

SCHEDULE 1 – ASSET SURVEILLANCE MANUAL



ASSET SURVEILLANCE MANUAL

ENGINEERING & INFRASTRUCTURE

SERVICES

JULY 2009

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1. INTRODUCTION

This document, titled “Asset Surveillance Manual,” sets out the requirements for Maroondah City Council’s Asset Surveillance Team, and details the rating system that is required to be utilised to assess specific defects within the City of Maroondah, that are associated with the road, and the off-road, infrastructure asset networks.

The condition of Maroondah City Council’s infrastructure asset networks is continually changing due to age, traffic, weather conditions, environmental factors, and maintenance activities. It is therefore necessary to undertake the asset surveillance at regular intervals, in accordance with **Schedule 6** (Inspection Frequencies) of Council’s Road Management Plan.

2. PRELIMINARIES

2.1 GENERAL REQUIREMENTS

Council’s Asset Surveillance Team consists of one Senior Asset Surveillance Officer and two Asset Surveillance Officers. The Senior Asset Surveillance Officer is responsible for providing appropriate training to the Asset Surveillance staff, and to ensure the consistent collection of data by all staff within the Asset Surveillance Team.

2.2 OCCUPATIONAL HEALTH & SAFETY

Maroondah City Council is obligated to provide and maintain, so far as is practicable, a working environment for its employees and members of the public, that is safe and without risk to health or the environment. It is therefore essential that the Asset Surveillance Team identifies and exercises all necessary precautions to ensure the health and safety of all persons, including the general public. This requires Asset Surveillance Officers to identify any, and all, potential risks to themselves and the public, and to implement appropriate risk management measures to mitigate such risk.

The vehicle used for Asset Surveillance activities must be clearly signed and equipped with flashing lights to warn motorists of the activities that are being undertaken. Where appropriate, safety cones and signs must also be carried and used, in accordance with the Road Management Act 2004 Code of Practice for Worksite Safety-Traffic Management.

2.3 UNIFORMS AND PERSONAL CLOTHING

The Occupational Health and Safety (OH & S) Act 2004 requires all Asset Surveillance Officers to wear high visibility safety jackets when undertaking Asset Surveillance within the road reserve. In addition, Asset Surveillance Officers are required to wear appropriate identification, and to wear comfortable walking shoes.

3. ASSET SURVEILLANCE

The primary aim of the Asset Surveillance Team is to identify and record all defects associated with Council's infrastructure assets, as described in **section 3.1** below, which either places, or may place, the general public's safety at risk. The secondary aim is to identify and record all defects associated with Council's infrastructure assets, as described in **section 3.1**, which may impact on the longevity, and the subsequent total life cycle costs of those assets.

3.1 ASSETS INSPECTED

The infrastructure assets, and the associated asset components, that are required to be assessed as part of Council's Asset Surveillance program, in accordance with **Schedule 6** (Inspection Frequencies) of Council's Road Management Plan, are as follows:

- Sealed Roads / Carparks / Rights of Way (ROWs)
 - Road surface
 - Kerb & channel
 - Road Shoulder
- Unsealed Roads / Carparks / Rights of Way (ROWs)
 - Road surface
 - Kerb & channel
 - Road Shoulder
- Pathways (formally and informally constructed), including shared paths (bike paths), and reserve paths
- Local Area Traffic Management (LATM) Devices
- Road Furniture (bus shelters, seats, bollards, barrier and safety fencing etc)
- Signage
- Linemarking

3.2 ASSET SURVEILLANCE SYSTEM

Asset Surveillance inspections are undertaken using tablet PCs, operating the AssetMap data collection software. AssetMap has been setup to display the relevant GIS layers, including the cadastre map base, the road polygons, carparks, laneways, shared paths and the aerial photography.

When surveillance is undertaken in areas where references to known property boundaries are not easily identified, Council's Asset Surveillance Team are able to utilise a Global Positioning System (GPS) to interface with the Tablet PCs.

In addition to the tablet PCs, the Asset Surveillance Officers are required to carry a tape measure and a 1.2m straight edge, to enable any defects to be accurately recorded in accordance with this manual, and the requirements of Council's Road Management Plan.

