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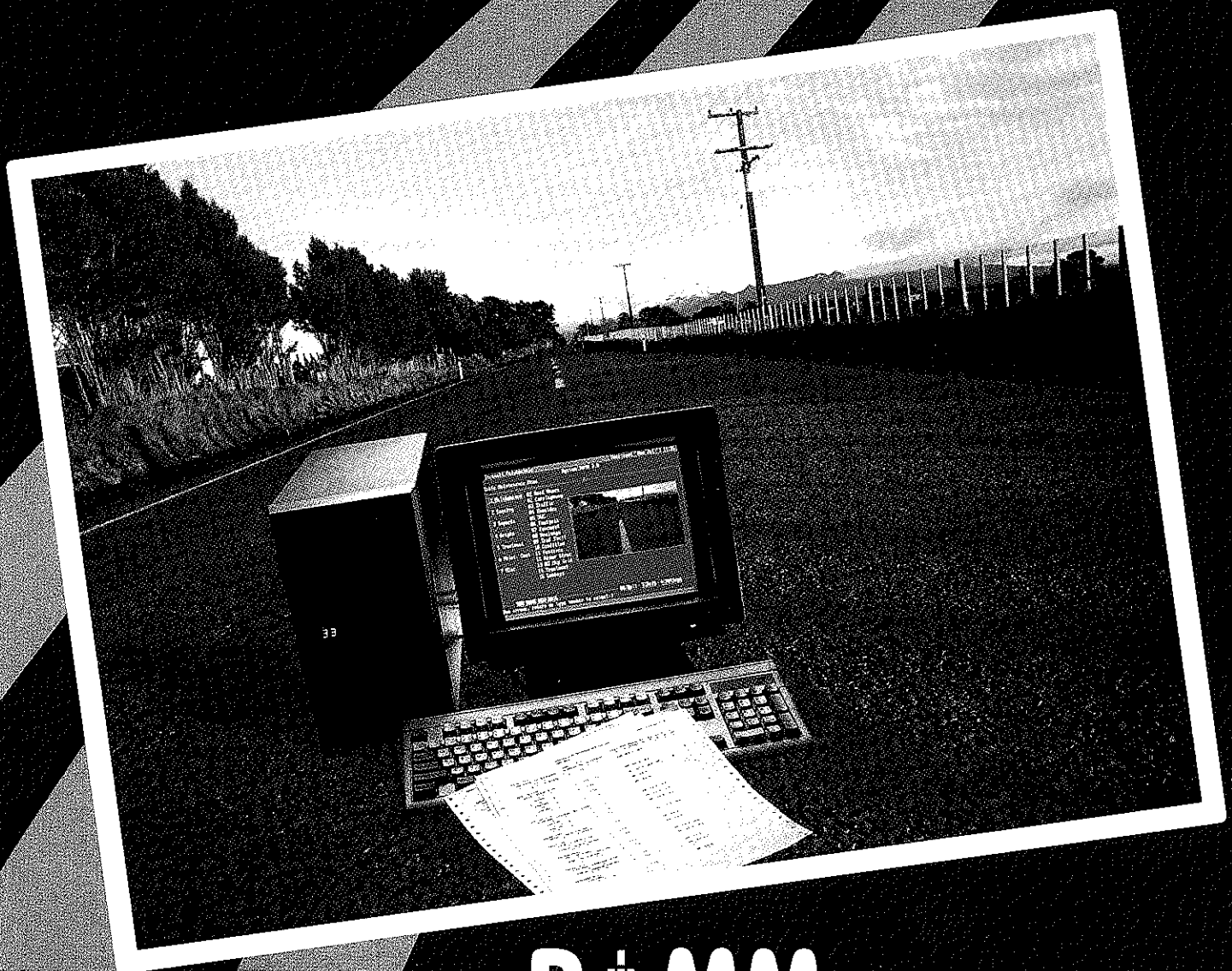
ARATAKI AOTEAROA

RAMM ROAD CONDITION RATING & ROUGHNESS



RAMM

ROAD ASSESSMENT
AND MAINTENANCE
MANAGEMENT SYSTEM

PFM 6

RAMM - ROAD CONDITION RATING AND ROUGHNESS MANUAL

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ROAD CONDITION RATING MANUAL

CONTENTS

PART ONE – ROAD CONDITION RATING MANUAL

1 General

The purpose of a visual road condition rating survey is to measure and record defects shown by each road element in a standard and objective manner. This provides a measure of the condition of each road element, which can be used to assess routine maintenance and rehabilitation needs.

The survey is accomplished by walking over the selected inspection length of road, identifying defects in each road element and recording the extent of the defects on a survey form.

Once completed, the survey information is entered into the road inventory database.

1.1 Section Definitions

For the purposes of condition rating each road in the network is divided into treatment lengths that have consistent properties, as each road is not necessarily inspected in total. Within each treatment length one or more inspection lengths are defined. It is within these inspection lengths that the rating takes place.

The sections are broken down as follows:

(a) Road Name

The road name is the base unit of the system:

- Each road in the network is given a unique road ID and name
- Where more than one road in a network has the same name (e.g. Beach Rd) the name must be modified in the RAMM inventory to create a unique name. (e.g. Beach Rd New Plymouth), North, South or another suitable identifier

(b) Treatment Lengths

Treatment lengths for sealed pavements can be created either from the top_surface table using major seal lengths or from the carriageway table using the start and end displacements. Treatment lengths for unsealed pavements will be created directly from the carriageway table.

Condition rating will occur on these treatment lengths. The Treatment Length Set-up procedure is located under the RAMM FOR WINDOWS Administration program.

1.2 Treatment Length Setup

The process defines initial treatment lengths by finding the widest surfaces within each road but splits these at changes in;

- ADT
- Number of lanes
- Pavement Type
- Pavement Use
- Urban/Rural flag

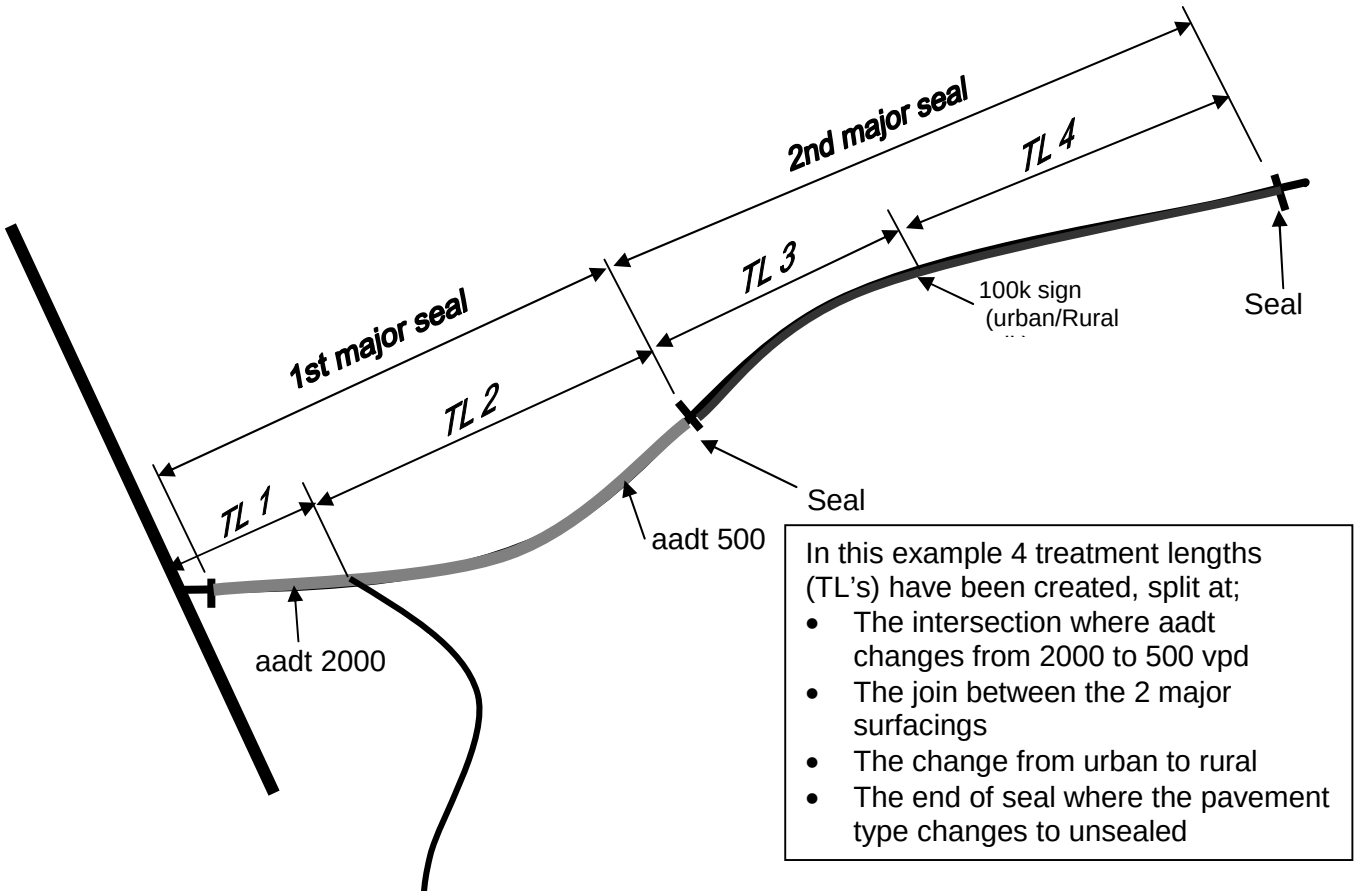


Figure 1

(c) Inspection Length

This is the portion of a treatment length that is physically inspected. When choosing an inspection length the following options are available;

(i) Frequency of inspection lengths
(ii) A percentage of the treatment length to be inspected
(iii) The minimum size for an inspection length.

The *autorate* process in RAMM for Windows allocates inspection lengths based on the percentage and minimum lengths specified. Autorate will define the first section 20m in from the beginning of treatment length. Each subsequent inspection within a treatment length is defined at the stated interval.

