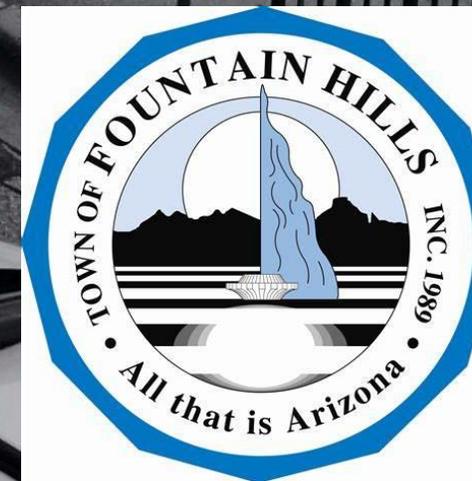




PAVEMENT CONDITION EVALUATION RESULTS TOWN OF FOUNTAIN HILLS, AZ



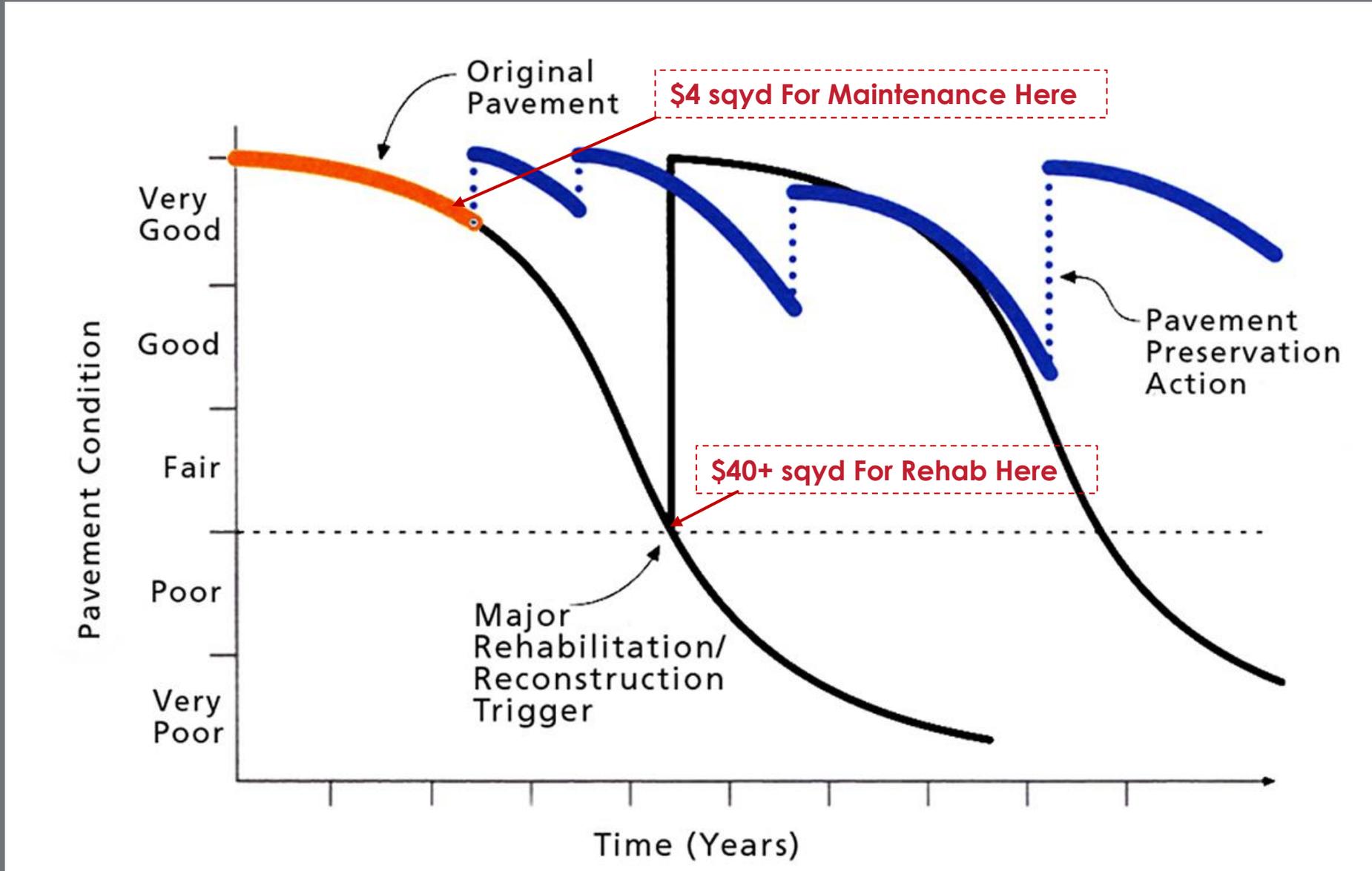


- **Centerline Miles** – Town maintains appx. 166 linear miles of paved roadway
- **Paved Area** – Over 3.5M SQYDS of pavement or enough material to pave a two-lane road from Fountain Hills to Las Vegas
- **Network Replacement Value** – Over a \$214M Dollar Asset (pavement only)
- **Pavement condition 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	EXCELLENT
71 – 85	VERY GOOD
61 – 70	GOOD
51 – 60	FAIR
41 – 50	MARGINAL
26 – 40	POOR
0 – 25	VERY POOR

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 15 feet
- Utilized for asset extraction.

Global Positioning System (GPS)

NCAT Certified 3-Laser Profiler -Roughness -Rutting

Laser Crack Measuring System (LCMS-2)

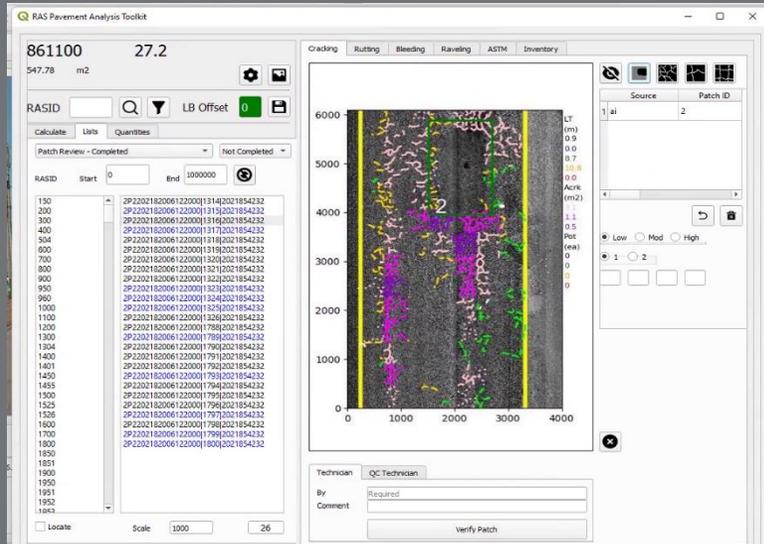
- two 1-millimeter resolution line scan cameras.
- 1mm resolution is equivalent to over 4,000 dedicated laser points.
- 32MP HD imagery
- 100% contiguous survey & processing
- Objective ASTM D6433 assessment

Internal Inertial Measuring Unit (IMU)