3.3 PREPARATION AND PLANNING

The Municipality has been segregated into 20 regions, as per **Section 8.1**, to enable the Asset Surveillance Team to adequately programme its surveillance activities, and to also facilitate the ongoing monitoring of Council's compliance with **Schedule 6** (Inspection Frequencies) of Council's Road Management Plan.

3.4 ASSET SURVEILLANCE INSPECTION TYPES

3.4.1 ON-FOOT INSPECTIONS

The Asset Surveillance Team conducts "on-foot inspections" for the identification of defects that are within the roadside or within reserves, and that are typically associated with footpaths, kerb & channel, shared paths, street furniture etc.

"On-foot inspections" allow Asset Surveillance Officers to walk the same paths that the general public walk, and to identify defects that would be encountered by cyclists and pedestrians within the community, including those pedestrians with physical disabilities. "On-foot inspections" also allow Asset Surveillance Officers to identify defects that are not necessarily infrastructure related, but that still impact on the pedestrian's path of travel, such as overhanging branches etc.

Occasionally the "on-foot inspections may vary to allow the Asset Surveillance Team to conduct inspections of shared pathways by bicycle. This allows the inspectors to assess the shared path from the perspective of cyclists and identify defects and hazards encountered by those users.

3.4.2 VEHICULAR INSPECTIONS

The Asset Surveillance Team conducts "vehicular inspections" for the identification of defects that are within the roadway, and that are typically associated with the road surface, signage, guide posts, linemarking, local area traffic management (LATM) devices, stormwater pits (lids, lintels etc) and where visible, the kerb & channel.

"Vehicular inspections" allow Asset Surveillance Officers to drive the same routes that the general public drive, and to identify defects that would be encountered by motorists, cyclists and pedestrians, within the community.

"Vehicular inspections" are undertaken within a slow moving vehicle with its hazard lights on. Inspectors may park the vehicle and undertake measurements of identified defects, only when it is safe to do so. Generally, the measuring of defects within the roadway would be undertaken on Local Roads and some Collector Roads, and not the busier Link Roads. It is the responsibility of the Asset Surveillance Officer to determine if it is safe to measure a defect within the roadway, by considering factors such as:

- Traffic volumes
- Traffic type (ie whether there are heavy vehicles, buses etc)
- Speed limit
- Traffic speed (perceived)
- Road width
- Geometry of the road (ie whether the location of the defect is on a bend, on a hill etc)
- Sight lines (ie whether there are physical features, such as trees or parked cars, obstructing the sight line between vehicles travelling the road and the Asset Surveillance Officer)

If necessary, the Asset Surveillance Officer may determine that advanced warning signs and/or cones/bollards are necessary to provide a safe working environment to undertake the required defect measurements.

4. INSPECTION FREQUENCY

Different types of road assets in different locations pose varying risks to the users. Maroondah has therefore developed a schedule of inspection frequencies to cover the entire road, and road related infrastructure networks. **Schedule 6** of Council's Road Management Plan details the inspection regions and inspection frequencies for each category of asset.

5. DEFECTS TO ASSESS

5.1 GENERAL

In this section, individual defects are discussed. Photographic examples are included for referencing purposes. However it should be remembered that the objective of the Asset Surveillance Team is to identify all obvious and potential hazards associated with Council's road, carpark, ROWs, pathway, and kerb & channel infrastructure networks, and to identify any hazards associated with the signs and street furniture within the Municipality. It is critical that all Asset Surveillance activities are undertaken in accordance with this manual and the inspection frequencies and intervention levels defined in **Schedule 6** and **Schedule 7** respectively of Council's Road Management Plan.

Note: The photographs included in this section are for example and general guidance purposes only. They are not intended to be a complete record of all hazardous situations nor are they intended to be a complete handbook on how to rate a defect. They are included as a guide to assessing the severity of a hazard for rating purposes. The Asset Surveillance Team member must use common sense and practical experience when assessing any specific defect and determining its associated rating.

