TECHNICAL METHODS FOR HIGHWAYS

TMH 9 : 1992

PAVEMENT MANAGEMENT SYSTEMS: STANDARD VISUAL ASSESSMENT MANUAL FOR FLEXIBLE PAVEMENTS

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PREFACE

TECHNICAL METHODS FOR HIGHWAYS (TMH) is a series complementing the TECHNICAL RECOMMENDATIONS FOR HIGHWAYS (TRH) series. The TRHs are intended as guides for the practising engineer and leave room for engineering judgement to be used. The TMHs are more in the nature of manuals for engineers, prescribing methods to be used in various road design and construction procedures. It is hoped that the use of these manuals will produce uniform results throughout the country.

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This TMH was prepared for the Compatibility of Pavement Management Systems Subcommittee of the Highway Materials Committee which is, in turn, a subcommittee of the Committee for State Road Authorities (CSRA). It is published with the approval of the CSRA.

SYNOPSIS

TMH 9 provides guide-lines for the visual assessment of the condition of flexible paved roads at network level for use in pavement management systems. Assessment procedures and requirements for road segment information data are specified. Different distress types are classified and detailed descriptions of degree of distress (including photographic plates illustrating condition) for each of the distress types are given. TMH 9 is a companion document to TRH 22 on pavement management systems.

SINOPSIS

TMH 9 voorsien riglyne vir die visuele evaluering van die toestand van buigbare plaveisels op netwerkvlak, vir gebruik in plaveiselbestuurstelsels. Evalueringsprosedures en vereistes vir padsegmentinligting word gespesifiseer. Verskillende verswakkingsmeganismes is geklassifiseer, en gedetailleerde beskrywings van graad van verswakking (insluitende foto's wat die toestand illustreer) word vir elke verswakkingsmeganisme gegee. TMH 9 is 'n bybehorende dokument tot TRH 22, oor plaveiselbestuurstelsels.

PMS Visual Assessments for Flexible Pavements
TMH9, Pretoria, South Africa, 1992

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PART A: GENERAL INFORMATION

A1. INTRODUCTION

A1.1 PURPOSE AND BACKGROUND

This document provides national guide-lines for the visual evaluation of the condition of flexible paved roads at network level for use in pavement management systems. Rigid pavements should be assessed in accordance with the Department of Transport Manual for the visual assessment of pavement distress: Part 2 (Reference D2).

Visual evaluations can be used for determining -

- condition indices;
- maintenance and rehabilitation needs; and
- priorities at network level.

In future, this document will be used as a companion document to the TRH 22 document on pavement management systems which is currently being compiled by the Compatibility of Pavement Management Systems Subcommittee of the Highway Materials Committee.

This visual assessment manual is intended for visual assessors of the condition of the pavement for pavement management systems and can also be used for the training of assessors.

A1.2 EVALUATION OF CONDITION OF THE PAVEMENT

The condition of the pavement is considered from two points of view, namely that of the road user and that of the road engineer. Since the road user regards the road as a service, the condition of the pavement is appraised in terms of those characteristics that affect quality of travel, notably comfort, safety and operating costs. The engineer, on the other hand, recognises these functional requirements, but also views the pavement as a load bearing structure to be maintained in good time if it is to remain serviceable at optimum cost. The assessment of the condition of the pavement is therefore based on functional descriptions and descriptions related to the condition of the pavement surfacing and pavement structure.

Visible distress is an important input in the assessment of the condition of a pavement structure. Distress is described by recording its main characteristics - the so-called attributes of distress, namely the **type**, **degree** and **extent** of occurrence (see section A2).

To reduce the amount of subjectivity involved in the assessment, the assessor should follow the assessment procedures as set out in this guide as closely as possible.

A1.3 INFORMATION TO BE OBTAINED FROM VISUAL EVALUATION DATA

As mentioned briefly in section A1.1, the following two main outputs can be achieved by processing the visual assessment data:

(a) A **condition index** calculated for each assessment length through the combination of -

- the rating for degree and
- extent for each distress type, together with
- a weight factor based on the importance of the distress type.

The condition index can be used -

- to give an indication of the condition of the pavement of each assessment segment;
- to indicate the change in the condition of a pavement over time; and
- to classify the road section into one of five condition categories for statistical or visual presentation:

VERY GOOD	GOOD	FAIR	POOR	VERY POOR
1	2	3	4	5

(b) Identification of certain required **maintenance** and/or **rehabilitation measures** and **priorities**. These identified needs are generally not for use at project level (implementation), but are used as input for programming and budgeting at network level.

A1.4 DEFINITIONS

(a) Road section

A road section is a length of road with a unique section number (refer to Section A4.2).

(b) Link

A road link is the length of road from one intersection or interchange to the next.

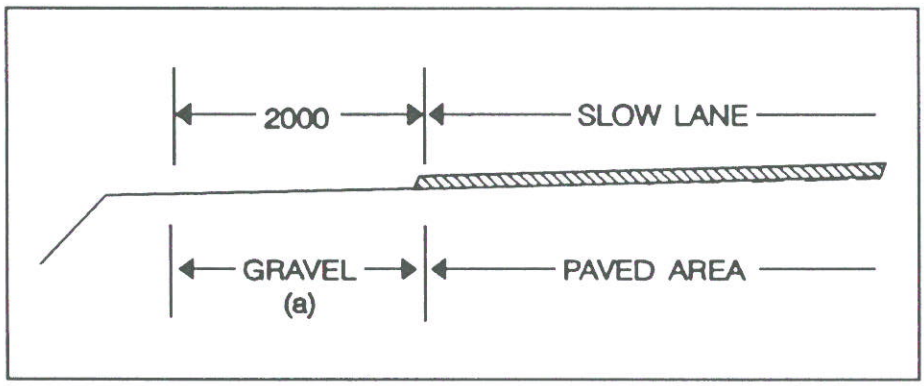
(c) Assessment segment

An assessment segment is the length of road for which one assessment rating is recorded. In the case of rural road networks, a road link is normally divided into road segments for visual assessment. For urban road networks where road links may be very short, uniform links may be grouped together to form an assessment segment.

(d) Shoulder

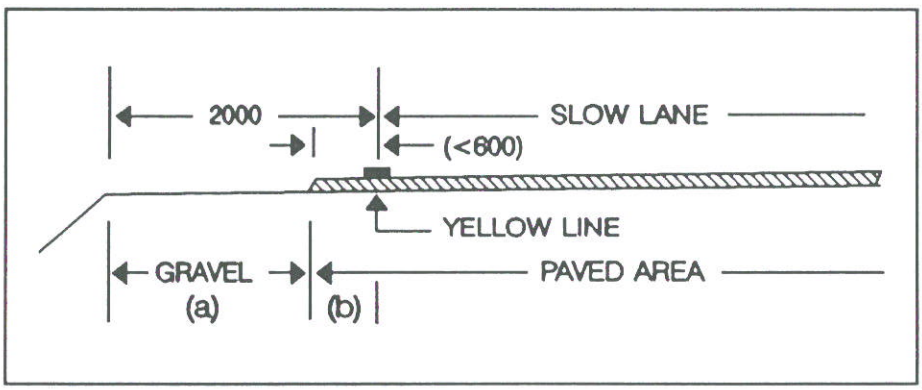
A shoulder is the area adjacent to the slow lane, but within 2,0 metres of the yellow line (or edge of the slow lane). The shoulder does not extend beyond a kerb (if any). The following three shoulder options are defined:

i) **Edge of surfacing = Edge of slow lane**



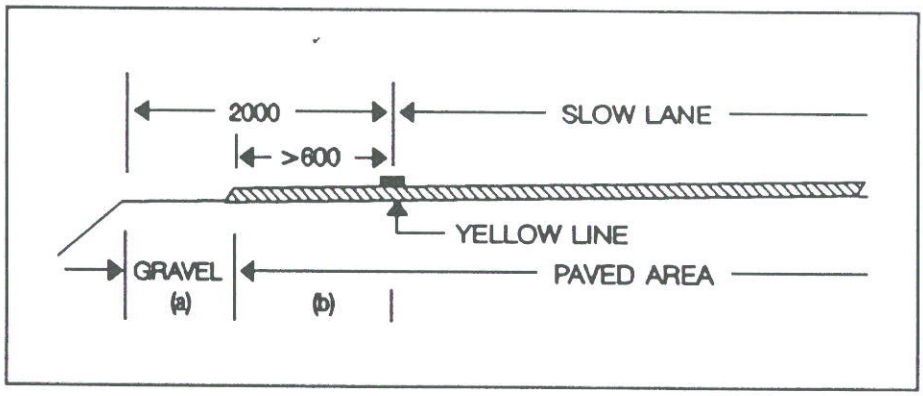
The condition of the unpaved shoulder (a) is assessed under item B3.4.1 (Unpaved shoulders).

ii) **Paved shoulder < 0,6 m**



The general condition of the paved area outside the yellow line (b) is not assessed as a paved shoulder. Individual items of distress are, however, assessed under the relevant headings. The condition of the gravel area (a) is assessed under item B3.4.1 (Unpaved shoulders).

(iii) **Paved shoulder ≥ 0,6 m**



The **general** condition of the paved area outside the yellow line (b) is assessed under item B3.4.2 (Paved shoulders). Individual items of distress are, however, still assessed under the relevant headings. The condition of the gravel area (a) is assessed under Item B3.4.1 (Unpaved shoulders).

(e) Paved area

The paved area is the area between the edges of the flexible surfacing layer.

(f) Condition: "Warning"

The condition of various defects is often referred to as "warning". This term indicates a condition that requires some action in the near future and/or a problem that may develop into a serious one.

A1.5 LAYOUT OF THE MANUAL

The manual comprises four parts:

Part A provides information to the assessor which should be studied as background to the detailed distress descriptions in Part B.
Part B provides detailed descriptions of the various distress types and the descriptions of the various degrees of distress. To illustrate these detailed descriptions, colour photographs of typical examples of each distress type (where available) for severity levels 1, 3 and 5 (refer to section A2) are provided.
Part C provides photographs of roads showing the various distress types together with examples of typical completed assessment forms.
Part D: References.

A2. ATTRIBUTES OF DISTRESS

A2.1 GENERAL

The appearance of distress is varied and often extremely complex. The task of describing this is achieved by recording its main characteristics - the so-called attributes of distress. The **attributes** referred to in this manual are the -

- type;
- degree;
- extent; and
- spacing or activity (where applicable),

and are defined below in general terms. Each of these attributes is described in more detail in Part B. In some cases information is also provided on the mechanisms and causes of distress.

A2.2 TYPES OF DISTRESS

(a) Classification of types of distress

Distress occurs in various ways. These are called **modes** of distress for example deformation, cracking or disintegration of the surfacing. Each of these modes of distress may occur in one of several different typical manifestations. These are called the various **types** of distress, for example crocodile cracks, transverse cracks or longitudinal cracks.

The various types of distress are classified as **essential** or **desirable** for the purposes of CSRA assessments. All CSRA visual assessments should contain the essential items, which constitute information necessary for basic statistics. The assessment of other distress types which will enhance and improve the quality of pavement management data and outputs, but which are not essential, are indicated as **desirable**. Visual assessment items for flexible pavements are given and classified accordingly in Table A1. The various items are also classified under the following headings:

- Surfacing assessment;
- structural assessment; and
- functional assessment.

TABLE A1: VISUAL ASSESSMENT ITEMS

VISUAL ASSESSMENT ITEM	ASSESSMENT REQUIREMENTS	
	ESSENTIAL	DESIRABLE
SURFACING ASSESSMENT		
Texture		X
Voids		X
Surfacing failure	X	
Surfacing cracks	X	
Aggregate loss	X	
Binder condition	X	
Bleeding/flushing	X	
STRUCTURAL ASSESSMENT		
Block/stabilisation cracks	X	
Longitudinal/slip cracks	X	
Transverse cracks	X	
Crocodile cracks	X	
Pumping	X	
Rutting	X	
Undulation/settlement		X
Patching	X	
Failures/potholing	X	
FUNCTIONAL ASSESSMENT		
Riding quality		X
Skid resistance		X
Drainage: Surface		X
Side		X
Shoulders: Unpaved	X	
Paved		X
Edge breaking	X	
OVERALL CONDITION	X	

(b) Discussion of listed desirable items in Table A1

Texture and voids are not used in the condition index calculation, but could assist in the determination of maintenance needs (including reseals).

Undulation/settlement data can be implied from riding quality measurements; their assessment is therefore not considered essential.

Riding quality data is considered essential for the calculation of a pavement condition index. Where accurately measured riding quality data are available, these should be used in the calculation as they are more accurate than the rating of the visual assessor. However, if these are not available, the assessment of riding quality should be included in the visual assessment.

The **skid resistance** of a road is very difficult to determine accurately from a visual assessment. However, the visually assessed data can be used to indicate apparent severe problem areas. These areas could then be investigated further through instrument measurements.

Surface drainage problems can be related to other defects, for instance rutting. It is also very difficult to assess such problems under dry conditions.

Side drainage problems may result in pavement failures. However, it is often difficult to assess such problems outside the wet season. In some road management systems, data on side drainage problems are identified through the maintenance management system.

Shoulders: Paved. The general rating for the condition of the paved shoulder is recorded to indicate where the shoulder condition differs significantly from that of the travelled way. This information is particularly relevant where the paved shoulders have been excluded from past reseal activities. Individual items of distress on the paved shoulder are rated under the relevant distress types as described in Section B.

A2.3 DEGREE

The degree of a particular type of distress is a measure of its severity. Since the degree of distress can vary over the pavement section, the degree to be recorded should, in connection with the extent of occurrence, give the **best average assessment of the seriousness** of a particular type of distress. The degree is indicated by a number where degree 1 indicates the first evidence of a particular type of distress ("slight"), degree 3 indicates a warning (requires attention) degree and degree 5 indicates the worst degree ("severe"). The general descriptions of degree of each type of distress are presented in Table A2. These descriptions relate to the possible consequences of each type of distress and therefore also to the urgency of maintenance or rehabilitation. Degree 1 generally indicates that no attention is required, degree 3 indicates that maintenance/rehabilitation is required in the near future, whereas degree 5 indicates that immediate maintenance/rehabilitation is required.

TABLE A2: GENERAL DESCRIPTION OF DEGREE CLASSIFICATION

DEGREE	SEVERITY	DESCRIPTION*
0	-	No distress visible.
1	Slight	Distress difficult to discern. Only the first signs of distress are visible.
2	Between slight and warning	
3	Warning	Distress is distinct. Start of secondary defects. (Distress notable with respect to possible consequences. Maintenance may be required in near future e.g. cracks can be sealed)
4	Between warning and severe	
5	Severe	Distress is extreme. Secondary defects are well developed (high degree of secondary defects) and/or extreme severity of primary defect (Urgent attention required).

* Specific classifications for the various types of distress (primary defects) have been compiled, based on these general descriptions (see Part B).

The most important categories of degree are 1, 3 and 5. If there is any uncertainty regarding the condition between degrees 1 and 3 or 3 and 5, the defect may be marked as 2 or 4, respectively.

A2.4 EXTENT

The extent of distress is a measure of how widespread the distress is over the length of the road segment. The extent is indicated by a number where -

- extent 1 indicates an isolated occurrence ("seldom");
- extent 3 indicates intermittent (scattered) occurrence over most of the length of road; and
- extent 5 indicates the extensive occurrence of a particular type of distress. The general description of the extent classifications is given in Table A3 and these are also illustrated diagrammatically in Figure A1.

The extent of the distress should be recorded for the traffic lane with the most significant distress in terms of possible action (mostly the slow lane on multi-lane carriageways). Distress on paved shoulders should be included in the assessment of extent.

TABLE A3: GENERAL DESCRIPTION OF EXTENT CLASSIFICATIONS
(Refer to Figure A1.)

EXTENT	DESCRIPTION
1	Isolated occurrence, not representative of the segment length being evaluated (seldom).
2	Intermittent (scattered) occurrence, over parts of the segment length (more than isolated).
3	Intermittent (scattered) occurrence, over most of the segment length (general), or extensive occurrence over a limited portion of the segment length.
4	More frequent occurrence over a major portion of the segment length.
5	Extensive occurrence.

A2.5 EXAMPLES OF USE OF DEGREE AND EXTENT

The following examples illustrate the combined use of degree and extent:

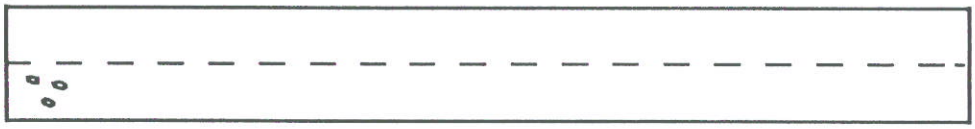
(i) If longitudinal cracking of degree 5 occurs seldom (i.e. extent 1) and longitudinal cracking of degree 3 occurs extensively (i.e. extent 5), the degree 3/extent 5 cracking is recorded as the best average indication of the severity of longitudinal cracking over the specific pavement segment in terms of possible rehabilitation/reseal action. In such a case the degree 5 cracking will be viewed as an area of localised distress requiring routine attention.

(ii) If longitudinal cracking of degree 5 and extent 2, and longitudinal cracking of degree 1 and extent 4 occurs, degree 5/extent 2 is recorded as the average indication of the problem that is most significant in terms of possible action. (Cracking of degree 1 is not considered significant in terms of possible action.)

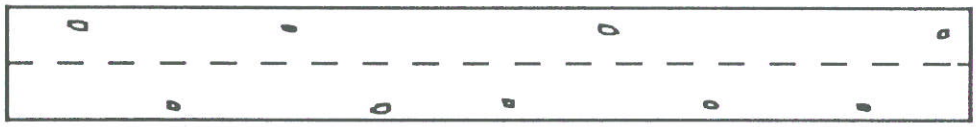
FIGURE A.1: DIAGRAMMATICAL ILLUSTRATION OF EXTENT

Extent = 1, isolated occurrence:

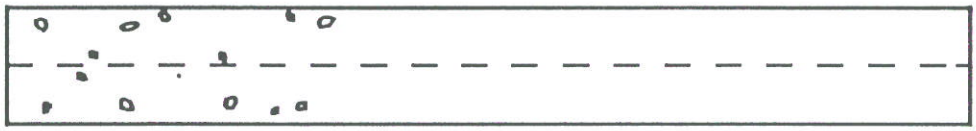
Or



Extent = 3, scattered occurrence over most of the length:



Or extensive occurrence over a limited portion of the length:



Extent = 5, extensive occurrence:

A3. SEGMENT LENGTHS

It is not the purpose of the assessment to identify uniform sections of distress on the road and to complete an assessment form for each of these uniform sections. The road network should be evaluated and compared according to previously identified road segments.

Segment lengths may vary according to various parameters. The recommended standard segment lengths (together with minimum and maximum lengths) are given in Table A4.

