METROPOLITAN REGIONAL ROAD GROUP (MRRG)
Guidelines for the Submission of Road Rehabilitation Projects

FOREWORD

The “State Road Funds to Local Government, Procedures and Road Project Evaluation Guidelines” was formally launched on March 14, 1996. This document was derived for the “Metropolitan Regional Road Group” (MRRG) in partnership with Main Roads Western Australia (MRWA), as a guide for assessing Road Rehabilitation projects.

This guide is intended to provide an unbiased reference system for assessing road pavement defects to reflect good asset management principles.

The visual defects are described in words and by photographs. These descriptions have been transferred directly from the MRWA “Standards for Maintenance 1991” manual. As the MRRG has the right to make variations to the requirements some of the levels of severity may differ from those nominated in the Standard. Variations are described in the text.

Provision is made for the allocation of a points scoring system to aid in the prioritisation of projects.

A number of iterations to this guide have been made over the years and a table of revision changes was commenced in February 2014.

Rev. No.	Rev. Date	Description of Key Changes
1	February 2014	1. Cracking being divided into stable and unstable environmental cracking and structural cracking. Unstable cracking being where pumping of fines is evident. Unstable cracking and structural cracking are automatically rated as High.
		2. Points are not allocated for both asphalt age and ravelling and instead is a formula for either age or ravelling.
		3. Remove additional points for public transport buses (noting no points were allocated to other buses or heavy vehicles) and instead provide additional points for roads with heavy vehicle usage within the traffic category.
		4. Reduction in rutting depths for each rating category to improve scoring category.
		5. Inclusion of road reinstatements for service and drainage excavations but continue to exclude road widening in patching category.
		6. Traffic is to be distributed per lane of road to better reflect impact of traffic on pavement.
2	February 2016	Additional clarification detail added on Sections, Cracking, Kerbing, Ravelling and project submission.
3	February 2017	Additional clarification detail added on Sections (parking lanes) and Project Assessment Form (turning pockets and ‘additional site areas’).
4	March 2017	Traffic Points Chart updated.
5	February 2018	Linemarking and Ancillary Costs added to Project Assessment form.

6.	February 2020	Additional treatment options and modifications made to Project Assessment form
7.	February 2023	Worksheet update - Unit rates updated to reflect current market rates.
8.	February 2024	Worksheet update – Unit rates updated to reflect WALGA's Road Building Cost Index for 2025/ 2026 submissions. Additional treatment types added - Asphalt Crumb Rubber Modified (T) and Asphalt Gap Graded Crumb Rubber M (T). Line marking & ancillary cost table updated to reflect MRWA State Wide Panel Contract for Pavement Marking. Appendix A – Worked example updated

Contents

1 Introduction

The aims of this document are:

(a) To provide a clear description in both words and photographs to assist in the evaluation of pavement defects;

(b) To provide an accountable scoring system to categorise road conditions in order of highest priority for funding;

(c) To create a consistent and non-biased interpretation of road condition and severity of defects; and

(d) To standardise the format for Local Government Authorities to submit projects for consideration for funding.

All projects submitted for funding will be independently audited and assessed for their compliance to the Guidelines. Project scores will be adjusted as necessary.

All projects submitted must include the field condition worksheets together with the project assessment form.

2 Submission Assessment

The Metropolitan Regional Road Group (MRRG) Rehabilitation Guidelines have been created to provide the basis of an unbiased approach to determining the condition and importance of potential grant funded rehabilitation projects. Each project is assessed using the approved accumulative points scoring system that considers road condition, surface age and volume of traffic.

2.1 Condition Assessment System

For the road condition, points are calculated whereby the total observed percentage of each defect is estimated and then multiplied by its level of severity by the factors of LOW – 3 points, MEDIUM – 5 points and HIGH – 7 points. The total points score of each defect are then given a weighting in relation to the severity of the defect or the disadvantages that the defect causes to the general motoring public *i.e.* ponding, roughness etc. The accumulated scores and points are submitted using the Project Assessment Form or similar. A worked example of the Field Assessment Worksheet and pavement design is located at Appendix A.

To achieve continuity of condition assessments across all MRRG Rehabilitation submissions and to help assessors undertake the rating, it is recommended that the following system of Sections and Subsections be adopted to allow each defect to be assessed in greater detail.

(a) Determine an appropriate start and end point for each road rehabilitation submission. This length of road is to be referred to as a "Section". Where a road has been previously patched to a high standard over a significant area, and that patch will not be treated in the rehabilitation of the road section, then the patch shall not be scored as a patch.
(b) Divide the road Section into lanes whether trafficked or parking (each lane including parking lanes is to be assessed individually);
(c) Divide each lane into smaller Subsections (*e.g.* 10, 20 or 50 m etc. depending on the overall length);

- Where the length of a section is ≤1000m, sections shall be in 10m increments. For sections >1000m, a minimum of 50 subsections shall apply, but increments shall be a multiple of 10m.

- The sum of the total number of Subsections represents the entire Section (i.e. 100 m of a 4 lane road assessed at 10m Subsections = 40 Subsections in total, 100 m of 2 lane road assessed at 10 m Subsections = 20 Subsections in total).

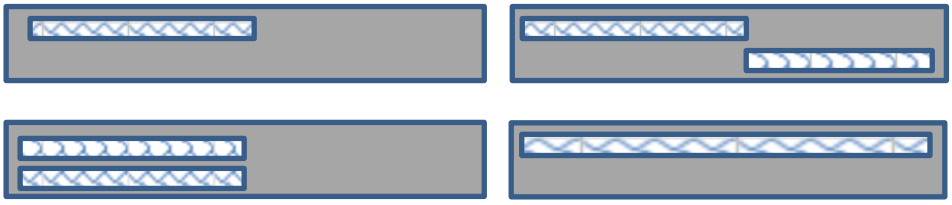
(d) Inspect each Subsection and calculate the amount of defects for each Subsection individually;

- Rutting and shoving defects are assessed as a percentage of the <u>length</u> of the each Subsection (i.e. if the rut extends the full 10 m length = 100%, if the rut extends only half the Subsection length (5 m) = 50% etc.).
- Environmental cracking and depressions defects are assessed as a percentage of the <u>area</u> of each Subsection (i.e. if the majority of the Subsection is cracked this is recorded as 100%, if only one wheel-track is cracked over the entire length, this is recorded as 50% and if there is one

single crack across the entire width of the Subsection, this is recorded as 20% etc.). It is relied upon the assessor to make an approximation only as to the area of the Subsection affected by cracking or depressions. Environmental cracking is subdivided into stable and unstable. Unstable cracking is evidenced by pumping of fines to the surface.
Where a single transverse cracking exists in a section, the transverse crack shall be taken as affecting an area 1m either side of the crack. Thus for a 10m section, a single transverse crack would score 20%. A single longitudinal crack extending the full length of a 4m lane over a 10m section would score 50%.

Where multiple environmental cracks are associated with a 5m length of a 10m section, the section would score 50%

- Structural cracking is evidenced as crocodile cracking and appears in wheel paths are assessed as a percentage of the length of the each Subsection (i.e. if the cracking extends the full 10 m length = 100%, if the cracking extends only half the Subsection length (5 m) = 50% etc.). The diagram below shows the intent, noting that a single 10m lane section is shown:



50% structural cracking 100% structural cracking

- Kerbing is assessed as the percentage of the length of each Subsection where the vertical or horizontal alignment is greater than the acceptable limits. Assessors must consider all kerbing present on both sides of the road (i.e. on a fully kerbed road, if the kerbing is defective for the full 20 m length of the Subsection on one side only, this should be recorded as 50%).
- Edge drop off and edge break are assessed as the percentage of the length of each Subsection defective on unkerbed roads.
- Patching extent is assessed as the percentage of the length of each Subsection that is affected (i.e. if the left hand wheel-track is patched for the entire Subsection length, this is recorded as 100%).
- Surface defects are assessed as a percentage of the area of each Subsection affected (i.e. if the majority of the Subsection is fretted, this is recorded as 100%).

(e) Record the assessed amount of defects of each Subsection onto the Field Assessment Worksheet, or similar;
(f) Calculate the amount of points awarded by multiplying the sum percentage of each defect across the road Section by its severity to give a condition score; and
(g) Calculate the final total points for the Section by multiplying the condition score by the defect weighting.

2.2 Surface Age

In the case of spray seals points are also awarded for the age of the Section's seal on the basis that older seals get higher points. Where a Section contains seals of different ages, then the oldest seal age should be used for the submission. Local Governments must provide evidence of the seal's age within their submission. Examples of this could be by way of a construction report or extract (such as a screen shot) from their road pavement management system (such as ROMAN).

Points for surface age are capped at 700 before the weighting is applied.

Points for age for asphalt surfacing are adjusted by deducting points awarded for ravelling as this is a reflection of pavement age in itself. .

