Street Maintenance Program

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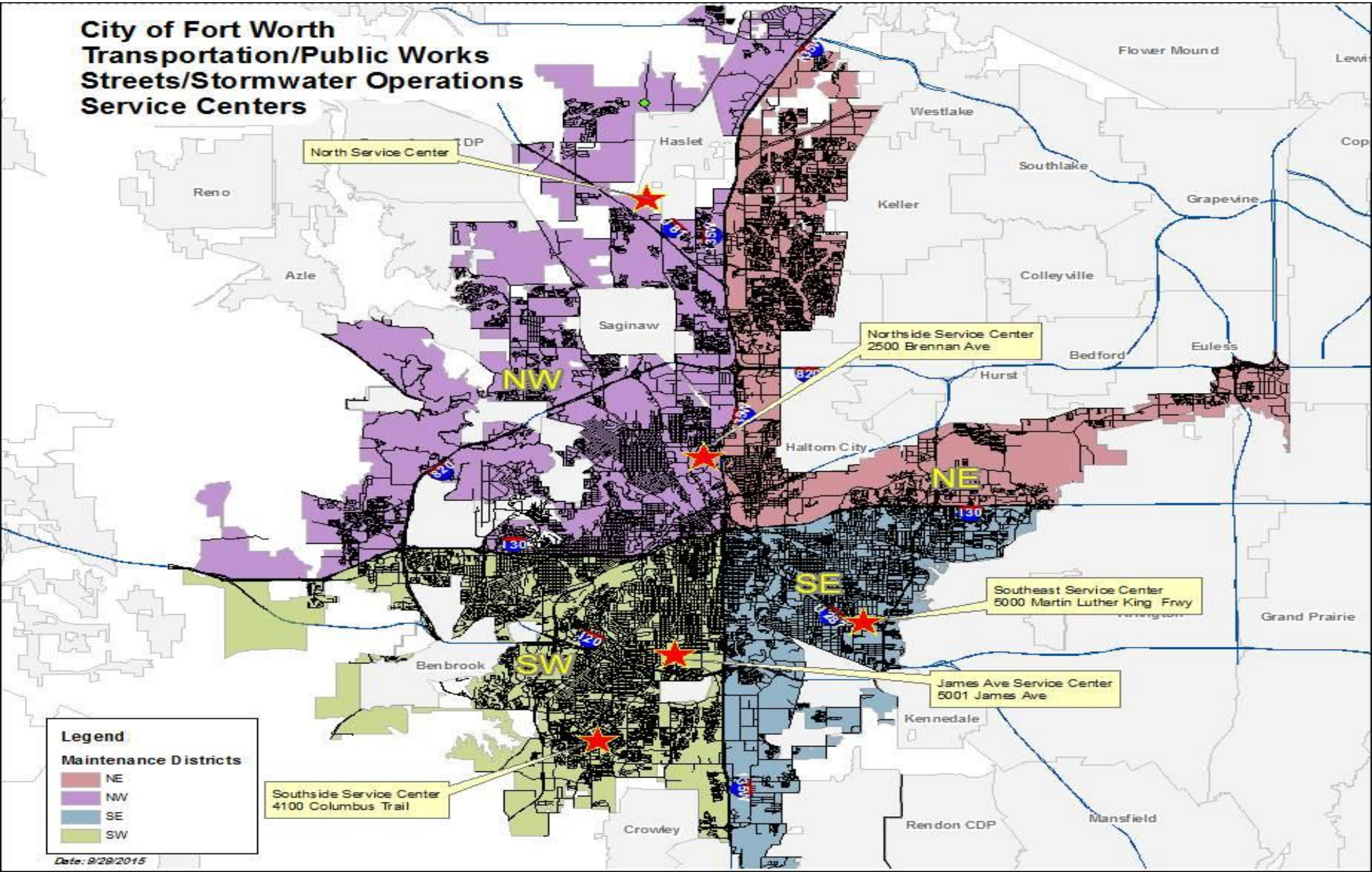
Pavement Management Overview

- Street System Inventory- 7,420 LM
- Street Condition Assessments (3 year cycle)
- Prioritize Street Construction and Maintenance
- Identify the Proper Pavement Treatments
- Implement Proper Maintenance Cycles

Service Areas



Maintenance Programs

In-house

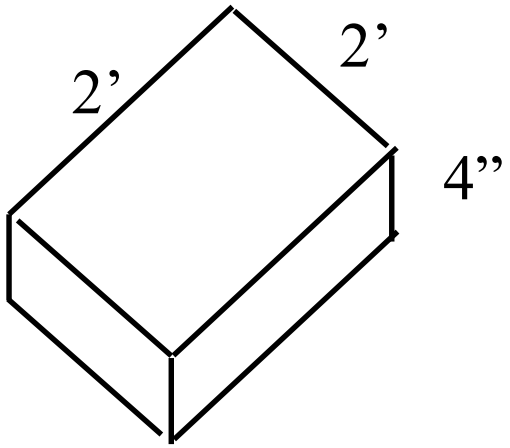
- Pothole Repair
- Base and Pavement Repair
- Concrete Repair
- Chip Sealing
- Crack Sealing
- Asphalt Mill and Overlay
- Bridge and Guardrail Repair

