



PAVEMENTS/MATERIALS CONFERENCE

“Current Challenges/Sustainable Solutions”

Pavement Preservation Challenges in the City of Phoenix, Arizona

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CITY OF PHOENIX

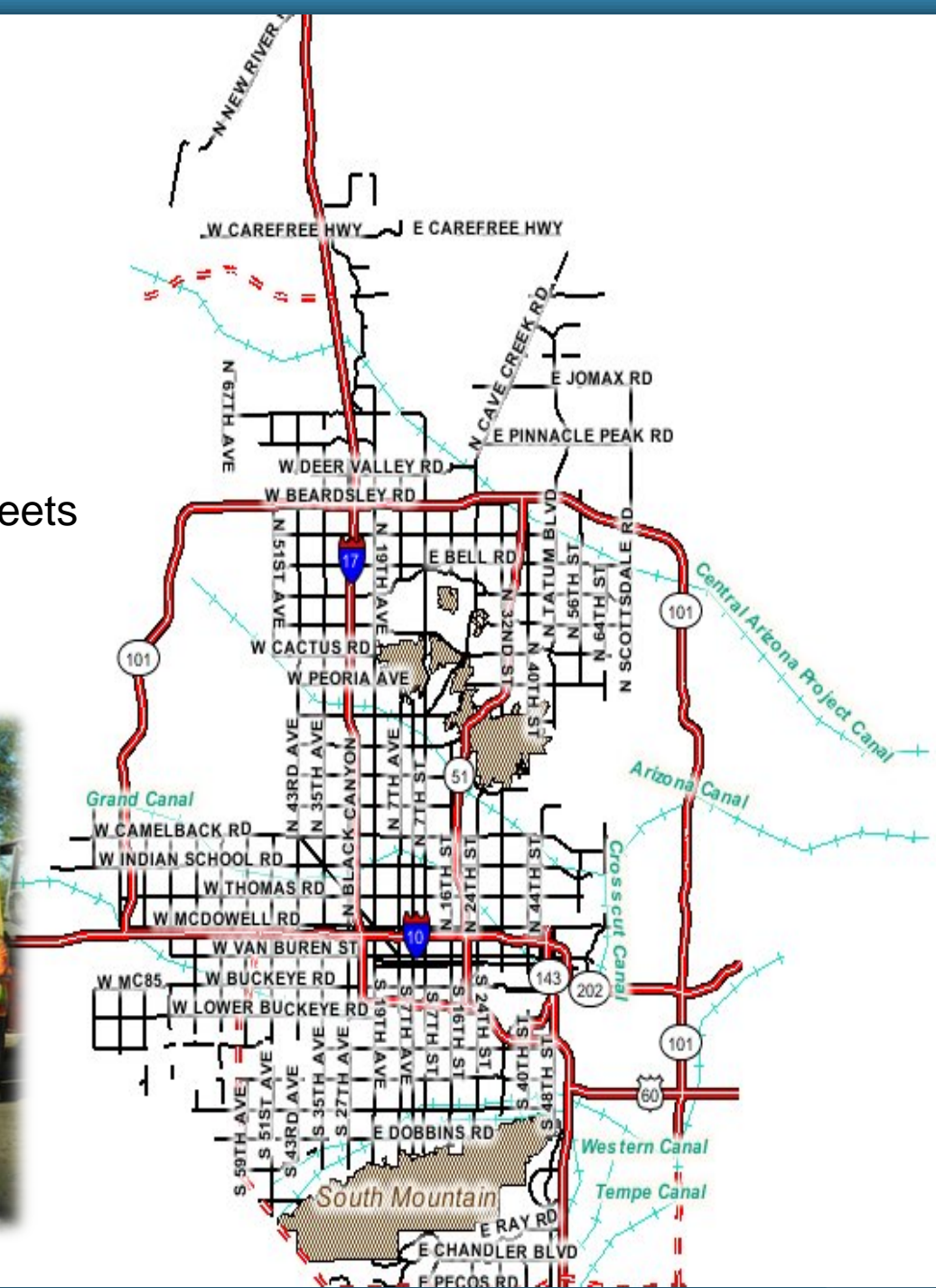
Population: 1.5 million

Area: 520 square miles

5,400 total miles of streets

1,300 miles of major & collector streets

4,100 miles of local streets





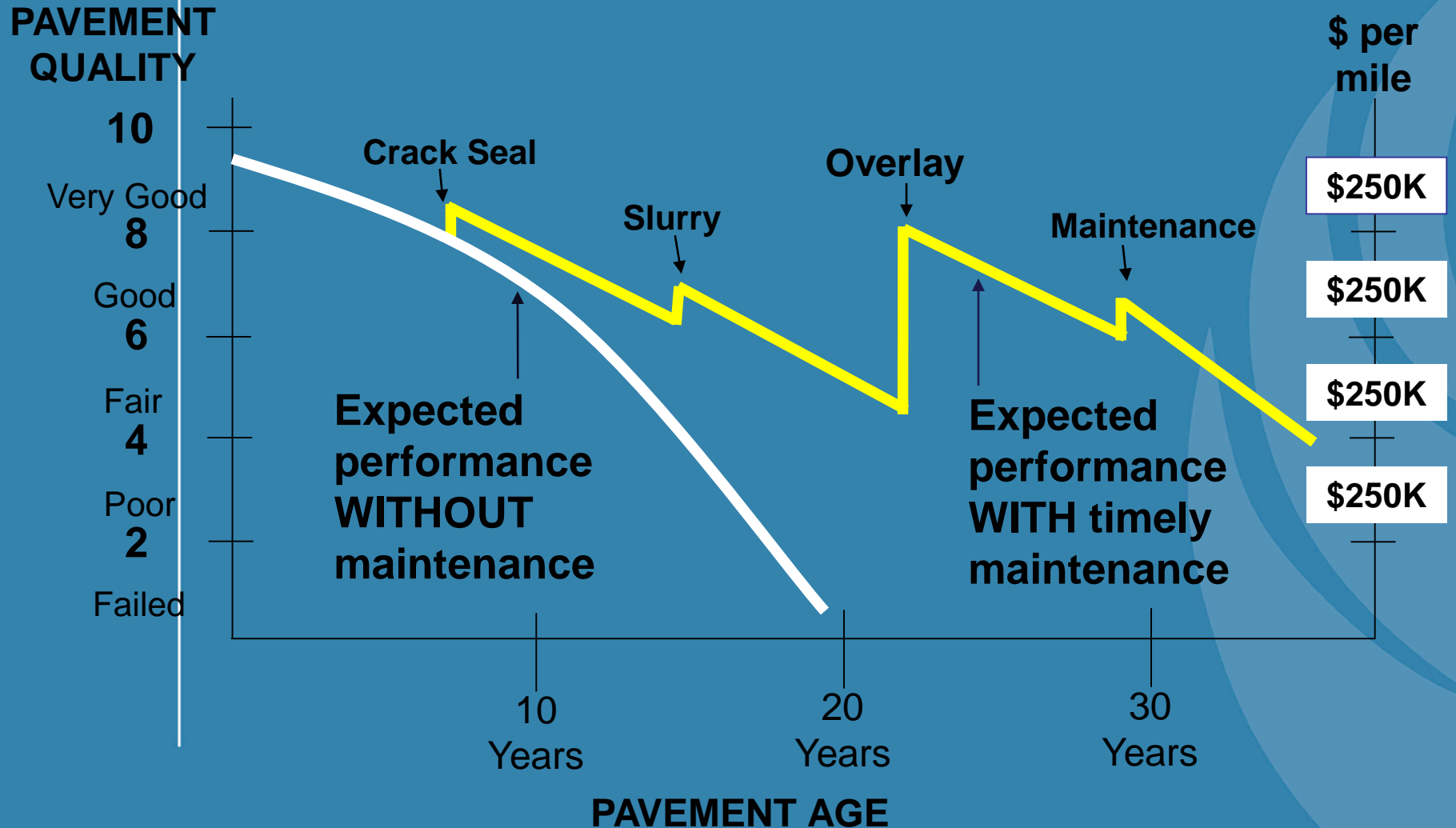
Pavement Preservation Practices

- Past
- Present
- Future





Concept of Preventative Maintenance





Past Pavement Preservation Practices



Dynaflect





Past Pavement Preservation Practices

- Limited data collection
- High level of subjectivity
- Lack of flexibility in programming
- Lack of commitment to use results
- Results were difficult to work with and reproduce
- Black box software





Past Pavement Preservation Practices

Effects on Preservation and programming

- Driven by citizen complaints
- Equal revenue distribution
 - Council districts
- Staff recommendations
 - High maintenance areas





Transition from Past to Present Pavement Preservation Practices

Year 2008

Phoenix contracts with FUGRO Roadware and Deighton to provide pavement management consulting services

- Data collection
- Analysis
- Recommendations
- Multi-year planning



Present Pavement Preservation Practice

