

Handbook 1 – Planning and Implementing Routine Maintenance on District Roads

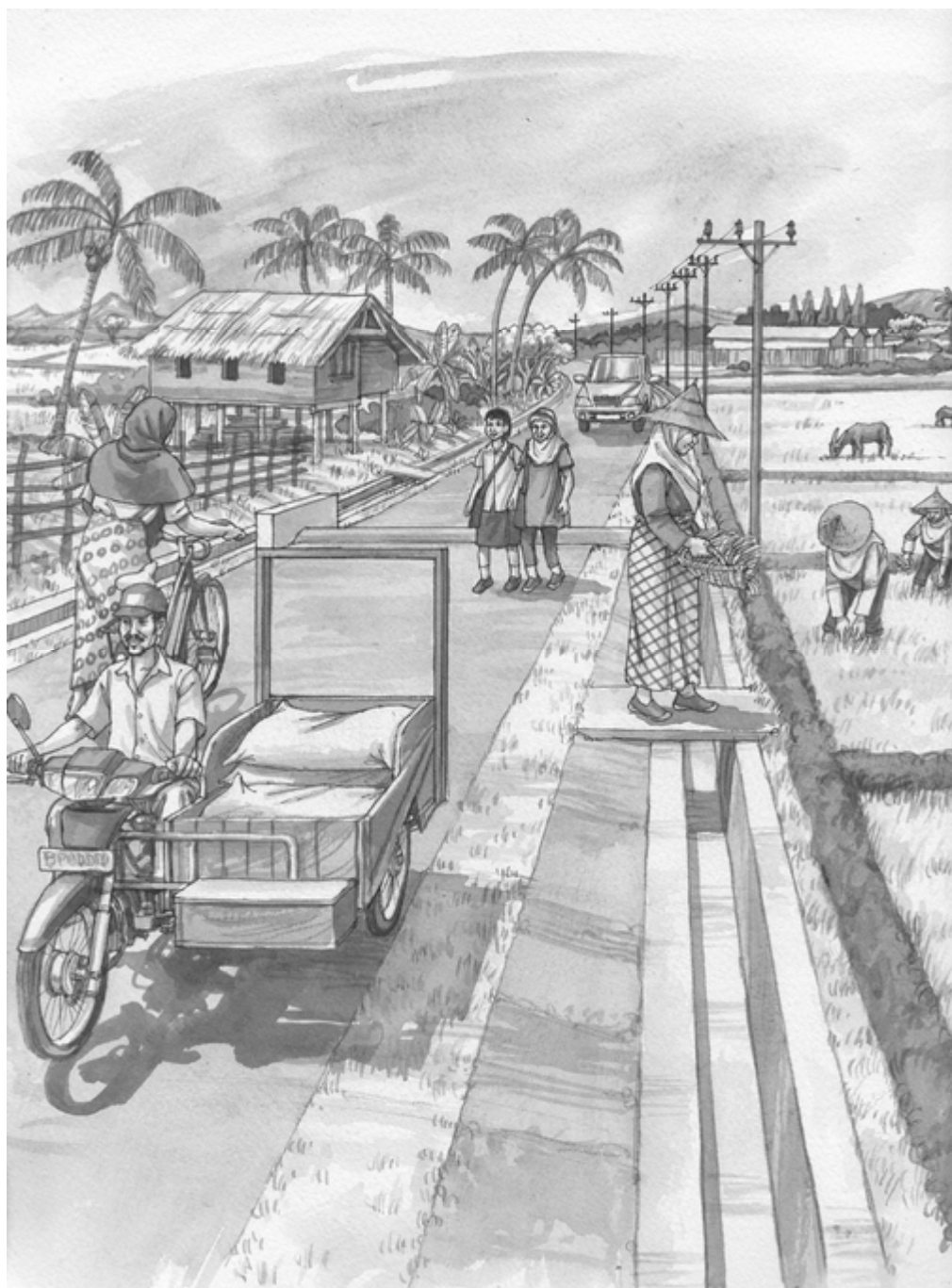


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Introduction to Handbooks 1, 2, and 3

This handbook is the first handbook in a series of three.

Handbook 1 (size A4) is for the use of Road Inspectors and Supervisors working for District Public Works Departments. It lays out the whole routine maintenance process from estimating, budgeting, planning, agreement preparation and signing, implementation, inspection through to the final payment and includes the training programme for the Community Routine Maintenance Team (CRMT).

Handbook 2 (size A5) is for the use of the community routine maintenance team leader and team members contracted to carry out the off-carriageway routine maintenance.

Handbook 3 (size A5) has been prepared as guidance to the District Supervisors and the Contractors' staff on the correct procedures for minor repairs to the carriageway. As standard government contracts will be used for this work, the contract documentation is not included in this handbook.

Introduction

Why do we need good roads?

- To bring inputs to farms
- To transport crops to market
- To be able to run businesses
- To allow services to reach villages
- To make journeys easier and more comfortable
- To support the development of the district
- To link to provincial and national roads

What is maintenance?

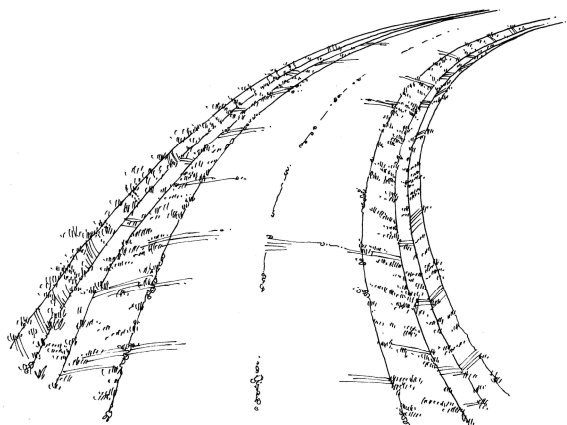
Maintenance is all about keeping the road in good condition and lengthening the life of the road through constant repair of minor problems when they appear.

Routine Maintenance

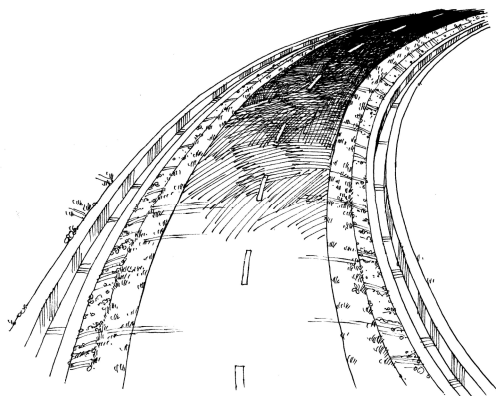
There are different types of maintenance. The most important is routine maintenance. Routine maintenance is something that will be carried out 2 or 3 times a year to ensure that the road stays in a good condition, and that small problems are not ignored but dealt with before they become large problems. Off-carriageway routine maintenance should be done 2 to 3 times per year and the on-carriageway routine maintenance once a year. The on-carriageway routine maintenance is not periodic maintenance, but minor repairs such as sealing of cracks, repair of potholes and small sections of base damage.

Periodic maintenance is something that happens less frequently (e.g. every 4 or 5 years). Carrying out periodic maintenance involves more work and higher costs, and includes such things as re-gravelling, surface overlay, major repairs to bridges and culverts, or improving of longer stretches of bad areas on the road.

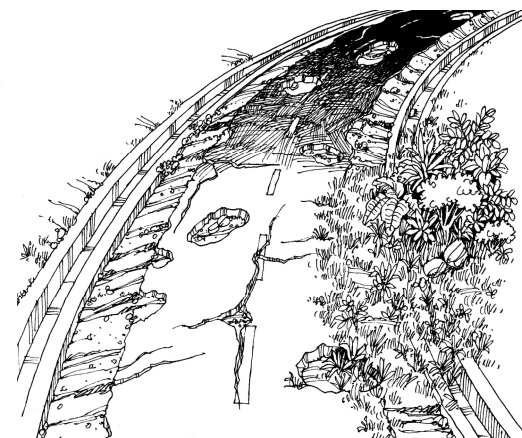
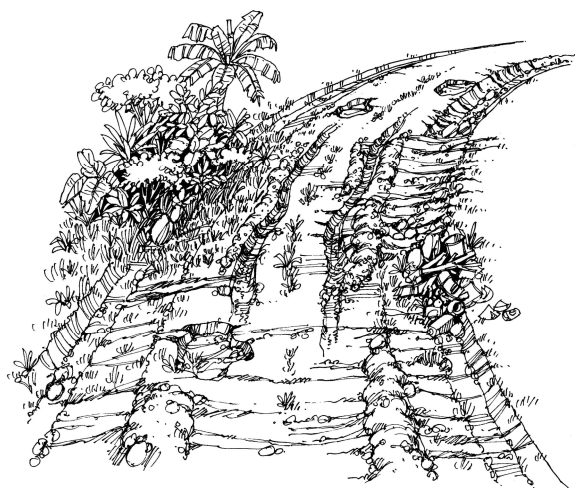
Why should we maintain roads?



A newly built gravel road in good condition



A newly built bitumen surface road in good condition



Roads after 3 to 5 years with no maintenance

It has cost a lot of money to build the road. If the road is not maintained, the money that was spent will have been wasted. If the road is maintained, it can be used all year round and for many years.

If roads are neglected they cost more money to repair than if they have been maintained properly each year. The table on the next page shows the costs over 5 years for maintaining the road are Rp 109 million, but to reconstruct a road which has had no maintenance would cost up to 76% more Rp 450 million.

(i) Road type	(ii) Construction costs ¹ Rp	(iii) RM costs /year	(iv) RM costs for 5 years	(v) PM cost after 5 years	(vi) Reconstruction costs after 5 years
Paved Road	450-490 million	10-15 million	60 million	49 million 10% of the road length 109 million	450 million
Total <i>with</i> maintenance (iv) + (v)					
Total <i>without</i> maintenance (vi)					450 million
Savings	450 - 109 =	341 million	(76%)		

The costs above are per km of road. With regular maintenance, the savings will be more than 70%. This means that instead of the District budget being used to continuously rebuild roads the money can be put to other projects and priorities of the DBMCK.

Why should we pay for all road maintenance?

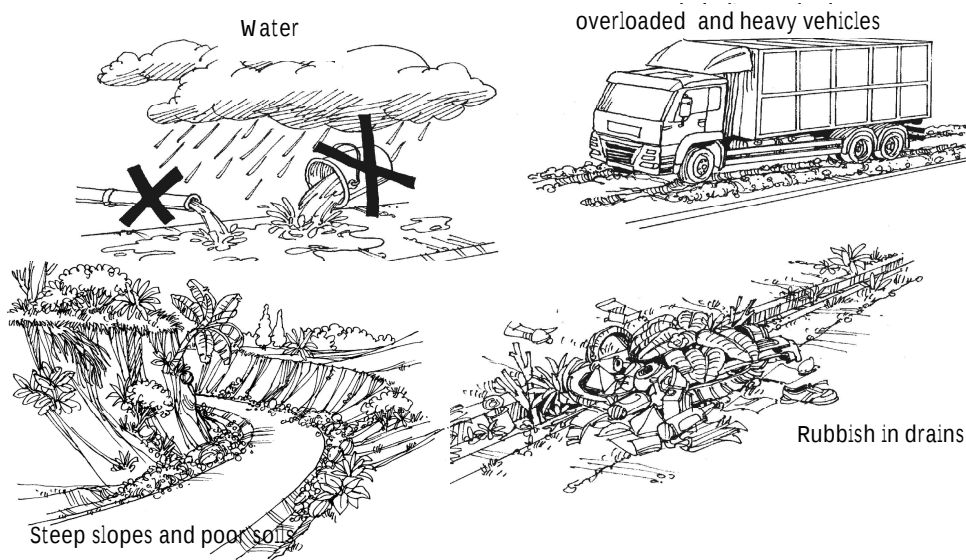
- It is easier to plan works if the workers are being paid
- All routine maintenance activities will be completed, not just the easy tasks, but even the more difficult ones
- The District supervisor is better able to control the quality of the maintenance work
- The result will be a road that is kept in better condition



Construction

Maintenance

What are the dangers to a good road?



Examples of construction problems are:

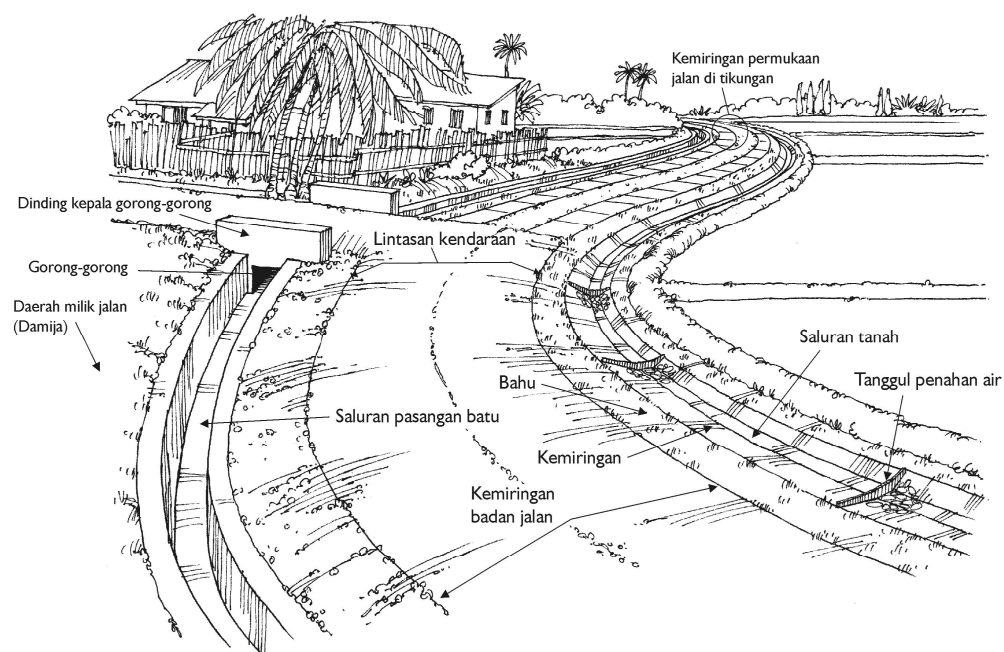
Steep gradients, low-lying flood areas, steep side cuts, lack of culverts, drain sides higher than the road level, poor quality gravel/ over heated bitumen.