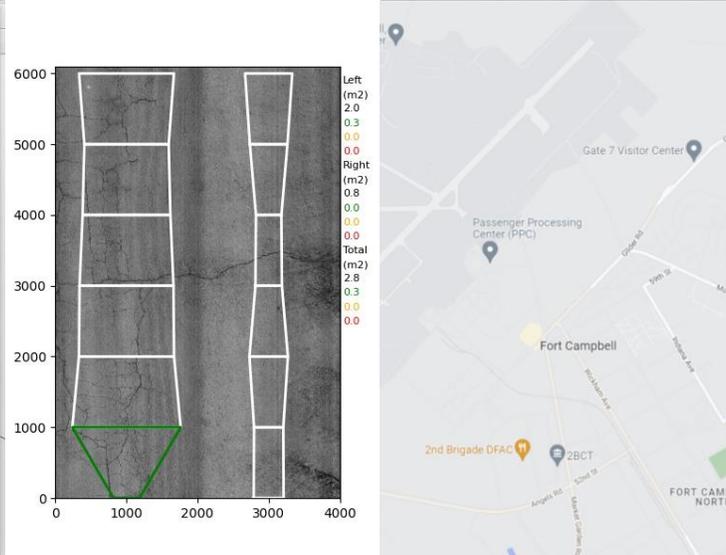
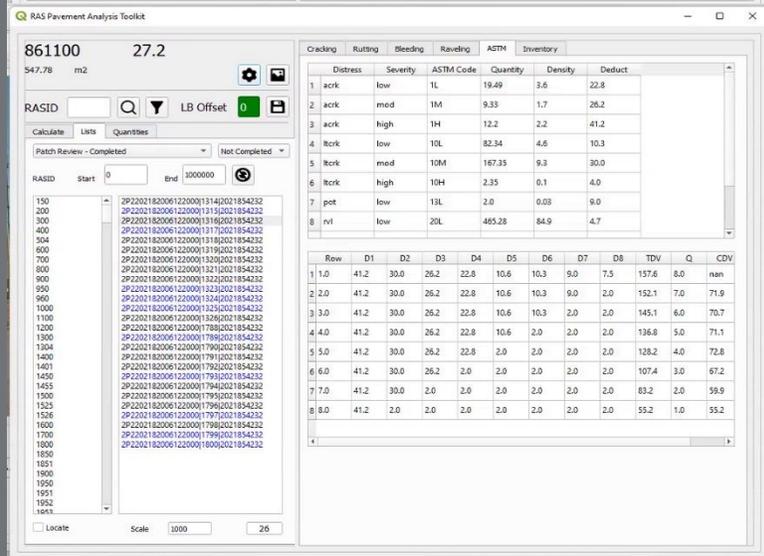
Distance Measuring Instrument (DMI)



Road TRIP™ - Technical Rating Intelligence Program

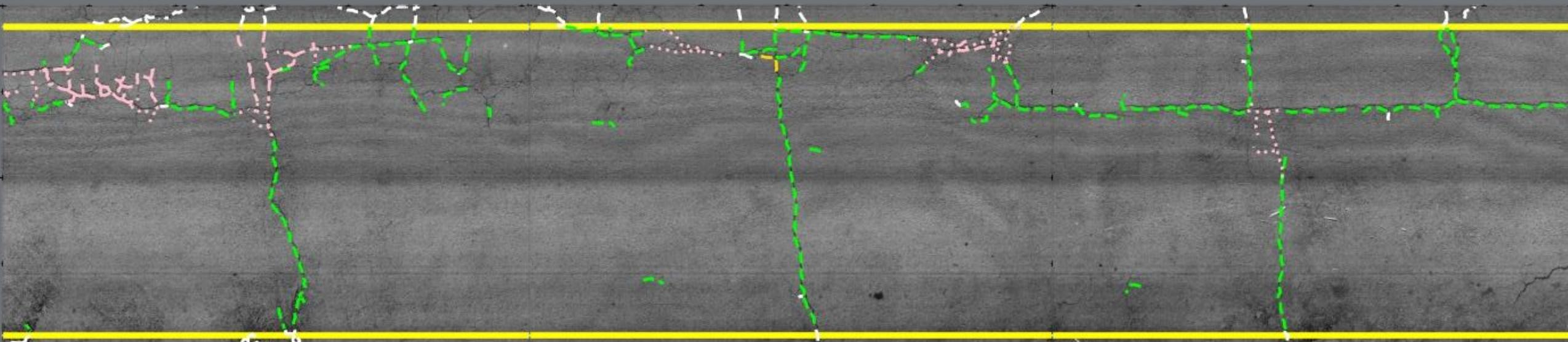


- Sensor processing enhanced with AI to detect, classify, and quantify ASTM D6433 distresses
- Detected distresses measured and overlaid on images
- Distresses classified based upon geometry and density algorithm
- GIS coordinates for each distress ties to images for location
- Images available for QC and verification

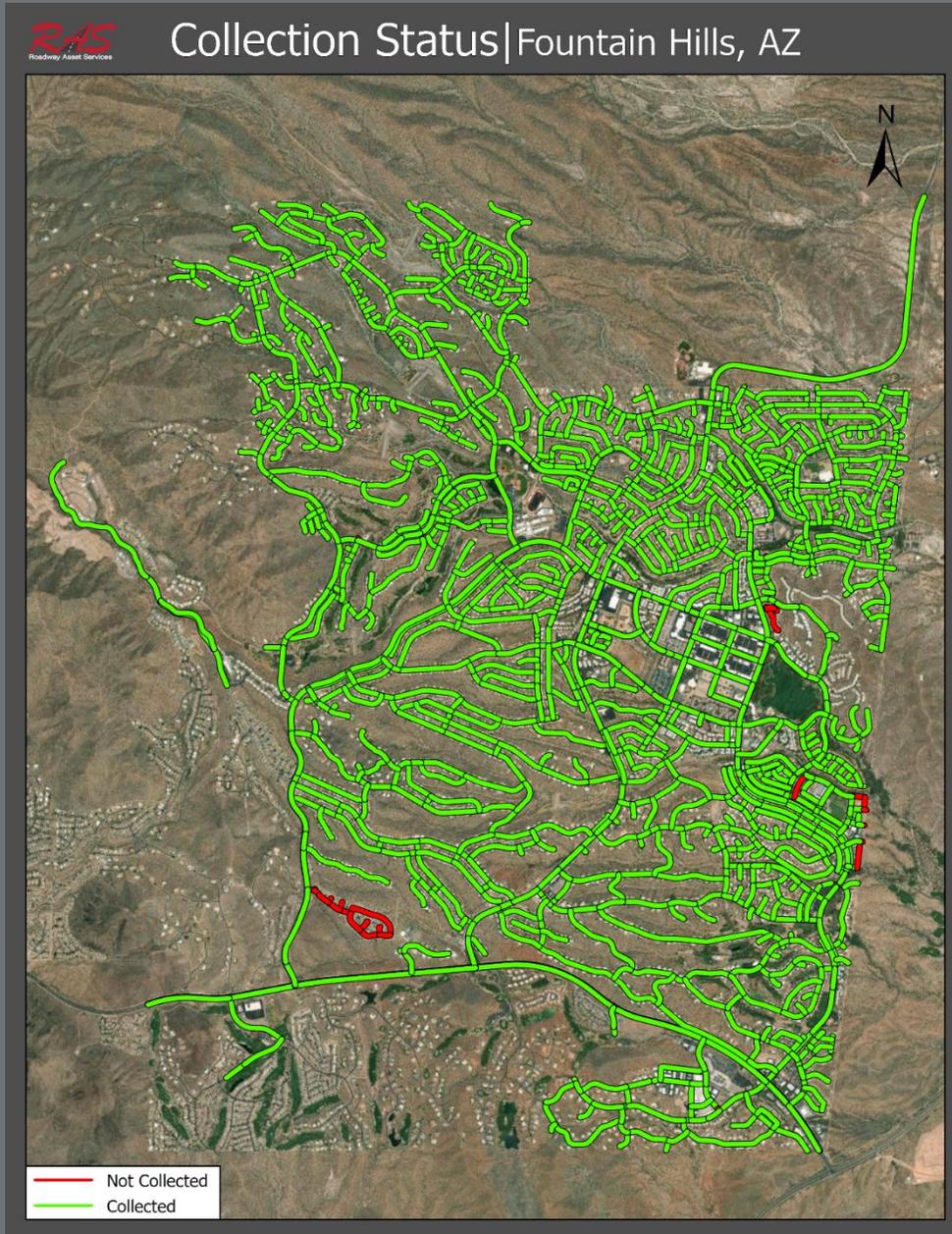


Onsite Pilot Field Review

- Perform field visit with Town staff to review pilot data and results
- Select Good / Fair / Poor roads for pilot
 - Perform QC on collected data in the field
- Discuss conditions and expectations with Staff
- Evaluate changes to historical data (if any)



