ROADS Services Training Group

LOCAL AUTHORITY ROADS CONFERENCE and EXHIBITION - 2017

SAFER ROADS

Radisson Blu Hotel, Rosses Point Road, Sligo, May 2017.

LOCAL AUTHORITY ROADS CONFERENCE
and EXHIBITION – 2017
SAFER ROADS

Pavement Management – Road Network Survey Needs

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LASNTG
Local Authority Services National Training Group

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

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Background

Regional & Local Roads

Maintenance & Rehabilitation Needs

- Surface Dressing
  - Minimum length of required per year is 4,700 km i.e. 5% of rural network.
  - Achieve just over half of target in 2013
- Strengthening
  - Minimum length of required per year is 4,700 km i.e. 5% of rural network.
  - Achieve significantly less than strengthening target in 2013
- Steady State Expenditure

Category	Road Length metres	%RI works	%RM works	RI rate €/m²	RM rate €/m²	Avg Width	Routine Maintenance €/km	RI Cost €	RM cost €	Routine Maint. Cost €	Total €
Rural											
Regional	12,370,523	5	5	25	5	6.03	2000	93,242,817	18,648,563	24,741,046	136,632,426
LP	23,254,428	5	5	19	4	4.44	1500	98,087,178	20,649,932	34,881,642	153,618,753
LS	32,560,550	5	5	15	4	3.56	1000	86,936,667	23,183,111	32,560,550	142,680,328
LT	20,955,934	5	5	13	4	3	1000	40,864,071	12,573,560	20,955,934	74,393,566
sub-total 1	89,141,435							319,130,734	75,055,167	113,139,172	507,325,073
Urban											
Regional	749,706	5	5	50	10	7	4000	13,119,863	2,623,973	2,998,826	18,742,662
Local	3,701,099	5	5	40	10	5	2000	37,010,990	9,252,747	7,402,198	53,665,935
sub total 2	4,450,805							50,130,853	11,876,720	10,401,024	72,408,597
Total	93,592,240							369,261,587	86,931,888	123,540,196	579,733,670

DTTAS Regional & Local Road Investment

Structure aligned with Pavement Management Principles

Range of related DTTAS Grant Categories

- Restoration Improvement (3 – 4 year plans required)
  - Community Involvement (mostly Local Tertiary Roads)
- Restoration Maintenance
- Specific Improvement Grant [historical works only]
- Discretionary Grant
  - Local Improvement Scheme (Non Public Roads)
  - Community Involvement (mostly Local Tertiary Roads)

Memorandum for Grants (updated 2017)

Regional & Local Roads Practice

Challenges

- Record Keeping
- Demonstrate Funding Needs
- Demonstrate Value for Money
- Improved business processes and systems
- Inadequate Road Funding
- Funding currently based on mileage
- Non-National Needs Studies i.e. 1995, 2005
- Type of National Pavement Management Plan

Future

- Practice moving towards more tailored locally based needs / plans supported by Pavement Management
- Main focus will be on maintenance, rehabilitation, drainage and bridges.
- State / Local Authority Own Resources ?
- Performance Based Approach - Trends and KPIs

Pavement Management

The process of planning the maintenance and repair of a network of roadways in order to optimise conditions over the entire network.

- Incorporates **life cycle costs** into a more systematic approach

- A **Pavement Management System (PMS)** is a software planning tool used to:
  - aid pavement management decisions.
  - model future pavement deterioration due to traffic and weather, and recommend maintenance and repairs to the road's pavement based on the type and age of the pavement and various measures of existing pavement quality.

- Research has shown that it is **far less expensive** to keep a road in good condition than it is to repair it once it has deteriorated. This is why pavement management systems place the priority on **preventive maintenance** of roads in good condition, rather than reconstructing roads in poor condition.

Pavement Management Process

A pavement management approach is a process that consists of a number of typical tasks / steps to include:

- Asset Inventory / Definition
- Identifying pavement conditions, identifying good, fair and poor pavements.

- Prioritisation - Assign importance ratings for road segments, based on traffic volumes, road functional class, and community demand.
- Condition Prediction & Analysis

- Schedule
  - Work Planning & Scheduling
  - maintenance of good roads to keep them in good condition.
  - repairs of poor and fair pavements as remaining available funding allows.

