Developing a Pavement Management Plan for Alachua County:

AgileAssets, Cityworks, and Equity

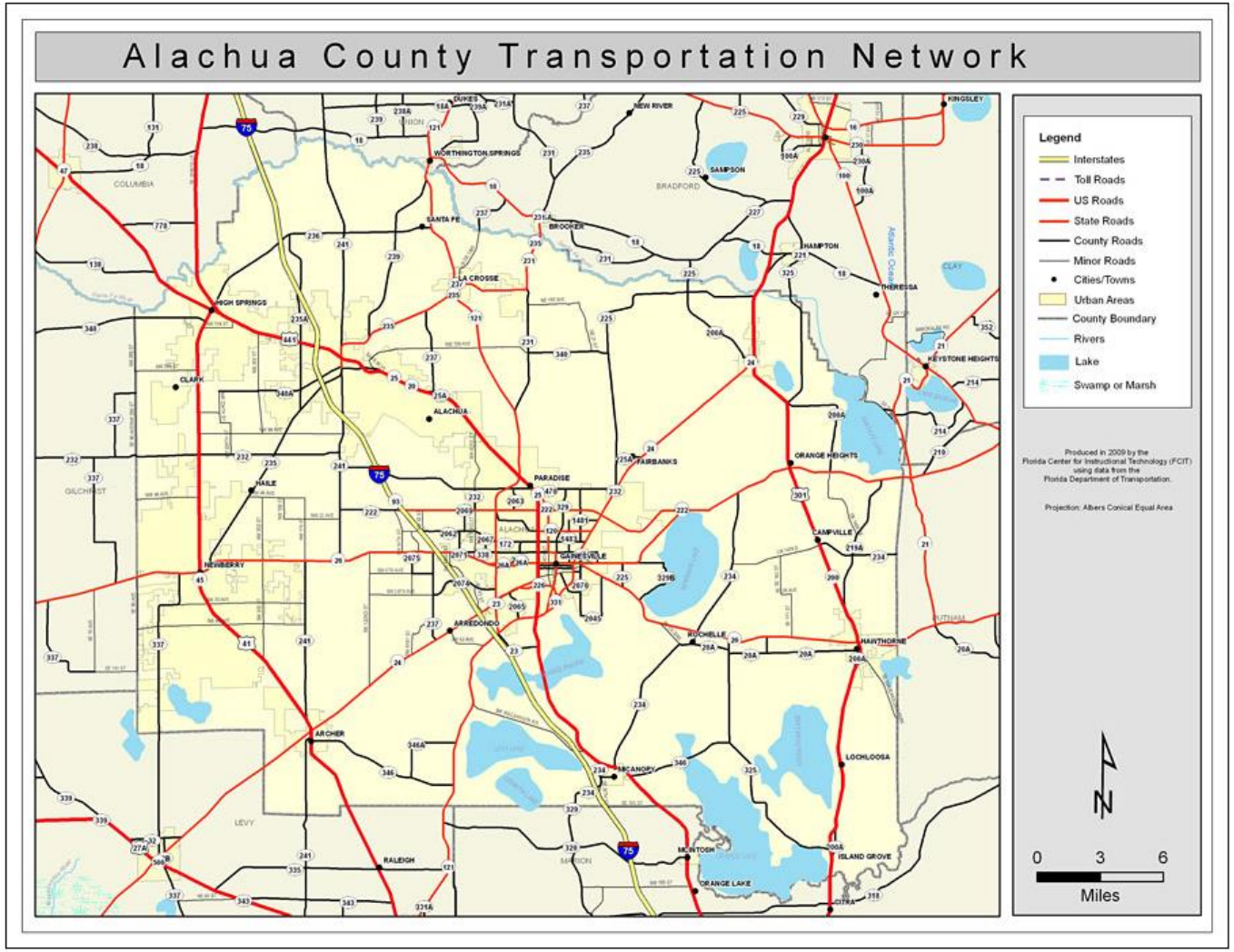
Don Clifton, Alachua County Road Superintendent
Brian Kauffman, P.E. Assistant PW Director
Scott Sevens, P.E. Principle Project Manager

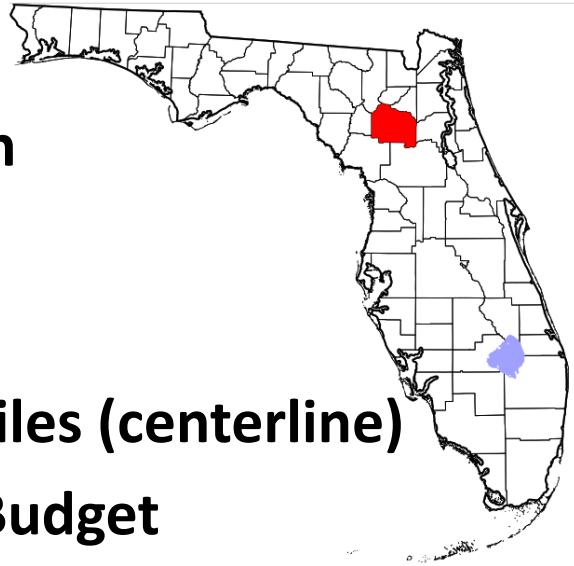
Introduction

- County Overview & Documenting Need - Brian
- Pavement Management & Agileassets - Scott
- Mapping Inequity Areas – Brian
- Cityworks - Don
- Summary & Take Aways - Brian

County Overview & Documenting Need

County Overview & Documenting Need





278,000 Population

9 Municipalities

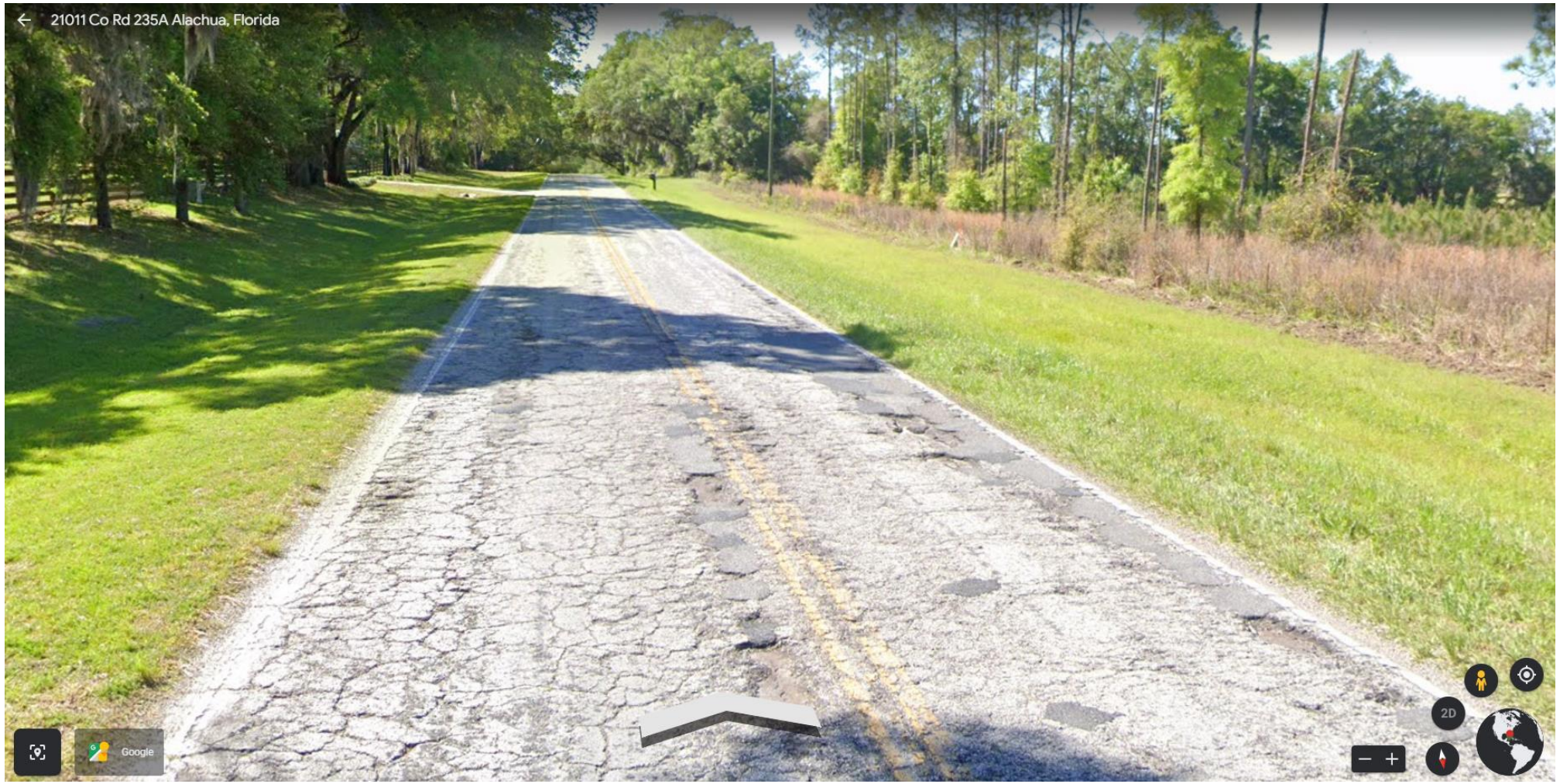
269 Square Miles

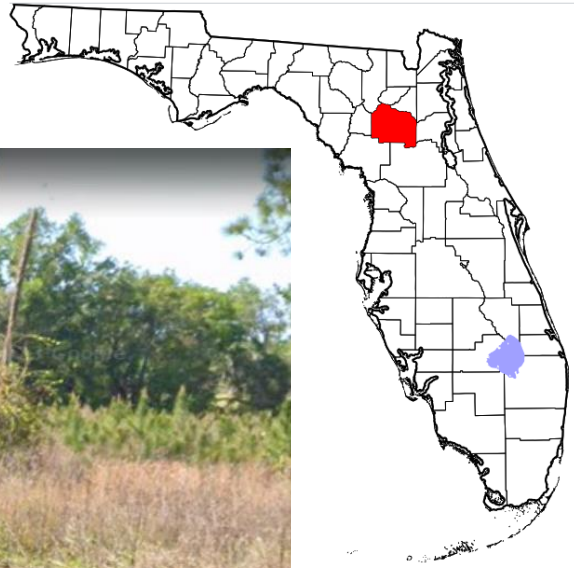
690 Paved Road Miles (centerline)

$4 Million Paving Budget

County Overview & Documenting Need

County Road 235A





County Overview & Documenting Need

- **2021 Pavement Management Report by The Kercher Group**
  - **2020 Pavement Condition Survey (visual)**
  - **FHWA Long Term Pavement Performance Methodology**

Table 1 – Current Condition and Inventory Summary

Element	Total
1. Length (CL Miles)	690.28
2. Lane Miles	1,422.90
3. Pavement Square Yards	9,814,657
4. PCI	60
5. Net Worth/Asset Value ($)	$1,531,086,474
8. Asset Value for Current Condition ($) *	$920,338,804
9. % Network in Good (PCI ≥ 80) Condition	25.3%
10. % Network in Poor (PCI < 60) Condition	43.9%

* 5. Net Worth/Asset Value ($) x 4. PCI/100

County Overview & Documenting Need

Table 2 – Initial Backlog Treatment Needs and Type Breakdown

Budget Group	Lane Miles	Treatment Cost
Maintenance	148.46	$6,099,167
Preservation	67.18	$3,177,932
Rehab-Thin	439.79	$88,405,495
Rehab-Thick	488.21	$239,214,663
Reconstruction	66.70	$71,395,237
Grand Total	**1210.10**	**$408,167,827**

We Need More Money

- November 2022, Voters approved 1 Cent Sales Tax
  - ½ Cent for Wild Spaces and Public Places
  - ½ Cent for Infrastructure (70% roads) $11.7 million
- BOCC allocates another $4 Million General Fund for a total of $8 Million
- BOCC agrees to budget ELMS nickel in 2028 for planning purposes

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
$17,960,880	$19,250,527	$19,250,527	$19,250,527	$19,250,527	$28,615,100	$28,615,100	$28,615,100	$28,615,100	$28,615,100

- Now that we have the money, we need a Pavement Management Plan

Alachua County, Florida

Pavement Management

What is Pavement Management?

- The American Association of State Highway and Transportation Officials (AASHTO) definition: The effective and efficient directing of the various activities involved in providing and sustaining pavements in a condition acceptable to the traveling public at the least life cycle cost.
- The National Cooperative Highway Research Program (NCHRP) definition: A coordinated set of activities, all directed toward achieving the best value possible for the available public funds in providing and operating smooth, safe, and economical pavements.

- "least life cycle cost" "best value possible"

– Why are these concepts so important?

Why is Pavement Management Important?

