



# **Maintenance and Rehabilitation Decision Methodology at VDOT**

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## Pavement Condition Data – Total Mileage

- **Total yearly collection: approx. 20,400 directional miles**
  - **Interstate: approx. 2,200 directional miles (100% of IS system)**
  - **Primary: approx. 10,500 directional miles (100% of PR system)**
  - **Secondary: approx. 7,700 directional miles (~20% of SC system)**
    - SC system is on a 5-year collection cycle

# Needs Analysis

- **Two Types of Needs Analysis**
  - **Unconstrained**
    - Provides a recommended treatment for entire network
    - Based on network condition data and augmented using Age, Traffic and FWD Data
  - **Network Optimization**
    - Uses performance target to optimize treatment recommendations for budgeting and allocation
- **Both use a common set of maintenance activities and costs**

# Maintenance Activity Categories

- **Do Nothing (DN)**
- **Preventive Maintenance (PM)**
- **Corrective Maintenance (CM)**
- **Restorative Maintenance (RM)**
- **Major Rehabilitation/Reconstruction (RC)**

# Examples of Maintenance Activities

## PM

- **Minor Patching**
  - <5% pavement area
  - Depth  $\leq 2''$
- **Surface Treatment**

## 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**

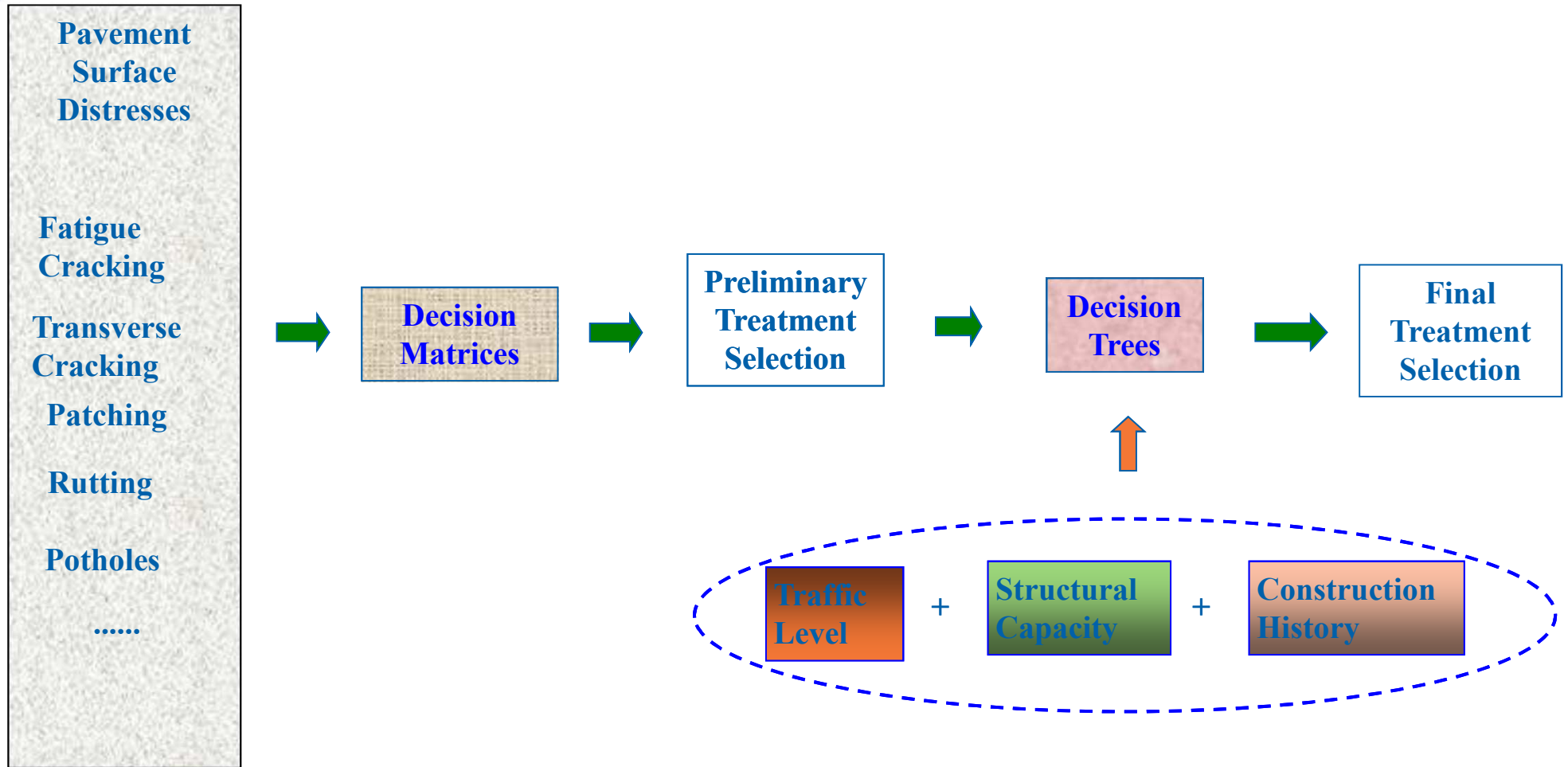
## CM

- **Moderate Patching**
  - <10% pavement area
  - Depth up to 6''
- **Partial depth patching and thin ( $\leq 2''$ ) overlay**
- **$\leq 2''$  milling and  $\leq 2''$  overlay**

## RC

- **Mill, break and seat and thick overlay**
- **Reconstruction**

# Framework for Treatment Selection





## **Performance Based Needs – Optimization**

- **Collect and apply condition data to management sections**
- **Utilize pavement condition prediction models**
- **Use criteria for pavement maintenance activity selection**
- **Establish performance measures and targets**
- **Create planning scenarios and run optimizations**
- **Determine performance based needs**

