JUPITER PRIME
Consulting • Training • Advisory
جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

Advanced GIS-Based Pavement Management Systems Training Course

31 January – 11 February 2027
Cairo

Advanced GIS-Based Pavement Management Systems Training Course

Ref: 144_3906 **Date:** 31 January – 11 February 2027 **Location:** Cairo **Fees:** 6500 GBP

Advanced GIS-Based Pavement Management Systems is a 2-week training course for pavement engineers, road maintenance managers and asset management engineers, and it ends with a GIS-based pavement maintenance plan for a road network. Road owners face ageing surfaces, tighter maintenance budgets and pressure to show why one section is resurfaced before another. Jupiter Prime Training treats Advanced GIS-Based Pavement Management Systems as the link between condition evidence, treatment choice and funding decisions.

Why GIS-Based Pavement Management Systems Matters Now

Three forces shape pavement decisions today. Heavier traffic loads and harsh climates accelerate cracking, rutting and ravelling; finance committees demand evidence that each maintenance riyal or pound delivers the longest pavement life; and automated survey vehicles now capture more distress data than spreadsheets can hold. A road authority that places this evidence on a referenced GIS network can time preservation treatments before costly reconstruction becomes unavoidable. One that reacts to complaints spends heavily on failed sections while sound pavements slip past the point where cheap treatments still work.

Who Gains Most from GIS-Based Pavement Management Systems

- Engineers who plan condition surveys and interpret distress data
- Managers who allocate annual resurfacing and patching budgets across districts
- Asset engineers who maintain the road inventory and linear referencing
- Analysts who build deterioration curves and treatment decision trees
- Airfield and estate engineers who manage runways, aprons and internal roads

A road maintenance department gains most when its survey engineers, asset data specialists and budget holders attend together and agree one condition rating and one treatment logic.

GIS-Based Pavement Management Systems Capabilities

Participants learn to turn distress surveys and network inventories into ranked, costed treatment lists that a funding committee can test and approve.

- Build a linear-referenced road network with homogeneous pavement sections — asset inventory owners
- Specify condition survey methods and distress rating rules — survey contractors and inspectors
- Calculate pavement condition index values by section — maintenance engineers
- Apply deterioration models to forecast future condition — multi-year budget planning
- Design treatment decision trees and cost-benefit ranking — funding committees
- Communicate maintenance scenarios through GIS maps and budget curves — senior road officials

Key GIS-Based Pavement Management Systems Terms

- Pavement Condition Index PCI — a numerical rating of surface condition derived from the type, severity and extent of observed distresses.
- Linear Referencing — locating events along a road by route and distance rather than by coordinates alone.
- Homogeneous Section — a stretch of road with similar structure, traffic and condition, managed as one unit.
- Deterioration Model — a curve or equation predicting how a pavement's condition declines with age and traffic.
- Preservation Treatment — a low-cost intervention such as crack sealing or surface seal applied while the pavement is still sound.
- Decision Tree — rules that assign a treatment to each section based on condition, traffic and pavement type.

GIS-Based Pavement Management Systems Day by Day

Day 1: Pavement Asset Context

- Pavement Life Cycle Concepts — Linking Timing of Treatment to Cost
- Road Asset Inventory — Establishing What the Network Holds
- Stakeholder Expectations — Balancing Users, Funders and Contractors
- Performance Targets — Setting Network Condition Goals
- Pavement Management Maturity — Choosing Where to Improve First

Day 2: Network Referencing in GIS

- Linear Referencing Systems — Defining Routes, Chainages and Events
- Homogeneous Sectioning — Splitting the Network for Management Units
- Pavement Structure Layers — Recording Construction History by Section
- Traffic Loading Attributes — Attaching Volumes and Heavy Vehicle Shares
- Network Topology Checks — Fixing Gaps and Overlaps in Route Geometry

Day 3: Condition Survey Methods

- Visual Distress Survey Procedures — Rating Cracking, Rutting and Ravelling
- Automated Survey Vehicles — Capturing Imagery, Roughness and Profile
- Sampling Units and Frequency — Balancing Coverage Against Survey Cost
- Field Data Collection Apps — Recording Distress With Location
- Survey Quality Assurance — Checking Rater Consistency and Repeatability