PROCESS

- Pavement Inventory
 - Condition Assessment
- } *Automated Data Collection and Distress Evaluation*



- Repair and Rehabilitation Strategies
 - Budget Considerations
- } *Analysis and Optimization*



- Work Program
 - Implementation
- } *Analysis and Optimization*



Present Pavement Preservation Practice



**Pavement Management Van:
*Automatic Road ANalyzer (ARAN) van***



Present Pavement Preservation Practice

Data Collection with ARAN Van

- Images of pavement with high resolution cameras to assess pavement condition
- Alternating two-year collection cycles for:
 - major/collector streets (1,350 miles)
 - with 100 % of mileage collected
 - residential streets (3,500 miles) in quarter sections
 - with 30 % collected (assumed “typical”)





Present Pavement Preservation Practice

Data Analysis w/dTIMS Software

Inputs

- Roughness Index
- Crack Indexes
- *Bleeding*
- *Shoving*
- *Rutting*

Environmental Index
(temperature)
Structural Index
(composition & age)

***Pavement
Condition
Index (PCI)***

- Treatments; Life and Costs
- Budget
- Traffic Volumes/Classification
- Other Considerations
 - Pavement age
 - # of cuts
 - Past treatments
 - Function

***Cost Benefit
Optimization***

Outputs

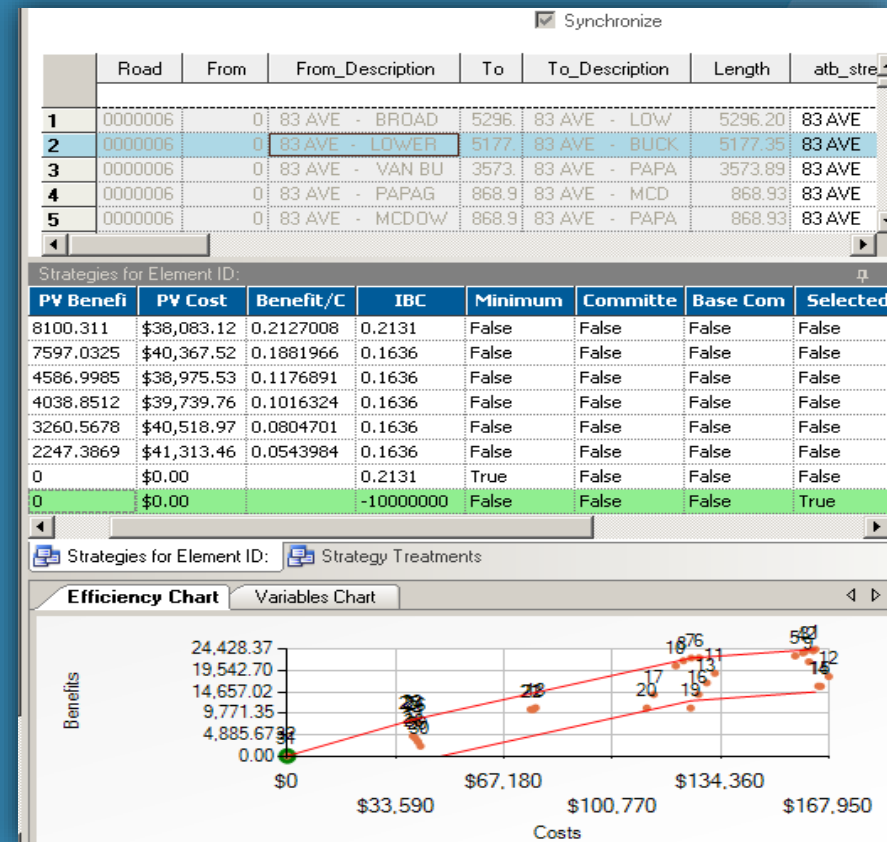
- Recommendations
 - Work Program: Location of treatments
 - Treatment types and time of application



