

CITY OF AUSTIN
PUBLIC WORKS DEPARTMENT

Prioritizing Street Renewal Projects

CONNECTING YOU
ALL AROUND AUSTIN



Street Assets

Basics

- Lane Mile Definition
- Data Collection
- Street Grades

Austin's Streets

- Street Inventory
- Benchmarking Austin
- Pavement Maintenance
- Pavement Life Cycle

Prioritization

- Pavement Management
- Prioritization Factors
- Coordination



Basics

Lane Mile Definition

Factors Affecting Pavement Life

Data Collection

Street Grades

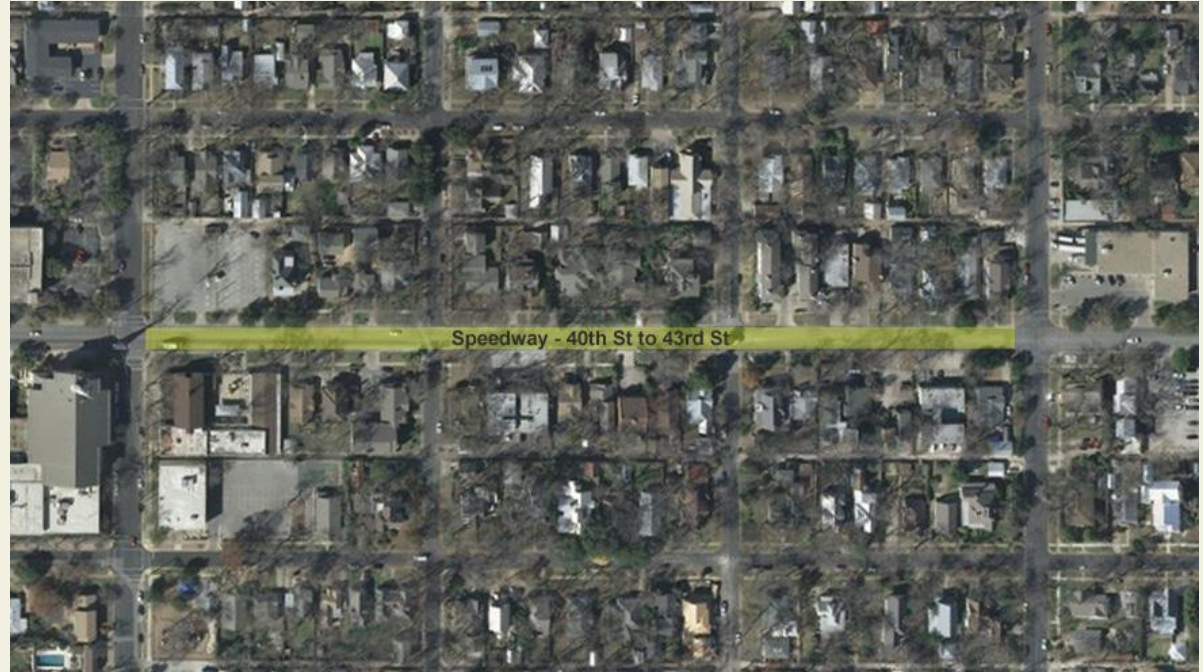
Street Activities Overview

Basics – Lane Miles

Lane Mile Definition

A Lane Mile (LM) is defined by the area of a 10' lane, one mile long.

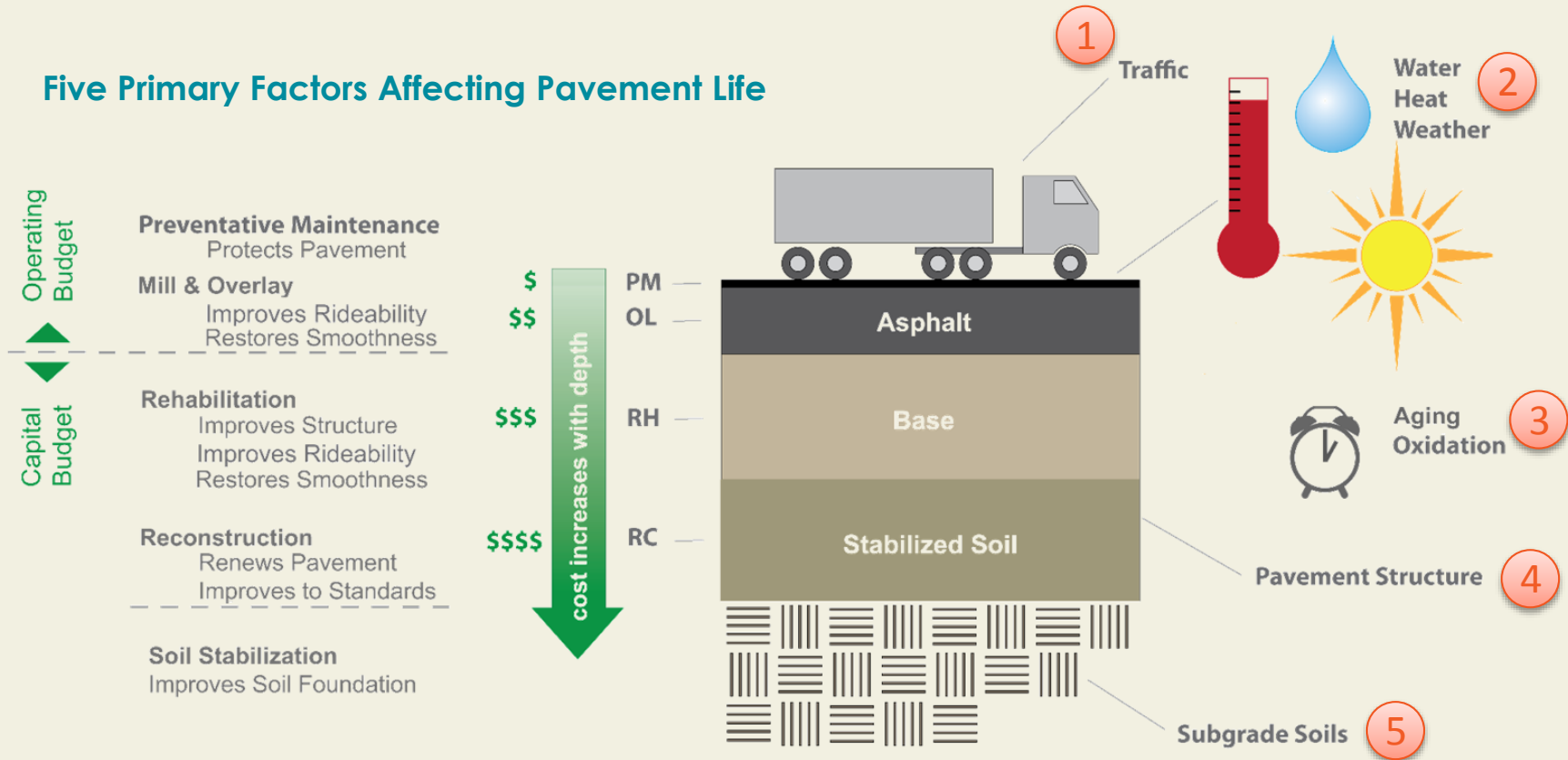
$$\begin{aligned} 1 \text{ LM} &= 10' \times 5,280' \\ &= 52,800 \text{ SF} \end{aligned}$$