¹ Reported construction costs vary widely and therefore the figures provided in the table above are indicative

Elements of a Road

Road Element Descriptions:

- Lined drain or lined ditch
- Unlined drain or unlined ditch
- Scour check
- Slope
- Shoulder
- Carriageway
- Culvert
- Headwall
- Camber
- Crossfall

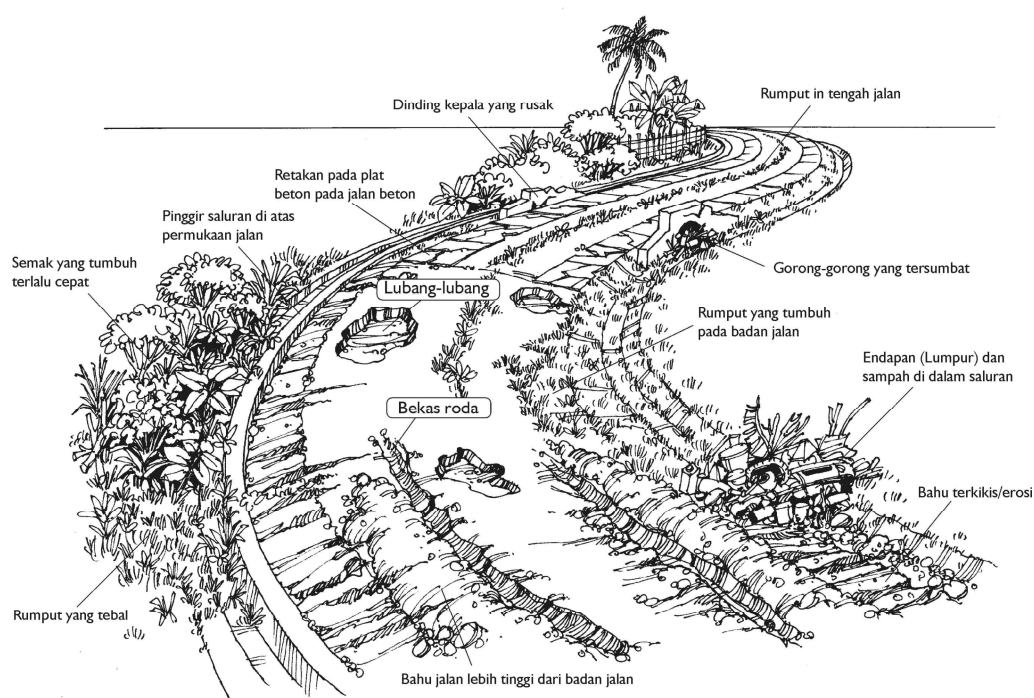


The picture above illustrates the main elements of a road so that everyone is familiar with the terms used later in this handbook.

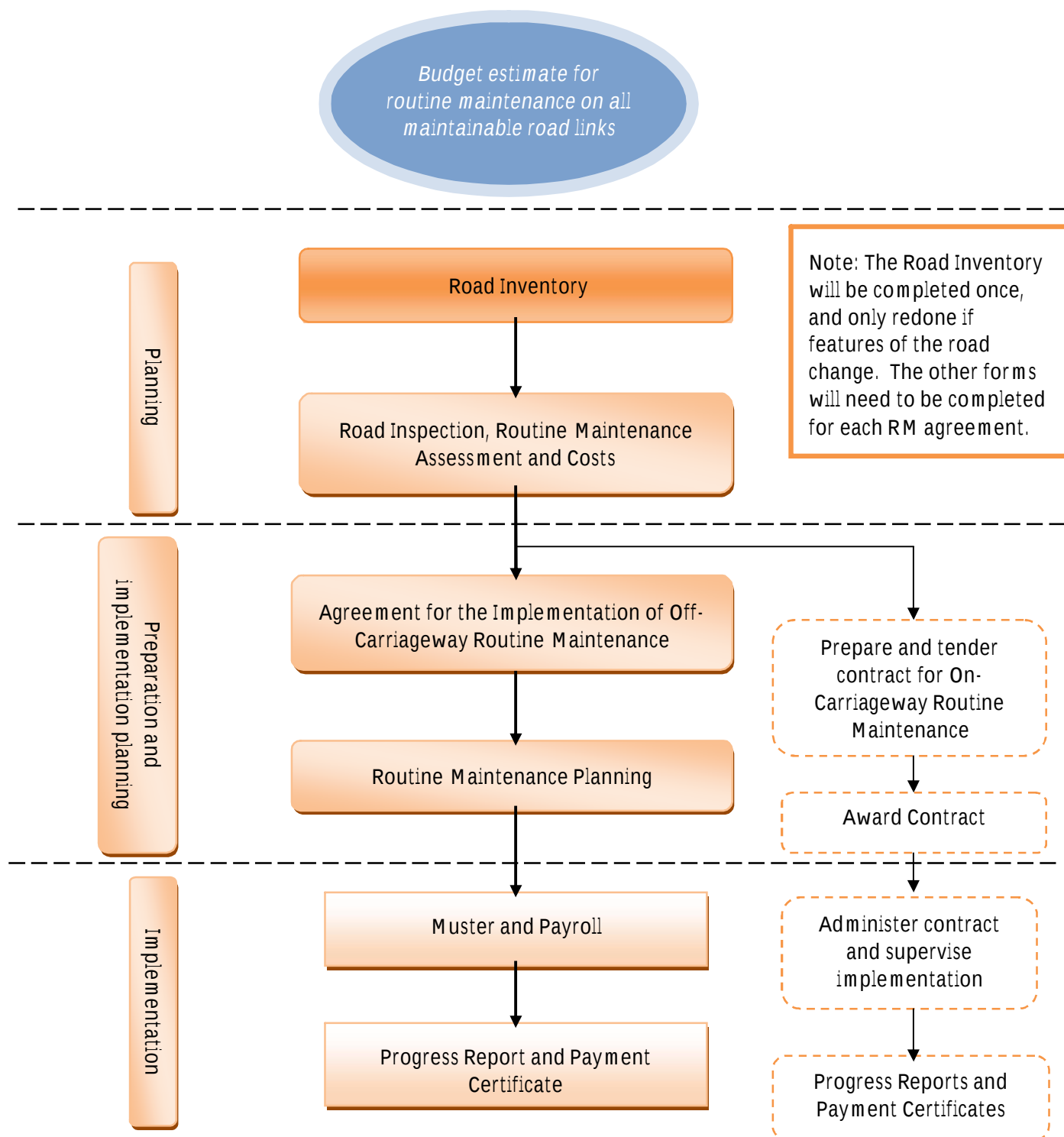
What and where are the problems on the road?

Road Problems:

- Ruts
- Potholes
- Eroded shoulders
- Edges of lined drains above the road level
- Silt and rubbish in drains
- Overgrown bush
- Long grass
- Grass in the centre of the road
- Culvert blocked
- Headwall damaged



This picture illustrates some of the common problems which occur on roads and which need to be corrected through routine maintenance.

What is the process for organising routine maintenance? - Key actions

Note: If the off-carriageway routine maintenance is taking place at the same time as the on-carriageway routine maintenance, the two contracts can be combined and put out to tender to a contractor with clauses in the contract obliging the contractor to employ the local routine maintenance team for the off-carriageway work.

Overview of Forms

At each stage of the process, forms are used to document the results and the preparation for the next stage. A list of the forms is provided here.

No	Form	Type of RM	Format
	Mapping	Whole road	Sketch or GPS
1.	Inventory	Whole road	MS Excel
2.	Assessment and cost estimate	Off-carriageway RM	MS Excel
3.	Assessment	On-carriageway RM	MS Excel
4.	Planning	Off-carriageway RM	MS Excel
5.	Community Contract Agreement	Off-carriageway RM	MS Word
6.	CRMT Leader responsibilities	Off-carriageway RM	MS Word
7.	CRMT responsibilities	Off-carriageway RM	MS Word
8.	Handtool list	Off-carriageway RM	MS Word
9.	Muster-roll	Off-carriageway RM	MS Excel
10.	Site inspection	Off-carriageway RM	MS Excel
11.	Interim payment	Off-carriageway RM	MS Word
12.	Final payment	Off-carriageway RM	MS Word

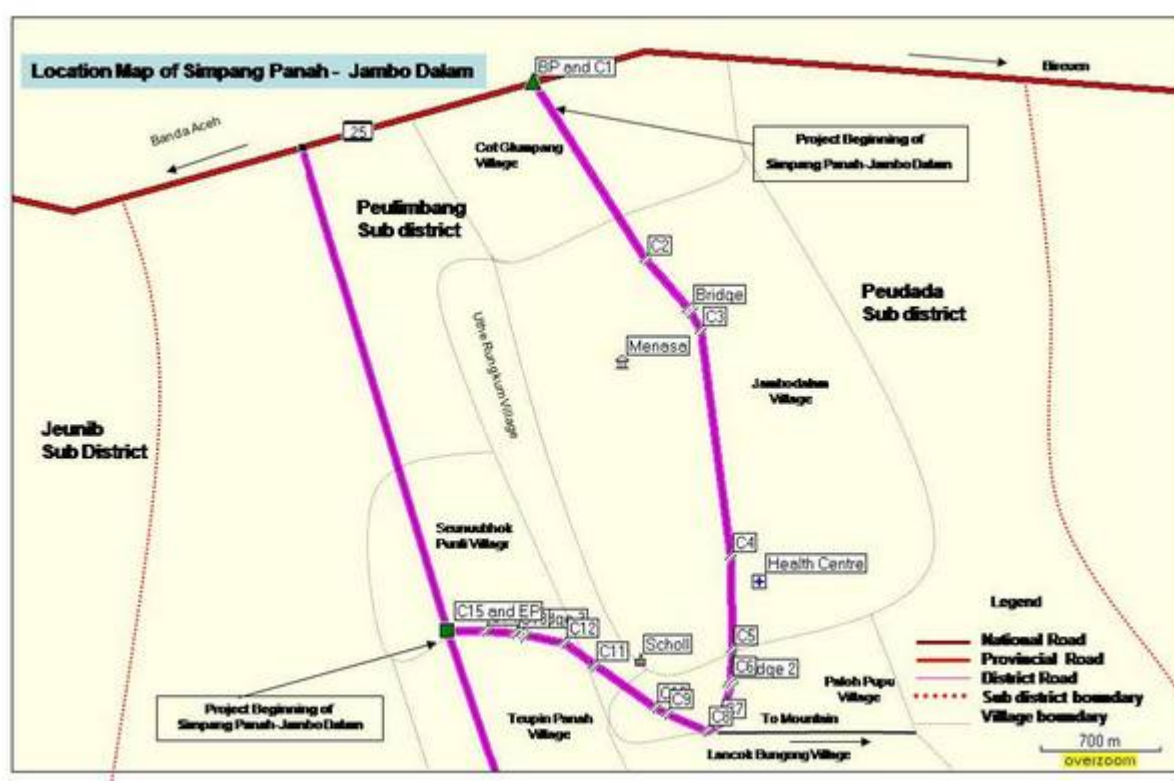
Additional Information
Sheet A1: Guidance on Form 1
Sheet A2: Guidance for Form 2
Sheet A3: Taskrate recommendations
Sheet A4: Guidance for form 4
Sheet B3: Guidance for form 3

The Process

1. Budgeting for the maintenance

For the initial estimate a value of Rp 10 - 15 million/ km per year can be used. This is based on carrying out the off-carriageway routine maintenance 2 times a year and the on-carriageway routine maintenance once a year. This estimate can be used for budgeting purposes until the actual cost estimate is prepared based on the road inspection as described in step 5 of this handbook. The discussion on setting aside funds for routine maintenance should take place when the Temporary Budget Priority Limit (PPAS) is being prepared.

2. Road Mapping



This mapping has been done with a GPS device, but even without this a simple line map with chainages as provided in the inventory form will be sufficient.

3. Road Inventory

For each road section to be maintained there may be available from the district a road inventory. An inventory once completed does not need to be renewed every year, but will only be up-dated if there are any major changes to the road (e.g. resurfacing, up-grading, new structures). Therefore this step in the process is a “one-time” step and will not be repeated for the next round of routine maintenance. The inventory can be used to provide a general indication of the road condition, but it is not an assessment tool for specific activities and quantities.

An example of a road inventory, together with an explanation of how the form can be used and completed, is provided in Form 1 and Sheets A1 in Annex 1 at the back of this book.

Routine maintenance activities

Before proceeding to the assessments of the maintenance work to be done, the next section is a reminder of the activities that are included under routine maintenance

The activities are simply listed here. More information about each of these activities is available in handbooks 2 and 3

Routine Maintenance Activities

1. Clearing bush and cutting grass
2. Clear debris from bridges
3. Cleaning culverts including inlets and outlets
4. Cleaning of side and outlet drains
5. Repair of erosion on shoulders and slopes
6. Grubbing of carriageway
7. Grass planting
8. Non-standard activities:
 - Minor repairs to retaining walls and culverts
9. On-Carriageway maintenance
10. Shoulder fill to support the edge of the carriageway
11. Road furniture repairs
12. Other tasks

4. Inspection of the roads and assessment of the work to be done

In this section reference will be made to forms provided in Annex 1 at the back of the handbook

*Action*

For the inspection, drive or walk down the road using the kilometres on the motorbike or car or measure with a tape measure and note all areas where work needs to be done to make sure that the drains and culverts are working and that the road surface and edges are in a good condition. Note the problem areas and note down the amount of work to be done. A sheet for guidance on the inspection and for the noting of problem areas is provided as the Road inspection [Form 2](#) with the accompanying explanation in sheets A2 in Annex 1. For the first assessments it is probably best to walk and note carefully the work to be done. As the assessments become more familiar, driving will be a quicker option, especially when the kilometres of road under routine maintenance increase.

The filling of the [Road Inspection Form 2](#), results in an estimate of the amount of work to be done. At first sight the table looks complicated, but it can be broken down into smaller parts and an explanation of each element and the task rates can be found in the pages attached to Form 2 (Sheets A2 and A3) in Annex 1. With practice, completing of the form becomes much easier.

