



Performance Based Road Maintenance Contract

PBC HANDBOOK

Edition 1
(March 2018)

MINISTRY OF TRANSPORT, INFRASTRUCTURE,
HOUSING & URBAN DEVELOPMENT



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Performance Based Road Maintenance Contract
(PBC Guideline Handbook)
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FOREWORD

PBC Handbook is a supplement to the PBC Guideline.

This pocket-size booklet is meant for use by inspectors and contractors (Self-Control Unit) to check standard service level compliance on site.

A service scope is described by various service criteria derived from the PBC Guideline, Appendix 1 (Standard Service Level/Paved Road) and Appendix 2 (Standard Service Level/Unpaved Road). The service levels and the defects are explained in pictorial representation and description of defects in road maintenance.

We hope it is effectively utilized for effective execution of road maintenance works and services.

A handwritten signature in black ink, appearing to read 'James M. Kung'u', with a large circular flourish on the left side.

Eng. James M. Kung'u
Chief Engineer (Roads)
Ministry of Transport, Infrastructure,
Housing and Urban Development

1. CONCEPT OF PBC GUIDELINE

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 the investment.

The concept of PBC in road maintenance and management has been adopted in Kenya and commenced in 2010. This method of management of maintenance is meant to ensure the road network is maintained in good condition throughout its life time.

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**

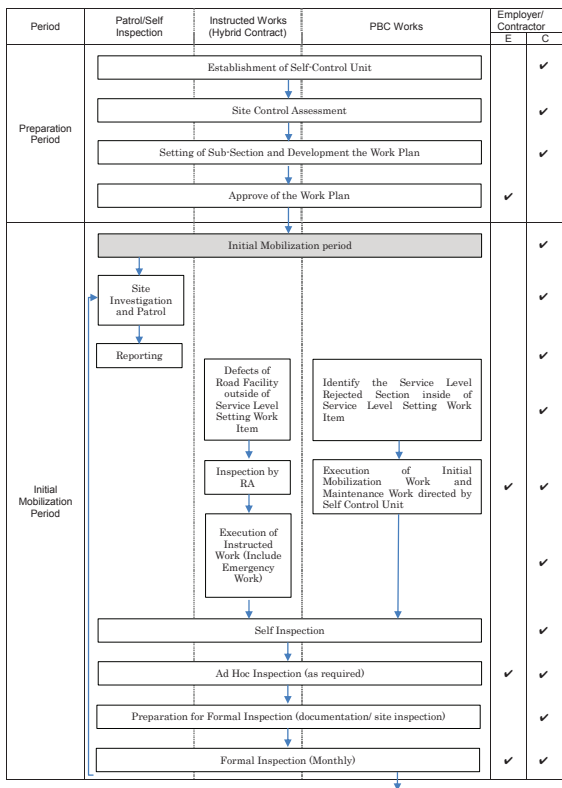
services provided by the contractor, except for unforeseen emergency works.

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*

2. WORKFLOW FOR PBC WORKS

A typical workflow for road maintenance under the PBC contract is shown as below.



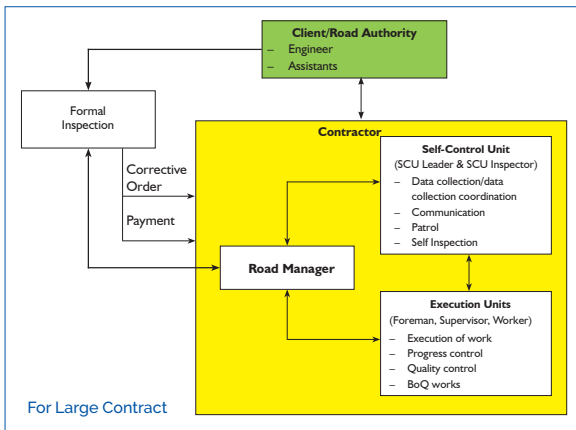
Period	Patrol/Self Inspection	Instructed Works (Hybrid Contract)	PBC Works	Employer/ Contractor	
				E	C
Completion Period	Final Formal Inspection			✓	✓
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">Service Level meets the specifications?</div>			✓	
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">Payment Reduction</div>			✓	
	Final Monthly Payment			✓	
	Evaluation of the Contract			✓	
	Completion of the Contract			✓	✓

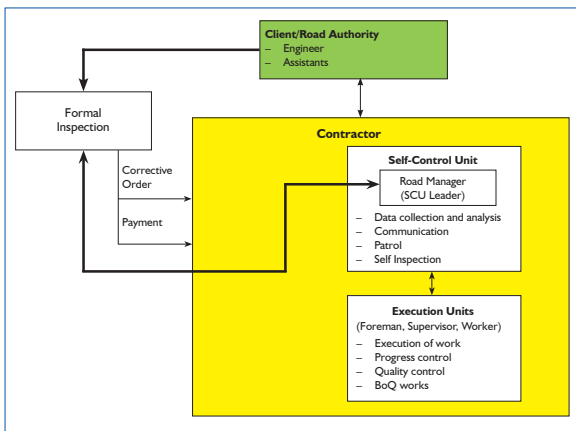
For performance based maintenance, the contract period is composed of the Initial Mobilization Period and the *Routine Maintenance Period*. During the Initial Mobilization Period, the Service Levels must be brought up to the required levels. Service Levels are evaluated during monthly formal inspections 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.

3. Establishment of the Self-Control Unit

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.

Execution Unit: A unit that comprises of a works foreman, supervisor & labourers, responsible for the execution of works, quality and progress control.