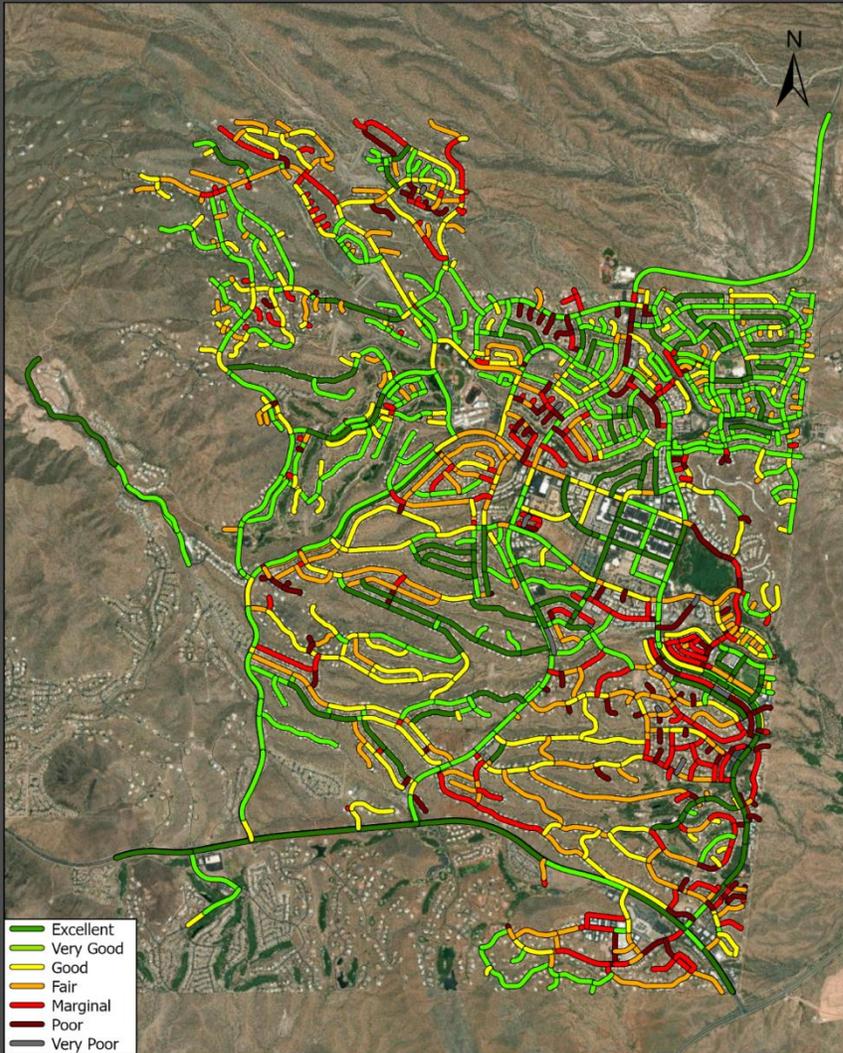
Centerline File Verification



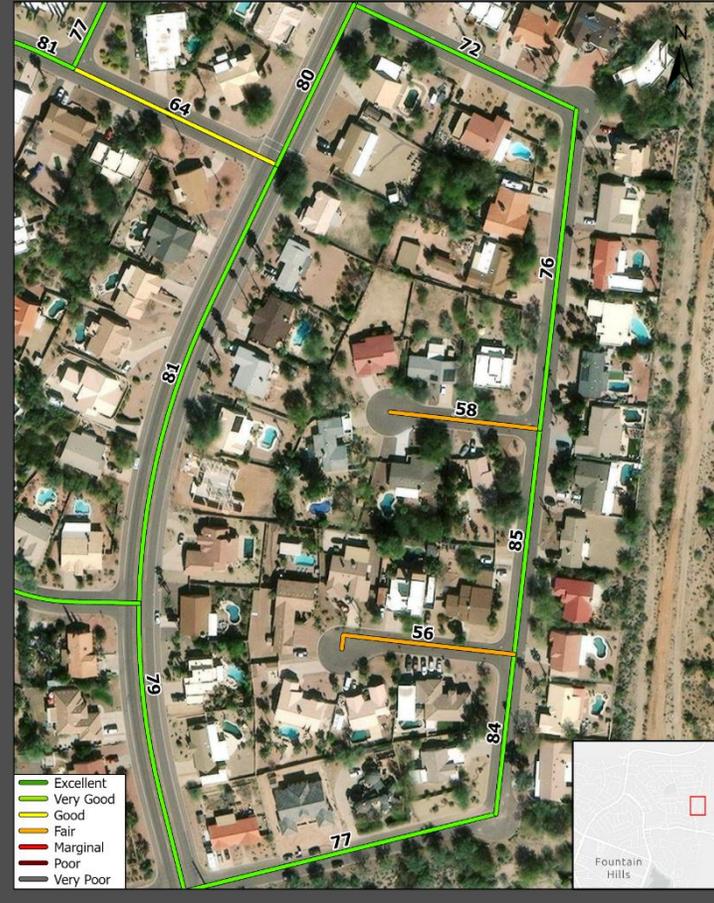
Pavement Condition Results



PCI Distribution | Fountain Hills, AZ



PCI Example | Fountain Hills, AZ



Pavement Condition Index (PCI) Range	Condition Description	Total Distance (Miles)	Total Area (Sq. Yd.)	Percent of Network By Centerline Miles
86 – 100	Excellent	27.28	606,319	16.4%
71 – 85	Very Good	54.03	1,217,767	32.5%
61 – 70	Good	30.76	636,866	18.5%
51 – 60	Fair	26.77	534,470	16.1%
41 – 50	Marginal	17.23	337,707	10.4%
26 – 40	Poor	9.43	184,142	5.7%
0 – 25	Very Poor	0.93	15,395	0.6%
Total of Rated Segments		166.44	3,532,666	100%

