



Pavement Preservation Program

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October 3, 2022



- ✓ Integral part of everyday life
- ✓ City's largest financial asset, estimated **\$560 million**
- ✓ Can have significant impacts (positive and negative) on many aspects of municipal activities
- ✓ Is your network getting the attention it deserves?



City of Fayetteville	=	95 sq. mi
Street System	=	1,194 mi
City	=	756 mi – 63%
NCDOT	=	293 mi – 25%
Private	=	145 mi – 12%

FY22 Pavement Preservation (includes additional \$2 M) = \$6.575 M

20.75 miles ([Traditional Resurfacing](#)) + 30.2 miles ([Slurry/Cape Seal](#)) = 51 miles

Link to Pavement Preservation Projects and Overall Maps:

<https://www.fayettevillenc.gov/city-services/public-services/resources/projects>

- ❖ As pavements age and experience traffic repetitions, pavement **distresses** begin to **accumulate**.
- ❖ It is normal after 3 to 5 year for asphalt to begin to become brittle and **start cracking**.
- ❖ Water begins **entering the cracks**, freezes and thaws during the yearly cycle and causing **larger cracks and potholes**.



Pothole

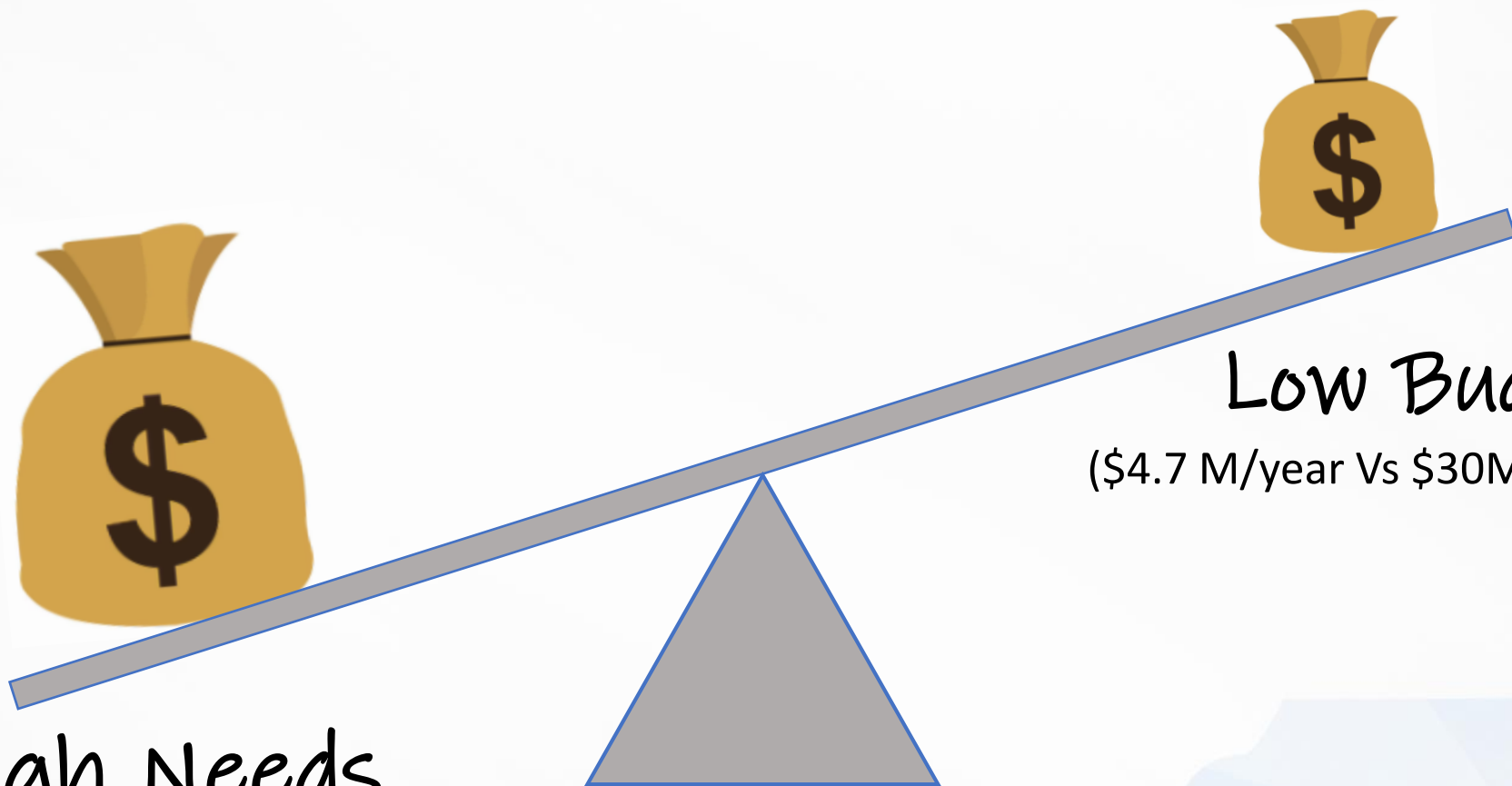


Alligator Cracking



Edge Cracking

What IS the MAIN Problem...?



High Needs

(756 Miles City's streets, which continuously deteriorate)

Low Budget

(\$4.7 M/year Vs \$30M/year required)



What IS the Solution...?

Pavement management is a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations.

Source: Federal Highway Administration (FHWA)-2005

Major Maintenance
(Traditional Resurfacing)

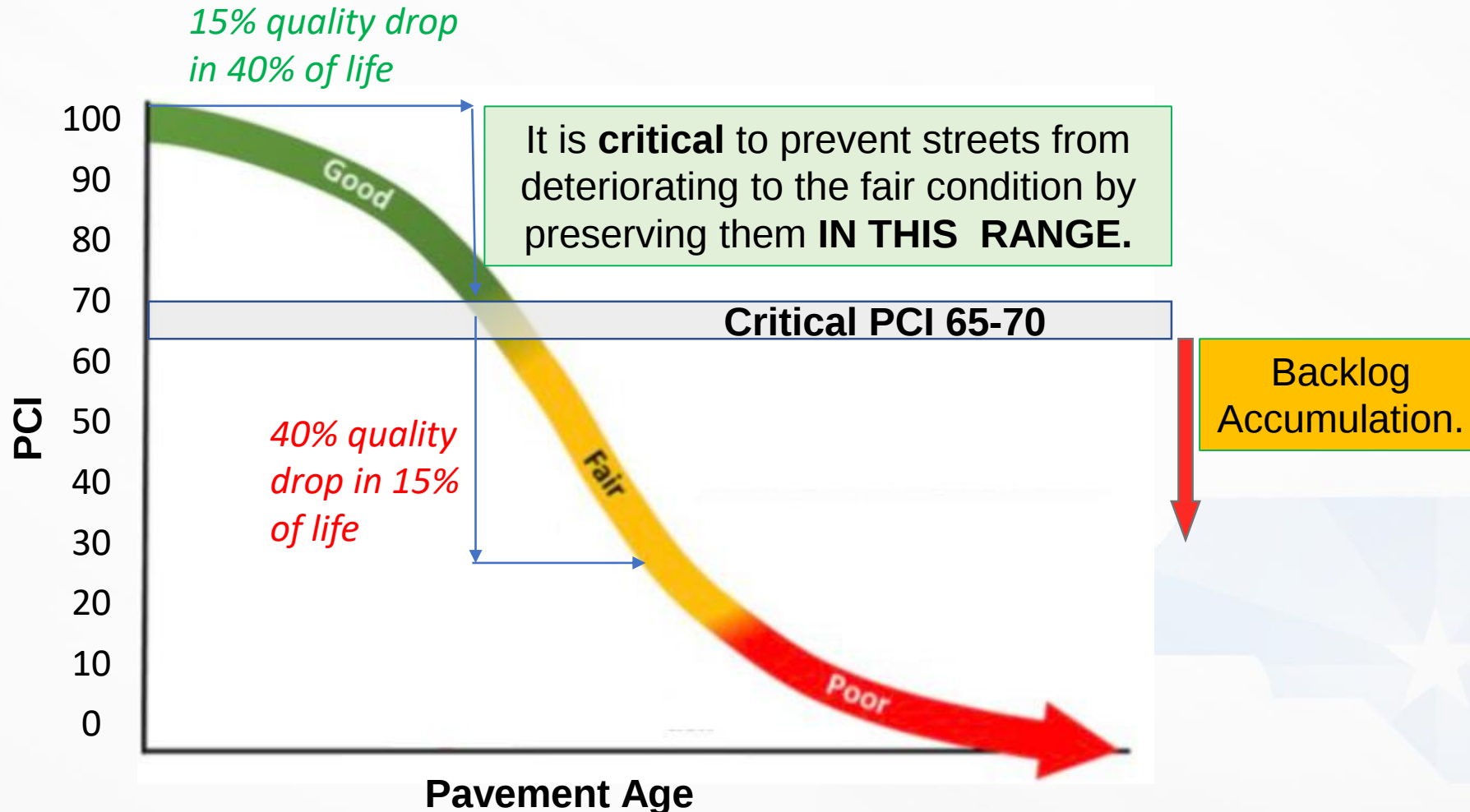
+

Preventive Maintenance
(Slurry Seal)