Contractual

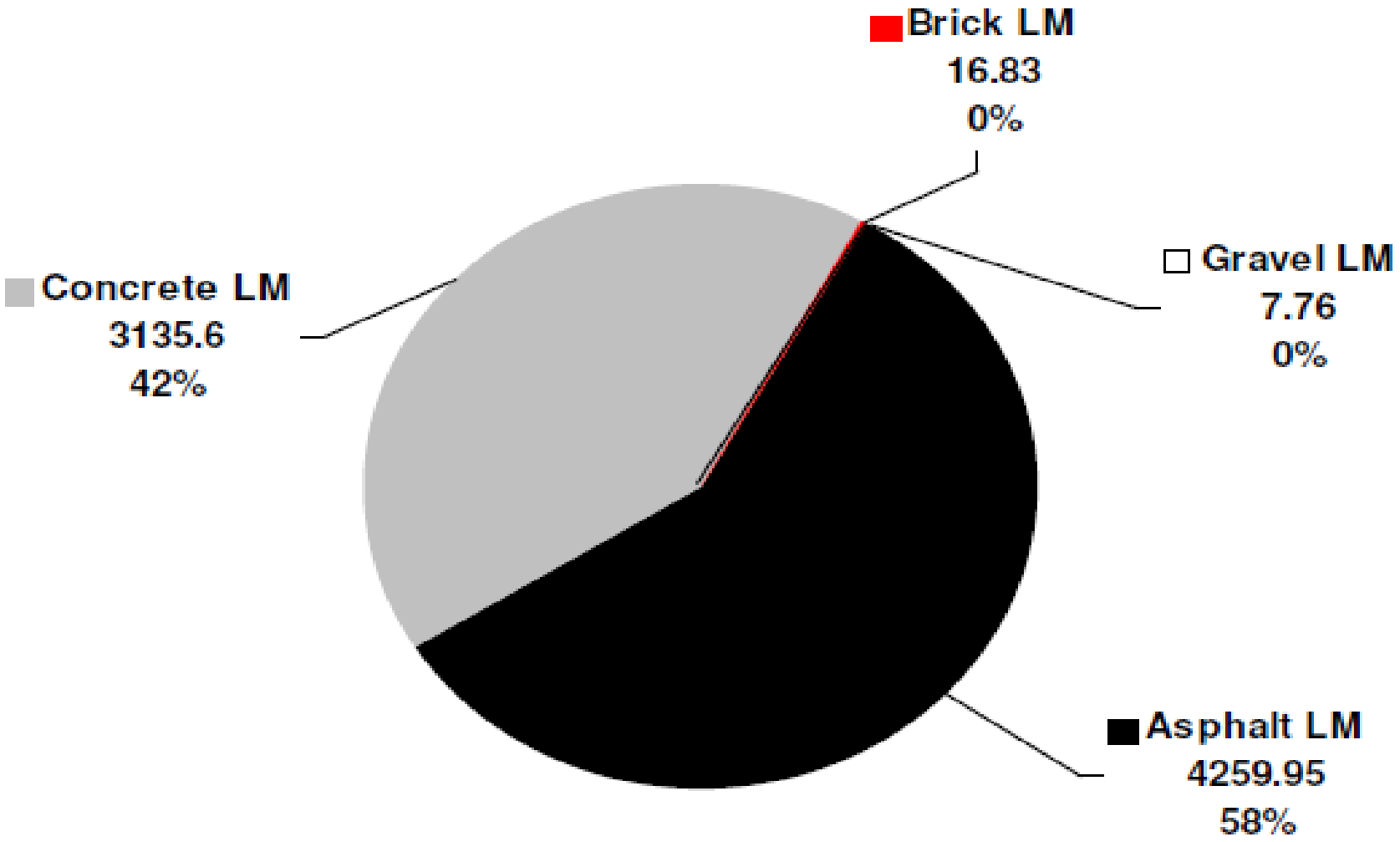
- Alley Mowing
- Base and Pavement Repair-Arterials
- Bridge Repair- Structural
- Asphalt Mill and Overlay
- Hot in Place Recycling
- Micro-surfacing
- Reclamation
- Fog Sealing
- Joint Sealing
- Concrete Restoration

Pothole Repair

- High Priority – Customer Satisfaction
- Repair Procedures
  - Potholes are squared, tacked and compacted
- Repaired Annually– 45,000
- Standard Pothole
  - 2 foot wide
  - 2 foot long
  - 4 inches deep



