

# **Performance Indicators For Road Asset Management**

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# Paradigm Shift

- Reforms in Road Sector
  - *Road Policy*
  - *Road Construction & Quality*
- Moving Towards
  - *Road Asset Management Approach*
- Maintenance Contracts

# Principles of Asset Management

- Long term view
- Sound data base
- Goal and objective
  - *Defined*
  - *Quantified*
- Performance measures
- Road user perception
- Analytical tools support
- Effective programme delivery and feed back

# Status of Road Network Performance Indicators

- Physical parameters collected and published as Basic Road Statistics
  - *Road length by category, type (surfaced / unsurfaced), width*
  - *Accidents, fatalities, injuries – related to population, vehicle registration, road length*
- Data regarding performance and impact of road network and its condition is lacking at National level

# Performance Indicators Used within Organisations

- Riding Quality of pavement surface
- Surface distress
- VOC

**Maximum Permissible Value of Roughness (mm/km) measured by BI**

Type of Surface	Condition of Road Surface		
	Good	Average	Poor
Thin Premix Carpet	< 3000	3000-4000	> 4000
Semi-dense Bituminous Conc.	< 2500	2500-3500	> 3500
Bituminous Concrete	< 2000	2000-3000	> 3000
Cement Concrete	< 2200	2200-3000	> 3000

Source IRC:SP:16-2004

# Current Practice

- Most Road Administrations use a range of indicators to measure physical condition of road assets. Target values have been set
- Roughness (mm/km)
- Visual distress indicators for pavement
  - *Potholes, cracks*
- Visual condition rating for structures
  - *Width, condition of deck, restrictions any*
- Congestion
- Safety of junctions, rail-road crossings

# Serviceability Indicators for Roads

<b>Serviceability Indicators</b>	<b>Good</b>	<b>Average</b>	<b>Acceptable</b>
<b>Roughness (Max) mm/km</b>	<b>2000</b>	<b>3000</b>	<b>4000</b>
<b>Potholes/km (Max. No.)</b>	<b>Nil</b>	<b>2-3</b>	<b>4-8</b>
<b>Cracking (Max)</b>	<b>5 %</b>	<b>10 %</b>	<b>10-15 %</b>
<b>Rutting (20mm Max)</b>	<b>1 %</b>	<b>1.5 %</b>	<b>2.5 %</b>
<b>Skid resistance (Min)</b>	<b>50 SN</b>	<b>40 SN</b>	<b>35 SN</b>
<b>Defective Bridge Deck</b>	<b>Nil</b>	<b>10 %</b>	<b>15 %</b>
<b>User Information</b>	<b>All road signs, markings in good condition</b>	<b>Major road signs, Marking in good cond.</b>	<b>Fair condition</b>

Source: Report of the committee on norms for maintenance of roads in India, MORTH

# Condition Rating of Rural Roads

- Based on riding comfort at a speed of 50 km/hr
- Based on comfortable driving speed

<b>Driving Speed</b>	<b>Pavement Condition Index</b>
Over 40 km/hr	5
30-40 km/hr	4
20-30 km/hr	3
10-20 km/hr	2
Less than 10 km/hr	1

(Operation Manual, NRRDA)

# Incremental Approach to Asset Management Implementation

- In India asset management approach is a more recent development
- Some practical performance indicator are proposed considering:
  - *Policy objectives*
  - *Road user needs*
  - *Physical condition of road assets*
  - *Amenability to easy an objective assessment*
  - *Achievability and affordability*
- Providing a defined level of service and monitoring performance
- Key performance indicators relate to pavement condition, structures, drainage, road furniture, safety, aesthetics.

## Road Maintenance Standards for Performance Based Maintenance

<b>Asset</b>	<b>Defect Indicator</b>	<b>Service Level</b>	<b>Tolerance</b>	<b>Response Days</b>
<b>Main Carriageway (Pavement &amp; shoulders)</b>	<b>Pothole</b>	<b>Nil</b>	<b>3 in 1 km</b>	<b>3</b>
	<b>Cracking</b>	<b>Seal all</b>	<b>10% in 200m</b>	<b>3/14</b>
	<b>Rutting</b>	<b>10 mm</b>	<b>20mm in 100m</b>	<b>28</b>
	<b>Edge Break</b>	<b>75 mm</b>	<b>100mm in 100m</b>	<b>28</b>
	<b>Edge Drop</b>	<b>Nil</b>	<b>500mm in 200m</b>	<b>7</b>
	<b>Shoulders</b>	<b>Requisite CF, no potholes</b>	<b>2.5 – 4 % CF</b> <b>5 isolated in a km</b>	<b>14</b>

**Asset: Main carriageway, Shoulders, Embankment/Cutting**

# Road Maintenance Standards for Performance Based Maintenance

<b>Asset</b>	<b>Service Level</b>	<b>Tolerance</b>	<b>Response</b>
<b>Road Embankment</b>	<b>Std. width &amp; side slopes</b>	<b>Not more than 100 m Length in one km below service level</b>	<b>14 days</b>
<b>Bridge and Culverts</b>	<b>Safe and free of obstructions</b>	<b>Not more than 10% restrict. In waterway &amp; damages to pitching</b>	<b>14-28 days</b>
<b>Drains</b>	<b>Normal, section free of obstructions</b>	<b>Not more than 5% length below the service level</b>	<b>14 days</b>
<b>Road Sign</b>	<b>In place, properly installed, clearly visible &amp; legible</b>	<b>Not more than 5% below the service level</b>	<b>7 days</b>

# Road Maintenance Standards for Performance Based Maintenance

<b>Asset</b>	<b>Service Level</b>	<b>Tolerance</b>	<b>Response</b>
<b>Pavement Marking</b>	<b>Clearly visible and reflective</b>	<b>Not more than 10% below the service level</b>	<b>14 days</b>
<b>Vegetation</b>	<b>No vegetation other than grass cover</b>	<b>Height of grass not more than 15 cm</b>	<b>14 days</b>
<b>Road side Plantation</b>	<b>No obstruction to traffic in sight dist. &amp; vertical clearance</b>	<b>Min. sight distance of 200 m &amp; vertical clearance 5 m</b>	<b>14 days</b>
<b>Attendance at Accidents</b>	<b>Assistance for First Aid and transport of victim, arrangement for safe movement of traffic</b>		<b>1 hr</b>

# Road Maintenance Standards for Performance Based Maintenance

	Max. Roughness*
• New surface as part of Periodic Renewal	2500 mm/km
• New surface as part of Riding Quality Improvement	2000 mm/km

(\*Measured by calibrated BI)

# Issues in Establishing Performance Indicators for road Asset Management

- Data base
- Customer perception of asset condition and performance
- Objective
  - This could be Assessment of accessibility, service quality, operational efficiency, environmental safety*
- Easy to measure
- Field studies to test indicators and their impact

# Challenges

- **To apply performance based asset management methods within the existing policy frame work**
- **To formulate policy objective, performance measures and targets in the context of existing institutional arrangements**
- **To promote performance based approach with local agencies**
- **Assured adequate funding**

***Thank You***