Present Pavement Preservation Practice

Recommendations/Treatments - Alternatives

- Treatment alternatives depend on distresses present
- Treatment year depends on available budgets and efficiency of treatment
- Efficiency of treatment depends on traffic type, volume, lanes of traffic, etc.





Present Pavement Preservation Practice

Treatment Programs

Major and Collector Streets

- Asphalt Rubber Overlay
- Fractured Aggregate Surface Treatment (reintroduced in 2013)
- Micro Surfacing (reintroduced in 2014)
- Crack Seal



Local Streets

- Asphalt Rubber Overlay
- Fractured Aggregate
- Slurry Seal
- Fog Seals
- Crack Seal





Present Pavement Preservation Practice

Financial

Annual Budget for FY 2014-2015	
Major Overlay	\$ 9.6 million
Residential Overlay	\$ 9.4 million
Program FAST Program	\$ 1.8 million
Crack Seal	\$ 1.0 million
Slurry Seal Program	\$.98 million
Micro-Surfacing	\$.50 million
Total	\$23.28 million



Present Pavement Preservation Practice

Implementation

- Job Order Contracting for all programs
- Three years with up to two additional years and/or cap on contract amount per JOC
- Overlay has 3 contractors servicing Major/Collector and Residential programs
- All others have one contractor each





