



PAVEMENT CONDITION EVALUATION RESULTS TOWN OF PRESCOTT VALLEY, AZ



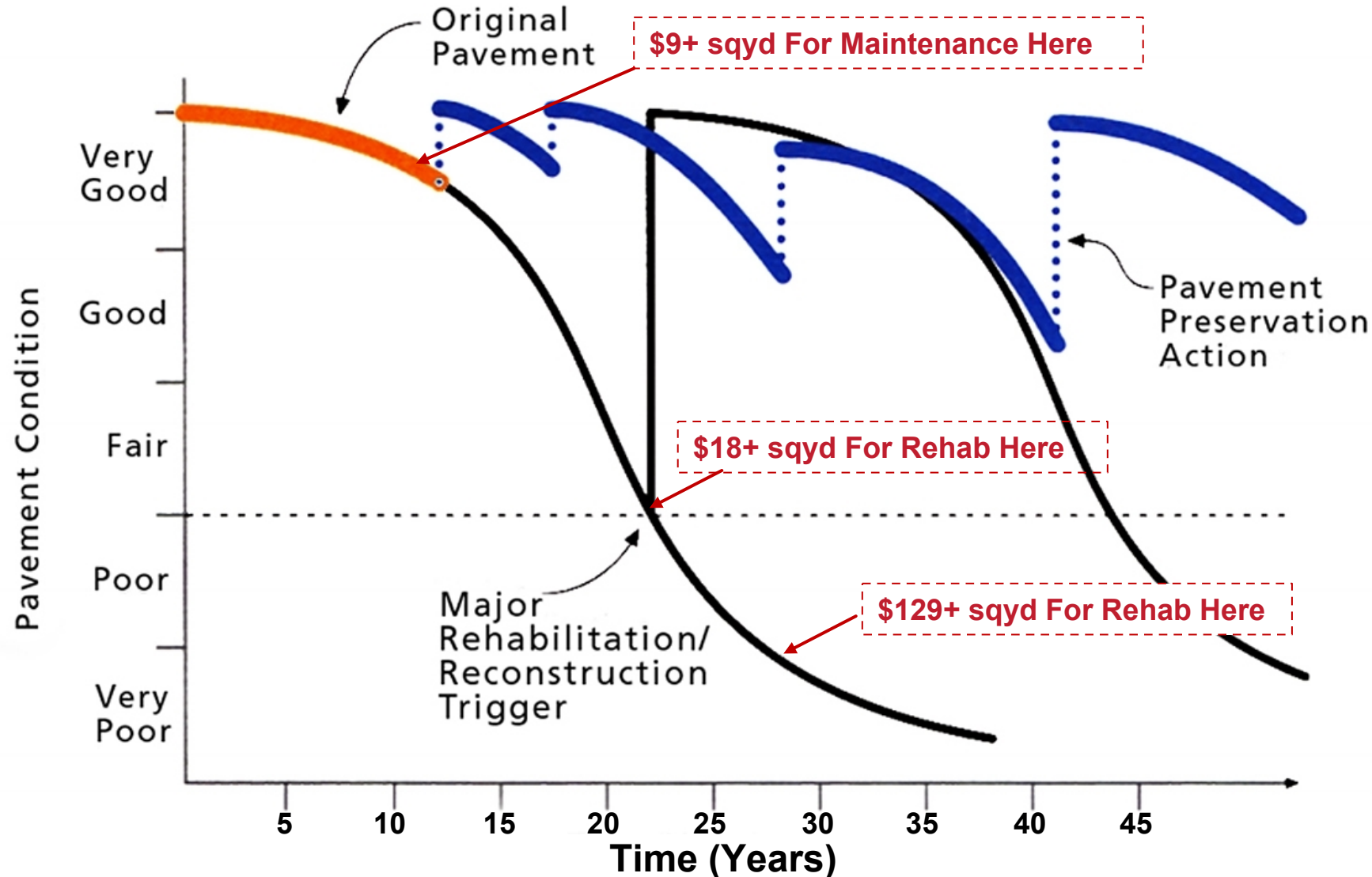


- **Centerline Miles** – Town maintains appx. 290 linear miles of paved roadway
- **Paved Area** – Over 4.46M SQYDS of pavement or enough material to pave a small two-lane road to San Diego California
- **Network Replacement Value** – Over a \$500M Dollar Asset (pavement only)
- **Pavement condition index (PCI)** – score 0 to 100
- **Preservation** – Light weight and cost-effective treatment to extend design life
- **ASTM D 6433** – National guideline for evaluation of pavements

| Pavement Condition Index (PCI) | Condition Description |
|--------------------------------|-----------------------|
| 86 – 100 | GOOD |
| 71 – 85 | SATISFACTORY |
| 56 – 70 | FAIR |
| 41 – 55 | POOR |
| 26-40 | VERY POOR |
| 11-25 | SERIOUS |
| 0 – 10 | FAILED |

System Statistics & Terminology

Purpose of Pavement Management



Benefits of Active Maintenance

- Extend pavement design life at lowest possible cost
- Reduce the cost of roadway ownership
- Improve the level of service over the roadway's life
- Delay costly rehabilitation for as long as possible

Roadway Asset Collection Van

Ladybug 360° Right-of-Way Camera

- Panoramic 360 degree video
- proven Ladybug camera technology
- 32 mega pixel resolution.
- Integrated with onboard DMI to increase relative accuracy
- Processed every 20 feet
- Utilized for asset extraction.

Global Positioning System (GPS)

Laser Crack Measuring System (LCMS-2)

- two 1-millimeter resolution line scan cameras.
- 1mm resolution is equivalent to over 4,000 dedicated laser points.
- 32MP HD imagery
- 100% contiguous survey & processing
- Objective ASTM D6433 assessment

TTI Certified 3-Laser Profiler -Roughness -Rutting

Internal Inertial Measuring Unit (IMU)

Distance Measuring Instrument (DMI)

