Performance Based Road Maintenance Contract

(PBC) Guideline

Edition 1.1

February 2016

JAPAN INTERNATIONAL COOPERATION AGENCY

Strengthening of Capacity on Road Maintenance Management through Contracting (Phase 2)

PERFORMANCE BASED ROAD MAINTENANCE CONTRACT
(PBC GUIDELINE)

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Contents

Foreword

The Government of Kenya has a Road Sector Investment Plan that provides the framework for work prioritization for the Road Network with maintenance as a priority consideration, to ensure the Road Asset is preserved to maximize on the value of this investment. In the past, there has been under investment in the maintenance of Road Infrastructure with lack of a life cycle management strategy, giving rise to a poor network with low standards of safety, poor access and travel time unreliability with increased costs of travel.

In order to reap maximum benefits from the road network and ensure sustainability, proper maintenance and management strategies must be put in place. The concept of Performance based contracting in road maintenance and management has been adopted in Kenya and commenced in 2010 on a pilot basis. This method of management of maintenance is meant to ensure the road network is maintained in good condition throughout its life time. This comprehensive guideline is expected to guide the user in the procurement, supervision and valuation through setting service levels as outputs measured by response time and permissible tolerances.

Generally, this document provides guidance on implementation of performance based contracting in road maintenance. It is hoped that the guideline will address the challenges related to reactive maintenance and will strengthen the culture of proactive interventions to ensure that the Road Asset is well maintained. All road Authorities, Counties and other entities involved in public roads maintenance are expected to make use of this guideline to maximize value for money in Road investment.

This document was developed by a National Working Group that worked through a technical Sub-Working Group under the Ministry of Transport and Infrastructure, State Department of Infrastructure with the assistance of the Japanese International Cooperation Agency (JICA). The Working Group consisted of KRB, KIHBT, KeNHA, KeRRA, KURA, KWS, PPOA, NCA, MTRD, Japanese Experts and the Chief Representative, who provided their valuable advice through a series of meetings, their contribution and dedication is recognized and acknowledged with appreciation. We are particularly grateful to the JICA team for their technical assistance in achieving this milestone and their assistance in capacity building in Road Maintenance and Management in Kenya.

Eng. Patrick Mwinzi
Chief Engineer (Roads)
Ministry of Transport and Infrastructure

Preface

Road Maintenance by Performance Based Contract (PBC) commenced in the Republic in 2010. It was first adopted in KeRRA Contracts then it was extended to the roads under KURA in 2012, the total length is now 870km among the three Road Authorities (KeNHA, KURA and KeRRA) and KWS.

In 2014, the number of contractors contracted to PBC was 55 while the total number of bidders reached more than 600 companies. As such, PBC now has an increasing role in road maintenance. Moreover, because Kenya has a policy to construct 10,000km of paved roads by 2020, the share of PBC road maintenance is expected to expand even more rapidly to meet the expected increased road maintenance needs.

Capacity building of all the stakeholders related to PBC is now one of the vital means to support the realization of this policy. This is because PBC is a new concept and majority of contractors and roads authority engineers often face problems during implementation stages of PBC. In particular, many contractors involved in road maintenance works are small-scale enterprises with modest understanding of contracts. Capacity building will facilitate understanding of the PBC concept and improve the level of service to be achieved. In this regard, technical guidelines for implementation of PBC works are therefore required.This guideline has been developed through wide stakeholder consultations to help address the capacity building needs for PBC road maintenance.

This guideline was developed based on surveys conducted for ongoing PBC contracts under KeNHA, KeRRA, KURA and KWS. The surveys were augmented with interviews with road authority engineers and representatives of contractors. Their suggestions and comments are reflected in the guideline. Also two brainstorming retreats were conducted in Naivasha on 2nd June – 5th June 2015 and 20th July – 24th July 2015 to review the guideline. Representatives from MOTI, KeNHA, KURA, KeRRA, KWS, KRB, NCA, KIHBT, AfD and KfW participated in the retreats. The suggestions and comments from the two retreats have also been incorporated in this guideline.

The guideline consists of the following sections:

1. Introduction
2. Part 1: Service Levels Setting
3. Part 2: Work Management under PBC
4. Part 3: Service Level Inspection under PBC
5. Part 4: Contractor's Evaluation for PBC
6. Appendices

The introduction section outlines the background, concepts and benefits of PBC in road maintenance, and project management through Plan, Do, Check, and Act (PDCA) cycle.

Part 1 provides a standard procedure for appropriately setting performance service levels based on road type, traffic volume, climate conditions and contractors' capacity. This part also introduces the International Roughness Index (IRI), a parameter that can be used to monitor road users' comfort and related costs due to lack of or poor maintenance. However each Road Authority and KWS will decide on whether to apply IRI target levels as one of service level under PBC contracts. Once roughness is introduced as a service level, the contractor will be required to factor in the cost of IRI measurement, surfacing and overlay works.

A Service Criteria of minimum speed can be introduced for unpaved (paved) roads in case equipment necessary for IRI measurement is not available.

Part 2 has been developed for Contractors. It provides descriptions of standard work procedures and the recommended work methodology for good practice. It also clearly illustrates the PBC work flow. It refers the reader to appendix 4 in which recommended work procedures for each service level are described. For each method, a description is provided based on "*what to do*", "*where to do it*", "*when to do it*" and "*how to do it*". This part also describes the establishment and roles of Self-Control Unit within the contractor's organisation. A self-control unit is a team responsible for supervision of service levels of the contracted roads. It is also responsible for patrolling and recording of work activities, preparation of documents for formal inspection. This part also gives a brief description of ad-hoc inspection, formal inspection, monthly payment, payment reduction, response time, frequency of PBC works and work safety.

Part 3 provides the standard method for carrying out service level inspection. It defines the Service Level Inspection and outlines principles under which service level inspections are based on. Three steps of inspection are described: 1) Self-Inspection 2) Ad-hoc inspection and, 3) Formal inspection. This part summarizes the standard methodology for measurement of service levels. Examples of measurement methods are also illustrated under service scopes, such as carriageway, drainage and vegetation. As in part 2, the following are also described in this part: 1) Self-Inspection; 2) Ad-hoc inspection; 3) formal inspection; and 4) monthly statement and calculation of payment length.

Part 4 provides the recommended contract evaluation criteria for PBC road maintenance. The objective of this part is to describe how to carry out systematic and fair contract evaluations and provides forms for that purpose. Finally, the procedure for contract evaluation, evaluation items, and evaluation scoring are illustrated, emphasizing on Contract management using evaluation scores.

Several forms necessary for implementing PBC road maintenance have been provided in the Appendices section. Explanations and examples on how to use the forms are clearly explained in the main text.

The minutes for the two retreats held in Naivasha are included as Appendix 20 and 21, and contractual recommendations, with comments/suggestions at the 2nd Retreat have been included as Appendix 19.

It is in the opinion of the study team that these guidelines will play a very crucial role in implementation of performance based contracting for road maintenance in Kenya and will be useful for all stakeholders in the road transport sub-sector including contractors.

List of Abbreviations

4WD	–	4 Wheel Drive
AADT	–	Annual Average Daily Traffic
AC	–	Asphalt Concrete
ASTM	–	American Society for Testing & Materials
BoQ	–	Bill of Quantities
CN	–	Cycle Number
DRIMS	–	Dynamic Response Intelligent Monitoring system
IMP	–	Initial Mobilization Period
IRI	–	International Roughness Index
JICA	–	Japan International Corporation Agency
KeNHA	–	Kenya National Highways Authority
KRB	–	Kenya Roads Board
KeRRA	–	Kenya Rural Roads Authority
KURA	–	Kenya Urban Roads Authority
KWS	–	Kenya Wildlife Services
MOR	–	Ministry of Roads (Now Ministry of Transport & Infrastructure)
MoTI	–	Ministry of Transport & Infrastructure
NCA	–	National Construction Authority
NEMA	–	National Environmental Management Authority
NWG	–	National Working Group
PBC	–	Performance Based Road Maintenance Contract
PDCA	–	Plan, Do, Check, Action
PM	–	Project Manager
PPOA	–	Public Procurement & Oversight Authority
QCBS	–	Quality & Cost Based Selection
R2000	–	Roads 2000
RA	–	Road Authority
RM	–	Road Manager
RMM	–	Road Maintenance Management
RMP	–	Routine Maintenance Period
ROW	–	Right of Way
SCL	–	Supervision Check List
SCU	–	Self Control Unit
VAT	–	Value Added Tax
VPD	–	Vehicles per Day

Performance Based Contract Guideline Glossary

Ad hoc Inspection	An inspection carried out by the Project Manager to inspect whether service levels are achieved by the contractor, on his/her own initiative, at anytime and anywhere on the road.
Carriageway	A section of the road which is covered under the PBC Works and the extent of which is as illustrated in Figure 1 at the end of this glossary.
Contractor's Evaluation	An evaluation of the contractor's performance by the Client upon completion of the contract. The result is forwarded to the procurement authority for the future tender evaluation purpose.
Compliance and Non-compliance	Compliance means that the contractor's output achieved meets the required service levels under the contract. Non-compliance means that the contractor's output failed to meet the service levels under the contract. Non-compliance of PBC Works may lead to partial payment
Client	The Client is the procurement entity who is responsible for the road network in Kenya and who enters into a road maintenance performance based contract with a contractor on a certain section of the road.
Corrective Order	An order made by the Client to the contractor to correct an activity or an achievement under the PBC Works, which are not in compliance with the specifications. Such an order may be issued during Ad hoc or Formal Inspection as depending on the judgment of the Project Manager.
DRIMS	An abbreviation for Dynamic Response Intelligent Monitoring System, a system developed in Japan and used for measuring International Roughness Index(IRI).
Documentation	A list of documents to be submitted by the contractor during formal inspection. Please refer to part 2, "Preparation for formal inspection" for the complete list.
Emergency Works	Emergency Works is a set of necessary activities required to reinstate a damaged road structure or the right of way strip as a result of unforeseen event. The need for execution of Emergency Works is jointly identified by the Client and the contractor. The Client shall issue a work order before execution of Emergency Works.

Environmental Management Plan	An environmental management plan is a plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with the National Environmental Management Authority (NEMA) environmental regulations.
Execution Unit	A unit that comprises of a works foreman, supervisor & labourers, responsible for the execution of works, quality and progress control.
Foreman	A representative of the contractor who directly controls site works.
Formal Inspection	A joint inspection carried out by the Project Manager and the Road Manager at the end of each month for the purposes of verifying the information presented in the contractor's Monthly Statement. The objective is to compare the actual site observations and measurements to those in the Contractor's Monthly Statement.
Hybrid Contract	A type of contract that has both PBC works (in which payment is in fixed lump sum per km per month measured by output) and Instructed Works (in which payment is based on a Bill of Quantities and agreed unit prices).
Improvement Works	Improvement Works are a set of interventions that add new features to the road in response to existing or new traffic, safety or other conditions. Measurement of improvement works are defined in the specification and payment are to be based on unit prices for each type of output.
Initial Mobilization Period	This is the transition period provided for under the PBC contract to allow the contractor to bring up the present road condition to the required service level in order to prepare the road for PBC Works. During the Initial Mobilization Period, the contractor will also carry out other activities normally required at the initial stage of the contract such as setting up his team and systems for the management of the road.
Input	Labour, materials, equipment and other supplies required to carry out the works and services.
Inner Zone	The zone under the PBC contract for vegetation control adjacent to the carriageway (refer to Appendix 3)
Instruction	An order issued by the Client to the contractor to undertake Instructed Works.
Instructed Works	The work instructed by the Client to the contractor payable by BOQ with prices agreed under the contract. On the other hand, PBC Works are initiated by the contractor without an instruction from the Client, and payment is based on lump sum per km per month on achieving the specified Service Levels.

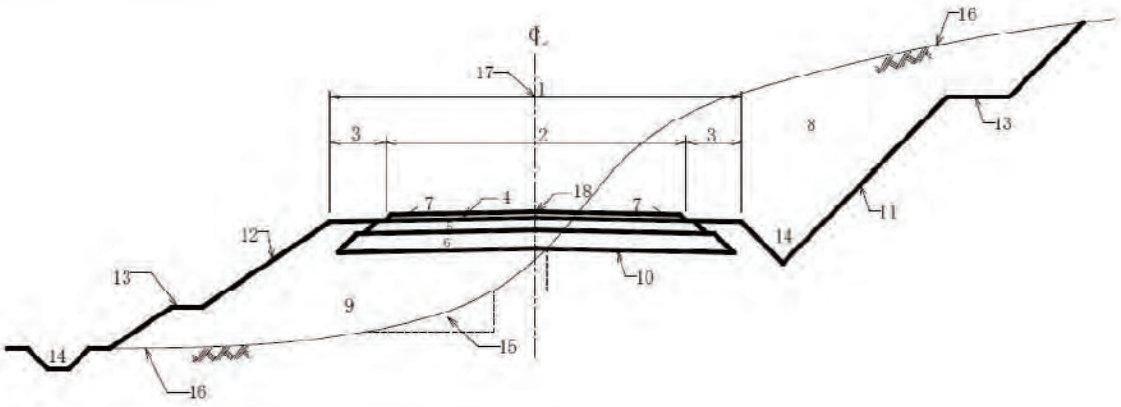
IRI	An abbreviation for International Roughness Index, commonly used as a measure of longitudinal smoothness/roughness of a road surface. It is measured in mm/m or m/km.
Maintenance Period	A period after Initial Mobilization Period when the contractor undertakes routine maintenance work.
Mobilization Period	The period required for the contractor to mobilize his labour, equipment and materials for commencement of the work. In the PBC, the period to allow the contractor to bring up the present road condition to the required service level in order to prepare the road for PBC Works is called the Initial Mobilization Period. It is important to note the difference of the two periods.
Monthly Statement	A statement of the achievement of service levels and the payment due to the contractor during the month under review. The statement shall contain the total length of roads for payment during the month and any payment reduction agreed by the Project Manager and the Road Manager.
Off-Carriageway	A section of the road which is covered under the PBC Works and the extent of which is clearly defined under the contract.
Outer Zone	The zone under the PBC contract outside of carriageway for vegetation control (refer to Appendix 3).
Output	Is the road feature and condition such as: road safety; pass-ability; pavement condition; drainage; vegetation; structures and road furniture for which minimum performance standards are described by respective Service Levels in the PBC Works.
Patrol	The action of ensuring that the entire road network is usable and passable at all times by driving/patrolling on the road network at a prescribed number of times per day. Any non-compliance will be communicated to the execution unit for further action.
Payment Reduction	The portion of payment for deduction due to non-compliance under the contract. The rate and the method for deduction are stipulated in the contract.
PDCA cycle	A management cycle of Plan, Do, Check and Action.
PBC	An abbreviation of Performance Based Road Maintenance Contract. This is a contract concept for road maintenance in which the contractor performs road maintenance services and works necessary for bringing the road to required service levels, based on measured 'outputs' and not on measured 'inputs'.

PBC Works	A series of works and services required for routine maintenance to bring up the road condition to the required service levels. Works and services are normally labour based works and pavement repair works.
Performance	The works and services to be provided by the contractor including all activities, physical and otherwise, which the contractor needs to carry out in order to comply with the specified Service Levels.
Project Manager	The representative of the Client with responsibilities and obligations under the PBC contract
Rehabilitation Works	Rehabilitation Works are a set of measurable inputs to be executed by the contractor during the Initial Mobilization Period in order that the road achieves the pre-determined performance standards specified in the specifications.
Road Class	The class of roads as stipulated in First Schedule (S.2.64), Classification of Public Roads Kenya under the Draft Kenya Roads Bill, 2014.
Road Manager	The representative of the contractor with responsibilities and obligations under the PBC contract
Routine Maintenance Period	A period after Initial Mobilization Period when the contractor undertakes routine maintenance work.
ROW	An abbreviation for the Right of Way. This is the transverse section within which the carriageway and off-carriageway facilities/assets are located.
Self-Control Unit (SCU)	An organization to be established by the contractor under the PBC contract for exclusively performing self-management of PBC Works. The Self-Control Unit is responsible for gathering information required by the Contractor to prepare the Monthly Statement. The unit shall have a complete knowledge of the road condition both on- and off-carriageway
Self-Control Unit Inspector	A member of the SCU who implements self-inspection, patrolling, communication and data collection.
Self-Control Unit Leader	The leader of the SCU who is in charge of self-inspection, patrolling, communication and data collection coordination and analysis.
Self-Inspection	The process of inspecting the road condition to check whether it meets specified service levels. The results of the inspection are recorded in a self-inspection report which consists of the results, action/response to non-compliance and incidents. Self-inspection is done by the Self-Control Unit.
Service Category	A category for defining the measured 'outputs' for the PBC Works. There are three (3) service categories: Road Usability, Road Comfort and Road Durability.

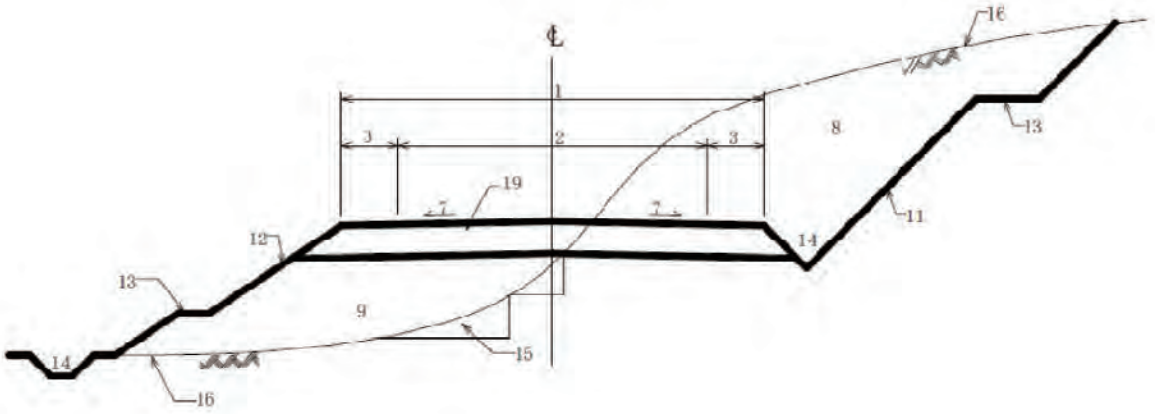
Service Criteria	A breakdown of Service Scope. Each Service Criteria has a Service Level with two performance indices: Response Time and Permissible Tolerance.
Service Level	Service Level is the minimum performance standard for the level of quality for each Service Criteria set under various Service Scope of the road as defined in the specifications.
Service Level Inspection	This is an inspection performed by both, or by either the Client or the contractor, to verify whether the works and services of the contractor meet the Service Levels stipulated in the contract during Self Inspection, Ad hoc Inspection and Formal Inspection.
Service Level Setting	Setting of service levels for PBC contract considering the type of road, traffic volume, the road condition and other special considerations.
Service Scope	A breakdown of Service Category for defining the measured 'outputs' for the PBC Works. There are 8 scopes consisting of: A) Road Usability; B) Pavement Shoulders and ROW; C) Drainage; D) Vegetation; E) Structures; F) Road Furniture; G) Profile and Width; and, H) Embankment and Slopes.
Site Survey	To investigate and assess the site condition planned for a PBC contract for the purpose of identifying all facilities and assets that require maintenance, and service scope of the Instructed Works.
Traffic Management	The use of reflective cones, reflective directional boards, flood lights, traffic signs and a flag man to safely direct/warn motorists and other road users of ongoing road works. This type of traffic control enables traffic to flow smooth and avoid accidents from occurring on site.
Unit Prices	It is a price quoted for units of estimated itemized work quantities in the given bill of quantities.
Work Frequency	The number of times (cycle number) a work item is repeatedly done per given time period (e.g. per week, per month or per year) to meet the prescribed service levels in the contract.
Work Program	A work program is a document in which the contractor prepares a list of items to help him execute the contract successfully. The list includes a work strategy, work items and their frequency of input, traffic management, work safety plan, emergency measures plan, site regulation plan, communication methods, report forms and cash flow.
Work Safety Plan	A work safety plan is a document that describes the process for identifying the physical and health hazards that could harm workers, procedures to prevent accidents, and steps to take when an accident occurs.
Work Procedure	A series of works and services, based on measured 'inputs', to be carried out by the contractor for performing the PBC Works.

Cross Section

The typical cross sections of paved, unpaved and urban roads are as follows:



Paved Road



Unpaved Road

1. Roadway 2. Carriageway 3. Shoulder 4. Surfacing 5. Base 6. Subbase 7. Camber (Cross Fall)

8. Cut 9. Embankment 10. Subgrade 11. Cut Slope 12. Embankment Slope 13. Berm 14. Side Ditch

15. Benching 16. Natural Ground Level 17. Centre-line 18. Marking 19. Gravel wearing course

Figure 1 Typical Cross Section of Road

Introduction

1. Background

Road maintenance by Performance Based Contract (PBC) commenced in the Republic of Kenya in 2010 when it was first adopted in KeRRA projects, then was extended to roads under KURA in 2012. The total length of roads under PBC is now 870km and includes roads managed by the three Road Authorities (KeNHA, KURA and KeRRA), and KWS. Figure 1-1 summarizes the PBC statistics.

PBC Contracts in Kenya (in Km)			
	FY11/12	FY12/13	FY13/14
KURA	14.3	73.5	177.7
KeNHA			234.0
KERRA		216.0	371.1
KWS		39.4	39.4
Total	14.3	328.9	822.2

PBC Contracts in Kenya (nos of contract)			
	FY11/12	FY12/13	FY13/14
KURA	1	2	5
KeNHA		0	4
KERRA		27	45
KWS		1	1
Total	1	30	55

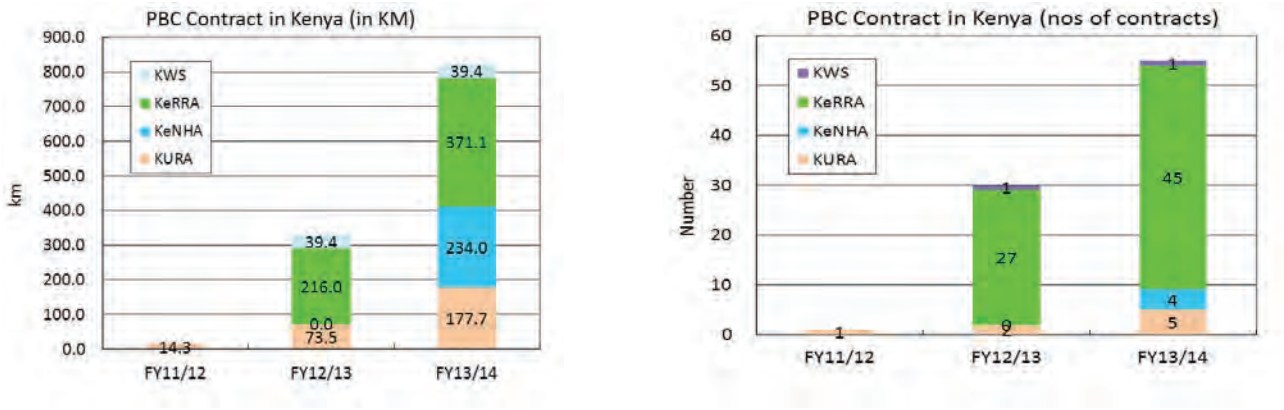


Figure 1-1 PBC statistics as of 2014

In 2014, the number of contractors contracted to PBC was 55 while the total number of bidders reached more than 600 companies. As such, PBC now has an increasing role in road maintenance. Moreover, because Kenya has a policy to construct 10,000km of paved roads by 2020, the share of PBC road maintenance is expected to expand even more rapidly to meet the expected increased road maintenance needs.

Capacity building of all the stakeholders related to PBC is now one of the vital means to support the realization of this policy. This is because PBC is a new concept and majority of contractors and roads authority engineers often face problems during implementation stages of PBC. In particular, many contractors involved in road maintenance works are small-scale enterprises with modest understanding of contracts. Capacity building will facilitate understanding of the PBC concept and improve the level of service to be achieved. In this regard, technical guidelines for implementation of PBC works are therefore required.

2. Outline of PBC

2.1 Concept of PBC

In PBC, contractors compete among each other during the tendering process, by proposing **fixed lump-sum prices per km per month for bringing the road to required service levels and then maintaining it for a specified period of time**. Payments made to the contractors are not based on quantities of works measured by unit prices for work "inputs" or physical works, but on measured '**outputs'** reflecting the specified and target conditions of the roads under contract.

All this represents outputs or outcomes. A monthly lump-sum remuneration paid to the contractor will cover **all physical and non-physical maintenance services** provided by the contractor, except for unforeseen emergency works.

For example, the contractor is not paid for removing 2 cubic metres of silt from a culvert (his actual work input) in a certain month, but for keeping the culvert clean and free of silt at all times (the output of his efforts). This means that in some months the contractor will be paid the agreed standard monthly lump sum amount even though much work has not been done. In other words, it is possible that during some months, the contractor will have to carry out a rather large amount of physical works in order to comply with the required Service Levels and very little work during other months.

Source: Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract

In addition to the PBC concept indicated above, the client is able to add to the Contractor's scope of service necessary rehabilitation works to bring the road up to pre-defined standards, improvement works in response to new traffic, safety or other conditions and emergency works required after damage has occurred as a result of unforeseen events. For such works, the contractor is paid at unit prices using standard BoQs.

2.2 Service Levels, Scope and Criteria

PBC is an alternative to the traditional methods of procuring road improvements, rehabilitation and maintenance, in which the key focus of the contract is not only on contract management and maintenance services (including physical works) but also on all activities related to the management and evaluation of the road section under contract.

The basic difference with the traditional methods is that under PBC most payments to the contractor are not based on quantities of works and unit prices for works inputs, but on measured "outputs". "Outputs" reflect the target conditions of the roads under contract ("what the roads are supposed to look like"), expressed through "Service Levels". Service Levels are defined in the contracts.

In PBC, the contractor is fully responsible for the works which are necessary to achieve the required monthly Service Levels, durability and performance of the road over a longer period. As the performance specification describes, the contractor is also obliged to achieve the Service Level for the entire stretch of the road.

A service scope (e.g. for drainage) can be described by meeting a number of service criteria. For example, drainage maintenance can be defined by how clean and free from obstructions culverts, drains and scour checks must be kept above a required performance level (Figure 2-1).

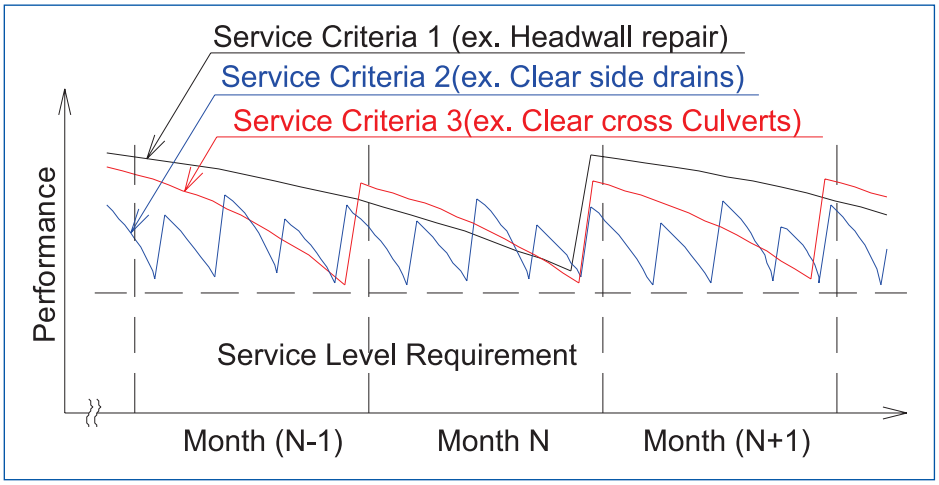


Figure 2-1 Service Level Requirement (example for drainage)

Table 2-1 shows current service scopes and service criteria/service levels applicable in 2015 by each road authority and KWS for drainage works. In PBC, service levels shall be selected in accordance with road characteristics and class instead of the current practice where single service level is given to all categories of road.

Table 2-1 Current Category, Service Scope and Service Criteria (in 2015)

Category	Service Scope		Service Criteria (PAVED ROAD)		Service Criteria (UNPAVED ROAD)	KeNHA	KURA	KeRRA	KWS
Road Usability	A) Road Usability	1	Passability	1	Passability	1			
		2	Road Works Advance Warning Sign	2	Road Works Advance Warning Sign	O	O	O	O
		3	(Roughness)	3	Average Traffic Speed or Roughness				
				4	Traffic Regulatory Control Signs				
				5	Minimum Traffic Speed				
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	Road Cleanliness	1	Road Cleanliness	O	O	O	O
		2	Potholes	2	Potholes	O			
		3	Cracking in flexible Pavement			O			
		4	Multiple cracks in the pavement			O			
		5	Rutting	3	Rut Depth	O			
		6	Ravelling			O			
		7	Loose pavement edges			O			
		8	Height of shoulders vs. height of pavement			O			
		9	Paved shoulders			O			
		10	Cracks in Concrete Pavement			O			
		11	Interlocking Block Pavement						
		12	Medians			O			
				4	Corrugation Amplitude				
Road Durability	C) Drainage	1	Side Drains, Mitre Drains and cut off drains (lined)	1	Side Drains, Mitre Drains and cut off drains (lined)	O	O	O	O
		2	Side Drains, Mitre Drains and cut off drains (unlined)			O	O	O	O
		3	Culverts and Access Drifts	2	Culverts and Access Drifts	O	O	O	O
		4	Scour Checks, Gabions and other erosion protection structures	3	Scour Checks, Gabions and other erosion protection structures	O	O	O	O
		5	Manholes and Gulleys						
	D) Vegetation	1	Vegetation free zone	1	Vegetation free zone		O	O	O
		2	Outer/inner vegetation	2	Outer/inner vegetation	O	O	O	O
		3	Growth encroaching into vegetation free zone from the side or top	3	Growth encroaching into vegetation free zone from the side or top	O	O	O	O
		4	Trees within ROW	4	Trees within ROW	O	O	O	O
	E) Structures	1	Concrete structures	1	Concrete structures				
		2	Steel Structures						
		3	Expansion joints	2	Expansion joints	O			
		4	Riverbeds (clear stream channels)	3	Riverbeds (clear stream channels)	O	O	O	O
	F) Road Furniture	1	Warning signs/Mandatory signs	1	Warning signs/Mandatory signs	O			
		2	Information signs, Edge marker posts, Guide posts, Kilometre Post	2	Information signs, Edge marker posts, Guide posts, Kilometre Post	O			
		3	Traffic Signals						
		4	Street Lighting			O			
		5	Road Markings/Road studs			O			
		6	Guardrails and Pedestrian rails	3	Guardrails and Pedestrian rails	O			
	G) Profile and Road width			1	Gravel thickness				
				2	Camber				
				3	Usable Road Surface Width				
	H) Embankment and Slopes	1	Embankment slopes	1	Embankment slopes	O			
		2	Slopes in Cuts	2	Slopes in Cuts				

Note: Appropriate service scope/service criteria shall be selected from Appendix 1 and 2 by the road authority

2.3 Expected Benefits

2.3.1 Benefit to Road Users

PBC is able to provide good road services to the road users compared to the traditional maintenance contract using unit rates. In the traditional contract, the service level of the road may occasionally drop too low, but in PBC the road condition will be maintained over time to the agreed service levels. Figure 2-2 and Figure 2-3 illustrate some of the benefits of PBC maintained roads.

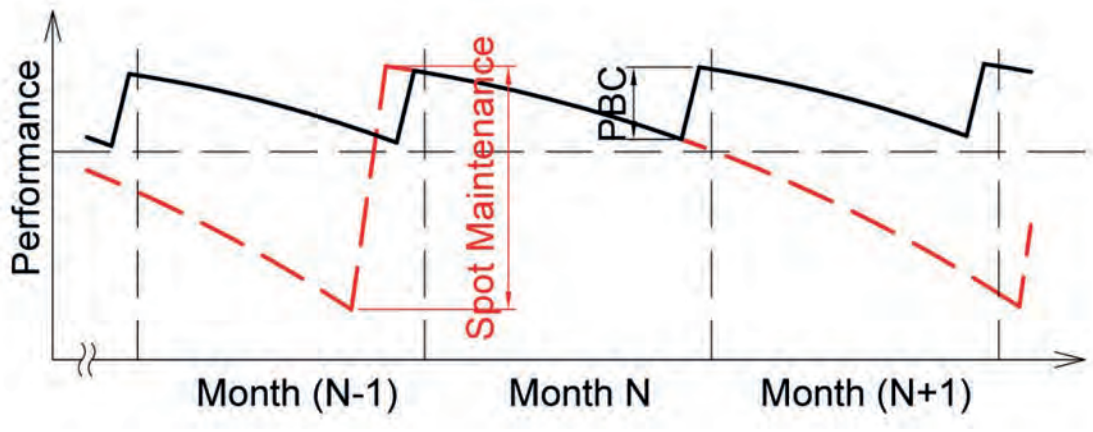


Figure 2-2 Comparison of Service Level between PBC and Spot Maintenance

Silted drainage on unmaintained road

Desilted drainage on a PBC maintained road

Catch basin full of garbage

Desilted culvert on a PBC maintained road

Potholes left unattended

Well maintained carriageway

Figure 2-3 Sample Photos of Road Conditions

2.3.2 Cost Benefit to Society

PBC also has a potential economic benefit due to reduced maintenance cost in the long term. (Figure 2-4) illustrates that the long-term cost of PBC is lower than that would be used for spot maintenance through the traditional method. Also considering the social (e.g. accessibility) and economic (road user costs) losses due to poorly maintained roads, the benefit of PBC is significant.

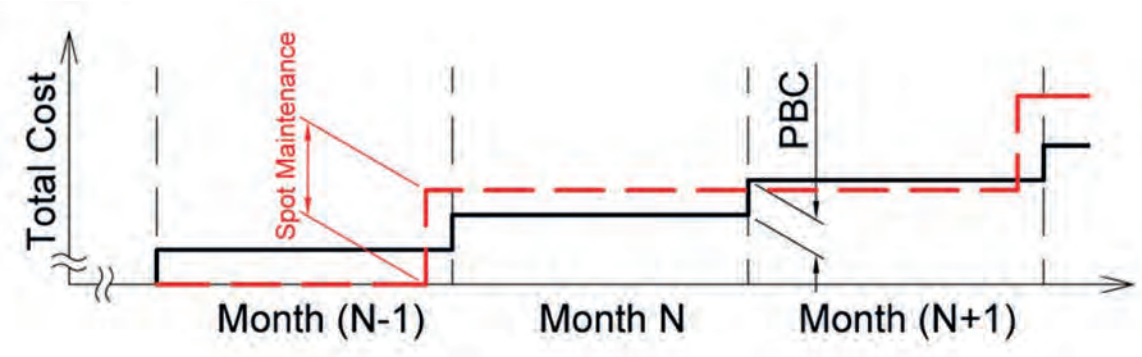


Figure 2-4 Economical Benefit of PBC Maintenance

2.3.3 Innovation Potential to Contractor

PBC allows the contractor to take advantage of innovation because the concept shifts the methodology and frequency of maintenance works and services from the client to the contractor.

2.4 PBC Works and Instructed Works

All current "PBC" projects in Kenya are of the Hybrid type which are partly fixed lump sum per km per month measured by output and instructed works in which payment is based on a Bill of Quantities and agreed unit prices. However, contractors still have full responsibilities for PBC Works required to improve the existing road condition to required service levels in this approach. There is always the need to assess

the road condition and quantify the volume of the work under the current approach. Currently, PBC works consist of mainly labour-based works and services such as road inspection, removal of obstructions, clearing of side drains, repair of scour checks, cleaning of cross culverts, outlets and inlets, repair of headwall, vegetation control, de-silting of drifts, maintenance and minor repair of bridges. Table 2-2 summarises the basic characteristics for the two types of contracts.

Table 2-2 PBC Works and Instructed Works

Work Type	PBC Works	Instructed Works
Payment Method	Based on Km-Monthly Lump Sum	Based on Bill of Quantities
Initiative	Contractor	Client

Based on the nature of the road condition, Instructed Works are a combination of the following works and services indicated in Table 2-3.

Table 2-3 Details of Instructed Works

Instructed Works	BoQ	Payment
Rehabilitation Works • To bring the road up to pre-defined standards. Typical examples include: filling potholes, laying gravel wearing course, carriageway edge repairs, reinstating road camber, road furniture maintenance and repair, repairs to culverts, and replacing culverts.	Prepared by the client	Unit Rates proposed by the contractor
Improvement Works • The aim is to add new features to the road in response to new traffic, safety or other conditions	Prepared by the client	Unit Rates proposed by the contractor
Emergency Works • Needed to reinstate the road after damage has occurred as a result of unforeseen events.	Prepared by the client	Unit Rates proposed by the contractor

2.5 Initial Mobilization Period

Initial mobilization period is provided to contractors for the following purposes:

1) as a period to bring up the physical road condition to required service levels; and,
2) as a period to mobilize his team and system for management of the road.

A road under a PBC contract may not be in a maintainable condition for routine maintenance at the beginning of the contract. The Initial Mobilization Period is therefore given to the contractor as a transition period to

bring up the road condition up to the pre-determined level before PBC. The required service levels are set lower during this period as indicated in Figure 2-5.

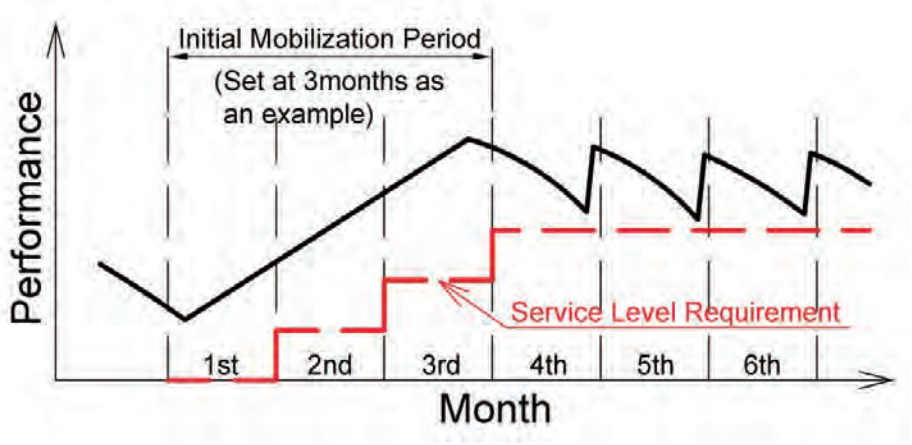


Figure 2-5 Initial Mobilization Period

2.6 Payment under PBC

Payment is made in accordance with achievement of Service Level every month. Achievement of Service Level is verified by two indices namely, the response time and the permissible tolerance. These indices are specified in the contract and the contractor must undertake maintenance of the road to the set tolerances. In case some sections of the road do not achieve the specified Service Level, the sections are classified as "non-compliant" and payment is reduced by the ratio prescribed in the contract for the entire Service Scope applicable.

Compliance of Service Level requires fully satisfying all Performance Indices by "Pass and Fail" method (Table 2-4). In order for the service scope to be considered as "Pass", all service criteria items under the service scope must be in compliance.

In this connection, specifying a Service Scope with too many Service Criteria makes achievement sometimes difficult. Therefore, selection of an appropriate and prudent number of Service Criteria is important.

Table 2-4 Service Criteria and Inspection Result

Service Criteria	Section 1	Section 2	Section 3
1. Side Drains, Mitre Drains, Cut off drains (Lined)	Pass	Pass	Pass
2. Side Drains, Mitre Drains, Cut off drains (Unlined)	Fail	Pass	Pass
3. Culverts and Access Drifts	Fail	Pass	Pass
4. Scour Checks, gabions and other erosion protection structures and gabions	Fail	Fail	Pass
5. Manholes and Gulleys	Fail	Fail	Pass
Inspection results	**Fail**	**Fail**	**Pass**

2.7 Risk Allocation

2.7.1 Principles

All types of public sector contracts seek to achieve an optimal transfer of risk and responsibility to the private sector (the contractor). Additional benefits can be gained if risks that are transferred to the private sector are those that they can have better control of, or can have better and more efficient mitigation measures to significantly reduce their likelihood, severity or cost. This is because every uncertainty is a risk and every risk has a cost attached to it. However, through an adequate shift of risks and transferring responsibilities, value for money can be achieved.

2.7.2 Performance Based Contracting

In a PBC the contractor bears significantly more risks than in the more traditional re-measure type contract. The contractor is entirely responsible for providing a service. The contractor must manage all aspects of the road asset for the full length of time in order to meet the required Service Levels.

A comparison of the standard risk allocation under traditional re-measure contracts and that under PBC contracts is shown in Table 2-5. Figure 2-6 shows the variation in risk transfer over different forms of contract.

Table 2-5 Comparison of Risk Allocation

Risk Item	Traditional Re-measure Contracts		PBC Contracts	
	Public Sector	Contractor	Public Sector	Contractor
Design Risk	√			√
Construction Risk		√		√
Technical & Management Risk	√			√
Performance Risk	√			√
Traffic Volume Risk	√		√	
Political Risk	√		√	
Social & Environmental Risk	√		√	√
Acts of God and Force Majeure Risk	√	√	√	√

Figure 2-6 Variation in Risk Transfer

2.7.3 Example of Risk in a PBC Contract

An example of a risk in a PBC contract can occur is the case of an unpaved road that initially had very low traffic (e.g. less than 50 vpd) before rehabilitation, but traffic suddenly increases significantly to say over 300 vpd after maintenance. The risk of increased traffic resulting into increased maintenance should be apportioned to the client.

Another example of proper risk allocation requiring careful attention is the following:

The standard PBC needing extensive initial rehabilitation works requires the contractor to specify and price the work required to bring the road to a given Service Level condition, so that it may thereafter be maintained without further rehabilitation works (except for Emergency Works).

For unpaved roads that have not been engineered the cost of fully rehabilitating the road to meet a given Service Level condition at all times is in most cases too high. The works often include establishing correct finished road levels over low lying areas to prevent flooding and installing enough culverts to avoid any future overtopping during the annual rains. PBC that require tenderers to price the initial rehabilitation works for such roads cannot be comparable since each tenderer will minimize the initial rehabilitation works to be the cheapest and win the contract.

It is therefore recommended that some risks should be transferred to the client for such roads as follows:

1. Sufficiency of road levels to prevent flooding;
2. Adequacy of culverts to cope with the runoff (the Initial Rehabilitation Works should include specific number and sizes of culverts to be installed); and,
3. Road reserve width (any encroachment of the road reserve should be dealt with by the client)

Transferring the above risks to the Employer would result in tenders that could be compared with each other on an equal basis.

2.7.4 Estimating the Cost of a PBC Contract

When estimating the cost of a PBC Contract it is important to take into account the cost of risk and that of providing the service to the specification required. These are not the same as multiplying quantities with the unit rates. Risks should be identified and entered into a Risk Register, quantified and priced. The total value of risk should then be included in the Bill of Quantities used to calculate the Engineer's Estimate. Since risks in PBC contracts may be difficult to quantify, the cost will be estimated under Other PBC Works as outlined in the Cost Estimation Manual where probable quantity will be based on probabilities.

2.8 Guideline for PBC

In the development of this guideline, previous studies on the main issues, challenges and lessons learnt from the on-going PBC projects in Kenya were collated and clarified through interview surveys involving contractors and Road Authorities.

Based on those desk studies and interviews, this guideline was designed to cater to PBC in line with the Plan, Do, Check, Act (PDCA) cycle. The guideline is composed of the following 4 parts.

- Introduction

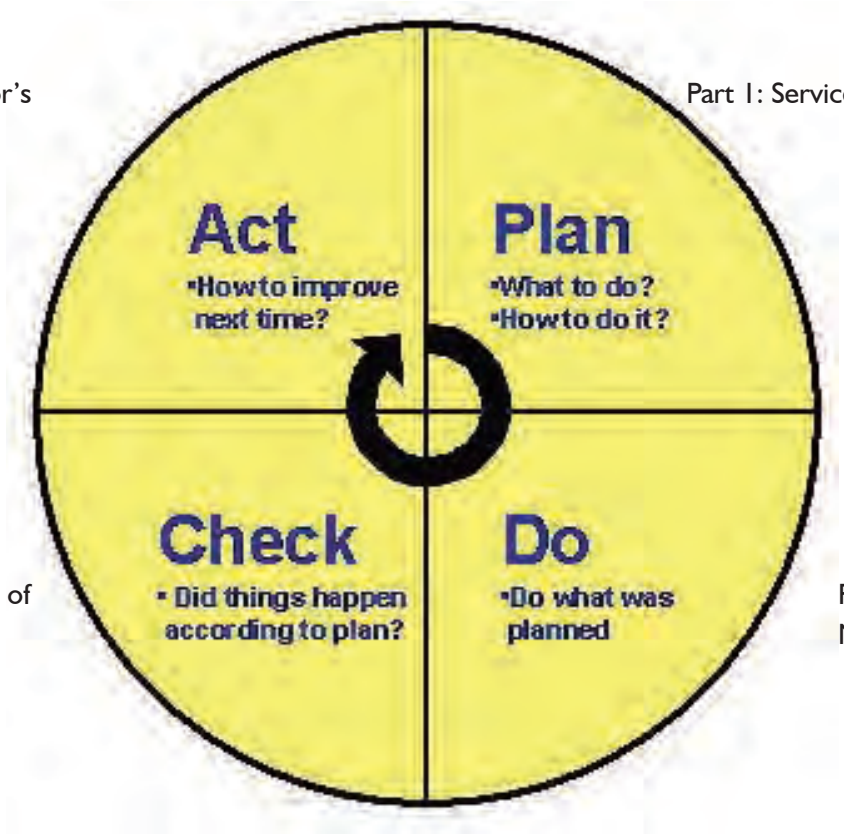
- Part 1: Service Level Setting for PBC
- Part 2: Work Management under PBC
- Part 3: Inspection of Service Levels under PBC
- Part 4: Contractor's Evaluation

Summary of the PBC Process

The position of each part of the guideline to the PDCA cycle is shown in Figure 2-7.