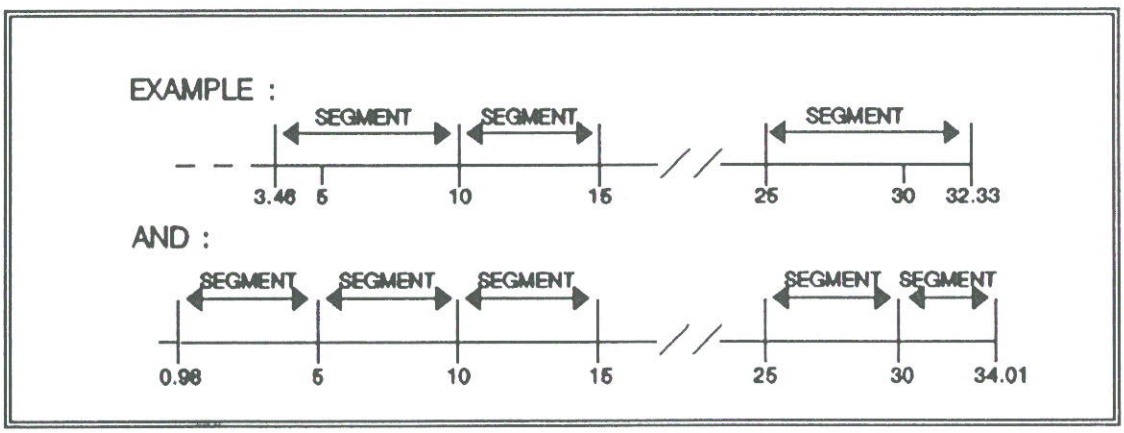
TABLE A4: RECOMMENDED SEGMENT LENGTHS FOR DIFFERENT TYPES OF ROAD (rural road authorities)

TYPE OF ROAD	RECOMMENDED SEGMENT LENGTHS (km)		
	Minimum	Standard	Maximum
Roads in rural areas	2,5	5,0	7,5
Roads in peri-urban and urban areas, and freeways	1,0	2,0	3,0

Example of typical segments (rural)

A road segment is defined as a 5 km length of road beginning at a multiple of five (e.g. km 5 or 10, etc.) and ending at a multiple of five (e.g. km 10 or 15, etc.). If the route/section begins, for example, at a municipal border and/or ends at a district border or crosses another route, the following rules apply where the distance from the border to the next multiple is less than 5 km. If the difference in distance is less than 2,5 km, it is added to the next road segment and then the specific length is considered as, for example, km 3,46 to km 10,00. If the difference in distance is more than or equal to 2,5 km, it is regarded as a separate segment, for example, km 0,98 to km 5,00. The same applies from the last 5 km multiple to the end of the route/section, municipal border or crossing of another route, for example, km 25,00 to km 32,33 or km 30,00 to km 34,01. The above-mentioned is illustrated in Figure A2.

FIGURE A2: DIAGRAMMATICAL ILLUSTRATION OF ASSESSMENT SEGMENTS



A4. ROAD SEGMENT INFORMATION

A4.1 INTRODUCTION

The various items of road segment information that are required for the definition of a road network are presented in Table A5 together with an indication of importance.

NOTE: Some of the data described below are stored in the PMS data base and not all items are required on the assessment form. Items that are printed on the assessment form, could where possible, be checked by the assessor to confirm the accuracy of the data base.

TABLE A5: ROAD INFORMATION ITEMS

ITEM	IMPORTANCE OF ITEM	
	ESSENTIAL	DESIRABLE
Road number	X	
Name of assessor		X
Start and end kilometre distance	X	
Date	X	
Node descriptions		X
Node types		X
Road category	X	
Road classification	X	
Road type		X
District/region	X	
Climate	X	
Terrain	X	
Road width	X	
Pavement structure	X	
Pavement age	X	
Shoulder width	X	
Traffic Class	X	

A4.2 ROAD NUMBER (essential item)

This item should cover the number of the road and section concerned, for example
MR16/10 (Main Road 16, Section 10)
N3/12 (National Route 3, Section 12)

If a dual carriageway is evaluated each carriageway should be evaluated separately. The two carriageway segments will have the same road number and kilometre distances. The direction of travel relative to the road distance markers should be used to distinguish between the two road segments. For example, a "-" after the road number will indicate the road segment on which vehicles travel in the direction of decreasing kilometre distances.

A4.3 NAME OF ASSESSOR (desirable item)

The name(s) of person or panel, in case of panel inspection, carrying out the evaluation. This is useful for reference purposes should any problem occur.

A4.4 START AND END KILOMETRE DISTANCE (essential item)

This is the start and end distance of the segment concerned. Recorded to the nearest 0,01 km.

A4.5 DATE (essential item)

The month and year (MM/YY) when the evaluation is being done: e.g. 06/90.

A4.6 START AND END NODE DESCRIPTIONS (desirable item)

This refers to the physical description of the starting and ending points of the segment. The description is a more detailed description to identify the segment (see A4.7). **Note:** This description is only applicable where the segment starting or ending points require special identification or where they coincide with link nodes.

A4.7 NODE TYPES (desirable item)

Abbreviated codes can be used for the identification of the start of the nodes. Typical examples of such codes are given below:

Intersection	X
T-Junction	T
T-Junction left	TL
T-Junction right	TR
Towns/villages	V
End of paved segment	EP
Start of paved segment	SP
Start of segment (no other nodes applicable, e.g. 5 km segment)	ST
End of segment (no other nodes applicable, e.g. 5 km segment)	EN
Borders (national, regional, district)	BO
Maximum segment length used as segment end	MX

A4.8 ROAD CATEGORY (essential item)

The road category should be defined according to a combination of parameters, such as importance, service level, traffic and constructed standard. The road category information is used in data processing, for example in the selection of the rehabilitation measure. Four road categories are described in Table A6. Refer to the TRH 4 and UTG 3 documents for detailed descriptions of the parameters used in the definitions.

TABLE A6: DEFINITION OF ROAD CATEGORIES

ROAD CATEGORY	DESCRIPTION	
	RURAL (TRH4 : 1985)	URBAN (UTG3 : 1988)
A	Interurban freeways, major interurban roads.	Trunk roads, primary distributors, freeways and major arterials. Also bypasses.
B	Interurban collectors, major rural roads, major industrial roads.	District and local distributors, minor arterials and collectors, industrial and CBD roads, goods loading areas and bus routes.
C	Lightly trafficked rural roads, strategic roads.	Residential access collectors and car parks.
D	Special pavements, innovations, cost saving ideas.	Local access roads: Loops, access ways, access courts, access strips and culs-de-sac.

A4.9 FUNCTIONAL ROAD CLASSIFICATION (essential item)

Roads can be classified into groups depending on their function and importance. A summary of the road classification system developed by the CSRA Subcommittee on Road Classification and expanded by the Road Classification Consortium is given in Table A7. This information can be used for the presentation of PMS results.

TABLE A7: DEFINITION OF FUNCTIONAL ROAD CLASSES

FUNCTIONAL ROAD CLASSES	BRIEF DESCRIPTION
Level 1 (Primary)	Roads which provide mobility in the national context. Normal features - - long distance traffic; - high speed design standards; and - minimum interference of through traffic.
Level 2 (Secondary)	Roads which provide mobility in the regional context. Normal features - - moderate distance traffic; - slightly lower design standards than level 1; and - link between towns not situated on level 1 road network.
Level 3 (Tertiary)	Roads which provide mobility in the context of a magisterial district. Normal features - - short trips between district centres and between higher level roads.
Level 4 (Tertiary)	All local access roads providing only local people access to the rest of the road network. The main function is to serve land uses next to the road network.

A4.10 ROAD TYPE (desirable item)

The road type should be indicated according to the parameters listed in Table A8. (e.g.: D2P)

TABLE A8: PARAMETERS FOR DESCRIPTION OF ROAD TYPE

PARAMETER	OPTIONS (CODES)
Carriageway category	Divided (D); Undivided (N)
Number of lanes per carriageway	1; 2; 3; 4; etc.
Shoulder	Paved (P); Unpaved (U)

A4.11 DISTRICT/REGION (essential item)

The name of the district or region is recorded.

A4.12 CLIMATE (essential item)

The specific climatic region is indicated, according to TRH 4: 1985 Climatic Regions. In specific cases where microclimates are different from the macroclimates, the climatic rating should be adjusted accordingly. Provision has been made for localised 'very wet' areas. Climatic regions are given in Table A9.

TABLE A9: CLIMATIC REGIONS

CODE	CLIMATIC REGION
D	Dry
M	Moderate
W	Wet
V	Very wet

A4.13 TERRAIN (essential item)

The terrain type is used for the calculation of excess user costs, and one of the types must be selected from Table A10. The terrain type is defined by gradient and/or curvature, always selecting the worst case. These are very broad guide-lines only. Refer to the CB Roads Manual for more detailed definitions.

TABLE A10: DESCRIPTION FOR TERRAIN TYPES

TERRAIN TYPE	GRADIENT	CURVATURE
Flat	Gradient mostly flat (<3%)	Curvature has no effect on vehicle running costs.
Rolling	Generally medium gradient (≈ 4%) with many sags and crests.	Significant curves for at least 30% of the length.
Mountainous	Generally steep gradient (≈ 7%) with many sags and crests.	Very sharp curves for at least 30% of length.

A4.14 ROAD WIDTH (essential item)

The road width can vary over the length of a segment. However, unless otherwise indicated, the average width of the paved area of the segment should be recorded to the nearest 0,1 m. Refer to section A1.4(e) for the definition of paved area.

A4.15 PAVEMENT STRUCTURE (essential item)

There are four major pavement types, as defined in TRH 4: 1985 and they are given in Table A11.

TABLE A11: CLASSIFICATION OF PAVEMENT STRUCTURES

CODE	CLASSIFICATION
PCC	Concrete pavements
A	Asphalt base
G	Granular base
C	Cemented base (stabilised)

A4.16 PAVEMENT AGE (essential item)

The structural and surfacing ages are classified in Table A11. The actual year of construction should be recorded in the data base.

TABLE A12: CLASSIFICATION OF PAVEMENT AGE

AGE CATEGORY	DESCRIPTION	
	STRUCTURAL AGE (YEARS)	SURFACING AGE (YEARS)
New (N)	< 5	< 5
Intermediate (I)	5 to 15	5 to 10
Old (O)	15 to 25	10 to 15
Very old (V)	> 25	> 15

A4.17 SHOULDER WIDTH (essential item)

Information on the width of shoulder should be given by recording the average width of the paved and/or gravel shoulder to the nearest 0,1 m. Refer to section A.1.4(b) for definitions.

A4.18 TRAFFIC

The traffic volumes are classified in Table A13. The actual traffic volumes should be recorded in the data base.

TABLE A13: CLASSIFICATION OF TRAFFIC

TRAFFIC CLASS	ANNUAL AVERAGE DAILY TRAFFIC (Total two direction traffic)
T1	< 500
T2	500 to 1500
T3	1500 to 4500
T4	4500 to 13500
T5	> 13500

A5. ASSESSMENT PROCEDURE AND QUALITY ASSURANCE

A5.1 TRAINING/CALIBRATION OF VISUAL ASSESSORS

The accuracy of the visual assessment data depends largely on the knowledge, experience and commitment of the assessors. To minimise the element of subjectivity and to ensure good knowledge of the assessment procedures, it is absolutely essential to have annual training and calibration of all assessors before the visual assessments. The intensity and duration of the training session will depend on the experience of the assessors.

It is therefore proposed that the training and recalibration session be held even if all the assessors were trained during previous years. Changes to guide-lines and procedures should also be presented and problems with the previous assessments should be discussed.

The training programme for new assessors should include the following:

(i) An overview of the objectives of the visual assessment together with a brief description of the data processing procedures and applications of the final results.

(ii) An overview of the method of assessment, including descriptions of various types of distress and ratings for each type. The use of colour slides to show examples is recommended. The visual assessment manual should be studied by all before the training session.

(iii) An overview of the format of the assessment sheet.

(iv) Practical training, assessing three or four road segments, preferably in different conditions. The method of rating should be discussed on the first segment and the assessors should then complete the assessments for the remaining segments independently. Notes should be compared afterwards and any problems should be discussed. If necessary, more segments should be assessed and discussed individually until reasonable agreement is reached.

In addition, it is advisable for each project leader to meet with all the assessors within days after the start of the formal assessment to check the initial assessments.

A5.2 PROCEDURE FOR VISUAL ASSESSMENT

Visual assessment should preferably be carried out in or towards the end of the rainy season and in the cooler months, for example March to May. Surveys should be completed within limited periods (preferably two to three months). The daily length of survey for rural roads should not exceed 130 km. Shorter daily lengths may be expected if the condition of the road is very variable, or in the case of shorter segment lengths. The assessors shall drive at a speed of less than 20 km/h, and where possible, they shall drive on the shoulder.

The first segment to be evaluated on a road requires a thorough orientation to adjust the assessor to the prevailing conditions, because the position of the sun (preferably from the rear), the amount and variability of cloud cover and a wet surface will influence the visibility of the defects (e.g. cracks). When the road is wet, it is difficult to observe distress, and this leads to erroneous ratings; visual surveys shall therefore be carried out under dry conditions only.

The accuracy of the assessor's rating will generally be influenced by the frequency of stops made to examine the road, and this frequency depends on the condition of the road and its variability. Furthermore, it is recommended that stops be made near the beginning and end of each segment and two in between, i.e. four stops per road segment. A minimum of three stops must be made over each road segment. During the assessment of the first segment more stops will probably be required. The assessor should leave the vehicle during the stops to examine the road more closely. The use of a screwdriver is recommended to remove aggregate from the surfacing.

During the visual assessment of a segment, dots can be made in the assessment form in the appropriate positions to indicate the degree of any type of distress that is observed. At the end of a segment, these dots are used to mark an average degree of distress for each type of defect. After completing the form, the assessor should also check road segment information, i.e. correct start and finish information, road width, etc.

Paved shoulders are inspected as part of the road surface. The assessment should cover the full paved width. On multi-lane roads, the inspection should concentrate on the slow lane.

A5.3 FIELD CHECKING

A representative sample (say approximately 10%) of all roads assessed should be checked independently to confirm the correctness of assessments made.

Roads should be selected from outputs of computer processed data, using highest priority roads in various rehabilitation/maintenance categories. Data errors shown by the data verification modules, which could not be solved in the office, should also be checked in the field.

PART B: DETAILED DESCRIPTION OF TYPES OF DISTRESS

NOTE: Examples and actual dimensions presented in Part B are given as guide-lines only and should not be regarded as fixed rules.

B1. SURFACING

This section covers the evaluation of the current visual condition of the surfacing.

B1.1 CURRENT SURFACING (desirable information)

The rater should record the surfacing type currently visible on the surface by using one of the abbreviations from the short list in Table B1 below. The list has been kept simple as it is so often not possible to distinguish visibly between the various subtypes of surfacing. If necessary, other codes specified by the individual road authorities could be added to the list. Detailed records of the actual surfacing types are kept in the maintenance history files. This data item is recorded only to be used as a rough check against that file.

TABLE B1: SHORT LIST OF GLOBAL SURFACING TYPES

SURFACING CODE	SURFACING TYPE
AS	Asphalt surfacing
SE	Seal (chip & spray)
CS	Cape seal
SL	Slurry

B1.2 TEXTURE AND VOIDS

B1.2.1 Texture (desirable item) (Plates 1 and 2)

This refers to the texture of the current surfacing. The texture, especially the texture depth, plays a very important role in skid resistance under wet conditions. A coarse textured surface may also require a pre-treatment (e.g. fine slurry) before a reseal. The texture depends on the aggregate size and the quantity of binder in the layer. The texture can be expressed as fine, fine-medium, medium, medium-coarse or coarse, or if it varies across the width of the road, as varying (refer to Table B2).

TABLE B2: DESCRIPTION OF TEXTURE TYPES

TEXTURE TYPE	DESCRIPTION
Fine	The surfacing is smooth and the coarse aggregate (if present) in the surfacing is not visible. For example a sand seal, fine slurry seal or smooth asphalt.
Medium	The road may have a smooth appearance. If present, the coarse aggregate is visible, but the surface does not appear coarse, because of fine aggregate between the coarse aggregate, e.g. normally a new 6,7 mm single seal or 13,2/6,7 mm double seal.
Coarse	The surfacing has a coarse appearance, with coarse aggregate clearly visible, e.g. a new 13,2 mm single seal.
Varying	This implies the variation of the texture in the cross-section of the road surface, e.g. the surface appears smooth in the wheel paths with a different texture elsewhere. If the texture is rated as varying, the different types of texture that are observed should also be noted.

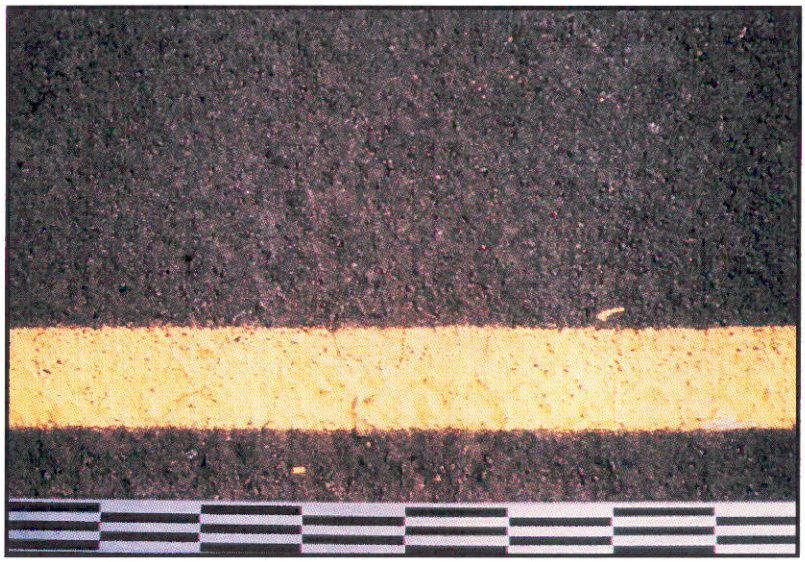
If the texture varies over the length of the segment (e.g. two types of seal were applied) both should be named under "Current seal" and the texture should be marked for both. It should not be rated as varying, except if the texture of one or both seals varies across the width of the road. Typical examples are the following:

1) Two types of seal are present on a segment. The first kilometre has a fine slurry on the surface whereas the remainder is resurfaced with a new 13 mm single seal. Texture should be marked as "Fine" and "Coarse", but not varying.

2) A road segment with a 13 mm single seal is bleeding in the wheel paths. The texture should be marked as "Varying" and "Fine" to "Coarse".

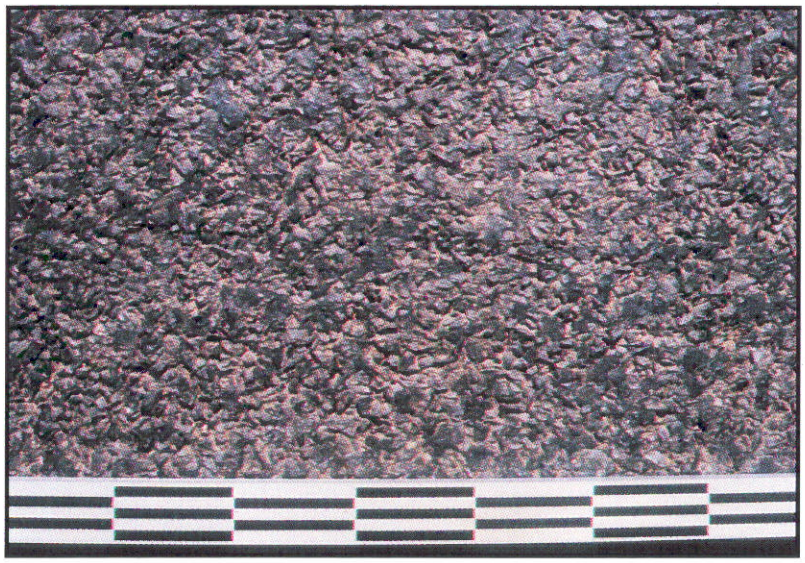
Isolated areas where the texture differs significantly from the remainder of the segment should not be recorded since these areas should, if necessary, be corrected individually and should not influence the choice of the seal or pre-treatment.