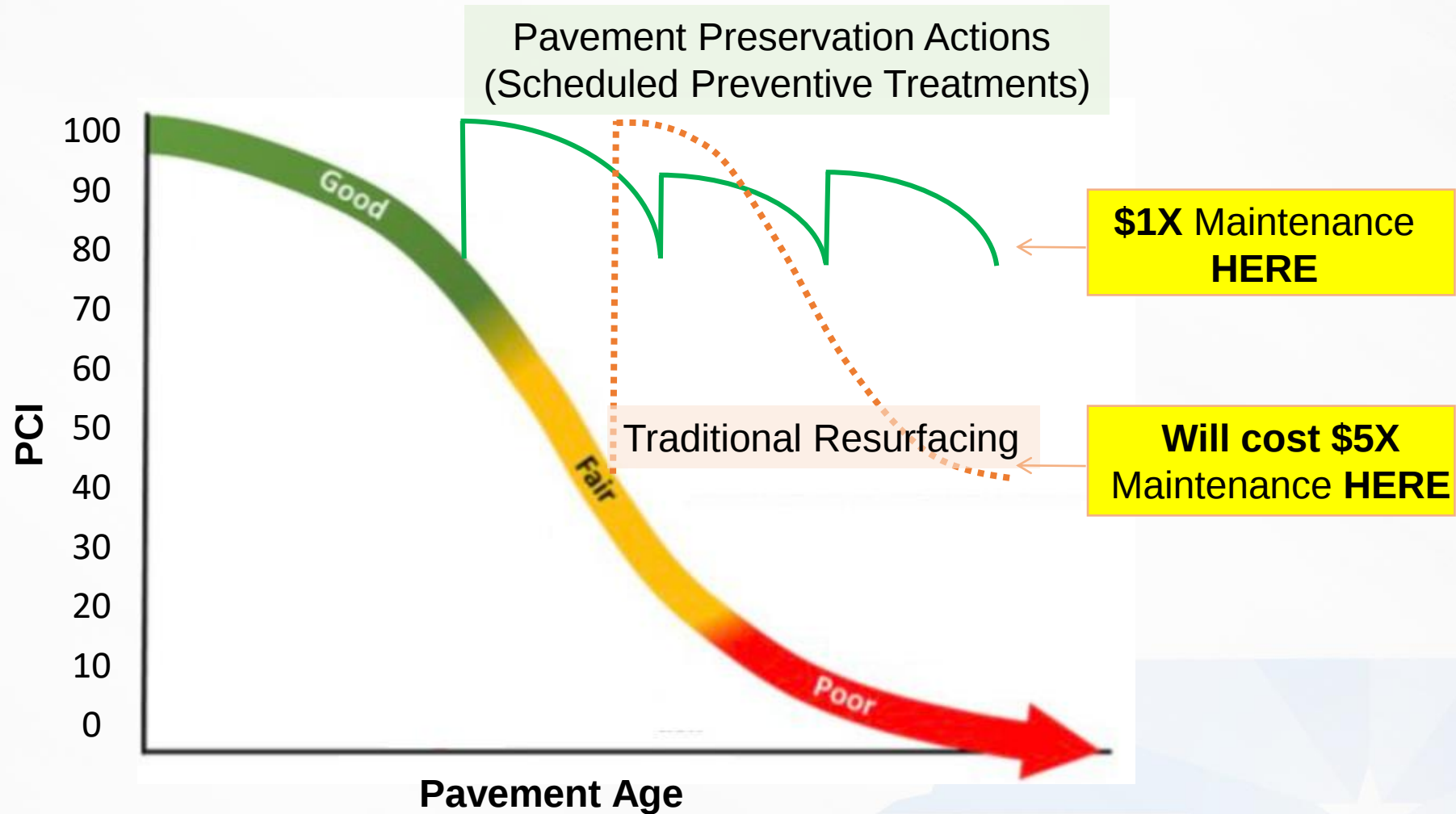
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Optimized Pavement
Management

- ❖ The deterioration of pavement occurs slowly at first, but then begins to accelerate as time wears on



Strategy Comparison



Streets are always in good condition (Above 75 PCI)

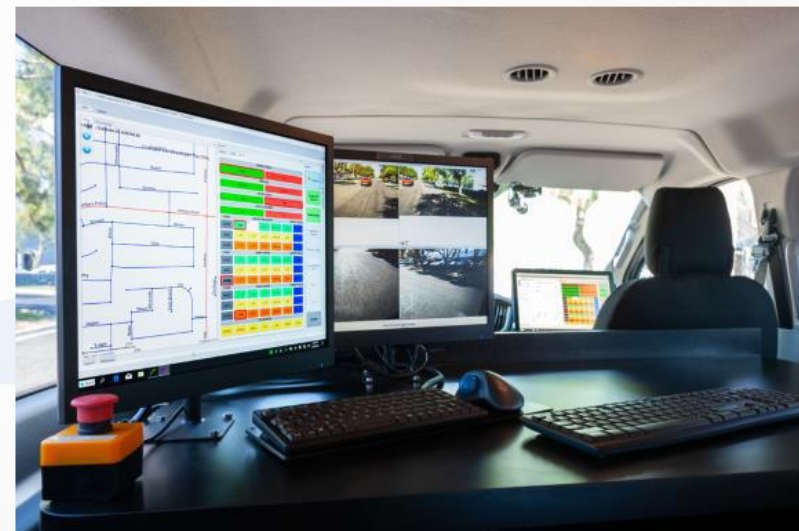
Fund Saving = Cover more mileage each year

Highlights

- ✓ The field survey was completed in **2016**
- ✓ They collected data ONLY through **cameras (Not Automated Laser Crack Detection)**
- ✓ The data was assessed by checking **photographs** and **windshield observation**
- ✓ The determined/converted PCI of Network was **81** in **2016**
- ✓ VUEWorks software was installed for checking Only the **condition ratings** (No budget Scenarios, Optimized Maintenance Recommendations were provided).

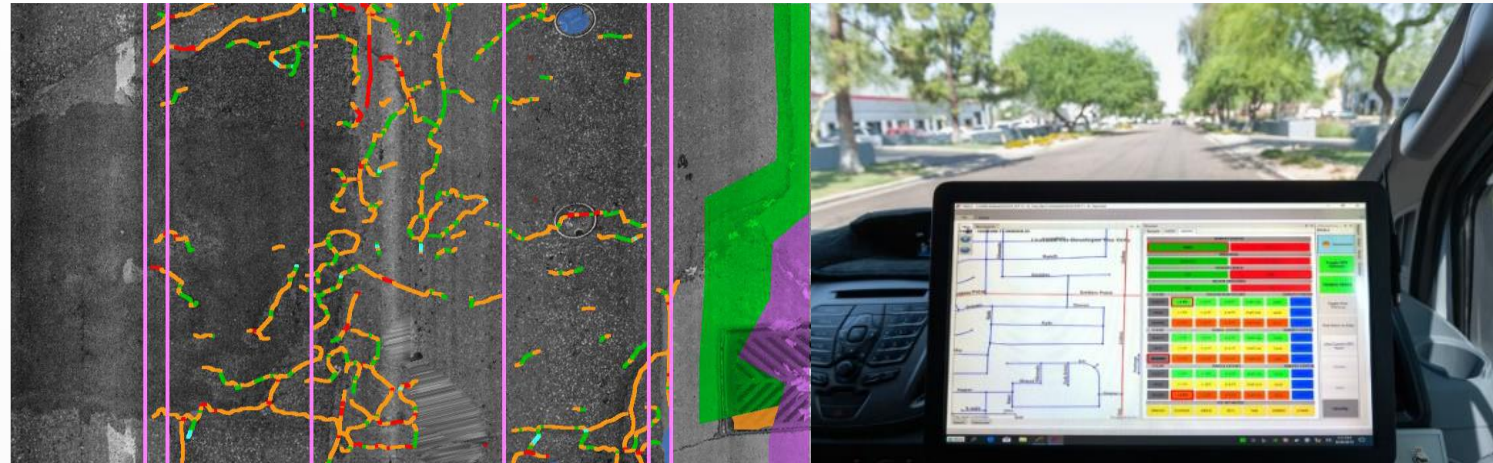
Objectives

- ✓ Perform a network-level field condition survey of the City's 756 miles
- ✓ Provide an up-to-date pavement condition indexes for each street
- ✓ Implement a new pavement management platform (PAVER) on City's sever
- ✓ Estimate the future Maintenance and Rehabilitation (M&R) requirements
- ✓ Converting Legacy database (PCR) to the new pavement condition criteria (PCI)



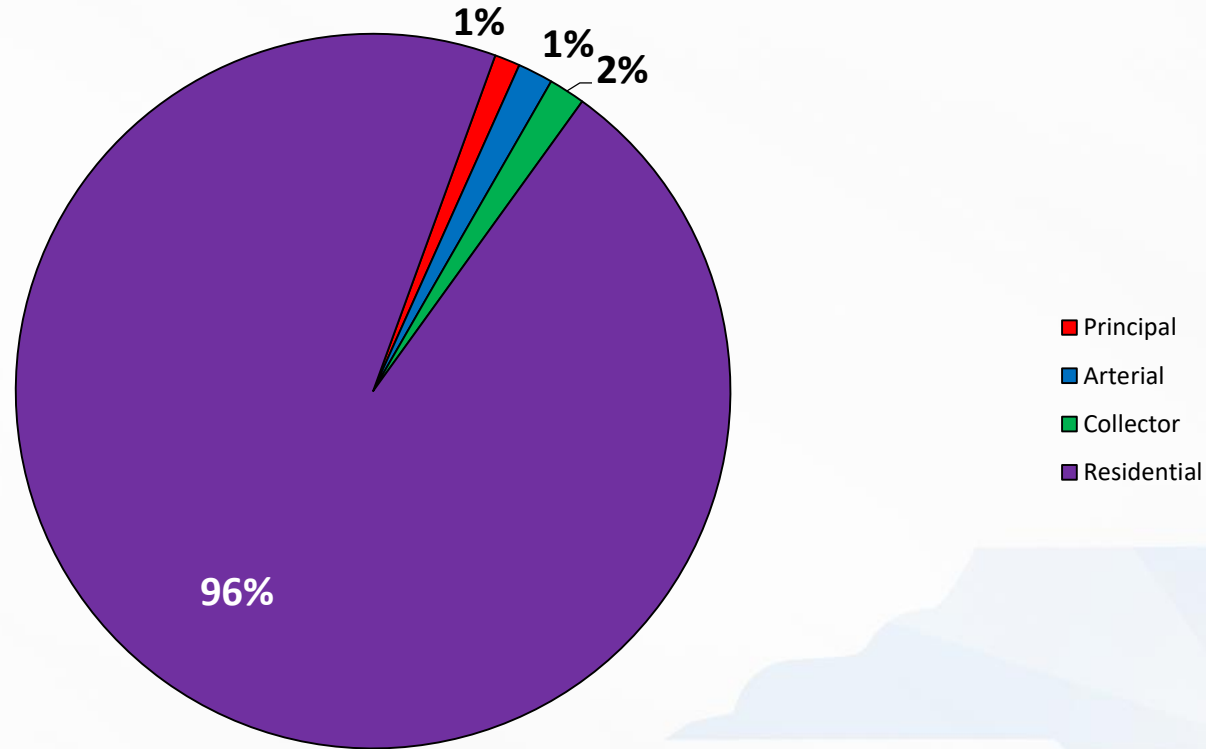
Methodology

- ✓ An automated pavement condition survey system fitted with **3D laser crack measurement system** (LCMS) was deployed for distress detection.
- ✓ **4K HD digital cameras** were used to capture surface pictures for forward, side, rear and right of way views.
- ✓ **All distresses** including patches/potholes, settlements, alligator and edge cracks were assessed in accordance with **ASTM D6433**.



