



REPUBLIC OF KIRIBATI

Performance-based Routine Road  
Maintenance by Microenterprises

# Inspection Manual

SECOND DRAFT

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Kiribati Road Rehabilitation Project (KRRP)



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## Note

Prices and wage rates in this manual are based on 2014 estimates and may need to be adjusted over time.

# Supervision and Inspection

This manual serves to assist the staff of the Ministry of Public Works and Utilities in the supervision and inspection of routine road maintenance by microenterprises. For this purpose regular visits to the microenterprises will be carried out, including informal supervision visits and formal inspections. One or more fixed staff members of the Ministry of Public Works and Utilities will be appointed as routine maintenance Inspectors, responsible for carrying out all supervision visits and inspections related to routine road maintenance.

## Supervision visits

Supervision visits should be carried out once a week. They serve to check that the routine road maintenance activities are being properly carried out by the microenterprises and to provide support to the microenterprises. The supervision visits are primarily focused on helping the microenterprises plan their activities in response to existing maintenance needs. Any maintenance needs identified during these informal visits are indicated to the microenterprise, and a programme for addressing the needs is discussed.

Support is also provided to the microenterprises in the proper implementation of the maintenance activities, ensuring the use of proper tools and the proper use of tools, and checking the quality of the work carried out (especially repairs to structures and pavements). Where necessary, additional training is provided. These supervision visits can be seen as a kind of on-the-job training for the microenterprises. As the microenterprises gain experience, they will require less support.

Apart from supervising the microenterprises, these visits also serve to identify any additional maintenance needs that need to be addressed by the maintenance yard under the Ministry of Public Works and Utilities.

## Inspections

Inspections should be carried out once a month. They are more formal, and the time and date needs to be agreed with the microenterprises in advance. The inspections serve to check the condition of the road and verify that it is in line with the performance standards. Where this is not the case, it may result in payment deductions. The participation of a representative from the microenterprise is therefore required during these inspections. Following the inspections, the approved monthly payments are made to the microenterprises.

# Routine Road Maintenance

**R**outine road maintenance aims to ensure that all road elements function properly, and that minor damage to these elements is repaired. It specifically aims to prevent serious damage to the road which would severely affect traffic and would be costly to repair. Routine maintenance consists of various activities that are aimed at the different road elements and that are carried out by maintenance microenterprises throughout the year. These are summarised below. Further information is provided in the activity sheets at the end of this manual, including the different steps involved in each maintenance activity.

## Drainage system

The proper working of the drainage system is essential to prevent damage to the road. These activities are aimed at ensuring that the drainage elements work properly and that water can flow freely away from the road.

1. **Cleaning side drains (U-drains).** Any sand, garbage, vegetation or other material is removed from the side drains and outlets to allow water to flow freely away from the road. In case of U-drains, the covers are removed first.
2. **Cleaning culverts.** Any sand, garbage, vegetation or other material is removed from the pipe culverts crossing the road so water can flow freely through them.
3. **Cleaning kerbs.** Any sand, garbage, vegetation or other material along the kerbs is removed so water can flow freely. Holes in the kerbs are cleaned so water can flow through them to the drains. Other causes of ponding water are removed or reported to MPWU.
4. **Cleaning weepholes.** Weepholes in seawalls and causeways are cleaned so water can drain freely and flow away from the road surface and shoulder.
5. **Clearing bridges and box culverts.** Any driftwood or other material under the bridges is removed so water can flow freely. Erosion of bridge structures is prevented with sandbags or sand-cement bags (up to a maximum of 20 bags per location). Larger damage is reported to MPWU.

## Seawalls and causeway revetments

Seawalls and revetments protect the road and causeways against damage by the sea. Any damage to these elements needs to be prevented or repaired.

6. **Preventing seawall erosion.** Where seawalls or revetments are being eroded, sandbags or sand-cement bags are placed to provide protection (up to a maximum of 20 bags per location). Larger damage is reported to MPWU.
7. **Sealing revetment cracks.** Where there are cracks in seawalls or revetments, these are sealed with proper sealant to avoid water seeping through and causing damage.
8. **Preventing coastal erosion.** In locations where there are no seawalls and the sea is causing erosion near the road, sandbags or sand-cement bags are placed to protect the road (up to a maximum of 20 bags per location). Larger damage is reported to MPWU.

## Road surface and shoulder

The road surface is the most important element of the road. Damage needs to be prevented and any existing damage needs to be quickly repaired to avoid further deterioration and to allow vehicles to pass safely.

9. **Clearing the roadway.** Any sand, garbage, vegetation or other materials are removed from the road surface, the road shoulder, the bus bays and the footpaths to allow vehicles and pedestrians to pass easily.
10. **Repairing gravel roads.** Any rills, potholes or cuts in unpaved roads are filled in with coral gravel and compacted.
11. **Repairing the road pavement.** Any cracks, potholes or broken edges in the road pavement are sealed with sealant or filled with cold mix and compacted.
12. **Repairing the road shoulder.** Any depressions, rills or cuts in the road shoulder are filled with coral gravel and compacted.

## Right-of-way and road furniture

The right-of-way and road furniture need to be kept clean to ensure proper drainage and visibility, ensuring that signs and other road safety measures work properly so that accidents can be avoided.

13. **Controlling vegetation.** Vegetation near the road is cut to avoid encroachment and improve drainage and visibility. Low hanging branches are cut to allow vehicles to pass safely.
14. **Removing garbage.** Any garbage along the road is collected and removed.
15. **Maintaining signage.** All signs and marker posts up to 3 metres above road level are kept clean and legible and are properly secured to posts and anchored in the ground.
16. **Maintaining guardrails.** Guardrails and their reflectors are kept clean and properly secured to posts and anchored in the ground.

## General

Apart from the maintenance activities related to specific road elements, the maintenance microenterprises will be responsible for general activities related to keeping the road open and implementing their contractual obligations.

17. **Keeping the road open.** In case of storm damage or traffic accidents, basic repairs are carried out to open up the road so vehicles can pass, with support from the Ministry of Public Works and Utilities where necessary.
18. **Reporting damage.** Any damage to the road elements beyond the scope of the above mentioned routine maintenance activities is immediately reported to the Ministry of Public Works and Utilities.
19. **Submitting Monthly Report.** A Monthly Report with information on the number of days worked and the time spent on the different maintenance activities is submitted to the Ministry of Public Works and Utilities each month.
20. **Using safety equipment.** Microenterprise members wear safety vests at all times and safety cones are in place on both sides of ongoing works.

## Tools, Safety Equipment and Materials

To carry out the routine road maintenance activities, the microenterprises will be provided with tools and safety equipment at the start of their contract. During the supervision and inspection visits, the condition of the tools and safety equipment should be checked, and any problems related to the quantity or quality of the tools should be addressed. Although the microenterprises are responsible for any loss, the Ministry of Public Works and Utilities is responsible for replacing any damaged or worn items. The Ministry of Public Works and Utilities is also responsible for providing the necessary materials to allow the microenterprises to carry out the different routine maintenance activities.

### Tools

The tools to be provided to the microenterprises are listed in the table below, together with the quantities required, the average duration that they are expected to be used before needing replacement, and their approximate unit costs. The exact quantities and types of tools may be adjusted based on the needs of each road section and the type of maintenance activities to be carried out. The timing of the replacement of tools should be based on the actual condition rather than the guidelines provided below.

Item	Quantity	Years of use	Unit cost
Broom	1 per worker	0.5	A\$ 25.00
Shovel	1 per worker	2	A\$ 40.00
Hoe	1 per 3 workers	2	A\$ 30.00
Pickaxe	1 per 5 workers	4	A\$ 30.00
Rake	1 per 5 workers	2	A\$ 40.00
Culvert tool	1 per 5 workers	4	A\$ 50.00
Lifting iron	1 per 5 workers	5	A\$ 65.00
Machete	1 per 3 workers	2	A\$ 20.00
Pruning saw	1 per 5 workers	2	A\$ 20.00
Crack sealing squeegee	1 per 5 workers	5	A\$ 65.00
Hand tamper	1 per 5 workers	5	A\$ 80.00
Watering can	1 per 5 workers	1	A\$ 20.00
Bucket	1 per 5 workers	1	A\$ 10.00
Sealant pouring jug	1 per 3 workers	5	A\$ 20.00
Wheelbarrow	1 per 5 workers	3	A\$ 270.00



The tools only make up a small portion of the total costs compared with the wages of the microenterprise members, and should therefore be provided in sufficient quantity and be of good quality to ensure that the microenterprise members can work productively.

