

Program Risk



John Milton

WSDOT Experience

Risk and Performance Management

Improving agency performance



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Risk and Asset Management Peer Exchange

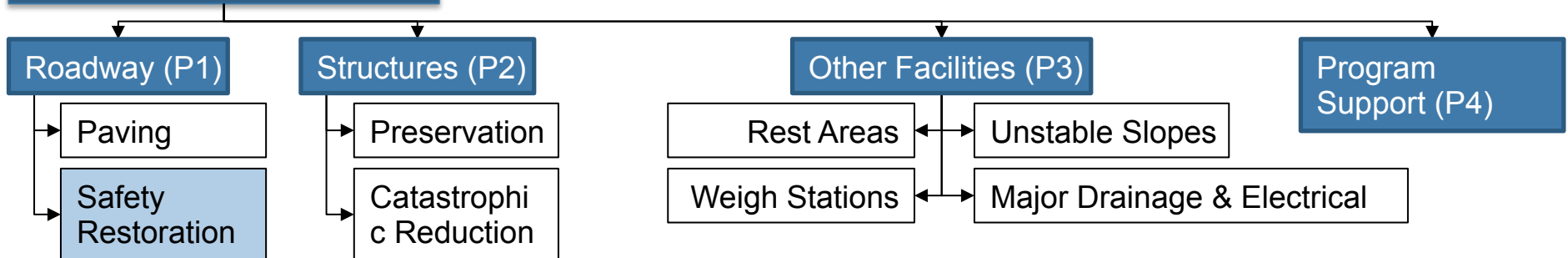
August 25, 2015
Minneapolis, Minnesota

What got us here: using safety and preservation as examples

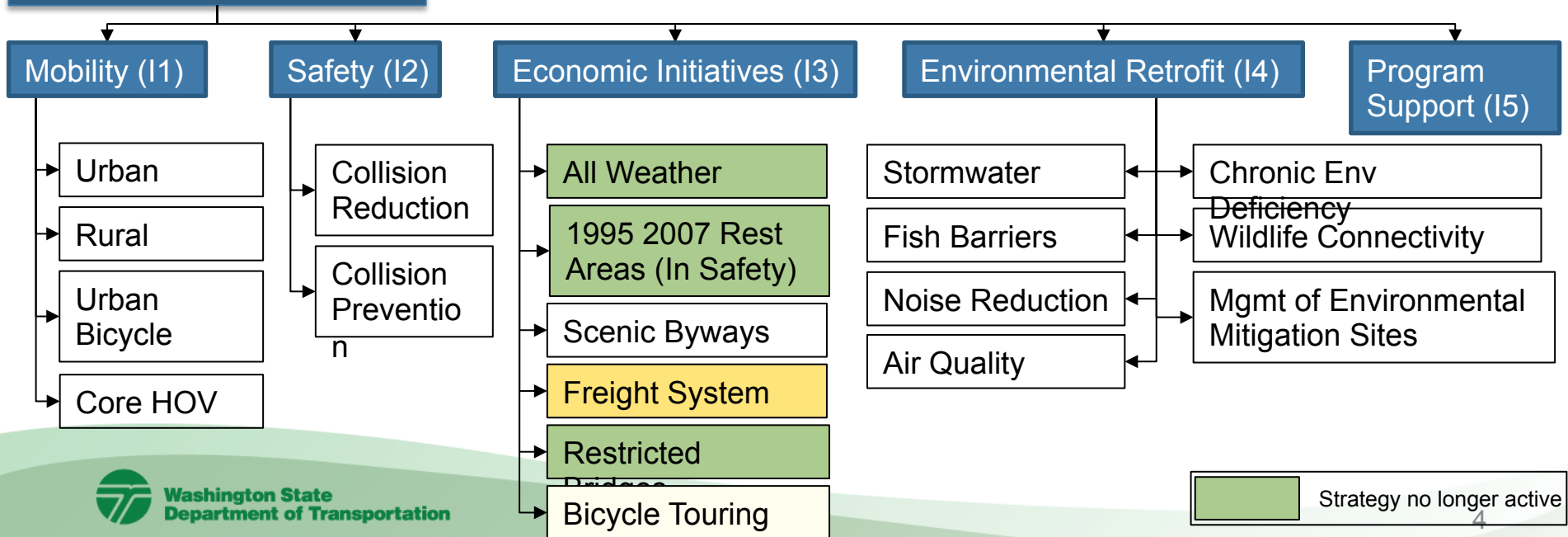
1. HISTORIC PERSPECTIVE

Highway Construction Program

PRESERVATION (P)



IMPROVEMENT (I)



Telling the story

Pavement:

Target lowest life-cycle cost

Funding crisis & meeting pavement preservation goals

Risk: declining funding:

- Maintaining over 20,000 lane miles while funding dropped by \$600 million in 10 years (27% reduction)

Mitigation strategies: Create efficiencies

- Target lowest life-cycle cost – WSDOT achieves pavement condition goals amidst funding crisis

Asset Management: Pavement Conditions Annual Report

Addressing the Pavement Rehabilitation Backlog

The projected annual cost for asphalt and chip seal projects currently programmed are compared, and categorized by projects from the Eastern and Western halves of the state. Annual costs for asphalt are low relative to the Western side because pavement life is longer (17 years compared to 9 years). Chip seal projects are slightly less in the Eastern side, as materials costs are lower (the average life is about the same). The highest cost projects are usually interchanges or urban areas where the number of lane miles are low, but the projects are complicated and require extensive traffic control changes.

WSDOT is pursuing a detailed analysis of economic performance measures to develop targets for future projects and evaluate pavement management practice materials. More use will be made of these indicators in future years.