Functional Class of City's Street Network

Fayetteville, NC
Functional Classification Distribution By Area (FunCL, 000's Sq Yds, %)



Total Mileage = 756.6 Centerline Miles
Total Area = 115208k Sq Yds

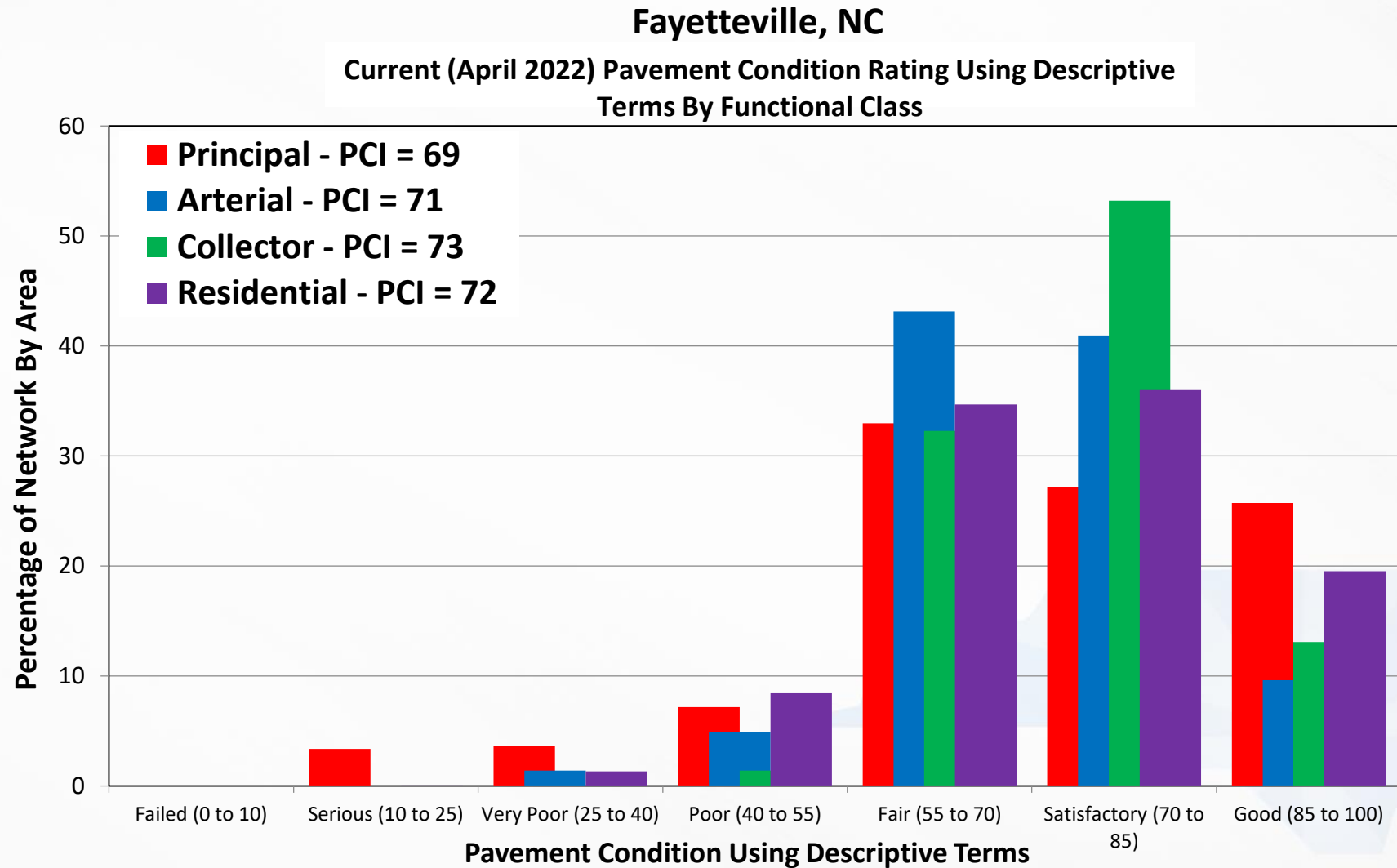
❖ Pavement conditions were categorized based on PCI values using the ASTM Standard criteria.

Condition Assessment	PCI Range	Typical Pavement Distresses and M&R Needed
Good	85-100	Fresh like-new pavement Preventative Maintenance: <i>Crack Sealing</i>
Satisfactory	70-85	Low severity L&T cracking and weathering Preventative Maintenance: <i>Crack Sealing & Surface Treatments</i>
Fair	55-70	Moderate severity L&T cracking Global preventive maintenance & localized repairs: <i>Localized surface and/or full-depth patching, surface treatments, and thin overlays</i>
Poor	40-55	Severe L&T cracking, low severity alligator cracking Moderate rehabilitation: <i>Localized full-depth patching, mill and overlays</i>
Very Poor	25-40	Moderate alligator cracking Major rehabilitation: <i>Mill and overlays, and reconstruction</i>
Serious	10-25	Severe alligator cracking, rutting Major rehabilitation: <i>Partial and complete reconstruction</i>
Failed	0-10	Severe alligator cracking, rutting and potholes Major rehabilitation: <i>Complete reconstruction</i>