During the supervision and inspection visits, the MPWU Inspector should aim to identify any problems related to the quantities or qualities of tools available to the microenterprises, which may negatively affect performance or the quality of works. Where tools are not available in sufficient number or are damaged and worn, new tools should be provided to the microenterprise. Proper care for the tools by the microenterprises should be encouraged.

The supervision and inspection visits should also check that the proper tools are brought to the worksite and are being used for the activities being carried out, and that these tools are used properly, thus ensuring higher productivity of the microenterprises and proper quality of their work. More information on the tools required for each activity is provided in the activity sheets at the end of this manual.

## Safety equipment

Safety equipment is provided to the microenterprises to avoid traffic accidents and injuries to the microenterprise members. The safety equipment to be provided to the microenterprises is listed in the table below, together with the quantities required, the average duration that they are expected to be used before needing replacement, and their approximate unit costs.

Item	Quantity	Years of use	Unit cost
Safety vest	1 per worker	1	A\$ 20.00
Safety cones	5 per microenterprise	3	A\$ 20.00
Boots	1 pair per worker	1	A\$ 100.00
Gloves	1 pair per worker	1	A\$ 15.00
Hat / Safety helmet	1 per worker	1	A\$ 20.00
First Aid kit	1 per microenterprise	2	A\$ 100.00

Supervision and inspection visits should verify that safety equipment is in good condition and is being used properly. Where safety equipment is not being used (especially safety vests and safety cones), this may lead to payment deductions to the microenterprise. Safety cones and first-aid kits are to be returned to MPWU at the end of the contract.

## Materials

Materials should be provided to the microenterprises as required. During the supervision and inspection visits, the material needs for the following weeks should be determined based on the planned maintenance activities, and the provision of these materials should be organised by the MPWU Inspector. More information on the materials required for the different maintenance activities is provided in the activity sheets at the end of this manual.

Certain materials such as coral gravel may be provided in stockpiles along the road to be used as necessary over a longer period. Other materials will need to be provided in the approximate volumes required to avoid them going to waste. The materials to be provided include the following.

- **Coral gravel** - to carry out repairs to unpaved roads and shoulders. Stockpiles of coral gravel should be placed at suitable locations along the section of road requiring repairs, no more than 200 metres apart.
- **Sand** - to fill sandbags or sand-cement bags. Where a suitable source of sand is not available locally, a stockpile of sand should be placed at the work site.
- **Coral aggregate** - to fill sand-cement bags. A stockpile of coral aggregate should be placed at the work site.
- **Cement** - to make repairs to structures and for use in sand-cement bags. This is best provided to the microenterprises on a case-by-case basis with sufficient bags for the work at hand.
- **Bags** - to fill with sand or sand-cement and use as erosion protection. Bags should be made from high quality UV stabilised textile to prevent rapid degradation. A sufficient quantity should be provided to the microenterprises and replenished when needed.
- **Coldmix asphalt** - to make repairs to the road pavement. This is best provided to the microenterprises on a case-by-case basis in bags for easy application.
- **Crack sealant** - to make repairs to cracks in revetments and pavements. It is recommended to use a coldmix sealant to facilitate application. This is best provided to the microenterprises on a case-by-case basis.
- **Garbage bags** - to collect garbage. A sufficient quantity should be provided to the microenterprises and replenished when needed.
- **Sign/marker/guardrail posts and reflectors** - to replace damaged posts for signs and guardrails. These should be provided to the microenterprises as required.
- **U-drain covers** - to replace any missing or damaged U-drain covers. These should be provided to the microenterprises as required.

Where materials are not provided in a timely manner by the Ministry of Public Works and Utilities, the microenterprise cannot carry out the required maintenance activities. This may lead to greater damage and more costly repairs, and should therefore be avoided as much as possible. Where materials have not been provided in a timely manner, microenterprises cannot be held accountable for not carrying out the work and no related deductions may be applied to the monthly payment.

To facilitate the timely provision of materials, stockpiles of different materials should be kept at the maintenance yard or other locations on the island. Sufficient quantities of imported materials should be purchased at the beginning of the year, and replenished in the course of the year if necessary. A stock should be kept by MPWU of specific parts as used in the KRRP project, including sign posts, marker posts, U-drain covers, guardrail posts and reflectors. Proper stock keeping should be carried out to ensure that low quantities are replenished on time, and that materials are used before they pass their use-by date.

## **Depositing removed materials**

Any sedimentation, vegetation, garbage and other materials removed from drains, culverts, pavement and other road elements should be properly deposited away from the road. The MPWU Inspector should indicate suitable locations along the roads to the microenterprises. In the case of garbage, this should be transported to a garbage dump. Where this is far away from the road section(s) being maintained by a particular microenterprise, the MPWU Inspector should arrange transport from central collection points along the main road, where the microenterprises can place the filled garbage bags for collection.

## Performance Standards

The payment for the maintenance work carried out by the microenterprises is not according to the number of days worked or the amount of work carried out, but based on the resulting condition of the road. A fixed monthly payment is made to the microenterprise if the road is in good condition and complies with the performance standards listed below. These performance standards define the maximum allowable defect for the different road elements.

Supervision visits should aim to identify any cases of non-compliance with these performance standards and indicate these to the microenterprises in order that they may be corrected. During the formal inspections, compliance with the performance standards will also be checked, but in this case non-compliance may result in payment deductions. The performance standards for the different maintenance activities are listed below.

### Drainage system

1. **Cleaning side drains (U-drains).** Not more than 10% of the depth of side drains (U-drains) is blocked in any location and water is able to flow freely through the drains. There are no obstacles within 5 metres of the drain outlet.
2. **Cleaning culverts.** Not more than 10% of the height of the culverts is blocked in any part of the culvert and water is able to flow freely through the culvert. There are no obstacles within 5 metres of the inlet or outlet of the culvert.
3. **Cleaning kerbs.** There is no sedimentation or vegetation on the pavement around the kerbs and water is able to flow away from the road.
4. **Cleaning weepholes.** Not more than 10% of the cross section of weepholes is blocked and water is able to flow freely away from the road.
5. **Clearing bridges and box culverts.** There are no obstacles restricting water flow below the bridges and box culverts. Erosion of the structures has been treated with sandbags or sand-cement bags.

## Seawalls and causeway revetments

6. **Preventing erosion of seawalls and revetments.** Erosion of seawalls and revetments has been treated with sandbags or sand-cement bags.
7. **Sealing cracks in seawalls and revetments.** The length of unsealed cracks is less than 2 metres for every 100 metres of seawall or revetment and in no location are unsealed cracks wider than 1 cm.
8. **Preventing coastal erosion.** Coastal erosion by sea water within 5 metres of the road edge is treated with sandbags or sand-cement bags.

## Road surface and shoulder

9. **Clearing the roadway.** The road surface and shoulders as well as any footpaths and bus bays are free of obstacles, vegetation and garbage, and the pavement is free of sand and other sediment.
10. **Repairing unpaved roads.** There are no more than 10 potholes per kilometre of road and potholes are not more than 30 cm in diameter or 5 cm in depth. There are no rills deeper than 5 cm.
11. **Repairing the road pavement.** The length of unsealed cracks is less than 2 metres in any 100 metre section of road and there are no unsealed cracks wider than 0.5 cm. There are no more than 5 potholes per kilometre and potholes are not more than 10 cm in diameter or 5 cm in depth.
12. **Repairing the road shoulder.** The shoulder next to the edge of the pavement is not higher than or more than 5 cm lower than the pavement.

## Right-of-way and road furniture

13. **Controlling vegetation.** Vegetation within 2 metres of the road edge is not more than 30 cm high (except for trees and hedges). There is no vegetation hanging over the road or shoulders that is lower than 3 metres above the road surface. Landscaped areas at roundabouts and drainage gardens are well maintained.
14. **Removing garbage.** There are no more than 20 items of garbage within 2 metres from the road edge (excluding private property) in any 100 metre section of road.
15. **Maintaining signs and marker posts.** All marker posts and signs up to 3 metres above road level are properly secured and anchored in the ground, are straight, and are clean and legible.
16. **Maintaining guardrails.** Guardrails are well secured to the posts and properly anchored in the ground. All reflectors are in place and are clean.

