Using PMS to Implement Preservation & Monitor Performance Target

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Introduction to VDOT

Virginia Department of Transportation (VDOT):

- Maintains and operates the 3\textsuperscript{rd} largest network of state maintained highways in the US
  - Over 125,000 lane-miles of pavement
  - Interstate: ~5,500 lane-miles
  - Primary: ~21,500 lane-miles
  - Secondary: ~98,500 lane-miles (~80,000 hard surfaced)
- Consists of 9 Maintenance Districts and a Central Office in Richmond
- Employs approximately 7,500 full time personnel
VDOT’s Pavement Management Program

- VDOT invests ~$400 M on pavement maintenance per year
  - Annual data collection
    - Over 20,000 directional miles of data collection/year
    - Data collection vendor Fugro-Roadware
    - 100% of Interstate (IS) and Primary (PR) systems
    - 20% of Secondary (SC) system
  
- Data stored and analyzed in PMS
  - Agile Asset’s Pavement Manager
  - Condition data combined with deterioration and treatment models to estimate maintenance needs to achieve performance targets
Pavement Management Program – Central Office

• CO responsibilities include:
  – Manage the annual data collection and QA/QC processes
  – Network level needs analysis and reporting
    • Needs estimation to meet performance targets
    • Performance based budgeting and allocation
    • Track and prepare yearly reports on performance
  – Management of the software application systems
    • PMS (used to analyze and store all pavement related data)
    • PMSS (Pavement Maintenance Scheduling System; used to estimate and develop contracts for pavement maintenance)
  – Provide expertise and guidance to the field
Pavement Management Program – District

• District responsibilities include:
  – Detailed, project specific cost estimation
  – Development of annual pavement maintenance schedules
    • Location, treatment and materials selection
    • Estimation of quantities
    • Contract development
  – Input and manage data in PMS
    • Maintenance history
    • Homogeneous/maintenance sections
Performance Targets monitoring and Reporting

- VDOT is responsible for monitoring and reporting conditions, meeting performance targets on pavements
  - Performance targets are set and approved by the Commonwealth Transportation Board (CTB)
  - VDOT Commissioner has to report to the CTB every year on the status of performance
  - VDOT is legislatively mandated to report to the State General Assembly every year on maintenance and operation needs and on performance.
Performance Targets monitoring and Reporting

• In 2010, Governor established VTrans2035
  – Vision for multimodal transportation in VA
  – Benchmark planning document adopted by CTB
  – Provides guidance on transportation improvements and policies
  – Includes measures, data and change levers to assess VDOT performance

• VDOT Business Plan created in response to VTrans2035

• Recent VDOT performance audit
  – Includes CO Maintenance Division responsibility to monitor, achieve and report on pavement condition and targets
Linking Budget, Performance Targets and Maintenance Schedule Development

Data Collection & Needs Assessment
- Pavement condition surveys to estimate current & future needs

Performance Targets
- Monitor and assess the effectiveness of maintenance activities
- Prioritize use of limited funds

Performance-based Budgeting
- Budget allocations to meet expected network performance

Schedule Development
- Little to no Central office involvement
Challenges

• How to ensure that the optimum combination of mix of fixes (PM, CM, RM, RC) are being selected by the field offices?
• How to strengthen the link between performance based budgeting and project/treatment selection?
• How to achieve performance targets and implement preservation in an optimum way?
• While doing the above, how can we ensure that CO is not encroaching on the field?
Pavement Performance Target Monitoring Process

• Create a formal, documented process for monitoring targets
  – Foster accountability and transparency

• Establish achievable targets to guide District programs
  – Set performance and paving targets using objective information

• Monitor project development & execution
  – Verify adequacy of planned work to meet established targets
  – Provide opportunity for course correction during planning process
  – Track planned work through completion
  – Validate selected treatment against PMS identified needs
  – Collect information to update PMS deterioration models
Pavement Performance Target Monitoring Process (Contd.)

- **Primary outputs from the process (based on optimization)**
  - Paving and performance targets
    - Performance targets (% Sufficient)
    - Paving targets (Lane Miles)
      - Preventive (PM)
      - Corrective (CM)
      - Restorative (RM)
      - Reconstruction / Major Rehab (RC)
  - Monthly status reports
    - Compares planned paving to targets by maintenance category
    - Location specific comparison of District treatment selection to needs
Sample Maintenance Activities

**Preventive (PM)**
- Minor Patching
  - <5% pavement area
  - Depth <=2”
- Surface Treatment (chip seal, slurry, latex, thin hot mix, etc)

**Corrective (CM)**
- Moderate Patching
  - <10% pavement area
  - Depth up to 6”
- Partial depth patching and thin (≤ 2”) overlay
- Milling and ≤ 2” overlay

**Restorative (RM)**
- Heavy Patching
  - <20% of pavement area
  - Depth up to 9”
- Full depth patching and up to 4” overlay
- Milling and up to 4” overlay

**Major Rehab/ Reconstruction (RC)**
- > 4” overlay
- Mill, break and seat and thick overlay
- Reconstruction
Status Report – Planned Paving vs. Target

• Planned paving summed by maintenance category
  – Planned paving should meet or exceed target for each category

