-4 people
15	Other/Materials			
16	Other/Materials			
The tools will be provided by the contractor for the CMG. The CMG Leader will responsible to distribut the hand tools to his/her team member. Each team member is responsible for maintaining and repairing the hand tools during the agreement period also responsible for the loss of tools.				
Date: / /		Date: / /		
Name:		Name:		
Signature:		Signature:		
(Received by CMG Leader)		(Handed over by supervisor of company)		

Annex 9 Sample Form, Monthly Activity Plan - Inspection Report

Monthly Activity Plan/Site Inspection Report								Form A-9	
District name:				Road name:			Suko:		
Contract No:				Section length:			Name of CMG Leader:		
Contractor:				Section of this contract Ch: to Ch:			Name of Supervisor:		
Monthly Activity Plan for the period: / / to / /									
Item No	Routine road maintenance activities	Output per WDs (work norm)	Quantity of works	Maintenance Length This Month		Additional information	WD planned	Percentage completed	Certification for work
				From Ch	To Ch				
RM-1	Road inspection and removing obstructions								
RM-2	Cleaning culverts incl. in/outlets								
RM-3	Clear debris from bridges , drifts and cause ways								
RM-5	Cleaning lined drain & repairing side drains/mitre drain								
RM-6	Repair scour checks								
RM-8	Repair of erosion on shoulders								
RM-9	Filling potholes								
RM-10	Fill rut in carriageway								
RM-11	Grabing carriage way								
RM-12	Rake exceeded gravel from shoulders in carriageway								
RM-13	Clearing bush and cutting grass								
RM-14	Plant grass								
RM-15	None standard items								
Supervision by GMG Leader									
Total WDs for this month									
Note: (a)=Total road length- km (b)= WDs/km/year (c)=(a) x (b) /12 =Total average WDs available during the month. In dry season should be given less and more in rainy season									
Date: / /				Date: / /			Date: / /		
Agreed by:				Measure by:			Witnessed by:		
Signature:				Signature:			Signature:		
(GMG Leader)				(Contractor's Supervisor)			(ERA Maintenance Engineer)		

[Insert Agreement Number]

[Insert Budget Code]

Annex 10 Sample Form, Payment Certificate

PAYMENT CERTIFICATE FOR ROAD ROUTINE MAINTENANCE WORKS										Form A-10
District:					Contract No:					
Contractor:					Certificate No:					
Address:										
Duration of Contract From / / To / /					Period of Payment Certificate From / / To / /					
This is to certify that the routine road maintenance works as detailed in the attached Site Inspection Report and referred to in the Bill of Quantities of the above mentioned Road Maintenance Contract have been completed and accepted to the satisfaction of the ERA Project in accordance with the terms and condition of the Contract.										
Road Section/ Chainage/ Composition of Team	Unit	Progress of work and worker-days till this month				Progress of Payment. (Amount USD)				
		Contract	Previous	This certificate	Total incl. this certificate	Value in Contract	Value all previous certificates	Value this certificates	Total (incl. this certificate)	
Road Name: A										
Section A (Suko A)	WD Leader									
0+000-5+000	WD Member									
M= F=	WD Women	>30%					%	%	%	
Section B (Suko B)	WD Leader									
5+000-10+000	WD Member									
M= F=	WD Women	>30%					%	%	%	
Section C (Suko C)	WD. Leader									
10+000-15+000	WD. Member									
M= F=	WD Women	>30%					%	%	%	
Road Name: B etc										
Section etc	WD Leader									
Chainage etc	WD Member									
M= F=	WD Women	>30%					%	%	%	
Worker Days and Amounts Totals										
Total=	WD Leader									
M=	WD Member									
F=	WD Women	>30%					%	%	%	
Women %										
Hand tools										
Laterite M ³										
Supervision cost fixed monthly										
Overhead+profit fixed monthly										
Other materials etc	Description									
Advances	Description									
Contingency	Description									
Note: The Monthly Site Inspection Report and Musterroll, duly signed, shall be attached to this Payment Certificate					Total					
					Other deduction					
					Amount due					
Works inspected by ERA Maintenance Engineer					Signature:		Date: / /			
Agreed by Contractor's Director					Signature:		Date: / /			
Approved by ERA Project Chief Engineer					Signature:		Date: / /			

Annex 11 Sample Employment Contract between the [Insert CMG Leader] and [Insert CMG Member].

