A REVIEW OF PAVEMENT MANAGEMENT SYSTEMS IN IRELAND
A Review of Pavement Management Systems for use on the Non-National Road Network

Study Commissioned by Department of Environment, Heritage and Local Government

Completed 2005
What is a PMS?

A tool to make informed decisions about the maintenance and rehabilitation of a pavement network
FIGURE 5: GENERALISED BEHAVIOUR OF FLEXIBLE ROAD PAVEMENTS
PAVEMENT PERFORMANCE FACTORS

**ENVIRONMENT**
- Moisture
- Radiation
- Freeze-thaw Cycles
- Temperature (Min., Max., Days, etc.)

**STRUCTURE**
- Layer Thicknesses
- Layer Types & Properties
- Variations in Thickness & Properties
- Subgrade Type & Properties

**CONSTRUCTION**
- Timing
- Methods
- Variance
- As-Built Quality

**TRAFFIC**
- Axle Group Loads
- Tire Types & Pressures
- Axle Spacing, Speed, Repetitions

**MAINTENANCE**
- Treatments
- Timing
- Methods
- Quality

Measure(s) of Serviceability or Deterioration

Age
## TYPICAL DATA

### INVENTORY

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road No.</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>Junctions</td>
<td></td>
</tr>
<tr>
<td>Pavement Type</td>
<td></td>
</tr>
<tr>
<td>Surface Type</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
</tbody>
</table>
TYPICAL DATA

CONDITION

Visual Assessment
Deflections
Riding Quality

![Chart showing data for different conditions and their visual impact on pavements and deflections.](image-url)
PAVEMENT PERFORMANCE

Riding Quality (PSI)

Conducted Riding Quality

Terminal Riding Quality

Structural Design Period (10 - 20 YRS)

Analysis Period (20 - 30 YRS)

Time/Traffic

Resurfacings

Structural Rehabilitation
PMS REVIEW OUTLINE

TECHNICAL FACTORS

USER NEEDS

PMS 1
PMS 2
PMS 3
PMS 4

EXTERNAL FACTORS

Policies
IT Environment
Institutional
Personnel
Funding
PMS REVIEW PROCESS

• Information Gathering
  • Questionnaire
  • Visits to Road Authorities
  • PMS Research
  • PMS vendors

• Evaluation
  • Environment (IT & Organisation)
  • Existing Systems
  • Needs & Requirements
PMS REVIEW PROCESS

• System Comparison
  • Detailed requirements
  • Evaluation vs requirements
  • Rating of Systems

• Conclusions and Recommendations
EXISTING SITUATION

Road Authorities

– IT Infrastructure
  • Hardware & Networks well developed
  • In-House software support limited
  • External software support – LGCSB / Contractors

– Existing GIS
  • All counties have GIS
  • Mainly MAPINFO
  • A few others (e.g. ArcView, Autodesk Map)
EXISTING SITUATION

– Road Network Databases
  • Most have Road network defined & recorded (80%)
  • DBMS – Most use MS-Access (74%) (MAPROAD)
  • Others – Excel (13%) SQL-Server (9%)

– Existing PMS
  • Less than 40% have existing PMS
  • Mainly MAPROAD
  • Others – Micropaver (1) RoSy (1)

Level of Implementation
- LOW

Level of Knowledge
- LOW
EXISTING SITUATION

Condition Surveys

- Not routine
- No standard methods
- Some experimentation with machine assisted surveys (e.g. VODEL, FASTMAP, PMS-ROMDAS)
- Uncertain about value of routine surveys
- Concerns about costs / resources
- Simple systems, methods favoured
DESIRE PMS INFORMATION

- Project History
- Topography / Terrain
- Traffic
- Ride Quality
- Pavement Condition
- Pavement Structure
- Pavement Surface Type
- No of Lanes
- Carriageway/shoulder Widths
- Intersections
- Segment Start / End
- Engineering Area
- Road Classification / Category
- Road / Route Number
CONDITION SURVEY NEEDS