Day 4: Condition Indices and Ratings

- Pavement Condition Index Calculation — Converting Distress to Section Scores
- Roughness Measures — Relating Ride Quality to User Experience
- Structural Capacity Testing — Using Deflection Results in Decisions
- Composite Condition Ratings — Combining Surface, Ride and Structure
- Condition Mapping in GIS — Displaying Network Health by Colour Band

Day 5: Deterioration Modelling

- Performance Curves by Family — Grouping Pavements With Similar Behaviour
- Regression and Probabilistic Models — Forecasting Condition Over Time
- Model Calibration With Local Data — Adjusting Curves to Observed Decline
- Treatment Reset Values — Modelling Condition After Each Intervention
- Forecast Validation — Comparing Predictions With Later Surveys

Day 6: Treatment Selection

- Treatment Catalogue — Defining Preservation, Rehabilitation and Reconstruction
- Decision Trees and Trigger Values — Assigning Treatments to Sections
- Unit Cost Libraries — Pricing Treatments by Area and Type
- Treatment Life Expectancy — Estimating Benefit Duration
- Constructability Constraints — Accounting for Utilities and Traffic Management

Day 7: Prioritisation and Optimisation

- Cost-Benefit Ranking — Ordering Sections by Benefit per Unit Cost
- Incremental Benefit-Cost Methods — Choosing Between Competing Treatments
- Multi-Year Optimisation — Scheduling Works Within Annual Budgets
- Strategic Weighting — Favouring Bus, Freight or Emergency Routes
- Project Packaging — Grouping Sections Into Practical Contracts

Day 8: Budget Scenarios and Reporting

- Budget Scenario Modelling — Testing Constant, Reduced and Increased Funding
- Backlog Estimation — Quantifying Deferred Maintenance Needs
- Network Condition Forecast Maps — Showing Outcomes of Each Scenario
- Performance Dashboards — Tracking Targets for Road Officials
- Funding Case Narratives — Explaining Consequences of Underinvestment

Day 9: Integration and Feedback Loops

- Work Order Integration — Linking Completed Works Back to Sections
- Maintenance History Records — Updating Construction Layers After Works
- Complaint and Defect Data — Adding Reactive Repairs to the Evidence
- Airfield Pavement Adaptations — Applying the Method to Runways and Aprons
- System Review Cycle — Refreshing Models After Each Survey Round

Day 10: Practising the GIS Pavement Maintenance Plan

- Network Section Build — Applying Linear Referencing to a Sample Network
- Condition Scoring Run — Applying Index Calculations to Survey Data
- Treatment Assignment — Applying Decision Trees and Unit Costs
- Scenario Comparison — Applying Budget Models to Rank Works
- GIS-Based Pavement Maintenance Plan — Completing the Work Product

Applying GIS-Based Pavement Management Systems After the Course

- Re-section one district's road network into homogeneous sections on a linear referencing system and attach the latest condition survey
- Run a two-scenario budget comparison for that district and present the forecast condition maps to the maintenance budget holder

GIS-Based Pavement Management Systems Questions FAQ

What are Advanced GIS-Based Pavement Management Systems and why do they matter now?

Advanced GIS-Based Pavement Management Systems link road referencing, condition surveys, deterioration models and treatment rules on one map. They matter now because ageing networks and limited budgets require evidence for every maintenance choice.

Which roles gain most from Advanced GIS-Based Pavement Management Systems?

Pavement engineers, road maintenance managers and asset management engineers gain most. They plan surveys, maintain inventories, model deterioration and decide which sections receive which treatment each year.

How do Advanced GIS-Based Pavement Management Systems differ from a pavement design course?

They focus on managing existing pavements across a network rather than designing new layers. A design course sizes thickness and materials; this course ranks maintenance treatments over time using condition evidence and budgets.

What do you bring back from Advanced GIS-Based Pavement Management Systems?

You bring back a GIS-based pavement maintenance plan for a road network, with referenced sections, condition scores, deterioration forecasts, treatment assignments and budget scenarios.

GIS-Based Pavement Management Systems: The Way Forward

The GIS-based pavement maintenance plan first informs which sections receive preservation treatments before they decline into costly rehabilitation. Maintenance managers, budget holders and contractors use it to agree annual works. After the next survey round, revisit the deterioration curves and trigger values, because observed decline often differs from the first calibrated forecast.