



Diamond Grind Pilot Program

Transportation Policy Committee
June 17, 2020

Presentation Overview

1. Rubberized Asphalt Overview
2. Freeway Pavement Noise Reduction Analysis Study
3. Diamond Grind Pilot Program

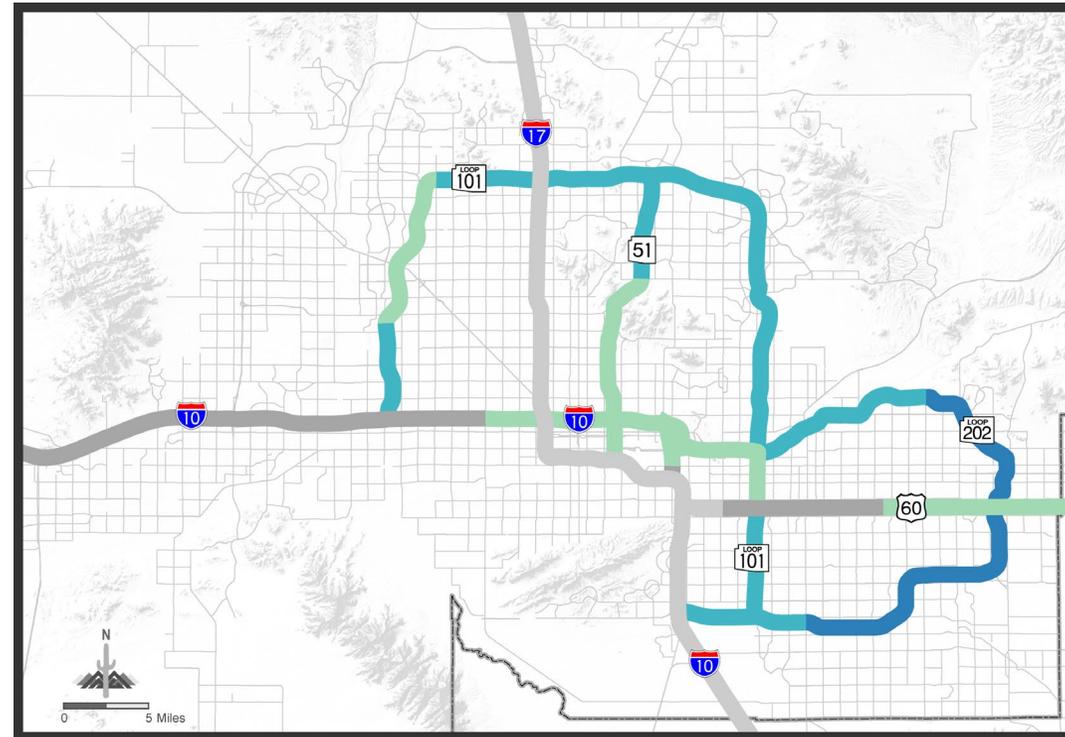


Photo Source: ADOT



Rubberized Asphalt: Overview and History

- Concerns in the early 2000s about freeway noise
- ADOT began investigating ways to mitigate noise
- Ultimately decided on a rubberized asphalt overlay
 - Asphalt Rubber Asphaltic Concrete Friction Course (AR-ACFC)
 - Quiet Pavement/Quiet Pave



