

Barcardine Regional Council
71 Ash Street, BARCALDINE QLD 4725

ROAD CONDITION ASSESSMENT MANUAL

Version 2

Adopted by Council on
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Purpose

The purpose of this document is to provide the staff and Councillors of the Barcaldine Regional Council with a standard and consistent method for assessing the condition of its road assets – owned and managed.

Asset Accounting

The completion and adherence to this Condition Assessment Manual is the first step in terms of complying with AASB 116 "Property, Plant & Equipment". The key messages to be noted from the accounting standard are:

- Asset valuation is based on fair value;
- Depreciation expense based on asset consumption;
- Depreciation/valuation must match pattern of consumption; and
- Complex assets need to be split into components, e.g. road into surface (or seal), pavement, formation and other considerations.

Fair value is defined as the amount for which an asset could be exchanged between knowledgeable, willing parties in an arm's length transaction. Fair value is determined by one of the following methods:

- Active and liquid market (market value)
- Observable market evidence (e.g. current market rentals)
- No market evidence (depreciated replacement cost)

The depreciation method used shall reflect the pattern in which the asset's future economic benefits are expected to be consumed by the entity and that each significant component of an asset to be depreciated separately.

The above rules define how assets should be componentised and conditioned assessed. In the case of the components are:

- Surface (or Seal)
 - Surface texture
 - Oxidation
 - Pot holes
 - Shoulder
- Pavement
 - Fatigue cracking (Crocodile cracking)
 - Linear cracking
 - Shape loss
 - Other defects
- Formation
 - Normally considered to have infinite life and therefore not conditioned assessed under normal circumstances
- Other considerations
 - Off road drainage
- Holistic
 - Capacity
 - Functionality

Sealed Roads

This part of the manual addresses the condition assessment of sealed roads. Assessment is by Surface, Pavement, and Other Considerations, some specific to the Barcaldine Regional Council.

Sealed Roads - Surface Texture (Surface)

A lack of aggregate on a road's surface results in less traction for a vehicle's tyres and limits the protection from the elements provided to the pavement by the seal. These defects are only truly significant in areas where traction is most commonly needed (in wheel paths particularly in intersections, or around bends), or when the pavement is close to being exposed.

Flushing: Partial or complete immersion of aggregate into the bituminous binder causing low texture depth and inadequate skid resistance.

Stripping: Loss of aggregate from the surface, resulting in exposed binder and/or pavement.

Polishing: Smoothing and rounding of the upper surface of the road aggregate, usually occurring in the wheel paths. Identified by relative appearance and feel in trafficked and un-trafficked areas. Polished areas will feel relatively smooth and may be noticeably shiny.

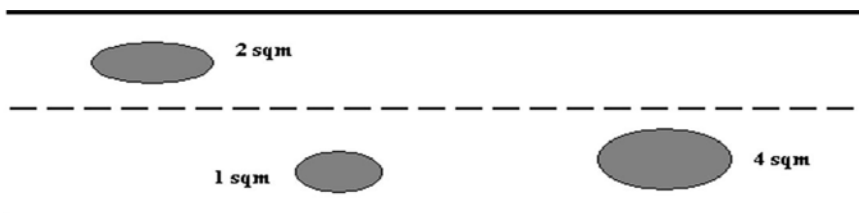


Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	Surface defects affecting >0 & <10% of segment area
2	Negligible	Surface defects affecting >10% & <15% of segment area
3	Minor	Surface defects affecting >15% & <20% of segment area
4	Moderate	Surface defects affecting >20% & <25% of segment area
5	Extreme	Surface defects affecting >25% of segment area

Notes:

- The accurate and repeatable estimation of defect percentage of a road segment is essential to obtaining a reliable dataset.

