

# Street Management Plan



# Street Management Plan

## Today's Presentation

- Work of Stantec Consulting Services
  - Data Collection
  - Findings
  - Recommendations

# Street Management Plan

## Today's Presentation

- Stantec's Recommendations vs State of Utilities
- Proposed "Phase 1" Street Project
- Funding
- Future



# Street Assessment Project

## Stantec Scope of Work

- Pavement Surface Distress & Roughness Survey
- Estimate Pavement Thicknesses
- Present Findings
- Propose Work Programs based on Findings & Alternative Budgets



Beaufort 2018 Pavement  
Present Status and  
Recommended Work  
Programs – Final Report

February 27, 2019

Prepared for:

Town of Beaufort  
701 Front Street  
Beaufort, NC 28516

Prepared by:

Stantec Consulting Services Inc.  
3133 West Frye Road, Suite 300  
Chandler, AZ 85226

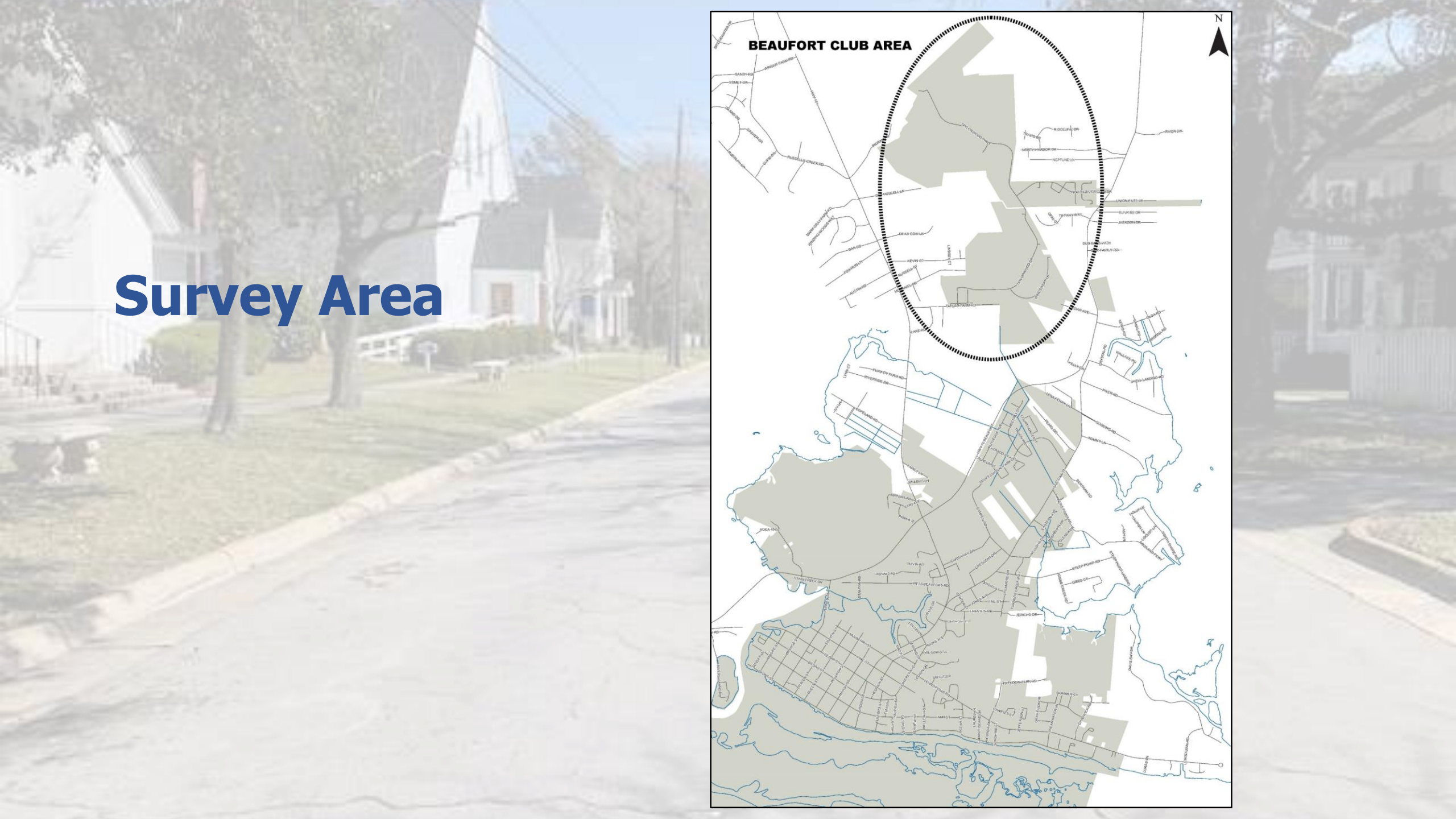


# Survey Area

- Corporate Limits  
– 25± miles

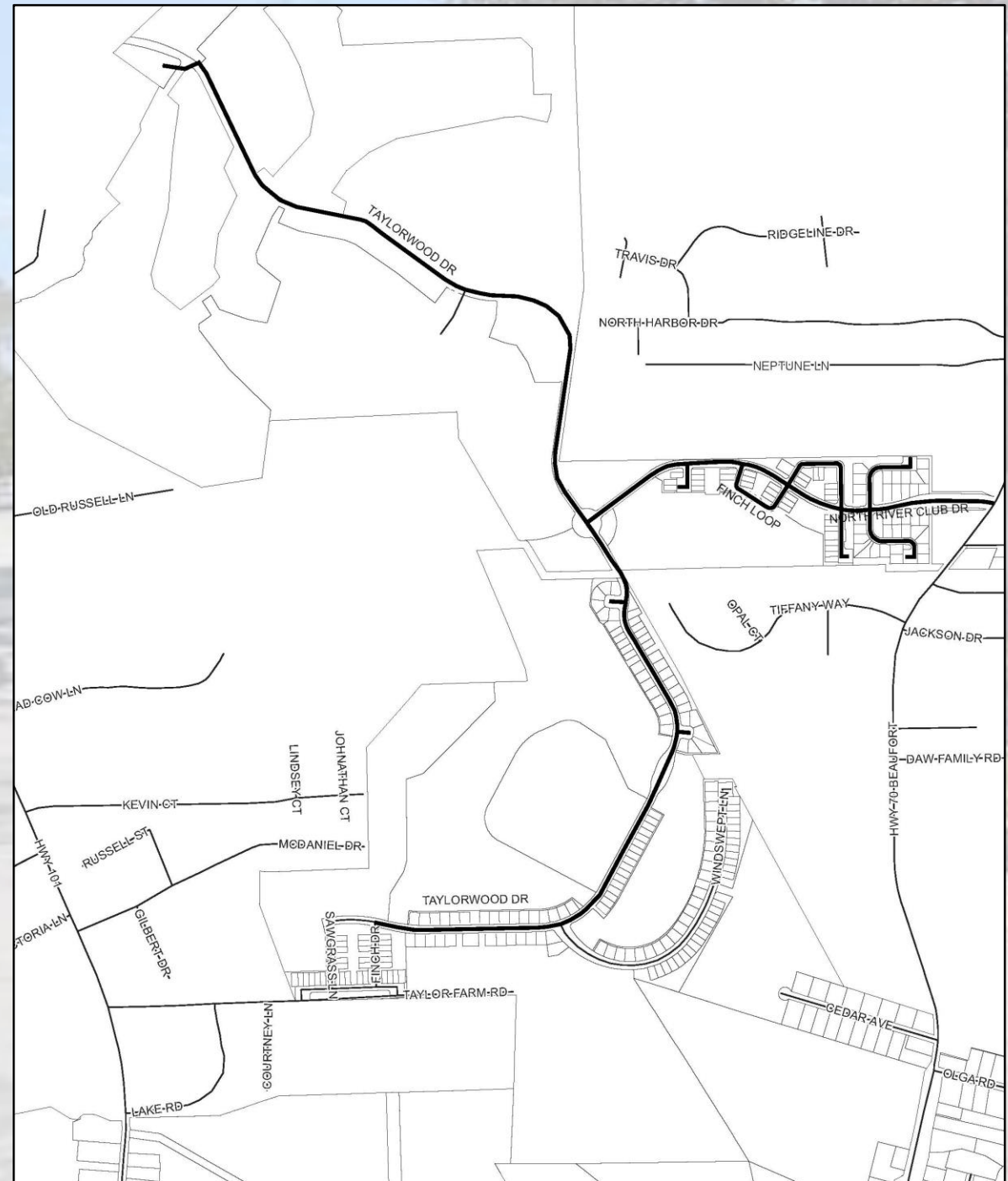


The image is a composite of a background photograph and an overlaid map. The background is a street scene with houses, trees, and a sidewalk. Overlaid on the right side is a map of the 'BEAUFORT CLUB AREA'. The map shows a network of streets and water bodies. A large, irregularly shaped area is shaded in light gray, representing the 'Survey Area'. A dashed black circle is drawn around a specific section of the map, likely indicating a sub-area of interest. The text 'Survey Area' is written in large, bold, blue letters on the left side of the image, partially overlapping the background photo and the map.





