# Road Maintenance Management: Pavement Condition, Treatment Selection and Life-Cycle Cost

14 – 18 November 2027
Dammam - Eastern Province five-star



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## Introduction:

Road maintenance management breaks down when road networks age faster than budgets allow and repairs are chosen by complaint rather than by condition data. Potholes are patched while cracked sections that a timely seal would have saved slide into costly rehabilitation. This Core Concept course gives road authority engineers and maintenance contractors the survey methods, pavement management system logic and treatment selection rules to spend each maintenance budget where it keeps the network serviceable longest. Participants work on a network condition dataset and leave with a Network Maintenance Plan and Treatment Programme.

## Course Objectives:

- Build a road asset inventory and referencing system that links every section to its condition, traffic and maintenance history
- Plan and interpret condition surveys using International Roughness Index, PCI distress ratings and falling weight deflectometer results
- Diagnose pavement distress types and their causes to separate surface defects from structural failure
- Select routine, preventive, periodic and rehabilitation treatments using decision trees and pavement deterioration models
- Rank maintenance needs by life-cycle cost and benefit to build a multi-year programme within a constrained budget
- Specify performance-based maintenance contracts with service levels, KPIs and payment deductions for non-performance

## Target Audience:

- Road authority engineers responsible for maintaining urban, rural and expressway networks in serviceable condition
- Road asset managers accountable for condition data, deterioration forecasts and multi-year maintenance budgets
- Maintenance contractor managers who deliver routine and periodic works under term or performance-based contracts
- Condition survey and road data teams who collect, validate and report roughness, distress and deflection data
- Maintenance planners and budget officers who prioritise treatment programmes and report network performance

## Course Outline:

### Day 1: Road Asset Inventory and Maintenance Context

- Road Network Referencing: Sections, Chainage and Linear Location Methods
- Road Asset Inventory Register: Carriageway, Shoulders, Drainage, Signs and Structures
- Functional and Structural Pavement Condition: Ride, Texture, Skid Resistance and Bearing Capacity
- Maintenance Categories: Routine, Preventive, Periodic, Rehabilitation and Emergency Works
- Current-State Network Review Using a Maintenance Backlog Register

### Day 2: Condition Surveys and Pavement Distress Diagnosis

- International Roughness Index: Quarter-Car Model, Inertial Profilers and m/km Reporting
- PCI Distress Survey to ASTM D6433: Sample Units, Severity, Extent and Deduct Values
- Asphalt Distress Catalogue: Alligator, Block and Transverse Cracking, Rutting, Ravelling and Bleeding
- Falling Weight Deflectometer Testing: Deflection Bowls and Backcalculated Layer Moduli
- Distress Cause Analysis: Fatigue, Moisture Ingress, Binder Ageing and Overloading

### Day 3: Pavement Management Systems and Treatment Selection

- Pavement Management System Workflow: Inventory, Inspection, Assessment, Prediction and Work Planning
- Deterioration Modelling: Empirical, Mechanistic, Markov and Machine Learning Approaches
- Surface Treatment Options: Crack Sealing, Chip Seal, Slurry Seal and Microsurfacing
- Rehabilitation Options: Mill and Inlay, Structural Overlay, In-Place Recycling and Full Depth Reclamation
- Treatment Decision Trees and Trigger Values by Road Class and Condition Band

### Day 4: Life-Cycle Cost, Prioritisation and Network Risks

- Life-Cycle Cost Analysis: Treatment Timing, Discounting and Road User Cost Effects
- Budget Scenario Analysis and Benefit-Cost Ranking of Maintenance Candidates
- Bridge and Culvert Maintenance Overview: Inspection Cycles, Joints, Bearings and Scour
- Drainage Maintenance and Climate Stress: Heat Rutting, Sand Encroachment, Flooding and Freeze-Thaw
- Traffic Management for Maintenance Works: Lane Closures, Work Zone Layouts and Night Operations

### Day 5: Maintenance Contract Case and the Network Maintenance Plan

- Performance-Based Maintenance Contract Design: Service Levels, Response Times and Payment Deductions
- Maintenance KPI Dashboard: Network Roughness Trend, Backlog, Defect Response and Cost per Lane-Kilometre
- Network Case Study: Interpreting a Condition Dataset and Defending Treatment Choices
- Multi-Year Treatment Programme Build Under a Fixed Budget Envelope
- Network Maintenance Plan and Treatment Programme Drafting and Peer Review

## Skills You Will Gain:

- Road Asset Referencing
- Roughness and Distress Survey Interpretation
- Deflection Data Analysis
- Pavement Deterioration Forecasting
- Maintenance Treatment Selection
- Life-Cycle Cost Ranking
- Work Zone Planning
- Maintenance Contract Performance Monitoring

## Why Attend This Course:

- Return with a Network Maintenance Plan and Treatment Programme built on your own network's condition data
- Replace complaint-driven patching with treatment triggers that intervene while pavements are still cheap to preserve
- Defend maintenance budget requests with life-cycle cost evidence and scenario results that finance teams can test
- Compare maintenance practice with road authorities and contractors working in hot, wet and cold climates

## Conclusion:

A road network holds its value only when maintenance is timed by condition rather than by failure. The course moves from asset inventory and maintenance categories, through roughness, distress and deflection surveys, to pavement management systems, deterioration models and treatment selection, then to life-cycle cost, budget ranking, structures, drainage and work zone traffic management. The final day applies these methods to a network case and produces a Network Maintenance Plan and Treatment Programme that participants use to set budgets, instruct contractors and track network performance.