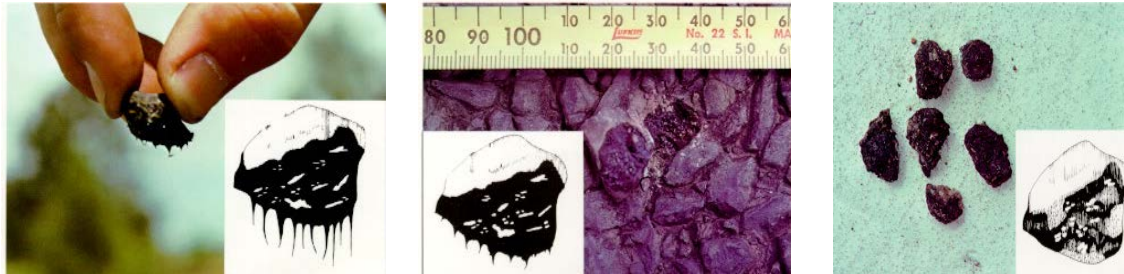
Example:



Length of segment: 20 m
 Width of seal: 4 m
 Segment Area: 100 m²
 Total area of local defects: 2+4+1=7 m²
 % area affected: 7/100 = 7%
 Score: 1

Sealed Roads - Oxidisation (Surface)

Bituminous binder oxidises over time, becoming brittle and losing its ability to hold the aggregate to road surface. Binder should be assessed by the number of aggregate that have been plucked from the surface seal



Condition Rating		
Rating	Considered to be	Binder Observation
1	Nil	Binder is black and shiny, slight smell of bitumen adheres to and stains fingers and screwdriver, may form long thin tails and/or stones "ease" out when removed. Approx 0-3 years seal age;
2	Negligible	Binder is black and shiny, slightly stains fingers and screwdriver and/or may form thin long to short tails. Approx 3-6 years seal age;
3	Minor	Binder is matt black and shiny, Slightly stains fingers and screwdriver and/or Forms short tails. Approx 6-9 years seal age;
4	Moderate	Binder is dull, little shine, forms hard black coating on stones, slightly tacky, and/or stone particles difficult to remove. Approx 9-12 years seal age;
5	Extreme	Binder is dull brown, May form black-brown powder, Hard and lacking in ductility, Some cracking may be evident and/or Stones will "pop" out after some effort. Approx greater than 12 years seal age;

Sealed Roads - Potholes (Surface)

Pot holes occur in the road when the seal is damaged or the surface has deteriorated leaving the pavement material exposed to the weather. Passing vehicles then remove the material resulting in a hole.



Condition Rating			
Pot hole diameter \ Depth	Depth: up to 50mm	Depth: 50-100mm	Depth: >100mm
Diameter: 0-200mm	1	2	3
Diameter: 200-500mm	2	3	4
Diameter: >500mm	3	4	5

Sealed Roads - Shoulder (Surface)

The shoulder of the road protects the condition of the surface and pavement, and provides for safe run off for vehicles requiring to exit the road for any reason.

The condition of the shoulder is assessed by the degree of:

- Shoulder drop* height that is the shoulder has dropped away from the being level with the road surface; and
- Surface break back* length of the surface seal and possibly the pavement below has broken off the edge of the road.



The condition of the shoulder is assessed using the following risk matrix: (rated 1 to 5)

Condition Rating			
Surface Break Back\Shoulder Drop	Drop: 0-25mm	Drop: 25-50mm	Drop: >50mm
Break Back: <20mm	1	2	3
Break Back: 20-50mm	2	3	4
Break Back: >50mm	3	4	5

Sealed Roads - Fatigue Cracking (Pavement)

Fatigue cracking includes crocodile and block cracking, which are often an indication of pavement failure. It is important to identify these defects in their initial stages as early intervention can significantly reduce treatment costs.

Crocodile Cracking: Interconnected or interlaced cracks resembling a crocodile hide. Cell sizes are generally less than 150mm across but may extend up to 300mm.

Block Cracking: Interconnected cracks forming a series of blocks, approximately rectangular in shape. Commonly distributed over the full pavement, block sizes are usually greater than 200mm and can exceed 3m.