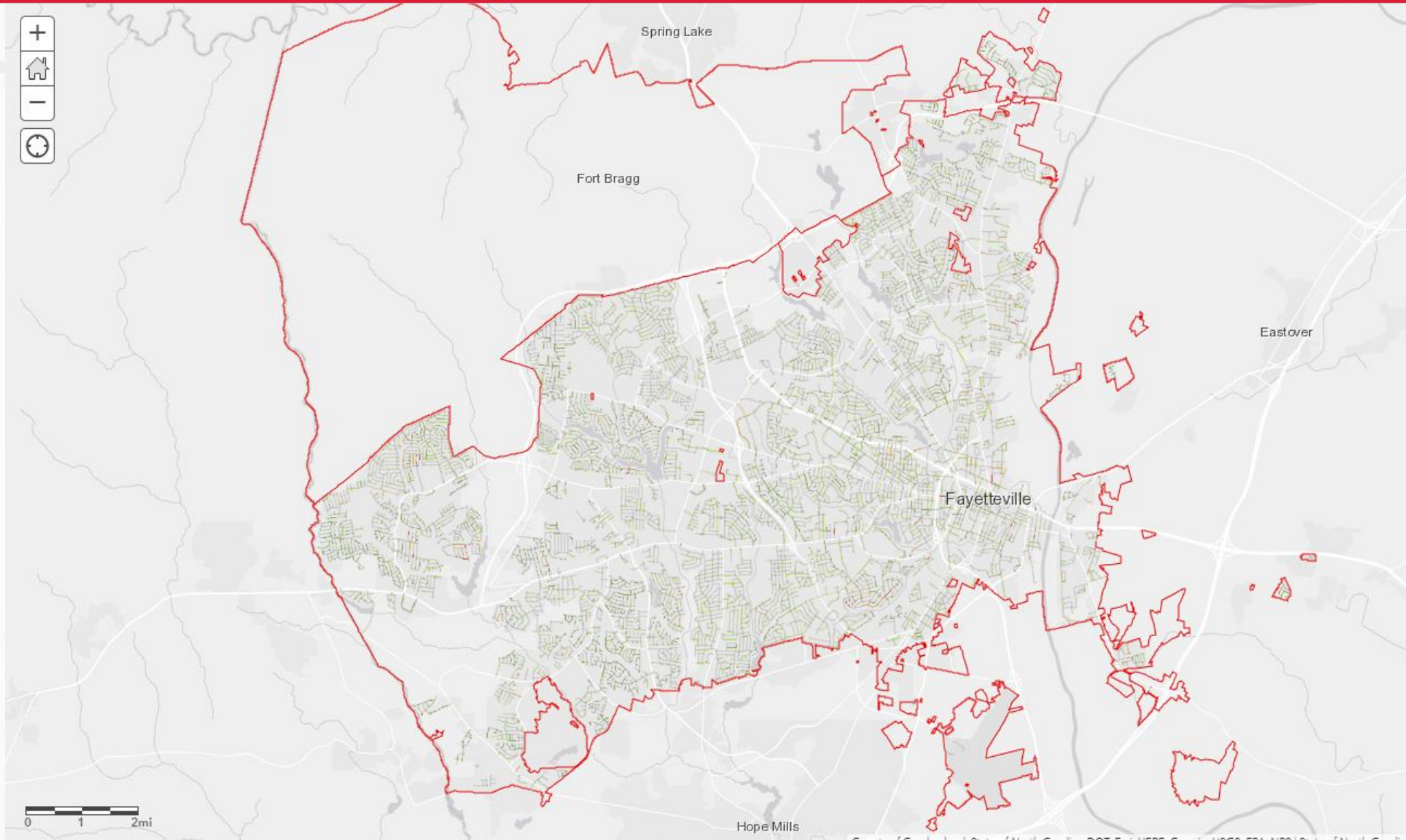
\$ Preventive Treatment

\$\$\$\$ Resurfacing

PCI Based on Functional Class



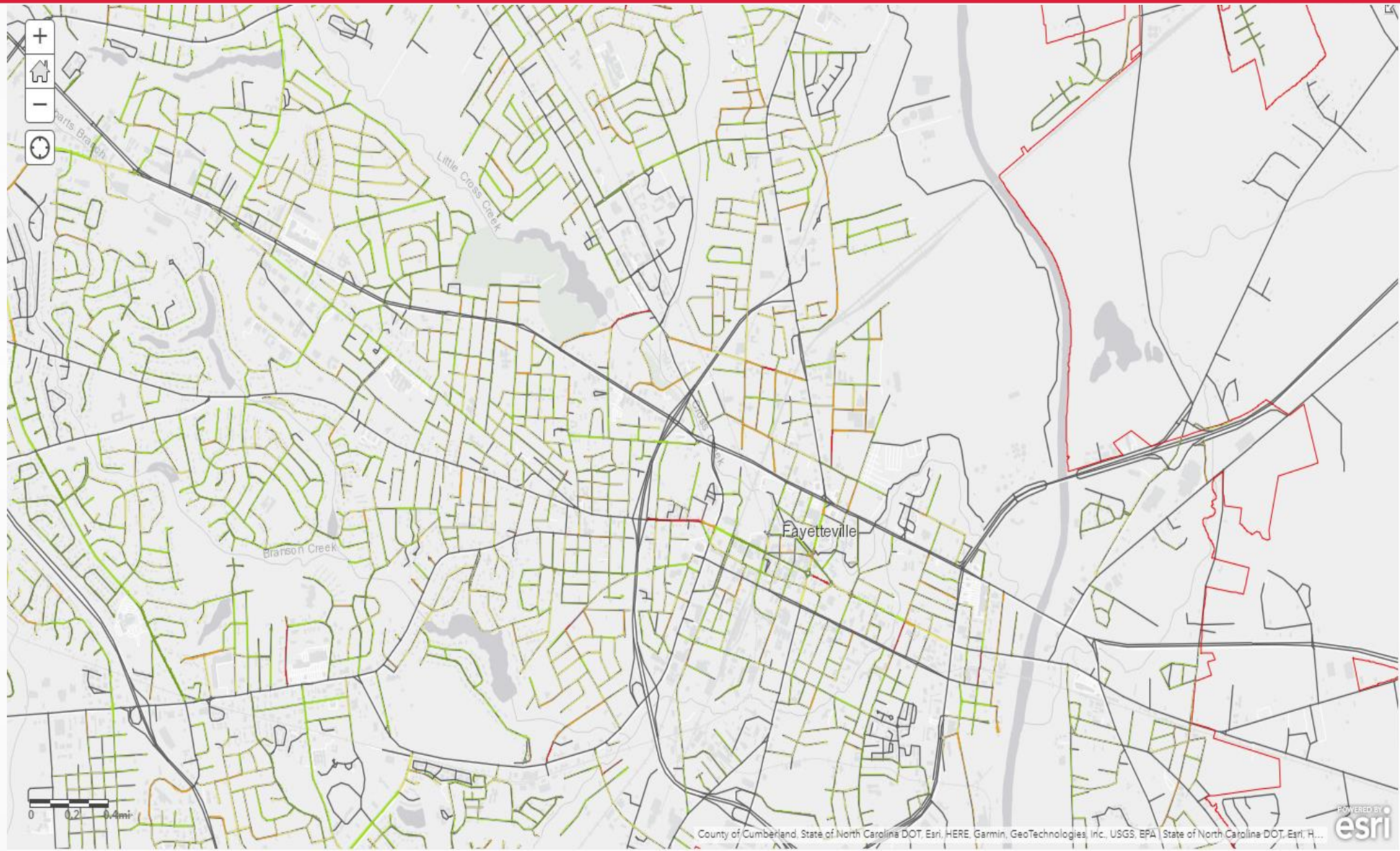
Fully Zoomed Out



PCI



Normally Zoomed In



PCI

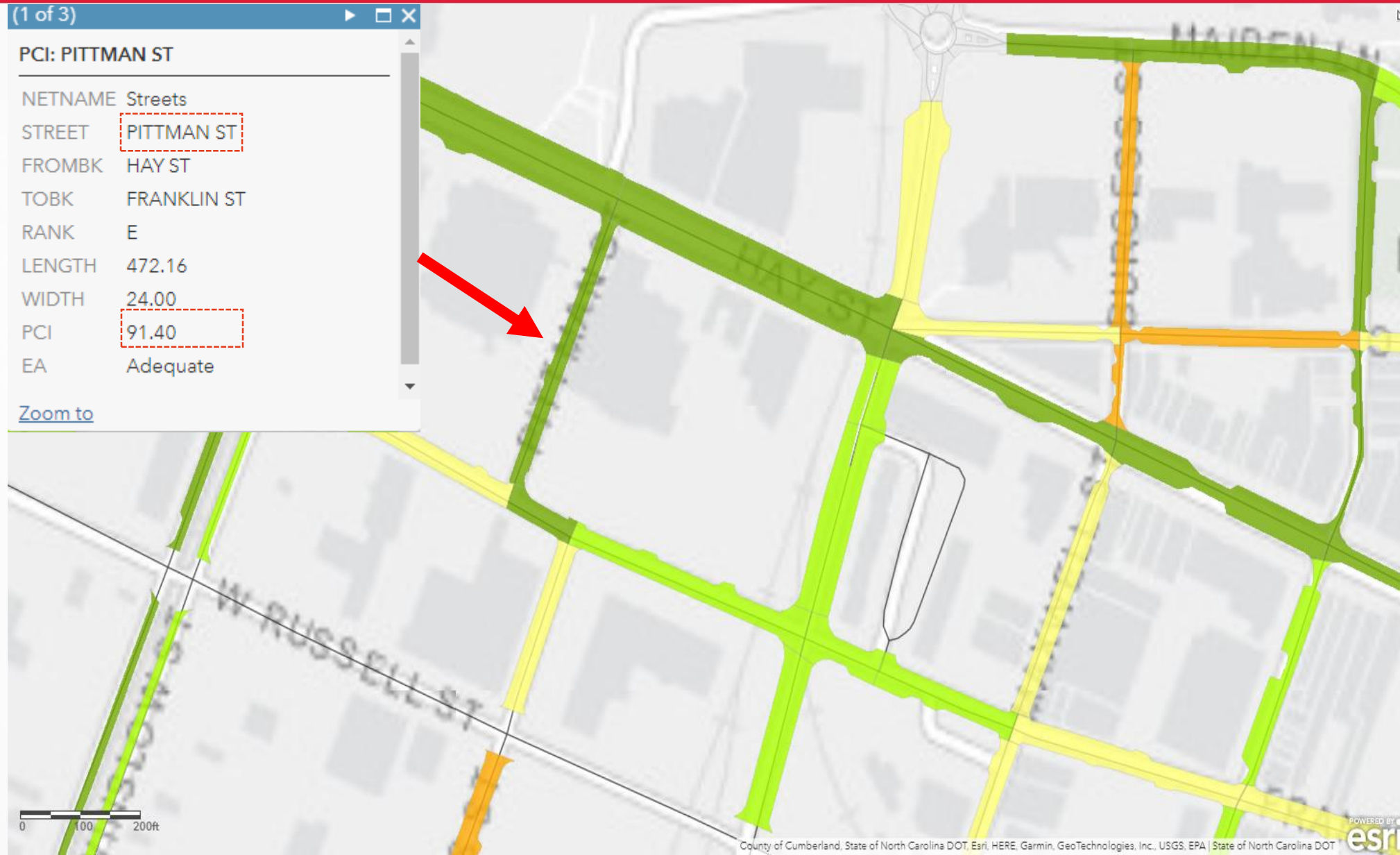


Fully Zoomed In

(1 of 3)

PCI: PITTMAN ST	
NETNAME	Streets
STREET	PITTMAN ST
FROMBK	HAY ST
TOBK	FRANKLIN ST
RANK	E
LENGTH	472.16
WIDTH	24.00
PCI	91.40
EA	Adequate

[Zoom to](#)

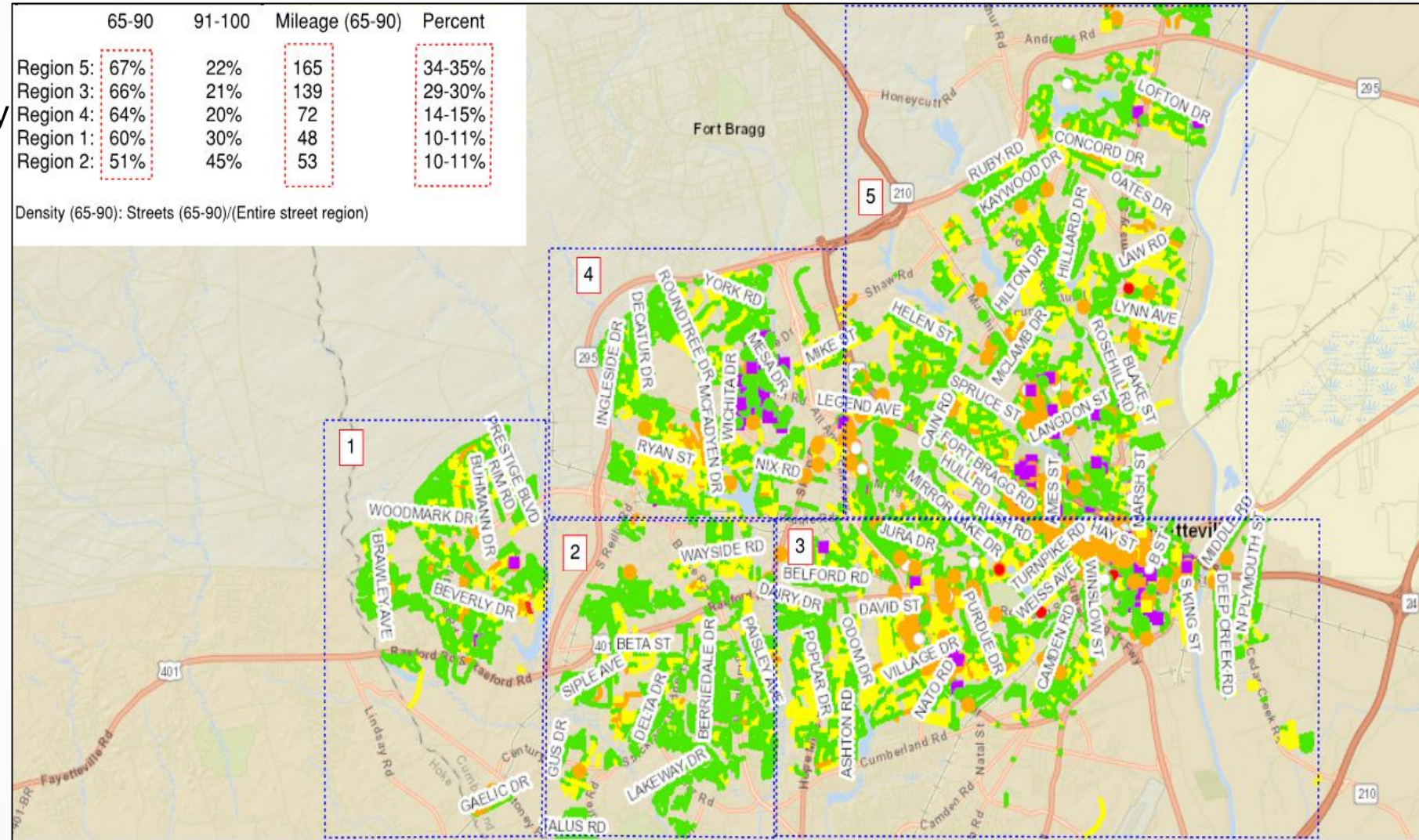


PCI

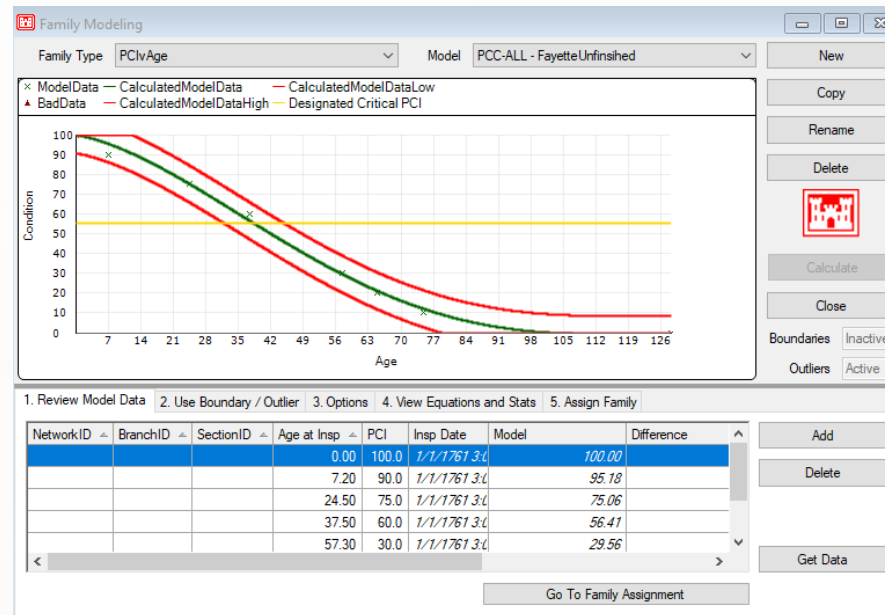
	> 85 - 100 Good
	> 70 - 85 Satisfactory
	> 55 - 70 Fair
	> 40 - 55 Poor
	> 25 - 40 Very Poor
	> 10 - 25 Serious
	0 - 10 Failed

