Transportation Asset Management Webinar Series

Webinar 32:
Life Cycle Planning and Management

Sponsored by FHWA and AASHTO

U.S. Department of Transportation
Federal Highway Administration

AASHTO
The Voice of Transportation

Webinar 32 – June 13, 2018

FHWA-AASHTO Asset Management Webinar Series

- This is the 32nd in a webinar series that has been running since 2012
- Webinars are held every two months, on topics such as off-system assets, asset management plans, asset management and risk management, and more
- We welcome ideas for future webinar topics and presentations
- Submit your questions using the webinar's Q&A feature
- Next webinar ***August 8, 2018 2:00 PM EST — TRB TAM Conference Highlights***

Welcome

- FHWA and the AASHTO Sub-Committee on Asset Management are pleased to sponsor this webinar
- Sharing knowledge is a critical component of advancing asset management practice

Life Cycle Planning

- Life-cycle planning is a strategic approach to managing assets over their life cycle
  - Achieving a desired level of service
  - Minimizing costs
- Life cycle planning provides a foundation for transportation asset management
  - Informed by life cycle cost analysis and asset valuation
  - Supported by management systems
- Visit FHWA's Asset Management homepage to learn more:
  - https://www.fhwa.dot.gov/asset/

Learning Objectives

- Building working knowledge of key concepts and definitions relevant to life cycle planning and management
- Understanding specific applications of life cycle planning and management to transportation asset management plans
- Beginning to apply this knowledge in order to answer:
  - How can agencies incorporate life cycle planning and management in their TAM plans and programs?
  - What benefits can states expect by addressing life cycle planning and management in their TAM plans and programs?
  - What are the key lessons-learned for agencies seeking to strengthen life cycle planning and management capabilities as part of their TAM plans and programs?

- **SHARE LESSONS LEARNED, IDEAS, KNOWLEDGE!!!**

Webinar Agenda

2:00 **Webinar Introduction and Overview**
Steve Gaj (FHWA), Matt Hardy (AASHTO),
and Bill Robert (Spy Pond Partners, LLC)

2:15 **Using a Life Cycle Planning Process to Support Asset Management –** Brad Allen (Applied Pavement Technology, Inc)

2:35 **Louisiana Experience** – Mark Suarez (Louisiana DOTD)

2:55 **Illinois Experience** – Jeannie Bland (Illinois DOT)

3:15 **Q&A and Wrap Up**

applied pavement TECHNOLOGY

Using a Life Cycle Planning Process to Support Asset Management

Based on FHWA Guidance:

https://www.fhwa.dot.gov/asset/pubs/life_cycle_planning.pdf

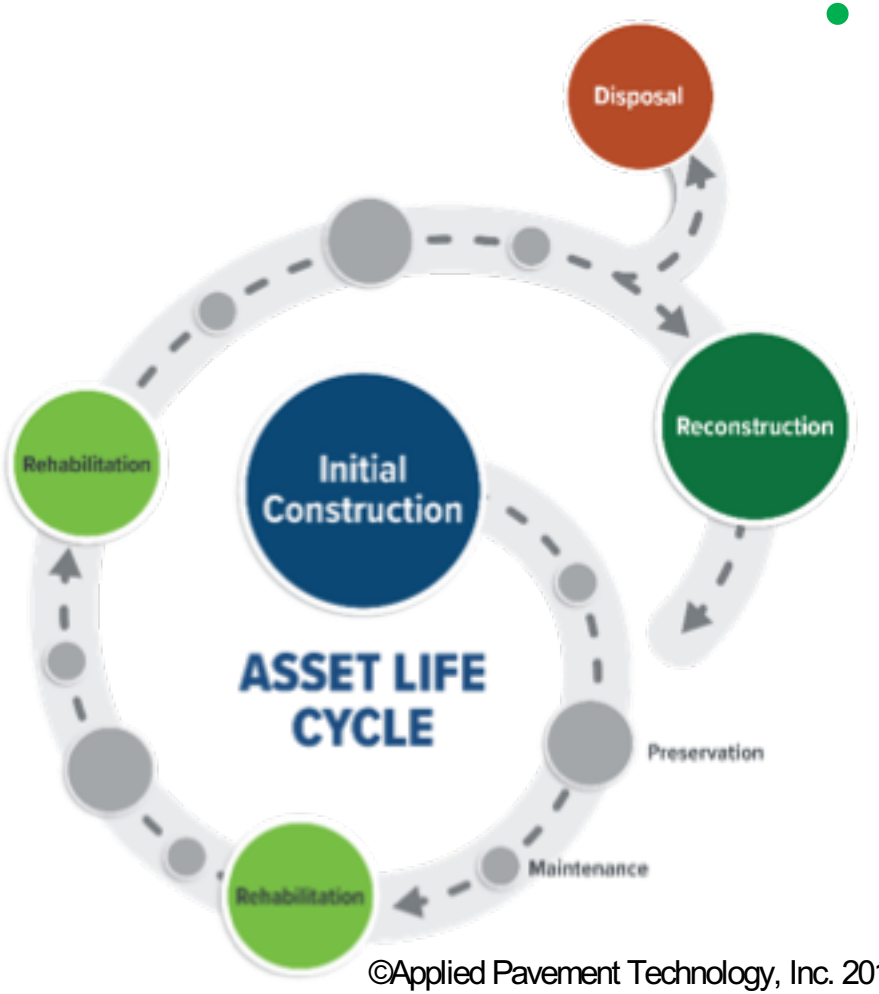
Presented by:
Brad Allen, APTech

June 13, 2018

Overview

- What is Life Cycle Planning (LCP)?
- Network-level LCP v. project-level life cycle cost analysis (LCCA)
- How LCP supports a TAMP
- Process for conducting LCP
- Using LCP results

What Is LCP?



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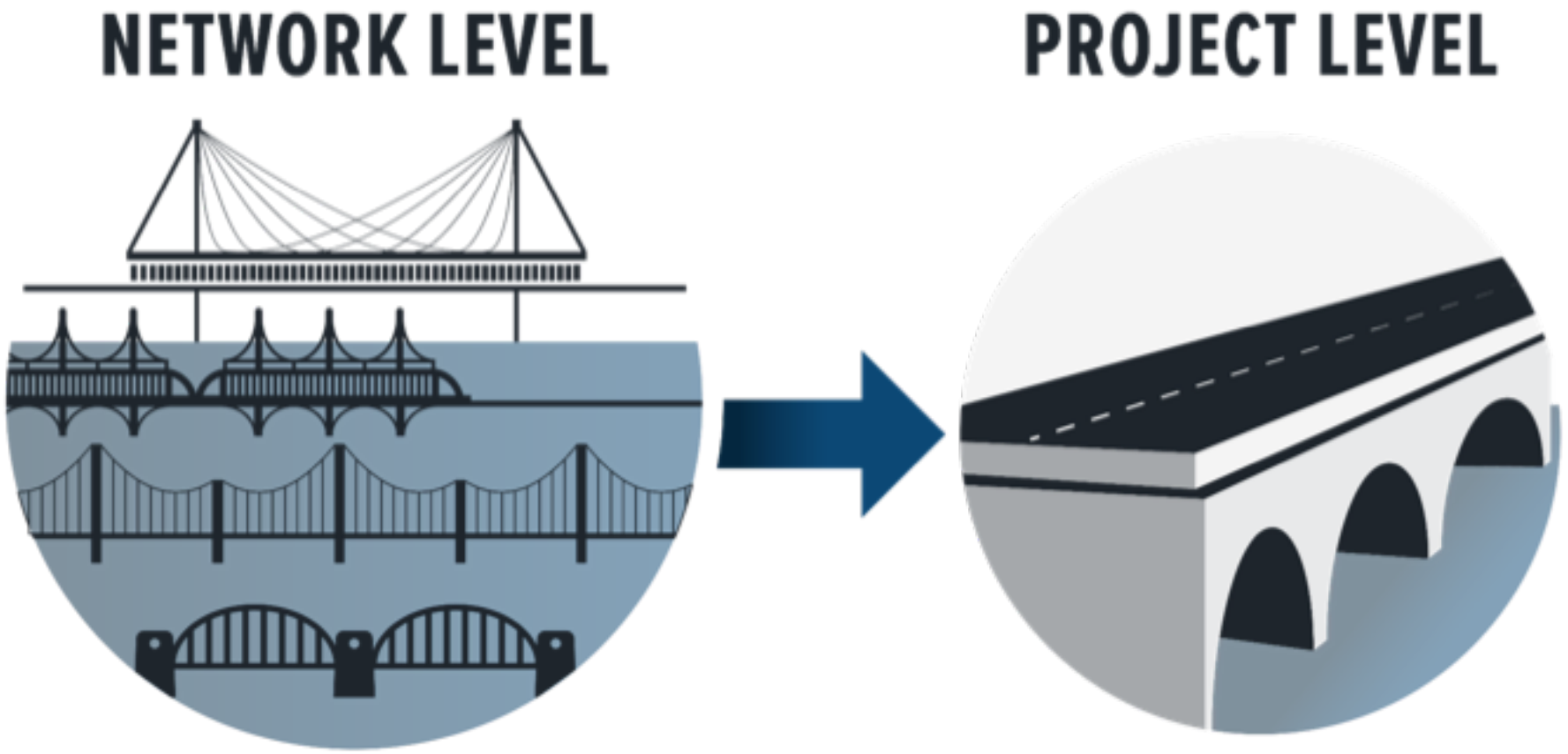
- LCP considers the:
  - Availability of different treatment options
  - Opportunity cost
  - Funding and other constraints
  - Analysis period
  - Time value of money

LCP v. LCCA



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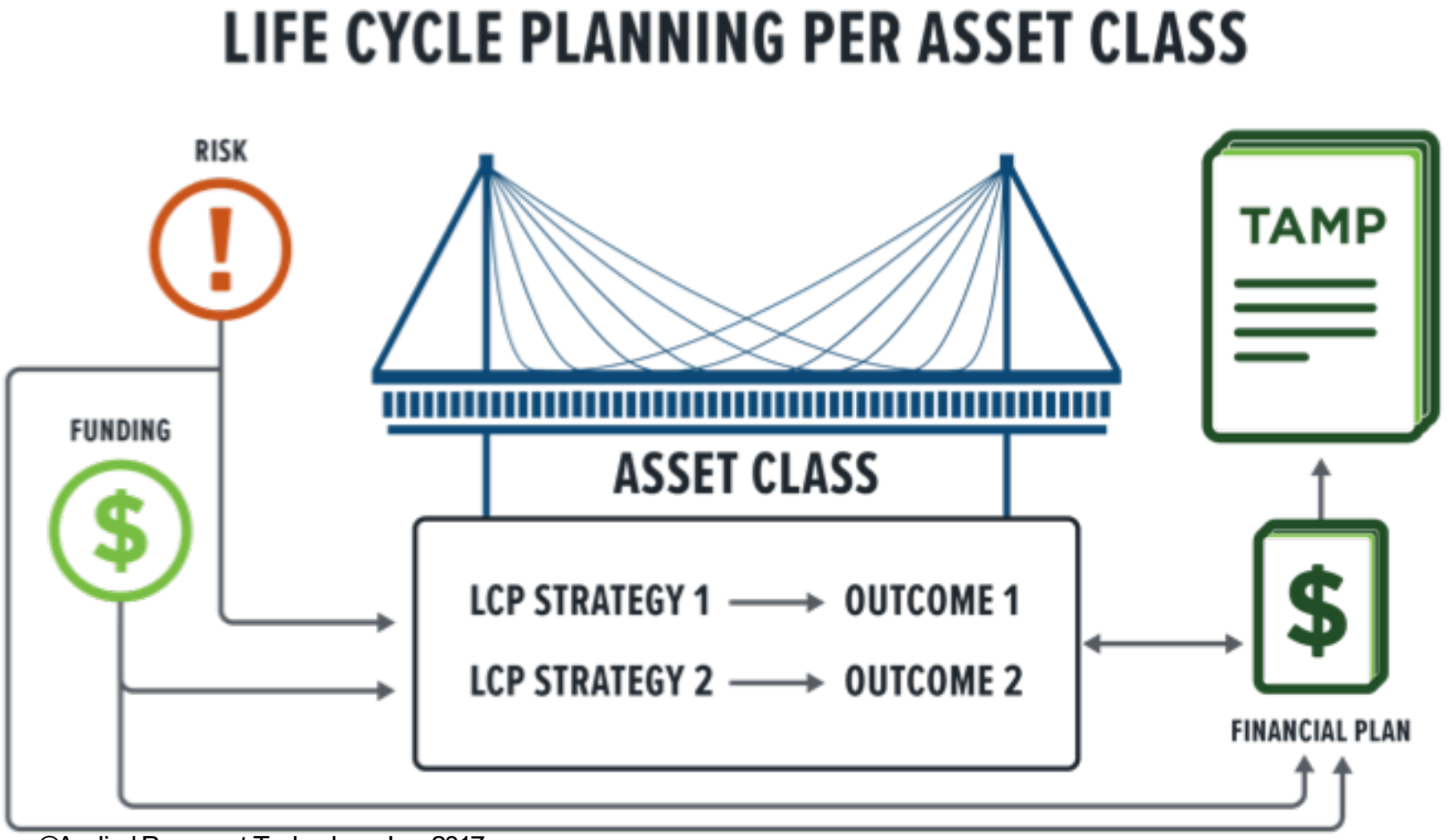
How Does LCP Support a TAMP?