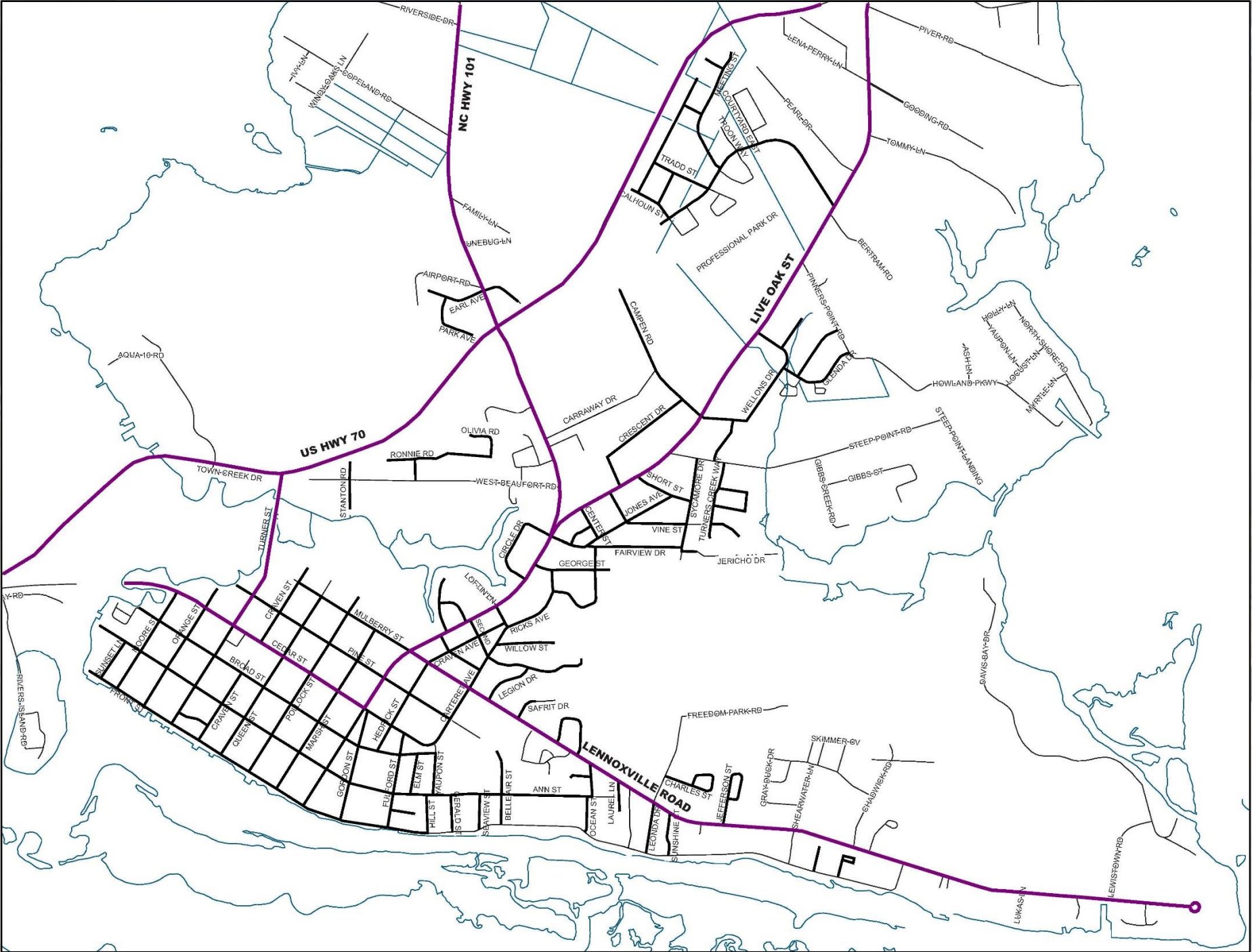
# Town Streets Beaufort Club





A background photograph of a residential street with houses and trees, overlaid with a map of the 'Survey Area'. The map shows a network of streets and water bodies, with a large area shaded in light green and labeled 'Survey Area' in blue text. A smaller, more detailed area within the survey area is shaded in a darker green and labeled 'CORE AREA' in black text. The map includes a north arrow in the top right corner.

# Town Streets Core Area





# Survey Scope

## Pavement Performance Indices

- Surface Distress – Surface Distress Index (SDI)
- Roughness – Riding Comfort Index (RCI)
- Overall Performance – Pavement Quality Index (PQI)



# Surface Distress Index (SDI)

## Surface Distress and Defect Data Collection

- Type
- Severity
  - How bad is it?
- Extent
  - How much is there?