5.2 SEALED ROAD/CARPARK/ROW DEFECTS

5.2.1 CRACKING - CROCODILE

Crocodile cracking consists of interconnected or interlaced cracks resembling a crocodile hide, and is typically located within the wheel path of a road surface. The cells associated with crocodile cracking are generally less than 150mm wide, however they may extend up to 300mm wide in some cases. Crocodile cracking indicates a possible pavement failure, in particular where there is evidence of discolouration from silt being pumped from below, and may eventually result in potholes. The determination of the severity of crocodile cracking is based on the area of the road surface that is affected, and also takes account of whether the "pumping of fines" is evident.

DEFECT TYPE	DESCRIPTION	RATING
CROCODILE CRACKING	Crocodile cracking < 1.0m ²	Rating 1
	Crocodile cracking ≥ 1.0m ² and < 5.0m ²	Rating 3
	Crocodile cracking ≥ 5.0m ²	Rating 5



Rating1



Rating 3



Rating 5**

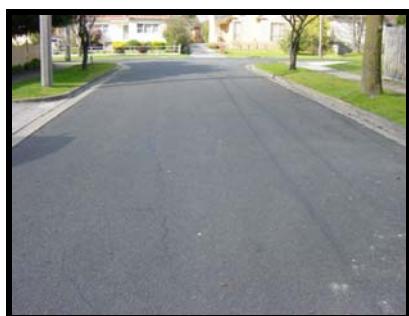
** Whilst this example (right hand photo – pot hole exists within the crocodile cracked area), shows severe and extensive crocodile cracking the defect should be recorded as a “pot hole” defect as this requires a more urgent response.

5.2.2 CRACKING - LINEAR

Linear cracking cover cracks that are longitudinal (i.e. in the same direction of travel), transverse (i.e. perpendicular to the path of travel, across the road surface) or diagonal in nature. Linear cracking is one of the most common defects found within Maroondah, and is predominantly due to the movement in the clay subgrade as a result of environmental changes (i.e. the drought). The determination of the severity of linear cracking is dependant on the width of the crack, and also takes account of the overall length of the crack.

CRACKING - LINEAR

WIDTH \ LENGTH	<2.0M	>= 2.0M & < 5.0M	>= 5.0M & < 10.0M	> 10.0M
<5MM	Rating 1	Rating 1	Rating 1	Rating 1
>=5MM & < 10MM	Rating 1	Rating 1	Rating 3	Rating 5
>= 10MM	Rating 3	Rating 3	Rating 5	Rating 5



Rating 1



Rating 3



Rating 5

5.2.3 DAMAGED LOCAL AREA TRAFFIC MANAGEMENT (LATM) DEVICE

Local Area Traffic Management (LATM) Devices includes those structures that are constructed or installed to generally control the speed and/or movement of vehicles, and includes splitter islands, roundabouts, raised pavements, speed cushions, speed humps, chicanes etc. Damaged LATM devices may create a potential safety hazard for motorists, cyclists and/or pedestrians, and may also affect the longevity of the adjacent infrastructure. The determination of the severity of a damaged LATM device is dependant on the Asset Surveillance Officer's determination of the associated potential risk, by considering the severity of any other defects identified (as per the entirety of **Section 5** of this manual).

DEFECT TYPE	DESCRIPTION	RATING
DAMAGED LATM DEVICE	Device damaged	Rating 5



Repairs to be determined by Asset Surveillance Officer based on impact to practical Traffic Management

5.2.4 EDGE BREAKS AND EDGE DROP OFFS

It is the intention that Edge Breaks and Edge Drop Offs are rated simultaneously and the higher rating from either defect should be the one recorded.

Edge breaks consist of fretting, broken or irregular edges of a sealed road surface, and are generally more predominant when the road shoulder is unsealed. The detrimental effects of edge breaks includes a reduction in road surface width, loss of ride quality and possible loss of vehicle control, and water penetration into the road pavement. The determination of the severity of edge breaks is dependant on the lateral measurement of the break, and takes account of the overall length of the break.