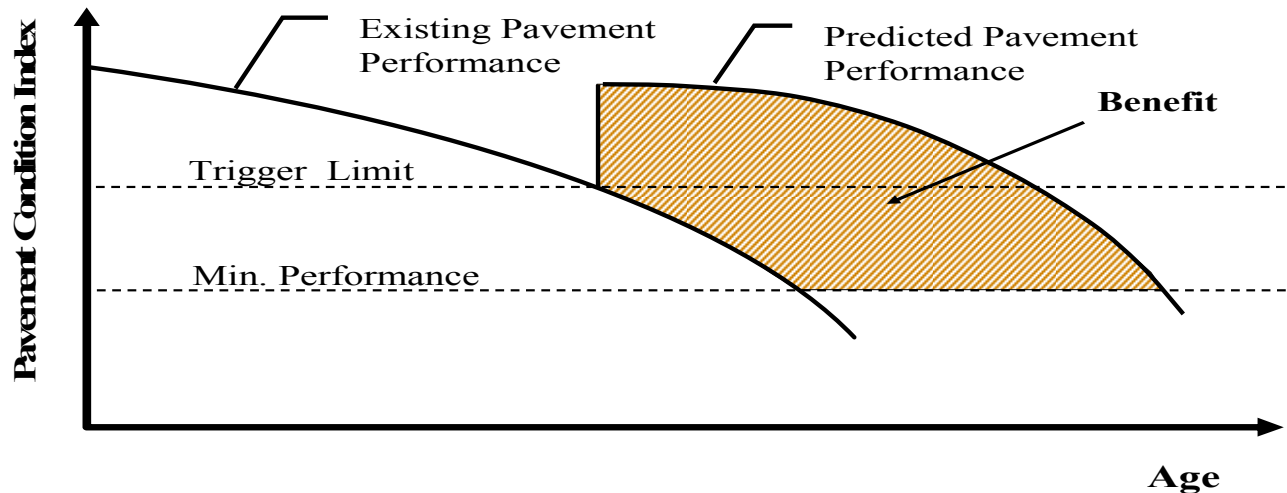


## Performance Based Budgeting – Optimization

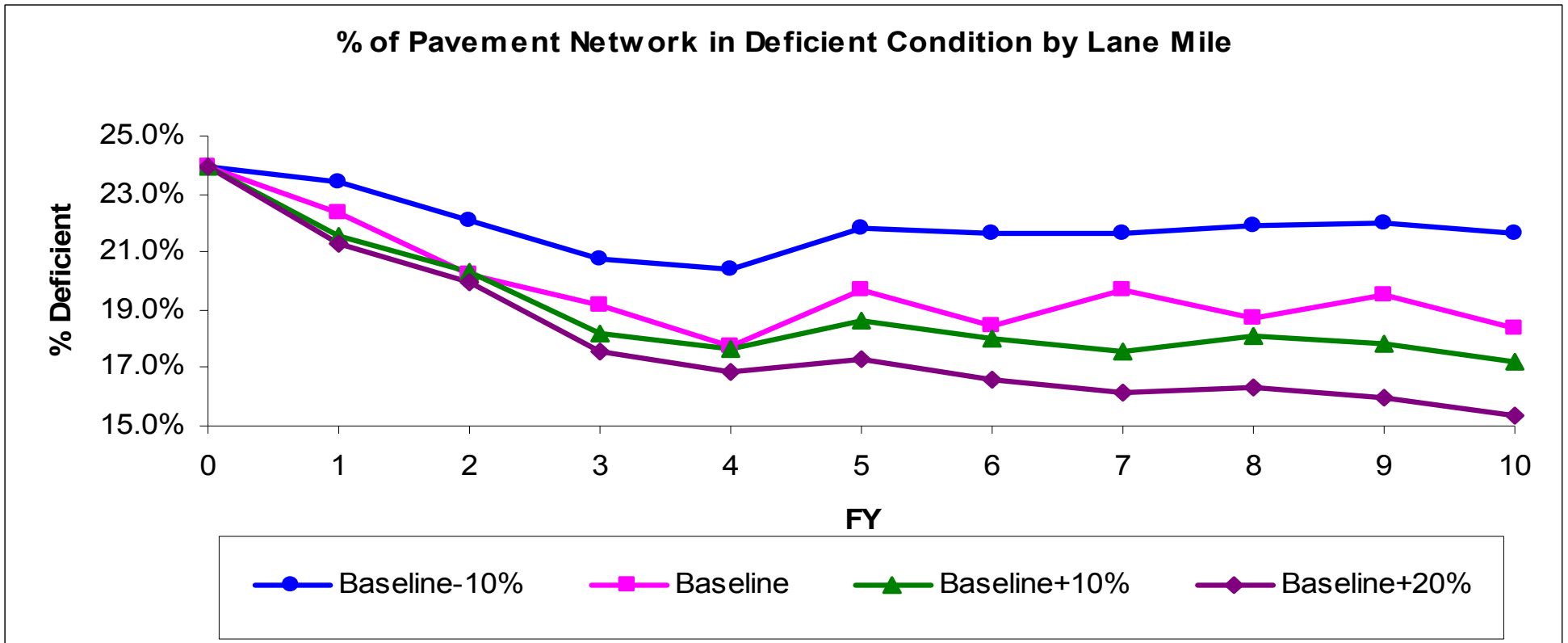
- **Single Year, Multi-Constraint Optimization**
  - Optimization of maintenance activities on pavement management sections to achieve the objective function against multiple constraints for one year at a time
- **Multi-Year, Multi-Constraint Optimization**