Part 4: Contractor's Evaluation

Part 1: Service Level Setting



Part 3: Inspection of Service Level

Part 2: Work Management

Figure 2-7 PDCA Cycle

More detailed flowchart of the PDCA between the road authority and the contractor is shown in Figure 2-8.

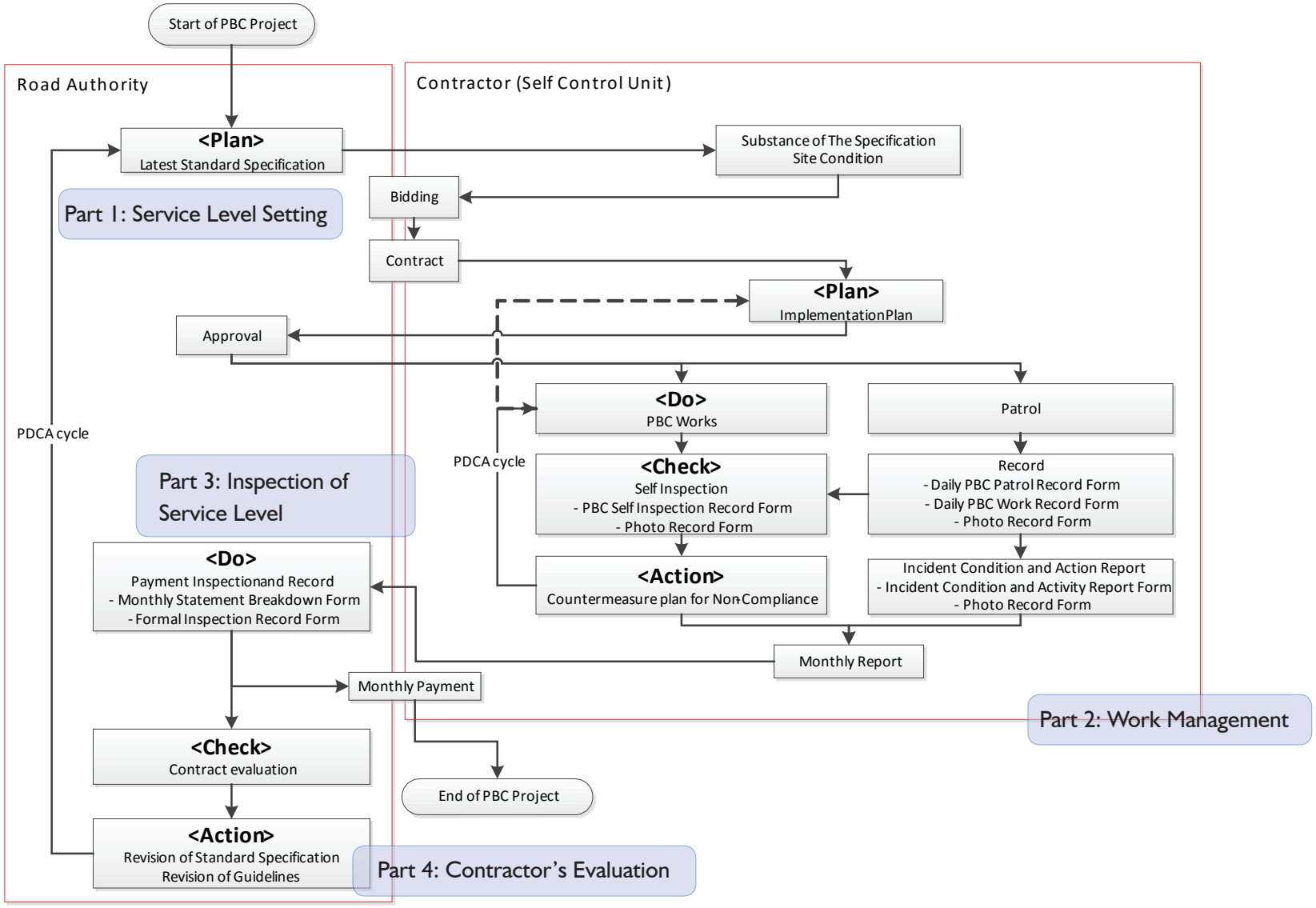


Figure 2-8 PDCA Cycle for PBC

3. Sample Photos from PBC

The sample photo of the road condition from the actual site under PBC is shown in Table 3-1.

Table 3-1 PBC Work Sample Photos by Service Scope

Service Scope	Photos	Description
A) Pavement, Shoulders and ROW 1. Road cleanliness	 Lanet-Njoro A104 Rd (End).	Well maintained clean carriageway, without any obstructions.
	 E1592 Gltugi-Nyangiti Rd.	Local residents cut trees and block the carriageway with tree branches. Most of the tree left-overs are on the carriageway and in the drains. **They should be identified by PBC contractor and removed.**
A) Pavement, Shoulders and ROW 2. Potholes	 Garden Estate Rd.	Pothole patching, deformed road surface repair and crack sealing on the Garden Estate road to ensure the carriageway is maintained to a good riding surface condition
	 Forest Rd.	Rutting and deformed road surfaces not repaired on Forest road. If left for longer periods, the road will deteriorate into a worse condition and will cost more to repair given that the road has heavy traffic flow. They should be repaired by instruction works under PBC contract.

B) Drainage 1. Side Drains, Mitre Drains, Cut off drains (Lined)	 Kisii-Kilgoris C17 Rd.	Well maintained side drains along the Kisii-Kilgoris road. The area experiences heavy rainfall that results in flooding and siltation.
	 Nairobi-Thika Highway A2 Road service lane	Poorly maintained side drains: there is vegetation growing on top of the silt build up, indicating that the drains has been neglected for a long time. **This is considered as "non-compliance" to the service level.**
B) Drainage 2. Scour checks, gabions and other erosion protection structures.	 Gitugi-Nyangiti Rd.	This masonry stone scour checks are well maintained and functioning properly to stop erosion and slow down storm water runoff during the rainy seasons.
	 E1593 Gakiogo-Kabuku Rd.	This section of the drain has eroded away and the check dams have stopped functioning properly. They need to be repaired and possibly additional check dams introduced to slow down erosion. **These check dams should be repaired under PBC.**

3. Side Drains, Mitre Drains, Cut off drains (Unlined)	 E1593 Gakiogo-Kabuku Rd.	This picture show well maintained paved drain to prevent eroding of the road formation.
	 E1587 Karuri-Karurumo Rd.	E1587 Karuri-Karurumo Rd shows non-functioning check dams that have led to the eroding of the side ditch. Given a steep slope, the ditch will continue to erode down-stream if not repaired on time. **The check dams should be repaired under PBC.**
4. Culverts and Access Drifts	 Kamiti Rd.	The cross culvert was previously fully blocked due to poor maintenance, but the contractor has unblocked it restoring it to proper working condition. **This type of work is to recover proper function are undertaken in PBC during initial mobilization period.**
	 Arwings Khodek Rd.	This 450mm dia. Culvert is not fully functional due to poor maintenance. There is garbage/ solid waste and silt build-up. Also the wing walls have collapsed into the drains. **This kind of blockage is often observed and should always be covered under PBC.**

5. Culverts and Access Drifts	 Kisii-Kilgoris C17 Rd.	Well maintained headwalls along the Kisii-Kilgoris Rd. They are still in good working condition.
	 Langata South Rd (Karen)	Un-maintained damaged head wall. **Headwall should be repaired under PBC.**
C) Vegetation 1. Vegetation free zone	 E540 Kiria-Ini Rd.	E540 Kiria-ini Rd. where the contractor used chemicals with permission from NEMA to control vegetation on the carriageway.
2. Outer/inner vegetation	 Lanet-Njoro A104 Rd.	Lanet-Njoro A104 Rd. where the contractor used lawn mowers too control grass growth as per the specified limits in the contract.

	 Nairobi-Thika Highway service lane at	Sections of the Nairobi -Thika Highway service lane where vegetation has been left to grow over 400mm high due to poor maintenance. **The vegetation should be controlled under given height (service level).**
D) Structures 1. Concrete structures 2. Steel structures	 E540 Kiria-ini Rd.	E540 Kiria-ini Rd. View of a bridge that is well maintained. The bridge is well paved, weep holes are clean, and the guard rails are functional for safety purposes.
	 E535 Muchungucha-Maragua River.	E535 Muchungucha-Maragua River. View of the bridge where the guard rail post has been damaged and the rails are leaning into the river. **Repair of guards should be done under PBC.**

4. Reference Document

Table 41 summarizes other available reference documents for PBC Road Maintenance.

Table 4-1 List of document for PBC Work Item and PDCA

Process	Road Authority	Contractor	Related Documents to refer
P : Plan	♦ Selection of Road ♦ Cost Estimation ♦ Budget Plan ♦ Contract Document Preparation ♦ Site orientation ♦ Tender ♦ Contract	♦ Site Survey ♦ Cost Estimation ♦ Work Execution Plan ♦ Self-Control Unit Setting	*Cost Estimation Manual* *For Road Maintenance Works, MOR,JICA, 2011* *Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract, MOR,JICA,2011* *Procurement of Works and Services under Output-and Performance-based Road Contracts and Sample Specifications, WB,2006*
D : Do	♦ Inspection ♦ Instruction	♦ Implementation of Maintenance ♦ Patrol	*Road Maintenance Manual, MOR, JICA Contractor's Field Handbook Routine Maintenance, Roads 2000, MOR,2008* *Contractor's Field Handbook, Road Improvement Works, Roads 2000, MOR,2008* *Standard Specification for Road and Bridge Construction,*
C : Check	♦ Contractor's Evaluation	♦ Self-Inspection	*Supervision and Contractor's Evaluation Manual for Road Maintenance Works, MOR,2012*
A : Action	♦ Revision of Standard Specification, Guidelines and etc.	♦ Remedy Work for NON Compliance ♦ Improvement of System	*Supervision and Contractor's Evaluation Manual for Road Maintenance Works, MOR,JICA,2012*

Part I

Service Level Setting for PBC

5. Objective of Part 1 Service Level Setting

This Part provides the standard method for setting service levels for roads in Kenya. Service levels are accompanied by the response time (i.e. the time allowed for either rectification or repair) and the permissible tolerance.

Service levels need to be set appropriately considering road functions, traffic volume, contractor's capacity level, climate condition, road surface types, and so on. The Service Levels should not be set too low or too high. This part provides a standard methodology to set service levels based on road types and traffic volumes.

Objective 1:	To provide a standard approach to set the scope, response times and permissible tolerances of the service level;
Objective 2:	To designate different sets of service levels depending on the type of road and the traffic volume on the road;

This Part has been developed considering the following key guidelines:

1. Service levels should be evaluated using suitable performance criteria.
2. A systematic method with a minimum number of service levels is formulated in order to avoid excessive workload during inspection.
3. In setting service levels one needs to pay critical attention so as not to set them too high or too low. If set too high, the cost of maintenance will become excessive; and if set too low then safety and quality maybe compromised.
4. The guideline should be as simple as possible so as to be used by small scale contractors/ enterprises, Road Authorities, and others with minimal assistance.
5. Measurement techniques that produce objective data are deployed.

6. Standard Service Level Category

Based on the study of current service levels applied by the road authorities, four (4) standard service level categories are proposed to cover road network in Kenya. The principal factors considered in the selection of service levels are road type and traffic volume. However specific road characteristics, such as climatic conditions, road function and terrain, may also be considered. Two service levels (High and Standard) are for paved roads and another two service levels (High and Standard) for un-paved roads.

The Service Levels should be selected from Table 6-1 according to the types of the road to be put under PBC.

Table 6-1 Standard Service Level Category

Road Type	Paved		Un-Paved	
Annual Average Daily Traffic Volume	High	Standard	High	Standard
	More than 50,000 vpd	Less than 50,000 vpd	More than 500 vpd	Less than 500 vpd
Service Level Category	High	Standard	High	Standard

Note: vpd – vehicles per day

Note that Table 6-1 shows indicative traffic volume of service level category. The Road Authority need to define service level based not only on traffic but also on road class, climate and road complexity

7. Service Level Setting

7.1 Procedure of Service Level Setting

In order to select and set the service level for each project, the following procedures need to be undertaken.

(1) Selection of Service Level Category
From Table 6-1, a suitable standard service level category is selected.

(2) Site Survey
The site survey is conducted to: (i) assess the current condition of the road; (ii) collect data on all facilities and assets to be maintained under the contract for cost estimation purposes; and, (iii) collect data on quantities required for instructed works.

(3) Selection of Service Criteria (Scope of Works)
Consideration should be made on whether to adopt the entire range of service criteria listed under the selected standard service level or not. High traffic roads normally require a wider range of criteria for maintaining traffic flow and for mitigating impact. On the other hand, for low traffic volume roads, a limited number of service criteria would normally suffice.

(4) Adjustment of Response Time (for Special Case)
A standard response time is normally set for each service level. In case of a "special condition" as defined under section 7.5, such response time may need to be checked and reviewed in order to adjust them to the anticipated site conditions and budget provisions.

Figure 7-1 is a flowchart for setting service levels.

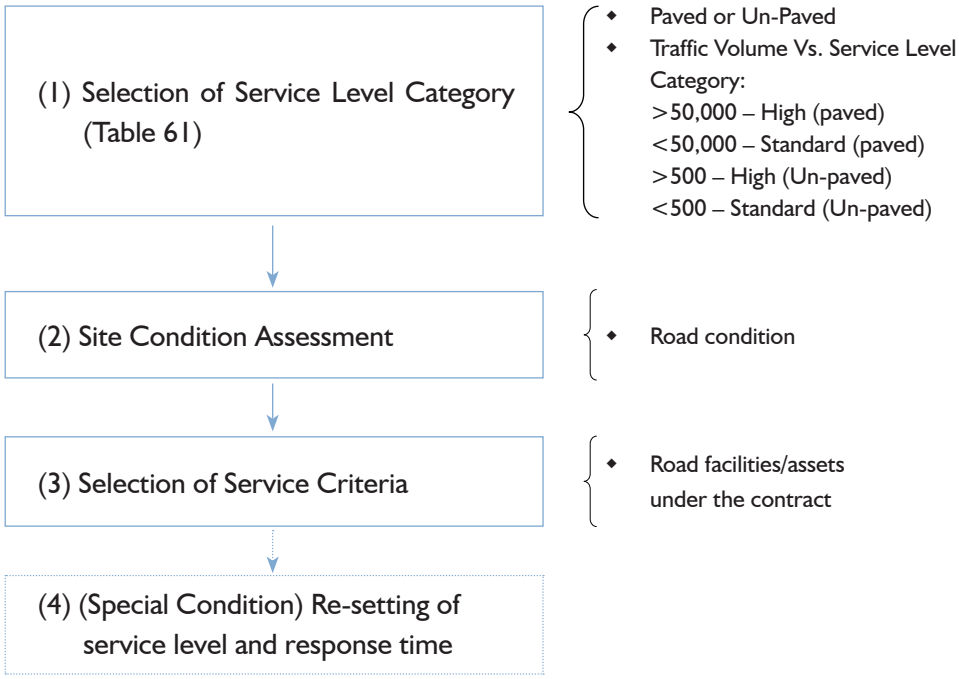


Figure 7-1 Service Level Setting

7.2 Selection of Standard Service Level Category

A suitable standard service level category should be selected from Figure 7-1 based on the road type (paved or unpaved) and the traffic volume.

7.3 Site Condition Assessment

Before bidding, the road authority should conduct road inventory and condition surveys of the road to be contracted. The objectives of the site survey should be:

1) To assess traffic volume and composition for selection of a standard service level;
2) To quantify road facilities and assets for cost estimation for the PBC;
3) To assess existing road condition for cost estimation of required instructed works; and,
4) To collect meteorological data.

The road asset survey sheets to be utilized for the site survey are given as Appendices 5-1 and 5-2.

7.4 Selection of Service Criteria

Table 7-1 shows the list of service criteria under each Service Category and Service Scope.

Table 7-1 List of Service Criteria

Category	Service Scope	Service Criteria (Paved Road)		Service Criteria (UnPaved Road)	
Road Usability	**A) Road Usability**	1	Passability	1	Passability
		2	Road Works Advance Warning Signs	2	Traffic Regulatory Control Signs
		3	Roughness	3	Roughness
				4	Average Traffic Speed or Roughness
				5	Minimum Traffic Speed
Road User Comfort	**B) Pavement, Shoulders and ROW for Paved Roads (P-B-1) & Unpaved Roads (UP-B-2)**	1	Road Cleanliness	1	Road Cleanliness
		2	Potholes	2	Corrugation depth
		3	Cracking in flexible Pavement	3	Rut Depth
		4	Multiple cracks in the pavement	4	Potholes
		5	Rutting		
		6	Ravelling		
		7	Loose pavement edges		
		8	Height of shoulders vs. height of pavement		
		9	Paved shoulders		
		10	Cracks in Concrete Pavement		
		11	Interlocking Block Pavement		
		12	Medians		
Road Durability	**C) Drainage**	1	Side Drains, Mitre Drains and cut off drains (lined)	1	Side Drains, Mitre Drains and cut off drains (lined)
		2	Side Drains, Mitre Drains and cut off drains (unlined)	2	Culverts and Access Drifts
		3	Culverts and Access Drifts	3	Scour Checks, gabions and other erosion protection structures
		4	Scour Checks, gabions and other erosion protection structures		
		5	Manholes and Gulley pots		
	D) Vegetation	1	Vegetation free zone	1	Vegetation free zone
		2	Outer/inner vegetation	2	Outer/inner vegetation
		3	Growth encroaching into vegetation free zone from the side or top	3	Growth encroaching into vegetation free zone from the side or top
		4	Trees within ROW	4	Trees within ROW
	E) Structures	1	Concrete structures	1	Concrete structures
		2	Steel structures	2	Steel structures
		3	Bridge expansion joints	3	Riverbeds
		4	Riverbeds		
	F) Road Furniture	1	Warning signs/Mandatory signs	1	Warning signs/Mandatory signs
		2	Information signs, Edge marker posts, Guide posts, Kilometre posts	2	Information signs, Edge marker posts, Guide posts, Kilometre post
		3	Traffic signals	3	Guardrails and Pedestrian rails
		4	Street Lighting		
		5	Road Markings/Road studs		
		6	Guardrails and Pedestrian rails		
	G) Profile and Road width			1	Gravel Thickness
				2	Camber
				3	Usable Road Surface Width
	H) Embankment and slopes	1	Embankment slopes	1	Embankment slopes
		2	Slopes in Cuts	2	Slopes in Cuts

Service criteria selection forms to be used in the site survey are given in Appendices 6-1 and 6-2. It should be noted that service criteria not included in these forms will be performed as instructed works.

The service scope and service criteria to be applied in the contract should be clearly explained and mentioned in the contract specifications. They should also be clearly explained at the pre-bid meeting for better understanding. Tender prices of PBC tend to have wide variances with the Engineer's cost estimate. It is therefore important to clarify the service scope to bidders for their better understanding at the pre-bid meeting.

Finally, stipulating many service criteria under a given service scope makes achievement of all the requirements very difficult. Therefore, careful selection of an appropriate and absolutely necessary number of service criteria is important.

7.5 Adjustment of Service Level and Response Time (for Special Conditions)

For special conditions, such as for a road in national parks and in central business districts, the service levels and the respective response times may need to be adjusted to reflect their particular conditions. As an example, the service level on "Road Cleanliness" for a road in a national park needs to meet the interests and expectations of park visitors. The response time in national parks may for example require less than "2 hours" while in the draft standard service level "12 hours" is prescribed. Road Authorities therefore need to review service levels to ensure that they meet their own interests whenever special conditions are to be addressed. Response times for each service level are presented in Appendices 1 and 2. An example of a service level and response time is presented in Figure 7-2 below.

Figure 7-2 Example of Response Time

Example: Road Cleanliness

Required Service Level Category	Service Level	Response Time
Paved High	The road must always be clean and free of soil and other objects, which must be removed within the time given if they pose a danger to traffic.	Within 3 Hours
Paved Standard		Within 4 Hours
Un-Paved High		Within 10 Hours
Un-Paved Standard		Within 24 Hours

8. Introduction of IRI Target Level for Maintenance

International Roughness Index (IRI) is an index that is used to indicate the level of smoothness/roughness of a road surface, measured longitudinally in mm/m or m/km. The lower the IRI the smoother is the road surface, which causes less discomfort and lower operating costs to road users.

Currently, International Roughness Index (IRI) measurement is not included as one of the specifications by any road authority or the KWS. However, this parameter is becoming standard in Kenya and many other countries as it is a reliable parameter for monitoring road unevenness and costs to road users.

The IRI target levels given in Table 8-1 are introduced in this guideline to allow Project Managers to start using IRI on a trial run basis.

Table 8-1 Draft IRI Target Levels

Road Surface Type	IRI Target Level		Remarks
Asphalt Concrete (new)	2.5 mm/m	1km average	
Asphalt Concrete (rehabilitated)	*3.5 mm/m **5.0 mm/m	1km average	*Rehabilitated to good condition (overlay) **Rehabilitated to fair condition (pothole patching)
Concrete road surface	5.0mm/m	1km average	
Unpaved (gravel surface)	11.0 mm/m	1km average	
Unpaved (quarry stone based)	15.0 mm/m	1km average	

Note: IRI target level of 11.0mm/m and 15.0mm/m for unpaved (gravel surface) and unpaved (quarry stone surface) respectively were proposed based on experience in KfW road projects in Kenya.

This guideline proposes the IRI Target Levels in Table 8-1 to allow various road authorities and KWS to start applying such IRI target levels as one of the Service Levels under PBC contracts.

Details of equipment to measure IRI should be specified in the specification of the PBC. The profiler Class 1 and Class 2 as per ASTM E-950 is recommended but Class 3 is also acceptable for measurement of IRI (DRIMS Dynamic Response Intelligent Monitoring System, can be used). A service criterion of Minimum Speed is proposed for unpaved roads in case equipment necessary for IRI measurement is not available within the road authority. A minimum speed of 40km/h and 30km/h are proposed for "un-paved high" and "un-paved standard" categories, respectively.

If any non-compliance is discovered, such incidence will be reported to the Project Manager and the cause of non-compliance identified for further action under the other applicable Service Criteria. However, it is important to note that once roughness is introduced as a Service Level, the contractor will need to allow for costs of necessary maintenance activities (surfacing works) that will make him comply with the specified IRI. In addition, the contractor will have to be competent in road surfacing and overlay works.

Part 2

Work Management under PBC

9. Objective of Part 2: Work Management under PBC

As explained in the previous section of this guideline, PBC would give the most benefits to road users by keeping roads safe and in good condition. This part provides the standard work procedure and the recommended work methodology for good practice by contractors.

Self-Control Unit (SCU) is for self-monitoring and management of the contract by the contractor. Survey results however indicate that various duties of the SCU are not well understood, utilized and put to use in most cases although it is emphasized in the contract. Studies among most contactors involved in PBC projects revealed that more in-depth training is required on how to implement PBC Works before tendering for a contract, especially to enlighten contractors on the function of the Self-Control Unit.

Having understood that in PBC works the entire work methodology is to be decided by the contractor, this part proposes a standard work procedure for PBC Works as per the two objectives below.

Objective 1:	To provide a standard management procedure and the recommended methodology for implementation of PBC work
Objective 2:	To define the function of Self-Control Unit for contract management

This Part is based on the following understanding;

1. Under PBC projects, the contractor is entitled to independently define: (i) what to do, (ii) where to do it, (iii) how to do it, and (iv) when to do it within the contract limitations and in compliance with local legislations, technical and performance specifications, environmental and social regulations.
2. However, contractors engaged in road maintenance are normally small scale and labour-based, and often require training and guidance to adopt this new concept. In Kenya, the majority of contactors currently involved in PBC Contracts are registered under class 6[1], which is a very low category. The current PBC contractors therefore do not have sufficient understanding of the concept especially on the initial stages of the contract. All contractors interviewed mentioned the importance of training before tendering for PBC.
3. While the concept of PBC may be unfamiliar to the majority of small-scale contractors, this guideline introduces a simplified standard work procedure that will enable such contractors to transform themselves to efficiently manage and maintain specified work service levels.

[1] Contractors class contracting PBC, Class 6 to 8 (KeRRA, KWS), Class 3 to 4 (KURA), Class 1 to 4 (KeNHA)

10. PBC Work Flow

10.1 PBC Works and Instructed Works

In the hybrid PBC, contractors implement works and services in two different categories each with a different payment method as shown in Table 10-1. Instructed Works are works with detailed locations, work volumes and technical specifications ordered by the client to the contractor. The bill of quantities prepared by the client is used for payments for completed works.

On the other hand, PBC Works are initiated by the contractor and payment is based on a monthly lump sum per Km at an amount that is based on the achievement of specified service levels.

Table 10-1 Hybrid Contracts

Work Type	PBC Work	Instructed Work
Payment Method	Lump Sum per Km per Month	BOQ
Initiative	Contractor	Client

10.2 Work Flow for PBC Works

A typical work flow for road maintenance under the PBC contract is shown in Figure 10-1. For performance based maintenance, the contract period is composed of the Initial Mobilization Period and the Routine Maintenance Period. During the Initial Mobilization Period, the Service Levels must be brought up to the required levels. Service Levels are evaluated during monthly formal inspections and the amount to be paid each month shall be determined considering the payment reduction for non-compliance with the Service Levels in the contract.

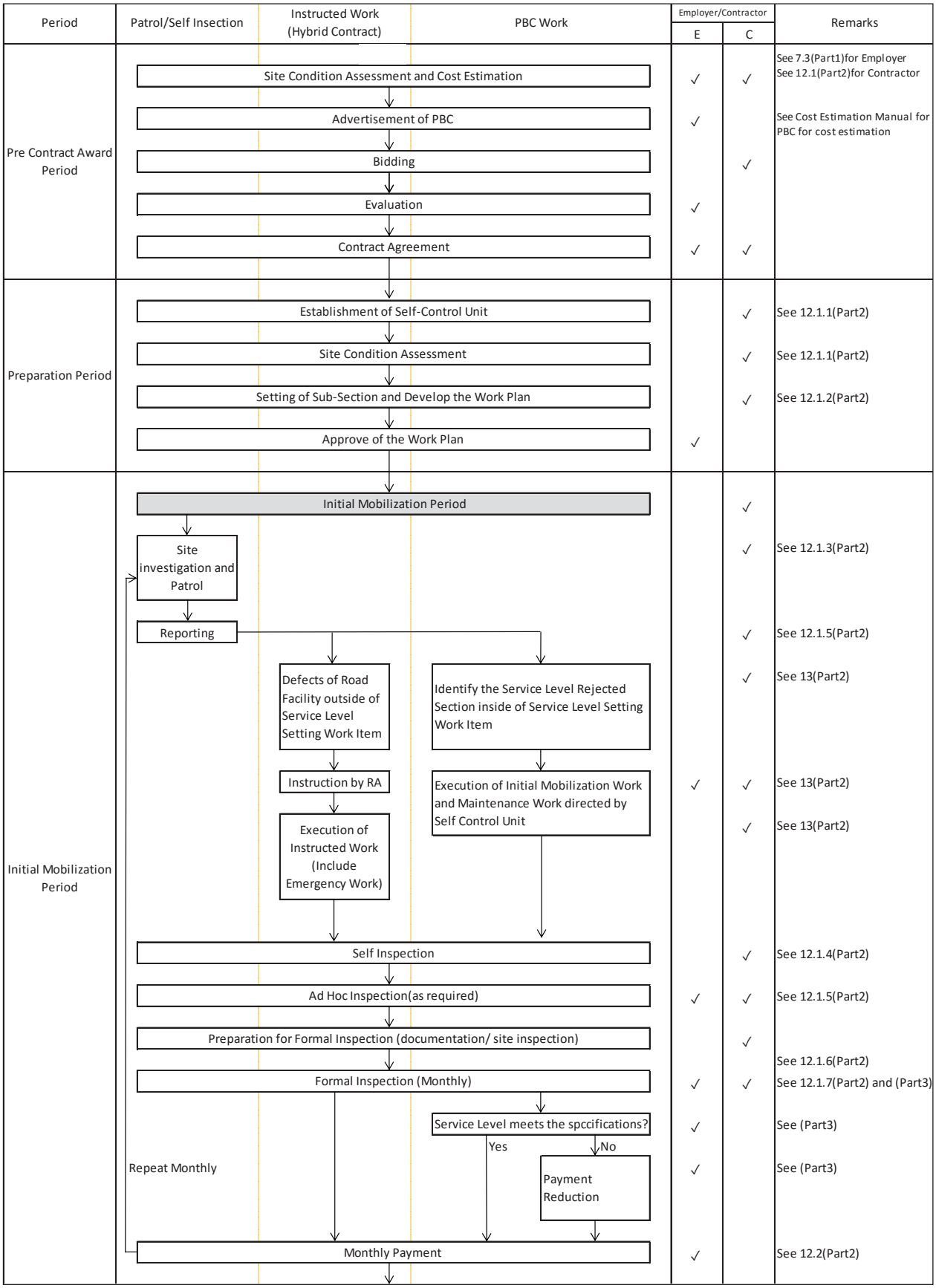


Figure 10-1 Typical flow of PBC Work

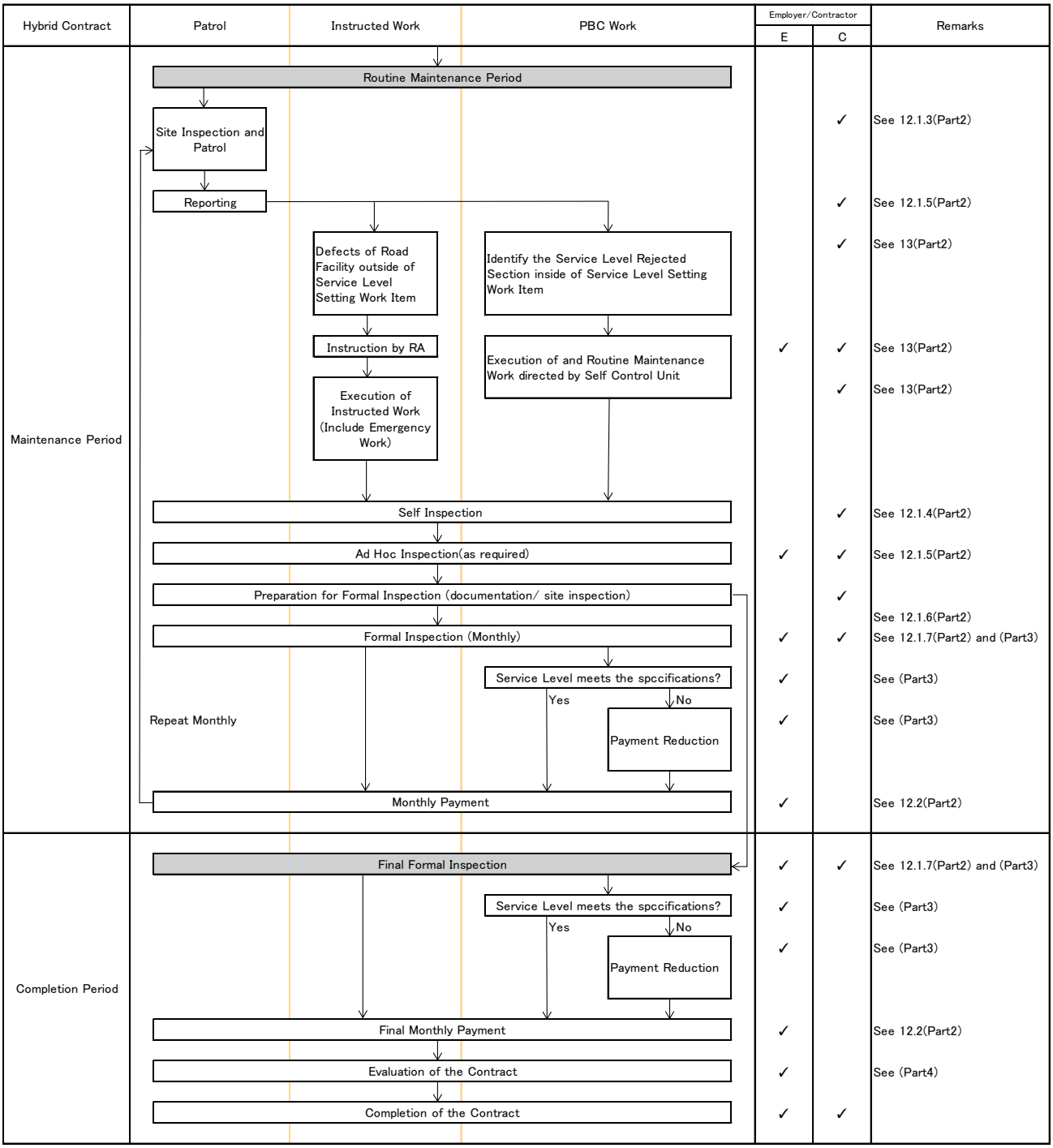


Figure 10-1 Typical flow of PBC Work *(continued)*

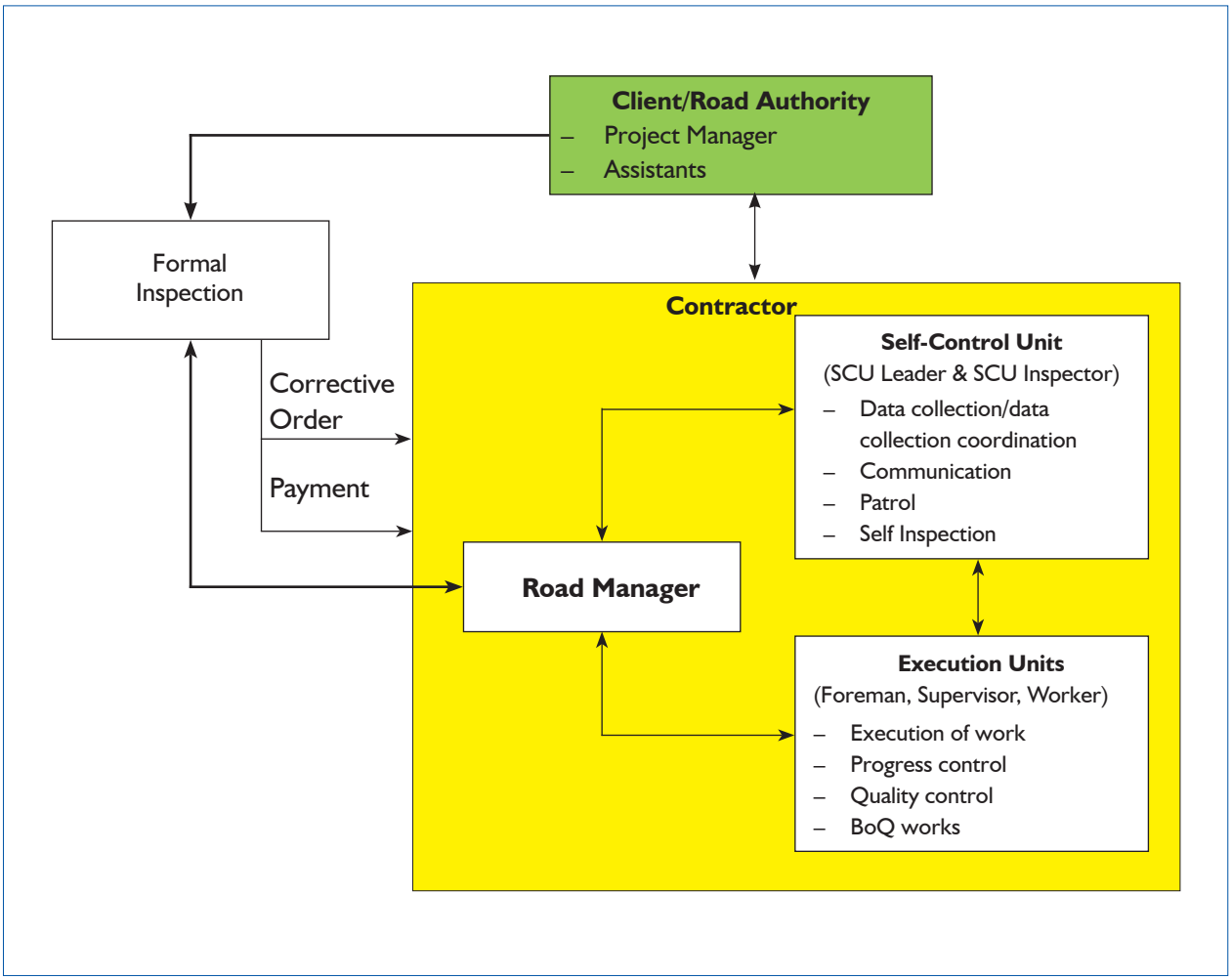
11. Actions by the Contractor

11.1 Establishment of Self-Control Unit

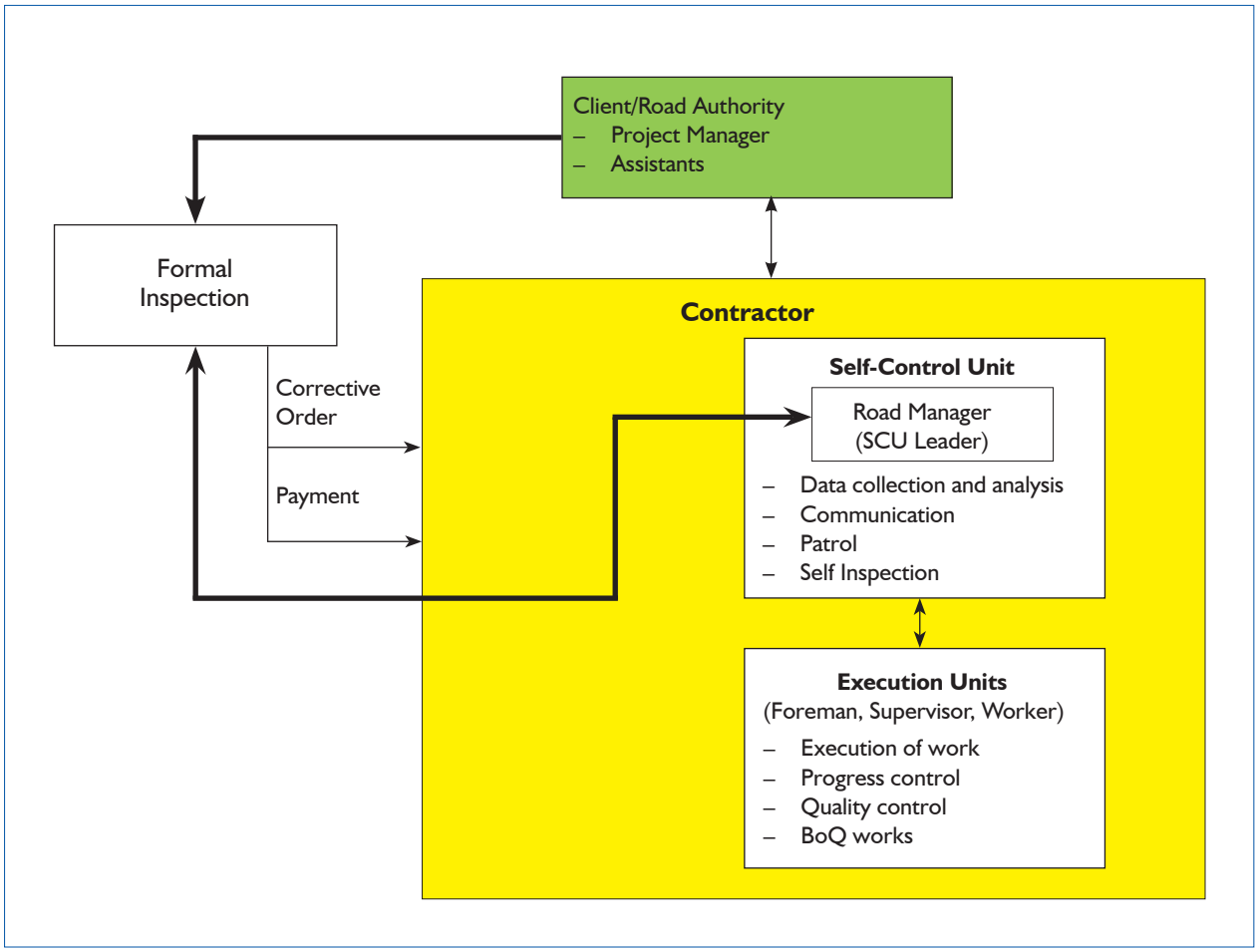
As already stated, in PBC the maintenance work is not undertaken based on the instruction of the client. Instead, the Self-Control Unit should be established within the organizational setup of the contractor to support the Road Manager in gathering the information needed by the contractor to manage the works and services. The information gathered is used to prepare Monthly Statements and ensures that a complete database of the road condition, both on- and off-carriageway, is available at all times.

The contractor must establish the Self-Control Unit after the award of the contract. The Self-Control Unit is a team within the contractor's organization responsible for supervision of service levels while the Execution Unit is responsible for implementation of the work on site. The Road Manager can be the Self-Control Unit leader in small contracts but in large contracts the Road Manager should not head the SCU.

Figure 11-1 illustrates the recommended organizational structures for large and small contracts.



For Large Contract



Note: This is applied for Unpaved Standard less than 10 km contract length

For Small Contract

Figure 11-1 Role of Self-Control Unit

11.2 Role of Self-Control Unit

In Clause 25.2 of the Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract, November 2011, the contractor is obliged to establish within its organization a Self-Control Unit SCU staffed with qualified personnel. The roles of the SCU are:

1. Self-inspection to verify the degree of compliance with the required service levels and preparation of PBC inspection record;
2. Patrol;
3. Assessment of the road;
4. Generation and presentation of the information requested by the Road Manager for the documentation required for the monthly statement; and,
5. Formal Inspection together with Road Manager and Project Manager

25.2 Unless specified otherwise in the PARTICULAR CONDITION OF CONTRACT, the Contractor shall establish, within his own organizational structure, a specific Unit staffed with qualified personnel, whose task is to verify continuously the degree of compliance by the Contractor with the required Service Levels. That Unit will also be responsible for the generation and presentation of the information needed by the contractor for the documentation required as defined in the Specifications. The Unit will be responsible for maintaining a detailed and complete knowledge of the condition of the Road and to provide to the Road Manager all the information needed in order to efficiently manage and maintain the Road. The Unit shall also carry out, in close collaboration with the Project Manager, the verifications on the Service Levels.

Clause 25.2 of Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract, November 2011

Typical tasks of the Self-Control Unit are shown in Table 11-1.

Table 11-1 Typical Tasks of Self-Control Unit

Stage	Tasks	Reports
Plan	Site condition assessment Development of Work Execution Plan	Report for site condition assessment of the road
Do	Data Collection/ Reporting/ Communication with the client Communication with road users	Daily Work Record (Appendix 7) Daily Patrol Record (Appendix 8) Photo Record (Appendix 9) Incident Report (Appendix 10)
Check	Self-inspection Formal and Ad hoc inspection Development of Draft Monthly Statement	Defect Detection and Rectification List (Appendix11) Self-Inspection Result Report (Appendix 12,13) Draft Payment Reduction Calculation Table (Appendix 14,15) Draft Monthly Statement (Appendix 16)
Action	Remedy action to Non-compliance	Remedial work report

A staffing structure of the Self-Control Unit by variable lengths of the road is shown in Table 11-2. Two (2) teams of the SCU is required if the road length is more than 50km.

Table 11-2 Staffing Structure of Self-Control Unit

	Position	Task	Requirements	Number of staff (Depends on the road type and complexity)		
				Up to 10km*1	Up to 50km*2	Over 50km*3
1	SCU leader	Coordination of data collection Report, communication	Trained in PBC, Experience more than 5 years in road construction and maintenance	1	1	1
2	SCU Inspector	Data collection Patrol	Experienced more than 3 years in road construction and maintenance	0	1	2

**1 Up to 10km: SCU leader conduct both patrol and self-inspection (1 vehicle required)*

**2 Up to 50km (standard): SCU leader conduct patrol and self-inspection with one inspector (1 vehicle required)*

**3 Over 50km: SCU leader and an assistant conduct patrol and self-inspection. An inspector conducts patrol in other roads under contract at same time (2 vehicles required).*

11.3 Roles of the Road Manager

The roles of the Road Manager include:

1. Drafting of Work Program including monitoring system;
2. Monthly formal inspection together with Project Manager;
3. Preparation of monthly statement; and,
4. Coordinating the work of the SCU and the Execution Unit

11.4 Roles of the Execution Unit

The roles of the Execution Unit include:

1. Execution of works;
2. Quality control testing required for rehabilitation works, improvement works and emergency works;
3. Progress control; and,
4. Executing Instructed (BoQ) works

12. Sample forms to be used for implementation of PBC

This manual provides standard forms for management of the contract by Self-Control Unit as shown in Table 12-1.