# Surface Distress Index

## Distress Types

### Block Cracking



### Longitudinal Cracking



# Surface Distress Index

## Distress Types

### Transverse Cracking



### Alligator Cracking





# Surface Distress Index

## Distress Types

Edge Cracking



Potholes



# Surface Distress Index

## Distress Types

### Patching



### Slippage & Distortion





# Surface Distress Index

## Distress Types

Rippling & Shoving



Raveling





# Surface Distress Index

## Distress Types

### Wheel Track Rutting



### Bleeding



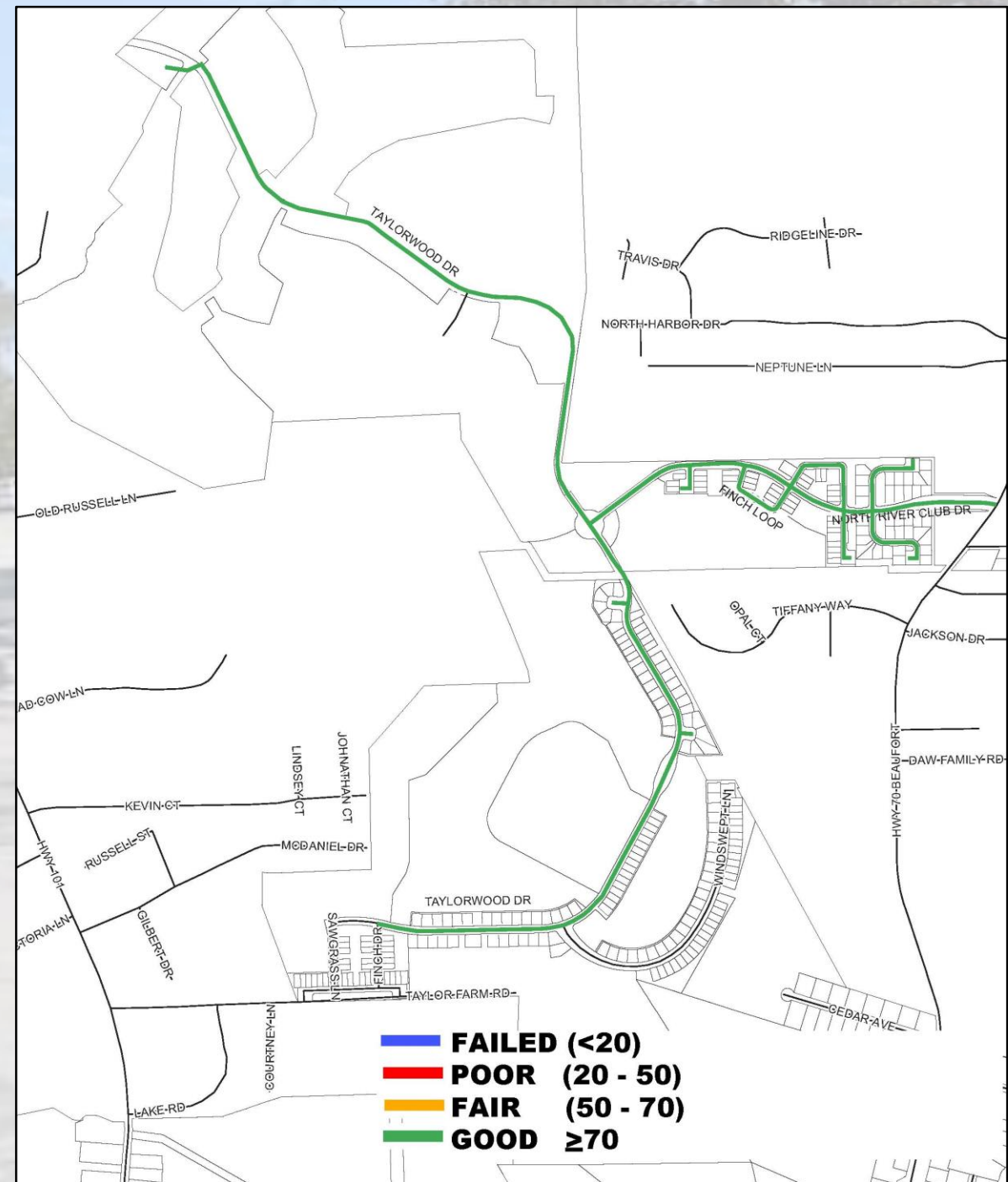
