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</table>
# Acknowledgements

This Manual was written by Dr. Kieran Feighan and Mr. Brian Mulry of PMS Pavement Management Services Ltd. in collaboration with a Steering Group of the Department of Transport, Tourism and Sport. The members of the Steering Group were as follows:

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</table>

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Section 1: Introduction

A major function of an urban authority is to use public funds to provide a comfortable, safe and economical road surface. This requires balancing priorities and making difficult decisions in order to manage pavements. Many urban pavement networks are often managed informally, based solely on the staff’s judgment and experience. While this process is both important and functional, using a slightly more formalised technique can make it easier to manage pavements effectively.

Experience has shown that there are three especially useful steps in managing urban roads:

1. Inventory all urban roads.
2. Periodically evaluate the condition of all pavements.
3. Use the condition evaluations to set priorities for projects and select appropriate treatments.

A comprehensive pavement management system involves collecting data and assessing several road characteristics: roughness (ride), surface distress (condition), surface skid resistance and structure (pavement strength and deflection). Managers can combine this condition data with economic analysis to develop short-range and long-range plans for a variety of budget levels. However, many urban agencies lack the resources for such a full-scale system.

Since surface condition is the most vital element in any pavement management system, urban agencies can use the simplified Pavement Surface Condition Index (PSCI) rating system presented in this Urban Flexible Roads Manual to evaluate their roads. The Urban Flexible Roads ratings combined with other inventory data (width, length, shoulder, pavement type, construction history, etc.) can be very helpful in planning future budgets and priorities.

The PSCI condition rating system in this manual has been designed with a number of objectives in mind. It should be simple to understand and implement by a wide range of survey personnel. No prior experience in pavement rating should be necessary to carry out the rating procedure. The PSCI rating system in Table 1 and Section 3 of this manual should be based only on visual pavement distresses. The impact of surface-related distresses, structural-related distresses and other defects on the overall rating system should be identified. The results of the rating system should be relatable to the maintenance treatment categories specified for use on urban flexible roads by the Department of Transport, Tourism and Sport (DTTAS). Table 2 in Section 5: Conclusions and Next Steps of this manual summarises the overall relationships between these factors.

This Manual is designed to improve the data collection and quality of visual surveying of urban flexible roads within the urban authorities of the Republic of Ireland. Substantial use was made of the template provided by the Pavement Surface Evaluation and Rating (PASER) manuals produced by the Transportation Information Center at the University of Wisconsin-Madison.
Section 2: Pavement Distress – Flexible Pavements

This manual uses visual inspection to evaluate pavement surface conditions. The key to a useful evaluation is identifying different types of pavement distress and linking them to a cause. Understanding the cause for current conditions is extremely important in selecting an appropriate maintenance or rehabilitation technique.

Deterioration has three general modes. These are:
- Environmental deterioration due to weathering and aging
- Structural deterioration caused by repeated traffic loading
- Deterioration due to unsuitable materials (e.g. consolidation of subgrade, subsidence).

Pavement deterioration will result from contributions by one or more of the modes. It is important to try to determine the relative contributions in order to select the most effective rehabilitation techniques. The rate at which pavement deteriorates depends on its environment, traffic loading conditions, original construction quality and interim maintenance procedures. Poor quality materials or poor construction procedures can significantly reduce the life of a pavement. As a result, two pavements constructed at the same time may have significantly different lives, or certain portions of a pavement may deteriorate more rapidly than others. On the other hand, timely and effective maintenance can extend a pavement’s life. Crack sealing and surface dressing can reduce the effect of moisture on weakening of flexible road pavements.

With all of these variables it is easy to see why pavements deteriorate at various rates and why we find them in various stages of disrepair. Recognising defects and understanding their causes helps us rate pavement condition and select cost-effective repairs. The pavement defects shown on the following pages provide a background for this process. Some defects are localised while others indicate that problems may develop throughout the pavement. It is important to distinguish between local and widespread defects. Assessing the conditions of actual roadways also involves looking for combinations of these individual defects.