Any repairs to the shoulders and the carriageway will be small isolated spots. If major repairs over long lengths of the road are needed, this can no longer be regarded as routine maintenance, but must be budgeted for as a separate activity to be dealt with under separate periodic maintenance or rehabilitation funding. In the case of bitumen surfaced roads any pothole filling and other repairs to the road surface requires specialist equipment, tools and expertise. This work on-carriageway work should be kept separate and be contracted out to an experienced contractor. (See section 15 below.)

Noting of repair work and maintenance where additional work is needed

Where major defects are noted such as broken bridge or serious damage to a culvert or long stretches of damage to the road surface, these should be reported to the DBMCK for inclusion in the periodic maintenance, rehabilitation or reconstruction. Normally major repairs should not be found as the roads should be in a “maintainable condition”.

For the cost estimate the following items will need to be written down:

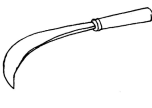
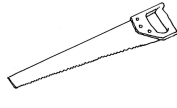
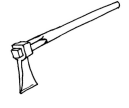
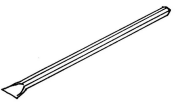
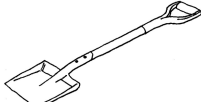
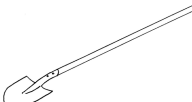
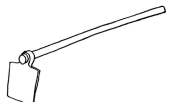
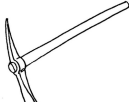
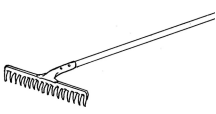
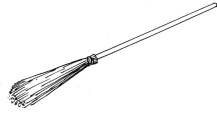
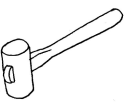
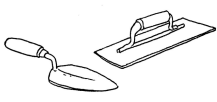
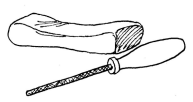
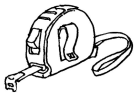
- a) How many days of work are needed in total?
- b) What is the wage rate per working day?
- c) If the work is to be completed within 4 to 8 weeks, how many people are needed in the team?
- d) Which hand-tools are needed, how many, and how much will they cost?
- e) What materials are needed (any cement, sand or stones)?

Once the number of days (workerdays) needed to do the maintenance work is known, the size of the team, the number of handtools and any materials required can be calculated.

From the completed workerdays in [Form 2](#):

- ✧ The workerdays estimated are combined with the average wage rate to give the cost of labour. The cost of supervision, handtools and materials are added.
- ✧ The wage rate should be based on the district unskilled labour rates. The team leader who will have additional supervision and reporting responsibilities under the agreement, should be paid at a higher rate - (suggested rate is 1.5 times the unskilled labour wage rate).
- ✧ Divide the total number of days required by 20 (maximum 40) working days to calculate the number of workers needed in the maintenance work team. Note: the team leader is expected to work alongside the other team members, not just supervise, and therefore is included in this calculation and entered into [Form 2](#)
- ✧ Which handtools are needed? Handtools which may be needed for road maintenance depending on the activities to be done are illustrated below.
- ✧ Once experience is gained, the section lengths can be increased from the current 200m up to 500m for longer roads.

Range of Hand tools

				
wheelbarrow	Grass cutter	Bush knife	Handsaw	Axe
				
Crowbar	Shovel	Shovel with long handle	Hoe	Pickaxe
				
Rake	Broom/brush	Hand rammer	Watering can	Bucket
				
Basket	Hammer	Pegs and string	Mason's tools	Tool sharpeners
				
Road safety signs	Gloves	Gum boots	5m tape-measure	50m tape-measure

Note: Not all tools are needed – only those required for the activities in form 2 need to be bought

5. Preparation of the community routine maintenance agreement

The District is responsible for organising the routine maintenance, but they will not do the work directly. The off-carriageway work will be done by a community routine maintenance team (CRMT) recruited from the villages along the road to be maintained. The on-carriageway routine maintenance of the combined links in the district or sub-district are maintained through a contract with a local contractor.

The contract document for the off-carriageway work is prepared by writing down the work to be done in a simple agreement which outlines the responsibilities of the District and those of the community routine maintenance team (CRMT) leader and the CRMT. It will also include the timing of the work and the payment arrangements.



What needs to be included?

- The names of the people signing the agreement
- Their responsibilities under the agreement
- The starting date and expected finishing date
- The amount of work
- Issuing and returning handtools
- Timing and conditions of payment
- How to deal with any disagreements

An example of a simple agreement form is shown in [form 5](#) in annex 1

Note: A simple agreement with the CRMT can be entered into by the district administration provided it is counter-signed by the Head of the Sub-District (Camat) as the legal authority.

6. Organising the Off-carriageway Routine Maintenance

For the actual maintenance work, the District needs to find a team of workers with a competent team leader. The District will sign an agreement with the team leader to do the routine road maintenance.

Before the search for a suitable team leader starts, the cost estimate and the agreement between the District and the CRMT Team leader must be prepared.

In addition to the Agreement, the CRMT team leader is provided with a description of his/her duties ([Form 6](#)) and an internal agreement between the team leader and the team members ([Form 7](#)). Each district can decide if they wish to use form 6 and 7 or if the simple agreement ([Form 5](#)) is sufficient.



6a. Planning of the necessary off-carriageway routine maintenance work

The planning is based on the work needing to be done as noted on the Road Inspection and Assessment [Form 2](#). It is also the basis for the agreement to be signed with the CRMT team leader, and authorised by the Camat.

To plan the works, the information from [Form 2](#) needs to be entered in the Planning and Implementation [Form 4](#). In [Form 4](#), the information from [Form 2](#) is arranged so that the amount and value of work to be carried out on each 200m section of the road is known for each activity but also for all activities combined together. [Form 4](#) is prepared so that the value of each 200m section is known in terms of workerdays and money, it also acts as an implementation guide for the team leader so that the CRMT can be organised to complete each 200m section within the allocated number of workerdays. [Form 4](#) is also designed to assist the Road Supervisor with the checking of progress along the road.

- ✧ From the completed inspection [Form 2](#) the number of workerdays needed for each activity, road section and the entire road length can be entered in to the Maintenance Planning and Implementation [Form 4](#). The cost of each activity and the cost of each 200m road section can be

calculated. The cost of the labour, supervision and handtools are known. The cost of any materials which may be needed are added.

- ✧ Where there are any repairs to masonry or concrete, the quantities of cement, sand and stone need to be calculated and the costs for each of the items included in the cost estimate. Any formwork (timber used to set the shape of the concrete) needs to be included in the costs. This should only be necessary in very rare cases.
- ✧ Where permissible, contingencies are added to cover unexpected work not included in the agreement. For example, if rains cause extra erosion that was not there when the road was originally assessed by the District, then the extra work will require extra payment. Extra work can only be done with the agreement of both the District and the Team leader and with the signature of the Camat.

Note: Existing Government Regulations do not allow for the addition of contingencies, and therefore a zero should be placed in the contingency box in [Form 4](#).

- ✧ See [Form 4](#) for the final costs and [Form 8](#) for the handtools, both forms are in Annex 1

7. *Making sure all the tasks get done*

Although the grass and bush may need to be cleared out of the way before other tasks can begin, it is important to plan and estimate to carry out all the maintenance activities. The good condition of the road depends not only on the surface but on good drainage and free flowing culverts.

8. *Selecting the maintenance work team*

a) *Advertise the work in the community*

One of the best ways of starting to put the team together is to advertise for team leaders (both women and men) to come forward and enter their names for selection for leading the routine maintenance team. The advert should be placed and announced where women and men will easily hear about the opportunity. The team leader should fulfil the following criteria:

- Literate and numerate
- A minimum age of 18
- Live in the Village
- Preferably has previous experience in working on roads with (KDP/PNPM / ILO / District or others)

It must also be clear that the team leader will work alongside the team and have to complete a task each day. The team leader is not just a supervisor, but also a working member of the team.

The team leaders will be responsible for putting together their own maintenance team. It is important that the team leader gets on well with the team and is respected by them and therefore the choice of team members should be made by the leader. However the team leader should be guided by certain principles and one is that at least 50% of the team are women. If the team consists of the team leader and 5 members (total = 6), then the team will have a minimum of 3 women members.



b) Use a ballot to pick the team leader

To select the team leader same size pieces of paper - or papers in envelopes - should be prepared with enough for all candidates. On only one of the papers will be written the words "you have been selected" All other papers will remain blank. The applicant, who draws out the paper with the writing, will then be asked by the District to form the community routine maintenance team (CRMT) and carry out the work in the agreement. The ballot should take place in a public place and be witnessed by the people who have applied to be the team leader

9. Inspecting the Road and the Routine Maintenance work

Once the work team leader has been identified, the District Supervisor should arrange to inspect the road with the CRMT team leader and team members to verify the amount of work to be carried out along the length of the road using the [Form 4](#).

10. Signing the Agreement for the Routine Maintenance work

Once this has been done and both the District Supervisor and the team leader are agreed, a date for the start of the work can be set and the agreement signed. At the same time the opportunity should be taken to train the CRMT in the works they have to do and on the standard of work that will be accepted by the District Supervisor. A separate training module for the CRMT has been prepared and is available in Annex 2 of this book.

The signatories necessary for the agreements with Community Routine Maintenance Teams (CRMTs), in line with District Government procedures are²:

- The agreement to be signed by the village CRMT leader
- It will be authorised by the Camat on the behalf of the CRMT and will be approved by Kepala Dinas
- It will be signed by the following district staff depending on the amount of the contract
 - o DBMCK treasury (Bendahara Dinas) for amounts up to IDR 5million;
 - o Head of DBMCK (Kepala Dinas) for amounts between IDR 5 and 200 million
 - o Secretary of the District (Sekda) for amounts between IDR 200 and 500 million
 - o Deputy Bupati (Wakil) for amounts between IDR 500 and 1,000 million
 - o Head of District (Bupati) for amounts greater than 1,000 million.

It is assumed that most routine maintenance agreements for the off-carriageway works will be not greater than 20 million and therefore can be signed for within the DBMCK.

- The agreement should also have a tax stamp as is required in all legal contracts.

11. Hand-tools – purchase and distribution.

There are several choices which the district can make in respect of the handtools:

² Amounts correct at time of writing.

1. The handtools are purchased by the district and issued to the team for the duration of the maintenance works after which they will be gathered in and return to the district store.
2. The handtools are purchased by the district and issued to the team for the duration of the maintenance works after which they will be kept by the head of the village in safe storage for use on the next routine maintenance contract
3. The cost of tools is added to the agreement with the village CRMT and the team are responsible for supplying the appropriate handtools as per the list provided by the district. The tools then remain with the team leader or the village leader – depending on the agreed arrangement.

The issuing and returning of tools needs to be registered and signed for by the CRMT Leader and the CRMT members who receive the tools. The tools are then checked at the end of the agreement period.

The preferred option is that the amount for the tools be added to the contract and that the team provide the tools which will be stored in the village at the end of the contract. When issuing the next routine maintenance contract, the sum for tools should be much less and only include replacement or additions of a few tools.

12. Checking the quality and progress of the work

The District have been responsible for planning the maintenance work and are now in a position to support the team in ensuring that the planned works are carried out in the intended location on the road. The district is also responsible for checking the completeness of the work and the quality of the work. If there are any areas not completed satisfactorily the team leader needs to be notified immediately and a note made recording the request for proper completion of the unsatisfactory tasks.

Should any dispute arise over the amount of work or the amount of the payment which cannot be amicably resolved by the District and the CRMT team leader, then the person nominated in the agreement to deal with disputes should be asked to decide the matter. In general it should not be necessary to involve anyone other than the District Supervisor and the CRMT, as they should be able to discuss and resolve any small difficulties.



Inspecting the completed routine maintenance works

Form 10 – Site Inspection (provided in Annex 1) sets out a checklist of the work to be approved before payment can be made.

13. Interim payments

Most workers would prefer not to have to wait till the end of the month to receive their wages, so even if the contract takes less than one month to complete, part payment needs to be made at based on progress. For the interim payments, the Community Routine Maintenance Team will be paid according to the progress along the road, but the total sum will not exceed the final amount in the agreement.

The team will agree with the District at which progress points the interim payments will be made. For example the interim payments will be made after each 400 or 600m. The team will then be paid the value of the metres as laid out in Form 4 and this will be divided by the days worked as recorded on the muster roll Form 9) to give the amount to be paid to each worker for each day worked. Form 9 is provided in annex 1. It is the responsibility of the team leader to keep the muster roll not the district staff. (Also see Handbook 2 for Form 9). The filling of the form will be explained to the CRMT Leader during the CRMT training.

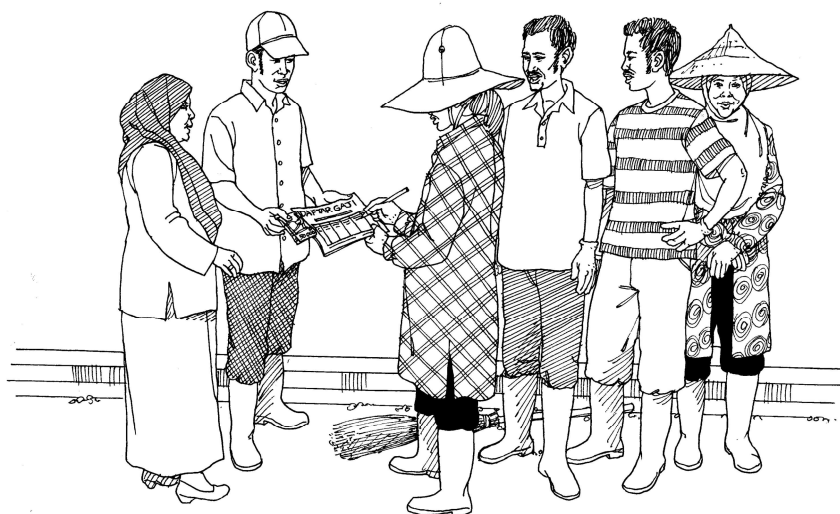
Example of payment calculation:

From form 4, the amount set aside for progress for the first 400m is IDR 1,150,000 + 700,000 = 1,850,000. The estimated number of workerdays needed to complete the first 400m was 23 + 14 = 37. The wage rate was set at IDR 50,000.

If the team has finished the work and only used 35 days on the muster roll Form 9, then the WD to be paid to each worker will be factored by 37/35, and this then multiplied by the actual days worked. The total amount to be paid to each worker will be their new Wds multiplied by the wage rate.