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LCP Process

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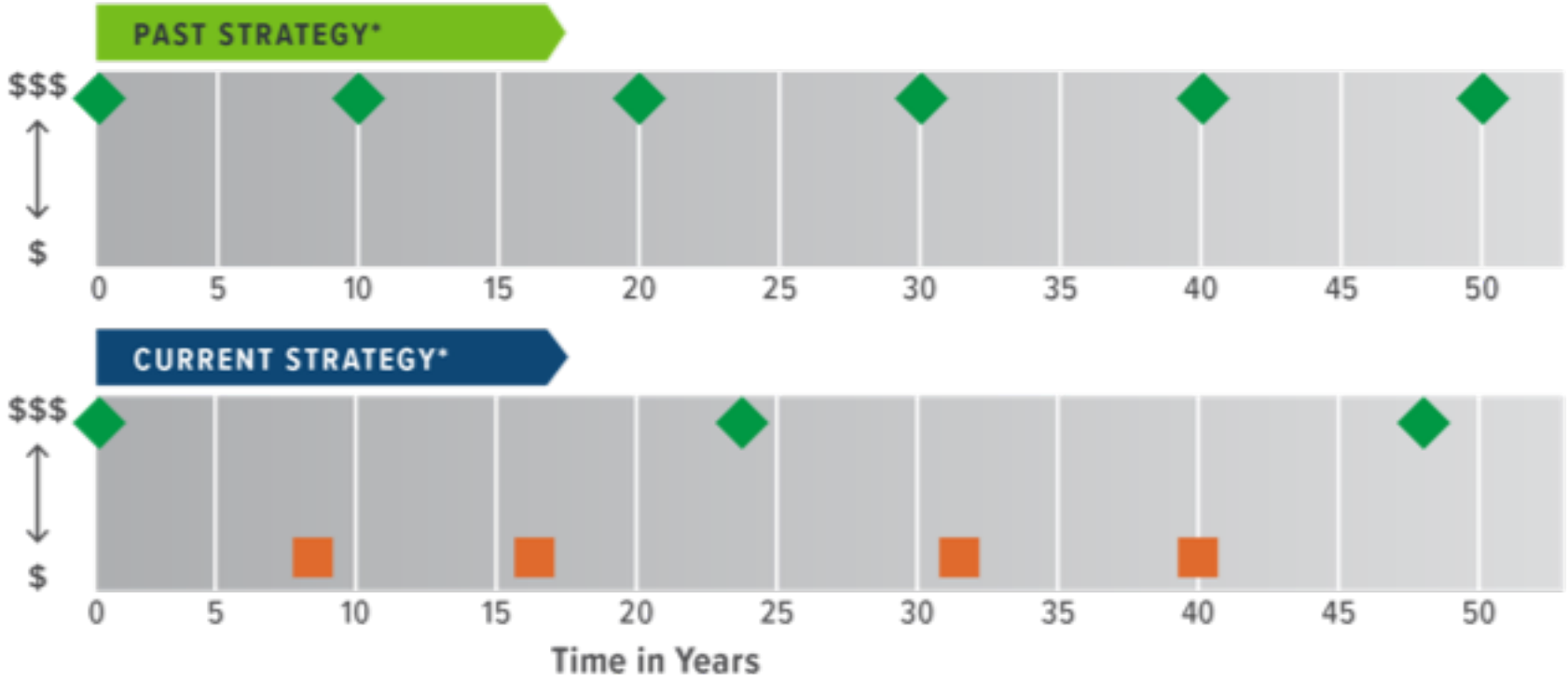
Key Terminology:

- LCP Strategy
  - A collection of treatments that represent the entire life of an asset class or sub-group
  - Modeled in management systems through treatment selection and prioritization rules
- LCP Scenario applies a strategy to a particular funding level to determine a particular funding approach

Step 1: Select Asset Classes and Networks

- Asset Classes
  - Pavements
  - Bridges
  - Culverts
  - Ancillary Structures
  - ITS
  - Rock Falls
- Networks
  - Interstates
  - National Highway System
  - State-owned routes
  - State-maintained routes
  - Federal-aid routes
  - All public roads

Step 2: Define LCP Strategies



Chip Seal/Microsurfacing/Thin Overlay | $40–80k per lane-mile

Mill/Overlay with pre-overlay repairs | $250–350k per lane mile

*In both strategies, crack sealing is performed on a 2–3 year cycle.

Step 3: Set LCP Scenario Inputs

- Current conditions
- Performance curves
- Annual funding / budgets
- Analysis timeframe
- Treatments
- Treatment costs
- Strategy details and rules

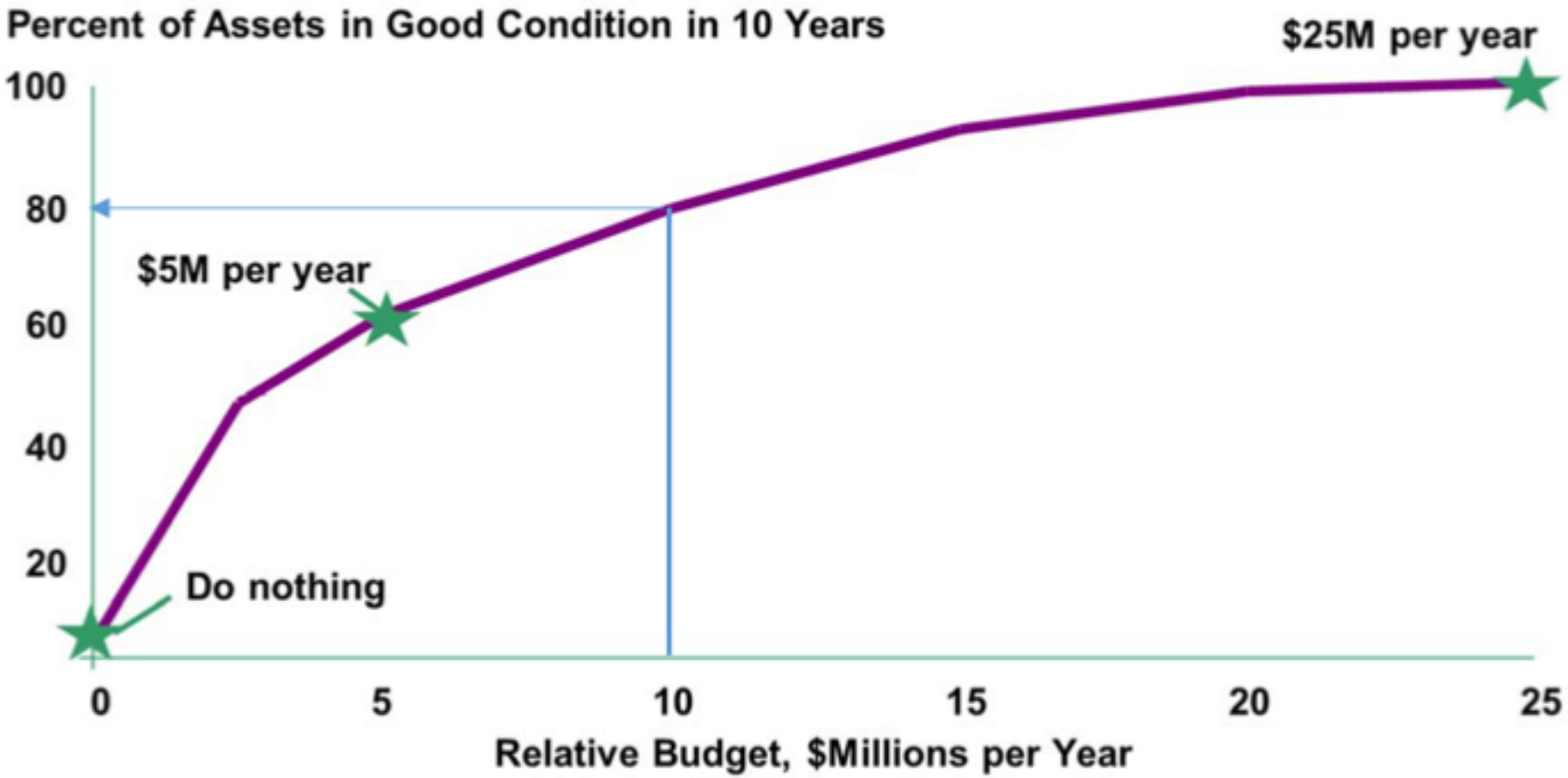
Step 4: Develop LCP Scenarios

	Reduced Funding	Expected Funding	Increased Funding	Unlimited Funding
Worst First		✓		
Traditional Programming	✓	✓	✓	✓
Preferred LCP Strategy	✓	✓	✓	✓
Maximize Preservation	✓	✓		

Step 4: Develop LCP Scenarios

- Goal-based Scenarios
  - Maintain Current Conditions
  - Maximize Asset Value
  - Achieve Desired State of Good Repair
  - Minimize VMT on Poor Assets