High Quality ROW Images

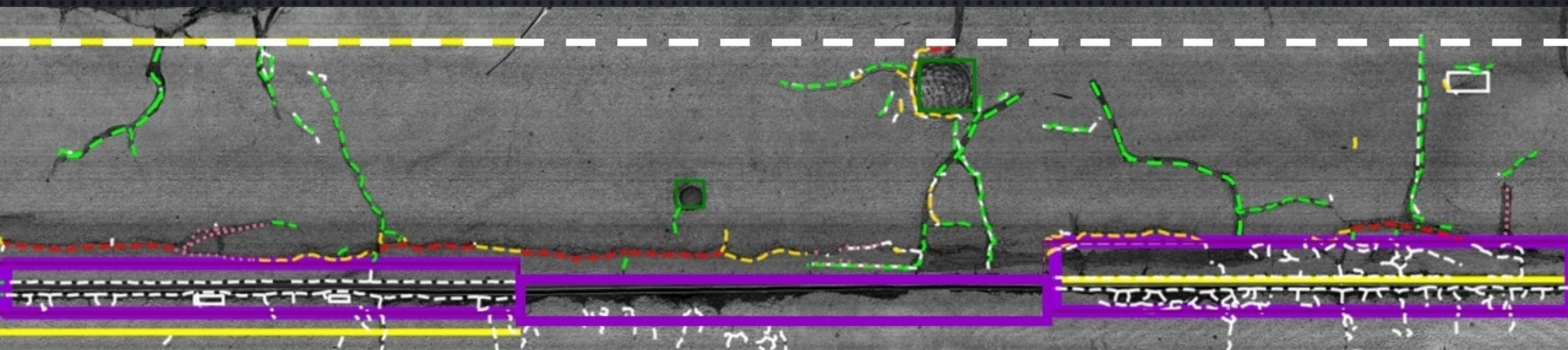


- Sensor processing to detect, classify, and quantify ASTM D6433 distresses
- Detected distresses measured and overlaid on images
- Distresses classified based upon geometry and density algorithm
- GIS coordinates for each distress ties to images for location
- Images available for QC and verification
- **Calculated an ASTM D6433 PCI score for every segment of road**

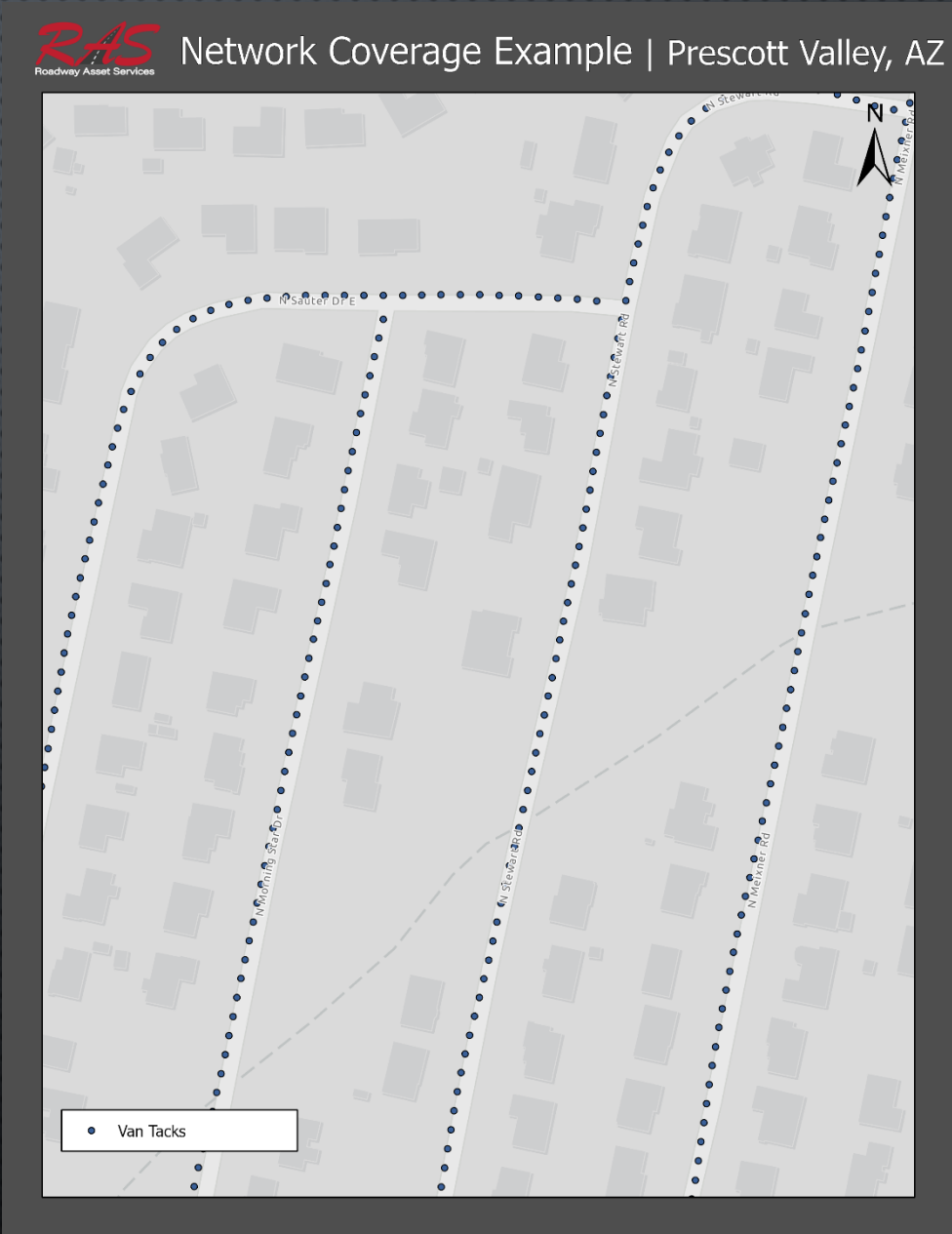
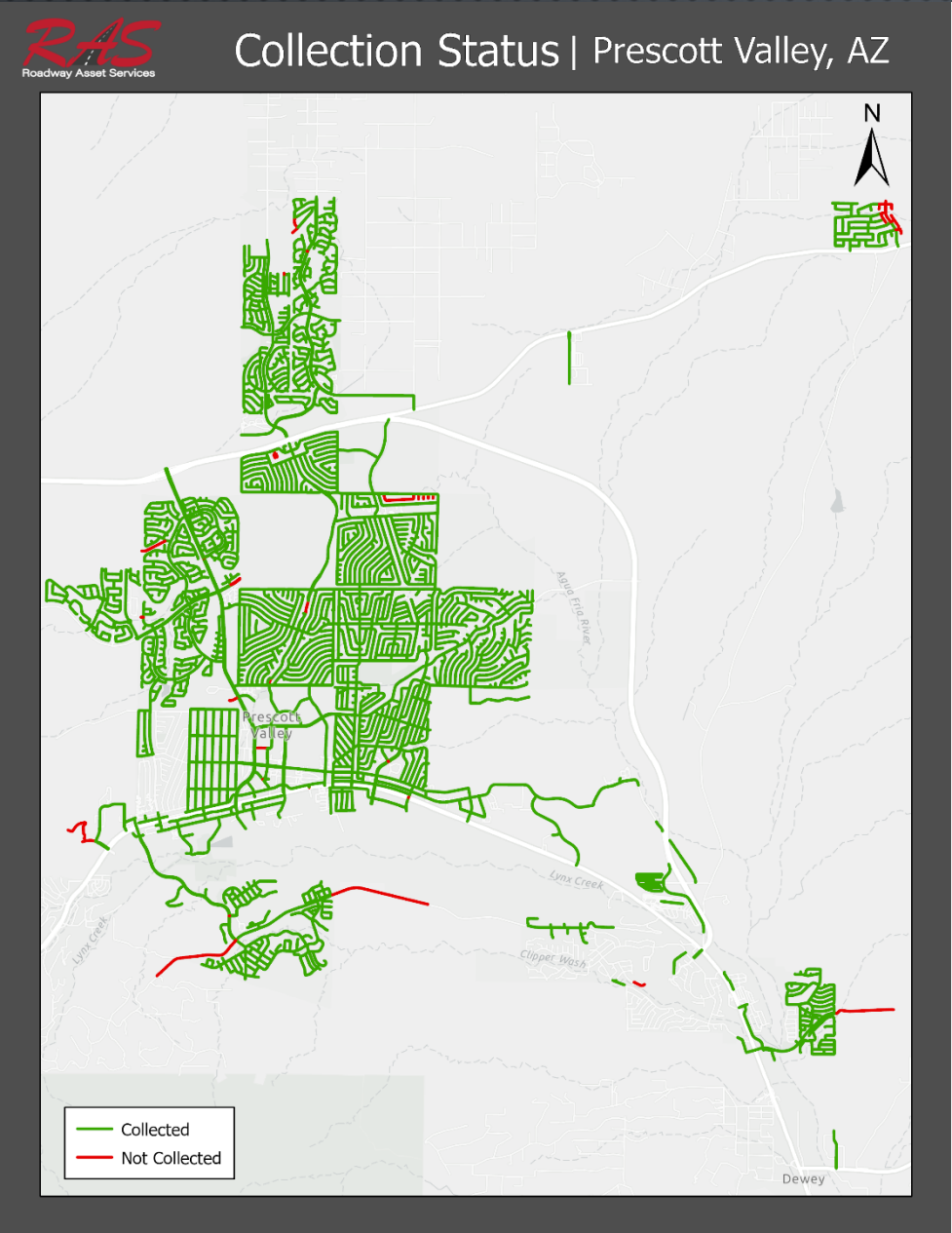
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Onsite Pilot Field Review