SURFACING: TEXTURE



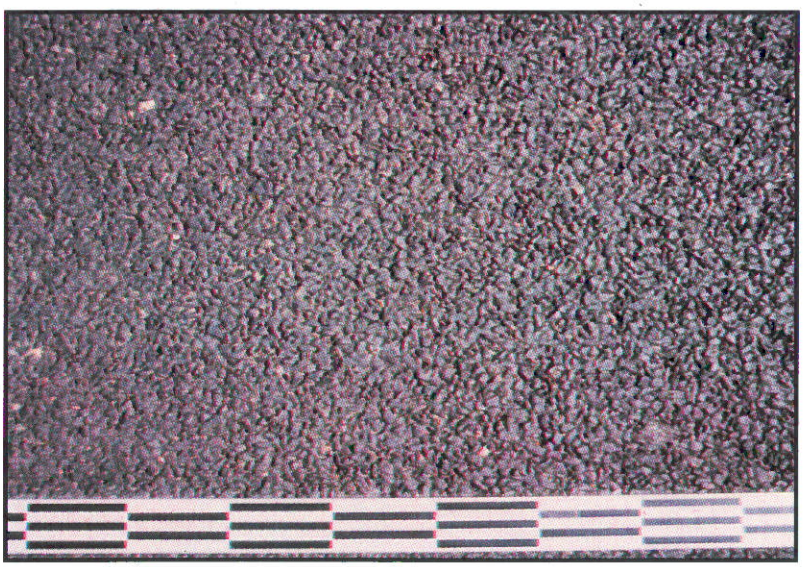
VARYING	~~FINE~~
MEDIUM	COARSE

(SLURRY SEAL)



VARYING	FINE
~~MEDIUM~~	COARSE

(DOUBLE SEAL)



VARYING	FINE
~~MEDIUM~~	COARSE

(6 or 9 mm SEAL)

SCALE

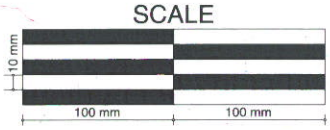
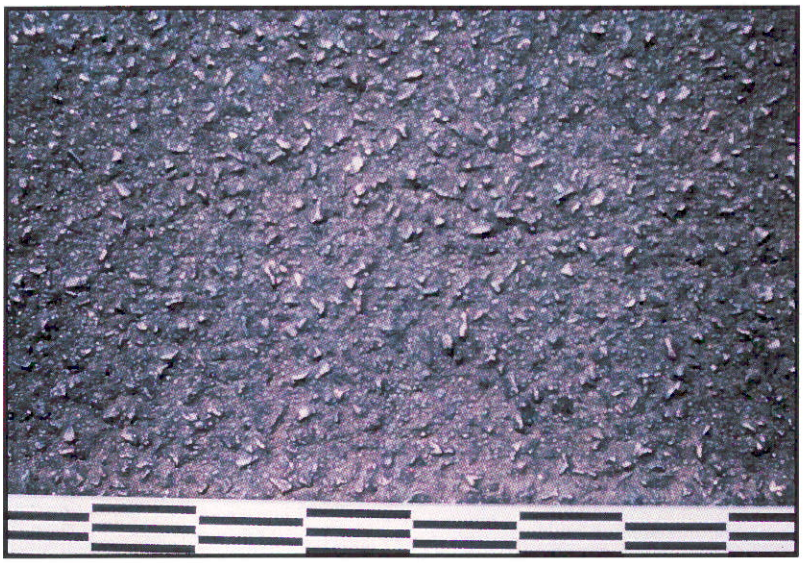


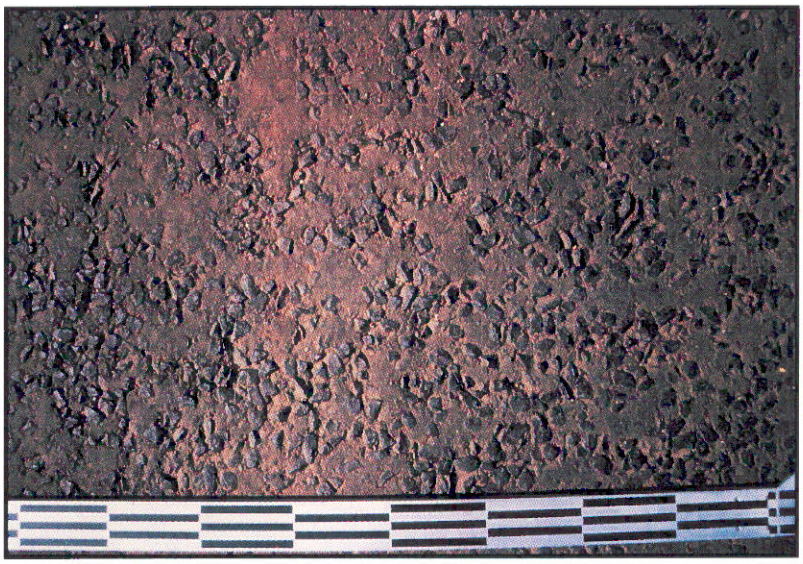
PLATE 1

SURFACING: TEXTURE



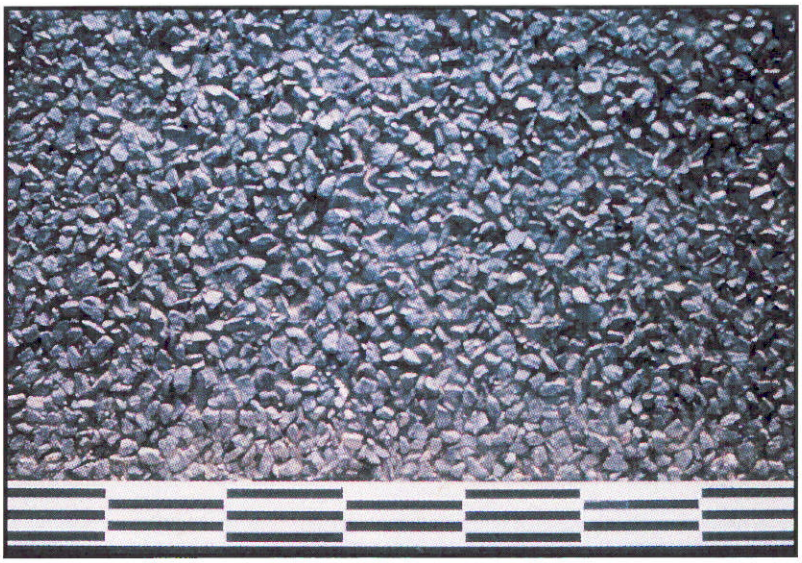
VARYING	FINE
~~MEDIUM~~	COARSE

(CAPE SEAL)



VARYING	FINE
~~MEDIUM~~	COARSE

(ASPHALT WITH
ROLLED IN CHIPS)



VARYING	FINE
MEDIUM	~~COARSE~~

(SINGLE SEAL; 13 mm)

SCALE

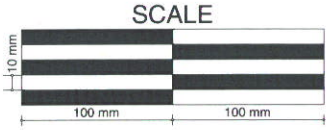


PLATE 2

B1.2.2 Voids (desirable item) (Plates 3 and 4)

The size of the aggregate and the quantity of binder have a direct influence on the available surface voids in a surfacing. When aggregate is removed from a surface treatment during evaluation (see section B.1.3.4), voids under the aggregate should also be checked in order to finalise this rating. The number of voids is directly related to the potential absorption of a diluted emulsion by the surfacing. By answering the following question the rater can obtain some idea of the number of voids. "If diluted emulsion is sprayed on the surfacing, will it be absorbed or not?" If not, the number of voids is expressed as none (e.g. a fine slurry or a bleeding seal). If it will be absorbed completely, the number of voids can be expressed as many. The description of void classes is given in Table B3. Ratings between the major classes can also be recorded (None - Few or Few - Many).

TABLE B3: DESCRIPTION OF VOID CLASSES

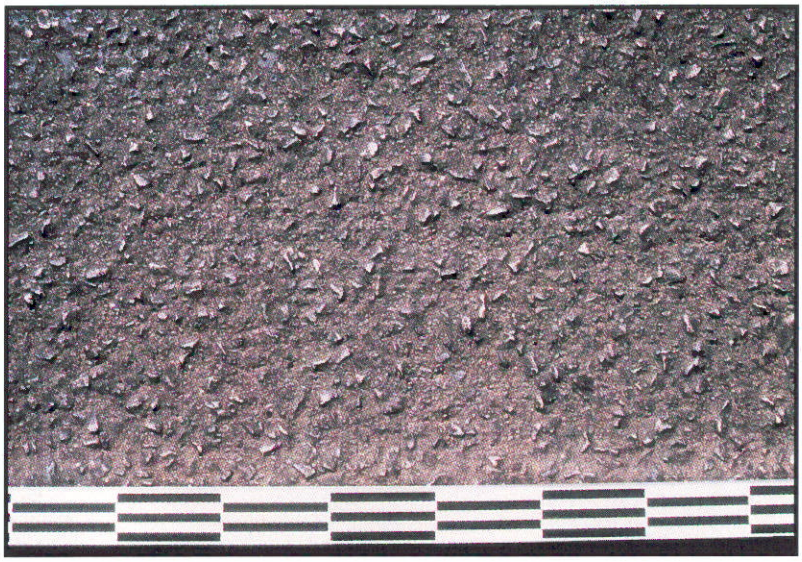
VOID CLASSES	DESCRIPTION
None	The surfacing is dense (or bleeding) and no voids are visible.
Few	Some voids are visible, surfacing is fairly dense.
Many	Many voids are visible, surfacing is open. Aggregates are well proud of binder.
Varying	This implies the variation of the voids in the cross-section of the road surface, e.g. the surface appears sealed in the wheel paths with many voids elsewhere. If the voids are rated as varying, the different degrees of voids that are observed should also be noted.

If the voids vary over the length of the segment (e.g. two types of seal were applied) both should be named under "Current seal" and the voids should be marked for both. It should not be rated as varying, except if the voids of one or both seals varies across the width of the road. Typical examples are the following:

1) Two types of seal are present on a segment. The first kilometre has a bleeding, fine slurry on the surface while the remainder is resurfaced with a new open 13 mm single seal. Voids should be marked as "None" and "Many", but not varying.

2) A road segment with a 13 mm single seal is bleeding only in the wheel paths. The voids should be marked as "Varying" and "None" to "Many".

SURFACING: VOIDS

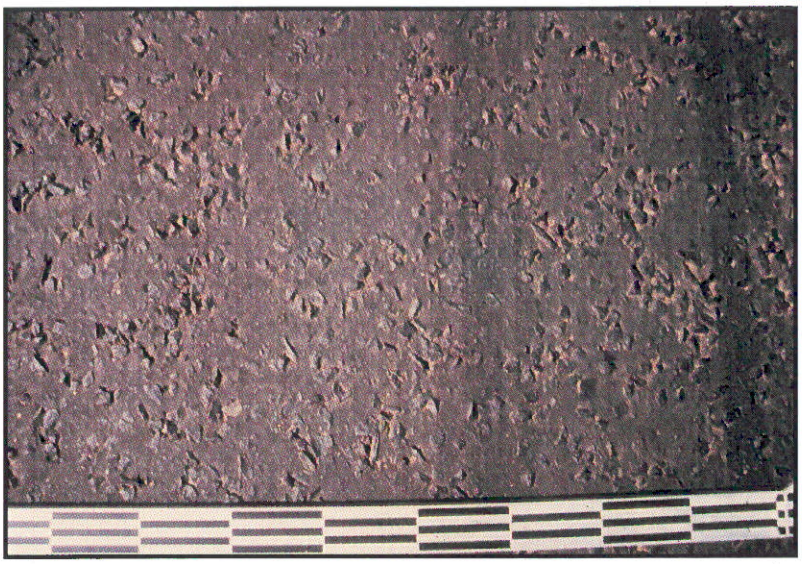


VARYING	~~NONE~~
FEW	MANY

(CAPE SEAL)

VARYING	NONE
~~FEW~~	MANY

(SLURRY SEAL)



VARYING	NONE
~~FEW~~	MANY

(ASPHALT)

SCALE

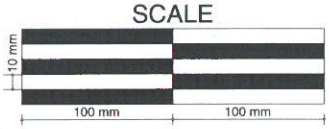
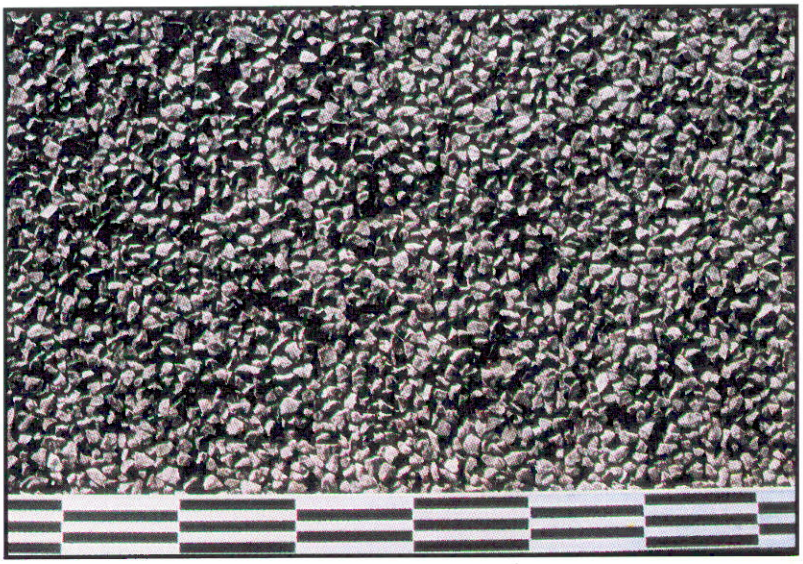


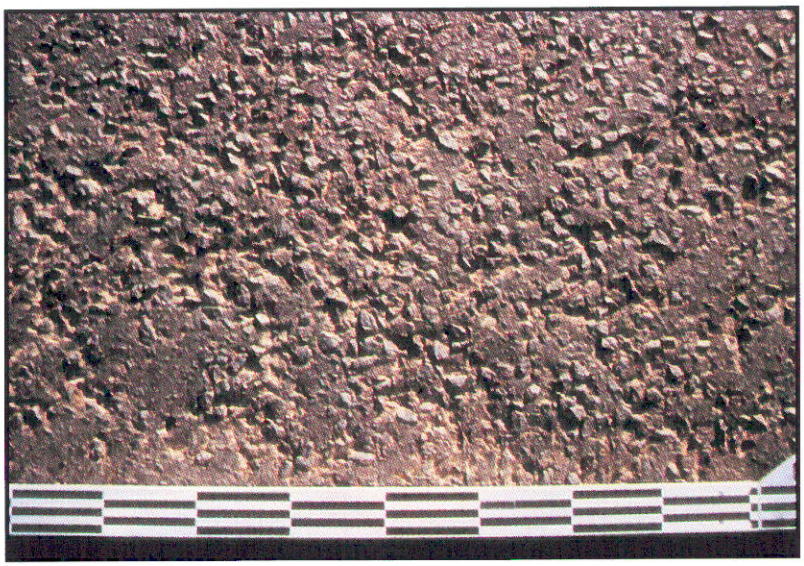
PLATE 3

SURFACING: VOIDS



VARYING	NONE
FEW	~~MANY~~

(SINGLE SEAL)



VARYING	NONE
FEW	~~MANY~~

(ASPHALT; ALSO COARSE TEXTURE)

~~VARYING~~	~~NONE~~
FEW	~~MANY~~

SCALE

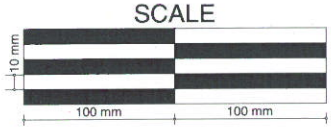


PLATE 4

B1.3 SURFACING DEFECTS

B1.3.1 Surfacing failures (essential item) (Plate 5)

Surfacing failure refers to surfacing failures only and excludes structural failures, which are evaluated in section B2. Typical examples of surfacing failure are surface related "potholes" caused by -

- spalling of reseals or overlays around cracks (spalling is defined as the crumbling away of surfacing material around cracks);
- mechanical damage to the surfacing;
- localised loss of surfacing owing to poor bonding with the underlying layer;
- disintegration of weak aggregates;
- distress owing to salt damage to the surfacing; and
- shoving of the surface layer owing to acceleration or braking forces.

NOTE: The loss of a surface seal in a circular area is not normally referred to as a pothole if the underlying layer has not been significantly affected (especially in cases of reseals or overlays).

Surfacing defects may appear if the preparation of the underlying layer is poor, for example too wet, not clean enough, and in cases where a tack coat has not been used where it was required. Surface failure is the loss of the aggregates and binder in the surfacing layer and therefore results in the exposure of the underlying layer. Where only the aggregates of a seal have been lost, with the binder remaining, the distress is described as aggregate loss (section B1.3.3).

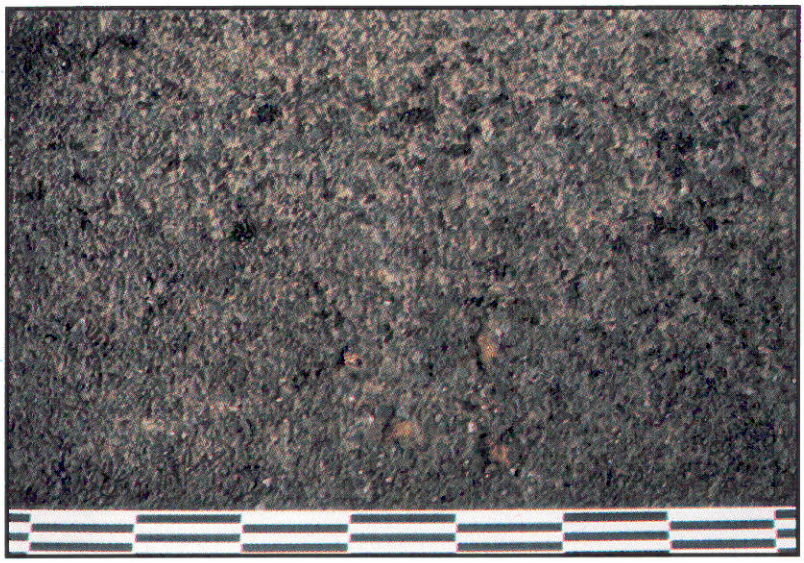
The degree of distress for failures is related mostly to the diameter or area of these failures, as given in Table B4.

TABLE B4: DESCRIPTION OF DEGREES OF SURFACE FAILURES

DEGREE	DESCRIPTION
1	Failures difficult to discern from moving vehicle. Small areas of surfacing are lost (diameter < 50 mm). Also: singular occurrence of significant failure.
3	Significant failures visible from moving vehicle (diameter ≈ 150 mm). Also: singular occurrence of large failure or concentration of small failures.
5	Failures occur over large areas and/or secondary defects have developed owing to the failures (diameter > 300 mm). Also: concentration of significant failures.