Figure 2 shows the relationship between the treatment length and the inspection length.

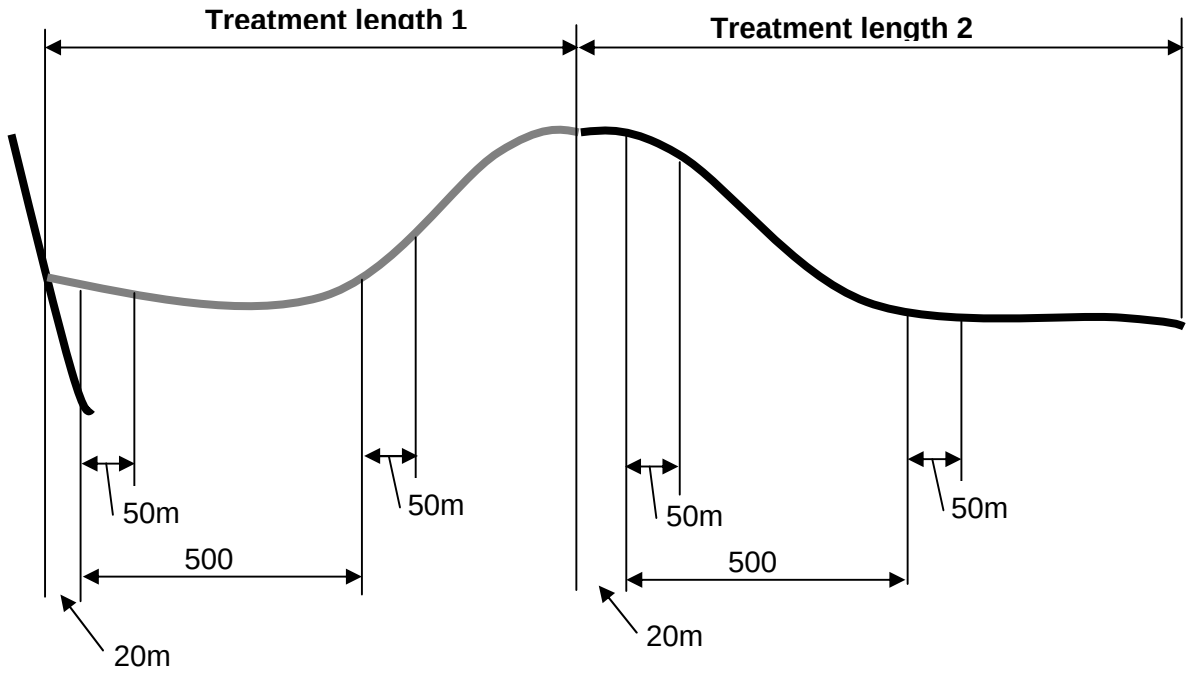


Figure 2 Inspection lengths set at 10% sampling at 500m intervals

1.3 Survey Forms

The computer programme pre-prints forms for each inspection length of road to be surveyed.

The form will provide the following information:

- Road Number
- Road Name
- Treatment length Start and End displacements
- Inspection Length Start and End displacements

The surveyor must sort the forms into the sequence in which the survey will be carried out and work his/her way through the area by locating the start of each

treatment length and moving to the inspection length position indicated on each form.

For dual carriageways separate forms will be provided for each side of the carriageway.

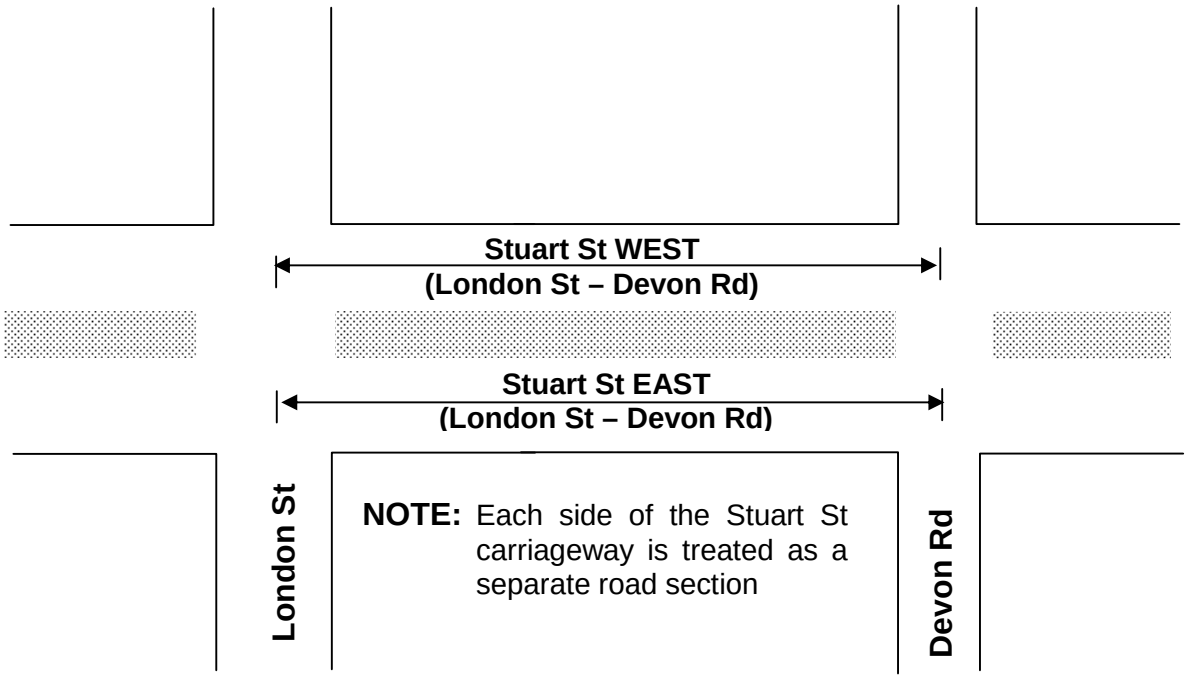
1.4 Rating Survey

The inspection length is either:

- The full length of the treatment length, or
- The preselected percentage and frequency of the treatment length

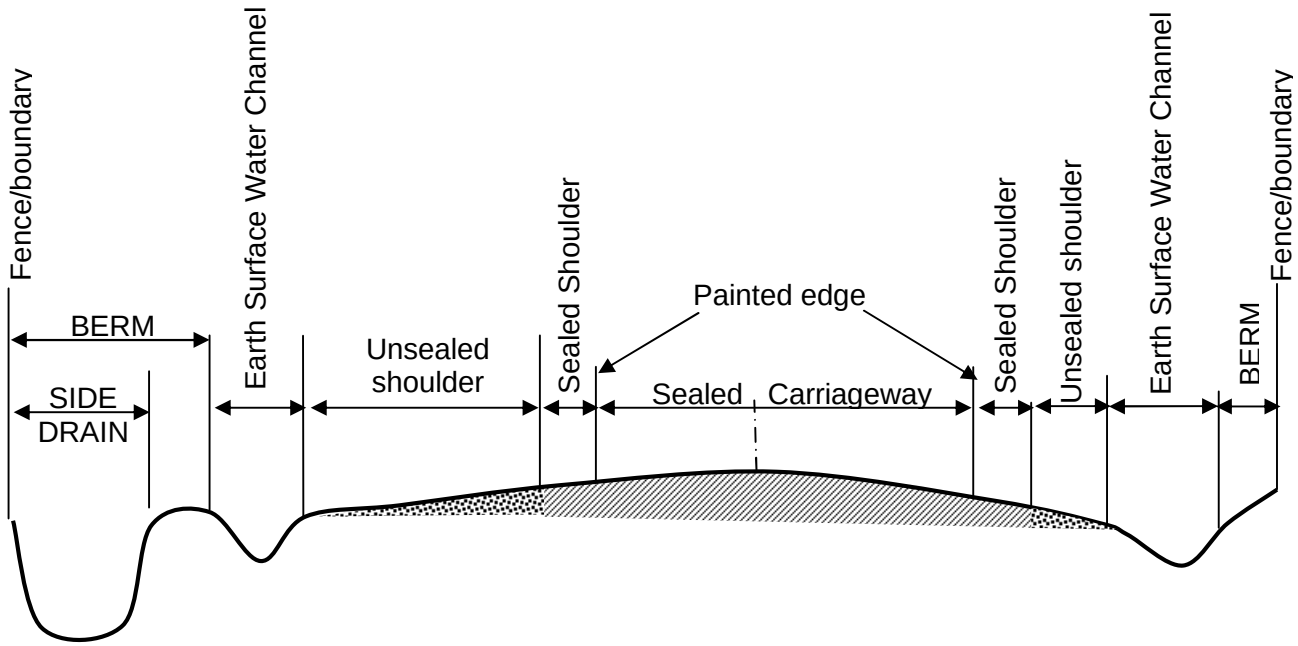
The surveyor is required to walk over the inspection length of road and record the extent of each of the distress types observed on the carriageway. These are recorded in a standard manner in the spaces provided on the survey form. Left and right hand sides are determined by proceeding in the direction of increasing distance along the road section.