For Small Contract

4. Criteria of Standard Service Level (Paved)

1. Passability

Check Element	(I) Pavement	
Defect	I) Obstruction on passage (carriageway)	
Service Level	The road should always allow for passage of traffic.	
PAVED	Response Time	Tolerance
Standard	Within 2 hours	No tolerance permitted
High	Within 1 hour	No tolerance permitted



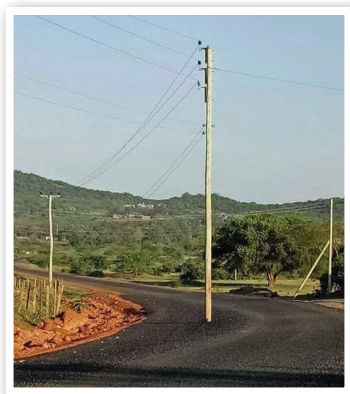
❌ Carriageway obstructed by bushes



✅ A well maintained carriageway allows smooth passage of traffic

1. Passability

Check Element	(1) Pavement	
Defect	2) Obstruction on overhead clearance	
Service Level	The road should always allow for passage of traffic.	
PAVED	Response Time	Tolerance
Standard	Within 2 hours	No tolerance permitted
High	Within 1 hour	No tolerance permitted



❌ Obstructed by an electricity pole



✅ A carriageway without obstruction

1. Smooth and Safe Traffic

Check Element	(I) Pavement	
Defect	I) Pavement Cleanliness	
Service Level	The road must always be clean and free of soil, debris, trash and other objects.	
PAVED	Response Time	Tolerance
Standard	Within 4 hours	No tolerance permitted
High	Within 3 hours	No tolerance permitted



Sweeping the carriageway/ pedestrian walkway of any silt, debris and trash.



Pavement cleanliness

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	2) Pavement too rough for road use	
Service Level	The pavement must at all times be kept to an acceptable level of roughness.	
PAVED	Response Time	Tolerance
Standard	Within 2 weeks	Maximum of 3.5 mm/m higher than the takeover IRI.
High	Within 1 week	Maximum of 2.5 mm/m higher than the takeover IRI.



An unacceptable level of roughness



A flat carriageway

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	3) Pothole	
Service Level	All visible potholes must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 2 days	The permitted maximum dimension of any pothole is 150 mm diameter, in any continuous 1 km section is 3.
High	Within 2 days	No tolerance permitted



❌ Approximately 200 mm diameter pothole



✅ Repaired by patching the potholes

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	4) Cracking in Surface (Alligator, Transverse and Longitudinal).	
Service Level	All cracks more than 3 mm in width must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 2 weeks	The permitted maximum cracked area does not exceed 10% in any subsection.
High	Within 1 week	The permitted maximum cracked area does not exceed 5% in any subsection.



Typical transverse crack



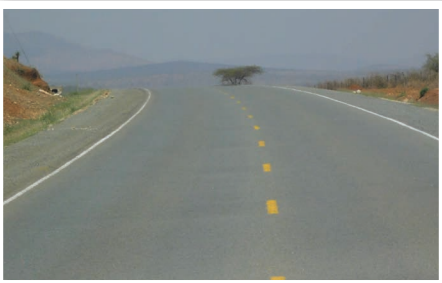
A smooth carriageway without crack

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	5) Rutting	
Service Level	All rutting of more than 2 cm deep must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum rutted area more than 2 cm deep does not exceed 2% of the area in any sub-section of 200 m length.
High		



Typical rutting



A smooth carriageway

1. Smooth and Safe Traffic

Check Element	(I) Pavement	
Defect	6) Heaving/Shoving	
Service Level	All heaving and shoving causing depression of more than 40 mm must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum area under heaving/shoving does not exceed 5% in any subsection.
High		



❌ Typical heaving causing depression



✅ A flat carriageway

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	7) Bleeding	
Service Level	The pavement must at all times be kept free from bleeding.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum area under bleeding does not exceed 5% in any subsection.
High		



Typical bleeding



A well maintained carriageway

1. Smooth and Safe Traffic

Check Element	(I) Pavement	
Defect	8) Glazing	
Service Level	The pavement must at all times be kept free from glazing.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum area under glazing does not exceed 5% in any subsection.
High		



Typical glazing



A smooth carriageway

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	9) Raveling	
Service Level	All raveled areas that are more than 5mm deep must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum raveled area does not exceed 2% of the area in any sub-section of 200 m length.
High		



❌ Typical raveling



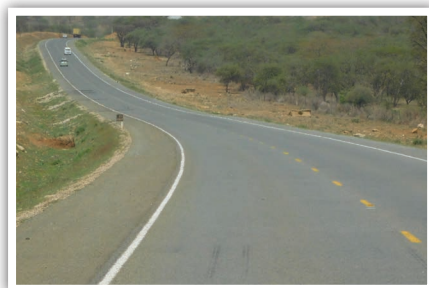
✅ A well-maintained carriageway

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	I0) Stripping/Fretting	
Service Level	Loose depth of fine Aggregates more than 20 mm must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum area under stripping / fretting does not exceed 5% in any subsection.
High		



Typical fretting



A well-maintained carriageway

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	11) Edge Damage	
Service Level	All loose pavement edges, and/ or pieces of pavement breaking off at the edges must be repaired.	
PAVED	Response Time	Tolerance
Standard	Within 2 weeks	The permitted maximum affected length does not exceed 2% in any sub-section.
High	Within 1 week	