Example: Speedway from 40th St to 43rd St
 $40' \times 1,320' = 52,800 \text{ SF} = 1.0 \text{ LM}$

Basics – Primary Factors

Five Primary Factors Affecting Pavement Life



Basics – Data Collection

Pavement Data Collection (PDC)

New street condition data is gathered by a certified contractor on half (50%) of the street network each year.

Pavement Data

- 1) **Ride Quality – International Roughness Index (IRI) – ASTM Standards E950, E1926**
- 2) **Surface Distresses – Pavement Condition Index (PCI) – ASTM Standard D6433**

Distresses: 4 Primary Cracking Types

- Alligator Cracking
- Block Cracking
- Longitudinal Cracking
- Transverse Cracking

**ASTM – American Society of Testing and Materials*



Basics – Street Grades

Street Grades

Street Condition Definitions

<u>Condition Grade</u>	<u>General Description</u>
“A” – Excellent	Very Smooth Ride
“B” – Good	Smooth Ride
“C” – Fair	Acceptable Ride (may have minor roughness)
“D” – Poor	Moderately Rough Ride
“F” – Failed	Very Rough Ride

Basics – Street Grades

Street Grades

A – Excellent Streets

Very Smooth Ride

Street should need only preventative maintenance (PM).



Basics – Street Grades

Street Grades

B – Good Streets

Smooth Ride

Street should primarily need only preventative maintenance (PM), may need a few minor spot repairs.



Basics – Street Grades

Street Grades

C – Fair Streets

Acceptable Ride (may have minor roughness)

Street still preserved primarily by preventative maintenance (PM); however, it may need more spot repairs to hold in acceptable condition.



Basics – Street Grades

Street Grades

D – Poor Streets

Moderately Rough Ride

Street is in less than desirable condition and has an unsatisfactory ride. Poor streets should be rehabilitated, but will be maintained as long as necessary with spot repairs and maintenance treatments.



Basics – Street Grades

Street Grades

F – Failed Streets

Very Rough Ride

Street does not have an acceptable ride even at reduced speeds. Reconstruction is necessary to improve a failed street.



Basics - Street Activities Overview

Categories & Purposes of Major Street Activities

Source	Strategy Type	Treatment	Grade(s)	Purpose
O&M	Maintenance	Crack Seal	A, B, C	Seal cracks from water
		Fog Seal	A, B	Protect surface from aging
		Seal Coat	A, B, C	Seal cracks from water, protect surface from aging
		Slurry Seal	A, B	Seal cracks from water, protect surface from aging
		Microsurfacing	A, B, C	Seal cracks from water, protect surface from aging
		Cape Seal	B, C	Seal cracks from water, protect surface from aging
		Thin Overlay	C	Protect surface, improve rideability, restore smoothness
		Overlay	C, D	Protect surface, improve rideability, restore smoothness
		Structural Overlay	D	Repair spot damage, improve rideability, restore smoothness
Capital	Reconstruction	Minor Rehabilitation	D	Repair spot damage, improve rideability, restore smoothness
		Major Rehabilitation	F	Repair spot damage, improve rideability, restore smoothness
		Reconstruction – Residential	F	Restore pavement back to new condition
		Reconstruction – Collector	F	Restore pavement back to new condition
	Rehabilitation	Reconstruction – Arterial	F	Restore pavement back to new condition
		Reconstruction – Downtown	F	Restore pavement back to new condition

