Development and Implementation of a Simplified System for Assessing the Condition of Irish Regional and Local Roads.

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1) Background

- Overall 99,008 kilometres (61,521 miles) of Road
- National Roads: 5,415 km (3,365 miles) - 6%
- Regional and Local Roads: 93,593 km (58,156 miles) - 94%
- 31 Local Authorities
- Total national expenditure in 2014 of c. €552 million (c. $750 million)
Regional and Local Roads

- Regional and Local Roads: 93,593km
  - 13,121 km of Regional road
  - 80,472 km of Local roads

- Irish word for road in ‘bóthar’ which means ‘cow track’

- Most are legacy, narrow local roads with poor geometry which carry low volumes of traffic

- Not cost effective to carry out network machine-based surveys or detailed visual inspection

- A simplified visual rating system has been developed for surveying these roads
2) Pavement Defects on Irish Roads

Irish Roads: 10 no. Distress Types – 4 Categories

- **Surface Defects**
  - Bleeding
  - Ravelling

- **Pavement Deformation**
  - Rutting
  - Surface Distortion (Shape problems, depressions/sags, shoving, bumps)

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

- **Surface Openings**
  - Patching
  - Potholes
  - Road Disintegration
Regrouping of Distresses

- **Surface Defects**
  - Bleeding
  - Ravelling

- **Other/Localised Distresses**
  - Other Cracking (non-structural, L&T, reflection, slippage)
  - Surface Distortion/Shape Problems
  - Good/Fair Patching

- **Structural Distresses**
  - Rutting
  - Alligator Cracking
  - Edge Cracking/Breakup
  - Potholes
  - Poor/Failed Patching
  - Road Disintegration
Surface Defects

- Bleeding
- Ravelling
Other/Localised Distresses

- L & T Cracking
- Surface Distortion
Structural Distress

- Alligator Cracking
- Rutting
Structural Distress

- Potholes
- Edge Cracking/Breakup
3a) The Simplified Rating System

- Steering Group of DTTAS, LGMA, LA’s & PMS
- New Rural Flexible Roads Manual Developed
- New Condition Rating Index
  - Pavement Surface Condition Index (PSCI)
  - Simplified 1 to 10 system
  - Based on visible pavement defects
  - Links pavement defects to condition rating
- Links Rating to Treatment
  - Standardised approach to link pavement distress to treatment measures
  (Index – Treatment – Money)
### Pavement Surface Condition Index (PSCI)

- **Colour-Coded:** **RED, AMBER, BLUE, GREEN**
- Rating assigned based on visible pavement distress.

#### 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, Ravelling or Bleeding ≤10%</td>
<td>Road surface in very good condition.</td>
</tr>
<tr>
<td>8</td>
<td>Moderate Surface Defects², Ravelling or Bleeding 10% to 30%</td>
<td>Little or No Other defects.</td>
</tr>
<tr>
<td>7</td>
<td>Extensive Surface Defects³, Ravelling or Bleeding ≥30%</td>
<td>Old surface with aged appearance.</td>
</tr>
<tr>
<td>6</td>
<td>Moderate Other Pavement Defects², Other Cracking ≤20%, Patching generally in Good condition. Surface Distortion requiring some reduction in speed.</td>
<td>Surface defects¹ may be present. No structural distress².</td>
</tr>
<tr>
<td>5</td>
<td>Significant Other Pavement Defects², Other Cracking ≥20%, Patching in Fair condition. Surface Distortion requiring reduction in speed.</td>
<td>Surface defects¹ may be present. Very localised structural distress³ (&lt; 5 m² or a few isolated potholes).</td>
</tr>
<tr>
<td>4</td>
<td>Structural Distress³ Present. Ratting, Alligator Cracking or Poor Patching for 5% to 25%. Short lengths of Edge Breakup/Cracking. Frequent Potholes.</td>
<td>Other defects may be present.</td>
</tr>
<tr>
<td>3</td>
<td>Significant Areas of Structural Distress³, Ratting, Alligator Cracking or Poor Patching for 25% to 50%. Continuous lengths with Edge Breakup/Cracking. More frequent Potholes.</td>
<td>Other defects may be present.</td>
</tr>
<tr>
<td>2</td>
<td>Large Areas of Structural Distress³, Ratting, Alligator Cracking or Very Poor Patching for ≥50%. Severe Rutting (≥ 75mm). Extensive Very Poor Patching. Many Potholes.</td>
<td>Very difficult to drive on.</td>
</tr>
</tbody>
</table>
# Linking Rating to Treatment Measures

## 5 Options

- Routine Maintenance
- Restoration of Skid Resistance
- Surface Restoration
- Structural Overlay
- Road Reconstruction