A damaged edge



A good edge

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	I2) Cracking in Concrete Pavement	
Service Level	1) All cracks more than 0.2 mm in width must be sealed. 2) Cracks more than 3.0 mm 3) Crack between 0.5 mm and 3.0 mm 4) Cracks more than 0.5 mm.	
PAVED	Response Time	Tolerance
Standard	I-3) Within 1 week	The permitted maximum cracked area does not exceed 1% in any sub-section of 200 m length.
High	4) Within 2 weeks	



❌ Typical cracking



✅ A well-maintained carriageway

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	13) Interlocking Paving Blocks	
Service Level	1) Must be 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.	
PAVED	Response Time	Tolerance
Standard	Within 2 days	No ponding water allowed on the paved surface for more than 4% of the area in any sub-section of 200 m length.
High	Within 24 hours	



Obstructed by paving blocks



Pavement cleanliness

1. Smooth and Safe Traffic

Check Element	(2) Shoulder	
Defect	1) Damaged (Scoured/Rutted/Depressed/Potholed) paved shoulders	
Service Level	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 more than 3 mm, multiple cracks and rutting of more than 2 cm	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	1. Cross fall not less than the camber on the paved surface for more than 4% of the subsection of 200 m length. 2. The permitted maximum cracked area with cracks more than 3 mm wide does not exceed 10% of the area in any sub-section of 200 m length.
High	Within 2 weeks	



❌ Typical damaged paved shoulder



✅ A smooth carriageway

1. Smooth and Safe Traffic

Check Element	2) Shoulder	
Defect	2) Shoulder Carriageway Step.	
Service Level	At all sections, difference in height at edge of pavement must be maintained to less than 5 cm.	
PAVED	Response Time	Tolerance
Standard	Within 2 weeks	The permitted maximum affected length of difference in height less than 2% for each subsection.
High	Within 1 week	



☒ A difference in height at edge of pavement



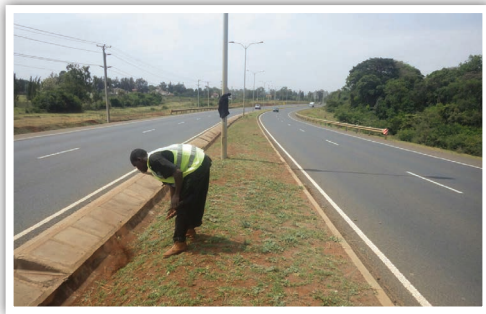
☑ Acceptable level of the difference

1. Smooth and Safe Traffic

Check Element	(3) Median	
Defect	1) Unclean Median	
Service Level	Must always be clean, free of debris and objects which must be removed within the time given if they pose danger to traffic safety.	
PAVED	Response Time	Tolerance
Standard		
High	Within 3 days	No tolerance permitted



Unclean median



Clean median

1. Smooth and Safe Traffic

Check Element	3) Median	
Defect	2) Ponding and Spillage	
Service Level	The level of filling in the median should be maintained such that there is no water ponding and no fill material spills onto the carriageway.	
PAVED	Response Time	Tolerance
Standard		
High	Within 2 weeks	No tolerance permitted



Poorly maintained



Well maintained

1. Smooth and Safe Traffic

Check Element	(3) Median	
Defect	3) Poorly Maintained Vegetation	
Service Level	Median plantations must be maintained properly with watering and pruning as required from time to time. The height of plantations less than 1 m at any time. There must be no obstruction in sight distance and no fallen plantations on carriageway allowed.	
PAVED	Response Time	Tolerance
Standard		
High	Within 2 weeks	No tolerance permitted



Poorly maintained



Well-maintained

1. Smooth and Safe Traffic

Check Element	(4) Footpath	
Defect	Obstruction due to soil, debris, trash rocks and fallen trees	
Service Level	All footpath must be clean, in good condition and fully functional. Should be well drained, no potholes and have access for people with disability.	
PAVED	Response Time	Tolerance
Standard	Within 3 hours	No tolerance permitted
High		



Obstructed by trash



A well-maintained footpath

1. Smooth and Safe Traffic

Check Element	Foot Bridge	
Defect	Broken Footbridge	
Service Level	The footbridge must be in good condition and fully functional.	
PAVED	Response Time	Tolerance
Standard	Within 3 hours	No tolerance permitted
High		



❌ The steel coating is rubbed raw



✅ A well-maintained foot bridge

2. Visibility

Check Element	(I) Sight Distance of availability	
Defect	Vegetation obstructs visibility or is within the vegetation free zone	
Service Level	Must be removed if within 5.5 m above the road surface and/or the minimum sight distance of 240 m is not maintained.	
PAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High		



Obstructed by bush



Vegetation free zone

2. Visibility

Check Element	(2) Street Lighting	
Defect	Two or more consecutive lights not functioning/missing bulbs	
Service Level	Road must always be well lit during the specified hours at night.	
PAVED	Response Time	Tolerance
Standard	Within 24 hours	The permitted maximum tolerance is 5% of the length of the road equipped with street lighting is below the defined Service Level.
High		



Damaged street lights



A carriageway with street lights

3. Traffic Information

Check Element	(I) Signage	
Defect	I) Absence of relevant warning signs/mandatory signs	
Service Level	All signage must be present, complete, clean, legible, reflective and firmly installed.	
PAVED	Response Time	Tolerance
Standard		Maximum tolerance is 5% of the signs are below the defined Service Level in any subsection.
High	Within 24 hours	



Absence of warning sign



A pavement with a sign

3. Traffic Information

Check Element	(I) Signage	
Defect	2) Absence of relevant Information Signs, Edge marker Post, Guide Post, Kilometre post	
Service Level	All signage must be present, complete, clean, legible, reflective and firmly installed.	
PAVED	Response Time	Tolerance
Standard	Within 2 days	Maximum tolerance is 5% of the signs are below the defined Service Level in any subsection.
High		



Kilometer post obscure.