- Pavement is typically the single largest financial investment for a public agency
- Strategic treatment selection and funding allocation is a complex process
  - Identification of long-term consequences
  - Limited availability of funding
- Provides objective justification for maintaining or increasing pavement funding allocations
- Formalized process provides transparency of budgeting decisions
- Maintains the network at the highest level of service for the traveling public for the funding available

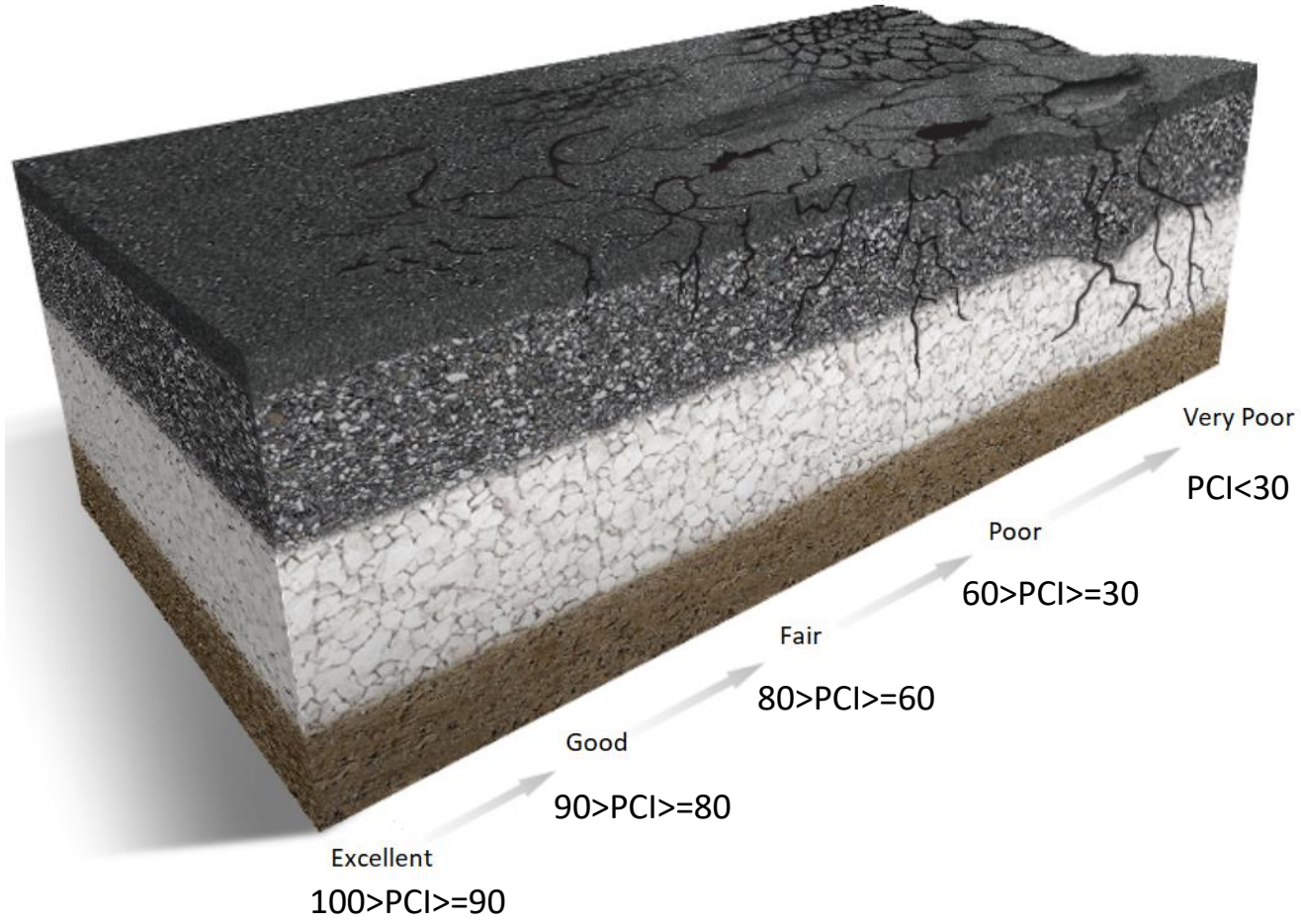
Benefit/Cost Optimization – What is Benefit?

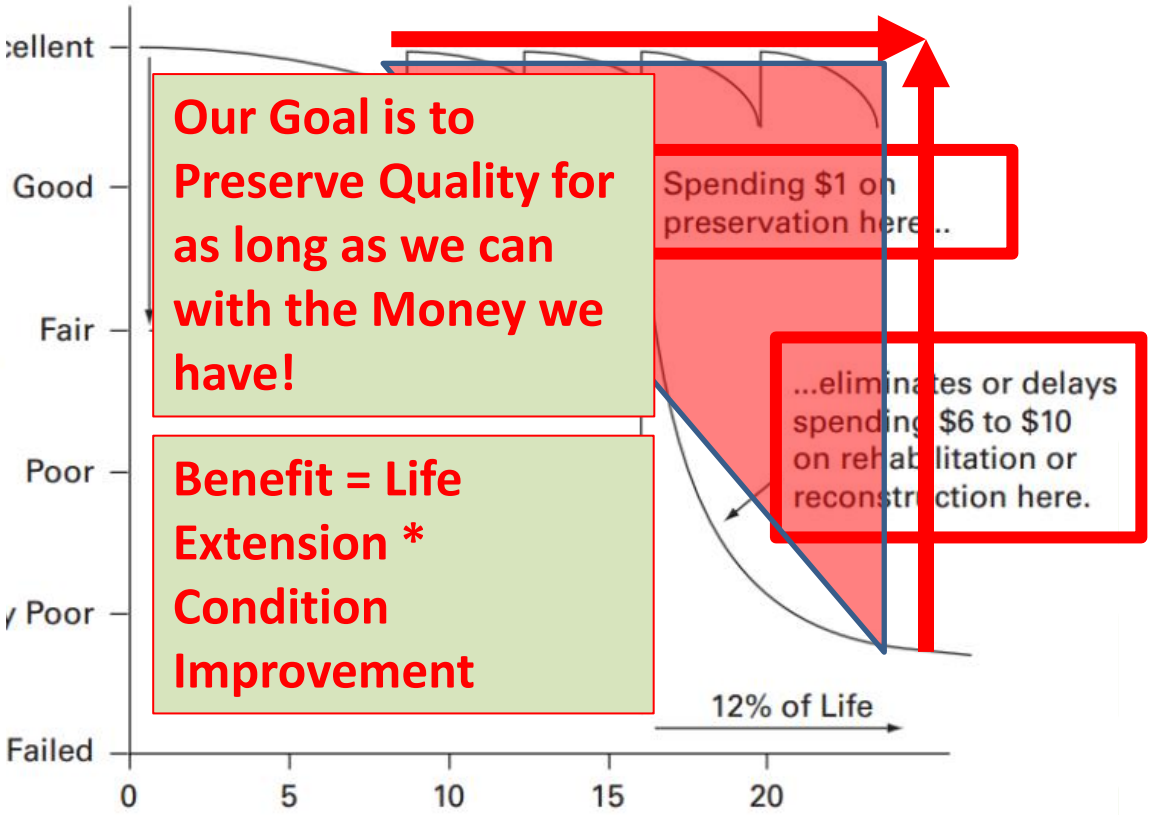
Condition Improvement = 70 PCI Points (100-30)

Life Extension = 20 Years

Benefit = Condition Improvement * Life Extension

Why do PM and preservation go hand-in-hand?





Our Goal is to Preserve Quality for as long as we can with the Money we have!

Benefit = Life Extension * Condition Improvement

Basic Components of An Asset Management System

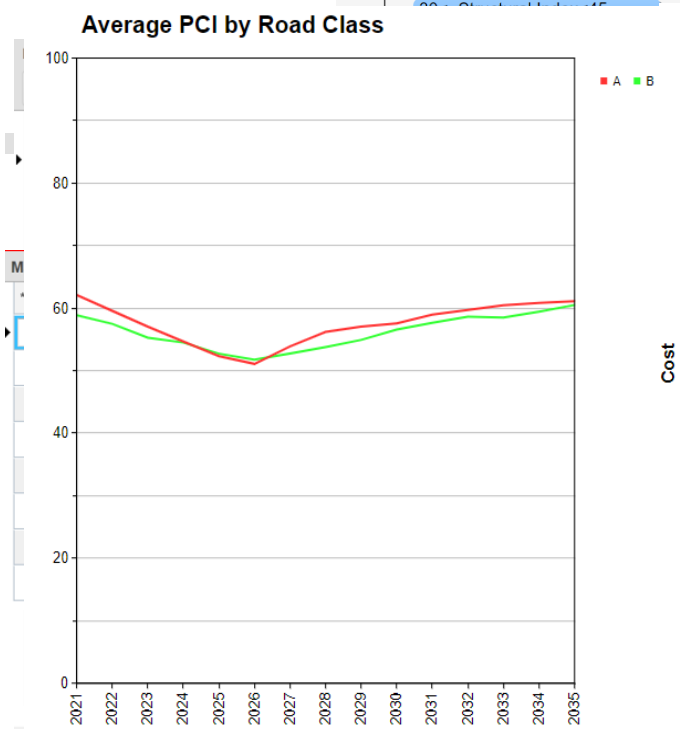
Data Management

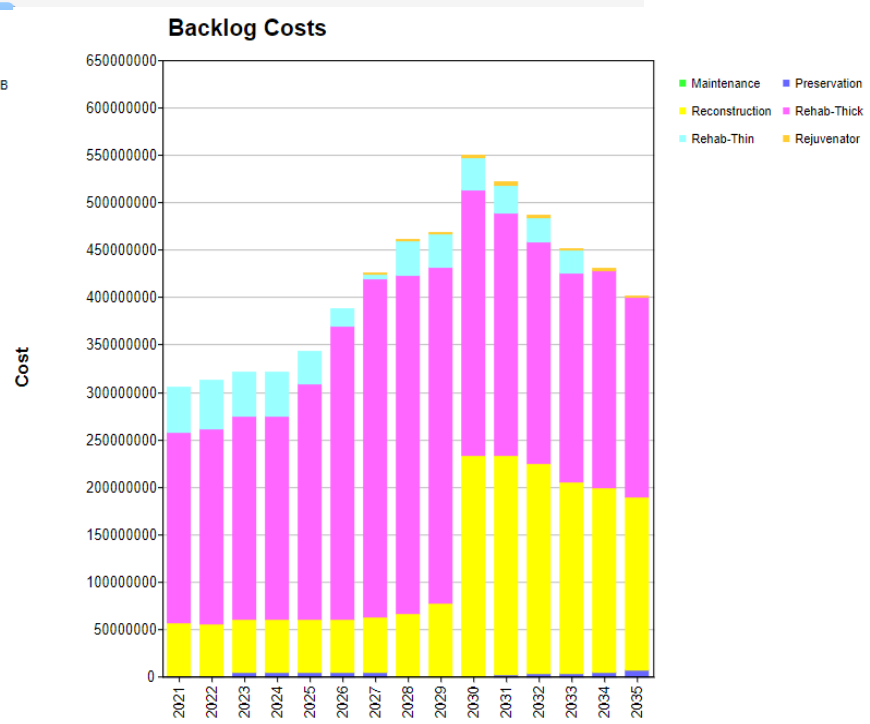
Policy Management

PMP Analysis and Project Selection Process

Structural Index<30

SE - Reconstruction-FDR





82.75	Good

FC Severity Level:
High Severity
Medium Severity...