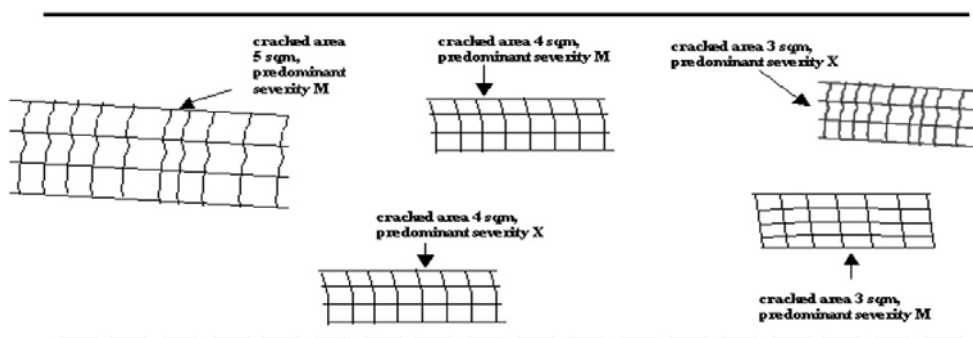


Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	Cracking affecting <1% of segment area
2	Negligible	Cracking affecting >1% & <5% of segment area
3	Minor	Cracking affecting >5% & <10% of segment area
4	Moderate	Cracking affecting >10% & <20% of segment area
5	Extreme	Cracking affecting >20% of segment area

Notes:

- When assessing fatigue cracking, raters' should be cognisant of the difference between intense localised cracking and general cracking across the length and breadth of the pavement segment, and report accordingly.
- The accurate and repeatable estimation of defect percentage of a road segment is essential to obtaining a reliable dataset.

Example:



Length of segment: 20 m
 Width of seal: 4 m
 Segment Area: 100 m²
 Total area of cracking: 5+4+3+3+4=19 m²
 % area affected: 19/100 = 19%
 Score: 4

Sealed Roads - Linear Cracking (Pavement)

Linear cracking can have many different geometries, but there should be little if any interconnection between individual cracks. Generally indicates that the pavement may have contracted or moved, but not failed. The difference between dormant and active cracks should be recognised. Active cracks have opened up recently, have sharp clean edges, and should not have any dirt or sediment lying in them. Conversely, dormant cracks were created some time ago, have more rounded edges, and have been partially filled with sediment. Dormant cracks are considered a lower priority for treatment, as further deterioration is unlikely.

Meandering Cracks: Irregular linear cracks.

Transverse Cracks: Unconnected cracks running transversely across the pavement.

Longitudinal Cracks: Cracks running longitudinally along the pavement. Some limited branching may occur.

Diagonal Cracks: Unconnected cracks that generally take diagonal lines across a pavement.



Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	Cracking width >0mm & <1mm
2	Negligible	Cracking affecting >1mm & <2mm
3	Minor	Cracking affecting >2mm & <3mm
4	Moderate	Cracking affecting >3mm & <4mm
5	Extreme	Cracking affecting >4mm

Notes:

1. Assessment is of active cracking only – dormant cracking is to be assumed to be equal to nil to minor level of cracking dependent on severity.

Sealed Roads - Shape Loss (Pavement)

Shape loss can take a number of different forms, but is always a result of pavement failure. Safety is usually the main concern when significant shape loss occurs. Large ruts can hold enough water to result in vehicles aquaplaning in wet weather. Major shoving or roughness can make vehicle control difficult particularly around bends in the road.

Rutting: Longitudinal deformation in a wheel path. May occur in one or both wheel paths of a lane and may be a problem at heavy traffic intersections.

Shoving: Deflection and bulging of the road surface generally parallel to the direction of traffic, and/or horizontal displacement of surfacing materials.



The condition of the shoulder is assessed using the following risk matrix:

Condition Rating			
% of Area affected\Shoulder Drop	Drop: 0-20mm	Drop: 20-50mm	Drop: >50mm
Area: 0-5%	1	2	3
Area: 5-20%	2	3	4
Area: >20%	3	4	5

Notes:

1. The accurate and repeatable estimation of defect percentage of a road segment is essential to obtaining a reliable dataset.

Unsealed Roads

This part of the Manual addresses the condition assessment of Unsealed roads.

Unsealed Roads - Shape Loss Condition

Shape loss can take a number of different forms, but is usually a result of poor quality gravel or running surface material. Safety is usually the main concern when significant shape loss occurs. Major shoving or roughness can make vehicle control difficult particularly around bends.

- Longitudinal wash:** Longitudinal washes in the wheel paths. May occur in one or both wheel paths.
- Potholes:** Usually occurs on roads after periods of wet weather where drainage off the running surface is inadequate.
- Rutting:** Usually created by loss of material from the wheel path. May occur in one or both wheel paths.
- Roughness:** Occurs where loose material creates corrugations and where water flows across the road resulting in transverse washes close together.