Pavement Conditions in Austin

Austin's Street Inventory

Street Condition

Age of Streets

Street Inventory

Complete FY16 Street Network

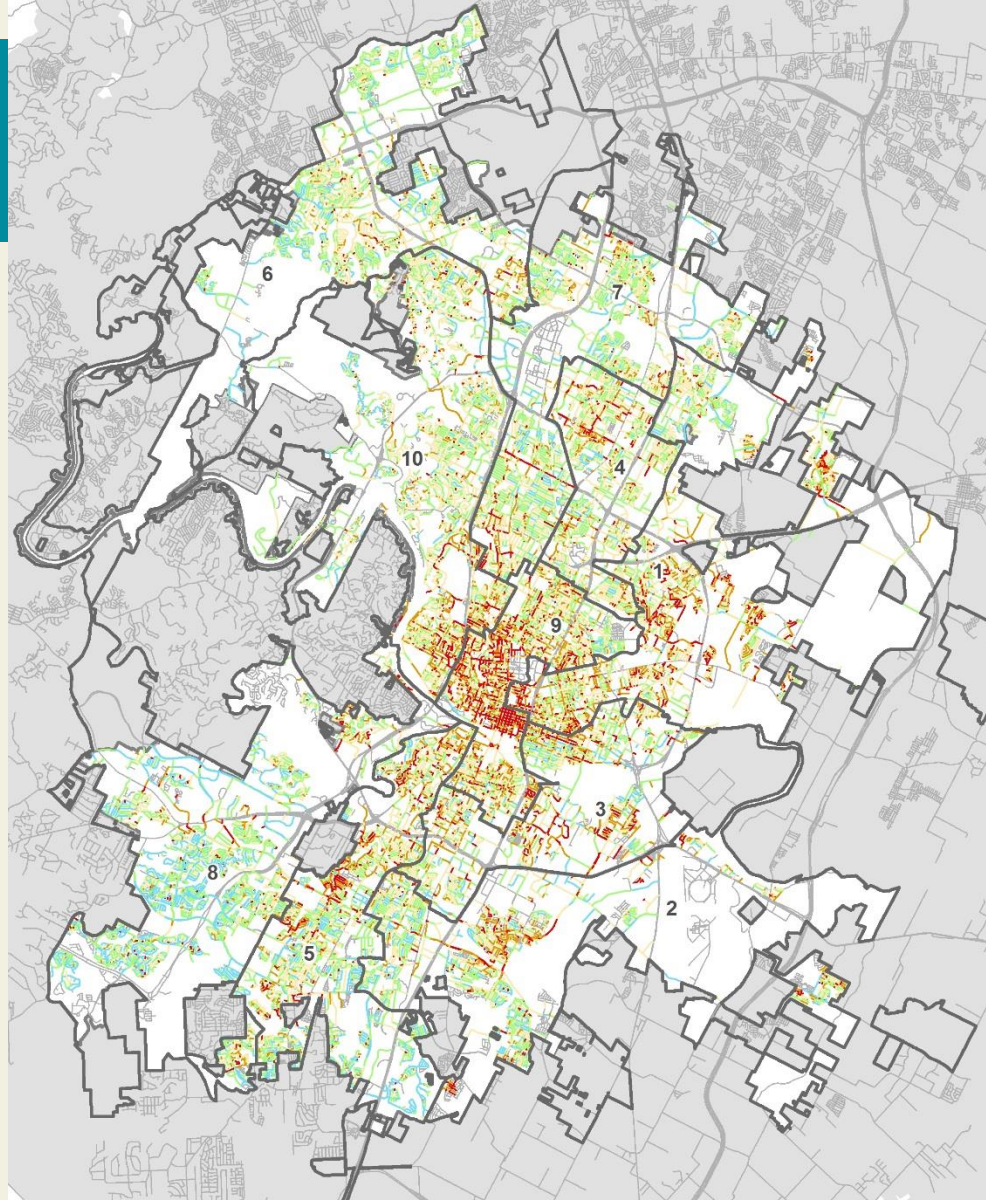
1,550 LM (20%)	A – Excellent	}	5,956 LM (78%) Satisfactory (A,B,C)
2,317 LM (30%)	B – Good		
2,089 LM (28%)	C – Fair		
1,090 LM (14%)	D – Poor	}	1,707 LM (22%) Unsatisfactory (D,F)
<u>617 LM</u> (8%)	F – Failed		
7,663 LM			

condition figures as of September 2016

Street Condition

Condition Grades

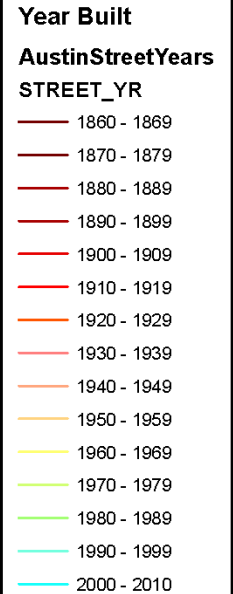
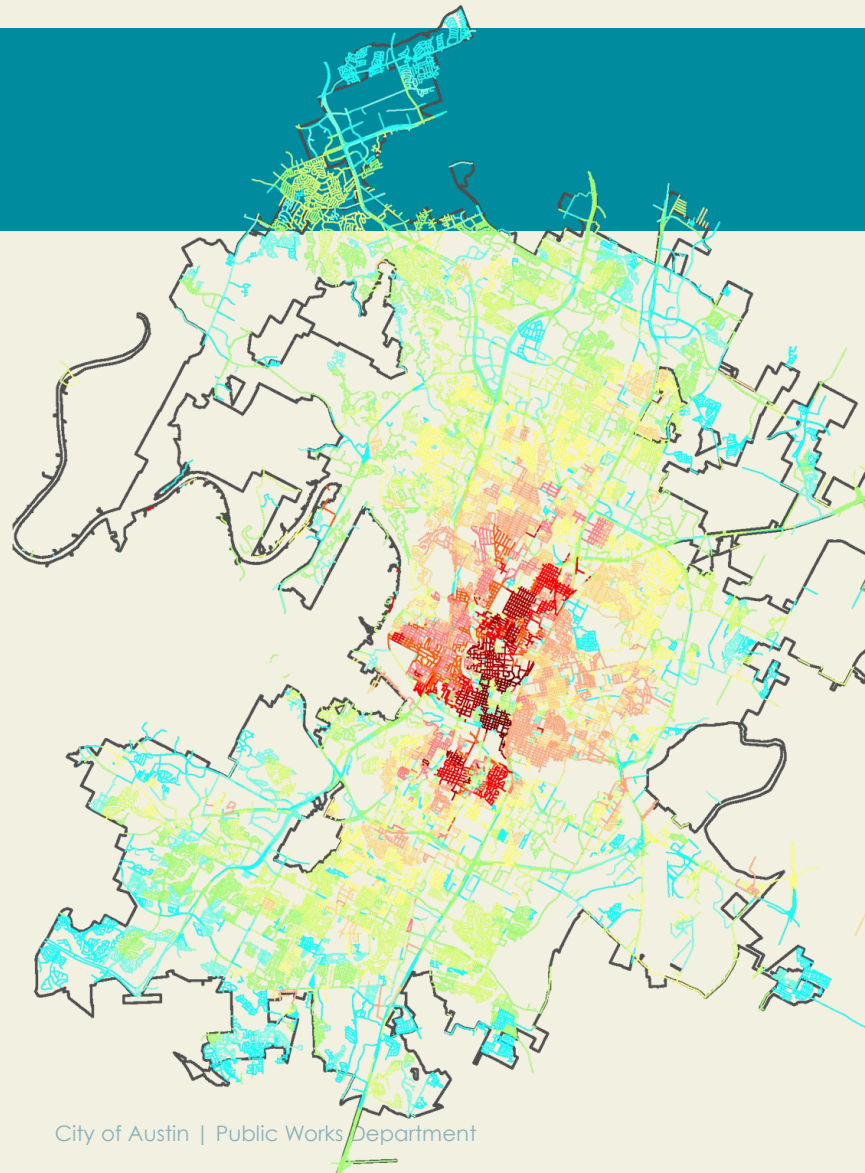
Blue – Excellent
Green – Good
Yellow - Fair
Orange – Poor
Red - Failed