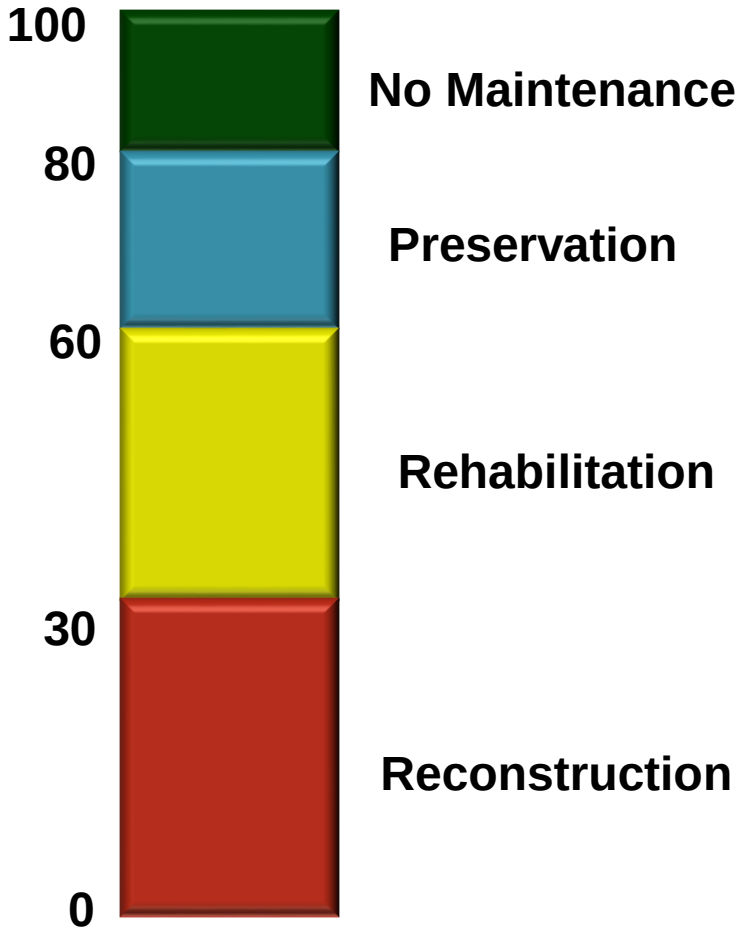
SE - Patching

MEDIUM/0-5

Thoughts on Pavement Decision Modeling

- A systematic and data driven approach to determining the appropriate application of a treatment to a specific situation or need
- Decision modeling maximizes effectiveness, efficiency, sustainability of pavement management strategies. i.e. Right Treatment, Right Place, Right Time
- Objectives may include maximizing conditions, minimizing lifecycle costs, optimizing safety, or multi-criteria.
- Typical decision variables:
  - Pavement Type
  - Classification
  - Traffic
  - Condition Indices

Using PCI Only for Decision Making



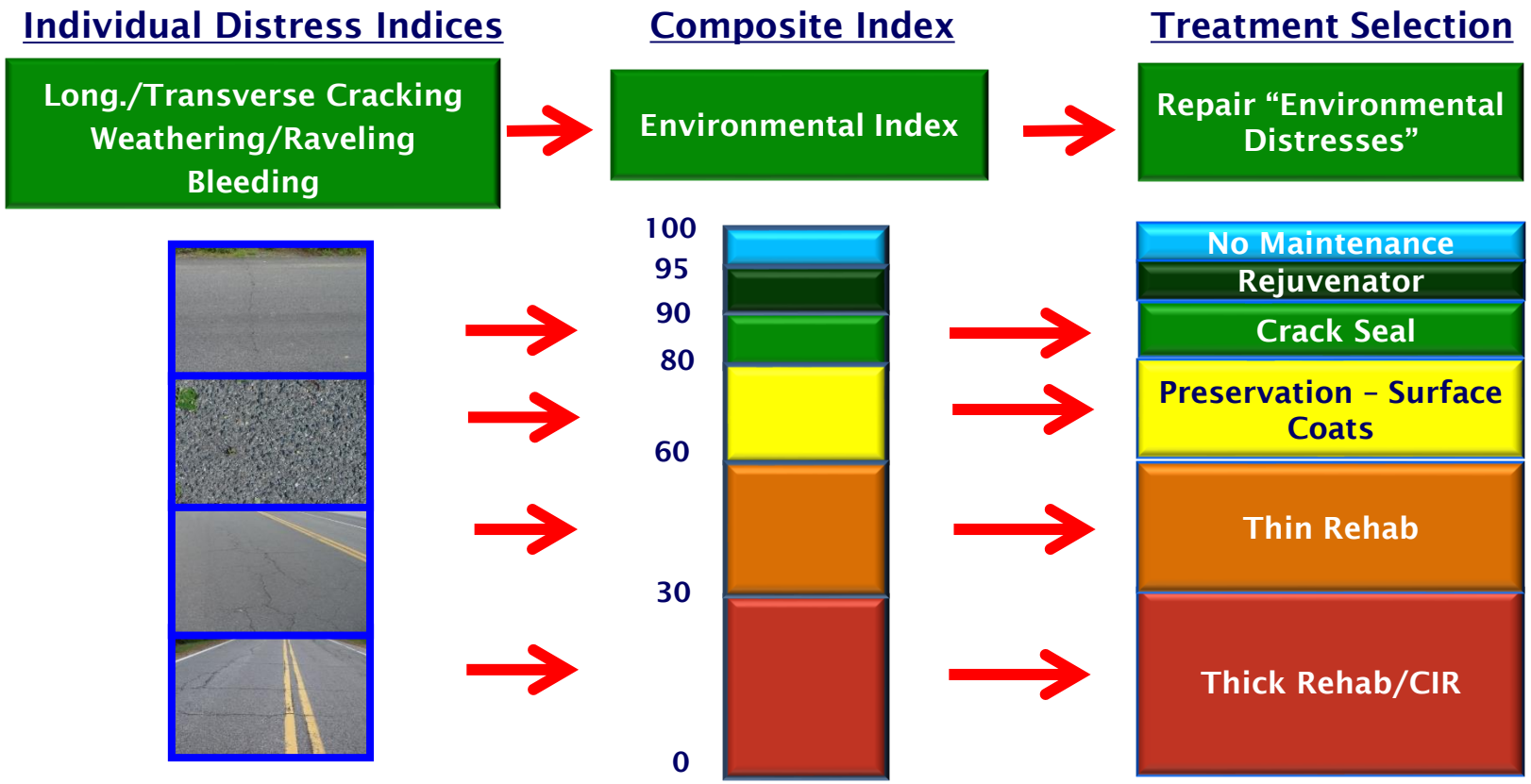
Problem:

- Single Index Only Provides a General Indicator of Overall Health

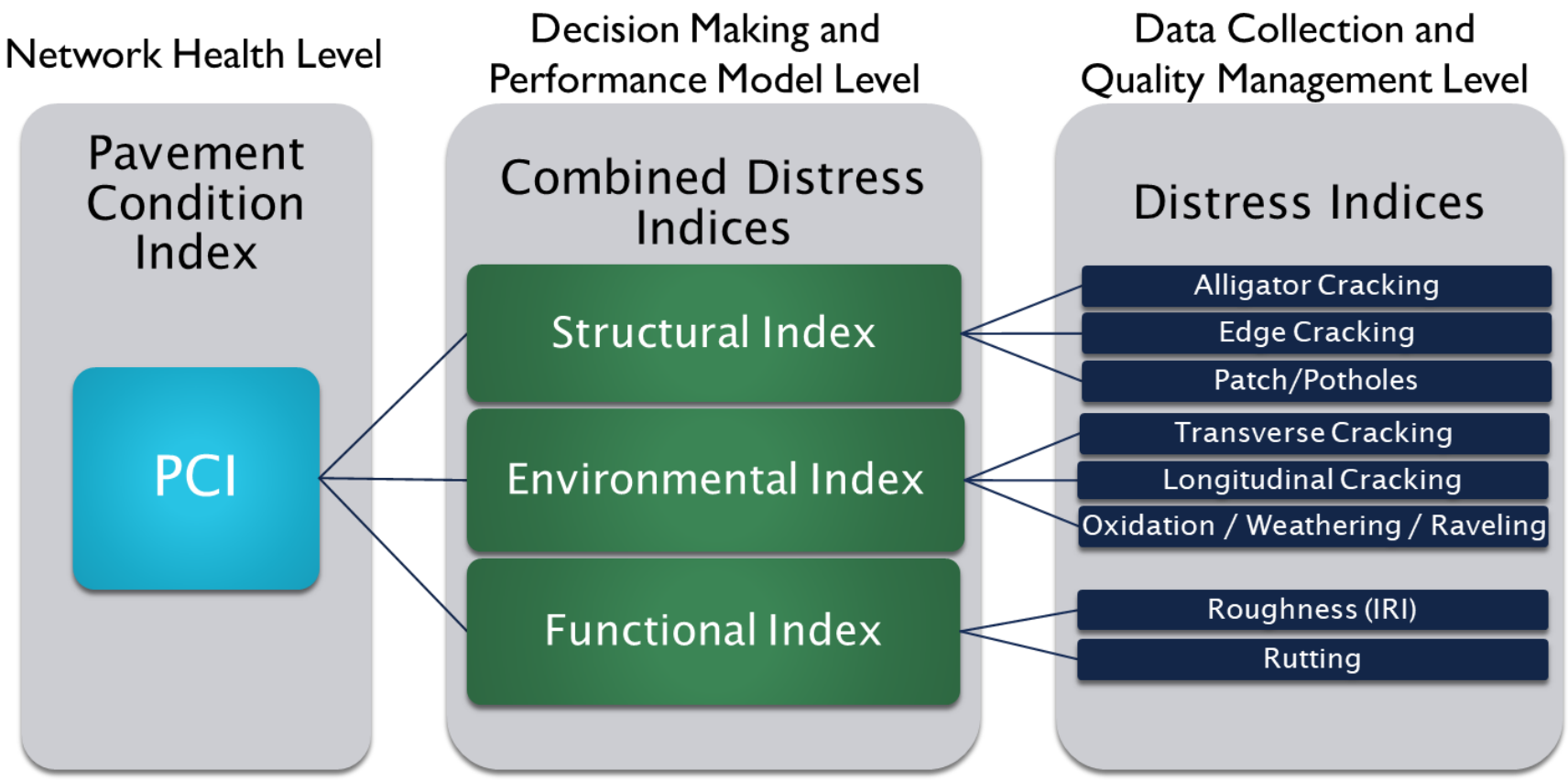
Questions:

- What Distresses are Present?
  - Severities and Extents?
- What Repair(s) Is Required?
- Reasonable Cost of Repair?

Better Approach to Treatment Selection & Decision Making



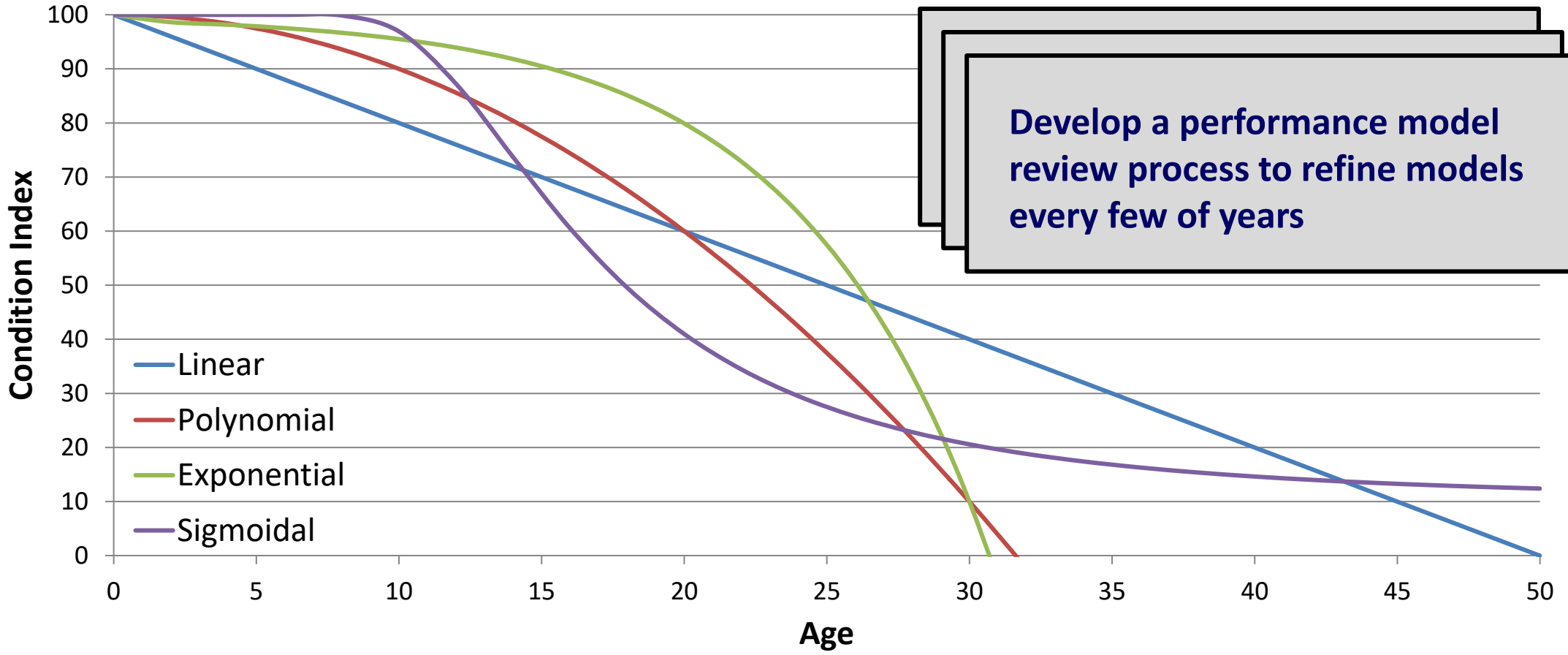
Condition Indices for Decision Making and Performance Modeling