Addressing the pavement rehabilitation backlog

The pavement rehabilitation "backlog" is the number of lane miles of state roads that are considered "due" or "past due" for rehabilitation, but funds are not available to complete the work. The backlog of lane miles that need rehabilitation should be considered in relation to the continued aging of the system.

How much rehabilitation is needed to keep WSDOT's pavement in a "steady state" condition?

Asphalt pavements On average statewide, asphalt pavements last about 17 years before rehabilitation is needed. If WSDOT rehabilitated about 7% of the agency's 11,000 lane miles of asphalt pavements every year, the system would be in a steady state, where each year the roads coming due for rehabilitation would be programmed and an additional backlog would develop. This steady-state asphalt network preservation would have an annual estimated cost of 180 million (700 miles a year at an average cost of \$260,000 per lane mile).

Chip seal (BS7) pavements The typical period between chip seal surfacing is six to seven years every year, about 15% of the agency's 4,500 lane-mile BS7 open-graded surfacing is remains in a steady state. The steady-state BS7 network would have an estimated annual cost of \$27 million a year (975 miles a year at an average cost of \$40,000 per lane mile).

Concrete pavements Concrete is a little more difficult to estimate, because of the varying age of these pavements. About 60% of the state's 2,200 lane miles of concrete pavements are 30 years old, but the expected design life of these older pavements was only 20 years. The age at which WSDOT typically replaces concrete pavements is around the 15 year mark.

Update on the flexible pavement backlog

In the December 2011 edition of the Gray Network User (GNU) 48, job for more details, an extensive discussion was included on the overarching backlog for WSDOT's flexible pavement systems. Asphalt and chip seal surfacing roads are flexible pavement. Since chip seal surfacing is the most cost-effective, they receive highest priority for programming, and so backlog is expected. The projects that do not get programmed are the asphalt projects, which in 2010 amounted to 1,400 lane miles.

The data for the 2011 performance measures report indicate that the expected backlog at the end of 2011 will be 1,600 lane miles, an 18% increase from 2010.

1 This calculation assumes that projects currently included in 2010 WSDOT's 2010-2011 budget, and subsequently canceled by 2011, have been taken out of the backlog total.

Update on roadway preservation funding

The graphs below illustrate the trends in roadway preservation funding (RF) since 1992. It shows that planned expenditures for roadway preservation continue to decline in real terms at about 1.5% per year. This decrease includes the additional funding from the American Recovery and Reinvestment Act in the 2009-11 biennium. In the 12 years since 2000, this decrease has amounted to \$732 million. If this trend continues through FY 2018, it will be \$1.39 billion. The expected impact is a pavement in good or fair condition for the last two years alone, prevents in the "very good" category decreased 1.7%, rougher roads over time, and more per hole and need for parking increased need for maintenance.

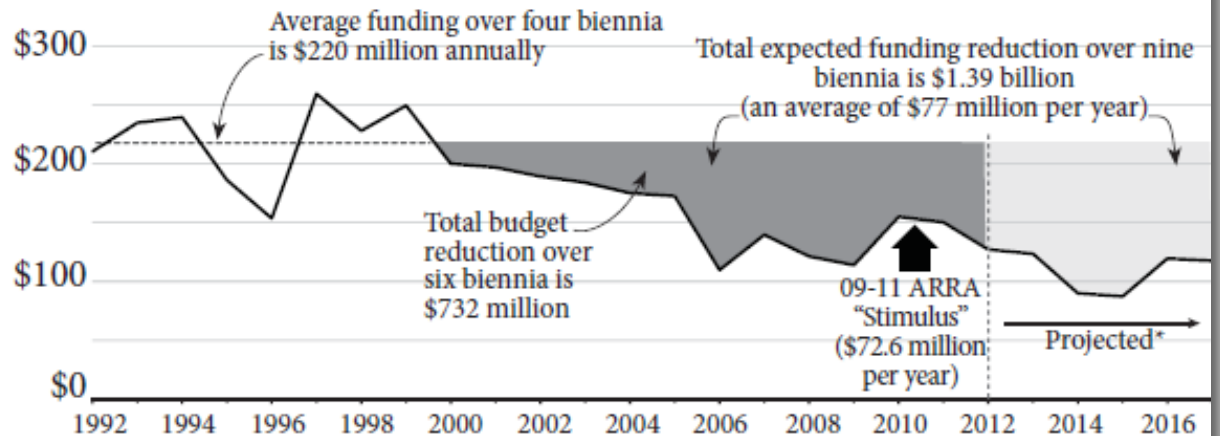
Pavement preservation funding FY 1992 - 2010

Source: WSDOT Materials Lab, 2011 edition

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Pavement preservation funding FY 1992 - 2018