If however the team used 40 days, then the Wds to be paid will be reduced by 37/40 times the number of worker days actually worked to give the new Wds, which in turn will be multiplied by the agreed wage rate of IDR 50,000.

An interim payment form is provided as Form 11 provided in Annex 1.



14. Return of hand-tools and final payment of the Maintenance Team

When making the final payment, all community handtools are to be returned either to the village or the district. If the handtools are the property of the district, then the cost of the handtools that are missing or damaged beyond what is reasonable to expect from the work carried out, will be deducted from the sum paid to the team leader.

Inspection should be made within 3 days of completion of all the work in the agreement. The payment should be within a further 3 days. The payment of the team members should follow immediately upon the team leader receiving the money and should be paid out in the presence of the District supervisor and/or the head of village and be based on the attendance record of the individual team members.

Both the final payment request and the previous interim payments based on the work done should be recorded on payment form 12. The final payment will again be based on progress as is the case with

the interim payments however, the team leader will be paid the balance of the money set aside for supervision. On completion of the work covered by the agreement the CRMT should be paid the full amount of the agreement (minus any unused contingencies) regardless of the number of days worked.

15. On-carriageway Routine Maintenance

The process described above from section 5 to 14 has dealt with the off-carriageway routine maintenance. This is only part of the routine maintenance. The work on-carriageway needs to be planned and implemented.

The village CRMTs are recruited for one road link, however, the on-carriageway maintenance should be prepared for the total number of links in the district/sub-district as one contract. Whether the contract will be for the district or sub-district will depend on the number of links and length of road to be put under routine maintenance, (e.g. the length of road in a maintainable condition).

The assessment is carried out using [Form 3](#) which is attached as the last form in this guide at the end of Annex 1. The defects to be noted are surface cracks, potholes, potholes and ruts with damage to the road base, damage to the road edge, and loss of fill on the shoulders. The last item is strictly speaking off-carriageway, but if there is need for transport of additional materials, the contractor is better placed to purchase, transport, and compact them.

16. Continued inspection of the roads and drainage

It will be the responsibility of the District Supervisor to regularly inspect the road and decide when the next round of routine maintenance is needed. Depending on the type of road and the terrain, it is recommended that the routine maintenance be carried out at least twice a year but it would be better three times a year.

For the next routine maintenance work the cycle begins again with the planning. With experience and familiarity with the trouble spots on the road the planning and quantifying of the work to be done will become easier and take less time than the preparation of the initial estimates and agreement.

17. Improve awareness about reducing damage to the roads

The District supervisor on their routine inspections and at other opportunities afforded through village meetings, should advise their communities on the damage which can be caused to the road. There are many causes such as: the disposing of waste in the drains, the building of entrances to houses which block the drains, the throwing of rubbish and waste water on the roads which weaken the surface and change the shape stopping the water from running off into the side drains. In particular the waste from cleaning irrigation channels needs to be removed away from the road.

The Forms and Sheets for Routine Maintenance

Examples of all the forms and sheets listed on page 6 of this handbook are provided in annex 1. Some forms are self explanatory or commonly used, and others are provided with a description of how to complete them.

Annexes

Annex 1

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Annex 1

Form 1: Road Inventory

Form 1	Name of District:	Name of Sub-district:	Road link Name /No:	Sheet no __ of __ sheets
	Road length:	Inspected by:	Signature:	Date:

Strip Map

☐ Village

☐ Retaining Wall

☐ Bridge

☐ Culvert

☐ Road/Track

(Existing features)

→ Ditch

SCH School

HCL Health clinic

BP Bathroom pit

Footpath

Chainage: __+000 to __+000		Km: Metres																				Total							
		1+000					2+000					3+000					4+000					5+000							
		0	200	400	600	800	1000	200	400	600	800	1000	200	400	600	800	1000	200	400	600	800	1000	200	400	600	800	1000	5000	
Inventory	Road surface width																												
	Total width including shoulders																												
	1 x = Asphalt																												
	2 x = Concrete																												
	3 x = Telford																												
	4 x = Gravel																												
	5 x = Earth																												
	6 Fill height and cut depth + / -																												
	7 Topography (f /u/ m)																												
	8a unlined ditch LHS																												
	8b unlined ditch RHS																												
	9a lined ditch LHS																												
	9b lined ditch RHS																												
	10a retaining wall LHS																												
10 retaining wall RHS																													
11 bridge span in m																													
12 lines of culverts																													
13 remarks / reference/ additional information/GPS																													

Source: Adapted from Technical Guidelines , Second Rural Transport Project , Ministry of transport (PMU18) Vietnam and LEDP Trail

Sheet A1: Guidance for Form 1 the Road Inventory

Purpose: To record the exact location of the road within the district road network, and to determine the existing features and their position along the road.

A road inventory does not need to be carried out every time maintenance work is prepared, it should be up-dated only if major changes are made to the road such as resurfacing, up-grading, or addition of culverts and other drainage infrastructure. Before carrying out a road inventory a check should be made at District level to see if the last inventory is available, as this can be carried to site either to check if it is still relevant or to act as a reference for the completion of a new road inventory and condition survey.

Below is a reduced copy of the road inventory and condition survey form. Once completed the form provides a pictorial and written record of the road and its present condition. A full copy of the form is provided in annex 1

The form has three parts:

- (i) title box
- (ii) Strip map with feature description (key)
- (iii) Inventory

The diagram shows the layout of Form 1, which is divided into three main sections:

- Title box:** Located at the top, it contains fields for Name of District, Name of Sub-district, Road link Name / No., Sheet no. of __ sheets, Road length, Inspected by, Signature, and Date.
- Strip map with key:** Located below the title box, it includes a legend for existing features (Village, Retaining Wall, Bridge, Culvert, Road/Track, Ditch, School, Health clinic, Borrow pit, Footpath) and a strip map showing a line divided into 200m sections.
- Inventory:** A large table below the strip map for recording road details. The table has columns for Chainage (0 to 5000+ meters) and rows for various road features and conditions.

Inventory	Chainage: ____+000 to ____		Km:		1+000		2+000		3+000		4+000		5+000		Total
	to	to	0	100	200	300	400	500	600	700	800	900	1000		
Road surface width															
Total width including shoulders															
1 x = Asphalt															
2 x = Concrete															
3 x = Telford															
4 x = Gravel															
5 x = Earth															
6 Fill height and cut depth + / -															
7 Topography (f / u / m)															
8a unlined ditch LHS															
8b unlined ditch RHS															
8c lined ditch LHS															
8d lined ditch RHS															
10a retaining wall LHS															
10b retaining wall RHS															
11 bridge span in m															
12 lines of culverts															
13 remarks / reference / additional information / GPS															

Source: Adapted from Technical Guidelines - Second Rural Transport Project - Ministry of transport (PMUSIS) Vietnam and MSDP Trail

The first part of the form is the title box. Once completed, the title box identifies the road link being assessed, who carried out the inventory assessment and the date of the inventory.

The strip map and the inventory are completed as the inspection team / inspector travels down the road.

The second part of the form shows the strip map. The type of information to be recorded on the strip map is provided in the left hand box. The road on which the inventory is being carried out is shown as a line divided into 200m sections (i.e. a strip map). Different features of the road should be added to it. For example, if the road being assessed starts at a junction, the other road forming the junction should be shown at Chainage 0m. If there is a bridge 450m from the start of the road, then the symbol for a bridge should be placed on the strip map at 450m. This form is designed to be filled manually, but there is also space under the remarks for the recording of GPS readings.

The diagram shows the Strip Map section of Form 1, which includes a legend for existing features (Village, Retaining Wall, Bridge, Culvert, Road/Track, Ditch, School, Health clinic, Borrow pit, Footpath) and a strip map showing a line divided into 200m sections.

The *third part of the form* provides the spaces for entering the inventory information. For this part of the form, first the Chainage of the section being assessed should be entered (i.e.0+000 to 5+000 for the first 5 kms and 5+000 to 10+000 for the sixth to tenth km etc.).

Chainage: ____+000 to ____	Km: _____	1+000 2+000 3+000 4+000 Total 0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400 3600 3800 4000 m															
Metres																	

At the end of each 200m, the inspector/ inspection team should decide: what are the main features of that particular 200m of the road.

Description of the categories used in the inventory:

Looking at the inventory row for row:

Inventory category	Description
Road surface width	Enter in metres the width of the surfaced carriageway
Total width including shoulders	Enter in metres the width of the surfaced carriageway plus any surfaced or gravelled shoulders
1 x = Asphalt 2 x = Concrete 3 x = Telford 4 x = Gravel 5 x = Earth	Enter x where the specific type of surfacing starts and an arrow to the end of the section and beginning of another surfacing or the end of the sheet. An example is shown in box 1.1 below. In the case of concrete strips enter "xs".
6 Fill height and cut depth + / -	Enter the height of any embankment in metres with a "+" in front (e.g. +0.8) or if there is a cut enter the depth of the cut with a "-" in front (e.g. - 1.2)
7 Topography (f /u/ m)	In this row the terrain surrounding the road should be entered. This can be entered with either a "f" for flat, "u" for undulating (small hills, slopes and valleys) and "m" for mountainous (large hills and mountains, steep slopes) The value only needs to be entered once with an arrow up to the end or any point where the terrain changes.
8a unlined ditches LHS	Enter the length in metres or if a longer section of ditch enter an x with an arrow to show the length .
8b unlined ditches RHS	Enter the length in metres or if a longer section of ditch enter an x with an arrow to show the length .
9a lined ditches LHS	Enter the length in metres or if a longer section of ditch enter an x with an arrow to show the length .
9b unlined ditches RHS	Enter the length in metres or if a longer section of ditch enter an x with an arrow to show the length .
10a Retaining walls LHS	Enter the length in metres or if la longer retaining wall enter an x with an arrow to show the length .
10b Retaining wall RHS	Enter the length in metres or if la longer retaining wall enter an x with an arrow to show the length .
11 bridge span in m	Enter the approximate span of an existing bridge. (Span is the width from abutment to abutment see box 1.2 below). Large box culverts should be included in this category

12 lines of culverts

Enter the number of lines of an existing pipe or box culvert.

13 remarks / reference/ additional information

The data collector should take frequent photos from during there assessment which either give a general impression of the road or depict a particular trouble spot like e collapsed bridge etc. However these pictures are only of any value if reference is taken of where the picture has been taken. The reference number appearing on the assessment form should match the final file name given to the picture in the archive of where it is going to be stored.

Additional observations can greatly increase the value of this assessment. It is best to note these on a plane separate sheet of paper and give each point a reference number. The reference is then entered on this line.

GPS coordinates for any of the major features

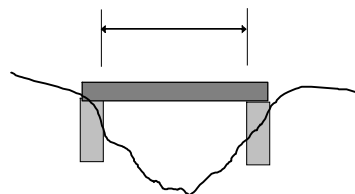
Any other short remarks for entry on form directly.

Where an entry remains the same an arrow can be entered after the first x until a new value or entry is needed. In the example below , for the first 1200m of the road has an asphalt surface and from 1200 it is a Telford construction

Metres	0	200	400	600	800	1000	200	400
Road surface width								
Total width including shoulders								
1 x = Asphalt	X	→						
2 x = Concrete								
3 x = Telford							X	→
4 x = Gravel								
5 x = Earth								

Box 1.1

Span is the width from abutment to abutment



Box 1.2

Below is an example of the entry of information on the inventory form

Chainage: ___+000 to ___		Km: Metres				
		0	200	400	600	800
Inventory	Road surface width					
	Total width including shoulders					
	1 x = Asphalt					
	2 x = Concrete					
	3 x = Telford					
	4 x = Gravel					
	5 x = Earth					
	6 Fill height and cut depth + / -					
	7 Topography (f / u / m)					
	8a unlined ditch LHS					
	8b unlined ditch RHS					
	9a lined ditch LHS					
	9b lined ditch RHS					
10a retaining wall LHS						
10b retaining wall RHS						
11 bridge span in m						
12 lines of culverts						
13 remarks / reference/ additional information/GPS						

3 m

4.5 m

X + →

+0.5 + = fill (m)

-0.5 - = cut (m)

f = flat

u = undulating

m = mountainous

X + →

X + →

X + →

span in m

No. of lines

GPS coordinates for start and end of road

Photo number etc.

Where the length of ditches and retaining walls are short, then the length in metres can be entered in the box rather than an X plus arrow

Form 2: Road Inspection and Routine Maintenance Assessment (Off-carriageway)

Form 2: Road Inspection and Routine Maintenance Assessment Form - Off carriageway											Page	of
Province						Agreement no:						
District:						Assessed by:						
Sub-District:						Signature:						
Road link:						Date of assessment:						
Road link no:												
Off-Carriageway routine maintenance activities	Stan-dard WD/ km	Factors**	Conditions each 20% road section					Length =	1 km	km		
		Cross Section	Condition	First 200	Second 200	Third 200	Fourth 200	Fifth 200	Daily wage	50,000	IDR/day	
									Average	Total WD		
1. Clearing bush and cutting grass	22	1	Light= 0.8 Medium= 1.0 Hard= 1.3	1	1			1	0.94	21	WD	
				3.5	3.5	4.4	5.7	3.5				
2. Clear debris from bridges	10	1	Light= 0.8 Medium= 1.0 Hard= 1.5	1	0	0	0	0	0.20	2	WD	
				2.0								
3. Cleaning culverts incl. in/outlets ,slopes	15	1	Light= 0.3 Medium= 1.0 Hard= 1.7					1	0.88	13	WD	
				5.1	5.1			3.0				
4. Cleaning of side and outlet drains	75	1	Light= 0.7 Medium= 1.0 Hard= 1.3	1	0	1	0		0.48	36	WD	
				10.5		15.0		10.5				
5. Repair of erosion on shoulders	27	1	Light= 0.8 Medium= 1.0 Hard= 1.5	0	1	0	0	0	0.16	4	WD	
					4.3							
6. Grubbing of carriageway	10	1	Light= 0.6 Medium= 1.0 Hard= 1.8	1			1	1	0.84	8	WD	
				2.0	1.2	1.2	2.0	2.0				
7. Grass planting	25	1	Light= 0.4 Medium= 1.0 Hard= 1.6				1		0.08	2	WD	
							2.0					
8. Non-standard routine maintenance activities	Works to be recorded under this activity may include clearing of landslide etc. Estimate WDs directly					3			Total WD non-standard=	3	WD	
Total workerdays / employment				23	14	24	10	19				
Employment to be created per kilometer of road =				90	WD / km			Sub-total =	90	WD		
Total amount of wages for (physical) maintenance works: 90 x IDR 50,000 =				IDR 4,500,000					4,500,000	IDR		
Allowance for TL for supervision for 23 work-days at 50%				25,000 IDR / day =					575,000	IDR		
Total amount of works including supervision by the TL:									5,075,000	IDR		
Amount in words =	Indonesian Rupiah five million and seventy five thousand											
Tools to be issued:				Implementation arrangements: Last page only								
Item	Item description	Unit	No	Planned number of workers:		90		wds				
1	Wheel barrows	No	2	Working days per week		6		days/w				
2	Grass cutter with handles	No	4	Size of team		4		people				
3	Grass cutting machine	No	0	Agreement duration:		4		weeks				
4	Bush knives	No	4	total for WD and team leader responsibility		IDR		5,075,000				
5	Shovel with handles	No	4	Total for handtools		IDR		1,975,000				
6	Hoe with handle	No	4	Total		IDR		7,050,000				
7	Hand rammer with handle	No	1									
8	Basket	No	4									
9	Watering can	No	1									
10	Steel peg and string line	set	1									
11	Safety clothing	set	4									
12	Tool Sharpeners	set	1									
13												
14												

Sheet A2: Guidance for Form 2: Road Inspection and Routine Maintenance Assessment

Purpose: To estimate the amount of routine maintenance work needed on the road link to ensure it remains in a good condition. To use the calculated works to estimate the number of worker-days and the costs of implementing the routine maintenance on the road link.