Age of Streets

Street Ages Key

Blue – 0 to 20 years
Green – 20 to 40 years
Yellow – 40 to 50 years
Orange – 60 to 80 years
Red – older



Infrastructure Activities

New – Maintenance – Repair - Rehabilitation - Reconstruction

New Alignments and Arterial Extensions

Completely new roadways on all new alignments. These are typically arterials that would never be built by a developer, but provide connectivity and capacity to improve mobility. Extensions of existing arterials are another good example of a new roadway project.

Localized New Capacity

New capacity can also be more localized in the form of additional traffic lanes, lane widening, turn lanes, and direct connecting ramps to major freeways.

Improvement of Substandard Streets

Improvements for substandard street designs are enhancements provide uniform infrastructure that meeting current standards and improve localized mobility. Substandard streets are often annexed county roadways or very old streets built to now obsolete standards.

Street Extension (New Capacity)

Todd Lane



before

after



Some Examples of Substandard Streets

Cooper Ln

- Narrow Street
- No Curb & Gutter
- Poor Drainage
- No Sidewalk



Johnny Morris Rd

- Narrow Street
- Poor visibility
- No Curb & Gutter
- Poor Drainage
- No Sidewalk

Circle S Rd

- Narrow Street
- One-lane Bridge
- Poor Drainage
- No Sidewalk



Infrastructure Activities

New – **Maintenance** – Repair - Rehabilitation - Reconstruction

Preventative Maintenance

Preventative Maintenance surface treatments protect the pavement surface from the effects of aging, oxidation, and weathering. Most treatments also seal cracks in the surface to keep water out of the pavement and further extend its useful life. Preventative Maintenance is funded by the Operating Budget (Transportation User Fee).

Examples: Crack Sealing, Fog Seal, Seal Coat, Slurry Seal, Overlay

Crack Sealing

Purpose: seal surface cracks to keep water out



before



after

Fog Seal

Purpose: protect surface from aging



before



after

Slurry Seal

Purpose: seal cracks to keep water out; protect surface from aging



before



after

Seal Coat

Purpose: seal cracks to keep water out; protect surface from aging



after

before

Overlay

Purpose: protect surface; improve rideability and restore smoothness



before



after

Infrastructure Activities

New – Maintenance – **Repair** - Rehabilitation - Reconstruction

Repair Maintenance

Repair or Corrective Maintenance typically fixes spot problems. Repairs are funded by the Operating Budget (Transportation User Fee).

Examples: Potholes, Level-up (small distortions), and Spot Repairs

Infrastructure Activities

New – Maintenance – Repair - **Rehabilitation** - Reconstruction

Street Rehabilitation

A street should be Rehabilitated when the pavement structure has deteriorated to a point where routine preventative maintenance (PM) is no longer adequate.

Rehabilitation includes full-depth repairs (FDR) to restore all damaged areas of the street prior to renewing the entire surface with an overlay. Rehabilitation is usually limited to less than 40% FDRs with an average of about 20%. Rehabilitation may also include damaged or ponding curb & gutter, valley gutters, driveways, and other spot structural improvements.

Street Rehabilitation is funded by the Capital Budget (GO Bonds).

Rehabilitation

S Lamar Blvd



before



after



Constructed by
Street & Bridge Operations
(in-house forces)

Infrastructure Activities

New – Maintenance – Repair - Rehabilitation - **Reconstruction**

Street Reconstruction

Capital Renewal of our street assets a crucial and inevitable part of the entire infrastructure life cycle process. Failed streets are selected for renewal via complete reconstruction when no other cost-effective actions are feasible. Street Reconstruction is definitely warranted when a street deteriorates to a point where more than 40% of the pavement requires full-depth repair due to generalized failures.

Full street reconstruction consists of replacing the entire depth of the pavement section. Streets typically have an asphalt surface, granular base course, and may also include some stabilization layers to control underlying swelling and shrinking soils.

Street Reconstruction is funded by the Capital Budget (GO Bonds).