Pavement Condition Results & Health Metrics



Network Average PCI

The average we see is a 60-65.
Less than 1 in 10 score above a 75



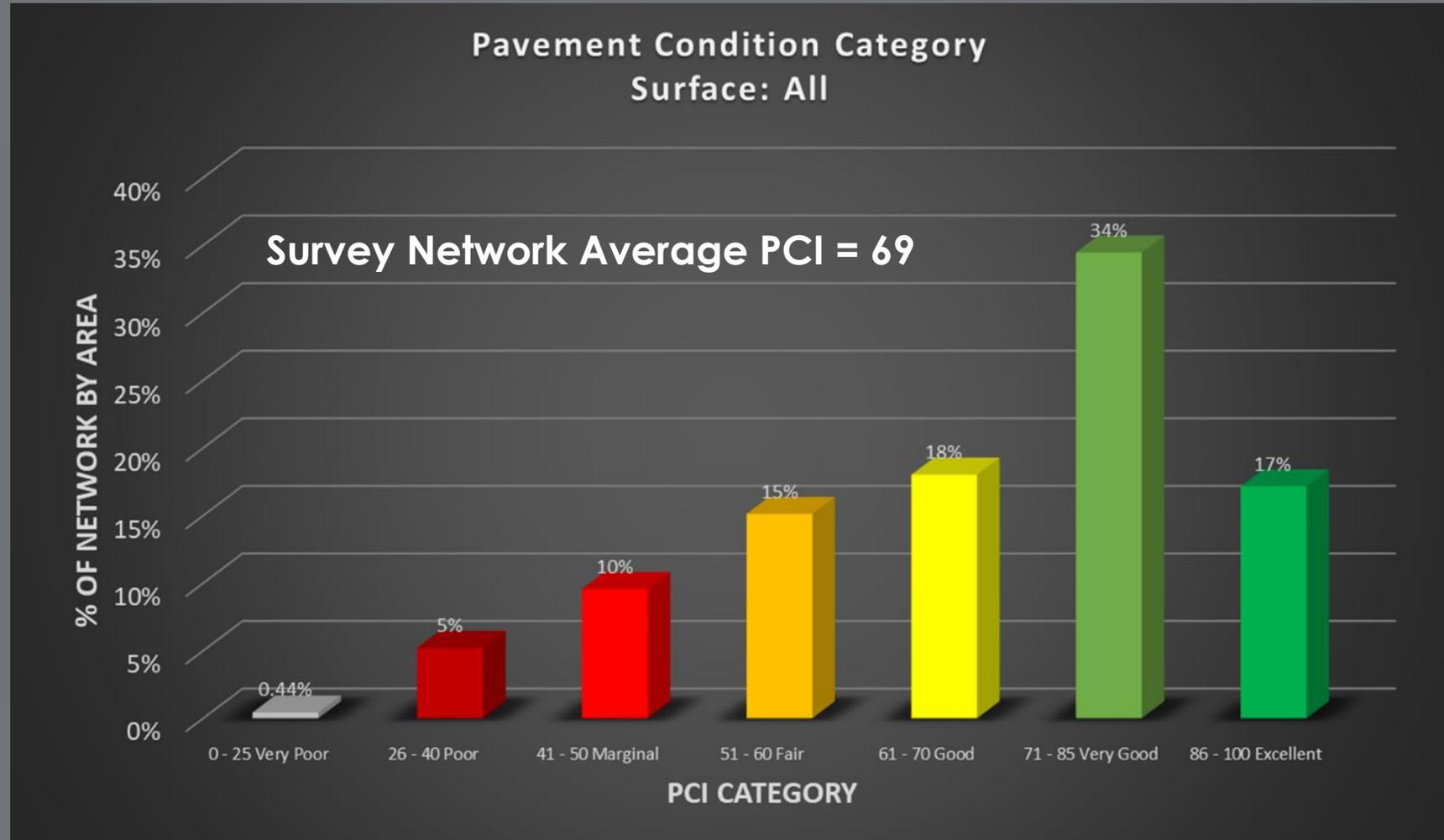
Percent of Good Roads

15% is about the average we see
across the nation



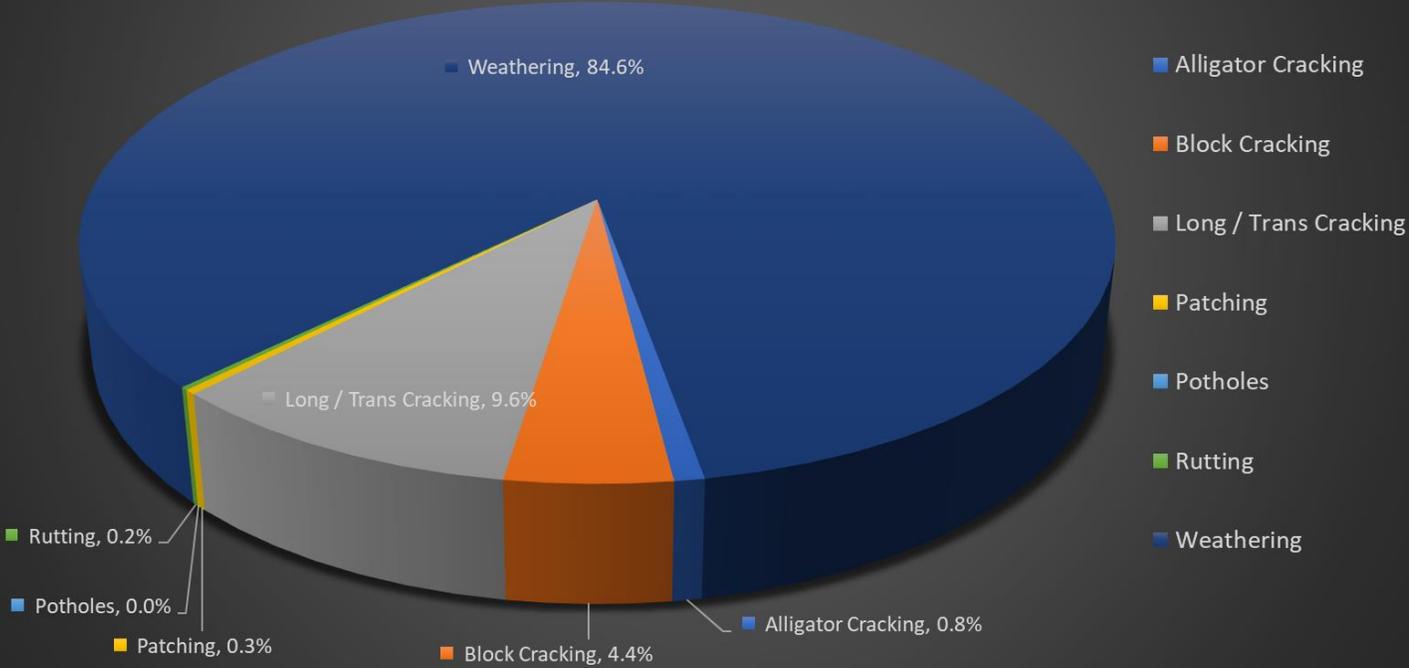
Percent of Backlog

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



Asphalt Distress Breakdown

Asphalt Distress Distribution

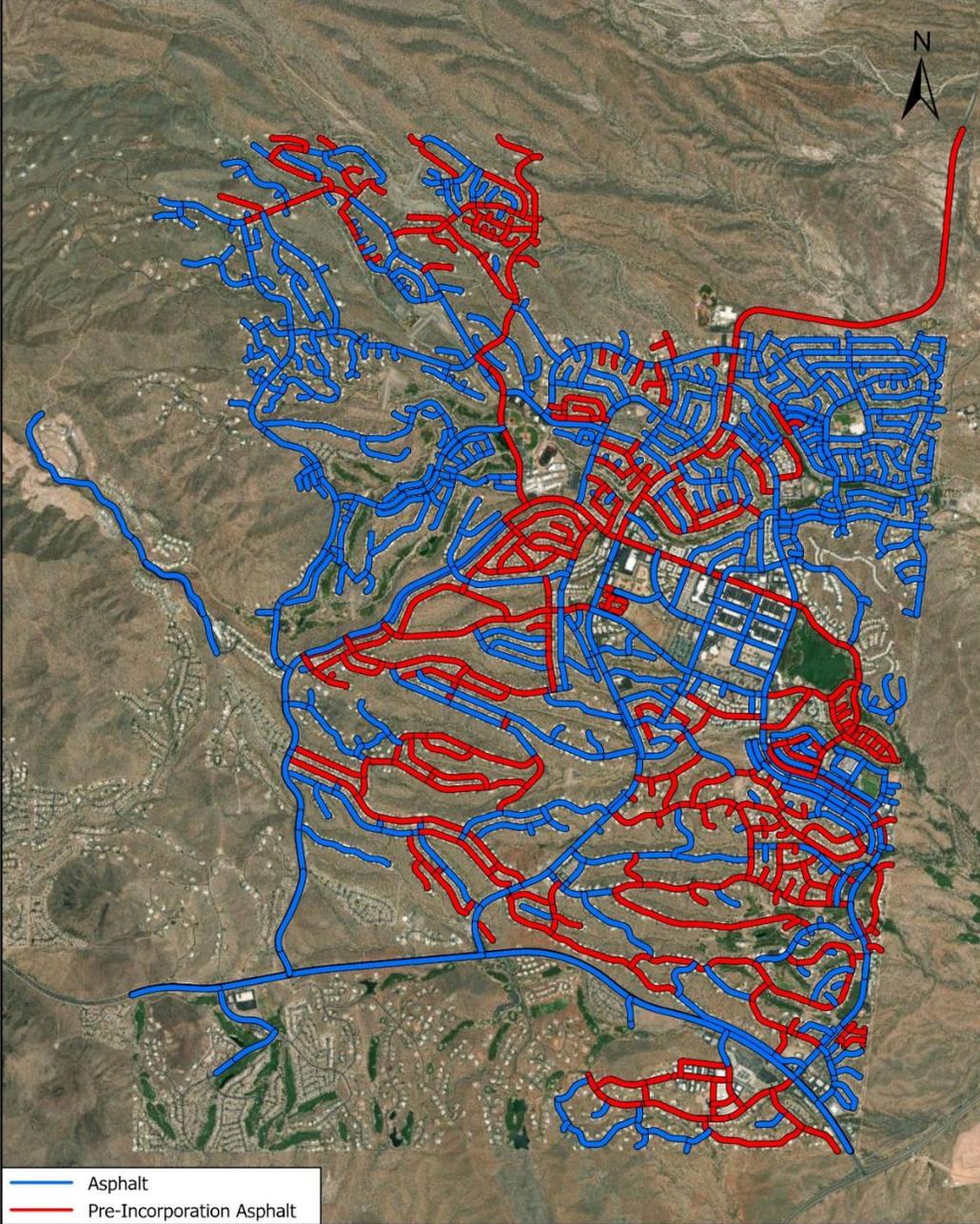
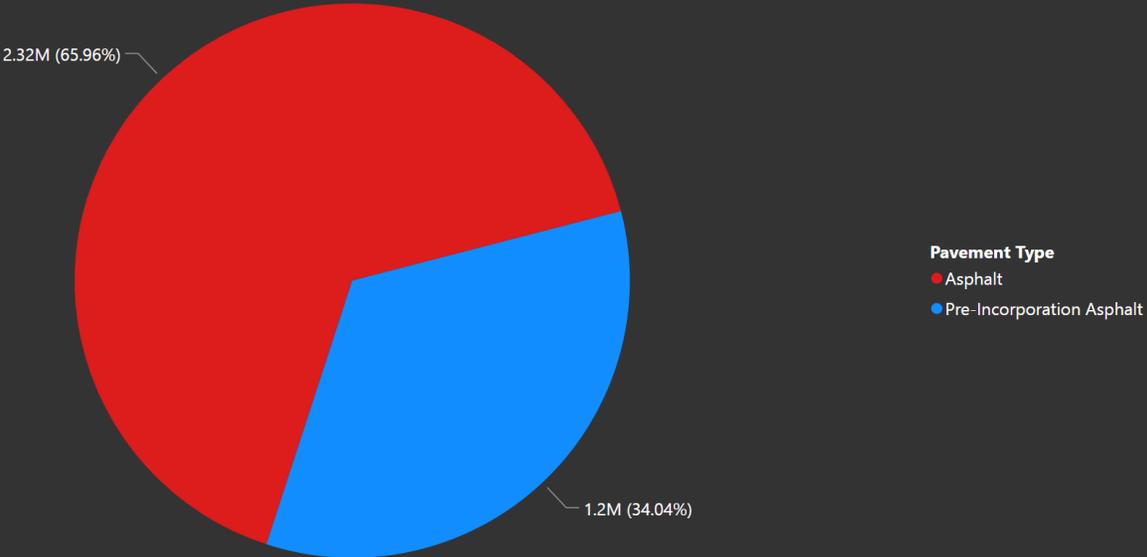