Dual carriageway roads are treated as separate road sections and are rated separately. Identification between each side of the dual carriageway is achieved by altering the road name, e.g. STUART ST EAST and STUART ST WEST

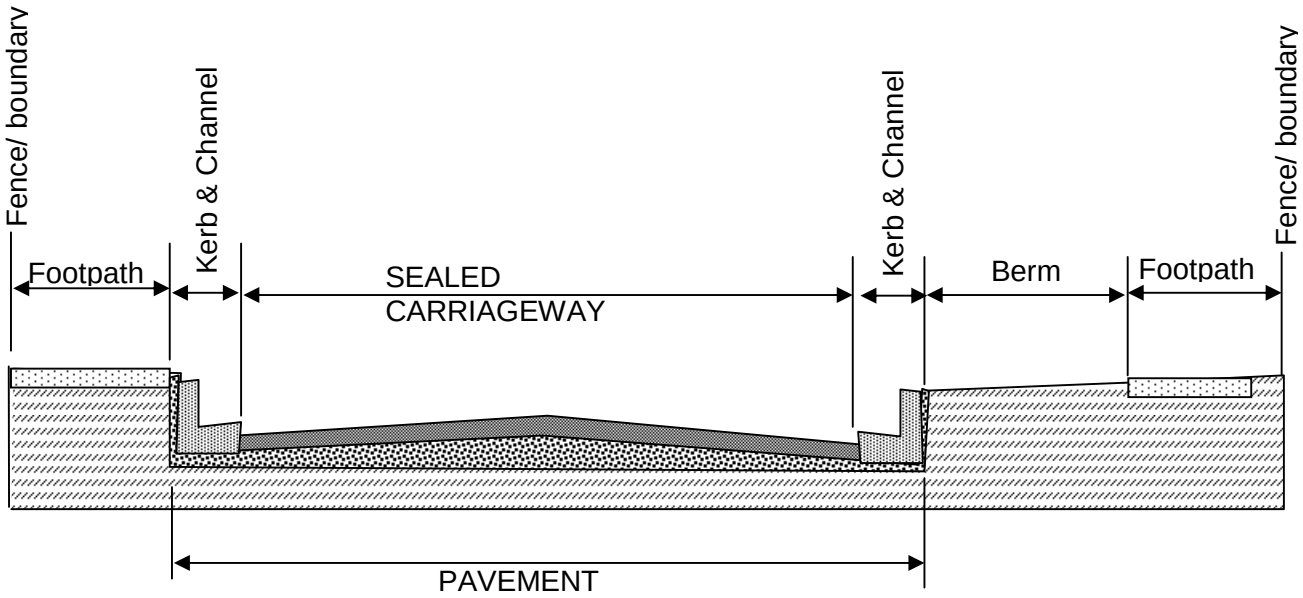


1.5 Typical cross sections

1.5.1 Rural Roads



1.5.2 Urban Roads



2 Faults Recorded

2.1 Surface water channels (SWCs)

Surface water channels (SWCs) can be either earth channels or surfaced channels.

Types of surfaced channels are:

- Kerb and channel
- Concrete dished channel
- Mountable kerb and channel
- Concrete nib kerb (if it is acting as a drainage path)
- Sealed channel
- Asphaltic concrete channel
- Half pipe channels.
- Any other constructed channel which has been surfaced

If both earth and surfaced channels are present in a road section then both are rated.

If two sets of SWCs are present parallel to the road, the SWC closest to the carriageway should be rated.

Each side of the carriageway is recorded separately on the rating form.

Shoulders are defined as the unsealed area between the edge of seal and the surface water channel. The shoulders are rated at the same time as the surface water channels.

2.1.1 Surfaced Channels

NOTE: The surfaced channels are to be rated for *the whole treatment length*, **not** just the inspection length. Left and right sides are recorded separately

This rating records the length of channel, which is defective in some respect and therefore not effective in gathering and transporting water from the pavement to the catchpit/sump.

LHS Surfaced Surface Water Channel (SWC) – Broken	The length of surfaced SWC in the rating length that is ineffective because it is broken. An entry is required.
LHS Surfaced SWC with High Lip of Channel	The length of surfaced SWC in for the rating length that is ineffective because it has a high channel lip. An entry is required.
LHS Surfaced SWC with Broken Surface at Channel Lip	The length of surfaced SWC in for the rating length that is ineffective because there is a break in the carriageway surfacing along the pavement/channel boundary.
Surfaced SWC with Blocked Channel	The length of surfaced SWC in the rating length that is ineffective because the channel is blocked. An entry is required.
Surfaced SWC with Grade of Channel Incorrect	The length of surfaced SWC in metres for the rating length that is ineffective because the grade of the channel is uphill to the catchpit. An entry is required.

2.1.2 Earth Surface water Channels

Earth SWC – Blocked	The length of earth SWC in metres for the rating length which is blocked by vegetation and/or soil such that water ponds and the SWC is not able to effectively channel water away from the pavement to a cut-out or culvert. An entry is required.
Earth SWC – Inadequate	The length of earth SWC in metres for the rating length that is below the standard set by the road controlling authority. This could also be a length where an SWC is required but does not exist. An entry is required.
Ineffective Shoulder	The length of shoulder in metres for the rating length that will not allow the free flow of water from the road surface to the SWC. An entry is required.
Channel Condition Indicator	Scale of 1 – 3 specifying the general condition of the Water Channel in regard to its effectiveness. (1 = Good , 2 = Average, 3 = Poor)

2.2 Carriageway

The carriageway is rated only within the defined inspection length.

Number of Traffic Lanes	The number of traffic lanes in the inspection length. An entry is required.
Rutting	The length of wheel path where rut depth exceeds 30mm (20mm on state highways)
OR: **Average Rut Depth**	Average rut depth for the inspection length recorded as the average of readings taken at the start,¼, ½, ¾ and end points in the outside wheel path for each side of the road.
Shoving	The length of wheel path in metres in the inspection length that is exhibiting shoving. An entry is required.
Scabbing	The area of carriageway in square metres in the inspection length the seal has lost more than 10% of the sealing chip. In the case of asphaltic concrete surfaces this will be the area of pavement showing signs of ravelling (surface attrition). An entry is required.

Flushing	The length of wheel path in metres in the inspection length where the carriageway surface has flushed. An entry is required.
Alligator Cracks	The length of wheel path in metres in the inspection length that is exhibiting alligator (fatigue) cracking. An entry is required.
Longitudinal and Transverse Cracks	The length in metres in the inspection length exhibiting longitudinal and transverse cracking. An entry is required.
Joint Cracks	The length in metres in the inspection length of joining cracking. An entry is required.
Potholes	The number of potholes in the inspection length. An entry is required.
Pothole Patches	The number of pothole patches in the inspection length. An entry is required.
Edge Break	The length of carriageway edge in metres in the inspection length showing signs of edge break where there is no surfaced channel. An entry is required.
Edge Break Patches	The same criteria apply here as for edge break except that the edge break has been patched.
High/Low Service Covers. High Low Patches and Trenches	The number of service covers and trenches in the wheelpath that are above or below the level of the carriageway by 20mm or more

2.3 Comments

This section of the rating form is for noting such things as:

- Water seepage in the carriageway
- Deteriorated, missing or badly aligned service covers
- Blocked or damaged catch pits/sumps, culverts, etc.

This will help record urgent routine maintenance work in the absence of regular routine maintenance inspections.

Full description of the data held in each field, including photographs to help identify the various distress types, is contained in **PART 2 – Rating Guide.**

3 General Guidelines

3.1 General

The consultant will be required to locate the inspection section within each treatment length on site from the information supplied.

The consultant shall mark each inspection length by a means agreed with the client so the exact location of each inspection length can be easily located when next rated.
All road condition rating and input is to be in accordance with the latest revisions of the RAMM Road Condition Rating Manual and the RAMM Computer Users' Manual.

The project manager, Supervisors, and all raters shall have attended a Transit New Zealand approved RAMM Road Condition Rating Workshop within the previous 12 months.

3.2 Safety

All surveying operations on NZ roads should be carried out in accordance with a safety plan that has been approved by the client prior to commencement of the contract. The Transit New Zealand Code of Practice for Temporary Traffic Management outlines the safety requirements for mobile survey activities and, in the case of state highways, must be complied with.

Training in safety and temporary traffic management is available from a variety of sources and is mandatory for those raters operating on State Highways

3.3 Validation Area

To ensure the accuracy of the data collected, the contract shall include a validation area comprising 5% of the total number of rating sections involved, or 50 rating sections, whichever is greater, including an even percentage of all road types listed in the schedule of prices.

The validation area shall be an area within the contract agreed by both the consultant and client.

The full data collected as specified shall be collected and input to the computer database. The field rating sheets shall then be forwarded to the client.

3.4 Accuracy

Longitudinal location of each rating section shall be accurate as follows:

Urban : ± 2m or .1%

Rural : ± 10m or .1%.

Accuracy of all individual rating measurements shall be to the nearest lineal metre or square metre. Accuracy and tolerances of the collected totals within each field shall be as described below.

3.5 Recommended Limits of Variation

Let L = *limit of variation*
Va = *value of defect measured by auditor*

Category A

L = ± 2 x √Va where Va > 12
L = ± (¼ Va + 4) where Va < 12

Sealed Roads	Unsealed Roads
Alligator cracking shoving pot-holes pot-hole patches	potholes

Category B

L = ± 3 x √Va where Va > 12
L = ± (¼ Va + 7) where Va < 12

Sealed Roads	Unsealed Roads
Rutting joint cracking L & T cracking Edgebreak edgebreak patches high lip broken surface blocked channel broken channel uphill channel flushing scabbing	scour shoving rutting corrugations

Category C

L = ± 4 x √Va where Va > 12
L = ± (¼ Va + 11) where Va < 12

Sealed Roads	Unsealed Roads
- Inadequate drainage - Ineffective shoulder - Blocked SWC - Inadequate SWC	- Inadequate drainage - Blocked SWC - Inadequate SWC

Inadequate drainage is an amalgamation of the sub-defects shown without double counting those occurring at the same location.

Category D

Unsealed road improper cross-section: ± 1.

Category E

Unsealed road loose aggregate: ± 50.

Corrective action should also be undertaken where gross or repetitive errors are detected.

3.6 Data Format And Loading

RAMM road condition rating data shall be provided in an agreed format on either computer disk of the agreed size, CD or tape cartridge for direct loading by the consultant, to the system nominated by the client. The consultant shall provide copies of the rating data in an agreed format on either computer disk of the agreed size or tape cartridge following the successful transfer of data.

To ensure the accuracy and completeness of the data to be transferred the consultant shall provide a count of the rating table in the contract, to allow the client to compare the row count of the same table following the transfer of data. This is to ensure a complete transfer of data, as the client's row count must match exactly with the consultant's row count. Any discrepancy in row counts shall be identified by the consultant and corrected. If the problem is outside the consultant's control, arrangements shall be made between the client and consultant for it to be corrected.