Present Pavement Preservation Practice

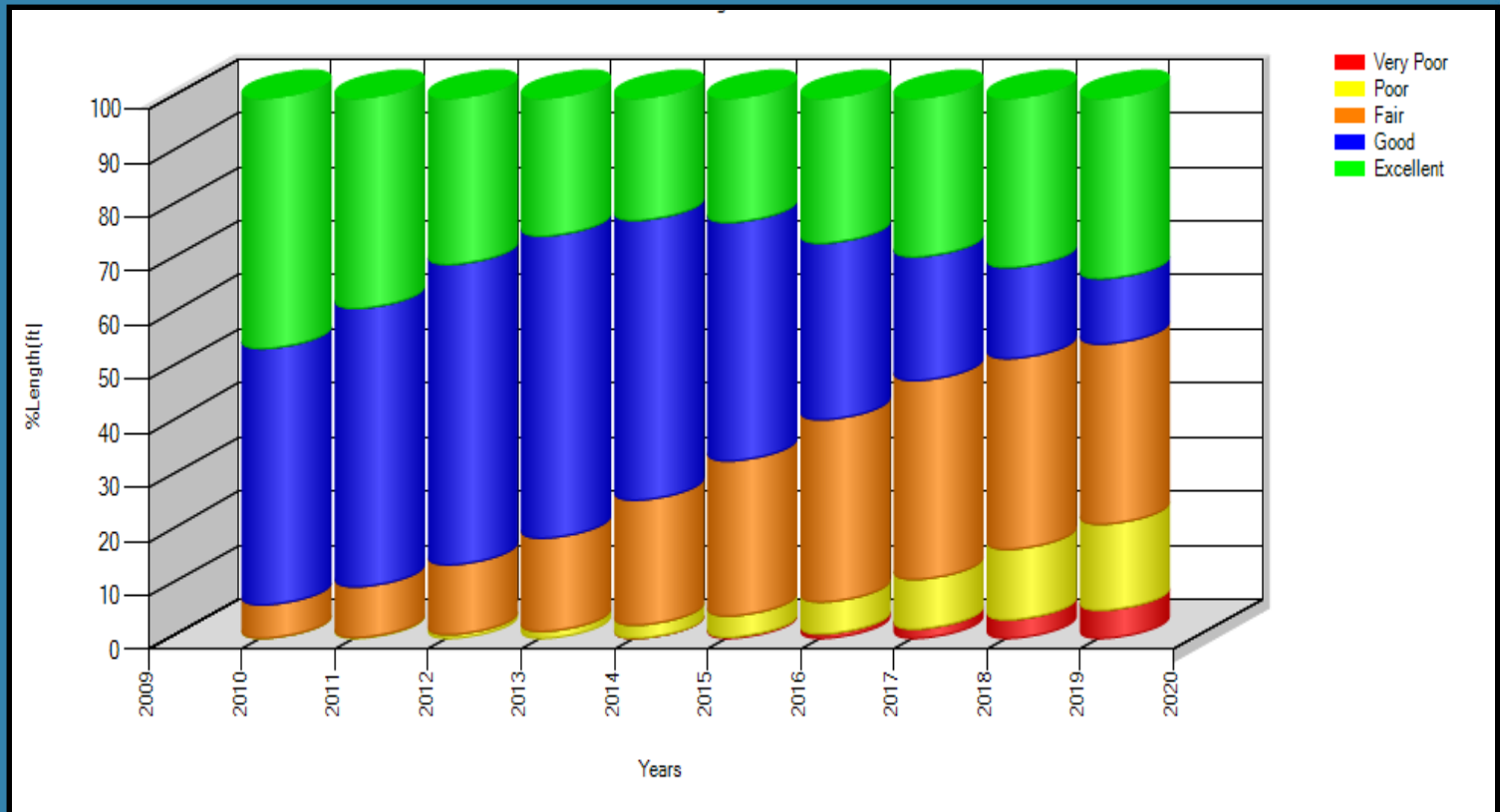
Work Program

Road	atb_street	atb_from	atb_to	trf_aadt	Ind_Rgh_nss	Ind_Env_mtl	Ind_Stru_tural	Ind_PCI	Con_dition	First Major Trt_Name	First Major Trt_Year
19550	12 ST	WASHINGTON ST	VAN BUREN ST	15001	1	87	94	32	P	Overlay	2010
19550	12 ST	WASHINGTON ST	VAN BUREN ST	15001	1	87	94	32	P	Crack_Seal	2016
20020	16 ST	JEFFERSON ST	WASHINGTON ST	14000	3	89	89	33	P	Overlay	2010
20020	16 ST	JEFFERSON ST	WASHINGTON ST	14000	3	89	89	33	P	Crack_Seal	2015
20825	24 ST	WASHINGTON ST	JEFFERSON ST	31000	0	88	93	32	P	Overlay	2010
20825	24 ST	WASHINGTON ST	JEFFERSON ST	31000	0	88	93	32	P	Crack_Seal	2015
33335	VAN BUREN ST	3 ST	CENTRAL AVE	11250	9	90	94	38	P	Overlay	2010
33335	VAN BUREN ST	3 ST	CENTRAL AVE	11250	9	90	94	38	P	Crack_Seal	2015
33670	ROOSEVELT ST	5 AVE	3 AVE	12500	1	83	90	31	P	Overlay	2010
33670	ROOSEVELT ST	5 AVE	3 AVE	12500	1	83	90	31	P	Crack_Seal	2015
33680	ROOSEVELT ST	3 AVE	CENTRAL AVE	12500	12	81	89	38	P	Overlay	2010
33680	ROOSEVELT ST	3 AVE	CENTRAL AVE	12500	12	81	89	38	P	Crack_Seal	2016



Present Pavement Preservation Practice

Condition Distribution





Present Pavement Preservation Practice

Benefit of current system

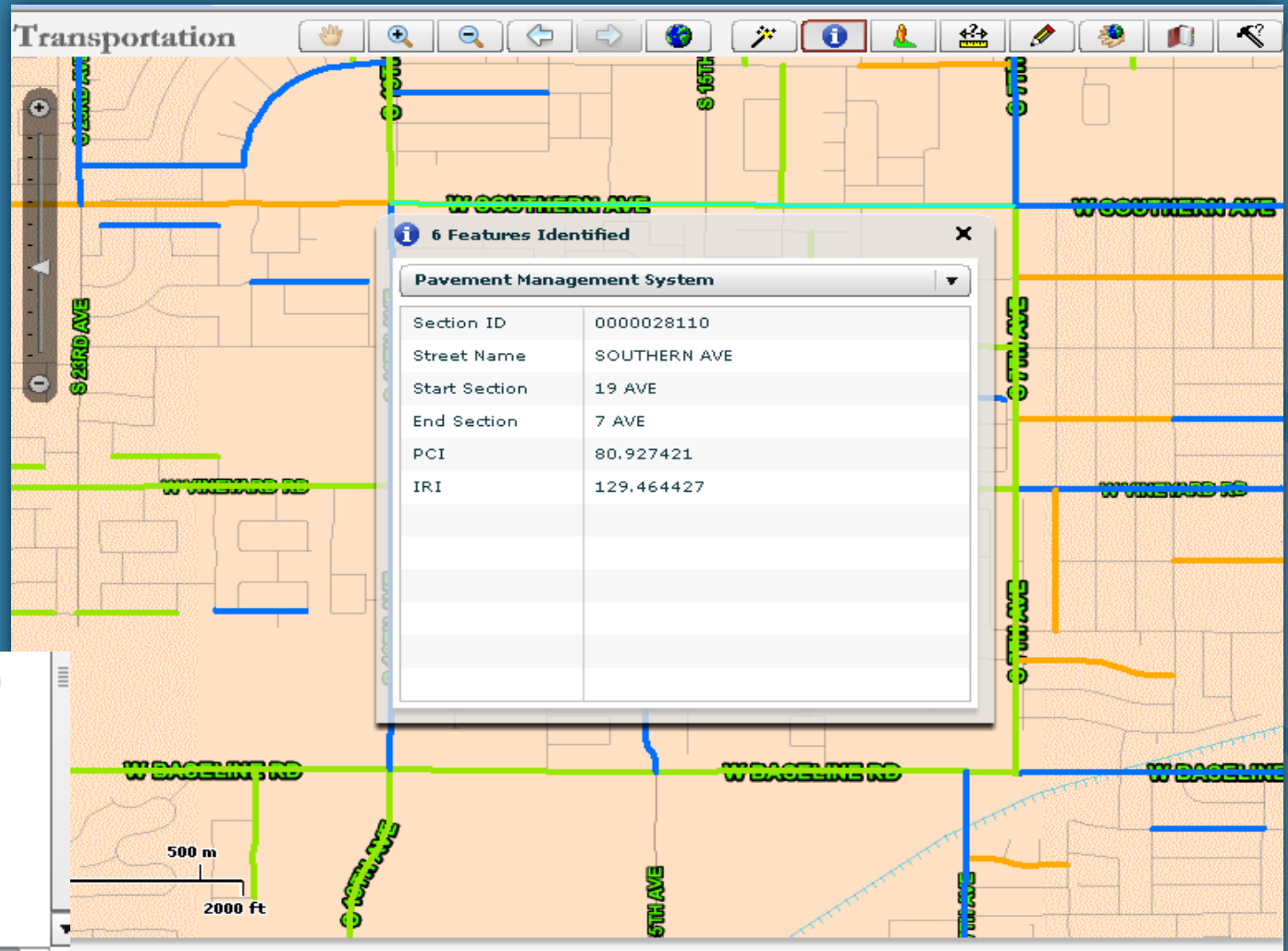
- Improved safety of collection
- Quicker pace
- Subjectivity minimized
- Results are easier to work with
- Offers flexibility with results
- Different budget scenarios analyzed