Asphalt Distress Breakdown by Severity			
Type	Low	Moderate	High
Alligator Cracking	0.7%	0.1%	0.0%
Block Cracking	4.3%	0.1%	0.0%
Long / Trans Cracking	8.6%	1.0%	0.0%
Patching	0.3%	0.0%	0.0%
Potholes	0.0%	0.0%	0.0%
Rutting	0.2%	0.0%	0.0%
Weathering	84.5%	0.1%	0.0%

Network Distribution by Pavement Type



Pavement Type by Area (yd2)



Condition Distribution by Pavement Type

Pre-Incorporation Asphalt

Average PCI = 56

Backlog = 14%

Marginal/Fair = 51%

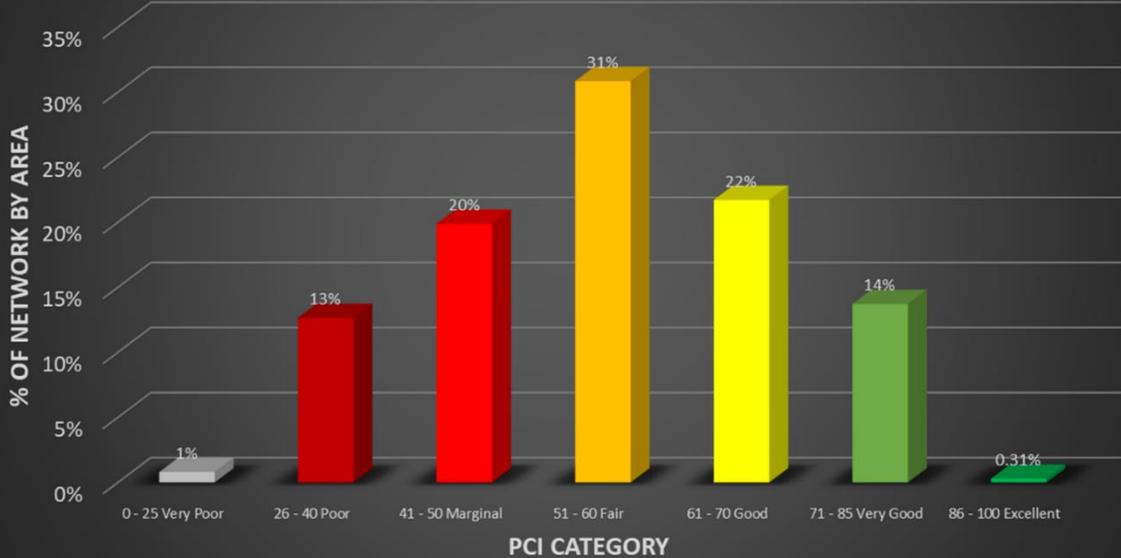
Asphalt

Average PCI = 75

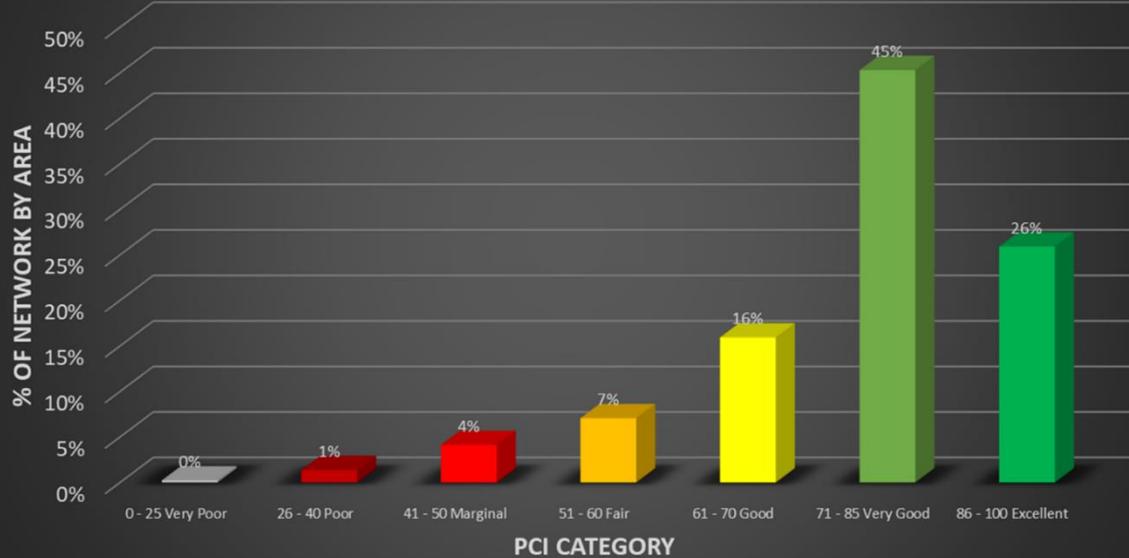
Backlog = 1%

Marginal/Fair = 11%

Pavement Condition Category
Surface: Pre-Incorporation Asphalt



Pavement Condition Category
Surface: Asphalt



Maintenance & Rehabilitation Treatment Options

Pavement Type	Classification	Min PCI	Critical PCI	Max PCI	Weak Road (> 10% Load Distresses)					Moderate Road (2% - 10% Load Distresses)					Strong Road (<2% Load Distresses)					Reset Type	Reset Value
					Code	Treatment	Unit Rate (\$/sy)	Deferral Cost	Priority	Code	Treatment	Unit Rate (\$/sy)	Deferral Cost	Priority	Code	Treatment	Unit Rate (\$/sy)	Deferral Cost	Priority		
Asphalt	Local	85	97	100	100	Do Nothing	\$ -	\$ (3.50)	5	100	Do Nothing	\$ -	\$ (2.50)	5	100	Do Nothing	\$ -	\$ (1.50)	5	Relative	0
Asphalt	Local	70	73	85	202	Surface Preservation + Patching x2	\$ 3.50	\$ (1.93)	4	201	Surface Preservation + Patching x1	\$ 2.50	\$ (1.93)	4	200	Surface Preservation	\$ 1.50	\$ (1.93)	4	Relative	10
Asphalt	Local	60	63	70	312	Slurry Seal + Patching x2	\$ 5.43	\$ (28.80)	1	311	Slurry Seal + Patching x1	\$ 4.43	\$ (28.80)	1	310	Slurry Seal	\$ 3.43	\$ (28.80)	1	Relative	20
Asphalt	Local	40	43	60	402	Mill & Overlay + Patching x2	\$ 34.23	\$ (4.04)	2	401	Mill & Overlay + Patching x1	\$ 33.23	\$ (5.04)	2	400	Mill & Overlay	\$ 32.23	\$ (6.04)	2	Absolute	95
Asphalt	Local	0	20	40	600	Full Depth Reconstruction	\$ 38.27		3	600	Full Depth Reconstruction	\$ 38.27		3	600	Full Depth Reconstruction	\$ 38.27		3	Absolute	99
Pre-incorporation Asphalt	Local	85	97	100	100	Do Nothing	\$ -	\$ (3.50)	4	100	Do Nothing	\$ -	\$ (2.50)	4	100	Do Nothing	\$ -	\$ (1.50)	4	Relative	0