Success Factors (World Bank)

Like any system the success of an RMS system depends three fundamental components:

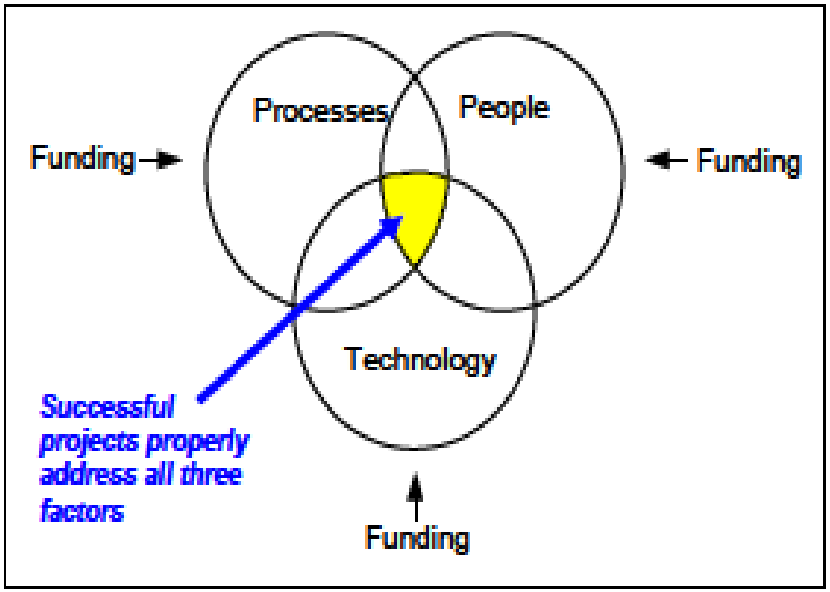
PROCESSES – PEOPLE - TECHNOLOGY - FUNDING

There must also be a commitment to adequate funding. If any of these are lacking, the system will not be successful.

The best technology in the world will ultimately fail: -

- If implemented in an environment where there are no people to run it,
- where the business processes are not in place to utilize it.

For an RMS to be successful, the importance of each component must be clear.



PMS - Benefits

- Maintain and improve the condition of the road network
- **Effective** & **Efficient** Maintenance Strategies and Budgeting process
- **Effectiveness** – measure of actual performance compared to planned
- **Efficiency** – assessment of cost of achieving the declared outputs.
- Improve the business case for **investment** in road
- Improved **safety** for the public
- Reduce **litigation** costs
- Improved understanding of **benefits** to be gained from various treatment types
- More **efficient** storage of data - Improved utilization & availability of data
- Full inventory and known value of Road Network

Implementation

Need to address key Tasks: -

No	Task	Lead Responsibility
1	Guidelines / Standards	DTTAS
2	Business Processes	DTTAS / LA
3	Resources (Dedicated Unit)	RMO (LA)
4	Technology / Software	LGMA / RMO (LA)
5	Training	LASNTG / RSTG (LA)
6	Funding	DTTAS / LA

Ultimately Local Authorities with Collaboration

Pavement Management - Objectives

Develop and Implement a system to record: -

- Works on the Road Network such as: -
  - Road Openings
  - Pavement Surface Maintenance / Improvement Works
- Condition of the Network for a range of parameters (visual and mechanical)
- Inventory and known value of Road Network (surface, geometry, etc.)

However need to update

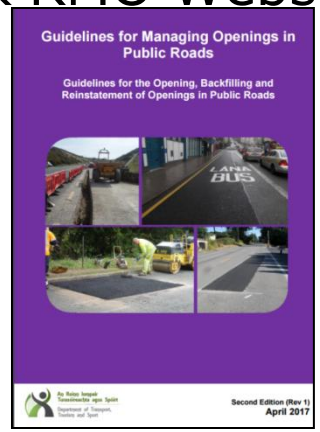
Develop and implement decision making processes for Pavement Management

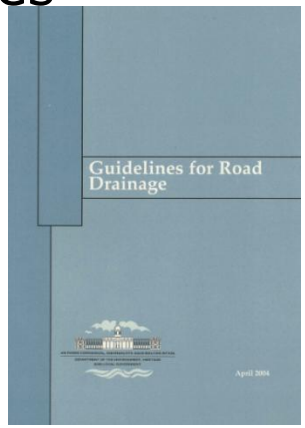
- Decision making processes for maintenance / improvement works
- Develop Pavement Management Strategies
- Monitor and Track Performance (Indicators / KPI's etc.)