Present Pavement Preservation Practice

Benefit of current system





Future of Pavement Preservation

Challenges and Goals

- Calibrate results for practical interpretation
- Acceptance as a tool for effective asset management
- Become fully integrated with preservation programming





Future of Pavement Preservation

Benefits of Integrating with Preservation

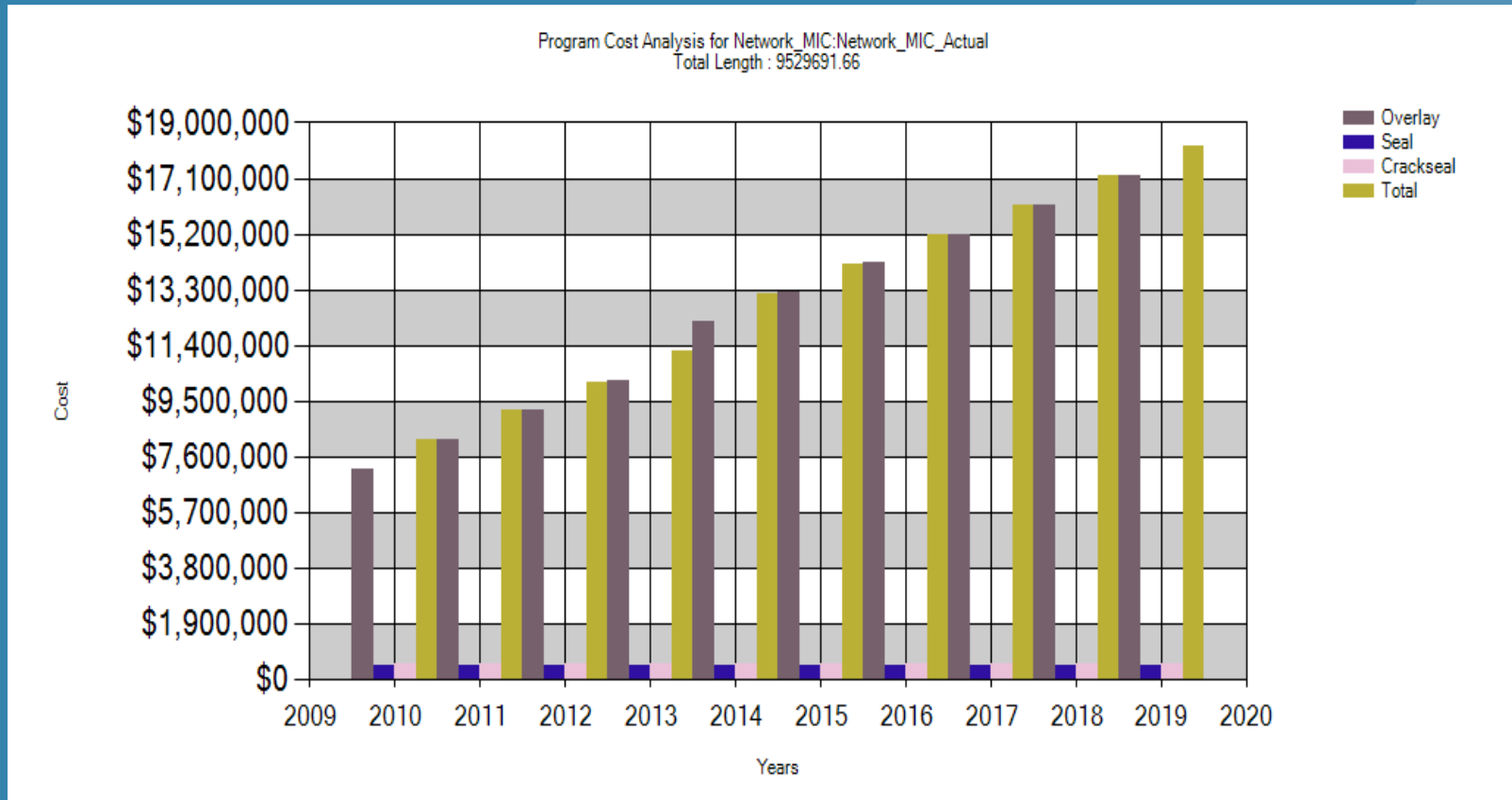
- Engineering based
- Comprehensive analysis of all assets
- Improved sequencing
- Improved quality and pavement life
- Effective system based practices
- Public perception
- Consistency