Pre-incorporation Asphalt	Local	70	73	85	202	Surface Preservation + Patching x2	\$ 3.50	\$ (1.93)	3	201	Surface Preservation + Patching x1	\$ 2.50	\$ (1.93)	3	200	Surface Preservation	\$ 1.50	\$ (1.93)	2	Relative	10
Pre-incorporation Asphalt	Local	60	63	70	312	Slurry Seal + Patching x2	\$ 5.43	\$ (42.92)	1	311	Slurry Seal + Patching x1	\$ 4.43	\$ (43.92)	1	310	Slurry Seal	\$ 3.43	\$ (44.92)	1	Relative	20
Pre-incorporation Asphalt	Local	0	40	60	610	Full Depth Reconstruction + Subgrade Prep	\$ 48.35		2	610	Full Depth Reconstruction + Subgrade Prep	\$ 48.35		2	610	Full Depth Reconstruction + Subgrade Prep	\$ 48.35		3	Absolute	99

PAVEMENT TYPE
CLASSIFICATION
STRENGTH
ACTIVE

All ▼

Local ▼

Strong ▼

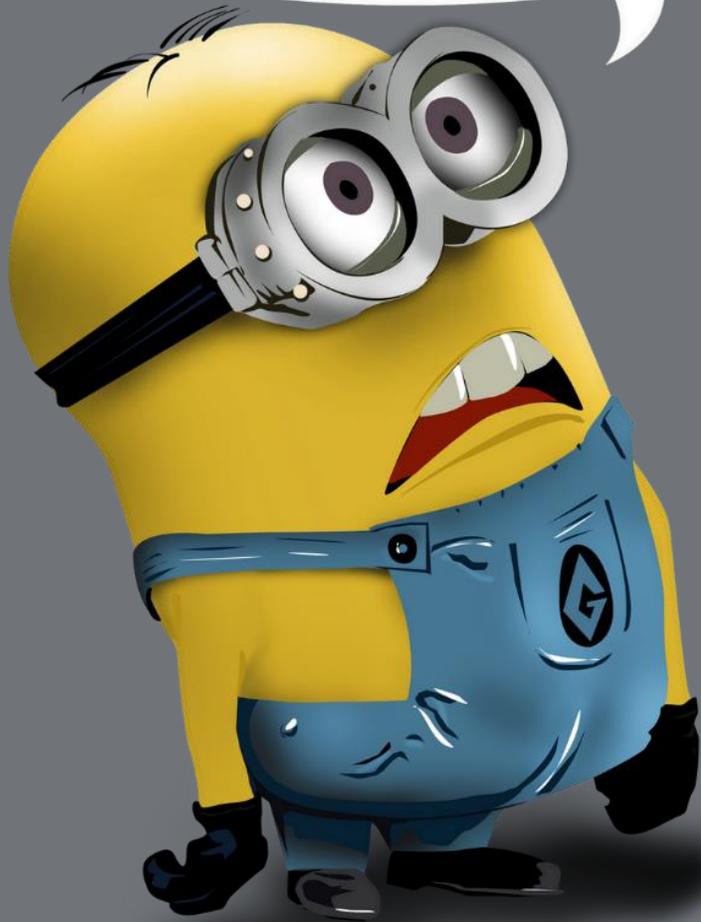
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	Pavement Type	Classification	Strength	Active	Code	Treatment	Min PCI	Critical PCI	Max PCI	\$/yd2	Priority	Reset Type	Reset Value
▲	Asphalt	Local	Strong	Y	200	Surface Preservation	70	73	85	1.58	400	relative	10
	Asphalt	Local	Strong	Y	310	Slurry Seal	60	63	70	3.60	100	relative	20
	Asphalt	Local	Strong	Y	400	Mill & Overlay	40	43	60	33.84	200	absolute	95
	Asphalt	Local	Strong	Y	600	Full Depth Reconstruction	0	20	40	40.18	300	absolute	99
	Pre-Incorporation Asphalt	Local	Strong	Y	200	Surface Preservation	70	73	85	1.58	200	relative	10
	Pre-Incorporation Asphalt	Local	Strong	Y	310	Slurry Seal	60	63	70	3.60	100	relative	20
	Pre-Incorporation Asphalt	Local	Strong	Y	610	Full Depth Reconstruction + Subgrade Prep	0	40	60	50.77	300	absolute	99

Why This Road And Not That One???

WHAAAAA?!?!?



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

PRIORITY

Prioritization = Order of Priority
Arrange from highest to lowest



CRITICAL – Roads that will drop into a more costly rehabilitation category next year. This has the highest priority in the pavement management system

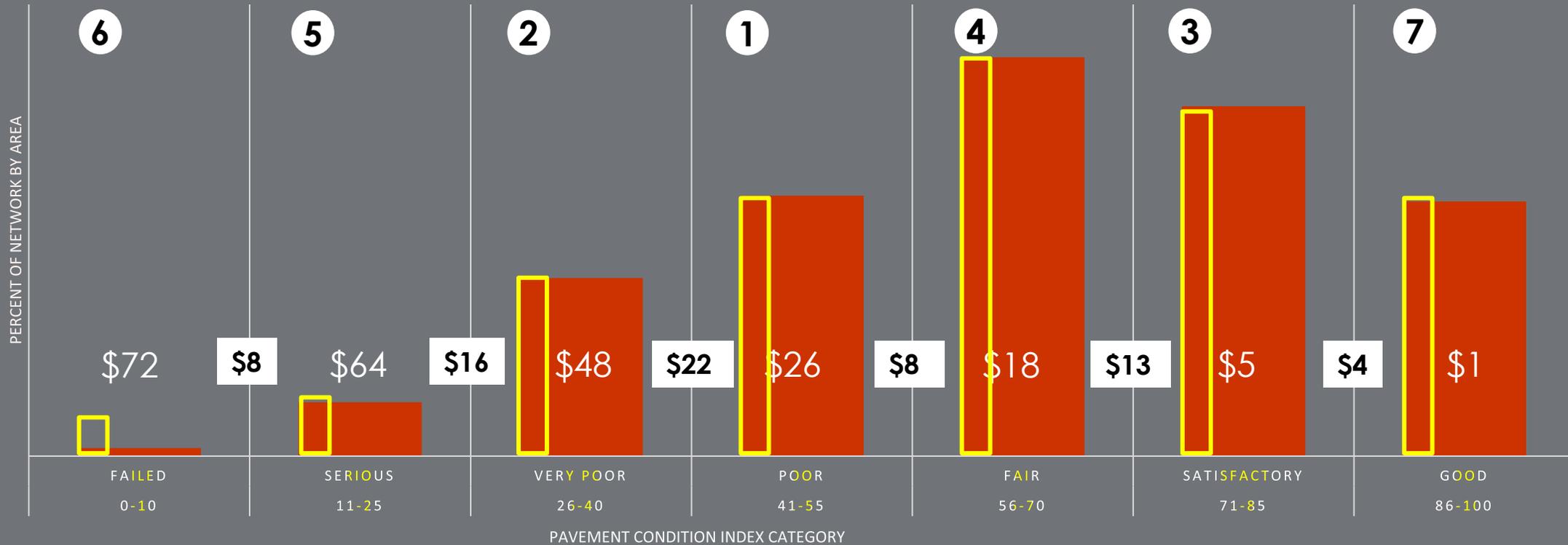
Traffic/Classification – Higher volume roadways have higher priority

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

PCI / Condition – Typical uses in prioritization are “Worst First” or “Best First” and only used as a tie breaker in the system

WHAT IS COST OF DEFERRAL & NEED YEAR PRIORITIZATION LOOKS LIKE...