2.3 Traffic

Points are awarded for the current amount of traffic that passes on the Section per day. Submissions must provide a copy of a recent classified traffic count for the Section indicating what the Average Annual Daily Traffic (AADT) volume is.

The total amount of points available for Traffic is currently capped at 700 before the weighting is applied.

2.4 Minimum Criteria for Applicable Submissions

The MRRG Rehabilitation grant scheme exists to provide an equitable and fair process that helps fund those roads of regional significance that require repair. In order to ensure that limited funds are expended on the roads most in need, certain minimum criteria must be met before a Section will be considered for funding. The MRRG Technical Committee has determined that roads which fail to meet one or more of the following minimum criteria are not either of regional significance, or are in a condition not considered poor enough for repair.

The following criteria apply to all MRRG rehabilitation submissions:

(a) All District Distributor A and B roads are applicable for funding with no required minimum number of vehicles per day (vpd);
(b) All Local Distributor roads carrying greater than 2,000 vpd are applicable for funding. Local Distributors that carry less than 2,000 vpd, but have a calculated Equivalent Standard Axles (ESA) design traffic volume for a 20 year life of greater than 1×10^6 are also applicable for funding. All Sections on Local Distributor roads should be supported with a copy of a full week classified traffic count contained within the grant submission. Where a Section on a Local Distributor has less than 2,000 vpd, evidence should also be given as to how the future ESA volume has been calculated, including reasons for the growth factor and percentage of commercial vehicles chosen;
(c) Access Roads are not applicable for funding;
(d) All Sections must have a minimum score of 700 points for the condition assessment. Projects below this threshold will not be considered for funding; and
(e) A pavement investigation and design is required for all submissions.

2.4.1 20 Year Design Traffic for Local Distributors

Where a Local Distributor does not carry more than 2,000 vpd, it must have a 20 year traffic design life of greater than 1 x 10^6 to qualify for grant funding. In order to calculate the future ESA, the following procedure should be used.

Design traffic, in ESAs should be determined in accordance with AUSTROADS "Pavement Rehabilitation, A Guide to the Design of Rehabilitation Treatments for Road Pavements 2004". Where only basic traffic data is available the formula shown below should be used. For the purpose of allocating points, traffic should be assessed over a 20 year period.

$$ESA's = \frac{AADT}{n} x1.2x \frac{C}{100} x365xGF$$

Where n = number of lanes C = % commercial vehicles GF = growth factor

Growth Factor for (20 years) design life:

Growth Rate per Annum	0	2	4	6	8	10
GF for 20 year design life	20	24.3	29.8	36.8	45.8	57.3

3 Condition Assessment

Identification of road defects requires assessment by a pedestrian assessor. Using this method the assessor is able to view the defect at various angles, heights and distances to establish the optimum viewing position. These details are often lost when viewing from a vehicle whether moving or stationary.

The pavement/surface condition assessment process has been predominantly developed from the Main Roads Standards for Maintenance (1991). Subtle changes have been made over time to help the MRRG condition assessment align closer to both Local Government needs and the ROMAN condition rating methodology. The following section sets out the current MRRG condition rating methodology for use with all rehabilitation submissions.

The following defect attributes are used to describe the pavement/surface condition:

- Rutting;
- Shoving;
- Depression;
- Cracking;
  - Environmental stable
  - Environmental unstable
  - Structural
- Kerbing;
- Shoulder edge break and drop off;
- Extent of patching; and
- Surface defects.

For each pavement defect attribute, the percentages of pavement affected are rated as either LOW, MEDIUM or HIGH in severity, with the exception of, environmental unstable and structural cracking, extent of patching and surface defects, which are always rated as HIGH.

The assessor should refer to the photographs in this document (Appendix B) or the Main Roads WA "Standard for Maintenance" when assessing defects. Many Subsections will have multiple defect types and will require each to be assessed, e.g. 50% HIGH cracking, 10% LOW rutting, 20% MEDIUM kerbing, 10% surface defects. This procedure is designed to identify and describe defects by an assessor on foot, relying on visual observation. With the visual nature of the exercise only an estimation of the dimensions, length, width and areas can be estimated by eye or pacing out. For more accuracy, devices such as measuring wheels or similar may be used. For the quantitative description of the attributes of defects such as rutting, shoving and depressions, direct measurement for depth and height should be undertaken by using either a 1.2 m or 3 m straight edge.

Significant changes in defect attributes can also occur within one Subsection. Where this occurs the assessor has to make judgements as to what the dominant defect feature and severity is and record as such.

3.1 Assessment Criteria

3.1.1 Rutting

Description

Rutting is a change in the road surface, which is usually as a result of trafficking (load associated) or environmental (non-load associated) factors which may reflect design or structural inadequacies.

Rutting will typically be viewed as a longitudinal deformation in a wheel-track and may appear in one or both wheel-tracks of a lane. The length to width ratio will typically be greater than 4 to 1.

The dominant defect attribute with rutting is always vertical displacement and is measured by assessing the maximum depth obtained under a 1.2 m straight edge.

Rutting is always assessed as a percentage of the Subsection length affected.

Possible causes

- Inadequate pavement thickness;
- Inadequate compaction in surfacing and/or base; and
- Inadequate strength in surfacing and/or base.

The severity rating using a 1.2 m straight edge shall be:

LOW	Longitudinal wheel-path deformation 1.2 m straight edge 5 $\leq$ 10 mm*
MEDIUM	Longitudinal wheel-path deformation 1.2 m straight edge 11 $\leq$ 20 mm
HIGH	Longitudinal wheel-path deformation 1.2 m straight edge $>$ 20 mm or ponding

*the lower limits of this defect were adjusted by the MRRG Technical Members and are different to the limits shown in Main Roads WA Standard for Maintenance severity levels. The above limits are to be used.

3.2 Shoving

Description

Shoving is a change in the road surface, which is usually as a result of trafficking (load associated) or environmental (non-load associated) factors which may reflect design or structural inadequacies.

Shoving will typically be viewed as a localised bulging of the road surface generally parallel to the direction of traffic or a horizontal displacement of surfacing materials, mainly in the direction of traffic where braking or acceleration occurs. Transverse shoving may also arise with turning traffic.

Shoving is measured by assessing the maximum depth of vertical displacement obtained under a 3.0 m straight edge.

Shoving is always assessed as a percentage of the Subsection length affected.

Possible causes

- Inadequate strength in surfacing and/or base;
- Poor bond between pavement layers;
- Lack of containment of pavement edge; and
- Inadequate pavement thickness.

The severity rating using a 3 m straight edge shall be:

LOW	bulging/horizontal displacement 3 m straight edge $20 \leq 35$ mm
MEDIUM	bulging/horizontal displacement 3 m straight edge $36 \leq 50$ mm
HIGH	bulging/horizontal displacement 3 m straight edge > 50 mm

3.1.2 Depressions

Description

Depressions are a change in the road surface, which is usually as a result of trafficking (load associated) or environmental (non-load associated) factors which may reflect design or structural inadequacies.

Depressions are typically localised failed areas within the pavement with elevations lower than the surrounding road surface. Depressions may not necessarily be confined to wheel-tracks and could extend across several wheel-tracks.

Depressions are measured by assessing the maximum depth of vertical displacement obtained under a 3 m straight edge.

Depressions are always assessed as a percentage of the Subsection area affected.

Possible causes

- Settlement of services or pavement widening;
- Consolidation of isolated areas of soft or poorly compacted subgrade or embankment materials;
- Volume change of subgrade materials due to environmental influences (e.g. drying out owing to presence of trees or change in moisture content of expansive soils); and
- Settlement due to instability of embankment.

The severity rating using a 3 m straight edge shall be:

LOW	pavement lower than surround 3 m straight edge by 15 ≤ 25 mm
MEDIUM	pavement lower than surround 3 m straight edge by 26 ≤ 40 mm
HIGH	pavement lower than surround 3 m straight edge by > 40 mm

3.1.3 Cracking

Description

Cracks are the result of partial or complete fractures of the pavement surface. Cracking of the road pavement surface can happen in a variety of patterns and widths, ranging from isolated single cracks to an interconnected pattern extending over the entire pavement.

In pavements, surface cracks are classified as follows:

- block
- crescent
- crocodile
- diagonal
- longitudinal meandering
- transverse

However in the assessment of cracks, cracks may be subdivided effectively into three categories:

- Environmental stable – those cracks that are a result of shrinkage, tree roots or reflection of underground services where the crack is stable and no movement or pumping is evident. This type of crack is evident as a block crack, meandering crack, transverse crack and possibly a longitudinal crack.
- Environmental unstable – those cracks that are a result of shrinkage, tree roots or reflection of underground services where the crack is unstable and movement and pumping is evident. This type of crack is evident as a block crack, meandering crack, transverse crack and possibly a longitudinal crack.
- Structural (crocodile) cracking where cracking is a result of excessive deflection under wheel loads. This type of cracking may be associated with rutting. It may result from fatigue of old asphalt, or as a result of a

structural deficiency in the pavement structure. It is generally confined to the wheel paths. In its early stages, it may appear as a longitudinal crack in the wheel path, followed by a second parallel crack, prior to disintegrating into a series of crocodile cracks.