The sign is easy to understand.

3. Traffic Information

Check Element	(1) Signage	
Defect	3) Absence of relevant Traffic sign	
Service Level	All traffic signals must be clean, operational and well synchronized.	
PAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High		



The traffic signal knocked down



The traffic signal is clean and operational.

3. Traffic Information

Check Element	(2) Road Works Advance warning signs	
Defect	Absence of relevant warning signs/obscured by vegetation	
Service Level	Must be placed when clearing works are required to be undertaken.	
PAVED	Response Time	Tolerance
Standard	Within 1 hour	No tolerance permitted
High		



Absence of warning sign



A relevant warning sign

3. Traffic Information

Check Element	(3) Road Making	
Defect	Faded marking, Damaged road reflectors	
Service Level	All road markings/road studs including “cat’s-eyes” are clear, visible and functional. If the reflection factor is less than 35% of the specified design value.	
PAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum tolerance is 5% of the area of road markings and the number of road studs below the defined Service Level.
High		



A faded road marking



A proper road marking

1. Drainage Capability

Check Element	(I) Side Drains, Mitre Drains, Cut off drains (Lined)	
Defect	Obstructions due to silt, sediments, debris, soil, materials washed after storm	
Service Level	Must be clean, free of sediments and obstructions to ensure free flowing conditions at all times.	
PAVED	Response Time	Tolerance
Standard	Within 1 week	The permitted maximum tolerance is 5% of the length of drains below the defined Service Level.
High	Within 3 days	



Inner vegetation drains



A well-maintained side drain

1. Drainage Capability

Check Element	(2) Side Drains, Mitre Drains, Cut off drains (Unlined)	
Defect	Obstructions due to silt, sediments, debris, soil, materials washed after storm	
Service Level	Must be clean, free of sediments and obstructions to ensure free flowing conditions at all times.	
PAVED	Response Time	Tolerance
Standard	Within 1 week	The permitted maximum tolerance is 5% of the length of drains below the defined Service Level.
High	Within 3 days	



Inner vegetation drains



A well-maintained side drains

1. Drainage Capability

Check Element	(3) Culverts and Drifts	
Defect	I) Obstructions due to debris	
Service Level	Must be clean and free of obstacles to ensure free flowing conditions at all times.	
PAVED	Response Time	Tolerance
Standard	a) Siltation/Obstruction must be cleared within 7 days, b) Damages must be repaired within 3 weeks	The permitted maximum tolerance is 5% of the length of drains below the defined Service Level.
High	a) Siltation/Obstruction must be cleared within 3 days, b) Damages must be repaired within 2 weeks	



❌ Obstructed by debris



✅ A well-maintained cross culvert

1. Drainage Capability

Check Element	(3) Culverts and Drifts	
Defect	2) Obstruction due to Structural Damage	
Service Level	Must be clean and free of obstacles to ensure free flowing conditions at all times.	
PAVED	Response Time	Tolerance
Standard	Broken culverts should be reported to the Engineer within 1 week	No tolerance permitted
High	Broken culverts should be reported to the Engineer within 24 hours	



Broken culverts



A well-maintained culverts

1. Drainage Capability

Check Element	4) Scour Checks, gabions and other erosion protection structures and gabions	
Defect	Erosion due to malfunction of the structures	
Service Level	Must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users.	
PAVED	Response Time	Tolerance
Standard	Within 1 week	The permitted maximum tolerance is 5% of the length below the defined Service Level.
High		



❌ Malfunctioning drainage



✅ A well protected structure

1. Drainage Capability

Check Element	(5) Manholes and Gully pots	
Defect	Blocked manholes/obstructions due to debris	
Service Level	Must be clean and free from obstructions and without structural damage and ensure free flowing conditions.	
PAVED	Response Time	Tolerance
Standard	a) Within 3 days b) Damaged manholes and gully pots within 1 week	The permitted maximum tolerance is 5% of the number of manholes and gully pots below the defined Service Level.
High		



Covered by overlay



Clean and free from obstructions

2. Vegetation Control

Check Element	(I) Vegetation free zone	
Defect	Unwanted vegetation on the Vegetation free zone	
Service Level	Carriageway, shoulders and structures must be kept with no vegetation.	
PAVED	Response Time	Tolerance
Standard	Height: 0 mm at all times	No tolerance permitted
High		



Growth encroaching



A vegetation free pavement

2. Vegetation Control

Check Element	(2) Inner Vegetation Zone	
Defect	Outgrown vegetation	
Service Level	Inner vegetation free zone, edge of shoulders to back of side drain / ditch or 2 m away from edge of shoulder on straight and outside of curves and 5 m on the inside of curves. Also control of vegetation around street furniture and other features.	
PAVED	Response Time	Tolerance
Standard	a) Height \leq 25 mm, \geq 150 mm at all times	The permitted maximum tolerance is 5% of the length below the defined Service Level in any subsection.
High	b) Outer vegetation within 25 mm and 300 mm	



Obstructed by bush



Bushes cleared

2. Vegetation Control

Check Element	(3) Overhanging Branches	
Defect	Vegetation obstructs visibility	
Service Level	Must be removed if within 5.5 m above the road surface and/or the minimum sight distance of 240 m is not maintained.	
PAVED	Response Time	Tolerance
Standard	Within 1 week	No tolerance permitted
High		