## General

17. **Keeping the road open.** The road is passable at all times. In case of significant damage to the road, road shoulder or structures making the road impassable or threatening to make it impassable, this has been reported to the Ministry of Public Works and Utilities. Unless damage is severe, the road is made passable within a maximum of 6 hours after the cause of the damage has ended (e.g. accident or king tide).
18. **Reporting damage.** All damage to road elements beyond the responsibility of the microenterprise (e.g. streetlights, road markings) and any significant damage to the road pavement or structures has been reported to the Ministry of Public Works and Utilities.
19. **Submitting Monthly Report.** A Monthly Report is submitted to the Ministry of Public Works and Utilities indicating the person-days worked by the microenterprise members and the activities carried out, as well as any damage to the road.
20. **Using safety equipment.** Microenterprise members wear their safety vests at all times and safety cones are in place on both sides of all ongoing works.

# Inspections and Payments

**A** part from the informal supervision visits where non-compliance with the performance standards is simply indicated to the microenterprises, formal inspections are carried out every month. Non-compliance identified during the formal inspections may lead to payment deductions.

## Inspections

Once a month, the road is inspected by the MPWU Inspector. The contracted roads are divided into segments of one kilometre (less if the remaining length is shorter than 1 kilometre), and for each road segment the condition of the different road elements is compared to the performance standards. Where the defects to specific road elements are greater than defined in the performance standards, this is indicated in the Monthly Inspection Form for that particular road segment (see page 14).

For this purpose a drive-over is carried out over the road sections under contract. In the case of structures (culverts, U-drains, bridges, causeways, seawalls), walkover surveys are carried out. Wherever potential non-compliance with the performance standards is identified, actual measurements are made to compare the defect to the performance standard. Note that measurements are only necessary if non-compliance with the performance standards is considered likely. The only equipment required for the inspections are a tape measure, a transparent ruler and a Monthly Inspection Form with a clipboard and a pen. More information on how to carry out the inspection for the different maintenance activities is provided in the activity sheets at the end of this manual.

## Monthly Inspection Form

During the monthly inspection, the Monthly Inspection Form is filled in. Before the start of the inspection, the details of the contract are filled in at the top of the form, including the road section names and lengths, the microenterprise name, the inspection period and date, and the agreed monthly payment as per the signed contract.

If it is found during the inspection that any of the performance standards are not complied with for a certain road segment, this is indicated in the Monthly Inspection Form by placing an “X” under the road segment concerned for the

specific performance standard that was not complied with (see the sample Monthly Inspection Form on the opposite page). However, this should not be done if the required materials for the activity were not provided by MPWU! This process is repeated for all performance standards that were not complied with, and for all road segments forming part of the contract.

Once the inspection of the different road segments has been completed, any necessary payment deductions may be calculated. For this purpose, the monthly payment per kilometre ③ is first calculated by dividing the full monthly payment ① by the total road length ②.

For each performance standard, the lengths of the different non-compliant road segments are added up to determine the total non-compliant road length ④. This length is multiplied by the deduction percentage for the performance standard concerned ⑤ and by the monthly payment per kilometre ③, resulting in the payment deduction for each performance standard ⑥.

The performance standards related to keeping the road open, reporting damage, submitting monthly reports and using safety equipment are not applicable to specific road segments, and payment deductions are applied to the full monthly payment. Apart from the monthly report submission, they may be applied if the performance standard was not complied with at any moment during the preceding month (not just at the time of inspection). Where this is the case, this is indicated in the Monthly Inspection Report and the related payment deduction ⑥ is calculated by multiplying the deduction percentage of the performance standard concerned ⑤ by the full monthly payment ①.

The total payment deduction for the month concerned ⑦ is calculated by adding up the deductions for the different performance standards ⑥. The total payment deduction ⑦ may not exceed the full monthly payment ①. The approved payment amount for the month concerned ⑧ is then equal to the full monthly payment ① minus the total monthly deduction ⑦.

The Employee contribution to the Kiribati Provident Fund ⑨, which is equal to 7.5% of the approved payment ⑧, needs to be deducted from this approved payment. The final monthly payment ⑩ which is to be made to the microenterprise is then equal to the approved payment ⑧ minus the contribution to the Kiribati Provident Fund ⑨.

The total number of person-days spent by the microenterprise ⑪ is copied from the Monthly Report to the Monthly Inspection Form. The Monthly Inspection Form is subsequently signed by both the MPWU Inspector and the representative of the microenterprise. One copy is given to the microenterprise and a second copy is brought to the Ministry of Public Works and Utilities for processing the payment.





## Monthly Report

During the inspection, the Monthly Report will also be submitted by the microenterprise (see the sample Monthly Report on the following pages). This should be checked to see if it is complete, indicating all the person-days worked by the different microenterprise members as well as the maintenance activities these days were spent on.

To facilitate the distribution of the monthly payment between the different microenterprise members, the MPWU Inspector needs to assist the microenterprise in calculating the amount to be paid to each member. The final monthly payment amount should be copied from the Monthly Inspection Form and entered in the Monthly Report ④. Based on this final monthly payment to the microenterprise, the payments to the individual microenterprise members are calculated based on the days worked by each member. The payment to a specific microenterprise member ② is calculated by dividing the final monthly payment amount paid to the microenterprise ④ by the total number of person-days worked by all the microenterprise members together ③, and multiplying that amount by the number of days worked by the specific microenterprise member concerned ①. The resulting payment amounts for each microenterprise member are entered in the Monthly Report.

The second page of the Monthly Report indicates the activities carried out each day, and the amount of time spent on each. This should be checked to see that it is in line with the total number of person-days spent by the microenterprise each day and during the month as a whole. The total number of person-days of the different microenterprise members ① should be equal to the total number of person-days spent on the different maintenance activities ⑤. Any damage reported in the Monthly Report should also be checked and discussed with the microenterprise.

If all is in order, the Monthly Report should be signed by the MPWU Inspector and by the representative of the microenterprise. One copy is given to the microenterprise and a second copy is brought to the Ministry of Public Works and Utilities for monitoring purposes. The payment amounts indicated in the Monthly Report are to be used to calculate the contributions to the Kiribati Provident Fund for each microenterprise member.



Monthly Report (page 2: activities and damage)

Reporting period (month):		January 2015																																		
Road name and length:		Main road Betio (6.60 km), FR01-FR11 (total 3.66 km)																																		
Microenterprise name:		Betio road maintenance microenterprise																																		
Maintenance activity	Remarks	Date																															Total days ⑤			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Cleaning side drains		6	5	6																																17.0
Cleaning culverts			5																																	5.0
Cleaning kerbs																																				-
Cleaning weepholes																																				-
Cleaning bridges																																			-	
Seawall erosion							6	3																			6								15.0	
Revetment cracks																																			-	
Coastal erosion																																			-	
Cleaning the roadway												6																							15.0	
Unpaved roads																																			-	
Road pavement																																			-	
Road shoulder																																			-	
Controlling vegetation																																			6.0	
Removing garbage																																			-	
Maintaining signage																																				-
Maintaining guardrails																																				-
Keeping road open																																				-
Total person-days by group members ⑥=sum⑤																																	74.0			
Damage report (mention location and type of damage)		The seawall at marker post 1+300 of the main road is partly damaged and needs to be repaired.																																		

# Payments

**B**ased on the monthly inspections, the payments to the microenterprises are made, including payments to the Kiribati Provident Fund in name of the microenterprise members. The payments to the individual microenterprise members are made by the microenterprise, and recorded in their Cashbook. At the start of the contract a transport allowance is also paid to the microenterprise for the duration of the contract.

## Monthly payment

The Monthly Inspection Form specifies the final monthly payment amount to be paid to the road maintenance microenterprise, based on the full monthly payment as stipulated in the Contact Agreement, and reduced with any deductions deemed necessary in light of actual performance, as well as the Employee contribution to the Kiribati Provident Fund.