3.7 Data Collection

Teams of two raters usually carry out data collection. Specific instructions for data gathering *may* be specified in a rating contract document. Regular checks should be carried out while data is being collected and not just at the end of the survey. By that stage it is too late to correct any mistakes. Regardless of the collection method used, the staff should be fully trained at an approved road condition-rating course.

3.8 Training

All persons collecting condition rating data must attend a Transfund NZ approved workshop as follows

New Raters or those who have not attended a workshop in the past 2 years

- Must attend a two day workshop
- Must attend a one day workshop in the following year
- Must attend a one day workshop every two years

3.9 Resources

The labour resources required will depend on the size of the network and the extent of the data to be collected for each section.

The following equipment is needed to carry out the survey :

- Accurate, calibrated odometer (fitted to a vehicle) e.g. Terratrip or Halda.
- Data collection forms or portable electronic data loggers.
- Clip boards and pens.
- Accurate measuring wheel
- 2m straight edge.
- Wedge (graduated).

PART TWO – RATING GUIDE

1 General

The purpose of this part of the manual is to provide a reference to determine the type and quantity of defect. A number of examples of each distress type are shown with an explanation of the type of defect and any information or techniques that may be helpful in determining the type of distress fault.

2 Surface Water Channels And Shoulders

Surface water channels and shoulders are rated for the whole length of the rating section, not just the inspection length.

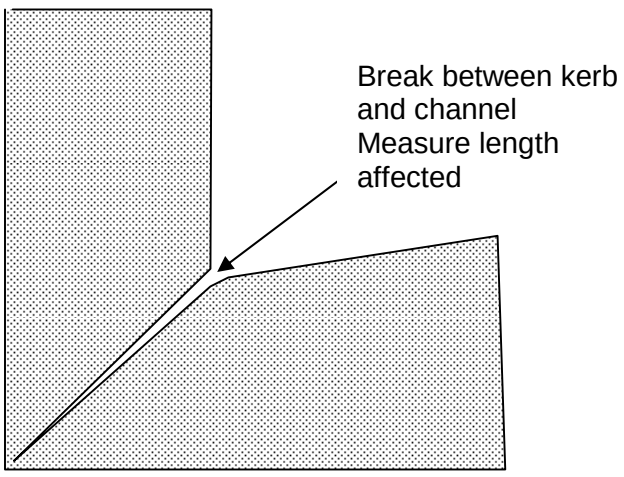
2.1 Surfaced Channels

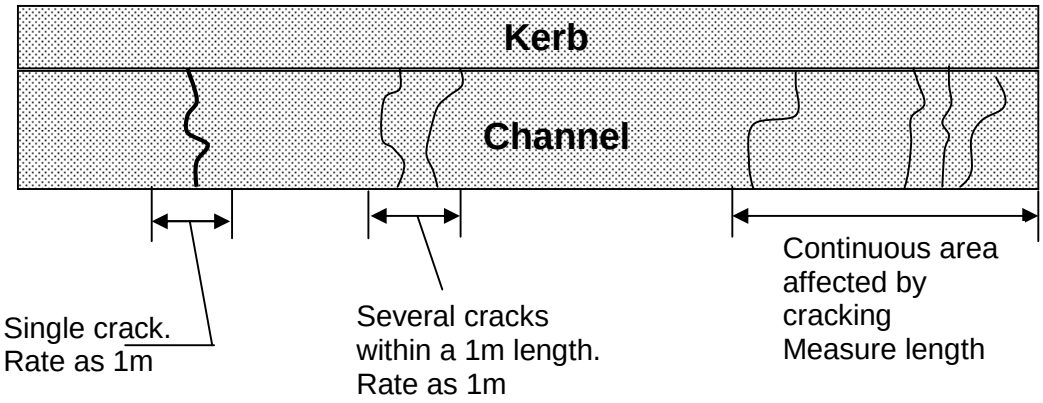
The types of channel which are rated for surfaced channels are as follows:

- Kerb and channel
- Concrete dished channel
- Mountable kerb and channel
- Concrete nib kerb (if it is acting as a drainage path)
- Sealed channel
- Asphaltic concrete channel
- Half pipe channels.

2.1.1 Broken

A broken channel is any channel, which is badly cracked or broken which will allow a light flow of water to readily leak through to the sub-base material. Inadequate joints between kerbing blocks and separation between the back of the kerb and the channel are included as cracking.





The photos below show broken channel, inadequate kerb block joints and separation between channel and back of kerb

(i) Example of a badly broken kerb and channel that is readily leaking water through to the sub-base of the carriageway.

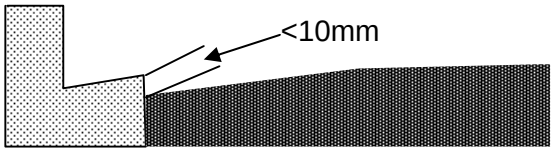
(ii) A broken section of channel adjoining a vehicle crossing.

(iii) Separation between the channel and the kerb upstand is to be rated as broken.

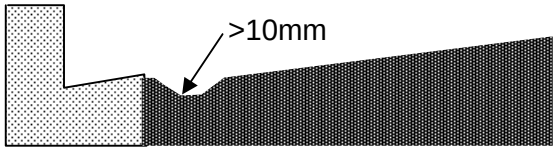
(iv) A single crack >10mm wide at the surface is rated as 1m of broken channel.

2.1.2 High Lip of Channel

If the lip of channel is 10mm, (the height of a Bic pen), or more higher than the carriageway surface then the length of kerb affected is recorded. Where there is also broken carriageway surface, this height will have to be estimated from a straight edge placed on the carriageway surface and extended to the channel edge.



Where the carriageway surface is shaped so that it is more than 10mm below the channel lip at a short distance from the line of the channel, then this should also be rated as high lip.



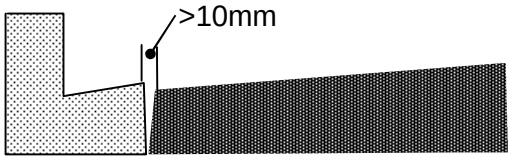
(i) The photo above shows the lip of channel above the carriageway. A pen such as the one in the photo is an easy way of measuring height differences.

(ii) Another good example of a kerb where the lip is higher than the carriageway surface.

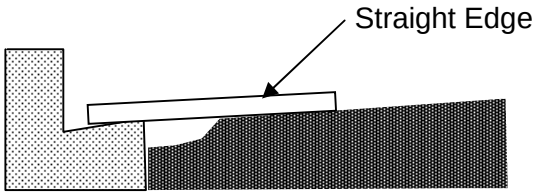
2.1.3 Broken Surface at Channel Lip

Where there is a separation or break >10mm wide between the carriageway surfacing and the channel, the length of channel affected is recorded.

If there is kerb only, the length of kerb is recorded if there is separation between the carriageway structure and the kerb >10mm.



If a straight edge indicates that the broken surface is the cause of high lip then it should be rated as broken surface only and not high lip.



(i) The photo above shows a break in the carriageway surface alongside the channel.

2.1.4 Blocked Channel

A channel is blocked when weed growth, firm settled debris, or other obstructions fill 75% of the channel width or cause water to flow onto the carriageway to get past.

(i) Kerb and channel blocked by debris and weed growth.

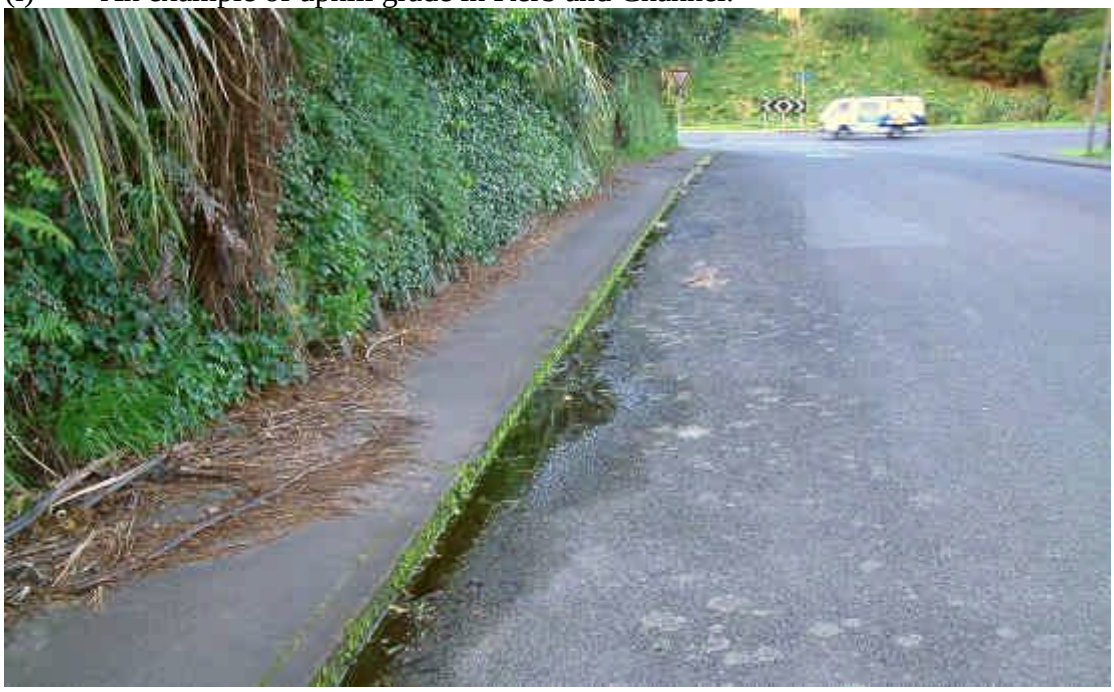
(ii) Kerb and channel blocked by badly maintained plate crossing. In this case the length of the crossing would be recorded as blocked

2.1.5 Grade of Channel Incorrect

This rating is for recording the length of channel that is ineffective because the grade is uphill to the catchpit/sump or it has sagged causing water to pond onto the carriageway surface.