Table 12-1 List of forms in Appendix

No	Name of Appendix		User		Description	Remark
			E	C		
Appendix	1	Standard Service Level (Paved Road)	✓	✓	Standard service level for paved road	
Appendix	2	Standard Service Level (Unpaved Road)	✓	✓	Standard service level for unpaved road	
Appendix	3	Vegetation Control	✓	✓		
Appendix	4	Recommended Work Procedure		✓		
Appendix	5-1	Road Asset Survey Sheet for Paved Road	✓	✓		Road condition assessment
Appendix	5-2	Road Asset Survey Sheet for Unpaved Road	✓	✓		
Appendix	6-1	Service Level Selection Form (Paved Road)	✓			Pre-contract
Appendix	6-2	Service Level Selection Form (Unpaved Road)	✓			
Appendix	7	Daily Work Record Form		✓	– To record detailed daily inputs and work achievements. This form has the following objectives for the improvement of PBC. – To analyze statistical work efficiency of PBC. This data shall be used to improve cost estimation and PBC standard specifications. – To notify the Client on the day's work activities In case, photos are required, Appendix 9: Photo Record Form shall be used.	
Appendix	8	Daily Patrol Record Form		✓	To record the activity of patrolling. Patrolling is the mandate of the Contractor. The activity of patrolling, removal of obstacles and any illegal obstacles on the road shall be recorded and reported to the Client. This form has the following objectives; To record as evidence of removal of obstacles on the road To record road safety on the road To inform on any significant issue such as illegal occupation to the Client. In case, Photos are required, Appendix 9: Photo Record Form shall be used.	

No	Name of Appendix		User		Description	Remark
			E	C		
Appendix	9	Photo Record Form		✓	Photos shall be recorded by this form.	
Appendix	10	Incident Report Form		✓	To be used in case any accident occurred or is reported to the Contractor. This form shall also be submitted to the Client.	
Appendix	11	Defect Detection and Rectification List		✓	– To be used by the Self-Control Unit for the following objectives; – To record defect locations and dates they are identified by the inspection team – To record rectification date of the detected defects	Required for Field Inspection
Appendix	12-1	Detail Self-Inspection Result Report Form (Paved Road)		✓	– To be used for self-inspection to check compliance of the service level in each standard section (200m). – Designed for paved road.	Required for Field Inspection
Appendix	12-2	Detail Self-Inspection Result Report Form (Unpaved Road)		✓	Same form as above but designed for unpaved road.	Required for Field Inspection
Appendix	13-1	Summary Self-Inspection Report Form (Paved Road)		✓	To be used to summarize compliance of the service level in km. This sheet is used to calculate non-compliance distance by each service scope. Designed for paved road.	Required for Field Inspection
Appendix	13-2	Summary Self-Inspection Report Form (Unpaved Road)		✓	Same form as above but designed for unpaved road.	Required for Field Inspection
Appendix	14	Payment Reduction Calculation Table (Paved Road)	✓	✓	To be used to calculate payment amount taking into account reduction length for the month.	Drafted by Contractor verified by Employer
Appendix	15	Payment Reduction Calculation Table (Unpaved Road)	✓	✓	Same form as above but designed for unpaved road.	
Appendix	16	Summary of Statement for Payment Account (Monthly Statement)	✓	✓	Monthly statement (amount due to the Contractor)	
Appendix	17	Monthly Evaluation Form	✓		To be used during Formal Inspection for contractor's evaluation purposes	Monthly contractor's evaluation purposes
Appendix	18	Contractor's Evaluation Tally Sheet for PBC	✓		To be used for contractor's evaluation after completion of the contract by the Employer.	Contactor's Evaluation

E: Employer, C: Contractor (Self Control Unit)

12.1 Road Maintenance Work Procedure

12.1.1 Site condition assessment in pre-award period

It is recommended that the contractor must visit site and assess the road condition before preparing his bid. This is to allow him to make a practical cost estimate for the works.

Road Asset Survey Sheet (Appendix 5-1, 5-2) should be used for this purpose.

12.1.2 Site condition assessment before commencement of work

One of the most important tasks of the Self-Control Unit is to assess the initial site condition and details including descriptions and quantities of road assets under the contract at the start of the contract. This is to identify areas where the existing Service Level is unacceptable and there is a need to bring up the level to the required Service Level. Based on such assessment, the Road Manager will produce a works programme.

The defects and locations to be covered by the contract should be listed in the "Defect Detection and Rectification List (Appendix11) before commencement of works. This will be used to monitor rectification of the work afterwards.

It is also important to identify sections/locations that will be considered as Instructed Works by the client.

This assessment may discover a significant condition such as illegal encroachment, illegal dumping and malfunction of the road furniture which may be out of the contractor's responsibility under the contract. In such a case this should be discussed with the Project Manager during the early stages of the contract.

Based on the results of the assessment, the Self-Control Unit will prepare a practical work execution plan for the PBC Works.

12.1.3 Determination of Subsection and installation of Marker/chainage post

At the commencement of the works and during the condition assessment, the Self-Control Unit will clearly mark on the road or install temporary posts to identify the sub-sections for detailed inspection purposes. The Self-Control Unit also prepares a map/ sketch showing the sub-sections identified.

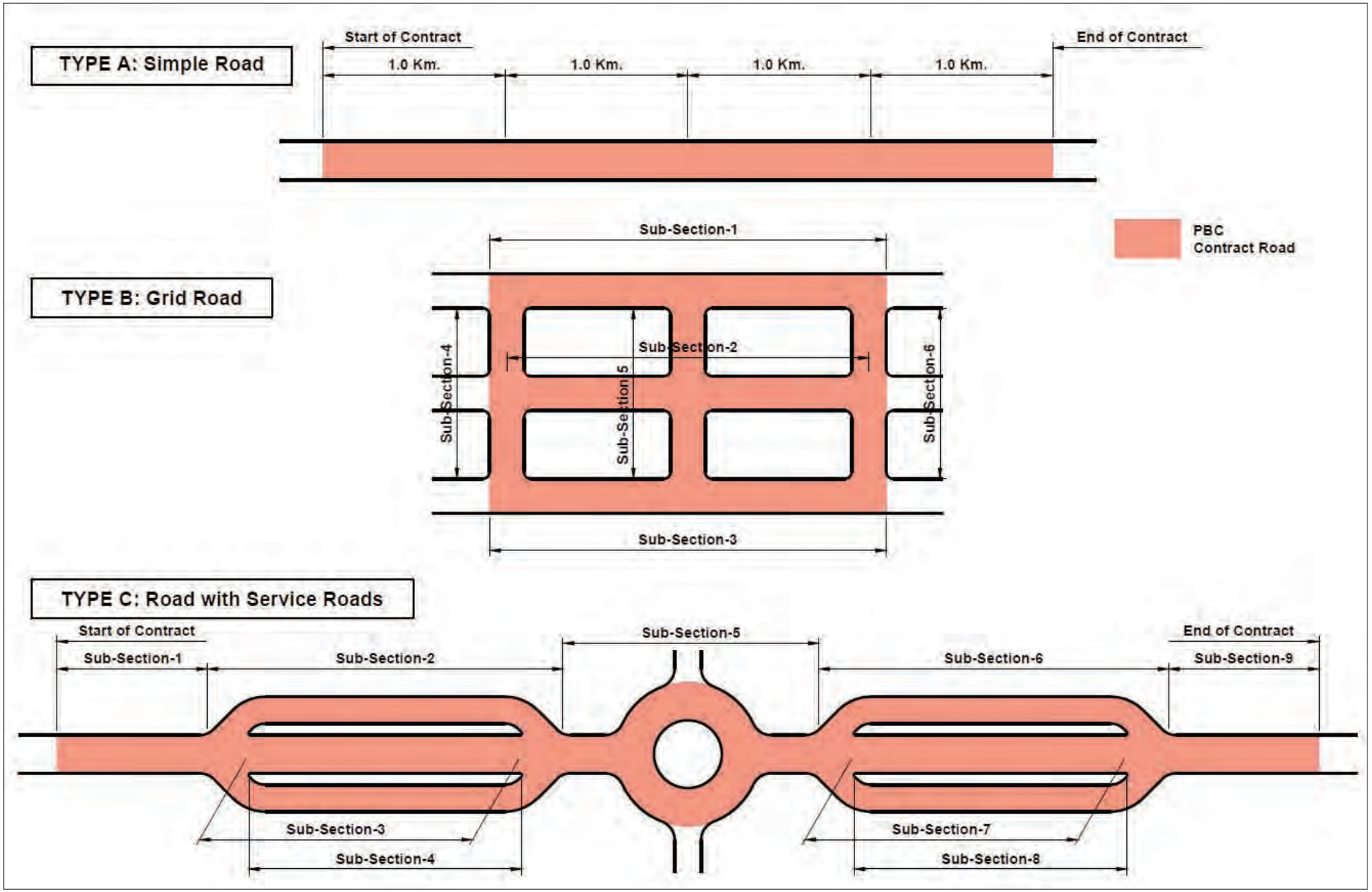


Figure 12-1 Sub-Sections for inspection

12.1.4 Work Programme

The Work Programme is an important part of "Planning" in the PDCA cycle for the Contractor. In order to start a contract with sufficient understanding of the responsibilities borne by the client and the contractor, the Work Programme should at least have items summarized below.

Items to be included in the Work Program

- Work methodology
- Work item and method statement including the proposed frequency of input to be provided by the contractor and tools/equipment to be used.
- Work schedule
- Patrol and self-inspection plan
- SCU establishment plan
- Traffic management plan
- Work safety plan
- Emergency measures plan
- Communication method
- Report form
- Cash flow
- Environmental and social management plan
- Quality Control plan
- Site regulation/organizational plan

The Work Program should be prepared by the Road Manager, assisted by the Self-Control Unit. The contractor should commence the works only after receiving the letter of commencement and upon completion of due appraisal and acceptance of the Work Program by the client.

12.1.5 Patrol and Recording of Work Activities

The SCU will collect the following data in the course of the contract period. The Road Manager has the responsibility to communicate with the client through submitting the following documents without delay:

1) Daily Work Record (to be submitted to the client upon request). Refer to **Appendix 7**
   - Number of machinery and equipment
   - Number of workers
   - Materials
   - Accomplishment (quantity of works carried out)

2) Daily Patrol Record (to be submitted to the client upon request by telephone). **Refer to Appendix 8.**
   - Record of surface cleanliness and obstacles that need to be removed or were removed.
   - Encroachments (posters, illegal constructions/roadside amenities)
   - Email alerts to the client when the Self-Control Unit finds an incident which hinders contractor's work, damages, or an illegal activity on the road. All emails shall be confirmed in writing.

3) Photo Record (to be submitted to the client on a monthly basis). Refer to **Appendix 9**
   - Photo of activity (location and work item)

4) Incident Report (**Appendix 10**)
   - Incident notification
   - Incident result
   - Site condition related to the incident

12.1.6 Self-Inspection

The Self-Control Unit is required to inspect the road condition to check whether it meets the level specified by the Service Levels. The results of self-inspection should be recorded in the Self Inspection Report (Refer to Appendices 12-1 and 12-2), but should at least contain the following:

- Results of the inspection
- Action and response to Non-compliance
- Incidents (including traffic accidents, illegal encroachment, illegal dumping, natural disaster etc.)

The frequency of the self-inspection shall be stipulated in the contract.

12.1.7 Ad hoc Inspection

The Project Manager can inspect the road to verify achievement of service levels anytime and anywhere during the contract period (see Chapter 18 of Part 3). The Self-Control Unit shall support the inspection of the Project Manager.

12.1.8 Preparation for Formal Inspection

The Self-Control Unit will prepare required documents for Formal Inspection in advance and present to the Project Manager before the inspection time. Self-Control Unit should assess the achievement of the service levels of the roads compared to the performance specification. The monthly statement shall be verified during the formal inspection. In case the documents are not submitted in advance, payment reduction should be applied.

The list of the documents to be prepared by the contractor is shown in Table 12-2.

Table 12-2 List of the document to be prepared by the contractor

Appendix No.		Name of document	Submit at Formal Inspection	Submit if requested
Appendix	7	Daily Work Record Form		✓
Appendix	8	Daily Patrol Record Form		✓
Appendix	9	Photo Record Form		✓
Appendix	10	Incident Report Form		✓
Appendix	11	Defect Detection and Rectification List	✓	
Appendix	12-1	Detail Self-Inspection Result Report Form (Paved Road)	✓	

Appendix No.		Name of document	Submit at Formal Inspection	Submit if requested
Appendix	12-2	Detail Self-Inspection Result Report Form (Unpaved Road)	✓	
Appendix	13-1	Summary Self-Inspection Report Form (Paved Road)	✓	
Appendix	13-2	Summary Self-Inspection Report Form (Unpaved Road)	✓	
Appendix	14	Payment Reduction Calculation Table (Paved Road)	✓	
Appendix	15	Payment Reduction Calculation Table (Unpaved Road)	✓	
Appendix	16	Summary of Statement for Payment Account (Monthly Statement)	✓	

12.1.9 Formal Inspection

The formal inspection shall be undertaken by the Project Manager, Road Manager and Self-Control Unit to verify the monthly statement prepared by the Self-Control Unit and determine the amount of the monthly payment.

Formal inspection includes both site inspection and inspection of documents. The documents listed in the previous section must be prepared for the formal inspection.

These inspections are initiated by the client. Please refer to Part 3, Inspection of Service Levels for the Formal and Ad hoc Inspections.

12.2 Monthly Payment

The Project Manager verifies the monthly statement during the formal inspection. The monthly payment amount will be determined taking into account the result of the inspection. The form for this activity is shown in Appendix 16

12.3 Remedial Action to Non-Compliance

Following the monthly inspection, the Self-Control Unit will report to the Road Manager on the non-complying sections/items identified and then the Road Manager will instruct the execution team on remedial action required. Such remedial action will be reported in the Remedial Work Report. By issuance of the Remedial Work Report, the contractor will be released from the obligation of liquidated damages specified in Clause 2.8 of the Performance Specification.

2.8 Payment Reductions and Liquidated Damages to be applied on Non-Compliance

In accordance with the relevant clauses of the Conditions of Contract, Payment Reductions are applied in case of non-compliance with Service Level requirements, while Liquidated Damages are applied in the case of non-compliance with required Repair, Maintenance and Emergency Works.

The results of each formal inspection of the Service Levels and other performance criteria will be recorded by the Project Manager in the form of a Memorandum. The Memorandum will state the type and location of any non-compliance detected, in particular those non-compliances already shown in the standard tables provided by the Contractor as part of the monthly statement. For each individual case of non-compliance, the Project Manager will determine a date by which the Contractor must have completed the necessary measures in order to remedy the cause of the non-compliance. A follow-up site visit is therefore necessary at the date fixed by the Project Manager, or soon thereafter, in order to verify that the Contractor has indeed remedied the cause of non-compliance.

If at the date indicated in the Memorandum, the Contractor has not remedied the cause for non-compliance, independent of the reason given for their failure to do so, the Contractor is subject to Payment Reductions in accordance with the relevant clauses of the Conditions of Contract.

Payment Reductions are variable over time. If the Contractor fails to remedy a cause of non-compliance for which a payment reduction has already been applied, the amount of the payment reduction increases month by month for that particular cause of non-compliance, without a ceiling being applied, until compliance is established. The calculation of the initial (first month) amounts of payment reductions, and the formula for their adjustment over time, is to be based on the following rules given in Table 2.8.

Clause 2.8 of Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract.

The remedial action is expected to be conducted within one (1) week after the issuance of the notice by the Project Manager, but this may be shortened as deemed necessary. The remedial action must be completed within the period to which the Road Manager/the Self-Control Unit and the Project Manager agree or else payment reduction should be applied.

12.4 Payment Reduction

Monthly payment will be made in accordance with the results of each formal inspection of the Service Levels. However, in case non-compliance is discovered after the formal inspection, payment reduction shall be applied in accordance with the relevant clauses of the Conditions of Contract without recourse on remedial measures. The cause of non-compliance and the date by which the contractor must complete such remedial measures will be indicated in the Memorandum as stipulated in the said clause. The forms to be used for payment reduction are shown in Appendices 14 and 15.

Such drastic action is recommended so that the contractor would not take advantage of the said clause and would instead be motivated to effectively utilize the Self Control Unit.

12.5 Handling of the uncertainties

During the PBC Works, the contractor may sometimes face obstructions beyond his control. Examples include: where a large amount of illegally dumped materials are placed within the right of way; or encroachment on the right of way; or illegal occupation of the road by residents preventing the contractor from performing his obligations; or any other act for which the contractor and the client has no control over. In such circumstances, the contractor will report to the Project Manager in writing who will then issue instructions as deemed necessary. If Project Manager defines them as outside the scope of the PBC, reduction of payment should not be applied.

13. Recommended Work Methods for PBC

This section describes recommended work methods for good practice covering major works and services under PBC.

13.1 Note for Initial Mobilization Period

1. The Initial Mobilization Period is stated as 3 months in the Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract. The contractor is required to bring the existing road conditions to the service level specified in the contract during this period.
2. In case the road under contract was previously placed under the PBC maintenance, then the road condition is most likely better than a road being placed under the PBC maintenance for the first time.
3. If a road has been used for several years before being maintained, it will require repairs, thus the PBC contractor will start with a poor initial condition. In such case, the Initial Mobilization Period should be set longer than the standard period of 3 months.

Sample: Clearing culvert to raise service level in Initial Mobilization Period

4. Unexpected problems may occur in the early stage of the Initial Mobilization Period. The Project Manager should consider a sufficient margin in the budget to allow for such unexpected issues as contingencies.
5. When the road was under PBC, such unexpected problems would rarely occur.

Example: Illegal pipes are found after cleaning the ditch during the Initial Mobilization Period

13.2 Recommended Work Methods

The work methods described in this section are proposal based on observations and assessments made on studies of the ongoing PBC projects in Kenya. They are included in this guideline to illustrate that more efficient and safer implementation can be ensured at the site. In some special cases or when new items are introduced, the work methods may need to be reviewed and modified accordingly.

Table 13-1 summarizes what is covered for each recommended standard work method. The recommended work methods for major work items are summarized in Appendix 4.

Table 13-1 Standard Work Methods for PBC

Aspects	Description
What to do	◆ Actions to be undertaken
Where to do	◆ Targets ◆ Areas of work
When to do	◆ Timing ◆ Frequency ◆ Relation to other work items
How to do	◆ Method ◆ Tools ◆ Manuals
References	◆ Road Maintenance Manual 2010 ◆ Contractor's Field Handbook Routine Maintenance May 2008 ◆ Safety measures as stipulated in the contract

13.3 Response Time (Time Allowed for Repairs and others)

Response time is the time allowed to the contractor to complete the action/s towards maintaining road usability (e.g. clearance of dangerous obstacles on the road in 6 hours means that the Contractor has to complete removal of such obstacles in 6 hours from the time such obstacles was detected.) However, it is often the case that such precise monitoring of the response time is not possible. For this reason, contractors are encouraged to take an initial action immediately when they find such a situation on the road. In such a case, the contractor should normally be ready to mobilize as fast as possible considering the time limit allowed.

13.4 Typical Frequency of PBC Works

From the observations made during the study, PBC works are carried out by contractors using several groups of workers. The group conducts a number of work items (such as grass slashing and cleaning culverts) all at the same time.

It is therefore important to consider the work cycle time for efficient work productivity. For example, if the Service Levels for vegetation is specified as "50mm～300mm" in the outer zone the height of the grass after slashing should be close to 50mm as possible to reduce the frequency of the work.

It is also important to note that frequency of the work during dry and wet seasons will have significant differences.

13.5 Work Safety

The PBC works involve working on site where regular flow of traffic is maintained. Therefore, it is important that the entire contractor's team including labourers, inspectors and engineers are trained on site safety. In addition, a common understanding must be developed among the team members that full care is provided towards both motorized and non-motorized traffic. The work safety plan must be included in the Work Programme and payment reduction will be applied if the contractor does not include it.

13.5.1 Safety Gears for Workers

All persons working on site including labourers, inspectors and engineers should wear safety gears and equipment at all times. The contractor must equip them with reflective jackets, helmets, safety boots and gloves. The labourers must have ample working spaces between them. A good example is shown in Figure 13-1.

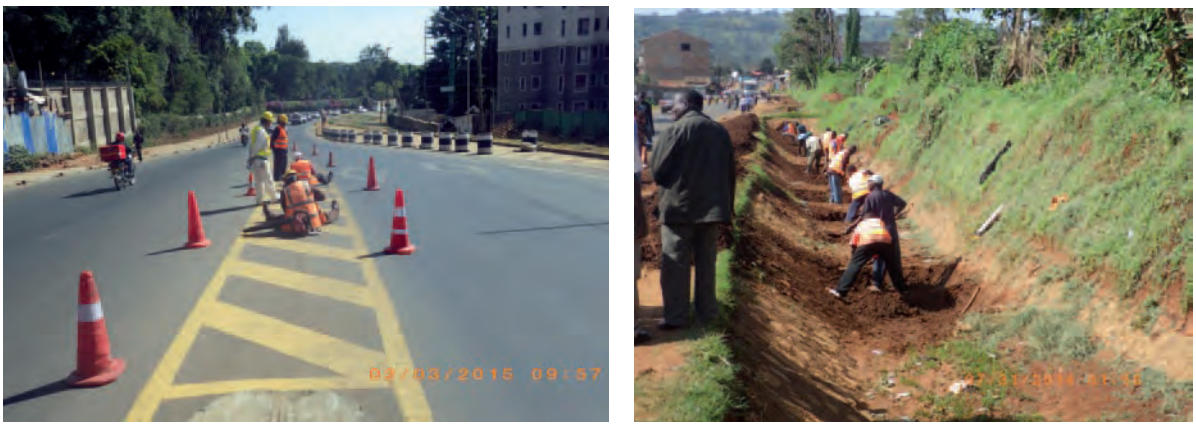


Figure 13-1 Inspection and work with safety jackets

13.5.2 Traffic Control for Safety

Traffic control is important for the safety of persons working on site and road users. Unless traffic control is maintained properly, safety on site may be compromised and there could be traffic jams affecting road users. A flagman controlling traffic is vital to be stationed at each end of the working site. Necessary safety equipment such as safety cones and warning signs will need to be erected at the site to warn road users of people working at the site. The contractor shall ensure that appropriate distance (250m) between the warning signs and the flagman is maintained at all times. Examples of traffic control operation are shown in Figure 13-3, Figure 13-4 and Figure 13-5.

Figure 13-2 Traffic control of Thika Road (grass cutting in the Median)

Source: ROAD MAINTENANCE MANUAL MAY 2010 MoR" (Figure 1.3-2)

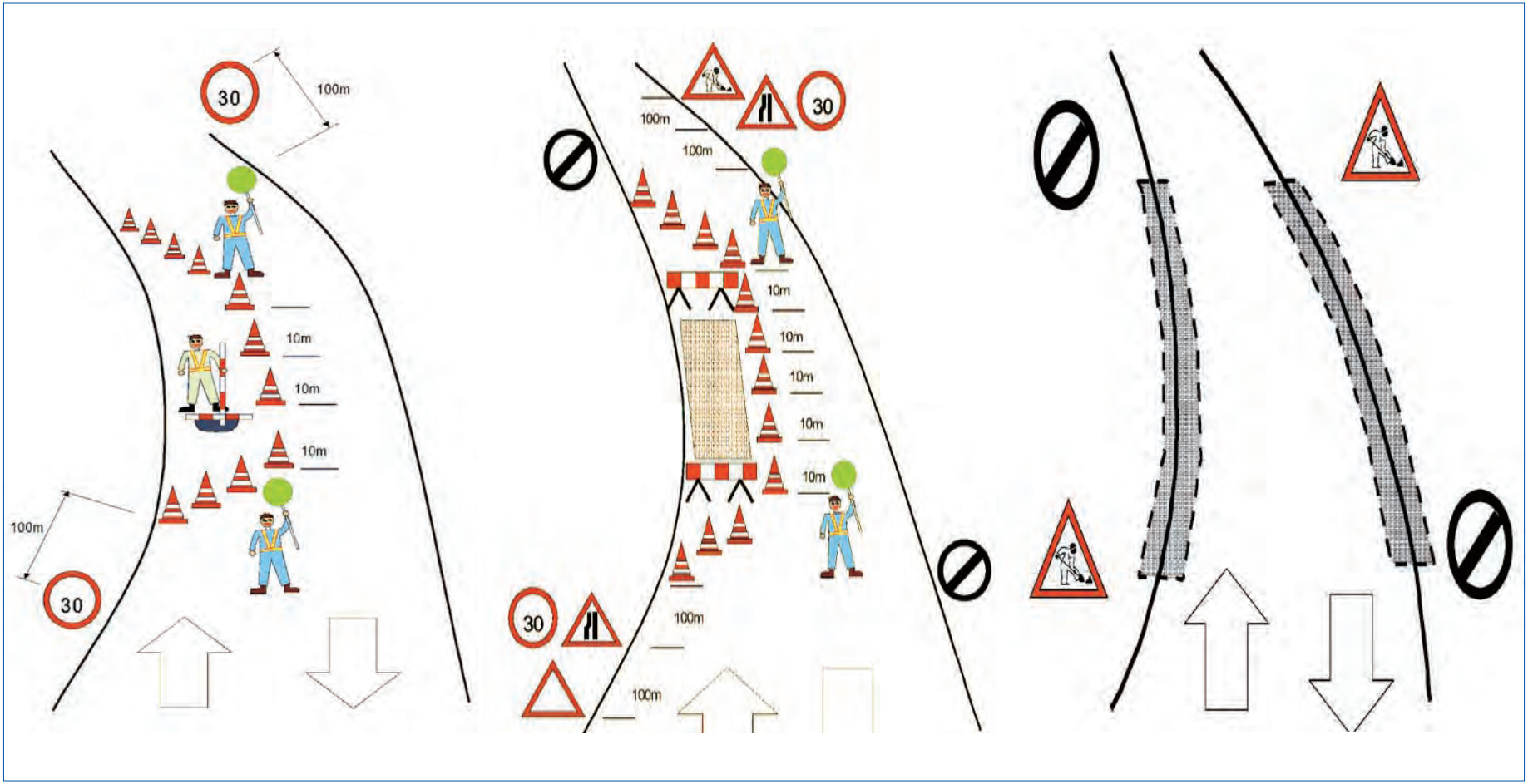
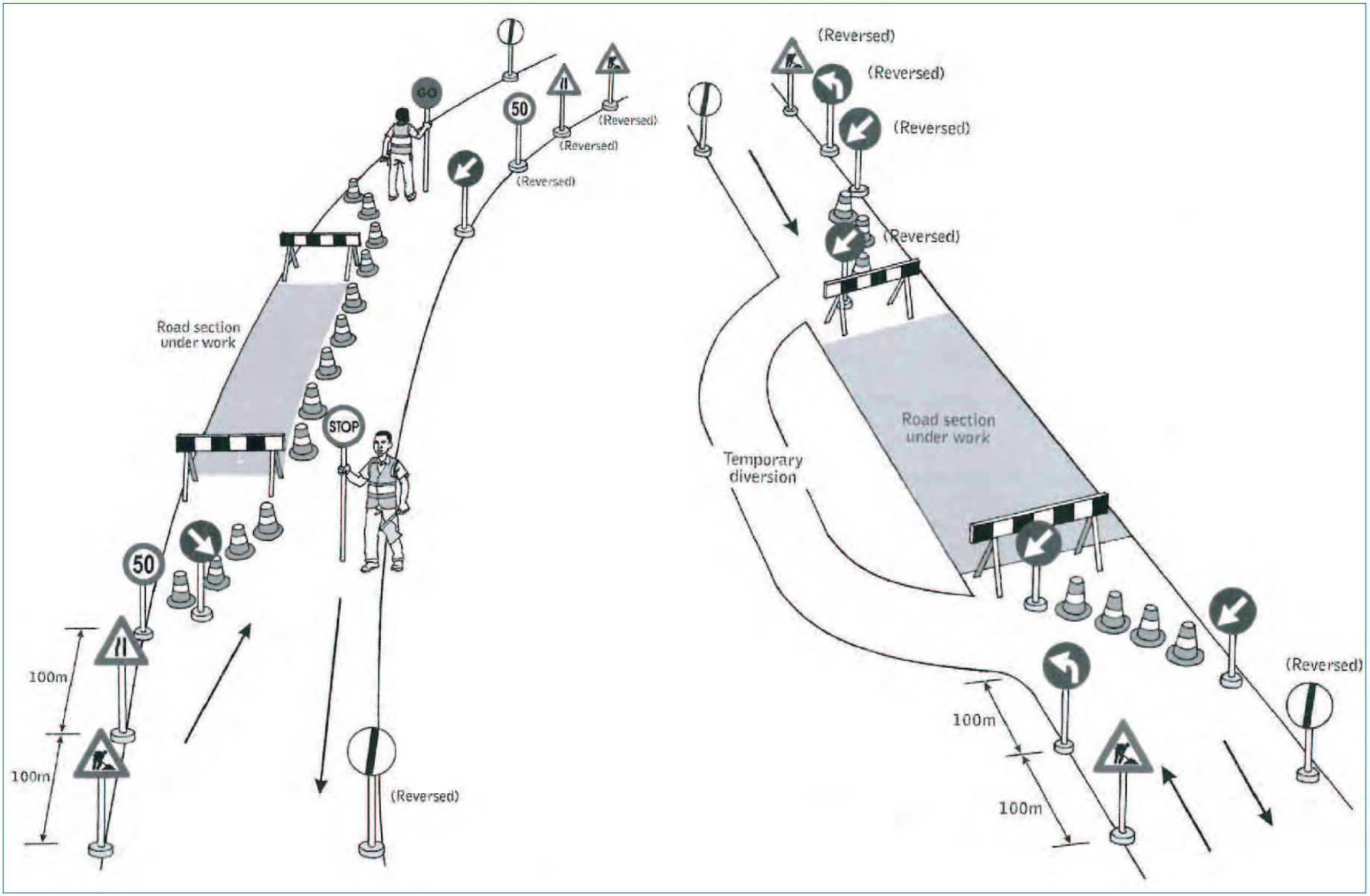


Figure 13-3 Safety Method for Execution Works



Source: CONTRACOR'S FIELD HANDBOOK, Routine Maintenance, May 2008 MoR" (see Figure 1.3-3)

Figure 13-4 Safety Method for Execution Works

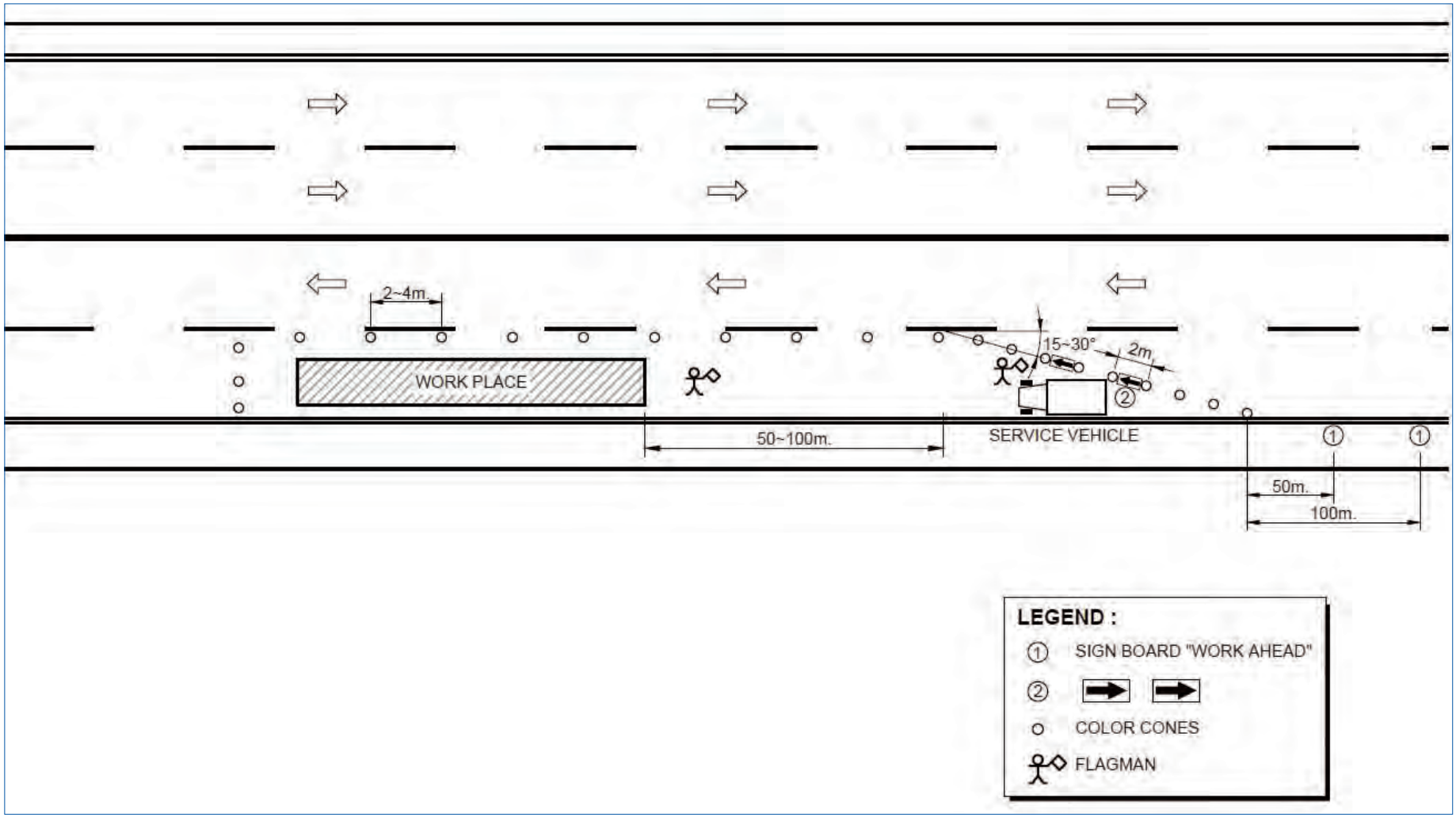


Figure 13-5 Standard Traffic Control for Dual Carriageways

13.5.3 Traffic Control for Safety at Night

Road maintenance works should be performed without disturbance or interference to traffic. It is therefore vital that the work during peak rush hours like from 7:00am to 9:00am and from 4:00pm to 7:00pm be avoided as much as possible. If these periods are avoided, daytime operation will be most effective but night time work may sometimes be necessary. For work at night, contractor needs to take sufficient safety and security measures to avoid traffic accidents. An example of traffic control arrangement at night is shown in Figure 13-6.

Reflective materials should be used for all road safety signs to be installed.

Required materials and tools for traffic control at night

- Cones with reflective tapes
- Safety jackets with reflective tape
- Directional board with reflective material
- Torch for flagman
- Vehicle with traffic signal (or sign board with light)
- Flood lights to light work area
- Head lights for labourers

Luminous arrow board on truck and cushions

Reflective Direction Board

Flood lights for work area

Reflective jackets for staff

Figure 13-6 Typical traffic control at night (example)

13.6 Miscellaneous Precaution

13.6.1 Road side fires

A large amount of grass, siltation materials and garbage may be collected by the contractor during the PBC Works within the RoW. Such unwanted materials should not be burnt on the road sides but should be disposed of in a proper dumping place designated in the Work Program. The Contractor is prohibited from burning of plastic materials in and out of the RoW.

13.6.2 Lost and found items

During the contract period, some items with the name of the owner or a contact person may be found during various works and services. Such items might have been misplaced by their owners or unintentionally left as a consequence of a criminal act. It is prudent that a system is put in place by the contractor so that such items are surrendered to the police. The important thing is that in addition to performing the PBC Works, the contractor is also contributing to the local society as a responsible partner.

Part 3

Service Level Inspection under PBC

14. Objective of Part 3: Service Level Inspection under PBC

This Part provides the standard method for each road authority to carry out service level inspections with the following objectives:

Objective 1: To carry out systematic inspections
Objective 2: To carry out fair and impartial inspections

The Part is based on the following basic understanding:

1. Under PBC road maintenance, the contractor is entitled to independently define: (i) what to do, (ii) where to do it, (iii) how to do it, and (iv) when to do it, within the provisions of the contract.
2. Under PBC road maintenance, outputs (service level) are measured together by the Project Manager (of the road authority) and the Road Manager (of the contractor) along with his Self-Inspection Unit every month during the formal inspection. Road length for payment is calculated in accordance with the method specified in the contract and payment statement prepared and settled. In such a system, inspection for service level compliance needs to be objective for good PBC contract management.
3. In the contract, the Self Control Unit is termed as a self-management body and its staff has sound professional knowledge in PBC contract management sufficient to undertake/execute the necessary tasks systematically. The Self Control Unit plays a vital role as the common link between the contractor and the client. For additional knowledge on the Self Control Unit, please read Part 2: Road Maintenance Work Procedure, Section 11.
4. To realize more efficient PBC road maintenance operations in Kenya, there needs to be: (1) a contractor who takes initiative on his task responsibilities under the contract; and, (2) a drastic mind shift by the contractor not to rely upon the road authority for delivery, but to develop and rely upon its own Self Control Unit to deliver the works.

These are the important steps to be taken before embarking on more expanded coverage by PBC road maintenance in the future.

15. What is "Service Level Inspection"?

"Service Level Inspection" is the main task undertaken at the end of every month by the client and the contractor to verify if the work and services of the contractor comply with the service levels stipulated in the contract. The amount of monthly payment is determined from the result of the inspection. It is therefore highly recommended that a systematic method is built that utilizes appropriate technologies that can provide objective and consistent data.

Service level inspection is based on the following principles;

1. The Self Control Unit is the main body to conduct self-inspection for the contractor;
2. The client carries out formal inspections to "verify" the information provided by the contractor; and,
3. The client's work load should be as minimal as possible considering further expansion of PBC road maintenance coverage.

16. Inspection Methods

16.1 Procedure of Inspection

Self-Inspection is the first inspection done by the contractor. This is conducted for the contractor's own purpose of verifying his/her performance in the achievement of Service Levels.

Ad hoc Inspection is the inspection which the Project Manager may carry out to inspect attainment of Service Levels. He/she may do so on his/her own initiative, at anytime and anywhere on the roads that are part of the contract.

The Project Manager may issue a Corrective Order to the contractor to correct any non-complying items during an Ad hoc inspection, and the contractor is expected to take corrective action. This is done solely to ensure that various time allowed for repairs are complied with by the contractor so that road users' satisfaction is guaranteed.

Formal Inspection is carried out jointly by the Project Manager and the Road Manager at the end of each month. The main purpose of the formal inspection is to enable the Project Manager to verify the information presented in the contractor's Monthly Statement with the actual observed and measured conditions on site. A Corrective Order may be issued at this stage so that the satisfaction of the road users is guaranteed.

There are three (3) steps of inspection

1. Self-Inspection by the contractor is a key element of PBC road maintenance and therefore the effectiveness of the Self-Control Unit is very important;
2. Ad hoc inspection by the Project Manager through checking the record forms; and,
3. Formal inspection undertaken jointly by the Project Manager and the Road Manager to check compliance with the provisions of contract, monthly reports, and to verify monthly statements (interim payment certificate).

It is important to note that non-compliant sections will attract payment deductions that are not recoverable. The procedure and methodology for Service Levels inspection are summarized in Table 16-1 and Figure 16-1, respectively.

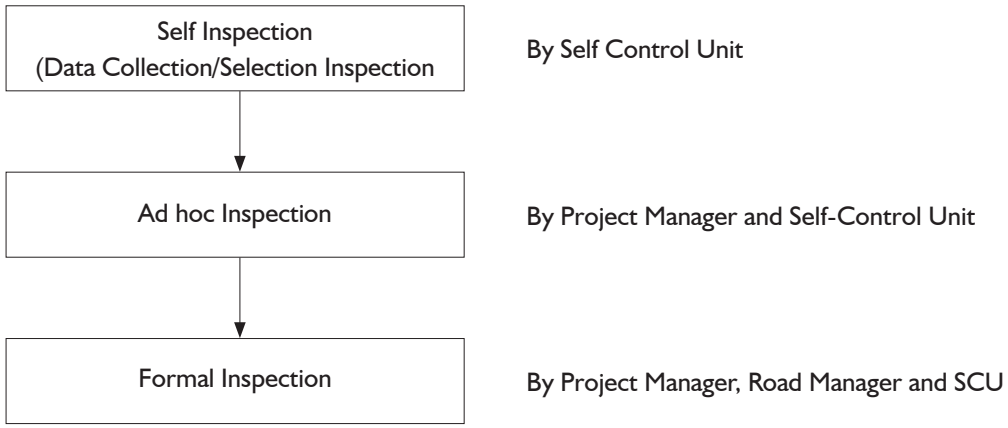


Figure 16-1 Procedure of Inspection

1. Project Manager is the representative of the Client in charge of the contract.
2. Road Manager is the representative of the Contractor in charge of the contract.

Table 16-1 Methodology for Service Level Inspection

	Inspection	Timing	Inspection location	Purpose	Evaluator	Activity Record/ Form	Method of Measurement
1	Self-Inspection	In accordance with contractor's program	Entire contract road length	(1) Self-monitoring of Service Level achievement (2) Record of activity	Self-Control Unit (SCU)	Self-Inspection Record	Visual Inspection and tools as specified in the contract
2	Ad hoc Inspection	At any time	At any place and section of road/s in the contract	(1) Monitoring of Service Level achievement (2) Advise the Contractor on ways he can improve on performance & address specific matters.	Project Manager, SCU	Notebook Corrective Order	Visual Inspection and tools as specified in the contract
3	Formal Inspection	End of month	Entire contract road/s length	Justification of Monthly Statement	Jointly by the Project Manager and Road Manager, SCU	Formal Inspection Check List Formal Inspection Form Corrective Order	Visual Inspection and tools as specified in the contract
4	Substantial Completion Inspection	One month before the end of the contract.	Entire contract road/s length	Conclude substantial completion of the contract and address outstanding matters	Jointly by the Project Manager and Road Manager	Substantial completion inspection minutes	Visual Inspection and tools as specified in the contract

16.2 Standard Methodology for Service Level Measurement

The standard methodology for service levels measurement is summarized in Table 16-2. The table includes performance indices recommended in Part 1 "Service Level Setting for PBC".

It is the responsibility of the client to verify the service level in a fair and impartial manner.