Using LCP Results



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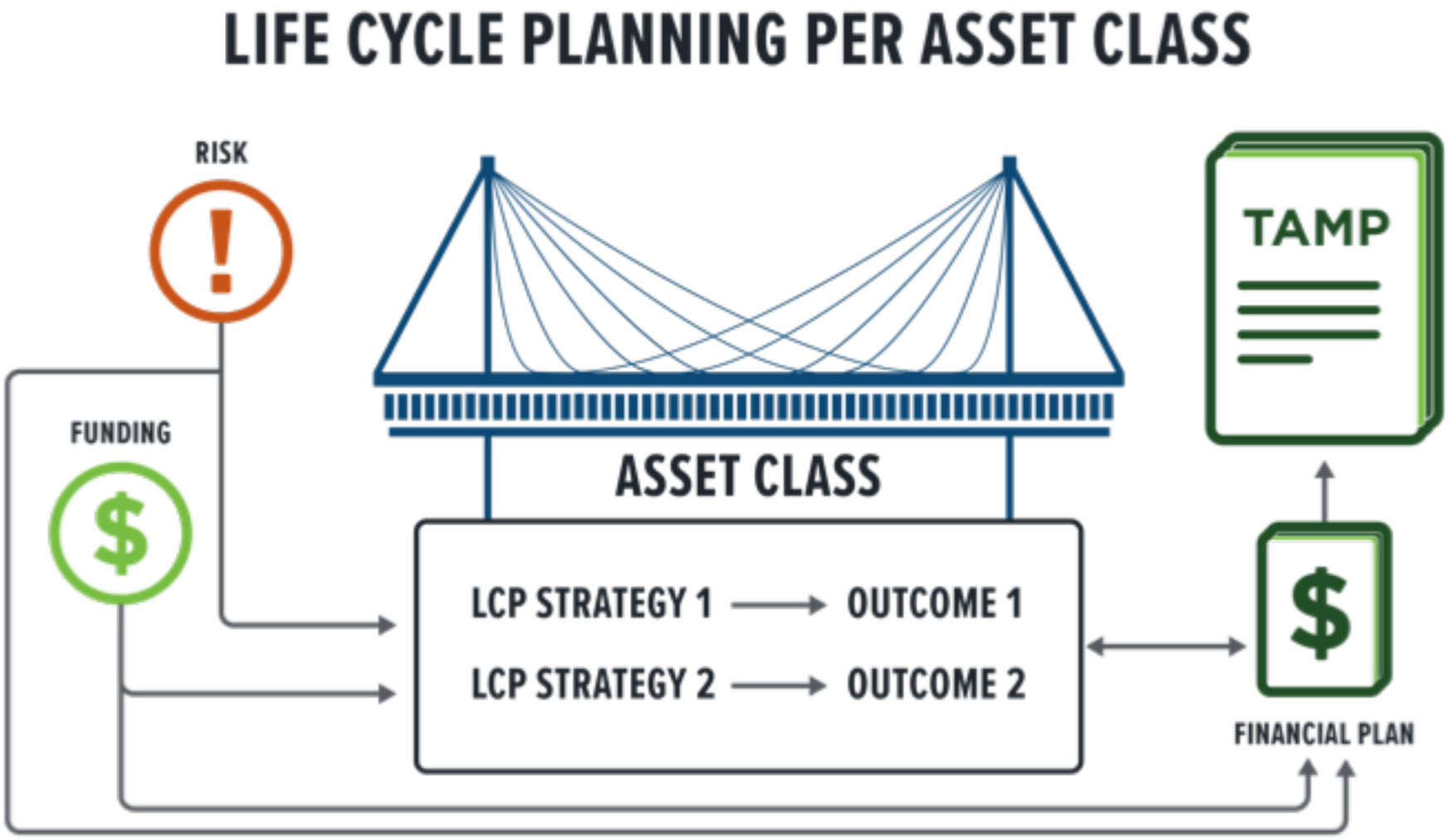
LCP Supports the TAMP



Any questions?

Life Cycle Planning & Management

2018 TAM Webinar 32

Louisiana Department of Transportation & Development

Mark Suarez P.E.

June 13, 2018

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Why Is

Life Cycle Planning &

Management

Critical to Louisiana DOTD?

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23 CFR Part 490.317
Interstate Pavement Penalties

- Penalties for not Maintaining Interstate (<5% Poor) System Pavement Condition
  - 2009 Apportioned Funding $92.2 M
  - 2% compounded annually yields a 2019 NHPP Obligation Total of $112.4 million
  - Additional Transfer of 9.2 M from STP
- **2019 Interstate Obligation 121.6 M**
- **Fed Aid Eligible Non-NHS Pavements Would Lose Significant Funding**
- **Compounds the Funding Shortfall That Already Exists for These Pavements**

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23 CFR Part 490.413
NHS Bridge Penalty

- Bridge Penalty Assessed If
  - **>10 %** of the Total Deck Area is **Structurally Deficient**
  - **For 3 Most Recent Years**
- Obligate **50 percent** of NHPP funds apportioned to such State for fiscal year 2009
- **2019 NHS Bridge Obligation $86 M**
- **Submitting NBI Data for 3rd Evaluation**
  - **Some States Could Be Assessed Penalty Later This Year**

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Why is LCP Management Critical?

- LADOTD 1984 Trust Fund
- 16 Cents Per Gallon Gas Tax
- As of 2014, 30-Year Inflation Reduced Buying Power by 56%
  - From 16 Cents to 7 Cents.
- Imagine Your Personal Buying Power if You Had Not Received a Pay Raise in 30 Years

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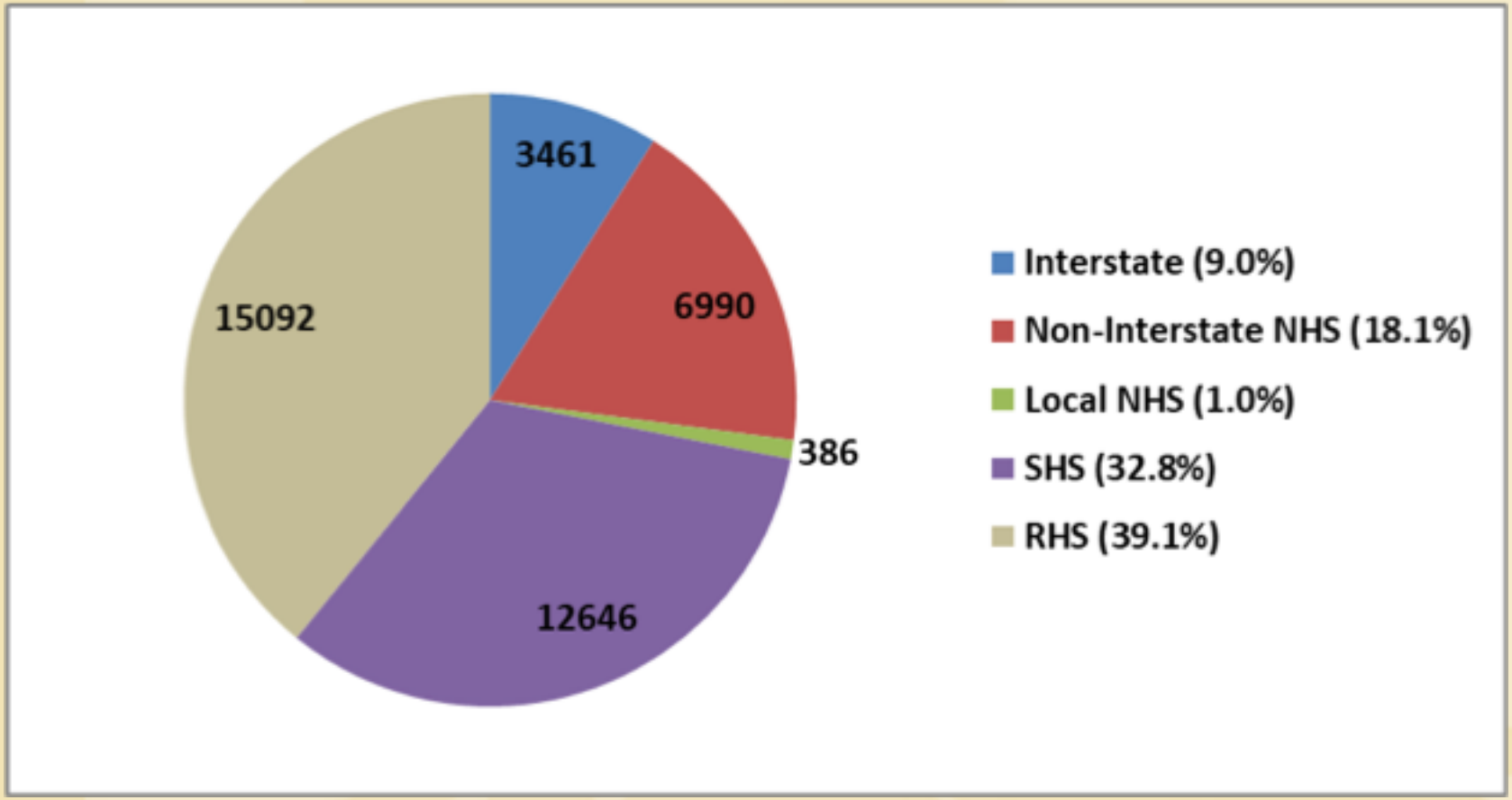
Why is LCP Management Critical?
Percent of Lane-Miles Highway Category



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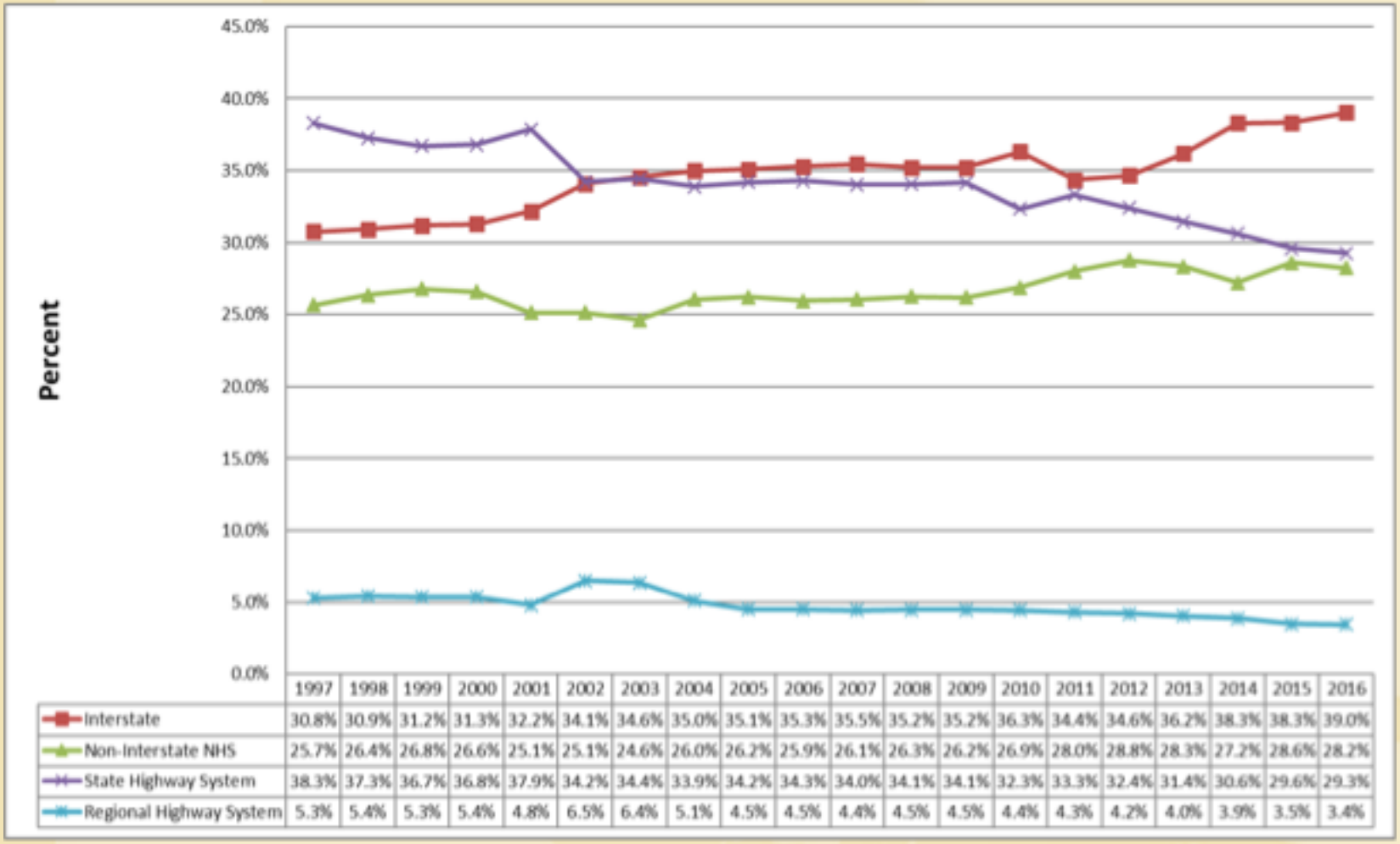
Why is LCP Management Critical?
Percent VMT Highway Category



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Interstate	30.8%	30.9%	31.2%	31.3%	32.2%	34.1%	34.6%	35.0%	35.1%	35.3%	35.5%	35.2%	35.2%	36.3%	34.4%	34.6%	36.2%	38.3%	38.3%	39.0%
Non-Interstate NHS	25.7%	26.4%	26.8%	26.6%	25.1%	25.1%	24.6%	26.0%	26.2%	25.9%	26.1%	26.3%	26.2%	26.9%	28.0%	28.8%	28.3%	27.2%	28.6%	28.2%
State Highway System	38.3%	37.3%	36.7%	36.8%	37.9%	34.2%	34.4%	33.9%	34.2%	34.3%	34.0%	34.1%	34.1%	32.3%	33.3%	32.4%	31.4%	30.6%	29.6%	29.3%
Regional Highway System	5.3%	5.4%	5.3%	5.4%	4.8%	6.5%	6.4%	5.1%	4.5%	4.5%	4.4%	4.5%	4.5%	4.4%	4.3%	4.2%	4.0%	3.9%	3.5%	3.4%

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Why is LCP Management Critical?
LADOTD Bridge Inventory

Table 3.3 2017 Bridge Count By Asset Class

Asset Class	Bridge Count	Bridge Deck Area	% Deck Area
State & Local NHS	2,977	127,596,675	79.6%
State Owned Non-NHS	4,834	32,779,295	20.4%
Totals	7,811	160,375,970	

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Why is LCP Management Critical?