Thoughts on Pavement Performance Modeling

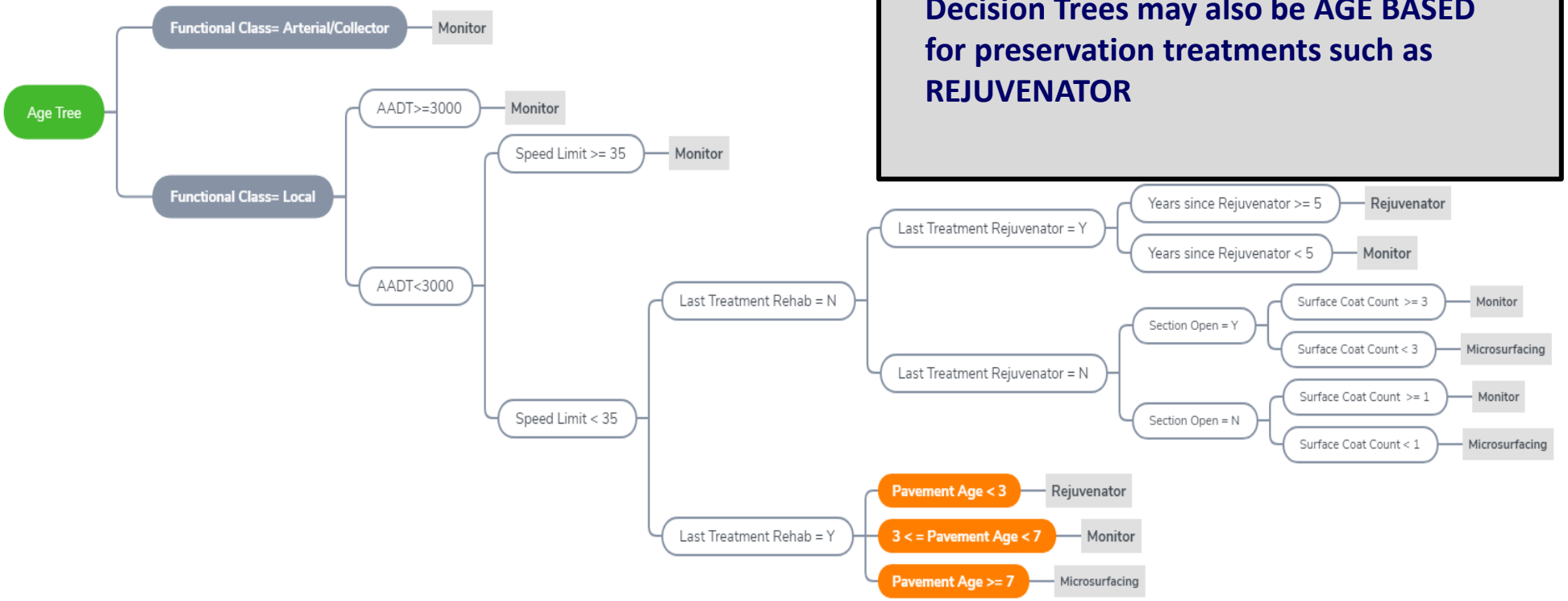
- In order to determine future condition and budget need, it is necessary to predict future condition in terms of current condition and/or after treatment condition
- Attempt to predict the performance, deterioration, and remaining service life of pavements under various conditions. Essentially establish a relationship between variables such as pavement age and condition of the pavement
- Typical performance variables:
  - Pavement Type
  - Pavement Structure
  - Traffic Loads/Volumes
  - Environment
  - Condition Indices
  - Pavement Age

Example Pavement Performance Models



Develop a performance model review process to refine models every few of years

How Optimized Treatment Recommendations Are Defined



Decision Trees may also be AGE BASED for preservation treatments such as REJUVENATOR

Let’s see an Example of how this works with Equity…

CR 235 from: SR26 | to: NW 62 Ave
PCI = 38
Treatment = Rehab (Major)
<u>In Inequity Area</u>

CR 235 from: NW 62 Ave | to: NW 94 Ave
PCI = 38
Treatment = Rehab (Major)
<u>Not In Inequity Area</u>

Let's see an Example of how this works with Equity…

CR 235 from: SR26 | to: NW 62 Ave
PCI = 38
Treatment = Rehab (Major)
In Inequity Area (Benefit Wt. = 1.4)
Assumed Cost = $8 Million

CR 235 from: NW 62 Ave | to: NW 94 Ave
PCI = 38
Treatment = Rehab (Major)
Not In Inequity Area (Benefit Wt. = 1)
Assumed Cost = $7 Million

Benefit = PCI Increase * Treatment Life Extension * Benefit Wt.

Benefit = +62 PCI * 20 Years * 1.4 = 1,736

Benefit = +62 PCI * 20 Years * 1 = 1,240

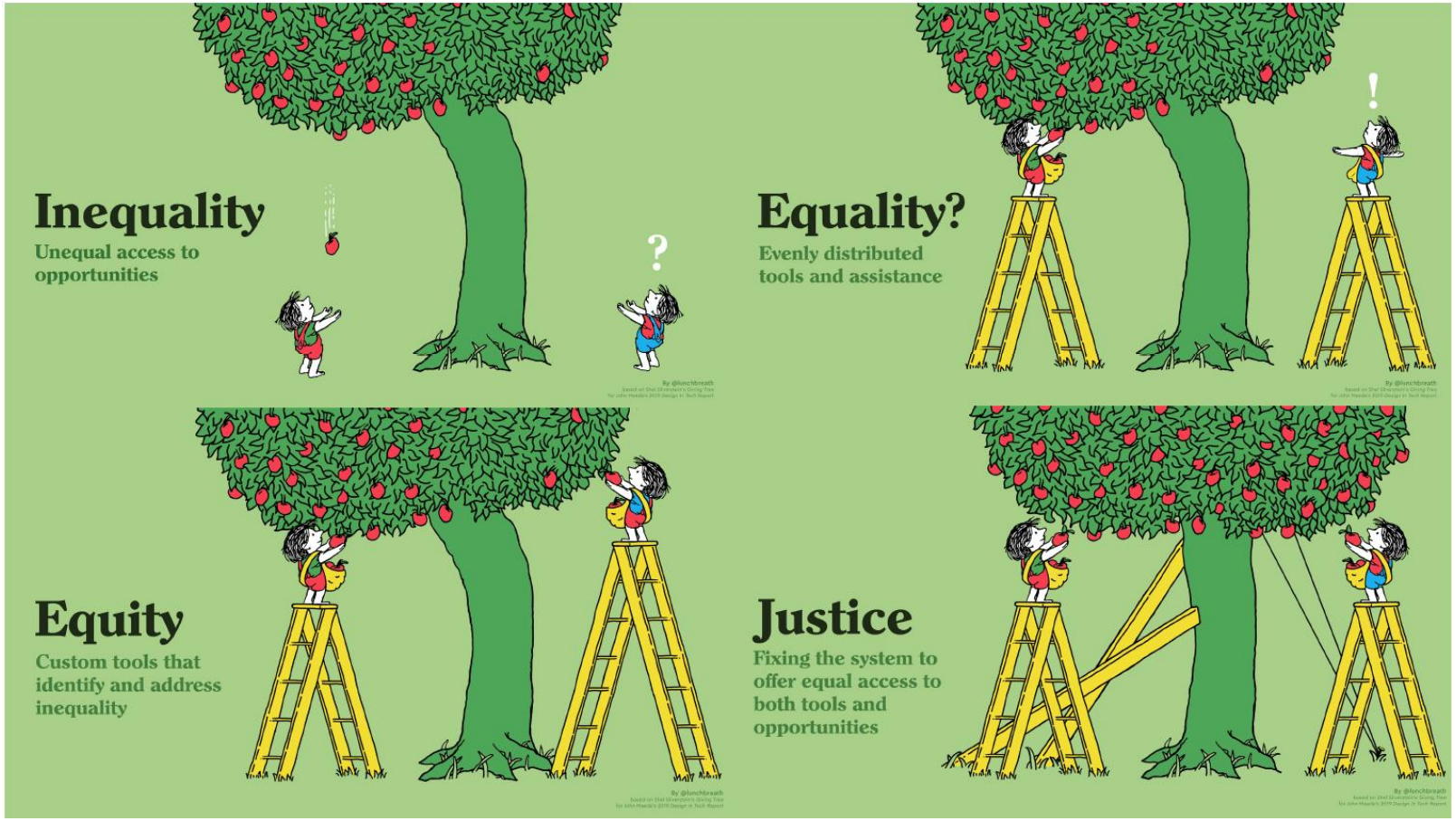
Let's assume we have a $10 Million Budget (we can only pick one)

Benefit/Cost = 1736/$8M = 217

Benefit/Cost = 1240/$7M = 177

Equity

What is Equity?

