

Using PMS to Implement Preservation & Monitor Performance Target

2012 National Pavement Preservation Conference
Nashville, TN

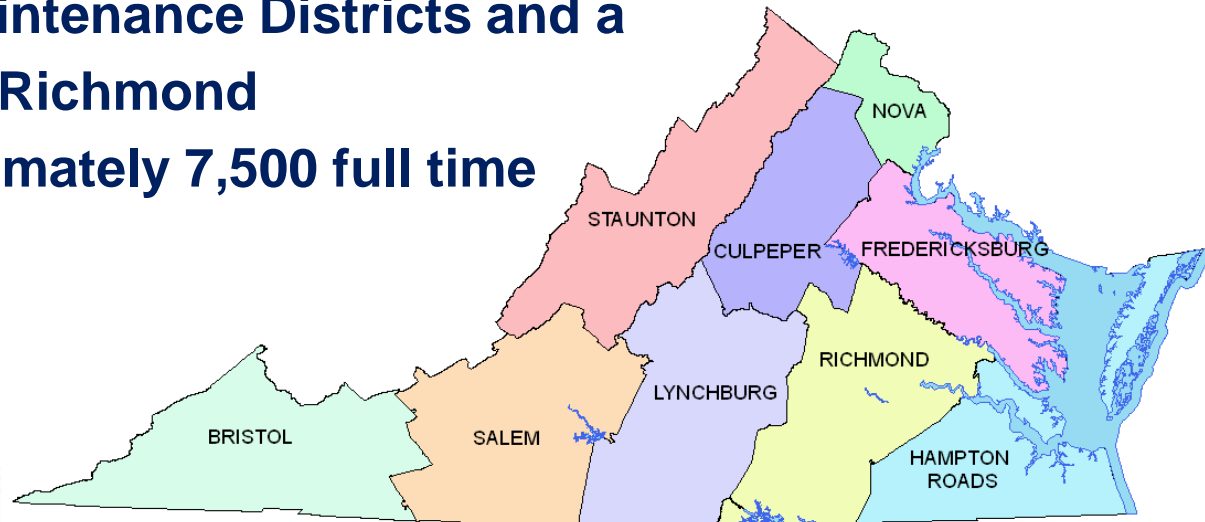
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Introduction to VDOT

Virginia Department of Transportation (VDOT):

- Maintains and operates the 3rd 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

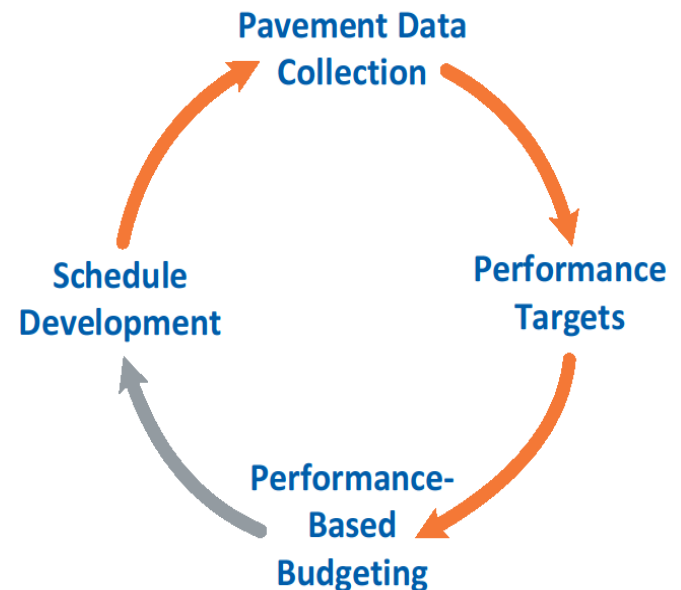
- Monitor and assess the effectiveness of maintenance activities
- Prioritize use of limited funds

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)**

Restorative (RM)

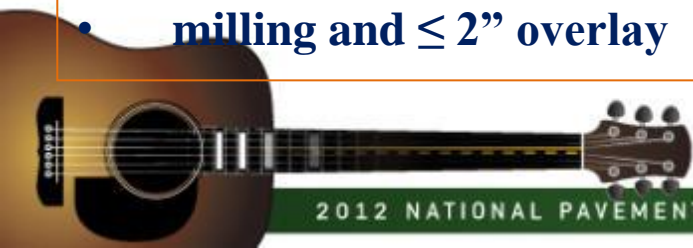
- **Heavy Patching**
 - <20% of pavement area
 - Depth up to 9"
- **Full depth patching and up to 4" overlay**
- **Milling and up to 4" overlay**