After the inspection, the MPWU Inspector prepares a payment request for signature by the Director Engineering Services, which is subsequently submitted to the Finance Division of MPWU. The Finance Division processes the payment and transfers the final monthly payment amount to the bank account of the road maintenance microenterprise. The payment is made from the budget specified for financing routine road maintenance and should be completed within one week after the inspection.

## Kiribati Provident Fund

Together with the payments to the microenterprises, the contributions to the Kiribati Provident Fund are made. This consists of an Employee contribution and an Employer contribution. The Employee contribution forms 7.5% of the approved payment to the microenterprise and is withheld by the Ministry of Public Works and Utilities for direct payment to the Kiribati Provident Fund. The Employer contribution is the same amount (also 7.5% of the approved payment), and is made as a separate payment from the routine maintenance budget of the Ministry of Public Works and Utilities. The exact contributions for each microenterprise member are calculated based on the payment amounts listed in the Monthly Report. The request for this payment should be included together with payment request prepared for the final monthly payment to the microenterprise. This also needs to be approved by the Director Engineering Services and submitted to the Finance Division for processing.

## Monitoring

**M**onitoring refers to the regular assessment of the system to verify that it is working efficiently, effectively and transparently. This means assessing whether the routine road maintenance budget is being used efficiently, whether the routine road maintenance is effective in slowing down the deterioration of the road and in keeping it in good condition, and whether the payments to the microenterprises and their members are being made in a transparent manner.

### Efficiency

The main aspect that will be assessed, is the average daily wage earned by the microenterprise members. The Monthly Reports submitted by the microenterprises stipulate the number of person-days worked by each member and by the microenterprise as a whole. By dividing the approved monthly payment (including the employee contribution to the Kiribati Provident Fund) by the number of person-days worked by the microenterprise, the average daily wage can be calculated.

This calculated average daily wage rate should be compared to the minimum wage rate (A\$ 13.60 for an 8-hour day). If the calculated wage rate is repeatedly much higher or significantly lower over a period of several months, it means that the payment level per kilometre is not correct and should be amended. This is one of the most important monitoring tools, as it can help ensure that microenterprise members earn a fair wage, and that the Ministry of Public Works and Utilities does not overspend on routine road maintenance. Changes will in principle be introduced in future contracts, unless the differences are so high that they warrant a change to ongoing contracts to be negotiated.

### Effectiveness

Monitoring of effectiveness basically looks at the resulting road conditions, and if these are as required. On the one hand it will look at the capacity of the microenterprise to cope with the amount of work required, and on the other hand it will look at the performance standards.

Repeated non-compliance with the performance standards by a microenterprise may indicate that the amount of work is too much for the number of microenterprise members. This can be verified by looking at the Monthly Reports to see if the microenterprise members are indeed working

more days than expected. Where this is the case, the average length of road per microenterprise member may need to be reduced in order that the microenterprise may comply with the performance standards (thus in effect increasing the number of members in the microenterprises). The increase in microenterprise members will need to be accompanied by a corresponding increase in the payment per kilometre.

A second case where the effectiveness is affected, is where the performance standard itself is not appropriate. For instance, where a maximum pothole size of 30 centimetres diameter is found to be too large to ensure good and safe driving conditions, or where the allowable cracks in a revetment are still resulting in significant water penetration leading to damage and collapse. Inappropriate performance standards can be identified where microenterprises are found to comply with the performance standards, but resulting road conditions are not found to be appropriate. In this case the performance standards will need to be amended in terms of the type(s) of indicators used or their allowable value(s). Such changes to the performance standard may affect the required labour inputs, and can therefore result in the need to amend the number of microenterprise members and/or the payment per kilometre.

Any changes will be introduced in future contracts, unless the effect is considered serious enough to warrant negotiated changes to ongoing contracts.

## Transparency

Transparency mainly refers to the payments made to the different microenterprise members. These payments to the different microenterprise members are an internal matter for the microenterprise and do not involve the Ministry of Public Works and Utilities directly. However, to ensure that funds are distributed fairly and that there is no abuse by the Leader, Treasurer or any other member of the microenterprise, the Cashbook will be checked once a month during the supervision and inspection visits (a sample Cashbook is provided on the next page). This will verify that the payments made to the different members are equal to the amounts calculated in the Monthly Report. The distribution of the transport allowance will also need to be checked, to ensure that this is used fairly to cover the transport costs of the different microenterprise members, taking into account that the Leader or Treasurer may need to travel to Betio or Bairiki each month to collect the payments.

Where any irregularities are discovered, this will be discussed with the microenterprise members. Should it not be possible to resolve these irregularities, the police may need to be involved.





# Complementary Maintenance

**A** part from the routine road maintenance by the maintenance microenterprises, additional complementary maintenance activities will need to be carried out by the maintenance yard under the Ministry of Public Works and Utilities.

## Complementary maintenance activities

The complementary maintenance activities to be carried out by the maintenance yard consist mainly of emergency maintenance and periodic maintenance of the road surface and structures (especially seawalls and causeways). These activities need to be carried out in a timely manner to keep the road open and in a maintainable condition. The supervision and inspection visits to the routine maintenance microenterprises also serve to identify any required complementary maintenance. Where such maintenance is required, the MPWU Inspector will need to report this to the Ministry of Public Works and Utilities and ensure that the required maintenance activities are carried out in a timely manner.

### Grading and regravelling

Unpaved roads will be affected by corrugation and rut formation as a result of the vehicles using them. Such deformations generally cover large areas of the road surface and are best addressed using equipment such as graders. The gravel layer will also need to be replenished regularly. This type of repairs is currently already being carried out by the maintenance yard for the unpaved sections of main road.

### Pavement repairs

Where pavement damage exceeds small areas of cracks and potholes that can be repaired by microenterprises, such repairs should be carried out by the maintenance yard. Although such repairs have been carried out by the maintenance yard in the past, access to proper materials and equipment has been an issue and this will need to be addressed.

### Resealing

The bituminous pavements of existing roads in Betio and Bairiki as well as the roads to receive bituminous pavement under the Kiribati Road Rehabilitation Project will require resealing every few years. There is currently no resealing capacity in the maintenance yard, and in light of the expected frequency and volumes of work it is recommended to outsource this activity.

### Seawall (re-)construction and revetment repairs

The Betio-Bairiki causeway revetment as well as many seawalls are damaged, and many additional seawalls are needed. To a certain extent this problem will be addressed through the Kiribati Road Rehabilitation Project and the Third Kiribati Adaptation Project, but there will be a continued need for seawall (re-)construction and revetment repairs even after these projects have ended. This is currently already being carried out by the maintenance yard using sand-cement bags. However, the maintenance yard will require training to improve the design and quality of the seawall and revetment repair works, as well as the materials used.

### Maintenance equipment

To ensure that the above-mentioned complementary maintenance activities can be carried out by the maintenance yard, it will require certain types of equipment. Proposed types and numbers of equipment are listed below. Many of these are already available at the maintenance yard, although some are quite old. Timely replacement of old and broken down equipment needs to be ensured to avoid maintenance activities being postponed, which may lead to a maintenance backlog that is not easily overcome. As far as possible, similar brands and types of equipment should be procured to simplify the purchase of spare parts. Resealing equipment is not included as the required frequency and volumes of work together with the lack of capacity of MPWU staff do not warrant the purchase of such equipment.

Equipment	Number
Grader	2
Excavator	2
Backhoe	2
Steel drum roller	1
Pneumatic roller	1-2
Dump truck (medium)	2
Dump truck (small)	1
Vibrating plate compactor	3
Cement mixer (medium)	2
Cement mixer (small)	3

**Maintenance**

**Activities**

## Activity 1 Cleaning side drains (U-drains)

<b>Description</b>	
Remove any sand, vegetation, garbage and other material from the side drains and outlets.	
<b>Objective</b>	
Cleaning of the side drains (U-drains) ensures that water can flow freely through them and away from the road, so that the road surface and shoulder are not damaged by water flowing over them.	
<b>Timing</b>	
The side drains must be kept clear throughout the year, but especially during the rainy season when the amount of runoff water is higher. The drains should be cleaned at the start of the rainy season and again when it is found that they are becoming silted up.	
<b>Tools</b>	<b>Procedure</b>
Shovel Hoe Lifting irons Wheelbarrow	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the side drains to be cleaned.</li> <li>2. Lift any covers off the side drains using the lifting irons.</li> <li>3. Remove any sand, vegetation, garbage and other material from inside the side drains and outlets.</li> <li>4. Replace the U-drain covers <u>at the end of each day</u>.</li> <li>5. Transport any removed material to a suitable location, downstream and away from the drain.</li> <li>6. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
-	
<b>Performance standard</b>	
Not more than 10% of the depth of side drains (U-drains) is blocked in any location and water is able to flow freely through the drains. There are no obstacles within 5 metres of the drain outlet.	
<b>Deduction percentage</b>	
50% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Carry out a walkover survey along any side drains. Check that side drains are clean. Where any blockage is assumed to exceed 10% of the height, check using a ruler or measuring tape.	