Street Reconstruction



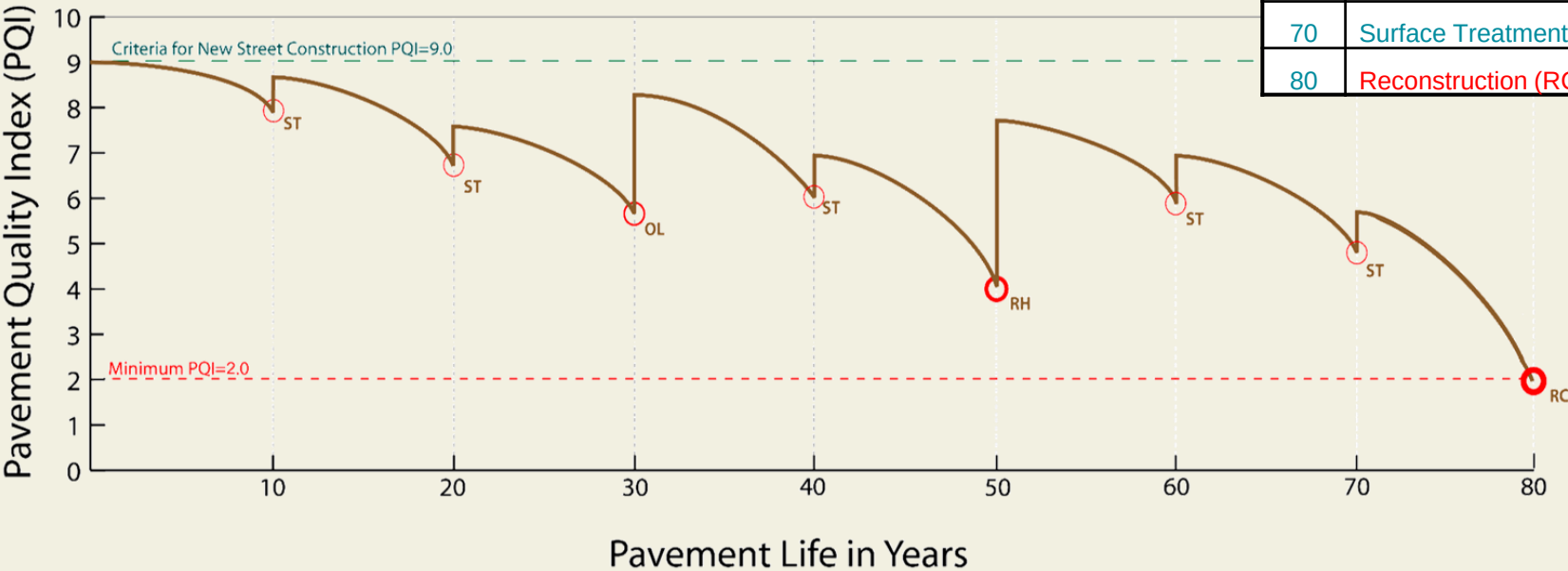
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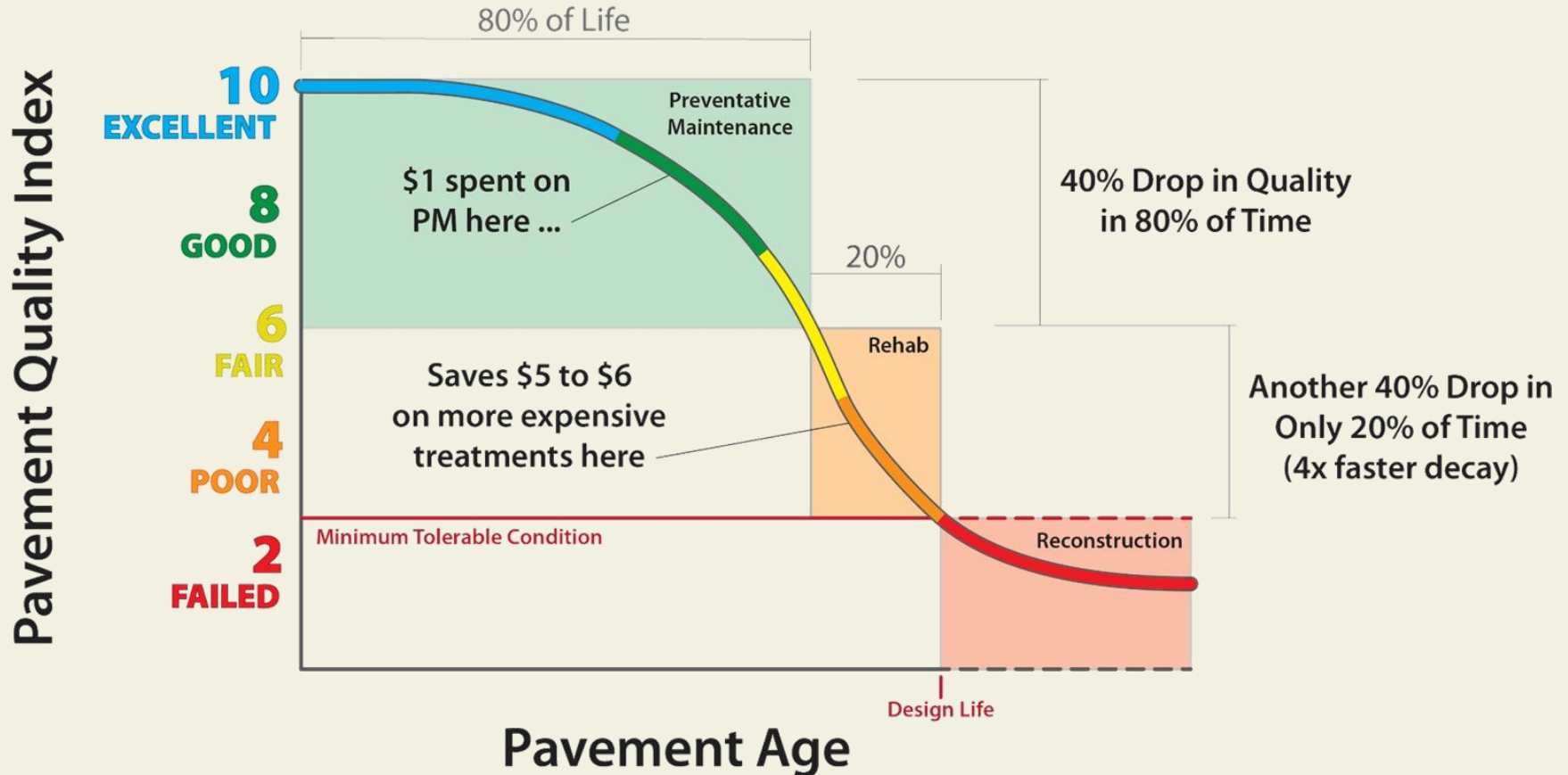
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Pavement Life Cycle