Table 16-2 Standard Methodology for Service Levels Measurement

ITEMS	Note: This table shows "Standard" Service Levels. For "High", please refer to Appendix 1 for paved road, Appendix 2 for unpaved road.	
Service Scope (Service Criteria)	**Service Levels (for Paved roads and Un-paved roads)**	**Method of Measurement**
P-A) Road Usability (Paved)		
1. Passability	The road should always allow for passage of traffic	Visual Inspection
2. Road Works Advance warning signs	Warning signs and relevant safety measures as stipulated in the contract must be placed when clearing works are required to be undertaken	Visual Inspection
3. Roughness	The pavement must at all times be kept at an acceptable level of roughness. The contractor is required to maintain IRI (1km average) at the following stipulated levels. Asphalt Concrete (new) 2.5 mm/m Asphalt Concrete (rehabilitated) 3.5 mm/m Rehabilitated to good condition (overlay) 5.0 mm/m Rehabilitated to fair condition (pothole patching) Cementitious Concrete 5.0mm/m Unpaved (gravel surface) 11.0 mm/m Unpaved (quarry stone based) 15.0 mm/m	IRI - DRIMS **(Measurement Method (4)), p 71**
UP-A) Road Usability (Un-Paved)		
1. Passability	The road should always allow for passage of traffic	Visual Inspection
2. Traffic Regulatory Control Signs	The following signs must be complete, clean, legible and structurally sound at all times; – stop – give way	Visual Inspection
3. Road Works Advance warning signs	Warning signs and relevant safety measures as stipulated in the contract must be placed when clearing works are required to be undertaken	Visual Inspection
4. Average Traffic Speed or Roughness	The road must at all times be kept at an acceptable level of smoothness. The IRI shall not exceed the specified level. For each one-km section the IRI shall not exceed 11	Calculating from distance and time IRI- DRIMS **(Measurement Method (4) p 71**
5. Minimum Traffic Speed	Acceptable minimum traffic speed is 40km/hr. The Contractor has to ensure that the standard vehicle (with the 4WD disengaged) is able to traverse the road in a safe manner and that the road surface conditions never constrain the vehicle speed to fall below the specified minimum speed on any point on the road surface in a one-km section.	Speedometer reading
Road User Comfort		
P-B) Pavement, Shoulders and ROW for Paved Roads		
1. Road Cleanliness	The road must always be clean and free of soil, debris, trash and other objects, which must be removed within the time specified.	Visual Inspection

ITEMS	Note: This table shows "Standard" Service Levels. For "High", please refer to Appendix 1 for paved road, Appendix 2 for unpaved road.	
Service Scope (Service Criteria)	**Service Levels (for Paved roads and Un-paved roads)**	**Method of Measurement**
2. Potholes	All visible potholes must be repaired. The permitted maximum dimension of any single pothole is 150 mm diameter. The permitted number of accumulated potholes either smaller than 150mm diameter in any continuous of 1km section is 3.	Visual inspection and tape measurement
3. Cracking in Flexible Pavement	All cracks more than 3mm must be repaired.	Visual inspection and tape measurement **(Measurement Method (1)), p68**
4. Multiple cracks in the pavement	All multiple cracks must be repaired.	Visual inspection and tape measurement **(Measurement Method (1)), p68**
5. Rutting	All rutting of more than 2cm deep must be repaired.	Visual inspection and Ruler **(Measurement Method (1)), p68**
6. Raveling	All raveled areas of more than 5mm deep must be repaired.	Visual inspection and tape measurement **(Measurement Method (1)), p68**
7. Loose pavement edges	All loose pavement edges, and/or pieces of pavement breaking off at the edges must be made good.	Visual inspection and tape measurement **(Measurement Method (2)), p69**
8. Height of shoulders vs. height of pavement (Drop off)	At all sections, difference in height at edge of pavement must be maintained at less than 5cm	Visual inspection and tape measurement **(Measurement Method (3)), p70**
9. Paved shoulders	All paved shoulders must be: 1) repaired to avoid water penetration; 2) without deformations and erosion so that the cross fall is not less than the camber on the paved surface; and, 3) free of visible potholes, cracks wider than 3mm, multiple cracks and rutting of more than 2cm.	Visual inspection and tape measurement **(Measurement Method (2)) p69**
10. Cracks in Concrete Pavement	All cracks more than 0.2mm wide must be sealed	Visual inspection and tape measurement **(Measurement Method (1)), p68**
11. Interlocking Block Pavement	All interlocking block pavement must be: 1) without deformations and depressions so that the cross fall allows for free flowing water so that there isn't any water ponding, 2) free of visible defects and missing pieces.	Visual inspection
12. Medians	Not Applicable	Visual inspection
Road User Comfort		
UP-B) Pavement, Shoulders and ROW for Unpaved Roads		
1. Road Cleanliness	The road must always be clean and free of soil, debris, trash and other objects, which must be removed within the time specified.	Visual Inspection

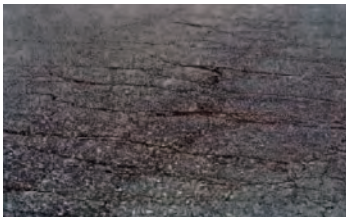
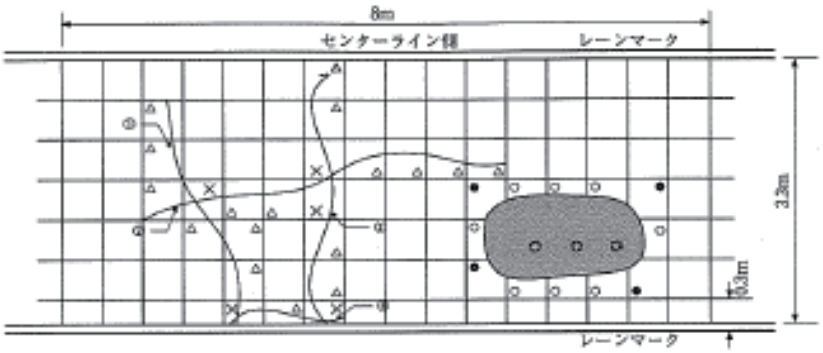
ITEMS	Note: This table shows "Standard" Service Levels. For "High", please refer to Appendix 1 for paved road, Appendix 2 for unpaved road.	
Service Scope (Service Criteria)	**Service Levels (for Paved roads and Un-paved roads)**	**Method of Measurement**
2. Corrugation spacing	Maximum wavelength = 3.0 cm Maximum wavelength at any single point of the road measured anywhere in a one-km section shall not exceed the stated value.	Visual inspection and tape measurement
3. Rut Depth	All rutting of more than 10 cm must be repaired. The maximum rut depth measured anywhere on a one-km section shall not exceed the specified value.	Visual inspection and Ruler **(Measurement Method (1)), p68**
4. Potholes	Maximum permitted area of any single deterioration in a one-km section is 35cm in diameter and a depth of 5cm. Maximum permitted area in a one-km section measured in any 30m road length selected by the Project Manager shall be 1.0 m^2 For each one-km section of road: i) no individual deterioration shall have an area greater than the value specified and/or; ii) the total area of deterioration in any 30m section selected by the Project Manager shall be less than the specified value	Visual inspection and tape measurement
Road Durability (Paved)		
P-C) Drainage		
1. Side Drains, Mitre Drains and Cut off drains (lined)	Must be clean and free of obstructions to ensure free flowing conditions at all times	Visual inspection Sample measurement by gauge
2. Side Drains, Mitre Drains and Cut off drains (unlined)	Must be clean and free of obstructions to ensure free flowing conditions at all times	Visual inspection Sample measurement by gauge
3. Culverts and Access Drifts	Must be clean and free of obstacles and without structural damage to ensure free flowing conditions at all times	Visual inspection Sample measurement by gauge
4. Scour Checks, gabions and other erosion protection structures and gabions	Erosion protection works must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users	Visual inspection Sample measurement by gauge
5. Manholes and Gulley pots	Must be clean and free of obstructions and without structural damage and ensure free flowing conditions	Visual inspection Sample measurement by gauge
P-D) Vegetation		
1. Vegetation free zone	Carriageway, shoulders and structures must be kept with no vegetation.	Visual inspection Sample measurement by gauge **(Measurement Method (6)), p73**

ITEMS	Note: This table shows "Standard" Service Levels. For "High", please refer to Appendix 1 for paved road, Appendix 2 for unpaved road.	
Service Scope (Service Criteria)	**Service Levels (for Paved roads and Un-paved roads)**	**Method of Measurement**
2. Outer/inner vegetation	- Inner vegetation zone, edge of shoulders to back of side drain/ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of vegetation around street furniture and other features. - outer vegetation zone, excluding inner zone.	Visual inspection Sample measurement by gauge **(Measurement Method (6)) p73**
3. Growth encroaching into vegetation free zone from the side or top	Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained. The level applies to vegetation control including trees, scrub or branches hanging over the zone	Visual inspection Sample measurement by gauge **(Measurement Method (6)) p73**
4. Trees within ROW	Trees within ROW outside of the drains must be protected as necessary	Visual inspection
P-E) Structures		
1. Concrete structures	The concrete structures including beams must be in good condition and fully functional. Any drainage system (e.g. weep holes) forming a part of the concrete structure will be kept the same	Visual inspection
2. Steel Structures	The steel structures (ex. Bridge and pedestrian bridge) must be clean, in good condition, free of corrosion and fully functional.	Visual inspection
3. Bridge expansion joints	All expansion joints must be clean and in good condition	Visual inspection
4. Riverbeds	1) Riverbeds must be maintained to ensure free flow of water under the bridge and up to 50 meters upstream and downstream of the river at all times 2) The design clearance of the river under the bridge must be maintained at all times 3) Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times	Visual inspection
P-F) Road Furniture		
1. Warning/Mandatory signs	All signage must be in place, complete, clean, legible, reflective and firmly installed	Visual Inspection
2. Information Signs, Edge marker Post, Guide Post, Kilometre Post	All signage must be in place, complete, clean, legible, reflective and firmly installed	Visual Inspection
3. Traffic Signals	All traffic signals must be clean, operational and well synchronized	Visual Inspection
4. Street Lighting	Road must always be well lit during the specified hours at night.	Visual Inspection
5. Road Markings/Road Studs	All road markings/road studs including 'cats eyes' are clear, visible and functional.	Visual Inspection
6. Guardrails and pedestrian rails	Guardrails must be in good condition and fully functional.	Visual inspection
P-G) Profile and Road Width	Not applicable	Not applicable

ITEMS	Note: This table shows "Standard" Service Levels. For "High", please refer to Appendix 1 for paved road, Appendix 2 for unpaved road.	
Service Scope (Service Criteria)	**Service Levels (for Paved roads and Un-paved roads)**	**Method of Measurement**
P-H) Embankment slopes		
1. Embankment slopes	All embankment slopes must be without deformations/damages and erosions of more than 100mm in depth.	Visual Inspection
2. Slopes in cuts	All slopes in cut must either be stable	Visual Inspection
Road Durability (Un-Paved)		
UP- C) Drainage		
1. Side Drains, Mitre Drains and Cut off drains	Must be clean and free of obstructions to ensure free flowing conditions at all times	Visual inspection Sample measurement by gauge
2. Culverts and Access Drifts	Must be clean and free of obstacles and without structural damage. Must be firmly contained by surrounding soil or material	Visual inspection Sample measurement by gauge
3. Scour Checks, gabions and other erosion protection structures and gabions	Erosion protection works must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users	Visual inspection Sample measurement by gauge
UP-D) Vegetation		
1. Vegetation free zone	Carriageway, shoulders and structures must be kept with no vegetation.	Visual inspection Sample measurement by gauge **(Measurement Method (6) p73**
2. Outer/inner vegetation	Inner vegetation zone, edge of road to back of side drain/ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of vegetation around street furniture and other features -Outer vegetation zone, excluding inner zone	Visual inspection Sample measurement by gauge **(Measurement Method (6) p73**
3. Growth encroaching into vegetation free zone from the side or top	Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained. The level applies to vegetation control including trees, scrub or branches hanging over the zone	Visual inspection Sample measurement by gauge **(Measurement Method (6) p73**
4. Trees within ROW	Trees within ROW outside of the drains must be protected as necessary	Visual inspection
UP-E) Structures		
1. Concrete structures	The concrete structures including beams must be in good condition and fully functional. Any drainage system (e.g. weep holes) forming a part of the concrete structure will be kept the same	Visual inspection
2. Bridge expansion joints	All expansion joints must be clean and in good condition	Visual inspection

ITEMS	Note: This table shows "Standard" Service Levels. For "High", please refer to Appendix 1 for paved road, Appendix 2 for unpaved road.	
Service Scope (Service Criteria)	**Service Levels (for Paved roads and Un-paved roads)**	**Method of Measurement**
3. Riverbeds	1) Riverbeds must be maintained to ensure free flow of water under the bridge and up to 50 meters upstream and downstream of the river at all times 2) The design clearance of the river under the bridge must be maintained at all times 3) Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times	Visual inspection
UP-F) Road Furniture		
1. Warning/Mandatory signs	All signage must be in place, complete, clean, legible, reflective and firmly installed	Visual Inspection
2. Information Signs, Edge marker Post, Guide Post, Kilometre Post	All signage must be in place, complete, clean, legible, reflective and firmly installed	Visual Inspection
3. Guardrails and pedestrian rails	Guardrails must be in good condition and fully functional.	Visual inspection
UP-G) Profile and Road Width	Not applicable	Not applicable
1. Gravel thickness	The gravel thickness along the road centre-line must be equal to the design thickness.	Visual inspection and tape measurement
2. Camber	The camber must be kept at 5.0%	Visual inspection
3. Usable Road Surface Width	The road width must be kept as per the design and to the minimum width of 5.4m.	Visual inspection and tape measurement
UP-H) Embankment slopes		
1. Embankment slopes	All embankment slopes must be without deformations and erosions	Visual Inspection
2. Slopes in cuts	All slopes in cut must either be stable or are stabilized with adequate retaining walls	Visual Inspection

Measurement Method No.1

Service Scope	**B) Carriageway**
Service Criteria	– P-B-2 Pothole patching, P-B-3 Cracking in flexible pavement – P-B-4 Multiple cracks in the pavement, P-B-5 Rutting – P-B-6 Raveling, P-B-10 Cracks in Concrete Pavement
Sample Photos	 (1) typical multiple crack  (2) typical transverse crack  (3) typical rutting
How to measure	– P-B-2 Pothole size (dimensions and depth) – P-B-3 Cracking in flexible pavement – Size of crack (width and length) – P-B-4 Multiple cracks in the pavement – Area of manifestation (width and length) – P-B-5 Rutting Depth of rutting (see below)   Use two scale to measure depth of rutting – P-B-6 Raveling: Area (Length and width) – P-B-10 Cracks in Concrete Pavement: Crack width – P-B-5 Rutting
Remark	For detailed survey, a mesh method can be applied. – one mesh 0.5x0.5m – if there are more than 2 cracks → 100% – if there are less than 2 cracks → 50% 

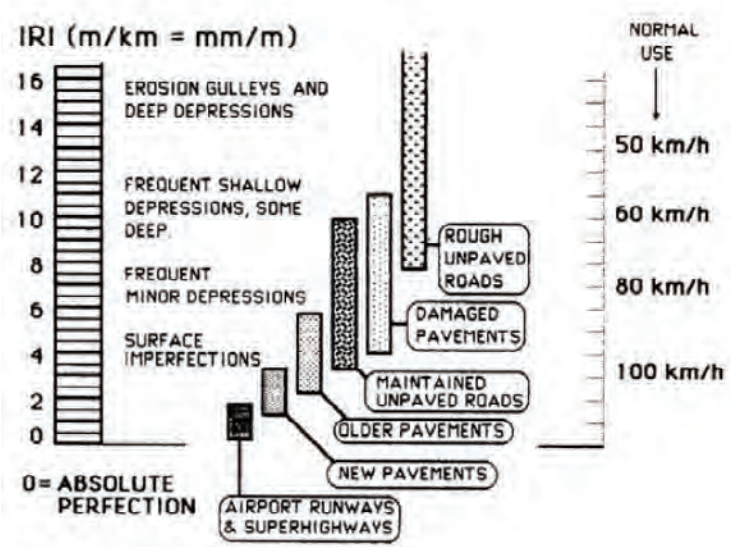
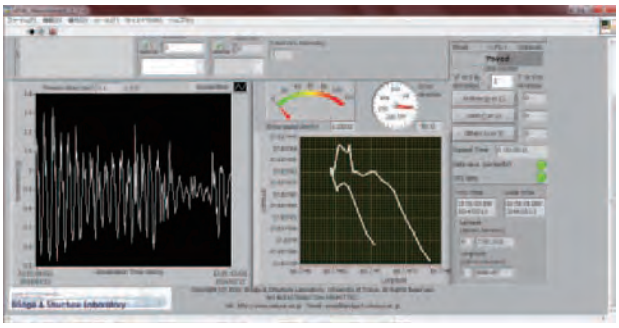
Measurement Method No.2

Service Scope	**B) Carriageway**
Service Criteria	– P-B-7 Loose pavement edge – P-B-9 Paved Shoulders
Sample Photos	 Loose pavement edge of a Double Surface Treated (DBST) Road  Interlocking block road  Asphalt Concrete road
How to measure	– length (m or km) of the section with loose edges or shoulders – location within the road
Remark	

Measurement Method No.3

Service Scope	**B) Carriageway**
Service Criteria	P-B-8 Height of shoulder vs height of pavement
Sample Photos	 
How to measure	– location of the section – length (m) – average difference of height by two scales (see picture below) 3 points 
Remark	

Measurement Method No.4

Service Scope	**B) Carriageway** International Roughness Index
Service Criteria	P-4-3 Roughness UP-A-4 Roughness
Sample Photos	IRI is International Roughness Index which is an index of surface smoothness developed by World Bank.  Typical IRI and road surface condition.
How to measure	Several equipment are available in the market for measurement of IRI. DRIMS (Dynamic Response Intelligent Monitoring System) is reasonable and handy equipment for which operational training is completed in KeNHA.  DRIMS equipment  DRIMS interface
Remark	

Measurement Method No.5

Service Scope	C) Drainage
Service Criteria	– C-1 Side Drains, Mitre Drains and (lined drains) – C-2 Side Drains, Mitre Drains (un-lined drains) – C-3 Culverts and Access Drifts – C-4 Scour Checks and other erosion protection structures – C-5 Cleaning of Manholes and Gulley pots
Sample Photos	 
How to measure	– scale (tape measure) – take 1 sample depth for drains, manhole and gulley pot – take 3 sample depths for drainage and take average – take 2 sample depths at each scour checks and take average 
Remark	

Measurement Method No.6

Service Scope	**D) Vegetation**
Service Criteria	– D-1 Free zone (Carriageway, shoulder, sidewalk) – D-2 Inner/Outer zone (Inner zone: besides structures, corner stones, mile stones, culverts, chainages, guard rail, abutment of bridges. Outer zone: corner stone, access to culvert, drainage)
Sample Photos	 Free zone (Carriageway and Shoulders)  Inner and Outer zone (Drainage to ROW)
How to measure	– take at least 3 samples of height at each 100m – verify if any of the samples do not exceed service levels
Remarks	

17. Self-Inspection

Self-Inspection is an inspection carried out by the Self-Control Unit of the contractor. The Self Control Unit will inspect roads and maintain the documents indicated below. Such documents are required to be submitted to the client before formal inspection; (see Section 12 of Part 2)

- Self-Inspection Result Form
- Draft Monthly Statement

18. Ad hoc Inspection

During the Ad-Hoc inspection, the Project Manager inspects the road to verify achievement of service levels anywhere and anytime during the contract period. The intention is to have a continuous monitoring schedule and the Project Manager should factor in his/her "special cases" that require special attention.

The Project Manager may issue a Corrective Order to the contractor to correct any non-complying items so that the contractor can take further action. This is done solely to ensure that various "times allowed for repairs" are complied with by the contractor so that road users' satisfaction is guaranteed.

19. Formal Inspection

Formal inspection should take the following procedure and manner:

1. A reasonable number of days should be allocated for this Inspection;
2. An advanced notice should be provided to the contractor on the proposed day of inspection; and,
3. The inspection should be conducted on two parts as outlined in Table 19-1 below:

   Part A: Document Inspection.

   Part B: Site Inspection.

Table 19-1 Procedure of Formal Inspection

Part	Inspection item	Remark
Part A: Document inspection	1. Table 19-2 2. Other documents submitted as outlined under self-inspection	If documents are not sufficiently prepared, the Project Manager can refuse Part B Inspection. Such refusal will be recorded in the monthly statement.
Part B: Site inspection	1) Site inspection as instructed by the Project Manager 2) Verification of service level compliance	If the Project Manager is not satisfied with the inspection in Part B, the Project Manager can request for a supplemental inspection for further to verification.

A Corrective Order maybe issued at this stage so that the satisfaction of road users is guaranteed. The Project Manager and the Road Manager need to pay careful attention to the analysis/evaluation of each compliance level to ensure that all non-conformities are captured and properly recorded.

Table 19-2 List of the document for Formal Inspection

No of Appendix	Name of document	Submit at Formal inspection	Submit if requested
Appendix 7	Daily Work Record Form		✓
Appendix 8	Daily Patrol Record Form		✓
Appendix 9	Photo Record Form		✓
Appendix 10	Incident Report Form		✓
Appendix 11	Defect Detection and Rectification List	✓	
Appendix 12-1	Detail Self-Inspection Result Report Form (Paved Road)	✓	
Appendix 12-2	Detail Self-Inspection Resu It Report Form (Unpaved Road)	✓	
Appendix 13-1	Summary Self-Inspection Report Form (Paved Road)	✓	
Appendix 13-2	Summary Self-Inspection Report Form (Unpaved Road)	✓	
Appendix 14	Payment Reduction Calculation Table (Paved Road)	✓	
Appendix 15	Payment Reduction Calculation Table (Unpaved Road)	✓	
Appendix 16	Summary of Statement for Payment Account (Monthly Statement)	✓	

20. Formal Inspection (Supplementary Inspection)

In case during Formal Inspection the Project Manager decides that a supplementary inspection is necessary, he/she can decide the date and time for Supplemental Inspection. In the supplementary inspection, additional inspection will be conducted to collect more samples/testing to verify that the required service level is achieved and that the submitted monthly statement is accurate and satisfactory. All Corrective Orders issued by the Project Manager prior to the supplementary inspection must be fully attended to by the contractor.

The Project Manager may amend the draft monthly statement if he/she believes that satisfactory verification was not achieved at the site.

21. Monthly Statement and Calculation of Payment Length

21.1 Service Level and Payment Condition

Payment is made every month in accordance with the achievement of Service Levels. Achievement of service levels is verified by service criteria as stipulated in the contract. In order to verify that each service criteria meets the service level and permissible tolerances, the Self-Control Unit must provide the Project Manager with the following documents during Formal Inspection:

1) Defect Detection and Rectification List (Appendix 11)
2) Detail Self-Inspection Result Report Form (Appendix 12-1, 12-2)
3) Summary Self Inspection Result Report Form (Appendix 13-1, 13-2)
4) Draft Payment Reduction Calculation Table (Appendix 14, 15)
5) Draft Monthly Statement (Appendix 16)

In case that a sub-section of the road does not meet the permissible tolerances, the section should be recognized as "NON-COMPLIANT" and payment is reduced by the ratio prescribed in the contract.

It is deemed that the service level for Service Scope is complied with when the requirements of all service levels for each Service Criteria are met.

21.2 Payment Reduction Calculation Table

During Inspection, the results of each section will be summarized into the Payment Reduction Calculation Table for calculation of payment length (Appendix 14 and 15).

In case of non-compliance, the NON-COMPLIANT length is calculated for each service scope according to the reduction rate stipulated in the contract.

21.3 Monthly Statement

Monthly statement will be the jointly agreed and signed statement by the Project Manager and the Road Manager.

In case payment reduction occurs during the Formal Inspection in accordance with the Payment Reduction Calculation Table, the amount to be deducted will then be transferred to the applicable column of the Monthly Statement (Appendix 16).

21.4 Inspection by Sub-section

A road under contract is normally evaluated in intervals of 1 km (clause 2.6 of *Performance Specification of Standard Tender Document for Procurement of Road Maintenance Works under Performance Based Term Contract*). However, in some cases where the PBC covers several road stretches in a single contract, or the road has different sections such as service roads, fly-overs and roundabouts, the unit for inspection should be divided considering the applicable site condition so that inspection can be carried out easily (Table 21-1).

Table 21-1 Interval of inspection

Inspection type	Inspection interval	Remark
Self- Inspection	Every sub-section	
Informal Inspection	At any location by Project Manager	
Formal Inspection	At least 5 locations per km	Number of inspection can be increased by the Project Manager

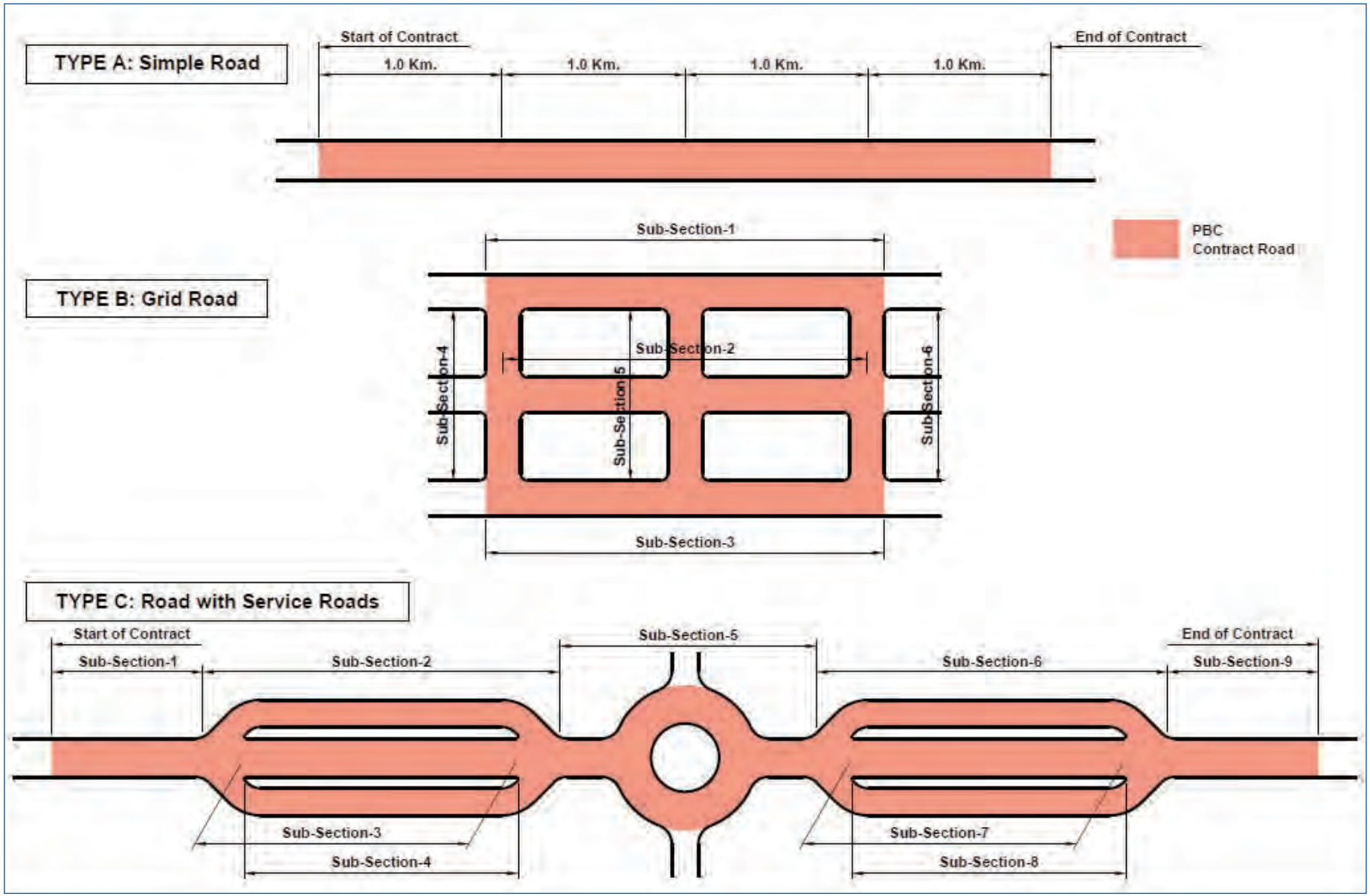


Figure 21-1 Sub-section Setting

Part 4

Contractor's Evaluation for PBC

22. Objective of Part 4: Contractor's Evaluation for PBC

This Part provides the recommended contractor's evaluation criteria for PBC Road Maintenance in line with the following objectives;

Objective 1: To carry out systematic and fair contractor's evaluation

Objective 2: To provide forms for contractor's evaluation

The concept of contractor's evaluation is in general to streamline the cyclic management process for contracted road works. The system allows a road authority, as the procuring entity, to evaluate the work performance of a contractor using a scoring system, and utilize the result of such evaluation for future tendering processes. By adopting a new scoring system, priority may be given to high performing contractors in new contracts, and elimination of poor performing contractors can be possible. Through continuous application of the system, the incentive for contractors to improve their performance may gradually increase.

The contractor's evaluation system described in this section is widely used in the Japanese procurement system. However, the proposed system has been modified to reflect the Kenyan situation and the manual describing this modified version was produced and published as "***Supervision and Contractor's Evaluation Manual for Road Works, 2012***". The concept is shown in Figure 22-1.

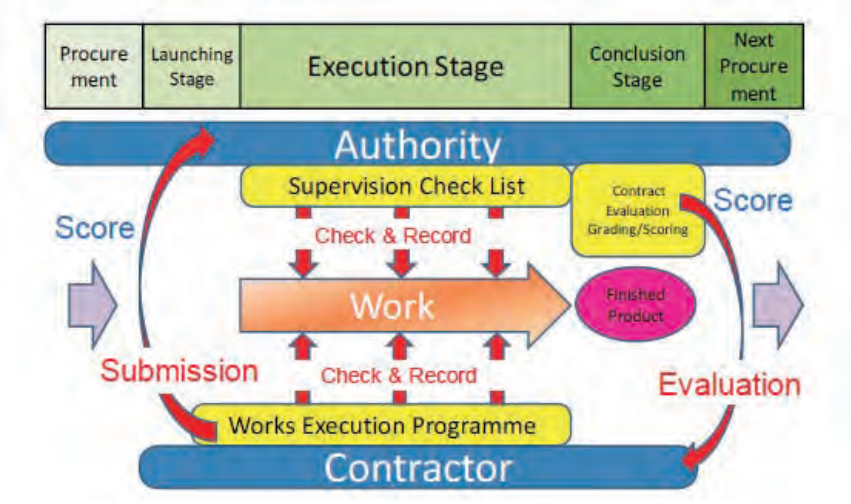


Figure 22-1 Schematic Representation of the Contractor's Evaluation

During the execution stage, the authority will use the Supervision Check List (SCL), which is a unified format where the degree of compliance and achievement against work targets are recorded. The results recorded on SCL are used as the basis for contractor's evaluation. At the completion stage, contractor's evaluation is conducted using an objective method to assess the overall performance and the finished works. The result of the evaluation is graded and then converted to a score.

However, this system is basically applicable to Unit Rate Based Contract (contract for instructed works), while in PBC, payments are made based on service level compliance under the contract so that the contractor is responsible for all the work processes involved. Hence, a different set of the specific evaluation criteria is needed.

23. Contractor's Evaluation Methods

23.1 Procedure of Evaluation

In "*Supervision and Contractor's Evaluation Manual for Road Works, 2012*", Supervision Check List (SCL) is provided to check contractor's work process during work execution stage. The check list items are listed below:

1. Execution System, in general
2. Equipment Holding
3. Contractor's in-house Staff
4. Personnel Employment
5. Site base Facility
6. Quality and Quantity Management
7. Work Scheduling
8. Work Safety Management
9. Environment and Social Management

Under PBC, items (1) to (7) are fully the responsibility of the contractor and the Road Authority in charge only checks the service level compliance during formal inspection stated in "Part 3" of this guideline. However, the Authority still needs to check item (8) Work Safety Management and (9) Environment and Social Management since the contractor can execute the works and achieve the required service level irrespective of these items. Moreover, safety and environmental issues are becoming more significant in Kenya and need careful mitigation actions to avoid any negative consequences that may arise.

Operational Procedure of Contractor's Evaluation is shown in Figure 23-1. The performance verification is conducted monthly during Formal Inspection and the final evaluation score is calculated after Substantial Completion Inspection based on the results of Formal Inspection.

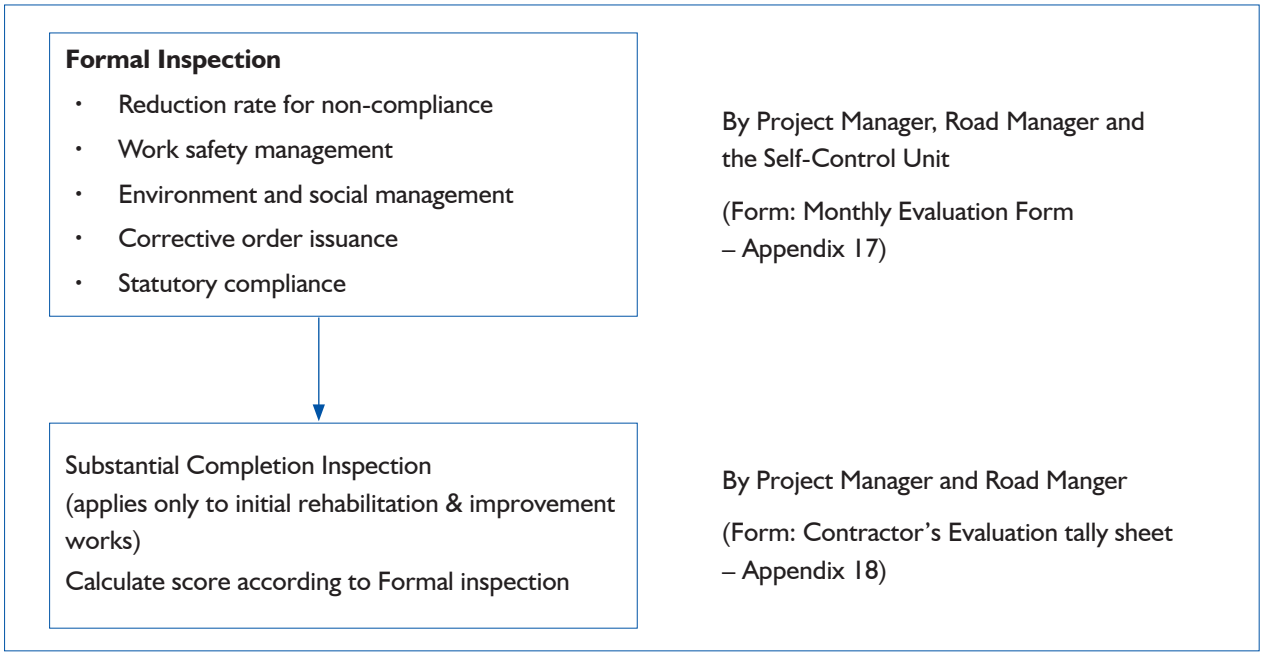


Figure 23-1 Operational Procedure of Contractor's Evaluation

23.2 Evaluation Items

During Formal Inspection, service level compliance is checked and "Reduction rate for non-compliance" is verified (refer to "Part 3"). In addition, the work process with respect to performance of self-control unit, safety, environment and statutory compliance is checked against the scope requirements as summarized in Table 23-1 below using the Pass/Fail criteria. The form given in Appendix 17 is used to record the evaluation result.

Table 23-1 Evaluation Items at formal inspection

Scope	Requirement (Pass Criteria)		Fail Criteria
Service Level compliance	1	Service level compliance is confirmed during formal inspection	Reduction rate for non-compliance to service level by equal or more than 5%
Self-control unit performance	1	Self-control unit is managed by qualified and experienced contractor's staff member	Registered self-control unit member does not inspect their road/s
	2	Self-control unit operates properly	Inspection record is not submitted to the client before formal inspection
Work Safety Management	1	Workers and operators wear proper safety gear	Workers and operators don't wear reflective jackets. Helmet is also needed in case of work using machinery.
	2	Traffic control is conducted properly	No traffic control (in case of work affecting traffic or without proper safety devices (e.g. sign board, cone, flag man)) and no tapered edge at the approach
	3	No accidents to workers, operators and other staff, attributable to the contractor	Worker or operator or other staff is injured and has to be hospitalized for more than or equal to 3 days
	4	No accidents to third-parties, attributable to contractor	Third-party person is injured or property is damaged (any level of the accident is not allowed)
Environment and social management	1	Environmental consideration is properly conducted	Mitigation measures against noise, emission, or dust at residential area is not taken and while complaints are received
	2	Waste material generated from the site is properly disposed	Waste material is left at the site
	3	Transportation by vehicles is properly controlled	Overloading, material falling, leakage, or spillage is found
Corrective order	1	No corrective order is issued by authority	No remedy is made for instruction by the client so that corrective order is issued
Statutory compliance	1	Contractor complies with the relevant statutory regulations	Contractor violates relevant statutory regulations and sanction is enforced

It is highly recommended that the Republic of Kenya regulations listed below should be in-built into the design of the contract documents for acceptable compliance. For the evaluation item of "*compliance with statutory regulations*", the authority will deduct the score if the contractor violates any relevant Republic of Kenya regulation. These relevant regulations are taken from "*Republic of Kenya, Supervision and Contractor's Evaluation Manual for Road Works, 2012, P-69, 3.5.3(2)*" and listed below:

1. Tax compliance (VAT registration, PIN registration)
    1) Income Tax Act Cap.470 (PAYE)
    2) Values Added Tax Act Cap.476
    3) Stamp Duty Cap. 486
2. Registration of business
    1) Companies Act Cap. 486
    2) Registration of Business Names Act Cap.499
3. Environmental law
    1) Environment Management and Coordination Act No.8 of 1999
    2) Environmental Impact Assessment and Audit Regulations - Legal Notice No.l21 of 2003
4. Traffic/Axle load regulations
    1) Traffic Act Cap. 403
    2) Kenya Roads Act, 2007
5. Labour law
    1) Employment Act Cap. 226
    2) Regulation of Wages and Conditions of Employment Act Cap. 229
    3) Workmen's Compensation Act Cap. 236 (Workman's Compensation)
    4) The Labour Relations Act, 2007
    5) Industrial Training Act Cap. 237
6. Engineers
    1) The Engineers Registration Act, No.43 of 2011
7. Social security
    1) National Social Security Fund Act Cap.258 (currently being amended)
    2) Retirement Benefits Authority Act Cap. 197
    3) Pensions Act Cap. 189
8. Hospital insurance fund
    1) National Hospital Insurance Fund Act, No. 9 of 1998
9. Local government
    1) Local Government Act Cap. 265 to be repealed upon Commencement of the Act in (2) below
    2) Urban Areas and Cities Act, 2011 (shall come into operation after the first elections under the constitution of Kenya 2010
10. Water resource management act
    1) Water Act.2002
11. Insurance
    1) Insurance Act Cap.487

12. Safety
    1) Public Health Act Cap.242
    2) Occupational Safety and Health Act, No. 15 of2007
    3) The Work Injury Benefits Act, No. 13 of 2007
13. Procurement laws
    1) Public Procurement and Disposal Act, 2005
    2) The Public Procurement and Disposal (Reference and Reservations Regulations. 20111)
    3) The Public Procurement and Disposal Regulations. 2006
    4) The Public Procurement and Disposal (Public Private Partnerships) Regulations, 2009
    5) The Public Procurement and Disposal (Amendment) Regulations, 2009
    6) National Construction Authority Act, 2011
14. Others
    1) Constitution of Kenya 2010
    2) Any other relevant laws that will come into effect after issuance of this document.

23.3 Evaluation Scoring

At the end of contract period, an evaluation score is calculated on the basis of the Formal Inspection results. The Evaluation Tally Sheet is given as Appendix 18. Fill "1" for "Pass" and "0" for "Fail" for each item in all months in the tally sheet according to monthly evaluation recorded in Appendix 17.

The score for each item is calculated by multiplying the item weight with the ratio of months when compliance was met to the total months of the contract, and expressed as a percentage. A penalty of minus 20 points is given for any "Statutory non-compliance" even if the non-compliance occurred in only one month. A sample evaluation is shown in Figure 23-1.

24. Contract Management using Evaluation Scores

It is important to develop and use a contract management cycle that reflects the correct evaluation of capable and poorly performing contractors. Such a system will not only assist in the selection of capable contractors in future but also serve as a motivation to the poorly performing contractors to improve their capacity. Most importantly, it will finally be a sustainable and self-motivated system for all contractors participating in PBC. The following necessary actions to develop management cycle are proposed:

(1) Developing evaluation score database

In order to apply the evaluation score in the procurement process, a database for storing the scores should be developed by each procurement entity/authority. In addition, a combined database which contains all scores from all procurement entities/authorities will enable sharing the data among all the entities. Such database should be managed and maintained by well-established units within the entities/ authorities.

(2) Notification of evaluation score to contractors

The contractor should be notified of the final score and its breakdown through an official letter from the procurement entity. This will allow contractors to comprehend their work performance and motivate

their self-improvement. The official letter can be used as a reference in subsequent procurement processes as the certificate of their work experience.

(3) Eliminating poorly performing contractor in pre-qualification for tendering

A contractor who gets a very poor evaluation score will be eliminated from participating in future procurements. In this context, a bidder with a consistent score of less than a certain threshold in recent years would be disqualified. A 50% score has been suggested as the threshold for elimination.

(4) Introduction of Quality and Cost Based Selection Method

Quality and Cost Based Selection (QCBS) is the recommended procurement method. QCBS uses a competitive process that takes into account the quality of the technical proposal and the cost of the works for the selection of a firm from a list of shortlisted firms. The relative weight to be given to the quality and cost should be determined on a case by case basis depending on the nature of the assignment. In Japan, a similar concept of procurement system called "***Comprehensive Evaluation Bidding System***" is often adopted to ensure that price and quality are well balanced in a contract. In this system, the contractor's evaluation score can be utilized in subsequent procurement procedures to select a contractor who performed well in a past contract, as past contractor's evaluation scores are incorporated in evaluating the technical capability of the bidder. Table 24-1 shows example of score allocation in the *Comprehensive Evaluation Bidding System*.

Table 24-1 Example of Comprehensive Evaluation Bidding System score allocation

Technical proposal	Past performance*	Price	Total
30%	30%	40%	100%

**Past contractor's evaluation score of the bidder in similar type of work is incorporated*

(5) Monitoring and revising contractor's evaluation system

The contractor's evaluation scheme incorporated in this guideline has been developed through discussions among procurement entities. However, the proposed criteria should be monitored through work experience and revised to reflect situations observed on the ground. In particular, evaluation items (Appendix 17) and their judgment criteria (Appendix 18) as shown in Table 23-1 above should be reviewed from time to time.

This form (Appendix 17) is for monthly evaluation according to pass/fail criteria in Table 23-1.

Appendix 17 Monthly Evaluation Form

Number of elapsed month = 7

Project Title	******
Road Authority	******
Contractor	******
Date of checking	Apr. 30, 2015

	Name
Project manager	********
Resident engineer	********

This form is used by Project manager to verify monthly performance for contract evaluation.

	Scope		item	Pass or Fail*1
1	Service revel compliance	1	Rreduction rate for service level non-compliance is less than 5.0%	0
2	Self-control unit performance	1	Self-control unit is organized by proper contractor's member	1
		2	Self-control unit operates properly	1
		Pass or fail in total*2		1
3	Work Safety Management	1	Workers and operators wear proper safety gear	1
		2	Traffic control is conducted properly	N/A
		3	No accident of workers, operators attributable to the contractor	1
		4	No accident of third-parties attributable to the contractor	1
		Pass or fail in total*2		1
4	Environment and social management	1	Environmental consideration is properly conducted	1
		2	Waste material generated from the site is properly disposed	0
		3	Transportation by vehicles is properly controlled	1
		Pass or fail in total*2		0
5	Corrective order	1	No corrective order is made by authority	1
6	Statutory compliance	1	Contractor complied with relevant statutory regulations	1

*1 Filling Example: "Pass"="1" "Fail" = "0" "Not applicable" = "N/A"

Fill "1" for "pass", "0" for "fail" or "N/A" for "not applicable"

*2 Scoring criteria:

In case of having more than one item in each evaluation scope, all the item except not applicable case shall be passed for pass evaluation in total

Appendix 18 Contract Evaluation Tally Sheet for PBC (Draft Ver.3)

Project Title	*******
Road Authority	*******
Contractor	*******
Date of Commencement	Oct. 1, 2014
Expected date of Completion	Jun. 30, 2015
Number of elapsed months in the end of last year	3

	Date	Name	Signature
Project Manager			
Road Manager			

This tally sheet (Appendix 18) is for calculating evaluation score according to monthly evaluation.

1. This tally sheet is for Project Manager to evaluate performance of contractor by scoring at the end of contract. Use this form for evaluation in every year during contract period.
2. Fill "1" for "Pass" or "0" for "Fail" in column for each item and month according to monthly evaluation form. Fill "-" for "Not applicable".