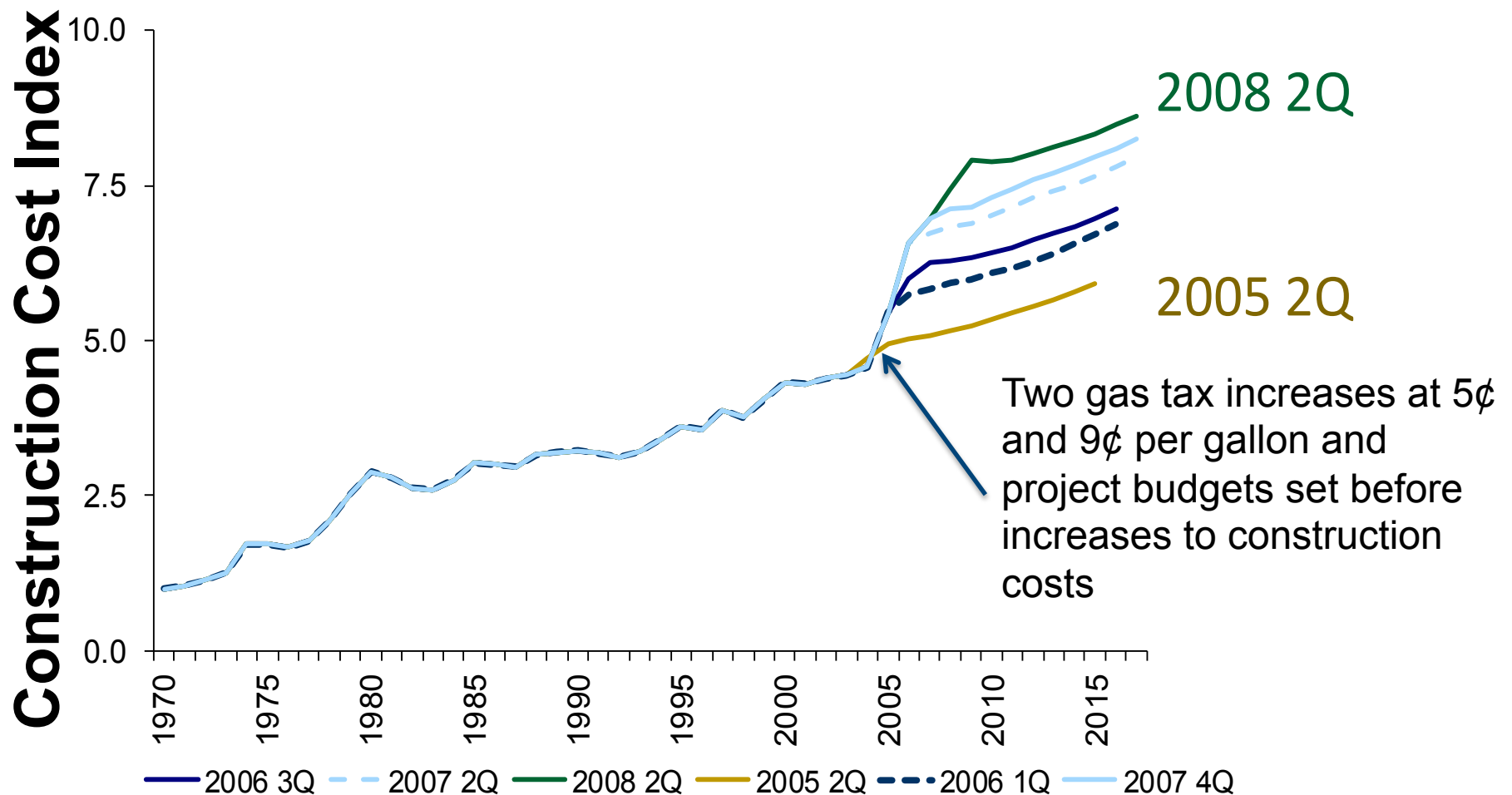
Dollars in millions; Constant 2010 dollars



Data source: WSDOT Materials Lab.

*Note: Projections as of December 2011.