Optimal Pavement Life Cycle with Preventative Maintenance



Value of Preventative Maintenance

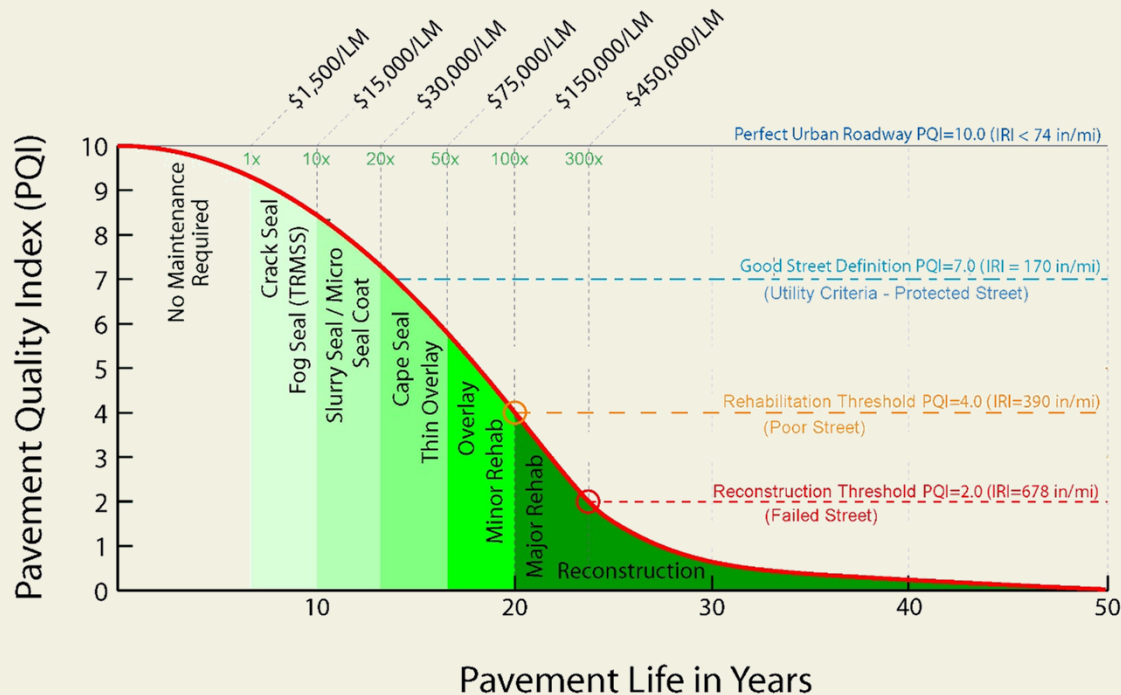


Approximate Cost of Street Activities

2017 Average Street Activity Costs (Pavement Only)			
Source	Strategy Type	Cost/Lane Mile	Treatment
O&M	Maintenance	\$1,500/LM	Crack Seal
		\$6,000/LM	Fog Seal
		\$18,000/LM	Seal Coat
		\$20,000/LM	Slurry Seal
		\$25,000/LM	Microsurfacing
		\$33,000/LM	Cape Seal
		\$50,000/LM	Thin Overlay
		\$75,000/LM	Overlay
		\$90,000/LM	Structural Overlay
Capital	Rehabilitation	\$150,000/LM	Minor Rehabilitation
		\$250,000/LM	Major Rehabilitation
	Reconstruction	\$400,000/LM	Reconstruction – Residential
		\$500,000/LM	Reconstruction – Collector
		\$750,000/LM	Reconstruction – Arterial
		\$1,250,000/LM	Reconstruction – Downtown