It is a requirement of this standard to nominate the type of cracking observed. The assessor must determine the percentage of the subsection area that is affected by environmental cracking and length of wheel path affected by structural cracking. It is often common to observe cracks of different widths within a Subsection. Where this occurs, the assessor should record the severity as being the most dominant (i.e. the most common) cracks observed.

For environmental stable cracking (partial or complete fractures) the rating shall be:

LOW	dominant crack width < 2 mm wide
MEDIUM	dominant crack width $2 \leq 5$mm wide
HIGH	dominant crack width > 5 mm wide

For environmental unstable or structural cracking, the rating shall be HIGH.

Where a Subsection a feature cracking that has been crack sealed, the assessor must consider this slightly differently. If the crack sealing is in a good condition and clearly is still preventing the ingress of water, then this is to be recorded as a HIGH severity defect. The reason behind this is that this will reward extra points to Local Governments who are undertaking preventative maintenance.

Where the Subsection has cracking sealing which is in a poor condition and which no longer prevents the ingress of water, only the areas of visible cracking is to be recorded in line with the normal crack rating methodology and the failed crack sealing ignored.

3.1.4 Kerbing

Description

Kerbing defects are assessed as a direct measurement of deviation from a straight line in either a vertical and/or a horizontal direction using a 3 m straight edge. The length of the deviation is recorded as a percentage of the Subsection assessed. Kerb cracking is not a recordable defect in its own right.

For kerbing the rating shall be:

LOW	vertical/horizontal variation from a 3 m straight edge $20 \leq 50$ mm
MEDIUM	vertical/horizontal variation from a 3 m straight edge $51 \leq 80$ mm
HIGH	vertical/horizontal variation from a 3 m straight edge > 80 mm

3.1.5 Edge BREAK

Description

Edge break is typified by the edge of a pavement surface being fretted, broken or irregular. Edge break is also usually associated with drop off from the edge of the pavement surface.

Edge break is always assessed as a percentage of the Subsection length affected.

For edge break the rating shall be:

LOW	edge break 20 ≤ 50 mm from original seal width*
MEDIUM	edge break 51 ≤ 100 mm from original seal width
HIGH	edge break > 100 mm from original seal width

*the lower limits of edge break and drop off defects were adjusted by the MRRG Technical Members and are different to the limits shown in Main Roads WA Standard for Maintenance severity levels. The above limits are to be used.

3.1.6 Edge Drop Off

Description

Edge drop off is typically where there is a vertical drop from the edge of the road seal to the adjoining road shoulder. The vertical distance from the surface of the seal to the surface of the shoulder should be measured at the edge of the bitumen.

Edge drop off is always assessed as a percentage of the Subsection length affected.

For edge drop off the rating shall be:

LOW	vertical drop between 15 ≤ 25 mm*
MEDIUM	vertical drop between 26 ≤ 50 mm
HIGH	vertical drop > 50 mm

*the lower limits of edge break and drop off defects were adjusted by the MRRG Technical Members and are different to the limits shown in Main Roads WA Standard for Maintenance severity levels. The above limits are to be used.

3.1.7 Patching – Asphalt or Chip Seal Surfacing

Description

A patch is a repaired area of the pavement consisting of the removal of the existing failed surface and replacement with a minimum of 30 mm of asphalt.

Patching extent is the length in metres of the patching as a percentage of the length of the Subsection being assessed. For example, if a 20 m Subsection is being assessed and there is approximately 10 m worth of patching running longitudinally, this should be recorded as 50%.

Where patches are adjacent, the intent of the method is to measure only the total longitudinal length of patching in the Subsection and not the cumulative length of each patch.

Areas of road widening shall not be included in patching. For patching the rating shall always be rated as HIGH.

LOW	Not Applicable
MEDIUM	Not Applicable
HIGH	All patching is rated as HIGH severity

3.1.8 Surface Defects

Surface defects are a group of defects that appear on either asphalt or chip seal roads. The main defects that fall under this category are delamination (d), flushing (f), ravelling (r) and stripping (s). Aggregate polishing is not included as a specific defect.

The assessor must determine the percentage of the Subsection area that is affected by surface defects.

For surface defects, the percentage of pavement affected is always rated as HIGH.

LOW	Not Applicable
MEDIUM	Not Applicable
HIGH	All surface defects are rated as HIGH severity

3.2 Example Procedure for Measuring Defect Percentage

The following procedure is provided as an example of how an assessor may undertake the assessment of a Subsection. In this case, the assessor is measuring the amount of patching present within the Subsection.

3.3 Apparatus

A distance measuring wheel.

3.4 Procedure

- Identify the measured lane and determine the boundaries of the Subsection, which is to be assessed;
- Determine the longitudinal length of the patching (to the nearest 1 m) within the Subsection;
- Record the longitudinal length of pavement where patching occurs as *Pl*.

3.5 Calculations

Calculate the Patching Extent per Subsection as a percentage using the formula:

$$\text{Patching Extent} = \frac{Pl}{Sl} x100$$

where*Pl* = longitudinal length of the patching in metres.

Sl = the length of the Subsection in metres.

4 Surface Age

Points are also awarded for the age of the road surface. This criteria helps to ensure that older roads are rehabilitated before younger roads of similar condition. Each Section submission must also be accompanied by evidence of the project's seal age, such as by way of construction records or pavement management system extract (i.e. screen shot from ROMAN).

In the case of spray seals, points are not adjusted. In the case of asphalt surfaces, as ravelling is a reflection of surface age, points awarded for ravelling are deducted from the age score.

Where a Section features a road with Subsections of different surface age, the submission should use the oldest recorded surface age present on the site.

Surface age points are calculated from the following: Asphalt surfaces

0	Surface age $\leq$ 10 years
350	Surface age >10 and $\leq$ 18 years
700	Surface age $>$ 18 years

Spray seals

0	Surface age $\leq$ 8 years
350	Surface age >8 and $\leq$ 11 years
700	Surface age $>$ 11 years

5 Traffic

Points are awarded to each Section for the amount of current traffic the road holds. There is no minimum traffic criteria for those roads classified as either District Distributor A or B. Projects on Local Distributors qualify only if the AADT exceeds 2,000 vehicles per day or the design traffic exceeds 1 x 10^6 Equivalent Standard Axles (ESA) for a 20 year design life. Where the Local Distributor carries less than 2,000 vpd, the 20 year design traffic calculation should be supported with evidence showing how the traffic growth rate and percentage of commercial vehicles carried have been derived.

Traffic points are factored for the heavy vehicle loading by a factor determined by the equivalent standard axles (ESA) applicable to the road. A factor is only applied where the 20 year ESA count is greater than 1 million ESA.

Where the 20year ESA count is > 1 million ESA, the factor k is determined by the equation:

$$k = \frac{\log\left(\frac{ESA}{120}\right)}{\log\left(\frac{1{,}000{,}000}{120}\right)}$$

To calculate the amount of points to be awarded for a Section's traffic volume, the following figure should be used. For cases where the ESA is greater than 1 million ESA, the value is then multiplied by k. The submission must also include a copy of a recent one week classified traffic count to support the points awarded.

The points available for traffic are capped at 700, even if a project's traffic flow is greater than 8,750 vpd.per lane irrespective of the ESA value for the road.