  - Optimization of maintenance strategies on a set of pavement management sections to achieve the objective function against multiple constraints over multiple years

# Multi-Constraint Optimization – Objective Functions

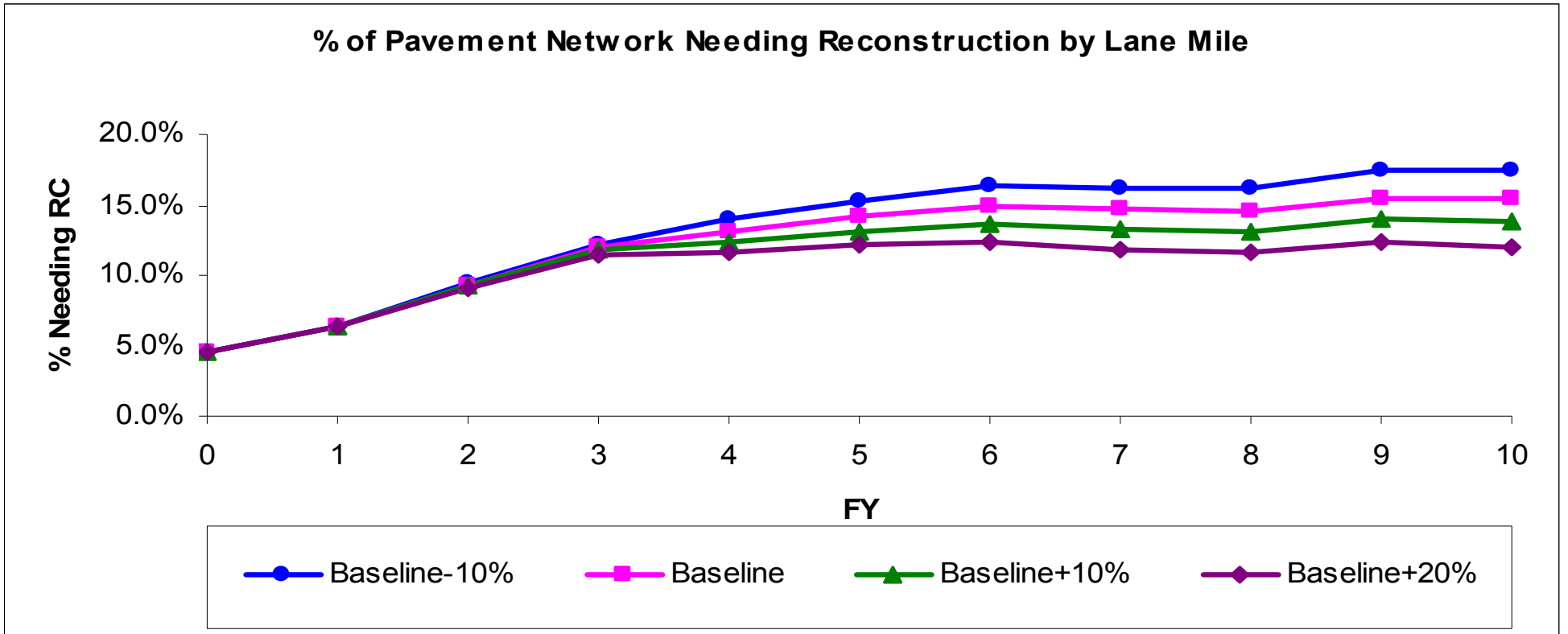
- Two types of objective functions available
  - Minimize Cost
  - Maximize Benefit (or other condition indicator)