Recent Inflation Trend



Gas tax purchasing power declines over time

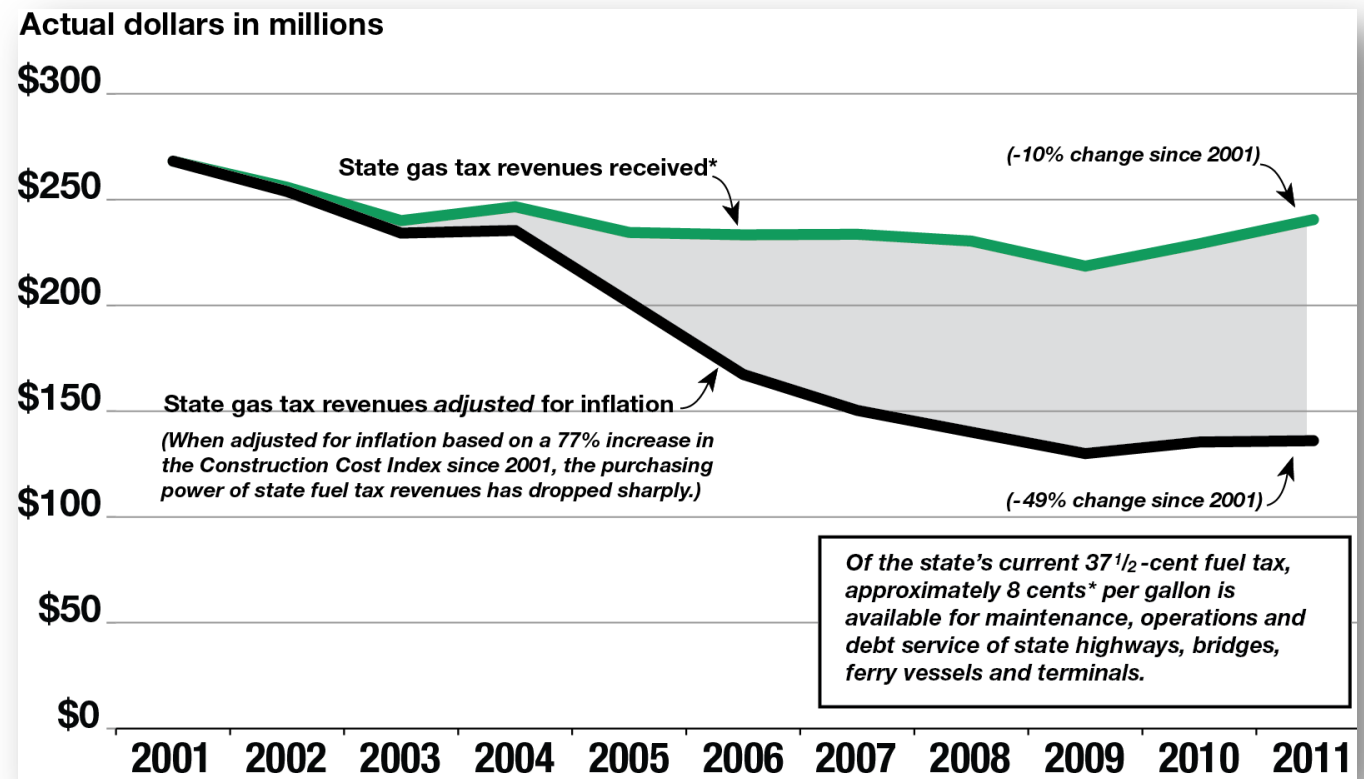
Gas tax not indexed to inflation

Promise to deliver on time and on budget

...and compelling communication of risk is more important than ever

Funding crisis

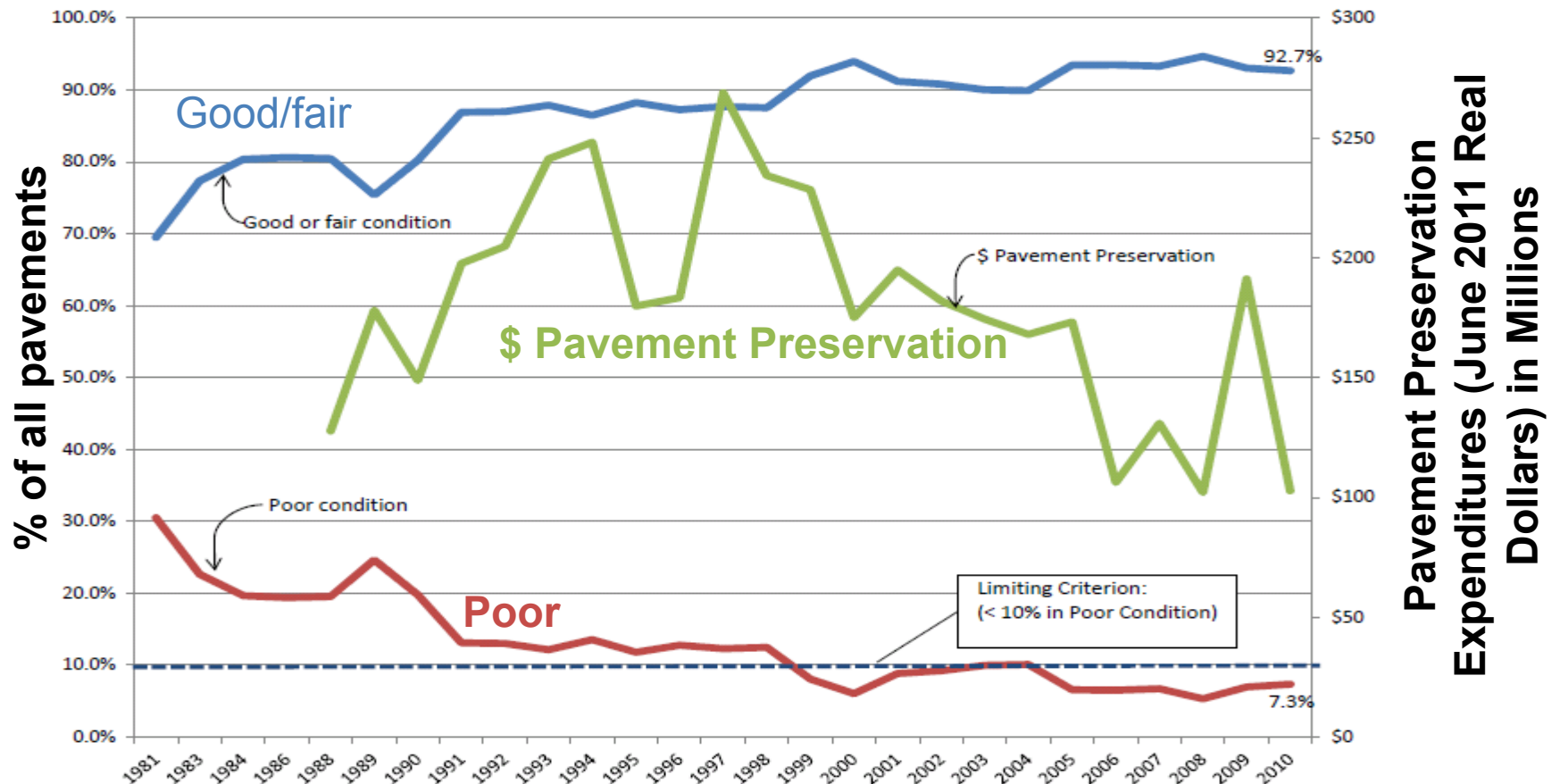
- Revenue significantly under projections
- Inflation increasing cost of maintenance and construction
- Challenge in getting another tax increase



• Includes maintenance, preservation, safety improvements, and other department operations.

** Less Debt Service.

Tracking cost versus pavement performance



State highway pavement trends (1980 – 2010)

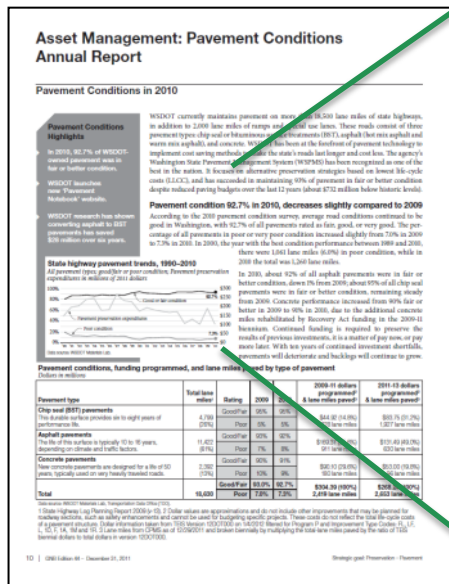
All pavement types (1981 – 2010)