There are four major categories of common road surface defects on urban flexible roads:

**Surface Defects**
- Ravelling
- Bleeding

**Pavement Deformation**
- Rutting
- Surface Distortion (shoving, settlement/heave, depressions, bumps, sags, etc.)

**Cracks**
- Alligator Cracking
- Edge Breakup and Cracking
- Other Cracking (longitudinal, transverse, reflection, meander, slippage, etc.)

**Surface Openings**
- Patching and Utility Repairs
- Potholes
- Manhole/Ironworks defects

Periodic inspection is necessary to provide current and useful evaluation data. It is recommended that Urban Flexible Road ratings be updated every two years, and an annual update is even better.
SURFACE DEFECTS

Ravelling
Ravelling is progressive loss of binder and aggregate chippings from the pavement surface. Ravelling can be caused by stripping of the bituminous film from the aggregate, binder hardening due to aging, poor compaction especially in cold weather construction, insufficient binder content or poor quality aggregate. In addition, ravelling can be caused by the action of tracked vehicles or oil spillage. Ravelling can occur on any part of the carriageway lane including areas with high friction surface and cycle tracks if they form part of the kerb to kerb carriageway surface.
Ravelling along cycle track on carriageway lane
SURFACE DEFECTS

Bleeding

Bleeding or fatting up is a film of excess bituminous material on the pavement surface which creates a shiny reflective surface that usually becomes sticky in hot weather. In surface dressings, it is usually caused by excessive embedment of the chippings or too high a rate of spread of the binder. Repair by the application of a properly designed surface treatment to restore adequate skid resistance or thin overlay if additional strength is required.
Bleeding

Bleeding: Dark, shiny areas show where binder has worked to the surface along the wheelpath

Fatting up of binder along the wheelpath on Clause 942 surface
**Rutting**

Rutting is a permanent longitudinal deformation in the wheel paths caused by traffic loading. It occurs due to the displacement of material, creating channels in the wheel paths. Some uplift may also occur along the sides of the rut. It is caused by traffic compaction or sideways movement of unstable material. Severe rutting (over 50mm) may be caused by base or subgrade consolidation. It is a form of structural failure caused by repeated traffic loading.
Rutting

Severe Rutting with uplift of sides in the wheelpath
Surface Distortion
All permanent surface deformation, with the exception of rutting, is identified as surface distortion. Rutting is a permanent longitudinal deformation in the wheel paths caused by traffic loading.

Surface distortion can be caused by poor construction, improper mix design or settlement of the subgrade. Distortion includes depressions or sags which are defined as small abrupt downward displacements of the pavement producing flat irregular shaped basins. Other pavement distortions include shoving, bumps, settlement, frost heave etc. with longer wavelengths. Shoving is a displacement of a localised area of pavement caused by traffic pushing against the pavement with unstable asphalt mixture. Bumps are small abrupt upward displacements of the pavement surface.

This distress causes roughness and can have a significant effect on driver and passenger comfort. Moderate surface distortion will reduce the driver comfort speed to less than 50 km/hr. Severe surface distortion will reduce the driver comfort speed to less than 30 km/hr.
Surface Distortion

Depression in pavement surface producing flat irregular shaped basin

Pavement deformation (note road marking on left edge)
Alligator Cracking
Alligator cracking is a series of interconnected cracks forming small, many-sided, sharp-angled polygons ranging in size from about 25mm to 125mm resembling chicken wire or the skin of an alligator. It’s caused by fatigue failure of the surface due to repeated traffic loading and very often also due to inadequate base or subgrade support. The edges of the cracks may or may not be spalled. Spalling is the loss of a piece of the pavement from along the edges of cracks.

Alligator cracking may comprise;

- Fine, longitudinal hairline cracks running parallel to each other and with none or only a few interconnecting cracks. There is no spalling which is a breakdown of material along the sides of a crack.

- A pattern of parallel and interconnecting cracks that may be lightly spalled.

- A well-defined pattern of interconnected polygon shaped cracks which are spalled at the edges. Some pieces may appear to be loose or may appear to rock under traffic.