Edge drops consist of the vertical displacement between the road surface and the adjacent road shoulder, and is generally more predominant when the road shoulder is unsealed. The detrimental effects of edge drop-offs includes the channelling of water at the road surface, and the possible loss of vehicle control if vehicles attempt to transition between the road surface and the road shoulder. The determination of the severity of the edge drop-off is dependant on the vertical depth of the edge drop-off, and takes account of the overall length of the edge drop-off.

DEFECT TYPE	DESCRIPTION	RATING
EDGE BREAKS	Edge break < 25mm laterally from the normal extent of the road surface	Rating 1
	Edge break ≥ 25mm and <75mm laterally from the normal extent of the road surface	Rating 3
	Edge break ≥ 75mm laterally from the normal extent of the road surface	Rating 5

Edge Break Ratings



Rating 5

DEFECT TYPE	DESCRIPTION	RATING
EDGE DROP-OFFS	Drop < 20mm deep	Rating 1
	Drop ≥ 20mm and < 30mm deep	Rating 2
	Drop ≥ 30mm and < 40mm deep	Rating 3
	Drop ≥ 40mm and 50mm deep	Rating 4
	Drop ≥ 50mm deep	Rating 5

Edge Drop Off Ratings



Rating 3



Rating 4



Rating 5

5.2.5 FADED LINEMARKING, DAMAGED OR MISSING RRPM'S

Linemarkings, and the associated Reflective Raised Pavement Markers (RRPMS), are used to guide, regulate and control road users. Any linemarking that is assessed as being less than 50% visible, either in colour intensity or definition of linemarking, is identified as a defect, and the determination of the severity is dependant on the type of linemarking that it is.

DEFECT TYPE	DESCRIPTION	RATING
FADED LINEMARKING, DAMAGED OR MISSING RRPM'S	Broken Centrelines & Parking lanes including RRPMs less than 50% visible	Rating 1
	Solid centrelines, including RRPMs, Directional Arrows & Chevron warning markings less than 50% visible	Rating 2
	Statcon (give way, stop) markings, and markings associated with LATM devices less than 50% visible	Rating 4
	School Crossings and Pedestrian Crossings less than 50% visible	Rating 5



Rating 1 (centreline)



Rating 2 (centreline)



Rating 4 (statcon)



Rating 5 (school crossing)

5.2.6 POTHOLES

Potholes consist of a steep sided or bowl-shaped cavity within the road that extends into the pavement layers below the asphalt-wearing course. They are produced when vehicular traffic abrades small pieces of the road surface, typically following areas of cracking or delamination, allowing the entry of water. Potholes can appear very quickly, and create one of the greatest hazards to motorists and cyclists. The determination of the severity of a pothole is dependant on the depth of the pothole, and takes account of the diameter of the pothole.

DEFECT TYPE	DESCRIPTION	RATING
POTHOLES	Potholes < 20mm in depth	Rating 1
	Potholes ≥ 20mm and < 30mm in depth	Rating 2
	Potholes ≥ 30mm and < 40mm in depth	Rating 3
	Potholes ≥ 40mm and < 50mm in depth	Rating 4
	Potholes ≥ 50mm in depth	Rating 5



Rating 1



Rating 3



Rating 4

5.2.7 SURFACE TEXTURE LOSS

While surface texture loss does not usually indicate a pavement's structural inadequacy, it has a significant effect on the service delivery potential, especially in regard to skid resistance and ride quality. In addition, the loss of surface texture can create a significant safety hazard, particularly where the loss of surface texture is at intersections or on curves in the road section. Surface texture loss can be as a result of a number of specific defects, such as Polishing, Stripping, Ravelling, or Bleeding.

Polishing consists of the smoothing and rounding of the upper surface of the aggregate within the road surface, and usually occurs within the wheel path. Polishing can occur on an asphalt or sprayed seal road surface. Polished surfaces feel relatively smooth, and may be noticeably shiny. Polishing creates a potential hazard for motorists, particularly during wet weather.

Stripping consists of the loss of aggregate from a sprayed seal surface only, resulting in exposed bituminous binder. Stripping may occur as a loss of individual stones, or as a complete loss of stone in a localised area, and is generally as a result of poor adhesion between the stone and the bitumen, or as a result of heavy vehicle turning movements (or high traffic stress).