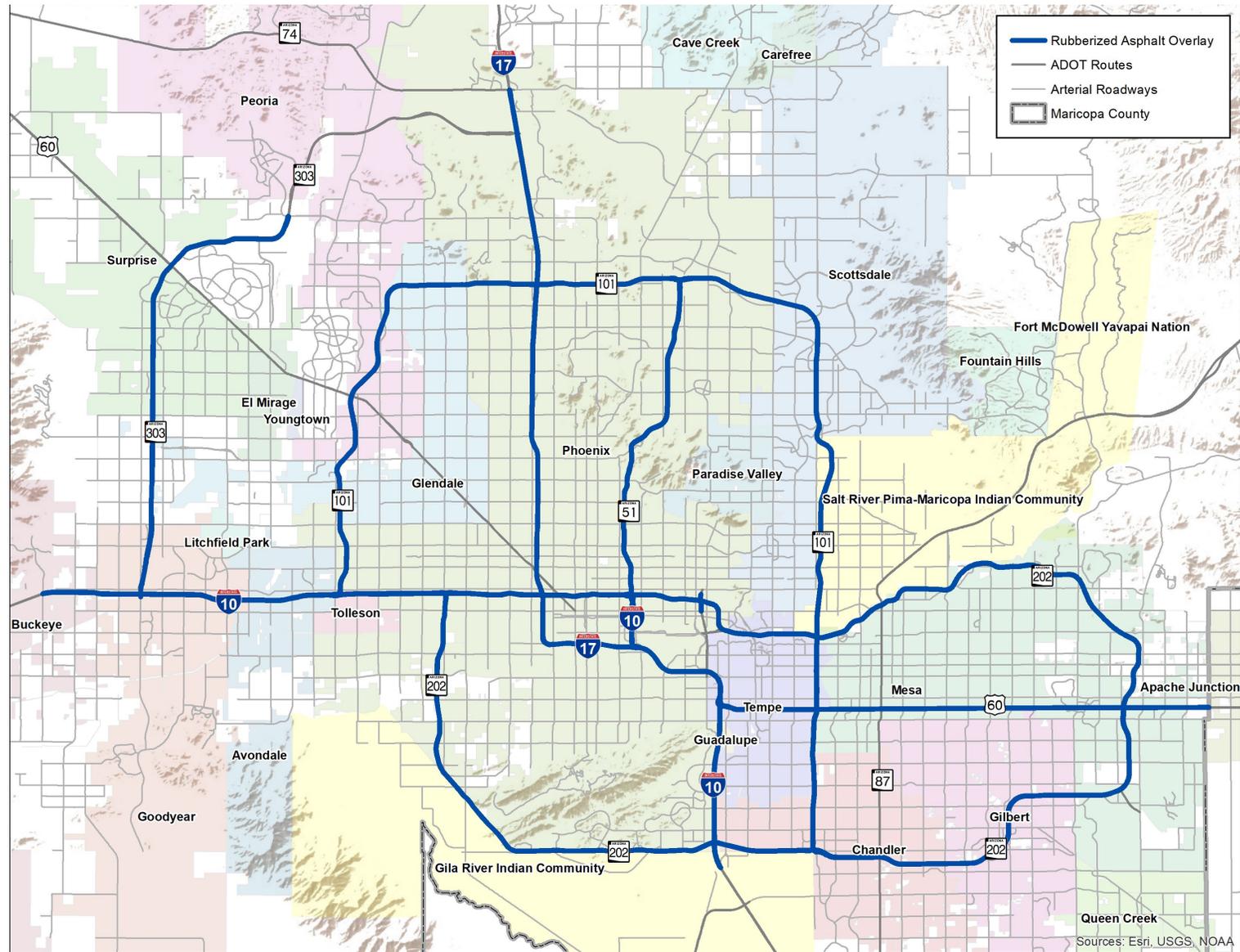
Freeway Construction Maricopa County

Year Open

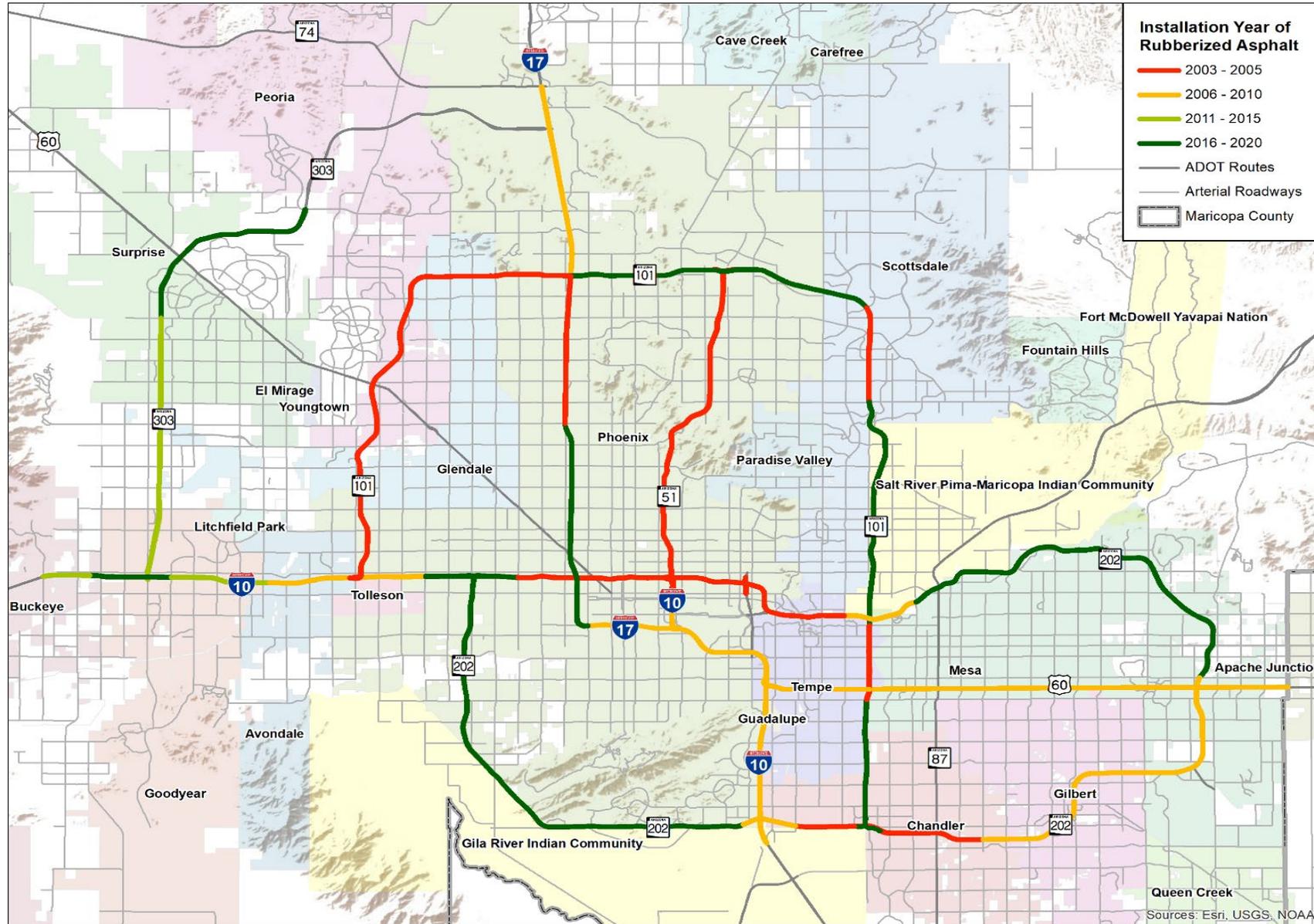
- 2004 - 2010
- 1996 - 2003
- 1985 - 1995
- 1971 - 1984
- Before 1971