> 175,000 deck area	Count	Deck Area
NHS	105	66,840,791.6
Local NHS	2	7,934,283.0
Non-NHS	16	4,697,179.2
Total	123	79,472,253.8

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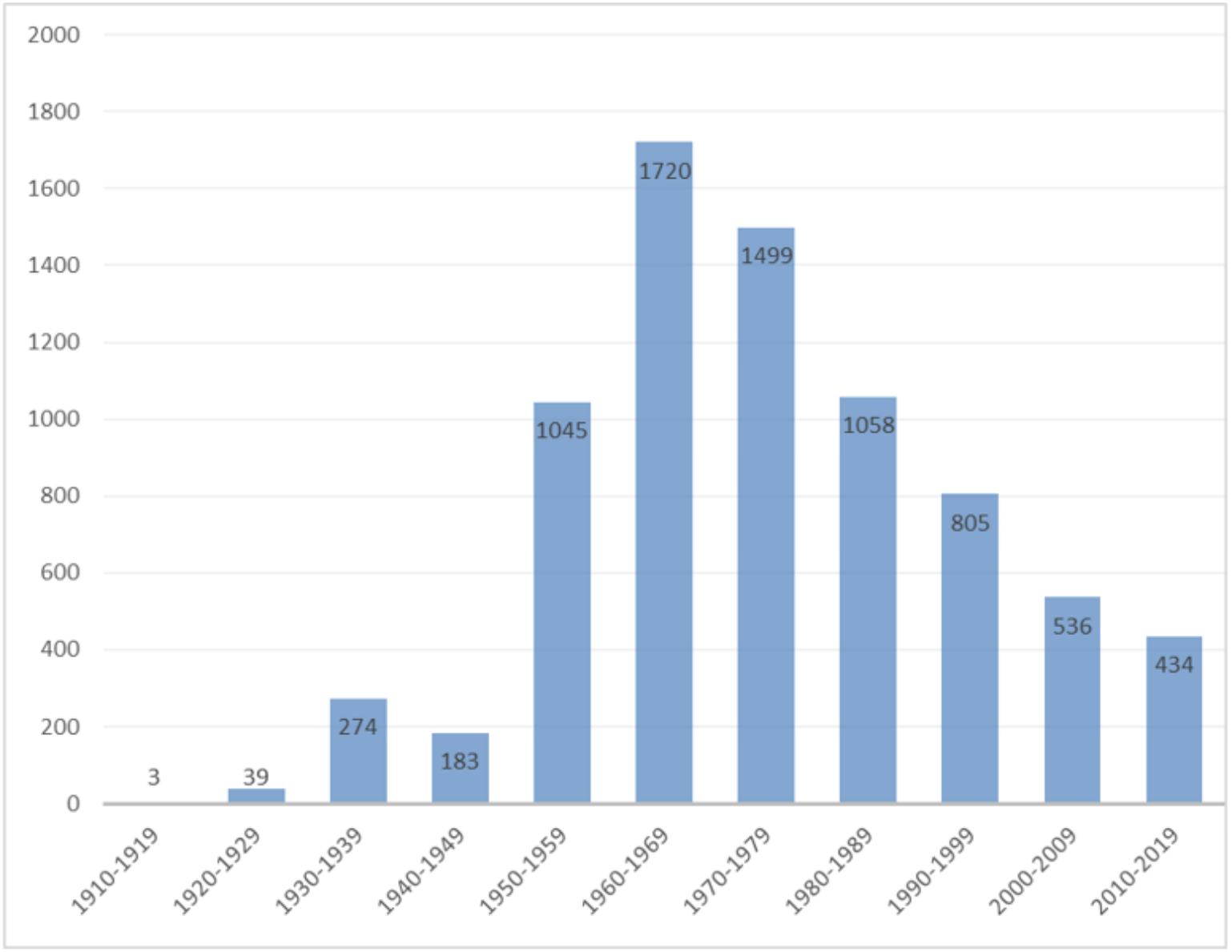
Why is LCP Management Critical?

Figure 3.9 Number of State Owned Bridges Built By Decade



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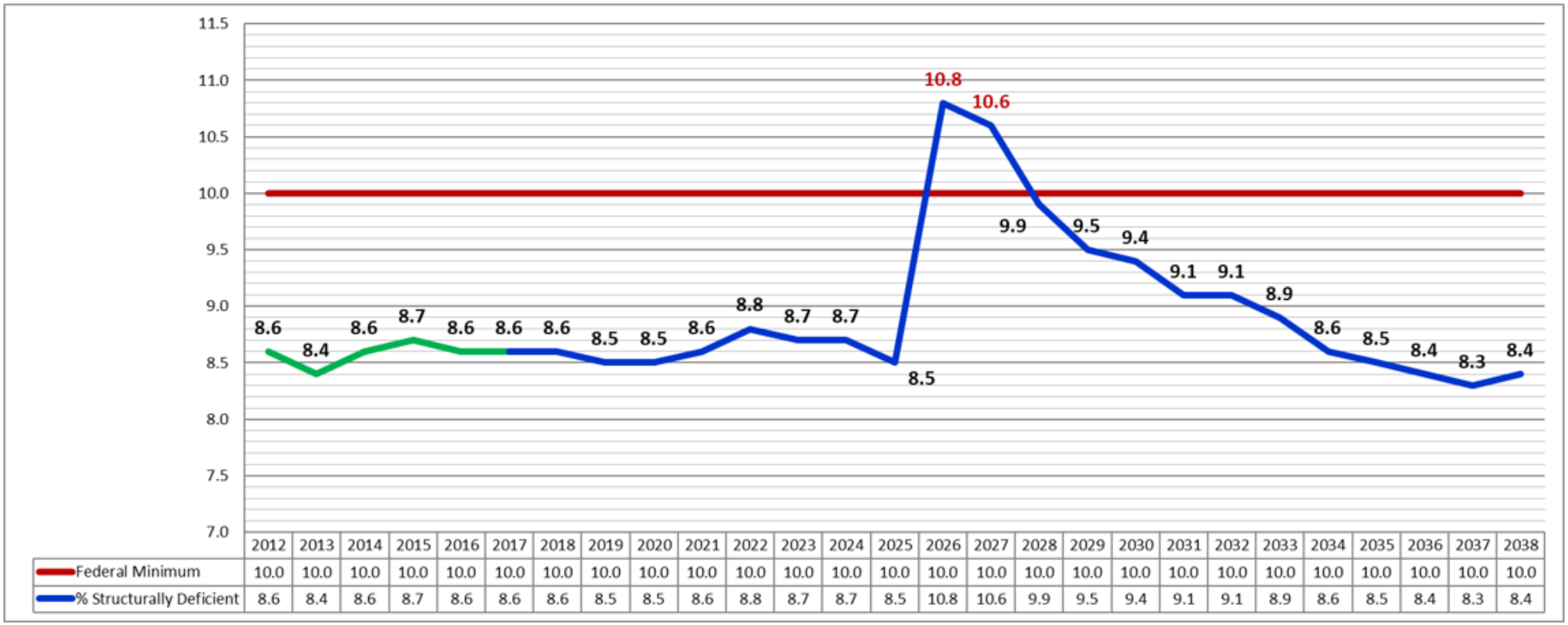
Why is LCP Management Critical?

Figure 4.7 SD Condition for Historical & Forecasted NHS Bridge
(Excluding Local NHS Bridges)



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Federal Minimum	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
% Structurally Deficient	8.6	8.4	8.6	8.7	8.6	8.6	8.6	8.5	8.5	8.6	8.8	8.7	8.7	8.5	10.8	10.6	9.9	9.5	9.4	9.1	9.1	8.9	8.6	8.5	8.4	8.3	8.4

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TAMP Major Focus Points

- NHS Pavements & Bridges –
  - Management Systems are now Mandated
- Asset Management Objectives & Measures
- Performance Gap Identification
- **Life Cycle Planning**
- Risk Management Analysis
- A Financial Plan
- Investment Strategies

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Life Cycle Planning

- LCP Extends Project LCCA Elements to Network Level
- Life Cycle Cost
  - Cost of Managing an Asset from Initial Construction to Replacement
- **Minimum Practical Cost** (New Term)
  - Lowest Feasible Cost to Achieve the Objective
  - Not Lowest Possible Cost

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Life Cycle Planning

23 CFR Part 515

"Life-cycle planning means a process to estimate the cost of managing an asset class, or asset sub-group over its whole life with consideration for minimizing cost while preserving or improving the condition."

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Life Cycle Planning

Principles of LCP

- Timely Investments, Via the Best sequence of Maintenance, Preservation, & Rehab Treatments
- Results In Improved Overall Condition, a Longer Life Span & Lower Long-Term Costs
- Requires Optimum Mix of Treatments Best Determined By Advanced PMS & BMS
- PMS & BMS Use Predictive Modeling & a Fundamental Understanding of the Costs, Benefits, & Service Life Extensions for Different Treatments
- LCP Provides a Maintenance Approach That Focuses on Proactive Preservation Verses Reactive, Fix It After Failure

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Life Cycle Planning

A "Worst First" treatment strategy involves spending most of the available funding on the worst conditioned assets in an effort to revive the nearly extinguished asset. This usually amounts to a replacement or major rehabilitation of the asset. The outcome of this approach is that a very limited number of assets are improved, while a large number of assets continue to decline in condition.

Worst 1st is Anti-LCP

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Life Cycle Planning

A "Preservation First" strategy effectively results in a spending approach that uses the very limited available funding on many more assets, essentially preserving these assets in as close to their current condition as possible, and not spending the money replacing a small number of assets in far worse condition.

Preservation 1st is Pro-LCP

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Life Cycle Planning

- NCHRP Report 859 (2017) quantified the consequence of delayed maintenance or preservation, clearly identifying that the result are
  - **degraded pavement conditions,**
  - **more advanced and costly treatments,**
  - **and a reduction in Level of Service (LOS).**
- "… highway assets that perform below the expected LOS have been perceived to generate user discomfort, increase exposure to accidents, increase fuel usage, and increase damage to vehicles (Setyawan et al. 2015). Environmentally, air pollution increases with greater traffic congestion. Furthermore, poorer pavement condition can affect vehicle fuel emissions (e.g., CO, CO2, HC, NOx) (Chang et al. 2016). Also, without proper maintenance, materials deterioration also can affect the environment negatively (Setyawan et al. 2015)."