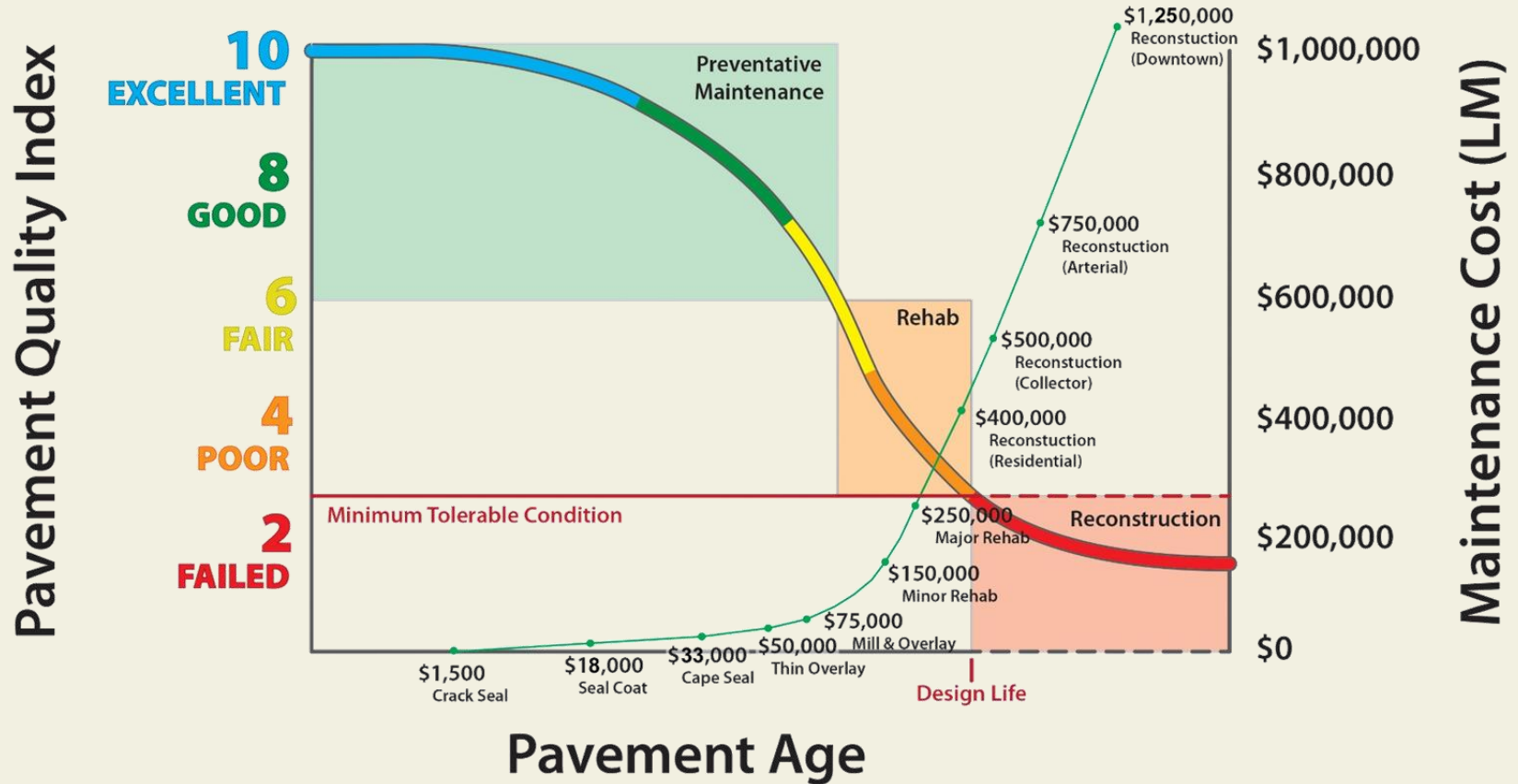
Maintenance Ranges and Relative Costs

Pavement Life Cycle, Maintenance Ranges, and Relative Costs



Treatments and Typical Costs	
\$1,500/LM	Crack Seal
\$6,000/LM	Fog Seal
\$18,000/LM	Seal Coat
\$20,000/LM	Slurry Seal
\$25,000/LM	Microsurfacing
\$33,000/LM	Cape Seal
\$50,000/LM	Thin Overlay
\$75,000/LM	Overlay
\$90,000/LM	Structural Overlay
\$150,000/LM	Minor Rehabilitation
\$250,000/LM	Major Rehabilitation
\$400,000/LM	Reconstruction - Residential
\$500,000/LM	Reconstruction - Collector
\$750,000/LM	Reconstruction - Arterial
\$1,250,000/LM	Reconstruction – Downtown

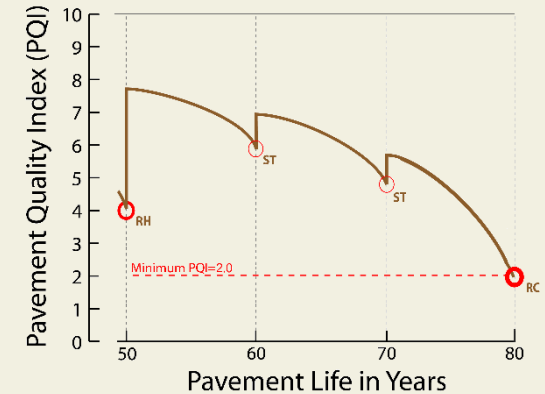
Maintenance Cost vs Pavement Quality



Street Prioritization

Methodology used by Pavement Management Information System (PMIS) to Select and Prioritize Street Maintenance and Capital Projects

- Initialize Multi-Constraint Analysis
 - Establish Budgets
 - Set Performance Goals
- Select Benefit Calculation
 - Maximize Distress or Roughness Index
- Select Treatment Candidates based on Condition Data
 - PMIS uses Decision Trees to select the correct treatments
 - Calculates a Benefit value for each treatment
- Perform Optimization Analysis
 - PMIS searches for the best set of candidate maintenance and reconstruction projects to maximize the total Benefit within budget and performance constraints



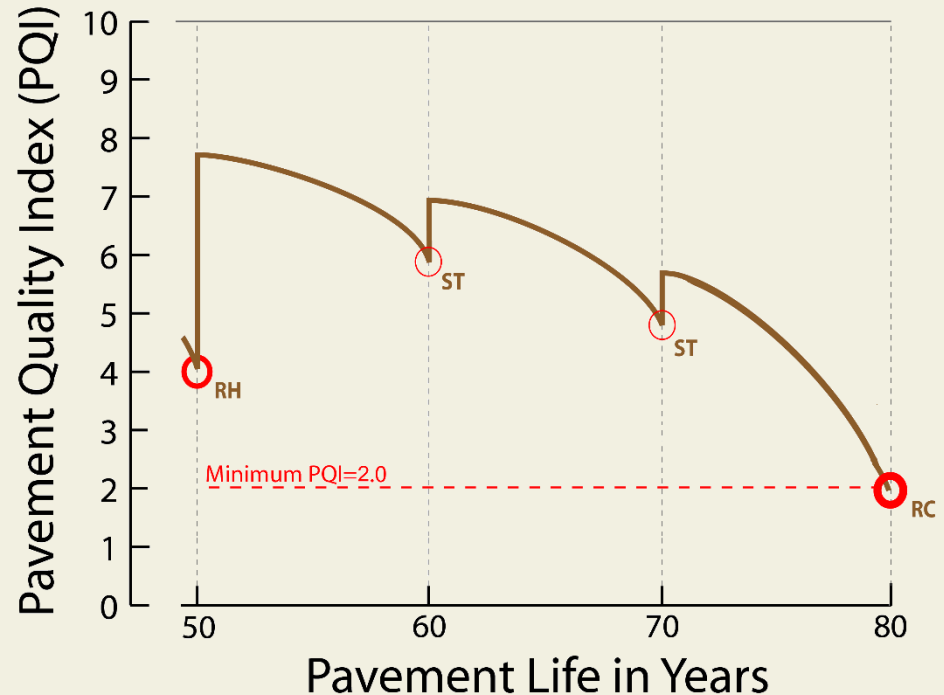
Street Prioritization

Methodology used by Pavement Management Information System (PMIS) to Select and Prioritize Street Maintenance and Capital Projects

The two most critical factors for selecting street reconstruction projects are

- 1) Extensive Street Roughness
- 2) Severe Damage and Distress

No maintenance strategy other than complete reconstruction will be practical or cost-effective after the PQI deteriorates down to the minimum tolerable level.



Primary PMIS Prioritization Factors

Street Performance	• Roughness (IRI) • Distresses (PCI)	Higher Classifications are held to higher standards to Minimize Risk
Demand	Classification • Arterial • Collector • Residential	 Traffic & Safety Requirements Increase with Class
Environment	Subgrade Soils • Weak • Marginal • Fair • Strong	
Maintenance History	• Time Since Last Treatment • Time Since Last Major Treatment	

Final Plan Development and Additional Factors

PMIS Candidate Projects

The Pavement Management process identifies a proposed annual maintenance plan and new CIP project candidates.