• Define data needed

• Develop data collection standards
  (methods / frequency / data capture)

• Develop processing standards
  (algorithms / decision criteria / reporting / presentation)

• Training

• Resources
PMS OBJECTIVES

- Availability of accurate road network data
- Construction, maintenance and rehabilitation history
- Current condition of road network
- Identify and prioritise candidate projects
- Current budget needs
- Periodic maintenance and rehabilitation programmes
- Estimate short and long term needs
- Justify Budget Requests
- Answer “what if” questions
- Performance trends and history
- Forecast future budget requirements
- Forecast future condition and level of service under different funding scenarios
- Cost effectiveness of maintenance and rehabilitation strategies
PMS OBJECTIVES

1. Answer “what if” questions
2. Forecast future condition and LOS under funding scenarios
3. Performance trends and history
4. Periodic maintenance and rehabilitation programmes
5. Construction, maintenance and rehabilitation history
6. Estimate short and long term needs
7. Justify Budget Requests
8. Identify and prioritise candidate projects
9. Cost effectiveness of maint & rehab strategies
10. Forecast future budget requirements
11. Current condition of road network
12. Availability of accurate road network data
13. Current budget needs
FUTURE PMS NEEDS

– Future PMS

• Most (78%) wish to introduce PMS

• Not always highest priority
CURRENT STATUS

PMS Logical Design

- Location and referencing
- Recording of condition data
- Inventory of maintainable assets
- Selection of options for remedial works
- Projection of future condition
- Costing of works
- Management of budgets
- Budgetary and maintenance needs
- Prioritisation on a condition basis
- Prioritisation using econometric principles

(Based on UKPMS)
PMS REQUIREMENTS

- Institutional
- Information Technology
- Functional
- Compatibility
- Support and Training
- Cost

36 Factors Total
PMS SELECTION REQUIREMENTS

• **Institutional**
  – Adaptable to Organisation
  – Simplicity
  – Quick Implementation

• **Information Technology**
  – Windows NT Networks
  – Network-enabled
  – Databases expandable
  – Modularity
  – GIS Compatibility (Mapinfo)
PMS SELECTION REQUIREMENTS

• Functional
  – Network Referencing Systems
  – Network Maintenance Tools
  – Flexible Inventory and attributes
  – Condition Monitoring
  – Prioritisation Tools
  – Work Programming and Budgeting Tools
  – Reporting and Viewing

• Compatibility Requirements
  – Expandibility
  – Other Systems

• Support and Training

• Cost
COMMERCIAL SYSTEMS EXAMINED

- microPAVER
- dTIMS
- MARCH
- WDM
- Exor
- Insight
- Confirm
- RoSy
- HIMS
- STREETSAVER
COMMERCIAL SYSTEM RATINGS

Overall Scores

Score

Exor 163
INSIGHT 161
DTIMS CT 157
Confirm 151
WDM 141
RoSy 134
MARCH 114
STREET SAVER 102
Micro PAVER 101
HIMS 101
COMMERCIAL SYSTEMS RECOMMENDED

EXOR
- Good functionality
- Adaptable
- Expandable
- GIS compatible
- Similar cost
- Good Support

INSIGHT

dTIMS

CONFIRM
MAPROAD

- Developed by LGCSB
- MAPINFO GIS
- Installed in most Local Authorities
- Road network data
- Basic PMS functionality
- Other RMS (e.g. Accidents / Bridges / Traffic)
- Supported by LGCSB
CAN MAPROAD BE UPGRADED?

- Well resourced development team
- Databases recently upgraded
- Existing user base
- Tailor – made system possible
- LGCSB committed to meeting needs of Authorities
- Upgrading cost reasonable

✅ OK
PMS IMPLEMENTATION

– Issues

• Implementation Process
• Implementation Factors
• Strategy – incremental or all-at-once
• PMS Awareness
• Succession Planning
RECOMMENDATIONS

PMS System

• MAPROAD

Implementation Process

• Structured
• Expert Assistance
• Steering Group
• Network Definition
• PMS Awareness