# Surface Distress Index

Key indicator of Pavement Performance

- 0 to 100 Scale
- Structural adequacy



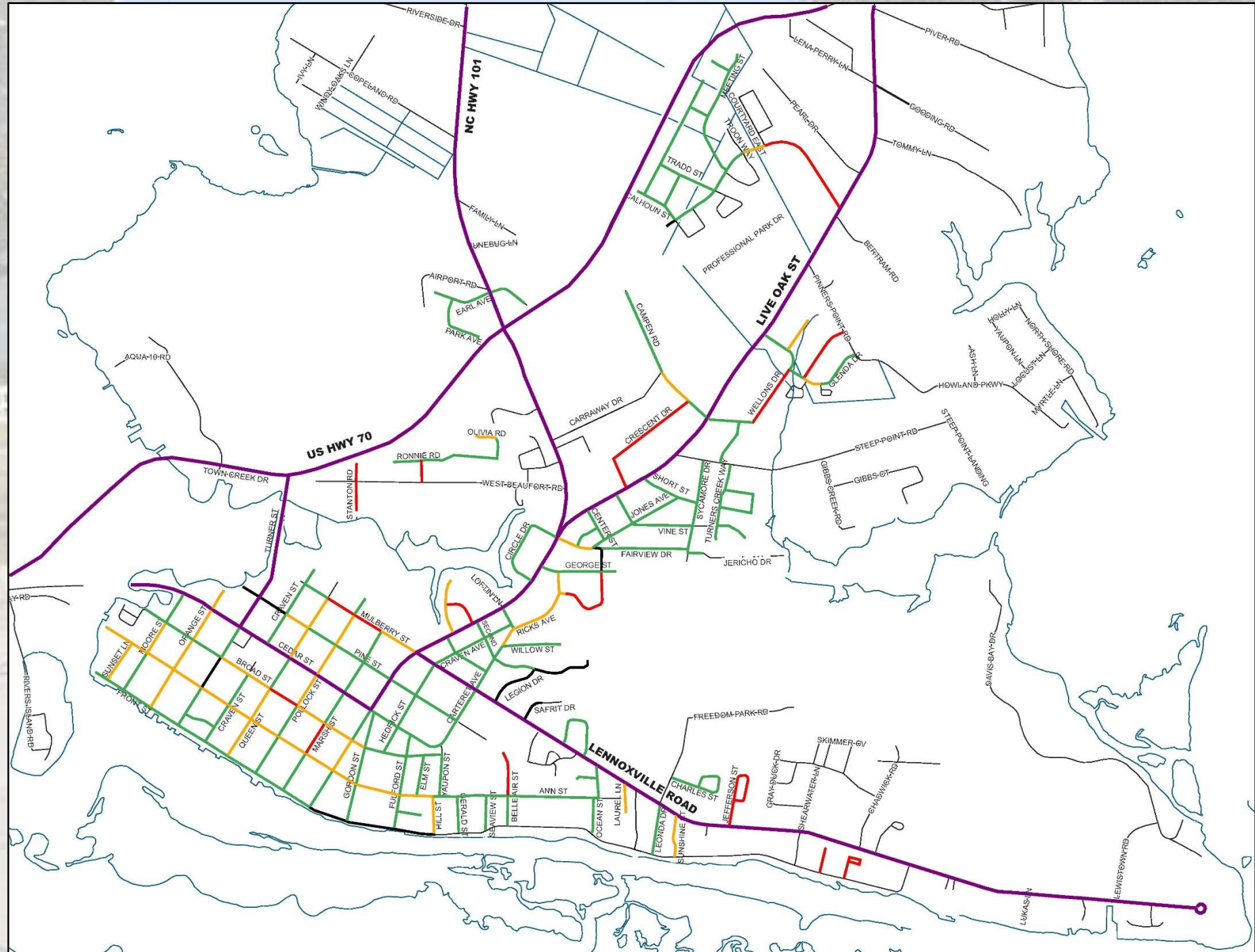
# 2018 Surface Distress Index





# 2018 Surface Distress Index

The map displays a coastal region with a network of roads. Major roads are highlighted in purple, including NC HWY 101, US HWY 70, and Live Oak St. Other roads are color-coded by their surface distress index: green for low distress, yellow for moderate, orange for high, and red for severe. The map includes numerous street names and a coastline with water bodies.