Repair by excavating localised areas and replacing base and surface. Large areas require overlay or reconstruction. Improvements in drainage may often be required.
Alligator Cracking

Open and spalled alligator cracking in the wheelpath

Alligator cracking made more visible by moisture in cracks
Edge Breakup/Cracking

Edge breakup/cracking can be caused by inadequate pavement width, inadequate lateral support to the pavement, moisture penetration, poor drainage or frost action. It is accelerated by repeated traffic loading. Edge breakup is identified as

- Any singular or multiple cracking within 300 mm of the pavement edge.
- Pavement edge showing considerable breakup with some portions of the edge having been removed.
- Breakup of the pavement edge including a mix of potholing, cracking and patching along the pavement edge.

Edge breakup differs from loss of surface (Ravelling) at the pavement edge as it is a structural distress caused by traffic loading. Edge breakup can be distinguished from Ravelling by the presence of cracking and loss of some or all the underlying pavement layers at the pavement edge.

Multiple longitudinal cracks in the pavement edge indicate a need for strengthening with an overlay or reconstruction.
Edge Breakup/Cracking

Edge breakup at road/footpath edge with material loss

Edge breakup/cracking at road edge
Other Cracking
Linear cracks include longitudinal, transverse and meander cracks. Longitudinal cracks are parallel to the pavement centreline. Transverse cracks extend across the pavement at approximately right angles to the pavement centreline and are often regularly spaced. Some pavement cracks appear to wander randomly, Meander cracks.

These types of cracking can be caused by Reflection cracking in the bituminous surfacing reflecting the pattern of joints or cracks in the underlying pavement layers, most typically concrete or cement-bound pavement layers. These cracks can also be caused by movement of the underlying layers due to moisture penetration, temperature changes, binder hardening due to aging or traffic loading. The crack edges can further deteriorate by ravelling or spalling, eventually eroding the adjacent pavement. Spalling is the loss of a piece of the pavement from along the edges of cracks.

Linear cracks may be non-filled or may be filled with a sealant. Non-filled cracks ≤ 12 mm in width, filled cracks of any width where the sealant is in satisfactory condition, and cracks where no spalling/ravelling exists would be considered to be at the lower end of deterioration. Non-filled cracks > 12 mm in width, filled cracks of any width where the sealant is in poor condition, and cracks where spalling exists are classified as having more severe deterioration.

Other cracking also includes Slippage cracking which are crescent or rounded cracks. They are caused by slippage between an overlay and the underlying pavement due to a low-strength surface mix or poor bond. Slippage is most likely to occur at areas where traffic is stopping and starting, turning or braking.
**Other Cracking**

- Reflection cracking, narrow width ($\leq 12\text{mm}$)
- Longitudinal and Transverse cracking, relatively tight cracks
Other Cracking

Reflection cracking, open (> 12mm) and unsealed

Wide open reflection cracking (>12mm) with spalling of edges
Other Cracking

Meander reflection cracking

Slippage cracking with underlying stability problems
**SURFACE OPENINGS**

**Patching**
A patch is an area where the original pavement has been removed and replaced with new material. A utility cut is a patch that has replaced the original pavement to allow the installation or maintenance of underground utilities. Patches showing cracking, settlement, joint deterioration, or other distress under continued traffic loading indicate underlying causes still remain.

Patches can be both small (< 1 m²) or large in size such as utility cut repairs. Patches may be in good condition and performing satisfactorily with little or no deterioration. Patches may be moderately deteriorating or badly deteriorating with other defects in the patched area and in need of replacement.

Well sealed small patch in very good condition
Patching

Utility cut repair in very good condition with well sealed joints

Utility cut patching repairs in fair condition
Patching

Utility Patch showing deterioration with linear and alligator cracking present

Very poor patching with extensive distress present
Potholes

Potholes are bowl-shaped depressions where part of the pavement has been removed, exposing the underlying layer(s). They are produced when cracking or some other defect allows moisture to penetrate the pavement surface, which is subjected to repeated traffic loading. This results in disintegration of the surface and the progressive removal of the underlying material. This is often combined with poor drainage. Repair by excavating or rebuilding localised potholes as well as localised surface dressing/overlay of repaired areas. Reconstruction required for extensive defects.
Potholes