Corrective (CM)

- **Moderate Patching**
 - <10% pavement area
 - Depth up to 6"
- **Partial depth patching and thin (≤ 2 ") overlay**
- **milling and ≤ 2 " 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**

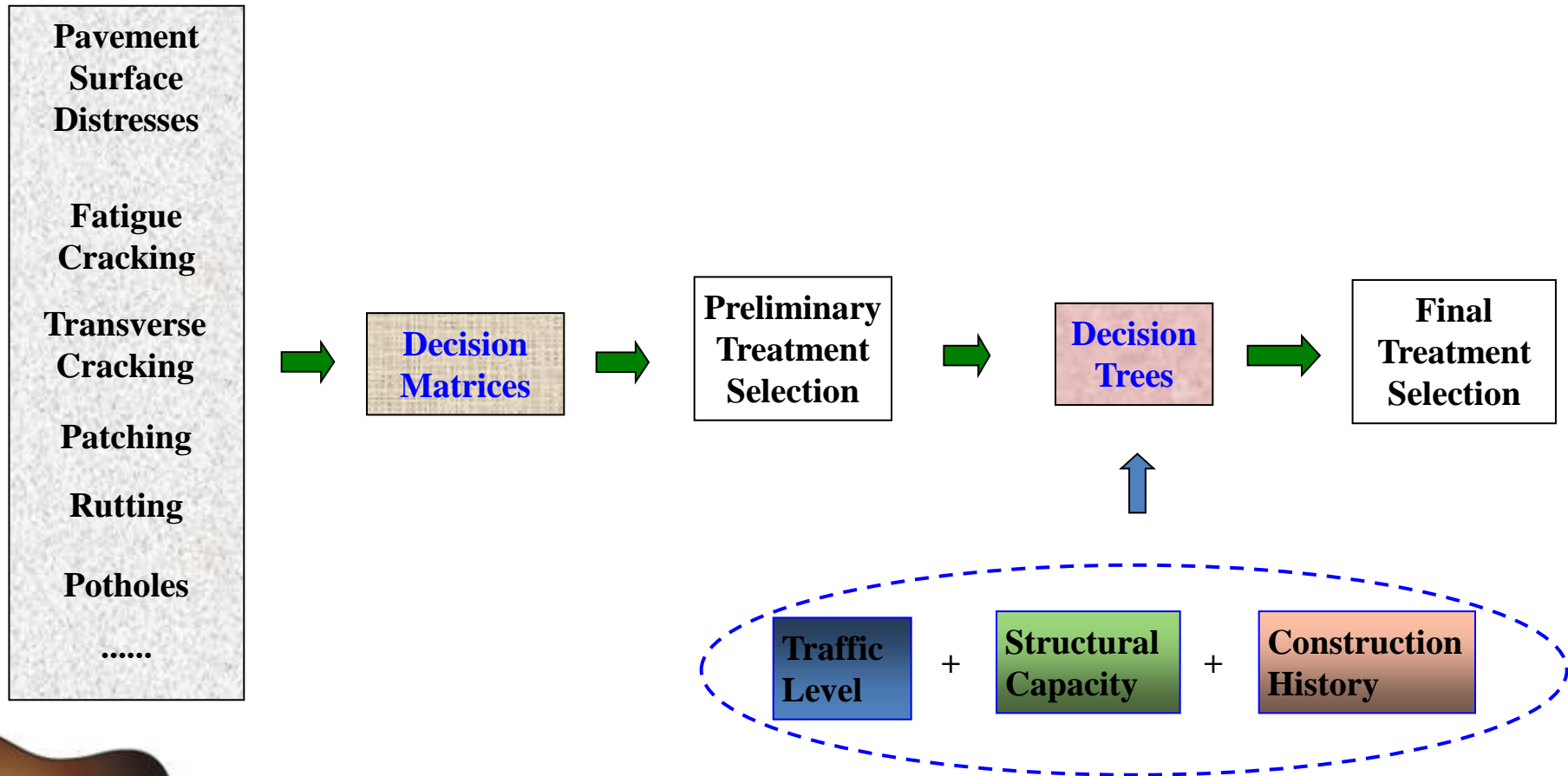


Status Report – Treatment Validation

- 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



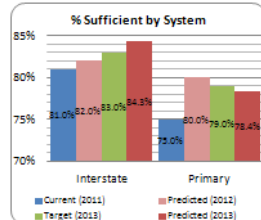
Sample Monthly Status Report

Hampton Roads District Paving Status Report

This report was developed using the following input data:

- 2011 Condition Data
- 2011 and 2012 PMSS Paving Schedules
 - As imported from PMSS into PMS on 7/15/2012
- Interstate Baseline Targets from Optimization Analysis #886
 - 2011 Awarded PMSS contracts on Interstate System
 - District FY2012 Interstate paving allocation of \$10,000,000
- Primary Baseline Targets from Optimization Analysis #887
 - 2011 Awarded PMSS contracts on Primary System
 - District FY2012 Primary paving allocation of \$15,000,000
- Interstate Predicted Performance from Optimization Analysis #995
 - Based on district 2012 planned PMSS Schedule work
- Primary Predicted Performance from Optimization Analysis #996
 - Based on district 2012 planned PMSS Schedule work

Hampton Roads District – 2013 Predicted Performance



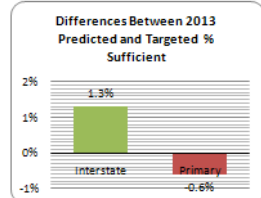
Hampton Roads Condition Summary

Interstate System

Current (2011) % Sufficient: 81.0%
 Predicted (2012) % Sufficient: 82.0%
 Targeted (2013) % Sufficient: 83.0%
 Predicted (2013) % Sufficient: 84.3%

Primary System

Current (2011) % Sufficient: 79.0%
 Predicted (2012) % Sufficient: 80.0%
 Targeted (2013) % Sufficient: 79.0%
 Predicted (2013) % Sufficient: 78.4%



Hampton Roads Predicted vs. Targeted % Sufficient in 2013

Interstate System

2013 Predicted % Sufficient: 84.3%
 2013 Targeted % Sufficient: 83.0%
 Difference: +1.3%

Primary System

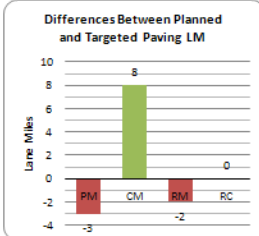
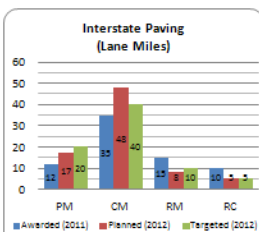
2013 Predicted % Sufficient: 78.4%
 2013 Targeted % Sufficient: 79.0%
 Difference: -0.6%

Given initial pavement conditions, expected deterioration and planned paving, Hampton Roads District is predicted to achieve its 2013 performance target of 83.0% of Interstate network in Sufficient Condition and is **not** predicted to achieve its 2013 performance target of 79.0% of Primary network in Sufficient Condition.

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Hampton Roads District Paving Status Report

Hampton Roads District – 2012 Interstate Planned Paving



Hampton Roads Interstate Paving Summary

Preventative Maintenance (PM)

2011 Awarded (PMSS): 16 LM
 2012 Planned (PMSS): 17 LM
 2012 Targeted (PMS Optimized): 20 LM
 Difference (Planned – Targeted): -3 LM

Corrective Maintenance (CM)

2011 Awarded (PMSS): 35 LM
 2012 Planned (PMSS): 48 LM
 2012 Targeted (PMS Optimized): 40 LM
 Difference (Planned – Targeted): +8 LM

Restorative Maintenance (RM)

2011 Awarded (PMSS): 15 LM
 2012 Planned (PMSS): 8 LM
 2012 Targeted (PMS Optimized): 10 LM
 Difference (Planned – Targeted): -2 LM

Reconstruction / Major Rehab (RC)

2011 Awarded (PMSS): 10 LM
 2012 Planned (PMSS): 7 LM
 2012 Targeted (PMS Optimized): 7 LM
 Difference (Planned – Targeted): 0 LM

Given planned 2012 Interstate paving, Hampton Roads District:

- Is **not** predicted to achieve its 20 lane mile paving target for Preventative Maintenance on the Interstate system.
- Is predicted to achieve its 40 lane mile paving target for Corrective Maintenance on the Interstate system.
- Is **not** predicted to achieve its 10 lane mile paving target for Restorative Maintenance on the Interstate system.
- Is predicted to achieve its 7 lane mile paving target for Reconstruction / Major Rehabilitation on the Interstate system.

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Hampton Roads District Paving Status Report

Hampton Roads District – Review of 2012 Treatment Selection

The District treatment selection was compared against the PMS identified, unconstrained needs for each location marked identified as 2012 mainline paving. Where the District treatment selection differed from the unconstrained needs by more than a single Treatment Category, the section has been flagged for District review.