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Life Cycle Planning

Figure 5.1 Life Cycle Cost and Preservation Intervals

Source: Principles of Pavement Preservation, Galehouse, et al. 2003

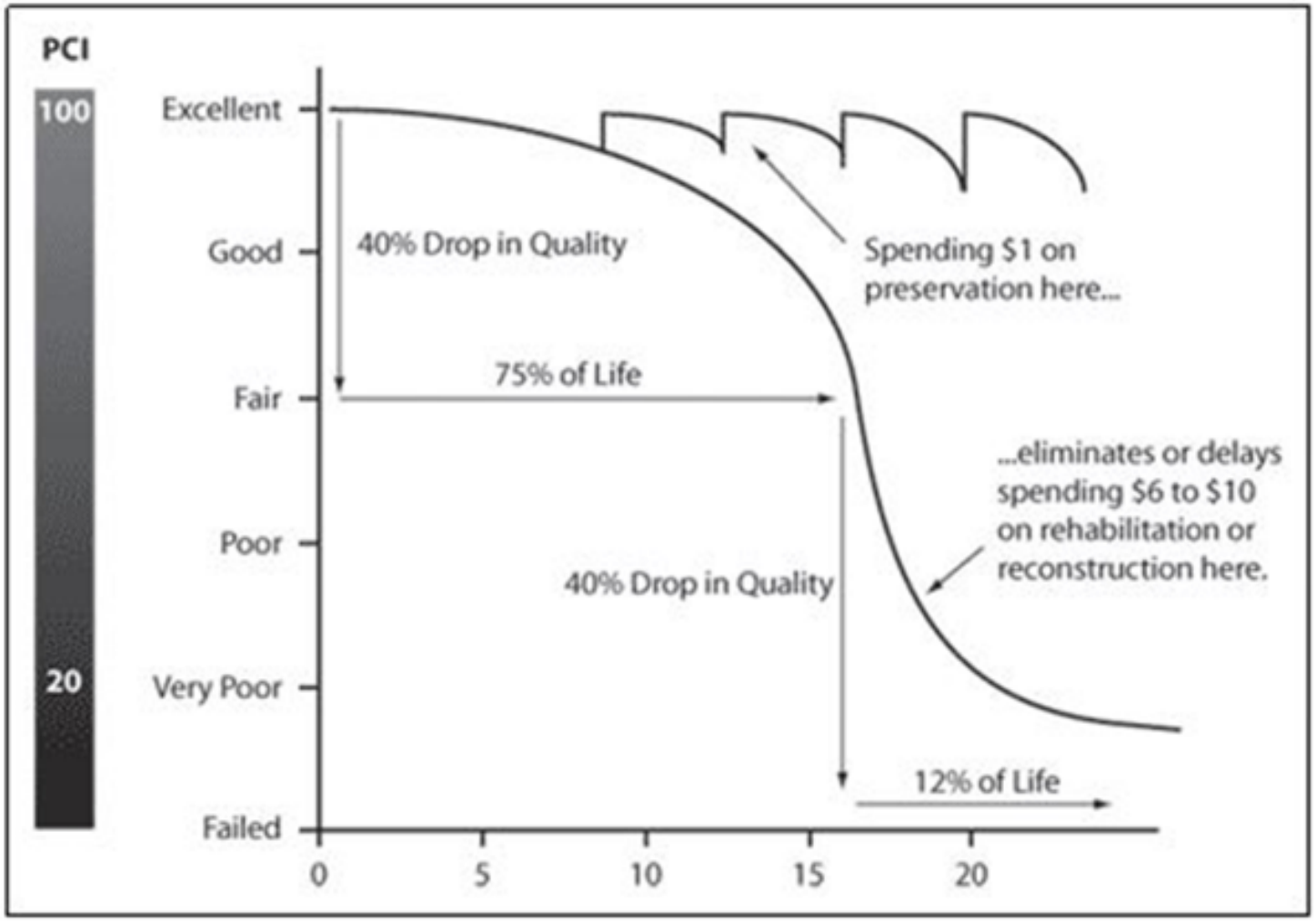

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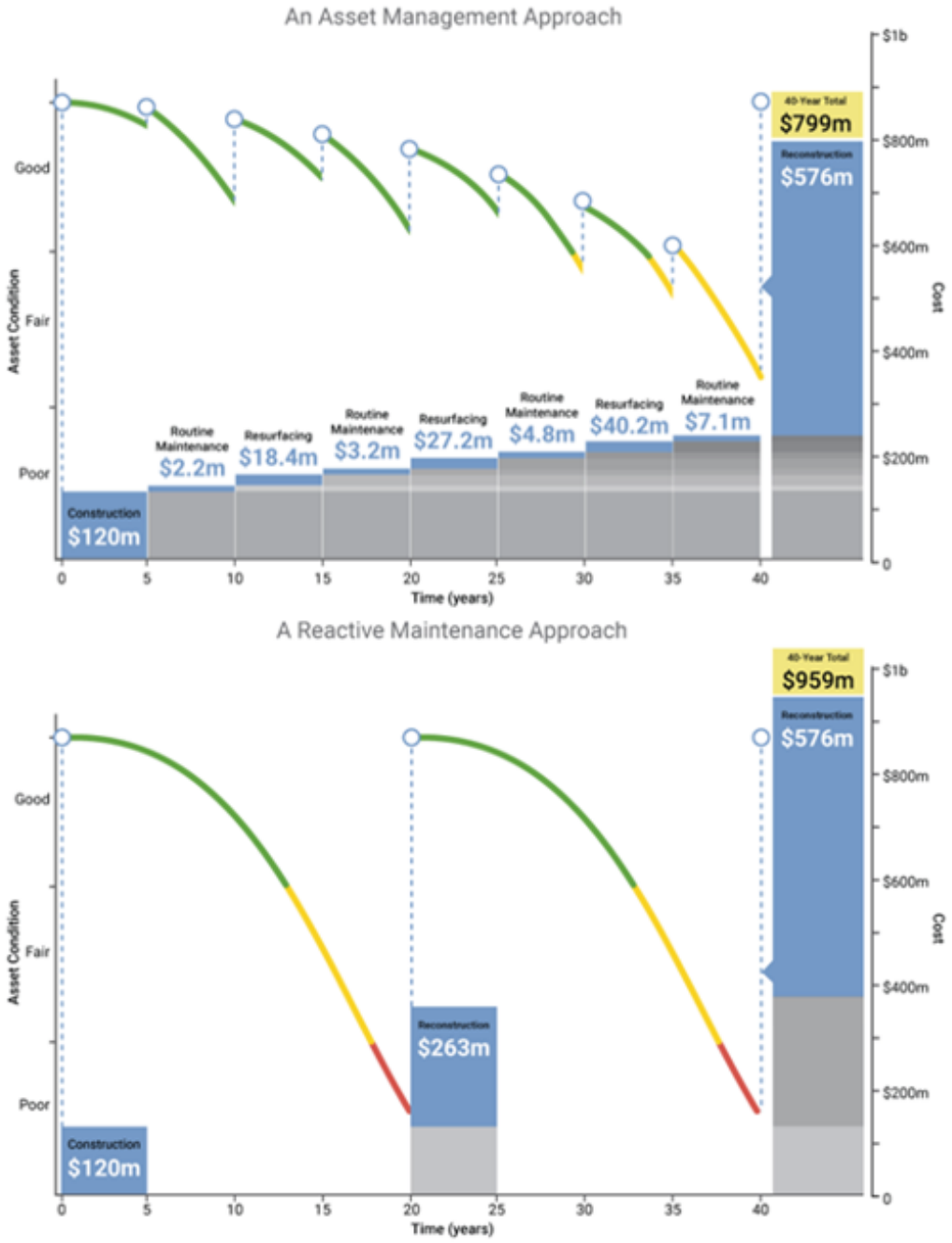
Figure 5.2 Proactive Preservation vs. No Preservation

Source: RIDOT – based on an analysis published by TXDOT, compiled for Caltrans by Spy Pond Partners



Asset Management saves money: Performing preventive maintenance keeps assets in better condition – at a lower cost over the long term.

Deferring maintenance costs more: Higher-cost reconstruction or replacement is needed when assets are not maintained in a state of good repair.

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Life Cycle Planning

Actual Consequences of Delayed Bridge Preservation

- Delayed Preservation Huey P. Long - O.K. Allen Bridge on US 190 North Baton Rouge over Mississippi River
- Joint KCS/LADOTD opened August 1940 @ cost **$8.4M**
- Last Painted in the Mid-1960s
- Efforts in 1980s to Secure Cost Share Agreement
- 1980s Estimate **$30M** Minor Repairs & Paint
- Mid-1980s Downturn Economy Created Funding Issue
- Ongoing Efforts Fail & Structure Continues Deterioration
- Project Recently Completed **$130M**

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Life Cycle Planning

Table 5.1 Average In-House Pavement Surface Maintenance Costs (FY 2014 to FY 2016)

PAVEMENT TYPE	CONDITION	AVG COST/MILE/YEAR
Interstate	Good	$1,308
	Fair	$1,608
Non-Interstate NHS	Good	$1,326
	Fair	$2,109
	Poor	$3,789

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Life Cycle Planning

Management Systems (Pavement & Bridge)

- MS are Fundamentally Comprehensive Life Cycle Planning & Deterioration Modeling Tools
- Analyze Condition Data to Enhance Performance, Planning, Design, Construction, Rehabilitation & Maintenance
- Allows Evaluation of Funding Scenarios to Determine Ability of Each Scenario to Achieve Targets & Desired State of Good Repair
- Analyze Actual Projected Budget for the Analysis Period
- 5-Year List of Prioritized Projects w/ Recommended Treatments

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Life Cycle Planning

Table 5.2 Asphalt Pavement Treatment Costs (Work Types) and Treatment Type Descriptions

#	ASPHALT PAVEMENT TREATMENT DESCRIPTION	COST PER MILE FOR 2 LANES	COST PER MILE FOR EXTRA LANES
1	Microsurfacing on Interstate	67,000	31,000
2	Thin Overlay on Interstate (Cold Plane 2", put 2" back; 0-100 sq.yds. Patching)	229,000	106,000
3	Medium Overlay on Interstate (Cold Plane 2", put 3.5" back or just 3.5" overlay, 100-300 sq.yds Patching)	452,000	172,000
4	Structural Overlay on Interstate (7" Overlay; 700 sq.yds. Patching)	1,053,000	311,000
5	Microsurfacing on Arterial	67,000	31,000
6	Thin Overlay on Arterial (Cold Plane 2", put 2" back; 0-100 sq.yd. Patching)	229,000	106,000
7	Medium Overlay on Arterial (Cold Plane 2", put 3.5" back or just 3.5" overlay, 100-300 sq.yds Patching)	452,000	172,000
8	Structural Overlay on Arterial (5.5" Overlay; 700 sq.yds. Patching)	851,000	255,000
9	Polymer Surface Treatment on Collector	72,000	29,000
10	Microsurfacing on Collector	67,000	31,000
11	Thin Overlay on Collector (2" Overlay; 0-100 sq.yd. Patching)	184,000	76,000
12	Medium Overlay on Collector (Cold Plane 2", put 3.5" back or just 3.5" overlay, 100-500 sq.yds Patching)	334,000	140,000
13	In Place Stabilization on Collector (In-Place Stabilization & 3" A.C.)	469,000	187,000

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Life Cycle Planning

PMS Determines the Actual Collection of Treatments, or Strategies, for:

- Asset Classes (Interstate, Non-Interstate NHS, etc.)
- & Asset Sub-Groups (Asphalt, Jointed Concrete etc.)
- On Each Homogeneous Pavement Section
- While Maximizing the LCP Benefit Decisions

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Life Cycle Planning

PMS Analysis Based on Current Pavement Condition

- LADOTD Converts Condition Values to Index Values for Apples to Apples Comparison
- Uses Different Condition Index Trigger Points for Each Asset Class to Identify the Appropriate Treatments
  - Triggered Treatments are Different for Various Asset Classes, e.g. Interstate vs Low Volume Rural Pavement

Example:

- Asphalt Pavement Uses 5 condition indexes, Alligator, Random, Patch, Rut and Roughness, to trigger various treatments (work types)

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Life Cycle Planning

BMS Analysis Based on NBI Bridge Inspection Data

- Uses 77 Different Proposed Treatments, or in Some Cases Multiple Proposed Treatments
- For Each Condition State
- Includes Unit Treatment Costs
- & Replacement Costs
- Project Selection Made at HQ

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Table 5.6 Small Sample of PONTIS Action and Cost Table