Large isolated pothole, extends through base.
Note adjacent alligator cracks which commonly deteriorate into potholes.
Manhole/Ironworks
The surface of a normal pavement may be interrupted to accommodate manholes, ironworks or a storm sewer inlet. Manholes and ironworks are considered a defect no matter how well they are constructed and are performing. Manholes and ironworks which have been poorly constructed or which have not been raised in line with the pavement surface have a negative effect on pavement condition and cause poor ride quality. Cracks, settlement, potholes etc. may develop around manholes and ironworks which may deteriorate further. These are often localised defects that may not indicate a general pavement problem.
Manhole/Ironworks

Inlet gully not raised to new road surface causing severe and sudden dip in left wheelpath

Failed pavement surface in vicinity of small ironworks
MANHOLE/IRONWORKS

Manhole with utility repair in poor condition

Ironworks above the pavement surface causing poor ride quality
Section 3: Rating Pavement Condition

Table 1 on the following page outlines the rating system for rating pavement condition. With an understanding of surface defects, structural distresses and other pavement defects, you can evaluate and rate flexible pavement surfaces. **Surface defects** comprise ravelling and bleeding; **Structural distresses** (i.e. load-related) include rutting, alligator cracking, edge cracking/breakup, potholes and poor/failed patching; while **Other pavement defects** include **Other cracking** (longitudinal, transverse, reflection, meander and slippage cracking); **Surface distortion** (depressions/sags, shoving, bumps, settlement, or heave), and **Surface openings** (good/fair patching, utility-cut patches and manholes/ironworks).

The rating scale ranges from 10 for a pavement in excellent condition to 1 for a pavement in failed condition. Most pavements will deteriorate through the phases listed in the rating scale. The time it takes to go from excellent condition (10) to complete failure (1) depends largely on the quality of the original construction and the amount of heavy traffic loading.

Once significant deterioration begins, it is common to see pavement decline rapidly. This is usually due to a combination of loading and the effects of additional moisture. As a pavement ages and additional cracking develops, more moisture can enter the pavement and accelerate the rate of deterioration.

Look at the photographs in this section to become familiar with the descriptions of the individual rating categories. To evaluate an individual pavement segment, first determine its general condition. Is it relatively new, toward the top end of the scale? Is it in very poor condition and at the bottom of the scale? Or somewhere in-between?

Finally, review the individual pavement distresses and using the primary rating indicators and secondary rating indicators given in Table 1, select the appropriate PSCI surface rating category for the pavement segment.

Individual pavements will not have all of the types of distress listed for any particular rating. They may have only one or two types.
### Table 1: The PSCI Rating System