Partially Designed or Shovel-Ready

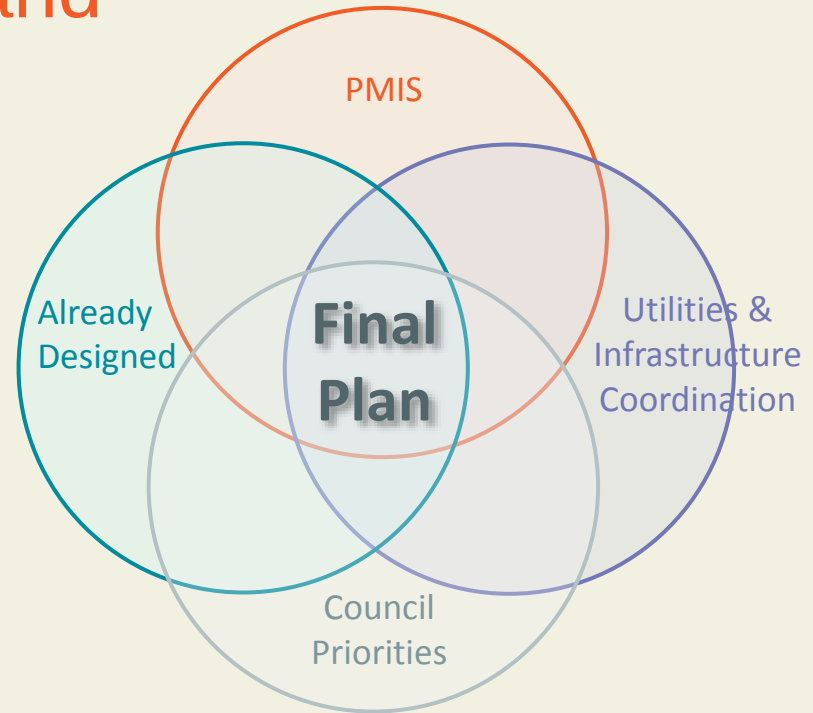
A higher priority is given to projects with some or all design work completed.

Council Priorities

City Council policies and concerns are given priority in project selection.

Utilities & Infrastructure Coordination

Coordination processes maximize benefits and attempt to minimize disruption.





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QUESTIONS + ANSWERS

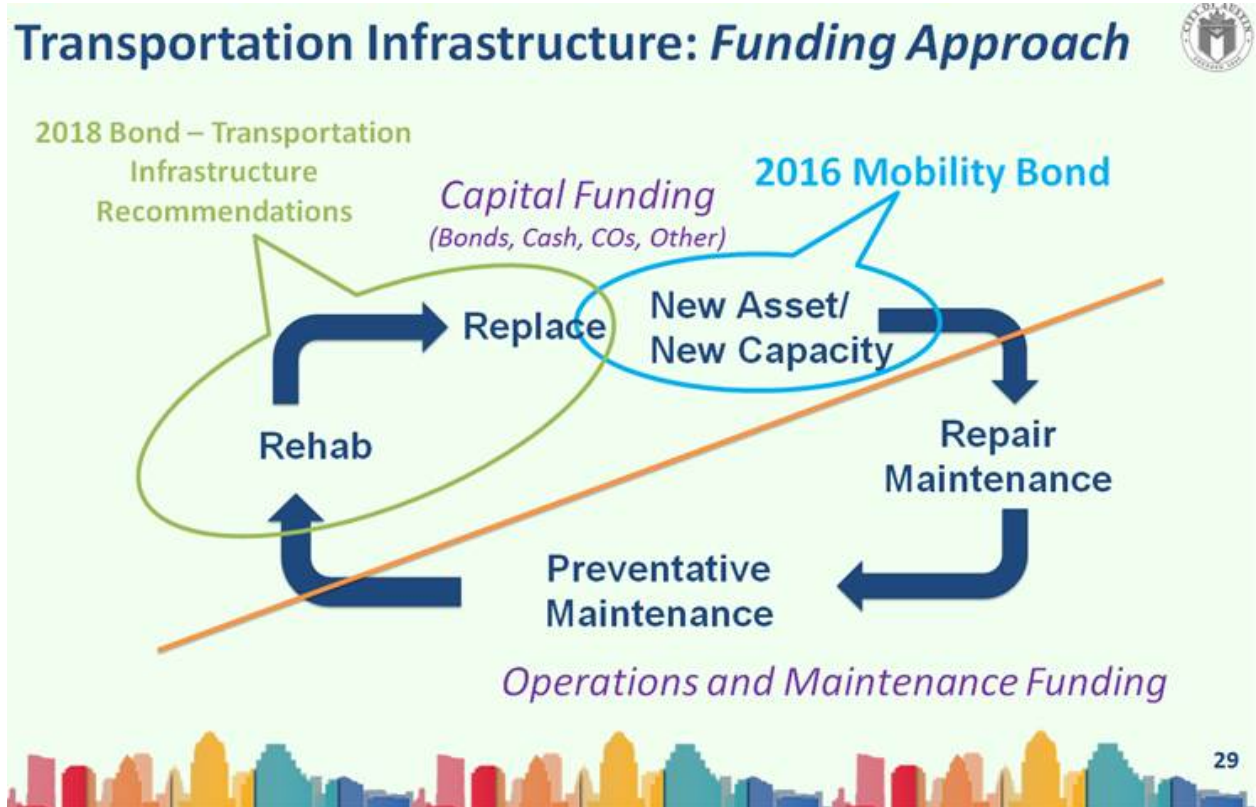
Ed Poppitt PE, Consulting Engineer
Street & Bridge Operations
Public Works Department
ed.poppitt@austintexas.gov
512.974.8768



Transportation Infrastructure Working Group

Questions from the CoA Bond Oversight Commission

Katy Zamesnik, Dorsey Twidwell; Bruce Evans, Herbert "Ken" Rigsbee,
Carla Steffen, Christopher Luca, Sumit DasGupta



What are each departments' prioritization and needs?

Our infrastructure management tools like the Pavement Management Information System (PMIS) are used to determine our core priorities and needs at any point in time. Several additional factors and budgetary constraints are used to refine these initial candidate portfolios to determine final priorities and needs.

How do these categories differ from each other?

These are all distinct life-cycle phases of any infrastructure asset. Each entails a specific appropriate action and O&M or Capital investment strategy during that phase of its life.

Can we identify which projects are included in this?

Yes, we have infrastructure management data on the street, bridge, and sidewalk conditions along these corridors which can be used to determine what actions and O&M or Capital investments are necessary during the analysis period.

What does rehab / replace mean and how do they differ from preventative maintenance & repair?

See pavement presentation for definitions of O&M and Capital actions.