Present / Future of Pavement Preservation

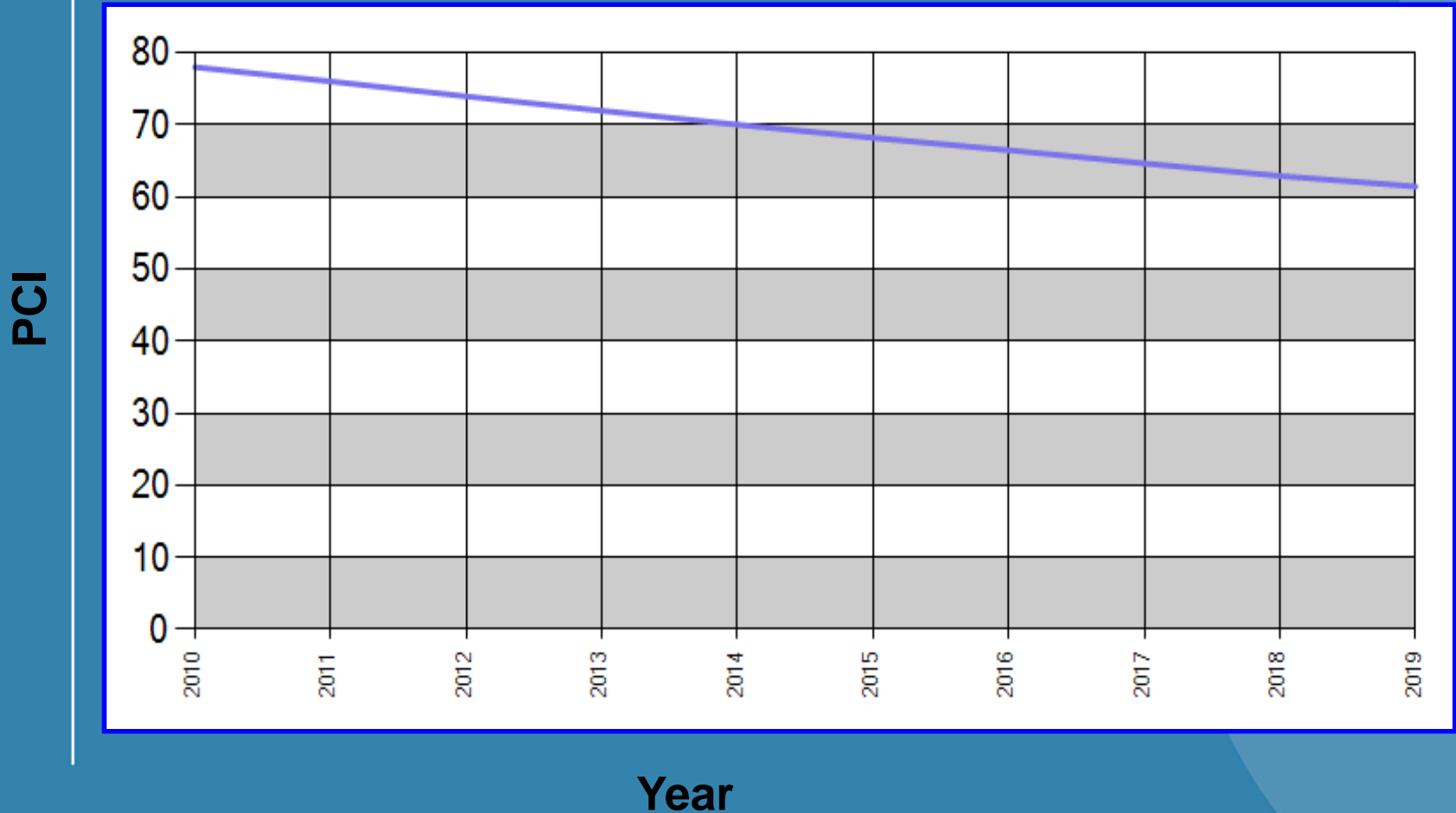
Cost Analysis





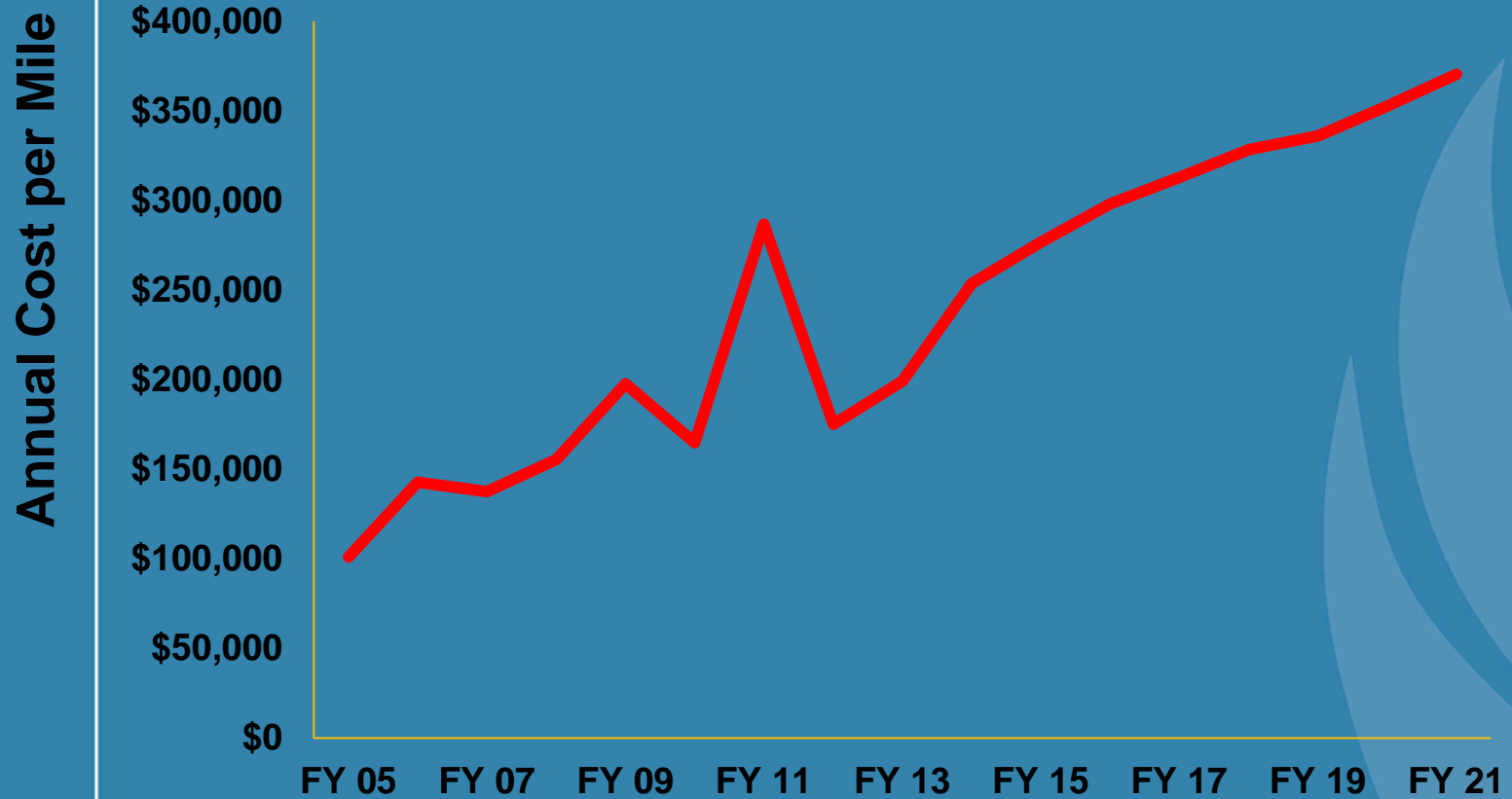
Present / Future of Pavement Preservation