<table>
<thead>
<tr>
<th>Overall PSCI Rating</th>
<th>Primary Rating Indicators*</th>
<th>Secondary Rating Indicators*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>No Visible Defects.</td>
<td>Road surface in perfect condition.</td>
</tr>
<tr>
<td>9</td>
<td>Minor Surface Defects1.</td>
<td>Road surface in very good condition.</td>
</tr>
<tr>
<td></td>
<td>Ravelling or Bleeding &lt;10%.</td>
<td>Like new.</td>
</tr>
<tr>
<td>8</td>
<td>Moderate Surface Defects1.</td>
<td>Little or No Other defects.</td>
</tr>
<tr>
<td></td>
<td>Ravelling or Bleeding 10% to 30%.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Extensive Surface Defects1.</td>
<td>Little or No Other defects.</td>
</tr>
<tr>
<td></td>
<td>Ravelling or Bleeding &gt; 30%.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Moderate Other Pavement Defects2, 3, 4.</td>
<td>No structural distress5.</td>
</tr>
<tr>
<td></td>
<td>Other Cracking2 &lt; 20%.</td>
<td>Surface defects1 may be present.</td>
</tr>
<tr>
<td></td>
<td>Sealed Cracks in Good condition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Some narrow Open Cracks2 (≤ 12 mm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surfacing in Good condition4.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface Distortion3 requiring some reduction in speed.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Significant Other Pavement Defects2, 3, 4.</td>
<td>Very localised structural distress5.</td>
</tr>
<tr>
<td></td>
<td>Other Cracking2 &gt; 20%.</td>
<td>Surface defects1 may be present.</td>
</tr>
<tr>
<td></td>
<td>Sealed Cracks in Fair condition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More frequent narrow Open Cracks2 (≤ 12 mm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surfacing in Fair condition4.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface Distortion3 requiring reduction in speed.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Structural Distress5 Present.</td>
<td>Other defects may be present.</td>
</tr>
<tr>
<td></td>
<td>Rutting, Alligator Cracking or Poor Patching for 5% to 25%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wide Open Cracks2 (&gt; 12 mm) with moderate Spalling.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sealed Cracks in Poor condition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequent Potholes.</td>
<td></td>
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<tr>
<td></td>
<td>Short lengths of Edge Breakup.</td>
<td></td>
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<tr>
<td>3</td>
<td>Significant Areas of Structural Distress5.</td>
<td>Other defects may be present.</td>
</tr>
<tr>
<td></td>
<td>Rutting, Alligator Cracking or Poor Patching for 25% to 50%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Many Wide Cracks2 (&gt; 12 mm) with severe Spalling.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More frequent Potholes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuous lengths with Edge Breakup.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Large Areas of Structural Distress5.</td>
<td>Pavement badly deteriorated. Very difficult to drive on.</td>
</tr>
<tr>
<td></td>
<td>Rutting, Alligator Cracking or Very Poor Patching for &gt; 50%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe Rutting (&gt; 50 mm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extensive Very Poor Patching.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Many Potholes.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Extensive Structural Distress5</td>
<td>Severe Deterioration Virtually undriveable.</td>
</tr>
<tr>
<td></td>
<td>Severe Deterioration of surface. Pavement Failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Many large and deep Potholes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extensive Failed Patching.</td>
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</tr>
</tbody>
</table>

*Individual pavements will not have all the types of distress listed for any particular rating. They may have only one or two types.*

**Note 1:** Surface Defects = Ravelling or Bleeding.

**Note 2:** Other Cracking = Longitudinal, Transverse, Reflection, Meander or Slippage Cracking.

**Note 3:** Surfacing Distortion = Shape Problems, Depressions/Sags, Shoving, Bumps, Settlement or Heave.

**Note 4:** Surfacing Openings = Good/Fair Patching and Utility Cut Patches or Manholes/Ironworks.

**Note 5:** Structural Distress = Load-related defects comprising Rutting, Alligator Cracking, Edge Breakup/Cracking, Potholes or Poor/Failed Patching.
**Rating 10**

Excellent – Routine Maintenance

Newly constructed or recently overlaid roads are in excellent condition and require routine maintenance.
Rating 10: Road with no visible pavement defects, relatively new surface dressing

Rating 10: Road with new HRA surface
**Rating 9**

*Very Good – Routine Maintenance*

Pavements in very good condition with very few visible defects. Newly surface dressed pavements. Less than 10% of surface with surface defects (ravelling and bleeding). No other defects.

Rating 9: New surface with Manhole/ironworks patching in very good condition

Rating 9: Pavement surface on carriageway and cycle lanes in very good condition
Rating 9: Road with good surface and well sealed joint

Rating 9: Fatting up of pavement surface less than 10%
**Rating 8**

**Good – Restoration of Skid Resistance**

This category includes roads which are showing surface defects (ravelling and bleeding) only. Roads with 10 to 30% of surface with surface defects. Little or No Other defects present: No structural distresses (rutting, alligator cracking, edge problems, potholes); No patching and No other cracking. Road shape is very good.

![Rating 8: Ravelling evident in wheelpaths, 10% to 30% of surface](image1)

![Rating 8: Ravelling evident in wheelpaths, 10% to 30% of surface](image2)
Rating 8: Ravelling in Cycle track on carriageway lane

Rating 8: Bleeding on pavement surface (10% to 30%)
**Rating 7**

**Good - Restoration of Skid Resistance**

Greater than 30% of surface with surface defects (ravelling or bleeding). Little or No Other defects: No structural distresses (rutting, alligator cracking, edge problems, potholes); No patching; No other cracking present, and road shape is good.