## Activity 2 Cleaning culverts

### Description

Remove any sand, vegetation, garbage and other material from inside the culverts and from their inlets and outlets using a culvert tool or shovel.

### Objective

Cleaning of the culverts and the inlets and outlets ensures that water can flow freely through them and away from the road, so that the road surface and shoulder are not damaged by water flowing over them.

### Timing

The culverts must be kept clear throughout the year, but especially during the rainy season when the amount of runoff water is higher. The culverts should be cleaned at the start of the rainy season and again when it is found that they are becoming silted up.

### Tools

Shovel  
Hoe  
Culvert tool  
Lifting irons  
Wheelbarrow

### Procedure

1. Place the safety cones on the road 50 metres from each side of the culvert to be cleaned.
2. Remove the manhole covers and the covers of the U-drain outlets to facilitate access to the culverts.
3. Remove any sand, vegetation, garbage and other material from inside the culverts and from their inlets and outlets using the culvert tool or shovel.
4. Replace the manhole and U-drain covers at the end of each day.
5. Transport any removed material to a suitable location, downstream and away from the culvert.
6. Remove the safety cones after completing the work.

### Safety equipment

Safety cones  
Safety vest  
Safety helmet  
Boots  
Gloves  
First-Aid kit

### Materials

-

### Performance standard

Not more than 10% of the height of the culverts is blocked in any part of the culvert and water is able to flow freely through the culvert. There are no obstacles within 5 metres of the inlet or outlet of the culvert.

### Deduction percentage

50% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.

### Inspection method

Check the inside and inlets/outlets of all culverts to see if they are clean. Where any blockage is assumed to exceed 10% of the height, check using a ruler or measuring tape.

## Activity 3 Cleaning kerbs

### Description

Remove any sand, vegetation, garbage and other material from the alongside the kerbs and clean any drainage holes in the kerbs. Remove any other causes of ponding water or report them to MPWU.

### Objective

Cleaning of the kerbs ensures that water can flow freely along them and away from the road, so that the road surface and shoulder are not damaged by ponding water.

### Timing

The kerbs must be kept clear throughout the year, but especially during the rainy season when the amount of runoff water is higher. The kerbs should be cleaned at the start of the rainy season and again when it is found that there is sedimentation or vegetation growing along the kerbs.

### Tools

Broom  
Shovel  
Hoe  
Machete  
Wheelbarrow

### Procedure

1. Place the safety cones on the road 50 metres from each side of the kerbs to be cleaned.
2. Remove any sand, vegetation, garbage and other material from the alongside the kerbs and clean any drainage holes in the kerbs.
3. In case of ponding along the kerb, determine and remove the cause or report it to MPWU.
4. Transport any removed material to a suitable location, downstream and away from the road.
5. Remove the safety cones after completing the work.

### Safety equipment

Safety cones  
Safety vest  
Safety helmet  
Boots  
Gloves  
First-Aid kit

### Materials

-

### Performance standard

There is no sedimentation or vegetation on the pavement around the kerbs and water is able to flow away from the road.

### Deduction percentage

25% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.

### Inspection method

Drive along the kerbs. Wherever there is sedimentation or kerb holes appear blocked, stop to verify.

## Activity 4 Cleaning weepholes

<b>Description</b>	
Remove any sand, vegetation, garbage and other material from the weepholes in seawalls and causeways.	
<b>Objective</b>	
Cleaning of the weepholes ensures that water can flow freely through them and away from the seawall or causeway, so that these are not damaged by ponding water.	
<b>Timing</b>	
The weepholes must be kept clear throughout the year, but especially during the rainy season when the amount of runoff water is higher. The weepholes should be cleaned at the start of the rainy season and again when it is found that they are starting to become blocked.	
<b>Tools</b>	<b>Procedure</b>
Broom Shovel Wheelbarrow	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the weepholes to be cleaned.</li> <li>2. Remove any sand, vegetation, garbage and other material from the weepholes in seawalls and causeways.</li> <li>3. Transport any removed material to a suitable location, away from the seawall or causeway.</li> <li>4. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
-	
<b>Performance standard</b>	
Not more than 10% of the cross section of weepholes is blocked and water is able to flow freely away from the road.	
<b>Deduction percentage</b>	
50% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Drive along the seawall or causeway. Wherever more than 10% of the weephole cross section appears to be blocked, stop to verify using a ruler or measuring tape.	

## Activity 5 Clearing bridges and box culverts

Description		
Remove any driftwood and other materials from under the bridge or box culvert. Where the structure is being eroded, place sandbags or sand-cement bags (up to a maximum of 20 bags per location). Report larger damage to MPWU.		
Objective		
Clearing of the bridges or box culverts ensures that water can flow freely below them, so that the bridge and road are not damaged. Prevention of erosion avoids undermining of the bridge or box culvert structure.		
Timing		
The bridges and box culverts must be kept clear throughout the year, but especially during king tides and storms when the amount of water flowing under them is higher. The bridges and box culverts should be checked and cleaned whenever a large storm or king tide is expected.		
Tools	Procedure	
Machete Pruning saw Shovel Hand tamper Wheelbarrow Cement mixer	<ol style="list-style-type: none"> <li>Place the safety cones on the road 50 metres from each side of the bridge or box culvert to be cleaned.</li> <li>Remove any driftwood or other material from under the bridge or box culvert.</li> <li>Transport any removed material to a suitable location, away from the bridge or box culvert.</li> <li>In case of erosion, fill sand bags or sand-cement bags to treat the eroded area. Fill sandbags with sand from an approved location or stockpile. Do not fill the bags too full.</li> <li>In case of sand-cement bags, mix the cement with the sand and coral aggregate in the cement mixer and fill the bags. Do not fill the bags too full. Hold the bags in the sea to mix with water.</li> <li>Place the filled bags in layers in the area being eroded, placing the bag on top of the gap between bags in the layer below.</li> <li>Where necessary, fill the area behind the bags with soil and compact using a hand tamper.</li> <li>Remove the safety cones after completing the work.</li> </ol>	
Safety equipment		
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit		
Materials		
Bags Sand Cement Coral aggregate		
Performance standard		
There are no obstacles restricting water flow below the bridges and box culverts. Erosion of the structures has been treated with sandbags or sand-cement bags.		
Deduction percentage		
50% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.		
Inspection method		
Carry out a walkover survey along any bridges or box culverts. Check that there is no driftwood or other obstructions. Check that any erosion has been treated.		



## Activity 6 Preventing seawall erosion

Description	
Place sandbags or sand-cement bags where seawalls or revetments are being eroded by seawater or runoff water, including where material is being washed away behind the seawall by overtopping waves (up to a maximum of 20 bags per location). Report larger damage to MPWU.	
Objective	
Preventing erosion of seawalls and revetments reduces the risk of them collapsing.	
Timing	
Erosion of seawalls and revetments must be prevented throughout the year, but especially before king tides and storms when wave action and the risk of collapse is greater. The seawalls and revetments should be checked whenever a large storm or king tide is expected.	
Tools	Procedure
Shovel Hand tamper Watering can Wheel barrow Cement mixer	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the seawall or section of revetment to be maintained.</li> <li>2. Fill sandbags with sand from an approved location or stockpile. Do not fill the bags too full.</li> <li>3. In case of sand-cement bags, mix the cement with the sand and coral aggregate in the cement mixer and fill the bags. Do not fill the bags too full. Hold the bags in the sea to mix with water.</li> <li>4. Place the filled bags in layers in the area being eroded, placing the bag on top of the gap between bags in the layer below.</li> <li>5. Where necessary, fill the area behind the bags with soil and compact using a hand tamper.</li> <li>6. Remove the safety cones after completing the work.</li> </ol>
Safety equipment	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
Materials	
Bags Sand Cement Coral aggregate	
Performance standard	
Erosion of seawalls and revetments has been treated with sandbags or sand-cement bags.	
Deduction percentage	
25% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
Inspection method	
Carry out a walkover survey along any seawalls and revetments. Check that any erosion has been treated with sand or sand-cement bags.	