Mitigating Risks Pavement: Innovations to lower costs, preserve life

WSDOT's pavement technology innovations help offset declining investments

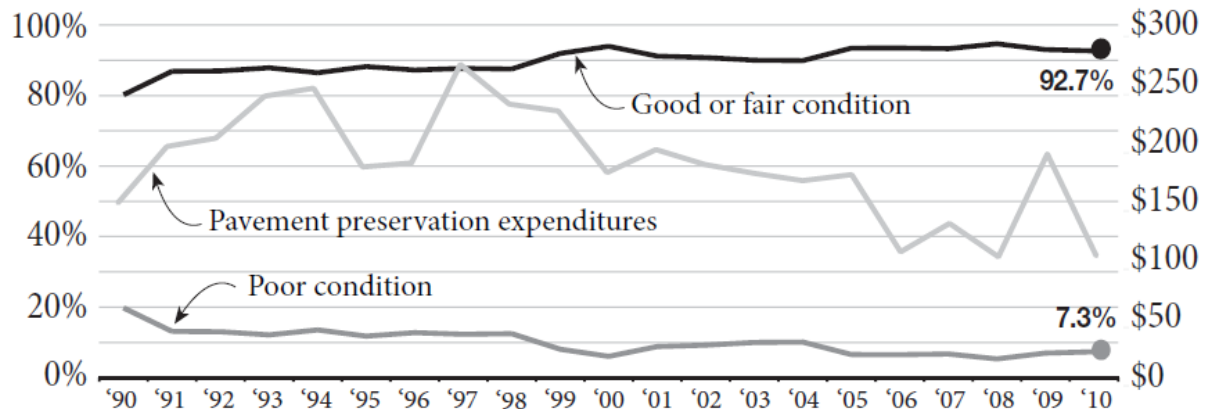
WSDOT uses pavement technology to make the state's roads last longer and cost less. Efficiencies include:

- Dowel bar retrofits on concrete pavements
- Selective panel replacement and diamond grinding on concrete pavements
- Converting higher cost asphalt pavements to lower cost chip seal pavements (\$151 million saved as of December 2011)



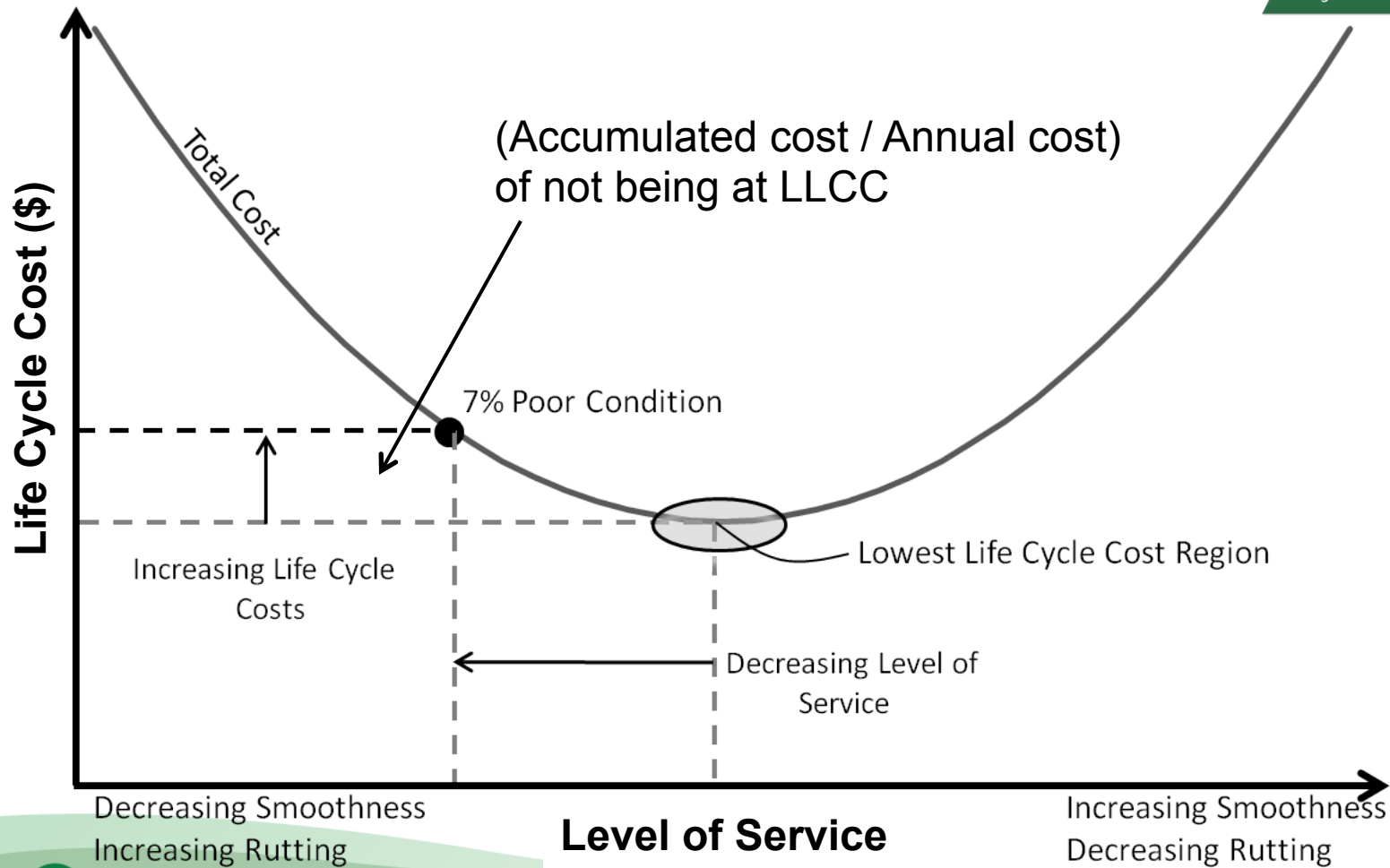
State highway pavement trends, 1990-2010