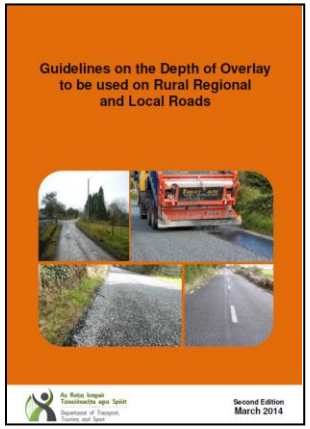
Needs to be Part of the Day Job (not something Nice)

Guidance and Standards (DTTAS)

- Department Guidelines
  - Guidelines for Managing Openings in Public Roads (Purple Book) (2015 & 2017)
  - Guidelines for Road Drainage
  - Guidelines on the Depth of Overlay to be used on Rural Non National Roads (Orange Book) (2014)
  - IPAG (Irish Pavement Asset Group) Guidelines (2015)
  - Pavement Surface Condition Index (PSCI) (3 volumes) (2012 & 2013)
  - Guidelines for Scheduling of Roads in Ireland (2012 & 2013)
  - Circular on Pavement Management Surveys (2014 & **2017**)
- On DTTAS & RMO Websites







Pavement Surface Condition Index (PSCI)

- Condition Rating Index (2012 & 2013) – 3 Manu
- Project Level & Network Level implementation (RW 21/2014)

Overall Rating	Primary Rating Indicators*	Secondary Rating Indicators*
10	No visible defects.	Road surface in perfect condition, like new.
9	Less than 10 % of surface with surface defects[1]	Road surface in very good condition.
8	10% to 30% of surface with surface defects[1]	Little or No Other defects.
7	Greater than 30% of surface with surface defects[1]	Little or No Other defects. Old surface with aged appearance.
6	Less than 20% of other Cracking[2] may be present. Patching generally in good condition. May be out of shape requiring some reduction in driver speed.	Surface defects[1] may be present. No structural distresses[3]
5	Greater than 20% Cracking[2] present. Patching generally in fair condition. Out of shape requiring reduction in driver speed. Very localised structural distress[3] (< 5 sq.m of surface) may be present.	Surface defects[1] may be present.
4	Structural Distress[3] present. Rutting or Alligator Cracking for 5% to 25% of surface. Short lengths of Edge Breakup/Cracking. Small number of Potholes.	Other defects may be present.
3	Significant areas of Structural distress[3]. Rutting or Alligator Cracking for 25% to 50% of surface. Significant continuous lengths with Edge Breakup/Cracking. Frequent Potholes.	Other defects may be present.
2	Large areas of Structural distress[3]. Rutting or Alligator Cracking for over 50% of surface. Severe Rutting (over 75 mm deep). Extensive Patching in very poor condition. Many Potholes.	Very difficult to drive on.
1	Severe Structural distress[3] with extensive loss of pavement surface. Road Disintegration of surface. Many large and deep Potholes. Patching in failed condition.	Severe Deterioration. Virtually undriveable.

Overall Rating	Treatment Measures	Surface	Structure
10	**Routine Maintenance**	Excellent	
9		Very Good	
8	**Resealing & Restoration of Skid Resistance**	Fair	Good
7		Poor	
6	**Surface Restoration** – Carry out localised repairs and treat with surface treatment or thin overlay.	Fair	Fair
5		Poor	
4	**Structural Overlay** – Required to strengthen road. Localised patching and repairs required prior to overlay.	Poor Overall	
3			
2	**Road Reconstruction** – Needs full depth reconstruction with extensive base repair.	Very Poor Overall	
1		Failed Overall	

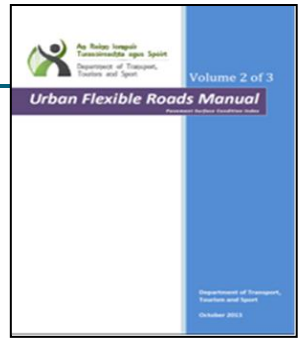
Condition <=> Rating <=> Treatment <=> Money

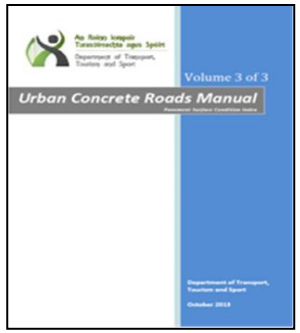
Key Users / Benefits

- National Oversight (NOAC / DTTAS)
- Managing Works / Funding
  (LA / DTTAS / DPER)