Asset Management
Pavement Infrastructure

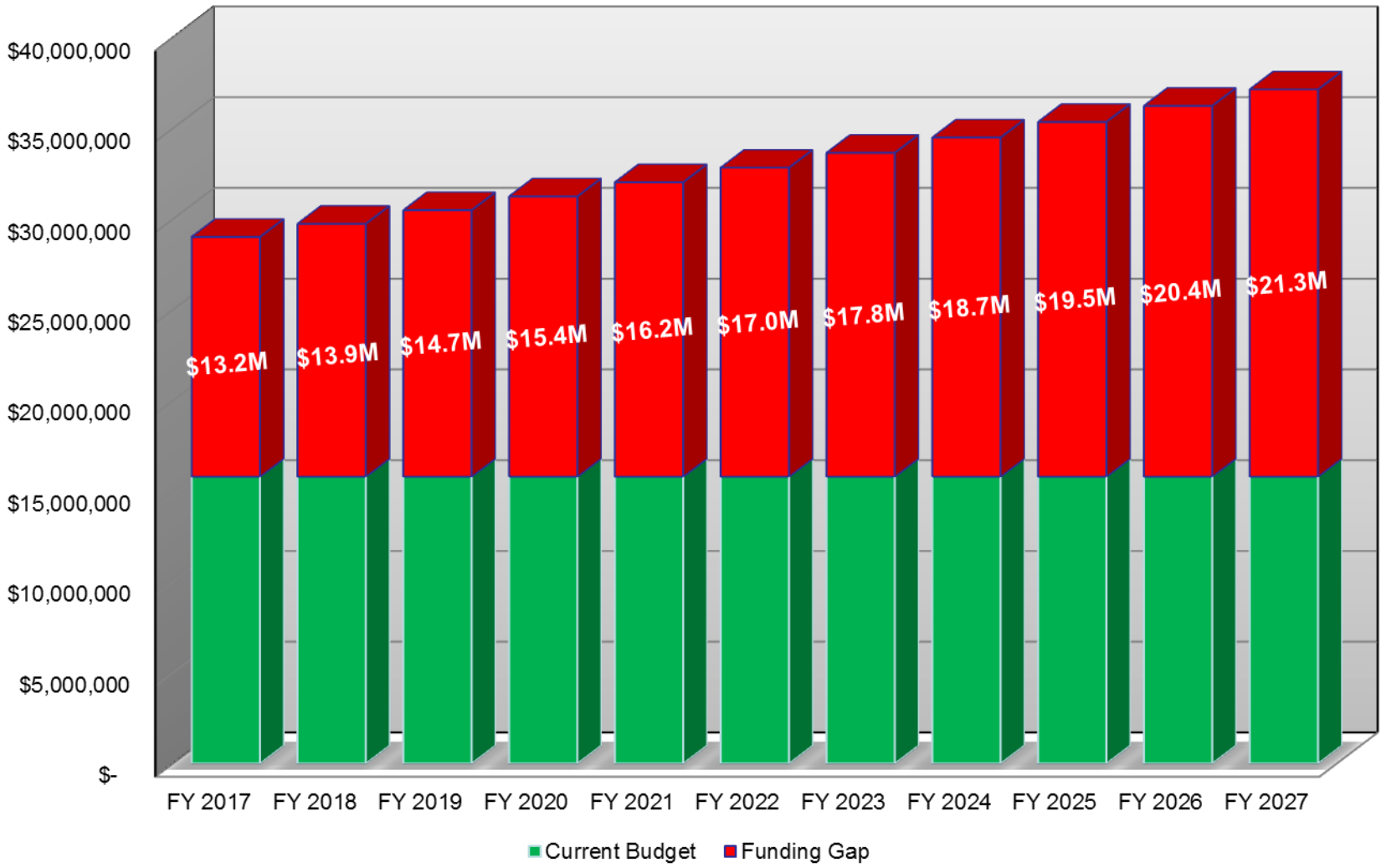


Pavement Design Manual

- All **new streets** are to be designed and built as **rigid pavements** - portland cement, concrete pavement.

- Maximize the life-cycle
  - Sustainability
  - Maximize life – usability – risk of failure
  - Minimize impact on maintenance costs

Maintenance Funding Gap



Network Conditions

PQI Condition	Classification of Streets					
	Principal Arterial	Collector	Local Residential	Total	Percent of Network	Percent Condition
Excellent	466.75	262.43	1,823.11	2,557.29	34.47%	70.12%
Good	791.00	370.38	1,484.11	2,645.49	35.65%	
Fair	297.26	363.84	1,088.68	1,749.78	23.58%	29.88%
Poor	15.71	84.00	367.88	467.59	6.30%	
	1,570.72	**1,080.65**	**4,768.78**	**7,420.15**	**100.00%**	**100.00%**

Asphalt Pavement Conditions

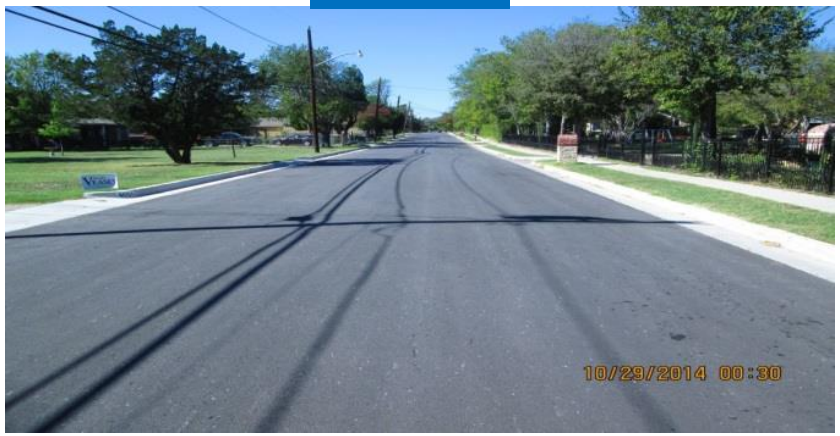
Asphalt Streets

Functional Classification of Streets in Fort Worth

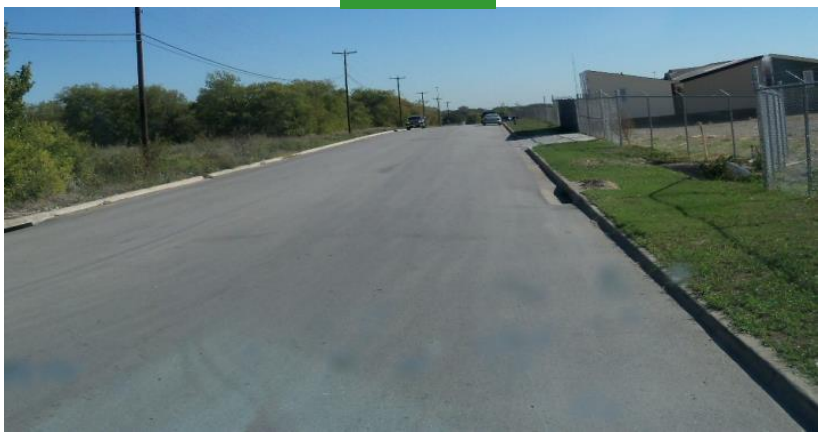
PQI Range	PQI Condition	Principal Arterial	Major Arterial	Minor Arterial	Collector	County Type Road	Local Residential	Total	Percent of Network	
2.00-4.09	Poor		4.83	1.89	10.36	24.82	**184.86**	226.76	5.31%	**30.59%**
4.10-6.09	Fair	6.37	54.10	29.76	101.10	126.65	**761.46**	1079.44	25.28%	
6.10-8.09	Good	38.15	131.91	76.87	179.08	182.69	1000.61	1609.31	37.69%	**69.41%**
8.10-10.00	Excellent	36.50	195.68	124.76	153.99	75.90	767.69	1354.52	31.72%	
		81.02	**386.52**	**233.28**	**444.53**	**410.06**	**2714.62**	**4270.03**	**100.00%**	**100.00%**