A level and string line may be used to check the grade of the channel if a grade problem is suspected.

(i) An example of uphill grade in Kerb and Channel.



(ii) Water ponding in a channel can indicate uphill grade

2.1.6 General

Catchpits/sumps should be checked to see if they are damaged or blocked and not collecting and delivering water to the storm water system. Faulty sumps should be noted in the comments section of the rating sheet to bring them to the supervisor's attention for repair.

2.2 Earth Surface Water Channels

Earth surface water channels (ESWCs) and shoulders are rated for the whole length not just the inspection length.

2.2.1 Blocked

Vegetation, slips, soil, aggregate or general debris may block the ESWC. The channel is blocked if water ponds or it cannot effectively transport water from the pavement to cutoffs/culverts, or if it is blocked to such an extent that it causes the water to flow along the carriageway surface.

(i) ESWC blocked by a solid mass of vegetation.

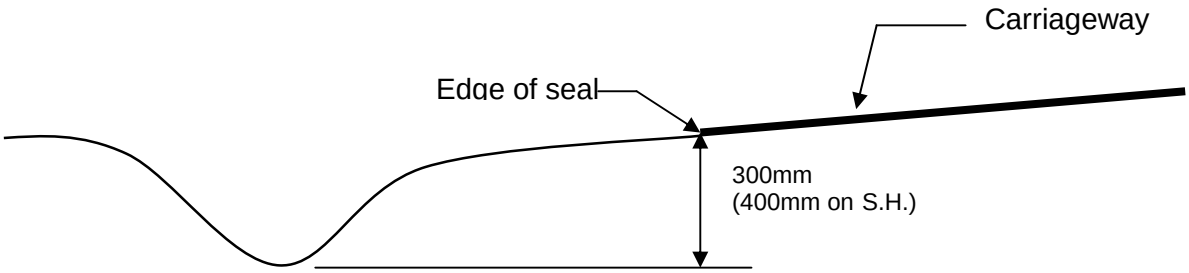
(ii) ESWC blocked by weed growth.

(iii) ESWC, culvert that has been blocked. The inlet for the culvert can just be seen. The length of the culvert is recorded as blocked

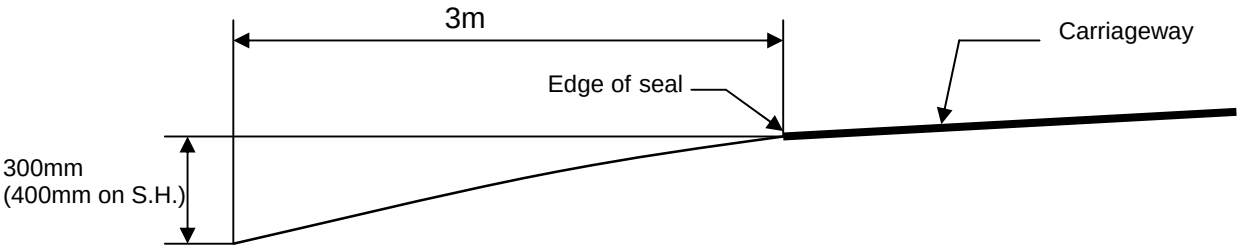
ESWC Blocked by a slip

2.2.2 Inadequate

This rating is for recording the length of ESWC where the depth of the adjoining pavement surface to the invert is less than 300mm (400mm for state highways).



Where there is no defined ESWC but the ground falls away from the carriageway, the depth is assessed at a point 3m from the edge of seal.



In some areas the minimum standard for channels may vary due to local conditions. Consultants should check with the client to establish any local variations.

(i) The photo above shows an inadequate ESWC.

(ii) Inadequate ESWC because of the depth of the channel. the weed growth in this photo would slow water down but would not cause it to pond

(iv) The photo above is a case where a SWC does not exist. It is rated as inadequate if there is not 300mm of fall 3m out from the edge of the carriageway

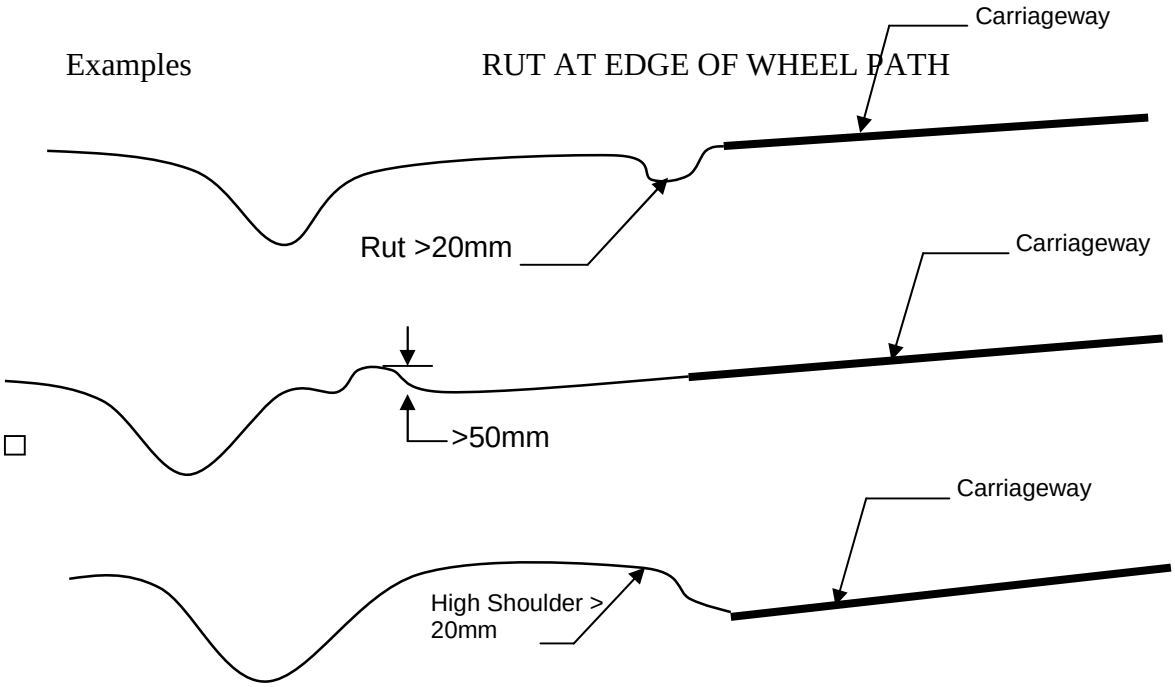
2.2.3 Ineffective Shoulder

This rating is for the length of shoulder where any obstruction, 20 mm or more within 1m of the carriageway prevents water flowing freely away from the carriageway surface.
OR: Any obstruction (e.g. windrow) that would cause ponding of water to a depth of >50 mm:

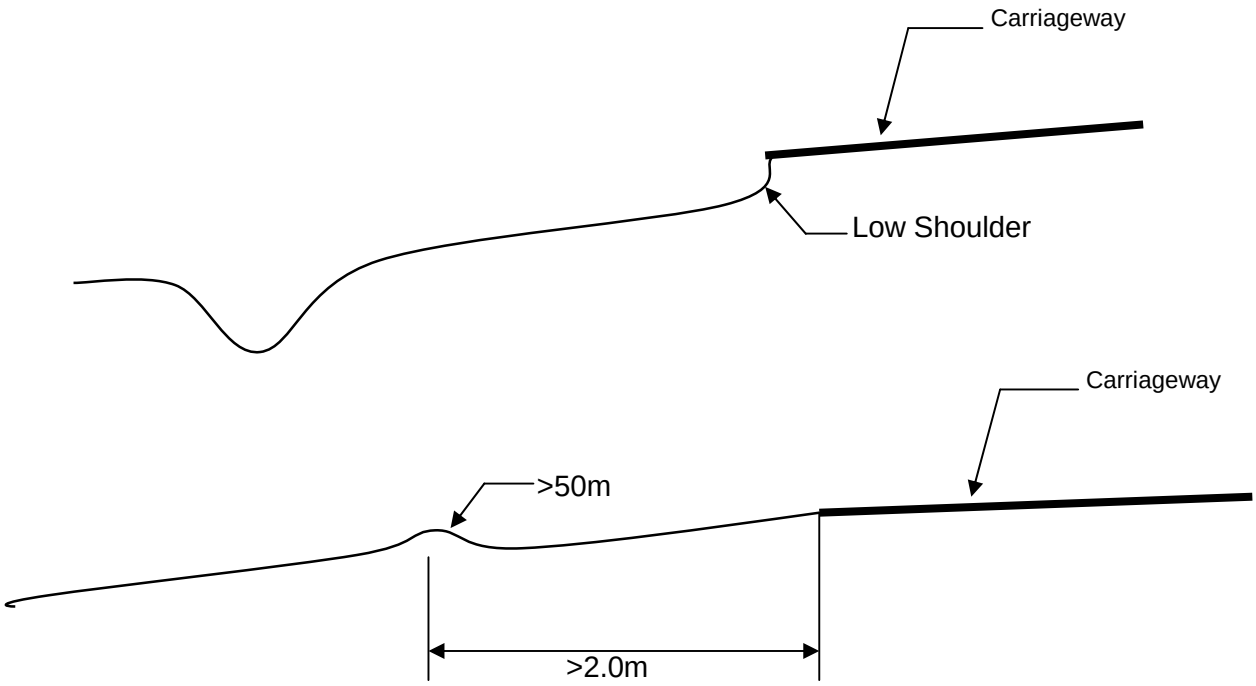
- Between the carriageway and the surface water channel
- Within 2 m of the carriageway surface where there is no formed surface water channel and the ground falls away from the carriageway

Typically high shoulders with edge rutting would be rated as ineffective shoulders. Low shoulders that do not impact the flow of water should not be rated.