Ravelling is the progressive disintegration of the asphalt road surface by the loss of both the bituminous binder and the aggregates. Ravelling is generally the result of oxidation or ageing, or as a result of inadequate compaction, or construction during wet or cold weather.

Bleeding consist of the partial or complete immersion of the aggregate into the bituminous binder, on asphalt and sprayed seal road surfaces, causing low texture depth and inadequate skid resistance. During the warmer weather, bleeding becomes very sticky. Bleeding is generally the result of an excessive application rate of the binder for sprayed seal surfaces, or as a result of inadequate asphalt mix design or compaction.

DEFECT TYPE	DESCRIPTION	RATING
SURFACE TEXTURE LOSS	Polishing, stripping, ravelling or bleeding < 5m ² in area	Rating 1
	Polishing, stripping, ravelling or bleeding is ≥ 5m ² and < 10m ² in area	Rating 3
	Polishing, stripping, ravelling or bleeding is ≥ 10m ²	Rating 5



Rating 1



Rating 3



Rating 5 (Polishing)



Rating 3 (Bleeding)



Rating 3 (Stripping)

5.2.8 VERTICAL MOVEMENT - WHEEL RUTTING, HEAVING, DEPRESSIONS OR CORRUGATIONS

Wheel Rutting consists of the longitudinal deformation in a wheel path, and may occur in one or both wheel paths of a lane. Wheel Rutting is more commonly located at heavily trafficked intersections, and is generally as a result of inadequate strength of a road surface and/or road pavement.

Depressions consist of a localised area of a road that has elevations lower than the surrounding area. Depressions are not necessarily confined to wheel paths, and can extend across several wheel paths. Depressions are typically a result of the consolidation of isolated areas of soft or poorly compacted subgrade, service and widening trenches or embankment materials.

Corrugations, otherwise known as ripples, consist of transverse undulations closely and regularly spaced, with wavelengths of generally less than 2m. Corrugations are generally as a result of an inadequate stability of the asphalt road surface or the road pavement.

The determination of the severity of vertical movement is dependant on the depth, or height, of the defect under a 1.2m straight edge, and takes account of the overall length and area of the defect.

DEFECT TYPE	DESCRIPTION	RATING
WHEEL RUTTING, HEAVING, DEPRESSIONS, OR CORRUGATIONS	Defects < 20mm under a 1.2m straight edge	Rating 1
	Defects ≥ 20mm and < 30mm under a 1.2m straight edge	Rating 2
	Defects ≥ 30mm and < 40mm under a 1.2m straight edge	Rating 3
	Defects ≥ 40mm and < 50mm under a 1.2m straight edge	Rating 4
	Defects ≥ 50mm under a 1.2m straight edge	Rating 5



Rating 1



Rating 2



Rating 3



Rating 4

5.3 UNSEALED ROAD/CARPARK/ROW DEFECTS

5.3.1 POTHOLES

See **Section 5.2.7** for the general definition of a pothole. The inadequate distribution of stormwater runoff typically contributes to the occurrence of potholes associated with unsealed road, unsealed carparks, or unsealed ROWs.

DEFECT TYPE	DESCRIPTION	RATING
POTHOLES	Potholes < 20mm in depth	Rating 1
	Potholes ≥ 20mm and < 30mm in depth	Rating 2
	Potholes ≥ 30mm and < 40mm in depth	Rating 3
	Potholes ≥ 40mm and < 50mm in depth	Rating 4
	Potholes ≥ 50mm in depth	Rating 5



5.3.2 VERTICAL MOVEMENT - WHEEL RUTTING, DEPRESSIONS OR CORRUGATIONS

See **Section 5.2.9** for the general definition of the different types of vertical movement. The inadequate distribution of stormwater runoff typically contributes to the occurrence of vertical movement associated with unsealed road, unsealed carparks, or unsealed ROWs.