	Item	Monthly Evaluation: No. of month with "Pass=1" in past years	Year (2015) Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(a) No. of month with "Pass=1" in total	(b) (a)/ Total month (%)	(c) Weight for each item	(d) Score for each item (b)*(c)	(f) Penalty*1
1	Service revel compliance	1	1	1	1	0	1	1	-	-	-	-	-	-	6	66.7	50%	33	
2	Self-control unit performance	3	1	1	1	1	1	1	-	-	-	-	-	-	9	100	10%	10	
3	Work safety management	3	1	1	1	1	1	1	-	-	-	-	-	-	9	100	20%	20	
4	Environment and social management	3	1	1	1	0	1	1	-	-	-	-	-	-	8	88.9	10%	9	
5	Corrective order issuance	3	1	0	1	1	1	1	-	-	-	-	-	-	8	88.9	10%	9	
6	Statutory compliance	2	1	1	1	1	0	1	-	-	-	-	-	-	7	77.8			-20
																		81	-20
																	Total score	61	

*1 Penalty of minus 20 point is given for non-compliance in equal or more than one month

The score is calculated by multiplying the item weight with the ratio of months when compliance was met to the total months of the contract, and expressed as a percentage. A penalty of minus 20 points is given for "Statutory non-compliance" even if it occurred in only one month

Figure 23-1 Example of Monthly Evaluation Form and Contractor's Evaluation Tally Sheet

Appendix

Appendix 1	Standard Service Level (Paved Road)
Appendix 2	Standard Service Level (Unpaved Road)
Appendix 3	Vegetation Control
Appendix 4	Recommended Work Procedure
Appendix 5-1	Road Asset Survey Sheet for Paved Road
Appendix 5-2	Road Asset Survey Sheet for Unpaved Road
Appendix 6-1	Service Level Selection Form (Paved Road)
Appendix 6-2	Service Level Selection Form (Unpaved Road)
Appendix 7	Daily Work Record Form
Appendix 8	Daily Patrol Record Form
Appendix 9	Photo Record Form
Appendix 10	Incident Report Form
Appendix 11	Defect Detection and Rectification List
Appendix 12-1 (a)	Detail Self Inspection Result Report Form (Paved Road)
Appendix 12-1 (b)	Detail Self Inspection Result Report Form (Paved Road)
Appendix 12-2 (a)	Detail Self Inspection Result Report Form (Unpaved Road)
Appendix 12-2 (b)	Detail Self Inspection Result Report Form (Unpaved Road)
Appendix 13-1 (a)	Summary Self Inspection Result Report Form (Paved Road)
Appendix 13-1 (b)	Summary Self Inspection Result Report Form (Paved Road)
Appendix 13-2 (a)	Summary Self Inspection Result Report Form (Unpaved Road)
Appendix 13-2 (b)	Summary Self Inspection Result Report Form (Unpaved Road)
Appendix 14	Payment Reduction Calculation Table (Paved Road)
Appendix 15	Payment Reduction Calculation Table (Unpaved Road)
Appendix 16	Summary of Statement for Payment Account (Monthly Statement)
Appendix 17	Monthly Evaluation Form
Appendix 18	Contractor's Evaluation Tally Sheet for PBC
Appendix 19	Contractual Recommendation(with result of discussion)
Appendix 20	Minutes of Meeting of 1st Retreat of SWG
Appendix 21	Minutes of Meeting of 2nd Retreat of SWG
Appendix 22	Typical Road Features

Appendix 1 Standard Service Level (Paved Road)

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
ROAD USABILITY						
A) Road Usability						
1. Passability	The road should always allow for passage of traffic	Maximum non passability of 1 hr after detection	No tolerance permitted	The road should always allow for passage of traffic	Maximum non passability of 2 hours	No tolerance permitted
2. Road works advance warning signs	Warning signs and relevant safety measures as stipulated in the contract must be placed when clearing works are required to be undertaken	Within 1 hour after detection of defects or materials washed on to the road	No tolerance permitted.	Warning signs must be placed when clearing works are required to be undertaken	Within 2 hours after detection of defects or materials washed on to the road	No tolerance permitted
3. Roughness) This item is not subjected to the payment reduction	The pavement must at all times be kept to an acceptable level of roughness. The contractor is required to maintain IRI at the following stipulated level. Paved High IRI to be lower than 2.5mm/m as the target level.	Within 1 week after detection	The contractor will report the details of non-compliance to the Project Manager and identify the cause of non-compliance for further action under the other applicable service criteria. The applicable permissible tolerance must be adhered to.	The pavement must at all times be kept to an acceptable level of roughness. The contractor is required to maintain IRI at the following stipulated level. Paved Standard IRI to be lower than 3.5 mm/m as the target level for newly constructed sections and 5.0mm/m as the target level for rehabilitated sections	Within 2 weeks after detection	The contractor will report the details of non-compliance to the Project Manager and identify the cause of non-compliance for further action under the other applicable service criteria. The applicable permissible tolerance must be adhered to.
ROAD USER COMFORT						
B) Pavement, Shoulders and ROW						
1. Road Cleanliness	The road must always be clean and free of soil, debris, trash and other objects, which must be removed within the time given if:		i) No tolerance permitted in respect of objects posing danger to traffic safety.	The road must always be clean and free of soil, debris, trash and other objects, which must be removed within the time given if:		i) No tolerance permitted in respect of objects posing danger to traffic safety.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
	- they pose a danger to traffic; such as rocks, fallen trees, dead animals, abandoned vehicles, fly tipping and other large obstacles etc	Within 3 hours after detection	ii) In case of no danger to traffic safety, the per-mitted maximum length of the road below the defined service level does not exceed more than 5 percent in any sub-section of 200 m length	- they pose a danger to traffic; such as rocks, fallen trees, dead animals, abandoned vehicles, fly tipping and other large obstacles etc	Within 4 hours after detection	ii) In case of no danger to traffic safety, the permitted maximum length of the road below the defined service level does not exceed more than 5 percent in any sub-section of 200 m length
	Material washed on to the road after storms/slides	Within 3 days after detection	Example [Say A sub-section is 200 m long The length below the defined service level must not exceed 10m in the sub-section.	- material washed on to the road after storms/ slides	Within 5 days after detection (3 days for urban roads)	Example [Say A sub-section is 200 m long The length below the defined service level must not exceed 10m in the sub-section.
2. Potholes	All visible potholes must be repaired	Visible potholes must be attended to within 2 days after detection. Potholes causing safety hazard to be repaired within 24 hours after detection.	No tolerance permitted.	All visible potholes must be repaired	Visible potholes must be attended to within 2 days after dete2ction. Potholes causing safety hazard to be repaired within 24 hours after detection.	The permitted maximum dimension of any single pothole is 150mm. diameter. The permitted number of accumulated potholes either smaller than 150mm diameter, in any continuous 1km section is 3.
3. Cracking in Flexible Pavement	All cracks more than 3mm in width must be repaired.	Within 1 week after detection	The permitted maximum cracked area does not exceed 5 percent of the area in any sub-section of 200 m length Example [Say area of sub-section of 200 m length = 7m x200 = 1400sqm. Area of cracking not to exceed 70 sqm in the sub-section.	All cracks more than 3mm must be repaired.	Within 2 weeks after detection	The permitted maximum cracked area does not exceed 10 percent of the area in any sub-section of 200 m length Example [Say area of sub-section of 200 m length = 7m x200 = 1400 sqm. Area of cracking not to exceed 140 sqm in the sub-section.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
4. Multiple cracks in the pavement	All multiple cracks must be repaired.	Within 1 week after detection	In any case, the permitted maximum multiple cra-cked area does not exceed 2 percent of the area in any sub-section of 200 m length Example [Say area of sub-section of 200 m length = 7m x200 = 1,400sqm. Area of cracking not to exceed 28 sqm in the sub-section.	All multiple cracks must be repaired	Within 2 weeks after detection	In any case, the permitted maximum multiple cracked area does not exceed 2 percent of the area in any sub-section of 200 m length
5. Rutting	All rutting of more than 2cm deep must be repaired.	Within 28 days after detection	The permitted maximum rutted area of more than 2cm deep does not exceed 2 percent of the area in any sub-section of 200m length. Example [Say area of sub-section of 200 m length = 7m x200 = 1,400sqm. Area of rutting not to exceed 28 sqm in the sub-section.	All rutting of more than 2cm deep must be repaired.	The location and the condition of rutting must be reported to the Project Manager by the Contractor at the Formal Inspection	Not Applicable
6. Raveling	All ravelled areas that are more than 5mm deep must be repaired.	Within 28 days after detection	The permitted maximum ravelled area does not exceed 2 percent of the area in any sub-section of 200 m length Example [Say area of sub-section of 200 m length = 7m x200 = 1,400sqm. Area of cracking not to exceed 28 sqm in the sub-section.	All ravelled areas that are more than 5mm deep must be repaired.	The location and the condition of rutting must be reported to the Project Manager by the Contractor at the Formal Inspection	Not Applicable
7. Loose pavement edges	All loose pavement edges, and/ or pieces of pavement breaking off at the edges must be made good.	Within 1 week after detection.	The permitted maximum affected length does not exceed 2 percent of the any sub-section of 200 m length Example	All loose pavement edges, and/or pieces of pavement breaking off at the edges must be made good.	Within 2 weeks after detection.	The permitted maximum affected length does not exceed 2 percent of the any sub-section of 200 m length Example

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
			[Say sub-section of 200 m length and the affected length of pavement edges not to exceed 4m in the sub-section.			[Say sub-section of 200 m length and. The affected length of pavement edges not to exceed 4m in the sub-section.
8. Height of shoulders vs. height of pavement (Drop off)	At all sections, difference in height at edge of pavement must be maintained to less than 5cm	Within 1 week after detection	The permitted maximum affected length of difference in height does not exceed 2 percent of the any sub-section of 200 m length Example [Say sub-section of 200 m length and. The affected length of difference in height not to exceed 4m in the sub-section.	At all sections, difference in height at edge of pavement must be maintained to less than 5cm	Within 2 weeks after detection	The permitted maximum affected length of difference in height does not exceed 2 percent of the any sub-section of 200 m length Example [Say sub-section of 200 m length and. The affected length of difference in height not to exceed 4m in the sub-section.
9. Paved shoulders	All paved shoulders must be: 1) repaired to avoid water penetration 2) without deformations and erosion so that the cross fall is not less than the camber on the paved surface 3) free of visible potholes, cracks wider than 3mm, multiple cracks and rutting of more than 2cm.	Within 2 weeks after detection	The permitted maximum affected area or length does not exceed each of the following tolerances: 1) Cross fall not less than the camber on the paved surface for more than 4 percent of the area in any sub-section of 200 m length 2) The permitted maximum cracked area with cracks of 3 mm wide does not exceed 10 percent of the area in any sub-section of 200 m length.	All paved shoulders must be: 1) repaired to avoid water penetration 2) without deformations and erosion so that the cross fall is not less than the camber on the paved surface 3) free of visible potholes, cracks wider than 3mm, multiple cracks and rutting of more than 2cm.	Within 28 days after detection	The permitted maximum affected area or length does not exceed each of the following tolerances 1) Cross fall not less than the camber on the paved surface for more than 4 percent of the area in any sub-section of 200 m length 2) The permitted maximum dimension of any single pothole is 150mm diameter. The permitted number of accumulated potholes either smaller than 150mm diameter, or less than 4 cm depth in any continuous 1km section is 3. 3) The permitted maximum cracked area with cracks of 3mm wide does not exceed 10 percent of the area in any sub-section of 200 m length.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
			3) The permitted maximum multiple cracked area does not exceed 4 percent of the area in any sub-section of 200 m length 4) The permitted maximum rutted area of more than 4cm deep does not exceed 5 percent of the area in any sub-section of 200m length. 5) The permitted maximum affected length of difference in height does not exceed 4 percent of the any sub-section of 200 m length.			4) The permitted maximum multiple cracked area does not exceed 4 percent of the area in any sub-section of 200 m length 5) The permitted maximum rutted area of more than 4cm deep does not exceed 5 percent of the area in any sub-section of 200m length. 6) The permitted maximum affected length of difference in height does not exceed 4 percent of the any sub-section of 200 m length.
10. Cracks in concrete pavement	All cracks more than 0.2 mm in width must be sealed – Cracks more than 3.0 mm – Cracks between 0.5 mm to 3.0 mm – Cracks up to 0.5 mm	Within 1 week after detection Within 2 weeks days after detection	Example [Say area of sub-section of 200 m length = 7m x200 = 1400 sqm. Area of cracking not to exceed 14 sqm in the sub-section.	– Cracks more than 3.0 mm – Cracks between 0.5mm to 3.0 mm	Within 1 week after detection Within 2 week after detection within one month after detection	The permitted maximum cracked area does not exceed 1 percent of the area in any sub-section of 200 m length Example [Say area of sub-section of 200 m length = 7m x200 = 1400sqm. Area of cracking not to exceed 14 sqm in the sub-section.
11. Interlocking Block Pavement	All interlocking block pavement must be: 1) Without deformations and depression so that the cross fall allows for free flowing water so that there isn't any water ponding. 2) Free of visible defects and missing pieces.	Within 24 hours after detection.	The permitted maximum affected area does not exceed each of the following tolerances: 1) No ponding water allowed on the paved surface for more than 4 percent of the area in any sub-section of 200 m length	All interlocking block pavement must be: 1) Without deformations and depression so that the cross fall allows for free flowing water so that there isn't any water ponding. 2) Free of visible defects and missing pieces.	Within 2 days after detection.	The permitted maximum affected area does not exceed each of the following tolerances 1) No ponding water allowed on the paved surface for more than 4 percent of the area in any sub-section of 200 m length

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
12. Medians	1) The medians must always be clean, free of debris and objects which must be removed within the time given if they pose danger to traffic safety	– Within 3 days after detection	1) No tolerance permitted in respect of objects posing danger to traffic safety.	Not Applicable	Not Applicable	Not Applicable
	2) The level of filling in the median should be maintained such that no fill material spills onto the carriageway	– Within 2 weeks after detection	2) No tolerance permitted in respect of spillage of fill materials.			
	3) Median plantations must be maintained properly with watering and pruning as required from time to time. The height of plantations must not exceed 1m at any time. There must be no obstruction in sight distance and no fallen plantations on roadway are allowed.	– Pruning of shrubs within 2 weeks after detection	3) No tolerance permitted in respect of median plantation maintenance and obstruction in sight distance			
ROAD DURABILITY						
C) Drainage						
1. Side Drains, Mitre Drains, Cut off drains (Lined)	Must be clean and free of obstructions to ensure free flowing conditions at all times	-Siltation/ Obstruction must be cleared within 3 days after detection	The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Must be clean and free of obstructions to ensure free flowing conditions at all times	-Siltation/ Obstruction must be cleared within 1 week after detection	The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.
		– Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 1 week after detection			- Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 2 weeks after detection	

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
		- Tolerance: Siltation and obstruction must always be less than 50mm in depth -Replace damaged covers and drain linings within 1 week after detection.			- Tolerance; Siltation and obstruction must be less than 50mm in depth -Replace damaged covers and drain lining within 2 weeks after detection.	
2. Side Drains, Mitre Drains, Cut off drains (Unlined)	Must be clean and free of obstructions to ensure free flowing conditions at all times	-Siltation/ Obstruction must be cleared within 3 days after detection - Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 2 weeks after detection - Tolerance: Siltation and obstruction must always be less than 50mm in depth above the designed depth.	The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Must be clean and free of obstructions to ensure free flowing conditions at all times	-Siltation/ Obstruction must be cleared within 1 week after detection - Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 2 weeks after detection - Tolerance: Siltation and obstruction must always be less than 50mm in depth above the designed depth.	The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
3. Culverts and Access Drifts	Must be clean and free of obstacles and without structural damage to ensure free flowing conditions at all times	-Siltation/ Obstruction must be cleared within 3 days after detection	The permitted maximum tolerance is 5 percent of the length of culverts and access drifts below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Must be clean and free of obstacles and without structural damage to ensure free flowing conditions at all times	-Siltation/ Obstruction must be cleared within 7 days after detection	The permitted maximum tolerance is 5 percent of the length of culverts and access drifts below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.
		- Damages including headwalls which jeopardize functionality or safety of structure or pose danger to traffic must be repaired within 2 weeks after detection			- Damages that jeopardize functionality or safety of structure or pose danger to traffic must be repaired within 3 weeks after detection	
		- Tolerance: Siltation and obstruction must be less than 50mm in depth			- Tolerance; Siltation and obstruction must be less than 50mm in depth	
		- Broken culverts to be replaced within 1 week after detection			- broken culverts to be replaced within 1 week after detection	
4. Scour Checks, gabions and erosion protection structures	Erosion protection structures must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users	Damage which jeopardizes functionality or safety of structure or poses safety hazard to road users must be repaired within 1 week after detection	The permitted maximum tolerance is 5 percent of the length of scour checks and other erosion protection structures below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Erosion protection works must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users	Damage which jeopardizes functionality or safety of structure or poses safety hazard to road users must be repaired within 1 week after detection	The permitted maximum tolerance is 5 percent of the length of scour checks and other erosion protection structures below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
		Other minor repair works to be repaired within 2 weeks after detection.			Other minor repair works to be repaired within 2 weeks after detection.	
5. Manholes and Gulley pots	Must be clean and free from obstructions and without structural damage and ensure free flowing conditions	-Siltation/ Obstruction must be cleared within 3 days after detection	The permitted maximum tolerance is 5 percent of the number of manholes and gulley pots below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Must be clean and free from obstructions and without structural damage and ensure free flowing conditions	-Siltation/ Obstruction must be cleared within 1 week after detection	The permitted maximum tolerance is 5 percent of the number of manholes and gulley pots below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.
		- Tolerance: Siltation and obstruction must be less than 50mm in depth			- Tolerance: Siltation and obstruction must be less than 50mm in depth	
		- Damaged manholes and gulley pots must be repaired within 1 week after detection			- Damaged manholes and gulley pots must be repaired within 1 week after detection	
D) Vegetation						
1. Vegetation free zone	Carriageway, shoulders and structures must be kept with no vegetation.	- Height: 0mm at all times	No tolerance permitted	Carriageway, shoulders and structures must be kept with no vegetation.	- Height: 0mm at all times	No tolerance permitted
2. Outer/inner vegetation	-Inner vegetation zone, edge of shoulders to back of side drain/ ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of vegetation around street furniture and other features.	Height: 25mm (min) to 150mm (Max) at all times	5% tolerance permitted	-Inner vegetation zone, edge of shoulders to back of side drain/ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of vegetation around street furniture and other features.	Height: 25mm (min) to 150mm (Max) at all times	5% tolerance permitted
	-outer vegetation zone, excluding inner zone.	25mm (min) to 300mm (max) at all times	5% tolerance permitted	-outer vegetation zone, excluding inner zone.	25mm (min) to 300mm (max) at all times	5% tolerance permitted

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
3. Growth encroaching into vegetation free zone from the side or top	Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained The level applies to vegetation control including trees, scrub or branches hanging over the zone	-Within 1 week after detection	No tolerance permitted.	Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained The level applies to vegetation control including trees, scrub or branches hanging over the zone	-Within 1 week after detection	The permitted maximum affected length does not exceed 2 percent of the any sub-section of 200 m length of the road Example [Say sub-section of 200 m length. The affected length of growth approaching into vegetation free zone from the side or top does not exceed 4m in the sub-section.
4. Trees within ROW	Trees within ROW outside of the drains must be protected as necessary	At the end of the month	The permitted maximum tolerance is 5 percent of the number of trees below the defined Service Level in any sub-section of 200 m length of the road.	Trees within ROW outside of the drains must be protected as necessary	At the end of the month	The permitted maximum tolerance is 5 percent of the number of trees below the defined Service Level in any sub-section of 200 m length of the road.
E) Structures						
1. Concrete structures	Concrete structures must be in good condition and fully functional. Any drainage system (e.g. weep holes) forming a part of the concrete structure will be kept the same	In case of any condition which threatens structural integrity of the concrete structure, the Contractor must immediately notify the Project Manager. Damage and defects must be repaired within 1 week of detection.	No tolerance permitted However, concrete structures pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.	Concrete structures must be in good condition and fully functional. Any drainage system (e.g. weep holes) forming a part of the concrete structure will be kept the same	The location and condition detected must be reported to the Client at Formal Inspection for further action. Concrete structures pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.	Not Applicable

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
2. Steel structures	The steel structures (e.g. Bridge and pedestrian bridge) must be clean, in good condition, free of corrosion and fully functional.	In case of any condition which threatens structural integrity of the steel structure, the Contractor must immediately notify the Project Manager.	No tolerance permitted	The steel structures (e.g. Bridge and pedestrian bridge) must be clean, in good condition, free of corrosion and fully functional.	In case of any condition which threatens structural integrity of the steel structure, the Contractor must immediately notify the Project Manager.	No tolerance permitted
		Obstacles and debris must be removed from the structure within 3 days of detection.	However, steel structures pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.		Obstacles and debris must be removed from the structure within 1 week of detection.	However, steel structures pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.
3. Bridge expansion joints	All expansion joints must be clean and in good condition	In case of any condition which threatens structural integrity of the expansion joint, the Contractor must immediately notify the Project Manager.	No tolerance permitted	All expansion joints must be clean and in good condition	In case of any condition which threatens structural integrity of the expansion joint, the Contractor must immediately notify the Project Manager.	No tolerance permitted
		Repairable damages and defects must be repaired within 1 week of detection.	However, expansion joints pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.		Repairable damages and defects must be repaired within 1 week of detection.	However, expansion joints pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.
4. Riverbeds	1) Riverbeds must be maintained to ensure free flow of water under the bridge and up to 50 meters upstream and downstream of the river at all times	– In case of any condition which threatens structural stability of the riverbed and water flow movement, the Contractor must immediately notify the Project Manager.	No tolerance permitted	1) Riverbeds must be maintained to ensure free flow of water under the bridge and up to 50 meters upstream and downstream of the river at all times	In case of any condition which threatens structural stability of the riverbed and water flow movement, the Contractor must immediately notify the Project Manager.	No tolerance permitted

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
	2) The design clearance of the river under the bridge must be maintained at all times 3) Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times.	– Causes for non-compliance must be eliminated within 2 weeks after water has sufficiently receded to allow working conditions.	However, the damaged portion pending repairs maybe left on site with proper signs and safety arrangements.	2) The design clearance of the river under the bridge must be maintained at all times 3) Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times.	Causes for non-compliance must be eliminated within 2 weeks after water has sufficiently receded to allow working conditions	However, the damaged portion pending repairs maybe left on site with proper signs and safety arrangements.
F) Road Furniture						
1. Warning signs / Mandatory signs	All signage must be present, complete, clean, legible, reflective and firmly installed	– Missing or defective signs must be replaced within 24 hours of detection	The permitted maximum tolerance is 5 percent of the number of warning/mandatory signs below the defined Service Level in any sub-section of 200 m length of the road.	All signage must be present, complete, clean, legible, reflective and firmly installed	Missing or defective signs must be replaced within 24 hours of detection	The permitted maximum tolerance is 5 percent of the number of warning/ mandatory signs below the defined Service Level in any sub-section of 200 m length of the road.
2. Information Signs, Edge marker Post, Guide Post, Kilometre post	All signage must be present, complete, clean, legible, reflective and firmly installed	– Information signs; Missing or defective signs must be replaced within 2 days of detection – Edge marker post, guidance post, Kilometre post: Missing or defective signs must be replaced within 1 month of detection	The permitted maximum tolerance is 5 percent of the number of information signs, edge marker posts and guide posts below the defined Service Level in any sub-section of 200 m length of the road.	All signage must be present, complete, clean, legible, reflective and firmly installed	– Information signs; Missing or defective signs must be replaced within 1 week of detection – Edge marker post, guidance post, Kilometre post: Missing or defective signs must be replaced within 1 month of detection	The permitted maximum tolerance is 5 percent of the number of information signs, edge marker posts and guide posts below the defined Service Level in any sub-section of 200 m length of the road.
3. Traffic Signals	All traffic signals must be clean, operational and well synchronized	-Within 24 hours of detection	No tolerance permitted	All traffic signals must be clean, operational and well synchronized	Within 24 hours of detection	No tolerance permitted

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
4. Street Lighting	Road must always be well lit during the specified hours at night.	– Within 24 hours for replacement of bulbs upon detection – Other defects must be repaired within 3 days after detection	The permitted maximum tolerance is 5 percent of the length of the road equipped with street lighting is below the defined Service Level at any sub-section of 200 m length of the road.	Road must always be well lit during the specified hours at night.	– Within 24 hours for replacement of bulbs upon detection – Other defects must be repaired within 3 days after detection	The permitted maximum tolerance is 5 percent of the length of the road equipped with street lighting is below the defined Service Level at any sub-section of 200 m length of the road.
5. Road Markings/Road Studs	All road markings/road studs including 'cats eyes' are clear, visible and functional.	Faded road markings are painted and damaged road reflectors are restored -Within 4 weeks of detection if the reflection factor is less than 35% of the specified design value.	The permitted maximum tolerance is 5 percent of the area of road markings and the number of road studs below the defined Service Level combined together in any sub-section of 200 m length of the road.	All road markings/road studs including 'cats eyes' are clear, visible and functional.	Faded road markings and road reflectors are reported to the Client by the Contractor at Formal Inspection	Not Applicable
6. Guardrails and pedestrian rails	Guardrails must be in good condition and fully functional.	In case of any condition which threatens structural integrity of the guardrails, the Contractor must immediately notify the Project Manager. Damage and defects must be repaired/ replaced within 1 week of detection.	No tolerance permitted However, guardrails pending repairs/ replacement of the damaged portion maybe left on site with proper signs and safety arrangements.	Guardrails must be in good condition and fully functional.	In case of any condition which threatens structural integrity of the guardrails, the Contractor must immediately notify the Project Manager. Damage and defects must be repaired/ replaced within 2 days of detection.	No tolerance permitted However, guardrails pending repairs/ replacement of the damaged portion maybe left on site with proper signs and safety arrangements.
G) Profile and Road Width	Not applicable					
H) Embankment and Slopes						
1. Embankment slopes	All embankment slopes must be without deformations/damages and erosions of more than 100 mm in depth.	-Within 1 week of detection	The permitted maximum tolerance is 5 percent of the length of the road with embankment slopes is below the defined Service Level at any sub-section of 200 m length of the road.	All embankment slopes must be without deformations/damages and erosions of more than 100mm in depth.	-Within 1 week of detection	The permitted maximum tolerance is 5 percent of the length of the road with embankment slopes is below the defined Service Level at any sub-section of 200 m length of the road.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
2. Slopes in Cuts	All slopes in cuts must be stable	Fallen slope material must be removed Quantities below 50m3 per Km section -from pavement within 4hrs after detection -from shoulders within 2days after detection. Quantities between 50m3 and 500m3 per Km section; -from pavement within 24hrs after detection. –from shoulders within 4 days after detection	No tolerance permitted	All slopes in cuts must be stable	Fallen slope material must be removed Quantities below 50m3 per Km section -from pavement within 4hrs after detection -from shoulders within 2 days after detection. Quantities between 50m3 and 500m3 per Km section; -from pavement within 24hrs after detection. –from shoulders within 4 days after detection	No tolerance permitted

Appendix 2 Standard Service Level (Unpaved Road)

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
ROAD USABILITY						
A) Road Usability						
1. Passability	The Contractor must ensure the entire road length provides passability of traffic	Maximum non passability of 12 hours after detection	No tolerance permitted	The Contractor must ensure the entire road length provides passability of traffic	Maximum non-passability of 24hours after detection	No tolerance permitted
2.Traffic Regulatory Control Signs	The following signs must be complete, clean, legible and structurally sound at all times; – STOP – GIVE WAY	Missing or defective signs must be replaced within 3 days after detection.	No tolerance permitted	Not applied	Not applied	Not applied
3. Road Works Advance warning signs	– Warning signs must be placed when clearing works are required to be undertaken	Within 6 hours after detection of defects or materials washed on to the road	No tolerance permitted	– Warning signs must be placed when clearing works are required to be undertaken	Within 12 hours after detection of defects or materials washed on to the road	No tolerance permitted
4.Average Traffic Speed or Roughness (only used if Roughness is measured, and bump integrator is not available) Note – Roughness represents an average value of road surface levels which is in effect also measured through a number of other Service Levels	– Average Traffic Speed 60km/hr (Equivalent to IRI of 11) using a 4WD pickup (TOYOTA Hilux*) comfortably without causing any damage. (The road must at all times be kept to an acceptable level of smoothness. The IRI shall not exceed the specified level. For each one-km section the IRI shall not exceed 11.) *Definition of a standard vehicle for use in checking compliance should be specified in the contract.	5 days after detection.	*The Contractor must ensure that the standard vehicle defined in the Specifications is able to travel in a safe manner on the road at a specified minimum average speed. The section will then be travelled in a normal and safe fashion, in a vehicle provided by the Contractor and driven by a driver provided by the Contractor. The driver must at all times respect the traffic regulations, in particular a maximum speed limit. The time for unforeseen stops which are unrelated to the road condition (such as checkpoints, breakdowns or other incidents) is to be deducted from the overall travel time.	– Average Traffic Speed 45km/hr (Equivalent to IRI of 15) using a 4WD pickup (TOYOTA Hilux*) comfortably without causing any damage. (The road must at all times be kept to an acceptable level of smoothness. The IRI shall not exceed the specified level. For each one-km section the IRI shall not exceed 15.) *Definition of a standard vehicle for use in checking compliance should be specified in the contract.	5 days after detection.	*The Contractor must ensure that the standard vehicle defined in the Specifications is able to travel in a safe manner on the road at a specified minimum average speed. The section will then be travelled in a normal and safe fashion, in a vehicle provided by the Contractor and driven by a driver provided by the Contractor. The driver must at all times respect the traffic regulations, in particular a maximum speed limit. The time for unforeseen stops which are unrelated to the road condition (such as checkpoints, breakdowns or other incidents) is to be deducted from the overall travel time.

ITEMS	**High**			**Standard**		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
5.Minimum Traffic Speed	– Minimum traffic speed 40km/hr • The Contractor has to ensure that the standard vehicle (with the 4WD disengaged) is able to travel in a safe manner on the road and such that the road surface conditions never constrain the vehicle speed to fall below the specified minimum speed on any point on the road surface in a one-km section.	5 days after detection.	No tolerance permitted	– Minimum traffic speed 30km/hr • The Contractor has to ensure that the standard vehicle (with the 4WD disengaged) is able to travel in a safe manner on the road and such that the road surface conditions never constrain the vehicle speed to fall below the specified minimum speed on any point on the road surface in a one-km section.	5 days after detection.	No tolerance permitted
ROAD USER COMFORT						
B) Pavement, Shoulders and ROW						
1. Road Cleanliness	The road must always be clean and free of soil, debris, trash and other objects, which must be removed within the time given if:		i) No tolerance permitted in respect of objects posing danger to traffic safety.	The road must always be clean and free of soil, debris, trash and other objects, which must be removed within the time given if:		i) No tolerance permitted in respect of objects posing danger to traffic safety.
	– they pose danger to traffic; such as rocks, fallen trees, dead animals, abandoned vehicles, fly tipping and other large obstacles etc.	Within 12 hours after detection	ii) In case of no danger to traffic safety, the permitted maximum length of the road below the defined service level does not exceed more than 5 percent in any sub-section of 200 m length Example	- they pose danger to traffic; such as rocks, fallen trees, dead animals, abandoned vehicles, fly tipping and other large obstacles etc.	Within 24 hours after detection	ii) In case of no danger to traffic safety, the permitted maximum length of the road below the defined service level does not exceed more than 5 percent in any sub-section of 200 m length Example
	– material washed on to the road after storms/slides	Within 1 week after detection	[Say A sub-section is 200 m long The length below the defined service level must not exceed 10m in the sub-section.	- material washed on to the road after storms/slides	Within 2 weeks after detection	[Say A sub-section is 200 m long The length below the defined service level must not exceed 10m in the sub-section.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
2. Corrugation spacing	Maximum spacing = 3.0 cm. Maximum spacing at any single point of the road measured anywhere in a one-km section shall not exceed the stated value.	– Within 1 week after detection	The permitted corrugated area does not exceed 5 percent of the area in any sub-section of 200m length. Example [Say area of sub-section of 200 m length=7m x200m =1,400 sqm. Area of corrugation not to exceed 70 sqm in the sub-section.	Maximum spacing = 3.0 cm • Maximum spacing at any single point of the road measured anywhere in a one-km section shall not exceed the stated value.	– Within 2 weeks after detection	The permitted corrugated area does not exceed 5 percent of the area in any sub-section of 200m length. Example [Say area of sub-section of 200 m length=7m x200m =1,400 sqm. Area of corrugation not to exceed 70 sqm in the sub-section.
3. Rut Depth	All rutting of more than 7cm must be repaired. The maximum rut depth measured anywhere on a one-km section shall not exceed the stated value.	– Within 1 weeks after detection	The permitted maximum rutted area does not exceed 5 percent of the area in any sub-section of 200m length. Example [Say area of sub-section of 200 m length=7m x200m =1,400 sqm. Area of rutting not to exceed 70 sqm in the sub-section.	All rutting of more than 10cm must be repaired. The maximum rut depth measured anywhere on a one-km section shall not exceed the stated value.	– within 2 weeks after detection	The permitted maximum rutted area does not exceed 5 percent of the area in any sub-section of 200m length. Example [Say area of sub-section of 200 m length=7m x200m =1,400 sqm. Area of rutting not to exceed 70 sqm in the sub-section.
4. Potholes	Maximum permitted area of any single degradation in a one-km section of 25cm diameter, depth 5cm. Maximum permitted area in a one-km section measured in any 30m road length selected by the Project Manager = 1.0 m2 For each one-km section of road i) no individual degradation shall have an area greater than the value specified and/or ii) the total area of degradations in any 30m section selected by the Project Manager shall be less than the value specified	– Within 1 weeks after detection	The permitted maximum area does not exceed 5 percent of the area in any sub-section of 200m length.	Maximum permitted area of any single degradation in a one-km section of 35cm diameter, depth 5cm. Maximum permitted area in a one-km section measured in any 30m road length selected by the Project Manager = 1.0 m2 For each one-km section of road i) no individual degradation shall have an area greater than the value specified and/or ii) the total area of degradations in any 30m section selected by the Project Manager shall be less than the value specified	– Within 2 weeks after detection	The permitted maximum area does not exceed 5 percent of the area in any sub-section of 200m length.

ITEMS	**High**			**Standard**		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
ROAD DURABILITY						
C) Drainage						
1. Side Drains, Mitre Drains, Cut off drains	Must be clean and free of obstructions to ensure free flowing conditions at all times	-Siltation/Obstruction must be cleared within 1 week after detection – Tolerance: Minimum depth of drains of 30cm. – Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 2 weeks – Replace damaged drain covers and drain lining within 2 weeks after detection	The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Must be clean and free of obstructions to ensure free flowing conditions at all times	Siltation/Obstruction must be cleared within 2 weeks after detection – Tolerance: Minimum depth of drains of 30cm. – Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 4 weeks – Replace damaged drain covers and drain lining within 4 weeks after detection	The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.
2. Culverts and Access Drifts	Must be clean and free from obstacles and without structural damage. To ensure free flowing conditions at all times	-Siltation/Obstruction must be cleared within 1 week after detection – Damages including headwalls which jeopardize functionality or safety of structure or poses danger to traffic must be repaired within 2 weeks after detection	The permitted maximum tolerance is 5 percent of the length of culverts and access drifts below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Must be clean and free of obstacles and without structural damage. Must be firmly contained by surrounding soil or material	– Siltation/ Obstruction must be cleared within 2 weeks after detection – Damages including headwalls which jeopardize functionality or safety of structure or poses danger to traffic must be repaired within 4 weeks after detection	The permitted maximum tolerance is 10 percent of the length of culverts and access drifts below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
		– Tolerance; Siltation and obstruction must be less than 50 mm in depth – broken culverts to be replaced within 2 weeks after detection			– Tolerance; Siltation and obstruction must be less than 50mm in depth – broken culverts to be replaced within 4 weeks after detection	
3. Scour Checks, Gabions and other erosion protection structures	Erosion protection works must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users	Damage which jeopardizes functionality or safety of structure or poses safety hazard to road users must be repaired within 1 week after detection Other minor repair works to be repaired within 2 weeks after detection.	The permitted maximum tolerance is 5 percent of the length of scour checks and other erosion protection structures below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.	Erosion protection works must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users	Damage which jeopardizes functionality or safety of structure or poses safety hazard to road users must be repaired within 2 weeks after detection Other minor repair works to be repaired within 4 weeks after detection	
D) Vegetation						
1. Vegetation free zone	Carriageway, shoulders and structures must be kept with no vegetation.	– Height: 0mm at all times	The permitted maximum affected length does not exceed 5 percent of the any sub-section of 200 m length of the road	Carriageway, shoulders and structures must be kept with no vegetation.	– Height: 0mm at all times	The permitted maximum affected length does not exceed 5 percent of the any sub-section of 200 m length of the road
2. Outer/inner vegetation	– Inner vegetation zone, edge of road to back of side drain/ ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of vegetation around street furniture and other features.	Height: 25mm (min) to 300mm (max) at all times	The permitted maximum affected length does not exceed 5 percent of the any sub-section of 200 m length of the road	– Inner vegetation zone, edge of road to back of side drain/ ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of vegetation around street furniture and other features.	Height: 25mm (min) to 300mm (max) at all times	The permitted maximum affected length does not exceed 5 percent of the any sub-section of 200 m length of the road
	– outer vegetation zone, excluding inner zone	Height: 25mm (min) to 500mm (max) at all times		– outer vegetation zone, excluding inner zone	Height: 25mm (min) to 500mm (max) at all times	

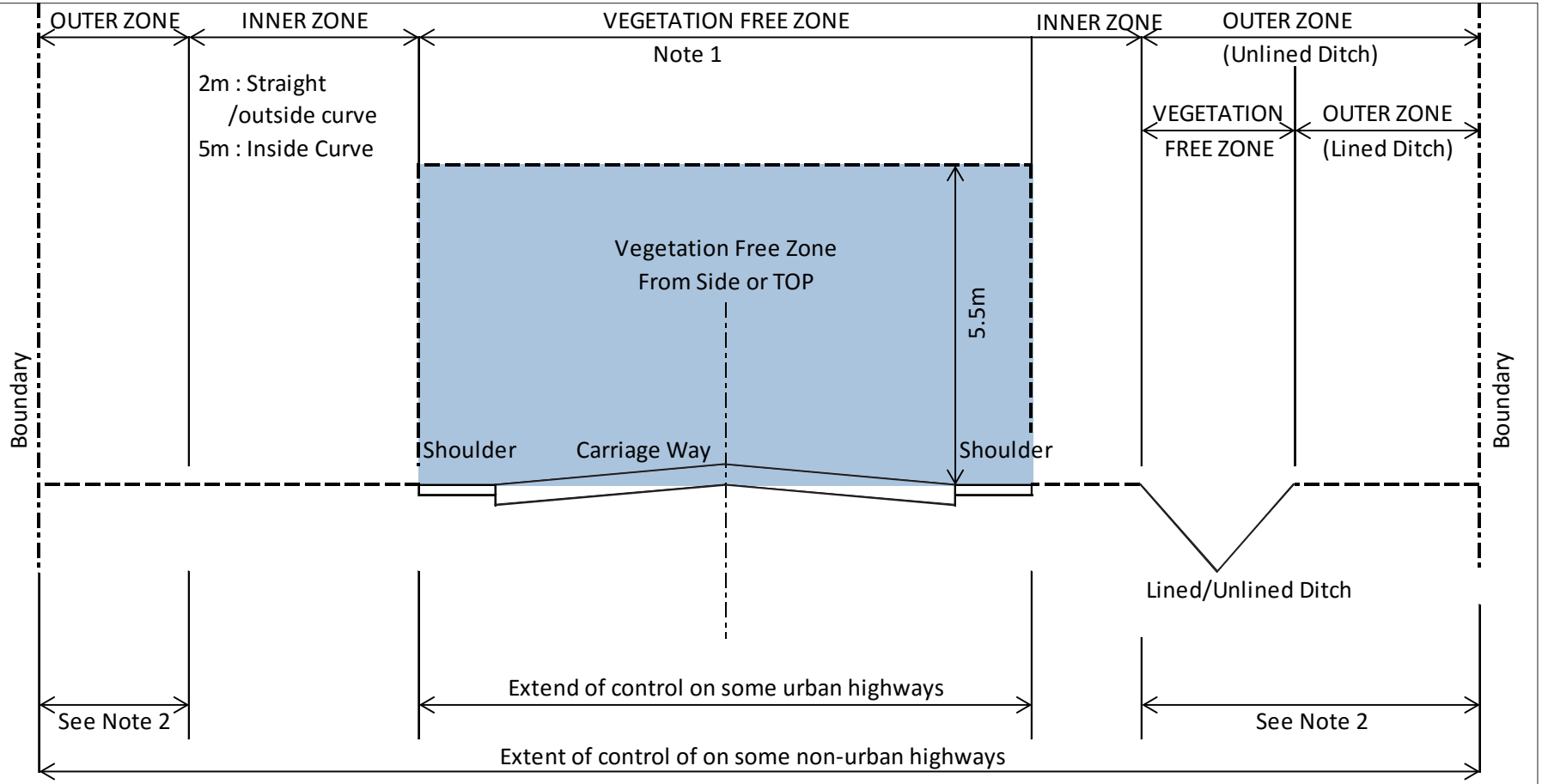
ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
3. Growth encroaching into vegetation free zone from the side or top	Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained The level applies to vegetation control including trees, scrub or branches hanging over the zone	-Within 1 week after detection	No tolerance permitted	Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained The level applies to vegetation control including trees, scrub or branches hanging over the zone	-Within 2 weeks after detection	The permitted maximum affected length does not exceed 5 percent of the any sub-section of 200 m length of the road Example: [Say sub-section of 200 m length and. The affected length of growth approaching into vegetation free zone from the side or top does not exceed 10m in the sub-section.
4. Trees within ROW	Trees within ROW must be protected as necessary	At the end of the month	The permitted maximum tolerance is 5 percent of the number of trees below the defined Service Level in any sub-section of 200 m length of the road.	Trees within ROW must be protected as necessary	At the end of the month	The permitted maximum tolerance is 5 percent of the number of trees below the defined Service Level in any sub-section of 200 m length of the road.
Structures.						
1. Concrete structures	Concrete structures including beams must be in good condition and fully functional. Any drainage system (e.g. weep holes) forming a part of the concrete structure will be kept the same	In case of any condition which threatens structural integrity of the concrete structure, the Contractor must immediately notify the Project Manager.	No tolerance permitted	Concrete structures including beams must be in good condition and fully functional. Any drainage system (e.g. weep holes) forming a part of the concrete structure will be kept the same	The location and condition detected must be reported to the Client at Formal Inspection for further action.	Not Applicable
		Damage and defects must be repaired within 1 week after detection.	However, concrete structures pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.		Concrete structures pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.	
2. Bridge expansion joints	All expansion joints must be clean and in good condition	In case of any condition which threatens structural integrity of the expansion joint, the Contractor must immediately notify the Project Manager.	No tolerance permitted	All expansion joints must be clean and in good condition	In case of any condition which threatens structural integrity of the expansion joint, the Contractor must immediately notify the Project Manager.	No tolerance permitted

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
		Damage and defects must be repaired within 1 week after detection.	However, expansion joints pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.		Repairable damages and defects must be repaired within 2 weeks after detection.	However, expansion joints pending repairs of the damaged portion maybe left on site with proper signs and safety arrangements.
3. Riverbeds	1) Riverbeds must be maintained to ensure free flow of water under the bridge and up to 50 meters upstream and downstream of the river at all times	-In case of any condition which threatens structural stability of the riverbed and water flow movement, the Contractor must immediately notify the Project Manager.	No tolerance permitted	1) Riverbeds must be maintained to ensure free flow of water under the bridge and up to 50 meters upstream and downstream of the river at all times	In case of any condition which threatens structural stability of the riverbed and water flow movement, the Contractor must immediately notify the Project Manager.	No tolerance permitted
	2) The design clearance of the river under the bridge must be maintained at all times	-Causes for non-compliance must be eliminated within 2 weeks after water has sufficiently receded to allow working conditions.	However, the damaged portion pending repairs maybe left on site with proper signs and safety arrangements.	2) The design clearance of the river under the bridge must be maintained at all times	Causes for non-compliance must be eliminated within 4 weeks after water has sufficiently receded to allow working conditions	However, the damaged portion pending repairs maybe left on site with proper signs and safety arrangements.
	3) Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times.			3) Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times.		
F) Road Furniture						
1.Warning signs / Mandatory signs	All signage must be present, complete, clean, legible, reflective and firmly installed	-Missing or defective signs must be replaced within 1 week after detection	The permitted maximum tolerance is 5 percent of the number of warning/ mandatory signs below the defined Service Level in any sub-section of 200 m length of the road.	All signage must be present, complete, clean, legible, reflective and firmly installed	Missing or defective signs must be replaced within 2 weeks after detection	The permitted maximum tolerance is 5 percent of the number of warning/mandatory signs below the defined Service Level in any sub-section of 200 m length of the road.
2. Information Signs, Edge marker Post, Guidance Post, Kilometre post	All signage must be present, complete, clean, legible, reflective and firmly installed	- Information signs: Missing or defective signs must be replaced within 2 weeks after detection	The permitted maximum tolerance is 5 percent of the number of information signs, edge marker posts and guide posts below the defined Service Level in any sub-section of 200 m length of the road.	All signage must be present, complete, clean, legible, reflective and firmly installed	- Information signs: Missing or defective signs must be replaced within 4 weeks after detection	The permitted maximum tolerance is 5 percent of the number of information signs, edge marker posts and guide posts below the defined Service Level in any sub-section of 200 m length of the road.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
		- Edge marker post, guidance post, Kilometre post: Missing or defective signs must be replaced within 4 weeks after detection			- Edge marker post, guidance post, Kilometre post: Missing or defective signs must be replaced within 4 weeks after detection	
3. Guardrails and Pedestrian rails	Guardrails must be in good condition and fully functional.	In case of any condition which threatens structural integrity of the guardrails, the Contractor must immediately notify the Project Manager. Damage and defects must be repaired within 1 week after detection.	No tolerance permitted	Guardrails must be in good condition and fully functional.	In case of any condition which threatens structural integrity of the guardrails, the Contractor must immediately notify the Project Manager. Damage and defects must be repaired within 2 weeks after detection.	No tolerance permitted
G) Profile and Road Width						
1. Gravel Thickness	The gravel thickness along the road centre-line must be equal to the design thickness.	-Within 6 months after detection (1 trial hole every 50m to check the thickness)	No tolerance permitted	The gravel thickness along the road centre-line must be equal to the design thickness.	-Within 6 months after detection (1 trial hole every 50m to check the thickness)	No tolerance permitted
2. Camber	The camber must be kept at 5.0%.	-Within 1 week after detection	±1.0%	The camber must be kept at 5.0%.	-Within 2 weeks after detection	±1.0%
3. Usable Road Surface Width	The road width must be kept as per the design and to the minimum width of 5.4m.	-Within 1 weeks after detection	The permitted maximum length of the road, the road width of which is narrower than 5.4m does not exceed 5 percent of the length in any sub-section of 200m length. Example: [Say sub-section of 200 m length and the. length of the section narrower than 5.4m does not exceed 10m in the sub-section.	The road width must be kept as per the design and to the minimum width of 5.4m.	-Within 2 weeks after detection	The permitted maximum length of the road, the road width of which is narrower than 5.4m does not exceed 5 percent of the length in any sub-section of 200m length. Example: [Say sub-section of 200 m length and the. length of the section narrower than 5.4m does not exceed 10m in the sub-section.