Note: For all locations flagged for further review, the District is responsible to submit a justification of treatment selection to Central Office Pavement Management no later than two weeks prior to submission of schedule work to Scheduling and Contracts Division.

Hampton Roads District 2012 Treatment Selection Review

Schedules Requiring Further Review

All locations on the Interstate and Primary systems of the following schedules have been reviewed and the following locations fall outside acceptable tolerance of identified needs.

- PM-5A-12

Route	County	Begin MP	End MP	Lane	Am	District Treatment	PMS Need	District Justification?	Central Office Concurrence?
44	044	12.345	21.456	W	XXX	XX-XXX	XX-XXX	YES NO	YES NO
250	043	11	13	B	BUS	CM-BIT	DN	YES	NO
293	043	0	1.50	E	RMP	RM-BCC	PM-BCC	YES	YES
288	020	5	6	S		CM-CRC	RC-CRC	NO	NO

- PM-5D-12

Route	County	Begin MP	End MP	Lane	Am	District Treatment	PMS Need	District Justification?	Central Office Concurrence?
258	087	0	1.50	E	RMP	RM-BCC	PM-BCC	YES	YES

Schedules Passing Review

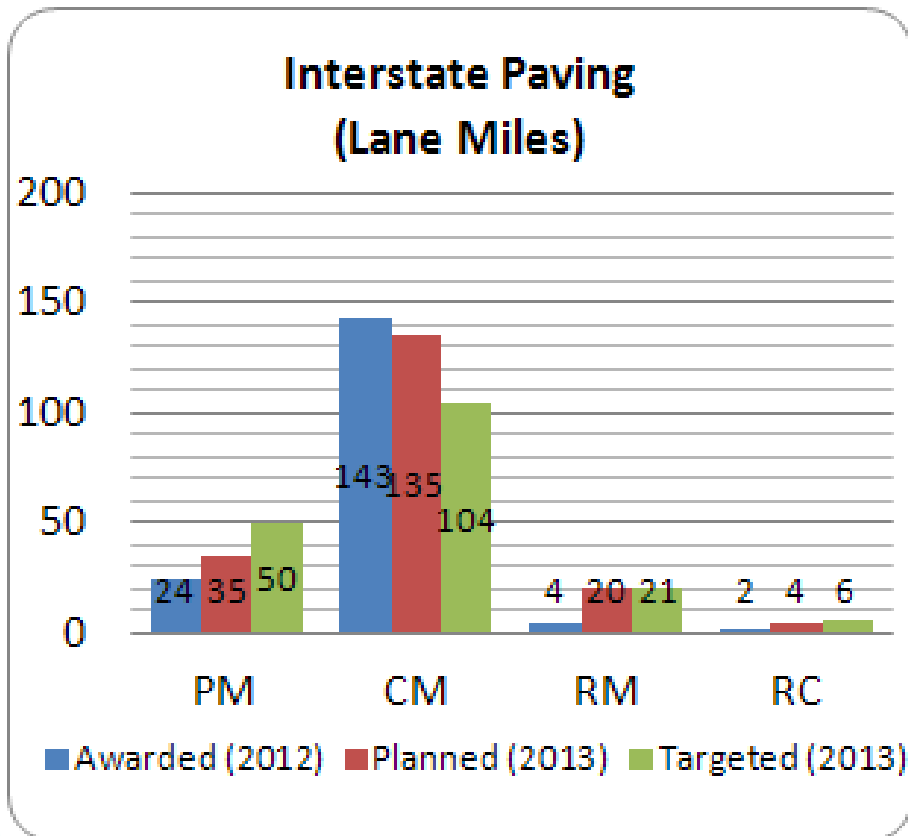
All locations on the Interstate and Primary systems of the following schedules have been reviewed and fall within acceptable tolerance of identified needs.