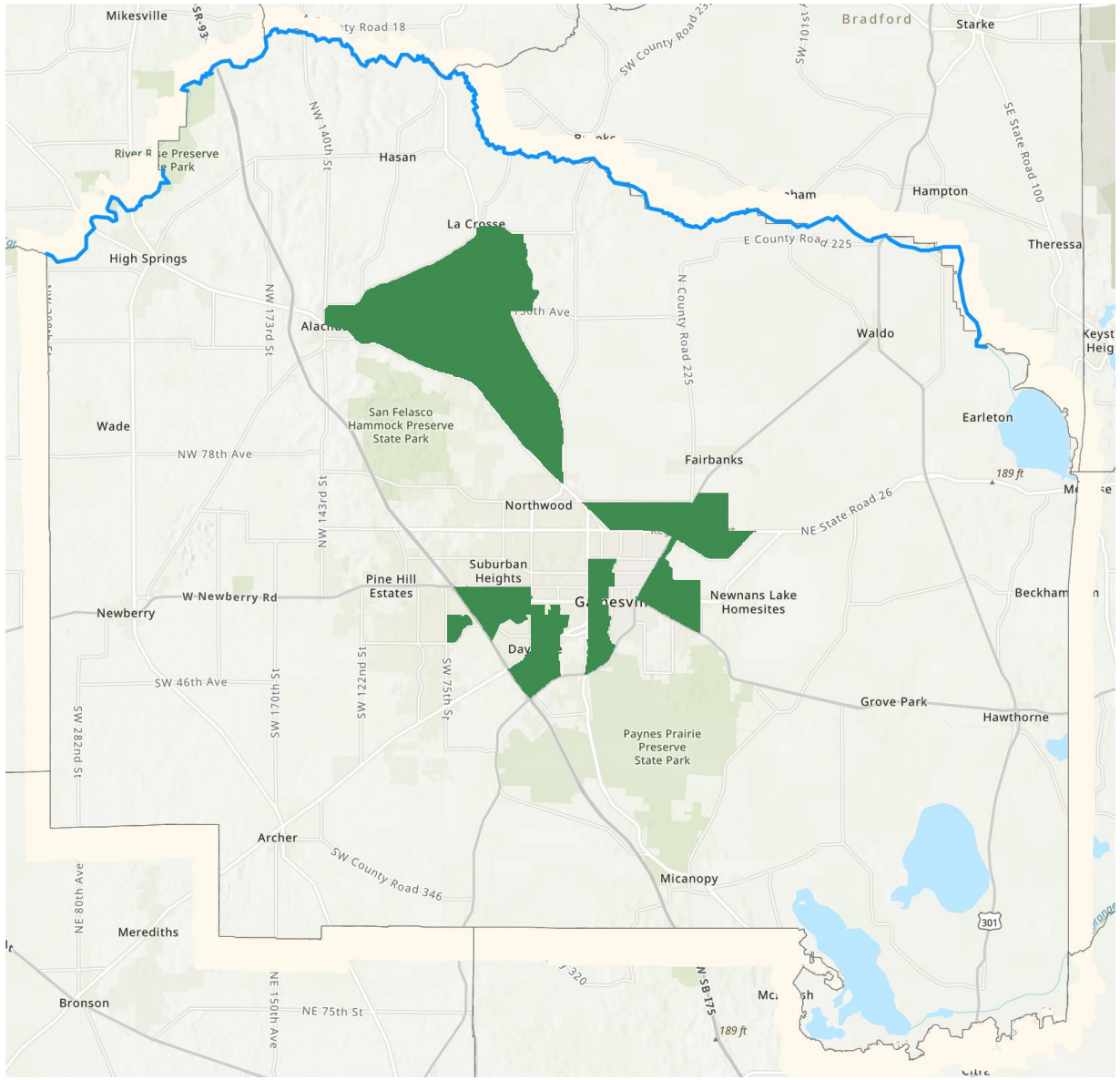


Diedre Houchen, Ph.D., Equity & Community Outreach Manager

Mapping Inequity

HUD Qualified Census Tracts

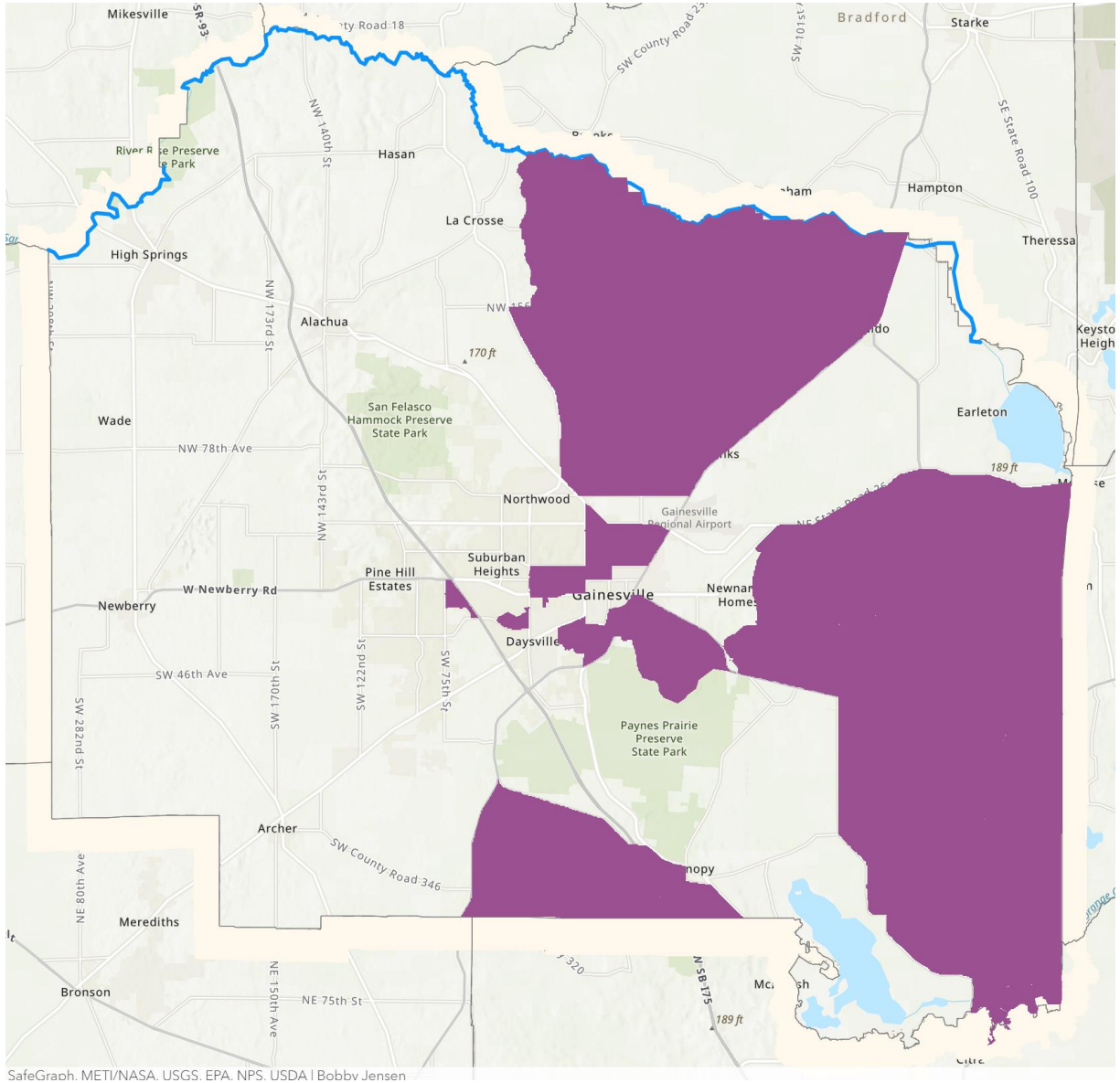
- **50 percent of households with incomes below 60 percent of the Area Median Gross Income (AMGI)**
- **poverty rate of 25 percent or more**



Mapping Inequity

Census Tracts

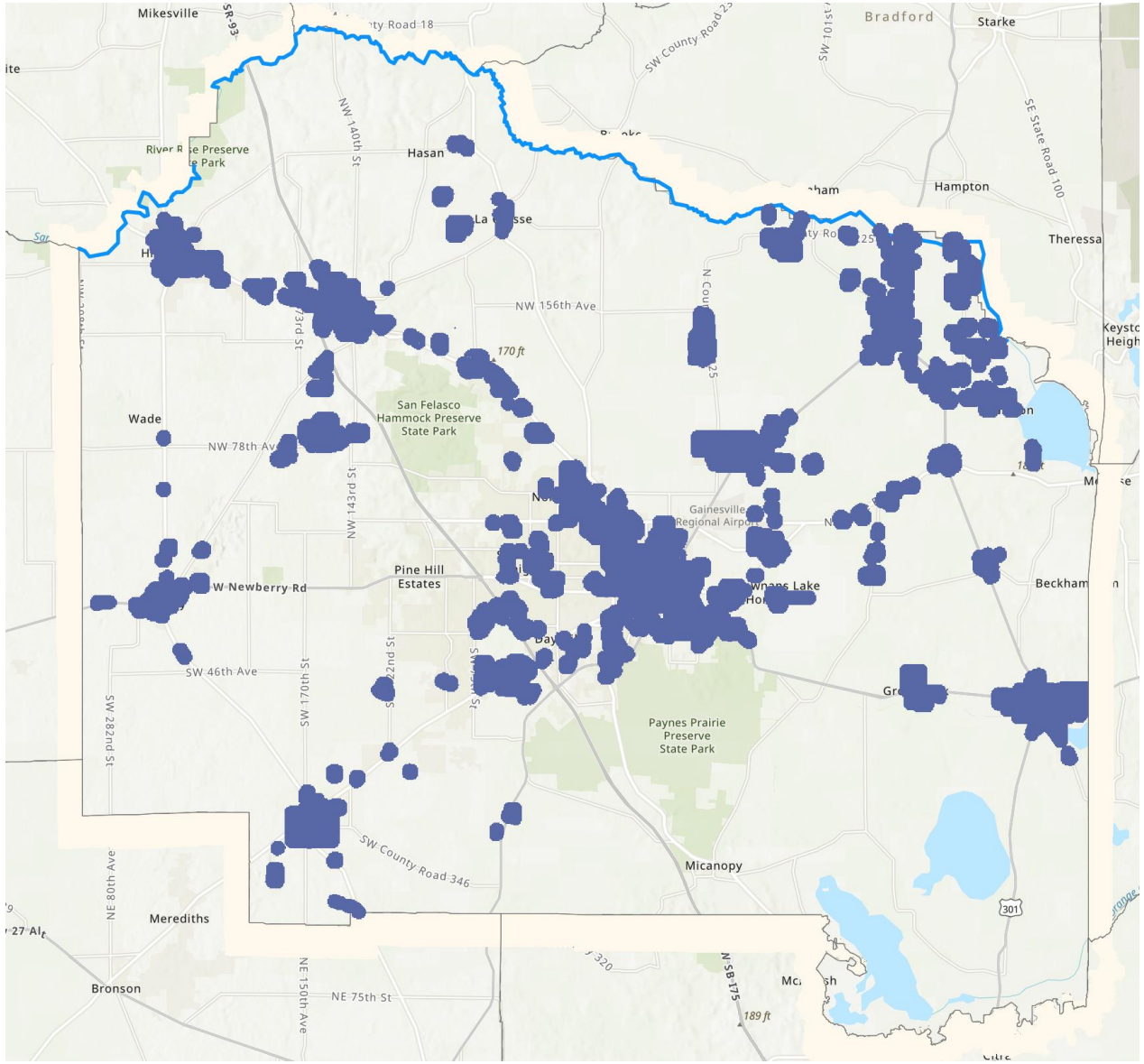
- **Median Income < 185% Federal Poverty Guidelines**



Mapping Inequity

Growth Management

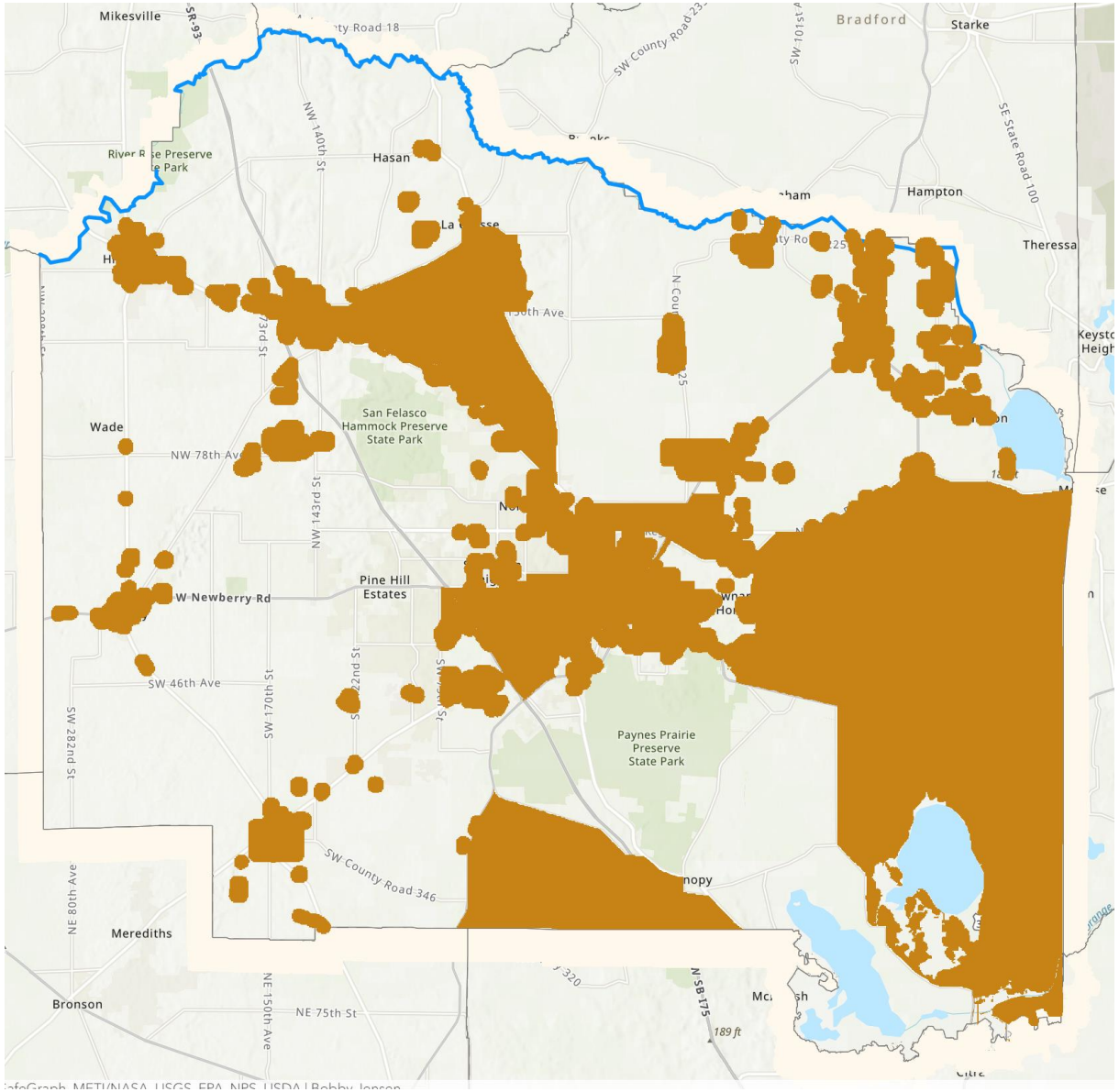
- **Bottom 20% Residential Improvement Values**
- **With a 1,320 Foot Buffer**