## Activity 7 Sealing revetment cracks

<b>Description</b>	
Clean the cracks in revetments and seawalls using a broom and seal them using a proper sealant.	
<b>Objective</b>	
Sealing the cracks in revetments and seawalls avoids water from entering and washing away the supporting material behind the seawall or revetment, preventing its collapse.	
<b>Timing</b>	
Sealing of cracks in seawalls and revetments must be carried out throughout the year. The seawalls and revetments should be checked regularly.	
<b>Tools</b>	<b>Procedure</b>
Broom Sealant jug Crack squeegee	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the section of revetment to be maintained.</li> <li>2. Clean any loose material from the cracks using a broom or other tool.</li> <li>3. Pour sealant onto the crack using the sealant jug.</li> <li>4. Spread the sealant over the crack using the squeegee.</li> <li>5. Where cracks are too wide to be sealed or larger damage is encountered, report this to the Ministry of Public Works and Utilities.</li> <li>6. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
Crack sealant	
<b>Performance standard</b>	
The length of unsealed cracks is less than 2 metres for every 100 metres of seawall or revetment and in no location are unsealed cracks wider than 1 cm.	
<b>Deduction percentage</b>	
50% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Walk along the revetment. Wherever unsealed cracks are encountered, measure the length and width using a tape measure and transparent ruler, and check these against the performance standard.	

## Activity 8 Preventing coastal erosion

<b>Description</b>	
Place sandbags or sand-cement bags where erosion of the shoreline is threatening the road (up to a maximum of 20 bags per location). Report larger damage to MPWU.	
<b>Objective</b>	
Preventing coastal erosion reduces the risk of the road being damaged by seawater and waves.	
<b>Timing</b>	
Prevention of coastal erosion near the road must be carried out throughout the year, but especially before and during king tides and storms when wave action and the risk of damage is greater. The shoreline should be checked whenever a large storm or king tide is expected, and this should be repeated during the king tide or storm, addressing any problem areas as soon as they are identified.	
<b>Tools</b>	<b>Procedure</b>
Shovel Hand tamper Wheelbarrow Cement mixer	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the location being eroded.</li> <li>2. Fill sandbags with sand from an approved location or stockpile. Do not fill the bags too full.</li> <li>3. In case of sand-cement bags, mix the cement with the sand and coral aggregate in the cement mixer and fill the bags. Do not fill the bags too full. Hold the bags in the sea to mix with water.</li> <li>4. Place the filled bags in layers in the area being eroded, placing the bag on top of the gap between bags in the layer below.</li> <li>5. Fill the area behind the bags with soil and compact using a hand tamper.</li> <li>6. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
Bags Sand Cement Coral aggregate	
<b>Performance standard</b>	
Coastal erosion by sea water within 5 metres of the road edge is treated with sandbags or sand-cement bags.	
<b>Deduction percentage</b>	
25% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Drive along the road. Wherever erosion near to the road is encountered, check whether it is within 5 metres of the road using a tape measure, and verify whether it has been treated.	

## Activity 9 Clearing the roadway

<b>Description</b>	
Remove any sand, vegetation, garbage or other materials from the road surface, shoulder, bus bays and footpaths.	
<b>Objective</b>	
Clearing the roadway allows water to flow easily off the road and allows vehicles and pedestrians to pass without problems.	
<b>Timing</b>	
The roadway should be kept clear throughout the year.	
<b>Tools</b>	<b>Procedure</b>
Broom Shovel Hoe Machete Wheelbarrow	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the road section to be cleared.</li> <li>2. Remove any sand, vegetation, garbage and other materials from the road surface, shoulder, bus bays and footpaths.</li> <li>3. Collect any garbage in garbage bags and remove them to the garbage dump or put them on the road side for collection.</li> <li>4. Transport any other removed material to a suitable location, away from the road.</li> <li>5. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
Garbage bags	
<b>Performance standard</b>	
The road surface and shoulders as well as any footpaths and bus bays are free of obstacles, vegetation and garbage and the pavement is free of sand and other sediment.	
<b>Deduction percentage</b>	
25% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Drive along the road. Wherever there is material on the road surface, shoulders, bus bays or footpaths, stop to verify.	

## Activity 10 Repairing unpaved roads

### Description

Repair any rills and potholes in the surface of unpaved roads by excavating vertical edges and removing loose material, filling the depressions with coral gravel and compacting with a hand tamper.

### Objective

Repairing the road surface prevents water from remaining on the road and weakening the unpaved surface, which may lead to greater damage to the road and to vehicles.

### Timing

Repairs to unpaved roads must be carried out throughout the year, but especially during the dry season when there is less risk of the repair work being negatively affected by rains. The rills and potholes should be repaired before the start of the rainy season to minimise further damage by rainwater.

### Tools

Shovel  
Pickaxe  
Rake  
Hand tamper  
Watering can  
Wheelbarrow

### Procedure

1. Place the safety cones on the road 50 metres from each side of the road section to be repaired.
2. Excavate the damage to the road surface (rill or pothole), creating smooth vertical edges and removing any loose material.
3. Ensure that the coral gravel material for filling is moist, but not wet (sticks together when compressed without excreting water). Allow to dry or add water if necessary.
4. Fill in the excavated hole with layers of coral gravel material up to 5 centimetres thick and spread the gravel using a rake. Compact each layer using a hand tamper. Repeat the process until the compacted layer sticks out slightly above the surrounding road surface.
5. Remove the safety cones after completing the work.

### Safety equipment

Safety cones  
Safety vest  
Safety helmet  
Boots  
Gloves  
First-Aid kit

### Materials

Coral gravel

### Performance standard

There are no more than 10 potholes per kilometre of road and potholes are not more than 30 cm in diameter or 5 cm in depth. There are no rills deeper than 5 cm.

### Deduction percentage

25% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.

### Inspection method

Drive along the road. Wherever rills or potholes are encountered in the road surface, stop and check the number and dimensions against the performance standards using a measuring tape or ruler.

## Activity 11 Repairing the road pavement

Description	
Repair any potholes in the road pavement by excavating vertical edges and removing loose material, filling with cold mix asphalt and compacting. Repair any cracks in the road pavement by removing any loose material and sealing with a proper sealant.	
Objective	
Repairing the road pavement prevents water from seeping into the pavement and weakening the pavement or the road base below, which may lead to greater damage.	
Timing	
Repairs to the road pavement must be carried out throughout the year, but especially during the dry season when there is less risk of the repair work being negatively affected by rains. The potholes and cracks should be repaired before the start of the rainy season to minimise further damage by rainwater.	
Tools	Procedure
Shovel Pickaxe Rake Hand tamper Crack squeegee Sealant jug Wheelbarrow	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the area to be repaired.</li> <li>2. Remove any loose materials from the cracks. Pour on sealant using the sealant jug. Spread the sealant along the crack using the squeegee. Remove any excess sealant.</li> <li>3. Excavate the potholes, creating smooth vertical edges and removing any loose material. In deep potholes, fill the pothole with layers coral gravel up to the bottom of the pavement, compacting each layer with the hand tamper. Place a layer of coldmix asphalt on top, filling to approximately 1 centimetre above the pavement. Compact using a hand tamper. Add extra coldmix until the compacted material sticks out slightly above the surrounding pavement.</li> <li>4. Remove the safety cones after completing the work.</li> </ol>
Safety equipment	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
Materials	
Coral gravel Coldmix asphalt Crack sealant	
Performance standard	
The length of unsealed cracks is less than 2 metres in any 100 metre section of road and there are no unsealed cracks wider than 0.5 cm. There are no more than 5 potholes per kilometre and potholes are not more than 10 cm in diameter or 5 cm in depth.	
Deduction percentage	
50% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
Inspection method	
Drive along the road. Wherever cracks or potholes are encountered in the pavement, stop and check the number and dimensions against the performance standards using a measuring tape or ruler.	