Pavement Condition Examples

Excellent



Good



Fair

Poor

Concrete Pavement Conditions

Concrete Streets

Functional Classification of Streets in Fort Worth

PQI Range	PQI Condition	Principal Arterial	Major Arterial	Minor Arterial	Collector	County Type Road	Local Residential	Total	Percent of Network	
2.00-4.09	Poor		4.38	2.50	3.90		13.28	24.06	0.76%	6.26%
4.10-6.09	Fair	20.50	30.78	23.60	21.60	0.13	77.69	174.30	5.50%	
6.10-8.09	Good	130.19	105.05	69.21	57.98	0.60	244.39	607.42	19.17%	93.74%
8.10-10.00	Excellent	97.00	258.38	132.87	137.56	4.51	1733.32	2363.64	74.58%	
		247.69	**398.59**	**228.18**	**221.04**	**5.24**	**2068.68**	**3169.42**	**100.00%**	**100.00%**

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Pavement Condition Examples

Excellent

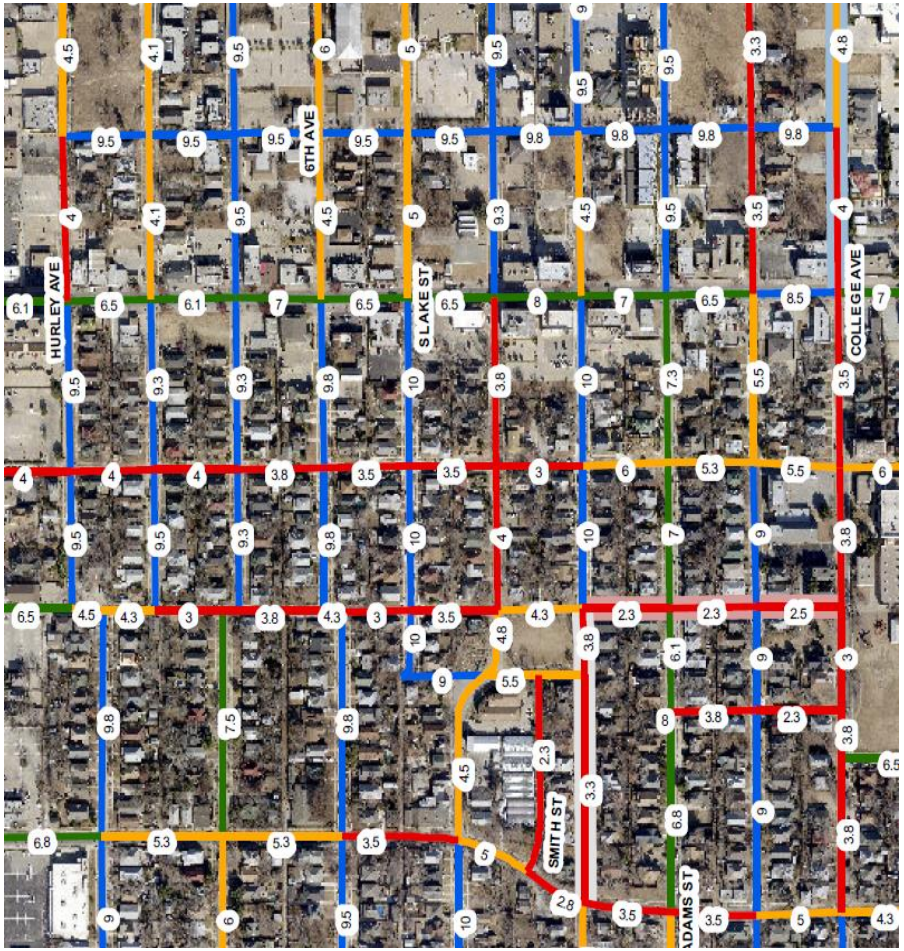
Good

Fair

Poor

Prioritizing Streets

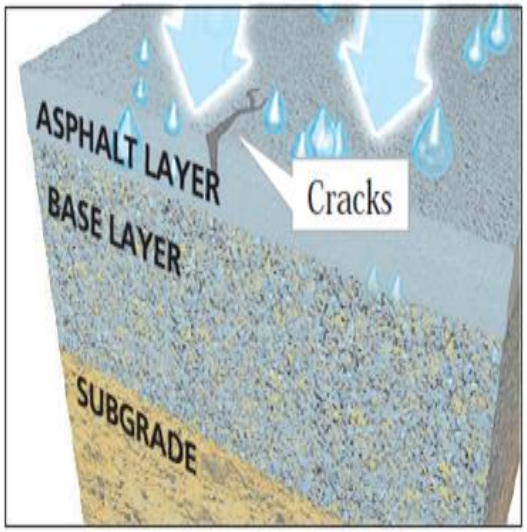
- Construction and Maintenance
  - Pavement and Flat Work Conditions
  - Neighborhood Approach
    - Poor Streets – Bond
    - Fair Streets- Rehabilitation
    - Good Streets- Sealants
    - Excellent Streets- Minor Maintenance
  - Multimodal Routes
    - Schools
    - Bus Routes
  - Density of Population
    - Residential
  - Customer Service Requests
    - High Customer Service Requests
    - Continual Maintenance



