



TECHNICAL DOCUMENT

APPENDIX C-2A

Remote Essential and Municipal Services

REMS

Municipal Services – Sealed Internal Road System

Maintenance **GUIDELINE**

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1 Introduction

The Principal, through the Remote Essential and Municipal Services (REMS) Program, and on behalf of the State of Western Australia, funds municipal service delivery (and associated infrastructure management) and environmental management to Remote Aboriginal Settlements across Western Australia.

The Principal seeks to implement a procedure of best practice for Sealed Internal Road System Maintenance within Remote Aboriginal Settlements. Most settlements have unsealed formed roads or tracks but a limited number have sealed internal roads.

Internal roads are those settlement roads servicing the buildings, infrastructure and residential homes and other key elements of the settlement including the landfill, sewage disposal areas, bores, aerodrome and any other key element that contributes to the operation of the settlement. Internal roads excludes settlement access roads coming from another location.

This Guideline has been developed through the REMS Program and focuses on the requirements for Services associated with Sealed Internal Road System Maintenance.

NOTE: There is a separate Guideline for Unsealed Internal Road System Maintenance Services.

NOTE: It is noted by the Principal that there will be some limits on outcomes achievable by the Contractor as a result of conducting sealed road maintenance due to a combination of factors including current road condition and the number of days of work allocated to maintenance as outlined in **Appendix E (REMS Municipal Services Scope and Frequencies)** of the Specifications. Overtime the Principal will undertake capital and major maintenance works to sealed road settlements as funding is available and this will further enhance the outcomes achievable. In the meantime and subject to the Contract the Principal will work collaboratively with the Contractor to maximise the outcomes achievable.

This Guideline has been developed with the following values in mind:

1. **Sustainability**
Seeking a pragmatic and appropriate balance between social, environmental and financial considerations for best practice outcomes in municipal Services management.
2. **Simplicity**
Reducing the complexity of approaches to municipal Services management.
3. **Local focus**
Seeking best practice municipal Services management for the benefit and amenity of the settlement..

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2 Who is this Guideline applicable to?

This Guideline applies to Contractors in regards to Sealed Internal Road System Maintenance Services (Maintenance Services) within Remote Aboriginal Settlements that are listed in **Attachment A** of this Appendix C-2A.

The Contractor shall always act in the best interests of the Principal. The Principal or the Principal's Representative may audit the Contractor's performance in this area.

The purpose of this Guideline is to set out the minimum standards applicable to the repair and maintenance services activities associated with the Sealed Internal Road System.

2.1 What are the Outcomes the Contractor is to achieve?

The key required outcomes for the Sealed Internal Road System Maintenance Services shall be the preservation of the asset and protection of public safety and amenity. This shall be achieved by best practice:

- (a) Maintenance activities designed to preserve the Sealed Internal Road System;
- (b) Maintenance activities designed to protect and safeguard the road user; and
- (c) Maintenance activities designed to protect and enhance the amenity of the local settlement.

The Guideline lists the minimum Service delivery tasks / standards which the Contractor must deliver to provide the desired outcome.

- (d) The Contractor must deliver the Services to settlements which have a sealed road system (as listed in Attachment A included in this Guideline) and in accordance with the number of sealed roads maintenance work days allocated in **Appendix E (REMS Municipal Services Scope and Frequencies)** of the Specifications and in accordance with **Schedule 11 (Maintenance Services Schedule)** of the Conditions of Contract.

NOTE: General information relating to individual settlement road systems can be found in:

- i. Appendix F-1 (REMS Municipal KIMB Settlement Infrastructure);
- ii. Appendix F-2 (REMS Municipal PILB Settlement Infrastructure); and
- iii. Appendix F-3 (REMS Municipal GOLD Settlement Infrastructure),

of the Specifications.

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2.2 How will the Principal use this Guideline?

The Principal acknowledges that Sealed Internal Road Systems within settlements vary widely in terms of construction type, overall length, complexity, and existing condition.

The Principal expects the Contractor to use all his initiative, skill and effort to undertake the maintenance activities best-suited to maintaining each individual settlement Sealed Internal Road System in as good a state of repair as possible and to make every reasonable endeavour to achieve the outcomes stated in this Guideline.

2.3 Risk based approach

The Principal recognises that there are unique constraints and hostile environments which heavily impact upon the ability to provide organised and effective Municipal Services within Remote Aboriginal Settlements.

The structure of this Guideline is set up according to a framework of outcomes and suggested measures for each relevant aspect of the Services. The outcomes must be achieved for each element of the Services, however an outcome may be achieved through different methods and it is the responsibility of the Contractor to ensure that a proposed methodology will achieve the required outcome. The suggested measures represent some of the acceptable methods to aid in achieving the desired outcomes.

Suggested measures may not necessarily be appropriate for every management application. The outcome of a risk based assessment for a management activity may indicate usage of alternative measures to those suggested in order to achieve the required outcomes. Subject to approval of the Principal's Representative, the Contractor can introduce a number of alternative control measures which may be applied to a hazard in order to mitigate a risk.

A risk based approach must be used in all aspects of Sealed Internal Road System Maintenance Services. A risk assessment may be qualitative or quantitative and, as well as considering environmental impacts, must also consider economic, social and other impacts. A risk assessment is a useful tool for identifying the unique risks and developing the potential alternative controls which may be put in place to manage or reduce risk to an acceptable level.

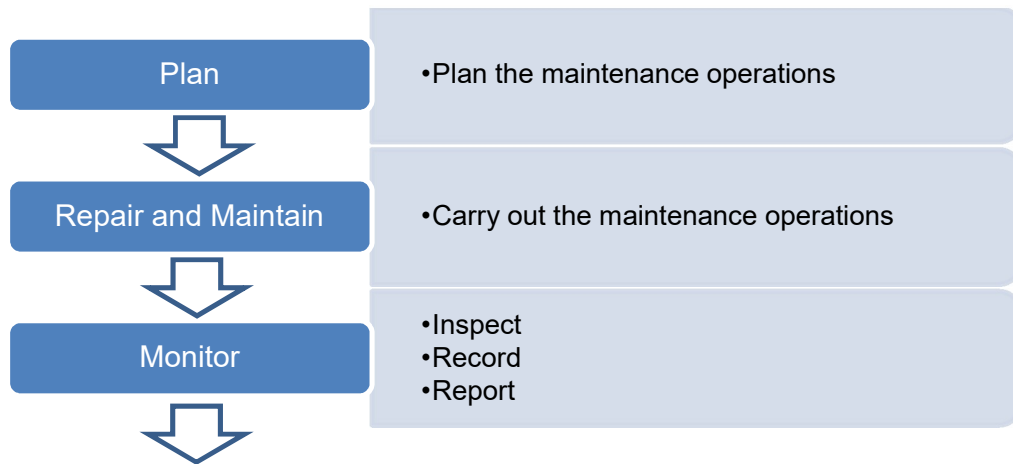
The Contractor must have a risk assessment in place for all activities associated with the Sealed Internal Road Maintenance Services.