ITEMS	High			Standard		
Service Scope	Service Levels	Time allowed for repairs and others	Permissible Tolerances	Service Levels	Time allowed for repairs and others	Permissible Tolerances
H) Embankment and Slopes						
1. Embankment slopes	All embankment slopes must be without deformations and erosions	-Within 1 week after detection	The permitted maximum tolerance is 10 percent of the length of the road with embankment slopes is below the defined Service Level at any sub-section of 200 m length of the road.	All embankment slopes must be without deformations and erosions	-Within 2 weeks after detection	The permitted maximum tolerance is 10 percent of the length of the road with embankment slopes is below the defined Service Level at any sub-section of 200 m length of the road.
2. Slopes in Cuts	All slopes in cuts must either be stable or are equipped with adequate retaining walls	Any of observed location must be reported to the Project Manager by the contractor at earliest possible time.	Not Applicable	All slopes in cuts must either be stable or are equipped with adequate retaining walls	Any of observed location must be reported to the Project Manager by the contractor at earliest possible time.	Not Applicable

Appendix 3 Vegetation Control



Note 1 Vegetation free zone must be maintained free of all vegetaiton

Note 2 These area must be maintained according to the local requirements

Appendix 4: Sample Work Method for Major Items

NOTE: This methodology can also be applied to other road types (Paved-Standard, Un-Paved-High & Un-Paved Standard roads).

Road Usability

Category	Road Usability		
Service Scope	Road Usability		
Service Criteria	Passability		
Performance specification * The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.	Service Level	Time allowed for repairs and others	Permissible Tolerances
	The road should always allow for passage of traffic. (Paved Road, High)	Maximum non passability of 1 hr after detection. (Paved Road, High)	No tolerance permitted. (Paved Road, High)
What to do	1. To monitor the road by regular patrols to identify any obstacles. 2. To inform of any illegal encroachment. 3. To keep records of incidents 4. Establish a call number for communication with the road users 5. Establish a linkage with local residents and roadside dwellers.		
Where to do	1. The entire stretch of the road under the contract 2. Any section of road that has been blocked by objects, obstacles etc.		
When to do	1. Any time there are any objects or obstacles that are blocking the road. 2. Routine patrol (principal method) - At least 2 times/ day for paved high Service Levels - At least 1 times/ day for paved standard Service Levels - At least 2 times/ week for unpaved high Service levels - At least 1 times/ week for unpaved standard Service Levels		
How to do	1. To monitor the road through regular patrols by the Patrol Unit to identify any objects or obstacles. 2. A reporting system by road users (additional method) – Erect public awareness information board on the road maintenance contract every 5km. – Encourage road users to report any obstructions they find on the road. 3. After the detection of objects/obstacles blocking the road, warning signs must be put in place and the contractor will be notified to remove the objects/obstacles within 1 hour.		
References	Daily Patrol Record Form **(Appendix 8)** Photo Record Form **(Appendix 9)** Incident Report Form **(Appendix 10)**		

<table>
<tr><td>Category</td><td colspan="3">Road Usability</td></tr>
<tr><td>Service Scope</td><td colspan="3">Road Usability</td></tr>
<tr><td>Service Criteria</td><td colspan="3">Road Works Advance Warning Sign</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>Warning signs and relevant safety measures as stipulated in the contract must be placed when clearing works are required to be undertaken. (Paved Road, High)</td><td>Within 1 hour after detection of defects or materials washed on to the road. (Paved Road, High)</td><td>No tolerance permitted. (Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. Put in place the necessary warning signs/relevant safety measures before the start of any works.
2. To keep records of signs and activities carried out.</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Sections of the road where clearing of the road, removal of obstacles or road works will take place.</td></tr>
<tr><td>When to do</td><td colspan="3">1. When clearing/de-siltation or removal of any obstacles on road surface.</td></tr>
<tr><td>How to do</td><td colspan="3">Before any works start, the contractor is to make sure that the necessary warning signs/relevant safety measures are strategically put in place to secure the working area.
 
Traffic cones: To warn motorists of a lane closure/lane change.
 
“Works Ahead” sign board: to warn motorists to stay alert and slow down/change lanes.</td></tr>
<tr><td>Reference:</td><td colspan="3">Relevant contract documents on safety measures
Road Maintenance Manual (hereafter RMM)
Guideline for Road Maintenance Under PBC (Part-2 Section 13.5-Work Safety, Fig. 13.3, 13.4 & 13.6 Safety methods for execution of works) Contractor’s Field Handbook Item 04-50-008</td></tr>
</table>

<table>
<tr><td>Category</td><td colspan="3">Road Usability</td></tr>
<tr><td>Service Scope</td><td colspan="3">Road Usability</td></tr>
<tr><td>Service Criteria</td><td colspan="3">Roughness</td></tr>
<tr><td>Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances.</td></tr>
<tr><td></td><td>The pavement must at all times be kept to an acceptable level of roughness.

The contractor is required to maintain IRI at the following stipulated level. Paved High IRI to be lower than 2.5mm/m as the target level.

(Paved Road, High)</td><td>Within 1 week after detection.

(Paved Road, High)</td><td>The contractor will report the details of non-compliance to the Project Manager and identify the cause of non-compliance for further action under the other applicable service criteria. The applicable permissible tolerance must be adhered to.

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. Measure IRI as per the contract specifications</td></tr>
<tr><td>Where to do</td><td colspan="3">1. The entire stretch of the road under the contract</td></tr>
<tr><td>When to do</td><td colspan="3">1. Measure the initial condition of the road surface at the beginning of the contract.
2. After the Initial Mobilisation Period (IMP) to confirm if the IRI targets have been met. After the IMP, measurements are done before the monthly inspection to confirm IRI compliance.</td></tr>
<tr><td>How to do</td><td colspan="3">As per the contract specifications</td></tr>
<tr><td>References</td><td colspan="3">Relevant contract documents on IRI measurement
Guideline for Road Maintenance Under PBC Part-1 Section 8 (Introduction of IRI Target Level for Maintenance)</td></tr>
</table>

Road User Comfort

<table>
<tr><td>Category</td><td colspan="3">Road User Comfort</td></tr>
<tr><td>Service Scope</td><td colspan="3">Pavement, Shoulders and ROW for Paved Roads</td></tr>
<tr><td>Service Criteria</td><td colspan="3">1) Cleanliness of the road</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>The road must always be clean and free from soil, debris, trash and other objects, and must be removed within the time given if:

– they pose danger to traffic; such as rocks, fallen trees, dead animals, abandoned vehicles, fly tipping and other large obstacles etc.

– material washed on to the road after storms/slides.

(Paved Road, High)</td><td>Within 3 hours after detection

Within 3 days after detection.

(Paved Road, High)</td><td>i) No tolerance permitted in respect of objects posing danger to traffic safety.

ii) In case of no danger to traffic safety, the permitted maximum length of the road below the defined service level does not exceed more than 5 percent in any sub-section of 200 m length

Example:
[Say a sub-section is 200 m long, the length below the defined service level must not exceed 10m in the sub-section.]

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep the carriageway clean & free of soil/silt, debris, trash and other objects.
2. To keep records of activities done</td></tr>
<tr><td>Where to do</td><td colspan="3">The entire stretch of the road under the contract</td></tr>
<tr><td>When to do</td><td colspan="3">Every day or according to the service level requirements</td></tr>
<tr><td>How to do</td><td colspan="3">Sweeping of the carriageway of any silt, debris and trash.
Removing any objects or obstacles.

 
De-silting of carriageway (left) and removal of sand from the surface (right)</td></tr>
<tr><td>Reference:</td><td colspan="3">Road Maintenance Manual (RMM)
Daily Work Record Form (Appendix 7)
Photo Record Form (Appendix 9)
Incident Report Form (Appendix 10)
Contractor’s Field Handbook Item 04-50-008</td></tr>
</table>

<table>
<tr><td>Category</td><td colspan="3">Road User Comfort</td></tr>
<tr><td>Service Scope</td><td colspan="3">B) Pavement, Shoulders and ROW for Paved Roads</td></tr>
<tr><td>Service Criteria</td><td colspan="3">2. Potholes</td></tr>
<tr><td rowspan="2">Performance specification

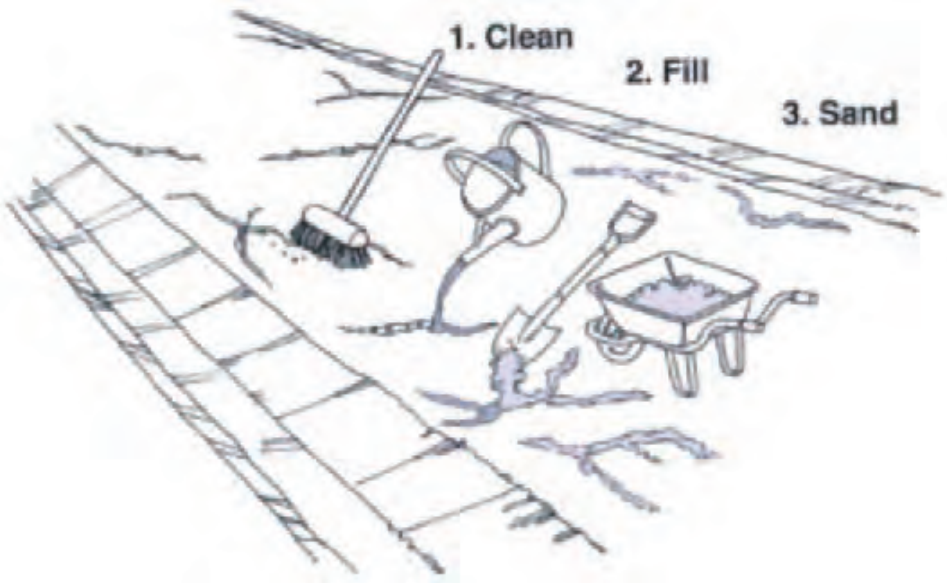
* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerance</td></tr>
<tr><td>All visible potholes must be repaired.
(Paved Road, High)</td><td>Visible potholes must be attended to within 2 days after detection.

Potholes causing safety hazard to be repaired within 24 hours after detection.

(Paved Road, High)</td><td>No tolerance permitted.
(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. Patrol/self-inspection
2. Patch the potholes as per the specified standards in the contract.
3. Record work done.</td></tr>
<tr><td>Where to do</td><td colspan="3">On a (AC) carriageway.</td></tr>
<tr><td>When to do</td><td colspan="3">Upon detection of a pothole during patrol/self-inspection</td></tr>
<tr><td>How to do</td><td colspan="3">1. Routine inspection and inventory
• Routine inspection
• Inventory of location of potholes and their sizes
• Locate the place by marking
2. Patch the potholes as per the specified standards in the contract with safety measures in place.
2.1 For urgent repair of high traffic volume roads

[Repair by Spot Sealing]
• This method is recommended to provide as a quick response when a crack is observed.

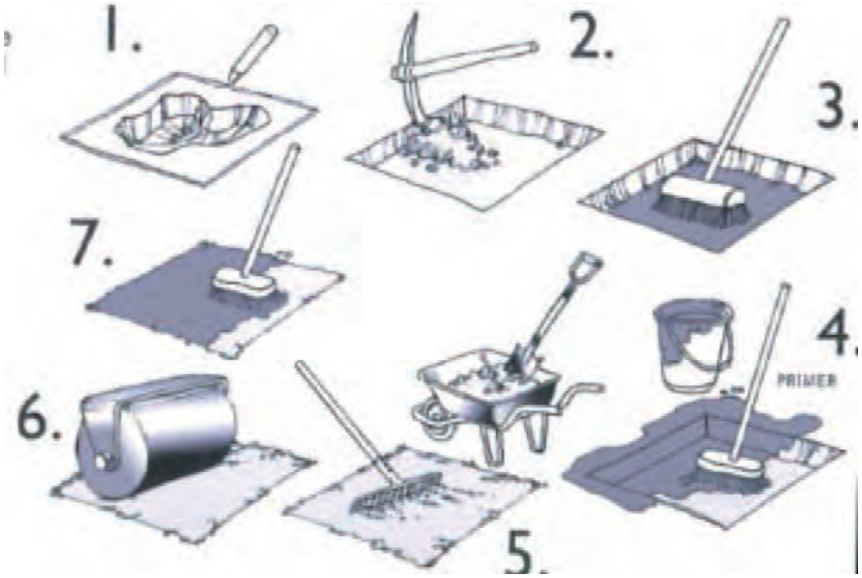
Key specification to note
- Clean surface, and fill with bitumen and fill with sand
- Use of Cut-back penetration bitumen (80/100)

Repair by Spot sealing
Source: Contractor's Field Handbook, R2000

[Repair by Cold Mixed Asphalt Concrete]
• This method is recommended for temporary repair of any roads with low traffic volumes (less than AADT 1000)</td></tr>
</table>

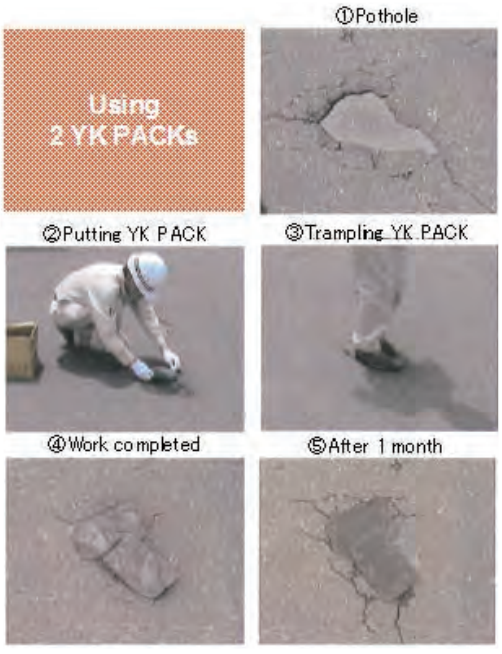
Key specification to note
- Cut rectangular damaged surface (steps 1 & 2)
- Clean surface (step 3)
- Distribute prime coat (step 4)
- Fill cold asphalt (step 5)
- Compact (1-2 ton roller) (step 6)
- The work must not be done in rain.



[Repair by Cold Packed Asphalt Concrete (Example of YK pack)

- This method is recommended for quick repair of express highways and high traffic urban roads where quick repair is required due to traffic condition etc.,
- Products (example of YK pack) are available in the market.

Key specification to note (example of YK pack)
- This requires following instructions from the product manufacturers.
- Place YK packs in the pot hole
- The products will be compacted by traffic
- The work must not be done under rain.



[Repair by Hot Mix Asphalt Concrete]

This method is recommended for permanent repair for all roads but especially high traffic volume roads (more than AADT 1000)

Key specification to be noted:
- the mixture must pass a laboratory test before the site work
- temperature control at site is as follows;
  - 125-165°C when 80/100 bitumen is used
  - 130-170°C when 60/70 bitumen is used
- The work must not be performed under rain.

1. Safety
   - Safety measures must be adhered to on site (see 4.5)
2. Self-inspection and record
   - Daily work record
   - Self-Inspection Record
3. Special case
   - In case shutdown or diversion of traffic is required, the contractor is required to obtain permission from the traffic police beforehand.

The contractor is required to take into consideration material and operational requirements indicated on the following table;

Material	Durability	Operational time	Characteristic
Cold Mixed	Low	Short	Need a small volume/area to repair Need compaction
Cold Packed	Low	Minimum (Within 10 min.)	Need a minimum volume/area to repair Do not require compaction
Hot Mixed	High	Long (a few hours)	Need a large volume/area to repair Need compaction

The contractor is required to select the method according to the each site condition including durability, the operational time and the total cost including the intended repair durability. If the road condition is much worse, the contractor should take into consideration selection of the overlay method instead of the pothole patching method.

References:

Daily Work Record Form (Appendix 7)

Detail Self Inspection Result Report Form (Appendix 12-1)

Photo Record Form (Appendix 9)

8-50-001/001B of RMM.

08-50-002/005 of Contractor's Field Handbook R2000

Guideline for Road Maintenance Under PBC (Part-2 Section 13.5-Work Safety, Fig. 13.3, 13.4 & 13.6 Safety methods for execution of works)

Road Durability

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">Drainage</td></tr>
<tr><td>Service Criteria</td><td colspan="3">Side Drains, Mitre Drains and Cut-off drains (Lined)</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>Must be clean and free of obstructions to ensure free flowing conditions at all times.

(Paved Road, High)</td><td>– Siltation/Obstruction must be cleared within 3 days after detection.

– Damage which jeopardizes functionality or safety of structure or poses danger to traffic must be repaired within 1 week after detection

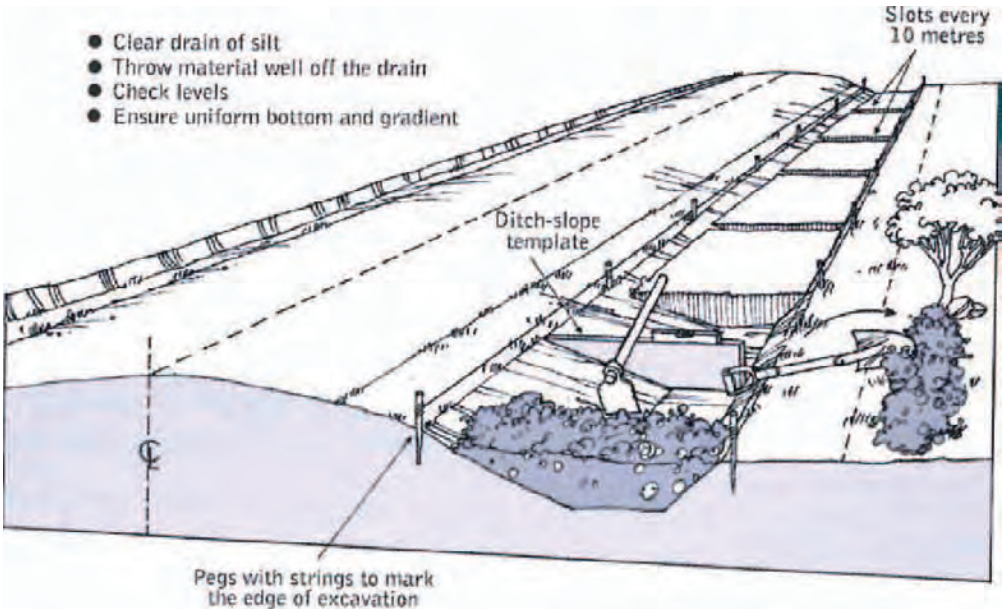
– Replace damaged covers and drain linings within 1 week after detection.
(Paved Road, High)</td><td>The permitted maximum tolerance is 5 percent of the length of drains below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.
(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep drainage free from obstacles and siltation
2. To remove siltation/obstruction by routine work</td></tr>
<tr><td>Where to do</td><td colspan="3">The carriageway drainage system along the entire stretch of the road under the contract.</td></tr>
<tr><td>When to do</td><td colspan="3">As frequent as possible to meet the stipulated service levels in the contract to ensure that side drains, mitre drains and cut off drains are clean and free of silt/obstructions for free flowing conditions at all times

Sample frequency of drainage de-silting

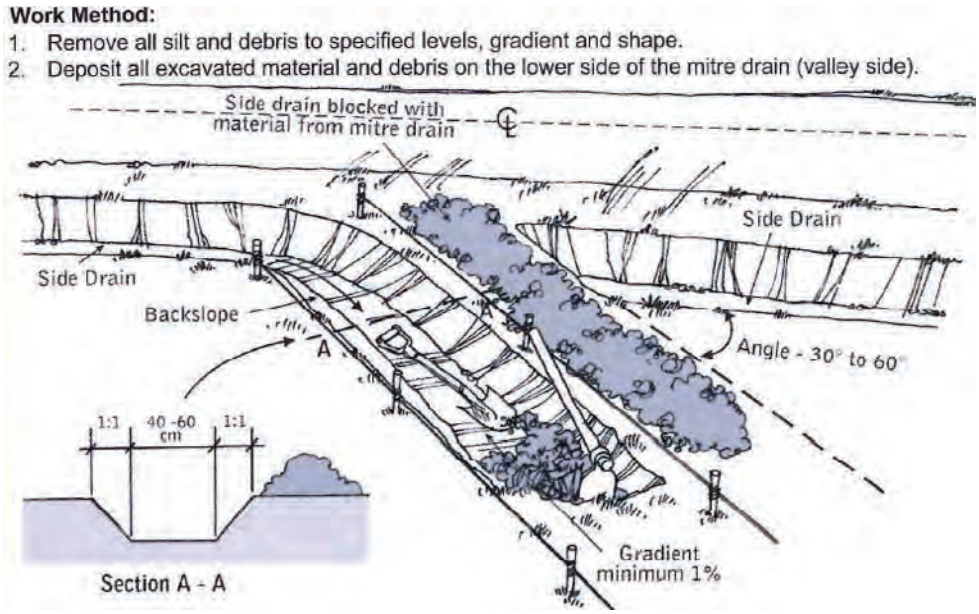
<table>
<tr><td>Road Authority</td><td colspan="2">KeNHA</td><td>KURA</td><td>KeRRA</td></tr>
<tr><td>Region</td><td>Kisii (Urban)</td><td>Kilgoris</td><td>Nairobi (Urban, Residential)</td><td></td></tr>
<tr><td>Annual rainfalls (mm)</td><td>1977</td><td>1480</td><td>925</td><td>1600</td></tr>
<tr><td>Dry Season (frequency)</td><td>2.5/month</td><td>Less than 1/month</td><td>6/month</td><td>1/month</td></tr>
<tr><td>Moderate/Average (frequency</td><td>20/month</td><td>Less than 1/month</td><td>10/month</td><td>1/month</td></tr>
<tr><td>Wet Season (frequency)</td><td>24/month</td><td>1/month</td><td>14/month</td><td>2/month</td></tr>
</table>

2. Number of times drains are de-silted at any given location per month for moderate/average conditions, rainy seasons & dry seasons. The PBC survey found that they mainly depend on:
– rainfall intensity,
– altitude: highland or lowland,
– terrain condition,
– crossing roads condition (paved or unpaved).</td></tr>
</table>

How to do	1. Routine removal of siltation 2. Proper collection and dumping of removed silt - Removed silt must be collected and dumped properly. It may easily go back into the drainage system. 3. As illustrated below, the contractor is to clear drains of silt, throw material well away from the drain, check levels/shape the drains using the template and ensure uniform bottom & gradient.



Source: Contractor's Field Handbook Item 08-50-002



Source:Contractor's Field Handbook, R2000

4. Self-Inspection and record (Daily Work record & Self-Inspection Record)

Reference:	Daily Work Record Form (Appendix 7) Detail Self Inspection Result Report Form (Appendix 12-1) Photo Record Form (Appendix 9) 8-50-001/001B of RMM. 08-50-002/005 of Contractor's Field Handbook R2000

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">C) Drainage</td></tr>
<tr><td>Service Criteria</td><td colspan="3">3) Culverts and Access Drifts</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances:</td></tr>
<tr><td>Must be clean and free of obstacles and without structural damage to ensure free flowing conditions at all times.

(Paved Road, High)</td><td>– Siltation/Obstruction must be cleared within 3 days after detection

– Damages including headwalls which jeopardize functionality or safety of structure or pose danger to traffic must be repaired within 2 weeks after detection

– Tolerance: Siltation and obstruction must be less than 50mm in depth

– Broken culverts to be replaced within 1 week after detection

(Paved Road, High)</td><td>The permitted maximum tolerance is 5 percent of the length of culverts and access drifts below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep drainage free from obstacles and siltation
2. To remove siltation/obstruction by routine work
3. To conduct self-inspection and record</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Culverts and Access Drifts</td></tr>
<tr><td>When to do</td><td colspan="3">1. This is a routine work item
2. The number of times culverts/access drifts are de-silted at any given location per month depends on the geographical location for moderate/average, rainy/dry seasons. De-silting frequency is the same as that of the drainage system. (see: Sample frequency of drainage de-silting)
3. When siltation/obstruction is found by patrol/self-inspection</td></tr>
<tr><td>How to do</td><td colspan="3">1. Routine removal of siltation
The de-silting frequency is generally the same as that of drainage. Also depends on the location surroundings and the weather;
• Proper collection and dumping of removed silt
• Removed silt must be collected and dumped properly. It may easily go back into the drainage.
 
• The sample picture shows workers de-silting inlets/outlets of a culvert using a long handle shovel/trowel
• The removed silt is placed well away from the drainage system and is to be deposited properly.</td></tr>
</table>

	2. Self-Inspection and record ▪ Daily work record ▪ Self-Inspection Record 3. Special case: illegal use of culvert ▪ Often observed illegal use of crossing culvert by private developers. ▪ In such case, report to Project Manager  *Example : Installation of pipe by private developer*
Reference	Daily Work Record Form (Appendix 7) PBC Self Inspection Record Form (Appendix 12-1) Daily Patrol Record Form (Appendix 8) Photo Record Form 8-60-001/0012 of RMM.

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">Drainage</td></tr>
<tr><td>Service Criteria</td><td colspan="3">Scour Checks, gabions and other erosion protection structures:</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>Erosion protection structures must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users.

(Paved Road, High)</td><td>– Damage which jeopardizes functionality or safety of structure or poses safety hazard to road users must be repaired within 1 week after detection

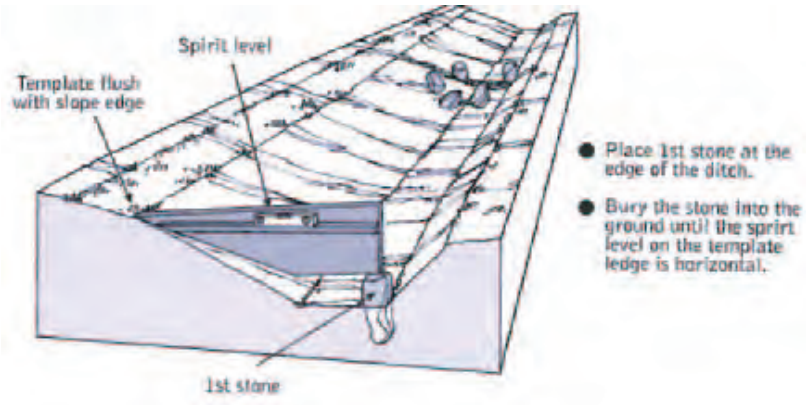
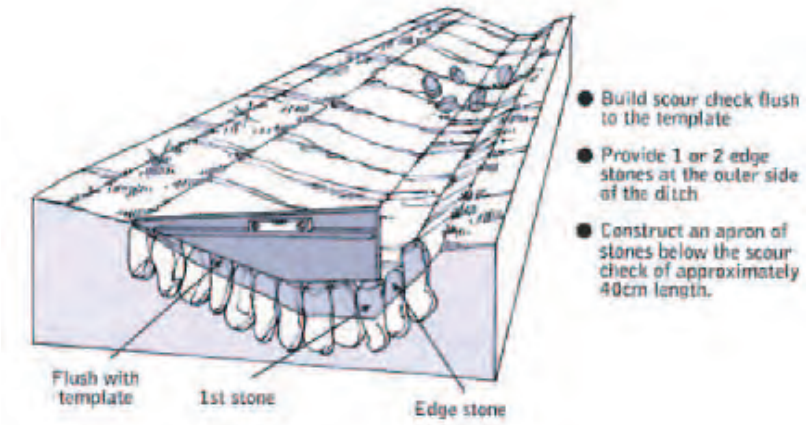
– Other minor repair works to within 2 weeks after detection.

(Paved Road, High)</td><td>The permitted maximum tolerance is 5 percent of the length of scour checks and other erosion protection structures below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep scour checks/other erosion prevention structures free from obstacles and siltation
2. To remove siltation/obstruction by routine work
3. To conduct self-inspection and record</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Scour checks/gabions and other erosion protection structures</td></tr>
<tr><td>When to do</td><td colspan="3">1. This is routine work
2. When siltation/obstruction is found by patrol/self-inspection</td></tr>
</table>

Sample frequency of Scour checks de-silting

Road Authority	**KeNHA**		**KURA**	**KeRRA**
Region	Kisii (Urban)	Kilgoris	Nairobi (Urban)	Murang'a (Rural/ unpaved)
Annual rain falls (mm).	1977	1480	925	1600
Dry Season (frequency)	2/month	Less than 1/ month	Less than 1/ month	1/month
Moderate/Average (frequency)	18/month	Less than 1/ month	1/month	1/month
Wet Season (frequency)	24/month	1/month	2/month	2/month

How to do	1. Routine removal of silt. a. Number of times erosion protection structures are de-silted on any given one location per month for moderate/average conditions, rainy season & dry season depend on the geographical location. Followings are typical examples; b. Proper collection and dumping of removed silt • Removed silt must be collected and dumped properly. It may easily go back into the drainage and may cause health hazard. 2. Repair of damaged part: – As illustrated in the below picture, the contractor is to use stone to level template horizontally using a spirit level. From the first stone, the scour check will be built to flush with the template. Provide 1 or 2 stones at the outer side of the ditch then construct an apron of the stones below the scour check.  Spacing | Gradient	Spacing	Gradient	Spacing
---	---	---	---
4% or less	not req.	8%	7.5m
5%	20m	9%	6m
6%	15m	10%	5m
7%	10m	>10%	4m	  *Source: Contractor's Field Handbook, R2000* 3. Self-Inspection/Daily work Records
Reference	Daily Work Record Form (Appendix 7) Detail Self Inspection Result Report Form (Appendix 12-1) Photo Record Form (Appendix 9) 8-70-004/005/006 of RMM 08-70-008 of Contractor's Field Handbook ,R2000

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">C) Drainage</td></tr>
<tr><td>Service Criteria</td><td colspan="3">1) Manholes and Gullies</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to Appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>Must be clean and free from obstructions and without structural damage and ensure free flowing conditions.

(Paved Road, High)</td><td>– Siltation/Obstruction must be cleared within 3 days after detection

– Tolerance; Siltation and obstruction must be less than 50mm in depth

– Damaged manholes and gulley pots must be repaired within 1 week after detection.

(Paved Road, High)</td><td>The permitted maximum tolerance is 5 percent of the number of manholes and gulley pots below the defined Service Level together with descriptions indicated in Time Allowed for Repairs in any sub-section of 200 m length of the road.

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep drainage free from obstacles and siltation
2. To remove siltation/Obstruction during routine work
3. To conduct self-inspection and record</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Manhole
2. Gullies</td></tr>
<tr><td>When to do</td><td colspan="3">1. This is a routine work item
2. In general once per month per location in dry season and twice per month per location in wet season (see example below)
3. When siltation/Obstruction is found by patrol/self-inspection

Sample frequency of manholes/gullies de-silting

<table><tr><th>Road Authority</th><th>KeNHA</th><th>KURA</th></tr><tr><td>Region</td><td>Kisii (Urban)</td><td>Nairobi (Urban)</td></tr><tr><td>Annual rain falls (mm).</td><td>1977</td><td>925</td></tr><tr><td>Dry Season (frequency)</td><td>2/month</td><td>Less than 1/month</td></tr><tr><td>Moderate/Average (frequency)</td><td>18/month</td><td>1/month</td></tr><tr><td>Wet Season (frequency)</td><td>24/month</td><td>2/month</td></tr></table></td></tr>
</table>

How to do	1. Routine removal of siltation  *Removing of siltation in Gulley* 2. Self-Inspection and record ▪ Daily work record 3. Special case ▪ The road without routine maintenance for a long time may have difficulty to open existing covers. The contractor should investigate and make inventory for such case. ▪ Instruction should be applied to such case.  *Sample : Covered by overlay*
Reference	Daily Work Record Form (Appendix 7) Detail Self Inspection Result Report Form (Appendix 12-1) Photo Record Form (Appendix 9) 8-70-004/005/006 of RMM.

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">D) Vegetation</td></tr>
<tr><td>Service Criteria</td><td colspan="3">2) Outer, Inner vegetation</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerance</td></tr>
<tr><td>- Inner veg zone, edge of shoulders to back of side drain/ditch or 2m away from edge of shoulder on straights and outside of curves, and 5m on the inside of curves. Also control of veg around street furniture and other features.

- Outer veg zone, excluding inner zone.
(Paved Road, High)</td><td>Height: 25mm (min) to 150mm (Max) at all times

25mm (min) to 300mm (max) at all times.
(Paved Road, High)</td><td>5% tolerance permitted

5% tolerance permitted.
(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep the height of the vegetation under required service levels (both maximum and minimum values) during the whole period of the contract. Safety measures must be in place as necessary for on carriage way works.
2. To conduct self-inspection and record</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Off carriage way</td></tr>
<tr><td>When to do</td><td colspan="3">1. This is a routine work
2. In general once per month per location in dry season and twice per month per location in wet season
3. When over grown vegetation is found by patrol/self-inspection unit</td></tr>
<tr><td>How to do</td><td colspan="3">1. Slashing and removal of vegetation using manual labor or machines.
Safety measures must be in place as necessary.
2. Use of chemicals is optional and requires approval from NEMA
– Use chemicals on the Side walk & driving lanes
3. Machine can be used to cut grass/vegetation.

The following are typical examples

  
Slashing grass on the ROW fence & the use of machines.

4. Proper dumping of removed grass/vegetation.
• Removed grass/vegetation must be collected and dump properly.</td></tr>
<tr><td>Reference.</td><td colspan="3">Daily Work Record Form (Appendix 7)
Detail Self Inspection Result Report Form (Appendix 12-1)
Photo Record Form (Appendix 9)
4-50-001/002A/002B/003of RMM.
Guideline for Road Maintenance Under PBC (Part-2 Section 13.5-Work Safety, Fig. 13.3, 13.4 & 13.6 Safety methods for execution of works)</td></tr>
</table>

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">A) Vegetation</td></tr>
<tr><td>Service Criteria</td><td colspan="3">1) Growth encroaching into vegetation free zone from the side or top</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>– Must be removed if within 5.5m above the road surface and/or the minimum sight distance of 240m is not maintained

– The level applies to vegetation control including trees, scrub or branches hanging over the zone.
(Paved Road, High)</td><td>Within 1 week after detection.

(Paved Road, High)</td><td>No tolerance permitted.

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep the height of vegetation under the required service level during whole period. Safety measures must be in place as necessary for on carriage way works.</td></tr>
<tr><td>Where to do</td><td colspan="3">1. On Carriage way</td></tr>
<tr><td>When to do</td><td colspan="3">1. This is a routine work item
2. once per month
3. When over grown vegetation is found by the patrol/self-inspection unit</td></tr>
<tr><td>How to do</td><td colspan="3">1. Routine work
▪ Inspection and keep records
▪ Negotiate with tree owners on how to trim any encroachment
▪ In case tree is within 5m from ground level, remove branches
2. Self-Inspection and record
▪ Daily work record
▪ Self-Inspection Record
3. Special case
▪ Tree may belong to the county or a private owners
▪ Must be confirmed before field work starts
 

Example: Lanet-Njoro Road, vegetation encroachment.</td></tr>
<tr><td>Reference</td><td colspan="3">Daily Work Record Form (Appendix 7)
Detail Self Inspection Result Report Form (Appendix 12-1)
Photo Record Form (Appendix 9)
Guideline for Road Maintenance Under PBC (Part-2 Section 13.5-Work Safety, Fig. 13.3, 13.4 & 13.6 Safety methods for execution of works)</td></tr>
</table>

Road Furniture

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">F) Road Furniture</td></tr>
<tr><td>Service Criteria</td><td colspan="3">2) Information Signs, Edge marker Post, Guide Post, Kilometre post</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>All signage must be present, complete, clean, legible, reflective and firmly installed.

(Paved Road, High)</td><td>- Information signs; Missing or defective signs must be replaced within 2 days of detection

- Edge marker post, guidance post, Kilometre post:

- Missing or defective signs must be replaced within 1 month of detection.
(Paved Road, High)</td><td>The permitted maximum tolerance is 5 percent of the number of information signs, edge marker posts and guide posts below the defined Service Level in any sub-section of 200 m length of the road.

(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. Make sure all signage are be present, complete, clean, legible, reflective and firmly installed</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Along the entire stretch of the road under the contract.</td></tr>
<tr><td>When to do</td><td colspan="3">1. During routine patrols.</td></tr>
<tr><td>How to do</td><td colspan="3">1. Any defects to the Information Signs, Edge marker Post, Guide Post, Kilometre post must be rectified to meet the service levels as per the allowed repair time.

Ex: Km post</td></tr>
<tr><td>Reference:</td><td colspan="3">Daily Patrol Record Form (Appendix 8)
Detail Self Inspection Result Report Form (Appendix 12-1)
Photo Record Form (Appendix 9)</td></tr>
</table>

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">F) Road Furniture</td></tr>
<tr><td>Service Criteria</td><td colspan="3">5) Road marking/Road studs</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>All road markings/road studs including ‘cats eyes’ are clear, visible and functional. If the reflection factor is less than 35% of the specified design value:
(Paved Road, High)</td><td>Faded road markings are painted and damaged road reflectors are restored -within 4 weeks of detection.

(Paved Road, High)</td><td>The permitted maximum tolerance is 5 percent of the area of road markings and the number of road studs below the defined Service Level combined together in any sub-section of 200 m length of the road.
(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. Make sure all signage are be present, complete, clean, legible, reflective and firmly installed</td></tr>
<tr><td>Where to do</td><td colspan="3">1. Along the entire stretch of the road under the contract.</td></tr>
<tr><td>When to do</td><td colspan="3">1. During routine patrols.</td></tr>
<tr><td>How to do</td><td colspan="3">Faded road markings are painted and damaged road reflectors are restored within the stipulated time upon detection as per the contract/Project manager’s instructions.

 
Example of pedestrian road marking along Western Ring Rd. The road marking is in good condition and visible.

A road stud along the road centerline. The road marking has started to fade.</td></tr>
<tr><td>Reference:</td><td colspan="3">Daily Patrol Record Form (Appendix 8)
Detail Self Inspection Result Report Form (Appendix 12-1)
Photo Record Form (Appendix 9)
Guideline for Road Maintenance Under PBC (Part-2 Section 13.5-Work Safety, Fig. 13.3, 13.4 & 13.6 Safety methods for execution of works)</td></tr>
</table>

<table>
<tr><td>Category</td><td colspan="3">Road Durability</td></tr>
<tr><td>Service Scope</td><td colspan="3">F) Road Furniture</td></tr>
<tr><td>Service Criteria</td><td colspan="3">6) Guardrails and Pedestrian rails</td></tr>
<tr><td rowspan="2">Performance specification

* The service levels listed are only for paved-high roads. Please refer to appendix 1 & 2 for other road types.</td><td>Service Level</td><td>Time allowed for repairs and others</td><td>Permissible Tolerances</td></tr>
<tr><td>Guardrails must be in good condition and fully functional.

(Paved Road, High)</td><td>In case of any condition which threatens structural integrity of the guardrails, the Contractor must immediately notify the Project Manager.

-Damage and defects must be repaired and replaced within 1 week of detection.
(Paved Road, High)</td><td>-No tolerance permitted

-However, guardrails pending repairs/replacement of the damaged portion maybe left on site with proper signs and safety arrangements.
(Paved Road, High)</td></tr>
<tr><td>What to do</td><td colspan="3">1. To keep the guardrails/pedestrian rails in good condition and fully functional.
2. To keep records of activities done</td></tr>
<tr><td>Where to do</td><td colspan="3">2. The entire stretch of the road under the contract</td></tr>
<tr><td>When to do</td><td colspan="3">2. Every day/upon detection of defects</td></tr>
<tr><td>How to do</td><td colspan="3">1. Defective/damaged guardrails/pedestrian rails are to be repaired to their original condition
 
A damaged guard rail along Thika road.</td></tr>
<tr><td>Reference:</td><td colspan="3">Daily Patrol Record Form (Appendix 8)
Photo Record Form (Appendix 9)
Incident Report Form (Appendix 10)
Guideline for Road Maintenance Under PBC (Part-2 Section 13.5-Work Safety, Fig. 13.3, 13.4 & 13.6 Safety methods for execution of works)</td></tr>
</table>

Appendix 5-1 Road Asset Survey Sheet (1/2) for Paved Road

Road Name:..... AADT:.....

Name of Surveyor:..... Road Length: .....

Survey Date:..... ROW width: .....

Typical Cross Section

Item		Unit	Simple Quantity	Actual Quantity	Dimension and Condition	Remark (ex.Qty to be Instructed Works)
Road Condition						
1	Carriage way witdth	m				
2	Shoulder width (L)	m				
3	Shoulder width (R)	m				
4	Sidewalk width (L)	m				
5	Sidewalk width (R)	m				
6	Pavement thickness	cm				
Road Usability						
A) Road Usability						
1	Average Roughness	mm/m				
Road User Comfort						
B) Pavement, Shoulders and ROW						
1	Road Cleanliness	m^2			ex. Heavily silted road edge area	
2	Potholes	nos			ex. Dia>30 cm: 30 cm >Dia?15 cm: Dia<15 cm:	
3	Cracking in flexible Pavement	m			ex. Cracks more than 3 mm	
4	Multiple cracks in the pavement	m^2			ex. Arrigator cracks	
5	Rutting	m^2				
6	Ravelling	m^2				
7	Loose pavement edges	m				
8	Height of shoulders vs. height of pavement	m				
9	Damaged Paved shoulders	m				
10	Cracks in Concrete Pavement	m			ex. Cracks more than 3 mm	
11	Damaged Interlocking Block Pavement	m^2				
12	Medians	m				

Appendix 5-1 Road Asset Survey Sheet (2/2) for Paved Road

Road Name:..... AADT:.....

Name of Surveyor: ..... Road Length: .....

Survey Date:..... ROW width: .....

Item		Unit	Simple Quantity	Actual Quantity	Dimension and Condition	Remark (ex.Qty to be Instructed Works
Road Durability						
C) Drainage						
1	Side Drains (lined)	m				
2	Side Drains (unlined)	m				
3	Cross Culverts / Access Culverts	m				
4	Catch Basin	nos				
5	Scour Checks	nos				
6	Manholes and Gulleys	nos				
7						
D) Vegetation						
1	Vegetation Free Zone	m^2				Carriage way + sidewalks
2	Outer inner Vegetation	m^2				
3	Growth enchroaching into vegetation free zone from the side or top	m^2				
4	Trees within ROW	nos				
E) Structures						
1	Concrete structures	nos				Concrete br. Box culverts
2	Steel Structure	nos				Steel bridge/pedestrian br.
3	Expansion joints	nos				
4	River beds	nos				
F) Road furniture						
1	Information signs	nos				
2	Warning signs	nos				
3	Traffic rule signs	nos				
4	Guide post	nos				
5	Kilometer posts	nos				
6	Road markings	nos				
7	Street Lighting	nos				
8	Guard rail and pedestrian rail	m				
G) Profile and Road Width						
H) Profile and Road Width						
1	Embankment slopes	m				
2	Slopes in cuts	m				

Appendix 5-2 Road Asset Survey Sheet (1/2) for Unpaved Road

Road Name:..... AADT:.....

Name of Surveyor: ..... Road Length: .....

Survey Date:..... ROW width: .....

Typical Cross Section

Road Condition						
Item		Unit	Simple Quantity	Simple Quantity	Dimension and Condition	Remark (ex.Qty to be Instructed Works)
1	Carriage way witdth	m				
2	Shoulder width (L)	m				
3	Shoulder width (R)	m				
4	Sidewalk width (L)	m				
5	Sidewalk width (R)	m				
6	Pavement thickness	cm				
Roa d Usability						
A) Road Usability						
1	Average Roughness	mm/m				
2	Average Traffic Speed					
Road User Comfort						
B) Pavement, Shoulders and ROW						
1	Road Cleanliness	km				
2	Corrugation Amplitude	nos				
3	Rut Depth					
4	Potholes					

Appendix 5-2 Road Asset Survey Sheet (2/2) for Unpaved Road

Road Name:..... AADT:.....

Name of Surveyor: ..... Road Length: .....

Survey Date:..... ROW width: .....