DEFECT TYPE	DESCRIPTION	RATING
WHEEL RUTTING, DEPRESSION OR CORRUGATION	Defects < 10mm in depth under a 1.2m straight edge	Rating 1
	Defects ≥ 10mm and < 20mm in depth under a 1.2m straight edge	Rating 2
	Defects ≥ 20 and < 30mm in depth under a 1.2m straight edge	Rating 3
	Defects ≥ 30mm and < 40mm in depth under a 1.2m straight edge	Rating 4
	Defects ≥ 40mm in depth under a 1.2m straight edge	Rating 5



5.4 PATHWAY DEFECTS

5.4.1 CRACKING

See **Section 5.2.2** for the general description of cracking.

Note: Where vertical displacement is associated with pathway cracking, the defect severity must be recorded under the defect that will generate the earliest response (See Risk Ratings in Schedule 3). I.e., if the vertical displacement is 40mm or greater but the width of the crack is less than 10mm, it is wise to record the vertical displacement, as this is the hazard generating the earliest response. However if the vertical displacement is only 20mm or less but the cracking is 20mm or greater in width then the cracking is the defect that must be recorded. Response is then appropriate for the defect

DEFECT TYPE	DESCRIPTION	RATING
CRACKING	Cracks, missing and broken pieces < 10mm wide	Rating 1
	Cracks, missing and broken pieces \geq 10mm and <20 mm wide	Rating 3 for pedestrian only use pathways
	Cracks, missing and broken pieces \geq 10mm and <20 mm wide	Rating 5 for shared pathways
	Cracks, missing and broken pieces \geq 20mm wide	Rating 5



Rating 1



Rating 3



Rating 5

5.4.2 POTHOLES

See **Section 5.2.7** for the general description of potholes. Potholes within pathways can create a fairly serious hazard for pedestrians and cyclists on Council's pathway network.

DEFECT TYPE	DESCRIPTION	RATING
POTHOLES	Potholes < 10mm in depth	Rating 1
	Potholes \geq 10mm and < 20mm in depth	Rating 3
	Potholes \geq 20mm in depth	Rating 5



Rating 1



Rating 3



Rating 5

5.4.3 VERTICAL MOVEMENT - LIPS

Lips in formally or in some cases informally constructed pathways may occur due to a number of causes. They create a vertical displacement in the pathway section at either the construction joint or dummy joint across the pathway. Lips may also occur between the pathway and vehicular crossings and pathway and pram crossings at street intersections. The displacement provides a tripping potential for users. The determination of the severity of the defect is dependant on the vertical measurement of the lip.

DEFECT TYPE	DESCRIPTION	RATING
LIPS	Lips < 10mm	Rating 1
	Lips ≥ 10mm and < 20mm	Rating 2
	Lips ≥ 20mm and < 30mm	Rating 3
	Lips ≥ 30mm and < 40mm	Rating 4
	Lips ≥ 40mm	Rating 5



Rating 1 (photo 1)



Rating 2 (photo 2)



Rating 3 (photo 3)



Rating 4 (photo 4)



Rating 4 (photo 5)



Rating 5 (photo 6)

When assessing the rating for a lip hazard it should be the actual height of the raised section relative to the immediate lower section. Measuring the level difference from a projected straight edge as shown in photo 5 and 6 above may result in an incorrect rating of the defect.

5.4.4 VERTICAL MOVEMENT HEAVING, DEPRESSIONS AND TILTING

Heaving occurs in pathways, usually in conjunction with cracking. It is generally the result of an upward pressure causing a bay or number of bays to lift up affecting the original vertical alignment of the pathway. Where the vertical displacement is large over a relatively small horizontal length, the effect on the users becomes hazardous.

Depressions are the direct opposite to heaving. They occur where the sub-base has collapsed due to trenching or other means and the pathway section drops into it.

The determination of the severity of the vertical movement is dependant on the vertical measurement of the defect under a 1.2m straight edge, and takes account of the overall length of the defect.