Examples



LOW SHOULDER (SHOULD NOT BE RATED AS INADEQUATE)

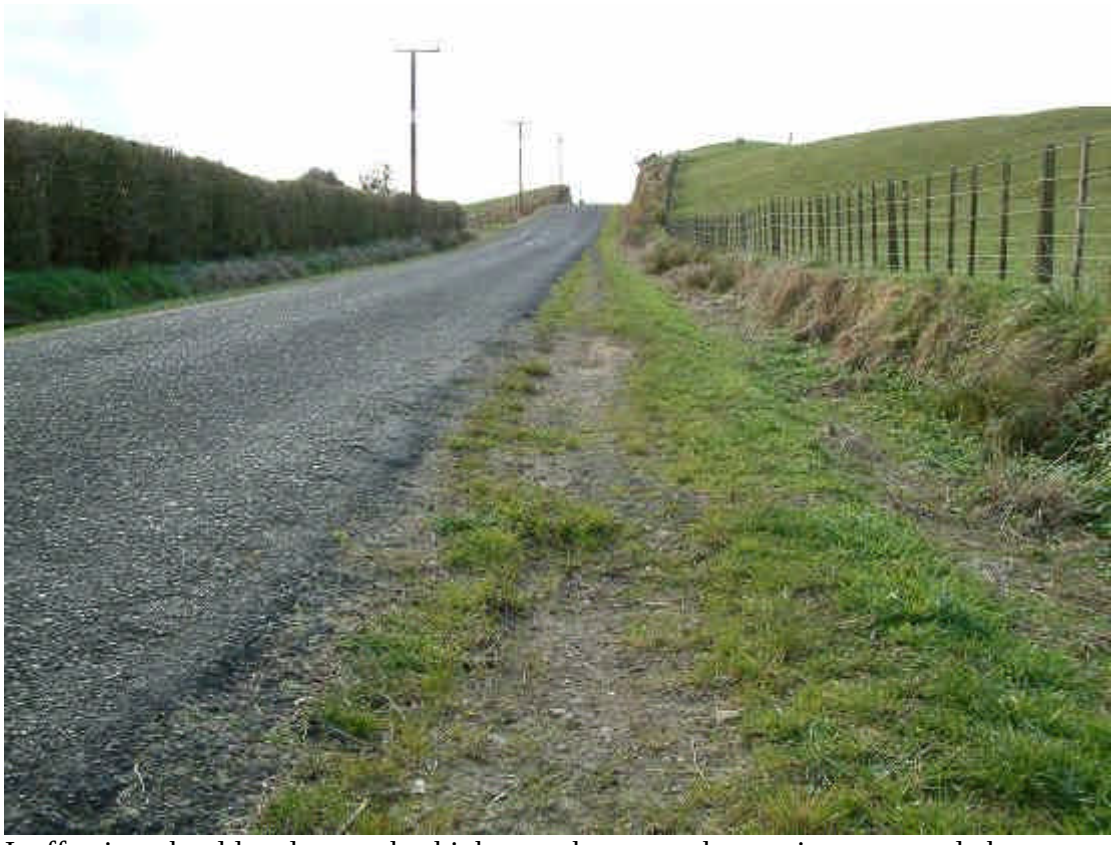


(ii) Another common problem is when the shoulders have been metalled too high and so cause water to flow along the carriageway. If the grass on the shoulder is not mown or cleared a problem can arise with the collection of material so that the shoulder builds up above the carriageway level.

Ineffective Shoulder. In this case the shoulder is higher than the carriageway

Shoulder is ineffective due to the wheel rut along the edge of the carriageway

Ineffective shoulder due to deep tyre tracks.



Ineffective shoulder due to the high area between the carriageway and the ESWC

2.3 Alternative Drainage Rating

Several problems have been highlighted concerning the existing method of rating ESWC's. These are:

- disproportionate amount of time rating ESWC's compared to carriageway faults
- variations in local requirements
- importance of the results to the treatment selection process

In order to accommodate these issues, the following alternative methods are available at the discretion of the client.

2.4 Combined Rating

To better balance the effort in rating ESWC drainage with the use of data in the Treatment Selection process, the three defect types (ineffective shoulder, blocked SWC, and inadequate SWC) may be amalgamated into a single rating as inadequate drainage.

Double counting of the defect quantities is to be avoided where more than one defect occurs at the same location.
Recording of the length of inadequate drainage is by length in metres and is to be entered in the inadequate SWC field.
The option of recording as three separate defects is still available.

2.5 SELECTIVE RATING

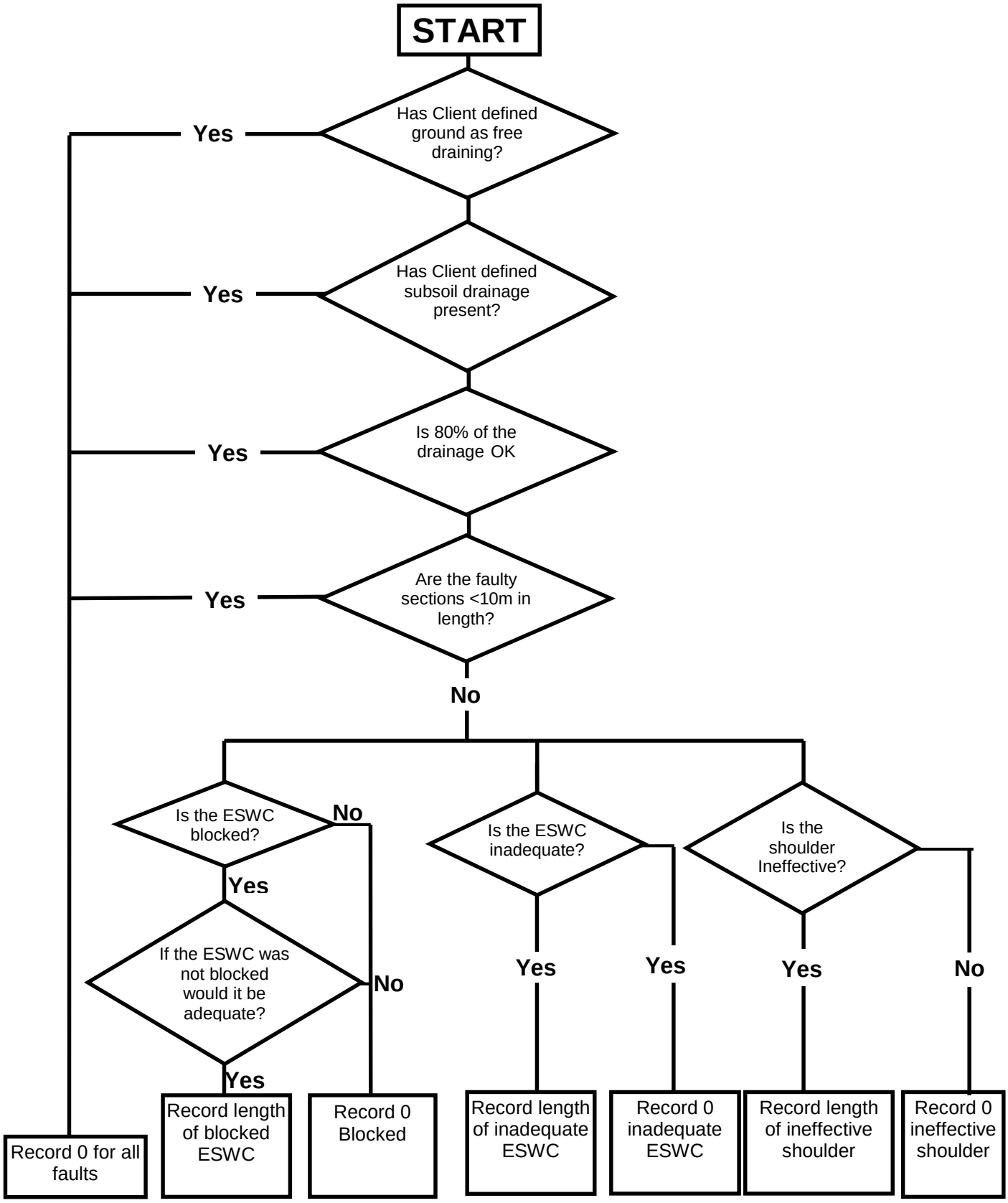
The client has the option of designating certain areas that should not be rated due to one of the following.

- Ground is free draining
- Sub-soil drainage is present
- An embankment situation
- Superelevation on curves

The rating forms for the inspection sections which fall in should be marked accordingly. For each form marked as above the raters should enter zero in the ESWC columns.
The rater makes an initial assessment as to whether greater than 20% of the treatment length ESWC is inadequate due to ineffective shoulder or inadequate channel. If less than 20% of the section fails then zero is entered in the *inadequate* column. If greater than 20% fails as above, but the failed areas are less than 10m in length, then zero is entered as inadequate
If greater than 20% of the length fails, and this is made up of areas greater than 10m in length then the length failed is recorded.

The flow chart overleaf illustrates the logic flow for this method.

2.6 ESWC RATING FLOW DIAGRAM



This process may be modified at the client's discretion

ESWC Condition Severity Indicator

This rating assigns a number on a scale of 1 to 3 to indicate the general severity of faults on the ESWCs.

1 Indicates low severity of faults as typified by ESWCs that comply with the conditions in the flow chart above.
I.e. 80% of the ESWCs in the treatment length show no faults and faulty areas are less than 10m long

Or

- Subsoil drainage is present
- The ground is free draining
- The client has specified that ESWCs are not required for this TL.

2 Indicates that the ESWC faults exceed the levels above. (Longer than 10m in length and Over 20% of the total length of channel is faulty. But there are no obvious water related faults on the carriageway or evidence of flooding or ponding on the carriageway, or shoulder

3 Indicates that the ESWC faults exceed the levels of level 1 and the following conditions also exist

- Boggy or rough water damaged shoulder
- Evidence of water ponding on the shoulder or carriageway
- Water related faults on the carriageway adjacent to areas of faulty ESWC

3 Carriageway

The rating of the carriageway is the most difficult part of the rating survey. It not only requires the recognition of the defects, but also the ability to differentiate between some defects such as rutting/shoving, longitudinal/transverse/joint cracks. The following description and photos will illustrate the differences and techniques required to observe the defects.