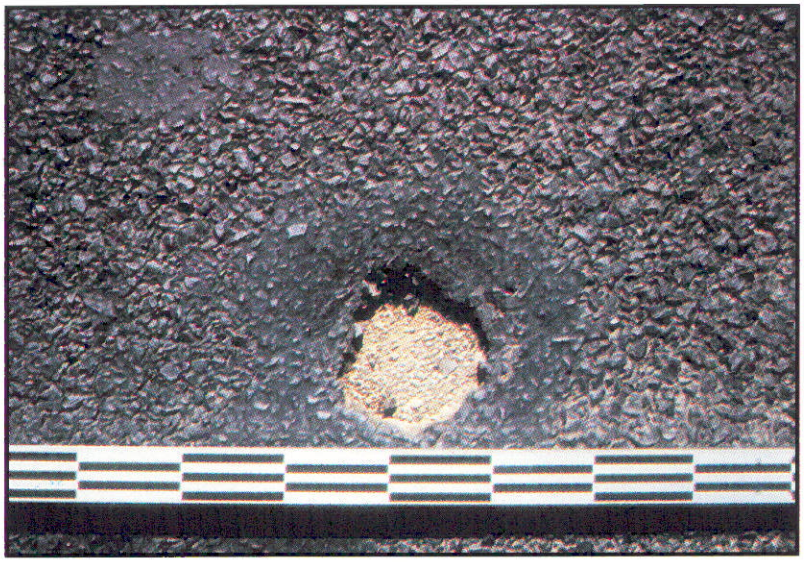
The extent of surface failure should be determined according to the definitions given in section A2.4.

TYPE OF DISTRESS: SURFACING FAILURE



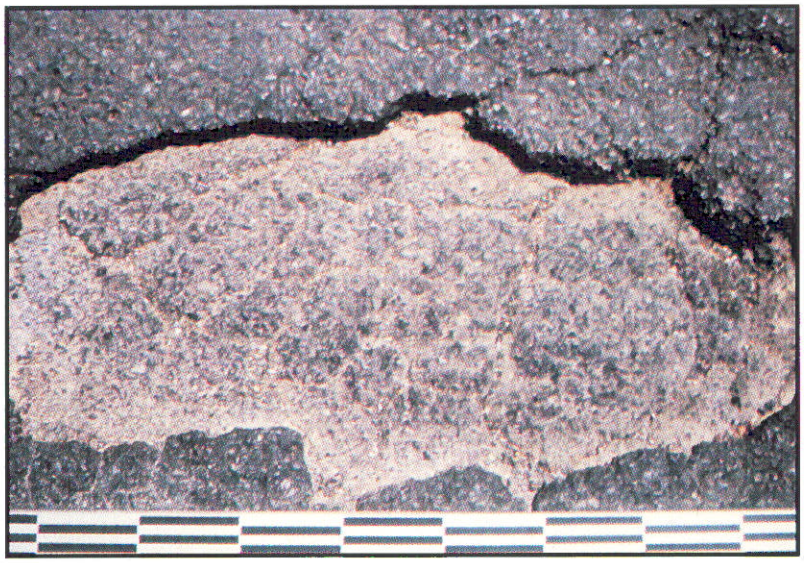
DEGREE:

1	2	3	4	5
X				



DEGREE:

1	2	3	4	5
		X		



DEGREE:

1	2	3	4	5
				X

SCALE

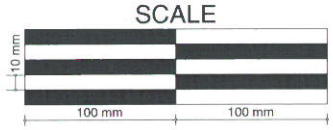


PLATE 5

B1.3.2 Surfacing (map) cracks (essential item) (Plate 6)

Surfacing cracks are caused mostly by shrinkage of the bituminous surfacing as a result of decreased binder volume. This occurs when the binder ages and loses its lighter oils and aromatics. These cracks are also sometimes referred to as map cracks, star cracks and amorphous cracks. These cracks are more commonly found in dense surfacings such as sand seals, slurry seals, Cape seals, etc. and are more easily observable on finely textured surfaces.

The initial cracking consists of short longitudinal and transverse cracks randomly spaced over the full road width. The severity of the cracking increases with ageing, to form a map pattern. In this state, secondary cracking induced by traffic around the shrinkage cracks is often evident. If maintenance is poor the condition can deteriorate so that the basic pattern of shrinkage cracks is not obvious.

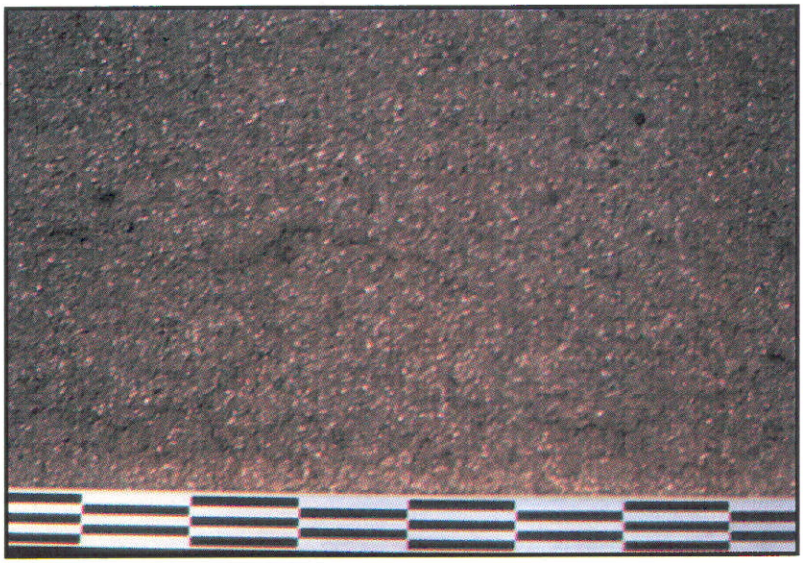
When surface treatments older than about eight years have areas of crocodile cracking over most of the road width, it is necessary to inspect less severely cracked areas for evidence of the characteristic map crack pattern resulting from binder shrinkage. Surfacing cracks are normally not confined to the wheel paths, as is the case with traffic associated crocodile cracks. This behaviourial feature should be used to help distinguish this crack type from crocodile cracking. However, when in doubt, record the distress as crocodile cracking. The description of the degrees of surfacing cracks is given in Table B5.

TABLE B5: DESCRIPTION OF DEGREES OF SURFACING (MAP) CRACKS

DEGREE	DESCRIPTION
1	Faint cracks. In some instances small cracks appear in a star pattern.
3	Distinct cracks. Slight spalling may be visible. Easily observable when driving slowly. Emergence of a map crack pattern.
5	Open cracks with severe spalling. Map crack pattern complete.

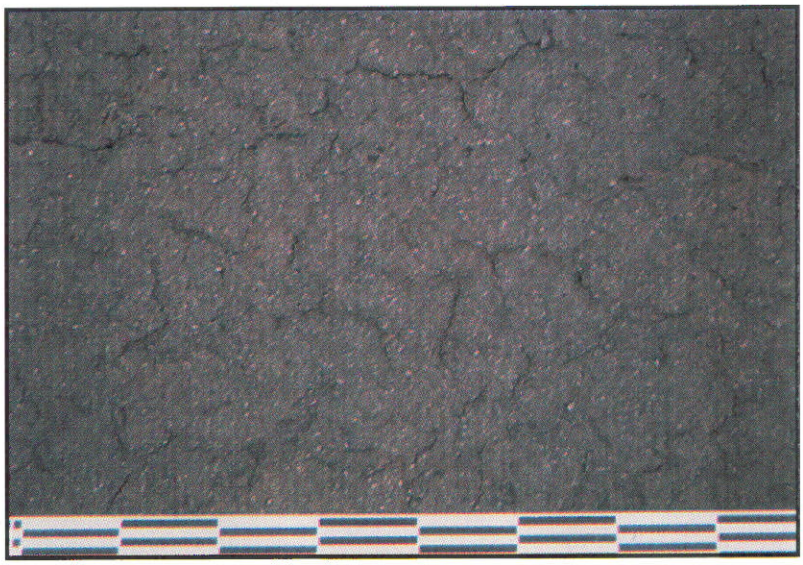
The extent of surface cracking should be determined according to the definitions given in section A2.4.

TYPE OF DISTRESS: SURFACING CRACKS



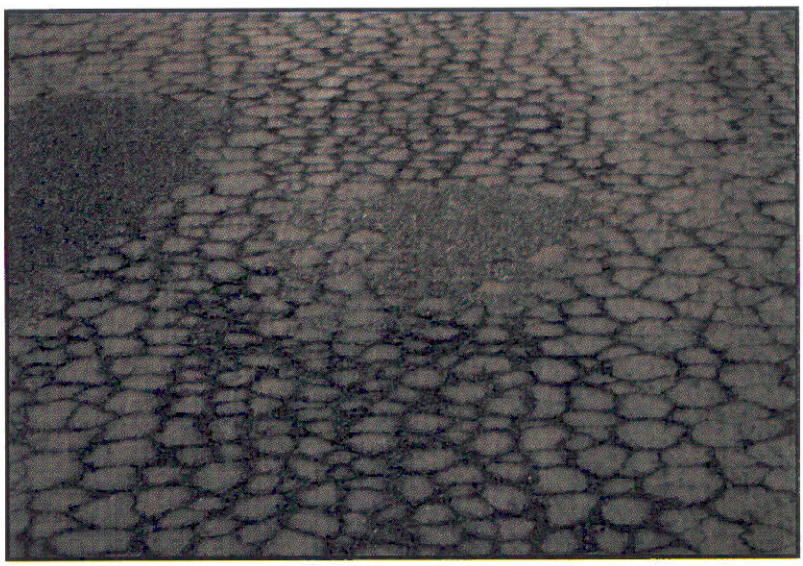
DEGREE:

1	2	3	4	5
X				



DEGREE:

1	2	3	4	5
		X		



DEGREE:

1	2	3	4	5
				X

(FULL WIDTH
OF ROAD)

SCALE

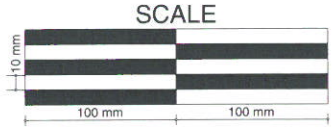


PLATE 6

B1.3.3 Aggregate loss (essential item) (Plate 7)

Aggregate loss (ravelling) is the crumbling and loss of the surfacing aggregate, usually as a result of the abrasive action of traffic.

In the case of thin surface treatments, this could eventually result in exposure of the underlying layer (then defined as a surfacing failure), and if this is an unbound layer, potholing will occur. In the case of an asphalt surfacing, the surfacing gradually disintegrates and then it eventually cracks, spalls and deteriorates into potholes. Aggregate loss can be caused by insufficient binder or the wrong grades of binder. Contaminated stone chippings or chips with poor adhesion properties can also lead to aggregate loss.

In assessing the degree of aggregate loss the following should be considered:

> A single surface treatment consists of one layer of single-size stone chips and consequently any aggregate loss directly exposes the underlying layer. In the case of multiple surface treatments, ravelling is characterised by loss of the fine stones on the surface, followed by loss of the larger stones in successively exposed layers. Asphalt surfacings consist of a mixture of stones of various sizes and often also include a final layer of precoated chips. Because of the different manifestations of the distress in different surfacings, the degree of aggregate loss is defined differently for each case. The type of surfacing inspected should therefore be recorded accurately.

Tell-tale signs of aggregate loss can sometimes be seen at the side of the road. However, the aggregate at the side of the road may be evidence of previous stone loss (before the application of a diluted emulsion). The loss of excess aggregate ("over-chipping"), should not be regarded as aggregate loss. All aggregate loss, irrespective of activity, should be recorded under this item. The assessor must rate the degree of this defect as he sees it.

The description of degrees of aggregate loss is given in Table B6.

An assessment of the activity of the aggregate loss must be made. Aggregate loss is defined as active if there are signs that the loss is continuing at that time, for example a fresh bitumen face where a stone has become dislodged from a seal. A close inspection of the surface should be carried out to determine if the aggregate loss is active. If previous aggregate loss has subsequently been successfully treated with diluted emulsion, which appears to have stopped further aggregate loss, the aggregate loss should be rated as non-active. Therefore if aggregate loss has been rated, one of the two categories in Table B6 (a) must be indicated. If uncertain, the aggregate loss must be rated as active.

TABLE B6: DESCRIPTION OF DEGREES OF AGGREGATE LOSS FOR VARIOUS TYPES OF SURFACING

DEGREE	DESCRIPTION		
	SLURRY SEALS	STONE SEALS	ASPHALT SURFACING
1	Very little discernible loss of aggregates. Loss of individual aggregates visible on close inspection. Difficult to discern from a vehicle.	Very little discernible loss of stone. Loss of individual stones visible on close inspection. Difficult to discern from a vehicle.	Very little discernible loss of aggregate or precoated chips. Difficult to discern from a vehicle
3	Distinct aggregate loss in small areas, easily discernable from moving vehicle. Also general pitted appearance through distinct but scattered loss of aggregate.	Distinct stone loss in small areas, or general pitted appearance through scattered loss of aggregate clusters, loosing shoulder to shoulder matrix.	Distinct disintegration of asphalt layer in small areas and/or general loss of precoated chips. Distinct pitted appearance.
5	General loss of slurry in large patches.	General loss of stone from all layers in large areas.	General disintegration of total asphalt layer.

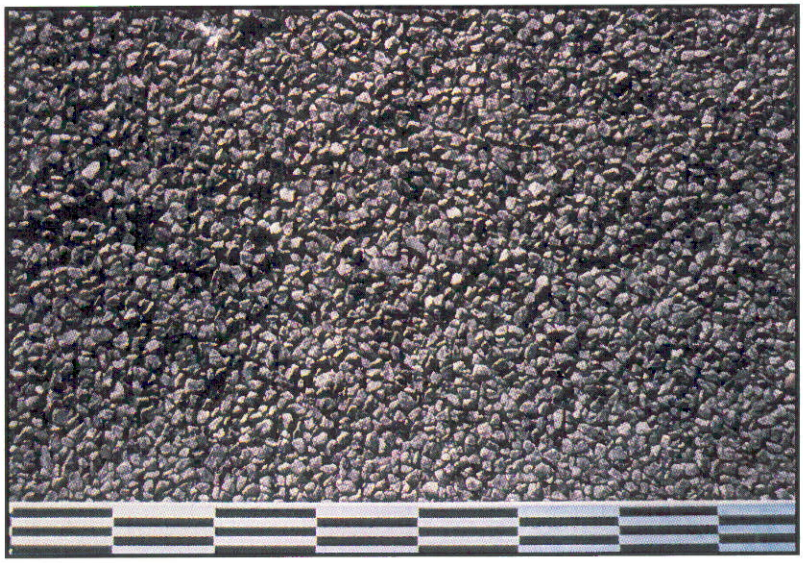
The extent of aggregate loss should be determined according to the definitions given in section A2.4.

TABLE B6(a): INDICATION OF AGGREGATE LOSS ACTIVITY (Desirable Item)

DEGREE OF ACTIVITY	DESCRIPTION
Active	Aggregate loss is continuing.
Non-Active	No continuing aggregate loss is visible.

The recording of aggregate loss activity is regarded as a desirable item.

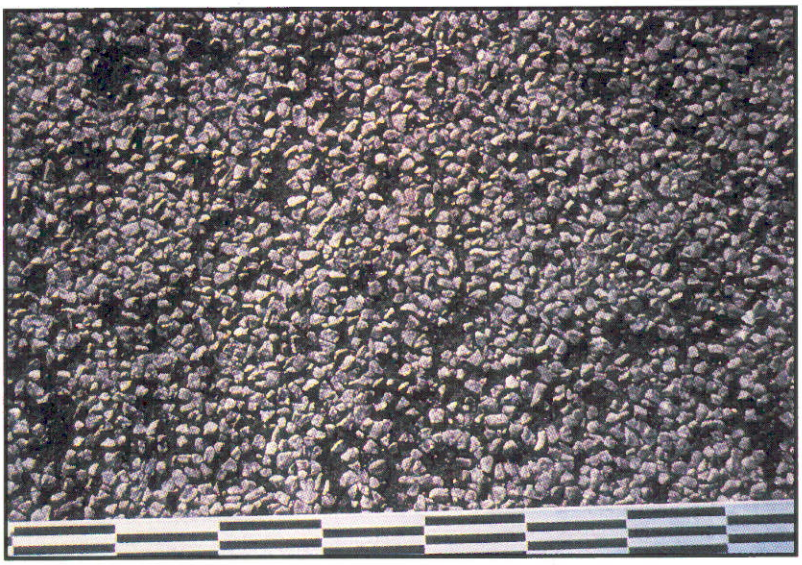
TYPE OF DISTRESS: AGGREGATE LOSS



DEGREE:

1	2	3	4	5
X				

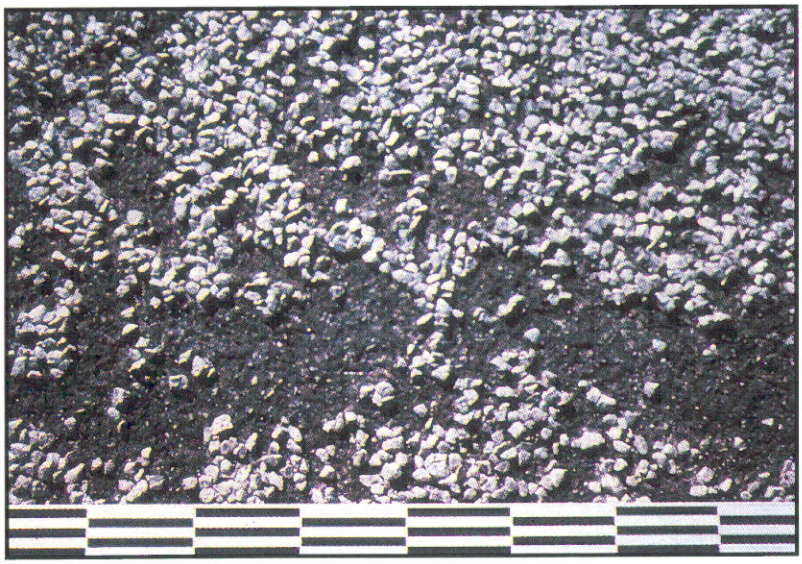
(SINGLE SEAL)



DEGREE:

1	2	3	4	5
		X		

(SINGLE SEAL)



DEGREE:

1	2	3	4	5
				X

(SINGLE SEAL)

SCALE

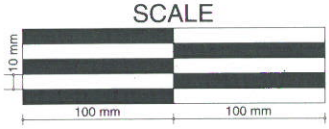


PLATE 7

B1.3.4 Binder condition (essential item) (no plate)

The binders in surface treatments and asphalts become increasingly dry and brittle with time. In surface treatments, with relatively thick films, there is an initial loss of the lighter, more volatile oils and aromatics and an increase in oxidation of the surface of the film. These oxidised products are partially water-soluble and also tend to shrink, exposing fresh surfaces after each rainfall, therefore allowing the oxidation to penetrate deeper into the binder film. In asphalts the binder film is thinner, but loss of oils and oxidation is restricted by the low voids in the mix.

To assess this defect, it is necessary to remove a chip or two from the surfacing between the wheel tracks and to test whether the binder is dry (lifeless) or not. The colour of the binder on the removed chip also gives an indication of the brittleness. If the binder is dry the colour will normally be dull and brownish and if the binder is 'lively' it will be bright black. The defect must not only be assessed visually on the road surface, because the colour of the aggregate can be misleading.