Below is a reduced copy of the road inspection, routine maintenance assessment and costs form (Form A2). Once completed the form provides not only an accurate assessment of the amount of work to be done, but also indicates at what point along the road the work should be carried out.

The form has seven parts:

- i. title box
- ii. maintenance work assessment
- iii. costs
- iv. tools
- v. implementation arrangements

Different parts of the form have different uses and these are described below:

Form 2: Road Inspection and Routine Maintenance Assessment Form - Off carriageway										Page	of
Province					Agreement no:						
District:					Assessed by:						
Sub-District:					Signature:						
Road link:					Date of assessment:						
Road link no:											
Off-Carriageway routine maintenance activities	Stan-dard WD/ km	Factors**	Conditions each 20% road section					Length =	1 km	km	
		Cross Section	Condition	First 200	Second 200	Third 200	Fourth 200	Fifth 200	Daily wage	50,000	
									Average	Total WD	
1. Clearing bush and cutting grass	22	1	Light= 0.8 Medium= 1.0 Hard= 1.3	1	1			1	0.94	21	
				3.5	3.5	4.4	5.7	3.5			
2. Clear debris from bridges	10	1	Light= 0.8 Medium= 1.0 Hard= 1.5	1	0	0	0	0	0.20	2	
				2.0							
3. Cleaning culverts incl. in/outlets, slopes	15	1	Light= 0.3 Medium= 1.0 Hard= 1.7					1	0.88	13	
				5.1	5.1			3.0			
4. Cleaning of side and outlet drains	75	1	Light= 0.7 Medium= 1.0 Hard= 1.3	1	0	1	0		0.48	36	
				10.5		15.0		10.5			
5. Repair of erosion on shoulders	27	1	Light= 0.8 Medium= 1.0 Hard= 1.5	0	1	0	0	0	0.16	4	
					4.3						
6. Grubbing of carriageway	10	1	Light= 0.6 Medium= 1.0 Hard= 1.8	1			1	1	0.84	8	
				2.0	1.2	1.2	2.0	2.0			
7. Grass planting	25	1	Light= 0.4 Medium= 1.0 Hard= 1.6				1		0.08	2	
							2.0				
8. Non-standard routine maintenance activities						3			Total WD non-standard=	3	
Works to be recorded under this activity may include clearing of landslide etc. Estimate WDs directly											
Total workerdays / employment				23	14	24	10	19			
Employment to be created per kilometer of road =				90	WD / km				Sub-total =	90	
Total amount of wages for (physical) maintenance works: 90 x IDR 50,000 =										4,500,000	
Allowance for TL for supervision for 23 work-days at 50%										575,000	
Total amount of works including supervision by the TL:										5,075,000	
Amount in words =	Indonesian Rupiah five million and seventy five thousand										
Tools to be issued:											
Item	Item description	Unit	No	Implementation arrangements: Last page only							
1	Wheel barrows	No	2	Planned number of workers: 90 wds							
2	Grass cutter with handles	No	4	Working days per week: 6 days							
3	Grass cutting machine	No	0	Size of team: 4 people							
4	Bush knives	No	4	Agreement duration: 4 weeks							
5	Shovel with handles	No	4	total for WD and team leader responsibility							
6	Hoe with handle	No	4	IDR 5,075,000							
7	Hand rammer with handle	No	1	Total for handtools							
8	Basket	No	4	IDR 1,975,000							
9	Watering can	No	1	Total							
10	Steel peg and string line	set	1	IDR 7,050,000							
11	Safety clothing	set	4								
12	Tool Sharpeners	set	1								
13											
14											

Title box

Maintenance work assessment

Costs

Handtools

Implementation Arrangements

Total costs

The first part of the form identifies where the road is, who is doing the inspection and which part of the road is being inspected (the chainage) the road construction type, and the carriageway width. The road length is divided up into 200 m sections (shown as the first, second, third, fourth and fifth on the form) which all together add up to one complete kilometre. The condition of the road is recorded for each of the sections. At the end of inspecting each 200m section the results will be entered into the form for that 200m. For the first assessments 200m has been used, but once the supervisor is familiar with the work and with the road sections this can be stretched to 500m.

Form 2: Road Inspection and Routine Maintenance Assessment Form - Off carriageway		Page	of
Province:		Agreement no:	
District:		Assessed by:	
Sub-District:		Signature:	
Road link:		Date of assessment:	
Road link no:			

The example here shows the first 1 km of the road. For the next kilometre a new form with the same layout will be used, but with the chainage altered to 1+000 to 2+000. The agreement number will be added later once the agreement has been prepared. The end box will only be filled on the last page. It has been filled in this form only as an example.

The *second part of the form* is used to assess the amount of work to be done for each routine maintenance activity. For each activity on the inspection form (e.g. 1) bush and grass clearing 2) clearing debris from bridges, etc.), the team inspecting the road must decide if the work to be done is light, medium or hard. To do this the road supervisor must bring with them the description sheets A3 a, b, c and d Taskrate Guidance and Handbook 2.

What are taskrates? Task rates are based on working experience, and are an estimate of the amount of work that can be carried out in a normal working day by one person. (I.e. amount of work completed per *workerday*) Some task rates are provided as a starting point, but these can be adapted based the experience of the road supervisor and the Community Routine Maintenance Teams.

Once the inspectors have decided if the activities are light, medium or hard, they should place a tick or the number 1 in the correct box in form 2

Looking at the first activity (1) Bush and grass clearing it can be seen that the assessment made of the amount of bush and grass to be cleared is: light in the first, second and fifth section, medium in the third section and hard in the fifth section.

Off-Carriageway routine maintenance activities	Stan-dard WD/ km	Factors**		Conditions each 20% road section					Length =		km
		Cross Section	Condition	First 200	Second 200	Third 200	Fourth 200	Fifth 200	Daily wage	Total WD	
1. Clearing bush and cutting grass	22	1	Light= 0.8	1	1			1	50,000	0.94	21
			Medium= 1.0			1					
			Hard= 1.3				1				
				3.5	3.5	4.4	5.7	3.5			

The same procedure is followed for routine maintenance activities 2 to 7. The descriptions of light, medium and hard from sheet A3 are used to enter the ticks in the form.

Before continuing, a short description of how the information that is being gathered will be used, will assist in understanding the reasons for going to this effort. The results of the inspection form need to be converted into amounts of work. In order to do this we need to know how many workerdays it will take to complete each activity.

For each activity, a standard number of workerdays has been provided. In the table shown here the value for grass and bush clearing for medium (normal conditions) is 22 workerdays per kilometre (wd/km). Therefore the value for 200m with medium conditions is $22 \times 1 \times 200/1000 = 4.4$ wd per 200m. Where there is less work to be done, the number of workerdays has been reduced to give light: $22 \times 0.8 \times 200/1000 = 3.5$ wd per 200m, and where the work is more difficult more days have been added to give hard: 5.7 wd per 200m. By using the factored workerdays per 200m, the amount of work per routine maintenance activity and per 200m can be filled in the form.

Stan-dard Wd/km	WDs Factored per 200m	
	Light	0.8
22	medium	1.0
	hard	1.3

The total number of workerdays estimated for the bush clearing and grass cutting for the first kilometre of the road is $0.94 \times 22 = 21$ workerdays (rounded to a whole number). Not all activities on the sheet will be needed in every 200m section. Where no work is required then a “-”(dash) or 0 (zero) should be entered in the form.

Under routine maintenance activity 8, small amounts of repair work or extra emergency work can be included in the assessment. To estimate the amount of workerdays needed for the activities use is made of taskrates.

Reference should be made to the taskrates in Sheet A3d and the descriptions in Handbook 2 used as a guide to the measurements and information that need to be noted.

Note : once all the activities are completed, the workerdays needed for each 200m section of the road are given by reading along the row with the title “Total workerdays/ employment created “ This is useful for organising the implementation of the routine maintenance.

Total workerdays / employment	23	14	24	10	19			
Employment to be created per kilometer of road =		90	WD / km			Sub-total =	90	WD
Total amount of wages for (physical) maintenance works: $90 \times \text{IDR } 50,000 = \text{IDR } 4,500,000$							4,500,000	IDR
Allowance for TL for supervision for 23 work-days at 50%				25,000	IDR / day =		575,000	IDR
Total amount of works including supervision by the TL:							5,075,000	IDR

After the necessary assessment and measurements have been noted on site, the calculation of the amount of work and the workerdays needed to complete the maintenance work can be done in the office.

A decision about the size of the team is made by deciding how many workers are needed to complete the job and at the same time to ensure that the team is not too small (less than 3 persons) and not too large(more than 8 persons). In this case 4 people will each have 23 days of work.

Using the size of the team an estimate can be made of the tools required and the cost. This is an accurate estimate for the preparation of the routine maintenance contract.

Tools to be issued:				Implementation arrangements: Last page only		
Item	Item description	Unit	No	Planned number of workers:	90	Wds
1	Wheel barrows	No	2	Working days per week	6	days/w
2	Grass cutter with handles	No	4	Size of team	4	people
3	Grass cutting machine	No	0	Agreement duration:	4	weeks
4	Bush knives	No	4	total for WD and team leader responsibility		
5	Shovel with handles	No	4			
6	Hoe with handle	No	4	Total for handtools		
7	Hand rammer with handle	No	1			
8	Basket	No	4	Total		
9	Watering can	No	1			
10	Steel peg and string line	set	1	Total		
11	Safety clothing	set	4			
12	Tool Sharpeners	set	1	Total		
13						
14				Total		

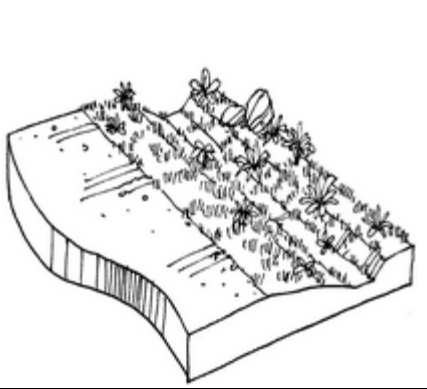
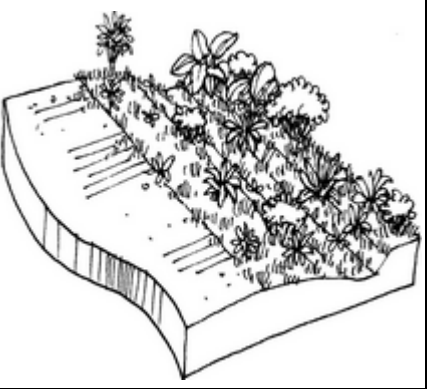
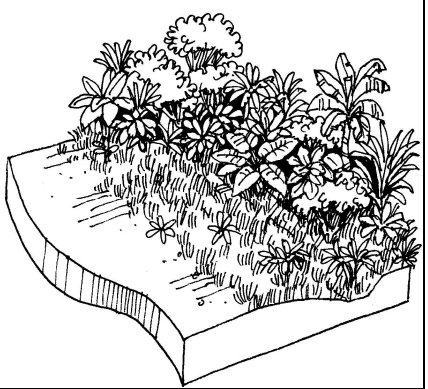
For well maintained roads the number of workerdays per km needed to keep the road in good condition should be less than 80. If the worker days per km exceed 250 then a decision will need to be made as to whether this is routine maintenance or if some of the work needs to be budgeted for separately as periodic maintenance.

An example of a completed Road Inspection [Form 2](#) is provided on page 6 above. The taskrate categories, their description and workerday rates are provided in the sheet A3, on pages 11 to 14.

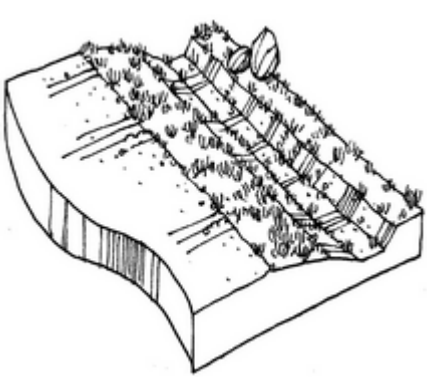
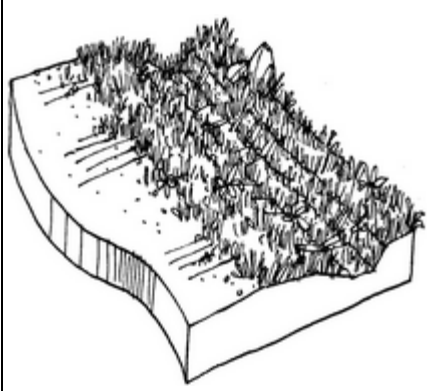
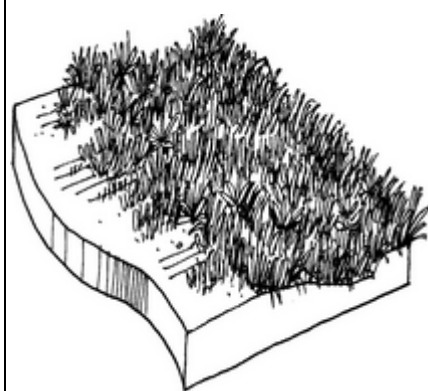
Sheet A3: Task rate recommendations³

Below are the descriptions of the work, and the categories light medium and hard, which should be used to complete the road inspection form.