Tilting is a defect where the cross fall of the pathway changes beyond that originally constructed to an angle that makes the pathway hazardous. Where a pathway has lifted or dropped on either side of the pathway, along the line of travel, by between 30mm and 40mm, it should be recorded as significant and as a Rating 4 defect. Where the pathway has lifted or dropped on either side of pathway, along the line of travel, by greater than 40mm it should be recorded as extreme and as a Rating 5 defect

DEFECT TYPE	DESCRIPTION	RATING
HEAVING, DEPRESSIONS AND TILTING	< 10mm in depth under a 1.2m straight edge	Rating 1
	≥ 10mm and < 20mm in depth under a 1.2m straight edge	Rating 2
	≥ 20mm and < 30mm in depth under a 1.2m straight edge	Rating 3
	≥ 30 and < 40mm in depth under a 1.2m straight edge or significant adverse cross fall	Rating 4
	≥ 40mm in depth under a 1.2m straight edge or extremely adverse cross fall	Rating 5



Rating 1



Rating 2



Rating 3



Rating 4



Rating 5



Rating 5

5.4.5 TACTILE PAVEMENT MARKERS

Missing or partially damaged Tactile Pavement Markers create a defect in footpaths. In these cases the integrity of the footpath for the visually impaired is compromised and the defect should be addressed in accordance with the following table

DEFECT TYPE	DESCRIPTION	RATING
AREA OF MISSING TACTILE	Area less than 100 Sq. Cm	Rating 1
	Area between 100 and 200. Sq. Cm	Rating 3
	Area greater than 200 Sq. Cm	Rating 5

5.5 KERB & CHANNEL DEFECTS

5.5.1 CRACKING

Cracking in kerb & channel may be due to excessive loading being applied (vehicular damage), subsidence of the sub-base, which over time causes the kerb to crack, tree roots lifting the middle of a section of kerb, incorrect construction, or age. The determination of the severity of the cracking defect is dependant on the width of crack, and takes account of the depth of the cracking (i.e., whether or not the crack is only at the surface).

DEFECT TYPE	DESCRIPTION	RATING
CRACKING	Cracks, missing and broken pieces are < 5mm	Rating 1
	Cracks, missing and broken pieces are ≥ 5 and < 10 mm wide	Rating 3
	Cracks, missing and broken pieces are ≥ 10 mm	Rating 5



Rating 1



Rating 3



Rating 5

5.5.2 VERTICAL MOVEMENT - LIPS, HEAVING AND DEPRESSIONS

See **Section 5.4.3** and **Section 5.4.4** for the general definition of lips, heaving and depressions.

DEFECT TYPE	DESCRIPTION	RATING
LIPS, HEAVING AND DEPRESSIONS	Displacement < 20mm under a 1.2m straight edge	Rating 1
	Displacement ≥ 20 mm and < 30mm under a 1.2m straight edge	Rating 2
	Displacement ≥ 30 mm and < 40mm under a 1.2m straight edge	Rating 3
	Displacement ≥ 40 and < 50mm under a 1.2m straight edge	Rating 4
	Displacement ≥ 50 mm under a 1.2m straight edge	Rating 5



Rating 2



Rating 3



Rating 4



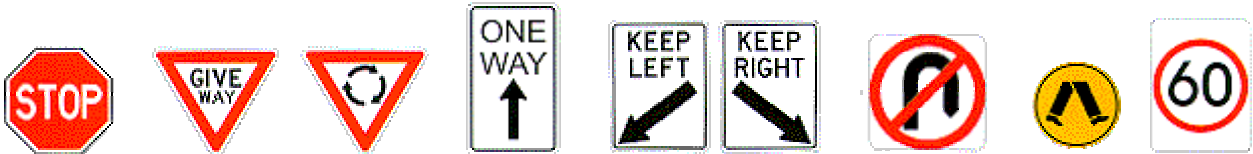
Rating 5

5.6 SIGN DEFECTS

Signage regulates, provides information, reinforces and controls traffic flow. It should therefore be appropriately placed for the task it is intended for, be clearly visible in all conditions, be legible and in a condition fit for purpose. Any sign that fails to meet all of the above requirements should be noted as hazardous.