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2.4 Structure of the Guideline

This guideline covers the three broad phases of the Sealed Internal Road System Maintenance Services process:

1. Planning
2. Maintaining
3. Monitoring



SUCCESSFUL INTERNAL ROAD SYSTEM MAINTENANCE SERVICES

2.5 Maintenance Strategy

Road systems in settlements vary considerably in terms of design and construction type; length; complexity; and current condition.

As a result, the Principal's Representative has developed a Maintenance Strategy for the Maintenance activities which are required to be carried out by the Contractor. The Maintenance Strategy is based on the knowledge the Principal's Representative has of the sealed internal road system within each remote Aboriginal settlement and the purpose of the Maintenance Strategy is to allow for the effective planning and programing of works on a **needs-basis** to maintain the integrity of the respective settlement Sealed Internal Road System.

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The Maintenance Strategy sets out the minimum Services expected from the Contractor and incorporates:

- 1) The total number of days allocated, based on a 10 hour day, within which the Contractor is to undertake road maintenance at each settlement (as specified in **Appendix E (REMS Municipal Services Scope and Frequencies)** of the Specifications;
- 2) The **priority level** of each maintenance activity to be undertaken during the attendance(s) as listed in **Attachment B** included in this Guideline (during the attendance at each settlement, the Contractor's work crew should start with the high priority maintenance activities and progress to the low priority activities);
- 3) The maintenance outcomes that the Contractor must aim to achieve (as per this Guideline);
- 4) The expectation that the Contractor will have **a minimum of 2 men per CREW** undertaking the Sealed Internal Road System Maintenance Services and that the work crew will complete a cycle of maintenance works within the settlements nominated within the Region for which the Contractor is responsible; and
- 5) The expectation that the Contractor will deliver the required maintenance works through in-house crews with fully equipped maintenance vehicles that enable them to attend to a variety of maintenance tasks during their network-wide maintenance patrols, so that flexibility is provided through a professional multi-skilled workforce with access to the readily available plant and equipment and materials which are required to complete the variety of all maintenance activities required.

Attachment B of this Appendix C-2A describes typical defects and repair and maintenance activities. The works required are broadly broken down into the areas of: Road Wearing Course; Road Shoulder; Road Kerbing; Road Drainage; and Road Furniture. The guide lists a brief repair / maintenance strategy for each defect / item noted, however the Contractor is responsible for ensuring that its personnel attending to the works are skilled and experienced and have access to suitable plant and equipment so that they can determine the best repair / maintenance option available and proceed to complete the works.

NOTE: The Principal acknowledges that not all maintenance activities may be able to be completed in the time allowed for each settlement under the durations listed in **Appendix E (REMS Municipal Services Scope and Frequencies)** of the Specifications, however the Contractor must make every endeavour to achieve the outcomes stated in this Guideline within those limitations.

NOTE: Not all defects are listed in the guide **Attachment B** and the Contractor is required to undertake repair and maintenance management of any defect whether or not it is listed in the guide.

Example: A repair and maintenance procedure for rehabilitating a pavement is most likely to be successful if it is selected on the basis of knowledge of the types of

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distresses occurring in the pavement, and understanding of the causes for those distresses. This knowledge and understanding is necessary to identify rehabilitation methods that effectively repair and prevent recurrence of the distress. Attachment B is provided for using the information contained in the inspection to diagnose the causes of the distresses seen. Many distresses have more than one possible cause. It is important to carefully study the distresses observed to determine their most probable causes. The goal is to identify the repair / maintenance techniques that are best suited to the types of distress present. These are the techniques that are most likely to produce satisfactory performance and cost-effectiveness in a rehabilitation treatment.

2.6 Maintenance Activity Category

The Contractor is to:

- (a) Always aim to deliver a high level of preventative and routine maintenance;
- (b) Identify and undertake the right treatment at the right time over the course of the road asset's life; and
- (c) Wherever possible, provide planned maintenance in preference to unplanned (demand) maintenance.

There are 4 different categories of maintenance activities: demand, routine, preventative and corrective (reconstructive). **Table 1** below explains how these different activities fit into a repairs and maintenance plan. Some can be performed before significant deterioration occurs. An example is a chip seal done before cracks develop. Preventive maintenance must be done before even moderate cracking occurs, or it will not last as long as it should.

Table 1

<i>Type of maintenance</i>	<i>Planned?</i>	<i>Performed before deterioration?</i>	<i>Extends Pavement Life?</i>
Demand	No	No	Not necessarily
Routine	Yes	Not necessarily	Generally
Preventative	Yes	Yes	Yes
Corrective	Yes	No	Yes

1. *Demand Maintenance (Unplanned Maintenance):*
Performing a technique to correct a hazard or meet a service request: e.g. pothole patching after the wet season.
2. *Routine Maintenance:*
Performed on a routine basis for operational reasons: e.g. cutting shoulders: street sweeping; line-marking.
3. *Preventive Maintenance:*

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Application of a treatment before significant deterioration occurs. It typically extends the life of the pavement and is usually planned. Surface treatments are usually considered preventive maintenance.

4. *Corrective Maintenance:*

Fixes pavement failures after they have occurred: e.g. a semi-permanent area patch is a form of corrective maintenance; a truing and levelling layer to fill minor ruts, with a follow up overlay, is another example. Corrective maintenance generally costs more than preventive or routine maintenance.

Planned Maintenance is preferred to Demand Maintenance, and Preventive Maintenance is preferred to Corrective Maintenance. The pavement condition starts in very good shape and deteriorates slowly at first. Maintenance repairs done early in the life of the pavement are much less expensive than those done later.

There is a definite relationship between pavement condition and the various levels of maintenance. Routine and preventive maintenance are the most economical options. Reconstruction techniques are the most expensive. They are usually done when there is no other choice.

There are times in the life of a pavement when the best alternative is to do nothing. This is usually when the pavement is not a candidate for maintenance, and rehabilitation or reconstruction are not yet justifiable. Where the condition of a road pavement surface is considered by the Principal's Representative to require extensive reconstructive works, these works will be considered to be Capital Works and as such are not the responsibility of the Contractor.