All pavement types; good/fair or poor condition; Pavement preservation expenditures in millions of 2011 dollars

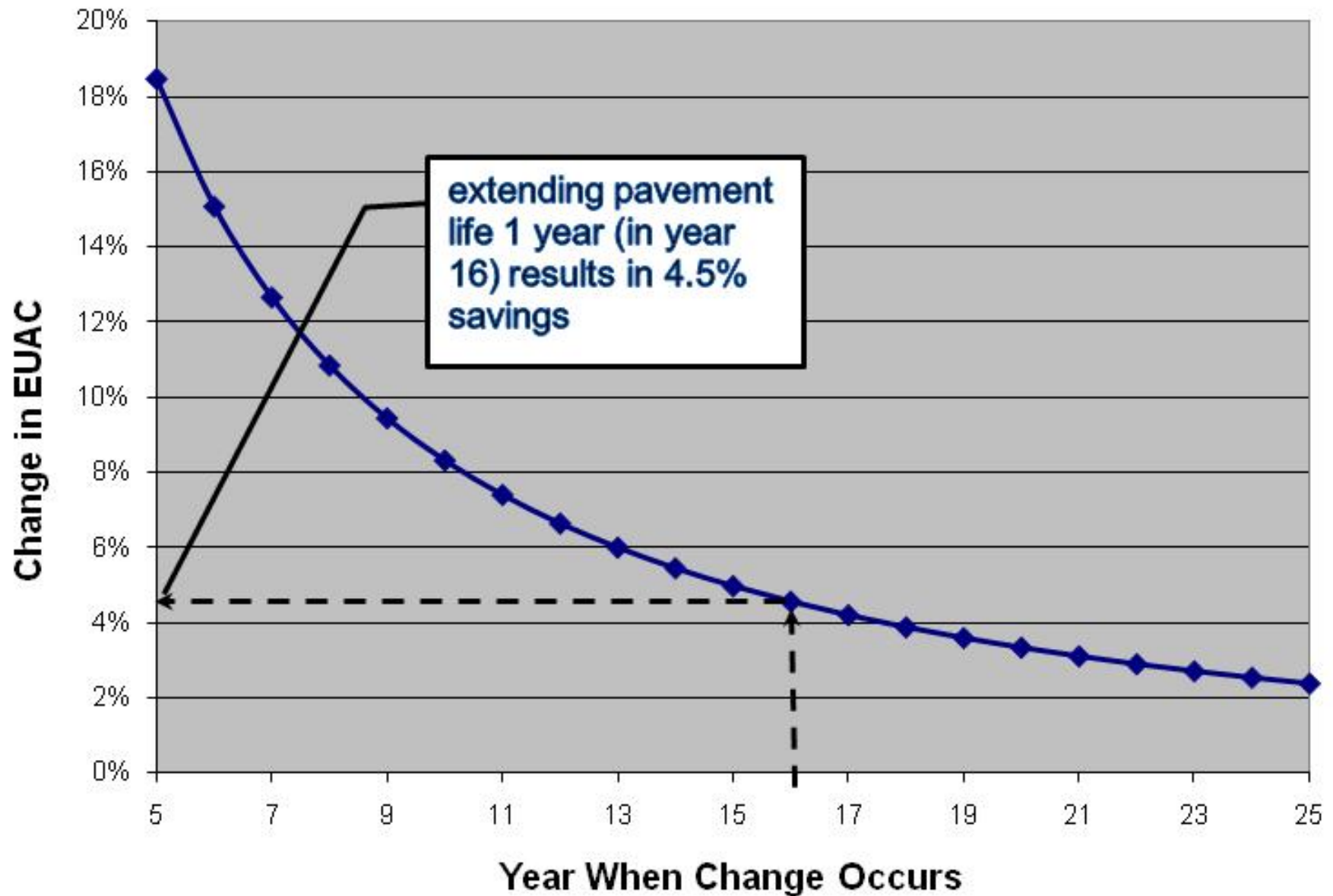


Data source: WSDOT Materials Lab.