Rating 7: Extensive Ravelling over most of pavement surface (> 30%)
Rating 7: Ravelling or striping of material from pavement surface

Rating 7: Bleeding in wheelpaths greater than 30% of surface
Rating 6

Fair – Surface Restoration

Small quantities (< 20%) of other cracking (longitudinal, transverse, reflection, meander or slippage) may be present with some open (≤ 12 mm). Sealed cracks in good condition. Patching present, generally in good condition. Pavement may be out of shape with some surface distortion present requiring some reduction in driver speed necessary to maintain driver and passenger comfort. Surface defects (ravelling and bleeding) may be present. No structural distresses present (rutting, alligator cracking, edge problems, poor/failed patching or potholes). Localised repair needed before surfacing.
Rating 6: Utility cut patch with surface defects present on pavement

Rating 6: Reflection cracks, tight in nature over less than 20% of pavement surface
Rating 5

Fair – Surface Restoration

Frequent other cracking present (> 20% of surface) with some open (≤ 12 mm). Sealed cracks in fair condition. Patching present generally in fair condition. Pavement out of shape with significant surface distortions requiring driver to reduce speed. Some very localised structural distress (rutting, alligator cracking, edge problems, poor/failed patching or potholes) may be present in small quantities (< 5 sq.m of surface or a few isolated potholes). Surface defects (ravelling and bleeding) may be present. The road requires either large quantities of localised repair before surfacing or the road is in need of reshaping with significant driver discomfort.
Rating 5: Patching generally in fair condition but failed in vicinity of ironworks

Rating 5: Patching generally in fair condition with signs of distress in vicinity of ironworks
Rating 4
Poor – Structural Overlay

Road shows signs of needing strengthening by structural overlay. Structural distresses are present (rutting, edge problems, alligator cracking, poor/failed patching or potholes). Rutting, alligator cracking or poor patching present (5% to 25% of surface). Wide open cracks (>12mm) with moderate spalling or sealed cracks in poor condition present. Short lengths of edge breakup/cracking present. Frequent potholes present. Other defects (ravelling, bleeding, surface distortion or other cracking) may be present.
Rating 4: Wide open cracks and poorly sealed joints and cracks, bituminous surface failed on concrete pavement

Rating 4: Extensive patching showing signs of distress and deterioration
Rating 4: Structural distress (5 to 25%), with some patching in poor condition
**Rating 3**

**Poor – Structural Overlay**

Significant quantities of structural distress present (rutting, edge problems, alligator cracking, poor/failed patching or potholes). Rutting, alligator cracking or poor patching (25% to 50% of surface). Many wide open cracks (>12mm) with severe spalling present. Significant continuous lengths with edge breakup/cracking and loss of material at edges. More frequent potholes. Other defects may be present. Structural overlay required to strengthen road.
Rating 3: Pavement in poor condition, with potholes and poor patching present

Rating 3: Severe alligator cracking and rutting evident over 50% of surface
Rating 3: Extensive Alligator cracking and poor patching
Rating 2

Very Poor – Road Reconstruction

Roads are severely deteriorated and need reconstruction. Very significant quantities of alligator cracking and rutting present (over 50% of surface). Severe rutting (over 50 mm deep). Extensive patching in very poor condition. Many potholes. Very difficult to drive on. Road needs full depth reconstruction with extensive base repair.
Rating 2: Severely deteriorated, extensive patching and structural problems, loss of surfacing in places

Rating 2: Extensive alligator cracking, very poor patching and potholes present, in very poor overall condition
**Rating 1**

**Failed – Road Reconstruction**

Road layers have completely failed. Severe structural distress with extensive loss of pavement surface. Many large and deep potholes, patching in failed condition. Severe deterioration and virtually undriveable. Road needs full depth reconstruction with extensive base repair.

Rating 1: Extensive failed patching with severe deterioration, pavement failure

Rating 1: Extensive failed patching, almost total loss of pavement integrity
Rating 1: Failed pavement with extensive failed patching and large surface openings

Rating 1: Severely deteriorated, extensive patching and structural problems, loss of surfacing in places
Section 4: Practical Advice on Rating Roads

Inventory and Field Inspection
Most agencies routinely observe roadway conditions as a part of their normal work and travel. However, a road network inspection means looking at the entire roadway system as a whole and preparing a written summary of conditions. This inspection has many benefits over casual observations. It can be helpful to compare segments, and rating decisions are likely to be more consistent because the roadway system is considered as a whole within a relatively short time.