PCI DISTRIBUTION GRAPH



TODAY'S Needs Of The Network

Pavement Type	Code	Treatment	Area (yd2)	Area By %	Selected	Segment Cost	Cost By %
Asphalt	200	Surface Preservation	943,968.96	31.57%	Y	1,491,470.95	2.33%
Asphalt	202	Surface Preservation + Patching x2	56,544.17	1.89%	Y	208,082.56	0.33%
Asphalt	300	Micro Surface	14,644.44	0.49%	Y	69,268.22	0.11%
Asphalt	302	Micro Surface + Patching x2	59,331.87	1.98%	Y	405,236.68	0.63%
Asphalt	310	Slurry Seal	324,817.93	10.86%	Y	1,169,344.56	1.83%
Asphalt	312	Slurry Seal + Patching x2	122,391.86	4.09%	Y	697,633.59	1.09%
Asphalt	400	Mill & Overlay	103,026.25	3.45%	Y	3,689,378.18	5.76%
Asphalt	402	Mill & Overlay + Patching x2	133,295.52	4.46%	Y	5,359,328.29	8.37%
Asphalt	600	Full Depth Reconstruction	33,427.39	1.12%	Y	1,534,789.34	2.40%
Pre-Incorporation Asphalt	200	Surface Preservation	109,669.07	3.67%	Y	173,277.13	0.27%
Pre-Incorporation Asphalt	202	Surface Preservation + Patching x2	1,140.32	0.04%	Y	4,196.39	0.01%
Pre-Incorporation Asphalt	300	Micro Surface	16,252.37	0.54%	Y	76,873.70	0.12%
Pre-Incorporation Asphalt	302	Micro Surface + Patching x2	23,207.79	0.78%	Y	158,509.23	0.25%
Pre-Incorporation Asphalt	310	Slurry Seal	59,599.22	1.99%	Y	214,557.19	0.34%
Pre-Incorporation Asphalt	312	Slurry Seal + Patching x2	126,792.12	4.24%	Y	722,715.09	1.13%
Pre-Incorporation Asphalt	610	Full Depth Reconstruction + Subgrade Prep	862,097.65	28.83%	Y	48,025,763.06	75.04%
Total			2,990,206.94	100.00%		64,000,424.17	100.00%

Scenario Considerations:

- Pre-incorporation roads are only 34% of the network by area
- 77% of the FIX ALL costs are Pre-Incorporation road related
- 75% of the FIX ALL costs are Pre-Incorporation Full Recon needs

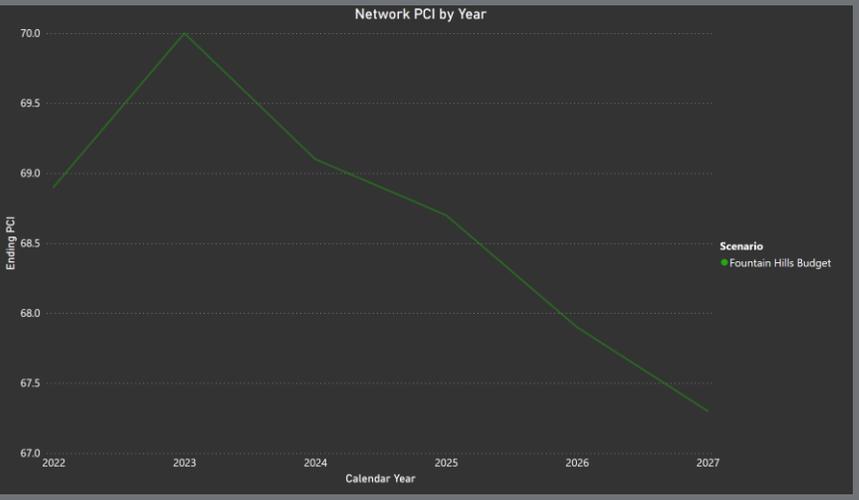
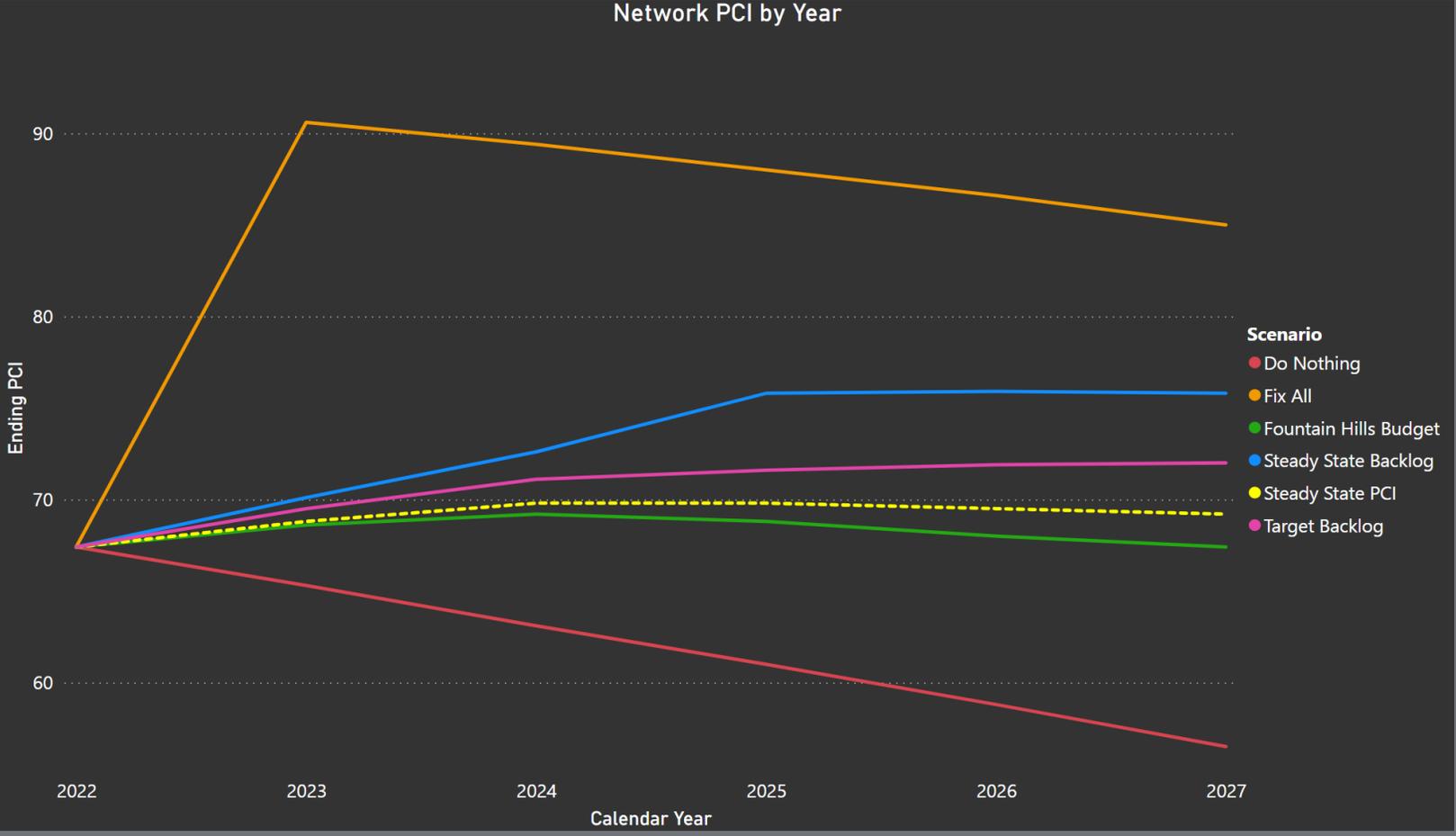
Budget Requirements & Needs

Town Budget = \$2.125M (does not include 15% for misc expenses)