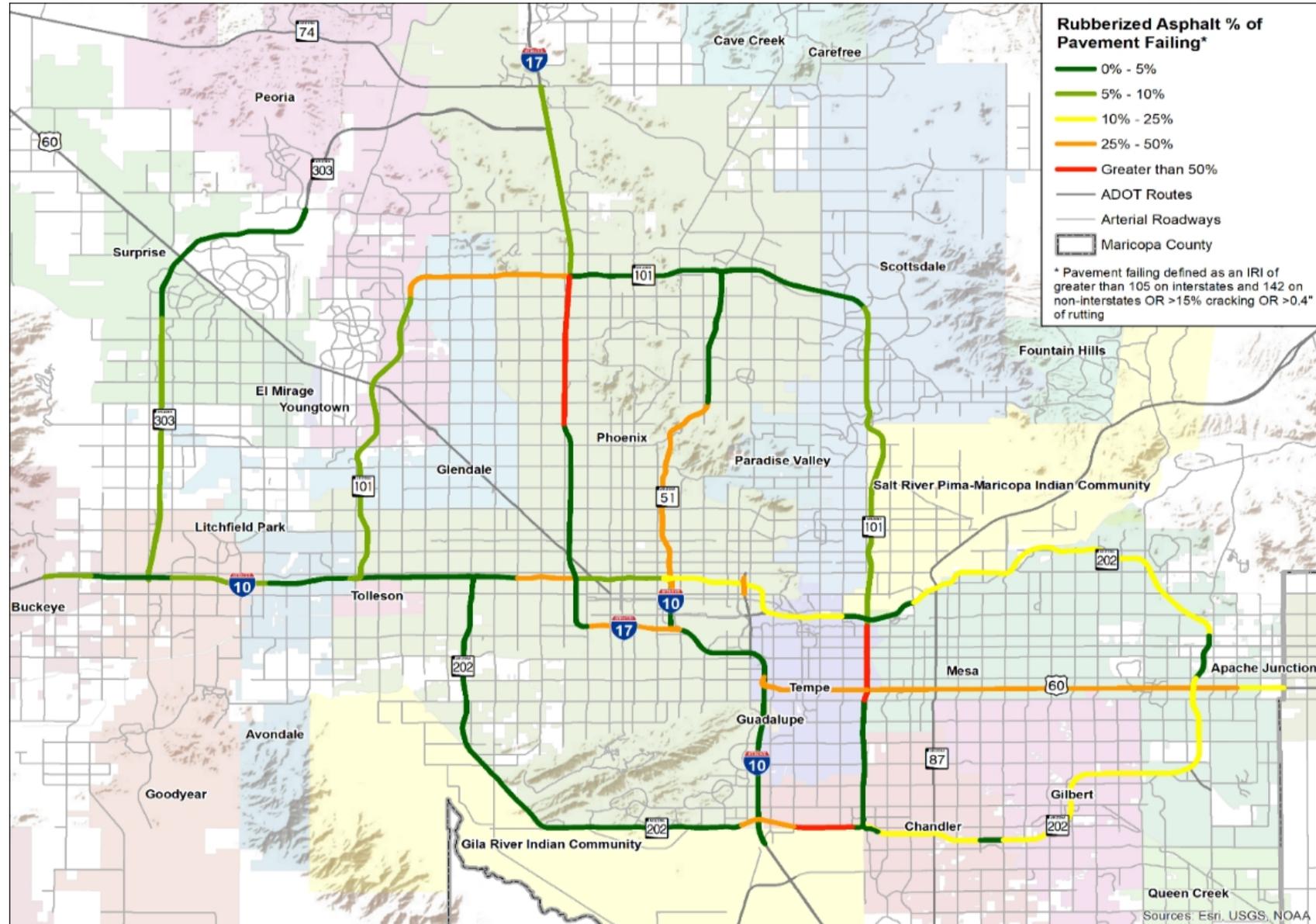
Freeway Life Cycle Program



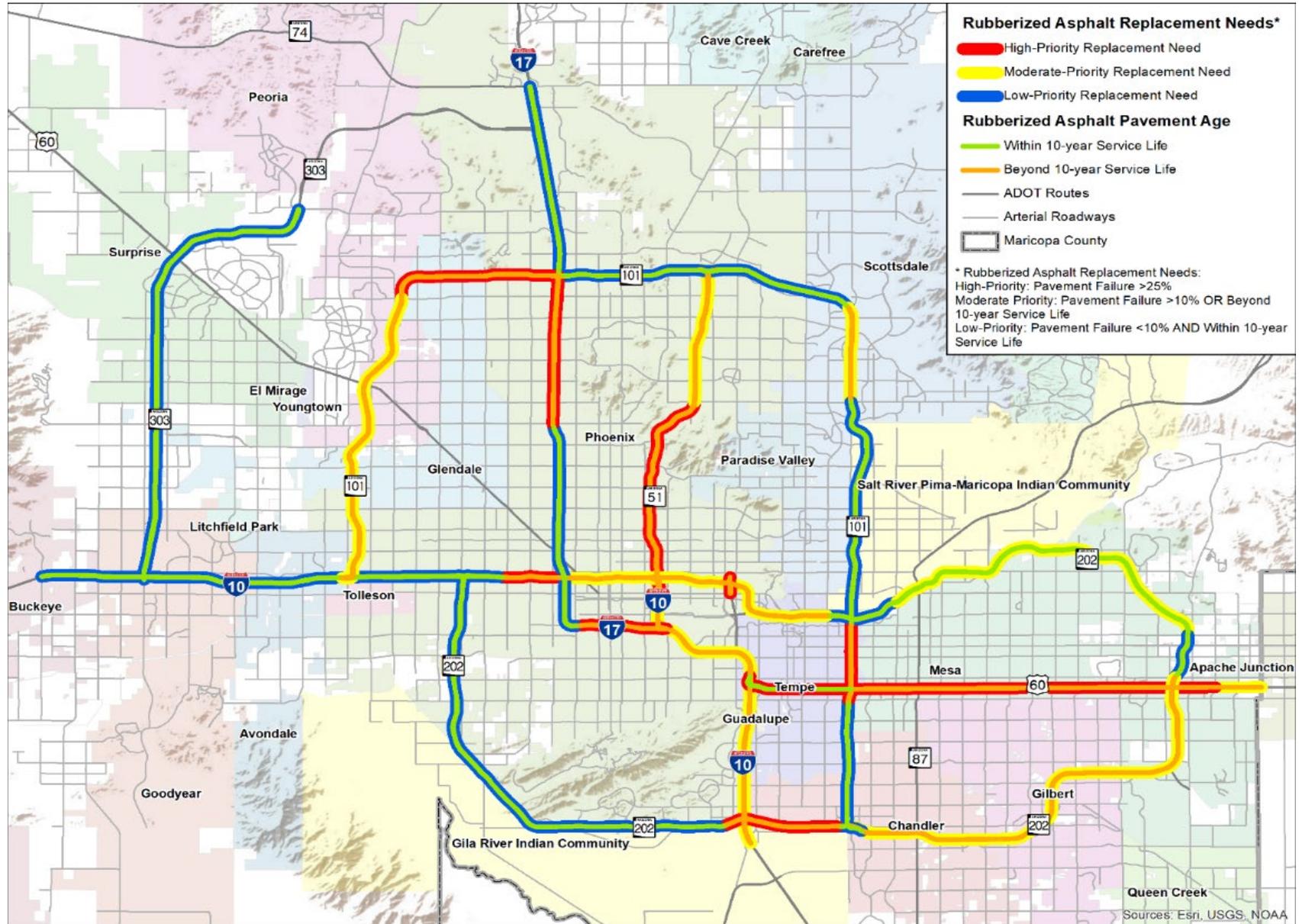
Rubberized Asphalt: Installation Year



Percentage of 'Failing' Rubberized