Delivery of major pavement repairs will be managed by the Principal's Representative through a competitive tender process. In a situation where the Principal completes a major capital works upgrade to a settlement sealed Internal Road System which is subject to the Sealed Internal Road System Maintenance Services of the Contractor, the Principal will negotiate with the Contractor to utilise the funds and time otherwise allocated by the Contractor for that particular settlement and redirect it to another settlement/s within the region.

2.7 Risks and Opportunities

The Contractor is to, when developing the Sealed Internal Road System maintenance works requirement in line with its **Annual Works Program (AWP)** referred to in **Section 3** of this Appendix C-2A:

- i. Identify any risks it faces in satisfactory delivery of the Sealed Internal Road System Maintenance Services and develop suitable mitigation procedures; and

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- ii. Identify and implement any opportunities available to more effectively and efficiently deliver the Sealed Internal Road System Maintenance Services.

2.7.1 Risks

Risks to the ability to effectively perform the Sealed Internal Road Maintenance Services must be identified by the Contractor, together with appropriate mitigation measures. For example, the prevailing climate conditions of the Kimberley region require delivery of heavy maintenance between April and November each year. The weather is the risk and scheduling of the works during the suitable time of the year is the mitigation measure.

The Contractor must develop a Risk and Mitigation schedule, such as but not limited to the following:

Key Risk	Mitigation
Wet season conditions –inability to attend site and carry out the works.	Program works for execution during dry season.
Lack of maintenance of critical road system assets –drainage structures.	Inspections and programmed maintenance. Adequate resources.
Loss of Road system knowledge through staff turnover.	Succession plans / transition plans / effective record keeping.
Insufficient local quality materials (e.g. gravel).	Planning lead-time; bring in materials.
Poor quality of repairs due to inadequate supervision, knowledge.	Knowledge sharing; training; competency verification; multiskilling of personnel; induction of replacement skilled and experienced personnel.

2.7.2 Opportunities

The Contractor is to:

- (a) Look for cost and time savings related to the performance of the works. In scheduling works, the Contractor must plan and prioritise the activities and aim to achieve operational efficiencies such as reducing the proportion of travelling time in the day, economy of scale considerations, use of specialised work-crews and timing of preventative type maintenance.
- (b) Where specialist subcontractors or specialist equipment is proposed to be used, reduce high mobilisation costs by:
 - i. Coordinating the Sealed Internal Road System AWP delivery with any capital works program which may be being undertaken;

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- ii. Networking with local government or private company suppliers undertaking works in the area to optimise opportunities for mobilisation cost sharing;
- iii. Combining similar works types program across the region; and
- iv. Utilising suitable available staff from other regions (where the Contractor is the Regional Service Provider in other regions) during quiet times or unsuitable weather times in the other region(s).

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3 Annual Works Program (AWP)

The Contractor is to:

- (a) Based on the Maintenance Strategy, develop and implement an Annual Works Program (AWP) which includes each Sealed Internal Road System within the settlements listed in **Attachment A** of this Appendix C-2A. The AWP shall focus on:
 - i. Asset preservation through regular inspection, assessment, and timely intervention;
 - ii. Planning repair and maintenance works to:
 - 1) Allow sufficient lead time to undertake preparatory works;
 - 2) Identify opportunities to coordinate with any planned capital works;
 - 3) Obtain any necessary approvals or provide notifications; and
 - 4) Secure suitable local natural gravels, construction water, or other required materials.
 - iii. Managing in-house and external resources to optimise delivery against seasonal constraints to provide value for money outcomes;
 - iv. Identifying appropriate treatments that consider local conditions and constraints to deliver cost-effective outcomes; and
 - v. Assessing road system condition to evaluate the repairs and maintenance works undertaken against overall performance of the road system.
- (b) Provide a copy of the AWP to the Principal's Representative upon request.

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4 Maintenance Activities

The Contractor is to:

- (a) carry out the required maintenance operations activities as listed within this Section 4;
 - i. identifying and progressively completing the repairs and maintenance works required starting from the High Priority works and progressing to the Low Priority works;
 - ii. undertaking the repairs and maintenance activities during the suitable weather time of the year for the settlement and where possible, prior to the wet season; and
 - iii. Delivering the Services within the number of days provided to individual settlements as specified in **Appendix E (REMS Municipal Services Scope and Frequencies)** of the Specifications and in accordance with **Schedule 11 (Maintenance Services Schedule)** of the Conditions of Contract.
- (b) carefully maintaining the Sealed Internal Road System in order to:
 - i. Minimise potential environmental impacts;
 - ii. Minimise health and safety risks; and
 - iii. Protect the integrity, longevity and value of the Sealed Internal Road System. Maintenance should be undertaken when roads are in fair-to-good condition, rather than waiting until they are in poor condition.
- (c) the repair and maintenance activities are to seek to deliver the following outcomes:
 - i. Preserves the road asset;
 - ii. Keeps the road service operational;
 - iii. Ensures traffic can move on the road without undue disturbance;
 - iv. Maximises safety of road users; and
 - v. Reduces the need for costlier and more complicated road system repairs.

The extent to which this can be achieved will be related to the quantum of days allocated by the Principal for maintenance and the existing condition of the pavement and furniture

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4.1 Road Wearing Course

The Contractor is to:

- (a) Inspect, assess and maintain the road wearing course (pavement); and
- (b) Preserve the structural integrity of the pavement through timely resealing and ongoing repairs and maintenance activities. The aim of the Sealed Internal Road System repairs and maintenance activities is to protect the underlying pavement structure by providing and maintaining a waterproof membrane, and protecting the pavement from wet season infiltration and scouring impacts.

4.2 Road Shoulders

The Contractor is to:

- (a) Inspect, assess and maintain the road shoulder (roadways without kerbs);
- (b) Shape, grade and compact shoulder areas as required to maintain the shoulder in good condition to protect the road pavement surface;
- (c) Maintain access to adjacent properties and side roads at all times to a level appropriate for the type and frequency of traffic;
- (d) Ensure adequate and safe access for pedestrians is provided, including delineated temporary access if existing access ways are closed as part of the works;
- (e) Repair or replace guide posts, delineators, signs or any roadside furniture or structure damaged during his operations; and
- (f) Reinstate associated road system drains. Re-cut any existing outer batters or table drains, ensuring the prevention of any excess materials from washing back into the table drains, culverts or other drainage structures. Trim all excavations to shed water and minimise scour and erosion damage.

4.3 Road Kerbing

The Contractor is to inspect, assess and maintain the kerbing associated with the road system.

4.4 Road Drainage

The Contractor is to provide the following outcomes:

- (a) Protect road surfaces from damage by stormwater flows;
- (b) Direct stormwater flows to fixed drainage lines / watercourses; and
- (c) Protect public areas, infrastructure, and housing from erosion due to stormwater shedding from the road surface.