PONTIS Element #	Element Description	Unit of Measure	LADOTD Action/Cost					Replacement Cost
			Condition State 1	Condition State 2	Condition State 3	Condition State 4	Condition State 5	
10 (Stand-Alone)	Asphaltic Concrete Overlay	SF	Do nothing	Do nothing	Do nothing	Do nothing	Do nothing	
				Repair potholes $0.03	Repair potholes $0.21	Repair potholes and substrate $0.68	Repair potholes and substrate $3.41	
					Replace AC overlay $3.19	Replace AC overlay $3.19	Replace AC overlay $3.19	$3.19
12 (Primary)	Deck - Concrete - Hardrock - Bare	SF	Do nothing	Do nothing	Do nothing	Do nothing	Do nothing	
				Repair spalls/delam $0.08	Repair spalls/delam $0.50	Repair spalls/delam $1.42	Repair spalls/delam; add an AC overlay $25.14	
						Repair spalls/delam; add an AC overlay $3.72	Replace Deck $42.86	$42.86
13	Deck - Concrete - Hardrock - w/AC Overlay	SF	Do nothing	Do nothing	Do nothing	Do nothing	Do nothing	
				Repair spalls/delam $0.10	Repair spalls/delam $0.63	Repair spalls/delam $1.78	Repair spalls/delam; add an AC overlay $27.65	
						Repair spalls/delam; add an AC overlay $4.09	Replace Deck $42.86	$42.86
26	Deck - Concrete Hardrock - w/Coated Rebar	SF	Do nothing	Do nothing	Do nothing	Do nothing	Do nothing	
				Repair spalls/delam $0.10	Repair spalls/delam $0.63	Repair spalls/delam $1.78	Repair spalls/delam; add an AC overlay $25.14	
						Repair spalls/delam; add an AC overlay $4.09	Replace Deck $47.86	$47.86
33	Slab - Concrete - Precast - Hardrock - w/AC Overlay	SF	Do nothing	Do nothing	Do nothing	Do nothing	Do nothing	
				Repair spalls/delam $0.10	Repair spalls/delam $0.63	Repair spalls/delam $1.78	Repair spalls/delam; add an AC overlay $27.65	
						Repair spalls/delam; add an AC overlay $4.09	Replace Deck $42.86	$42.86
37	Slab - Concrete - Precast - Hardrock - Bare	SF	Do nothing	Do nothing	Do nothing	Do nothing	Do nothing	
				Repair spalls/delam $0.08	Repair spalls/delam $0.50	Repair spalls/delam $1.42	Repair spalls/delam; add an AC overlay $25.14	
						Repair spalls/delam; add an AC overlay $3.72	Replace Deck $42.86	$42.86

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Management Outcomes
Life Cycle Planning

Non-Interstate NHS Pavement LCP Management Changes

- Created a Separate Budget Category for the Non-Interstate NHS Pavements
- Treatment Selection Process for the Non-Interstate NHS pavements was Moved from the Districts to HQ
- Now Matches the Current Interstate Project Selection Process

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Why is LCP Management Critical?

- Analysis of **Completed Bridge Projects** Since 2009
  - Identify Project Improvements to NBI Deck, Substructure & Superstructure
- Preliminary Findings
  - Maintenance & General Preservation
    - **Appear to Only Slow the Decline**
  - Serious Preservation & Minor Rehab Projects
    - **Appear to Maintain the Status Quo**
  - Significant Rehab Projects
    - **Appear to Improve the Bridge NBI Ratings**
- **It Appears that Worst 1st is Required to Extract an Agency From a Bridge Penalty Situation**

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Management Outcomes
Life Cycle Planning

- New LCP Management Strategy Bridges 1st Priority
- TAMP Analysis Has Identified Bridges that are Approaching the Fair & Poor Thresholds
  - Prevent Those Bridges From Crossing into the Lower Condition State
- Insufficient Funding For Significant Period of Time, Deferred Preservation, Now Playing Catch Up
- Further Exasperated by Significant # of Very Large Bridges & High # of Total Bridges
- Preservation Strategies Must Be Used As Much As Practically Possible
- Can Never Eliminate Major Rehab & Replacement

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Questions?

"If you have an opportunity to make things better and you don't, then you are wasting your time on earth."

Roberto Clemente

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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Illinois Department of Transportation's Transformative Processes to Achieve Improved Condition over the Long Term

Stay the Course or Change Direction

Worst-First or Desired State of Acceptable Condition

Prior to the development of our TAMP, IDOT had separate performance goals for asset conditions

Pavement Backlog Criteria – Needs

CRITICAL, BACKLOG, ACCRUING AND ADEQUATE CRITERIA

Pavement Classification	Improvement Type	Backlog (CRS values) Critical Backlog (CB)	Other Backlog (OB)	Accruing (AC)	Adequate (AD)
Interstate	RS	1.0-4.8	4.9-5.1	5.2-6.5	6.6-9.0
Rural - Marked					
> 3000 ADT	RS	1.0-4.5	4.6-5.0	5.1-6.4	6.5-9.0
1000 to 3000 ADT	RS	1.0-4.0	4.1-4.5	4.6-5.5	5.6-9.0
350 to 999 ADT	RS	1.0-3.7	3.8-4.2	4.3-4.9	5.0-9.0
< 350 ADT	RS	---	1.0-3.7	3.8-4.9	5.0-9.0
Rural - Unmarked					
> 3000 ADT	RS	1.0-4.0	4.1-4.6	4.7-5.4	5.5-9.0
1000 to 3000 ADT	RS	1.0-3.7	3.8-4.2	4.3-4.7	4.8-9.0
350 to 999 ADT	RS	1.0-3.2	3.3-3.8	3.9-4.3	4.4-9.0
< 350 ADT	RS	---	1.0-3.2	3.3-4.3	4.4-9.0
Urban - Marked/Unmarked					
>350 ADT					
≥ 20' Width	RS	1.0-4.2	4.3-4.8	4.9-6.0	6.1-9.0
< 20' Width	WRS	1.0-4.5	4.6-5.0	5.1-6.3	6.4-9.0
Urban – Marked/Unmarked					
< 350 ADT Any Width		---	1.0-4.2	4.3-6.0	6.1-9.0
Frontage Roads	RS	1.0-3.7	3.8-4.2	4.3-4.7	4.8-9.0
Half-Slabs	WRS	1.0-3.2	3.3-3.8	3.9-4.3	4.4-9.0

Bridge Backlog Criteria - Needs

CRITERIA FOR DETERMINATION OF ILLINOIS BRIDGE NEEDS Bridge Analysis and Monitoring System (BAMS) for State-Maintained Structures (Official or CBA Backlog Logic)					
SD* or FO	TABLE #	*WHEN:* ITEM NUMBER	DESCRIPTION	*RATES:* RATING	*THEN:* NEEDS CATEGORY
+SD	1	59, 60 OR 62	Super, Sub or Culvert	0 - 3	CRITICAL BACKLOG
+SD	2	58	Deck	0 - 3	
SD	3	67	Structural Evaluation	0 - 2	
SD	4	70 A2, B2, C2, D2	Posted Load Limit	D2 > 0 or A2, B2, C2 Not Spaces	
+SD	5	59, 60 OR 62	Super, Sub or Culvert	4	OTHER BACKLOG
SD	6	64 A & B	Operating Rating	0 - 26 Tons	
FO	7	68	Deck Geometry	0 - 3	
		67	Structural Evaluation	≤ 5	
		29/ON **	I, M = AADT	≥ 750	
		29/ON **	S = AADT	≥ 500	
FO	8	69 **	I, M = Underclearance	0 - 3	
		67	Structural Evaluation	≤ 5	
		29/UN **	S = Same as I, M Plus AADT	> 500 Under	
FO	9	72	Approach Alignment	0 - 3	
		29/ON	AADT	≥ 1000 ON	
+SD	10	58	Deck Condition	4	SHORTTERM ACCRUING
SD	11	67	Structural Evaluation	3	
			-OR-		
		70	Posting Level	L	
SD	12	59, 60 OR 62	Super, Sub or Culvert	5	
SD	13	64 A & B	Operating Rating	27-35 Tons	
FO	14	130	Sufficiency Rating	0.0 - 49.9	

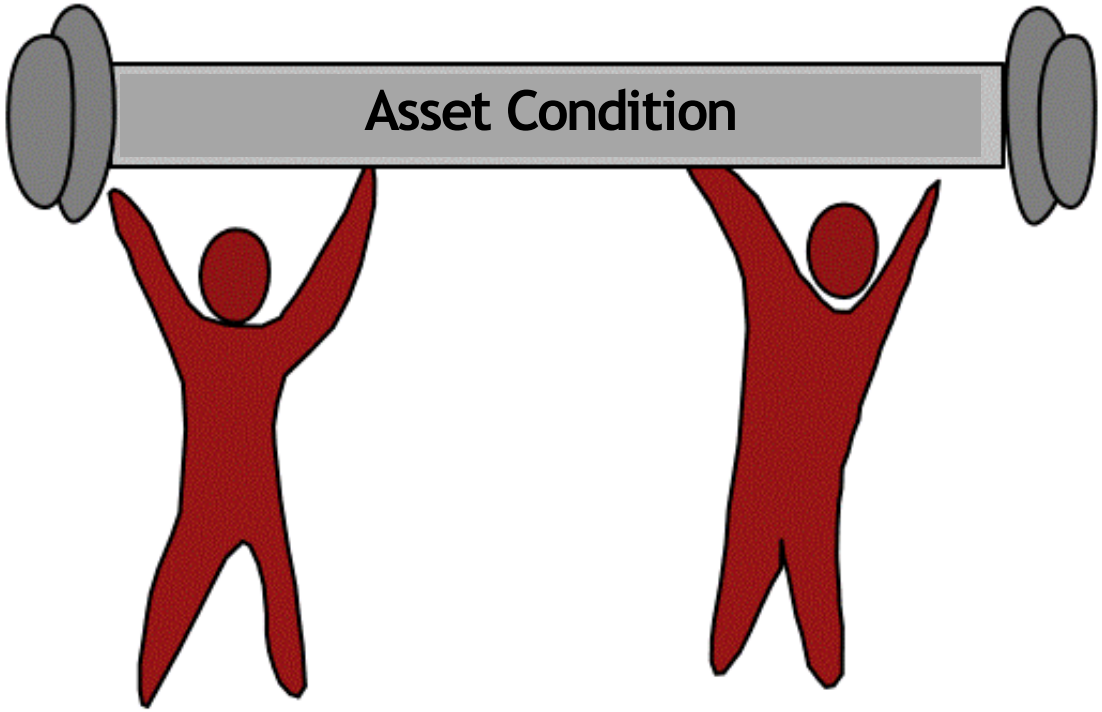
IDOT is ...
RAISING the BAR

by moving from Backlog to Desired Acceptable Conditions.