Asphalt Pavement in 2018 by Segment



Rubberized Asphalt Replacement Needs



Freeway Pavement Noise Reduction Analysis Study



Pavement Surface Treatment Alternatives



Diamond Grind Treatment



Whisper Grind Treatment

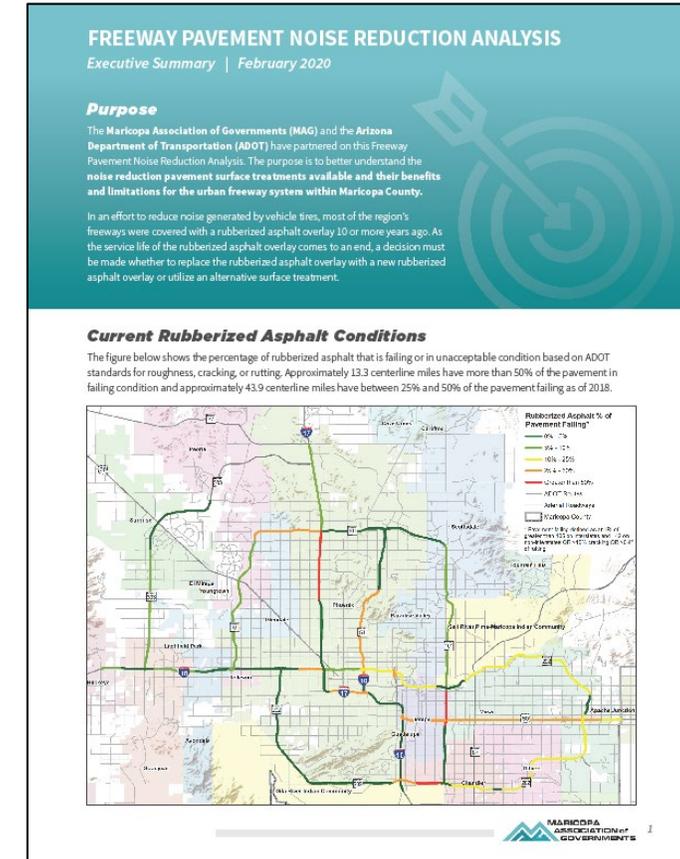


Skidabrader Treatment



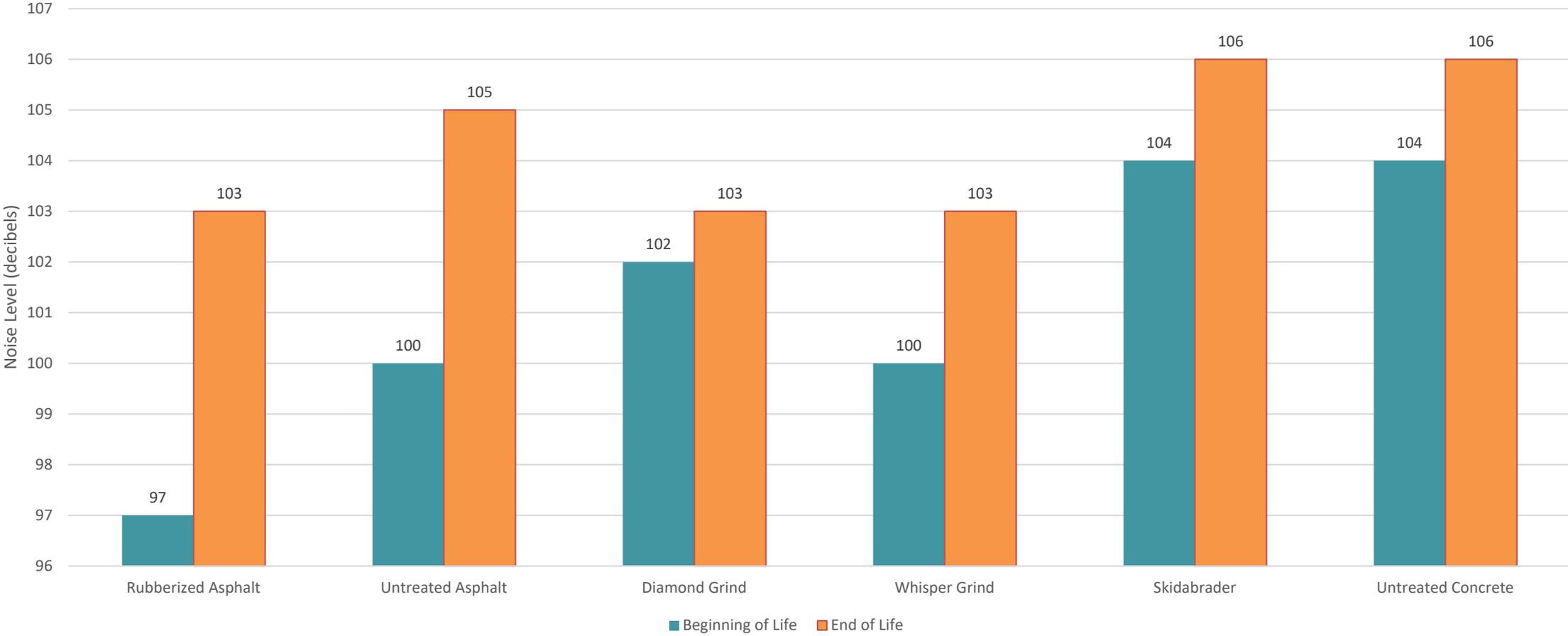
Freeway Pavement Noise Analysis Reduction Study