Mapping Inequity

Final Inequity Areas

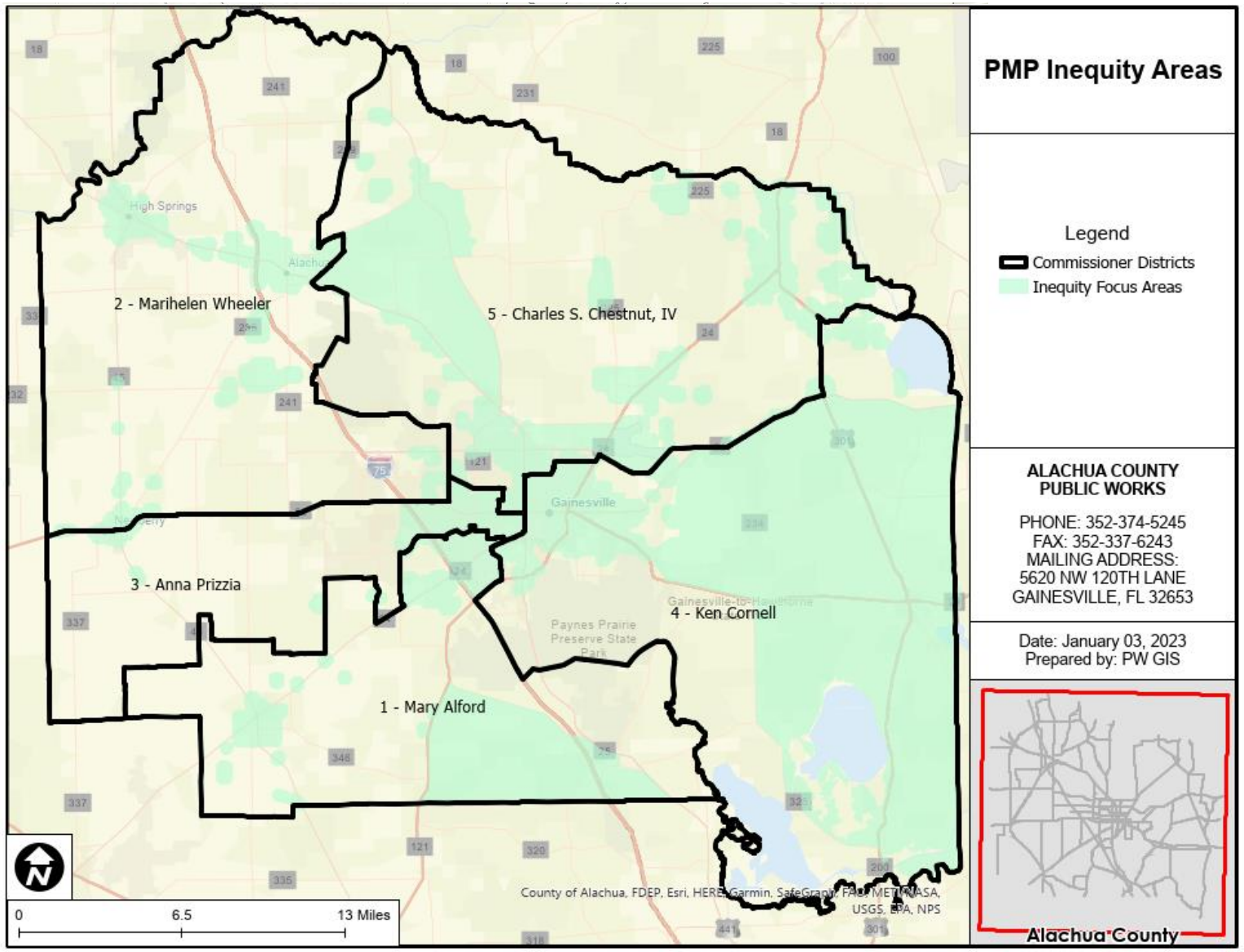
- Combination of All 3 Maps
- Incorporated & Unincorporated
- 1/3 of County Population (90,000)



Mapping Inequity

Inequity Areas

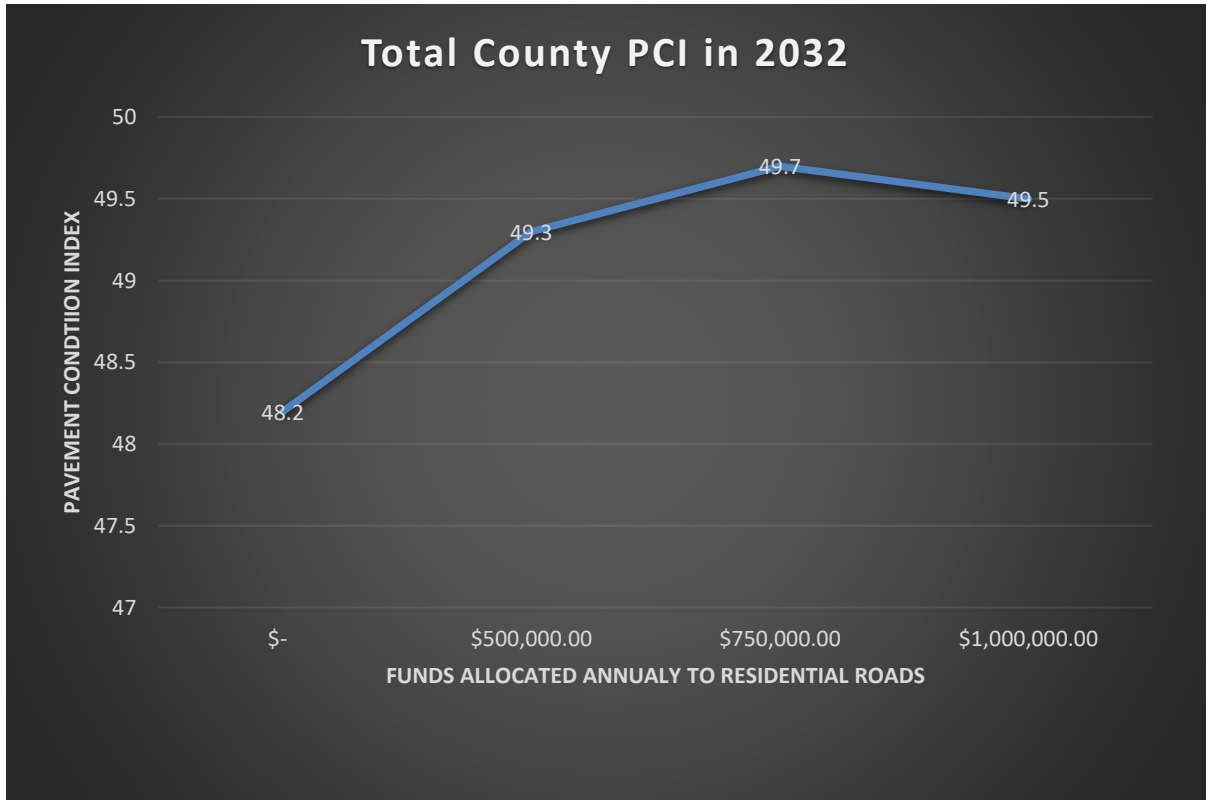
- **By Commission Districts**



Incorporating Equity

How Should We Incorporate Inequity Areas Into the PMP

- This is a leading-edge analysis considering Inequity – very important topic in Asset Management, but few examples available from around the US
- How much should we allocate to residential roads $750,000
- Iterative Process with the Board
  - Weighting factor 20%, 30%, and 40%



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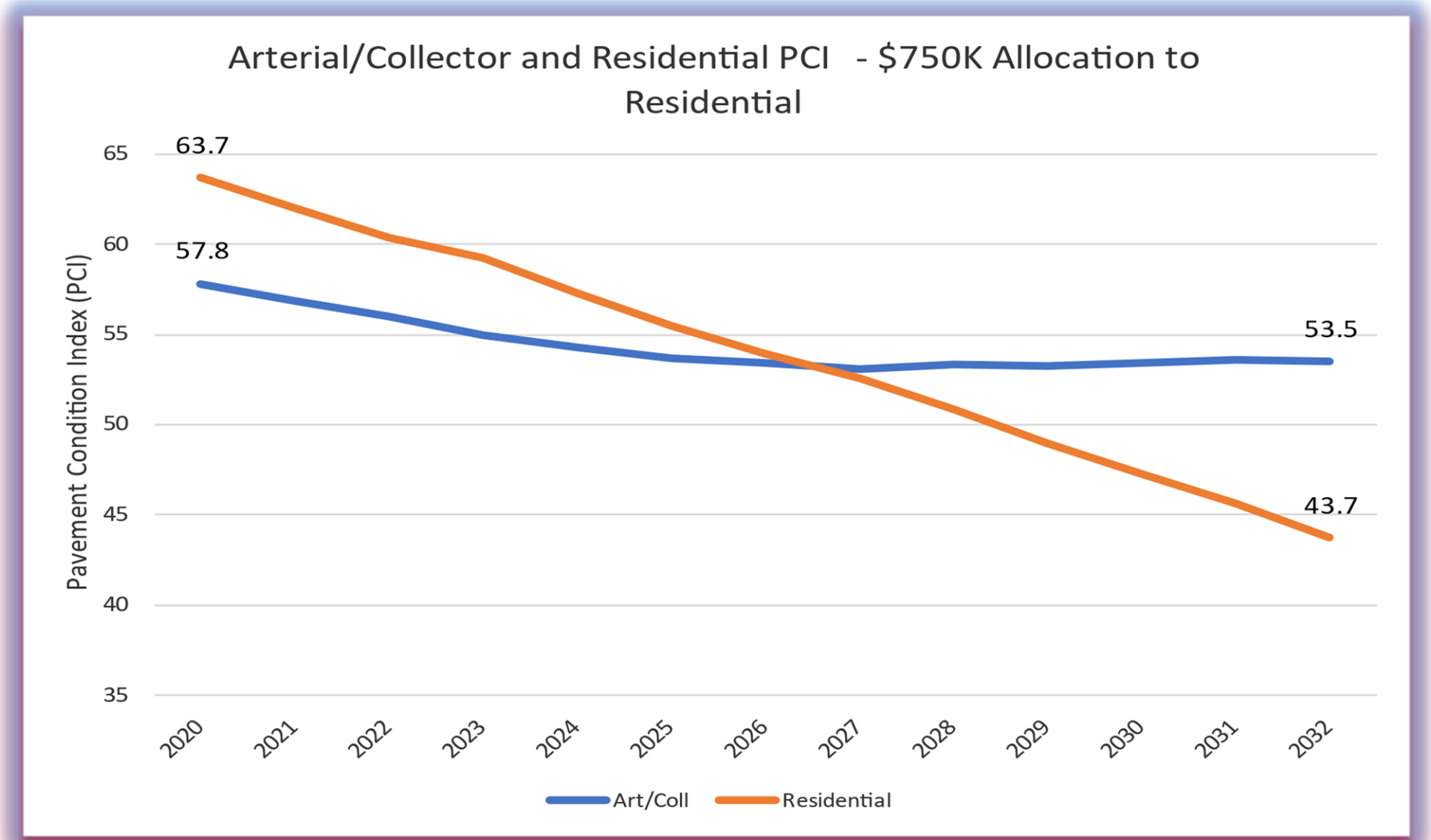


Dedicating $750K/year to Residential Roads within the Areas of Inequity Yielded the Best (highest PCI) for both Collector/Arterial and Residential Roads

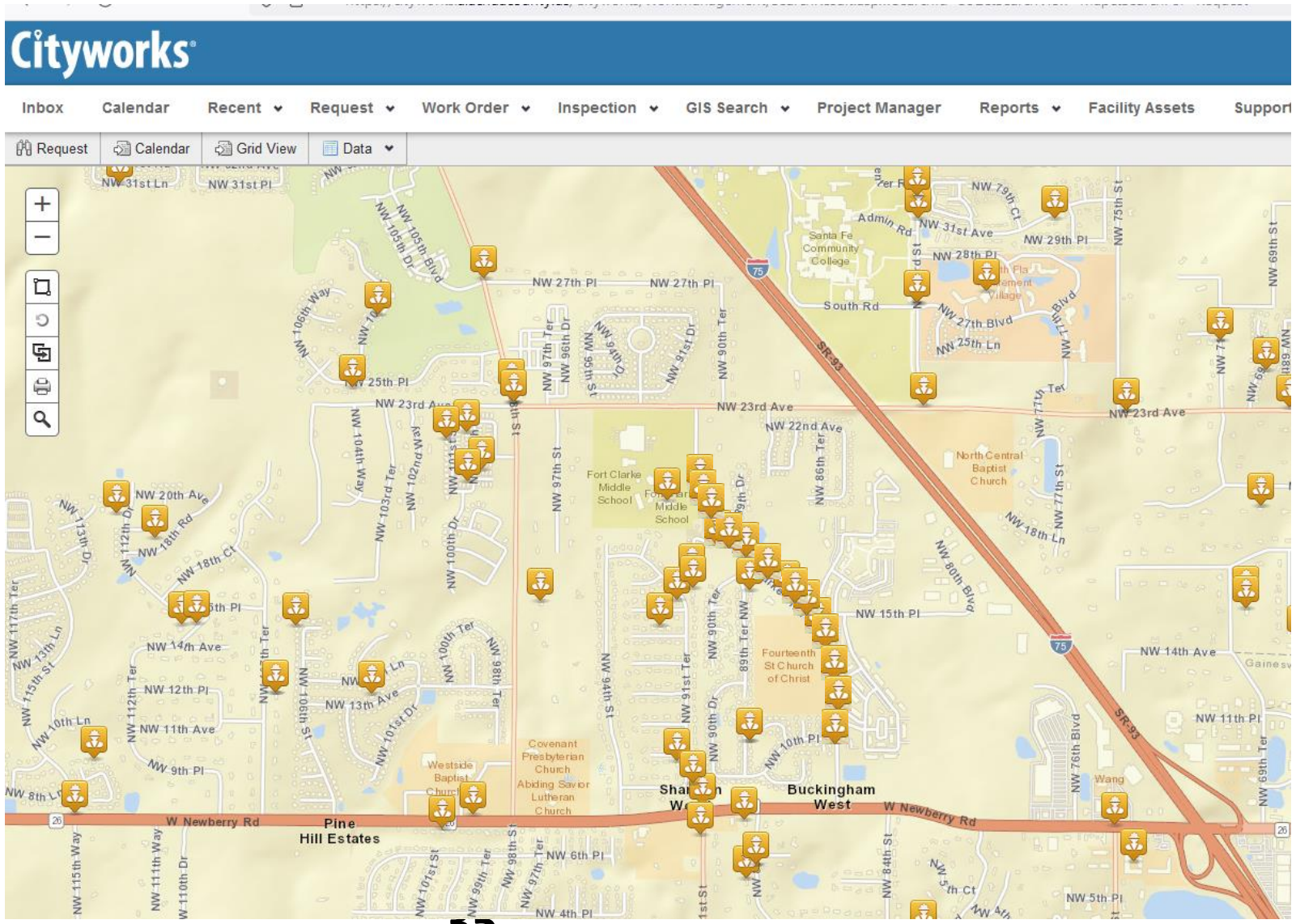
Alachua County, Florida

Using Cityworks & GIS

Using Cityworks

- **City Works Database**

  Include road segments with ≥15 work orders for pothole repair.