• PMS used to predict performance given expected deterioration and planned maintenance
  – Expected performance should meet or exceed performance target

• Provides guidance and supports for selection of optimal mix of fixes without dictating project specific details to district
Status Report – Treatment Validation

• Each project reviewed individually
• Compare needs recommendation (from PMS) and treatment selection
  ▪ Districts have the opportunity to submit treatment selection justification to CO
Treatment Selection Decision Tree

Pavement Surface Distresses
- Fatigue Cracking
- Transverse Cracking
- Patching
- Rutting
- Potholes

Decision Matrices → Preliminary Treatment Selection → Decision Trees → Final Treatment Selection

Traffic Level + Structural Capacity + Construction History
Sample Monthly Status Report

Hampton Roads District Paving Status Report

This report was developed using the following input data:
1. Current Conditions Data
2. 2011 and 2012 PMS System
3. Interstate Maintenance from Optimization Analysis
4. Primary Maintenance from Optimization, analysis
5. 2011 Awarded PMS3 Contracts on Interstate System
6. Interstate FY2012 PMS System allocation of $15,000,000
7. Primary Maintenance System allocated
8. 2011 Awarded PMS3 Contracts on Primary System
9. Interstate FY2012 Primary Paving allocation of $15,000,000
10. Predicted Performance from Optimization Analysis
11. Based on 2012 plan PMS3 Schedule work

Hampton Roads District – 2012 Interstate Planned Paving

Hampton Roads Interstate Paving Summary

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Hampton Roads District – Review of 2012 Treatment Selection

The Hampton Roads District Paving Status Report provides a detailed overview of the pavement conditions and maintenance strategies for the Hampton Roads District. The report includes data on interstate and primary systems, presenting performance metrics and planned paving activities. The summary highlights the performance of different paving systems and the effectiveness of maintenance strategies. The report is an essential resource for understanding the current status and future planning of pavement maintenance in the Hampton Roads District.
Sample Monthly Status Report – Planned Paving

Interstate Paving (Lane Miles)

- **Awarded (2012)**
  - Lane Miles under maintenance contract during planning season
- **Planned (2013)**
  - Lane miles planned by district for the coming year
- **Targeted (2013)**
  - Results of PMS optimization i.e. work needed to meet performance target
Sample Monthly Status Report – Predicted Performance

% Sufficient by System

- Current 2012
- Predicted 2013
  - Apply 1 year pavement deterioration
  - Improve based on 2012 Paving
- Target 2014
  - Apply 1 year pavement deterioration
  - Optimize 2013 treatment selection based on paving allocation
- Predicted 2014
  - Apply 1 year pavement deterioration
  - Improve based on 2013 planned work
Pavement Performance Monitoring Process – Timeline and milestones

- Feb 2012: Planning Targets Established
- Jun 2012: 2012 Condition Data Loaded
- Jul 2012: Planned Paving Status Report
- Sep 2012: Planned Paving Status Report
- Feb 2013: Awarded Paving Status Report

- Jan 12: 2012 Data Collection
- Apr 12: 2013 Schedule Development
- Jul 12: Aug 2012 Planned Paving Status Reports
- Jan 13: 2013 Data Collection

- Jun 2012: Paving Targets Finalized
- Aug 2012: Planned Paving Status Reports
- Oct 2012: Planned Paving Status Report
- Apr 2013
Pavement Performance Monitoring – Reports cont’d.

February
• CO publishes tentative “planning” targets

May
• Districts receive pavement allocation & establish budget

June
• CO Maintenance uses PMS to optimize investment, establishes:
  – Performance targets (% Sufficient)
  – Paving targets (Lane Miles)
    • Preventive (PM)
    • Corrective (CM)
    • Restorative (RM)
    • Reconstruction / Major Rehab (RC)
July

• Districts
  – Start selecting pavement sections and contract preparation for the next year’s maintenance schedule

• Central Office
  – Upload planned maintenance / construction into PMS
  – Predict condition using current condition and planned maintenance
  – Review district paving status report, provide feedback to districts
    • Performance Target vs. Predicted Condition
    • Paving Targets vs. Planned Maintenance
    • Location Specific Treatment Selection vs. Needs
Pavement Performance Monitoring – Reports (contd.)

• Additional Status Reports
  • Aug: Following establishment of project funds
  • Sept: Prior to transmittal of paving schedules for Ad
  • Oct: Following transmittal of paving schedules for Ad
  • Feb: Following award of paving contracts

• Copies of the Final Status Report and the Completed Paving Report are provided to upper level management at the District and CO
Expected Benefits

• Transparency
  - Clearly defined performance measures
  - Objective methodology for assessing performance

• Uniformity in Approach
  - Strengthen link between budgeting, program development and execution
  - Traceability between PMS needs analysis and actual work planned/completed
  - Improve PMS models to better reflect project costs/constraints and pavement deterioration
Expected Benefits (contd.)

• **Accountability**
  - Establish achievable performance measures based on funding and condition
  - Analyze planned work to provide opportunities for course correction
  - Track planned work through advertisement and completion

• **Targeted Investment**
  - Optimize benefits of investment and force appropriate amount of preservation work
  - Select the Right treatment, at the Right place, at the Right time
Questions?

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