This Procedure is **NO** Longer Employed

1. Dividing the City into 5 regions
2. Determining the level and severity of distress for each region
3. Allocating fund to each region based on their demand level



- ✓ Most widely used in the world
- ✓ PAVER is state-of-the-art technology in pavement management
- ✓ Software system was developed by U.S. Army Corps of Engineers
- ✓ Using PCI criteria as ASTM standard
- ✓ Promoted by APWA (American Public Works Association)



Major supporters of Paver:

“Department of Defense, US Air Force, US Army, US Navy Federal Aviation Administration, and Federal Highway Administration”

Selection Procedure

PAVER utilizes an internal **ALGORITHM** to develop optimized plan **BASED ON:**

Critical PCI

Street Classification (Traffic volume)

Yearly budget

Time period

Treatment Type and Cost

Optimize the best
usage of Fund

Obtaining the highest PCI for the City's Network

Optimally assigns maintenance strategies

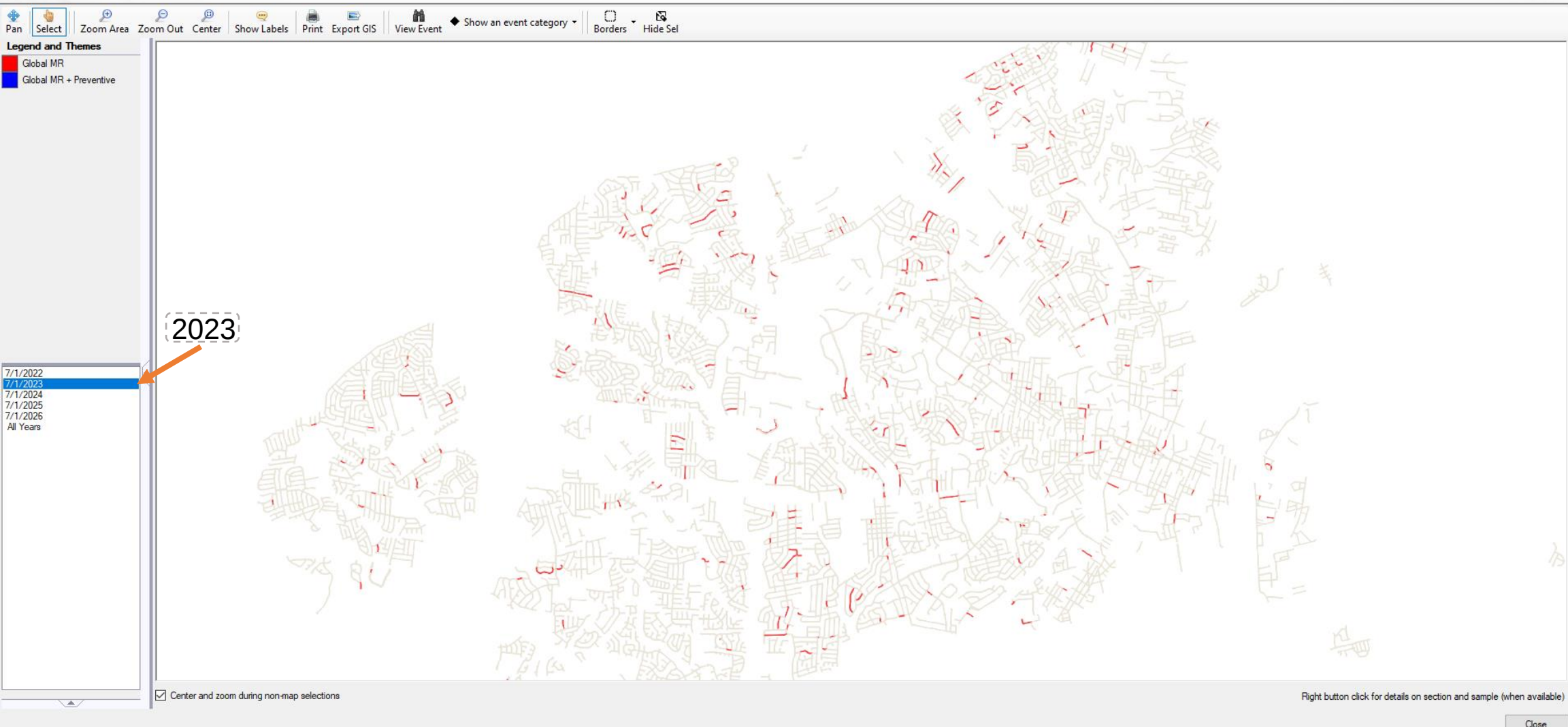
Scattered maintenance actions throughout the City

Long-term plan for Preventive and Resurfacing actions

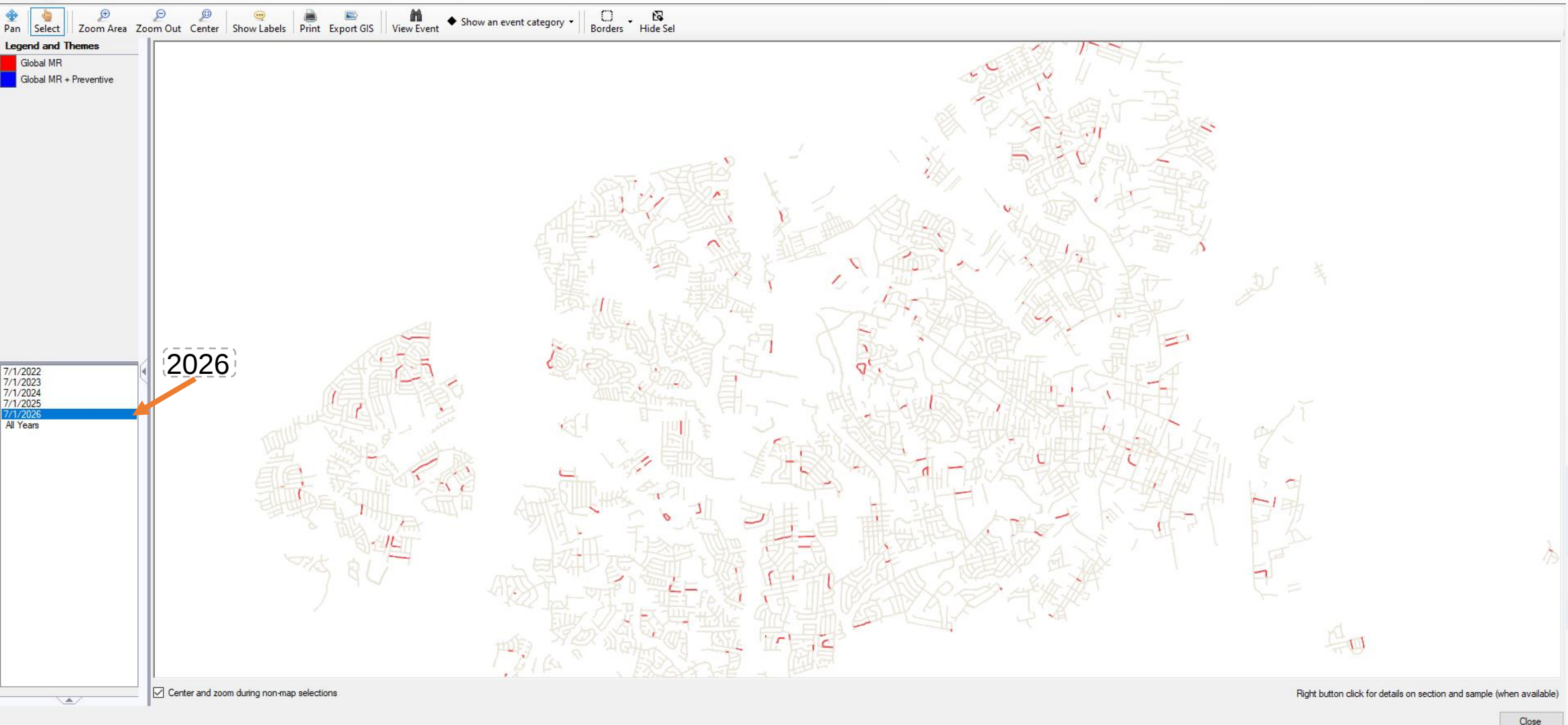
Additional Criteria (**City's Interference Projects**):

1_Stormwater Projects, **2**_Annexation Plan, **3**_PWC Utility Works

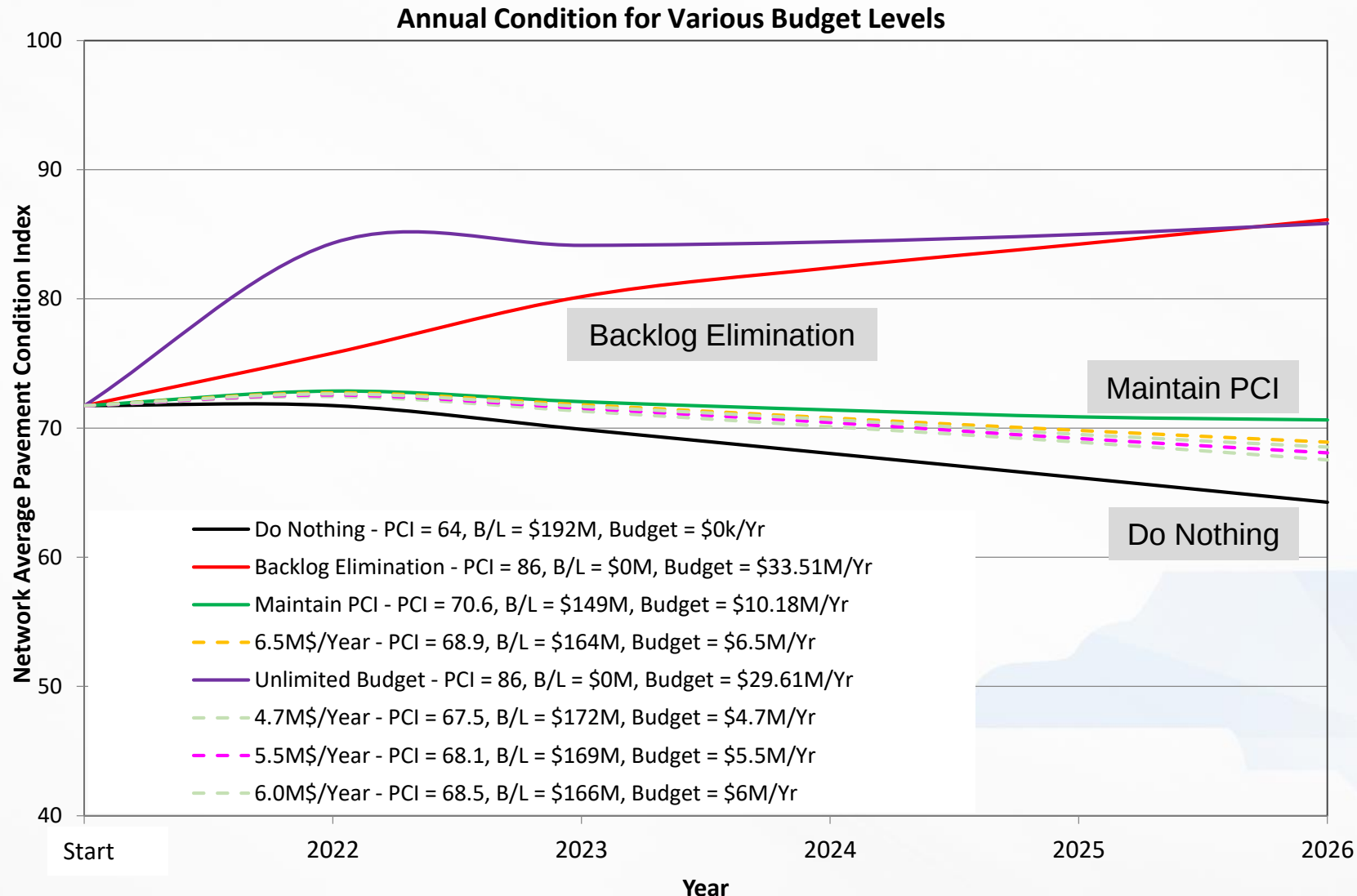
Scattered Maintenance Recommended for 2023