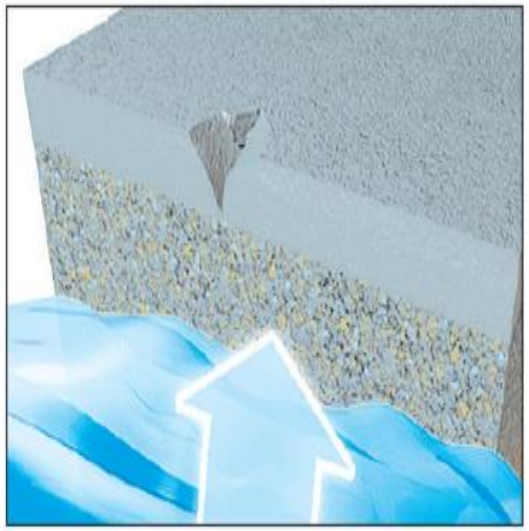
Factors to Consider

- Total Life-Cycle Costs
- Soil Conditions
- Risk of Failure
- Time To First Maintenance
  - 3 Years- Flexible
  - 8 Years- Rigid
- Maintenance Cycles

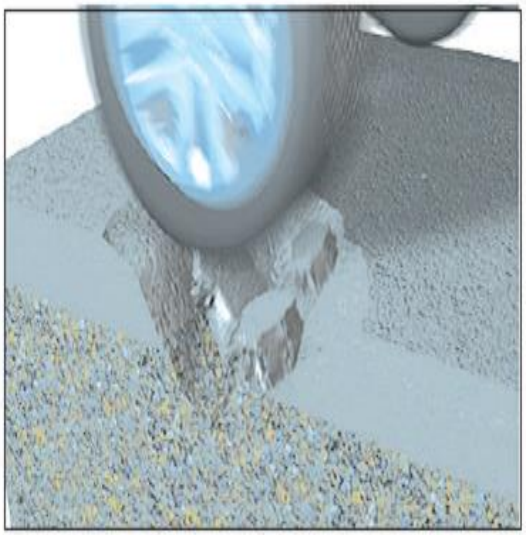
Risk of Failure



- Cracking
- Moisture penetration
- Weakens the pavement structure



- Prolonged moisture weakens base layer
- Ground saturation



- Street structure can no longer support vehicle weights
- Continual traffic chip the pavement developing potholes

Pavement Distresses

Asphalt Pavement:

- Alligator Cracking
- Bleeding
- Distortion
- Edge Cracking
- Excessive Crown/Shoulder Drop off
- Longitudinal Cracking
- Transverse Cracking
- Patching
- Potholes
- Raveling and Weathering
- Ripping and Shoving
- Rutting

Concrete Pavement:

- Cracking
- Corner Cracking
- Distortion
- Joint Sealant Loss
- Spalling
- Panel Displacement
- Longitudinal Cracking
- Patching
- Polishing

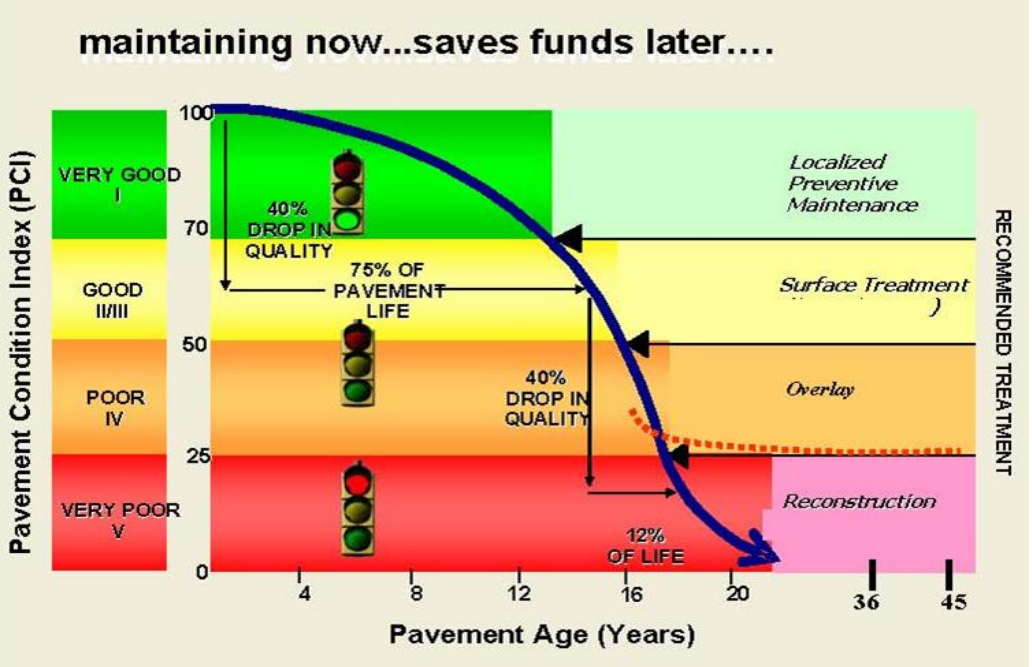
Maintenance Techniques

Asphalt Maintenance

- Crack Sealing
- Fog Sealing
- Chip Sealing
- Micro-Surfacing
- Asphalt Overlay
- Asphalt Rehabilitation
- Reconstruction