## Activity 12 Repairing the road shoulder

### Description

Repair any rills, potholes and other depressions in the road shoulder, filling the depressions with coral gravel and compacting with a hand tamper, ensuring that the shoulder is level with the road pavement. Remove any banks on the shoulders that prevent water from flowing off the road.

### Objective

Repairing the road shoulder prevents water from staying on the shoulder or on the road surface and weakening it. It also ensures support to the road pavement and prevents edge break and drop offs that may cause damage to vehicles.

### Timing

Repairs to road shoulders must be carried out throughout the year, but especially during the dry season when there is less risk of the repair work being negatively affected by rains. The shoulder depressions and banks should be repaired before the start of the rainy season to minimise further damage by rainwater.

### Tools

Shovel  
Hoe  
Pickaxe  
Rake  
Hand tamper  
Watering can  
Wheelbarrow

### Procedure

1. Place the safety cones on the road 50 metres from each side of the shoulders to be repaired.
2. Ensure that the coral gravel material for filling is moist, but not wet (sticks together when compressed without excreting water). Allow to dry or add water if necessary.
3. Place layers of coral gravel material in the depressions in the road shoulder, spreading each layer with a rake and compacting each layer with a hand tamper.
4. Remove any banks on the shoulder.
5. Remove the safety cones after completing the work.

### Safety equipment

Safety cones  
Safety vest  
Safety helmet  
Boots  
Gloves  
First-Aid kit

### Materials

Coral gravel

### Performance standard

The shoulder next to the edge of the pavement is not higher than or more than 5 cm lower than the pavement.

### Deduction percentage

25% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.

### Inspection method

Drive along the road. Wherever depressions or banks in the shoulders are encountered, stop and check the dimensions against the performance standards using a measuring tape or ruler.

## Activity 13 Controlling vegetation

<b>Description</b>	
Cut vegetation growing alongside the road as well as any low hanging branches.	
<b>Objective</b>	
Controlling vegetation facilitates water flowing off the road, avoiding damage to the pavement and shoulder. It also improves visibility for drivers, reducing the risk of accidents. The removal of low hanging branches allows high vehicles to pass easily.	
<b>Timing</b>	
Vegetation control must be carried out throughout the year, but especially during the rainy season when vegetation grows faster and proper drainage needs to be ensured. Vegetation should be cut at the start of the rainy season to ensure that rainwater can easily flow off the road and again whenever it is found that the vegetation is growing too long or branches are hanging too low.	
<b>Tools</b>	<b>Procedure</b>
Rake Machete Pruning saw Wheelbarrow	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the area where vegetation will be controlled.</li> <li>2. Cut short all vegetation within 2 metres of the road that is not on private property and avoid any encroachment of the road surface and shoulder.</li> <li>3. Cut any overhanging branches that are less than 3 metres above the road surface.</li> <li>4. Transport any removed material to a suitable location, away from the road.</li> <li>5. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
-	
<b>Performance standard</b>	
Vegetation within 2 metres of the road edge is not more than 30 cm high (except for trees and hedges). There is no vegetation hanging over the road or shoulders that is lower than 3 metres above the road surface. Landscaped areas at roundabouts and drainage gardens are well maintained.	
<b>Deduction percentage</b>	
10% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Drive along the road. Wherever high vegetation or low hanging branches are encountered, stop and verify compliance with the performance standards using a measuring tape.	



## Activity 14 Removing garbage

<b>Description</b>	
Collect all the garbage from alongside the road and remove it to a suitable location.	
<b>Objective</b>	
Collecting and removing garbage avoids the drainage system from being quickly clogged up and results in a more pleasant surrounding for road users and people living along the road.	
<b>Timing</b>	
Collection and removal of garbage must be carried out throughout the year, but especially during the rainy season when garbage can easily clog up the drainage system.	
<b>Tools</b>	<b>Procedure</b>
Broom Shovel Rake	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the road section to be cleaned.</li> <li>2. Pick up any garbage within 2 metres of the road edge that is not on private property and put it in garbage bags.</li> <li>3. Transport the full garbage bags to the nearest garbage dump. Where the nearest garbage dump is far away, arrange collection of the garbage bags by the Ministry of Public Works and Utilities from a central location.</li> <li>4. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
<b>Materials</b>	
Garbage bags	
<b>Performance standard</b>	
There are no more than 20 items of garbage within 2 metres from the road edge (excluding private property) in any 100 metre section of road.	
<b>Deduction percentage</b>	
10% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
<b>Inspection method</b>	
Drive along the road. Wherever multiple items of garbage are encountered, stop and verify compliance with the performance standard.	

## Activity 15 Maintaining signage

Description	
Clean marker posts and signs up to 3 metres above road level and ensure that they are well secured to the poles and properly anchored in the ground.	
Objective	
Maintaining signs and marker posts ensures that they are properly visible and provide information to road users, reducing the risk of accidents.	
Timing	
Maintenance of signs and marker posts must be carried out throughout the year, whenever signs and marker posts are found to be dirty or are not properly secured or anchored.	
Tools	Procedure
Hand tamper Bucket	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the road section to be maintained.</li> <li>2. Check whether signs and marker posts are straight, properly secured and anchored in the ground.</li> <li>3. Straighten any crooked signs or marker posts and anchor loose signs and marker posts using a hand tamper. Where posts are damaged, replace them with new ones.</li> <li>4. Clean any dirty signs using water and rags to ensure their legibility.</li> <li>5. Report any dirty or damaged signs higher than 3 metres above road level to MPWU.</li> <li>6. Remove the safety cones after completing the work.</li> </ol>
Safety equipment	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
Materials	
Rags Marker posts Sign posts	
Performance standard	
All marker posts and signs up to 3 metres above road level are properly secured and anchored in the ground, are straight, and are clean and legible.	
Deduction percentage	
10% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
Inspection method	
Drive along the road. Wherever signs or marker posts are crooked or illegible, stop to verify compliance with the performance standard.	

## Activity 16 Maintaining guardrails

Description	
Maintain guardrails and ensure that they are well secured to the posts and properly anchored in the ground, and that all reflectors are present and clean.	
Objective	
Maintaining guardrails and reflectors ensures that these are visible and serve their function to prevent vehicles from running off the road.	
Timing	
Maintenance of guardrails must be carried out throughout the year, whenever guardrails are found to be poorly secured or anchored, or when reflectors are missing or dirty.	
Tools	Procedure
Hand tamper Bucket	<ol style="list-style-type: none"> <li>Place the safety cones on the road 50 metres from each side of the road section to be maintained.</li> <li>Check that the guardrails are properly secured and anchored in the ground.</li> <li>Where the guardrail is loose, properly secure it to the post and anchor the post in the ground using a hand tamper. Where posts are damaged, replace them with new ones.</li> <li>Check that the reflectors are present and clean.</li> <li>Where reflectors are damaged or missing, replace them (one for every second post). Clean any dirty reflectors using water and rags.</li> <li>Remove the safety cones after completing the work.</li> </ol>
Safety equipment	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
Materials	
Rags Guardrail posts Reflectors	
Performance standard	
Guardrails are well secured to the posts and properly anchored in the ground. All reflectors are in place and are clean.	
Deduction percentage	
10% of the monthly payment for each road segment where the performance standard is not complied with at the time of inspection.	
Inspection method	
Carry out a walkover survey along the guardrails to check that it is well secured and anchored, and reflectors are present and clean.	