# 2018 Surface Distress Findings

SDI Range	Surface Distress	# of Sections	Length (LN-MI)	% of Network
SDI < 20	Failed	2	0.4	1
$20 \leq \text{SDI} < 50$	Poor	18	4.7	10
$50 \leq \text{SDI} < 70$	Fair	58	9.1	19
SDI $\geq 70$	Good	192	32.9	70



# Riding Comfort Index (RCI)

## Public's Opinion of Pavement's Smoothness

- Roughness measurements against Public's Perspective
  - Driver/Citizen rating panels
  - Calibration 30 $\pm$  years ago

# Riding Comfort Index (RCI)

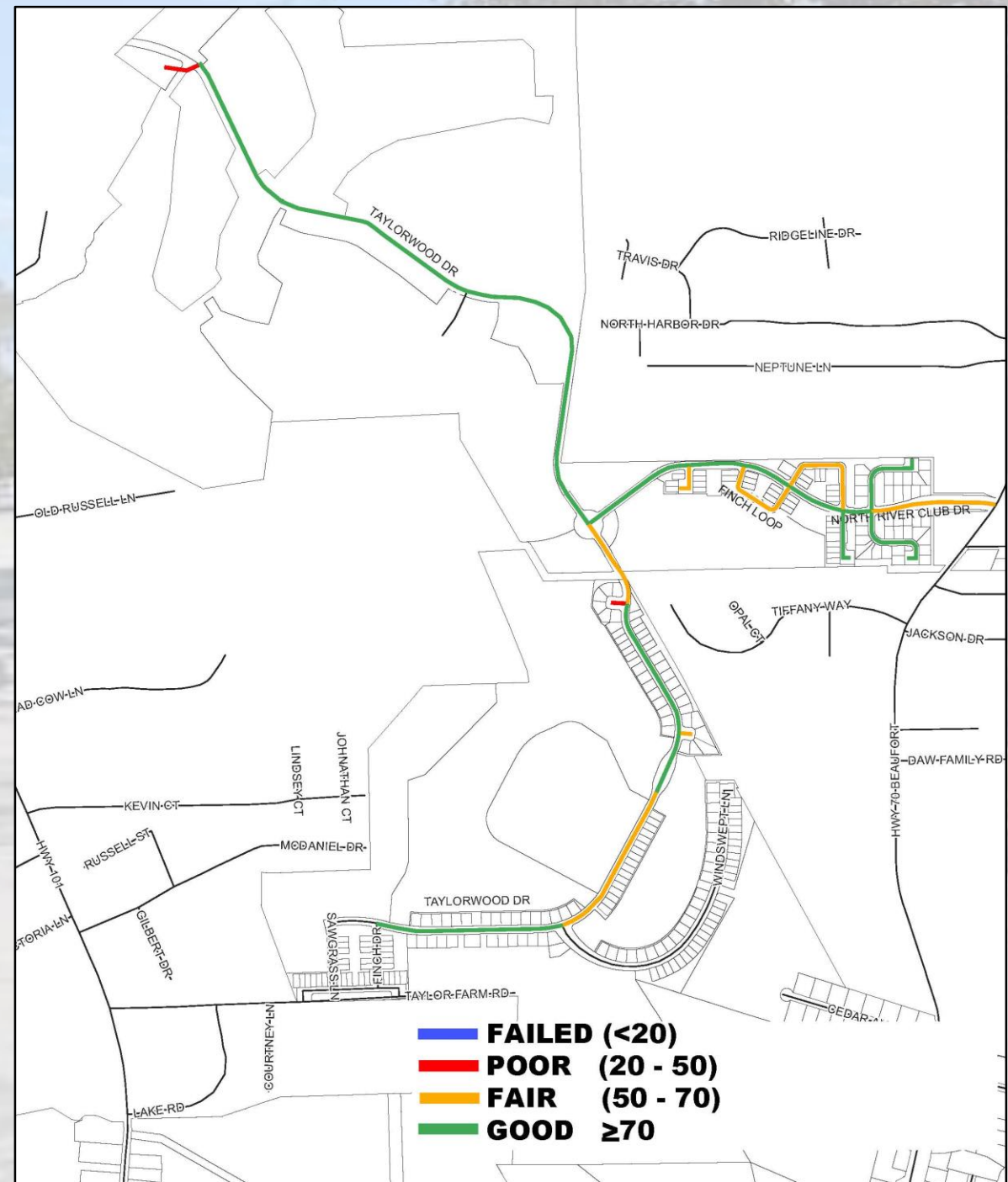
## Roughness Data Collection

- Longitudinal Profile
- Bouncing of Vehicle





# 2018 Riding Comfort Index







# 2018 Riding Comfort Findings

RCI Range	Ride Quality	# of Sections	Length (LN-MI)	% of Network
RCI < 20	Failed	1	0.1	0
$20 \leq \text{RCI} < 50$	Poor	127	19.7	42
$50 \leq \text{RCI} < 70$	Fair	123	22.5	48
RCI $\geq 70$	Good	19	4.8	10