NOTE: Temperature could influence the brittleness of the binder. Conventional binders normally appear hard and dry below road temperatures of 20 °C.

The inspection of the shrinkage crack pattern may provide another clue. See section B1.3.2. The description of degrees of binder condition is given in Table B7.

TABLE B7: DESCRIPTION OF DEGREES OF BINDER CONDITION

DEGREE	DESCRIPTION
1	Binder not fresh but is sticky, and colour still bright black and/or very difficult to dislodge aggregates from seal. (No shrinkage cracks yet.)
3	Binder appears dull (brownish), binder is brittle owing to hardening and/or aggregates can be dislodged from seal with relatively little effort. (Shrinkage cracks may have appeared in slurries or asphalt.)
5	Binder is dull (brown) and very brittle (not sticky at all), binder elasticity is very low and/or aggregate can be dislodged from seal without effort. (Expect surface cracks in asphalt and slurries, and aggregate loss on stone seals.)

The extent of binder condition should be determined according to the definitions given in section A2.4. If the degree of binder condition is rated as > "0", then the extent should be rated as "5", unless there are significant variations in binder condition over the length of the road segment.

The secondary defects of dry binder condition, shrinkage cracks and aggregate loss, are described in sections B1.3.2 and B1.3.3.

B1.3.5 Bleeding/flushing (essential item) (Plate 8)

Bleeding occurs when excess binder moves upwards relative to the aggregates, therefore reducing surface texture depth. The measurement of this form of distress is complicated by the pronounced difference in textures obtained in the different forms of newly laid surfacings (e.g. asphalt, gap-graded asphalt with precoated chips, etc.). A common scale for the degree of bleeding for all types is desirable and Table B8 therefore gives a description of the degree of bleeding with particular reference to the presence of excess binder.

TABLE B8: DESCRIPTION OF DEGREES OF BLEEDING

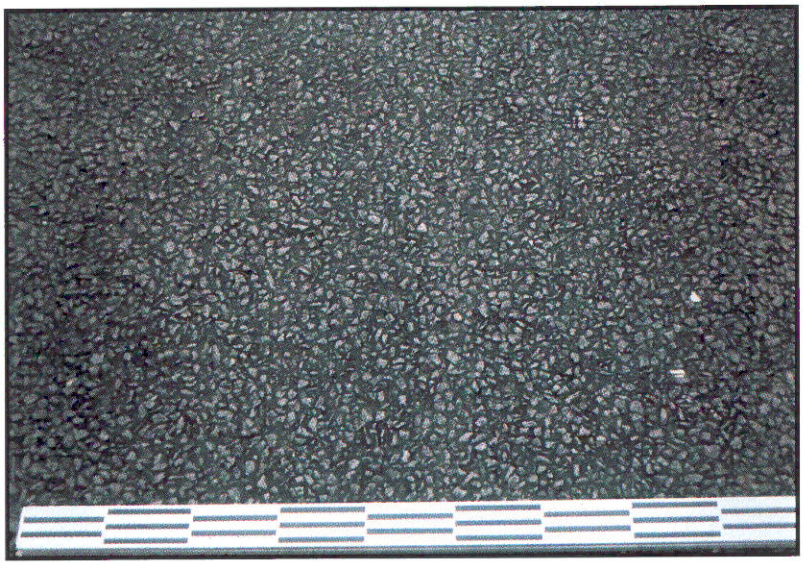
DEGREE	DESCRIPTION
1	Surfacing is slightly rich in excess binder. Stones well proud of binder.
3	Surfacing rich in excess binder. Smooth appearance, but stones visible in the binder.
5	Surfacing very rich in excess binder giving pavement surface a wet look. Film of excess binder covering all stones in wheel paths. Surface is tacky during hot weather, and/or wheel prints are visible in binder with possible pick-up of binder.

Degree 1 represents a texture depth that would be considered adequate for skid resistance of roads carrying high speed traffic, whereas degree 5 indicates the worst possible condition for skid resistance for all roads.

The descriptions of visual appearance with regard to depth between stones relate to surface seals. A dense-graded asphalt, for example, cannot obtain a condition described as degree 1 in terms of depth between stones. It is also difficult to determine the extent to which a lack of texture in depth is due to actual distress (i.e. a deterioration), rather than to the way in which it was constructed. Usually, however, only degrees 3 to 5 are of practical interest for such surfacings.

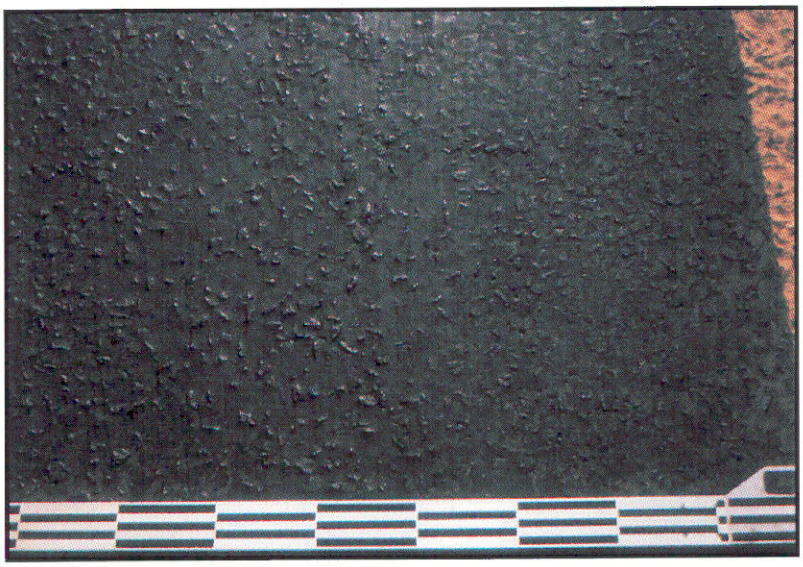
The extent of bleeding should be determined according to the definitions given in section A2.4.

TYPE OF DISTRESS: BLEEDING / FLUSHING



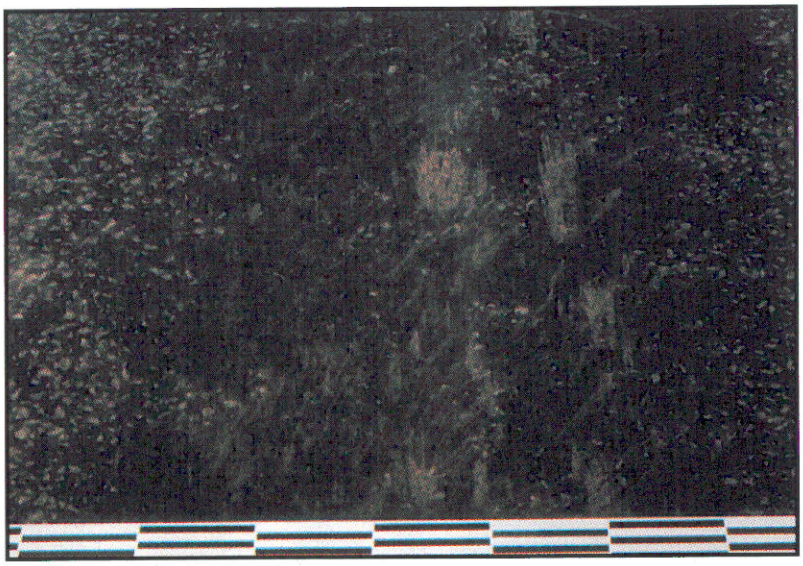
DEGREE :

1	2	3	4	5



DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5

SCALE

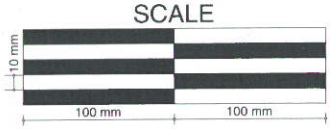


PLATE 8

B2. STRUCTURE

This section provides guide-lines for the evaluation of the current condition of the pavement structure as manifested through visible distress. This assessment will, together with the surfacing assessment, be used to determine the need for maintenance (including reseal and rehabilitation).

The defects are the result of deterioration of the strength of the pavement structure caused by, for example, a poor surfacing, ingress of water, traffic, climate, quality of material in pavement layers and the age of the pavement.

The following modes of distress which indicate the defects in the pavement structure are to be evaluated with regard to degree and extent:

- Cracking;
- pumping;
- deformation;
- patching; and
- failures/potholing.

B2.1 CRACKS

The following types of cracking have to be assessed:

- Block/stabilisation;
- longitudinal;
- transverse; and
- crocodile.

B2.1.1 Block/stabilisation cracks (essential item) (Plate 9)

Block cracks are normally caused by the shrinkage of treated (stabilised) pavement layers. The cracks are not only confined to the wheel paths. The cracks have a definite block pattern, although the longitudinal and transverse cracks do not always meet. The spacing of the cracks (Table B9) depends on the type of material, the type and quantity of stabilising or modifying agent used, and the degree of secondary distress (e.g. spalling of cracks).

The cracks do not necessarily indicate a significant deterioration of the pavement, but a potential for deterioration. Traffic action may lead to the formation of secondary cracks, which could eventually lead to severe distress.

It is often difficult to distinguish between block cracks and a combination of longitudinal and transverse cracks on a particular road segment. In such a case the cracks should be classified under only one of the two options, i.e. the more predominant type.

The description of degrees of block cracks is given in Table B9.

TABLE B9: DESCRIPTION OF DEGREES OF BLOCK/STABILISATION CRACKS

DEGREE	DESCRIPTION
1	Faint cracks.
3	Distinct, open cracks (≈ 3 mm) with slight spalling, deformation or secondary cracking at corners in the form of triangles.
5	Open cracks (> 3 mm) with significant spalling, secondary cracking or deformation evident around open cracks, or wide open cracks (> 10 mm) with little or no secondary defects.

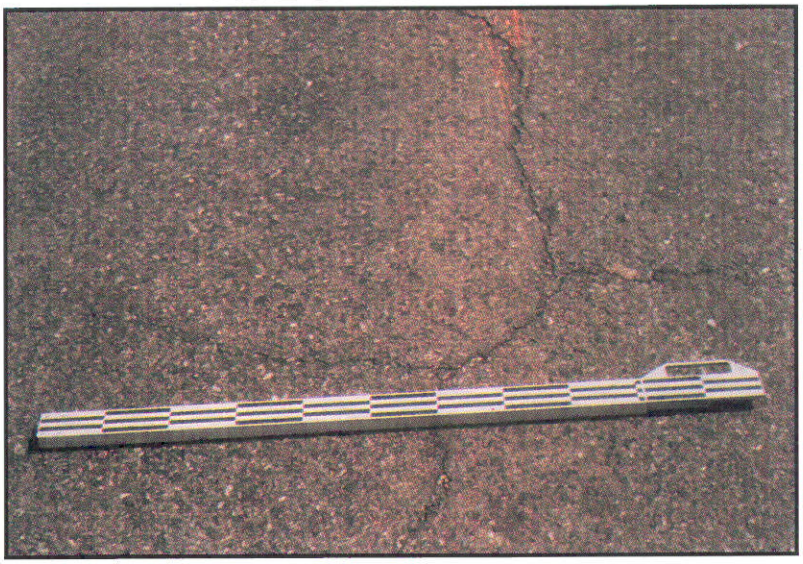
The extent of block cracking should be determined according to the definitions given in section A2.4.

The cracks for which the degree and extent rating was recorded must also be rated for crack spacing. This assessment of the average spacing **in the direction of travel** should be made as this also gives an indication of the severity of this type of distress. This is because the spacing of cracks is related to crack activity. Crack spacing should be rated as one of three spacing categories, as given in Table B9(a). In cases where block cracks have deteriorated to a very narrow spacing, this could be classified as block cracks with narrow spacing, or alternatively as crocodile cracks.

TABLE B9(a): SPACING CATEGORIES FOR BLOCK/STABILISATION CRACKS

CATEGORY	SPACING (m) (In direction of travel)
Narrow	< 0,5
Medium	0,5 to 2,5
Large	> 2,5

TYPE OF DISTRESS: BLOCK / STABILISATION CRACKS

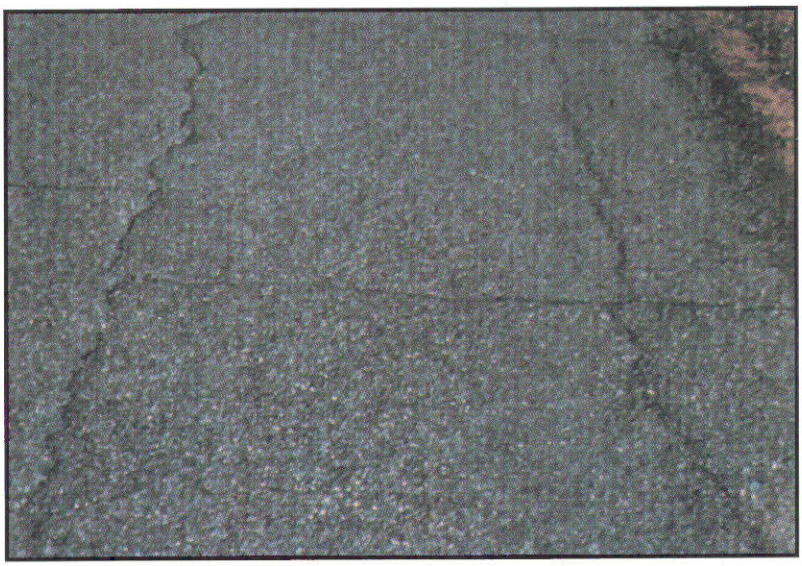


DEGREE:

1	2	3	4	5

SPACING

N	M	L



DEGREE:

1	2	3	4	5

SPACING

N	M	L

DEGREE:

1	2	3	4	5

SPACING

N	M	L

SCALE

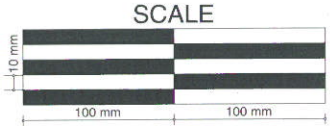


PLATE 9

B2.1.2 Longitudinal/slip cracks (essential item) (Plate 10)

This item includes the following two crack types:

(a) Longitudinal

These cracks are not restricted to the wheel paths and may occur because of poor construction techniques (e.g. asphalt overlay construction joint), settlement of embankments or active clay subgrades. These are line cracks running longitudinally along the pavement. They are often located near the edge of the pavement.

Although these cracks are not normally caused by traffic, the action of traffic and lack of maintenance can lead to crocodile cracking in the wheel paths. The first signs of fatigue cracking visible in the wheel path in the form of a small longitudinal crack should be rated as a longitudinal crack.

(b) Slip

These cracks are related to the movement of embankments and to embankment foundations. They often occur in circular patterns and are not restricted to wheel paths. A difference in height between affected and adjacent unaffected areas, separated by a crack at the tension zone between the two areas, could indicate subsidence or slip. The cracks may also occur at embankments and approaches to bridges and box culverts.

These cracks normally require major routine maintenance and, if left unattended, may lead to severe distress, especially in the case of high embankments.

The description of degrees of longitudinal/slip cracks is given in Table B10.

TABLE B10: DESCRIPTION OF DEGREES OF LONGITUDINAL/SLIP CRACKS

DEGREE	DESCRIPTION
1	Faint cracks.
3	Distinct, open cracks (≈ 3 mm) with slight spalling, deformation or secondary cracking at corners in the form of triangles.
5	Open cracks (> 3 mm) with significant spalling, secondary cracking or deformation evident around open cracks, or wide open cracks (>10mm) with little or no secondary defects.

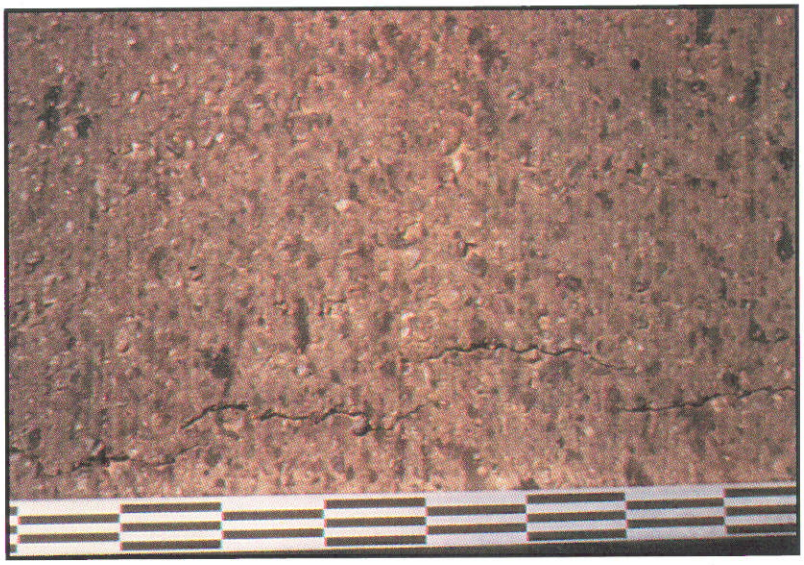
The extent of longitudinal/slip cracking should be determined according to the definitions given in section A2.4.

In cases where two or more longitudinal cracks occur next to each other, an assessment of the average spacing, **transverse to the direction of travel**, should be made. The spacing should be rated according to Table B10(b). The recording of the **crack spacing** in longitudinal cracks is considered to be a **desirable item**.

TABLE B10(b): SPACING CATEGORIES FOR LONGITUDINAL/SLIP CRACKS (Desirable item)

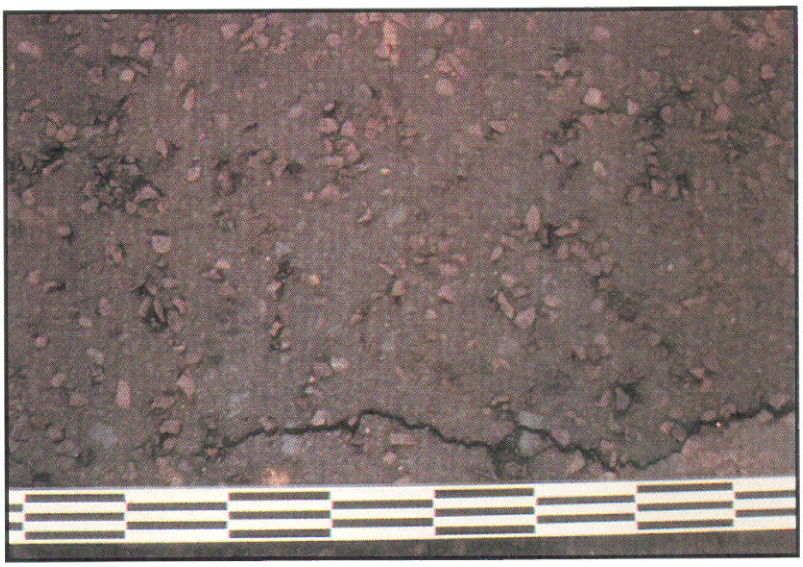
CATEGORY	SPACING (m) (Transverse to the direction of travel)
Narrow	< 0,5
Medium	0,5 to 2,5
Large	> 2,5

TYPE OF DISTRESS: LONGITUDINAL / SLIP CRACKS



DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5

DEGREE:

1	2	3	4	5

SCALE

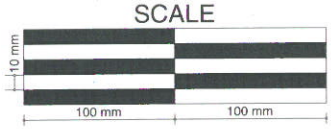


PLATE 10

B2.1.3 Transverse cracks (essential item) (no plate)

Transverse cracks are line cracks across the pavement. They are often a first manifestation of shrinkage in a cement stabilised base or subbase, but may also be a sign of active clay in the subgrade. Transverse cracks can also be a sign of temperature associated fatigue and seasonal effects. They are normally not related to structural problems, but further deterioration of the pavement may occur with the ingress of water through the cracks.