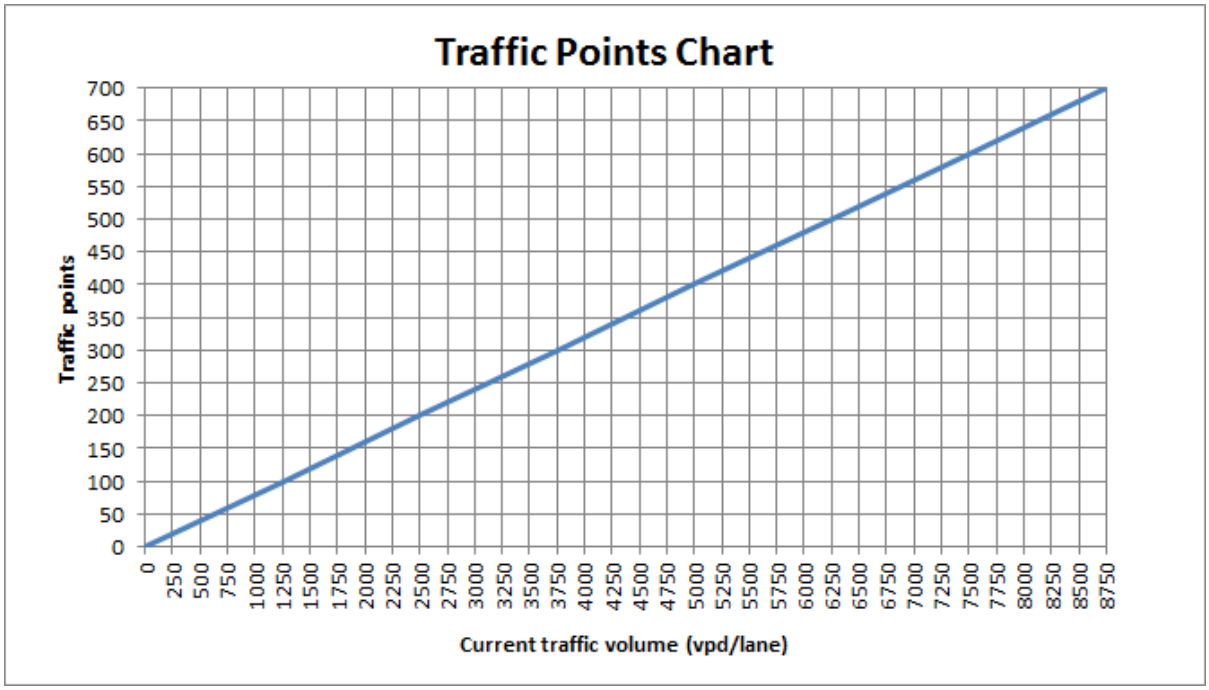


Figure 1 – Traffic Points

6 Project Cost

In order to ensure that a level playing field is maintained when calculating the total cost of each rehabilitation Section, standardised unit rates for treatment type (based on thicknesses or area) are built into the project assessment form which is to be used for all submissions. Each submission is to document the chosen rehabilitation treatment, which is supported by an accompanying pavement design.

The project assessment form has allowances for project difficulty, where traffic management and degree of difficulty can be rated as easy, difficult or extreme as shown in Table 1.

A 'Linemarking and Ancillary Costs' table is contained within the project assessment form to cover other standard costs not covered by the rehabilitation treatment unit rates. Costs calculated in this table are automatically added to the Total Cost.

The MRRG funds can only be applied for the identified "standardised conditions". Associated works such as crossover adjustments, non-pavement works etc, which can be additional costs to the project are to be wholly funded by the Local Government.

If the submission is successful, then the Local Government will receive two-thirds of the determined project cost.

Table 1 – Difficulty rating

Site difficulty rating		Percentage markup
Easy	No business activity, road easily accessed, simple detours, low traffic volumes	20%
Difficult	Significant business activity, or AADT <5,000 but can be undertaken with partial road closures and maintain two way traffic flow	30%
Extreme	Significant business activity, or AADT >5000 or limited width requiring one lane traffic control, or works involving signalised intersections	40%

7 Pavement Investigation and Design

A pavement investigation, evaluation and design is required for each project to ensure that the appropriate treatment is being implemented. The results of the investigation, evaluation and design should be presented in a report and accompany the submission.

A worked example using the various required forms and a pavement design is shown at Appendix A.

It is possible that within a section, more than one treatment may be applicable, eg in a dual carriageway, the left lane carrying truck traffic may require a complete rehabilitation, where the right lane may require only resurfacing. The condition may also vary longitudinally where sections may require resurfacing and others a more expensive treatment.

The project assessment form allows for two different treatments within one section, and also allows for specific overlay and stabilisation thicknesses to be applied.

8 Declaration

The declaration must be signed by a senior Local Government representative such as the Chief Executive Officer or Director / Executive Manager of the relevant area.

9 Audit

Submissions will be subject to audit, the audit will be carried out by either Main Roads WA or a Main Roads WA approved and suitably qualified agent. All submissions will be audited by a single person to ensure consistency of the audit process.

10 Section details sheet

The section details are entered into the Section Details Sheet, much of the other information required in the inspection sheet self populates from this sheet. Yellow cells are to be completed, orange cells are entered. SLK is in km, chainage can be free text, but generally should be entered as the SLK in meters.

Section details

Inspection date	
Local Authority	
Road name	
From intersection	
SLK	
Chainage start	
To intersection	
SLK	
Chainage end	
Section length	
Width of rehab	
Number lanes inspected	
Direction	
AADT	
% Heavy Vehicles	
Design period	
Growth rate %pa	
Inspection interval	
Other area (m^2)	
Seal age (yr)	
Seal type	
Road class	
Lanes/direction	

Includes turn pockets, intersections

Drop down selection

11 Field Condition Assessment Worksheet

The field assessment worksheet is shown below. Only an extraction is shown. All yellow cells require completion. Cracking Type has a drop down box to ensure only one of three types of cracking is entered. There is provision for up to 4 lanes of traffic in cases of 4 lane undivided roads.

FIELD WORKSHEET AND CALCULATIONS

Local Authority	0		Road:	0		Direction:		Segments (m)	0
Inspection date	0/01/1900	Lanes	0	Section:		: SLK to : SLK			
Start	: SLK		Chainage	0	End	: SLK		Chainage	0

LANE:	Lane 1																	Lane 2																
Sections	Ru		Sh		De		Cr			EB		ED		K		Pa	Sd		Ru		Sh		De		Cr			EB		ED		K		Pa	Sd	
(m)	Sev	%	Sev	%	Sev	%	Sev	Type	%	Sev	%	Sev	%	Sev	%	%	Type	%	Sev	%	Sev	%	Sev	%	Sev	Type	%	Sev	%	Sev	%	Sev	%	%	Type	%

Severity	Defect											
				Cracking							SD	
	Ru	Sh	De	ES	EU	St	EB	ED	K	Pa	R	Oth
High												
Medium												
Low												

Ru = Rutting Sh = Shoving
De = Depression
Cr = racking
K = Kerbing
Ed = Edge Drop Off
Eb = Edge break
Pe = Patching Extent (MR30AS Min)
Sd = Surface Defects

Ru, Sh, K, Ed, Cr (St & EU, Eb, Pe & Sd, calculated as % of length

De & Cr (ES), calculated as % of area

12 Project Assessment Form

The project assessment form is shown below. In this form, project data and assessment populates from the field assessment worksheet. Only cells in yellow need data inserted.

Turning pockets can be claimed as additional site areas as per the input cell in the Project Assessment Form. Side road intersection areas (whether T-junction, round-about or other four-legged intersection) cannot be included in a submission without meeting the minimum criteria in Section 2.4 and must be included in condition assessment.

PROJECS DESAILS												
LOCAL GOVERNMENT AUTHORITY:								Inspection date				
ROAD:				SECTION		: SLK to : SLK						
PROJECT LENGTH (m)			PROJECT WIDTH (m)			POINT SCORING						
PROJECT AREA (m2)			TURNING POCKETS (m²)			3	5	7	% x point	x weight		Total
						LOW	MEDIUM	HIGH				
1	Pavement condition	Rutting		% of length		0%	0%	0%	0.0	3		0.0
		Shoving		% of length		0%	0%	0%	0.0	3		0.0
		Depression		% of area		0%	0%	0%	0.0	2		0.0
		Cracking	Environmental stable	% of area		0%	0%	0%	0.0	1		0.0
			Environmental unstable	% of area				0%	0.0	3		0.0
			Structural	% of length				0%	0.0	3		0.0
		Edge Break		% of length		0%	0%	0%	0.0	1		0.0
		Edge Drop Off		% of length		0%	0%	0%	0.0	1		0.0
		Kerbing		% of length		0%	0%	0%	0.0	1		0.0
		Patching Ext.		% of Length				0%	0.0	3		0.0
		Ravelling (Asphalt surface only)		% of Length				0%	0.0	1		0.0
		Other surface defects (Stripping, flushing, delamination)		% of length				0%	0.0	1		0.0
											A	0.0
2	Seal age	0	Seal type	0							B	0.0
Same treatment throughout				Section 1 area			Section 2 area			0		
3	Traffic volumes	Road class		Asphalt type layer 1			Asphalt type later 1				C	
		AADT for road		Asphalt thickness layer 1 (mm)			Asphalt thickness layer 1 (mm)					
		AADT/direction		Asphalt type layer 2			Asphalt type layer 2					
		No lanes/direction		Asphalt thickness layer 2 (mm)			Asphalt thickness layer 2 (mm)					
		%HV		Reconstruction (m²)			Reconstruction (m²)					
		Design period		Stabilisation depth (FBS/Emulsn.) (mm			Stabilisation depth (FBS/Emulsn.) (mm					
		Growth rate		Stabilisation passes (mm)			Stabilisation passes (mm)					
		ESA for ranking		After hours			After hours					
		Design ESA's		Granular o'lay thickness (mm)			Granular o'lay thickness (mm)					
				Site difficulty rating			Site difficulty rating					
										TOTAL PROJECT SCORE:		

PROJECT COST					
	Area 1	Area 2			
Treatment code			Treatment Detail		Total cost = Area x Unit rate
Linemarking and ancillary items					
Shouldering repairs					
Kerb replacement					
Profiling					
Spray seal			Comments		
Reconstruct/Granular overlay/Rework					
Unit rate ($/m²)					

Linemarking and ancillary costs			
Item	Rate	Units	Cost
Solid line (m)	$1.10		$0
Broken line (m)	$0.75		$0
Stop line signals (m)	$39.54		$0
Stop/Give Way (m)	$27.00		$0
Straight arrows (ea)	$135.91		$0
Turn arrows (ea)	$157.44		$0
Signal loops (ea)	$2,000		$0
Raised Pavement Markers (ea)	$21.32		$0
Traffic management line marking (days)	$1,700.00		$0
Traffic management line marking (night)	$2,200.00		$0

Cost split	MRRG City
Area 1	
Area 2	

Note that where two treatment options are selected, additional cells will turn yellow, and details of the areas of the alternative treatments will be required for entry

13 References

MAIN ROADS WA (1991): “Standard for Maintenance” Main Roads WA manual Document No 7201/055

AUSTROADS (2004): “Pavement Rehabilitation: A Guide to the Design of Rehabilitation Treatments for Road Pavements”. AUSTROADS Publication No AP-G78/04

Main Roads WA (2004): “Engineering Road Note 9” Procedure For Thickness Design Of Flexible Pavements.