- Perform field visit with Town staff to review pilot data and results
- 100% Linear Survey
- Automated processing evolution
 - Block cracking vs Alligator cracking
- Select Good / Fair / Poor roads for pilot
 - Perform QC on collected data in the field
- Discuss conditions and expectations with Staff



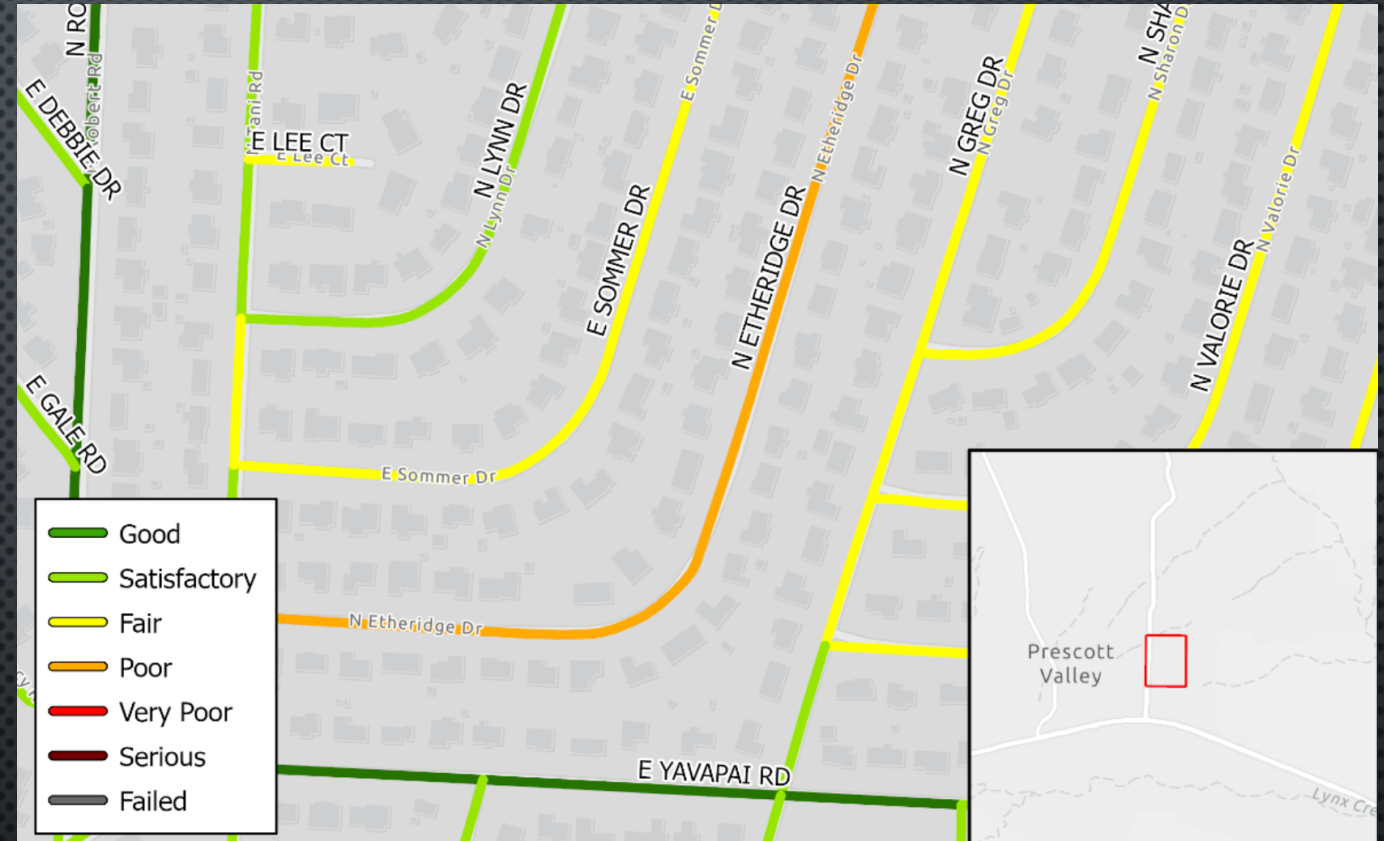
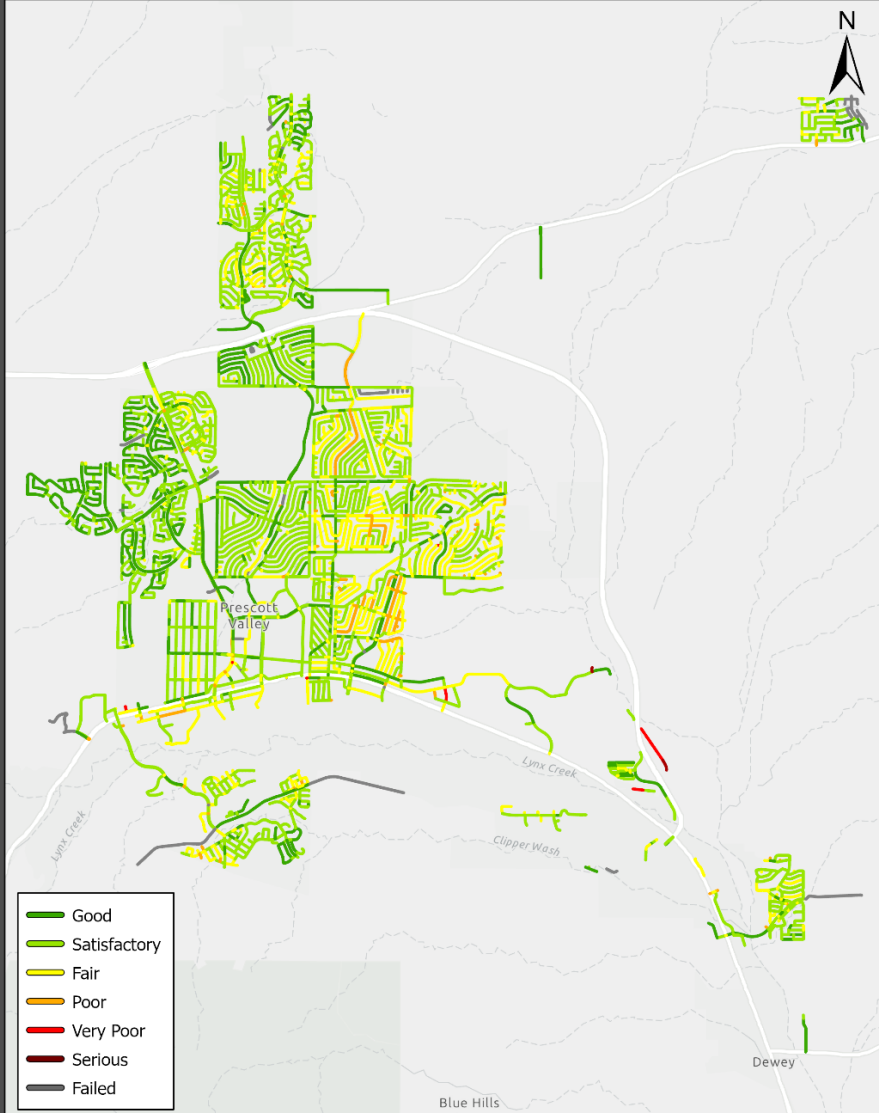
CENTERLINE FILE VERIFICATION