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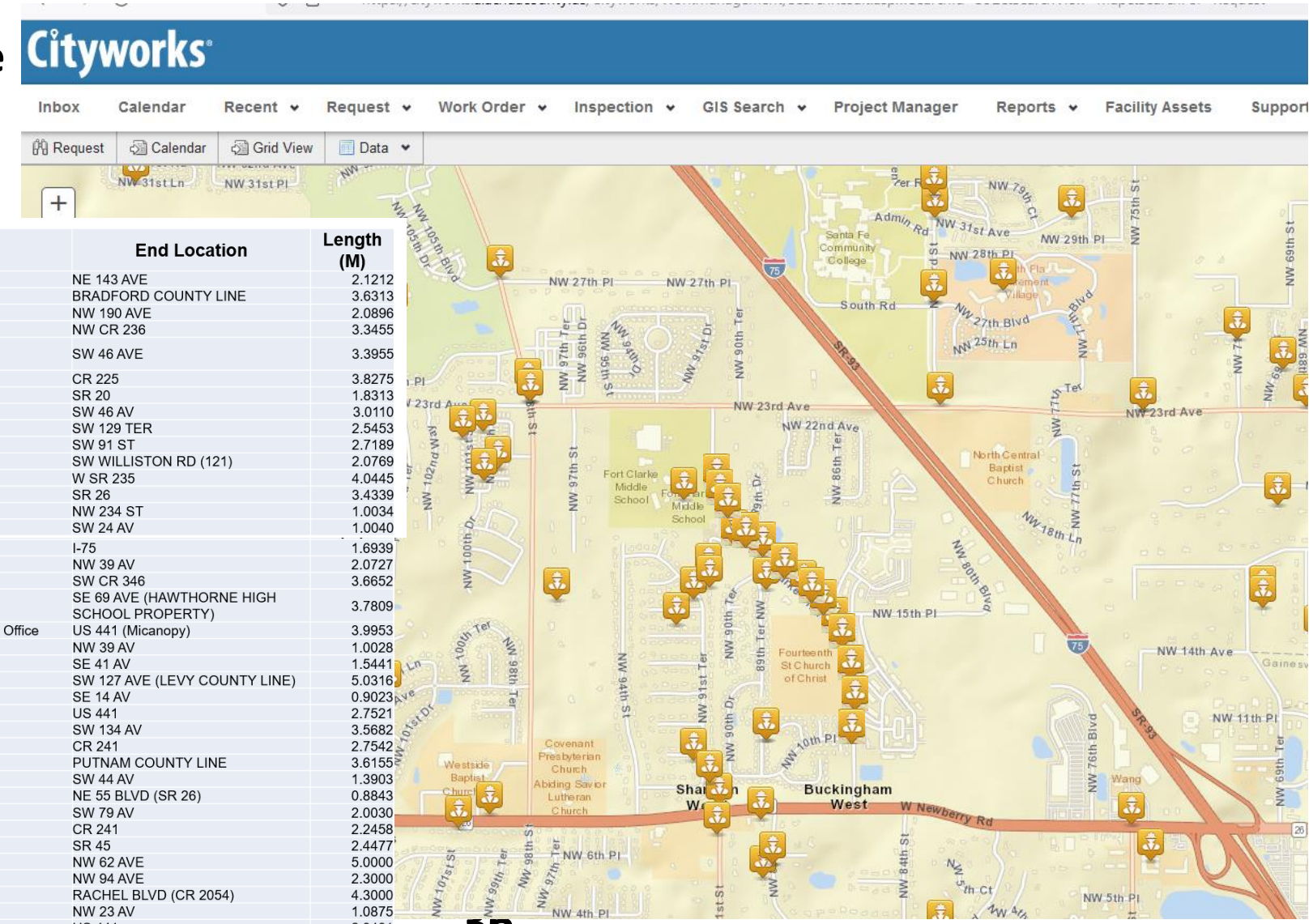

Street Name	Begin Location	End Location	Length (M)
NE COUNTY RD 1471	US 301	NE 143 AVE	2.1212
NE COUNTY RD 1471	NE 143 AVE	BRADFORD COUNTY LINE	3.6313
NW COUNTY RD 235A	US 441	NW 190 AVE	2.0896
NW COUNTY RD 235A	NW 190 AVE	NW CR 236	3.3455
SW 266 ST/SW 282 ST/SW 30 AV (CR 337)	SR 26	SW 46 AVE	3.3955
NE/NW 156 AV	CR 231	CR 225	3.8275
SE 27 ST (KINCAID LOOP) (CR 2043)	SE 39 PL	SR 20	1.8313
SW 170 ST	SR 26	SW 46 AV	3.0110
SW COUNTY RD 346	SW SR 45	SW 129 TER	2.5453
SW COUNTY RD 346	SW 129 TER	SW 91 ST	2.7189
SW COUNTY RD 346	SW 91 ST	SW WILLISTON RD (121)	2.0769
NW COUNTY RD 237	NW US 441	W SR 235	4.0445
NE COUNTY RD 234	E CR 1474	SR 26	3.4339
NW 110 AV	SR 45	NW 234 ST	1.0034
SW 91 ST	SW 8 AV	SW 24 AV	1.0040
NW 23 AV	NW 58 BLVD	I-75	1.6939
NW 98 ST	SR 26	NW 39 AV	2.0727
SW 137 AV/SW 91 ST (CR 346A)	SW WILLISTON RD (SR 121)	SW CR 346	3.6652
SE COUNTY RD 2082	SE 152 ST (CR 2041)	SE 69 AVE (HAWTHORNE HIGH SCHOOL PROPERTY)	3.7809
SE CR 234	Entrance to Paynes Prairie Maint Office	US 441 (Micanopy)	3.9953
NW 83 ST	NW 23 AV	NW 39 AV	1.0028
SE 15 ST (KINCAID LOOP) (CR 2043)	SE 14 AV	SE 41 AV	1.5441
SW 282 ST (CR 337)	SW 46 AVE	SW 127 AVE (LEVY COUNTY LINE)	5.0316
SE 15 ST (KINCAID LOOP) (CR 2043)	SR 20	SE 14 AV	0.9023
NW 202 ST	CR 2054	US 441	2.7521
SW 170 ST	LEVY COUNTY LINE	SW 134 AV	3.5682
NW 94 AV	CR 235	CR 241	2.7542
HOLDEN PARK RD	US 301	PUTNAM COUNTY LINE	3.6155
SW 91 ST	SW 24 AV	SW 44 AV	1.3903
NE 27 AV	NE 39 BLVD	NE 55 BLVD (SR 26)	0.8843
SW 170 ST	SW 46 AV	SW 79 AV	2.0030
PEGGY RD	CR 235A	CR 241	2.2458
SW 170 ST	SW 79 AV	SR 45	2.4477
CR 235	SR 26	NW 62 AVE	5.0000
CR 235	NW 62 AVE	NW 94 AVE	2.3000
CR 235	NW 94 AVE	RACHEL BLVD (CR 2054)	4.3000
FORT CLARKE BLVD	NEWBERRY RD	NW 23 AV	1.0875
SE COUNTY RD 234	MARION COUNTY LINE	US 441	2.9481

Using Cityworks

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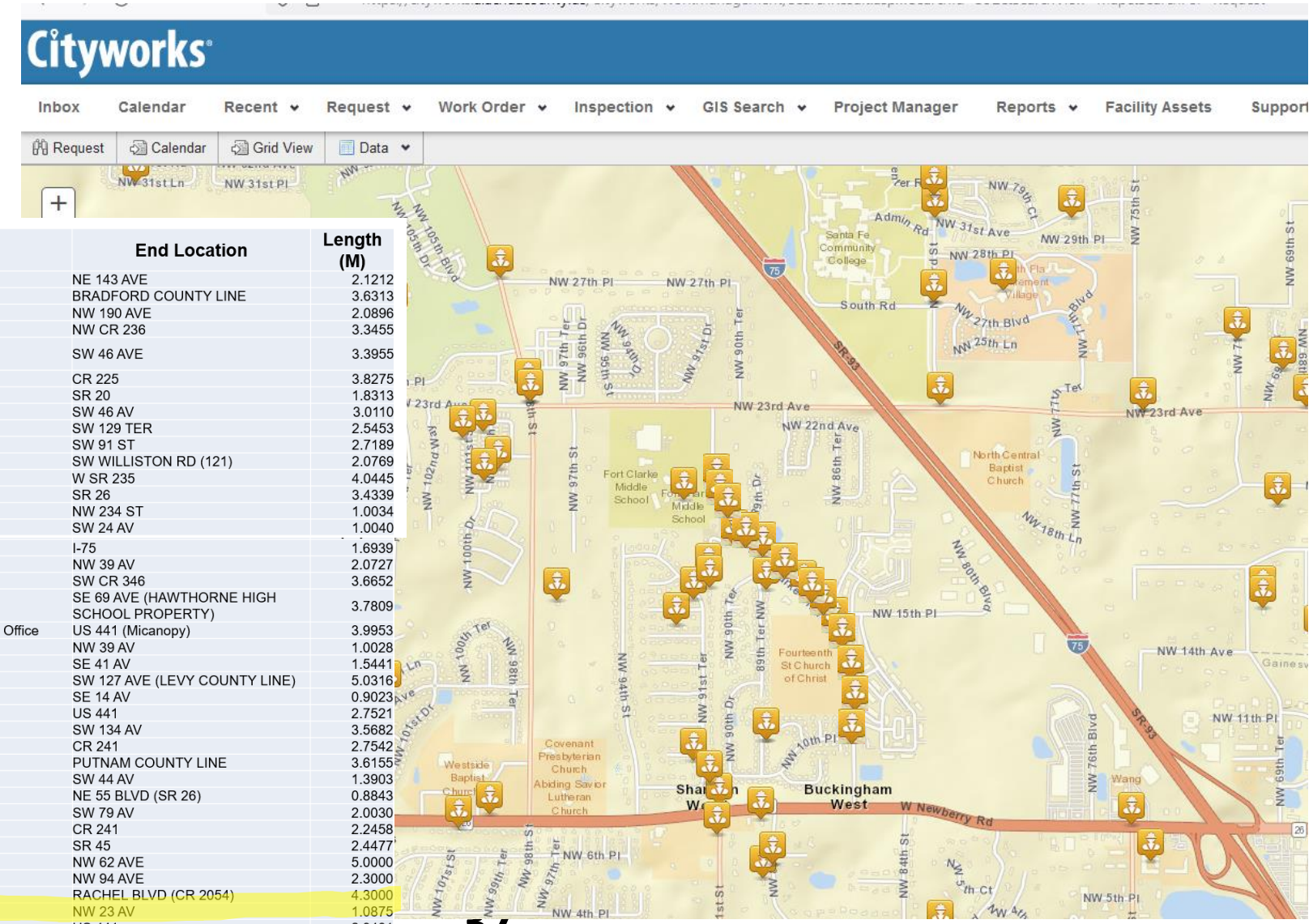
  Include road segments with >15



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SW 170 ST	SW 46 AV	SW 79 AV	2.0030
PEGGY RD	CR 235A	CR 241	2.2458
SW 170 ST	SW 79 AV	SR 45	2.4477
CR 235	SR 26	NW 62 AVE	5.0000
CR 235	NW 62 AVE	NW 94 AVE	2.3000
CR 235	NW 94 AVE	RACHEL BLVD (CR 2054)	4.3000
FORT CLARKE BLVD	NEWBERRY RD	NW 23 AV	1.0875
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Using Cityworks