1 Bush clearing and Grass cutting**Description of the Bush:**

		
Light: Very few low bushes and shrubs	Medium: Thicker bush and shrubs with a height up to 1.5m	Hard: Really thick and overgrown area with tall bushes and shrubs.

Description of the Grass:

		
Light: Little grass with gaps between, and low growing	Medium: Denser grass taller and stronger with hardly any gaps	Hard: Really thick and tall grass

Using the descriptions above the material (bush or grass) to be cleared should be given a category of light medium or hard.

All debris removed from the road, ditches and verges 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 TP3 no further than 500m from the road site.

Where verges are very small (< 0.5 m) then the number of worker days should be reduced as the work will be less than for a 1.5 to 2m verge width.

Stan- dard Wd/km	WDs Factored per 200m	
22	Light	0.8
	medium	1.0
	hard	1.3

³ Taken from information provided by the ILO project and from international sources

2 Clear debris from bridges

Sheet A3b

As bridges and major culverts come in various shapes and sizes, the volume of work must be calculated for each case. Volume = height x length x width (m³)

Light	clearing up to 2m ³ of debris
Medium	clearing more than 2m ³ up to 5 m ³ of debris
Hard	clearing more than 5m ³ up to a maximum of 10m ³ of debris

Stan- dard Wd/km	WDs Factored per 200m
10	Light 0.8
	medium 1.0
	hard 1.5

All debris removed from the road, ditches and verges 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 TP3 no further than 500m from the road site.

3 Cleaning culverts including inlets and outlets

The cleaning of culverts includes the clearing of the entrance and exits for a minimum of 10m from the end of the pipes or boxes. The diameter of the pipe culvert and the height and with of a square culvert will be a maximum of 80 cm (0.8 m). Any larger culverts will be cleared using item 2.

Light	One culvert up to half full with soft soil	One culvert up to quarter full with hard soil
Medium	One culvert three quarters full with medium soil	One culvert half full with hard soil
Hard	One culvert full with medium soil	One culvert more than half full with hard soil

Stan- dard Wd/km	WDs Factored per 200m
15	Light 0.3
	medium 1.0
	hard 1.7

4a Cleaning side and outlet drains (lined and unlined)

The first table below gives general guidance for excavation in different soil conditions, and these values can be used for all excavation activities. The second table provides the workerdays specifically for excavation within the road drains.

moist and loose soils	average soil conditions	hard and dry soils
3.0 m ³ /wd	2.5 m ³ /wd	2.0 m ³ /wd

Light	Drains up to a maximum length of 200m (when adding both sides of the road) in length with medium soil.	Drains up to 0.3m with loose soil
Medium	Drains up to 0.5 m wide with loose soil	Drains up to 0.3m wide with medium or hard soil
Hard	All drains more than 0.3m wide with hard soil	All drains where more than 0.3m in depth needs to be excavated in medium or hard soil

Stan- dard Wd/km	WDs Factored per 200m
75	Light 0.7
	medium 1.0
	hard 1.3

Sheet A3c

All soil, silt and debris removed from the drains 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 road supervisor no further than 500m from the road site. Note: This work is extra to grass cutting and bush clearing. If only grass cutting and bush clearing are needed then this should be included in item 1.

5 Erosion and shoulder/slope repairs and reshaping

This 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.

Light	Slight erosion or vehicle damage covering a maximum area of 15m ²
Medium	Deeper erosion or vehicle damage up to a depth of 15 cm covering a maximum area of 75m ²
Hard	Extensive damage requiring new soil not available at the edge of the road, covering a maximum area of 75m ²

Stan- dard Wd/km	WDs Factored per 200m
27	Light 0.8
	medium 1.0
	hard 1.5

6 Grubbing of the carriageway

For the assessment of the work to be done, the important factor for grubbing is the extent of the grass covering the carriage way.

Light	Average width of grass area to be grubbed is not greater than 30 cm (0.3m)
Medium	Average width of grass area to be grubbed is greater than 30cm and less than 1.0m
Hard	Average width of grass area to be grubbed is more than 1.0 m

Stan- dard Wd/km	WDs Factored per 200m
10	Light 0.6
	medium 1.0
	hard 1.8

All grass removed from the road 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 TP3 no further than 500m from the road site.

7 Grass planting

Where the grass is available and ready to plant the following task rates apply. Should it be necessary to gather the grass plants first, this will be an extra task and needs to be calculated separately based on local conditions.

Light	Up to a maximum of 100m ² on flat or gently sloping ground	Up to a maximum of 75m ² on steeply sloping ground
Medium	From 100m ² to 250 m ² on flat or gently sloping ground	From 75m ² to 150 m ² on steeply sloping ground
Hard	More than 250m ² on flat or gently sloping ground	More than 150m ² on steeply sloping ground

Stan- dard Wd/km	WDs Factored per 200m
25	Light 0.4
	medium 1.0
	hard 1.6

8 Others: Minor repairs to the carriageway (gravel): Filling Potholes, filling ruts and reshaping the carriageway

8a Pothole filling (gravel road) using material on or next to the road:

15 potholes /wd Maximum size (0.5 m²)

This work includes excavating and cutting the pothole to a square shape, removing all spoilt soil, replacing with good soil and water and compacting in layers.

8a Rut filling (Telford and gravel roads)

This work includes the removal of spoilt soil and the filling of the ruts with good soil, watering and compacting of the new soil to recover the camber (roof shape) of the road.

Light	Slight erosion or vehicle damage covering a maximum area of 15m ²
Medium	Deeper erosion or vehicle damage up to a depth of 15 cm covering a maximum area of 75m ²
Hard	Extensive damage requiring new soil not available at the edge of the road, covering a maximum area of 75m ²

Stan- dard Wd/km	WDs Factored per 200m
6	Light 0.2
	medium 1.2
	hard 5

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 300m² in each kilometre.

8b Masonry work

The task needs to be based on experience and the complexity of the work.

A starting point is 1.6 m³ /wd

8c Concrete work

The task needs to be based on experience and the complexity of the work.

A starting point is Mass Concrete 0.3 m³ / WD

Reinforced concrete 0.1 m³ / WD

4b Replacing / building scour checks

Depending on how readily available the materials are (stones or wood for making wooden stakes) and how badly the scour checks are damaged or if they do not exist and need to be built.

Minor repairs	Major repairs or new construction
5 to 7 scour checks /wd	3 to 4 scour checks /wd

The numbers relate to the full descriptions and illustrations of all tasks that are provided in Handbook 2.

Form 3 Survey of Routine Maintenance (on-carriageway) will be dealt with at the end of the handbook on page 29 as the amount of work and costs are calculated separately from those of the off-carriageway works.

Form 4: Planning and Implementation

Form 4: Planning and Implementation		Name of Province:	Name of District:	for the District	for the CRMT	witnessed	Sheet _ of _		
Road link no:		Name of Village:	Name:	Name:	Name:	Name:			
Agreement no:		Name of Road:	Position:	Team Leader:	Team Leader:	Village Leader:			
Date:		Date:	Signature:	Signature:	Signature:	Signature:			
		0.000 km	0.200 km	0.400 km	0.600 km	0.800 km	1.000 km	Total WD per activity	Wage Costs per activity IDR
1. Clearing bush and cutting grass	WDs	3.5	3.5	4.4	5.7	3.5		21	1,030,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	175,000	175,000	220,000	285,000	175,000			
2. Clear debris from bridges	WDs	2	0	0	0	0		2	100,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	100,000	0	0	0	0			
3. Cleaning culverts incl. in/outlets ,slopes	WDs	5.1	5.1	0	0	3		13	660,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	255,000	255,000	0	0	150,000			
4. Cleaning of side and outlet drains	WDs	10.5	0	15	0	10.5		36	1,800,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	525,000	0	750,000	0	525,000			
5. Repair of erosion on shoulders	WDs	0.0	4.3	0	0	0		4	215,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	0	215,000	0	0	0			
6. Grubbing of carriageway	WDs	2	1.2	1.2	2	2		8	420,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	100,000	60,000	60,000	100,000	100,000			
7. Grass planting	WDs	0	0	0	2	0		2	100,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	0	0	0	100,000	0			
8. Non-standard routine maintenance activities e.g. Masonry repairs, landslides etc. minor carriageway repairs	WDs	0	0	3	0	0		3	150,000
	Wage rate IDR	50,000	50,000	50,000	50,000	50,000			
	Wage Costs IDR	0	0	150,000	0	0			
Total WDs and total wage costs per 200m Wage rate = IDR 50,000	Total WDs	23	14	24	10	19		90	4,500,000
	Total wage costs IDR	1,155,000	705,000	1,180,000	485,000	950,000			
Total WDs for km <u>1</u>		= 90 WDs		Employment to be created per km= 90 WD/km Sub-total = 90 WD		Materials		Quantity	Cost IDR
Total WDs from previous sheets kms <u> </u> to <u> </u>		= 0 WDs		Total amount of wages for (physical) maintenance works: 4,500,000 IDR		Sand			
Total wds at the end of km <u>1</u>		= 90 WDs		Allowance for TL for supervision for 23 work-days at 25,000 IDR/day = 575,000 IDR		Stone			
				Total amount for works including supervision by the TL: 5,075,000 IDR		Aggregate			
size of team = 90 / 24 days is > 3 , therefore 4 persons in the team						Cement			
supervision = 23 days @ 25,000 extra = IDR 575,000				Handtools as per Sheet 8 1,975,000 IDR		Total			
Total Costs for wages, supervision, handtools and Materials = 7,050,000 IDR		Contingencies (if applicable)5% = 0 IDR		Final Total 7,050,000 IDR					

Sheet A4: Guidance for Form 4: Routine Maintenance Planning and implementation

Purpose: To change the estimate into a more practical implementation guide where the amount of work to be done, estimated in workerdays, and the payment for the work are linked to progress of the routine maintenance team along the road. This is a planning tool.

The routine maintenance planning, tool issue and instruction form (form 4) has four parts

- The title box and signatures
- Chainage
- Activities with workerdays, estimated costs and supervision
- Tool and material requirements and total costs

Form 4: Planning and Implementation		Name of Province:	Name of District:	for the District	for the CRMT	Witnessed	Sheet _ of _
Road link no:		Name of Village:	Name:	Name:	Name:	Camat/ Village Leader:	
Agreement no:		Prepared by:	Name of Road:	Position:	Team Leader:		
Date:		Date:	Signature:	Signature:	Signature:		
	0.000 km	0.200 km	0.400 km	0.600 km	0.800 km	1.000 km	Total WD per activity
1. Clearing bush and cutting grass	WDs 3.5 Wage rate IDR 50,000 Wage Costs IDR 175,000	WDs 3.5 Wage rate IDR 50,000 Wage Costs IDR 175,000	WDs 4.4 Wage rate IDR 50,000 Wage Costs IDR 220,000	WDs 5.7 Wage rate IDR 50,000 Wage Costs IDR 285,000	WDs 3.5 Wage rate IDR 50,000 Wage Costs IDR 175,000		21
2. Clear debris from bridges	WDs 2 Wage rate IDR 50,000 Wage Costs IDR 100,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0		100,000
3. Cleaning culverts incl. in/outlets, slopes	WDs 5.1 Wage rate IDR 50,000 Wage Costs IDR 255,000	WDs 5.1 Wage rate IDR 50,000 Wage Costs IDR 255,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 3 Wage rate IDR 50,000 Wage Costs IDR 150,000		13
4. Cleaning of side and outlet drains	WDs 10.5 Wage rate IDR 50,000 Wage Costs IDR 525,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 15 Wage rate IDR 50,000 Wage Costs IDR 750,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 10.5 Wage rate IDR 50,000 Wage Costs IDR 525,000		36
5. Repair of erosion on shoulders	WDs 4.3 Wage rate IDR 50,000 Wage Costs IDR 215,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0		4
6. Grubbing of carriageway	WDs 2 Wage rate IDR 50,000 Wage Costs IDR 100,000	WDs 1.2 Wage rate IDR 50,000 Wage Costs IDR 60,000	WDs 1.2 Wage rate IDR 50,000 Wage Costs IDR 60,000	WDs 2 Wage rate IDR 50,000 Wage Costs IDR 100,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0		8
7. Grass planting	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 2 Wage rate IDR 50,000 Wage Costs IDR 100,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0		2
8. Non-standard routine maintenance activities e.g. Masonry repairs, landslides etc. minor carriageway repairs	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 3 Wage rate IDR 50,000 Wage Costs IDR 150,000	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0	WDs 0 Wage rate IDR 50,000 Wage Costs IDR 0		3
Total WDs and total wage costs per 200m	Total WDs 23 Total wage costs IDR 1,155,000	Total WDs 14 Total wage costs IDR 705,000	Total WDs 24 Total wage costs IDR 1,180,000	Total WDs 10 Total wage costs IDR 485,000	Total WDs 19 Total wage costs IDR 950,000		90
Total WDs for km 1 = 90 WDs		Total WDs for km 2 = 0 WDs		Total WDs for km 3 = 90 WDs			
Total WDs from previous sheets km 1 to 1 = 90 WDs		Total WDs at the end of km 1 = 90 WDs					
Size of team = 90 / 24 days is > 3, therefore 4 persons in the team supervision = 23 days @ 25,000 extra = IDR 575,000		Handtools as per Sheet 8 = 1,975,000 IDR		Materials: Sand 4,500,000 IDR, Stone 5,075,000 IDR, Aggregate 5,075,000 IDR, Cement 5,075,000 IDR, Total 19,750,000 IDR			
Total Costs for wages, supervision, handtools and Materials = 7,050,000 IDR		Contingencies (if applicable) 5% = 0 IDR		Final Total = 7,050,000 IDR			

Title box

Chainage

Wds per activity

Costs per activity

Total Wds

Supervision

Total Costs for WDs and supervision

Handtool requirements

Contingencies

Total costs

The first part of the form is the title box and this contains the same information as previous title boxes. As this form provides the amount of work to be done by the team it will form part of the contract and as such will need to be signed on completion by the district representatives, the CRMT and the Camat or village Leader. In all the forms the cost of the physical works in terms of workerdays and supervision are always shown separately and not combined with the procurement of handtools etc. This is because the agreement which will be made with the Community Routine Maintenance Team may be for the physical works only. Procurement for handtools will be carried out separately for all the teams following normal procurement procedures.