PAVEMENT CONDITION RESULTS



OCI Distribution | Prescott Valley, AZ



| Pavement Condition Index (OCI) Range | Condition Description | Total Area Yd2 | Total Distance (Centerline Miles) | Percent of Asphalt Miles |
|--------------------------------------|-----------------------|----------------|-----------------------------------|--------------------------|
| 86 - 100 | Good | 1,073,236 | 62.82 | 24.05% |
| 71 - 85 | Satisfactory | 2,441,478 | 158.56 | 54.70% |
| 56 - 70 | Fair | 821,659 | 54.25 | 18.41% |
| 41 - 55 | Poor | 112,966 | 7.19 | 2.53% |
| 0- 40 | Very Poor | 11,602 | 0.79 | 0.26% |
| 11-25 | Serious | 2,505 | 0.17 | 0.06% |
| 0-10 | Failed | 0 | 0 | 0.00% |
| Total of Rated Segments | | 4,463,446 | 283.78 | 100% |

Pavement Condition Results & Health Metrics



Network Average PCI

The national average we see is a 65-75. Less than 1 in 10 score above a 75 and less than 1 in 20 above an 80



Percent of Good Roads

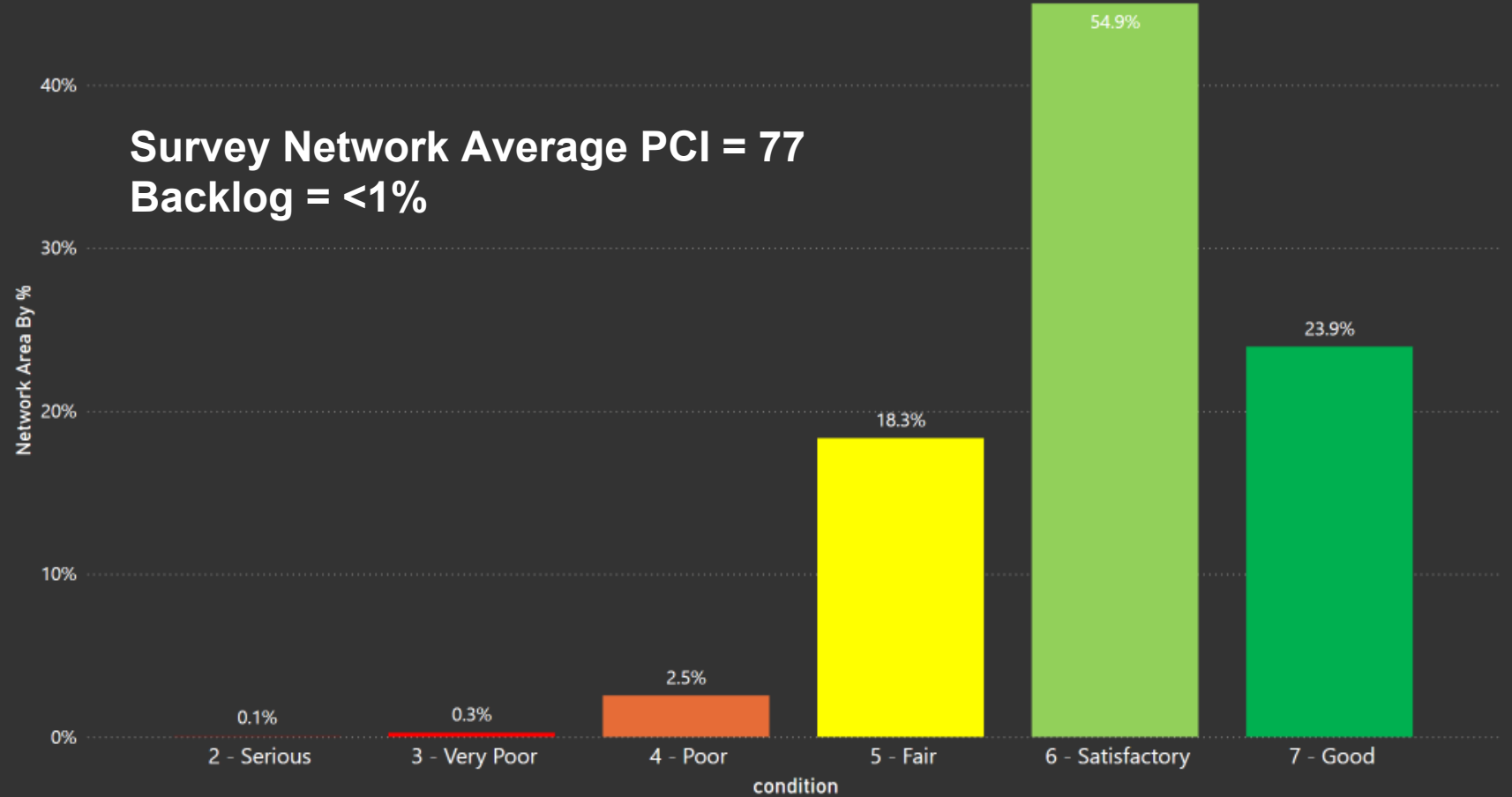
20% is about the average we see across the nation