❌ The vegetation covers part of the road



✅ Grass / vegetation cutting

2. Vegetation Control

Check Element	(4) Trees within ROW	
Defect	I) Self-sown tree of nuisance >> 1 m high	
Service Level	Must be removed in case of outgrown roots which damage the road/structure.	
PAVED	Response Time	Tolerance
Standard	The permitted maximum tolerance is 5% of the number of trees are below the defined Service Level in any subsection.	
High	Within 1 month	



Bush obstruction



Vegetation trimming

2. Vegetation Control

Check Element	(4) Trees within ROW	
Defect	2) Dead tree that presents risk of falling onto the road	
Service Level	Dead trees within outer vegetation zone must be removed.	
PAVED	Response Time	Tolerance
Standard	Within 1 week	The permitted maximum tolerance is 5% of the number of trees are below the defined Service Level in any subsection.
High		



❌ Obstructed by small vegetation



✅ A well-maintained road

3. Maintenance of Other Structures

Check Element	(I) Concrete structures	
Defect	Structural deterioration	
Service Level	Concrete structures must be in good condition and fully functional.	
PAVED	Response Time	Tolerance
Standard	In case of structural damage the contractor to notify the Engineer within 24 hours	No tolerance permitted
High		



A damaged guard rail post



The bridge is working well

3. Maintenance of Other Structures

Check Element	(1) Box Culvert	
Defect	Obstruction due to sediments, soils and washed materials	
Service Level	Must be free flowing at all times.	
PAVED	Response Time	Tolerance
Standard	In case of structural damage the contractor to notify the Engineer within 24 hours	No tolerance permitted
High		



❌ Obstructed by soil deposit (case of pipe culvert)



✅ A well maintained box culvert (case of pipe culvert)

3. Maintenance of Other Structures

Check Element	(2) Steel structures	
Defect	Structural deterioration, Leaking structures	
Service Level	The steel structures (e.g. Bridge and pedestrian bridge) must be clean, in good condition, free of corrosion and fully functional.	
PAVED	Response Time	Tolerance
Standard		
High	In case of structural damage the contractor to notify the Engineer within 24 hours.	No tolerance permitted



Steel structures deterioration



The steel structure is in good condition

3. Maintenance of Other Structures

Check Element	(3) Bridge expansion joints	
Defect	Debris impeding joint movement/damaging the joint	
Service Level	All expansion joints must be clean and in good condition and fully functional.	
PAVED	Response Time	Tolerance
Standard	In case of any condition which threatens structural integrity of the expansion joint, the Contractor must notify the Engineer within 24 hours	No tolerance permitted
High		



The expansion joint is not in good condition (deficit of finger joint)



The expansion joint is in good condition.

3. Maintenance of Other Structures

Check Element	(4) Guardrail / Pedestrian Rail	
Defect	Deformed/Missing guardrails	
Service Level	Guardrails must be in good condition and fully functional.	
PAVED	Response Time	Tolerance
Standard	Within 1 week	No tolerance permitted
High		



Defective/damaged guardrails/pedestrian rails are to be repaired to their condition.



A guardrail in good condition

3. Maintenance of Other Structures

Check Element	(5) Riverbeds	
Defect	I) Obstructions due to debris or inappropriate vegetation	
Service Level	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.	
PAVED	Response Time	Tolerance
Standard	Any accumulation of debris within 400 mm	No tolerance
High	must be removed.	permitted



❌ A riverbed with debris and other obstructions



✅ A well-maintained riverbed

3. Maintenance of Other Structures

Check Element	(5) Riverbeds	
Defect	I) Eroded river beds	
Service Level	Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times.	
PAVED	Response Time	Tolerance
Standard	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.
High		



Erosion around bridge abutment



A proper bridge abutment

4. Slope Stability

Check Element	(1) Embankment slopes	
Defect	Possible slope failure	
Service Level	All embankment slopes must be without deformations/damages and erosions of more than 100mm in depth.	
PAVED	Response Time	Tolerance
Standard		The permitted max. tolerance is 5% of the length of the road with embankment slopes is below the defined Service Level in each subsection.
High	Within 1 week	



❌ Embankment slopes are deformed.



✅ A well-maintained slope.

4. Slope Stability

Check Element	(I) Slopes in cuts	
Defect	Possible slope failure	
Service Level	All slopes in cuts must be stable	
PAVED	Response Time	Tolerance
Standard High	Fallen slope material must be removed, Quantities below 10 m ³ per Km section from pavement: within 4 hours from shoulders: within 1 day	No tolerance permitted



Slopes in cut is not stable



A well-maintained slope.

5. Criteria of Standard Service Level (Unpaved)

1. Passability

Check Element	Pavement	
Defect	1) Obstruction on passage	
Service Level	The road should always allow for passage of traffic.	
UNPAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High	Within 12 hours	No tolerance permitted



Obstructed by rocks



A clean pavement

1. Passability

Check Element	Pavement	
Defect	2) Obstruction on overhead clearance	
Service Level	The road should always allow for passage of traffic.	
UNPAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High	Within 12 hours	No tolerance permitted



Obstructed by bush



Clean pavement

1. Smooth and Safe Traffic

Check Element	(I) Pavement	
Defect	I) Unclean Pavement	
Service Level	The road must always be clean and free of soil, debris, trash and other objects.	
UNPAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High	Within 12 hours	No tolerance permitted



- Local residents cut trees and block the carriageway with tree branches. Most of the tree left-overs area on the carriageway and in the drains.