Item		Unit	Simple Quantity	Simple Quantity	Dimension and Condition	Remark (ex.Qty to be Instructed Works)
C) Drainage						
1	Side Drains (lined)	m				
2	Side Drains (unlined)	m				
3	Cross Culverts	m				
4	Catch Basin	nos				
5	Scour Checks	nos				
6						
7						
D) Vegetation						
1	Vegetation Free Zone	m^2				
2	Outer /Inner Vegetation Zone	m^2				
3	Growth enchroaching into vegetation free zone from the side or top	m^2				
4	Trees within ROW	nos				
E) Structures						
1	Concrete structures	nos				
2	Expansion joints	nos				
3	River beds	nos				
F) Road furniture						
1	Information signs	nos				
2	Warning signs	nos				
3	Traffic rule signs	nos				
4	Guide post	nos				
5	Kilometer posts	nos				
G) Profile and Road Width						
1	Gravel Thickness					
2	Camber					
3	Usable Road Surface Width					
H) Profile and Road Width						
1	Embankment slopes	m				
2	Slopes in cuts	m				

Appendix 6-1 Service Level Selection Form (Paved Road)

Road Authority		
Contractor		
Project		
Road Name/Chainage		
Road Class	Standard Service Level	PH / PS
Inspected By		

Category	Service Scope		Service Criteria (PAVED ROAD)	Items to apply	Remark 1. Selection of Service Criteria: In case there is no road asset to apply, the service criteria shall not be applied. 2. Time allowance and Permissible Tolerance: modify according to site condition requirement
Road Usability	A) Road Usability	1	Passability		
		2	Road Works Advance Warning Sign		
		3	(Roughness)		
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	Road Cleanliness		
		2	Potholes		
		3	Cracking in flexible Pavement		
		4	Multiple cracks in the pavement		
		5	Rutting		
		6	Ravelling		
		7	Loose pavement edges		
		8	Height of shoulders vs. height of pavement		
		9	Paved shoulders		
		10	Cracks in Concrete Pavement		
		11	Interlocking Block Pavement		
		12	Medians		
Road Durability	C) Drainage	1	Side Drains, Mitre Drains and cut off drains (lined)		
		2	Side Drains, Mitre Drains and cut off drains (unlined)		
		3	Culverts and Access Drifts		
		4	Scour Checks, Gabions and other erosion protection structures		
		5	Manholes and Gulleys		
	D) Vegetation	1	Vegetation free zone		
		2	Outer/inner vegetation		
		3	Growth encroaching into vegetation free zone from the side or top		
		4	Trees within ROW		
	E) Structures	1	Concrete structures		
		2	Steel Structures		
		3	Expansion joints		
		4	Riverbeds		
	F) Road Furniture	1	Warning signs/Mandatory signs		
		2	Information signs, Edge marker posts, Guide posts, Kilometer Post		
		3	Traffic Signals		
		4	Street Lighting		
		5	Road Marking/Road Studs		
		6	Guard rails and pedestrian rails		
	G) Profile and Road width				
	H) Embankment and Slopes	1	Embankment slopes		
		2	Slopes in Cuts		

Appendix 6-2 Service Level Selection Form (Unpaved Road)

Road Authority		
Contractor		
Project		
Road Name/Chainage		
Road Class	Standard Service Level	UNH / UNS
Inspected By		

Category	Service Scope		Service Criteria (UNPAVED ROAD)	Items to apply	Remark 1. Selection of Service Criteria: In case there is no road asset to apply, the service criteria shall not be applied. 2. Time allowance and Permissible Tolerance: modify according to site condition requirement
Road Usability	A) Road Usability	1	Passability		
		2	Traffic Regulatory Control Signs		
		3	Road Works Advance Warning Sign		
		4	Average Traffic Speed or Roughness		
		5	Minimum Traffic Speed		
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	Road Cleanliness		
		2	Corrugation Amplitude		
		3	Rut Depth		
		4	Potholes		
Road Durability	C) Drainage	1	Side Drains, Mitre Drains and cut off drains		
		2	Culverts and Access Drifts		
		3	Scour Checks, Gabions and other erosion protection structures		
	D) Vegetation	1	Vegetation free zone		
		2	Outer/inner vegetation		
		3	Growth encroaching into vegetation free zone from the side or top		
		4	Trees within ROW		
	E) Structures	1	Concrete structures		
		2	Expansion joints		
		3	Riverbeds		
	F) Road Furniture	1	Warning signs/Mandatory signs		
		2	Information signs, Edge marker posts, Guide posts, Kilometre Post		
		3	Guard rails and pedestrian rails		
	G) Profile and Road width	1	Gravel Thickness		
		2	Camber		
		3	Usable Road Surface Width		
	H) Embankment and Slopes	1	Embankment slopes		
		2	Slopes in Cuts		

Appendix 7 Daily Work Record Form

Sheet of

Basic Information

Road Authority			
Contractor			
Project			
Road Name/Chainage			
Road Class		Standard Service Level	

Date

Date		Weather	

PBC Work Operations

Chainage		Activity Description	Photo No,
From	To		

Machinery, Truck

Description	Plate No,	Photo No,

Labor

Category	number	Photo No,

Materials Delivered to Site

Description	Quantity	Photo No,

Materials Removed from Site

Description	Quantity	Photo No,

Admission

Personal	Name	Sign	Date
Self Control Unit			
Road Manager			

Appendix 8 Daily Patrol Record

Sheet of

Basic Information

Road Authority			
Contractor			
Project			
Road Name/Chainage			
Road Class		Standard Service Level	

Patrol

Date		Weather	

Cleanliness/Obstacles

Chainage	Time		Remarks	Photo No.
	Detection	Removal		

Any other activities undertaken

Chainage	Objects, Condition, other information	Photo No.

Admission

Personal	Name	Sign	Date
Self Control Unit			
Road Manager			

Appendix 9 Photo Record

Sheet of

Basic Information

Road Authority			
Contractor			
Project			
Road Name/Chainage			
Road Class		Standard Service Level	

No,	DATE	DATE
Photo	Photo file size : less than 300kB	Photo file size : less than 300kB
Remarks		
No,	DATE	DATE
Photo	Photo file size : less than 300kB	Photo file size : less than 300kB
Remarks		
No,	DATE	DATE
Photo	Photo file size : less than 300kB	Photo file size : less than 300kB
Remarks		

Appendix 10 Incident Condition and Activity Report

Sheet of

Basic Information

Road Authority			
Contractor			
Project			
Road Name/Chainage			
Road Class		Standard Service Level	

Incident Notification Caller Phone No,

Date/Time /Chainage or Location			
Information Resource	Road Autority, Police, Engineer, Road Users, Others ( )		
Mature of Incident			
Location of Incident			
Condition of Accident Vehicles			
Number/Conditions of injured People			

Description

Site Condition
(Any road asset damaged by the accident)

Assets	Damage condition	Photo No,

Appendix 11 Defect Detection/ Rectification Record Form

Road Authority			
Contractor			
Project		Road Name	
Service Level	Category		
	Service Scope		
	Servie Criteria		

No	Detection (to be filled by SCU or PM)			Rectification (to be filled by EXU)			Remark
	Date	Location	Description	Date	Compliance (Yes/No)		
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							

Appendix 12-1(a) Detail Self Inspection Result Report Form (Paved Road)

Sheet 1 of 5

Project	ABC Road PBC Maintenace Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 0+00-10+00		10

A. Document Verification

Document	1	1	Work Program	1	Compliance=1
	1	2	Defect/Rctification List(Appendix 11)	1	
	1	3	Self Inspection Result Form (Appendix 12 and 13)	1	
	1	4	Payment Reduction Calculation Form (Appendix 14)	1	
	1	5	Monthly Statement (Appendix 15)	1	
			Compliance	1	1

B. Site Verification

Service	Service Scope	Selection*1		Service criteria	Sub Section of Compliance ("Pass"=1, "Fail"=0) 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
				km	1km 2km 3km 4km 5km 6km 7km 8km 9km 10km	0.0	
Road Usability	A) Road Usability	1	1	Passability	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Road Works Advance Warning Sign	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	3	(Roughness)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of A)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.0	2.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Potholes	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	3	Cracking in flexible Pavement	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	4	Multiple cracks in the pavement	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	5	Rutting	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	6	Ravelling	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	7	Loose pavement edges	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	8	Height of shoulders vs. height of pavement	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	9	Paved shoulders	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	10	Cracks in Concrete Pavement	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	11	Interlocking Block Pavement	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	12	Medians	1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of B)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6.0	4.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Side Drains, Mitre Drains and cut off drains (unlined)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	3	Culverts and Access Drifts	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	4	Scour Checks, Gabions and other erosion protection structures	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	5	Manholes, Gulleys and catch Basins	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of C)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.0	2.0
	D) Vegetation	1	1	Vegetation free zone	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Outer/inner vegetation	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	3	Growth encroaching into vegetation free zone from the side or top	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	4	Trees within ROW	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of D)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.0	2.0
	E) Structures	1	1	Concrete structures	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Steel Structures	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	3	Expansion joints	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	4	Riverbeds	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of E)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.0	2.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	3	Traffic Signals	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	4	Street Lighting	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	5	Road Marking/Road Studs	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	6	Guard rails and pedestrian rails	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of F)	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.0	2.0
	G) Profile and Road width*only for Unpaved.	0					
		0					
		0					
				Compliance of G)			
	H) Embankment and Slopes	1	1	Embankment slopes	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
		1	2	Slopes in Cuts	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				Compliance of H)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8.0	2.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 12-1(b) Detail Self Inspection Result Report Form (Paved Road)

Project	ABC Road PBC Maintenace Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 10+00-15+00	5	

A. Document Verification

Document	1	1	Work Program	1	Compliance=1
	1	2	Defect/Rctification List(Appendix 11)	1	
	1	3	Self Inspection Result Form (Appendix 12 and 13)	1	
	1	4	Payment Reduction Calculation Form (Appendix 14)	1	
	1	5	Monthly Statement (Appendix 15)	1	
			Compliance	1	1

B. Site Verification

Performance					Sub Section of Compliance ("Pass"=1, "Fail"=0)																							Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
Service	Service Scope	Selec-tion*1		Service criteria	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		
				10 km					11 km					12 km				13km					14 km					15 km			
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.0	
		1	2	Road Works Advance Warning Sign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	(Roughness)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of A)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
Road User Confort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Cleanliness of the road	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Potholes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Cracking in flexible Pavement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Multiple cracks in the pavement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	5	Rutting	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	6	Ravelling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	7	Loose pavement edges	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	8	Height of shoulders vs. height of pavement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	9	Paved shoulders	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	10	Cracks in Concrete Pavement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	11	Interlocking Block Pavement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	12	Medians	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of B)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Side Drains, Mitre Drains and cut off drains (unlined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Culverts and Access Drifts	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	5	Manholes and Gulleys	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of C)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Outer/inner vegetation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Trees within ROW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of D)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	E) Structures	1	1	Concrete structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Steel Structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Expansion joints	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Riverbeds	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of E)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Traffic Signals	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Street Lighting	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	5	Road Marking/Road Studs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	6	Guard rails and pedestrian rails	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of F)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	G) Profile and Road width*only for Unpaved.	0																													
		0																													
		0																													
				Compliance of G)																											
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Slopes in Cuts	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of H)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 12-2 (a) Detail Self Inspection Result Report Form (Unpaved Road)

Sheet 1 of 5

Project	ABC Road PBC Maintenace Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 0+00-10+000		10

A. Document Verification

Document	1	1	Work Program	1		
	1	2	Defect/Rctification List(Appendix 11)	1		
	1	3	Self Inspection Result Form (Appendix 12 and 13)	1		
	1	4	Payment Reduction Calculation Form (Appendix 14)	1		
	1	5	Monthly Statement (Appendix 15)	1		Compliance=1
			Compliance	1		1

B. Site Verification

Performance					Sub Section of Compliance ("Pass"=1, "Fail"=0)																																															
Service	Service Scope	Selec-tion*1		Service criteria	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	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Total Com-plied (km)	Total Non-complied (km) to payment reduction calculation sheet
				km					1km					2km					3km					4km					5km					6km					7km					8km					9km					10km	0.0	
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Traffic Regulatory Control Signs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Road Works Advance Warning Sign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	4	Average Traffic Speed or Roughness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		0	5	Minimum Traffic Speed	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
				Compliance of A)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	8.0	2.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	2	Corrugation Amplitude	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	3	Rut Depth	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	4	Potholes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
				Compliance of B)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	8.0	2.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Culverts and Access Drifts	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of C)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	8.0	2.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Outer/inner vegetation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	4	Trees within ROW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
				Compliance of D)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	8.0	2.0
	E) Structures	1	1	Concrete structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Expansion joints	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Riverbeds	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of E)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	8.0	2.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	3	Guard rails	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
				Compliance of F)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	8.0	8.0
	G) Profile and Road width*only for Unpaved.	1	1	Gravel Thickness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Camber	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Usable Road Surface Width	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of G)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10.0	0.0
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
		1	2	Slopes in Cuts	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1		
				Compliance of H)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	8.0	2.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 12-2 (b) Detail Self Inspection Result Report Form (Unpaved Road)

Sheet 2 of 5

Project	ABC Road PBC Maintenace Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B. C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 10+00-15+00		5

A. Document Verification

Document	1	1	Work Program	1	Compliance = 1
	1	2	Defect/Rctification List(Appendix 11)	1	
	1	3	Self Inspection Result Form (Appendix 12 and 13)	1	
	1	4	Payment Reduction Calculation Form (Appendix 14)	1	
	1	5	Monthly Statement (Appendix 15)	1	
			Compliance	1	1

B. Site Verification

Performance					Sub Section of Compliance ("Pass" = 1, "Fail" = 0)																									Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
Service	Service Scope	Selection*1		Service criteria	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		
				10 km				11 km					12 km				13 km						14 km					15 km				
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Traffic Regulatory Control Signs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Road Works Advance Warning Sign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Average Traffic Speed or Roughness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	5	Minimum Traffic Speed	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of A)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Corrugation Amplitude	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Rut Depth	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Potholes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of B)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Culverts and Access Drifts	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of C)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Outer/inner vegetation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	4	Trees within ROW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of D)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	E) Structures	1	1	Concrete structures	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Expansion joints	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Riverbeds	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of E)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Guard rails	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of F)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	G) Profile and Road width*only for Unpaved.	1	1	Gravel Thickness	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Camber	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	3	Usable Road Surface Width	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of G)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
		1	2	Slopes in Cuts	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
				Compliance of H)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5.0	0.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 13-1 (a) Summary Self Inspection Result Report Form (Paved Road)

Sheet 3 of 5

Project	ABC Road PBC Maintenance Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 0+00-10+00		10

A. Document Verification

Document		1	1	Work Program	1											
		1	2	Defect/Rectification List (Appendix 11)	1											
		1	3	Self Inspection Result Form (Appendix 12 and 13)	1											
		1	4	Payment Reduction Calculation Form (Appendix 14)	1											
		1	5	Monthly Statement (Appendix 15)	1											Compliance=1
				Compliance	1											1

B. Site Verification

Performance					Sub Section of Compliance ("Pass"=1, "Fail"=0)										Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
Service	Service Scope	Selection*1		Service criteria	1	2	3	4	5	6	7	8	9	10		
				km												
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1	1	1	1	1	1		
		1	2	Road Works Advance Warning Sign	1	1	1	1	1	1	1	1	1	1		
		1	3	(Roughness)	1	1	0	0	1	1	1	1	1	1		
				Compliance of A)	1	1	0	0	1	1	1	1	1	1	8.0	2.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1	1	1	1	1	1	1	1	1	1		
		1	2	Potholes	1	1	1	1	0	1	1	0	1	1		
		1	3	Cracking in flexible Pavement	1	1	1	1	0	1	1	0	1	1		
		1	4	Multiple cracks in the pavement	1	1	1	1	0	1	1	0	1	1		
		1	5	Rutting	1	1	1	1	0	1	1	0	1	1		
		1	6	Ravelling	1	1	1	1	0	1	1	0	1	1		
		1	7	Loose pavement edges	1	1	1	1	0	1	1	0	1	1		
		1	8	Height of shoulders vs. height of pavement	1	1	1	1	0	1	1	0	1	1		
		1	9	Paved shoulders	1	1	1	1	0	1	1	0	1	1		
		1	10	Cracks in Concrete Pavement	1	1	1	1	0	1	1	0	1	1		
		1	11	Interlocking Block Pavement	1	1	1	1	0	1	1	0	1	1		
		1	12	Medians	1	1	0	0	0	1	1	0	1	1		
				Compliance of B)	1	1	0	0	0	1	1	0	1	1	6.0	4.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	0	1	1	0	1	1		
		1	2	Side Drains, Mitre Drains and cut off drains (unlined)	1	1	1	1	0	1	1	0	1	1		
		1	3	Culverts and Access Drifts	1	1	1	1	0	1	1	0	1	1		
		1	4	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	0	1	1	0	1	1		
		1	5	Manholes, Gulleys and Catch Basins	1	1	1	1	0	1	1	0	1	1		
				Compliance of C)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	1	1	1	1	1	1		
		1	2	Outer/inner vegetation	1	1	1	1	0	1	1	0	1	1		
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	0	1	1	0	1	1		
		1	4	Trees within ROW	1	1	1	1	0	1	1	0	1	1		
				Compliance of D)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	E) Structures	1	1	Concrete structures	1	1	1	1	0	1	1	0	1	1		
		1	2	Steel Structures	1	1	1	1	0	1	1	0	1	1		
		1	3	Expansion joints	1	1	1	1	0	1	1	0	1	1		
		1	4	Riverbeds	1	1	1	1	0	1	1	0	1	1		
				Compliance of E)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	0	1	1	0	1	1		
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	0	1	1	0	1	1		
		1	3	Traffic Signals	1	1	1	1	0	1	1	0	1	1		
		1	4	Street Lighting	1	1	1	1	0	1	1	0	1	1		
		1	5	Road Marking/Road Studs	1	1	1	1	0	1	1	0	1	1		
		1	6	Guard rails and pedestrian rails	1	1	1	1	0	1	1	0	1	1		
				Compliance of F)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	G) Profile and Road width*only for Unpaved.	0														
		0														
		0														
				Compliance of G)												
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	0	1	1	0	1	1		
		1	2	Slopes in Cuts	1	1	1	1	0	1	1	0	1	1		
				Compliance of H)	1	1	1	1	0	1	1	0	1	1	8.0	2.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 13-1 (b) Summary Self Inspection Result Report Form (Paved Road)

Sheet 4 of 5

Project	ABC Road PBC Maintenance Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 10+00-15+00		5

A. Document Verification

Document		1	1	Work Program	1											
		1	2	Defect/Rectification List (Appendix 11)	1											
		1	3	Self Inspection Result Form (Appendix 12 and 13)	1											
		1	4	Payment Reduction Calculation Form (Appendix 14)	1											
		1	5	Monthly Statement (Appendix 15)	1											Compliance=1
				Compliance	1											1

B. Site Verification

Performance					Sub Section of Compliance ("Pass"=1, "Fail"=0)										Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
Service	Service Scope	Selection*1		Service criteria	11	12	13	14	15							
				km												
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1							
		1	2	Road Works Advance Warning Sign	1	1	1	1	1							
		1	3	(Roughness)	1	1	1	1	1							
				Compliance of A)	1	1	1	1	1						5.0	0.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1	1	1	1	1							
		1	2	Potholes	1	1	1	1	1							
		1	3	Cracking in flexible Pavement	1	1	1	1	1							
		1	4	Multiple cracks in the pavement	1	1	1	1	1							
		1	5	Rutting	1	1	1	1	1							
		1	6	Ravelling	1	1	1	1	1							
		1	7	Loose pavement edges	1	1	1	1	1							
		1	8	Height of shoulders vs. height of pavement	1	1	1	1	1							
		1	9	Paved shoulders	1	1	1	1	1							
		1	10	Cracks in Concrete Pavement	1	1	1	1	1							
		1	11	Interlocking Block Pavement	1	1	1	1	1							
		1	12	Medians	1	1	1	1	1							
				Calculation	1	1	1	1	1							
				Compliance of B)	1	1	1	1	1						5.0	0.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	1							
		1	2	Side Drains, Mitre Drains and cut off drains (unlined)	1	1	1	1	1							
		1	3	Culverts and Access Drifts	1	1	1	1	1							
		1	4	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	1							
		1	5	Manholes, Gulleys and Catch Basins	1	1	1	1	1							
				Compliance of C)	1	1	1	1	1						5.0	0.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	1							
		1	2	Outer/inner vegetation	1	1	1	1	1							
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	1							
		1	4	Trees within ROW	1	1	1	1	1							
				Compliance of D)	1	1	1	1	1						5.0	0.0
	E) Structures	1	1	Concrete structures	1	1	1	1	1							
		1	2	Steel Structures	1	1	1	1	1							
		1	3	Expansion joints	1	1	1	1	1							
		1	4	Riverbeds	1	1	1	1	1							
				Compliance of E)	1	1	1	1	1						5.0	0.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	1							
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	1							
		1	3	Traffic Signals	1	1	1	1	1							
		1	4	Street Lighting	1	1	1	1	1							
		1	5	Road Marking/Road Studs	1	1	1	1	1							
		1	6	Guard rails and pedestrian rails	1	1	1	1	1							
				Compliance of F)	1	1	1	1	1						5.0	0.0
	G) Profile and Road width*only for Unpaved.	0														
		0														
		0														
				Compliance of G)												
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	1							
		1	2	Slopes in Cuts	1	1	1	1	1							
				Compliance of H)	1	1	1	1	1						5.0	0.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 13-2 (a) Summary Self Inspection Result Report Form (Unpaved Road)

Sheet 3 of 5

Project	ABC Road PBC Maintenance Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 0+00-10+00		10

A. Document Verification

Document		1	1	Work Program	1										
		1	2	Defect/Rectification List (Appendix 11)	1										
		1	3	Self Inspection Result Form (Appendix 12 and 13)	1										
		1	4	Payment Reduction Calculation Form (Appendix 14)	1										
		1	5	Monthly Statement (Appendix 15)	1										Compliance=1
				Compliance	1										1

B. Site Verification

Performance					Sub Section of Compliance ("Pass"=1, "Fail"=0)										Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
Service	Service Scope	Selection*1		Service criteria	1	2	3	4	5	6	7	8	9	10		
				km												
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1	1	1	1	1	1		
		1	2	Traffic Regulatory Control Signs	1	1	1	1	1	1	1	1	1	1		
		1	3	Road Works Advance Warning Sign	1	1	0	1	1	1	1	0	1	1		
		1	4	Average Traffic Speed or Roughness	1	1	0	1	1	1	1	0	1	1		
		1	5	Minimum Traffic Speed	1	1	0	1	1	1	1	0	1	1		
				Compliance of A)	1	1	0	1	1	1	1	0	1	1	8.0	2.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1	1	1	1	1	1	1	1	1	1		
		1	2	Corrugation Amplitude	1	1	1	1	0	1	1	0	1	1		
		1	3	Rut Depth	1	1	1	1	0	1	1	0	1	1		
		1	4	Potholes	1	1	1	1	0	1	1	0	1	1		
				Compliance of B)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	0	1	1	0	1	1		
		1	2	Culverts and Access Drifts	1	1	1	1	0	1	1	0	1	1		
		1	3	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	0	1	1	0	1	1		
				Compliance of C)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	0	1	1	0	1	1		
		1	2	Outer/inner vegetation	1	1	1	1	0	1	1	0	1	1		
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	0	1	1	0	1	1		
		1	4	Trees within ROW	1	1	1	1	0	1	1	0	1	1		
				Compliance of D)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	E) Structures	1	1	Concrete structures	1	1	1	1	0	1	1	0	1	1		
		1	2	Expansion joints	1	1	1	1	0	1	1	0	1	1		
		1	3	Riverbeds	1	1	1	1	0	1	1	0	1	1		
				Compliance of E)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	0	1	1	0	1	1		
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	0	1	1	0	1	1		
		1	3	Guard rails	1	1	1	1	0	1	1	0	1	1		
				Compliance of F)	1	1	1	1	0	1	1	0	1	1	8.0	2.0
	G) Profile and Road width*only for Unpaved.	1	1	Gravel Thickness	1	1	1	1	1	1	1	1	1	1		
		1	2	Camber	1	1	1	1	1	1	1	1	1	1		
		1	3	Usable Road Surface Width	1	1	1	1	1	1	1	1	1	1		
				Compliance of G)	1	1	1	1	1	1	1	1	1	1	10.0	0.0
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	0	1	1	0	1	1		
		1	2	Slopes in Cuts	1	1	1	1	0	1	1	0	1	1		
				Compliance of H)	1	1	1	1	0	1	1	0	1	1	8.0	2.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 13-2 (b) Summary Self Inspection Result Report Form (Unpaved Road)

Sheet 4 of 5

Project	ABC Road PBC Maintenance Project	Month, Year,Contract Month	September	2014	3
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/Chainage	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road		
Standard Service Level	High or Standard	Inspected Chainage /Number of Sub Sections	Km 10+00-15+00		5

A. Document Verification

Document		1	1	Work Program	1										
		1	2	Defect/Rectification List (Appendix 11)	1										
		1	3	Self Inspection Result Form (Appendix 12 and 13)	1										
		1	4	Payment Reduction Calculation Form (Appendix 14)	1										
		1	5	Monthly Statement (Appendix 15)	1										Compliance=1
				Compliance	1										1

B. Site Verification

Performance					Sub Section of Compliance ("Pass"=1, "Fail"=0)										Total Complied (km)	Total Non-complied (km) to payment reduction calculation sheet
Service	Service Scope	Selection*1		Service criteria	1	2	3	4	5							
				km												
Road Usability	A) Road Usability	1	1	Passability	1	1	1	1	1							
		1	2	Traffic Regulatory Control Signs	1	1	1	1	1							
		1	3	Road Works Advance Warning Sign	1	1	1	1	1							
		1	4	Average Traffic Speed or Roughness	1	1	1	1	1							
		1	5	Minimum Traffic Speed	1	1	1	1	1							
				Compliance of A)	1	1	1	1	1						5.0	0.0
Road User Comfort	B) Pavement, Shoulders and ROW for Paved Roads	1	1	Road Cleanliness	1	1	1	1	1							
		1	2	Corrugation Amplitude	1	1	1	1	1							
		1	3	Rut Depth	1	1	1	1	1							
		1	4	Potholes	1	1	1	1	1							
				Compliance of B)	1	1	1	1	1						5.0	0.0
Road Durability	C) Drainage	1	1	Side Drains, Mitre Drains and cut off drains (lined)	1	1	1	1	1							
		1	2	Culverts and Access Drifts	1	1	1	1	1							
		1	3	Scour Checks, Gabions and other erosion protection structures	1	1	1	1	1							
				Compliance of C)	1	1	1	1	1						5.0	0.0
	D) Vegetation	1	1	Vegetation free zone	1	1	1	1	1							
		1	2	Outer/inner vegetation	1	1	1	1	1							
		1	3	Growth encroaching into vegetation free zone from the side or top	1	1	1	1	1							
		1	4	Trees within ROW	1	1	1	1	1							
				Compliance of D)	1	1	1	1	1						5.0	0.0
	E) Structures	1	1	Concrete structures	1	1	1	1	1							
		1	2	Expansion joints	1	1	1	1	1							
		1	3	Riverbeds	1	1	1	1	1							
				Compliance of E)	1	1	1	1	1						5.0	0.0
	F) Road Furniture	1	1	Warning signs/Mandatory signs	1	1	1	1	1							
		1	2	Information signs, Edge marker posts, Guide posts, Kilometer Post	1	1	1	1	1							
		1	3	Guard rails	1	1	1	1	1							
				Compliance of F)	1	1	1	1	1						5.0	0.0
	G) Profile and Road width*only for Unpaved.	1	1	Gravel Thickness	1	1	1	1	1							
		1	2	Camber	1	1	1	1	1							
		1	3	Usable Road Surface Width	1	1	1	1	1							
				Compliance of G)	1	1	1	1	1						5.0	0.0
	H) Embankment and Slopes	1	1	Embankment slopes	1	1	1	1	1							
		1	2	Slopes in Cuts	1	1	1	1	1							
				Compliance of H)	1	1	1	1	1						5.0	0.0

Note: In order for the service scope to be cosidered as pass, all the service criterias items under the service scope must be in compliance.

Appendix 14 Payment Reduction Calculation Table (Paved Road)

Sheet 5 of 5

Project	ABC Road PBC Maintenance Project			Contract Period	24
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/ Class/ Chainage/ (j)Length	ABC Road		Road Class	A, B, C, D, E, Unclassified, Urban Road	15.0 Km
Statement Month/ Year and Elapse of Month	September	2014	3	Standard Service Level	High, Standard

Contract Due Amount of the Month (x)	500,000	KSH

Service Level Criteria		Compliance			Reduction						
Service	Service Scope	(a) Contract Road Length (km)	(b) Required Target	(c)=(a)*(b) Target Length (km)	(d)=(a)-(c) Exemption Length (km)	(e) Non-Compliant Length (km)	(f)=(e)-(d) (>=0) Adjusted Non-Compliant Length (km)	(g)=(f)/(c) NON-Compliant Rate	(h) Reduction Weight	(i)=(g)*(h) Reduction Rate (%)	(j)=(c)x(i) Reduction Length (km)
Documentation		15.0	100%	15.0	-	-	-	0%	4%	0.0%	0.00
1. Road Usability	A) Road Usability	15.0	100%	15.0	0.0	2.0	2.0	13%	40%	5.3%	0.80
2. Road User Comfort	B)Pavement, Shoulders	15.0	100%	15.0	0.0	4.0	4.0	27%	50%	13.3%	2.00
3. Road Durability	C)Drainage	15.0	100%	15.0	0.0	2.0	2.0	13%	30%	4.0%	0.60
	D)Vegetation	15.0	100%	15.0	0.0	2.0	2.0	13%	30%	4.0%	0.60
	E) Structures	15.0	100%	15.0	0.0	2.0	2.0	13%	20%	2.7%	0.40
	F) Road Furniture	15.0	100%	15.0	0.0	2.0	2.0	13%	20%	2.7%	0.40
	G) Profile and Road Width (unpaved)	Not Applied									
	H) Embankment and Slopes	15.0	100%	15.0	0.0	2.0	2.0	13%	6%	0.8%	0.12
									(k) Total = 200%	32.8%	4.92

Required Target			
Elapse of Month	1. Road Usability	2. Road User Comfort	3. Road Durability
1	50%	50%	50%
2	100%	75%	75%
3	100%	100%	100%
4	100%	100%	100%
5	100%	100%	100%
6	100%	100%	100%
7~	100%	100%	100%

Calculation of the Payment Amount of the Month			
Contract Due Amount of the Month	KSH	**500,000**	(x)
Reduction Rate	%	**32.8%**	(k)
Reduction Amount	KSH	**164,000**	(z)=(x)x(k)
Payment Amount of the Month	KSH	**336,000**	(y)=(x)-(z)

Appendix 15 Payment Reduction Calculation Table (Unpaved Road)

Sheet 5 of 5

Project	ABC Road PBC Maintenance Project			Contract Period	24
Road Authority	KeNHA or KURA or KeRRA or KWS	Contractor	XYZ Contractor		
Road Name/ Class/ Chainage/ (j)Length	ABC Road	Road Class	A, B, C, D, E, Unclassified, Urban Road	15.0 Km	
Statement Month/ Year and Elapse of Month	September	2014	3	Standard Service Level	High, Standard

Contract Due Amount of the Month (x)	500,000	KSH

Service Level Criteria		Compliance			Reduction						
Service	Service Scope	(a) Contract Road Length (km)	(b) Required Target	(c)=(a)*(b) Target Length (km)	(d)=(a)-(c) Exemption Length (km)	(e) Non-Compliant Length (km)	(f)=(e)-(d) (>=0) Adjusted Non-Compliant Length (km)	(g)=(f)/(c) NON-Compliant Rate	(h) Reduction Weight	(i)=(g)*(h) Reduction Rate (%)	(j)=(c)x(i) Reduction Length (km)
Documentation		15.0	100%	15.0	-	-	-	0%	4%	0.0%	0.00
1. Road Usability	A) Road Usability	15.0	100%	15.0	0.0	2.0	2.0	13%	40%	5.3%	0.80
2. Road User Comfort	B)Pavement, Shoulders	15.0	100%	15.0	0.0	2.0	2.0	13%	40%	5.3%	0.80
3. Road Durability	C)Drainage	15.0	100%	15.0	0.0	2.0	2.0	13%	30%	4.0%	0.60
	D)Vegetation	15.0	100%	15.0	0.0	2.0	2.0	13%	30%	4.0%	0.60
	E) Structures	15.0	100%	15.0	0.0	2.0	2.0	13%	20%	2.7%	0.40
	F) Road Furniture	15.0	100%	15.0	0.0	2.0	2.0	13%	20%	2.7%	0.40
	G) Profile and Road Width (unpaved)	15.0	100%	15.0	0.0	0.0	0.0	0%	10%	0.0%	0.00
	H) Embankment and Slopes	15.0	100%	15.0	0.0	2.0	2.0	13%	6%	0.8%	0.12
									(k) Total = 200%	24.8%	3.72

Required Target			
Elapse of Month	1. Road Usability	2. Road User Comfort	3. Road Durability
1	50%	50%	50%
2	100%	75%	75%
3	100%	100%	100%
4	100%	100%	100%
5	100%	100%	100%
6	100%	100%	100%
7~	100%	100%	100%

Calculation of the Payment Amount of the Month			
Contract Due Amount of the Month	KSH	**500,000**	(x)
Reduction Rate	%	**24.8%**	(k)
Reduction Amount	KSH	**124,000**	(z)=(x)x(k)
Payment Amount of the Month	KSH	**376,000**	(y)=(x)-(z)

Appendix 16 Summary of Statement for Payment Account (Monthly Statement)

Contract No.						
Contract Name: PERFORMANCE-BASED ROAD MAINTENANCE CONTRACT FOR…					CERTIFICATE NO.	
Contractor:					VALUATION AS AT	
CONTRACT SUM:			Region		Fin. Year	
			Administrative Boundary:		Month	
			Previous Certificate (Kshs)	This Certificate (Kshs)	Total (Kshs)	
A. PBC Works *(x) of Payment Reduction Calculation Table (Appendix 14 or 15)						
B. Instructed Works *if included in contract						
C. Sub-total of (A+B)						
D. REDUCTION FOR NON-COMPLIANCE *(z) of Payment Reduction Calculation Table (Appendix 14 or 15)						
E. Sub-total of (C+D)						
	TOTAL VALUE OF WORK (E)					
		F. ADD 16% VAT (16% of E)				
		G. LESS 5 % RETENTION				
		H. LESS 3% WITHHOLDING TAX				
		I. CUMMULATIVE DEDUCTIONS (G+H)				
		J. TOTAL PAYMENT (E+F-I)				
		K. ADVANCE PAYMENT				
		L. RECOVERY OF ADVANCE				
		M. INTEREST ON LATE PAYMENTS				
		N. LESS LIQUIDATED DAMAGES				
		O. NET PAYMENT				
			LESS PREVIOUS CERTIFICATES			–
			NOW DUE TO CONTRACTOR			–

Submitted by

_____ Date.....

Contractor

_____ Date.....

TEAM LEADER

I hereby confirm the above rates & quantities are correct

Checked by

_____ Date.....

SUPERVISOR

_____ Date.....

ENGINEER (GM(M))

Appendix 17 Monthly Evaluation Form

Number of elapsed month =

Project Title	
Road Authority	
Contractor	
Date of checking	

	Name
Project manager	
Assistants	

This form is used by Project manager to verify monthly performance for contract evaluation.

Scope			Requirement	Pass or Fail*1
1	Service revel compliance	1	Reduction rate for service level non-compliance is less than 5.0%	
2	Self-control unit performance	1	Self-control unit is organized by proper contractor's member	
		2	Self-control unit operates properly	
		Pass or fail in total*2		
3	Work Safety Management	1	1Workers and operators wear proper safety gear	
		2	Traffic control is conducted properly	
		3	No accident of workers, operators attributable to the contractor	
		4	No accident of third-parties attributable to the contractor	
		Pass or fail in total*2		
4	Environment and social management	1	Environmental consideration is properly conducted	
		2	Waste material generated from the site is properly disposed	
		3	Transportation by vehicles is properly controlled	
		Pass or fail in total*2		
5	Corrective order	1	No corrective order is made by authority	
6	Statutory compliance	1	Contractor complied with relevant statutory regulations	

*1 Filling Example: "Pass"="1" "Fail" = "0" "Not applicable" = "N/A"

*2 Scoring criteria:

In case of having more than one requirement in each evaluation scope, all the requirements except not applicable case shall be passed for pass evaluation in total

Appendix 18 Contract Evaluation Tally Sheet for PBC

Project Title	
Road Authority	
Contractor	
Date of Commencement	
Expected date of Completion	
Number of elapsed months in the end of last year	

	Date	Name	Signature
Project Manager			
Road Manager			

1. This tally sheet is for Project Manager to evaluate performance of contractor by scoring at the end of contract. Use this form for evaluation in every year during contract period.
2. Fill "1" for "Pass" or "0" for "Fail" in column for each item and month according to monthly evaluation form. Fill "-" in column for non applicable.

Item		Monthly Evaluation													(a)	(b)	(c)	(d)	(f)
		No. of month with "Pass=1" in past years	Year (2015)												No. of month with "Pass=1" in total	(a)/ Total month (%)	Weight for each item	Score for each item (b)*(c)	Penalty*1
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
1	Service revel compliance														**0**		**50%**	0	
2	Self-control unit performance														**0**		**10%**	0	
3	Work safety management														**0**		**20%**	0	
4	Environment and social management														**0**		**10%**	0	
5	Corrective order issuance														**0**		**10%**	0	
6	Statutory compliance														**0**				0
																		0	0
																	Total score	0	

*1: Penalty of -20 point is given for non-compliance in equal or more than one month

Appendix 19 Contractual Recommendations (with result of discussion)

Introduction

1 Monthly Payment Cut-off Line

2 Cash Flow Management during Initial Mobilization Period

3 Variation of Initial Mobilization Period

4 Abolition of Rectification Period Following the Formal Inspection

5 Division of Monthly Payment between Service Levels and Management

6 Risk Allocation of PBC

7 Contract Term Improvement with Termination Clause

9 Adoption of a Separate Contract for Initial Rehabilitation Works (Medium Term Action)

Introduction

The clauses presented in this Appendix were propositions to the SWG that if adopted will improve the standard contract. All the clauses were discussed at the retreats and concluded as described below.

Propositions were given under the following headings:

1. Monthly Payment Cut-off Line
2. Cash flow control for initial mobilization period
3. Variation of initial mobilization period
4. Abolition of rectification period following formal inspection
5. Division of Monthly Payment between Service Levels and Management
6. Risk Allocation of PBC
7. Contract Term Improvement with Termination Clause
8. Adoption of a separate contract for initial rehabilitation works (medium term action)

In making recommendations for changes to the PBC contract documents the emphasis was on:

1. Enabling termination of non-performing Contractors,
2. Ensuring as far as possible the monthly maintenance payments are closely related to the physical work undertaken,
3. Ensuring that the Self-Control Unit properly performs its function,
4. Appropriate risk transfer to the Employer (especially on low traffic un-engineered unpaved roads in order to keep road improvement costs low)
5. Ensuring the carriageway is always safe for traffic (by imposing high payment reductions for delays in repairs)

1 Monthly Payment Reduction Weight

Clause 1: Monthly Payment Reduction Weight

The proposal was to increase reduction weight from the current 100% to 200% in total. This helps to encourage a contractor to achieve specified service level. The example of WB which the total weight of payment reduction rate is more than 300% was also explained at the meeting.

The SWG agreed to adopt payment reduction weight of 200% in total and this has been reflected in the payment reduction calculation sheets in Appendices 14 and 15.

The current method of equal monthly payments for maintenance allows payments to the contractor even when compliance with the Service Level is very low. In order to ensure better contractor performance it is believed that a "Cut-off line" for monthly payments below which no payment is made could serve to address this concern.

Figure 1-1 illustrates an example of such cut-off line for 50% compliance with a Service Level. The figure shows that if the percentage compliance is less than 50% then the amount to be paid is zero. The amount to be paid increases linearly from zero to full payment once the total length of compliance exceeds 50%.

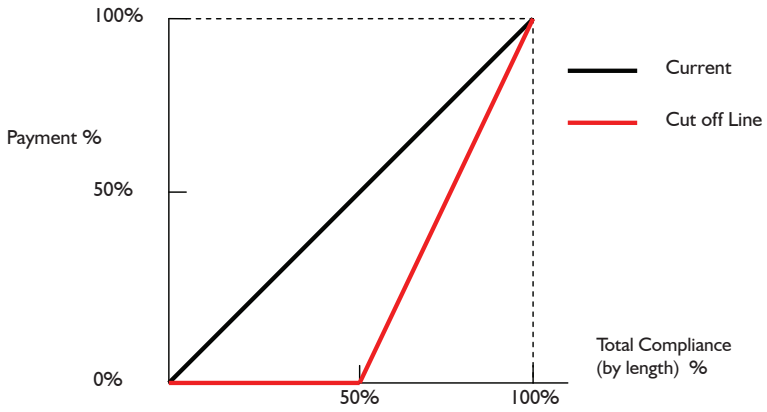


Figure 1-1 Sample of payment cut off for monthly payment (Slide Type)

The concept illustrated in Figure 5-1 can be applied by adjusting weights on Payment Reduction Calculation Table from the total aggregate of each weight currently set at 100% to 200%. Table 5-1 illustrates an example in which the amount of reduction is increased from Ksh. 80,000 to Ksh. 160,000.

Appendix 15 Payment Reduction Calculation Table (Unpaved Road)

Sheet 5 of 5

Project	ABC Road PBC Maintenance Project			Contract Period	24
Road Authority	KeNHA, KURA, KeRRA		Contractor	XYZ Contractor	
Road Name/ Class/ Chainage/ (j)Length	ABC Road		Road Class	A, B, C, D, E, Unclassified, Urban Road	15.0 Km
Statement Month/ Year and Elapse of Month	September	2014	3	Standard Service Level	High, Standard, Fair

Contract Due Amount of the Month (x): 500,000 KSH

Service Level Criteria		Compliance			Reduction						
Service	Service Scope	(a) Contract Road Length (km)	(b) Required Target	(c)=(a)*(b) Target Length (km)	(d)=(a)-(c) Exemption Length (km)	(e) Non-Compliant Length (km)	(f)=(e)-(d) (>=0) Adjusted Non-Compliant Length (km)	(f)/(c) NON-Compliant Rate	(g) Reduction Weight	(h)=(f)*(g) Reduction Rate (%)	(i)=(c)x(h) Reduction Length (km)
Documentation		15.0	100%	15.0	-	-	-	0%	4%	0.0%	0.00
1. Road Usability	A) Road Usability	15.0	100%	15.0	0.0	2.0	2.0	13%	40%	5.3%	0.80
2. Road User Confort	B)Pavement, Shoulders	15.0	100%	15.0	0.0	4.0	4.0	27%	50%	5.3%	2.00
3. Road Durability	C)Drainage	15.0	100%	15.0	0.0	2.0	2.0	13%	30%	4.0%	0.60
	D)Vegetation	15.0	100%	15.0	0.0	2.0	2.0	13%	30%	4.0%	0.60
	E) Structures	15.0	100%	15.0	0.0	2.0	2.0	13%	20%	2.7%	0.40
	F) Road Furniture	15.0	100%	15.0	0.0	2.0	2.0	13%	20%	2.7%	0.40
	G) Profile and Road Width (unpaved)	15.0	100%	15.0	0.0	0.0	0.0	0%	10%	0.0%	0.00
	H) Embankment and Slopes	15.0	100%	15.0	0.0	2.0	2.0	13%	6%	0.8%	0.12
									(j) Total = 200%	24.8%	3.72

Required Target			
Elapse of Month	1. Road Usability	2. Road User Comfort	3. Road Durability
1	50%	50%	50%
2	100%	75%	75%
3	100%	100%	100%
4	100%	100%	100%
5	100%	100%	100%
6	100%	100%	100%
7~	100%	100%	100%

Calculation of the Payment Amount of the Month			
Contract Due Amount of the Month	KSH	**500,000**	(x)
Reduction Rate	%	**25%**	(j)
Reduction Amount	KSH	**124,000**	(z)=(x)x(i)
Payment Amount of the Month	KSH	**376,000**	(y)=(x)-(z)

Table 1-1 Payment Reduction Calculation Table (Weights adjusted to 200% during the Routine Maintenance Period)

The above proposal still has the following disadvantages: (1) the contractor's performance would have to be very poor for the compliance to be as low as 50% for each work item, which is not the objective of PBC works as the road will remain in poor condition; and, (2) in a case where the contractor abandons the work when the percentage compliance is greater than 50%, and remains so for some time, the client will still have to pay the contractor *while* the road reverts to an undesirable poor condition.

2 Cash Flow Management during Initial Mobilization Period

Clause 2: Cash Flow Management during Initial Mobilization Period (IMP) was not adopted on the argument that small PBC contractors may be unable to get bank guarantees. However, the client may lose money if the contractor's performance in initial rehabilitation works is below specifications or if the contractor abandons the work. In addition, during the IMP the contractor receives full monthly lump sum payment yet he is not necessarily required to achieve 100% service levels. There is also a risk of mismanagement of funds by the contractor during IMP.

In the PBC, the monthly inputs required in the Initial Maintenance Period to bring the road to a Service Level condition are often significant and higher than for the remainder of the contract. However, the standard contract does not recognize this reality and instead allows for payment of equal monthly rates for the whole duration of the contract.

The survey conducted amongst contractors currently involved in PBC revealed that improved cash flow during the initial months is one of the key improvements required.

A possible solution is the payment of higher monthly payments for, say, during the initial 3 months of the contract and then reduced to lower fixed monthly payments during the routine maintenance period (RMP).

For roads that are already in good condition at the start of the contract the cash flow problem above would of course not apply and no adjustments are required.

