Performance-Based Contracts for Management and Maintenance of Roads (PMMR)

Module 2
Development of Performance Standards and Response Times

Module 2: Development of Performance Standards and Response Times

- Introduction
- The purpose of this module is to learn how you can define service quality criteria and response times that could be used to monitor a performance based road maintenance contract

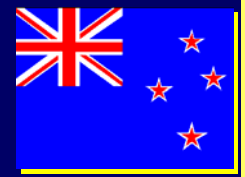
Performance Standards

- **Objectives**
  - **To satisfy the road user**
    - **accessibility**
    - **comfort**
    - **travel speed**
    - **safety**
  - **To minimize total system cost (cost to road users and agency – *life-cycle cost of assets*)**
  - **To minimize environmental impacts**

Scope of Contract (assets and services) Example Washington DC, USA

- Drainage System
- Pavement, incl. markings
- Traffic assets (safety, signs, markings, signals, etc.)
- Roadside Assets
- Bridges
- Tunnels
- Traffic Services
- Emergency Response
- Snow & Ice Control

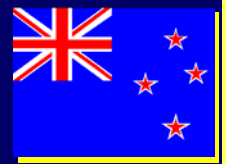
Scope of Performance Standards
Example New Zealand



- **Management Performance Standards**
  - Contract Quality Plan
  - Contractor's Programme
  - Contractor's Reports
  - Traffic Management
- **Key Performance Measures**
  - Network Availability
  - Texture Requirements
  - Skid Resistance
  - Roughness

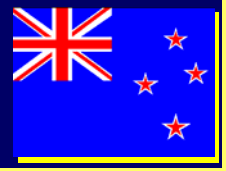
Source: SM032 App B4 Hybrid V3.3: 01March 2002, Transit New Zealand

Scope of Performance Standards
Example New Zealand (cont.)



- **Operational Performance Standards**
  - Pavement Maintenance
  - Shoulder Maintenance
  - Detritus
  - Drainage System Maintenance
  - Routine Bridge and Minor Structure Maintenance
  - Barrier Maintenance
  - Raised Pavement Markers
  - Pavement Marking
  - Lighting
  - Major Drainage Control

Scope of Performance Standards
Example New Zealand (cont.)



- **Operational Performance Standards** cont.
  - Incident Response
  - Frost and Ice Gritting and Snow Clearance
  - Work Practices
  - Sign Maintenance
  - Sight Rail Maintenance
  - Edge Marker Post Maintenance
  - Litter Removal
  - Crash and Damage Reporting
  - Vegetation Control

Performance Standards
Examples of Latin America (1)

Asset Class	Component	Performance Standards
Pavement	Potholes Roughness (a) Roughness (b) Rutting Cracks > 3mm	No potholes IRI < 2.0 (A), < 2.8 (U) IRI < 2.9 (A), < 3.4 (U) < 12mm (A), < 10mm (U) Sealed
Gravel surfaces	Potholes Roughness Thickness of gravel layer	No potholes IRI < 6 (U), < 10 (C) > 10cm (C,U)
Paved Shoulders	Potholes Cracks > 3mm Joints with pavement	No potholes Sealed Vertical alignment < 1cm (C,U)

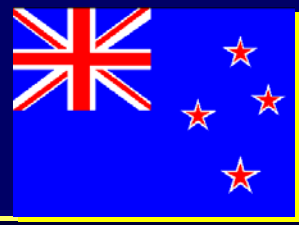
a asphalt; b bituminous surface treatment; A Argentina; C Chile; U Uruguay

Performance Standards
Examples of Latin America (2)

Asset Class	Component	Performance Standards
Drainage system	Obstructions	No obstructions. Should allow for unhindered flow of water
	Structures	Structurally sound with no damages
Road signs and markings	Road signs	Complete, visible, and clean
	Reflectivity of Road markings	> 160 mcd/lx/sqm (Argentina), > 70 mcd/lx/sqm (Chile)
Right of way	Vegetation	< 15 cm height of grass (Argentina) 5 –15 cm height of grass (Uruguay)
	Foreign objects	No foreign objects allowed

a asphalt; b bituminous surface treatment; A Argentina; C Chile; U Uruguay

Performance Specified Maintenance Contract, New Zealand



Feature	Performance Standard	Response time
Potholes on highways > 10000 vpd	Not more than 3 potholes with a diameter greater than 70 mm on any 10 km section	48 hrs
Potholes on all highways	No potholes greater than 150 mm in diameter	48 hrs
Depression and Rutting	No ponding greater than 30 mm in depth at any location	6 months
Lined Channels	No lined channels with more than 10% of the cross-sectional area obstructed and free of vegetation	1 week
Edge Break	No more than 2 m of edge break within any continuous kilometer greater than 0.5 m	1 month

Scope of Services to Be Provided
(Sample Bidding Document of the World Bank)

- Pavements (paved roads)
- Road surface (unpaved roads)
- Signaling and road surface furniture
- Drainage structures
- Vegetation control
- Slopes (cuts and embankments)
- Structures
- Traffic management
- Data collection
- etc.