- Timber Transport
- Milk Collection
- Construction Impacts
- Road Openings

- Maintenance Management / Hazards
- Public liability





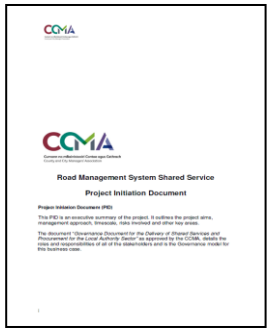
Resourced / Dedicated Unit (RMO)

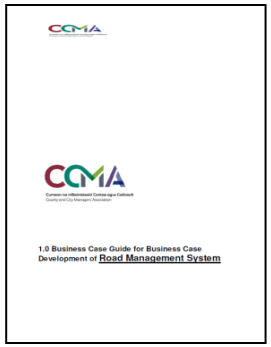
- Prior to 2014 resources drawn on a more ad hoc basis and clearly needed a greater focus

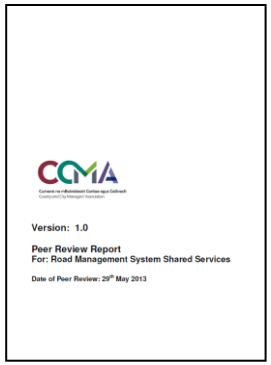
- Shared Local Authority Service set up in late 2014
  - Sponsored by CCMA & DTTAS
  - Consortium (Donegal, Cork County, Cork City, Tipperary, Kerry)

- Roles
  - Pavement Management – development, implementation / rollout
  - Develop and support technology suitable for Local Authorities
  - Road Licencing such as road openings

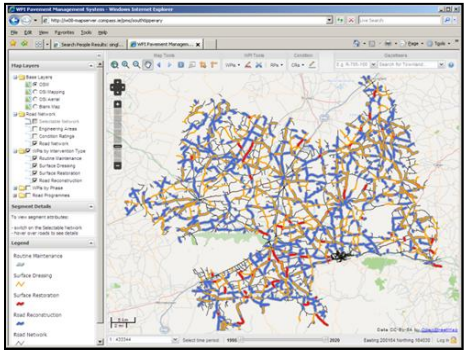
- Important for
  - Long Term Sustainability
  - Support Structure for Local Authorities
  - Centre of Excellence / Specialist Skills

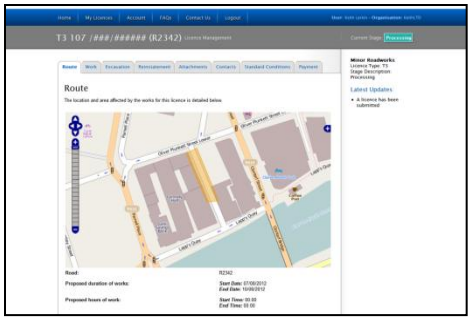






Technology / IT (LGMA)



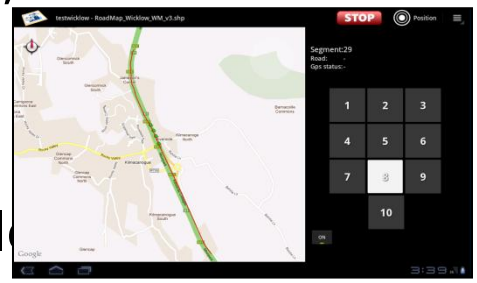


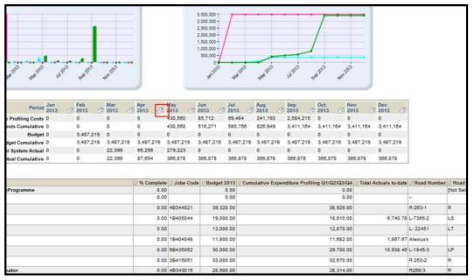
MapRoad

Integrated, Geographical Information System (GIS) enabled, Roads Management System.