Average PCI at present budget levels



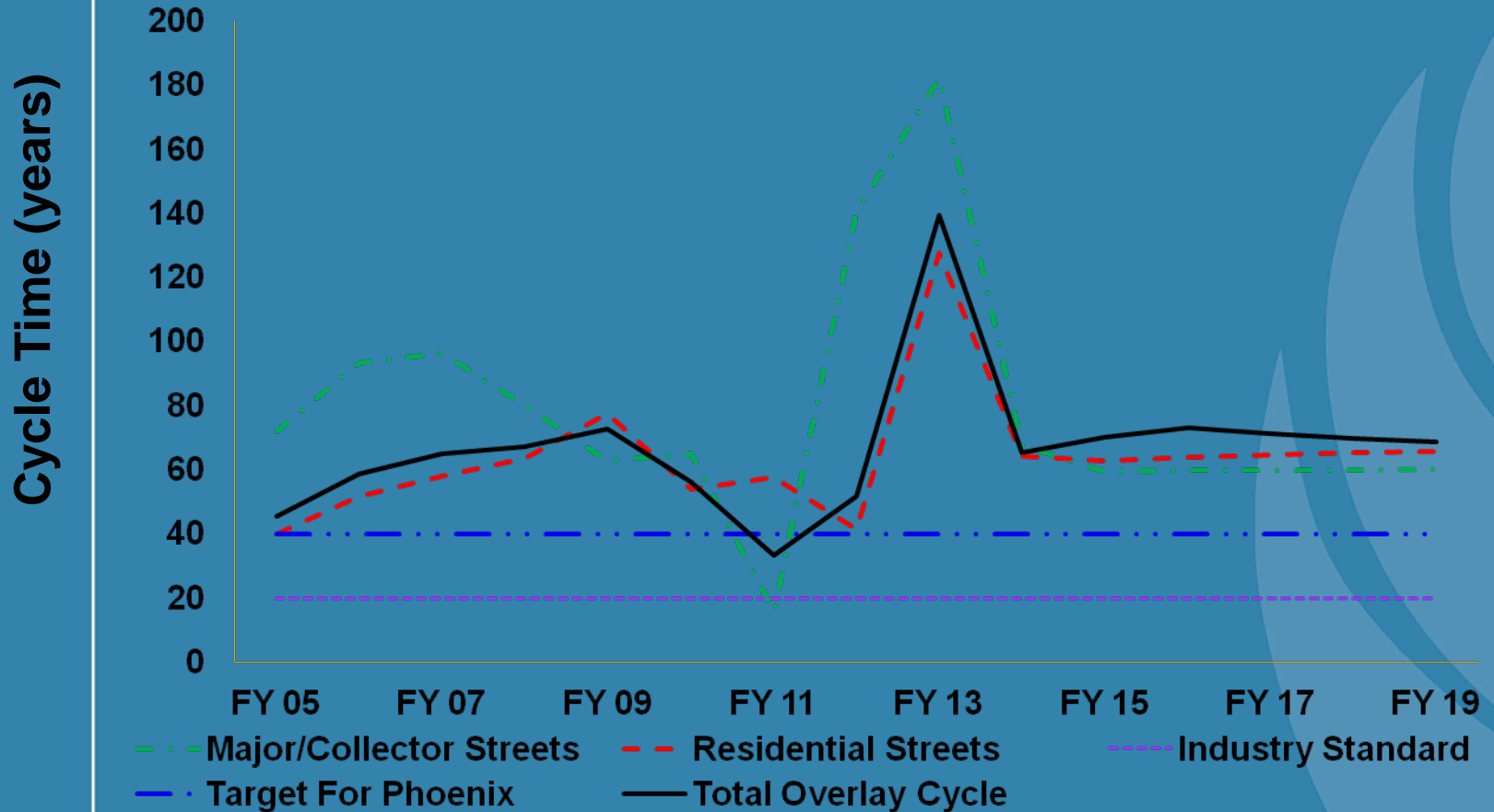


Cost Per Mile of Overlay



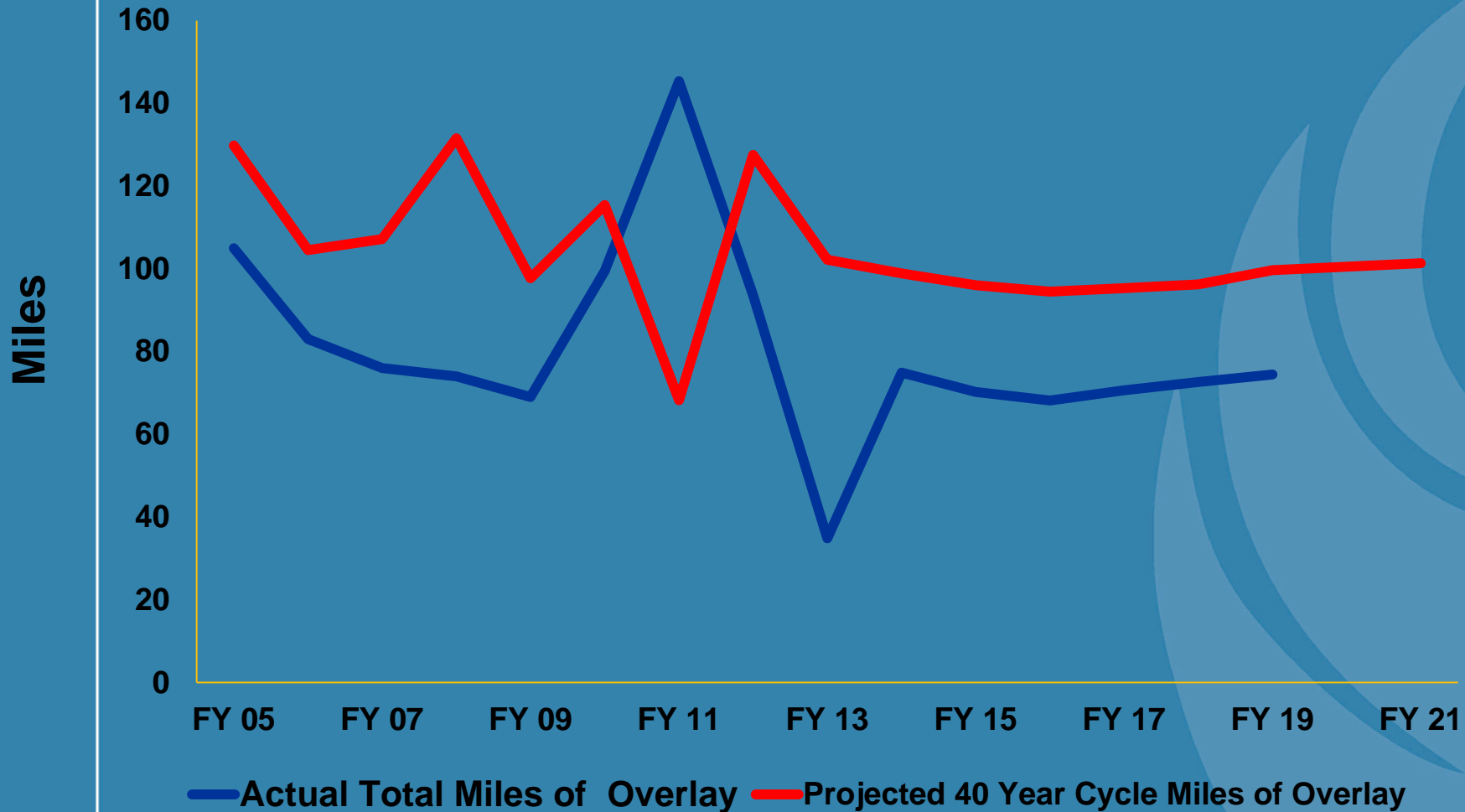


Cycle Times with Current Funding