The second part of the form, ties the actual estimate of workerdays and the costs to each section (200m or 500m) of the road. This will assist the team leader to plan the allocation of work to ensure that sufficient progress is being made on individual activities and for each section. The following excerpt from the form illustrates this point:

	0.000 km	0.200 km	0.400 km	0.600 km	0.800 km	1.000 km	Total WD per activity	Wage Costs per activity IDR
1. Clearing bush and cutting grass	WDs 3.5 Wage rate IDR 50,000	WDs 3.5 Wage rate IDR 50,000	WDs 4.4 Wage rate IDR 50,000	WDs 5.7 Wage rate IDR 50,000	WDs 3.5 Wage rate IDR 50,000		21	1,030,000

For the *third part of the form*, each section of road (in this case 200m), working days have been calculated in form 2. These workerdays are automatically entered using excel or can be manually entered. The wage rate has also been set in form 2. From the example above we can see that the actual Wds per section are 3.5 and the total for grass cutting 21 Wds. These values have been rounded up in the excel table. The second last column gives the total workdays per km for the activity and the last column the cost. From this the supervisor can see which cost relates to which activity

	0.000 km	0.200 km	0.400 km	0.600 km	0.800 km	1.000 km	Total WD per activity	Wage Costs per activity IDR
Total WDs and total wage costs per 200m Wage rate = IDR 40,000	Total WDs = 23	Total WDs = 14	Total WDs = 24	Total WDs = 10	Total WDs = 19		90	4,500,000
	Total wage costs IDR = 1,155,000	Total wage costs IDR = 705,000	Total wage costs IDR = 1,180,000	Total wage costs IDR = 485,000	Total wage costs IDR = 950,000			

The sub-total for each activity and the total for the length of road are provided in the bottom row of the second section of the form. From the total and the allocated cost estimate for the work. The team leader can read how many workerdays there are available for each activity in the section, but also the total number of days and the amount of payment for each completed section. In the example above, the team leader knows that the first section needs to be completed within 23 days if the team are to remain on target. Added to the total for the works are the supervision days for the team leader to provide the total for the physical works and the agreement.

The *fourth part of the form* adds the additional costs of the supervision (total days/no of team members – $90/4 = 22.5$ say 23), tools and materials and, where acceptable, a contingency of up to 5%. The districts generally do not include contingencies in contracts and therefore this has been entered as zero in the example shown here.

Total WDs for km <u>1</u>	= 90 WDs	Employment to be created per km= 90 WD/km	Sub-total = 90 WD	Materials	Quantity	Cost IDR
Total WDs from previous sheets kms <u> </u> to <u> </u>	= 0 WDs	Total amount of wages for (physical) maintenance works:	4,500,000 IDR	Sand		
Total wds at the end of km <u>1</u>	= 90 WDs	Allowance for TL for supervision for 23 work-days at 25,000 IDR/day =	575,000 IDR	Stone		
		Total amount for works including supervision by the TL:	5,075,000 IDR	Aggregate		
size of team = 90 / 24 days is > 3, therefore 4 persons in the team		Handtools as per Sheet 8	1,975,000 IDR	Cement		
supervision = 23 days @ 25,000 extra =	IDR 575,000			Total		
Total Costs for wages, supervision, handtools and Materials =	7,050,000 IDR	Contingencies (if applicable) 5% =	0 IDR	Final Total	7,050,000	IDR

Alternative for Form 4: A Manual Form for Routine Maintenance Planning and implementation,-

The form 4 shown above is for use with excel, however a simpler form can be used for manual completion. Only the *third* section of the form (I.e. the actual estimate of workerdays and the costs to each section (20%) of the road and the total for the whole road) will vary.

Form 4: Planning and Implementation		Name of Province:	Name of District:	for the District	for the CRMT	witnessed	Sheet _ of _	
Road link no:		Name of Village:	Name:	Name:	Name:	Name:		
Prepared by:		Name of Road:	Position:	Team Leader:	Team Leader:	Team Leader:		
Date:		Date:	Signature:	Signature:	Signature:	Signature:		
	0.000 km	0.200 km	0.400 km	0.600 km	0.800 km	1.000 km	Total WD per activity	Wage Costs per activity IDR
1. Clearing bush and cutting grass	WDs 3.5	3.5	4.4	5.7	3.5	21	1,030,000	
2. Clear debris from bridges	WDs 2	0	0	0	0	2	100,000	
3. Cleaning culverts incl. in/outlets, slopes	WDs 5.1	5.1	0	0	3	13	660,000	
4. Cleaning of side and outlet drains	WDs 10.5	0	15	0	10.5	36	1,800,000	
5. Repair of erosion on shoulders	WDs 0.0	4.3	0	0	0	4	215,000	
6. Grubbing of carriageway	WDs 2	1.2	1.2	2	2	8	420,000	
7. Grass planting	WDs 0	0	0	2	0	2	100,000	
8. Non-standard routine maintenance activities e.g. Masonry repairs, landslides, minor carriageway repairs etc.	WDs 0	0	3	0	0	3	150,000	
Total WDS	23	14	24	10	19	90	4,500,000	
Total wage costs IDR	1,155,000	705,000	1,030,000	485,000	950,000			
Total WDs for km 1 = 90 WDs		Employment to be created per km = 90 WD/km Sub-total = 90 WD		Materials		Quantity	Cost IDR	
Total WDs from previous sheets kms 1 to 1 = 0 WDs		Total amount of wages for (physical) maintenance works: 4,500,000 IDR		Sand				
Total wds at the end of km 1 = 90 WDs		Allowance for TL for supervision for 23 work-days at 25,000 IDR/day = 575,000 IDR		Stone				
size of team = 90 / 24 days is > 3, therefore 4 persons in the team		Total amount for works including supervision by the TL: 5,075,000 IDR		Aggregate				
supervision = 23 days @ 25,000 extra = IDR 575,000		Handtools as per Sheet B 1,975,000 IDR		Cement				
Total Costs for wages, supervision, handtools and Materials = 7,050,000 IDR		Contingencies (if applicable) 5% = 0 IDR		Final Total		7,050,000 IDR		

The section of the form showing only workerdays and total costs is illustrated below

		0.000 km	0.200 km	0.400 km	0.600 km	0.800 km	1.000 km	Total WD per activity	Wage Costs per activity IDR
	WDs	3.5	3.5	4.4	5.7	3.5	21		1,030,000
	WDs	2	0	0	0	0	2		100,000
	WDs	5.1	5.1	0	0	3	13		660,000
	WDs	10.5	0	15	0	10.5	36		1,800,000
	WDs	0.0	4.3	0	0	0	4		215,000
	WDs	2	1.2	1.2	2	2	8		420,000
	WDs	0	0	0	2	0	2		100,000
	WDs	0	0	3	0	0	3		150,000
Total WDS		23	14	24	10	19	90		4,500,000
Total wage costs IDR		1,155,000	705,000	1,030,000	485,000	950,000			

By entering the workerdays as estimated in Form 2, these can be multiplied by the wage rate to give the cumulative totals for each 20% section and the cumulative totals for each activity in workerdays and cost estimate.

Note that for the individual sections, the value is 21 Wds x 50,000 (wage rate) = 1,050,000. The total Wds have been rounded up from 20.6 to 21 to give a whole number. The accurate total costs are 20.6 x 50,000 = IDR 1,030,000. Due to the rounding up of workerdays, slight differences in totals for each section (20%) and the total for the whole activity can occur.

Note: The full form 4, with all costs individually entered, can be used either with excel or manually, this form shown above is merely a simpler alternative.

The remaining forms and tables are self-explanatory and therefore are not accompanied by a separate explanation.

Form 5: Agreement for the implementation of routine maintenance

Province:	Road link no(s):
District:.....	Road name:.....
Sub-District:.....	Road Length:..... (km)
Village:	Maintenance Team Leader:

(delete all the instructions in italics when drafting the agreement)

The District of (hereinafter referred to as “the District”) agrees to the implementation of routine maintenance in connection with its annual routine maintenance programme for Sub-District

..... *(insert Kecamatan)* be carried out by the Community Road Maintenance Team (CRMT) of

..... Village in the sub-District of in the District of
(insert name of the village, Sub-District, and District)

under the leadership of

.....
(insert the name and address of the team leader)

hereinafter referred to as “the team leader” who has accepted to execute such work according to the following terms and conditions:

Purpose and starting date of activity

The purpose of the activity is to carry out routine maintenance on km of road with a starting date of and a finishing date of

Number of team members:

Location of the work: on road links in the District of

.....

Total cost of the routine maintenance activity.....

The payments for the routine maintenance will be disbursed in tranches, according to progress in reaching the agreed chainages which will not exceed two working weeks apart

On completion of the routine maintenance activities, the District Engineer/ Supervisor will verify the completion of the activities. The muster roll and any other documentation relating to expenditure must be submitted with the payment certificate.

For the District

For the CRMT

(signature)

(signature)

(name and functional title)

(name and functional title)

(place and date)

(place and date)

Witnessed by

Approved by

(signature)

(signature)

(Village Leader)

(Camat)

(place and date)

(place and date)

Attachments:

Annex 1: Form 4 - Routine Maintenance Workplan

Annex 2: Form 6: Terms of Reference for the CRMT Team Leader

Form 6: Terms of Reference for the Team Leader

Terms of Reference for the Team Leader of the Community Road Maintenance Team (CRMT)

Province:	Road link no(s):
District:.....	Road name:.....
Sub-District:.....	Road Length:..... (km)
Village:	Maintenance Team Leader:

Objective:

- A. To efficiently plan, organise, direct, control and report all routine maintenance activities of the road links under the contract.
- B. To control all the required resources (team members, handtools and materials)

Main Tasks

1. To direct the CRMT in implementing the agreed routine maintenance tasks according to the maintenance plan and quantities attached to the Routine Maintenance Agreement;
2. To physically participate in implementing the routine maintenance activities as part of the CRMT;
3. To ensure that the work is implemented according to the standards described in the routine maintenance technical handbook, which has been received by from the District;
4. To maintain a muster roll as issued by the District, and pay all CRMT members according to the tasks completed;
5. To have the muster roll available for inspection at all times
6. To prepare together with the District Supervisor, the interim and final payment certificates for the agreement;
7. To sign for the hand tools provided for the works as issued by the District and recorded in the hand tool issue form/ or to buy the tools according to the agreement
8. To return the tools on completion of the work covered in the agreement and before the final payment is made, or if bought under the agreement, to hand over to the village leader for safe-keeping. *(The Maintenance Team is responsible for taking care of the tools provided by the district to them. The cost of any lost item or tool will be deducted from the last payment.)*

In addition

9. To alert the District supervisor if there is any need for urgent unforeseen work

Work Discipline

10. The CRMT should follow the safety guidance for routine road maintenance work.
11. If the CRMT leader or members repeatedly refuses to comply with the guidance of the directions of the District Engineer or Supervisor to fulfil the contract requirements, the District will have the right to terminate the contract.
12. Any disputes that cannot be resolved on site will be taken to the Sub-district Leader (Camat) in his office.

I understand and agree to the above Terms of Reference

Witnessed By

(Signature)

(signature)

(Name)

(Camat /Village Head)

(Date)

(Date)

Form 7: Community Routine Maintenance Team (CRMT) Internal Agreement

Agreement between the Community Road Maintenance Team (CRMT) Leader and the CRMT Members.

Province:	Road link no(s):
District:.....	Road name:.....
Sub-District:.....	Road Length:..... (km)
Village:	Maintenance Team Leader:

Role and responsibilities of the CRMT team leader

1. To direct the CRMT in implementing the agreed routine maintenance tasks according to the maintenance plan and quantities as per annex 1 of the contract;
2. To physically participate in implementing the routine maintenance activities as part of the CRMT;
3. To ensure that the work is implemented according to the standards described in the routine maintenance technical handbook, which has been received by from the District;
4. To maintain a muster roll and pay all CRMT members according to the tasks completed at the agreed wage rate;
5. To issue the hand tools provided by the District / or bought by the team leader under the contract, to each team member.
6. To gather the tools on completion of the contract and before the final payment is made.
(*The Maintenance Team is responsible for taking care of the tools provided to them. The cost of any lost item or tool belonging to the District will be deducted from the last payment.*)

Role and responsibilities of the CRMT team members

7. To implement routine maintenance activities according to the instructions of the CRMT team leader;
8. To receive hand tools from the team leader for the routine maintenance works;
9. To return all issued tools at the end of the contract to the team leader;
10. To implement the routine maintenance according to the standards described in the routine maintenance technical handbook, which the team leader received by from the District;

Agreement

11. The CRMT team leader will pay the team members for tasks completed as per the task rates set out in the attached annex A1⁴
12. One task only will be completed per team member per day and will be paid at a rate of R_____

Work Discipline

13. The CRMT members will follow the safety guidance for routine road maintenance work as directed by the team leader.
14. If members of the CRMT repeatedly refuse to comply with the guidance of the team leader and / or the district supervisor to fulfil the contract requirements, the team leader will have the right to bring this to the attention of the District and to request that the team member can be released from the team.

I understand and accept the terms of agreement as described above

(Name of team leader & ID)

⁴ Annex A1 Contains the sheets A3 a, b, c & d.

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Name of team member &ID)

(Date)

Form 8: Handtools for routine maintenance

Purpose: An overview of the tools which may be needed and a cost estimate for each – this can be used for individual contracts or when tools for several contracts are being procured together.