By:

- i. Inspecting, assessing and maintaining the road drainage system;
- ii. Establishing measures to prevent stormwater from pooling on roadways, from shedding from roadways into settlement infrastructure, and to control run-off and prevent erosion;

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- iii. Maintaining all existing drainage structures to the design form, shape, and grade, and repairing any damaged drainage structures as required to facilitate good drainage;
- iv. Inspecting the inlet and outlet points of culverts and drainage structures and providing protection to these areas as required to minimise scour and undermining; and
- v. Making-safe stormwater pits with missing or broken lids immediately upon observation or notification.

NOTE: All roads incorporate features to drain water off the road surface and allow it to cross from one side to the other. Satisfactory road drainage is the key to maintaining the roads' integrity. Potholes, ruts, and mud on the surface of the road are symptoms of drainage problems. A properly maintained road will have very little standing or running water on the road surface even during heavy rain events. For these reasons, careful maintenance of drainage systems will always be considered a high priority activity.

4.5 Road Furniture

The Contractor is to:

- (a) Maintain and protect road system furniture associated with the road systems. Road System Furniture includes: fencing; guideposts; delineators; road signs; information signs; flood-gauge posts; cattle grids; speed bumps; attenuators and guardrails;
- (b) Inspect road furniture;
- (c) Repair or replace any road furniture damaged during road repair and maintenance operations; and
- (d) Where road furniture is observed to be damaged or defective or missing for reasons other than the activities of the Contractor, report the matter as soon as possible to the Principal's Representative for action.

4.6 Protection of Underground Services

The Contractor must, when undertaking sealed internal road system repair and maintenance works, take all care not to damage existing underground services.

4.7 Protection of Existing Road System Infrastructure

The Contractor must:

- (a) Manage his operations and take all measures necessary to ensure that existing road system structures and associated road furniture is not damaged during repair and maintenance operations; and
- (b) Where road system infrastructure is inadvertently damaged during operations, notify the Principal's Representative and ensure the damage is repaired as soon as possible to the satisfaction of the Principal's Representative.

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4.8 Emergency Repairs and Other Works

The Contractor must perform Emergency Repairs and / or Other Works (other than standard maintenance operations works) as required from time to time to maintain, make safe or restore the condition of the Sealed Internal Road System. Where works are required, such works shall be carried out at the direction and discretion of the Principal's Representative and in accordance with the Schedule of Rates contained in Attachment 1 to Schedule 1 (Pricing Schedule) of the Conditions of Contract.

4.9 Damage to Property / Utility

The Contractor must:

- (a) Carry out Sealed Internal Road System repair and maintenance operations with all due care in order to avoid damage to property, utility installations and associated structures such as fences, and the environment;
- (b) Promptly repair or have repaired any damage to property, utility installation, or the environment resulting from activities associated with the repair and maintenance operations; and
- (c) Notify the Principal's Representative of any incident.

4.10 Traffic Management

The Contractor must:

- (a) When conducting road repair and maintenance activities, minimise obstruction and inconvenience to the public and ensure public safety is accommodated at all times; and
- (b) Where more extensive operations are planned, develop and implement a Traffic Management Plan (TMP). The TMP must identify and assess potential hazards and detail the proposed treatments for the proposed work activities at the work site.

4.11 Contingency Plans

The Contractor must:

Develop, and implement when required, Contingency Plans that include procedures for dealing with:

- i. on-site personal injuries; and
- ii. accidents and other emergency response.

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5 Monitoring and Reporting

Regular, formal inspections play a vital role in the successful management of Municipal Services. A settlement Sealed Internal Road System that has no regular inspection regime is at high risk of deterioration.

The Contractor must provide the following:

- (a) Monitor the condition of the Sealed Internal Road System;
- (b) Based on the repair and maintenance activities required, develop and maintain an inspection schedule for all components and items which require periodic inspection;
- (c) Keep records of the condition of the municipal infrastructure and the repair and maintenance activities undertaken; and
- (d) Provide a copy of the records to the Principal's Representative upon request.

5.1 Field Surveys

Field Surveys are regularly undertaken by the Principal's Representative for the purpose of assessing compliance by the Contractor with the Municipal Services tasks and duration required to be undertaken.

The Principal's Representative will endeavour to align surveys where possible with periodic maintenance activities undertaken by the Contractor in accordance with the approved **Schedule 11 (Maintenance Services Schedules)** of the Conditions of Contract.

The Contractor must appoint a responsible officer, agreed by the Principal, to represent the Contractor and attend Field Surveys with the Principal's Representative as requested, and any works being undertaken to an unsatisfactory level will be noted and result in an agreed action to be undertaken by the Contractor within a specified timeframe to rectify the issue noted. Field Surveys on any Remote Aboriginal Settlement are generally but not always separated by a period of approximately 4 - 6 months depending on the Remote Aboriginal Settlement size.

The Field Surveys may also identify additional work outside of the Contract that the Contractor may be required to complete, as directed by the Principal's Representative and in accordance with the Schedule of Rates contained in Attachment 1 to Schedule 1 (Pricing Schedule) of the Conditions of Contract.

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6 Values

The values of *stewardship*, *communication*, and *process* are important to the Principal.

The principle of *stewardship* is of utmost importance to the Principal – it requires the Contractor to always act professionally in the best interests of the Principal, such that funds are wisely invested and the asset is maintained accordingly.

The principle of *communication* means an effective transfer of captured knowledge between the Contractor and the Principal; and between the Contractor and the Remote Settlement Representative, such that a high level of trust and mutual respect is developed.

The principle of *process* requires the Contractor to maintain a systematic approach to management of municipal Services, including process driven activities such as the identification of required tasks and the subsequent undertaking of the involved tasks to resolve the issue.

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7 Definitions

Where the Definitions contained in this Appendix conflicts with the Definitions specified in the Glossary of the Conditions of Contract, the Definitions in the Conditions of Contracts will prevail.

Contractor	The appointed Contractor (also referred to as the Regional Service Provider) or his authorised nominee, who carries out the required works.
Municipal Infrastructure	Has the meaning given to it in the Specifications. For avoidance of doubt, the term refers to both the infrastructure and the public areas where Municipal Services Delivery Services are to be undertaken under this Contract.
Principal	The Housing Authority.
Principal's Representative	An officer appointed by the Principal to manage the Contractor.
REMS Program	Remote Essential and Municipal Services Program.
REMS Manager	The Department of Communities (Housing) officer appointed to oversee the REMS Program.
Sealed Internal Road System	The network of principal and secondary roads within a settlement which are sealed and have a pavement surface, and serve the strategic transport needs of the settlement. The road system includes all associated drainage structures, shoulders, kerbing, and associated road furniture. The road system includes sealed internal roads which provide access to key settlement infrastructure. The road system does not include the access road to or from the settlement.
Remote Settlement Representative	The individual or individuals who represent the governing body of the remote Aboriginal settlement.