- Pavement cleanliness

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	Pavement too rough for use	
Service Level	The pavement must at all times be kept to an acceptable level of roughness.	
UNPAVED	Response Time	Tolerance
Standard	Within 5 days	The permitted level of tolerance of the IRI shall be a maximum of 11 mm/km.
High		



An unacceptable level of roughness.



A well-maintained section

1. Smooth and Safe Traffic

Check Element	(I) Pavement	
Defect	3) Potholes	
Service Level	All visible potholes must be repaired.	
UNPAVED	Response Time	Tolerance
Standard	Within 2 weeks	The permitted maximum area does not exceed 5% percent of the area in any sub-section of 200m length.
High	Within 1 week	



Approximately 200 mm diameter pothole



Repaired by patching the potholes

1. Smooth and Safe Traffic

Check Element	(2) Pavement	
Defect	4) Corrugations	
Service Level	Maximum spacing 3.0 cm	
UNPAVED	Response Time	Tolerance
Standard	Within 2 weeks	The permitted maximum corrugated area does not exceed 5% of the area in any subsection.
High	Within 1 week	



Corrugated all area



A well-maintained road

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	5) Rutting	
Service Level	All rutting of more than 7cm deep must be repaired.	
UNPAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum rutted area more than 7 cm deep does not exceed 5% of the area in any sub-section.
High	Within 1 weeks	



☒ Typical rutting



☑ A well maintained road

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	6) Loss of Camber	
Service Level	The Camber must be kept at 5.0%	
UNPAVED	Response Time	Tolerance
Standard	Within 2 weeks	$\pm 1\%$
High	Within 1 week	$\leq 1\%$



- Flooding and water penetration causing softening of pavement and making the road impassable



- Acceptable camber

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	7) Erosion Gullies	
Service Level	The pavement must at all times be kept free from Gullies.	
UNPAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum area under bleeding does not exceed 5% in any subsection.
High		



Eroded all area



A well-maintained road

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	8) Soft Spot	
Service Level	The pavement must at all times be well drained. Quality base materials must be used at all times.	
UNPAVED	Response Time	Tolerance
Standard	Within 4 weeks	The permitted maximum area under glazing does not exceed 5% in any subsection.
High		



Undrained area



A well-maintained road

1. Smooth and Safe Traffic

Check Element	(1) Pavement	
Defect	9) Loss of Gravel Depth	
Service Level	The gravel thickness along the road centre line must be equal to design thickness.	
UNPAVED	Response Time	Tolerance
Standard	Within 6 months	No tolerance permitted
High		



❌ Unacceptable level of gravel depth



✅ A well-maintained road

1. Smooth and Safe Traffic

Check Element	(2) Shoulder	
Defect	(1) Damaged (Scoured/Rutted/Depressed/Potholed/High vegetation) UNPAVED shoulders	
Service Level	1) Repaired to avoid water penetration 2) Without deformations and erosion so that the cross fall is not less than the camber on the UNPAVED surface. 3) Free of visible potholes, cracks wider than 3 mm, multiple cracks and rutting of more than 2 cm	
UNPAVED	Response Time	Tolerance
Standard	Within 4 weeks	1. Cross fall the camber on the UNPAVED surface than 4% of the subsection. 2.3. The permitted maximum cracked area with cracks more than 3 mm wide does not exceed 10% of the area in any sub-section.
High	Within 4 weeks	



Damaged unpaved shoulders



A well-maintained road

1. Smooth and Safe Traffic

Check Element	Shoulder	
Defect	Shoulder Carriageway Step.	
Service Level	At all sections, different	
UNPAVED	Response Time	Tolerance
Standard	Within 2 weeks	The permitted maximum affected length of difference in height less than 2% for each sub-section.
High	Within 2 weeks	



A rough shoulder



A well-maintained road

1. Smooth and Safe Traffic

Check Element	(3) Footpath	
Defect	Obstruction due to soil, debris, trash rocks and fallen trees	
Service Level	All footpath must be clean, in good condition and fully functional. Should be well drained, no potholes and have access to people with disability.	
UNPAVED	Response Time	Tolerance
Standard	Within 3 hours	No tolerance permitted
High		



Unpaved footpath with obstruction



A well-maintained road

2. Visibility

Check Element	Sight Distance of visibility	
Defect	Vegetation obstructs visibility or is within the vegetation free zone.	
Service Level	Must be removed if within 5.5 m above the road surface and/or the minimum sight distance of 240 m is not maintained.	
UNPAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High		



Obstructed by bush



A well-maintained road

3. Traffic Information

Check Element	(I) Signage	
Defect	I) Absence of relevant warning signs/Mandatory signs	
Service Level	All signage must be present, complete, clean, legible, reflective and firmly installed.	
UNPAVED	Response Time	Tolerance
Standard	Within 24 hours	Maximum tolerance is 5% of the signs are below the defined Service Level in any subsection.
High		



Absence of relevant warning sign for bump



A clear warning sign

3. Traffic Information

Check Element	(1) Signage	
Defect	2) Absence of relevant Information Signs, Edge marker Post, Guide Post, Kilometre post	
Service Level	All signage must be present, complete, clean, legible, reflective and firmly installed.	
UNPAVED	Response Time	Tolerance
Standard	Within 2 days	Maximum tolerance is 5% of the signs are below the defined Service Level in any subsection.
High		



Absence of relevant information sign



A relevant information sign

3. Traffic Information

Check Element	(1) Signage	
Defect	3) Absence of relevant Traffic signals	
Service Level	All traffic signals must be clean, operational and well synchronized.	
UNPAVED	Response Time	Tolerance
Standard	Within 24 hours	No tolerance permitted
High		