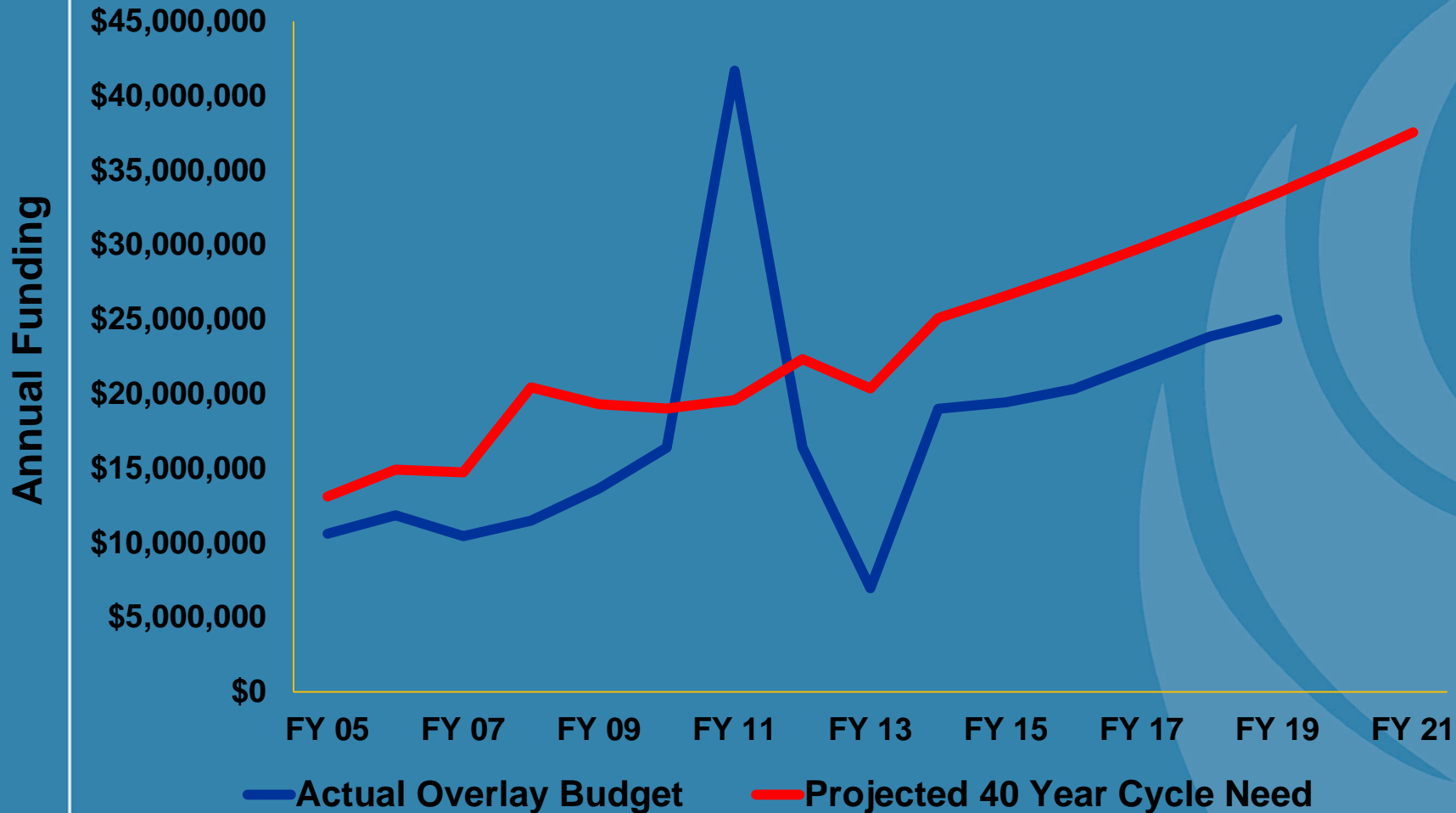


Annual Total Miles of Overlay





Actual Overlay Funding vs Need (for 40-Year Cycle)





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