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Attachment A - Sealed Internal Road Systems in Remote Aboriginal Settlements

The following Remote Aboriginal Settlements have a Sealed Internal Road System:

	Settlement	Description
Kimberley	Ardyaloon	Kerbing and drainage structures in place.
	Bayulu	Kerbing and some drainage structures in place.
	Beagle Bay	Kerbing and drainage structures in place.
	Kalumburu.	Kerbing and some drainage structures in place.
	Kundat Djaru (Ringer Soak)	Kerbing and drainage structures in place.
	Looma	Some kerbing in place; some drainage structures in place.
	Muludja	Kerbing and some drainage structures in place.
	Wangkatjungka	Kerbing and drainage structures in place.
	Yakanarra	Kerbing and drainage structures in place; approximately 25% of roadways do not have kerbing.
Pilbara	Burringurrah	No kerbing; some drainage structures in place.
	Innawonga	No kerbing; minimal drainage structures.
	Mingalatharndoo	No kerbing; minimal drainage structures.
	Wandanooka	No kerbing; some drainage structures in place.
	Wakathuni	No kerbing; minimal drainage structures.
	Yandeyarra	Kerbing and some drainage structures in place.
	Youngaleena	Narrow road; no kerbing in place.
	Yulga Jinna	No kerbing; minimal drainage structures.

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Attachment B - Sealed Internal Road System - Repairs and Maintenance Works Guide

Sealed Pavement	Road Wearing Course	Block Cracking	Distress Mode: Fracture
			
Priority	High Cracks > 10mm wide with definite spalling and disintegration at crack locations. Cracks are very noticeable with obvious distortions to pavement surface.	Moderate Cracks <= 10mm width and may or may not display minor spalling. Definite cusps within the region of the crack are evident.	Low Hairline cracks are essentially transverse with some interconnecting longitudinal cracking.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Block Cracking appears generally as a series of interconnecting cracks that form in a roughly rectangular pattern. It can occur in both concrete and flexible road pavements. This type of cracking is generally the result of environmental conditions (thermally induced) rather than load associated, but may also result from fatigue and loss of sub-base support or subgrade settlement.		
Repair Strategy	Repair needs to be affected at first indication of fines pumping through crack. Pumping of fines will create void under surfacing and potholes will rapidly develop. Crack seal minor cracking; crack patch major cracking. The aim of the repair is to reinstate waterproof surfacing and prevent water penetration.		

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Sealed Pavement	Road Wearing Course	Crocodile Cracking	Distress Mode: Fracture
			
Priority	High Cracking has progressed so that pavement pieces appear loose with obviously spalled edges. Cracks > 6mm wide on pavement surface and potholes may be developing.	Moderate Longitudinal cracks in wheel paths forming crocodile skin pattern. Cracks <= 6mm wide and spalling may or may not becoming evident.	Low Single or multiple longitudinal disconnected hairline cracks <= 2.5mm wide running parallel to each other.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Crocodile Cracking (fatigue cracking) is generally a load associated structural failure. The failure can either be in the surface, base or sub-base. Appearing as a series of interconnected cracks usually found in areas subject to repeated traffic loadings (ie wheel paths), crocodile cracking initially presents as fine longitudinal cracks which gradually deteriorate to a more crocodile skin pattern.		
Repair Strategy	Repair needs to be affected at first indication of fines pumping through crack. Pumping of fines will create void under surfacing and potholes will rapidly develop. Crack seal minor cracking; remove unsound area and reinstate full seal using cold or hot mix. The aim of the repair is to reinstate waterproof surfacing and prevent water penetration.		

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Sealed Pavement	Road Wearing Course	Longitudinal Cracking	Distress Mode: Fracture
			
Priority	High Cracks are greater than 10mm in width and disintegration at crack facing edges is progressing and pothole may be developing.	Moderate Cracks <= 10mm wide and minor spalling may or may not be present. Crack pattern may be similar to block or crocodile cracking as condition worsens.	Low Continuous or discontinuous hairline cracks <= 3mm wide running longitudinally along the pavement surface.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Longitudinal cracks are cracks that occur relatively parallel to the pavement centreline and run longitudinally along the pavement. It can consist of a single crack or as a series of parallel cracks. Longitudinal cracks located along the centreline and lane / shoulder area are often the result of substandard construction practices. Longitudinal cracks in wheel paths are due primarily to vehicle load, while those occurring between the wheel paths can be as a result of thermal forces or as a consequence of shear failures.		
Repair Strategy	Repair needs to be affected at first indication of fines pumping through crack. Pumping of fines will create void under surfacing and potholes will rapidly develop. Crack seal minor cracking; crack patch major cracking. Repeated crack sealing may be required. The aim of the repair is to reinstate waterproof surfacing and prevent water penetration.		

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Sealed Pavement	Road Wearing Course	Random Cracking	Distress Mode: Fracture
			
Priority	High Cracks > 10mm wide with definite spalling and disintegration at crack locations. Cracks are very noticeable with obvious distortions to pavement surface.	Moderate Cracks <= 10mm width and may or may not display minor spalling. Definite cusps within the region of the crack are evident.	Low Hairline cracks with some interconnecting of cracks.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Random cracking is similar to Block Cracking but with cracks appearing more randomly and generally in a polyangular pattern. This type of cracking is usually the result of environmental conditions (thermally induced) rather than load associated. Cracking of the wearing course allows water ingress into the roadway which is a general precursor to more serious failures.		
Repair Strategy	Repair needs to be affected at first indication of fines pumping through crack. Pumping of fines will create void under surfacing and potholes will rapidly develop. Crack seal minor cracking; crack patch major cracking; pavement repair required for long-term fix - remove unsound area and reinstate full seal using cold or hot mix. The aim of the repair is to reinstate waterproof surfacing and prevent water penetration.		