Having a written record and objective information also improves your credibility with the public. Finally a written inventory is very useful in documenting changing roadway conditions. Without records over several years it is impossible to know if road conditions are improving, holding their own, or declining.

Annual budgets and long range planning are best done when based on actual needs as documented with a written inventory.

Averaging and Comparing Sections
For evaluation, divide the urban road system into individual segments which are similar in construction and condition. Obviously, no roadway segment is entirely consistent. Also, surfaces in one section will not have all of the types of distress listed for any particular rating. They may have only one or two types. Therefore, some averaging is necessary.

The condition of the full width of the roadway should be rated. The roadway includes the carriageway lane in both traffic directions, and also includes areas with high friction surface and cycle tracks if they form part of the kerb to kerb carriageway surface.

The objective is to rate the condition that represents the majority of the roadway. Small or isolated conditions should not influence the rating. Occasionally surface conditions vary significantly within a short length along the road segment. For example, very short sections (< 20 metres) of good condition may be followed by sections of poor surface conditions. In these cases, it is best to rate the segment according to the worst conditions. It is not necessary to keep track of all changes in road condition if the condition is varying over very short lengths. As a rough guide, a length of at least 50 metres is required to justify recording a change in road condition rating category.

The overall purpose of condition rating is to be able to compare each segment relative to all the other segments in your roadway system. On completion you should be able to look at any two pavement segments and find that the better surface has a higher rating.

Within a given PSCI rating, say 6, not all pavements will be exactly the same. However, they should all be considered to be in better condition than those with lower PSCI ratings, say 5. Sometimes it is helpful in rating a difficult segment to compare it to other previously rated segments. For example, if it is better than one you rated 5 and worse than a typical 7, then a rating of 6 is appropriate. Having all pavement segments rated in the proper relative order is most important and useful.
Section 5: Conclusions and Next Steps

Using Urban road funds most efficiently requires good planning and accurate identification of appropriate rehabilitation projects. Assessing roadway conditions is an essential first step in this process. This Pavement Surface Condition Index (PSCI) rating system in this Urban Flexible Roads Manual has been developed to improve the data collection and quality of visual surveying of non-national roads, and to improve decision making and use of road maintenance funds more efficiently. It can be used directly by urban authority officials and staff in the Republic of Ireland. It may be combined with additional pavement testing and data collection in a more comprehensive pavement management system in planning future budgets and priorities.

The PSCI rating system is based only on visual pavement defects. The impact of surface-related defects, structural-related defects and other defects is identified when applying the overall PSCI rating. The results of the rating system should be relatable to the maintenance treatment categories specified for use on Non-National roads by the Department of Transport, Tourism and Sport. Table 2 on the following page summarises the overall relationships between these factors.
<table>
<thead>
<tr>
<th>Overall PSCI Rating</th>
<th>Treatment Measures</th>
<th>Surface Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td><strong>Routine Maintenance</strong></td>
<td>Excellent</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>8</td>
<td><strong>Resealing &amp; Restoration of Skid Resistance</strong></td>
<td>Fair</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td><strong>Surface Restoration</strong></td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>Carry out localised repairs and treat with surface</td>
<td></td>
</tr>
<tr>
<td></td>
<td>treatment or thin overlay.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Poor Overall</td>
</tr>
<tr>
<td>4</td>
<td><strong>Structural Overlay/Inlay</strong></td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>Required to strengthen road.</td>
<td>Overall</td>
</tr>
<tr>
<td></td>
<td>Localised patching and repairs required prior to overlay/inlay.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Very Poor Overall</td>
</tr>
<tr>
<td>2</td>
<td><strong>Road Reconstruction</strong></td>
<td>Failed Overall</td>
</tr>
<tr>
<td>1</td>
<td>Needs full depth reconstruction with extensive base repair.</td>
<td></td>
</tr>
</tbody>
</table>
Section 6: Bibliography