Scope of Performance Standards (1)
(Sample Bidding Document of the World Bank)

- **Unpaved roads**
  - **Usability of the Road**
    - open to traffic and free of interruptions
  - **Average Traffic Speed**
    - of a specific typical vehicle
  - **Road User Comfort**
    - Road Corrugation Amplitude
    - Rut Depth
    - Other Surface Degradations
    - Cleanliness of the Pavement Surface and Shoulders

Scope of Performance Standards (2)
(Sample Bidding Document of the World Bank)

- **Paved roads (1)**
  - **Road Usability**
    - **open to traffic and free of interruptions**
  - **Road User Service and Comfort Measures**
    - **Potholes**
    - **Patching**
    - **Cracking**
    - **Multiple Cracks**
    - **Cleanliness of Pavement Surface and Shoulders**
    - **Rutting**
    - **Raveling**
    - **Loose pavement edges**
    - **Height of Shoulders vs. Height of Pavement**
    - **Paved Shoulders**

Scope of Performance Standards (3)
(Sample Bidding Document of the World Bank)

- **Paved roads (2)**
  - **Durability Measures**
    - **Road Roughness**
    - **Road Deflection**
    - **Pavement Width**
- **All Roads**
    - **Signaling and Road Safety**
    - **Drainage**
    - **Vegetation**
    - **Structures**
    - **Slopes – Cuts and Embankments**

Typical Service Levels for Paved Roads
(Sample Bidding Document of the World Bank)

	Fair	Good	Very Good	Excellent
Typical Traffic Volumes Vehicles/day	< 250	250 - 1000	1000 - 5000	5000 +
Potholes (Max Dia of any single pothole)	40 cm	30 cm	20 cm	No potholes
Potholes (Max number in any 1000m with diameter greater than 100 mm	10	5	1	0
Patching* (Response time)	28 days	28 days	14 days	7 days
Cleanliness of the pavement surface and shoulders for safety related matters (Response time)	8 hrs	4 hrs	2 hrs	1 hr

* Patches (i) shall be square or rectangular, (ii) shall be level with surrounding pavement, (iii) shall be made using materials similar to those used for the surrounding pavement, •and (iv) shall not have cracks wider than three (3) mm.

Typical Service Levels for Vegetation Control (Sample Bidding Document of the World Bank)

Type	Height (mm)	Features Applied to:
1	25 -75	Urban highway shoulders, medians, traffic islands and highway verges, grass in rest areas (including around rest area furniture).
2	25 - 300	Non-urban roads and large vegetated areas, including surface water channels with longitudinal gradient ≥ 3%.
3	Vegetation Free or Near Vegetation Free[1] [Note vegetation up to 200 mm high may be acceptable in these zones]	Vegetation control around: ➢· Edge marker posts ➢· Signposts ➢· Bridge end and culvert markers ➢· Guardrails ➢· Sight rails ➢· Lighting Columns ➢· Bridge abutments
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Typical Service Levels for Structures
(Sample Bidding Document of the World Bank)

Item	Service Level	Measurement / Detection	Time allowed for repair
Steel or other metal structures	Guardrails must be present and painted. All metal parts of overall structure painted and free of corrosion. Drainage system in good condition and fully functional.	Visual inspection	Guardrails damaged by accidents must be replaced within seven (7) days.
Expansion joints	Clean and in good condition	Visual inspection	Damages and defects must be repaired within seven (7) days.
Riverbeds	Contractor must ensure free flow of water under bridge and up to 100 meters upstream. Contractor must maintain design clearance under bridge.	Visual inspection	Causes for non-compliance must be eliminated within fourteen (14) days after water has sufficiently receded to allow minimum working conditions.

Performance Standards or Service Levels

- Performance standards should be clearly define and objectively measurable as much as possible to avoid ambiguity
- Different portions of the road network might require different performance standards due to different road surfaces, traffic levels, etc.
- Contractor has to be given time to reach the performance standards if road conditions are below the required levels
- At the end of the contract period, some performance standards might be increased to allow for a certain time span necessary for re-tendering