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Sealed Pavement	Road Wearing Course	Transverse Cracking	Distress Mode: Fracture
			
Priority	High Single or multiple cracks > 10mm wide extending across the pavement surface. Spalling and disintegration at crack edges with depressions developing and possible distortion of pavement edges at crack locations.	Moderate Cracks <= 10mm wide, generally perpendicular to the pavement centreline and extending across the pavement surface.	Low Hairline cracks up <= 5mm wide and have little or no spalling or depression.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Transverse cracks occur relatively perpendicular to the pavement centreline or laydown direction. While similar to Block and Random Cracking, transverse cracking is those cracks which extend greater than 75% of the width of the respective roadway. Transverse cracking is usually a type of environmental (thermal) cracking.		
Repair Strategy	Repair needs to be affected at first indication of fines pumping through crack. Pumping of fines will create void under surfacing and potholes will rapidly develop. Crack seal minor cracking; crack patch major cracking. The aim of the repair is to reinstate waterproof surfacing and prevent water penetration.		

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Sealed Pavement	Road Wearing Course	Reflection Cracking	Distress Mode: Fracture
			
Priority	High Cracks > 10mm wide and numerous cracks with spalling around cracks.	Moderate Cracks <= 10mm wide and higher frequency of cracks.	Low Cracks <= 5mm wide and infrequent cracks.
Location	May occur anywhere on pavement surface where different basecourses intersect.		
Causes	Reflection cracking occurs in bituminous overlays over concrete or concrete jointed pavements or in overlays of cracked flexible pavements. The reflection cracks occur over the original joints or cracks in the underlying pavement. Reflection cracking can include cracks that occur away from an underlying joint or from any other type of base –such as reflective cracks due to subgrade shrinkage cracking or culverts or other utilities. If not properly maintained, these cracks can allow water penetration to underlying layers causing further damage to the bond between the existing pavement and overlay and causing moisture damage in pavement layers.		
Repair Strategy	Repair needs to be affected at first indication of fines pumping through crack. Pumping of fines will create void under surfacing and potholes will rapidly develop. Crack seal minor cracking; crack patch major cracking. The aim of the repair is to reinstate waterproof surfacing and prevent water penetration. A flexible sealant must be considered where there is a probability of continued movement.		

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Sealed Pavement	Road Wearing Course	Potholes	Distress Mode: Failure
			
Priority	High	Moderate	Low
	Any pothole > 50mm depth		
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Potholes are holes of various sizes in the pavement surface resulting from the loss of pavement material. A pothole is a failure and is created by the interaction between water and traffic. Typically the surfacing has cracked / failed and allowed water into the basecourse layer, the hydraulic action of tyres going over water blows the basecourse apart and a pothole is formed Potholes generally represent spot distress modes at high severity although regions surrounding the pothole may vary in severity. Because a pothole is a failure, all potholes must be considered of <i>High</i> severity rating.		
Repair Strategy	For cracking or stone loss in / on bituminous surface affect crack sealing then apply enrichment fog coat or reseal. For detachment of seal reseal or plane off existing and replace with prime and seal or primer seal. For major potholes: saw-cut, break-out and remove existing pavement surface; remediate basecourse as required and re-compact; reseal and reinstate the pavement surface using hot or cold mix.		

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Sealed Pavement	Road Wearing Course	Rutting	Distress Mode: Failure
			
Priority	High Any ponding of water.	Moderate 25mm deep rut.	Low ≤ 20mm deep rut.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Rutting is the longitudinal vertical deformation of a pavement surface in a wheel path, measured relative to a straight edge placed at right angles to traffic flow direction across the wheel path. The rut is a surface depression (in the wheel path) caused by permanent deformation in any pavement layer or subgrade due to traffic load applications. Pavement uplift may occur along the sides of the rut. There are two basic types of rutting: mix rutting and subgrade rutting. Mix rutting occurs when the subgrade does not rut yet the pavement surface exhibits wheel path depressions. Subgrade rutting occurs when the subgrade subsides and exhibits wheel path depressions due to loading – the pavement surface settles into the subgrade depressions.		
Repair Strategy	Rut depth to be monitored until depth constant and rut can then be filled using appropriate size asphalt or slurry. Where it is obvious water is entering the basecourse and the basecourse is failing, affect the same repair type as for major potholes.		

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Sealed Pavement	Road Wearing Course	Failure	Distress Mode: Failure
			
Priority	High	Moderate	Low
	Affected areas require complete full-depth reconstruction and remediation of base materials. Area covers 6M2 or more.	Affected areas require major rehabilitation such as structural overlays and partial-depth reconstruction.	Affected areas require minor rehabilitation including surface treatments and non-structural overlays.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Failure may be defined as being that point at which a roadway (or section of roadway) is no longer able to meet the performance requirements for which it was initially designed and constructed. In terms of the road wearing course, this means that the pavement surface is no longer suitable for driving on and underlying sub-base and subgrades have been or are becoming compromised. Failure is a result of poor construction practises in new pavement and will develop with age in old seals / surfacings.		
Repair Strategy	Selective use of slurry, micro surfacing, asphalt (hot or cold mix) or overlays are all appropriate methods of surface correction for low to moderate issues. Moderate failure may be treated in the same way as for major potholes. Where the failure is considered High, the matter must be reported to the REMS Representative for inclusion in the Capital Works Program.		

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Sealed Pavement	Road Wearing Course	Shoving (and Corrugation)	Distress Mode: Failure
			
Priority	High	Moderate	Low
	Hazardous to traffic at design speed or any ponding water.	Deformation of wearing course $\geq 40\text{mm}$.	Deformation of wearing course $< 40\text{mm}$.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths and intersections.		
Causes	Shoving appears as a longitudinal displacement of a localised area of pavement surface caused by the force of load pushing against the pavement. It is a form of plastic movement of the pavement surface typified by an abrupt wave (shoving) or ripples (corrugation) across the pavement surface. This distortion is perpendicular to the direction of traffic flow and usually occurs at points where traffic starts, stops, or turns.		
Repair Strategy	Selective use of slurry, micro surfacing, asphalt (hot or cold mix) or overlays are all appropriate methods of surface correction for low to moderate issues. High failure may be treated in the same way as for major potholes with remediation of basecourse materials as required.		

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Sealed Pavement	Road Wearing Course	Delamination	Distress Mode: Disintegration
			
Priority	High Delamination hazardous to traffic at design speed.	Moderate Delamination >30mm depth.	Low Delamination <30mm depth.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Poor construction practices – inadequate cleaning / sweeping of surface or deficient tack coat applied before wearing course placement resulting in weak bond between layers. Poor quality wearing course material. Water seepage breaking bond between layers. Wearing course placed on top of a weak loose layer.		
Repair Strategy	For cracking or stone loss in / on bituminous surface affect crack sealing then apply enrichment fog coat or reseal; for detachment of seal reseal or plane off existing and replace with prime and seal or primer seal.		