These cracks often also occur at drainage structures or where services have been installed subsequent to initial construction by the pavement layers. They could indicate poor compaction of the material in the immediate vicinity of the cracks.

Shrinkage cracks which often appear in an asphalt surfacing layer (map pattern) should not be noted as transverse cracks, but as surfacing cracks.

The description of degrees of transverse cracks is given in Table B11.

TABLE B11: DESCRIPTION OF DEGREES OF TRANSVERSE CRACKS

DEGREE	DESCRIPTION
1	Faint cracks.
3	Distinct, open cracks ($\approx$ 3 mm) with slight spalling, deformation or secondary cracking at corners in the form of triangles.
5	Open cracks ($>$ 3 mm) with spalling, secondary cracking or deformation evident around open cracks, or wide open cracks ($>$ 10 mm), with little or no secondary defects.

The extent of transverse cracking should be determined according to the definitions given in section A2.4.

B2.1.4 Crocodile (fatigue) cracks (essential item) (Plate 11)

Crocodile cracking is often limited to the wheel paths. Crocodile cracks normally occur as a result of fatigue failure of surfacing or base layers and are related to the inability of the pavement to carry the traffic load. In addition, they may occur as a result traffic fatigue of dry or brittle surfacing layers in the wheel paths, permitting the ingress of water into the pavement layers. In such cases there is initially no sign of rutting. Crocodile cracks also occur in isolated patches where failure is caused by poor drainage and sealed-in moisture.

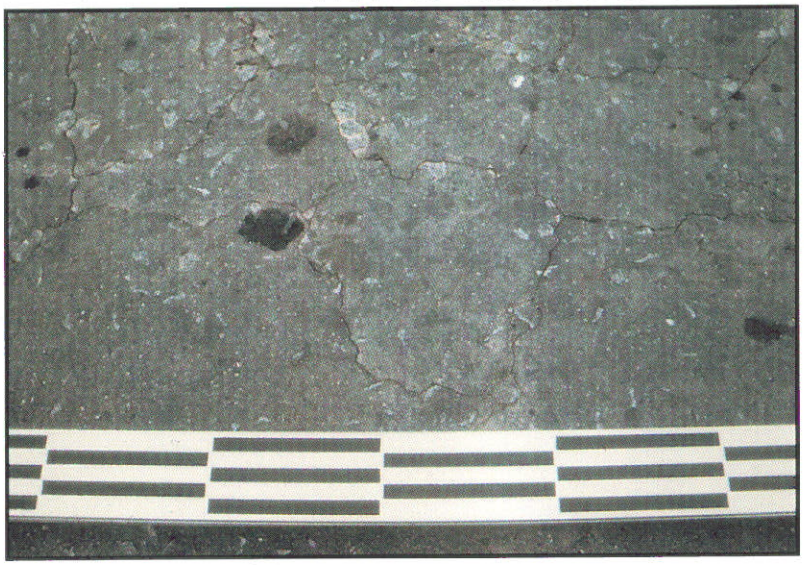
Initially, crocodile cracking often appears as fine, irregular longitudinal cracks which grow progressively closer and eventually interconnect to form the familiar crocodile pattern. These initially fine, irregular longitudinal cracks, should however be classified as longitudinal cracks for the purposes of the assessment. Crocodile cracking also occurs as secondary cracking around primary line cracks. Higher degrees (degree $\geq$ 3) of crocodile cracking are often accompanied by deformation. The description of the degrees of crocodile cracks is given in Table B12.

TABLE B12: DESCRIPTION OF DEGREES OF CROCODILE CRACKS

DEGREE	DESCRIPTION
1	Faint cracks in wheel paths. Only visible on close inspection.
3	Distinct cracks with slight deformation/movement of cracked areas and/or slight spalling of the edges.
5	Open cracks with severe deformation/movement of cracked area and/or extensive spalling of edges. Crocodile cracking has spread outside the wheel paths. High density of crocodile crack pattern.

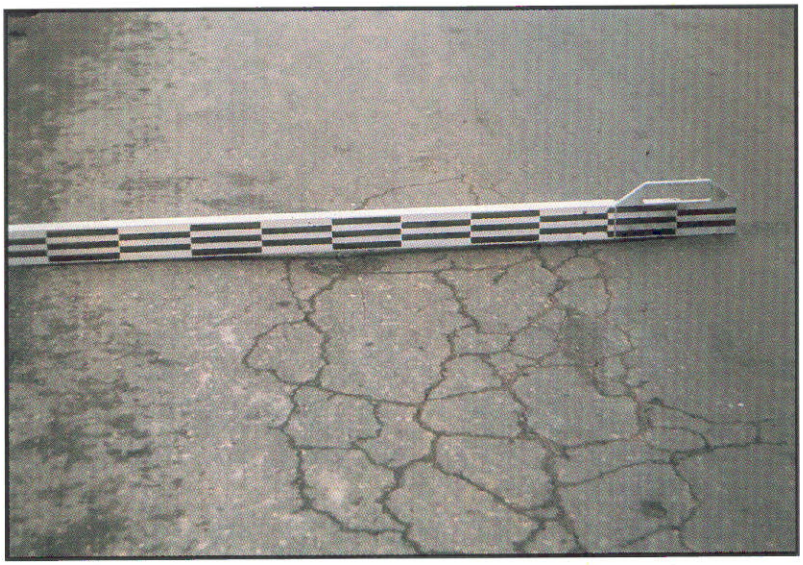
The extent of crocodile cracking should be determined according to the definitions given in section A2.4.

TYPE OF DISTRESS: CROCODILE CRACKS



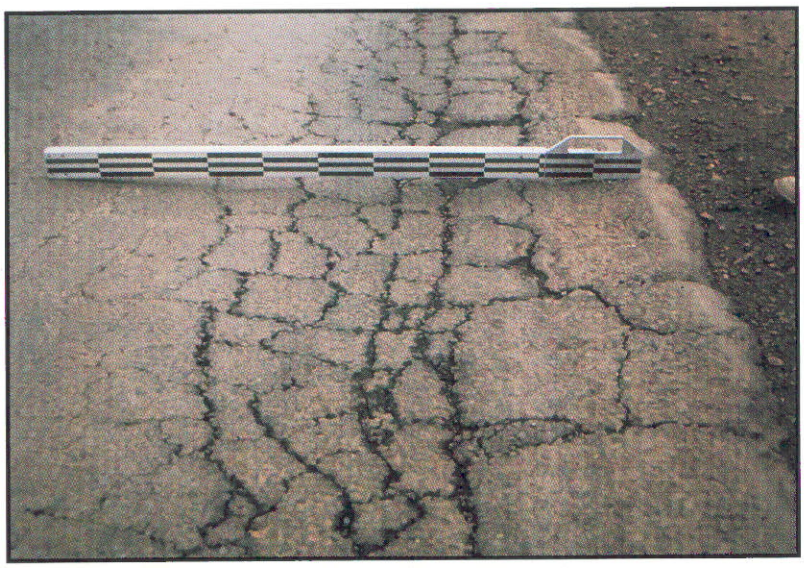
DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5

SCALE

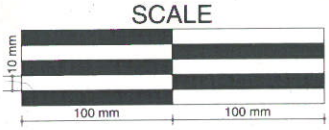


PLATE 11

B2.2 PUMPING (essential item) (Plate 12)

Pumping occurs when active pore pressures under traffic loading cause fine material to be pumped from within the pavement to the surface, normally through existing cracks. Pumped out fines are visible along the cracks on the surfacing and there is usually a thin layer of fines next to the cracks which adheres to the surface layer.

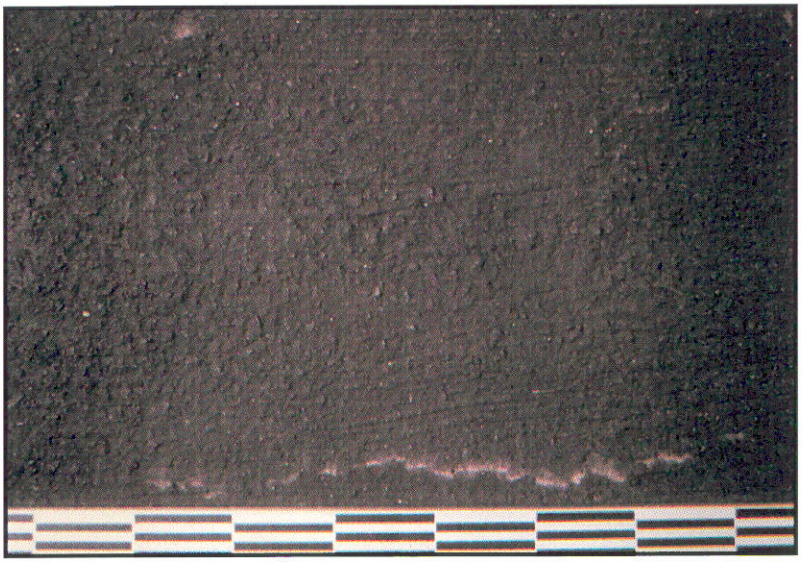
Pumping of fines is affected by rainfall and cracks should therefore be inspected carefully for signs of pumping. The description of the degrees of pumping is given in Table B13.

TABLE B13: DESCRIPTION OF DEGREES OF PUMPING

DEGREE	DESCRIPTION
1	Pumping faintly visible on close inspection.
3	Pumping clearly visible from vehicle. Only slight or no deformation of road surface next to the crack.
5	Extensive deposits of fines alongside the cracks and/or severe deformation at cracks.

The extent of pumping should be determined according to the definitions given in section A2.4.

TYPE OF DISTRESS: PUMPING



DEGREE:

1	2	3	4	5
X				

DEGREE:

1	2	3	4	5
		X		

DEGREE:

1	2	3	4	5
				X

SCALE

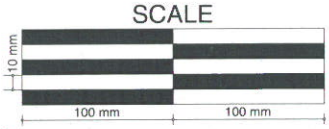


PLATE 12

B2.3 DEFORMATION

Deformation is a change in the road surface profile. This is manifested as an area of the pavement having its surface either above or below that of the original level. The following types of deformation are assessed:

- Rutting; and
- undulation/settlement.

B2.3.1 Rutting (essential item) (Plate 13)

Rutting results from compaction or shear deformation through the action of traffic and is limited to the wheel paths. When the rutting is fairly wide and even-shaped, the problem is normally in the lower pavement layers. When rutting is narrower and more sharply defined, the problem normally lies within the upper pavement layers. Rutting frequently occurs with crocodile cracking, especially for pavement structures with thin bituminous layers. A deviation of the yellow line could also assist in the identification of rutting.

The assessor is not expected to measure rut depths using a straight edge, but for calibration purposes rutting is defined as the maximum deviation measured under a two metre straight edge placed transversely across the rut. The description of the degrees of rutting is given in Table B14.

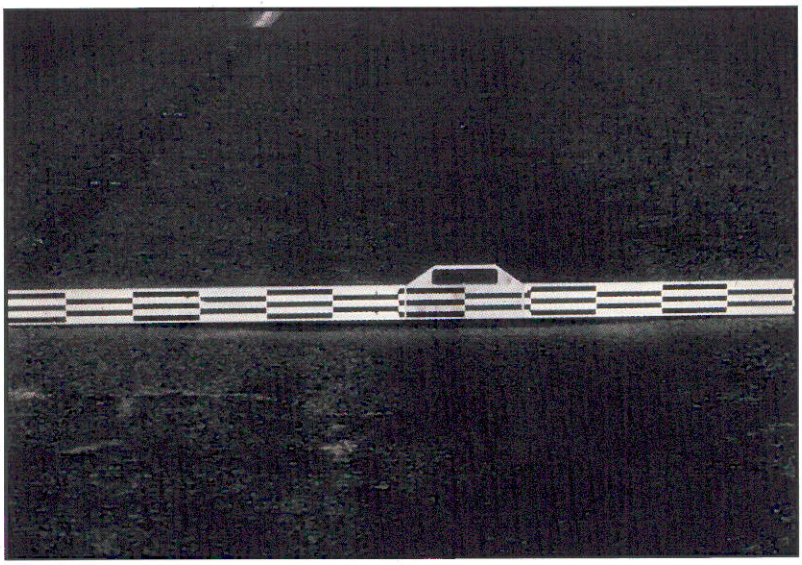
TABLE B14: DESCRIPTION OF DEGREES OF RUTTING

DEGREE	DESCRIPTION
1	Difficult to discern unaided (< 5 mm).
3	Just discernible (≈ 10 - 15 mm).
5	Severe, dangerous. Very obvious from moving vehicle, even at high speed. Affects directional stability. (> 30 mm).

The extent of rutting should be determined according to the definitions given in section A2.4.

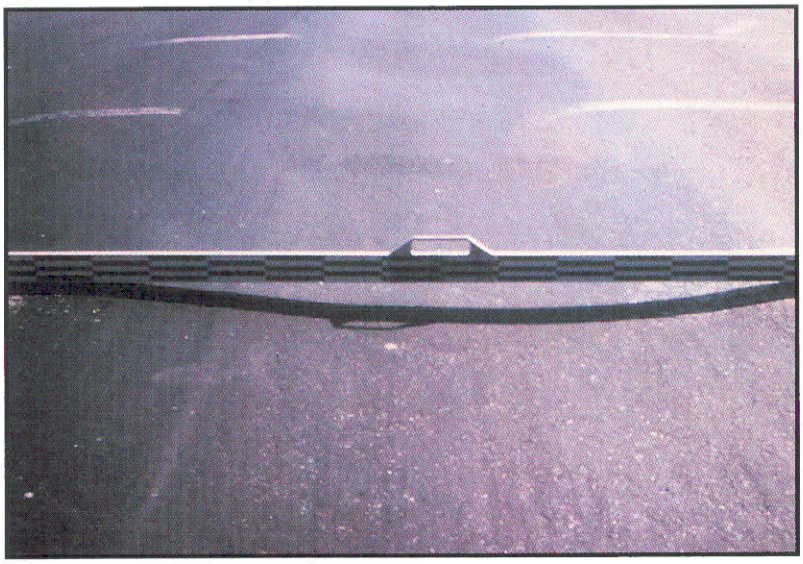
TYPE OF DISTRESS: RUTTING

NO PHOTOGRAPH



DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5

SCALE

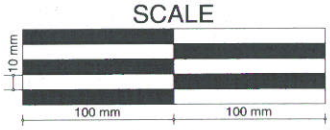


PLATE 13

B2.3.2 Undulation/settlement (desirable item) (Plate 14)

Undulation is a wavy form of deformation of the type usually associated with the settlement (especially differential settlement) of embankments at culverts and bridges. It is often associated with adverse foundation conditions, e.g. in-situ foundation materials with a slow rate of consolidation or heaving clays affected by changes in moisture conditions. This defect can also be caused by compaction.

The degree of undulation is fairly subjective. Table B15 serves as a guide to link the degree of undulations to the riding quality of the road and therefore the safety of the road user. Although there is an overlap of this item with riding quality, the purpose of this rating is to highlight the presence of differential settlement, consolidation or heaving related deformation.

NOTE: Unevenness caused by patches, potholes, corrugations and failures should not be rated as undulation/settlement. General unevenness of the road resulting from constructions or other minor problems should not be rated under this item, but will be reflected in the riding quality measurement or rating.

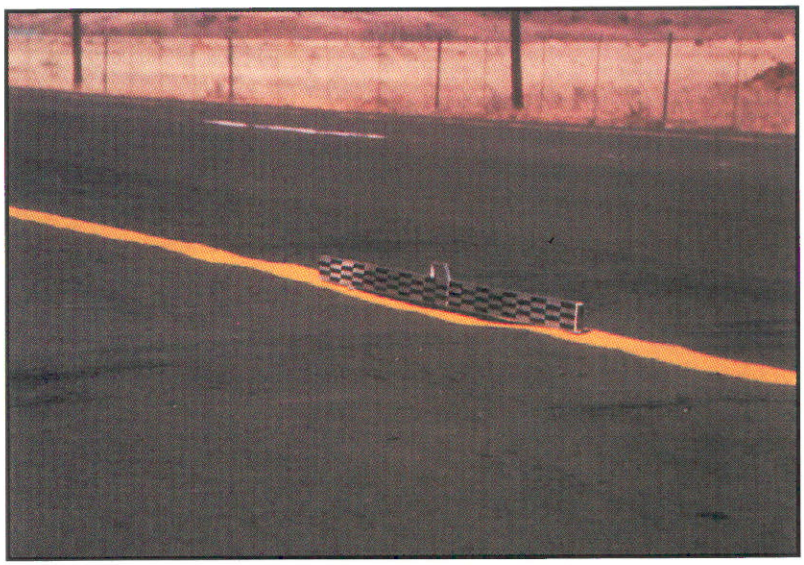
TABLE B15: DESCRIPTION OF DEGREES OF UNDULATION

DEGREE	DESCRIPTION
1	Undulation causes slight unevenness of road profile, ride is still smooth and comfortable.
3	Undulation is clearly visible and has an effect on riding quality. Motorists may have to reduce driving speed if extent is more than merely localised.
5	Ride very poor and very uncomfortable owing to undulations, road unsafe at normal speed limit. Speed restrictions may have been imposed.

The extent of undulations should be determined according to the definitions given in section A2.4.

TYPE OF DISTRESS: UNDULATION / SETTLEMENT

NO PHOTOGRAPH



DEGREE:

1	2	3	4	5

DEGREE:

1	2	3	4	5

SCALE

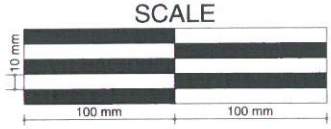


PLATE 14

B2.4 PATCHING (essential item) (Plate 15)

Distressed areas are often patched. Although such patches are not necessarily "defects", they do give an indication of the condition of the pavement in so far as they show the extent of previous distress.

The description of the degrees of patching is given in Table B16.

TABLE B16: DESCRIPTION OF DEGREES OF PATCHING

DEGREE	DESCRIPTION
1	Patching in good condition.
3	Patching with significant signs of distress. (E.g. cracking and/or deformation)
5	Severely distressed patching. (Patching breaking up and/or severe deformation with cracking)

The extent of patching should be determined according to the definitions given in section A2.4.

NOTE: Distress types within a patch (e.g. cracking and pumping) should not be rated separately.

The recording of the **size of patching** is regarded as a **desirable item.** The assessment of the average size of the patches can give an indication of the severity of the distress type that was repaired with the patch. The size of patches, for which the degree and extent rating was recorded, should be rated as one of the three categories given in Table B16(a).