Percent of Backlog

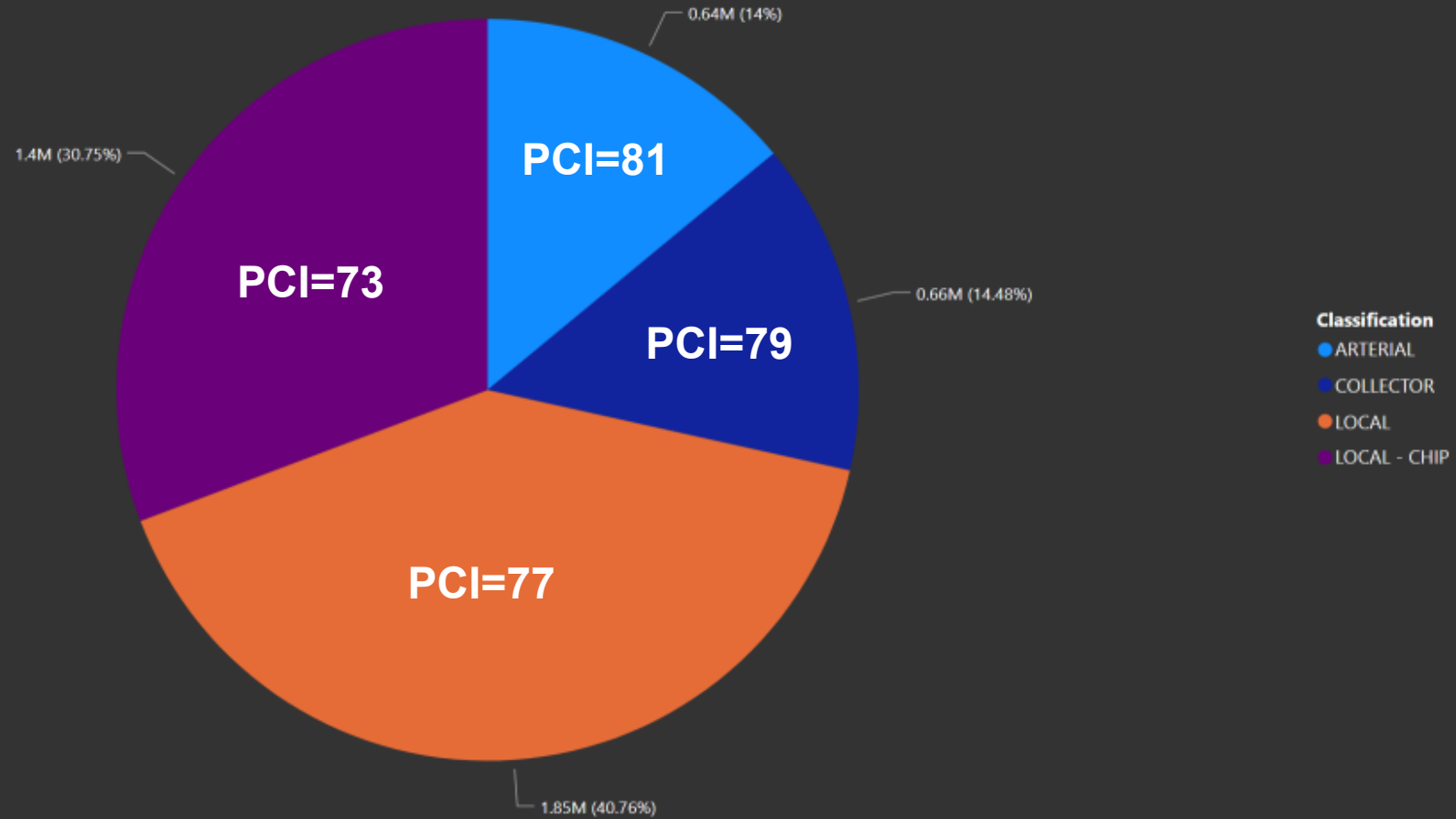
These are the Very Poor, Serious, & Failed roads. Less than 10% is ideal and 15% is a maximum recommended mark. 20% and greater is difficult to catch up from

Condition Summary By Category



Types of Roadways in Prescott Valley

Sum of Area (yd2) by Classification



Programmed Maintenance & Rehabilitation Activities

| PAVEMENT TYPE | | CLASSIFICATION | | STRENGTH | | ACTIVE | |
|---------------|--|----------------|--|----------|--|--------|--|
| Asphalt | | ARTERIAL | | Strong | | All | |

| Pavement Type | Classification | Strength | Active | Code | Treatment | Min OCI | Critical OCI | Max OCI | \$/yd2 | Priority | Reset Type | Reset Value |
|---------------|----------------|----------|--------|------|---------------------------|---------|--------------|---------|--------|----------|------------|-------------|
| Asphalt | ARTERIAL | Strong | N | 0 | Do Nothing | 85 | 88 | 100 | 0.00 | 500 | absolute | 0 |
| Asphalt | ARTERIAL | Strong | Y | 100 | Microsurfacing | 70 | 73 | 85 | 9.78 | 300 | relative | 10 |
| Asphalt | ARTERIAL | Strong | Y | 110 | Cape Seal + Patching | 60 | 63 | 70 | 10.22 | 200 | relative | 15 |
| Asphalt | ARTERIAL | Strong | Y | 200 | Mill & Overlay | 40 | 43 | 60 | 16.78 | 100 | absolute | 95 |
| Asphalt | ARTERIAL | Strong | Y | 300 | Full Depth Reconstruction | 0 | 25 | 40 | 129.00 | 400 | absolute | 99 |

A few enhancements:

Treat each classification separately

Arterials – Collectors – Locals – Locals w/chip

Preservation activities included (i.e. slurry, Micro, Cape, etc.)