System Condition was identified by Backlog

Accruing Backlog

Acceptable



Moving forward, IDOT has set asset goals that raised the bar for asset conditions on the entire transportation network

Focus on Achieving a Desired State of Acceptable Condition

TAMP highway system hierarchy

- Interstate Routes
- Non-Interstate NHS Routes
- Non-NHS Marked Routes
- Non-NHS UnMarked Routes

IDOT is ... RAISING the BAR by establishing new Desired Acceptable Conditions for Pavements

Established constrained performance goals that better aligned with available funding

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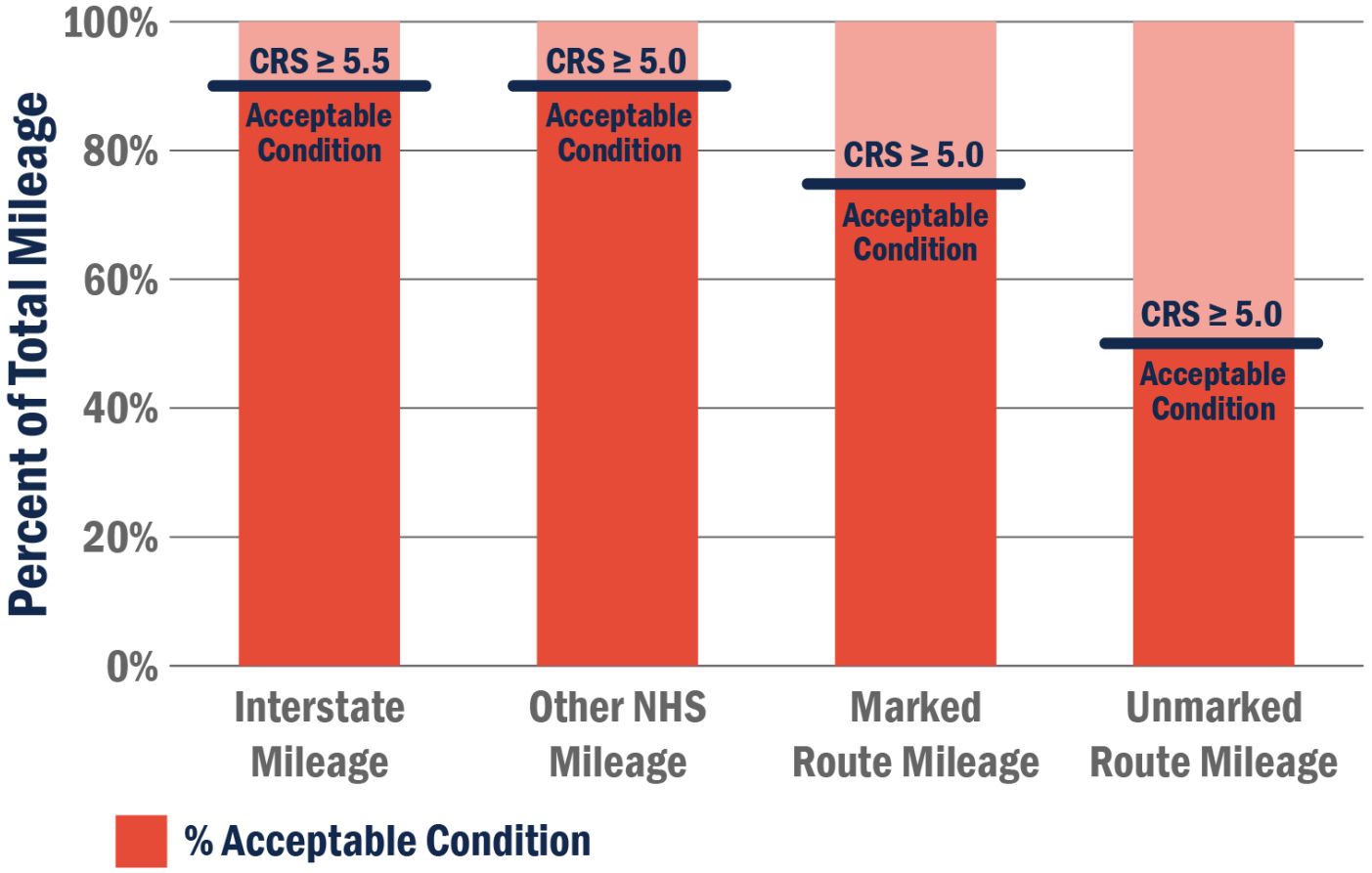
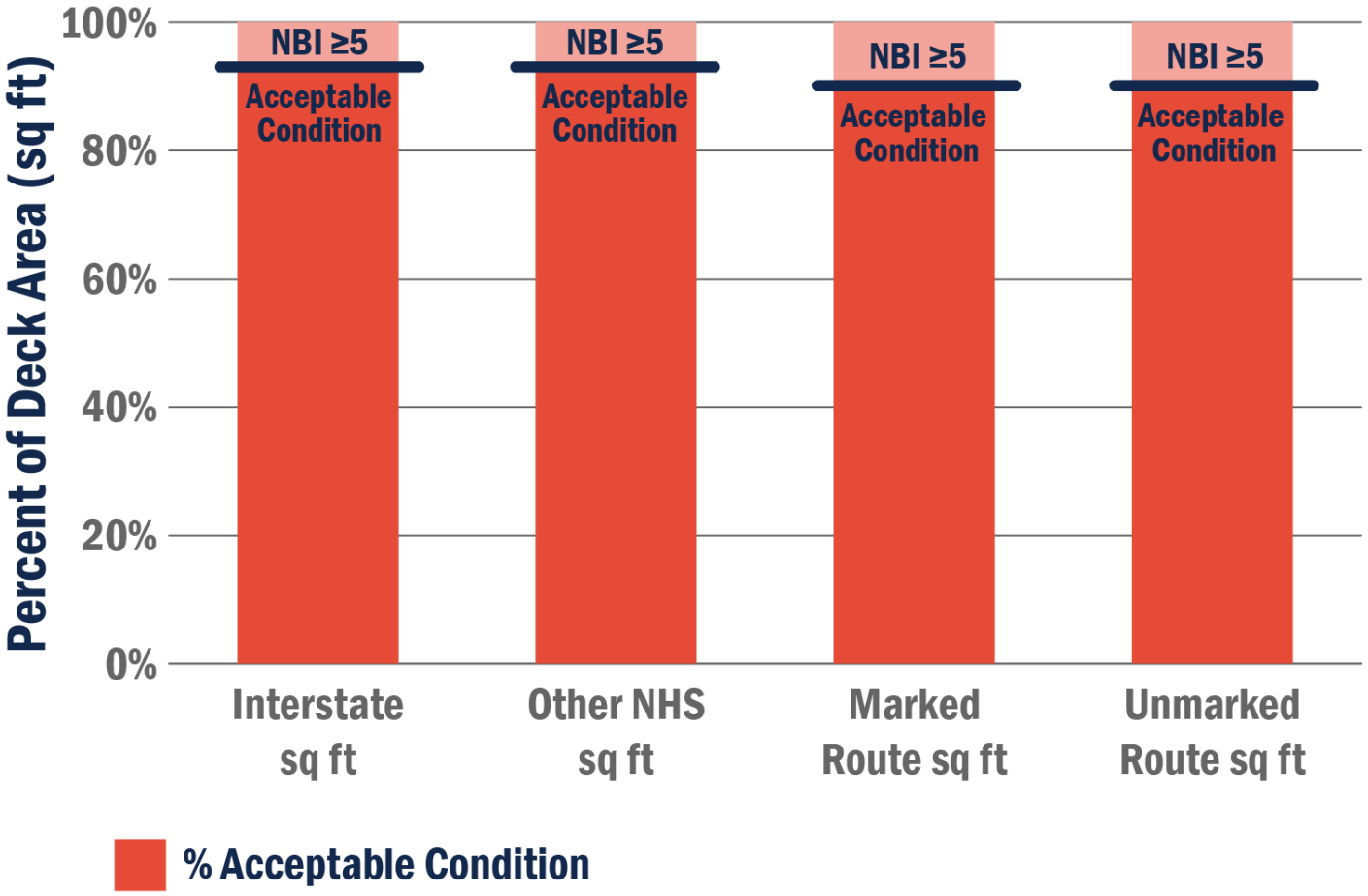
Acceptable Conditions for pavements and bridges were set at the tipping point between preservation and rehabilitation activities

Desired State of Acceptable Condition (Percentage)–Pavements



Desired State of Acceptable Condition (Bridge Deck Percentage)–Bridges



Shift in Philosophy from Worst-First to Life Cycle Planning

TAMP initiated a shift towards proactive investments in preservation activities that will slow the rate of pavement and bridge deterioration to delay the need for more costly repairs and ensure a longer life of the asset

IDOT is ...
RAISING the BAR
by **extending** the useful lives of existing assets while **reducing** long-term preservation costs.

- Major Change in the way we do business
- Shift towards data-driven decision processes
- Adopt life cycle planning strategies

Life Cycle Planning Work Categories

Treatment costs vary based on the amount of deterioration present

Life Cycle Work Activities

- Category selection criteria
- Appropriate treatment options
- Anticipated Service Life
- Estimated cost per treatment

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Develop and Implement long-term strategies for proper maintenance to delay the need for more costly repairs and ensure a longer life of our assets