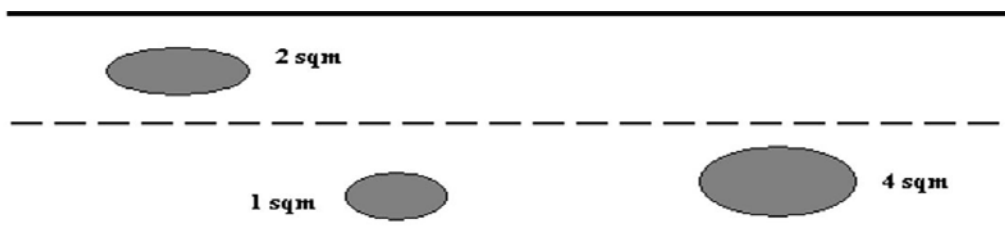
These shape losses may occur in isolated areas (such as in dips in a segment), and thus severity may be negligible in terms of the overall segment length. This isolated cases should be recorded as such and re-segmentation of the road is to be considered.

Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	Affecting < 5% of segment area
2	Negligible	Affecting >5% & < 10% of segment area
3	Minor	Affecting >10% & < 20% of segment area
4	Moderate	Affecting > 20% & <50% of segment area
5	Extreme	Affecting >50% of segment area

Notes:

- The accurate and repeatable estimation of defect percentage of a road segment is essential to obtaining a reliable dataset.

Example 1:



Length of segment: 20 m
 Width of seal: 4 m
 Segment Area: 100 m²
 Total area of local defects: 2+4+1=7 m²
 % area affected: 7/100 = 7%
 Score: 2

Unsealed Roads - Surface Condition (Loose Material)



Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	affecting >0% & < 5% of segment area
2	Negligible	affecting >5% & < 10% of segment area
3	Minor	affecting >10% & < 20% of segment area
4	Moderate	affecting > 20% & < 50% of segment area
5	Extreme	affecting >50% of segment area

Unsealed Roads – Pavement failure (Water retention)

Ponding may occur as a result of deformation of the road surface, prolonged rain events or depressions in the road.



Condition Rating			
Length of ponding / width affected	width: <1.5m	Width: 1.5m to 2.5m	Width: >2.5m
Length being < 5m	1	2	3
Length being > 5m but < 20m	2	3	4
Length being > 20m	3	4	5

Road furniture (Obstructions)

This part of the Manual addresses the condition assessment of gravel roads.

Note:

Footpaths are covered in a separate document.

Grids

A grid is a type of obstacle used to prevent livestock, such as sheep or cattle, from passing along a road which penetrates the fencing surrounding an enclosed piece of land.

All new grid construction within the Barcaldine Regional Council must conform to the Councils Grid Policy (BRC I 001 as amended)



Condition Rating		
Rating	Considered to be	Description
1	Full Compliance	Meets all the requirements including any existing recognised standards e.g. Ausroads, Aust Standard, Main Roads etc (must be marked)
2	Substantial Compliance	Meets some, but not all, of the engineering standards but is visibly sound in the deck and abutments, has no history of problems
3	Limited Compliance	Does not meet any engineering standards, but is visibly sound, has little or no history of problems
4	Very Limited Compliance	Does not meet any engineering standards, is not visibly acceptable but is not "dangerous/unsafe"
5	Dangerous/Unsafe	Is dangerous/unsafe requires immediate action.

Notes:

1. Assessors of grid conditions should also refer to Council Policy BRC I 001 'Stock Grids and Gates'
2. Grid Inspection record forms are to be used for a full grid condition rating

Manhole Covers

Service pits are often embedded into the road surface for access into sewers or storm water infrastructure below the road.