Mill & Overlay and Full Depth Reconstruction included

| PAVEMENT TYPE | | CLASSIFICATION | | STRENGTH | | ACTIVE | |
|---------------|--|----------------|--|----------|--|--------|--|
| Asphalt | | LOCAL | | Strong | | All | |

| Pavement Type | Classification | Strength | Active | Code | Treatment | Min OCI | Critical OCI | Max OCI | \$/yd2 | Priority | Reset Type | Reset Value |
|---------------|----------------|----------|--------|------|---------------------------|---------|--------------|---------|--------|----------|------------|-------------|
| Asphalt | LOCAL | Strong | N | 0 | Do Nothing | 85 | 88 | 100 | 0.00 | 500 | relative | 0 |
| Asphalt | LOCAL | Strong | Y | 140 | Slurry Seal | 70 | 73 | 85 | 9.78 | 300 | relative | 10 |
| Asphalt | LOCAL | Strong | Y | 101 | Microsurfacing + Patching | 60 | 63 | 70 | 9.78 | 200 | relative | 15 |
| Asphalt | LOCAL | Strong | Y | 200 | Mill & Overlay | 40 | 43 | 60 | 16.78 | 100 | absolute | 95 |
| Asphalt | LOCAL | Strong | Y | 300 | Full Depth Reconstruction | 0 | 25 | 40 | 129.00 | 400 | absolute | 99 |

Why This Road and Not That One???

WHAAAA?!?!?



Let's define selection criteria commonly used:

Prioritization = Order of Priority
Arrange from highest to lowest

Financial Optimization = Maximum Financial Benefit
Arrange from maximum to minimum



Prioritization = Order of Priority
Arrange from highest to lowest



CRITICAL — Roads that will drop into a more costly rehabilitation category next year

Pavement Type — Asphalt typically a higher priority as it deteriorates more rapidly

Traffic/Classification — Higher volume roadways have higher priority

Strength — Weak roads have a higher priority than strong roads

PCI / Condition — Absolute PCI values are then used as a tie breaker

What Does Cost of Deferral Prioritization Look Like?