## Activity 17 Keeping the road open

Description	
<p>Reopen the road after blockage by storm damage or road accidents, carrying out basic repairs using sand or sand-cement bags (maximum 20 bags per instance) and removing obstacles to vehicle passage (e.g. broken down vehicles or trees that fell over). Where damage is significant, immediately inform the Ministry of Public Works and Utilities and assist them in their repair activities.</p>	
Objective	
<p>Keeping the road open will ensure vehicles can travel from one side of South Tarawa Island to the other without interruption.</p>	
Timing	
<p>Basic repairs and removal of obstacles should be carried out whenever the road is blocked, as soon as conditions permit this (e.g. after the flooding has receded or the people involved in the accident have been assisted).</p>	
Tools	Procedure
Broom Shovel Pickaxe Machete Pruning saw Wheelbarrow	<ol style="list-style-type: none"> <li>Place the safety cones on the road 50 metres from each side of the section to be maintained.</li> <li>In case of an accident, inform the police, the ambulance service and the Ministry of Public Works and Utilities, and provide help. After any injuries have been addressed, ensure that the vehicles involved in the accident are moved off the road.</li> <li>In case of storm or flood damage, remove any blockage from the road.</li> <li>Where the road is being threatened by waves and floodwater, use bags filled with sand to create a temporary seawall to protect the road for the duration of the storm or high tide. After the storm or high tide has subsided, assist the Ministry of Public Works and Utilities to make more permanent repairs.</li> <li>Remove the safety cones after completing the work.</li> </ol>
Safety equipment	
Safety cones Safety vest Safety helmet Boots Gloves First-Aid kit	
Materials	
Bags Sand	
Performance standard	
<p>The road is passable at all times. In case of significant damage to the road, road shoulder or structures making the road impassable or threatening to make it impassable, this has been reported to the Ministry of Public Works and Utilities. Unless damage is severe, the road is made passable within a maximum of 6 hours after the cause of the damage has ended (e.g. accident or king tide).</p>	
Deduction percentage	
<p>10% of the full monthly payment for each case of non-compliance encountered during the preceding month</p>	
Inspection method	
<p>Drive along the road. Verify that there are no impassable sections that have not been reported. Informal supervision visits may also be used to identify non-compliance.</p>	

## Activity 18 Reporting damage

Description	
Report to the Ministry of Public Works and Utilities any damage to the road elements that is beyond the responsibility of the microenterprises as well as any significant damage to the pavement or structures as soon as this is encountered. The damage is reported by phone and also written in the Monthly Report.	
Objective	
Reporting of damage to the Ministry of Public Works and Utilities will allow the Ministry to repair the damage in a timely manner, avoiding further damage from occurring or road users from being negatively affected.	
Timing	
Damage should be reported to the Ministry of Public Works and Utilities as soon as it is encountered. This requires regular inspections of the road sections under contract, especially during king tides and storms.	
Tools	Procedure
-	<ol style="list-style-type: none"> <li>1. Regularly inspect the entire road length under the contract.</li> <li>2. Where any damage is encountered that is not the responsibility of the microenterprise to fix, report this by phone to the Ministry of Public Works and Utilities.</li> <li>3. Where any significant damage to pavement or structures is identified, report this by phone to the Ministry of Public Works and Utilities.</li> <li>4. Record any damage in the Monthly Report, indicating the location and the type of damage.</li> </ol>
Safety equipment	
Safety vest Safety helmet Boots Gloves	
Materials	
Monthly Report Pen	
Performance standard	
All damage to road elements beyond the responsibility of the microenterprise (e.g. streetlights, road markings) and any significant damage to the road pavement or structures has been reported to the Ministry of Public Works and Utilities.	
Deduction percentage	
5% of the full monthly payment for each case of non-compliance encountered during the preceding month.	
Inspection method	
Drive along the road. Verify that any damage encountered along the road has been reported to the Ministry of Public Works and Utilities and has been included in the Monthly Report. Informal supervision visits may also be used to identify non-compliance.	

## Activity 19 Submitting Monthly Report

Description	
<p>Submit a Monthly Report to the Ministry of Public Works and Utilities indicating the number of days worked by the different microenterprise members and the time spent on different maintenance activities during the preceding month. Any identified damage to the road elements is also indicated in the report.</p>	
Objective	
<p>Submitting a Monthly Report allows the Ministry of Public Works and Utilities to monitor the type of work carried out in the different road sections on Tarawa and to identify any possible problem areas. The data from the Monthly Report does not affect the monthly payments to the microenterprise.</p>	
Timing	
<p>The Monthly Report should be prepared and submitted at the time of the monthly inspection.</p>	
Tools	Procedure
-	<ol style="list-style-type: none"> <li>At the end of each workday, note down the days worked by each microenterprise member and the maintenance activities the time was spent on.</li> <li>Where any damage is encountered that is not the responsibility of the microenterprise to fix, report this by phone to the Ministry of Public Works and Utilities and write it in the Monthly Report.</li> <li>At the end of the month, add up the numbers of days worked by each person and by the microenterprise as a whole, as well as the number of person-days spent on each maintenance activity.</li> <li>Submit the Monthly Report to the MPWU Inspector who will enter the final monthly payment amount, and assist in determining the payment to each microenterprise member.</li> </ol>
Safety equipment	
-	
Materials	
<p>Monthly Report Pen</p>	
Performance standard	
<p>A Monthly Report is submitted to the Ministry of Public Works and Utilities indicating the person-days worked by the microenterprise members and the activities carried out, as well as any damage to the road.</p>	
Deduction percentage	
<p>2% of the full monthly payment in case of non-compliance.</p>	
Inspection method	
<p>Check that the Monthly Report has been properly filled in (total number of person-days for the different microenterprise members and for the different maintenance activities are equal). Calculate the payment to each microenterprise member.</p>	

## Activity 20 Using safety equipment

<b>Description</b>	
Place safety cones 50 metres on each side of ongoing works and make sure all maintenance workers wear safety vests. Helmets, boots and gloves should also be used. The first-aid kit should be present at the work site.	
<b>Objective</b>	
Placing safety cones and wearing safety vests warns road users of ongoing works and ensures that all maintenance workers are easily visible to road users so that accidents are avoided. Helmets, boots and gloves can help prevent injuries. The first-aid kit can be used to treat any minor injuries.	
<b>Timing</b>	
Safety cones, safety vests and other safety equipment should be used at all times when working on the road.	
<b>Tools</b>	<b>Procedure</b>
-	<ol style="list-style-type: none"> <li>1. Place the safety cones on the road 50 metres from each side of the area to be maintained.</li> <li>2. Ensure that microenterprise members are wearing their safety vests at all times.</li> <li>3. Ensure that a first-aid kit is available on site.</li> <li>4. Encourage the use of safety helmets, boots and gloves to avoid injuries.</li> <li>5. Remove the safety cones after completing the work.</li> </ol>
<b>Safety equipment</b>	
Safety cones	
Safety vest	
Safety helmet	
Boots	
Gloves	
First-Aid kit	
<b>Materials</b>	
-	
<b>Performance standard</b>	
Microenterprise members wear their safety vests at all times and safety cones are in place on both sides of ongoing works.	
<b>Deduction percentage</b>	
2% of the full monthly payment for each case of non-compliance encountered during the preceding month.	
<b>Inspection method</b>	
Verify that microenterprise members are wearing their safety vests and that safety cones are placed on the road. Informal supervision visits may also be used to identify non-compliance.	

## Performance-based Routine Road Maintenance by Microenterprises

# INSPECTION MANUAL

This manual is meant for use by the Ministry of Public Works and Utilities in the supervision and monthly inspection of the work carried out by the road maintenance microenterprises. It describes the maintenance activities to be carried out by the microenterprises. It explains the performance standards that define the maximum allowable defects for the different road elements, and how these should be inspected. It furthermore explains the use of the Monthly Inspection Form and the calculation of the resulting payments as well as the Monthly Report to be submitted by the microenterprises.

This Inspection Manual forms part of a set of four manuals that describe the system of performance-based routine road maintenance by microenterprises, providing guidance in its application. The set consists of the following manuals:

1. **Procurement Manual** - to assist the Ministry of Public Works and Utilities in the formation and procurement of routine road maintenance microenterprises.
2. **Inspection Manual** - to assist the Ministry of Public Works and Utilities in the supervision and inspection of the routine road maintenance microenterprises.
3. **Technical Manual** - to assist the routine road maintenance microenterprises in the technical implementation and planning of maintenance activities
4. **Managerial Manual** - to assist the routine road maintenance microenterprises in the internal management of the microenterprises.

This manual was written as part of the Kiribati Road Rehabilitation Project (KRRP). The KRRP project involved the rehabilitation of most of the main and secondary road network on South Tarawa Island in Kiribati. As part of the support to the Government of Kiribati to improve maintenance of the rehabilitated road network and improve its sustainability, the KRRP project provided technical assistance for the development of a routine road maintenance system based on microenterprises and the preparation of this set of manuals.