- MAG and ADOT partnered on the Freeway Pavement Noise Reduction Analysis Study
- Presented to the RTP Management Committee Work Group on March 4, 2020
- Presented to MAG Management Committee on March 11, 2020



Freeway Life Cycle Program

Typical Pavement Surface Noise Level over Service Life



Advantages and Disadvantages of Surface Treatments

Surface Attribute	Concrete Surface	Asphalt Surface
 NOISE LEVEL	<ul style="list-style-type: none"> + Little change over time - Typically higher than asphalt initially 	<ul style="list-style-type: none"> + Typically lower than concrete initially - Increases over time, ultimately being equal to or higher than concrete
 LIFE-CYCLE COST	<ul style="list-style-type: none"> + Lower than asphalt over service life - Typically higher than asphalt initially 	<ul style="list-style-type: none"> + Typically lower than concrete initially - Higher than concrete over service life
 ROAD SMOOTHNESS	<ul style="list-style-type: none"> + Little change over time - Has expansion cracks from heat/cold cycles 	<ul style="list-style-type: none"> + Has no expansion cracks - Raveling and cracking increase over time, especially when traffic volumes are high or there are many heavy vehicles (trucks)
 AESTHETICS	<ul style="list-style-type: none"> + Little change over time - Hard to see white pavement markings unless black outline of markings on white concrete surface are provided 	<ul style="list-style-type: none"> + Easy to see white pavement markings on dark asphalt surface - Deteriorates over time
 ENVIRONMENTAL IMPACTS	<ul style="list-style-type: none"> + Cooler than asphalt during the day - Hotter than asphalt at night; cannot easily be recycled 	<ul style="list-style-type: none"> + Cooler than concrete at night; can easily be recycled; provides slight reduction in PM-10 emissions compared to untreated concrete - Hotter than concrete during the day



Noise Levels, Life Span, and Costs

Pavement Noise Reduction Treatment	Typical Noise at Beginning of Service Life (dBA)	Typical Noise at End of Service Life (dBA)	Life Span (years)	Costs ¹			
				Per Lane Mile	Corridor ²	Life-Cycle Corridor ³	Life-Cycle System ⁴
Rubberized Asphalt	97	103	10	\$116,000	\$9,280,000	\$41,760,000	\$1,239,901,000
Diamond Grind	102	103	15	\$123,000	\$9,840,000	\$29,520,000	\$912,784,000
Whisper Grind	100	103	15	\$150,000	\$12,000,000	\$36,000,000	\$1,098,290,000
Skidabrader	104	106	15	\$90,000	\$7,200,000	\$21,600,000	\$686,054,000

1. Bridge joint replacement work is included in the diamond grind, whisper grind, and Skidabrader cost estimates.

2. Corridor costs based on a new 10-mile, eight-lane section (four lanes in each direction) with auxiliary lanes and shoulders.

3. Life-cycle costs based on corridor costs over a period of 25 years.

4. System costs based on maintenance and construction cost of the treatment for the entirety of the freeway system that currently has rubberized asphalt over a period of 25 years.