Concrete Maintenance

- Joint Sealing
- Slab Lifting
- Concrete Restoration
- Reconstruction



Concrete Infrastructure Repair

Joint Seal - $21,000 Lane Mile

Pavement Preservation

Crack Seal -$1,000 Lane Mile

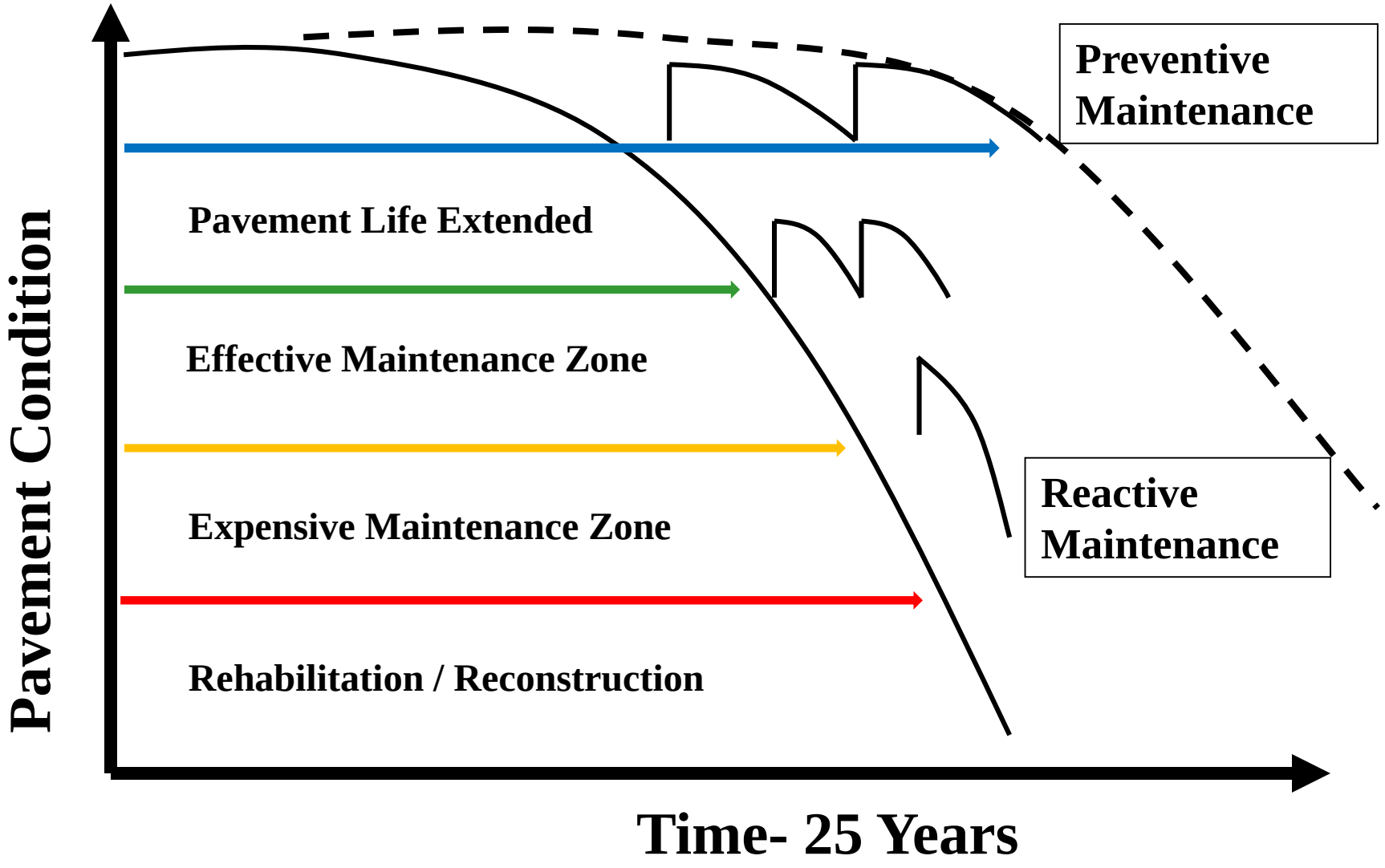
Chip Seal - $16,000 Lane Mile

Fog Sealing

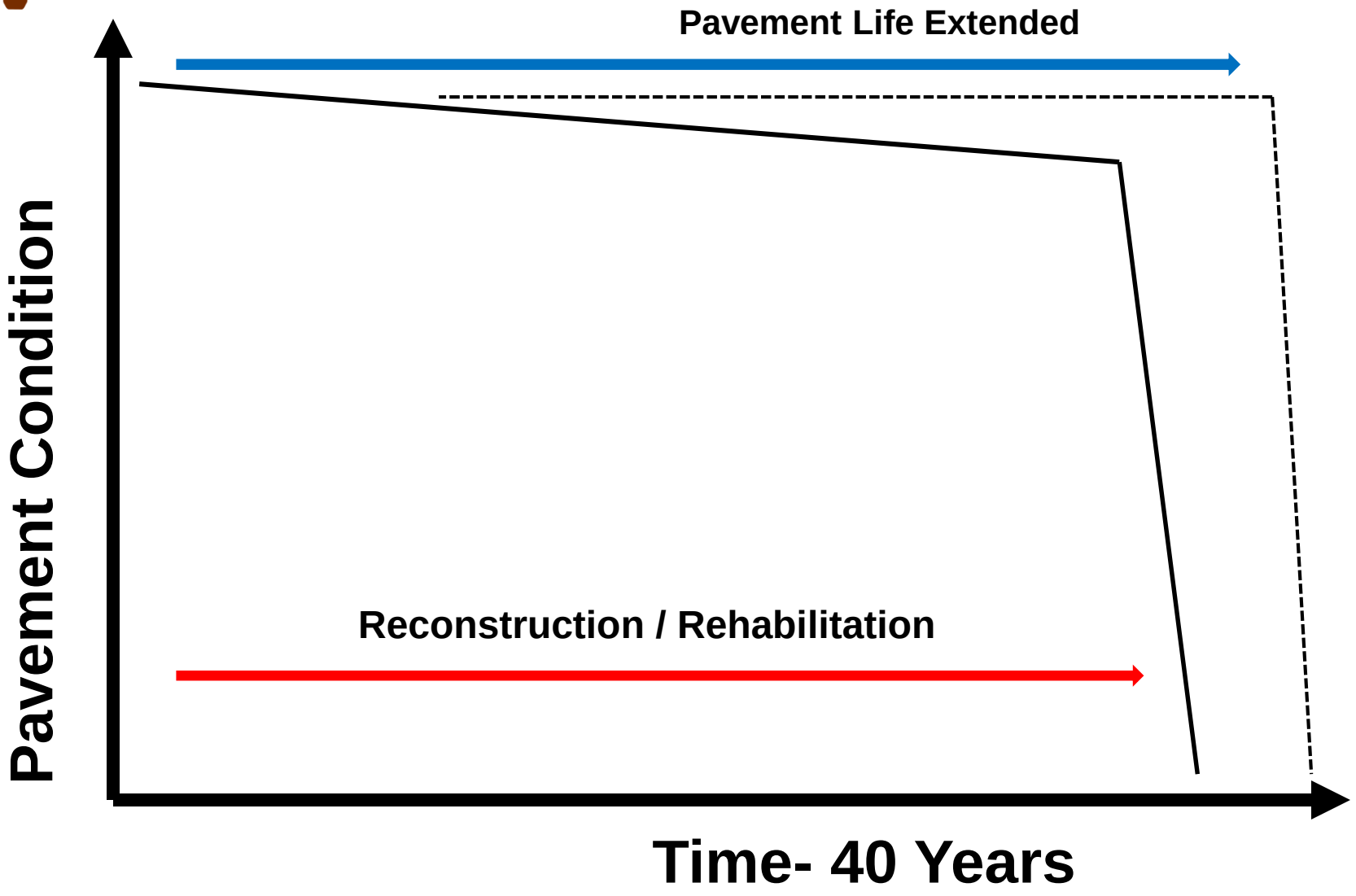
Seal Coating

Street Reclamation

Optimized Maintenance- Asphalt

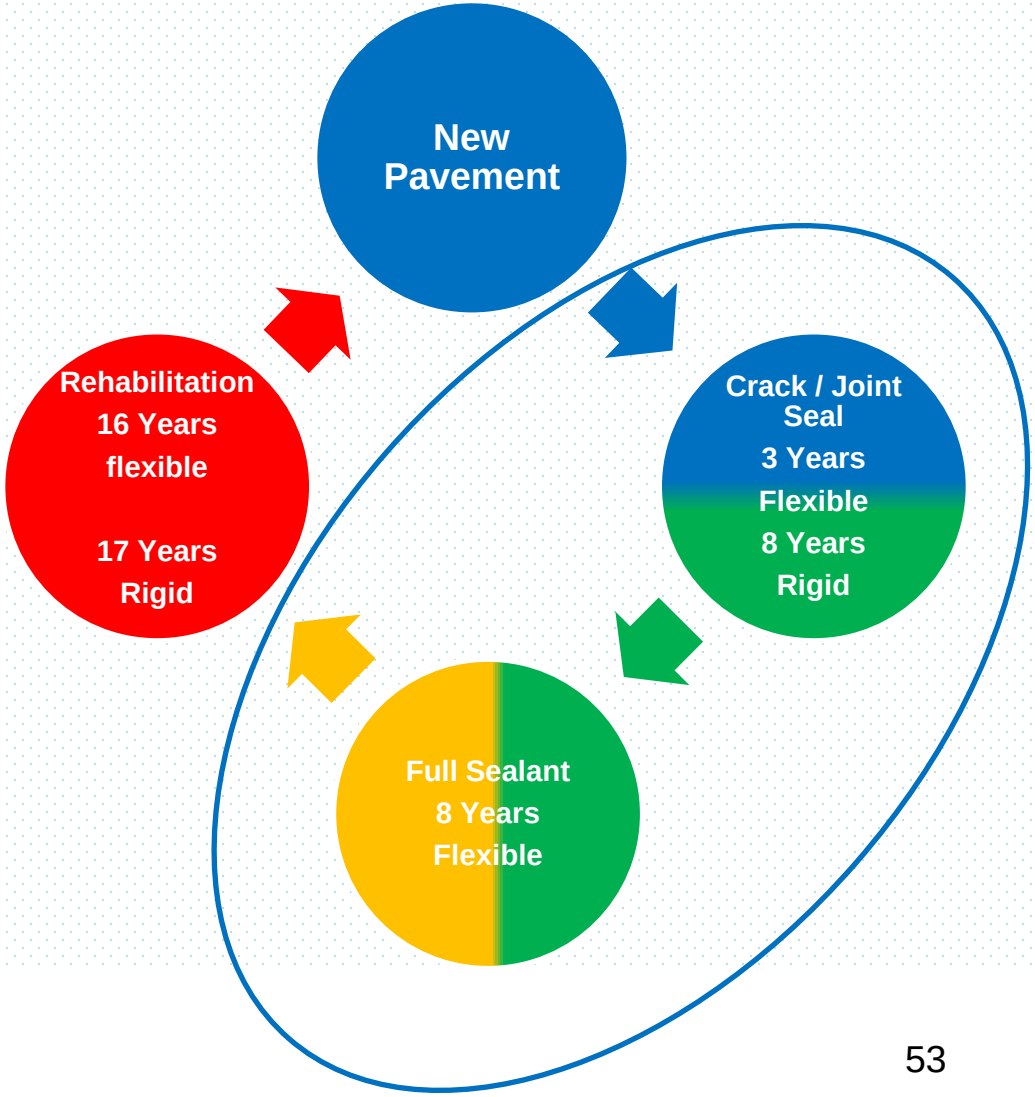


Optimized Maintenance- Concrete



Maintenance Cycles

- 25 Year Street Life Cycle - Asphalt
  - Scheduled Maintenance, Sealants to Rehabilitation
  - Recapitalization, Full Reconstruction
- 40 Year Street Life Cycle - Concrete
  - Joint Sealing to Panel Replacement
  - Recapitalization, Full Reconstruction
- Optimum Maintenance Cycle
  - 16 Years- Asphalt
  - 25 Years- Concrete
- ROI - Minimal Maintenance
- Optimum-Short Cycle
  - Deter Rehabilitation Costs