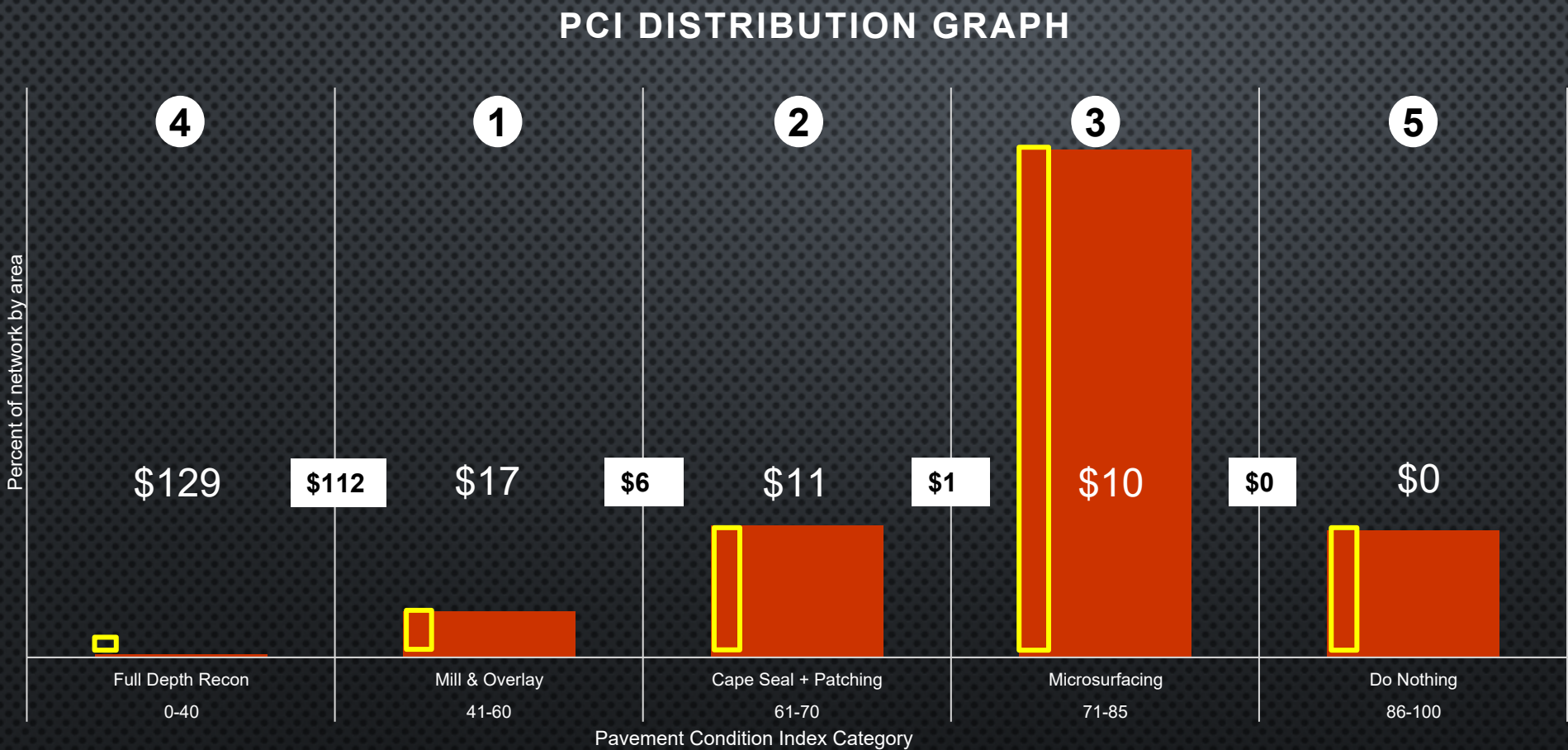


Illustration Legend



Cost of maintenance in this PCI range per SQYD



Critical roads at risk of costing more next year



Cost of deferred maintenance per SQYD



Selection sequence using financial optimization

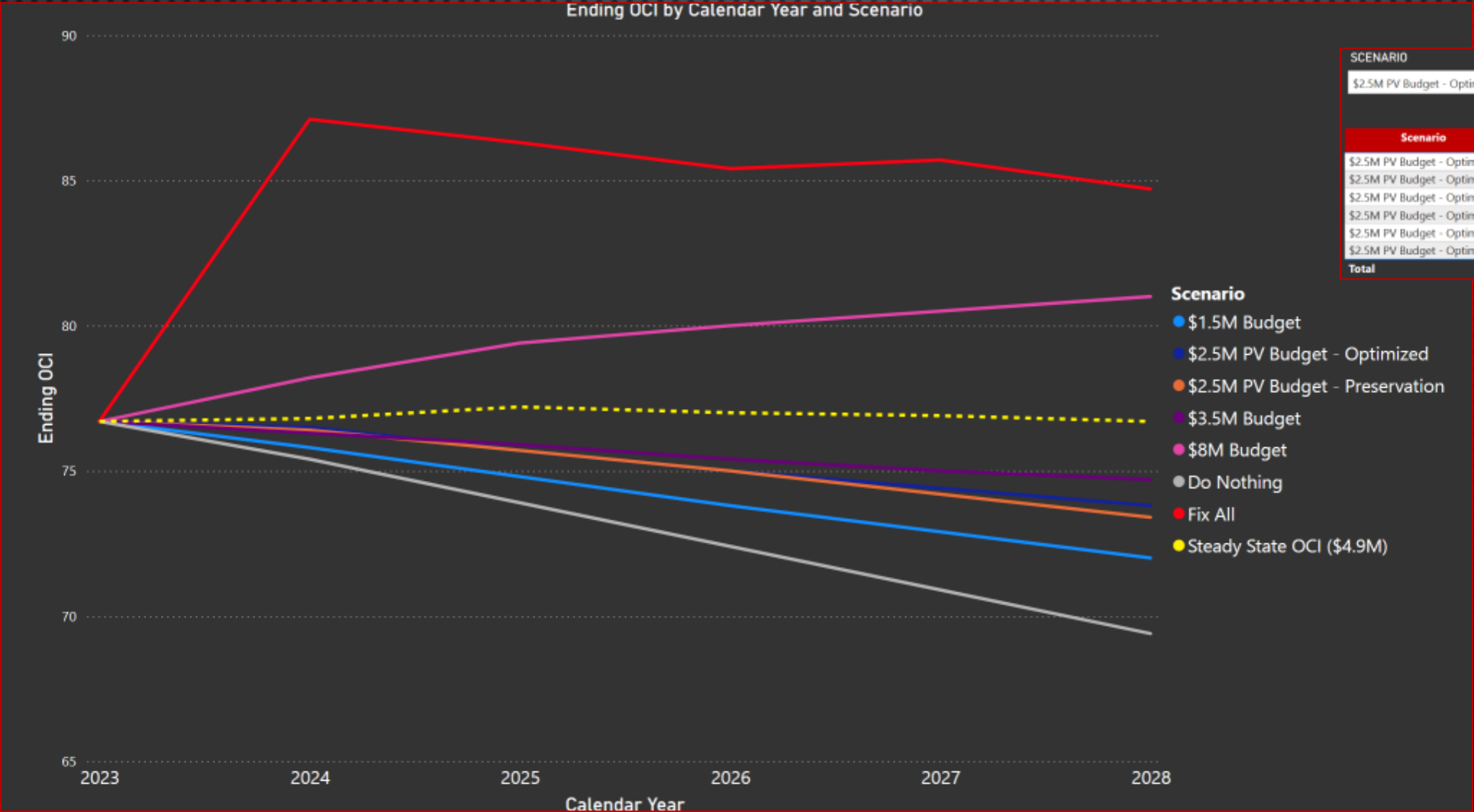
*Sample Illustration Using Rounded Prescott Valley Unit Rates for the Arterial Roadway Network

Unlimited Funding - TODAY'S Needs Of The Network

| Pavement Type | Treatment Code | Treatment | Area (yd2) | % By Area | Unit Rate | Selected | % By Cost | Segment Cost |
|---------------|----------------|-------------------------------|-------------------|----------------|-----------|----------|----------------|------------------------|
| Asphalt | 100 | Microsurfacing | 2,775,622 | 6.24% | 9.78 | Y | 7.05% | \$4,941,548.51 |
| Asphalt | 100 | Microsurfacing | 123,087 | 0.28% | 10.27 | Y | 0.43% | \$300,457.72 |
| Asphalt | 101 | Microsurfacing + Patching | 932,897 | 2.10% | 9.78 | Y | 2.55% | \$1,788,392.97 |
| Asphalt | 101 | Microsurfacing + Patching | 2,292 | 0.01% | 10.27 | Y | 0.03% | \$23,541.55 |
| Asphalt | 102 | Microsurfacing + Patching x1 | 4,125,175 | 9.28% | 10.78 | Y | 7.93% | \$5,561,620.17 |
| Asphalt | 102 | Microsurfacing + Patching x1 | 152,538 | 0.34% | 11.32 | Y | 0.72% | \$501,702.34 |
| Asphalt | 110 | Cape Seal + Patching | 22,506 | 0.05% | 10.22 | Y | 0.09% | \$65,820.10 |
| Asphalt | 110 | Cape Seal + Patching | 187 | 0.00% | 10.73 | Y | 0.00% | \$2,006.25 |
| Asphalt | 111 | Cape Seal + Patching x1 | 281,665 | 0.63% | 11.22 | Y | 1.30% | \$910,088.06 |
| Asphalt | 112 | Cape Seal + Patching x2 | 71,449 | 0.16% | 12.22 | Y | 0.69% | \$480,454.27 |
| Asphalt | 120 | Chip Seal + FOG | 6,243,441 | 14.05% | 9.44 | Y | 15.51% | \$10,871,530.91 |
| Asphalt | 120 | Chip Seal + FOG | 672,251 | 1.51% | 9.91 | Y | 1.35% | \$948,293.93 |
| Asphalt | 121 | Chip Seal + FOG + Patching x1 | 3,132,240 | 7.05% | 10.44 | Y | 9.19% | \$6,439,809.57 |
| Asphalt | 130 | Chip Seal + FOG+ Patching x1 | 346,063 | 0.78% | 9.78 | Y | 0.91% | \$640,965.70 |
| Asphalt | 130 | Chip Seal + FOG+ Patching x1 | 1,473 | 0.00% | 10.27 | Y | 0.02% | \$15,123.87 |
| Asphalt | 131 | Chip Seal + FOG+ Patching x2 | 2,403,727 | 5.41% | 10.78 | Y | 8.05% | \$5,645,257.59 |
| Asphalt | 131 | Chip Seal + FOG+ Patching x2 | 99,080 | 0.22% | 11.32 | Y | 0.29% | \$203,807.15 |
| Asphalt | 140 | Slurry Seal | 14,638,667 | 32.93% | 9.78 | Y | 23.67% | \$16,597,305.60 |
| Asphalt | 140 | Slurry Seal | 956,005 | 2.15% | 10.27 | Y | 1.52% | \$1,067,464.77 |
| Asphalt | 141 | Slurry Seal + Patching x1 | 669,905 | 1.51% | 10.78 | Y | 1.39% | \$971,642.43 |
| Asphalt | 200 | Mill & Overlay | 43,648 | 0.10% | 16.78 | Y | 0.72% | \$502,029.67 |
| Asphalt | 200 | Mill & Overlay | 20,073 | 0.05% | 17.62 | Y | 0.35% | \$243,022.14 |
| Asphalt | 201 | Mill & Overlay + Patching x1 | 5,366,520 | 12.07% | 0.00 | Y | 0.00% | \$0.00 |
| Asphalt | 201 | Mill & Overlay + Patching x1 | 223,602 | 0.50% | 17.78 | Y | 1.84% | \$1,288,681.52 |
| Asphalt | 201 | Mill & Overlay + Patching x1 | 66,928 | 0.15% | 18.67 | Y | 0.56% | \$389,998.24 |
| Asphalt | 202 | Mill & Overlay + Patching x2 | 622,198 | 1.40% | 18.78 | Y | 5.58% | \$3,909,073.29 |
| Asphalt | 202 | Mill & Overlay + Patching x2 | 264,473 | 0.59% | 19.72 | Y | 1.86% | \$1,304,124.57 |
| Asphalt | 300 | Full Depth Reconstruction | 38,741 | 0.09% | 129.00 | Y | 2.81% | \$1,968,668.46 |
| Asphalt | 301 | Full Depth Reconstruction | 156,197 | 0.35% | 90.00 | Y | 3.60% | \$2,525,028.96 |
| Total | | | 44,452,650 | 100.00% | | | 100.00% | \$70,107,460.31 |