<table>
<thead>
<tr>
<th>Overall Rating</th>
<th>Treatment Measures</th>
<th>Surface</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Routine Maintenance</td>
<td>Excellent</td>
<td>Good</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Very Good</td>
<td>Good</td>
</tr>
<tr>
<td>8</td>
<td>Resealing &amp; Restoration of Skid Resistance</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Very Good</td>
<td>Fair</td>
</tr>
<tr>
<td>6</td>
<td>Surface Restoration</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>Carry out localised repairs and treat with surface</td>
<td></td>
<td>Fair</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>Fair</td>
</tr>
<tr>
<td>4</td>
<td>Structural Overlay</td>
<td>Poor Overall</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>Required to strengthen road. Localised patching</td>
<td></td>
<td>Fair</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Poor Overall</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>and repairs required prior to overlay.</td>
<td></td>
<td>Fair</td>
</tr>
<tr>
<td>2</td>
<td>Road Reconstruction</td>
<td>Very Poor Overall</td>
<td>Poor Overall</td>
</tr>
<tr>
<td></td>
<td>Needs full depth reconstruction with extensive base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Poor Overall</td>
<td></td>
</tr>
</tbody>
</table>
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. This category also includes old roads with aged appearance that need a surface dressing to maintain or restore waterproofing of the pavement surface.

Rating 7: Extensive Ravelling (> 30%) over most of pavement surface.

Rating 7: Extensive Bleeding (> 30%) over most of pavement surface.
Ratings 3 or 4

- Structural Distress present

[Images of roads showing distress]
Ratings 1 or 2

- Severe Structural Distress
3b) MapRoad Mobile App

- Driven Survey (2 Person Team: Driver and Rater)
- Data is Recorded electronically using **Tablet and App**
- Mobile Survey App, **MapRoad Mobile**, has been developed
- **Samsung Galaxy Tablet** (10.1’ inch) recommended due to screen and supports 3G & Wi-Fi
- GPS location used to store PSCI visual rating data points
- **GPS accuracy of 5 to 10 metres** (can be increased to 2 to 3 metres)
MapRoad Mobile App
MapRoad Mobile App

Project Type: -- Please Choose An Option --
Shapefile: -- Please Choose An Option --
Surveyor Name: 

Surface Type: -- Please Choose An Option --
Local Authority: Galway City
Description: 

You have the latest version of your Local Authority road schedule.

Cancel OK
MapRoad Mobile App
- Assigned PSCI (1 to 10) Rating and associated GPS data are recorded in real-time
- PSCI data is uploaded directly to **MapRoad PMS**
- MapRoad PMS is an integrated, GIS enabled, Roads Management Information System operated by DTTAS.

- Survey speed range: typically 30 to 50 km/hr
- Typical daily output of **150 to 200 km per day**
PSCI rating uploaded directly to MapRoad PMS

PSCI Ratings

Map Filtered for Local Primary only
MapRoad PMS – PSCI Data

Data at County Level
MapRoad PMS – PSCI Data

Data at Detailed Level
PSCI from Digital Video
4) Implementation & Training

- National & Regional Workshops held
- Buy-in from Local Authority staff
- In Use by all 31 Local Authorities
- Training Course Developed
  - 2 Parts
    1. Classroom Training – 1 day
    2. Site Practical Exam (live survey on c. 10km route)
- Over 35 training courses completed since 2013
- Over 300 personnel trained from 31 Local Authorities
- >80% Pass rate
- Moving to Blended Learning
5) Use of PSCI in Pavement Management

- There is never enough money and there are always too many roads, so roads have to be prioritised.
- The PSCI is playing a major role in this regard.
- PSCI is a Key Performance Indicator (KPI) used by the DTTAS and LA’s for:
  - Scheme Selection/Prioritisation
  - Treatment Selection
  - Allocation of Funding
  - Financial Planning
PSCI Data Nationally

- MapRoad Mobile – 1 to 10 PSCI survey
- c. 64,000 km (70%) of Regional and Local Roads surveyed
National Picture
13th May, 2015

c. 64,000 km surveyed (c. 70% coverage)

by Local Authority Staff
Off their own bat.
PSCI & Pavement Management

- Provides a Picture of Network (Rating Number, Colour)
- Provides evidential basis for funding
- Supports justification for scheme selection and in prioritising works

- PSCI is required by DTTAS from the Local Authorities:
  - for the selection of projects for Maintenance works
  - for Maintenance Treatment selection
  - for ‘Before’ and ‘After’ surveys of all maintenance and improvement works from 2012 onwards

- These requirements have accelerated the implementation process
6) Benefits of PSCI (1 to 10)

- **Fast**
  - Walking Survey (Sampling): c. 5 km/day
  - Windshield Survey: c. 50 km/day
  - Driven PSCI Survey: 150 to 200 km/day

- **Continuous** – 100% Survey

- **Fit for Purpose** (Network Level)

- **Much Safer** – huge consideration in Ireland

- **GIS based Tablet & App** – **no paper** involved

- Uploaded directly to Cloud and **Immediately Available**

- **Colour-coded/Easy to Understand** – ‘Picture tells 1000 Words’ so is very attractive to funding managers and politicians – they like it.
Summary

- Simplified 1 to 10 Rating Developed (PSCI)
- Collected using a Tablet and Android App
- Rural, Urban and Concrete Roads
- Links: Defects – Index – Treatment – Money
- Integrated into the DTTAS MapRoad PMS
- Implemented in all Local Authorities
- Management at National and Local level — overall objective is to establish current condition and lengths of road requiring various remedial works plus costs at both nationally and at county level.
Go n-éirí on Bóthar Leat.

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