☒ Corrosion of traffic signs



☑ A good road sign

3. Traffic Information

Check Element	(2) Road Works Advance warning signs	
Defect	Absence of relevant warning signs/obscured by vegetation	
Service Level	Must be placed when clearing works are required to be undertaken.	
UNPAVED	Response Time	Tolerance
Standard	Within 6 hours	No tolerance permitted
High		



Absence of relevant warning signs



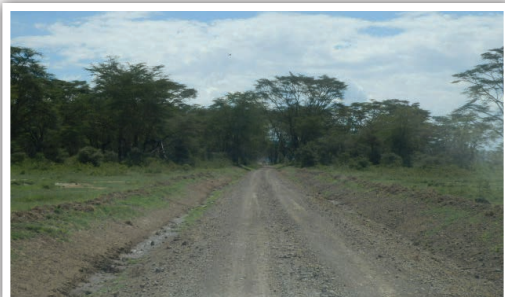
A relevant warning sign

1. Drainage Capability

Check Element	(1) Side Drains, Mitre Drains, Cut off drains	
Defect	Obstructions due to silt, sediments, debris, soil, materials washed after storm	
Service Level	Must be clean, free of sediments and obstructions to ensure free flowing conditions at all times.	
UNPAVED	Response Time	Tolerance
Standard	Within 1 week	The permitted maximum tolerance is 5% of the length of drains below the defined Service Level.
High	Within 1 week	



Non-functioning drains that have led to eroding of the side ditch.



A well-maintained paved drain to prevent eroding of the road formation

1. Drainage Capability

Check Element	(2) Culverts and Drifts	
Defect	I) Obstructions due to debris	
Service Level	Must be clean and free of obstacles to ensure free flowing conditions at all times.	
UNPAVED	Response Time	Tolerance
Standard	a) Siltation/ Obstruction must be cleared within 7 days; b) Damages must be repaired within 3 weeks	The permitted maximum tolerance is 5% of the length of drains below the defined Service Level.
High	a) Siltation/ Obstruction must be cleared within 3 days; b) Damages must be repaired within 2 weeks	



❌ Obstructed by debris



✅ Workers de-silting inlets/outlets of a culvert using a long handle shovel

1. Drainage Capability

Check Element	(2) Culverts and Drifts	
Defect	1) Obstruction due to Structural Damage	
Service Level	Must be clean and free of obstacles to ensure free flowing conditions at all times.	
UNPAVED	Response Time	Tolerance
Standard	Broken culverts should be reported to the Engineer within 1 week	No tolerance permitted
High	Broken culverts should be reported to the Engineer within 24 hours	



Obstructed by structural damage



Well-maintained side drains along the road

1. Drainage Capability

Check Element	(3) Scour Checks, gabions and other erosion protection structures and gabions	
Defect	Erosion due to malfunction of the structures	
Service Level	Must be fully functional with no serious defects that can endanger the structure, roadway or pose safety hazard to road users.	
UNPAVED	Response Time	Tolerance
Standard	Within 1 week	The permitted maximum tolerance is 5% of the length below the defined Service Level.
High		



- This section of the drain has eroded away and the scour checks have stopped functioning.



- This masonry stone scour checks are well maintained and functioning properly to stop erosion and slow down storm water runoff during the rainy seasons.

2. Vegetation Control

Check Element	(4) Vegetation free zone	
Defect	Unwanted vegetation on the Vegetation free zone	
Service Level	Carriageway, shoulders and structures must be kept with no vegetation.	
UNPAVED	Response Time	Tolerance
Standard	Height: 0 mm at all times	No tolerance permitted
High		



Growth encroaching



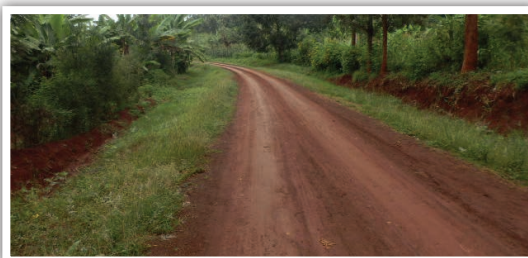
A well-maintained road

2. Vegetation Control

Check Element	(5) Inner Vegetation Zone	
Defect	1) Outgrown vegetation	
Service Level	Inner vegetation must zone, edge of shoulders to back of side drain /ditch or 2m away from edge of shoulder on straight and outside of curves and 5m on the inside of curves. Also control of vegetation around street furniture and other features.	
UNPAVED	Response Time	Tolerance
Standard	<ul style="list-style-type: none"> a) Height: 25 mm (min) to 300 mm (max) at all times b) Outer vegetation within 25 mm (min) and 300 mm (max) 	The permitted maximum tolerance is 5% of the length below the defined Service Level in any subsection.
High	<ul style="list-style-type: none"> a) Height: 25mm (min) to 150mm (max) at all times b) Outer vegetation within 25 mm (min) and 300 mm (max) 	



Vegetation has been left to grow over 400mm high due to poor maintenance.



A well-maintained road

2. Vegetation Control

Check Element	(5) Inner Vegetation Zone	
Defect	2) Vegetation obstructs visibility	
Service Level	Must be removed if within 5.5 m above the road surface and/or the minimum sight distance of 240 m is not maintained.	
UNPAVED	Response Time	Tolerance
Standard	Within 1 week	No tolerance permitted
High		



The vegetation covers the road.



Cut grass/vegetation

2. Vegetation Control

Check Element	(6) Trees within ROW	
Defect	1) Self-sown tree of nuisance >> 1 m high	
Service Level	Must be removed incase of outgrown roots which damage the road/structure.	
UNPAVED	Response Time	Tolerance
Standard		
High	Within 1 month	The permitted maximum tolerance is 5% of the number of trees are below the defined Service Level in any subsection.