District:	Contract Code:
Sub-District:	Road link:
Suko:	CMG Member:

The CMG Member has participated in training for routine road maintenance work and now agrees to participate in the routine maintenance activities as a member of a team of workers. The CMG Leader will organise the daily work and set tasks for the CMG.

The CMG Member will follow the instructions given by the CMG Leader and implement routine maintenance activities according to the agreed monthly activity plan and to the standards described in the Technical specifications as instructed during the training.

The CMG Member will follow the safety guidance for routine road maintenance work as taught in the training and as directed by the CMG Leader.

The CMG Leader will issue to the CMG Member tools and materials in sufficient numbers and quality necessary to complete the works. The CMG Member is responsible for maintenance and care of tools and shall return tools by the end of the works, or otherwise report them lost or broken.

The CMG Leader will maintain a musterroll which should be signed by the CMG Member following completion of a work task, which equals one worker day. The CMG Leader will pay the maintenance members for tasks completed to satisfaction as per the task rates set out the Monthly Activity Plan and actually completed as verified through the Monthly Inspection Report. The musterroll will form the basis for payment and workers are paid **USD 4.50** for each completed day.

If a CMG Member repeatedly refuse to comply with the guidance of the CMG Leader, then the CMG Leader will have the right to bring this to the attention of the Contractor and the ERA's maintenance engineer and may request for a change in group member(s).

The CMG Leader should make sure that each CMG Member completes the registration form in Annex B2, which should be submitted to the Contractor and ERA maintenance engineer

for the CMG Leader:

.....
 ... [Insert Signature]

 ...
 [Insert Name of Contractor]

 ...
 [Insert Place and Date]

Witnessed by:

.....
 ...
 [Insert Signature]

 ...
 [Insert Name of Suko Chief]

for the CMG Member:

.....
 ...
 [Insert Signature]

 ...
 [Insert Name of CMG Leader]

 ...
 [Insert Place and Date]

Attachments:

Annex B2: Sample Registration Form

...
[Insert Place and Date]

Employment Registration Form

Contract Code					
Road Name					
Name of CMG Member					
ID Number					
Place and Date of Birth		_____ / ____ / _____		Age: (>15) _ _	
Home address		District			
		Sub-district			
		Suku			
		Aldeia			
Sex	☐ Feto ☐ Mane	Civil status	☐ Kaben Nain ☐ Viuva/u/Faluk	☐ Divorsiu/Soe malu ☐ Klosan/Soltero	
Profession	☐ La-servisu ☐ Estudante	☐ Servisu iha sektor:	☐ Hotel/Restaurante ☐ Fa'an sasan ☐ Manufaktur ☐ Agricultura/peska ☐ NGO ☐ Transporte ☐ Fo servisu ☐ Kostrusaun ☐ Elektrisidade ☐ Servisu ba han rasik		
Education	☐ La-eskola ☐ Primaria ☐ Pre-sekundaria ☐ Secundario ☐ Tekniku-preparatoriu ☐ Ensinu Superior				
Vocational Training	☐ Seidauk ☐ Tuir ona	Area of training	Name of Training Provider		
Name CMG Leader					
Date of registration	_____ / ____ / _____		Signature		

Annex 12 Sample Form, Musterroll/Payroll

Muster and Payroll																				Form A-12									
District name:										Road Name:										Suko:									
Contract No:										Section of this contract Ch: to Ch:										From / / To / /									
Contractor:										Name of CMG Leader										Page no: Of									
No	Full Name	Sex		Muster-Roll																Actual WD		C=Equivalent WD	Wage rate. USD	Payroll					
		M	F																	M	F			Amount paid. USD	Signature/Finger Print				
		Day->																		M	F								
1	Name of Gang leader																					1							
2	Name of member 1																						2						
3	Name of member 2																					3							
4	Name of member 3																					4							
5	Name of member 4																					5							
6	Name of member 5																					6							
7	Name of member 6																					7							
8	Name of member 7																					8							
9	Name of member 8																					9							
10	Name of member 9																					10							
11	Name of member 10																					11							
(a) = Total WDs planned for this month				(C) = (a) / (b) * (actual WDs of each person)												Total		300		Total									
(b) = Total actual WDs of this month																Total													
(C) = Equivalence WDs of each person																													
Date: / /										Date: / /										Date: / /									
Name:										Name:										Name:									
Signature:										Signature:										Signature:									
(CMG Leader)										(Contractor's Supervisor)										(Contractor's director)									

[Insert Agreement Number]

[Insert Budget Code]

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Training modules developed through the Enhancing Rural Access Project, with technical support from the ILO and funding from the European Union and the Government of New Zealand