3.1 Rutting (Wheeltracking) Option 1 – Exceeding 30mm

The total length of rutting in each wheelpath that exceeds 30mm in depth when measured under a 2m long straight edge. Rutting tends to gradually taper down and up over a length of affected road. Only the length of rutting that is 30mm or more in depth is recorded

3.2 Rutting (Wheeltracking) Option 2 - Mean Rut Depth

Mean rut depth is calculated by recording 10 measurements of rut depth using a 2 metre long straight edge. in the outside wheelpath in each direction, at the start, ¼, ½, ¾, and end points in the inspection length. (e.g. 0m,12m, 25m, 36m, and 50m. This will result in 10 readings that can be used to calculate the mean depth.

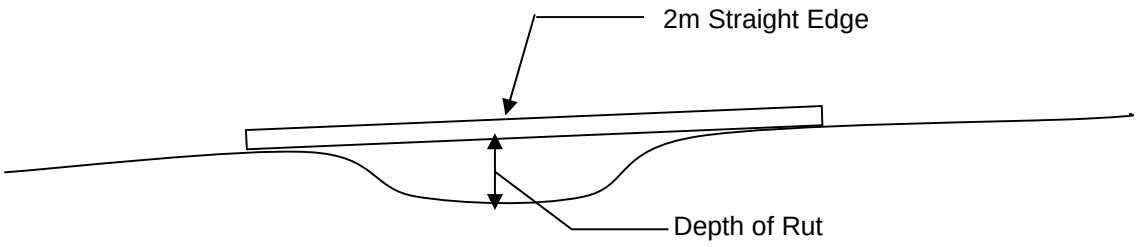
Where obvious rutting is present outside these points, some of the above readings should be replaced by an equal number of measurements taken at points near the beginning, middle and end point of the rut.

In any case, a total of ten reading should be recorded

Example

Rut Depth	Start	¼	½	¾	End	Total
Left Wheelpath	12	10	15	30	13	80
Right Wheelpath	10	0	0	10	0	20
					Total	100
					Mean	10

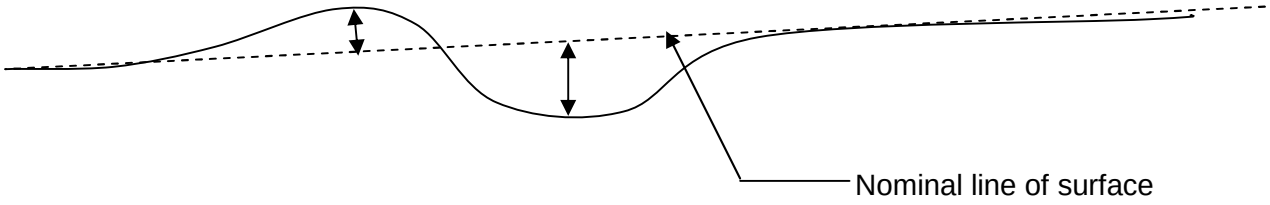
NOTE: The RAMM data entry process allows the entry of the 10 readings into the Mean rut depth field as a list separated by plus signs (+). The software will then calculate the mean ands standard deviation for the data entered.



3.3 Shoving

Shoving occurs when material is displaced to form a bulge or heave alongside a depressed area as shown in the diagrams and photos. The length in metres is recorded.

Where other faults occur within the area affected by shoving, they are ignored for rating purposes. E.G. if both alligator cracking and potholes appear within a shoved area, only the shoving is recorded.



Shoving

A large shoved area. The additional faults such as cracking, potholes and Patches are not recorded within the shoved area

An abrupt shove near a service cover

3.4 Alligator Cracks

This rating records the length of individual wheelpath, in metres where alligator (fatigue) cracking is showing in the pavement. Alligator cracking is commonly called chicken wire cracking as it has the appearance of chicken wire mesh. The cracking starts as fine hair cracks, which in the early stages are not easy to observe, as the carriageway does not lose its shape until water enters the cracks. The cracks then start to become more obvious. Alligator cracks are easiest to observe in the coldest months of the year as the surface contracts and the cracks open up. After light rain the cracks are more obvious as the surface dries leaving moisture in the cracks, however, it is not possible to see fine alligator cracks on a wet surface therefore carriageway rating cannot be carried out in rain or wet conditions.

In bright sunshine fine alligator cracks are much harder to see due to expansion of the carriageway surface and glare off the surface. But looking into your shadow, cracks can usually be observed as shown in the photos.

Fine cracking confined to an area within 150mm of the edge of the seal is not recorded as alligator cracking, as it is not usually caused by fatigue.

NOTE: Flushing, rutting, and alligator cracking are usually found in the wheelpaths shown by traffic wear on the carriageway surface. Sometimes vehicles traffic the pavement outside the normal wheelpaths such as in bus bays, sealed shoulders etc. If any of the above faults are found outside the wheelpaths, they should be recorded. The total recorded however, may not exceed the number of wheelpaths x length of inspection section.

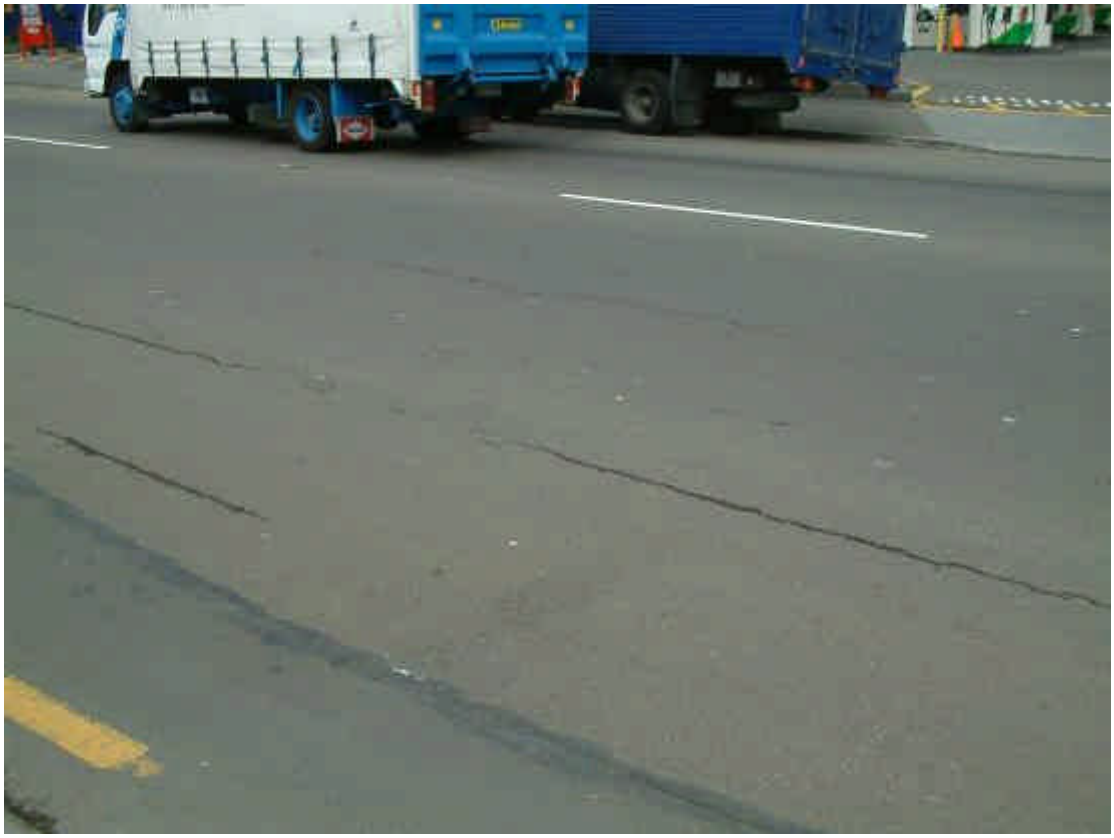
(i) The two photos above are of the same areas of carriageway. The first photo is taken on a clear sunny day and the fine alligator cracks are nearly impossible to see. The second photo is taken in the same place but shading the surface and the alligator cracking is now very obvious.

Alligator cracking is to include all irregular polygon shaped cracking irrespective of the size of the polygons formed by the cracks. Any alligator cracking that is observed outside the main wheeltracks such as in bus bays and clearways is to be included in the rating.

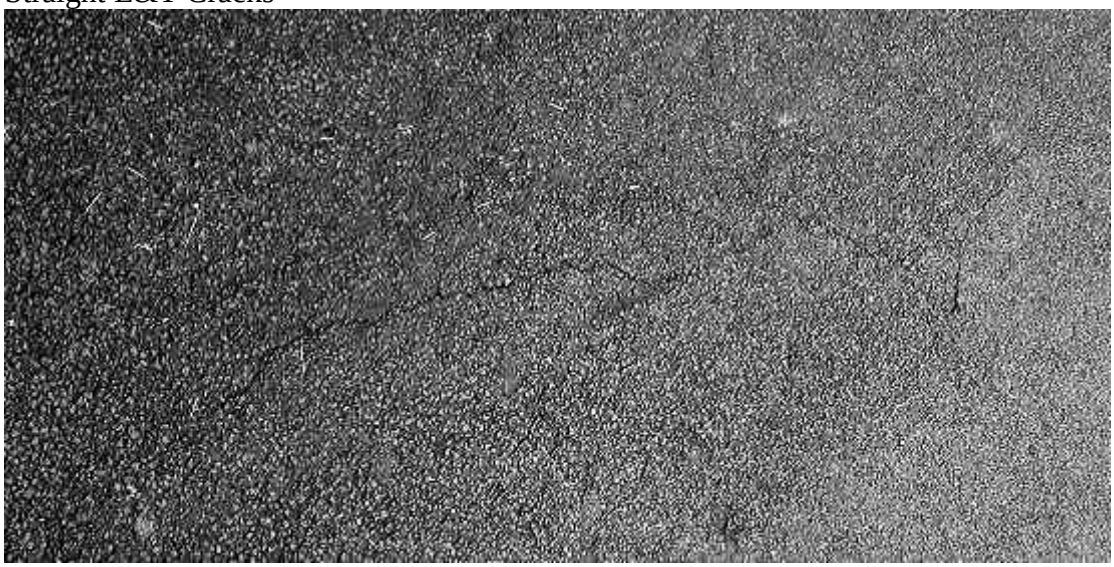
3.5 Longitudinal and Transverse Cracks (Not Joint Cracks)

The photo shows longitudinal and transverse cracks along and across the carriageway. Large rectangular cracks are to be included as these are just a more severe form of longitudinal and transverse cracking, which has extended to form a network. The total length in metres of cracking is to be recorded for this rating.