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	Road Wearing Course	Intersecting Road Plains	Distress Mode: Disintegration
Sealed Pavement			
Priority	High Cracks > 10mm wide with definite spalling and disintegration at crack locations and loss of stone. Cracks are very noticeable with obvious delamination distortions to pavement surface.	Moderate Cracks <= 10mm width and may or may not display minor spalling / delamination.	Low Hairline cracks are essentially transverse.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths at intersections.		
Causes	The junction point at which individual roadways meet is often a point at which various pavement distresses manifest. Most roadways are crowned to centre and the point at which roadways meet, when poorly constructed or poorly formed, presents a weakness in the pavement surface. This location is a point at which cracking may develop, water pool and eventually infiltrate, leading initially to issues with the wearing course and eventually affecting the base and sub-base layers.		
Repair Strategy	For cracking or stone loss in / on bituminous surface affect crack sealing then apply enrichment fog coat or reseal; for detachment of seal reseal or plane off existing and replace with prime and seal or primer seal.		

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Sealed Pavement	Road Wearing Course	Ravelling (Stripping)	Distress Mode: Disintegration
			
Priority	High Widespread pitting, stripping, and erosion of aggregate. Exposed binder oxidised or missing. Roadbase becoming exposed and affected.	Moderate Nominal aggregate loss. Small areas stripped away but roadbase still covered.	Low Minimal aggregate loss. Small amount of pitting and aggregate binder has begun to wear away.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Ravelling is the wearing away of the pavement surface wherein aggregate particles are dislodged (Ravelling) and binder is lost (Weathering) so that the wearing course is compromised. Ravelling may be caused by substandard construction methods, environmental factors, and / or traffic wear elements. In most cases, water sitting on the pavement surface is the primary cause of binder loss, while vehicular traffic gradually ravels away the aggregate which has been loosened due to the binder loss. As a result, ravelling causes bald spots in the originally stone-rich covered surface and loss of protection for the roadway.		
Repair Strategy	Resurfacing by functional overlay to extend the service life; chip seal (seal coating).		

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	Road Wearing Course	Ravelling (Scouring)	Distress Mode: Disintegration
Sealed Pavement			
Priority	High Widespread pitting, stripping, and erosion of aggregate. Exposed binder oxidised or missing. Roadbase becoming exposed and affected. Cracks visible.	Moderate Nominal aggregate loss. Small areas stripped away but roadbase still covered. Small cracks appearing.	Low Minimal aggregate loss. Small amount of pitting and aggregate binder has begun to wear away.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths and drainage lines.		
Causes	Ravelling (Scouring) is the wearing away of the pavement surface wherein aggregate particles are dislodged (Ravelling) and binder is gradually lost so that the wearing course is compromised. Scouring may be caused by substandard construction methods, environmental factors, and / or traffic wear elements. In most cases, water running over the pavement surface is the primary cause of binder loss, while vehicular traffic gradually ravels away the aggregate which has been loosened due to the binder loss. As a result, ravelling causes bald spots in the originally stone-rich covered surface and loss of protection for the roadway.		
Repair Strategy	For cracking or stone loss in / on bituminous surface affect crack sealing then apply enrichment fog coat or reseal; for detachment of seal reseal or plane off existing and replace with prime and seal or primer seal. Resurfacing by functional overlay to extend the service life; chip seal (seal coating).		

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Sealed Pavement	Road Wearing Course	Patching (and Service Installation)	Distress Mode: Failure
			
Priority	High Cracks > 10mm wide with definite spalling and disintegration at Patch locations and joints; subsidence of patched area >75mm with obvious distortions to pavement surface.	Moderate Cracks <= 10mm width and may or may not display minor spalling / delamination; subsidence and pooling of water.	Low Cracks are appearing and patch is subsiding.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Failure in surfacing treatment / failure in basecourse. New services and utilities installations placed through roadways are a necessary part of progress within a settlement, expansion of existing infrastructure and provision of new housing. While not considered primarily as a mode of pavement distress, installation of services often involves cutting through the roadway and underlying subgrade. Resultant subsidence of underlying layers as well as substandard treatments to the wearing course, lead to distress manifestations in the patched roadway and particularly in the pavement surface.		
Repair Strategy	Remediation of subgrade and resurfacing treatment (hot or cold mix).		

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Sealed Pavement	Road Wearing Course / Road Shoulder		Edge Cracking	Distress Mode: Fracture
				
Priority	High Cracks > 5mm wide or crocodile pattern sections which have failed; or crescent shaped pieces of pavement extending more than 300mm into the pavement and may be loose or missing altogether. Potholes may be developing.	Moderate Cracks <= 5 mm wide and developing into a crocodile or crescent shape pattern at pavement edge and beginning to extend into the edge of the pavement surface.	Low Hairline cracks beginning to show. Cracks are random with no distinct pattern.	
Location	Edge of seal on shoulder.			
Causes	Edge Cracking appears as crescent shaped cracks, or fairly continuous cracks, parallel to and usually within 300 – 600 mm of the outer edge of the pavement. Edge cracking is more frequent in pavements without paved shoulders or kerbs. Failure begins at the edge of the road and progresses toward the wheel path. Pavement edge distress can result in worsening of wheel path condition, allowing moisture intrusion into the sub-base and or subgrade, leading to eventual failure.			
Repair Strategy	Reinstate full seal using cold or hot mix. Reinstate shoulder at same time to protect the wearing course edge. Edge reinstatement without shoulder re-conditioning will generate edge drop-off and create an area for water to pond or scour.			

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	Road Shoulder	Edge Drop Off	Distress Mode: Other
			
Sealed Pavement	Priority	High 100mm depth.	Moderate ≤75mm depth.
			Low ≤30mm depth.
Location	Edge of seal on shoulder.		
Causes	Typically caused by vehicles travelling along or across the unsealed shoulder. Can also be caused by shoulder material being poorly placed and compacted or having inadequate resistance values to environmental erosion and physical abrasion.		
Repair Strategy	As per site conditions, either box out and replenish shoulder material using the best available local materials, or bring old shoulder material off batter slope and reinstate shoulder and re-compact as required.		

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Sealed Pavement	Road Wearing Course / Road Drainage	Debris on roadway / Blocked outlets	Distress Mode: Other
			
Priority	High	Moderate	Low
	Any debris / foreign body or material that poses a hazard to traffic or blocks drainage systems or causes water to pool on the road.	Debris that affects the functionality and ride quality of the wearing course.	Light sand or vegetation over the road surface.
Location	May occur anywhere on pavement surface but likely to be concentrated along gutters, at intersections, and at drainage structure inlets.		
Causes	Inadequate cleaning / sweeping of the roadway; weather events, accidents, vegetation and animals. Poor clean-up after construction works or repairs. Poor maintenance standards.		
Repair Strategy	Remove the debris; unblock / clear obstructions from drainage structures.		