Appendix A – Worked Example

3.6 Smith Street

3.7 Clyde St to George St

The following example is a hypothetical case but shows how the secion details, inspection sheet and score sheet appear.

Project details	
Inspection date	1/04/2020
Local Authority	City of Timbuktoo
Road name	Smith St
From intersection	Clyde St
SLK	1.3
Chainage start	1300
To intersection	George St
SLK	1.9
Chainage end	1900
Section length	600
Width of rehab	7.5
Number lanes inspected	2
Direction	One direction
AADT	12000
% Heavy Vehicles	5
Design period	40
Growth rate %pa	3
Inspection interval	10
Other area (m²)	500
Seal age (yr)	19
Seal type	Asphalt
Road class	District distributor
Lanes/direction	2

3.8 Example Inspection Sheet

FIELD WORKSHEET AND CALCULATIONS																																									
Local Authority	City of Timbuktoo									**Road:**	Smith St									**Direction:**										**Segments (m)**		10									
Inspection date	1/04/2020					**Lanes**	2			**Section:**	Clyde St: SLK1.3 to George St: SLK1.9																																		
Start	Clyde St: SLK1.3									**Chainage**	1300					**End**	George St: SLK1.9									**Chainage**	1900														
LANE:	**Lane 1**																		**Lane 2**																						
Sections	**Ru**		**Sh**		**De**		**Cr**			**EB**		**ED**		**K**		**Pa**	**Sd**		**Ru**		**Sh**		**De**		**Cr**			**EB**		**ED**		**K**		**Pa**	**Sd**					
(m)	**Sev**	**%**	**Sev**	**%**	**Sev**	**%**	**Sev**	**Type**	**%**	**Sev**	**%**	**Sev**	**%**	**Sev**	**%**	**%**	**Type**	**%**	**Sev**	**%**	**Sev**	**%**	**Sev**	**%**	**Sev**	**Type**	**%**	**Sev**	**%**	**Sev**	**%**	**Sev**	**%**	**%**	**Type**	**%**					
1310	H	100%					H	St	100%																											R	100%					
1320	H	100%					H	St	100%																											R	100%					
1330	H	100%					H	St	100%										L	100%															R	100%					
1340	H	100%					H	St	100%										L	100%															R	100%					
1350	H	100%					H	St	100%										L	100%															R	100%					
1360	H	100%					H	St	100%										L	100%					L	EU	20%								R	100%					
1370	H	100%					H	St	100%										L	100%															R	100%					
1380	H	100%					H	St	100%										L	100%															R	100%					
1390	H	100%					H	St	100%										L	100%															R	100%					
1400	H	100%					H	St	100%										L	100%															R	100%					
1410	H	100%					H	St	100%																L	EU	20%								R	100%					
1420	H	100%					H	St	100%																L	EU	20%								R	100%					
1430	H	100%					H	St	100%																L	EU	20%								R	100%					
1440	H	100%					H	St	100%																L	EU	20%								R	100%					
1450	H	100%					H	St	100%																											R	100%					
1460	H	100%					H	St	100%																											R	100%					
1470	M	100%					H	St	100%																											R	100%					
1480	M	100%					H	St	100%																											R	100%					
1490	M	100%					H	St	50%																											R	100%					
1500	M	100%					H	St	50%																											R	100%					
1510	M	100%					H	St	50%																H	St	100%								R	100%					
1520	M	100%					H	St	50%																											R	100%					
1530	M	50%					H	St	50%																											R	100%					
1540	M	50%					L	EU	20%																H	St	100%								R	100%					
1550	L	100%																																	R	100%					
1560	L	100%																																	R	100%					

FIELD WORKSHEET AND CALCULATIONS

Local Authority	City of Timbuktoo	Road:	Smith St	Direction:		Segments (m)	10
Inspection date	1/04/2020	Lanes	2	Section:	Clyde St: SLK1.3 to George St: SLK1.9		
Start	Clyde St: SLK1.3	Chainage	1300	End	George St: SLK1.9	Chainage	1900

LANE:	Lane 1																		Lane 2																	
Sections	Ru		Sh		De		Cr			EB		ED		K		Pa	Sd		Ru		Sh		De		Cr			EB		ED		K		Pa	Sd	
(m)	Sev	%	Sev	%	Sev	%	Sev	Type	%	Sev	%	Sev	%	Sev	%	%	Type	%	Sev	%	Sev	%	Sev	%	Sev	Type	%	Sev	%	Sev	%	Sev	%	%	Type	%
1570	L	100%																							L	EU	20%								R	100%
1580	L	100%					L	EU	20%										L	100%															R	100%
1590	L	100%																	L	100%															R	100%
1600	L	100%																	L	100%															R	100%
1610	L	100%																	L	100%					L	EU	20%								R	100%
1620	L	100%																	L	100%															R	100%
1630							L	EU	20%										L	100%															R	100%
1640							L	EU	20%										L	100%															R	100%
1650							L	EU	20%										L	100%															R	100%
1660							L	EU	20%																L	EU	20%								R	100%
1670																									L	EU	20%								R	100%
1680																									L	EU	20%								R	100%
1690																									L	EU	20%								R	100%
1700	H	100%					H	St	100%																										R	100%
1710	H	100%					H	St	100%																										R	100%
1720	H	100%					H	St	100%																										R	100%
1730	H	100%					H	St	100%																										R	100%
1740	H	100%					H	St	100%																										R	100%
1750	H	100%					H	St	100%																										R	100%
1760	H	100%					H	St	100%																										R	100%
1770	H	100%					H	St	100%																										R	100%
1780	H	100%					H	St	100%																										R	100%
1790	H	100%					H	St	100%																										R	100%
1800	H	100%					H	St	100%																										R	100%
1810	H	100%					H	St	100%																										R	100%
1820	H	100%					H	St	100%																										R	100%
1830	H	100%					H	St	100%																										R	100%
1840	H	100%					H	St	100%																										R	100%

FIELD WORKSHEET AND CALCULATIONS

Local Authority	City of Timbuktoo	**Road:**	Smith St	**Direction:**		**Segments (m)**	10
Inspection date	1/04/2020	**Lanes**	2	**Section:**	Clyde St: SLK1.3 to George St: SLK1.9		
Start	Clyde St: SLK1.3	**Chainage**	1300	**End**	George St: SLK1.9	**Chainage**	1900

LANE: Lane 1

Sections	Ru		Sh		De		Cr			EB		ED		K		Pa	Sd	
(m)	Sev	%	Sev	%	Sev	%	Sev	Type	%	Sev	%	Sev	%	Sev	%	%	Type	%
1850	H	100%					H	St	100%									
1860	M	100%					H	St	100%									
1870	M	100%					H	St	100%									
1880	M	100%					H	St	50%									
1890	M	100%					H	St	50%									
1900																		

LANE: Lane 2

Sections	Ru		Sh		De		Cr			EB		ED		K		Pa	Sd	
(m)	Sev	%	Sev	%	Sev	%	Sev	Type	%	Sev	%	Sev	%	Sev	%	%	Type	%
1850																	R	100%
1860																	R	100%
1870																	R	100%
1880																	R	100%
1890																	R	100%
1900																		

	Defect											
				Cracking							SD	
Severity	Ru	Sh	De	ES	EU	St	EB	ED	K	Pa	R	Oth
High	27%	0%	0%	0%	3%	35%	0%	0%	0%	0%	49%	0%
Medium	9%	0%	0%	0%			0%	0%	0%			
Low	20%	0%	0%	0%			0%	0%	0%			

The summary table at the end of the spreadsheet shows the final defects as a percentage of the area or length as applicable