An irregular L&T Crack



Straight L&T Cracks



A small irregular L&T crack

3.6 Joint Cracks

Joint cracks in the pavement can be caused by a number of problems including

- Construction joints in asphaltic concrete pavement.
- Construction joints in concrete pavements.
- Joints between concrete and asphalt pavements.

Joint cracks are recorded where there is a *visible* joint between two surfacings such as a reinstated trench or repair, or a change in surface type. If a crack appears in a continuous surface, then it is recorded as an L&T crack.

The total length of joint cracks is recorded for this rating.

(iv) Joints along service trenches.

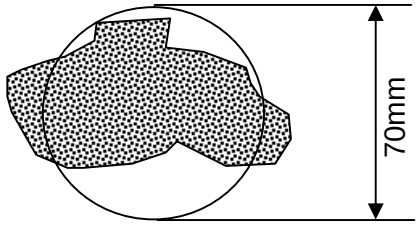
(v) Saw cuts, which have not been sealed also rate as joints.

Joint Crack at the edge of a repair

Joint Cracking around a patch

3.7 Potholes

This rating records the number of potholes where the surfacing has broken to the extent that the layer (usually aggregate) below the surface is exposed. The break must have a maximum dimension of 70mm or more to be rated as a hole. The rating for potholes is a count of the quantity.

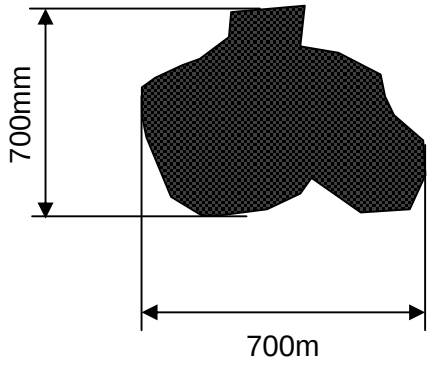


Examples of these are shown in the photos.

(i) A typical example of a pothole in chipseal surface.

3.8 Pothole Patches

This rating records the number of pothole patches. An example is shown below. A patch is only recorded as a pothole patch where it is less than $0.5m^2$. in area.

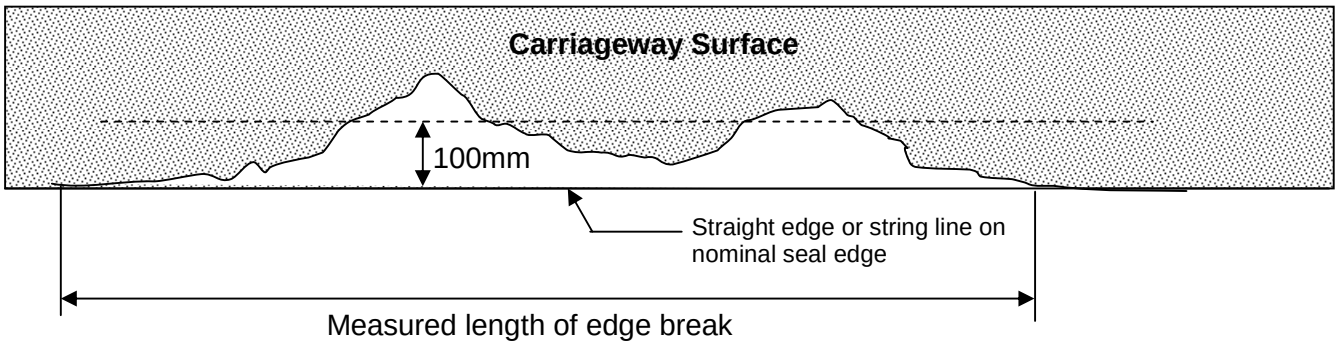


Area < $.5m^2$

Pothole patches in a Chipseal

3.9 Edge Break

Edge break is the failure of the pavement along the edge of the sealed surface where there is no surface water channel present. Edge break will be rated if the seal width is reduced by 100mm or more from the nominal edge of seal. The length recorded shall be measured from the start of the taper leading up to the 100mm+ edge break to the point where the broken edge rejoins the line of the nominal seal edge as shown in the diagram and photo below.



(i) Edge break along a chipseal carriageway showing a reduction in seal width of greater than 100m.

Edgebreak

3.10 Edge Break Patches

Edge break patches appear as narrow repairs at the edge of seal. Usually patches are easily identifiable as edge break that has been patched. The same rating criteria as edge break applies.

Edge break patches are not to be confused with seal widening on the shoulder of the carriageway which usually appears as longer areas where the entire edge of seal has been relocated by the widening. A photo of each is shown below.

(i) Edge break patches.

(ii) Edgebreak patch with edgebreak.

3.11 Scabbing

Scabbing occurs when sealing chips have become separated from the bitumen in a chipseal. In an asphaltic concrete pavement the aggregate loss from the mix is called ravelling and is rated as scabbing. The carriageway is to be rated as scabbed when it has a chip or aggregate loss of 10% or greater. The following photos show a seal with a 10% chip loss, a seal with greater than 10% chip loss and an asphaltic concrete pavement showing signs of ravelling.

The rating records the area affected in m^2

(i) A chipseal showing 10% chip loss.

(ii) A chipseal with greater than 10% chip loss in large areas

Widespread scabbing

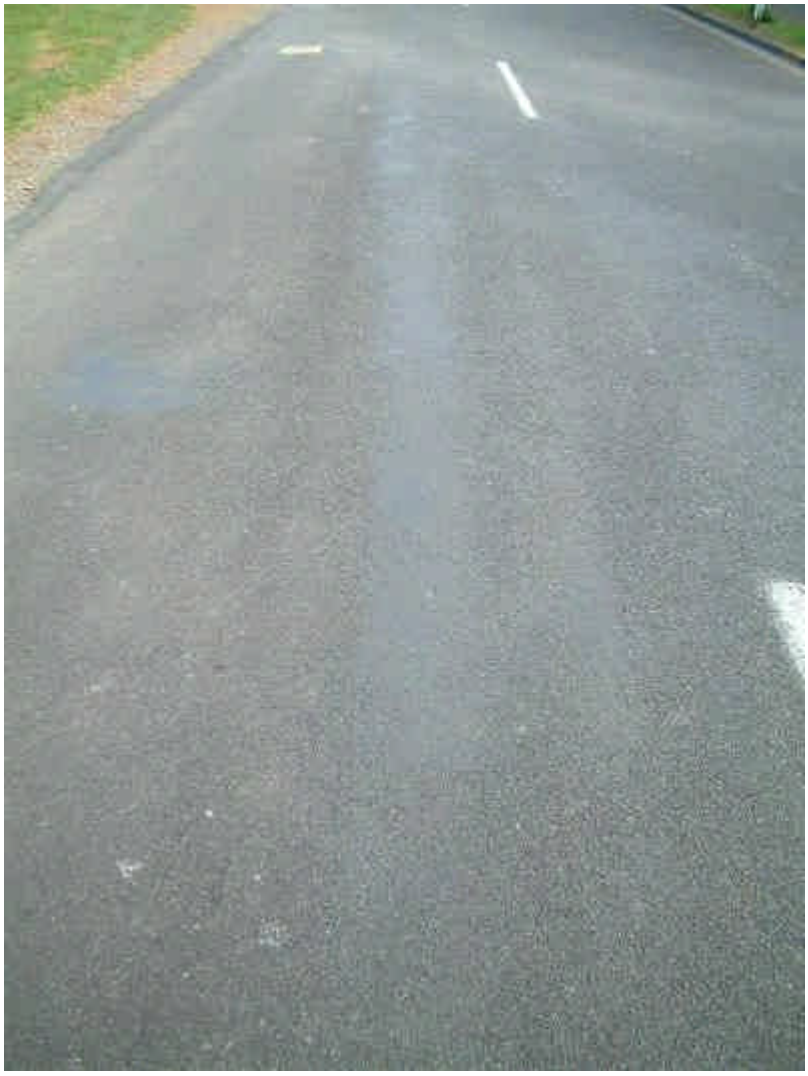
3.12 Flushing

Flushing occurs when the bitumen has risen to where the surface aggregate is just protruding (about 2mm on grade 3 and 4 chip seals) or where the binder has risen to be level with or over the top of the surface aggregate. In most cases where flushing is present, all three of these conditions will exist. Flushed areas are characterised by a generally shiny or slick appearance and a lack of surface texture.

This rating records the length of wheeltracks in metres affected by flushing.

The photo above shows a close up view of a flushed wheelpath.

A general view of carriageway with extensive flushing in the wheelpaths.



(i) Marginal Flushing. The carriageway surface shown above is just showing signs of flushing with the binder just below the top of the aggregate. .

High and Low Service Covers and Trenches

This rating records the number of service covers, (hydrants, manholes, etc) and service trenches that run across the carriageway, are in the wheelpath and are 20mm or more higher or lower than the carriageway surface
The rating recorded is a count of the high and low covers and trenches in the TREATMENT LENGTH (Not just the inspection length)

High Service cover 20mm above the carriageway and in the wheelpath.

High Service cover.

3.13 COMMENTS

This section of the rating form is for any items, which may require urgent attention.

Examples of the type of things that should be noted are :

I. Water seepage in the carriageway.

II. Damage to footpaths or channels in front of building or demolition sites.