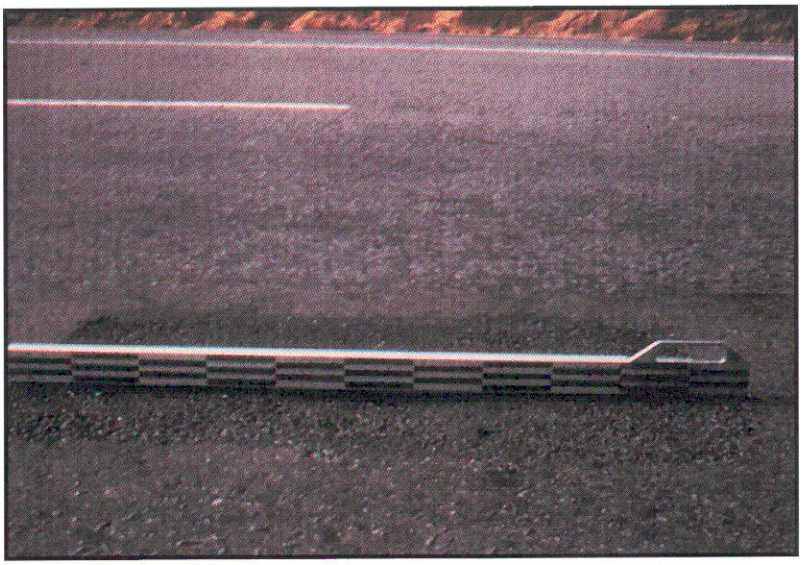
TABLE B16(a): CATEGORIES FOR DESCRIBING SIZE OF PATCHING (Desirable Item)

CATEGORY	SIZE
Small	$< 2\ m^2$
Medium	$\approx 5\ m^2$
Large	$> 10\ m^2$

NOTE: The following items are not regarded as patching:

- Sealed cracks.
- Rut filling.
- Slurry or emulsion painted over a distressed area.
- Repair work constructed with major plant using the following items as guide-lines:
  - Width of repair work greater than the width of one lane; and/or
  - length of repair work more than 50 metres.

TYPE OF DISTRESS: PATCHING

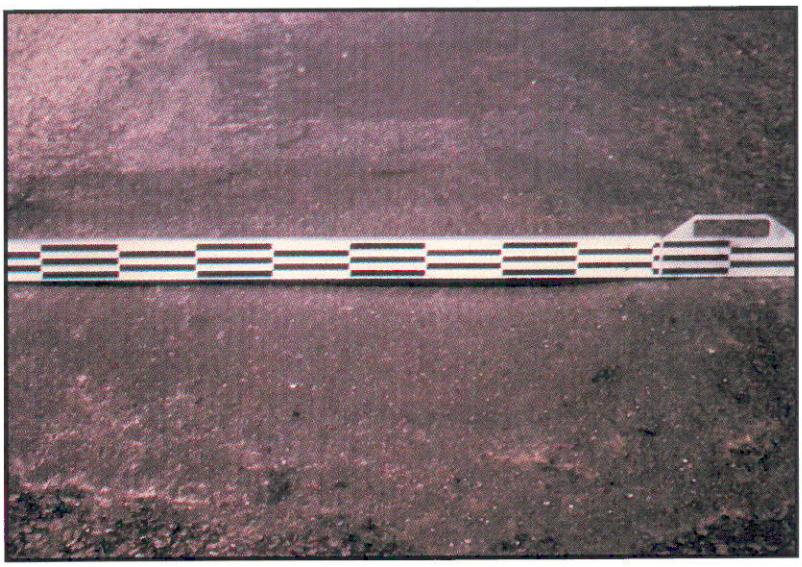


DEGREE:

1	2	3	4	5
X				

SIZE:

S	M	L
X		

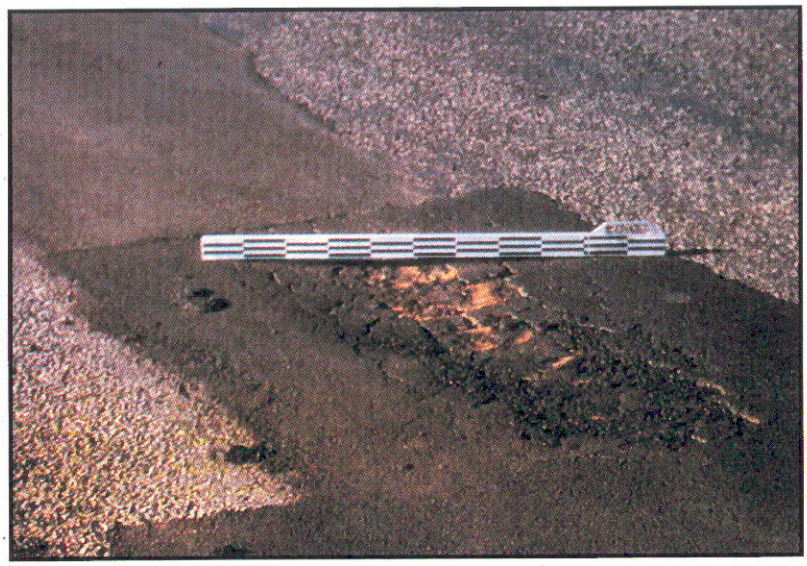


DEGREE:

1	2	3	4	5
		X		

SIZE:

S	M	L
X		



DEGREE:

1	2	3	4	5
				X

SIZE:

S	M	L
	X	

SCALE

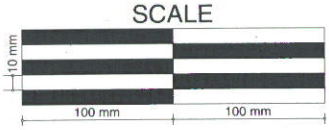


PLATE 15

B2.5 FAILURES/POTHOLING (essential item) (Plates 16 and 17)

Failures/potholes (loss of material from the base layer) refer to structural failures and exclude surfacing failures (owing to loss of surfacing) described in section B1.3.1.

Structural failures are manifested mostly as potholes, which are generally a secondary form of distress that develops from cracking or extreme loss of aggregate. They are traffic induced and normally develop from structural cracking in the wheel paths. Moisture ingress into the pavement layers can result in the total loss of the structural capacity of the pavement and in the formation of potholes. Failures occur when materials in weak pavement layers are displaced laterally through shear forces induced by traffic, resulting in mounds adjacent to depressions.

The degree of potholing can generally be expressed by the diameter and depth of the potholes. The description of degrees for failures and potholes is given in Table B17.

TABLE B17: DESCRIPTION OF DEGREES OF FAILURES/POTHOLING

DEGREE	DESCRIPTION	
	FAILURES	POTHOLING
1	Not defined for failures.	Not defined for potholes.
3	Failure developing. Minor depression (< 30 mm). Start of surface distress and shoving.	Potholes ≈ 200 mm diameter and of significant depth. (> 25 mm)
5	Severe failure with loss of surfacing and base material or severe depression (> 50 mm) and shoving.	Potholes > 300 mm diameter and of serious depth (> 50 mm) and/or severe secondary defects.

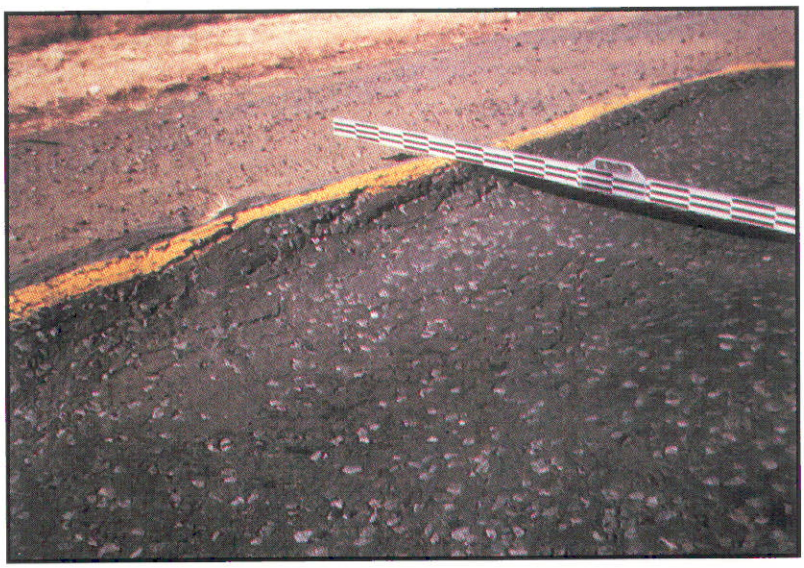
The extent of failures/potholing should be determined according to the definitions given in section A2.4.

NOTE: Distress types within a failure (e.g. cracks and pumping) should not be rated separately. Edge breaking should not be rated as potholes unless it extends into a wheel track.

TYPE OF DISTRESS: FAILURES / POTHOLES

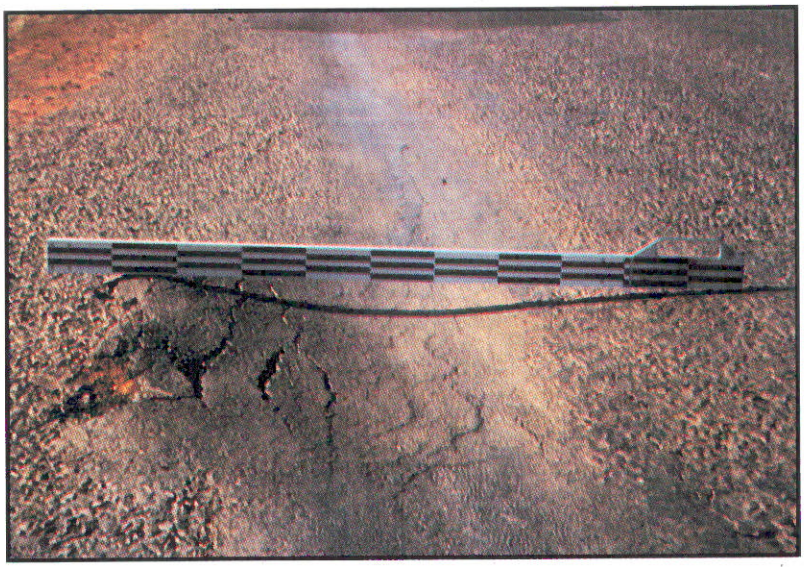
DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5

SCALE

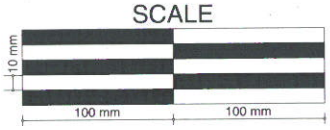
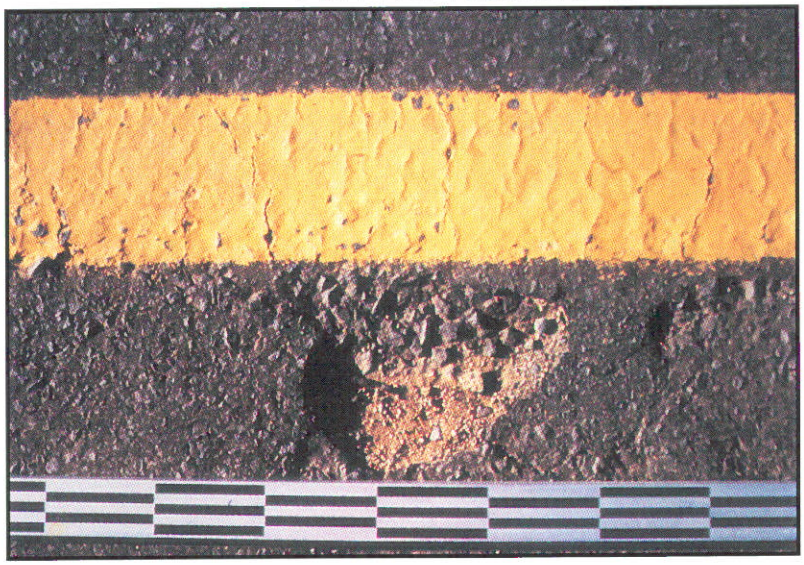


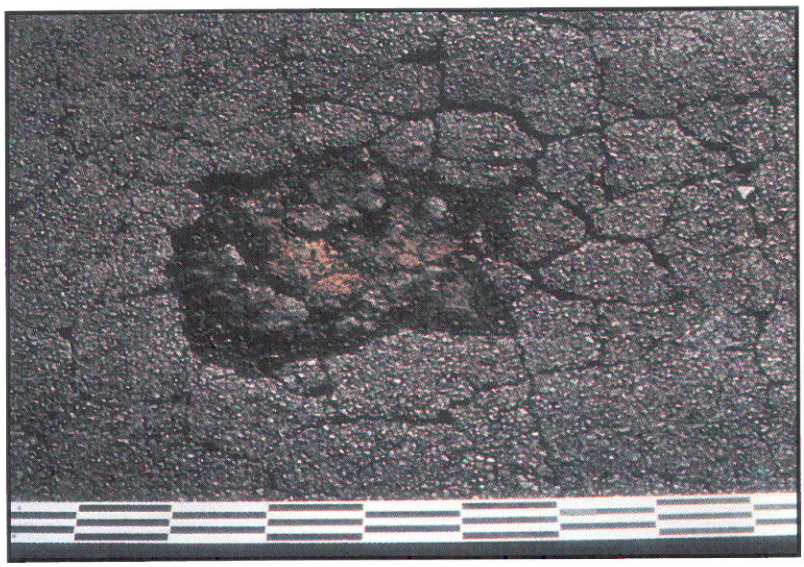
PLATE 16

TYPE OF DISTRESS: FAILURES / POTHOLES



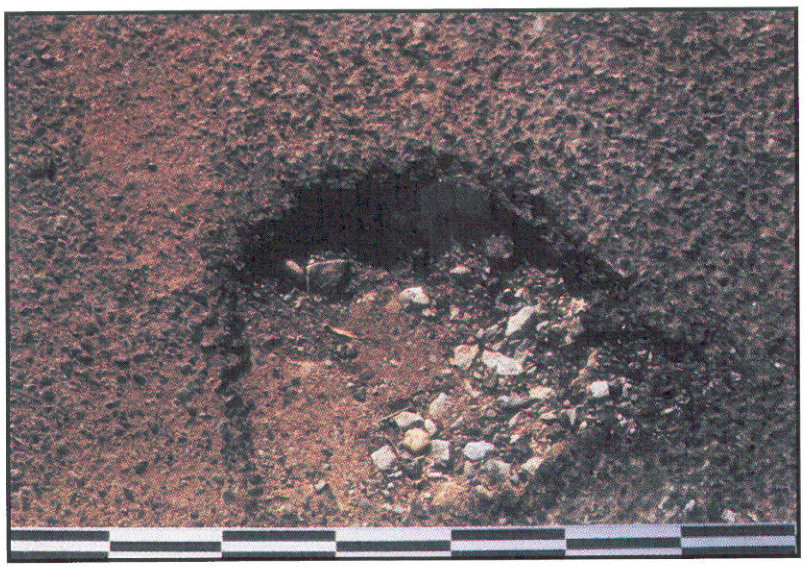
DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5



DEGREE:

1	2	3	4	5

SCALE

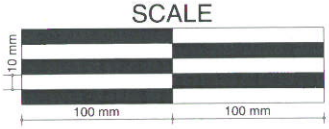


PLATE 17

B3. FUNCTIONAL FEATURES

The functional requirements of a road reflect the service it provides to the road user. They are predominantly those that govern the comfort, safety and speed of travel.

The various functional features to be assessed are the riding quality, skid resistance, surface drainage, condition of the shoulders and edge breaking. In this section they are assessed either on a five-point or a three-point scale (excluding edge breaking).

B3.1 RIDING QUALITY (desirable item) (No Plate)

The riding quality of a pavement is defined as the general extent to which road users, through the medium of their vehicles, experience a ride that is smooth and comfortable, or bumpy and therefore unpleasant or perhaps unsafe. This is determined by the unevenness of the road profile (longitudinal deformation, rutting in wheel paths, etc.), the loss of surface or base layer material (potholes, extreme ravelling, etc.) and uneven patching. The description of degrees of riding quality is given in Table B18.

TABLE B18: DESCRIPTION OF DEGREES OF RIDING QUALITY

DEGREE	DESCRIPTION	APPROXIMATE PSI*
Very good	Ride very smooth and very comfortable, no unevenness of the road profile, no rutting, ravelling or uneven patching.	>3,5
Good	Ride smooth and comfortable, slight unevenness of the road profile, slight rutting, ravelling or uneven patching.	3
Fair	Ride fairly smooth and slightly uncomfortable, intermittent moderate unevenness of the road profile, moderate rutting, ravelling or uneven patching.	2,5
Poor	Ride poor and uncomfortable, frequent moderate unevenness of the road profile, frequent rutting, ravelling or uneven patching, comfortable driving speed below speed limit.	2,0
Very poor	Ride very poor and very uncomfortable, extensive severe unevenness of the road profile, extensive rutting, ravelling or uneven patching, comfortable driving speed much lower than speed limit, road unsafe owing to severe unevenness.	<1,5

* PSI: Present Serviceability Index according to TRH 4: 1985.

NOTE: Problems resulting in poor riding quality can be indicated on the assessment form (if required), by marking the appropriate block(s), if provided on the form. These problems include -

- potholes/failures;
- patching;
- undulations;
- corrugation; and
- general unevenness.

B3.2 SKID RESISTANCE (desirable item) (no plate)

Skid resistance reflects the general ability of the road surface to prevent skidding when wet, in all manoeuvres generally executed by vehicles. The property that largely determines skid resistance is the surface texture. The two important characteristics of the surface texture are the surface texture depth and the hardness or roughness of the stones themselves.

The surface texture depth relates to the gaps between the stones protruding from the surface. The roughness of the stones can be qualitatively assessed by examining the stones and determining if they are rough and angular or smooth and rounded (polished by traffic action). The description of degrees of skid resistance is given in Table B19.

TABLE B19: DESCRIPTION OF DEGREES OF SKID RESISTANCE

DEGREE	DESCRIPTION
Very good	Skid resistance adequate for roads carrying high speed traffic, surface texture coarse, many voids. Stones very rough, edges sharp to the touch. (Example: New 13 mm single seal.)
Fair	Skid resistance intermittently inadequate for high speed traffic and/or surface texture medium to fine, few voids. Stones not very sharp or very rough to touch. (Example: Continuously graded asphalt surface.)
Very poor	Skid resistance inadequate for all traffic and/or texture fine, no voids, film of binder covering all stones. Stones rounded and smooth to the touch. (Example: Severe bleeding and/or very smooth asphalt surface on curve or rolling terrain.)

NOTE: Problems resulting in poor skid resistance can be indicated on the assessment form (if required), by marking the appropriate block(s), if provided on the form. These problems include -

- bleeding (described in section B1.3.5); and
- polished aggregates (described above).

B3.3 DRAINAGE

B3.3.1 Surface drainage (desirable item) (no plate)

The surface drainage of a road is a measure of the general ability of the road to keep the riding surface clear of water. This is related to the speed at which water runs off during rain and to the extent of the ponding of water during and after rain. It is an important factor which affects the skid resistance and the volume of water sprayed on to other vehicles. The function of good surface drainage is also to keep the road surface clear of grit washed onto the road from the verges. Overall drainage, including side drains should not be assessed as part of surface drainage. Surface drainage includes only the area up to two metres from the outside yellow line (paved and unpaved shoulders).

The description of degrees is given in Table B20.

TABLE B20: DESCRIPTION OF DEGREES OF SURFACE DRAINAGE RATINGS

DEGREE	DESCRIPTION
Adequate	No visible problem that could retard the run-off of water from the road and shoulders.
Warning	Problems exist that could lead to general slight ponding or severe localised ponding.
Inadequate	Problems exist that could lead to widespread severe ponding in the wheel paths.

NOTE: Problems leading to inadequate surface drainage can be indicated on the assessment form (if required), by marking the appropriate block(s), if provided on the form. These problems include the following -

- Alignment : Horizontal or vertical alignment problems;
- shoulders : Too high or overgrown, leading to ponding of water on the road; and
- rutting : Water ponding in wheel ruts on relatively flat roads.