Hand Tools for Routine Road Maintenance					
District:.....			Road Id(s).....		
Sub-district:.....			Road Name(s).....		
Village(s).....			road Length(s)..... kms		
.....			Date:.....		
No	Item Description	Qty	Estimated Price /Unit (IDR)	Estimated Amount (IDR)	Remarks
1	Wheel barrow			-	
2	Grass-cutter			-	
3	Bush knife			-	
4	Handsaw			-	
6	Axe			-	
7	Crowbar			-	
9	Shovel			-	
10	Shovel with long handle			-	
11	Hoe				
12	Pickaxe				
13	rake			-	
14	Broom/ brush			-	
15	Hand rammer				
16	Watering can				
17	Bucket				
18	Basket				
19	Hammer				
20	Pegs and string				
21	Mason's tools				
22	Tool sharpeners				
23	Road safety signs(2)				
24	gloves				
25	boots				
26	5m. tape measure				
27	50m tape measure				
	others: site notebook				
16	others:				
	Sub total			-	
	Contingency	0%		-	
	Total			-	
Date:..... /...../ 20			Date:..... /...../ 20		
Prepared by:.....			Purchased by:.....		
Name:			Name:		

Form 9: Muster and Payroll

Formulir 9 : Perhitungan HOK dan Sistem Pembayaran Secara Lumpsum														
Desa/Kecamatan				Lokasi :				Upah Standar						
Jenis Aktivitas				Tanggal :				HOK Standar/Ekivalen :						
Pekerjaan				Waktu :				Upah untuk 1 pekerja :						
conteng v di dalam kotak														
No	Nama	Lk	Pr	Kategori Pekerja			Azsal		Volume Pekerjaan Untuk Team (Produksi) Km	Aktual HOK	Nilai HOK Ekivalen	Nilai Upah (Rp)	Tanda Tangan Atau Cap Jempol (Tangan Kiri)	
				Tidak Terampil	Terampil	Team Leader	Dari Desa	Luar Desa						
1.	A	v				v	v		0.400 km	5	22/19 x5= 5.8	232,000	1	2
2.	B		v				v			5	5.8	232,000		
3.	C	v					v			4	22/19x4= 4.6	184,000	3	4
4.	D		v				v			5	5.8	232,000		
5.													5	6
6.														
7.													7	8
8.														
													9	10
Total										19		880,000.00		
Keterangan: Lk : Lelaki Pr : Perempuan														
Mengetahui Engineer				Pengawas Kabupaten				Ketua Tim		Saksi		Camat/Kepala Desa		
(Nama Jelas)				(Nama Jelas)				(Nama Jelas)		(Nama Jelas)		(Nama Jelas)		

This form is in Bahasa only as it has been adapted from the original PNPM form. Village committees are familiar with this form and so it was decided to continue using it.

INSPECTION CHECKLIST.

Routine Maintenance

Agreement No.:.....

Province:

District:

Sub-district:

Village name:

Road Link No.:

Road link name:

Actual chainage:.....to.....

Checklist status: APPROVED / NOT APPROVED

Supervisor name:

signature

Inspection date:

1. Clearing bush and cutting grass

Is the grass and bush cut from road shoulder, slope and road reserve to keep visual of traffic?

☐

Yes

☐

No

Is the grass has kept maximum 5 cm above the ground?

☐

Yes

☐

No

Is the grass cut within road reserve: min 1 m out side the lined drain or toe slope?

☐

Yes

☐

No

Is the grass disposed or transport away from drainage system?

☐

Yes

☐

No

2. Clear debris from bridges	Is bolder, tree branches, silt earth and other material cleared and removed from bed of bridge to allow free flow of water under the bridge; ☐ Yes ☐ No
3. Cleaning culverts including in/outlet and slop	Is silt earth and other material has been cleared and remove from inside, inlet and outlet of the culvert to allow free flow of water in the culvert? ☐ Yes ☐ No
4. Cleaning of side drains and outlet drains	Has the waste material, silt, and earth that obstructed the free flow of water from the drain has been cleared and removed? ☐ Yes ☐ No
5. Repair of erosion on shoulders	Is the eroded or damaged road shoulder and slope are filled up and compacted in order to extend damage the road surface? ☐ Yes ☐ No
6. Grubbing of carriageway	Is the grass cleared from road carriage way and a minimum of 10 cm from the road edge? ☐ Yes ☐ No
7. Grass planting	Is the grass planted on shoulder and slope in order to protect them from erosion? ☐ Yes ☐ No
8. Non standard activities	Is the land slide in a smaller volume than 10 m3 cleared from road carriage way and drainage structure to allow traffic and water free flow? ☐ Yes ☐ No Are the masonry and concrete repairs complete? ☐ Yes ☐ No

Form 11: Interim payment Certificate

Routine Maintenance agreement no:.....

Province:	Road link no(s):
District:.....	Road name:.....
Sub-District:.....	Road Length:..... (km)
Village:	Maintenance Team Leader:

This is to certify that the routine road maintenance works as detailed in the attached breakdown of payments and referred to in the Bill of Quantities of the above mentioned Routine Maintenance Agreement have been completed and accepted to the satisfaction of the Road supervisor in accordance with the terms and conditions of the Agreement.

Current Payment

	Progress since last payment	Amount (IDR)
Length of road with routine maintenance complete	Chainage: To Chainage: Total in metres:	
Amount of team leader supervision days		
Others (materials etc.)		
1. Total Amount Due		

Details of Previous Payments

Payment No.	Date	Amount paid
1		
2		
3		
2. Total Previous Payments		

3.	Agreement Value	
----	-----------------	--

4.	Agreement Balance (3.-2.-1.)	
----	------------------------------	--

Payments to individual workers will be made immediately on receipt of payment by the Maintenance Work Team Leader, based on the muster roll form (See Form 9) and witnessed by the Camat.

Works inspected by Road supervisor signature: Date:

Approved by District Responsible: signature: Date:

Witnessed by Camat/ Village leader : signature: Date:

Form 12: Final Payment Certificate

Certificate no:.....

Routine Maintenance agreement no:.....

Province:	Road link no(s):
District:.....	Road name:.....
Sub-District:.....	Road Length:..... (km)
Village:	Maintenance Team Leader:

Start date: (Actual) Completion date:

This is to certify that the routine road maintenance works as detailed in the attached breakdown of payments and referred to in the Bill of Quantities of the above mentioned Routine Maintenance Agreement have been completed and accepted to the satisfaction of the Road supervisor in accordance with the terms and conditions of the Agreement.

	Percentage completed	Amount (Rp)
Length of road with routine maintenance complete	Chainage: To Chainage: Total in metres:	
Balance of team leaders supervision payments ⁵	N/A	
Other	N/A	
Amount Due		
Deductions (if any)		
Total amount due		

1⁶,

Details of Previous Payments

Cert. No.	Date	Percentage completion	Amount (Rp)
1			
2			
3			
Total Previous Payments			

2.

3.

Agreement Value	
-----------------	--

4.

Total value of actual work done under the agreement (1+2)	
---	--

Works inspected by Road supervisor signature: Date:

Approved by District Responsible: signature: Date:

Witnessed by Camat/ village leader: signature: Date:

⁵ In form A4 a sum has been identified for supervision. The final payment should be this sum minus all previous amounts paid to the team leader for supervision.

⁶ There will be no retention monies withheld

Form 3: Survey of Routine Maintenance - on carriageway

[illegible]

Sheet B3: Guidance for form 3

The Engineer or Supervisor must walk (or drive and stop after each 50m) along the road and record the damage and the repairs that are needed.

It is important for the contractor that the position of each piece of work is recorded as a chainage on the third column of the form.

Each item such as pothole repairs or crack sealing etc needs to be noted in the appropriate columns as an area or length. At the bottom of the form all the same type of work at different chainages will be added together to give a total for the form.

Finally all forms will be collect and compiled to give a final total for the whole road link.

Annex 2: Guide for the Road supervisor for the training of the Community Routine Maintenance Team (CRMT)

Introduction

1. Overall Purpose: To ensure that a good quality of routine maintenance is implemented by the CRMT on District Roads.
2. Training Purpose: To equip the CRMT Leader and Members with the knowledge, information and techniques to plan and implement the routine maintenance tasks effectively and to keep the necessary site records.

The training is divided into two parts:

- A: Training in a classroom or local hall on all topics
- B: On-site demonstration

Topics which will be covered in the training

- Introduction to the training and the topics to be covered
- Elements of a road
- How roads deteriorate and the causes
- Keeping roads in good condition
- Overview of handtools
- Routine Maintenance activities and taskrates
- The Routine Maintenance Agreement
- Reading Form 2 and Form 4
- Keeping the muster roll
- Payment procedures

It will not be necessary for the whole team to understand fully training topics 8, 9 and 10, but the CRMT Leader must have a clear understanding of what is expected of her/him.

How to use the notes

These notes are prepared for the use of the trainers and should be read together with [Handbook 2: Working to Keep District Roads in Good condition](#). The trainer should also refer to [Handbook 1: Planning and Implementing Routine Maintenance on District Roads](#).

These notes consist of

- (i) the introduction and timetable
- (ii) the training course elements
- (iii) the management of the training

The recommendations for the use of handouts and flipcharts included in this handbook, do not exclude the possibility of using overheads or beamers, where available.

Note: The District can decide either to do a central training for all CRMTs in a sub-district (if budget is available) or opt for training in the village where the participants can be informed that the mornings training and the first afternoon's work will be the start of the contract. Working in the CRMT will be conditional on having attended the training.

Training Timetable

TRAINING PROGRAMME			
Subject: Routine Maintenance training for CRMT Date and Place: Duration: ½ day Classroom and ½ day on site demonstration Trainers:			
Day 1			
Session No	CONTENTS	TRAINERS	TIME
1	1. Opening of the training and introduction to the training and the topics		9:00 - 9:15
	2. Brief overview: • Elements of a road • How roads deteriorate and the causes • Keeping roads in good condition • Handtools		9:15 - 9:30
	3. Routine Maintenance Activities and taskrates for light, medium and hard tasks		9:30- 10:15
	<i>Tea Break</i>		10:15 – 10:30
2	4. Understanding Form 2 and form 4		10:30- 11:15
	5. Routine Maintenance Agreement, Forms 5, 6 & 7 ⁷		11:15 - 11:30
	6. Keeping the Muster roll – From 9 and payment procedures		11:30 – 11:55
	7. Closing of the classroom training		11:55 – 12:00
	<i>Lunch Break</i>		12:00 – 13:30

Training Materials

The trainer should have the following items with her/him:

• A flip chart and stand plus extra flip chart paper • Where the venue allows the use of computers and beamers / overhead projector: Power extension cable, Computer, Beamer, screen or cloth. • Extra copies of the filled form 2 and 4, for the road to be maintained by the CRMT(s).	• Copy of the contract forms 5, 6 & 7 for the CRMT(s) being trained • Copies of form 9 • At least two copies of handbook 2 per CRMT • Marker pens • Measuring tapes • Strings and pegs
---	---

⁷ The forms 5,6, and 7 should already be familiar to the participants as they form the already signed agreement. Therefore this session need only be a reminder of duties and responsibilities.

A. Training Content

The training follows the pages in Handbook 2. Handbook 2 should be used to guide the order of the training and information from Handbook 1 and 2 used for the training. The following references show where the trainer can access the relevant information.

Where equipment and power supply allow, the accompanying training presentation CD, which is available from DBMCK can be used to present the topics. Otherwise a flipchart with papers can be used.

Session No	CONTENTS	TRAINING ACHIEVEMENTS OF THIS SESSION	REFERENCES
1	Opening of the training 1. Introduction to the training and the topics to be covered	Welcoming and introducing of the trainers and participants All participants have an understanding of the days training and the expectations	
	2. Brief overview: • Elements of a road • How roads deteriorate and the causes • Keeping roads in good condition • Handtools	All participants know the parts of the road by name so that it is clear in training item 4 where the various activities should be carried out. All participants know what are the dangers for the road and what will cause damage The participants have a quick overview of the maintenance activities – not in detail but of all the activities which when combined together result in the whole routine maintenance The participants should know the range of tools which can be used, and understand that not all are needed but the tools will be decided based on the actual work to be done.	Handbook 2: P 1 Handbook 1: P 4 Handbook 2: P. 2 Handbook 1: P. 2-4 Handbook 2: P. 2 Handbook 1: P. 8 Handbook 2: P. 3 Handbook 1: P. 11

Session No	CONTENTS	TRAINING ACHIEVEMENTS OF THIS SESSION	REFERENCES
	3. Routine Maintenance Activities and taskrates for light, medium and hard tasks	The participants understand in detail the work of each activity, the acceptable quality, and the most suitable tools including safety. They should also understand that tasks can be light medium or hard depending on the amount of work to be done	Handbook 2: P. 4-9 plus 12 (Handbook 2: Annex 1, P. 1-3, Only if these types of work are planned on the road) Handbook 1: Annex 1, P. 11-14, sheets A3
2	4. Understanding Form 2 and Form 4	The participants do not need to be able to compile forms 2 and 4 this is the work of the supervisor, but they must be able to read Form 4 in particular and the team leader should be able to set team tasks based on this form.	Handbook 2: P 11 and 12 plus 18 & 19 Handbook 1: Annex 1, P. 6 – 16
	5. Routine Maintenance Agreement – Forms 5, 6 & 7	The participants understand what the contract contains, what the team leader has signed, and their own agreement with the team leader.	Handbook 1: Annex 1, P. 20 - 23 Plus actual agreement for the specific road to be maintained
	6. Keeping the Muster roll – Form 9 and payment procedures	The team leader must be able to fill the muster roll on a daily basis. The calculation of payment is based on progress and needs to be understood by all team members. The participants understand how the district makes the payments based on the work completed.	Handbook 2: P. 13 & 19 Handbook 1: Annex 1, P. 25 Districts own procedures
	7. Closing of the Classroom Training	Any questions and an agreement on the starting date for the work which will include on-site advice from the district supervisor on setting tasks and implementing then to the correct standard.	

B. Site training

It is important that the District Supervisor remains with the team on the first working day so that what has been learned in the classroom can be practised on site. The Supervisor should assist the team leader in setting out the tasks and demonstrating the proper use of string-lines for marking the extent of the work. The Supervisor should continue to visit regularly, to ensure that the work activities are understood and that an acceptable quality and progress are being achieved.

Note:

If the training is not being carried out by the District Road Supervisor who is responsible for the routine maintenance works, then the Supervisor should have attended at least one training of this type so that she/he knows what the CRMT has been taught.