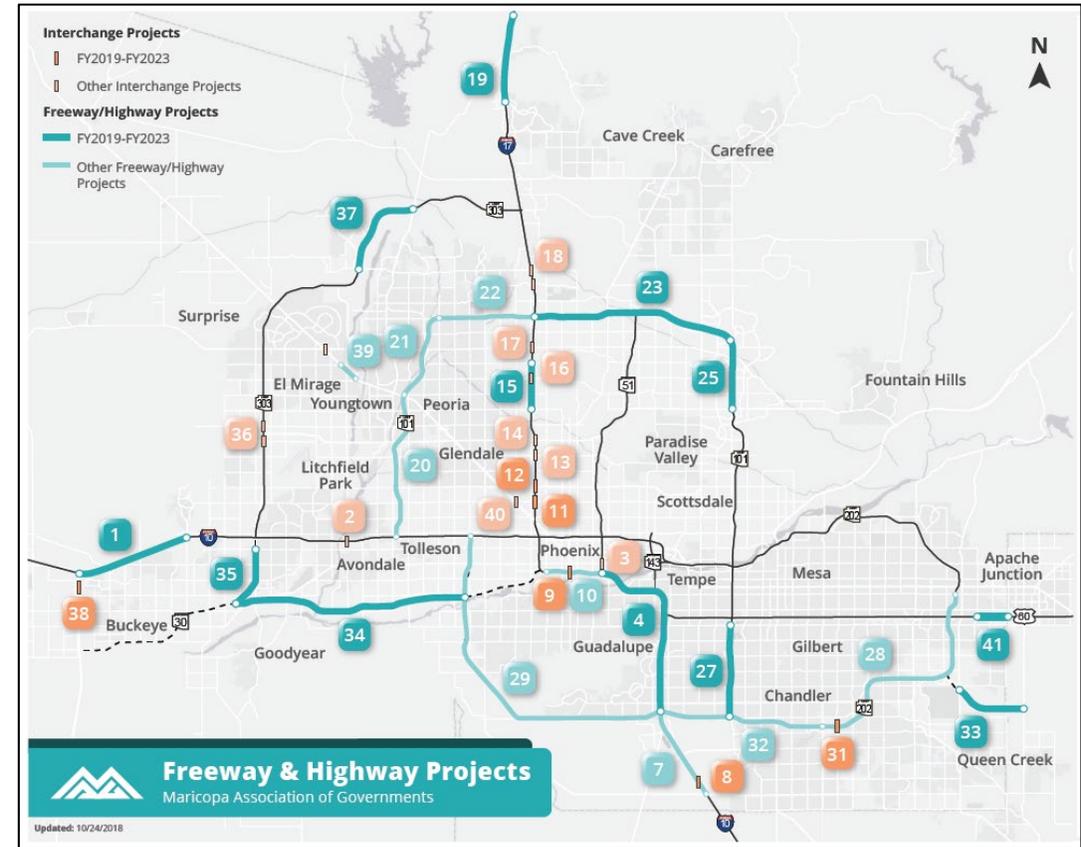


Diamond Grind Pilot Program



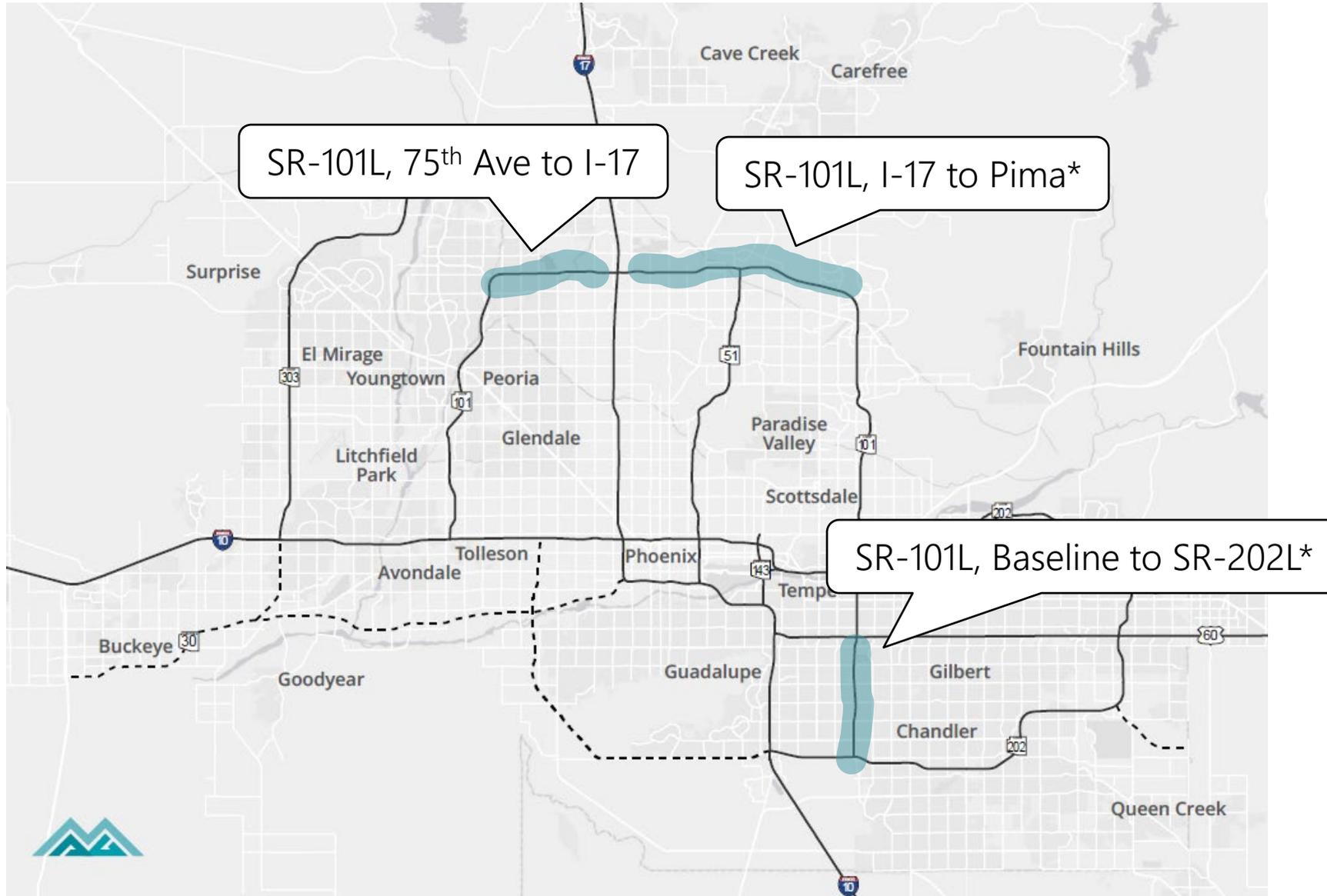
Diamond Grind Pilot Program

- Direction was provided to explore concrete-based surface treatments as an alternative to a rubberized asphalt overlay
- MAG has been working with ADOT to determine which FLCP projects could be candidates for a diamond grind pilot program



Freeway Life Cycle Program

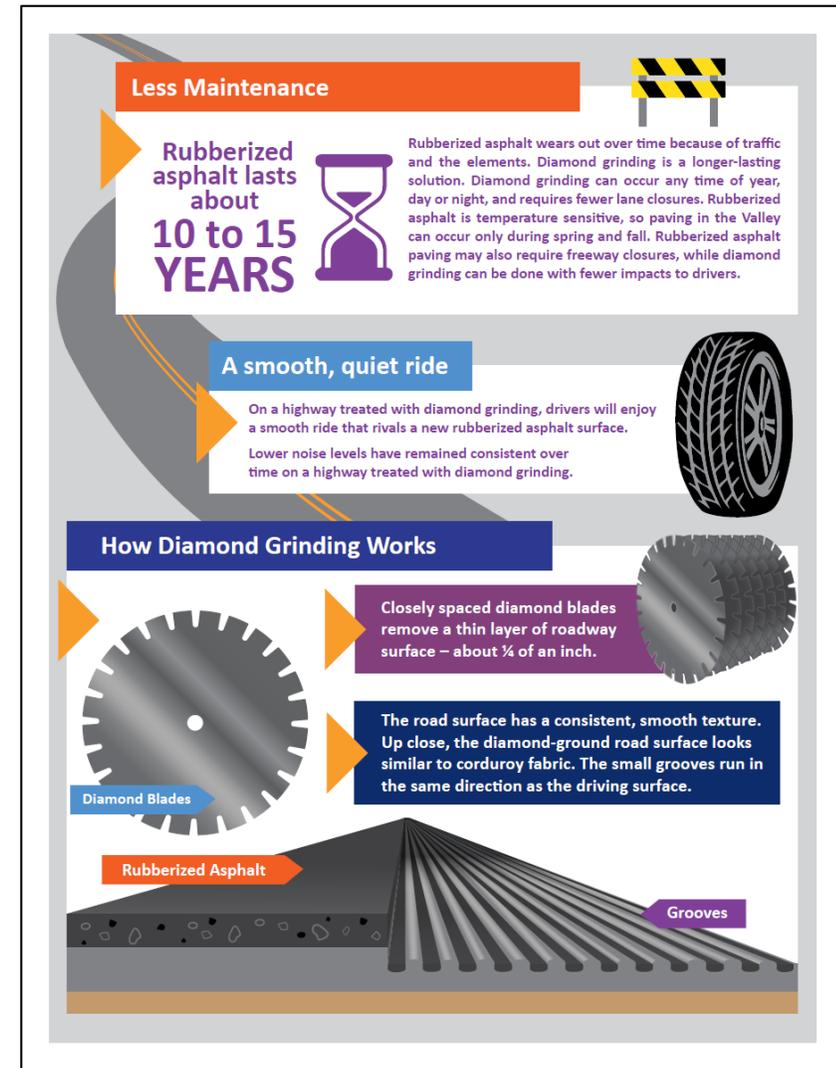
Diamond Grind Pilot Program: Projects



*Under Construction

Diamond Grind Pilot Program: Moving Forward

- ADOT will assess:
 - Life cycle costs
 - Quality of ride
 - Public acceptance of a ground concrete surface
- Formal approval to modify the project scopes to replace rubberized asphalt with a diamond grind surface treatment
- If the pilot demonstrates diamond grind is less effective, funding would be provided for a rubberized asphalt overlay



Freeway Life Cycle Program

Requested Action:

Recommend approval of the diamond grind pilot program.