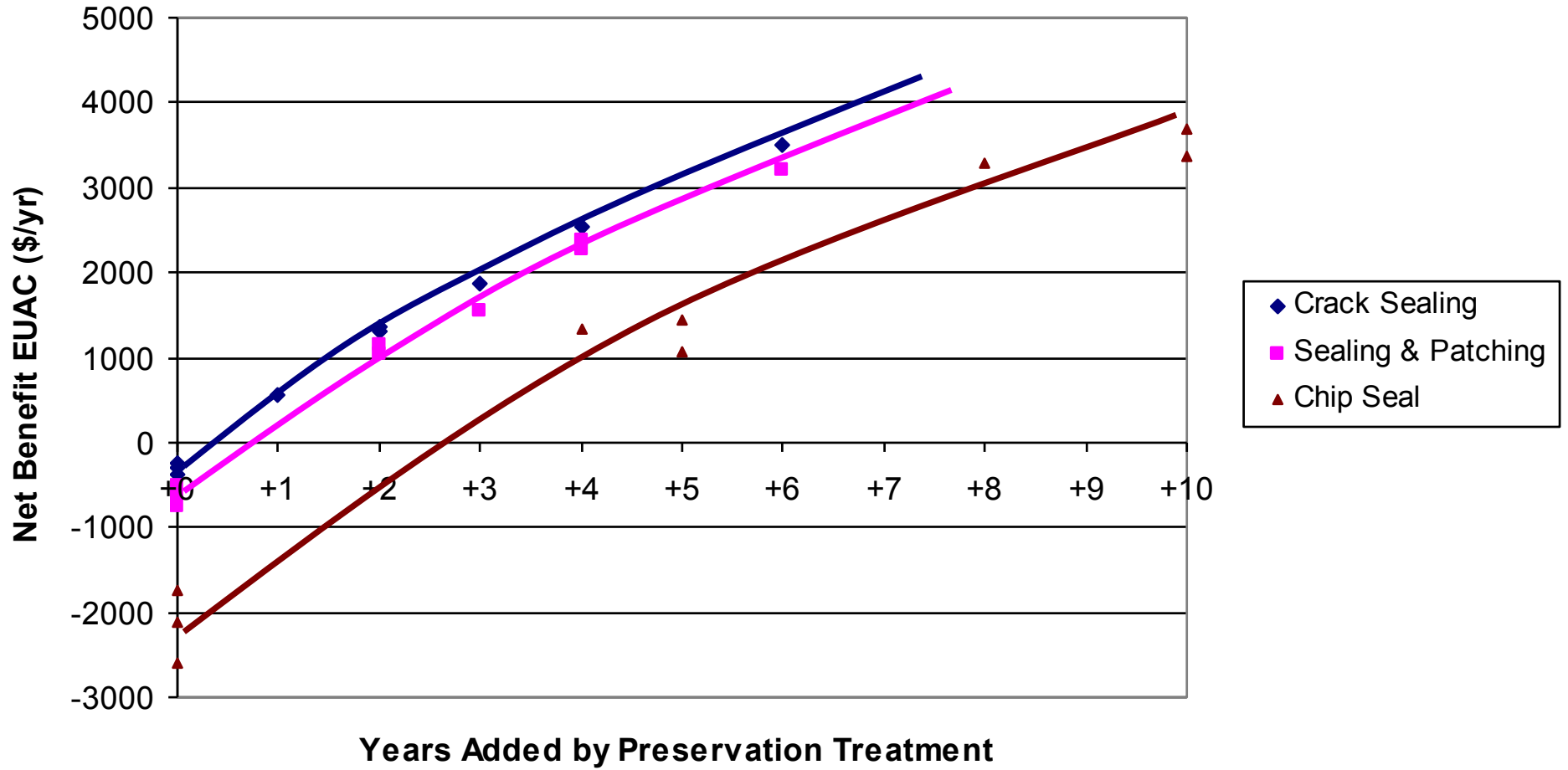
Level of Service versus Life Cycle Cost



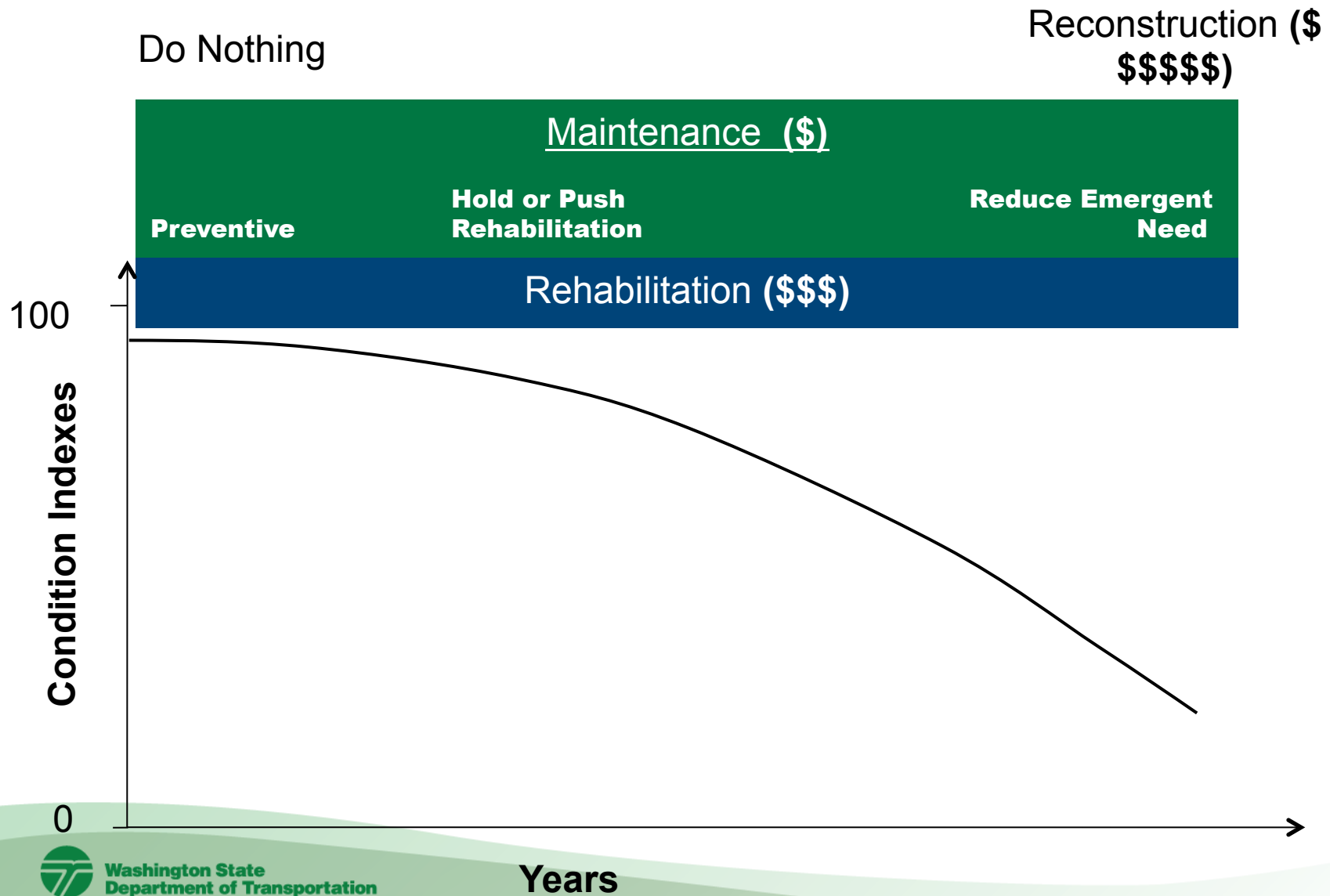
Change in EUAC per Year Change in Pavement Life