# 2018 Riding Comfort vs Surface Distress

RCI Range	Ride Quality	# of Sections	Length (LN-MI)	% of Network
RCI < 20	Failed	1	0.1	0
20 ≤ RCI < 50	Poor	127	19.7	42
50 ≤ RCI < 70	Fair	123	22.5	48
RCI ≥ 70	Good	19	4.8	10

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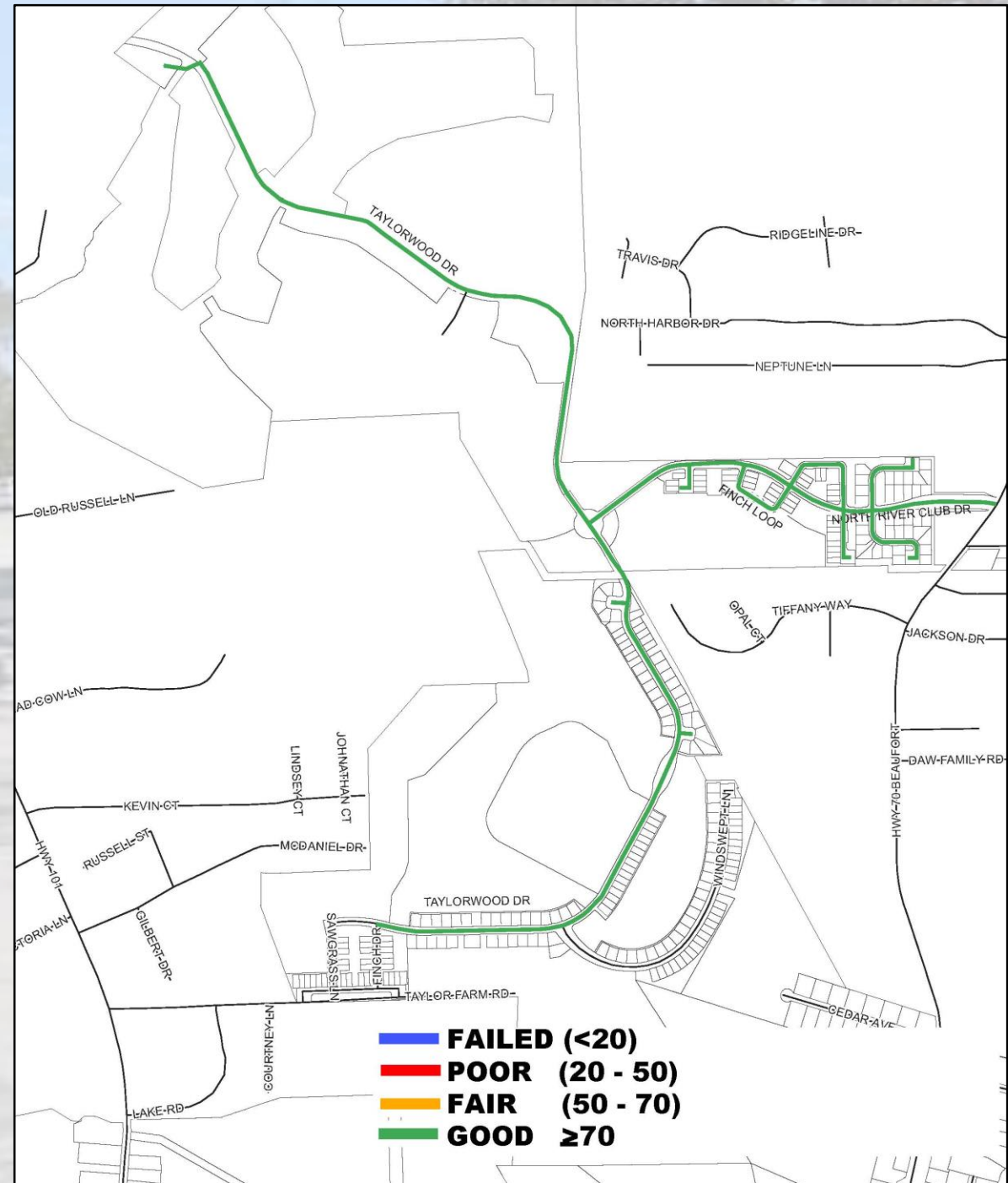


# Pavement Quality Index (PQI)

## Overall Performance Indicator

- Function of RCI, SDI & SAI (Structural Adequacy Index)
- Collector Streets
  - Strongly influenced by RCI
- Local Streets
  - Strongly influenced by SDI