Manhole covers not matching road surface

Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	Level difference of < 5mm
2	Negligible	Level difference of > 5mm & < 10mm
3	Minor	Level difference of > 10mm & < 20mm
4	Moderate	Level difference of > 20mm & < 50mm
5	Extreme	Level difference of > 50mm

Roadside Guide posts

Guide posts are placed along the road to demarcate the road edges. This section includes delineators placed on guard rails



Condition Rating			
Situation / defect	Leaning / damaged	Broken (must be reflective)	Missing
Straight rural road	1	2	3
Curves (must be able to see two)	2	3	4
Demarcating an obstruction (e.g. culvert)	3	4	5

Roadside Signs (Regulatory & Information)

Traffic sign become worn and are sometimes knocked over by passing vehicles and vandals

- Regulatory:** These are traffic signs intended to instruct road users on what they must or must not do in a particular circumstance. They are used to indicate or reinforce traffic laws, regulations or requirements which apply either at all times or at specified times or places upon a street or highway.
- Warning:** Warning signs are put in place to advise drivers of potentially hazardous conditions on or beside the road in the interest of the safety of drivers and other road users.
- Information:** Signs to advise road users about the route they are following and give directions and distances to destinations on the route or along other roads that intersect the route. They also supply information to identify points of.
- Temporary:** Movable signs or traffic lights that are used to warn motorist of temporary changes to conditions or activities.
- Name:** Street names, property names and town names.



Condition Rating			
Sign type / defect	Faded (readable)	Damaged (must be readable)	Missing (not readable)
Regulatory / Warning	3	4	5
Information	2	3	4
All other signs	1	2	3

Roadside Obstructions (eg Vegetation)

Traffic is often impeded by road side obstacles. These obstructions are often caused by vegetation on the side of the road which slowly encroaches on the road, especially in the vicinity of intersections (predominantly in urban areas) and bends (predominantly in rural areas)

Line of sight: Grass and other vegetation in the line of sight area. This is fundamentally a design parameter that is dependant on road type, curves radii and design speed, all of which are unknown to the inspector.

Obstructions: This has many forms, namely:

- Any vegetation that is obscuring or could obscure regulatory or warning signs.
- Overhanging tree limbs that may restrict vehicle access along a road



Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	Not impeding traffic
2	Negligible	affecting >5% & < 10% of segment area
3	Minor	affecting >10% & < 20% of segment area
4	Moderate	affecting > 20% & <50% of segment area
5	Extreme	affecting >50% of segment area

Roads Drainage Structures

This part of the Manual addresses the condition assessment of gravel roads.

Off Road Drainage (Table Drains)

This rating is about assessing the quality and existence of drainage. It includes the ability of the roadway to drain water from the road surface and the ability of the roadside table drain to function and carry water. Stagnant pools of water beside a road will often lead to pavement failure in the long term.



Condition Rating		
Rating	Considered to be	Drainage Observation
1	Nil	Road and shoulder have good cross fall, and road side drains are unobstructed and functional.
2	Minor	Adequate road and shoulder cross fall observed which will enable water to drain away to the edge of the roadway. Less than 20% of the road side drain is obstructed with vegetation, rocks, silt, etc. Water should still be able to drain away freely from the side of the road.
3	Moderate	Adequate road and shoulder cross fall observed which will enable water to drain away to the edge of the roadway, but minor shoulder erosion or build-up may be observed. Between 20-50% of the road side drain is obstructed with vegetation, rocks, silt, etc. Generally water should be able to drain away from the side of the road, but some large puddles may remain. Water depth of remaining water is less than 100mm
4	Extreme	Inadequate road and/or shoulder cross fall observed. Major shoulder erosion or build-up may be noticeable. More than 50% of the table drain is obstructed with vegetation, rocks, silt, etc. Road side drain will remain flooded for a significant amount of time after a rain event. Water depth of remaining water is greater than 100mm

Kerb & Channel Drainage

This rating is about assessing the quality and effectiveness of the kerb and channel. It includes the ability of the roadway to drain water from the road surface. Stagnant pools of water beside a road will often lead to pavement failure in the long term.



The defects are considered should water be backed up by a minimum of 20m

Condition Rating			
Vertical Displacement / width affected	width: <1.0 m	Width: 1.0m to 2.0m	Width: >2.0m
Displacement < 20mm	1	2	3
Displacement > 20mm but < 50mm	2	3	4
Displacement > 50mm	3	4	5

Culverts

This rating is about assessing the functionality and existence of culverts. It includes an assessment on the culverts ability to remove storm water and its structural integrity ability.