Scattered Maintenance Recommended for 2026



Budget Scenarios Summary (70/30 Split Resurfacing/Slurry) Fayetteville, NC



Budget Scenarios Summary (70/30 Split Resurfacing/Slurry)

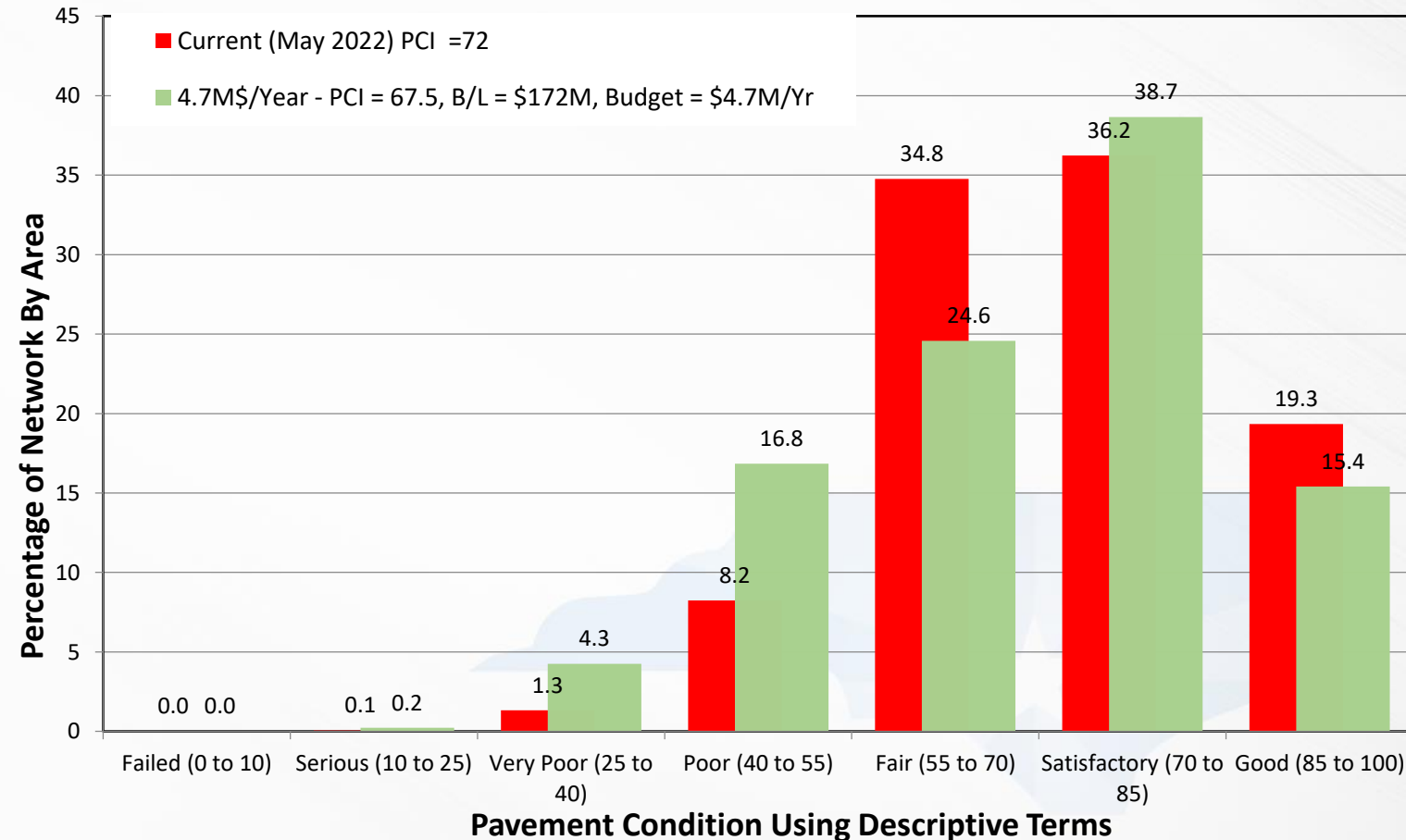
Scenario Description	Annual Budget (Yearly)	5 Year Total Spending (Yearly)	Remaining B/L (Yearly)	Total Cost (Spending +B/L) (Yearly)	5 th Year PCI
Backlog Elimination	\$33.5 M	\$167.5 M	\$0	\$167.5 M	86.1
Unlimited Budget	\$29.6 M	\$148 M	\$0	\$148.06	85.8
Maintain PCI	\$10.1 M	\$50.8 M	\$148.53 M	\$199.4 M	70.6
\$6.5M/Year	\$6.5 M	\$32.5	\$164.12	\$196.6 M	68.9
\$5.5M/Year	\$5.5 M	\$27.5 M	\$168.8 M	\$196.3	68.1
\$6M/Year	\$6 M	\$30 M	\$166.26 M	\$196.3	68.5
\$4.7M/Year (70/30 Split)	\$4.7 M	\$23.5 M	\$172.166 M	\$195.6	67.5
\$4.7M/Year (Resurfacing)	\$4.7 M	\$23.5 M	\$171.115 M	\$195.5	65

The current network condition distribution (Red)
AGAINST
 5- year post rehabilitation distribution in 2026 with \$4.7M/Yr

Fayetteville, NC
 Current Versus Post Rehab Condition

Current PCI = 72

2026 PCI (70/30 Split Resurfacing&Slurry) = 67.5



Years	PCI
2012	82
2016	81
2022	72
2026 (30/70 Split)	67.5
2026 (Traditional resurfacing)	65

%11 Drop

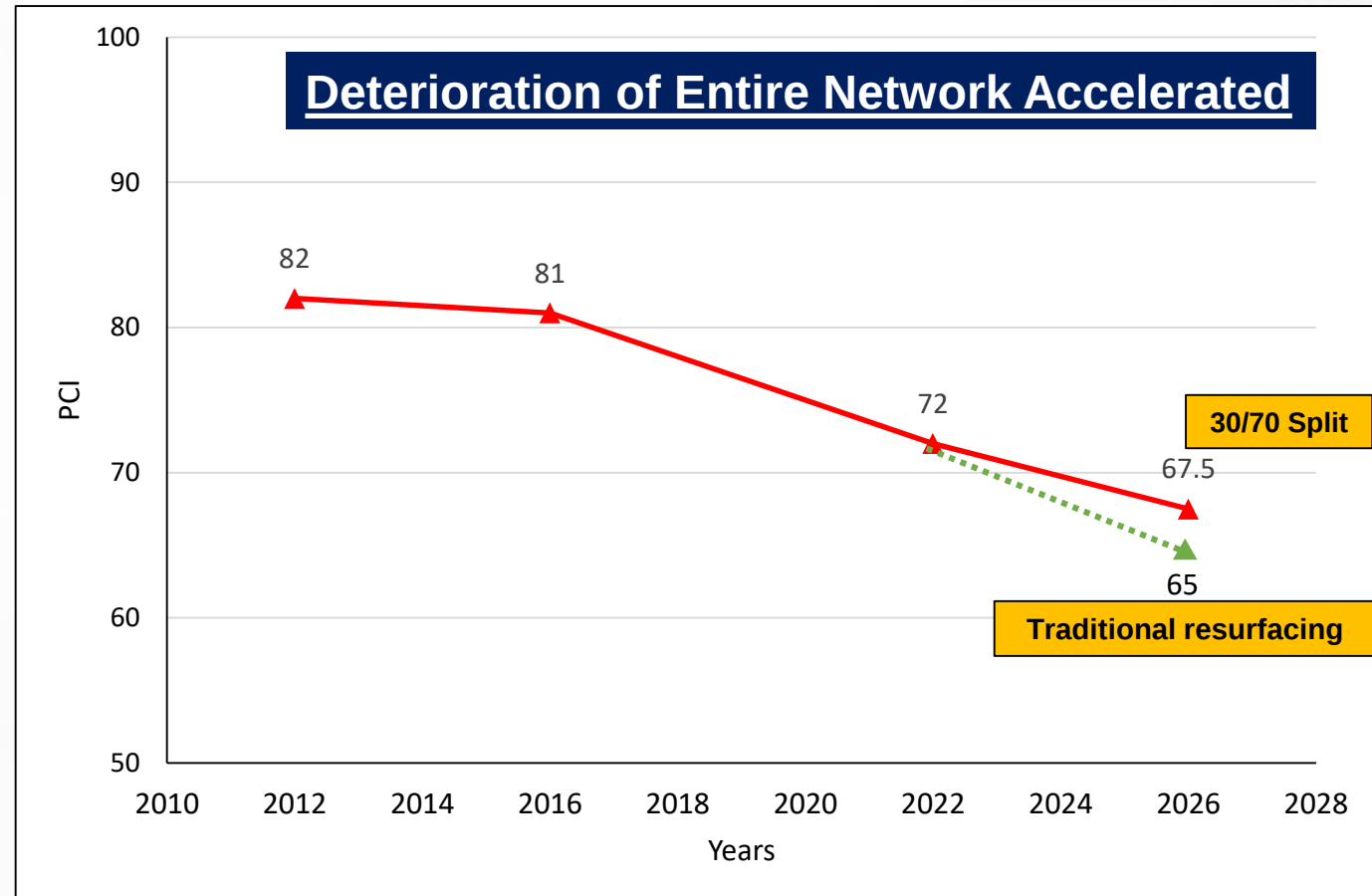
%6 Drop

%10 Drop

WHAT ARE THE CAUSES...?