5.6.1 REGULATORY SIGNS

Regulatory signs inform road users of traffic laws or regulations, which it would be an offence to disregard. Some examples of Regulatory signs are illustrated below:



TYPE	DESCRIPTION	RATING
REGULATORY SIGNS	Insecure mounting	N/A
	Sign obstructed and/or facing the incorrect way	N/A
	Missing Sign	N/A
	Sign and/or pole paint faded, lifted, cracking or graffitied	N/A
	Sign and/or pole bent	N/A

5.6.2 WARNING SIGNS AND HAZARD SIGNS

Warning signs are used to warn traffic of potentially hazardous conditions on or adjacent to the road. Some examples of Warning signs are illustrated below:



TYPE	DESCRIPTION	RATING
WARNING SIGNS	Insecure mounting	N/A
	Sign obstructed and/or facing the incorrect way	N/A
	Missing Sign	N/A
	Sign and/or pole paint faded, lifted, cracking or graffitied	N/A
	Sign and/or pole bent	N/A

5.6.3 PARKING SIGNS

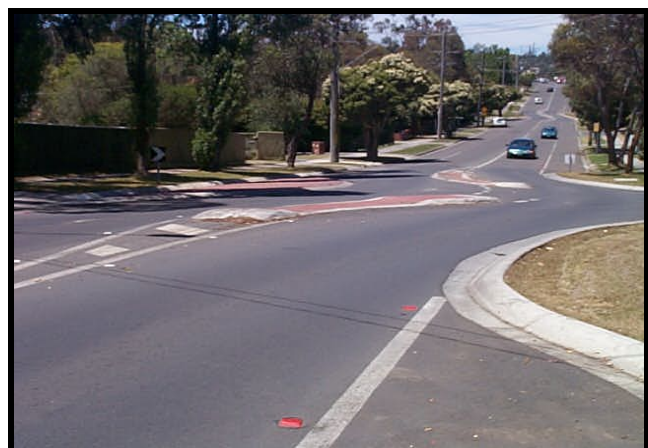


TYPE	DESCRIPTION	RATING
ADVISORY SIGNS	Insecure mounting	N/A
	Missing Sign	N/A
	Sign and/or pole bent and/or graffitied	N/A

5.6.4 LOCALITY / DIRECTORY / ADVISORY SIGNS



TYPE	DESCRIPTION	RATING
DIRECTIONAL SIGNS	Insecure mounting	N/A
	Missing Sign	N/A
	Sign and/or pole bent and/or graffitied	N/A



Examples of Missing Signs

5.7 STREET FURNITURE

5.7.1 BOLLARDS

TYPE	DESCRIPTION	RATING
BOLLARDS	Damaged, Graffitied or Unclean	N/A

5.7.2 BUS SHELTERS

TYPE	DESCRIPTION	RATING
BUS SHELTERS	Damaged, Graffitied or Unclean	N/A

5.7.3 FENCING (BARRIER OR SAFETY)

TYPE	DESCRIPTION	RATING
FENCING	Damaged, Graffitied or Unclean	N/A

5.7.4 GUARD FENCE

TYPE	DESCRIPTION	RATING
GUARD FENCE	Damaged, Graffitied or Unclean	N/A

5.7.5 SEATS

TYPE	DESCRIPTION	RATING
SEATS	Damaged, Graffitied or Unclean	N/A

6. QUALITY ASSURANCE (AUDITING)

Quality assurance, or auditing, is undertaken to ensure consistency of the Asset Surveillance Officer's defect ratings, in accordance with this manual and the requirements of Council's Road Management Plan.

The Senior Asset Surveillance Officer undertakes cyclic sample auditing of the data that is collected by the Asset Surveillance Officers, and undertakes any necessary training or re-education to ensure the consistency that is required.

7. AMENDMENTS AND REVISIONS

REV	DATE	AMENDMENT
A	1-Jan-2003	Original Document Released
B	1-Jun-2005	Amended Document Released, in accordance with Road Management Act 2004 requirements
C	1-Jul-2007	Document redrafted in conjunction with the review of Council's Road Management Plan and released for use
D	1-Jul-2009	Document redrafted in conjunction with the review of Council's Road Management Plan and released for use

8. APPENDICES

8.1 INSPECTION REGIONS MAP