Obstructed by bush



Cut grass/vegetation

2. Vegetation Control

Check Element	(6) Trees within ROW	
Defect	2) Dead tree that presents risk of falling onto the road	
Service Level	Dead trees within outer vegetation zone must be removed.	
UNPAVED	Response Time	Tolerance
Standard	The permitted maximum tolerance is 5% of the number of trees are below the defined Service Level in any subsection.	
High	Within 1 week	



Dead trees on the road



Cut grass/vegetation

3. Maintenance of Other Structures

Check Element	(1) Concrete structures	
Defect	Structural deterioration	
Service Level	Concrete structures must be in good condition and fully functional.	
UNPAVED	Response Time	Tolerance
Standard	In case of structural damage the contractor to notify the Engineer within 24 hours	No tolerance permitted
High		



❌ Bared steels



✅ The bridge that is well maintained, and well paved. The weep holes are clean and the guard rails are functional for safety purposes.

3. Maintenance of Other Structures

Check Element	(1) Concrete structures	
Defect	Blocked/Obstruction due to sediments, soils and washed materials	
Service Level	Must be free flowing at all times.	
UNPAVED	Response Time	Tolerance
Standard	In case of structural damage the contractor to notify the Engineer	No tolerance permitted
High	In case of structural damage the contractor to notify the Engineer within 24 hours	



Blocked by weeds and soil



A well-maintained condition

3. Maintenance of Other Structures

Check Element	(2) Steel structures	
Defect	Structural deterioration, Leaking structures	
Service Level	The steel structures (e.g. Bridge and pedestrian bridge) must be clean, in good condition, free of corrosion and fully functional.	
UNPAVED	Response Time	Tolerance
Standard	In case of structural damage the contractor to notify the Engineer	No tolerance permitted
High	In case of structural damage the contractor to notify the Engineer within 24 hours	



Damage of steel deck



The steel structure is in good condition.

3. Maintenance of Other Structures

Check Element	(3) Bridge expansion joints	
Defect	Debris impeding joint movement/damaging the joint	
Service Level	All expansion joints must be clean and in good condition and fully functional.	
UNPAVED	Response Time	Tolerance
Standard	In case of any condition which threatens structural integrity of the expansion joint, the Contractor must notify the Engineer within 24 Hours.	No tolerance permitted
High		



The expansion joints are not in good condition.



The expansion joints are in good condition.

3. Maintenance of Other Structures

Check Element	(4) Guardrail /Pedestrian Rail	
Defect	Deformed/Missing guardrails	
Service Level	Guardrails must be in good condition and fully functional.	
UNPAVED	Response Time	Tolerance
Standard	Within 1 week	No tolerance permitted
High		



Defective/damaged guardrails/
pedestrian rails are to be repaired to their condition.



A straight guardrail

3. Maintenance of Other Structures

Check Element	(5) Riverbeds	
Defect	I) Obstructions due to debris or inappropriate vegetation	
Service Level	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.	
UNPAVED	Response Time	Tolerance
Standard	Any accumulation of debris within 400 mm	No tolerance
High	must be removed.	permitted



❌ A riverbed with debris and other obstructions



✅ A well-maintained riverbed

3. Maintenance of Other Structures

Check Element	(5) Riverbeds	
Defect	2) Eroded river beds	
Service Level	Erosion around bridge abutments and piers must be controlled with all reasonable measures at all times.	
UNPAVED	Response Time	Tolerance
Standard	Causes for non-compliance must be eliminated within 2 weeks after water has sufficiently receded to allow working conditions.	
High	However, the damaged portion pending repairs maybe left on site with proper signs and safety arrangements.	



☒ Erosion around bridge abutment



☑ A standard bridge abutment

4. Slope Stability

Check Element	(I) Embankment slopes	
Defect	Possible slope failure	
Service Level	All embankment slopes must be without deformations / damages and erosions of more than 100 mm in depth.	
UNPAVED	Response Time	Tolerance
Standard		The permitted maximum tolerance is 5% of the length of the road with embankment slopes is below the defined Service Level in each subsection.
High	Within 1 week	



☒ Embankment slopes are deformed.



☒ Embankments slopes are deformed.

4. Slope Stability

Check Element	(2) Slopes in cuts	
Defect	Possible slope failure	
Service Level	All slopes in cuts must be stable.	
UNPAVED	Response Time	Tolerance
Standard	Fallen slope material must be removed, Quantities below 10 m ³ per Km section from pavement: within 4 hours from shoulders: within 1 day	No tolerance permitted
High		



Slopes in cut is not stable.



Slope in cut is suitable.

6. Contractor's Evaluation

Work performance shall be verified during Formal Inspection for Contractor's Evaluation. The final score calculated by monthly inspection should be notified to the contractor at the end of contract. This is to evaluate contractor's performance.

Pass/fail criteria for evaluation 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

Source: Part 4 Contractor's Evaluation for PBC, PBC Guideline, JICA, Jan.2016

Appendix: Failure Case



1. Guard rails: Pricing of guard rails beams



2. Proper bolts and nuts



3. Incorrect jointing position flange



4. Lighting post without cover and reinforcement



5. Traffic signal : Signal not facing traffic directly



6. Vegetation obstructs visibility



7. Footpath: Openings unsafe for pedestrians



8. Culvert: Irregular occupation in culvert by utilities



9. Drainage problem



10. Coordination liaison with utility office