Example of Completed Form

PROJECS DESAILS											
LOCAL GOVERNMENT AUTHORITY:			City of Tim				Inspection date			1/04/2020
ROAD:		Smith St	SECTION	Clyde St: SLK1.3 to George St: SLK1.9						
PROJECT LENGTH (m)	600	PROJECT WIDTH (m)	7.5	POINT SCORING						
PROJECT AREA (m2)	5000	TURNING POCKETS (m²)	500	3	5	7	% x point	x weight		Total
				LOW	MEDIUM	HIGH				
1	Pavement condition	Rutting	% of length	20%	9%	27%	294.0	3		882.0
		Shoving	% of length	0%	0%	0%	0.0	3		0.0
		Depression	% of area	0%	0%	0%	0.0	2		0.0
		Cracking Environmental stable	% of area	0%	0%	0%	0.0	1		0.0
		Environmental unstable	% of area			3%	21.0	3		63.0
		Structural	% of length			35%	245.0	3		735.0
		Edge Break	% of length	0%	0%	0%	0.0	1		0.0
		Edge Drop Off	% of length	0%	0%	0%	0.0	1		0.0
		Kerbing	% of length	0%	0%	0%	0.0	1		0.0
		Patching Ext.	% of Length			0%	0.0	3		0.0
		Ravelling (Asphalt surface only)	% of Length			49%	343.0	1		343.0
		Other surface defects (Stripping, flushing, delamination)	% of length			0%	0.0	1		0.0
									A	2023.0
2	Seal age	19	Seal type	Asphalt					B	357.0
Same treatment throughout			No	Section 1 area		2000	Section 2 area		3000	
3	Traffic volumes	Road class	District distributor	Asphalt type layer 1		DGA	Asphalt type layer 1		DGA	C 240.0
		AADT for road	12000	Asphalt thickness layer 1 (mm)		40	Asphalt thickness layer 1 (mm)		40	
		AADT/direction	6000	Asphalt type layer 2			Asphalt type layer 2			
		No lanes/direction	2	Asphalt thickness layer 2 (mm)			Asphalt thickness layer 2 (mm)			
		%HV	5.00	Reconstruction (m²)			Reconstruction (m²)			
		Design period	40.00	Stabilisation depth (FBS/Emulsn.) (mm		250	Stabilisation depth (FBS/Emulsn.) (mm			
		Growth rate	3.00	Stabilisation passes (mm)		1	Stabilisation passes (mm)			
		ESA for ranking	5.15E+06	After hours		Yes	After hours		Yes	
		Design ESA's	1.44E+07	Granular o'lay thickness (mm)			Granular o'lay thickness (mm)			
				Site difficulty rating		Difficult	Site difficulty rating		Difficult	
									TOTAL PROJECT SCORE:	2620.0

PROJECT COST						
	Area 1	Area 2				
Treatment code	BSDGA	MFDGASAM	Treatment Deatil A1	Bitumen stabilise & DGA	Total cost = Area x Unit rate	$324,806
Linemarking and ancillary items	Yes - complete table					
Shouldering repairs	No					
Kerb replacement	No		Treatment detail A2	DGA mill and fill & SAMI		
Profiling		Yes				
Spray seal		SAMI	Comments			
Reconstruct/Granular overlay/Rework						
Unit rate ($/m²) Area 1	$102.76	$39.76				

Linemarking and ancillary costs			
Item	Rate	Units	Cost
Solid line (m)	$1.10	600	$660
Broken line (m)	$0.75	600	$450
Stop line signals (m)	$39.54		$0
Stop/Give Way (m)	$27.00		$0
Straight arrows (ea)	$135.91		$0
Turn arrows (ea)	$157.44	3	$472
Signal loops (ea)	$2,000		$0
Raised Pavement Markers (ea)	$21.32		$0
Traffic management line marking (days)	$1,700.00		$0
Traffic management line marking (night)	$2,200.00	1	$2,200

Cost split		MRRG	$216,537.33
		City	$108,268.67
Area 1	Lane 1 SLK 1.3 to SLK 1.9		
Area 2	Lane 2 SLK 1.3 to SLK 1.9 and turn pocket		

Note that all information in this form in shaded cells is either embedded or automatically populated from the score sheet. Only the white cells are to be completed.

3.9 Rehabilitation Design Using Pavement Sampling and Laboratory Testing

3.10 Evaluation of a pavement showing distress or failure.

(a) Determine existing pavement profile by measuring thickness and sampling of pavement layers.
(b) Determine strength of subgrade by laboratory California bearing ratio (CBR) testing or by regional experience.
(c) Evaluate quality of pavement material by laboratory testing.
(d) Determine design traffic in terms of equivalent standard axles (ESA's).
(e) Use CBR design chart (Figure 2) to determine if the pavement thickness is adequate.
(f) If thickness and quality of pavement is satisfactory, and the pavement can carry its design traffic, then re-work the basecourse to correct shape or replace the asphalt seal.
(g) If the pavement is too thin, increase thickness or improve strength of subgrade.
(h) If the basecourse material is sub-standard, replace with conforming material, improve basecourse strength or provide an overlay (granular material or asphalt).
(i) When considering a structural asphalt overlay, a check should be made, using falling weight deflectometer or Benkelman beam testing, to ensure that the asphalt will not fail early due to fatigue.

3.11 Example

Road with a design traffic of 2.5×10^6 ESAs and of Bassendean sand subgrade with a CBR of 12%. The pavement is rough and requires attention.

Check pavement thickness from Figure 2. For design traffic of 2.5×10^6 ESA and a CBR of 12%, the required pavement is:

Basecourse Thickness	140 mm
Total Pavement Thickness	250 mm

3.12 See Table No. 2 for diagnosis and rehabilitation treatment options.

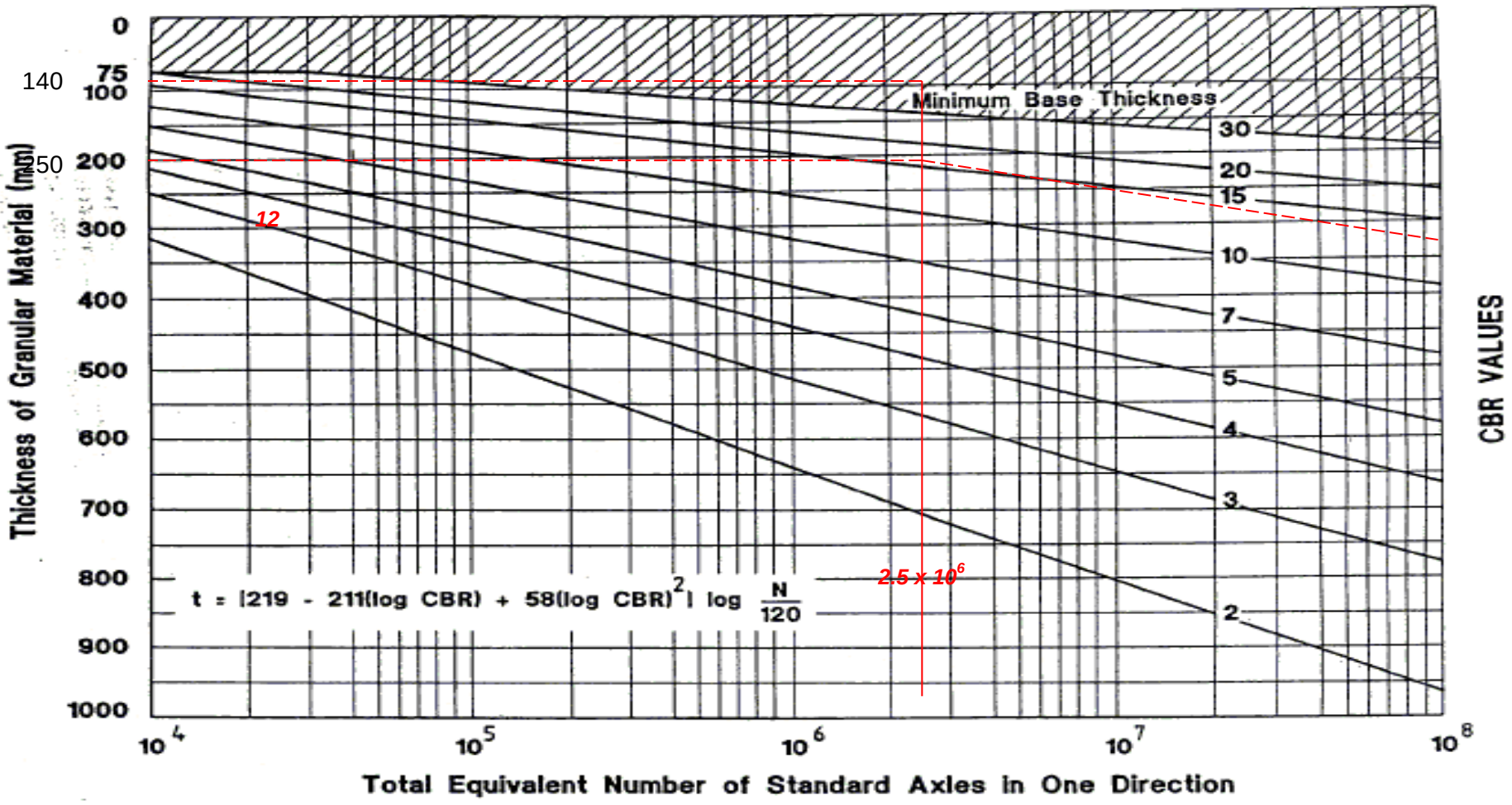


Figure 2 CBR Design Chart

3.13 Diagnosis and rehabilitation treatment options

Case	Existing pavement profile		Diagnosis	Rehabilitation treatment options	
1.	Basecourse Thickness Total Pavement Thickness	150 mm 260 mm	• Basecourse conforms to requirements • Pavement thickness satisfactory	Option 1 Option 2	Rework the existing basecourse shape and reseal Overlay with a thin layer of asphalt to correct surface shape.
2.	Basecourse Thickness Total Pavement Thickness	80 mm 155 mm	• Basecourse is substandard • Pavement thickness is substandard	Option 1 Option 2	Remove seal, apply granular overlay of 100 mm and reseal. Reconstruct pavement to the required basecourse, and total thickness (Refer to Figure 9), and reseal.
3.	Basecourse Thickness Total Pavement Thickness	150 mm 270 mm	• Basecourse is substandard • Pavement thickness is satisfactory	Option 1 Option 2 Option 3	Remove existing basecourse, replace with conforming material and reseal Strengthen existing basecourse (e.g. cement stabilisation) and reseal. Remove seal, apply granular overlay of 140 mm of basecourse quality material

Table 2 – Diagnosis and rehabilitation treatment options

3.14 Example Pavement Rehabilitation Design Using Falling Weight Deflectometer Testing

Note that this method is only applicable if the pavement is structurally sound, in relatively good shape, and the pavement thickness is adequate. It is assumed that the thickness has been determined adequate.

Road: Jones Street

Section: Smith St to Brown St

From Falling Weight Deflectometer Testing:

Characteristic Deflection: 0.49 mm

Mean Curvature: 0.21 mm

Design CBR: 8%

Design Traffic: 2,526,000 ESA's

From Design Tables (figure 3 overleaf)

Tolerable Deflection: 1.02 mm

Tolerable Curvature: 0.15 mm

2.526×10^6 ESA's

Therefore, 50mm minimum AC Overlay required.

Design Overlay: 60 mm 14 H.D Gap Grade AC 75 Blow Marshall 4-6% Voids

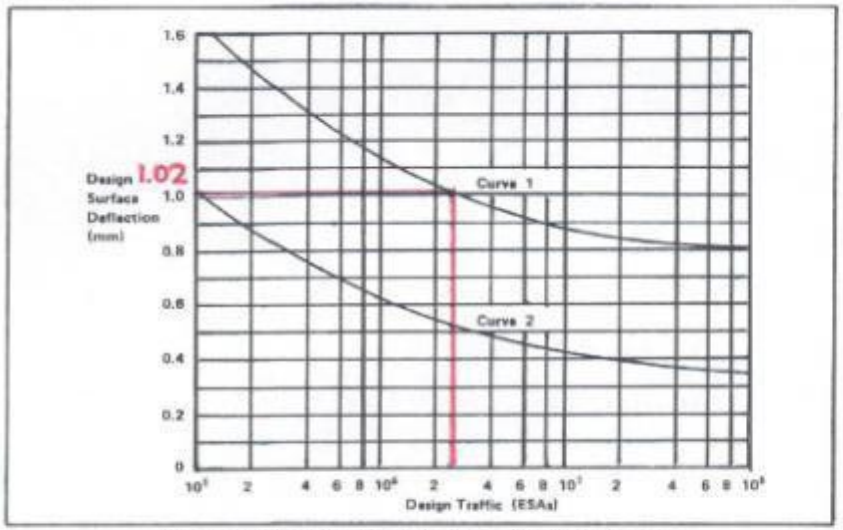


FIGURE 10.3 DESIGN DEFLECTION LEVELS DESIGN TRAFFIC (ESA)

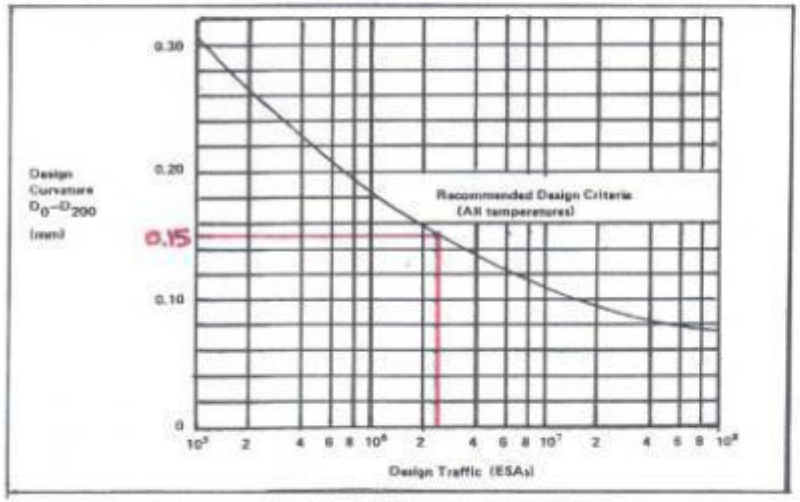


FIGURE 10.4 DESIGN CURVATURE FUNCTION DESIGN TRAFFIC (ESA)

DESIGN TRAFFIC - 2.526×10^6 ESA's

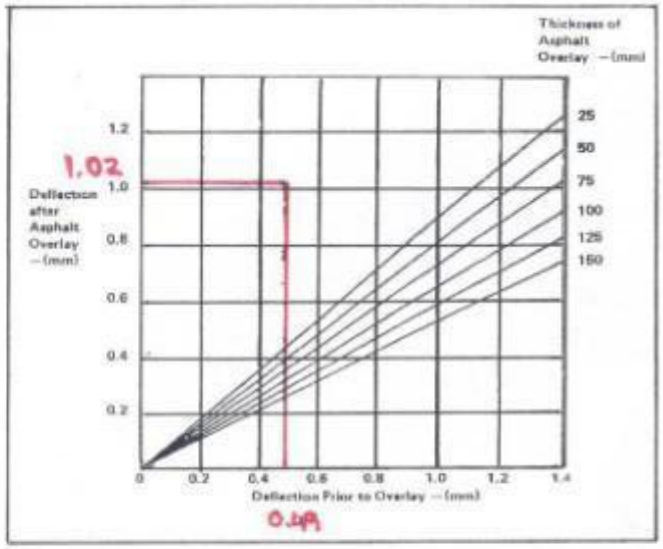


FIGURE 10.7 EFFECT OF ASPHALT OVERLAY ON DEFLECTION

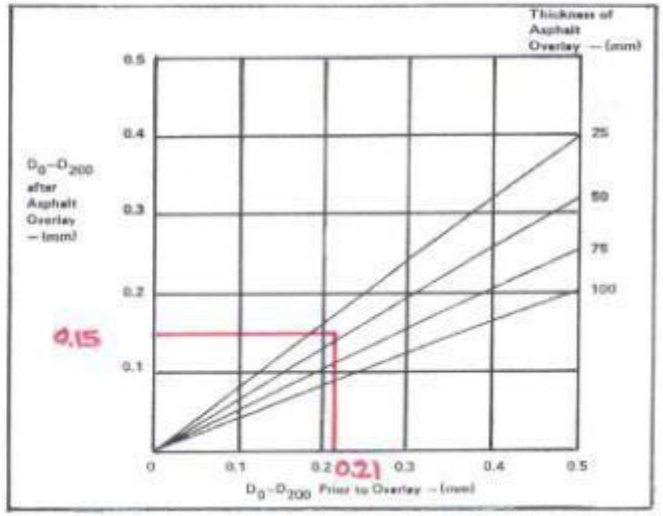


FIGURE 10.8 REDUCTION IN D_0-D_{200} DUE TO AN ASPHALT OVERLAY

Figure 3 **– Overlay Calculation Graphs**

Appendix B – Main Roads WA Standard for Maintenance

Document Name: Appendix B: Standard For Maintenance Page: 2 of 17 Document No: 71-05-1397 Date: May 1991

Note this Standard has been varied for the purposes of assessing road condition for scoring of points in the MRRG Road Rehabilitation Guidelines

RUTTING

Description

Longitudinal deformation in a wheel path. The length-to-width ration would normally be grater then 4 to 1. May occur in one or both wheel paths of a lane.

3.15 Severity Levels

LOW - Depression below a 1.2m straight edge from 10-15 mm MEDIUM - Depression below a 1.2m straight edge from 16-25 mm
HIGH - Depression below a 1.2m straight edge exceeds 25 mm or ponding of water hazardous traffic to occur.