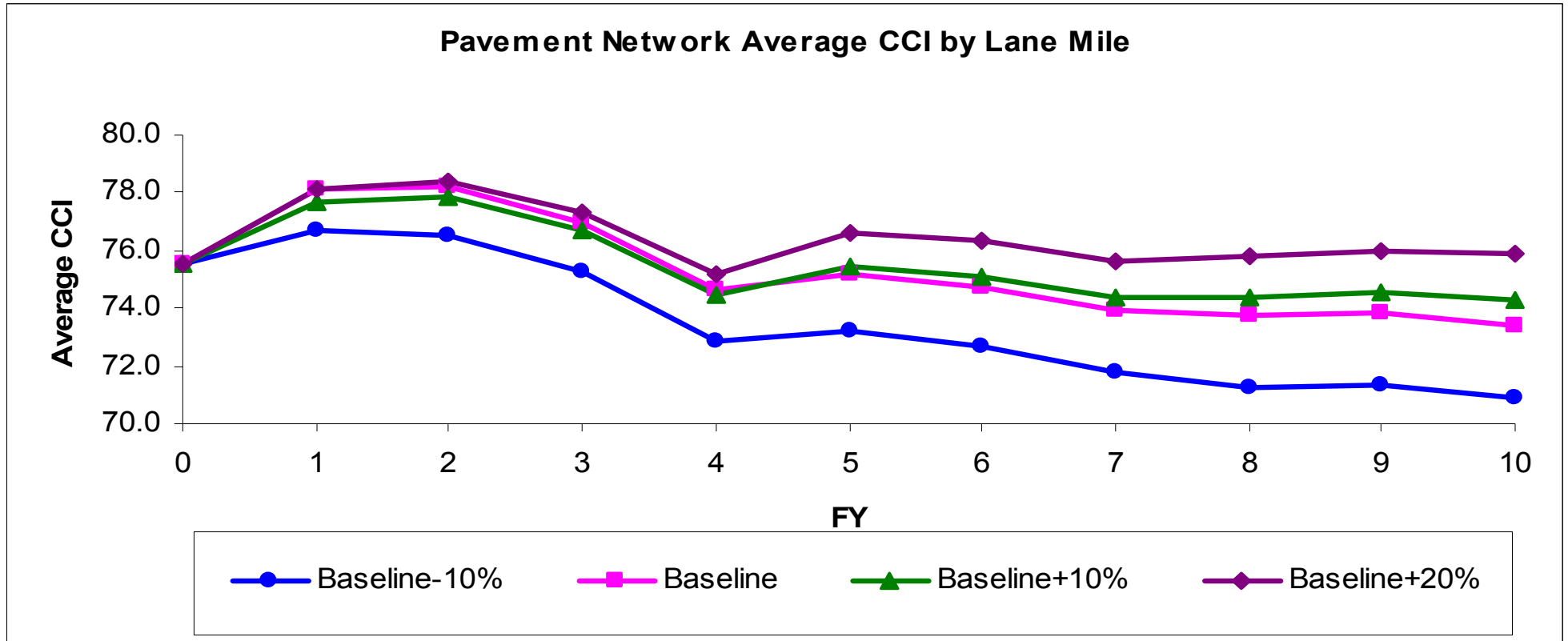
# Optimization Results – % Deficient



# Optimization Results – % Needing Reconstruction



# Optimization Results – Average LM-Weighted CCI



**Thank You**