MapRoad has five main elements:

1. Desktop System (original system)
   - Bridges / Collisions / Hazards
   - Mechanical Data Viewer (2009)
2. Web Based Interface (since 2010)
3. Licensing system
4. Project /Financial Module,
5. Mobile Apps



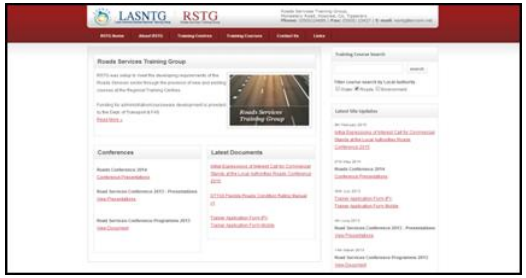


WEB based and open source software solutions where possible

Training & Quality (LASNTG)

- Support
  - Quality Control, Issue of consistency and quality of results
  - Tracking Performance and Monitoring
- Seminars (Webinars)
- Workshops (E Meetings)
- Regional Meetings (RMO)
- Training Courses
  - E Learning

- Specific Courses Developed
  - PSCI
  - Basic Trench Reinstatement
  - Advanced Trench Reinstatement (Certifier)



Pavement Management

- A lot of the building blocks are in place
- Essential to have an effective survey regime for an effective PMS (bread & butter)

Questions?

- How does PMS and Survey Regime Stand up / compare to others?
- What are other Pavement Management Systems doing?
- Is what we have effective?
- Are we achieving the objectives we should be?
- Where should we be going next?

Pavement Management Survey Regime

Pavement Management Survey Regime (Circular RW 21) - Review

- In place since 2014 and followed on from earlier back to 2010

Review objective

- Close out outstanding tasks (History of Works / Inventory)
- Improve efficiency of survey regime (mechanical / Visual)
- Improve context/background
- Improve alignment with current/emerging/future requirements
- Address Quality Control
- Address Training
- Define role of RMO more clearly for surveys and quality control

To issue May / June 2017

Reasons for Network Survey - 1

Efficiency and Accountability

- Report to Independent Monitoring/Auditing Agency – NOAC, BVPI, Scotland Audit Commission, NZ Audit Commission etc.
- Report to Funding Agency – States to FHWA, TTI to DTTAS, Local Authorities to DTTAS
- Report to Funding Oversight Committees – PAC, Joint Oireachtas Committee on Transport
- Report to Local Authority Council Meetings, Corporate Policy Group and Strategic Policy Committees
- Report to Taxpayers and General Public via Media
- Support a case for increased funding

Reasons for Network Survey -2

Network Management

- Define Backlog requirements over time
- Monitor impact of spending on network performance over time
- Identify Programme of Works
- Auditing of Visual Condition – QA process for PSCI
- Support and monitor Contractor maintenance performance

Condition Data to Support PMS

- What to collect (Data types)
- Data Collection Frequency
- Data Collection Quantum (100% or Sampling)

Network Hierarchy – different answers for different networks

Local Roads by Local Authority

% in LP, LS and LT

2004 survey inventory

Local Authority	LP	LS	LT
Carlow	35	36	30
Cavan	29	55	16
Clare	33	43	24
Cork	31	47	22
Donegal	37	39	24
Dun L/Rathdown	19	18	63
Fingal	36	28	36
Galway	26	47	27
Kerry	31	27	41
Kildare	20	61	19
Kilkenny	31	53	16
Laois	37	36	27
Leitrim	38	33	29
Limerick	34	48	17
Longford	33	40	27
Louth	31	49	20
Mayo	24	32	44
Meath	23	31	46
Monaghan	25	28	47
North Tipp	43	35	22
Offaly	33	37	30
Roscommon	30	43	27
Sligo	26	41	33
South Dublin	17	75	8
South Tipp	41	39	20
Waterford	42	48	11
Westmeath	29	51	21
Wexford	35	44	21
Wicklow	30	59	11

Local Authority	LP	LS	LT
South Dublin	17	75	8
Dun L/Rathdown	19	18	63
Kildare	20	61	19
Meath	23	31	46
Mayo	24	32	44
Average	31		
South Tipp	41	39	20
Waterford	42	48	11
North Tipp	43	35	22

Local Authority	LP	LS	LT
Dun L/Rathdown	19	18	63
Kerry	31	27	41
Monaghan	25	28	47
Fingal	36	28	36
Average		42	
Kilkenny	31	53	16
Cavan	29	55	16
Wicklow	30	59	11
Kildare	20	61	19
South Dublin	17	75	8

Local Authority	LP	LS	LT
South Dublin	17	75	8
Waterford	42	48	11
Wicklow	30	59	11
Kilkenny	31	53	16
Average			27
Kerry	31	27	41
Mayo	24	32	44
Meath	23	31	46
Monaghan	25	28	47
Dun L/Rathdown	19	18	63