Pavement Life Cycle Costs - 25 Yr

Asphalt Pavements

- 3 Yrs - Crack Seal
- 8 Yrs – Seal Coat
- 16 Yrs- Asphalt Overlay
- 19 Yrs- Crack Seal
- 24 Yrs- Seal Coat

- Total Cost $242,276 LM
  - 2% annual inflation

Concrete Pavements

- 8 Yrs- Joint Seal
- 17 Yrs- Point Repairs
- 25 Yrs- Joint Seal

- Total Cost $146,429 LM
  - 2% annual inflation

Pavement Life Cycle Costs – 40 Yr

Asphalt Pavements

- 3 Yrs - Crack Seal
- 8 Yrs – Seal Coat
- 16 Yrs- Asphalt Overlay
- 19 Yrs- Crack Seal
- 24 Yrs- Seal Coat
- 29 Yrs- **Reconstruction**
- 31 Yrs- Crack Seal
- 35 Yrs- Seal Coat

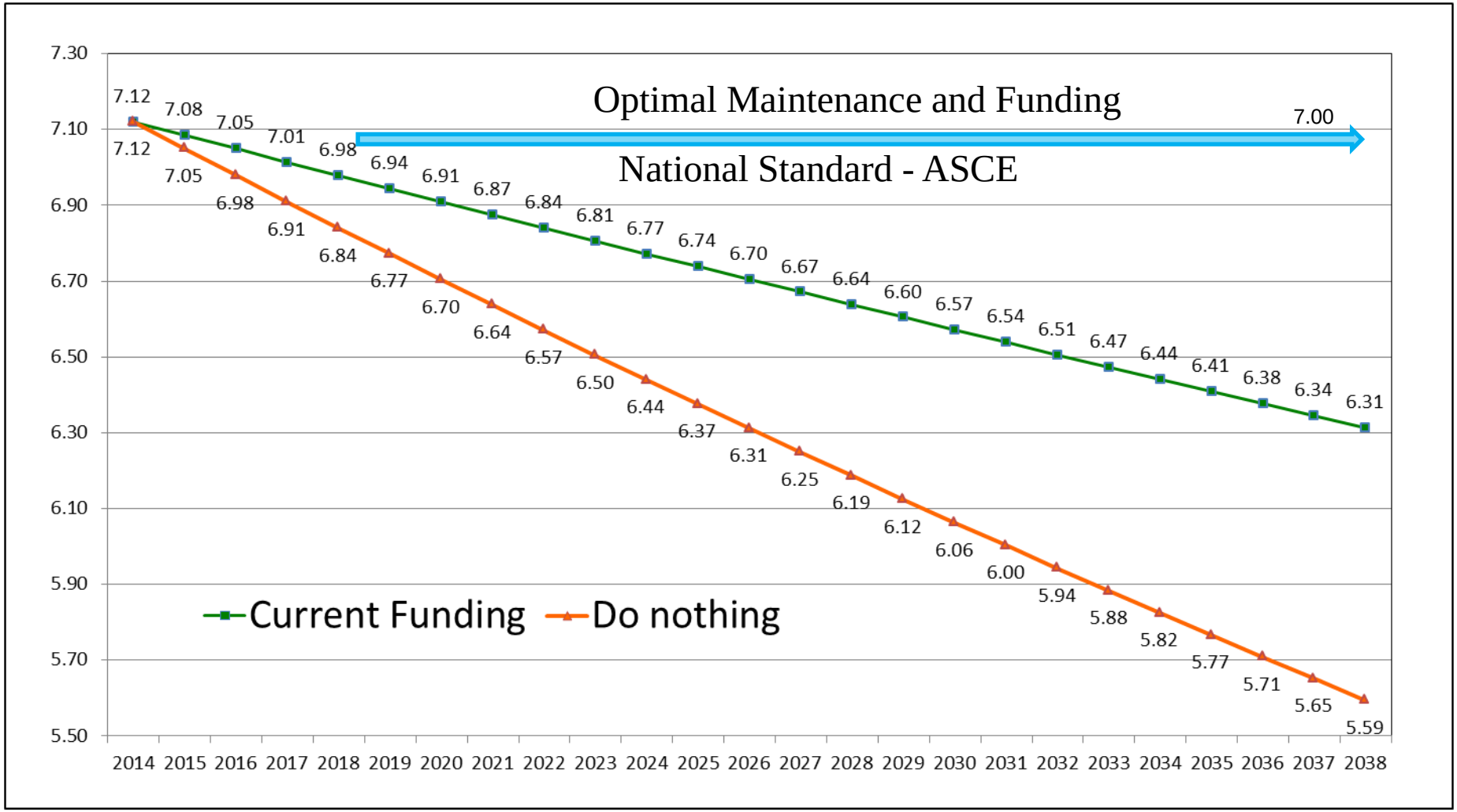
- Total Cost $1,113,767 LM

Concrete Pavements

- 8 Yrs- Joint Seal
- 17 Yrs- Point Repairs 10%
- 25 Yrs- Joint Seal
- 33 Yrs- Point Repairs 25%
- 40 Yrs- Joint Seal

- Total Costs $492,845 LM

Managing Aging Assets



Asset Management

upfront *planning* of the asset life cycle...

…*efficient* maintenance cost.

…ongoing *effective* maintenance...

…*effective life cycle*...

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Preservation today or……

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Questions?

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