Budget Requirements & Needs

Town Budget = \$4.9M (pavements only)



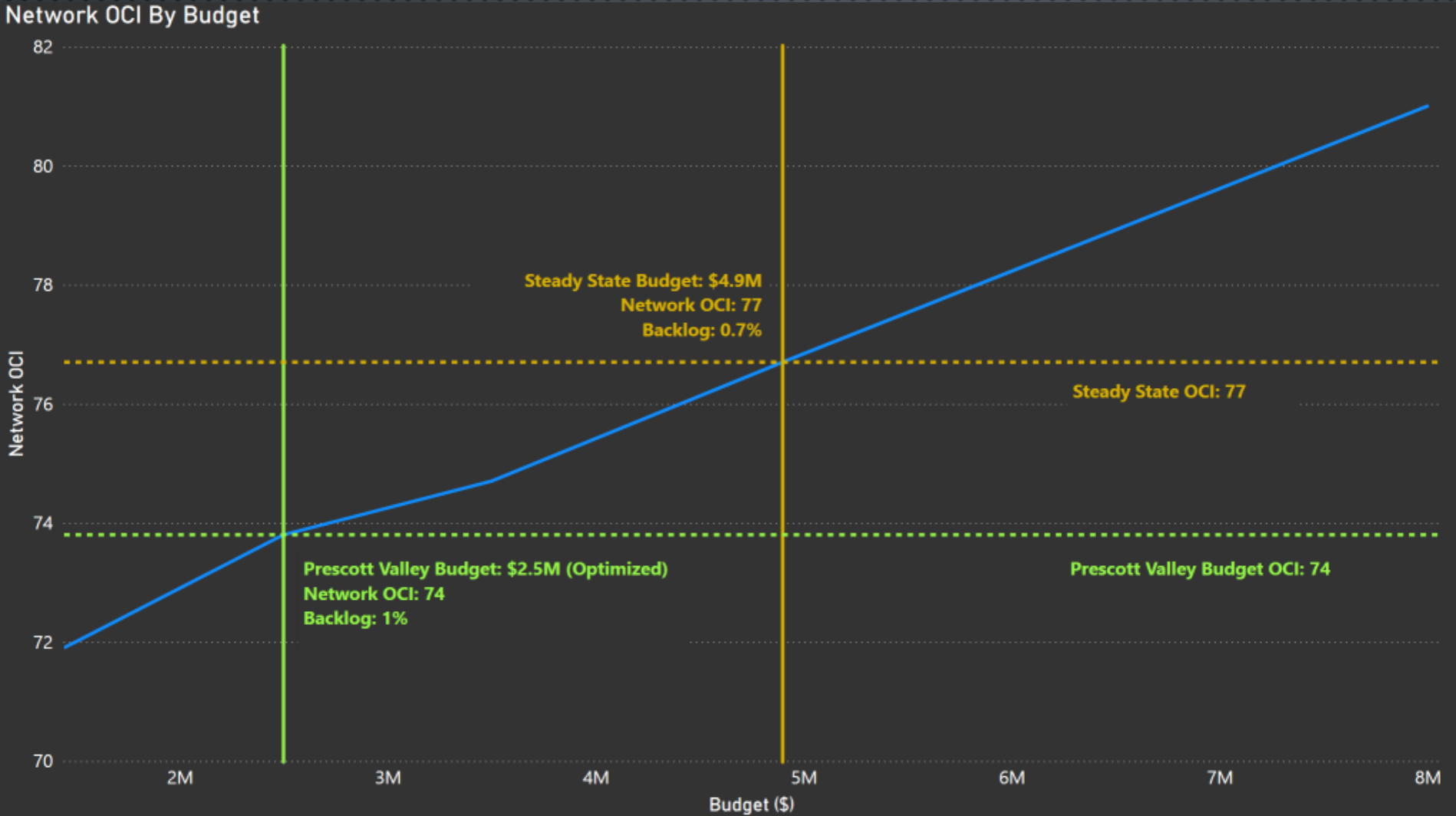
SCENARIO

\$2.5M PV Budget - Optimized

| Scenario | Budget | Calendar Year | Fiscal Year | Ending OCI | Ending Backlog (%) |
|------------------------------|------------|---------------|-------------|------------|--------------------|
| \$2.5M PV Budget - Optimized | 0 | 2023 | 2025 | 76.70 | 0.30 |
| \$2.5M PV Budget - Optimized | 2,500,000 | 2024 | 2025 | 76.50 | 0.40 |
| \$2.5M PV Budget - Optimized | 2,500,000 | 2025 | 2026 | 75.70 | 0.40 |
| \$2.5M PV Budget - Optimized | 2,500,000 | 2026 | 2027 | 75.00 | 0.40 |
| \$2.5M PV Budget - Optimized | 2,500,000 | 2027 | 2028 | 74.40 | 0.90 |
| \$2.5M PV Budget - Optimized | 2,500,000 | 2028 | 2029 | 73.80 | 0.90 |
| Total | 12,500,000 | | | | |

Approximately \$4.9M per year is needed to maintain a Network PCI of 77.

Budget Requirements & Needs...



Pavements Only

\$4.9M is for pavements only and does not include:

- Utility paving
- Future bonds
- Growth
- Drainage concerns
- Additional width
- Signage, striping, etc.

QUESTIONS