Silting/debris: Silt build up through a culvert results in the capacity of the culvert being greatly reduced, while debris can almost block a culvert causing the water to flow over the road

Line & level: When a culvert goes out of line and level, deposition of silt occurs resulting in the capacity being reduced and the road over the culvert deforming.

Head walls: The headwalls and apron protect the ends of the culvert from wash both through the culvert and from water running off the road down the side of the culverts.

Integrity: Often caused by bad construction methods, such as gaps between barrels or uncompacted backfill.



The overall condition rating is the highest of the following:

Silt / debris Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	affecting < 5% of cross sectional area
2	Negligible	affecting >5% & < 10% of segment area
3	Minor	affecting >10% & < 20% of segment area
4	Moderate	affecting > 20% & <50% of segment area
5	Extreme	affecting >50% of segment area

Line / Level Condition Rating		
Rating	Considered to be	Area Affected
1	Nil	No visible bow in the culvert
2	Negligible	Bow in culvert resulting in reduction of >5% & < 10% of cross sectional area
3	Minor	Bow in culvert resulting in reduction of >10% & < 20% of cross sectional area
4	Moderate	Bow in culvert resulting in reduction of >20% & <50% of cross sectional area
5	Extreme	Bow in culvert resulting in reduction of >50% of cross sectional area

Headwall Condition Rating (inlet or outlet)		
Rating	Considered to be	Damage
1	Nil	No visible wash or damage
2	Negligible	
3	Minor	Leaning due to wash around sides of head wall
4	Moderate	
5	Extreme	Headwall destroyed requires replacement

Structural Condition Rating			
Vertical Displacement / Gap between culvert sections	Gap width: <20mm	Gap width: 20mm to 50mm	Gap width: >50mm
Displacement < 20mm	1	2	3
Displacement > 20mm but < 50mm	2	3	4
Displacement > 50mm	3	4	5

Holistic Considerations

Asset Capacity

Capacity is a measure of future growth requirements based on current utilization. Future growth requirements are addressed within the Asset Management Plan for Roads; however, the collection and advisement of the current utilization of roads is the responsibility of the Engineering Services Department within Council (or equivalent). Other people assessing road conditions do **not** need to assess for capacity; however, should be aware of this criterion.

Utilisation

Utilisation is an assessment of an asset's ability to satisfy the current demand placed on it.

Condition Rating		
Rating	Considered to be	Description
1	Under Utilised	Demand less than 65% of capacity
2	Growth Available	Demand 65% to 85% of capacity
3	Well Utilised	Demand 85% to 100% of capacity
4	Overcrowded	Demand exceeds 100% of capacity – Level of Service degraded but still generally acceptable
5	Demand Failure	Demand exceeds 100% - service denied for legislative or compliance reasons or Level of Service degraded to unacceptable levels

Note: As an under utilised asset is as undesirable as an asset unable to meet the demand on it; the ideal score for Utilisation

Asset Functionality

The assessment of asset functionality is the responsibility of the Engineering Services Department within Council (or equivalent). Other people assessing road conditions do **not** need to assess for functionality; however, should be aware of this criterion.

Condition Rating		
Rating	Considered to be	Description
1	Excellent	Design New < 5
2	Good	Design Good
3	Serviceable	Design still meets Rural Road Purpose
4	Poor	Stakeholders seeking new design
5	Unserviceable	Design no longer meets needs of stakeholders

Excluded Assessments from Asset Condition Assessment

The assessments of roads are excluded from the assessing of road condition but none the less should be noted or recorded from a follow-up road maintenance perspective:

- Road Reserve Slashing
- Presence of Animal Carcasses
- Sign Maintenance
- Silting of culverts
- Condition of Rubbish Bins
- Degree of Littering

Related assets such as road curbing, bridges, floodway's are also excluded from assessment as each is subject to a separate and unique condition assessment regime; however, their general condition should be noted and in particular the need for any specific follow-up inspections and other actions.

Rural Road Inspection Regime

The Proactive rural road inspection regime is defined within the Rural Road Level of Service Manual, along with the remedial response times to rectify and condition weaknesses found during road inspections.

Urban Road Inspection Regime

The Proactive urban road inspection regime is defined within the Urban Road Level of Service Manual, along with the remedial response times to rectify any condition weakness found during road inspection.

This Manual is still to be developed