Class	Length
National	5,300
Regional	13,120
Local Primary	24,373
Local Secondary	33,222
Local Tertiary	22,878

Ireland

Area: 70,000 sq.km
Population: 4.8 million

Class	Frequency	Direction	Notes	Method
National	100% Annually	One		Machine
Regional	100% every 5 years	One	Minimum	Machine/Visual
Local Primary	10% every 2 years	One	Minimum	Machine
Local Secondary	5% every 2 years	One	Minimum	Machine
Local Tertiary	5% every 2 years	One	Minimum	Machine
Regional	100% Annually	One		Visual
Local Primary	100% every 2 years	One	Minimum	Visual
Local Secondary	100% every 2 years	One	Minimum	Visual
Local Tertiary	100% every 5 years	One	Minimum	Visual

Scotland

Class	Description	km
	Transport Scotland	
	Motorways	420
A	Dual Carriageways	504
A	Single Carriageway	2,326
	Local Authority Roads	
A	Dual Carriageway	272
A	Single Carriageway	7,134
B	Single Carriageway	7,498
C	Single Carriageway	10,681
U	Single Carriageway	26,832

Area: 80,000 sq.km
Population: 5.4 million

Class	Frequency	Direction	Notes	Method
National	100% Annually	One		Machine
A	100% every 2 years	One	Minimum Requirement	Machine
B	100% every 2 years	One	Minimum Requirement	Machine
C	100% every 2 years	One	Minimum Requirement	Machine
U	10% per year (no repeats)	One	Minimum Requirement	Machine

England

England	kilometres
Trunk Motorway	4,798
Principal Motorway	66
Trunk 'A'	6,693
Principal 'A'	45,309
'B' class	32,026
'C' class	103,716
Unclassified	293,052
Total	485,661

Area: 130,000 sq.km
Population: 55 million

National	Twice per year	Both	Lane 1	Machine
National	Annually	Both	Remaining Lanes	Machine
A	90% every 2 years	One	Minimum Requirement	Machine
B	85% every 2 years	One	Minimum Requirement	Machine
C	80% every 2 years	One	Minimum Requirement	Machine
U	100% every 2 years	One	No Requirement	Visual

Country	Class	Km
Sweden	Arterial Routes	8,769
	Local Routes	82,873
Finland	State Routes	13,329
	Local Routes	37,800
	Unpaved Local	27,000
	Additional Unpaved	360,000
Norway	National Routes	27,000
	County Routes	27,000
	Municipal Routes	39,000

Country	Area (sq.km)	Population
Sweden	448,000	9.8
Finland	338,000	5.5
Norway	385,000	5.2

Sweden	Arterial Routes	100% Annually	One		Machine
	Local Routes	100% every 2 years	One	76,000 km private roads	Machine
Finland	State Routes	100% Annually	One		Machine
	Local Routes	100% every 2 years			Machine
	Unpaved Local				N/A
	Additional Unpaved				
Norway	National Routes	100% Annually	One		Machine
	County Routes	100% every 2 years	One		Machine
	Municipal Routes	No Minimum Requirement	One	Locally funded and maintained	

Country	Class	Km
New Zealand	Arterial Routes	10,700
	Local Roads	50,000
South Australia	National	12,650
	Other Arterial	15,000
Victoria	Arterial Network	22,000
British Columbia	Primary	6,500
	Secondary	6,000
	Side Roads	12,500

Country	Area (sq.km)	Population
New Zealand	268,000	4.6
South Australia	984,000	1.7
Victoria	238,000	5.8
British Columbia	945,000	4.6

New Zealand	Arterial Routes	100% Annually	Both	Minimum Requirement	Machine
	Local Roads	100% Annually	One	No Minimum Requirement	Machine
South Australia	National	100% Annually	One	10,000 km unsealed roads	Machine
	Other Arterial	100% very 4 years	One	60,000 km unsealed roads	Machine
Victoria	Arterial Network	100% every 2 years	One		Machine
British Columbia	Primary	100% every 2 years	Both		Machine/Visual
	Secondary	100% every 2 years	One	40,000 km unsealed roads	Machine/Visual
	Side Roads	25% every 4 years	One	Sampling	Machine/Visual