- LM-52-12
- PM-5C-12
- PM-5X-12
- PM-5Z-12

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Sample Monthly Status Report – Planned Paving

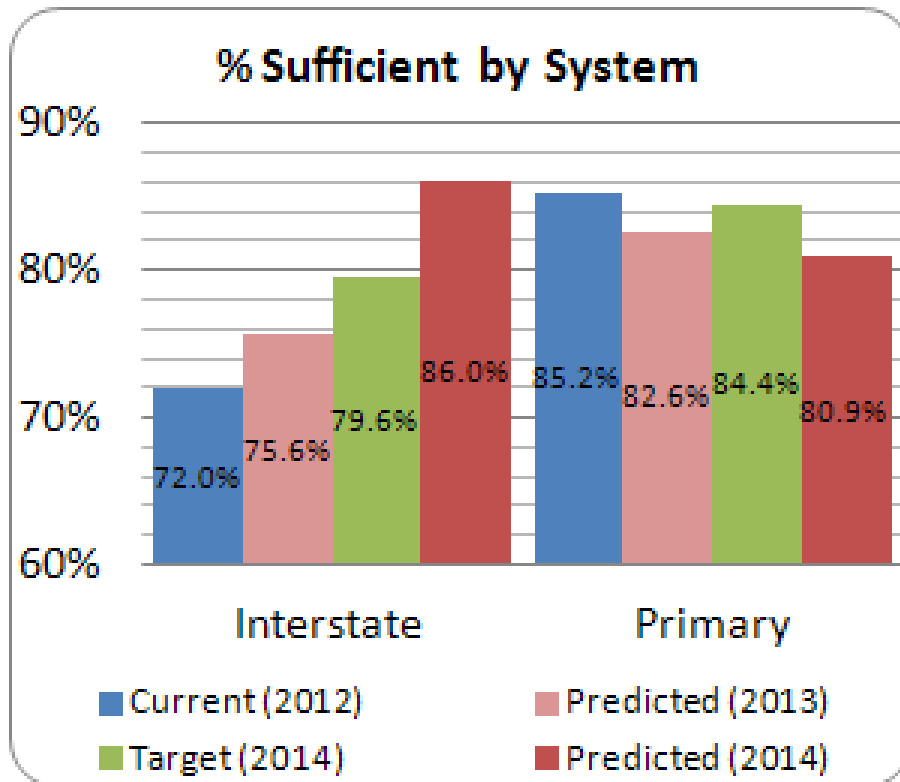


Interstate Paving (Lane Miles)

- **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

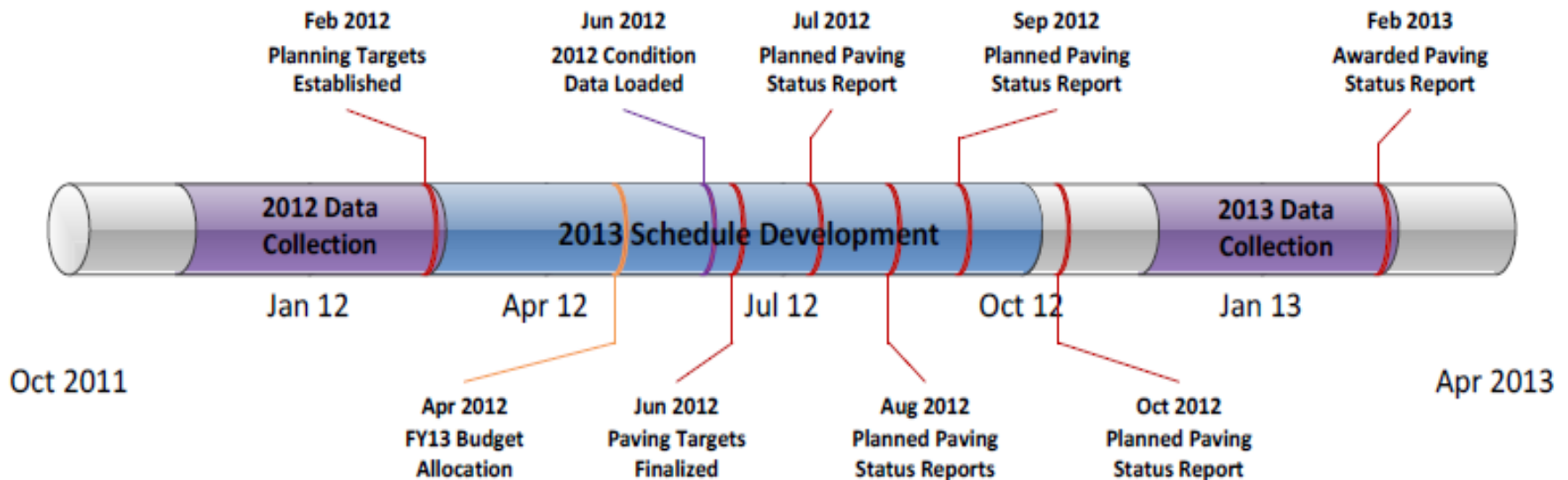


% Sufficient by System

- 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



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)



Pavement Performance Monitoring – Reports cont'd.

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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