An example for payment schedule under this method is shown below;

Example.1 (Contract Amount: Ksh.15,000,000/Contract Term: 1year/IMP: 3months)

IMP (3months): 2,000,000/month

【Calculation Formula】 = (Contract Amount)×(twice/(IMP + Contract Term))

= (15,000,000)×(2/(3+12)) = 2,000,000

【Subtotal】 = 2,000,000/month×3 months = 6,000,000 in 3months

RMP (9months): 1,000,000/month

【Calculation Formula】 = (Contract Amount)×(one/(IMP + Contract Term))

= (15,000,000)×(1/(3+12)) = 1,000,000

【Subtotal】 = 1,000,000/month×9 months = 9,000,000/9months

【total】 = 3,000,000/3months + 9,000,000/9months = 15,000,000 in 12months

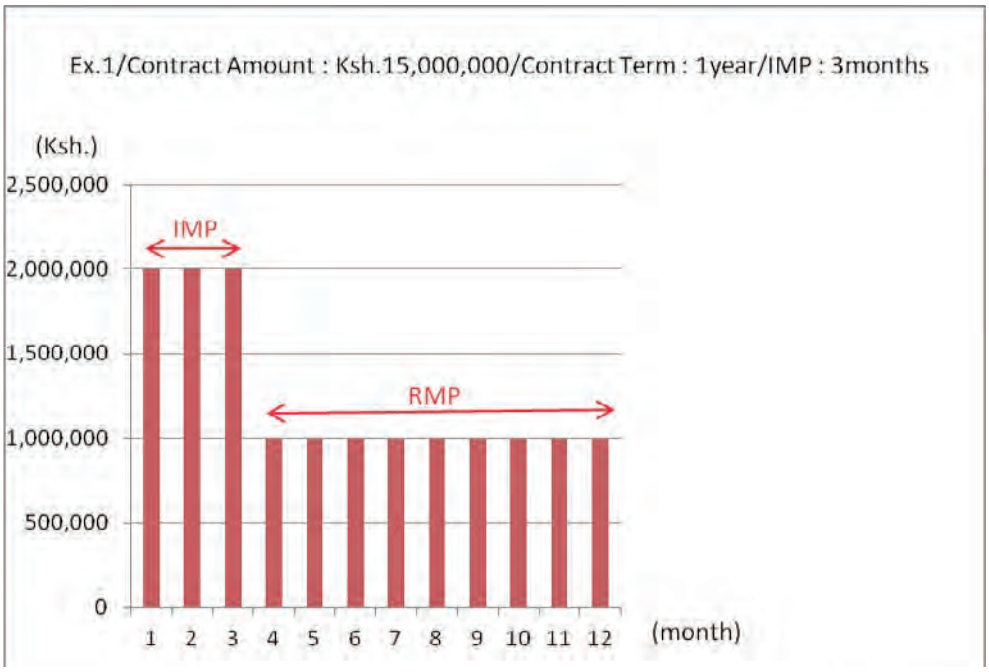


Figure 2-1 Monthly payment

One disadvantage with adopting this system of payment is that a non-performing contractor who is unable to complete the initial works within the required period will still receive high initial payment.

Payment of an Advance Payment at the start of the contract (for contractors who are able to arrange for bank guarantees) would be an alternative to ensure funds are available to undertake the high volume of initial works. The bank guarantee will protect the Employer in the event the contractor does not perform as expected.

For smaller contractors (who cannot arrange bank guarantees) one option is to group the initial works to achieve desired Service level into an "Initial Rehabilitation Works" payable on output using standard Bill of Quantities.

Since the Advance Payment is to improve cash flow for mobilization and to fund the initial higher costs of the contract the PBC should require that the contractor submit receipts confirming its use on inputs related to the contract if/when requested by the Client. Past experience indicates that contractors do not always spend the advance correctly and, if requested, take a long time to prove how the funds were spent, with the contract not having any penalties for misuse of the advance payment.

It is therefore recommended that in the tender submission, the tenderer should be requested to detail how he will use the Advance Payment. This will help in monitoring that the contractor spends funds on eligible work related inputs.

Prompt payment to the contractor by the client is very important in ensuring that road maintenance works do not stop due to contractor's poor cash flow. Payment delay will affect progress of works and consequently affect road users' comfort.

3. Variation of Initial Mobilization Period

Clause 3 Variation of Initial Mobilization Period was already being practiced in some PBC implemented by KeNHA. The SWG recognized that the proposed concept in Clause 3 was already in use.

In the standard PBC the initial mobilization period until the road is brought to Service Level condition is 3 months. However, the period should vary depending on the initial condition of the road and magnitude of the project. For example, if a road was under PBC in a previous contract the initial mobilization period should be shorter than for a road which has been poorly maintained. The recommended initial periods are given in Table 3-1 below for PBC contracts lasting between 12 and 24 months.

Table 3-1 Initial Mobilization Period based on Road Conditions

Road Condition	Initial Mobilization Period	Remarks
Current System	Fixed as 3 months	–
Good roads (Rehabilitated roads and new roads)	0 month	Continuous contract to the same contractor
Good roads (Rehabilitated roads and new roads)	1 month	Initial mobilization period is for assessment/ mobilization purposes.
Fair roads (not having been under maintenance for a short period)	2 months	Initial mobilization period is for mobilization purposes and for bringing up the service level on small scale works
Poor roads/ long roads (Heavily damaged roads)	6 months	Initial mobilization period is for bringing up the service level on large scale works.

For PBC lasting 5 years, the initial mobilization period could go up to 24 months for a road in poor condition.

4. Abolition of Rectification Period Following Formal Inspection

Clause 4: Abolition of Rectification Period following formal inspection was adopted. It is reflected in "12.4 Payment Reduction" in Part 2.

The formal inspection takes place at the end of each month and the current PBC allows for many "non-compliances" to be addressed within a specific period before payment reduction is applied. This method allows new contractors to the PBC system to make repairs to avoid payment reduction. This is in recognition that new contractors to PBC are expected to encounter difficulties in ensuring all Service Levels are met because they may not have a Self-Control Unit, or fully appreciated the role of the SCU. However, as

PBC expands, the aim should be to apply payment reduction for non-compliance at the time of the formal inspection so that road users do not suffer.

Each road authority should consider the best option between immediate reductions or a time allowance to repair specific defects on a case by case basis, taking into account the capabilities of the available contractors.

It is recommended that the allowance given to the contractor following the formal monthly inspection to repair defects should be within 3-5 days. It has the advantage of motivating the contractor and also ensuring that defects are repaired before the end of the subsequent month.

The best option on this issue is for Project Manager and contractor to jointly undertake a mid-month Ad hoc inspection in which the contractor is advised where payment reductions are likely to be enforced at the forthcoming end-of-month formal inspection. This will help to ensure the defects are repaired by the end of the month rather than face payment reduction after the formal inspection.

5. Division of Monthly Payment between achieving Service Levels and SCU Management

Clause 5; Division of Monthly Payment between Service Levels and SCU Management was not adopted because a 4% weight is already allocated for in monthly payment reduction for documentation services and management's non-compliance. This was deemed sufficient.

The rationale for considering this proposal was because of the important role of the Self-Control Unit on large contracts. A consequence of the poor performance/absence of the Self-Control Unit is the large percentage of payment reduction at the end of the month. It was noted that road users are more interested in the road meeting certain standards than in payment reduction to the contractor.

Past experience shows that many contractors do not always give the necessary importance to the SCU in terms of dedicating personnel, transport and other resources to it. It is perhaps because many contractors do not fully appreciate the role of the SCU in managing the works since such a unit is not a feature of the traditional unit-priced contracts.

One option that was considered was to divide the Lump Sum Price for maintenance services into the following two categories, where "Service and Management" applies to the Self-Control Unit:

Table 5-1 Example Apportioning of Lump-Sum Price

Category	Percentage
Maintenance Works	90%
Service and Management	10%

In conclusion, it is recommended that certain inputs from the Self-Control Unit are presented as part of the monthly payment certificate to the Project Manager before payment is approved.

6. Risk Allocation of PBC

In the PBC the contractor bears more risks than in the traditional unit-priced contract because he must manage the timing of works as well as undertake them in order to meet the specified Service Levels. In fact the contractor owns all risks related to the technical and management aspects of the work in PBC.

The standard risk allocation under PBC contracts and under traditional maintenance contracts is shown in Table 6-1.Risk increases and decreases between the client and the contractor based on various maintenance contract types is illustrated in Figure 6-1.

Table 6-1 Standard Risk Allocation under PBC Contracts and Traditional Maintenance Contracts

Risk Items	PBC Contracts		Traditional Maintenance Contracts	
	Client	Contractor	Client	Contractor
1. Design Risk		✓	✓	
2. Construction Risk		✓		✓
3. Technical and Management Risk		✓	✓	
4. Perfomance Risk		✓	✓	
5. Traffic Volume Risk	✓		✓	
6. Political Risk	✓		✓	
7. Social and Environmental Risk	✓		✓	
8. Acts of God and Force Majeur	✓	✓	✓	✓

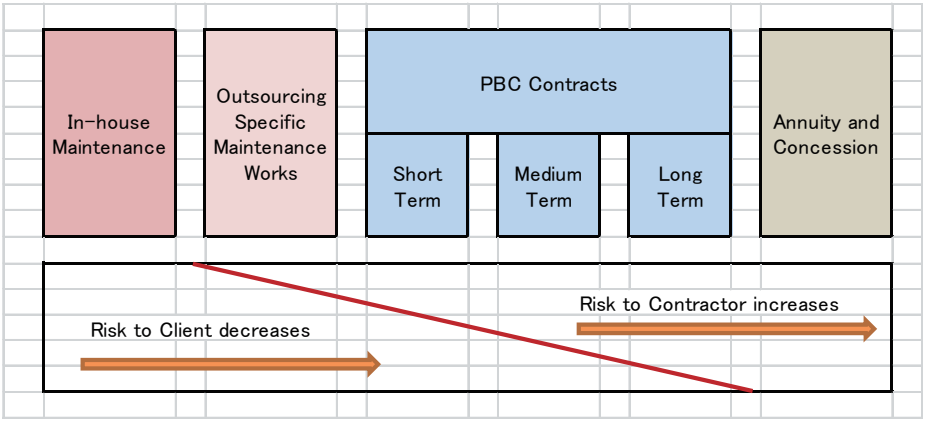


Figure 6-1 Risk Allocation based on Maintenance Contract Types

An example of a risk in a PBC contract is the case of an unpaved road that initially had very low traffic (e.g. less than 50 vpd) before rehabilitation, but traffic suddenly increases significantly to say over 300 vpd after maintenance. The risk of increased traffic resulting into increased maintenance should be apportioned to the client.

Another example of proper risk allocation requiring careful attention is the following:

The standard PBC needing extensive initial rehabilitation works requires the contractor to specify and price the work required to bring the road to Service Level condition, so that it may thereafter be maintained without further rehabilitation works (except for Emergency Works).

For unpaved roads that have not been engineered, the cost of fully rehabilitating the road to meet Service Level condition at all times is in most cases too high. The works often include establishing correct finished road levels over low lying areas to prevent flooding and installing enough culverts to avoid any future overtopping during the annual rains. PBC that require tenderers to price the initial rehabilitation works for

such roads cannot be comparable since each tenderer will minimize the initial rehabilitation works to be the cheapest and win the contract.

It is therefore recommended that some risks should be transferred to the client for such roads as follows:

1. Sufficiency of road levels to prevent flooding;
2. Adequacy of culverts to cope with the runoff (the Initial Rehabilitation Works would include specific number and sizes of culverts to be installed); and,
3. Road reserve width (any encroachment of the road reserve would be dealt with by the client)

Transferring the above risks to the Employer would result in tenders that could be compared with each other on an equal basis.

7 Contract Term Extension with Termination Clause

Clause 7: Contract Term Extension with Termination Clause. It was suggested that this clause was already captured in the contract/tender document for each contract. The contract administration clause can be tailored in such a way that a non-performing contractor is terminated depending on performance level.

The key factors for PBC maintenance are high quality, less work and value for money. This means that there must be a minimum acceptable performance from the contractor.

The current contract periods in Kenya are from 9 to 24 months, it is advantageous to award PBC on a long term basis e.g. for 3-5 years from the viewpoint of work efficiency and cost effectiveness, and also to minimize the frequency of re-tendering.

Below are proposed steps to be followed in implementing a 3-year performance-based contract, suitable for roads where initial rehabilitation works are minimal.

Year 1

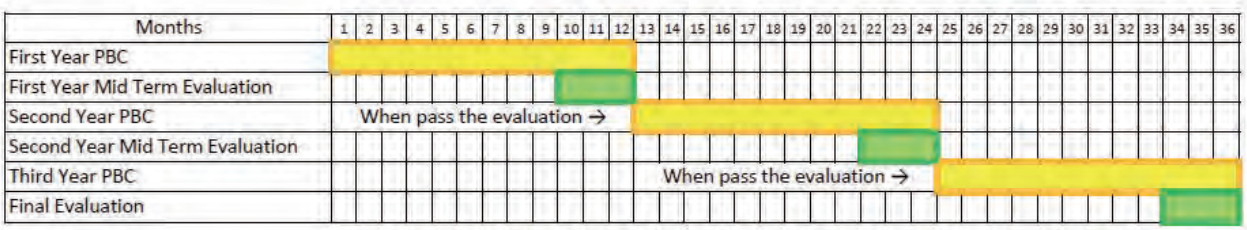
The contractor will be awarded an initial 1 year contract and proceeds to Year 2 only if acceptable performance is achieved in Year 1. The evaluation of Year 1 will be undertaken as follows:

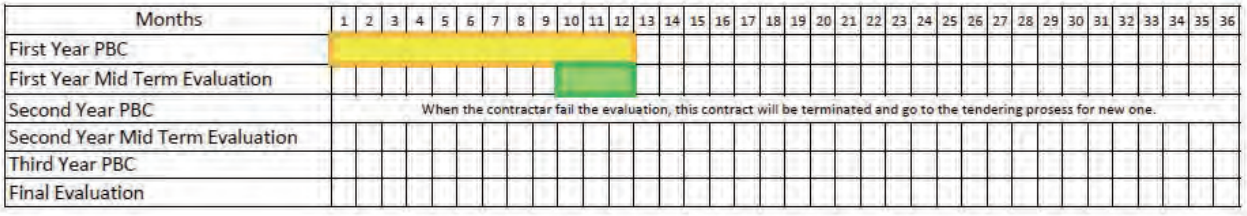
1. The monthly payment reductions are summed for the initial 9 months.
2. A mid-term evaluation for Year 1 is undertaken in the last 3 months.
3. Payment reductions must not exceed 20% for the contractor to proceed to Year 2.
4. If the contractor does not meet the 80% level the contract will be terminated and another contractor employed at the start of Year 2.

Year 2

The same process as for Year 1 is undertaken in the last 3 months of Year 2 and a non-performing contractor is removed and replaced for Year 3 works.

The process is shown in the bar chart below.





The above system means that the contractor will only sign a one-year contract at the start and can be removed if he does not perform. This is better than awarding a 3-year contract where non-performance will result in a protracted process to remove the contractor. However, the 80% performance level as the threshold may need to be raised, since roads made of good materials and in a suitable alignment may manage to achieve 80% level even if the contractor is not performing.

8. Adoption of a Separate Contract for Initial Rehabilitation Works (Medium Term Action)

Clause 9: Adoption of a separate contract for initial rehabilitation works (Medium Term Action). The cost of procurement (advertisement/evaluation) of contract is high and time-consuming. This causes delays as per the current PPOA act/regulations. Therefore this clause was omitted and the "Hybrid" type of contract which is composed of both instructed works and PBC works as is currently structured was adopted. If the PBC contractor has limited capacity to handle initial rehabilitation works, he can sub-contract the works to another contractor with higher capability.

It was also suggested that the contractor who carries out construction should take over PBC maintenance works (e.g. through an annuity model)

In many PBC contracts in Kenya, the initial Rehabilitation Works are actually more than 40-50% of the contract value. In such a case, the World Bank recommends that an initial separate contract may be warranted using a standard civil works contract. However, under the present PBC, where the value of the initial Rehabilitation and Improvement Works are high relative to the overall contract value then part of these works are transferred to the cost of the Maintenance Services. This is to avoid the contractor front-loading the tender in order to receive most payment at the start of the contract and later on give maintenance a lower priority.

Experience indicates that many PBCs are taken up by equipment-intensive contractors who want to utilize their equipment as much as possible. Therefore they prefer initial rehabilitation/improvement works but not the subsequent maintenance works which are mainly labor-intensive and distributed along the entire road. The subsequent maintenance works require a particular expertise and are suitable for community oriented small-scale contractors and not large contractors.

Since PBCs are at the development stage in Kenya, such mismatch of contractor resources may be inevitable. However, looking into the next 5 years, a proposal that will need to be considered where there is significant percentage of initial works to bring the road to Service Level condition is to hire a separate equipment-intensive contractor for the initial rehabilitation work. The subsequent routine maintenance service can then be handled by labor-intensive small scale contractors.

Appendix 20 Minutes of the Retreat on PBC Guideline held on 2nd – 5th June 2015 at Naivasha Simba Lodge

PROJECT FOR THE STRENGTHENING OF CAPACITY ON ROAD MAINTENANCE MANAGEMENT THROUGH CONTRACTING.

MINUTES OF THE 1st RETREAT ON THE PREPARATION OF THE PBC GUIDELINE HELD ON 2nd – 5th JUNE 2015

1.0 PRESENT

1.	Winnie Owiti	KeNHA	Chairing
2.	Francis Gitau	MOTI, Dep. CE(R),	
3.	Boniface Maithya	MOTI	
4.	Hiroshi Tsujino	JICA Chief Adviser	
5.	Margaret Ogai	KRB	
6.	Edward Greenhalf	AfD	
7.	Eric Goss	AfD	
8.	Maureen Wangui	KeNHA	
9.	Opuge Ephraim	KeNHA	
10.	Eunice Wanjiru	KeNHA	
11.	Carolyne A. Orwa	KeNHA	
12.	Hiroshi Mita	JICA	
13.	Hidetsugu Ikeda	JICA	
15.	Jared Onyoni	JICA	
16.	Jemimah Nyamweya	KIHBT	
17.	Edwin Odwesso	KURA	
18.	Walter Ochieng	KWS	
19.	Robert Mutai	JICA	— Taking minutes

2.0 AGENDA

1. Opening address from the Chair
2. Remarks from JICA Chief Advisor
3. Deliberations on the PBC Guidelines
   - i. Introduction
   - ii. Part 1 Service Level Setting for PBC
   - iii. Part 2 Work Procedure under PBC
   - iv. Part 3 Service Level Inspection under PBC
   - v. Part 4 Contractor's Evaluation for PBC
   - vi. Part 5 Contractual Recommendations
4. Closing Remarks from the Chair

MIN 1/1 Opening address from the Chair

The retreat commenced on 2nd June 2015 under the chair of Ms. Winnie Owiti. The chair welcomed the participants to the retreat and requested them to freely engage in the deliberation throughout the retreat. She informed the participants that Eng. Gitau who was to chair the retreat was not able to attend since he was held up in other official duties in Nairobi but he would attend the last session and give his official closing remarks on 5th June 2015. She noted that the main purpose of the retreat was to review the PBC guidelines that had been prepared by the JICA project team. She then invited the JICA Chief advisor, Mr. Hiroshi Tsujino to give his remarks.

MIN 1/2 Remarks from the JICA Chief Advisor

In his opening remarks, Mr Hiroshi Tsujino thanked the participants for attending the retreat. He noted that there was need to improve the PBC contracts, pointing out that the PBC guidelines being developed would go a long way in enhancing the performance based contracting in road maintenance. He further urged the members to actively participate in the deliberations with a view to improving the guidelines. He also suggested that the technical sections of the guidelines would be prioritised in the discussions and the inputs from the participants would be welcomed to improve on the sections.

MIN 1/3 Deliberations on the PBC Guidelines

The suggestions and comments from the participants during the entire retreat were agreed upon and are summarised as follows;

1) Introduction

a) Figure 2.2-1 service level requirement
This figure was revised to reflect the months and different types of service levels *(Refer to the figure in the guideline)*

b) Table 2.2-1 was also revised to define the levels of service as; Category, Service Scope/Criteria and service levels

c) Figure 2.2-2 concept of asset management was expunged from the guideline

d) Clause 2.3 Benefits offered; under this clause, figure 2.3.1-1 comparison of service level between PBC and Spot maintenance was modified to reflect on months verses performance *(Refer to figure2.3.1-1 in the guideline)*

e) Clause 2.5-1 Initial Mobilisation; Figure 2.5-1 was modified to reflect on months vs performance during IMP and the routine maintenance period *(Refer to figure 2.5-1 in the guideline)*

f) Clause 2.6 payment under PBC
Table 2.8 Amounts of payment reduction and formula for their adjustment over time was expunged from the guideline

2) Part 1 Service Level Setting for PBC

a) Table 2-1 Standard Service Level Category was revised as shown;

i) Paved Road
- High – AADT>50000
- Standard – AADT<50000

ii) Unpaved Road
- Standard – AADT>1000
- Fair – AADT<1000

b) Table 2-2 was expunged from the guideline

c) In clause 3.1 procedure of service level setting, it was agreed that the selection of service level category should be done before the site survey and thus the two were interchanged *(Refer to Figure 3.1-1 Flow of Service Level Setting)*

d) Table 3.4-1 List of Service Criteria;
- Advance Warning signs was added under service criteria for Road safety/Passability
- Road width and Minimum speed were introduced under service criteria for Unpaved Roads

e) Table 3.4-2 was expunged from the guidelines

f) Table 2.6-1 performance index and payment condition (sample of drainage) in the Introduction part was brought to Part 1 and named Table 3.4-3 Service Criteria and Inspection Results

g) Figure 3.5-1 Sample of Response Time; this figure was modified for easier understanding of Service criteria/level (Refer to figure 3.5-1 in the guideline)

h) Appendix 1 Draft Standard Service Level was harmonised with table 2-1 and service scope, service levels and response times for all categories were discussed and agreed upon for both Paved and Unpaved Roads. The JICA team was tasked to introduce a column for permissible tolerances on each category for Paved Roads by using the format from Thika road project. Mr. Edward Greenhalf and Mr. Eric Goss were tasked to provide suggestions for permissible tolerances for Unpaved Roads. (Refer to the revised Appendix 1 in the guideline)

i) Appendix 5 Classification of Roads was expunged from the guidelines.

j) On page 1-12, a minimum speed of 50Km/hr and 30Km/hr were proposed for standard unpaved and fair unpaved roads respectively

3) Part 3 Service Level Inspection under PBC

a) In clause 3.0 Inspection Methods, the term "Informal Inspection" was replaced to "Ad-hoc Inspection"

b) Figure 3.1-1 Procedure of Inspection was modified to replace the term Informal Inspection with "Ad-hoc Inspection" *(Refer to the figure 3.1-1 in the guidelines)*

c) Table 3.1-1 Methodology of Service Level Inspection
- Under "Inspection Location" column, items 1) Self Inspection, item 3) Formal Inspection and item 4) Substantial Completion Inspection to apply to whole stretch of the Road
- Item 2) Informal Inspection was replaced by Ad-hoc Inspection
(Refer to the table in the guideline)

d) Table 3.2-1 Standard Methodology Table of service levels measurement; this table was harmonised with Appendix 1 and measurement method No. 1,2,3,4,5 & 6 *(Refer to the table in the guideline)*

e) Table 8.3-1 and 8.3-2 Payment Reduction Calculation Table; The % of reduction weight in column (g) were modified to reflect on agreed percentages *(Refer to the table in the guideline)*

f) Appendix 1, Appendix 2 and Appendix 3 were modified to include advance warning signs and minimum speed *(Refer to the Appendices)*

4) Part 4 Contractor's Evaluation for PBC

a) Title was changed from "Contractor's Evaluation for PBC Road Maintenance" to "Contractor's Evaluation for PBC"

b) Figure 2.1 Operational Procedure of Contractor's Evaluation; It was proposed that formal should be done by Project Manager and SCU (Refer to figure 2-1 in the guideline)

c) Table 2-1 Evaluation items at formal inspection;

- Self-control was included in the scope column
- Accidents to third parties were separated from accidents to workers, operators

d) Clause 2.3 Evaluation scoring
Reduction rate for service level non-compliance was raised from maximum of 1% to maximum 5%. Thus for evaluation of service level compliance, less than 5% of reduction rate for service level non-compliance in each month is considered as "Pass-1"

e) Clause 3 contract management using evaluation scores; Quality and Cost Based Selection (QCBS) concept was introduced.

Furthermore, the following suggestions were discussed and proposed as a way forward in finalising the guidelines;

- Due to time constraints, Part 2; Work Procedure under PBC and Part 5; Contractual Recommendations were not reviewed. The JICA team would arrange for another retreat during which the review of these two parts of the guideline would be reviewed.
- The JICA team was tasked to seek the services of a professional editor to edit, arrange and format the entire document to make it more understandable and appealing to the readers.

MIN 1/4 Closing Remarks from the Chair

In his closing remarks on 5th June 2015, Eng. Francis Gitau, on behalf of the Chief Engineer Roads and MOTI, thanked and appreciated all the participants for their attendance and commitment to the finalisation of the PBC guidelines for road maintenance. He conveyed special gratitude to JICA for steering this important exercise of development of the guidelines. He also expressed gratitude to the various road agency counterparts; KeNHA, KeRRA, KURA, KWS, KRB, KIHBT, PPOA, NCA and various donor partners whose contributions and commitments has been key in the achievement of this milestone. He noted that the guidelines will ensure capacity building to the stakeholders involved in the construction, rehabilitation and maintenance of our roads. He illustrated the importance of the guideline as follows;

- Guidelines will help in the inspection of PBC works
- Will guide contractors in works implementation and the establishment of self-control
- Will help RAs in evaluation of performance of various contractors

He reassured the participants and the JICA team of all the necessary support from MOTI in developing the PBC guidelines and the overall success of the project. He then declared the retreat officially closed.

There being no other business the retreat was closed on 5th June 2015 at 1.00 P.M.

CHAIRMAN..... Date 20th July, 2015.....

Member ..... Date 20th July 2015.....

Appendix 21 Minutes of the 2nd Retreat for PBC Guideline held on 20th – 24th July 2015 at Naivasha Simba Lodge

PROJECT FOR THE STRENGTHENING OF CAPACITY ON ROAD MAINTENANCE AND MANAGEMENT THROUGH CONTRACTING

MINUTES OF THE 2ND PBC RETREAT HELD ON 20TH JULY, 2015 – 24TH JULY, 2015

A. PRESENT

1.	Mr. Robert Mutai	JICA	Chairing
2.	Mr. Hiroshi Tsujino	JICA	
3.	Hidetsugu Ikeda	JICA	
4.	Eng. Maurice Akech	NCA	
5.	Eng, Margaret Ogai	KRB	
6.	Mr. Jared Onyoni	JICA	
7.	Mr. Takumi Uno	JICA	
8.	Mr. Takashi Nakajima	JICA	
9.	Mr. Ephraim Opuge	KeNHA	
10.	Ms. Maureen Wangui	KeNHA	
11.	Ms. Eunice Wanjiru	KeNHA	
12.	Ms. Carolyne Orwa	KeNHA	
13.	Mr. Niels Kofoed	ICBTRS / KeRRA	
14.	Mr. Julius Kaliti	KIHBT	
15.	Mr. Eric Goss	AFD	
16.	Mr. Edward Greenhalf	KFW	
17.	Eng. Edwin Odwesso	KURA	
18.	Mr. Walter Ochieng'	KWS	
19.	Mr. Forbes Johnston	ICBTRS	
20.	Ms. Winnie Owiti	KeNHA	Taking Minutes

B. AGENDA

1. Opening Address from the Chair
2. Opening Remarks from the JICA Chief Advisor
3. Confirmation of minutes of the 1st PBC Retreat
4. Deliberations on the PBC Guideline
   i. Part 2 – Work Procedures
   ii. Part 5 – Contractual Recommendations
5. Cost Estimation System and Trial

Closing Remarks MIN	AGENDA	ACTION
1/2	**Opening Address from the Chair** The Chair called the meeting to order at 2.10pm. He gave a brief overview of the purpose of the 2nd PBC retreat and informed the meeting that the main purpose of the 2nd PBC Retreat was to finalize the 2 remaining parts of the PBC Guideline (Part 2 – Work Procedures and Part 5 – Contractual Recommendations). He requested a volunteer to offer an opening prayer. Ms. Winnie Owiti of KeNHA offered a word of prayer to start the meeting. He then asked for self-introduction of the members present and then welcomed Mr. Hiroshi Tsujino – JICA Chief Advisor to give his opening remarks.	All
2/2	**Opening Remarks from the JICA Chief Advisor** Mr. Hiroshi, the JICA Chief Advisor welcomed the members to the 2nd PBC Retreat and thanked the members for the good attendance. He informed the meeting that the PBC Concept was being received well in Kenya as it was evident that many road agencies were adopting PBC as a way of maintaining roads. He then declared the meeting officially opened. He invited Mr. Nakajima to give an overview of the objective of the 2nd PBC Retreat. Mr. Nakajima in his presentation highlighted some of the objectives of the retreat as follows:- i. Confirmation on revision from the 1st retreat (Intro, Parts 1, 3 & 4) ii. Comments on the remaining chapters (part 2 and part 5) iii. Finalize the comments to submit "Edition 1" to the NWG The Chair then took members through the minutes of the 1st PBC Retreat.	All
3/2	**Confirmation of minutes of the 1st PBC Retreat**	
	The minutes of the 1st PBC Retreat were confirmed as a true reflection of the deliberations. The minutes were proposed by Eng. Margaret Ogai of KRB and seconded by Ms. Winnie Owiti of KeNHA as a true reflection and record of what transpired.	
4/2	**Deliberations on the PBC Guideline (Part 2 and Part 5)**	
	Eng. Margaret suggested that in Part 1, Table 3.4-1 List of service criteria "Plastic wastes within ROW" to be moved to the Miscellaneous section and all agreed on the suggestion. In Part 1 Table 4-1 "Draft IRI Target Level" under the remarks column for "Asphalt Concrete (rehabilitation)" it was agreed upon that "Rehabilitated to good condition" will refer to overlay and "Rehabilitated to fair condition" refer to patching.	All

Closing Remarks MIN	AGENDA	ACTION
	In part 3, Figure 3.1-1 & part 4 Figure 2-1, it was agreed by the members that "Formal Inspection" will be done by the Road Manager, Project Manager and the Self Control Unit.	All
	In Part 3, Table 3.1-1, under "inspection location" Eng. Margaret suggested that the phrase "The whole road in the contract" be revised. Mr. Niels suggested the use of what the actual contract says to avoid confusion. It was agreed upon that the phrase should be replaced by "Contract road length" as this would include the width of the road reserve.	
	In part 4 section 3 "Contract management using evaluation scores" No 1. It was recommended that the last line be removed as it didn't fit in the guidelines. Eng. Margaret suggested that No.2, in the first paragraph, the words "World Bank" is removed .The members concurred.	
	It was amended that the service levels should be placed into 3 groups as proposed by the World Bank. Passability, Road User Comfort & Durability under comment #1.	All
	Comment #2. It was agreed that this particular requirement be applicable only to rural roads.	
	In Part 3, Mr Goss noted that Appendix 3 and the "Payment reduction calculation table" aren't harmonized and Mr Tsujino proposed that they would be harmonized the following day.	
	Mr Opuge proposed that for paved (high) roads, ad hoc inspection should be done weekly. For standard paved roads ad hoc inspections should be done once, before formal inspection.	
	The members made several changes to Appendix 1 on un-paved roads in part 1 in regards to Mr Greenhalf's comments.	All
	It was agreed that the times to repair defects be harmonized. End of the month, 1 week, 2 weeks, 4 weeks etc. so that it's easy to keep track of defect repair times.	
	The "Miscellaneous" section was eliminated and its contents moved to the "Durability" section. Manholes & gullies were removed as this doesn't apply to up-paved roads.	
	Under "structures", pedestrian rails were added to guardrails and these items were moved to the "road furniture" section.	
	Mr Nakajima re-grouped the paved road service criteria.	All
	Mr Greenhalf suggested that penalties should be applied only at the end of the month instead of during the month to avoid too much paper work. Mr Tsujino and Mr Goss agreed but suggested that the matter will be discussed further.	

Closing Remarks MIN	AGENDA	ACTION
	Several items were amended in Appendix I (paved roads) starting with the drainage. Mr Tsujino proposed that drainage be divided into lined/un-lined drains and the members proposed that siltation tolerance be 50mm above the designed depth for high and standard.	All
	In section E, under service scope, pedestrian rails were added to guardrails. And these items were moved to the road furniture section. Under Structures, steel structures were added to the list of service scopes.	
	Under road marking in section F, the phrase "if the reflection factor is less than 35% of the specified design value" were added to determine when faded road marking should be painted.	
	Service scope "Removal of fallen materials on carriageway upon occurrence of slides" was removed and this was replaced by "cleanliness of the roads" under road safety and passability.	
	Under "score checks and other erosion prevention structures" gabions were added. Under "Information signs, edge marker posts, guide posts", kilometre post markers was added.	All
	Part 2: in Fig 2.2-1 "before contract agreement" was changed to "pre-contract award". "Initial mobilization period" was changed to "mobilization period". "Final month" was changed to "completion period".	
	In the same figure, it was agreed that "liquidated damages" don't apply in PBC works, rather only for instructed works. Thus this was removed from the chart.	
	In section 3.2, the title was changed to "roles of the SCU"	
	In Fig 3.3-1, "PBC works" was changed to "execution unit". "Site agent" was changed to "Foreman". Table 3.3-1 was also revised.	All
	Members proposed to add several words to the glossary including execution unit, management procedure, environmental management plan, site regulation plan, self-inspection, work methodology, work program, traffic management, report form, work safety plan, work frequency etc.	
	Eng. Margaret and Maurine proposed that sections 3.2, 3.3 & 3.4 be restructured & harmonized to eliminate repetition as this was also the view of the members.	
	Section 3.6 was absorbed by section 3.5 in part 2-9.	
	In section 3.7 work program, site regulation plan was added to the list of items to be included in the work execution plan.	All
	It was agreed that all tables be moved to the appendix.	
	Mr Opuge proposed that in section 3.8 number 2, "illegal obstacles" be changed to encroachments as this was approved by the members.	

Closing Remarks MIN	AGENDA	ACTION
	It was agreed that appendix 1 and 2 be combined. Service reduction calculation tables were revised. Under the service column, items were arranged as 1. Road usability 2. Road user comfort 3. Road usability. Under item "G" for paved roads, there isn't any reduction weight applied. This only applies to un-paved roads which has a 5% reduction weight. Fig. 3.3-1 of section 3.3 in part 2 was revised to reflect small/large contractor's organization. In section 3.13 of part 2, Eng. Akech recommended that clause 2.8 be applied in the section and members agreed on the same. In section 3.15 of part 2, Mr Opuge, Eng. Akech & Maurine proposed that a complete list of risk management allocation to the contractor/client e.g. Illegal dumping, failures beyond the scope, back slope collapses natural calamities etc. should be included and the JICA team was to work on this. Road safety was introduced as part of "road usability" and was allocated a 5% reduction weight. Road usability was given a 15% reduction weight. Section 4.7.1 of part 2, Ms. Maurine suggested that the NEMA regulations should be referred to in confirming if "fires" are allowed to be set as a way of disposing trash within the ROW. In part 5, Fig 1.2 "Drop type" was removed. Table 11 was agreed upon to replace the payment reduction calculation table 8.3-1 and 8.3-2. It was agreed that there will be no advanced payment to contractors since there are many risks associated with this. Thus contractors will just get evenly distributed monthly payments even during the IMP. It was agreed that Table 4-1 in part 5 be eliminated as it was proposed that IMP are variable and are to be established according to each case. Section 5 was removed as proposed by the members. Table 6-1 was modified to reflect risk allocations to the contractor/client. The group proposed that Mr. John Forbes will further assist in restructuring the table. It was agreed that Section 7 be removed as the contents will be captured in the contract. Section 9 was removed.	All All All All
5/2	**Cost Estimation System and Trial** The Chair welcomed Mr. Takumi Uno to take members through the cost estimation system for PBC. Mr. Uno in his presentation highlighted some of the components of the Cost Estimation System as follows:-	All

Closing Remarks MIN	AGENDA	ACTION
	i. Cost Estimation System for PBC 2015 ii. Calculating Direct Cost iii. COSTES Program Outline • System Requirement • Program Files • Program Structure and work flow iv. Program Step and User input • Menu and log in • Data Input – COSTES Contract Condition Editor • Unit Price / Ratio Confirmation • Other PBC Works (Optional) – COSTES PBC Works • Instructed Works (Optional) Mr. Uno guided members through a practical session where each and every member was taught how to use the Cost Estimation System for PBC.	All All
6/2	**Closing Remarks** The Chair welcomed Mr. Tsujino, the JICA Chief Advisor to give the closing remarks. Mr. Tsujino thanked the members for their contributions towards the development of the PBC Guideline. He noted that the 2nd Retreat was well attended and members' contributions were very key towards the development of the guideline. He then declared the retreat officially closed.	All

There being no other business the retreat ended at 5.00 p.m. with a word of prayer from Ms. Winnie Owiti of KeNHA.

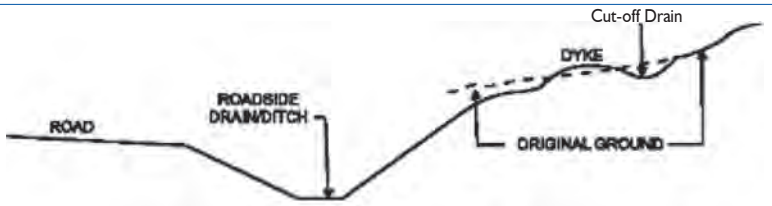
CHAIRMAN..... Date 4th Aug. 2015

Member ..... Date 4th Aug, 2015

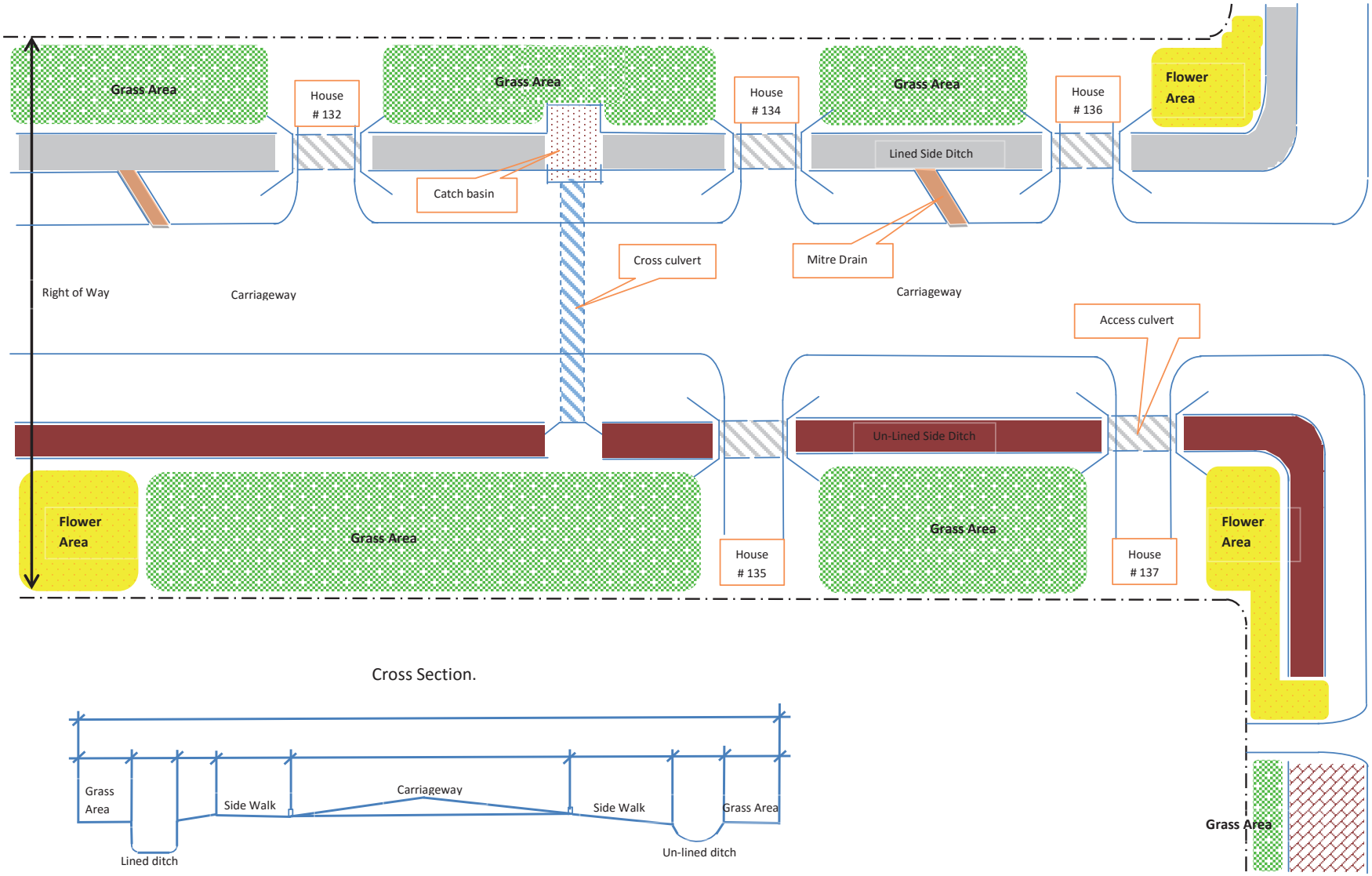
Appendix 22 Typical Road Features

Glossary		
Terms	Description	Picture
Access culvert	A circular/rectangular duct used to carry surface water under a driveway	
Carriageway	The part of road used by vehicular traffic.	
Catch basin	A covered/un-covered accessible chamber with a sump for collection of silt that forms part of the drainage system	

Cross culvert	A circular/rectangular duct used to carry surface water under the road	
Lined side ditch/drain	A long narrow excavation that is lined with concrete, designed to collect and drain off surface water	
Un-Lined side ditch/ drain	A long narrow earth excavation, designed to collect and drain off surface water	
Mitre drains	Short, open, skew ditches used to remove water from the road side ditches or gutters. Use of this reduces the necessary size of the side ditches and minimizes the velocity of water and thereby the risk of erosion.	

Cut-off Drains	A drain cut to intercept surface water flowing from adjacent land and to prevent it reaching a pavement or other prepared surface.	

Site Layout Example



Cross Section.

PBC Sub-Working Group Members

Name	Organization
Eng. Francis Gitau	Ministry of Transport and Infrastructure
Boniface Maithya	Ministry of Transport and Infrastructure
Eng. Margaret Ogai	Kenya Roads Board
Maureen Wangui	Kenya National Highways Authority
Winnie Owiti	Kenya National Highways Authority
Opuge Ephraim	Kenya National Highways Authority
Eunice Wanjiru	Kenya National Highways Authority
Mr. Julius Kaliti	Kenya Institute of Highways and Building Technology
Jemimah Nyamweya	Kenya Institute of Highways and Building Technology
Eng. Edwin Odwesso	Kenya Urban Roads Authority
Mr. Walter Ochieng	Kenya Wildlife Services
Eng. Maurice Akech	National Construction Authority

Advisors

Hiroshi Tsujino	JICA Chief Advisor P.E Jp.
Hidetsugu Ikeda	JICA Expert
Takashi Nakajima	JICA Short Term Expert, P.E Jp.
Hiroshi Mita	JICA Short Term Expert, P.E Jp.
Yoshihisa Noda	JICA Short Term Expert, P.E Jp.
Yoriko Kawakami	JICA Short Term Expert
Takumi Uno	JICA Short Term Expert
Robert Mutai	JICA/Consultant, Kenya Staff
Jared N. Onyoni	JICA/Consultant, Kenya Staff
Edward Greenhalf	Grontmij: Improvement of Rural Roads & Market Infrastructure in Western Kenya
Eric Goss	AfD Roads 2000 Central Phase 2 Project
Niels Kofoed	Project of Institutional Capacity Building to the Transport/Road Sector in Kenya, KeRRA
Forbes Johnston	Project of Institutional Capacity Building to the Transport/Road Sector in Kenya (ICBTRS), KeRRA

National Working Group Members

Name	Organization
Eng. P. M. Mwinzi	Ministry of Transport and Infrastructure
Eng. Francis Gitau	Ministry of Transport and Infrastructure
Kenji Yokota	JICA – Kenya Office
Dr. Steve Mogere	JICA – Kenya Office
Eng. Margaret Ogai	Kenya Roads Board
Eng. George M. Kiiru	Kenya National Highways Authority
Opuge Ephraim	Kenya National Highways Authority
Winnie Owiti	Kenya National Highways Authority
Eng. Amos Ombok	Kenya Urban Roads Authority
Eng. N. N. Nganga	Kenya Rural Roads Authority
Mr. Julius Kaliti	Kenya Institute of Highways and Building Technology
Eng. Maurice Akech	National Construction Authority
Mr. Walter Ochieng	Kenya Wildlife Services
Chris Gachanja	Public Procurement Oversight Authority
Hiroshi Tsujino	JICA Chief Advisor P.E Jp.
Hidetsugu Ikeda	JICA Expert

NOTES

SEAMLESS CONNECTIVITY

MINISTRY OF TRANSPORT AND INFRASTRUCTURE

HARAMBEE

JICA