State	Frequency
Arizona (ADOT)	3 years
Arkansas (AHDT)	Interstate-1 year Other roads-2 years
Colorado (CDOT)	1 year
Delaware (DelDOT)	2 years
Georgia (GDOT)	1 year
Illinois (IDOT)	Interstate-1 year Other roads-2 years
Indiana (INDOT)	Interstate-1 year Others-2 years
Kansas (KDOT)	1 year
Maryland (MDOT)	1 year
Michigan (MDOT)	2 years
New York (NYSDOT)	Interstate-1 year Others-2 years
Oklahoma (ODOT)	2 years
Pennsylvania (PENNDOT)	1 year
Texas (TxDOT)	1 year
New Jersey (NJDOT)	2 years

State	Data Collected
Arizona (ADOT)	IRI, rutting, cracking*, friction, flushing
Arkansas (AHDT)	IRI, rutting, faulting, cracking*, raveling
Colorado (CDOT)	IRI, rutting, cracking*, corner breaks
Delaware (DelDOT)	Patch deterioration, joint seals, bleeding, cracking*
Georgia (GDOT)	Rut depth, cracking*, edge distress, bleeding, corrugations, loss of section
Illinois (IDOT)	IRI, rutting, surface distress
Indiana (INDOT)	IRI, rut, cracking*, faulting
Kansas (KDOT)	IRI, rutting, cracking*, joint distress
Maryland (MDOT)	IRI, rutting, cracking*, friction
Michigan (MDOT)	IRI, rutting, cracking*, popouts, raveling, delaminated areas
New York (NYSDOT)	IRI, rutting, faulting
Oklahoma (ODOT)	IRI, rutting, cracking*, patching, faulting, corner breaks, punchouts
Pennsylvania (PENNDOT)	IRI, rut, cracking*, patching, edge deterioration, joint spalling
Texas (TxDOT)	IRI, ride quality, texture deflection, rut, patching, cracks*, raveling
New Jersey (NJDOT)	IRI, rutting, cracking*, shoulder condition, shoulder drop, faults,

Summary

- Data Collection Regime depends on aims
- Commonly, same data collected on all hierarchies
- Differentiated by frequency
- Differentiated by scale – sampling at lower road classes (problem in Ireland)
- Machine surveys much more common internationally
- If supporting privatised maintenance, or production of annual work plans, higher frequency and greater coverage

An Roinn Iompair Turasóireachta agus Spóirt
Department of Transport, Tourism and Sport

Next Steps

Road Management (MapRoad)
Current Development

Priorities

- MapRoad Development
  - Pavement Management

    Mechanical Surveys, Condition, Prioritisation, Modelling, Plans
  - Works / Financial Tracking
  - Licensing (Roadworks)
- Standards, Guidance and Processes
  - IPAG Guidelines – Published (to continue development)
  - Updated Memorandum (2017)
  - Pavement Management Planning
  - Orange Book – further develop/update
  - Schedule – Published (further update required)

Improved Performance & Monitoring

- Improved metrics
- Performance Indicators (KPI's) to demonstrate Value for Money reported to LAs, DTTAS and NOAC
- Audit (Financial) – full costs, unit costs
  - Returns (tracking / monitoring works versus expenditure)
  - Unit Costs
    - Increased emphasis on monitoring unit costs focusing on urban footpath and carriageway grants
      - Example of current max unit costs for Surface Dressing are: -
        - Regional Roads is €5.50
        - Local Roads is €4.50
    - Where costs are 'abnormally' high an explanation is sought
  - True costs (incl. own resources)
- Inspections (Engineering) – condition data, works history

Pavement Management Survey Regime

Pavement Management Survey Regime (Circular RW 21) - Review

- Works (RMO/DTTAS)
  - Current Works – ongoing task (planned / completed)
  - **Historical Works (where available) – Once off task to complete in 2017**
- Pavement Inventory (RMO/DTTAS)
  - **Surface Inventory – Once off task to complete in 2017**
- Condition (RMO/DTTAS)
  - Mechanical – carried out by RMO on behalf of LAs
  - Visual – carried out by LAs, but co-ordinated by RMO
  - Project level surveys – revised regime
  - Network level surveys – revised regime
- Data quality and verification (RMO)
- Training Requirements (LASNTG / RSTG)
- Questionnaire – Get a snapshot on progress
- Improved overall guidance and background information
- Developed role for the RMO

To issue May / June 2017