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Sealed Pavement	Road Drainage	Blocked / Damaged Culverts	Distress Mode: Other
			
Priority	High	Moderate	Low
	Blocked or silted >50% of cross-sectional area or can't see daylight.	Blocked or silted >25% of cross-sectional area; vegetation or litter obstructing free flow.	Vegetation or litter in drainage opening or outlet or drain line.
Location	Strategic locations along the road system.		
Causes	Inadequate cleaning / sweeping of Roadways leading to washing of sand and debris into drainage points; inadequate maintenance of drainage lines to keep clear and shaped to design grade.		
Repair Strategy	Remove the debris and clear to daylight; reshape and grade open earth swale drains to promote free-flow of stormwater.		

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Sealed Pavement	Road Drainage	Blocked outlets	Distress Mode: Other
			
Priority	High Blocked or silted >50% of opening area.	Moderate Blocked or silted <=30% of opening area.	Low Vegetation or litter in drainage opening or outlet or drain line.
Location	Strategic locations along the roadway.		
Causes	Inadequate cleaning / sweeping of Roadways leading to washing of sand and debris into drainage points; inadequate maintenance of drainage lines to keep clear and shaped to design grade.		
Repair Strategy	Remove the debris and clear to daylight; reshape and grade open earth swale drains to promote free-flow of stormwater.		

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Sealed Pavement	Road Drainage	Protection of inlets / outlets	Distress Mode: Other
			
Priority	High Pavement surface being eroded or starting to fail; edges undermined >75mm.	Moderate Edges undermined <= 75mm.	Low Edges starting to become undermined.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths.		
Causes	Poor construction practices – inadequate protection of edges of outlets allowing stormwater to scour and erode surfaces; wearing course placed on top of a weak loose layer; stormwater flow more than design outlet or grade.		
Repair Strategy	Protect the edge with rock pitching or concrete or geofabric; remediate basecourse as required and replace lost seal.		

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Sealed Pavement	Road Kerbing	Displaced / Broken kerbing	Distress Mode: Other
			
Priority	High	Moderate	Low
	Any kerbing material impeding the roadway hazardous to traffic at design speed. Any broken kerbing at formed outlets which is impeding stormwater from entering the outlet.	Damaged or missing or displaced kerbing lengths >1.0 lineal metres.	Damaged or missing or displaced kerbing ≤ 1.0 lineal metres.
Location	Usually occurs adjacent to areas of high traffic flow or in long road lengths where thermal forces displace the kerbing sections.		
Causes	Poor construction practices – inadequate control joints or poor materials or construction water in concrete. Poor quality wearing course material. Traffic going across kerbing section. Thermal forces.		
Repair Strategy	Saw-cut and remove broken or damaged sections or remove at the nearest control joint. Reinstall kerbing using appropriate hand tool form to match section shape; saw-cut and install expansion joints. For long continuous sections a kerb laying machine may be a consideration. Protect kerbing during curing.		

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Sealed Pavement	Road Furniture	Cattle Grids / Other structures	Distress Mode: Other
			
Priority	High Any hazard to traffic at design speed.	Moderate Road surface cracking away from structure or crack allowing water to enter the joint.	Low
Location	Strategic locations along the roadway.		
Causes	Poor construction practices – water seepage breaking bond between layers. Wearing course placed on top of a weak loose layer. Expansion of joints due to thermal forces. Heavy traffic over the structure.		
Repair Strategy	Remediate the basecourse if required and reseal; consideration to concrete infill to close the opening; application of flexible sealant where continuous movement is expected.		

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Sealed Pavement	Road Furniture	Traffic control devices	Distress Mode: Other
			
Priority	High Damage hazardous to traffic at design speed; or structures missing; or not performing function.	Moderate Structures damaged or worn but still effective.	Low
Location	Strategic locations along the roadway.		
Causes	Poor maintenance practices – inadequate cleaning / sweeping of road surface. Damage from heavy traffic.		
Repair Strategy	Repair damaged structures; replace missing structures; re-paint; re-fix.		

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Sealed Pavement	Road Furniture	Traffic control devices	Distress Mode: Other
			
Priority	High	Moderate	Low
	Damage hazardous to traffic at design speed; or structures missing; or not performing function.	Structures damaged or worn but still effective.	
Location	Strategic locations along the roadway.		
Causes	Poor maintenance practices – inadequate cleaning / sweeping of road surface. Damage from heavy traffic. Silt or debris build-up around structures leading to pooling of water on road surface.		
Repair Strategy	Repair damaged structures; replace missing structures; re-paint; re-fix.		

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Sealed Pavement	Road Furniture	Attenuators / Barriers	Distress Mode: Other
			
Priority	High Damage hazardous to traffic at design speed; or structures missing; or not performing function.	Moderate Structures damaged or worn but still effective.	Low
Location	Strategic locations along the road system.		
Causes	Poor maintenance practices – inadequate cleaning / sweeping of road surface. Damage from heavy traffic. Damage from impact.		
Repair Strategy	Repair damaged structures; replace missing structures; re-paint; re-fix.		

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Sealed Pavement	Road Furniture	Signage	Distress Mode: Other
			
Priority	High Damage hazardous to traffic at design speed; or structures missing; or not performing function.	Moderate Signs damaged or worn but still effective.	Low
Location	Strategic locations along the road system.		
Causes	Poor maintenance practices – inadequate cleaning / sweeping of road surface. Damage from heavy traffic. Damage from impact.		
Repair Strategy	Repair damaged structures; replace missing structures; re-paint; re-fix.		

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Sealed Pavement	Road Furniture	Delineators	Distress Mode: Other
			
Priority	High Damage hazardous to traffic at design speed; or structures missing; or not performing function.	Moderate Delineators / marker posts damaged or worn but still effective.	Low
Location	Strategic locations along the road system.		
Causes	Poor maintenance practices – inadequate cleaning / sweeping of road surface. Damage from heavy traffic. Damage from impact.		
Repair Strategy	Repair damaged structures; replace missing structures; re-paint; re-fix.		

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Sealed Pavement	Road Furniture	Line marking	Distress Mode: Other
			
Priority	High Line-marking –double white lines or warning markings no longer visible.	Moderate General line-marking faded <=70%.	Low General line-marking fading.
Location	May occur anywhere on pavement surface but likely to be concentrated in wheel paths at intersections / stop signs.		
Causes	Poor maintenance practices – inadequate cleaning / sweeping of roadway leading to wearing of lines.		
Repair Strategy	Reinstate line-marking.		