Right Treatment at the Right Time

Current Asset Condition Data

Deterioration Models

Prediction Models

Treatment Rules - *Guidelines*

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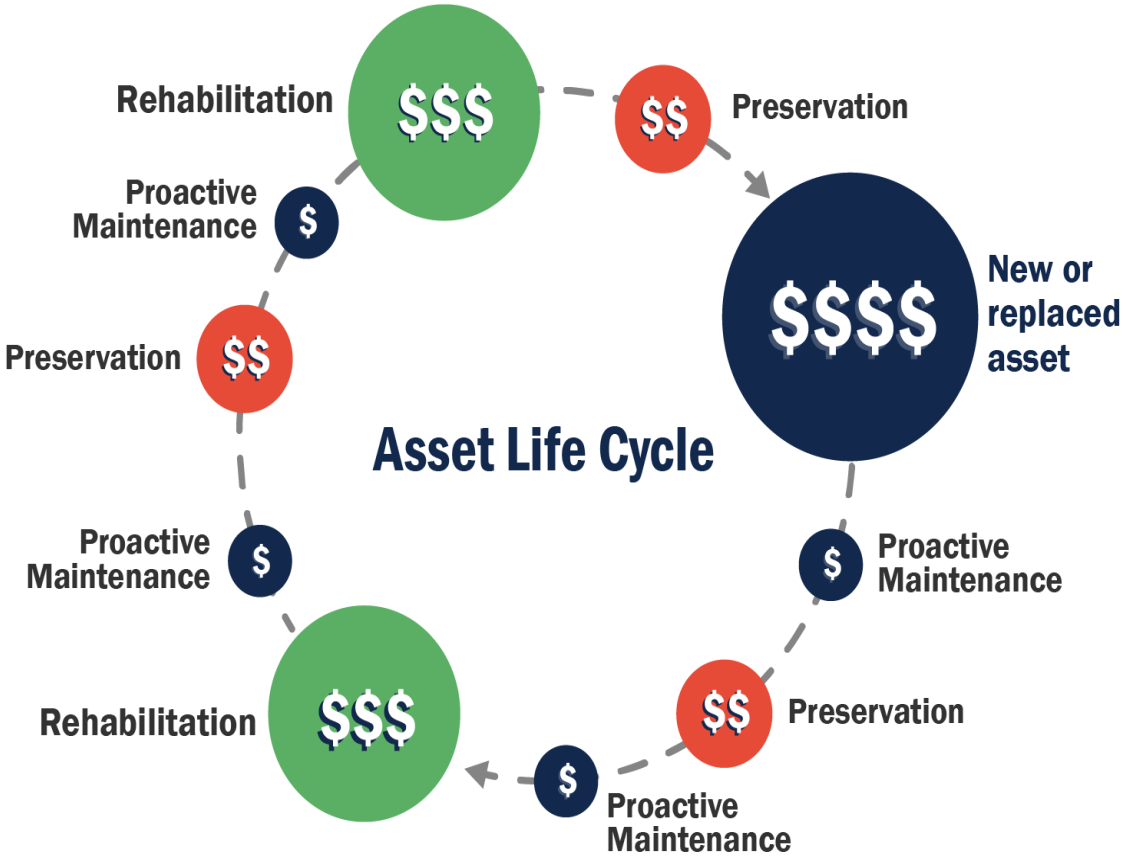
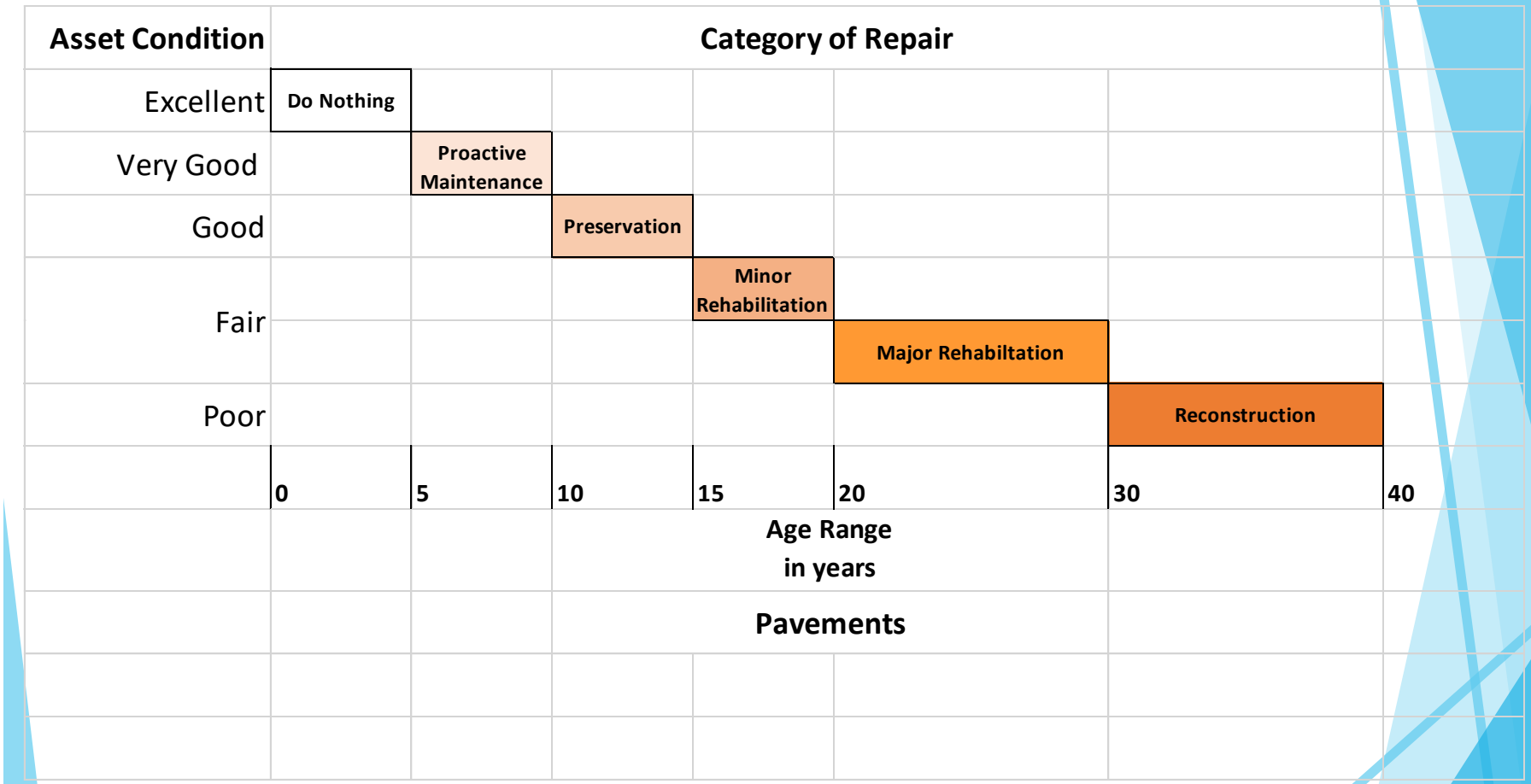
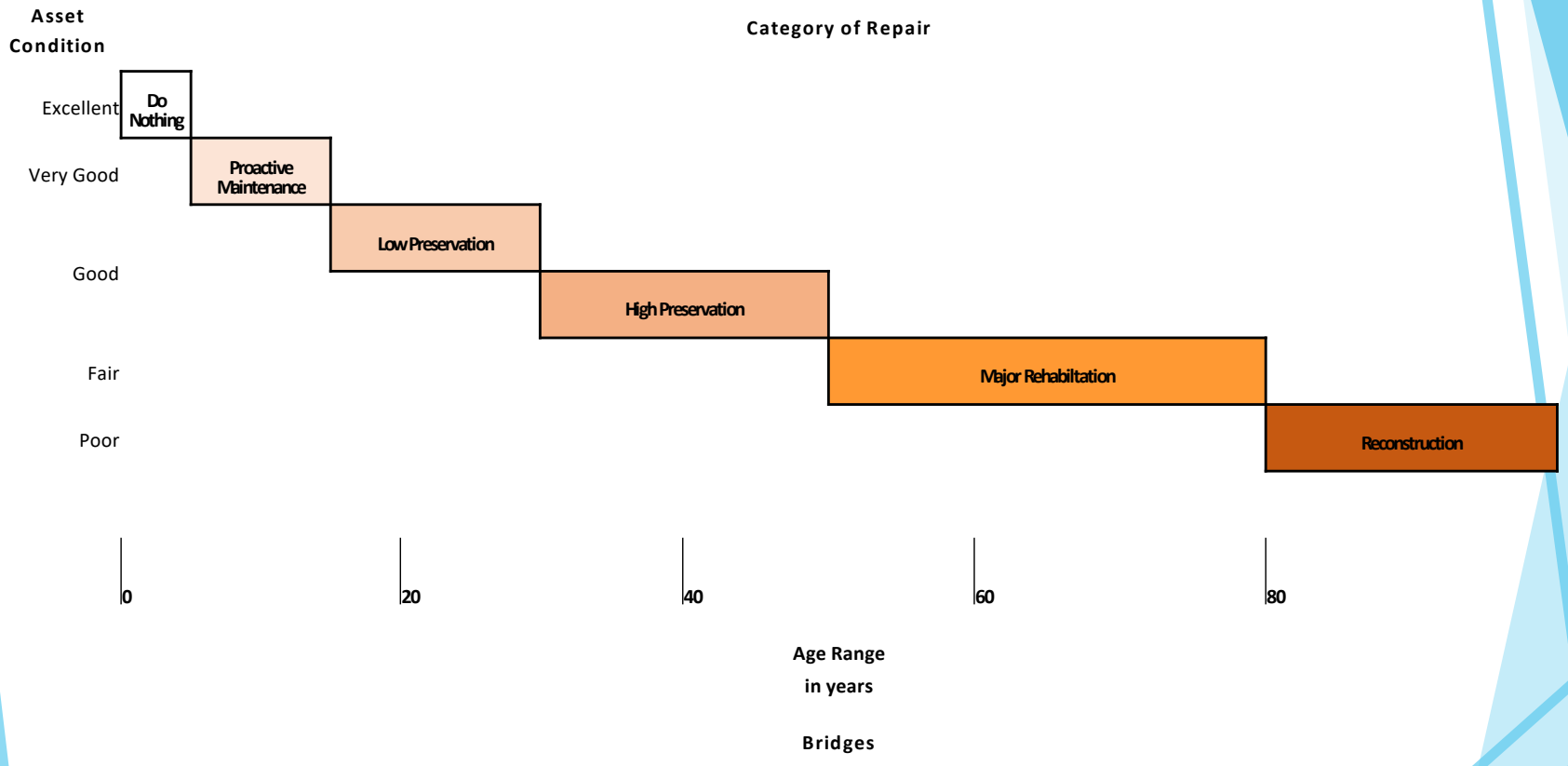

Asset Life Cycle
Rehabilitation
$$$
Proactive Maintenance
$
Preservation
$$
New or replaced asset
$$$$
Proactive Maintenance
$
Preservation
$$
Proactive Maintenance
$
Rehabilitation
$$$
Proactive Maintenance
$
Preservation
$$


Asset Condition
Category of Repair
Excellent
Very Good
Good
Fair
Poor
Do Nothing
Proactive Maintenance
Preservation
Minor Rehabilitation
Major Rehabiltation
Reconstruction
0
5
10
15
20
30
40
Age Range in years
Pavements


Asset Condition
Category of Repair
Excellent
Very Good
Good
Fair
Poor
Do Nothing
Proactive Maintenance
Low Preservation
High Preservation
Major Rehabiltation
Reconstruction
0
20
40
60
80
Age Range in years
Bridges

Interstate **TAMP Category Selection Criteria - Pavements**

Category	Subcategory	Treatments	Service Life	CRS
Reconstruction		Replacement of entire cross-section, Unbonded Concrete Overlay, HMA Overlay of Rubblized PCC	30-40	< 4.0
Rehabilitation	Major	Structural HMA Overlay, Structural PCC Overlay	10 - 15	4.0 - 4.5
	Minor	Standard HMA Overlay, Bonded PCC Overlay, Structural Cold In-Place Recycling	10 - 15	4.6 - 5.4
Preservation	High	SMART Overlay, Functional Cold In-Place Recycling, Hot In-Place Recycling, Longitudinal Joint Partial-Depth Repair, Ultra-Thin Bonded Wearing Course, Load Transfer Restoration, Full-Depth Repairs	7 - 12	5.5 - 6.5
	Low	Bituminous Surface Treatment (A-1, A-2, A-3), Micro-Surfacing, Slurry Seal, Cape Seal, Half SMART, Partial-Depth Repairs	3 - 7	6.6 - 7.5
	Proactive Maintenance	Crack and Joint Filling / Sealing, Fog Seal, Cold/Micro-Milling, Diamond Grinding / Grooving	2 - 5	> 6.0
Maintenance	Reactive Measures	Low Preservation as a Stop-Gap	Varies	< 6.0

Non-Interstate TAMP Category Selection Criteria - Pavements

Category	Subcategory	Treatments	Service Life	CRS
Reconstruction		Replacement of entire cross-section, Unbonded Concrete Overlay, HMA Overlay of Rubblized PCC	30-40	< 3.5
Rehabilitation	Major	Structural HMA Overlay, Structural PCC Overlay	10 - 15	3.5-4.3
	Minor	Standard HMA Overlay, Bonded PCC Overlay, Structural Cold In-Place Recycling	10 - 15	4.4-4.9
Preservation	High	SMART Overlay, Functional Cold In-Place Recycling, Hot In-Place Recycling, Longitudinal Joint Partial-Depth Repair, Ultra-Thin Bonded Wearing Course, Load Transfer Restoration, Full-Depth Repairs	7 - 12	5.0 - 6.5
	Low	Bituminous Surface Treatment (A-1, A-2, A-3), Micro-Surfacing, Slurry Seal, Cape Seal, Half SMART, Partial-Depth Repairs	3 - 7	6.6-7.5
	Proactive Maintenance	Crack and Joint Filling / Sealing, Fog Seal, Cold/Micro-Milling, Diamond Grinding / Grooving	2 - 5	> 6.0
Maintenance	Reactive Measures	Low Preservation as a Stop-Gap	Varies	< 6.0

TAMP Category Selection Criteria - Bridges

TAMP Work Activities

Construction / Reconstruction	Complete Replacement	Culvert Condition	Deck Condition		Superstructure Condition	Substructure Condition	Age	Cost ($/sq.ft.)	Other Criteria	Recurrence (Years)
			≤4		≤4	≤4	Any	$225.00		80
			≤4	OR	≤4	≥5	≥60			
		≤4					Any			
Rehabilitation	Deck Replacement		≤4	OR	≤4	≥5	<60	$150.00		40
	Superstructure Replacement									
	Major Substructure Rehabilitation		≥5		≥5	≤4		$75.00		40
Preservation	Washing		≥5					$2.00*		1*
	Deck Sealing		≥5							4*
	Concrete Substructure Sealing					≥5		$2.00		4
	Paint (cost not to be added to rehabilitation cost when coinciding with rehabilitation)				≥3			$30.00	Main or approach Material type - Steel	20
	Expansion Joint Replacement		≥5							20
	Overlay (includes deck patching if needed)		≥5						Deck Patching considered preservation only if included with an overlay	20
Maintenance	Bearing Replacement		≥5					$30.00		20
	Steel Repair		≥5							
	Concrete Repair		≥5							
	Deck Patching		≥5						Considered maintenance if stand-alone activity with no overlay included	

* Washing to be annual. Sealing every 4 years. Cost combined at this time for simplicity.

Updated 2-8-18

IDOT is currently developing Treatment Selection Decision trees

- Asset Condition and functional characteristics
- Treatment Options

RAISING the BAR

IDOT's transformative processes will help achieve improved conditions over the long term.

- Move towards a more performance-based approach to decision making
- Provide IDOT staff improved access to accurate asset data and information
- Adopt maintenance strategies that consider long-term investment needs
- Find a balance between proactive, preservation-first, and reactive, worst-first strategies
- Increase the use of preservation treatments

So you thought you couldn’t afford to invest in preventative maintenance

Actually, You can’t afford not to …

? Questions

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