- Preventive Treatment **WAS NOT EMPLOYED**
- Fund is not **ENOUGH**
- Traditional Resurfacing was the **ONLY OPTION**
- Maintenance Cost **INCREASED**

Where we WERE, Where we ARE, Where we WILL BE



❖ Pavement conditions were categorized based on PCI values using the ASTM Standard criteria.

Condition Assessment	PCI Range
Good	85-100
Satisfactory	70-85
Fair	55-70
Poor	40-55
Very Poor	25-40
Serious	10-25
Failed	0-10

\$ KEY to Keep streets within this range before it's **TOO LATE**

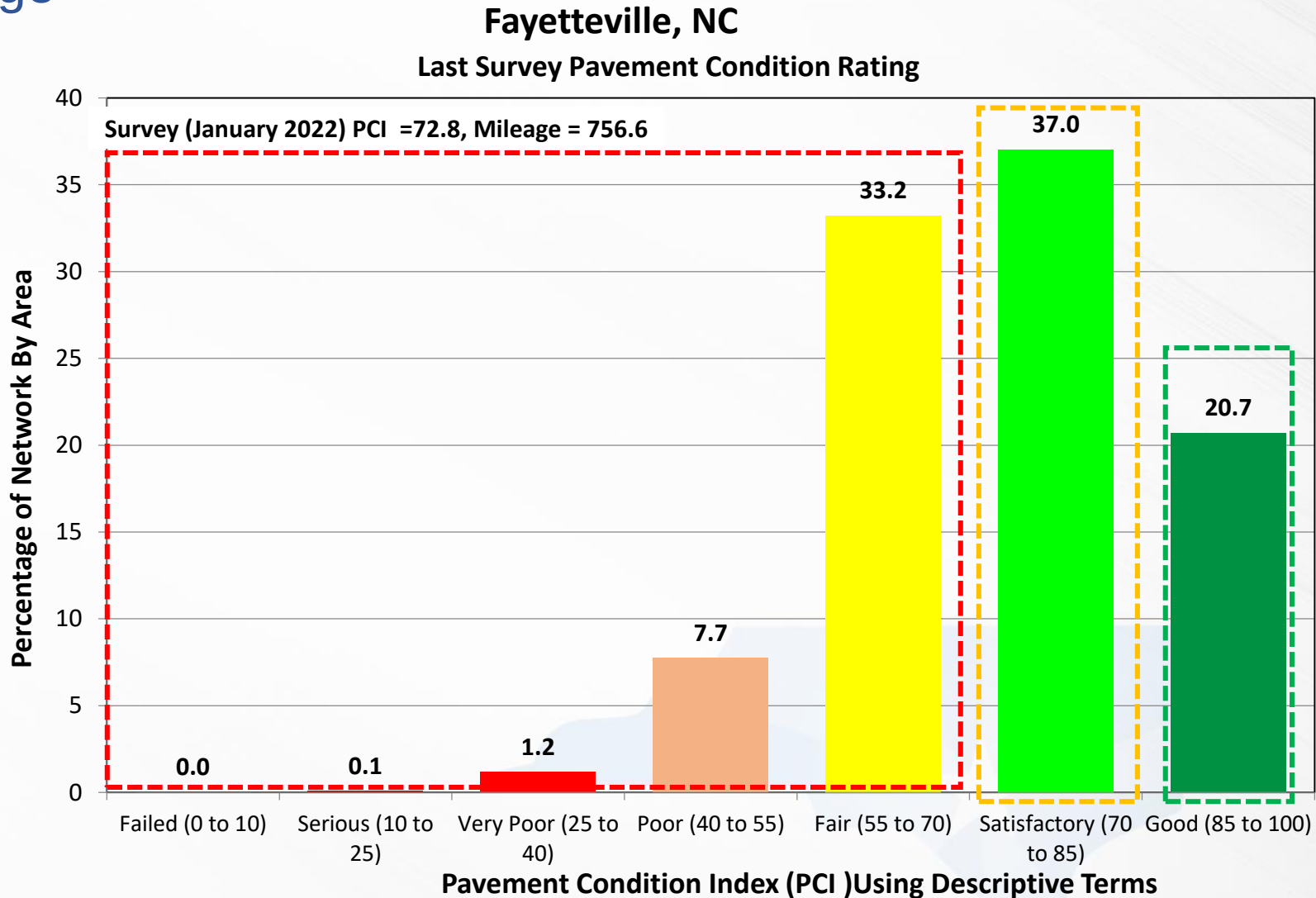
\$\$\$\$ LOW Mileage Coverage leading to accumulation of **BACKLOG**

Condition of network by percentage

PCI (Below 70):
Traditional Resurfacing
42% X 756 miles = 318 miles

PCI (70-85):
Preventive Maintenance
37% X 756 miles = 280 miles

PCI (85-100):
No Essential Maintenance
20% X 756 miles = 151 miles



Interpretations:

PCI (Below 70):

Traditional Resurfacing

42% X 756 miles = **318 miles**

PCI (70-85):

Preventive Maintenance

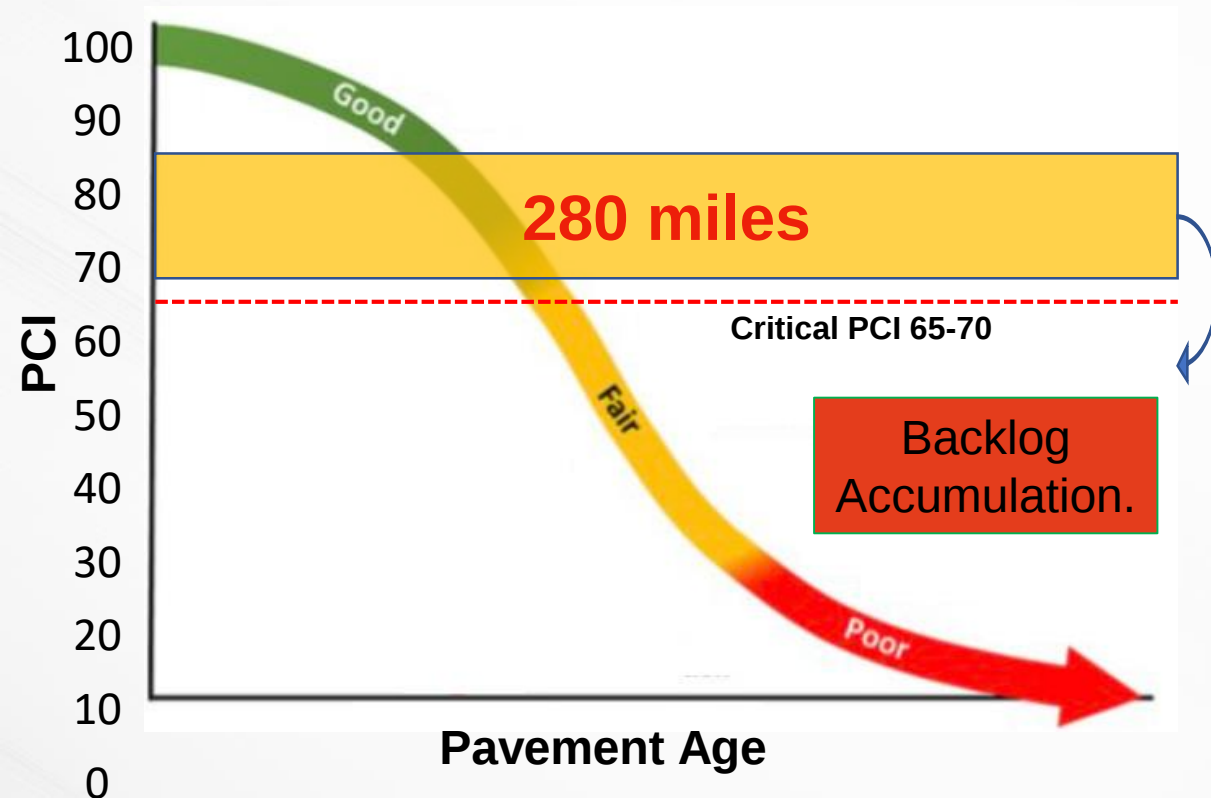
37% X 756 miles = **280 miles**

Current Funding: **\$4.7 M**

IF Neglect **280 Miles** & Resurfacing **ONLY**:
Resurfacing 15 mile/year Or **75** miles in **5 Years**:
23% of 318 miles

AFTER 5 Years Consequence:

- The condition of **280 miles** worsen
- Each year more miles adds to "POOR" list needing EXPENSIVE maintaining
- Backlog Grows Continuously