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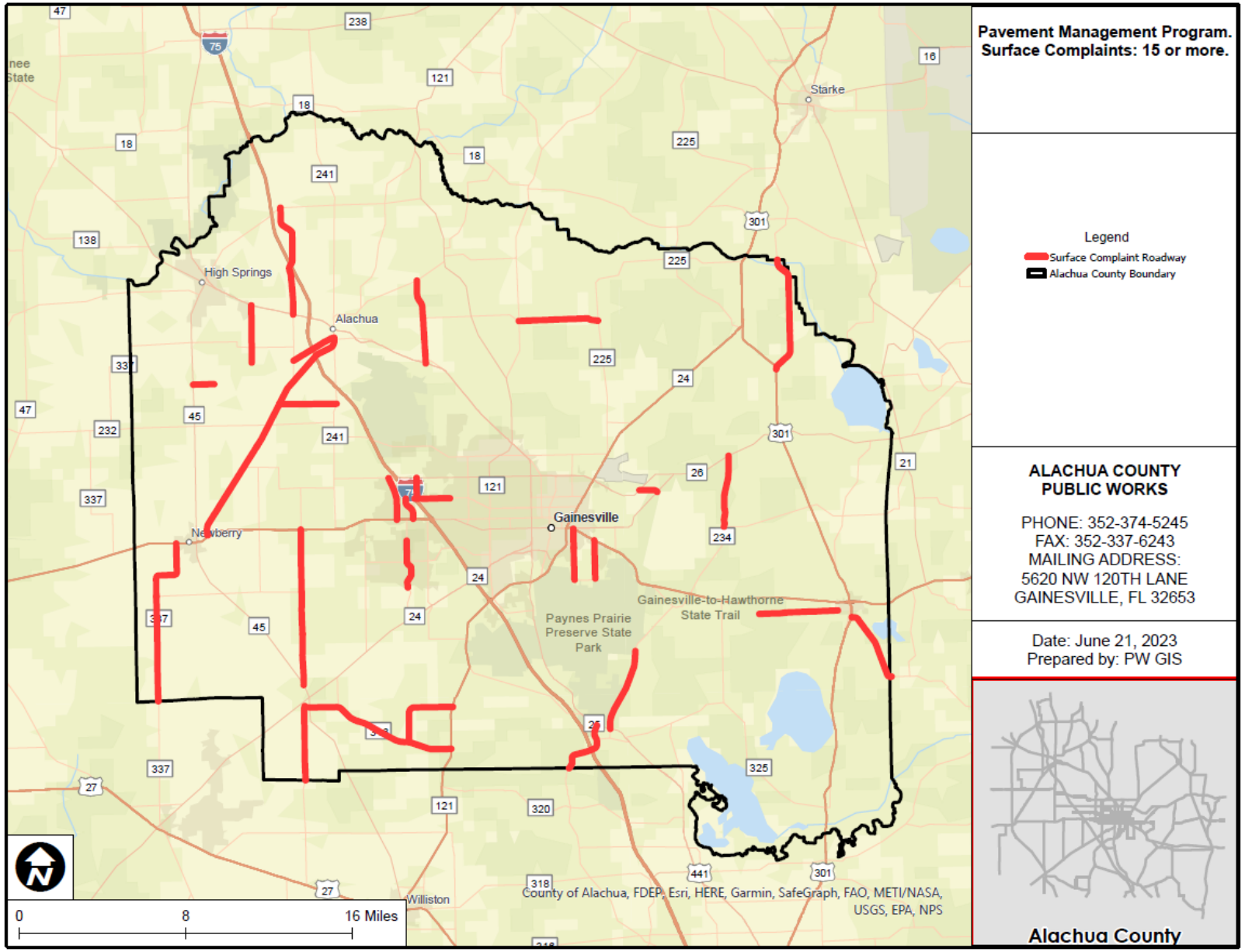
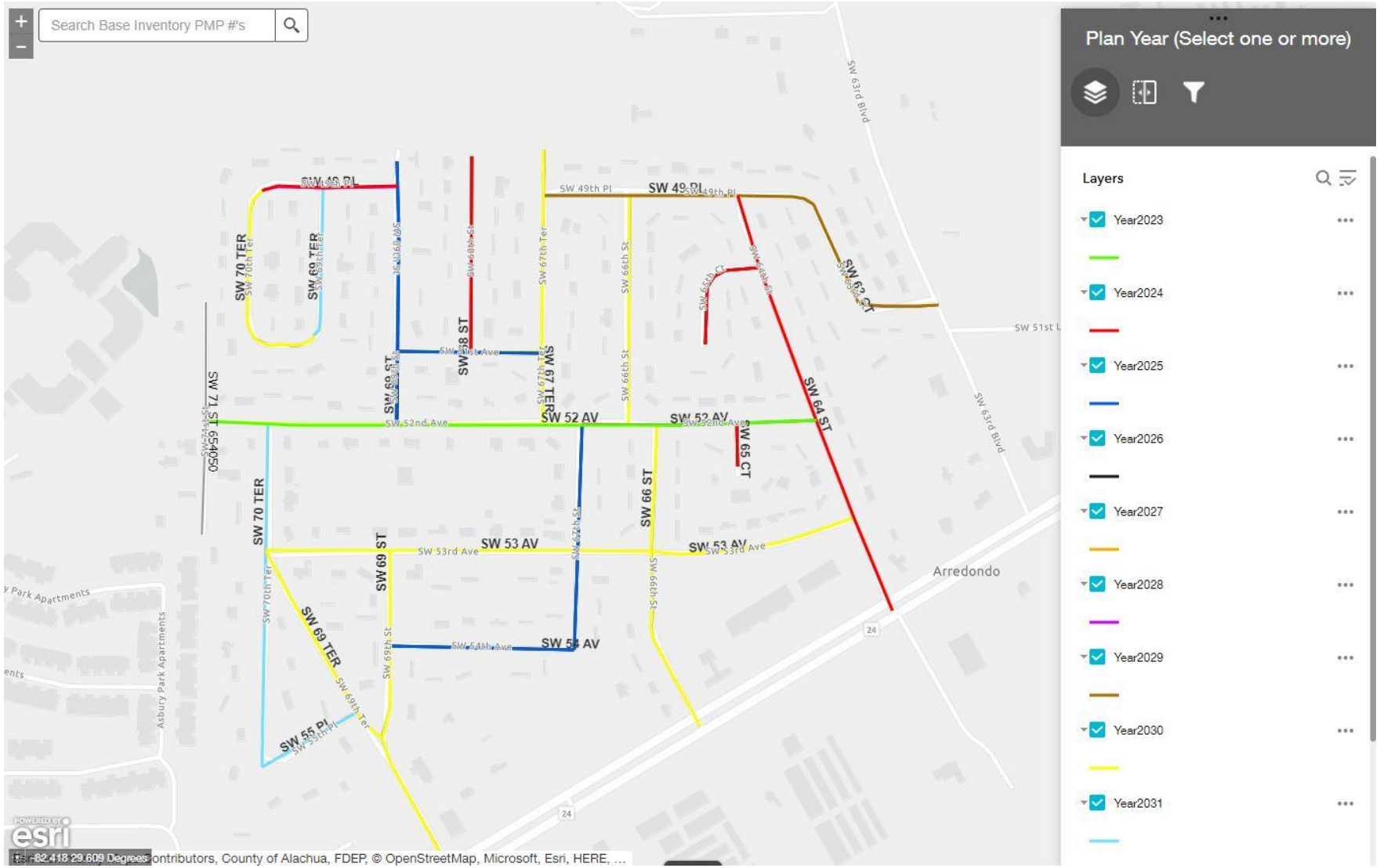


Using GIS

Spatial Analysis

- Grouped Projects
  - Location
  - Like Treatment
- Saves on Mobilization Cost
- Makes Political Sense to Complete a Neighborhood



Summary

Summary

AgileAssets Optimized Road Projects Based on Budget and Equity

10-Yr CIP List

City Works Used to Check for Squeaky Wheels

Spatially Analyzed 10-Yr CIP Using GIS. Then Lumped Projects by Year and Work Type

Reran the CIP List in AgileAssets to Validate Budget

10-Yr CIP List

Summary

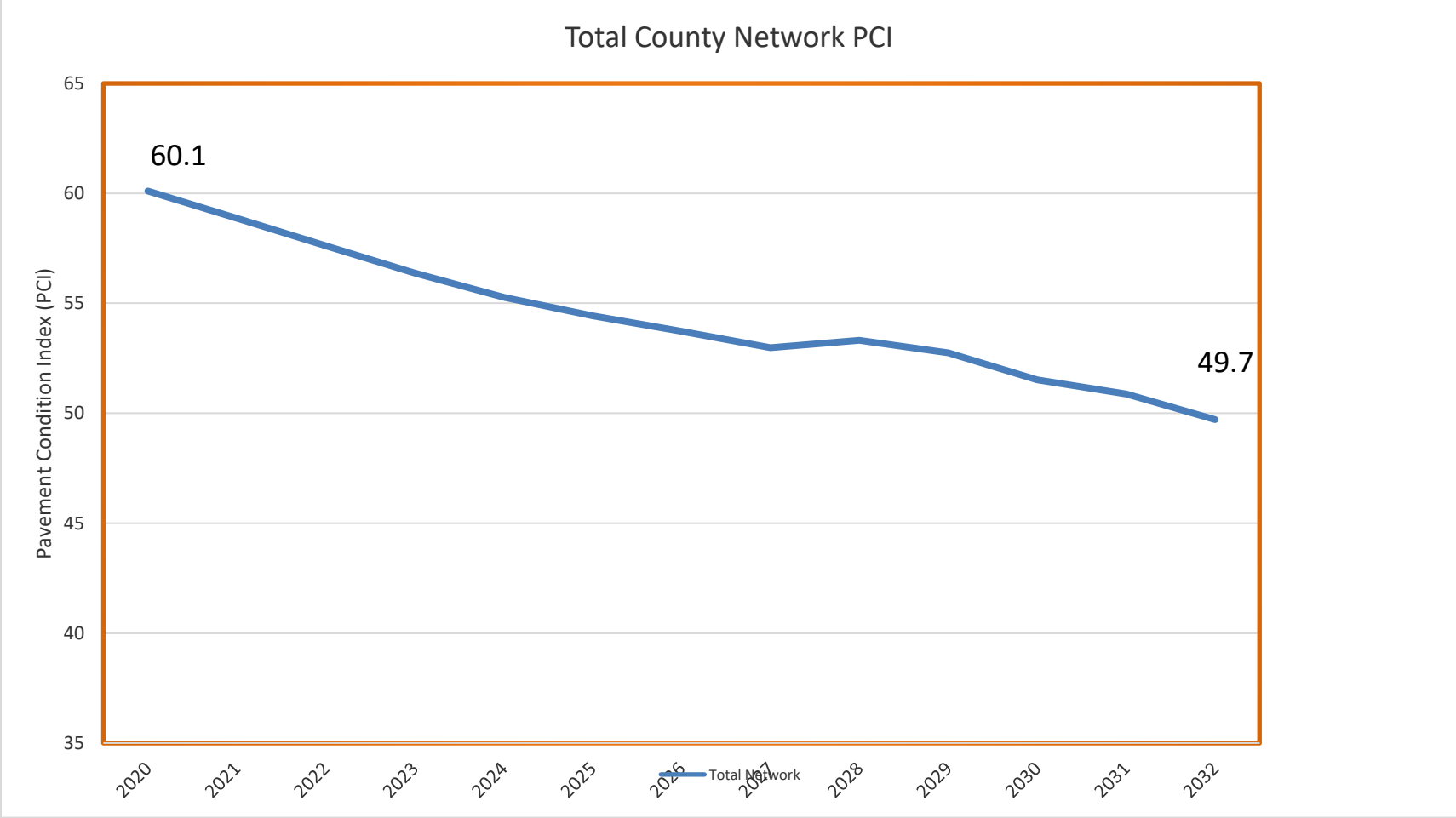
Transportation Capital Improvement Program
2023 - 2032

		Totals (10-Year)	Project Totals (Thru 2032)
1.	Roadways - Widening & Other Major Improvements	$ 8,010,276	$ 16,658,951
2.	Roadways - Pavement Management Program with Minor Improvements	$ 219,552,620	$ 219,552,620
3.	Program - Signals	$ 6,007,411	$ 6,007,411
4.	Program - Bridge Rehabilitation / Construction	$ 3,287,517	$ 3,942,517
5.	Program - Bike/Ped Program	$ 5,034,413	$ 5,034,413
	Transportation Capital Improvement Program (2023 - 2032):	**$ 241,892,238**	**$ 251,195,912**

Summary

Transportation Capital Improvement Program
2023 - 2032

		Totals (10-Year)	Project Totals (Thru 2032)
1.	Roadways - Widening & Othe		3,951
2.	Roadways - Pavement Manag		,620
3.	Program - Signals		7,411
4.	Program - Bridge Rehabilitatic		2,517
5.	Program - Bike/Ped Program		4,413
			,912



- **Originally Projected 41.2**

Summary

- Consultants and software are very useful in demonstrating the need for funding
  - Consultants are experts
- Sales tax for road funding is more likely to pass with conservation land funding
- Road Segments should be the same in each software
- Inequity will look different for every community
  - Demographics are different
  - Key indicators or metrics may be different
  - It is an iterative process with the Board, Public and Staff.
- There is always a limited budget
- Not all roads will be fixed in the first 10 years

Summary

- Good News
  - Incorporating Inequity Areas raised the overall County PCI
  - Most of the highly travelled collector roads, which yielded most of the work orders, will be repaired
  - County Roads will Improve
  - Paving started this week