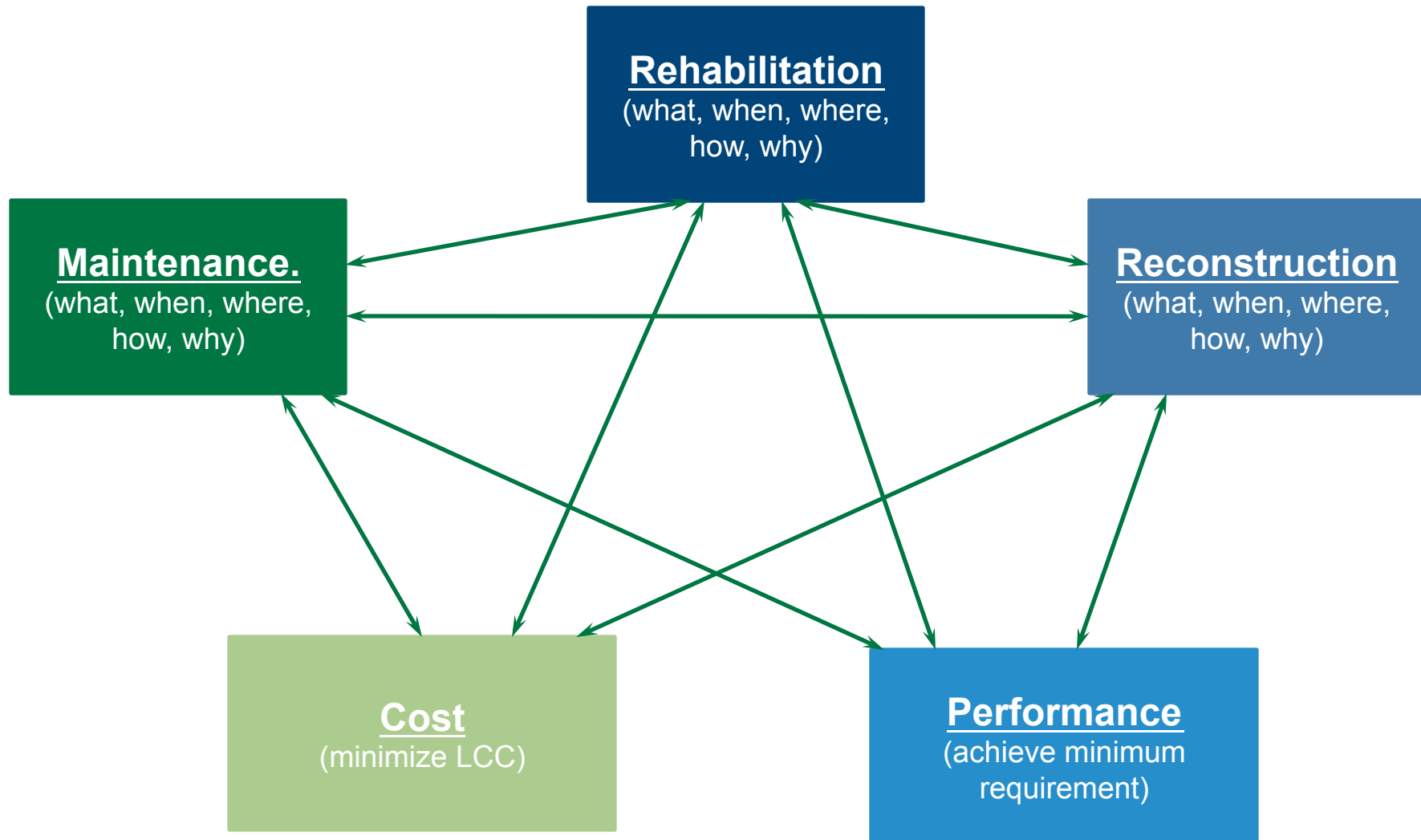
Net Benefit (EUAC)



Asphalt Pavement Preservation Decisions



Decisions and Outcomes



Uses for Economic Performance Methodologies

- Evaluation of Pavement Management
 - How efficiently are pavements performing?
 - [Are the most cost-effective decisions being implemented?](#)
- Evaluation of Pavement Design
 - Is pavement structure over designed or under designed?
- Evaluation of Freight Corridors
 - Are freight corridors designed with the most efficient pavements?

1990-2010: Changes in Pavement Asset Management

Then (1990)

Worst first

Allocation funding

WSPMS as sideline

Hveem mix design protocol

Volumetrics in the lab

Concrete Total Replacement

Dowel bar retrofit

Thick overlays (>2"+)

No westside BST

BST only if ADT <2000 ADT

5,000-10,000

No RAP

No RAS

No clear pavement selection

No dowel bar selection

Now (2010)

Lowest life cycle cost

Need based funding

WSPMS as key decision making tool

Superpave mix design

Volumetrics in the field

Dowel bar retrofit

Triage protocol

P-1 protocol (2" overlays for all HMA)

All west side regions doing BST

BST on all routes under 5,000 ADT and
consideration for routes between

Consuming all the RAP produced in the state

Test project with RAS

Pavement Type Selection Protocol

Dowel Bar Selection Protocol