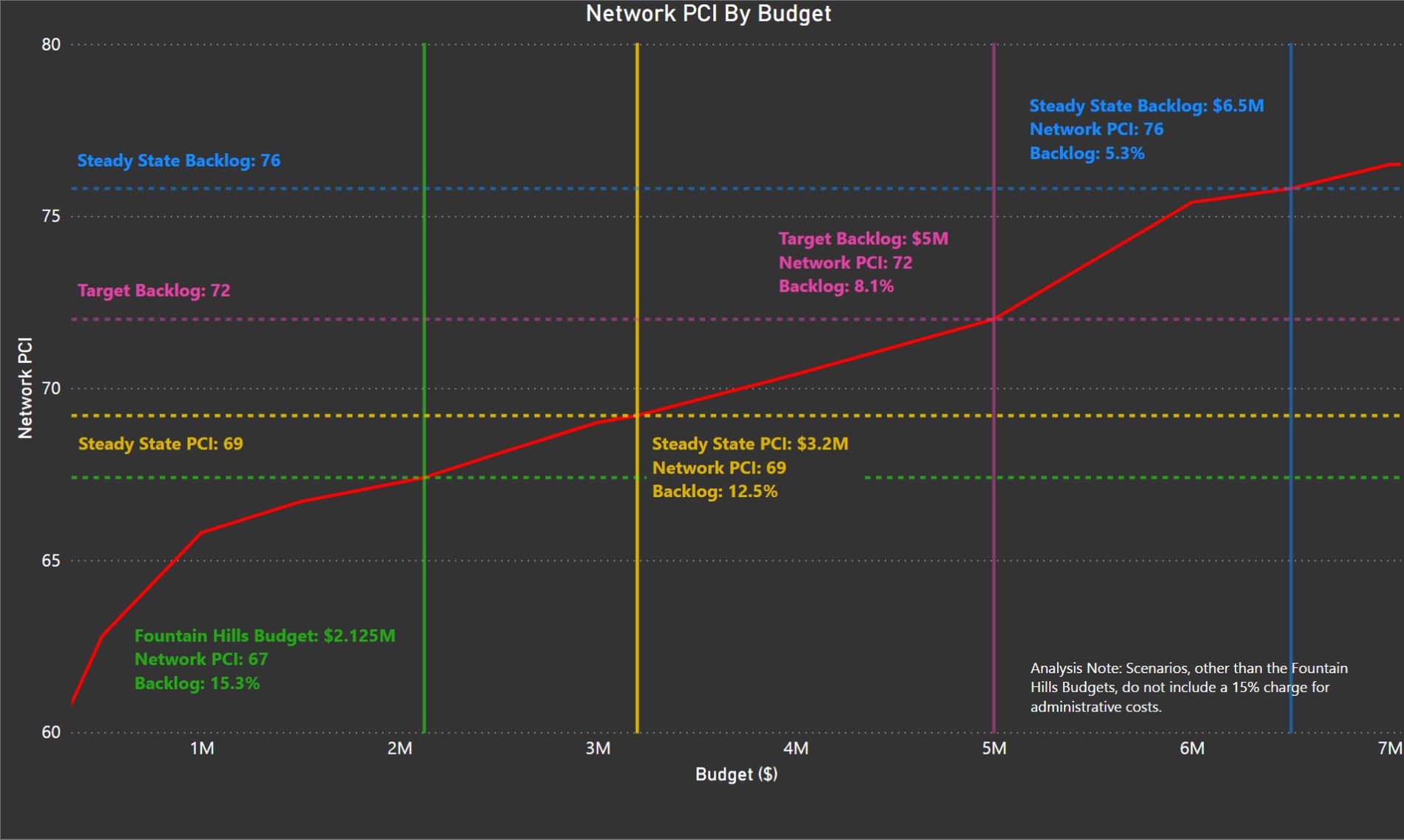
SCENARIO

Fountain Hills Budget

Scenario	Budget	Fiscal Year	Ending PCI	Ending Backlog (%)
Fountain Hills Budget	2,125,000	2024	68.60	7.20
Fountain Hills Budget	2,125,000	2025	69.20	6.30
Fountain Hills Budget	2,125,000	2026	68.80	8.60
Fountain Hills Budget	2,125,000	2027	68.00	10.50
Fountain Hills Budget	2,125,000	2028	67.40	15.30
Total	10,625,000			



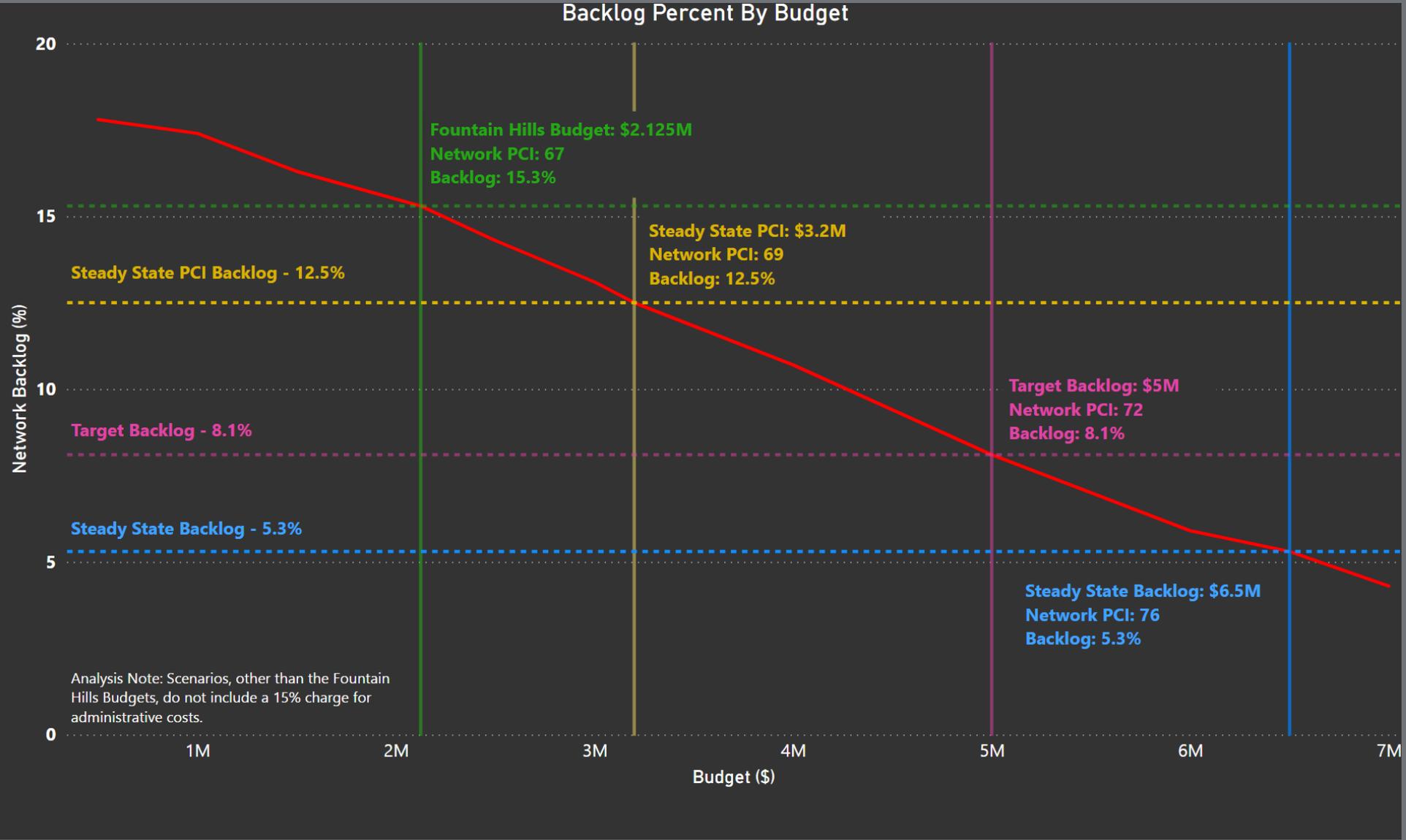
PCI Budget Requirements & Needs...



Scenario Considerations:

- Budgets exclude 15% misc costs for admin, engineering, inspection, etc.
- Looking at PCI alone can be misleading
- Controlling for PCI does not control for backlog

Backlog Budget Requirements & Needs...



Scenario Considerations:

- Budgets exclude 15% misc costs for admin, engineering, inspection, etc.
- Backlog grows at an alarming rate
- Current funding does not control the growth in backlog

Questions