LOW SEVERITY

MEDIUM SEVERITY

HIGH SEVERITY

SHOVING

Description

Bulging of the road surface (generally parallel to the direction of traffic) and/or horizontal displacement of the road surface materials.

Severity Levels

Low - Depth below a 3m straight edge from 20-35mm when measured to the trough with one end of the straight edge resting on the crest of the bulge.

Medium - Depth below a 3m straight edge from 36-50mm when measured to the trough with one end of the straight edge resting on the crest of the bulge.

High - Depth below a 3m straight edge from exceeds 50mm when measured to the trough with one end of the straight edge resting on the crest of the bulge.

LOW SEVERITY

MEDIUM SEVERITY

HIGH SEVERITY

DEPRESSION

Description

Localised area within a pavement lower than the surrounding area. May not be confined to wheel paths and could extend across several wheel paths. The length width ratio would normally be less than 4 to 1.

Severity Levels

Low - Depression below a 3m straight edge from 15-25 mm Medium - Depression below a 3m straight edge from 26-40 mm
High - Depression below a 3m straight edge exceeds 40 mm or ponding of water hazardous to traffic occurs.

LOW SEVERITY

MEDIUM SEVERITY

HIGH SEVERITY

CRACKING

Environmental Stable Cracking

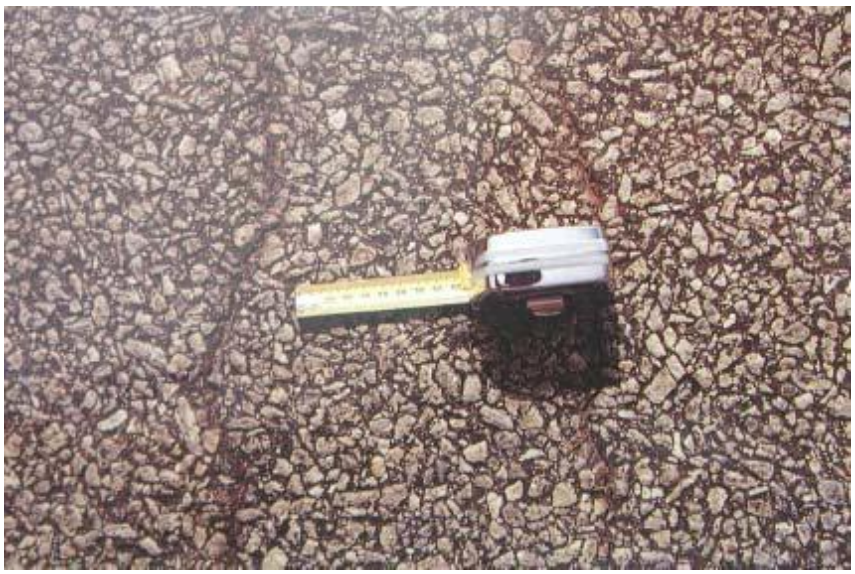
Description

Fissures resulting from partial or complete fractures of the pavement surface that result from reflection of underlying cracks, reflection of old trenches and widenings, old joints in surfacing, reflection of tree roots or shrinkage of base materials. These cracks show no signs of pumping.

Severity Levels

LOW – Dominant crack width less than 2 mm wide MEDIUM - Dominant crack width 2-5 mm wide HIGH - Dominant crack width more than 5 mm wide

LOW SEVERITY



MEDIUM SEVERITY

HIGH SEVERITY

Environmental Unstable Cracking

Description

These cracks may arise from any of the sources described in the Environmental Stable, but show evidence of pumping, which indicates movement and moisture are affecting the underlying base.

Severity Levels

HIGH - All environmental unstable cracks are rated as high.

HIGH SEVERITY Environmental unstable cracks

HIGH SEVERITY Environmental unstable cracks

Structural (Fatigue) Cracking

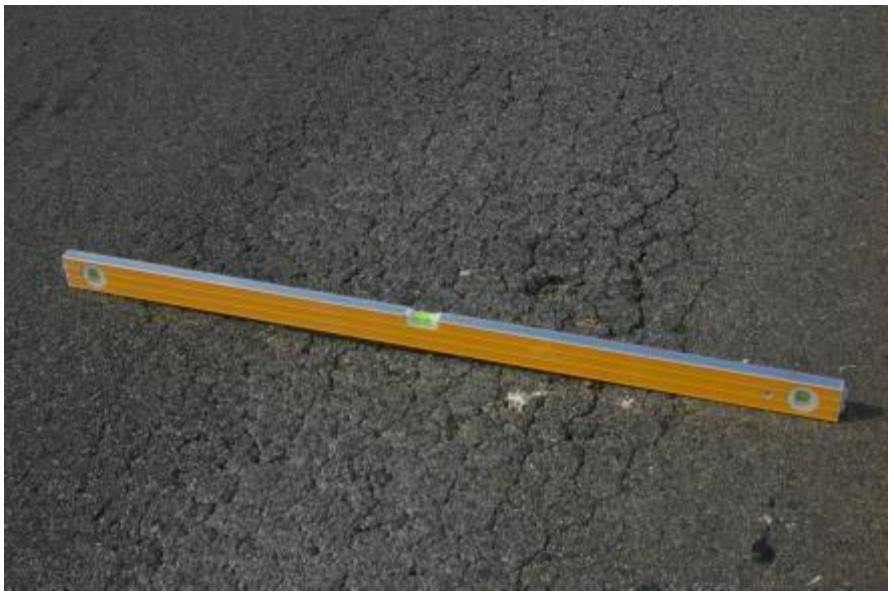
Description

These cracks may arise from traffic induced fatigue and may arise from either very old asphalt that has become brittle, or as a result of a weak base material. They are evidenced as cracking that appears like a crocodile skin, but may in the early stages of development be evidenced as a single crack parallel to the direction of traffic and in the wheel path.

Severity Levels

HIGH - All fatigue cracks are rated as high.

HIGH SEVERITY structural cracking with pumping



HIGH SEVERITY structural cracking

HIGH SEVERITY structural cracking early stages of development

KERBING

Description

Damaged or missing kerbing which results in a deviation from a straight line in either a horizontal or vertical direction.

Severity Levels

LOW – Vertical/horizontal variation from a 3 m straight edge is 20 – 50 mm. MEDIUM - Vertical/horizontal variation from a 3 m straight edge is 51 – 80 mm. HIGH - Vertical/horizontal variation from a 3 m straight edge is more than 80 mm.

EDGE BREAK

Description

The edge of the bituminous surface fretted, broken or irregular. Usually associated with drop off from the edge of the bitumen. This applies equally to the edge of the bitumen whether on sealed shoulders or trafficked lanes without sealed shoulders.

Severity Levels

LOW - Edge break between 20 and 50 mm from the original seal width MEDIUM - Edge break between 51 and 100 mm from the original seal width HIGH - Edge break over 100 mm from the original seal width.

LOW SEVERITY

MEDIUM SEVERITY

HIGH SEVERITY

EDGE DROP-OFF

Description

The vertical distance from the surface of the seal to the surface of the shoulder measured at the edge of the bitumen. This applies equally to the edge of the bitumen whether on sealed shoulders or trafficked lanes without sealed shoulders.

Severity Levels

LOW - Vertical drop between 15 and 25 mm MEDIUM - Vertical drop between 26 and 50 mm HIGH - Vertical drop greater than 50 mm

LOW SEVERITY

MEDIUM SEVERITY

HIGH SEVERITY

EXTENT OF PATCHING ASPHALT SURFACING

Description

A measured lane is a trafficable lane within the pavement, for which measures of pavement conditions are taken. A patch is a repaired area of pavement consisting of removal of the existing failed asphalt pavement and replaced with a minimum of 30 mm of asphalt.

Severity Levels

HIGH – Patching is always rated as HIGH severity.

SURFACE DEFECTS

Description

Surface defects are a group of defects that appear on either asphalt or chip seal roads. The main defects that fall under this category are delamination, flushing, ravelling and stripping. The road surface can have a combination of these defects present on it.

Severity Levels

HIGH – Surface defects are always rated as HIGH severity.

Delamination

Delamination typically occurs when a top asphalt surfacing layer de-bonds from an older surface layer below.

Flushing

Flushing typically occurs on Chip Seal roads and is a defect caused by either bitumen rising to the surface of the road, or stone aggregate being pushed down into the surface.

Ravelling

Ravelling commences as the loss of fines from the surface. The bitumen binder oxidises and hardens over time due to exposure to oxygen and ultra violet light and the asphalt becomes more prone to ravelling and surface cracking. Ravelling is often highly evident in the non-trafficked areas, but does not appear as severe in the wheel paths, as the aggregate itself is subject to attrition in these areas, thus the surface texture is lower in the wheel paths than non-wheel paths. Ravelling shall be scored only where the resultant surface texture is high leaving course aggregate well exposed.

Stripping

Stripping occurs on chip seal roads where the aggregate loses its bond from the bitumen binder, resulting in aggregate loss.