B3.3.2 Side drainage (desirable item) (no plate)

Although a side drainage problem is not a pavement distress type and therefore not an indication of pavement condition, problems with the side drains could lead to premature pavement failure. If there are problems, they are only noted by marking the side drain block and not rated as degree and extent. Side drainage problems could include -

- overgrown side drains;
- blocked side drains; or
- non-existent side drains.

B3.4 SHOULDERS

B3.4.1 Unpaved shoulders (essential item) (Plate 18)

Unpaved road shoulders are defined in section A1.4(d).

The unpaved shoulder is rated in terms of the availability of the shoulder as a safe recovery area. Several problems might render the unpaved shoulder unsafe, for example -

- the erosion of the shoulder by water;
- wearing out by traffic;
- elevational differences between edge of carriageway and shoulder;
- the width of the shoulder is too narrow;
- the cross-sectional slope of the shoulder is too steep; or
- sight distances are obstructed by vegetation.

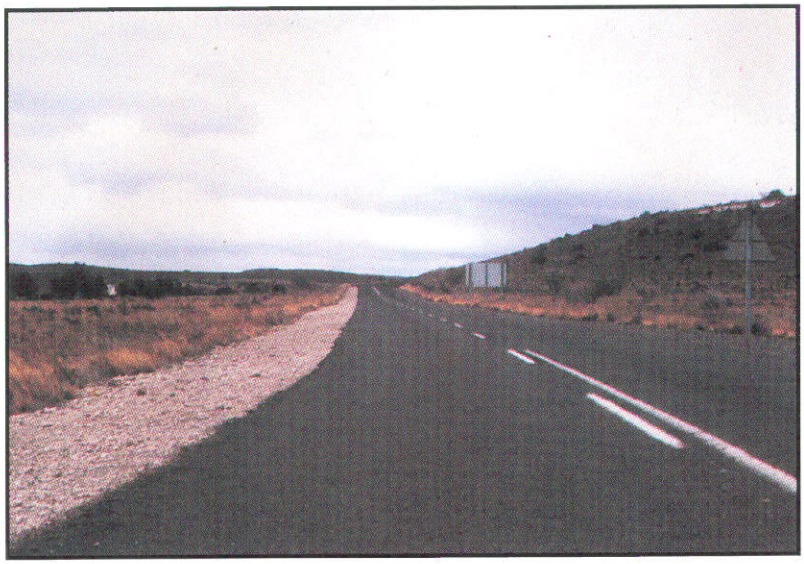
These problems can be indicated on the assessment form by marking the appropriate block(s), if provided on the form. If the paved shoulder width is less than 2 m, the verge (unpaved area) should be rated as part of unpaved shoulder.

The description of the degrees of unpaved shoulder conditions is given in Table B21.

TABLE B21: DESCRIPTION OF DEGREES OF UNPAVED SHOULDER CONDITIONS

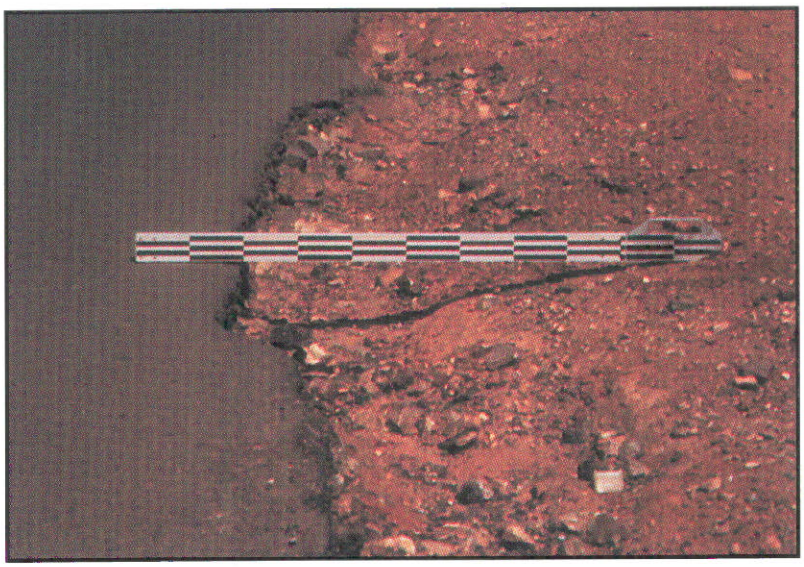
DEGREE	DESCRIPTION
Safe	Shoulder can be safely used as stopping area at the posted speed limit.
Warning	Problems may be expected if the shoulder is used as stopping area at the posted speed limit (routine maintenance required).
Unsafe	Shoulder definitely unsafe to be used as stopping area at the posted speed limit.

TYPE OF DISTRESS: SHOULDERS



DEGREE:

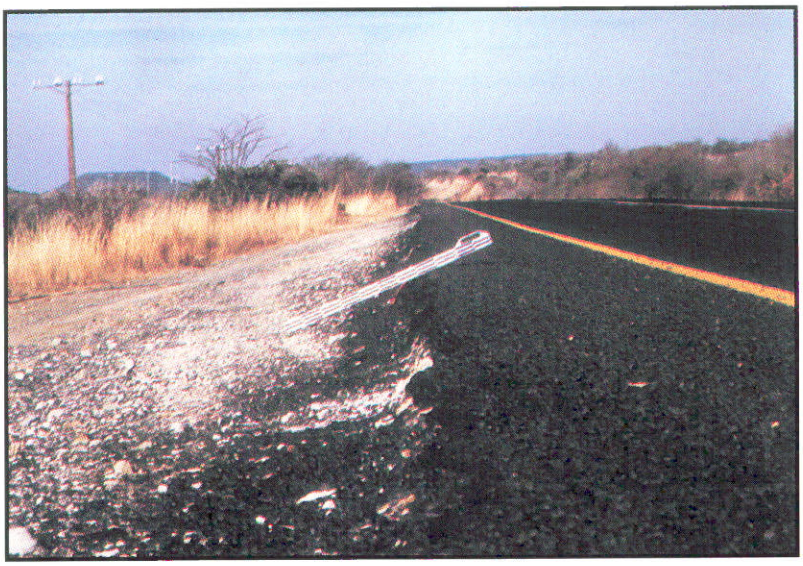
~~SAFE~~	WARNING	UNSAFE



DEGREE:

SAFE	WARNING	~~UNSAFE~~

(EROSION; ALSO EDGE BREAKING DEGREE 4.)



DEGREE:

SAFE	WARNING	~~UNSAFE~~

(STEEP)

SCALE

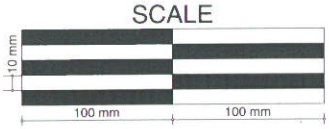


PLATE 18

B3.4.2 Paved shoulders (desirable item) (no plate)

Individual items of distress on paved shoulders are assessed as part of the road pavement. In some cases the condition of paved shoulders differs significantly from the condition of the travelled lanes owing to -

- low traffic coverage;
- overloading by heavy vehicles of a low standard pavement structure in the shoulder, or
- past maintenance (reseal) of travelled lanes only.

To highlight the above-mentioned situations, a general condition rating can be recorded for the paved shoulder, over and above the ratings for the individual distress types. The description of the degrees of paved shoulder conditions is given in Table B22.

TABLE B22: DESCRIPTION OF DEGREES OF PAVED SHOULDER CONDITIONS

DEGREE	DESCRIPTION
Very good	Very few or no defects.
Fair	A few defects with degree of defects seldom severe.
Very poor	Many defects. The degree of the majority of defects is severe and the extent is predominantly general to extensive.

B3.5 EDGE BREAKING (essential item) (Plate 19)

Edge breaks are caused by the breaking away of the surfacing at the outside edges of the surfacing. This is often due to poor unpaved shoulder maintenance. The degree of edge breaking is rated by measuring the average distance from the edge of the pavement to the maximum point of breakage. The description of degrees of edge breaking is given in Table B23. For consistency of evaluation, edge breaks on paved shoulders should also be rated.

TABLE B23: DESCRIPTION OF DEGREES OF EDGE BREAKING

DEGREE	DESCRIPTION
1	Slight edge breaking ($\approx$ 50 mm).
3	Significant edge breaking ($\approx$ 150 mm)
5	Severe edge breaking which is a safety hazard to traffic ($>$ 300 mm) and/or severe secondary defects.

The extent of edge breaking should be determined according to the definitions given in section A2.4

NOTE: Edge breaking extending into the wheel path should be classified as potholing.

TYPE OF DISTRESS: EDGE BREAKING

DEGREE:

1	2	3	4	5
X				

DEGREE:

1	2	3	4	5
		X		

DEGREE:

1	2	3	4	5
				X

SCALE

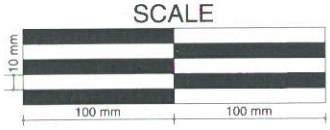


PLATE 19

B4. SUMMARY

This section defines the summarised pavement condition and need information to be recorded by the assessor. The information is not used in data processing, but provides checks for the verification of the condition assessment data.

B4.1 OVERALL CONDITION OF THE PAVEMENT (essential item)

The description of the overall condition of the pavement is given in Table B24. A general rating for the condition of the pavement is useful for data verification.

TABLE B24: DESCRIPTION OF DEGREES OF OVERALL CONDITION OF PAVEMENT

DEGREE	DESCRIPTION
Very good	Very few or no defects. Degree of defects < 3 (less than warning).
Good	Few defects. Degree of structural defects mostly less than warning.
Fair	A few defects with degree of defects seldom severe. Extent is only local if degree is severe (excluding surfacing defects).
Poor	General occurrence of particularly structural defects with degrees warning to severe.
Very poor	Many defects. The degree of the majority of structural defects is severe and the extent is predominantly general to extensive.

B4.2 TREATMENT RECOMMENDED (desirable)

The assessor must give an indication of the type of treatment which he considers necessary on the road segment, together with its priority. Four treatments are possible, as described in Table B25 below.

TABLE B25: DESCRIPTION OF RECOMMENDED TREATMENTS

TYPE	DESCRIPTION
None	The current condition of the road requires no immediate attention. For example, new roads, recently rehabilitated roads, or roads which have recently been maintained effectively .
Routine	Routine maintenance is required, i.e. work that can be done using normal maintenance facilities. For example, repair of potholes, crack sealing, shoulder blading, etc.
Reseal	More extensive work than routine maintenance is needed, aimed primarily at maintaining or improving the existing road surface. Some minor preparation work, such as patching, may be needed before the resurfacing is done.
Light rehabilitation	Similar work to the reseal but extensive preparation work is needed before resurfacing is done. Resurfacing may also include an asphalt overlay (< 50 mm)
Heavy rehabilitation	The road must be put on the rehabilitation programme. Could include pavement reconstruction, additional layers (asphalt included), or settlement repairs, but mainly involves strengthening of the pavement structure.

B4.3 PRIORITY

The priority of the treatment recommended must be given. The different priorities which should be used are described in Tables B26 to B28.

TABLE B26: DESCRIPTION OF ROUTINE PRIORITIES

PRIORITY	DESCRIPTION
A	Urgent attention is required. Safety risk, degree of distress so severe that it is a danger to the road user. The maintenance must be done immediately and deserves continuous attention. For example, dangerous isolated failures.
B	Attention is needed within 6 months in order to prevent further deterioration. For example, crack-sealing of severe cracks, repair of surface failures, etc.
C	Maintenance which should be programmed, such as minor crack sealing and edge repairs.

TABLE B27: DESCRIPTION OF RESEAL OR LIGHT REHABILITATION PRIORITIES

PRIORITY	DESCRIPTION
A	**Within 1 year:** Seal must be done as soon as possible to prevent further deterioration.
B	**Within 2 years:** Reseal should be done in the following financial year. Make provision for it in the estimates.
C	**Within 3 years:** Work which should be scheduled for reseal within the next three years. Re-evaluate in following year.

TABLE B28: DESCRIPTION OF HEAVY REHABILITATION PRIORITIES

PRIORITY	DESCRIPTION
A	**2-year programme:** Attention must be given to defects as soon as possible. Poor to very poor condition with signs of rapid deterioration.
B	**5-year programme:** Attention must be given to defects in the medium term. Project must appear on the 5-year rehabilitation programme.
C	**10-year programme:** This segment should receive attention in the long term. Project should appear on 10-year rehabilitation programme. Consequences of deferment not serious as rate of deterioration is slow or traffic volumes are low.

PART C: TYPICAL EXAMPLES OF THE COMPLETION OF ASSESSMENT FORMS

C1. INTRODUCTION

This part provides photographs of roads showing one or more distress types together with examples of typical assessment forms illustrating how such forms should be filled in.

NOTE: No CSRA visual assessment form is prescribed, but two typical examples are given. Every road authority is free to develop its own unique form.

C2. EXAMPLES

Plate 20: Overall pavement condition: Poor
Plate 21: Overall pavement condition: Very poor

SOUTH AFRICAN ROADS BOARD : DEPARTMENT OF TRANSPORT

Pavement Management System

FLEXIBLE PAVEMENT FIELD INSPECTION

Option	Route	Section	Direction	Date (Y Y Y Y m m d d)
2	05 I N 0099	01	N	1992 11 01

Range of observation		Surfacing assessment										Structural assessment																Functional					
Start kilometre	End kilometre	Surfacing failure		Surfacing cracks		Aggregate loss		Binder-condition		Bleeding/ Flushing		Cracks: Block			Crocodile		Longi-tudinal		Trans-verse		Pumping		Rutting		Patching		Potholes/ Failures		Edge-breaking		Skid resistance	Shoulders		General condition
		Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Spacing	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext	Deg	Ext		Type	Cond.	
000•0	005•0	3	1	3	3	1	3	3	5	0	0	0	0		3	4	0	0	0	0	0	0	3	3	5	3	5	1	3	4	F	U	3	4

Coded by: AA

General Comments

GENERAL PAVEMENT CONDITION: POOR

PLATE 20

CSRA : TMH9
EXAMPLE OF VISUAL ASSESSMENT FORM

ROAD SEGMENT INFORMATION

ROAD No	: R99 / 1			ASSESSOR	: AB
START km	: 0,0	END km	: 5,0	DATE	: 11 / 92 (M / Y)
START DESC.	: T R69	END DESC.	: EN	ROAD WIDTH	: 8,6 (M)
ROAD CATEGORY	A B C D	ROAD CLASS	: L1 L2 L3 L4	SHOULDER WIDTH	: 0,6 (M)
REGION / DISTRICT	: A / B	ROAD TYPE	: N 2 P	PAVEMENT STRUCT.	PCC A B C
CLIMATE	D W V	TERRAIN	F R M	TRAFFIC CLASS (T)	1 2 3 4 5

SURFACING ASSESSMENT

TYPE: AS

F1 TEXTURE: VARYING | 1: FINE | 2: F-M | 3: MEDIUM | 4: M-C | 5: COARSE

F2 VOIDS: VARYING | 1: NONE | 2: N-F | 3: F.E.W | 4: F-M | 5: MANY

SURFACING DEFECTS		DEGREE (SLIGHT 1 2 3 4 5 SEVERE)	EXTENT (ISOLATED 1 2 3 4 5 EXTENSIVE)
SURFACING FAILURE	F3	0	
SURFACING CRACKS	F4	0	
AGGREGATE LOSS A N	F5	0	
BINDER CONDITION	F6	0	
BLEEDING / FLUSHING	F7	0	

STRUCTURAL ASSESSMENT

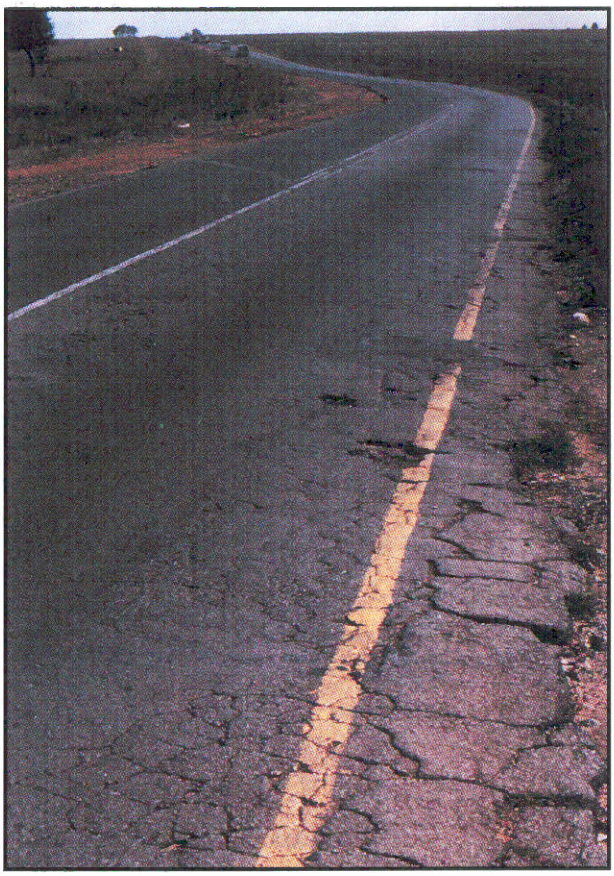
		DEGREE (SLIGHT 1 2 3 4 5 SEVERE)	EXTENT (ISOLATED 1 2 3 4 5 EXTENSIVE)
CRACKS			
BLOCK / STABILISATION N M L	F8	0	
LONGITUDINAL / SLIP N M L	F9	0	
TRANSVERSE	F10	0	
CROCODILE	F11	0	
PUMPING	F12	0 1 2 3 4 5	1 2 3 4 5
DEFORMATION		1 2 3 4 5	1 2 3 4 5
RUTTING	F13	0	
UNDULATION / SETTLEMENT	F14	0	
PATCHING S M L	F15	0 1 2 3 4 5	1 2 3 4 5
OCCURANCE		STRUCTURES VALLEYS GRADIENTS CUTTINGS GENERAL	
FAILURES / POTHOLING	F16	0 1 2 3 4 5	1 2 3 4 5
OCCURANCE		STRUCTURES VALLEYS GRADIENTS CUTTINGS GENERAL	
EDGE BREAKING	F17	0 1 2 3 4 5	1 2 3 4 5

FUNCTIONAL ASSESSMENT

RIDING QUALITY	F18	0: V. GOOD	1: GOOD	2: FAIR	3: POOR	4: V. POOR
PROBLEM			POTHOLES	PATCHING	UNDULATION	CORRUGATION
SKID RESISTANCE	F19	0: V. GOOD	1: GOOD	2: FAIR	3: POOR	4: V. POOR
PROBLEM					BLEEDING	POLISHED
SURFACE DRAINAGE	F20	0: ADEQUATE		2: WARNING		4: INADEQUATE
SIDE DRAINS	PROBLEM			ALIGNMENT	SHOULDERS	BUFFING
SHOULDERS : UNPAVED	F21	0: SAFE		2: WARNING		4: UNSAFE
PROBLEM		ERODED	FRETTING	TOO HIGH	NARROW	STEEP	Q. GROWTH	L GRAVEL
: PAVED	F22	0: V. GOOD		2: FAIR		4: POOR

SUMMARY

TYPE OF ATTENTION NEEDED	0: NONE	1: RESEAL		2: RESEAL		3: L. REHAB		4: R. REHAB			
PRIORITY	C	B	A	C	B	A	C	B	A	C	B	A
OVERALL PAVEMENT CONDITION	0: V. GOOD		1: GOOD		2: FAIR		3: POOR		4: V. POOR		



GENERAL PAVEMENT CONDITION: VERY POOR

PLATE 21

PART D: REFERENCES

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