PCI = 48: Resurfacing



PCI = 70: Slurry Seal



GISID : 8518
From : CHEROKEE DR
To : CATAWBA ST

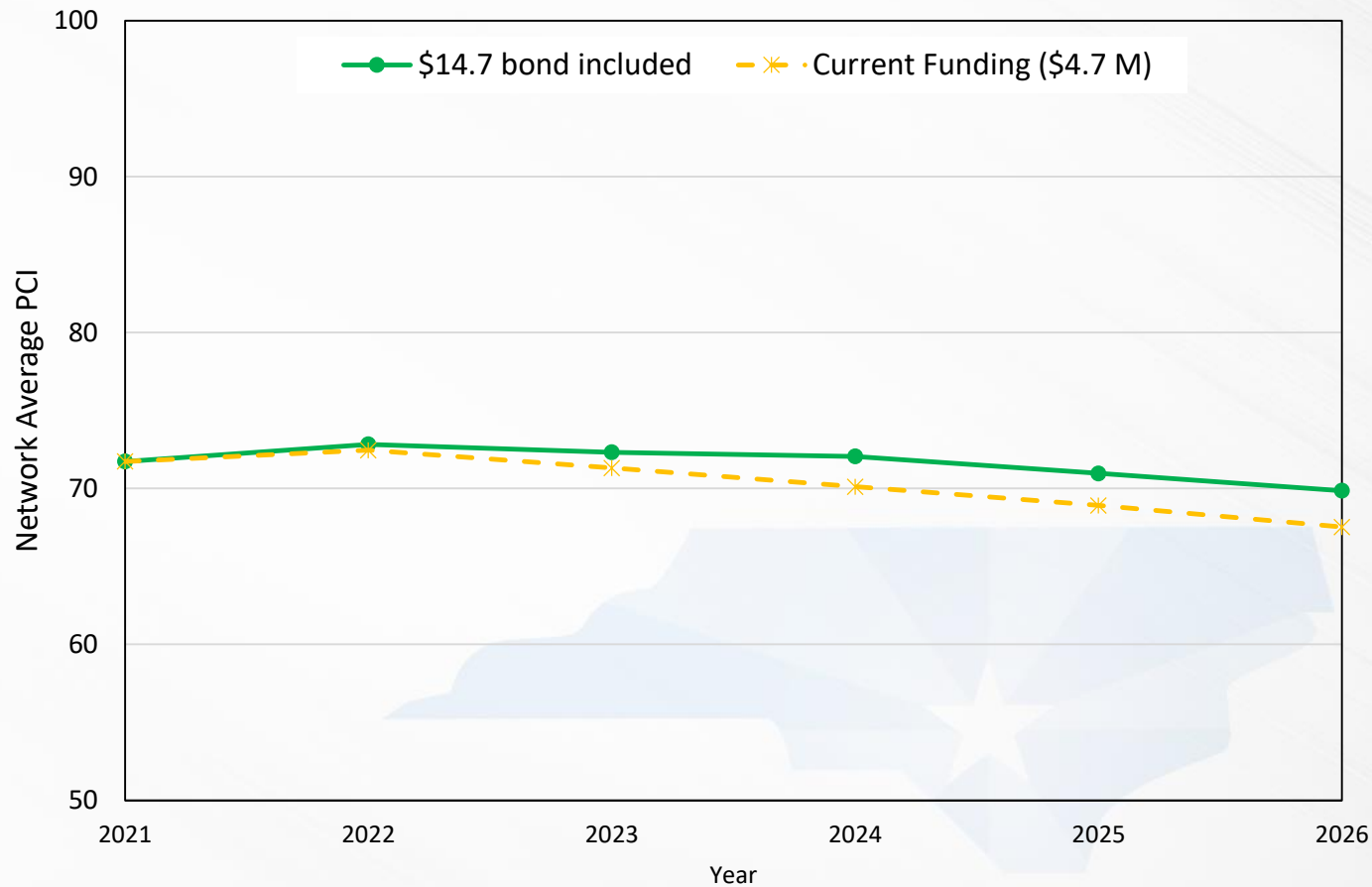
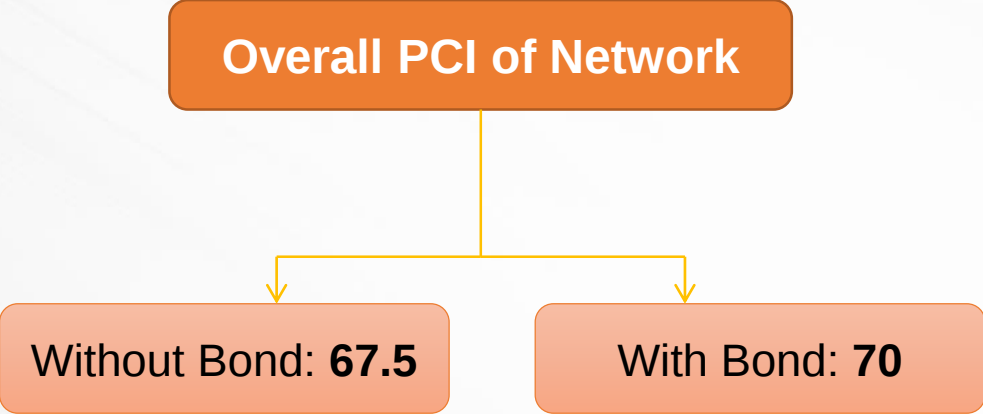
MOHAWK AVE

IMS
35.07749557
-78.91920471
Thu Feb 03 17:06:25.3

Plan for Bond Budget

Bond Budget: \$14.7 M

Spending the Bond on **Resurfacing** in **3 Years**: $\frac{\$14.7\text{ M}}{3} = \4.9 M Additional budget on Resurfacing Projects



Current Funding VS Bond included

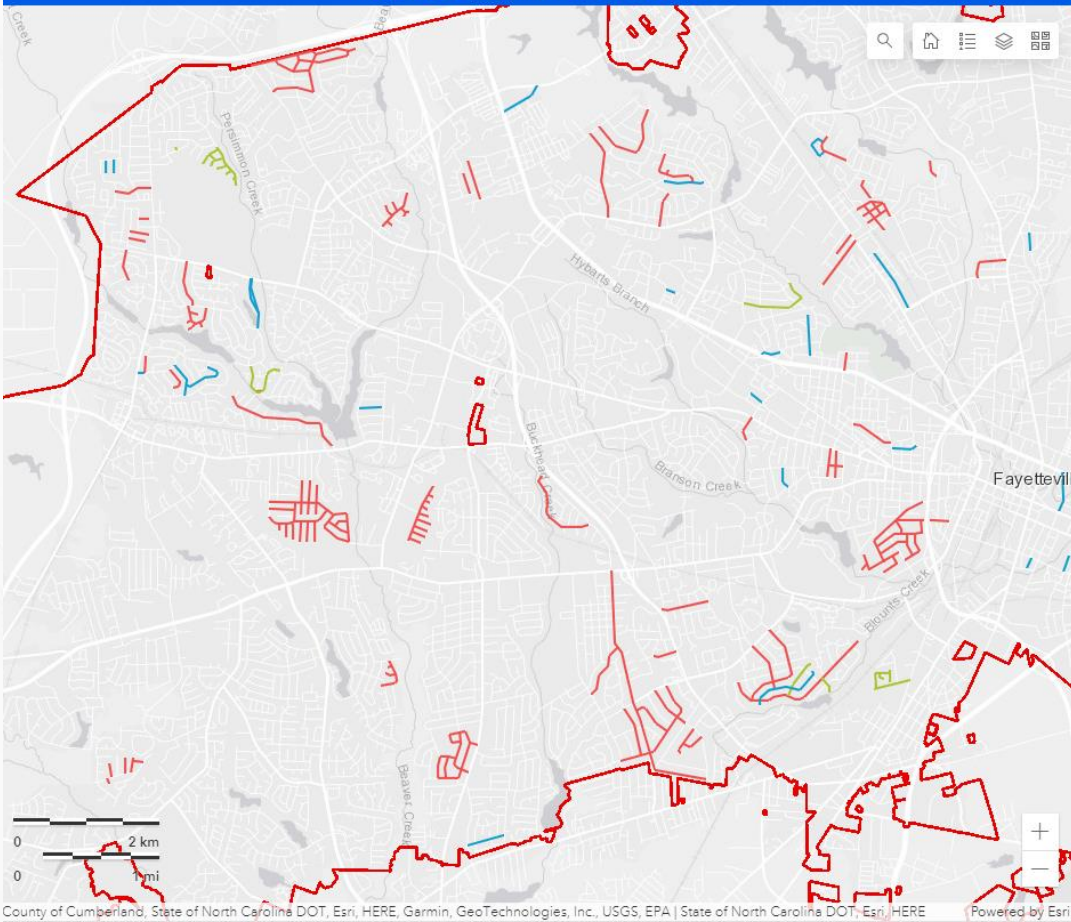
Current Funding (\$4.7 M)				
FY22	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	72		
FY23	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	71.3		
FY24	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	70		
FY25	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	68.9		
FY26	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	67.5		

VS

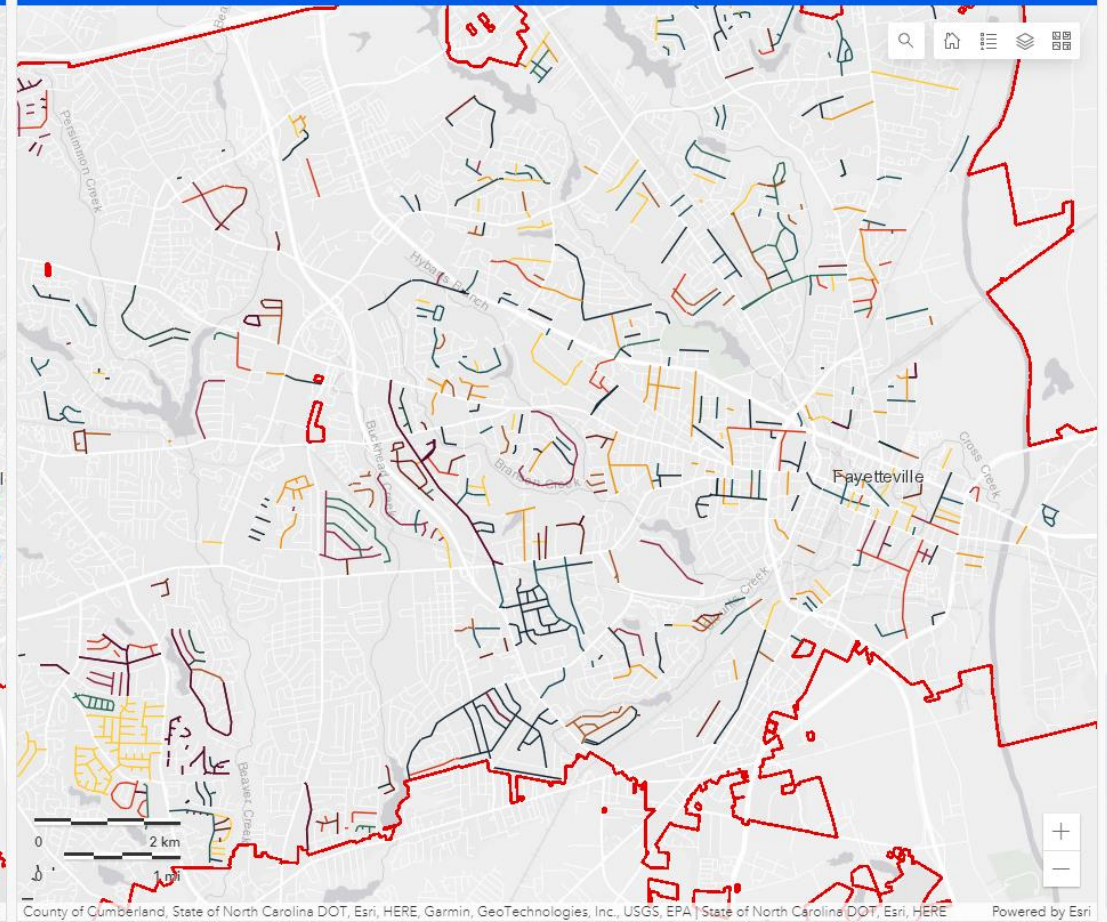
Bond included (\$14.7/3 years + \$4.7 M)				
FY22	Resurfacing	\$8.2 M	28 miles	51 miles
	Slurry	\$1.4 M	23 miles	
	PCI	72		
FY23	Resurfacing	\$8.2 M	28 miles	51 miles
	Slurry	\$1.4 M	23 miles	
	PCI	72.3		
FY24	Resurfacing	\$8.2 M	28 miles	51 miles
	Slurry	\$1.4 M	23 miles	
	PCI	72		
FY25	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	71		
FY26	Resurfacing	\$3.3 M	10 miles	33 miles
	Slurry	\$1.4 M	23 miles	
	PCI	70		

Pavement Preservation Program
Public Services Department | Engineering Division

Proposed Pavement Preservation



Completed Pavement Preservation





FayettevilleNC.gov