# 2018 Pavement Quality Index



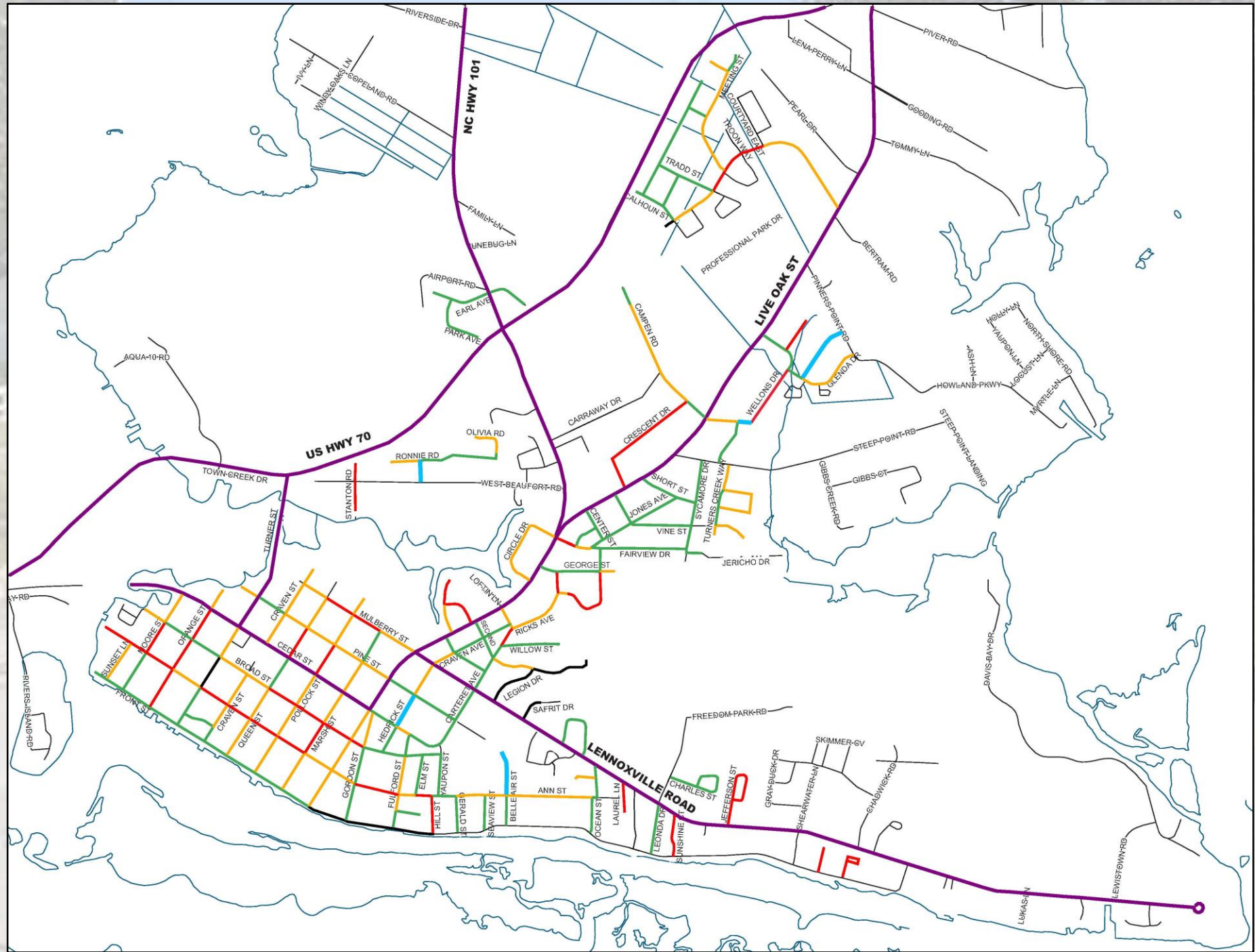


# 2018 Pavement Quality Index

The map displays the 2018 Pavement Quality Index (PQI) for various streets in Live Oak, FL. The streets are color-coded based on their condition:

- Red:** Poor
- Orange:** Fair
- Green:** Good
- Purple:** Excellent

Major roads shown include US HWY 70 and NC HWY 101. Other streets include LIVE OAK ST, LENNOXVILLE ROAD, and various residential streets like TOWN CREEK DR, TURNER ST, and CRANFORD ST. The map also shows the location of the airport and the surrounding water bodies.



# 2018 Pavement Quality Findings

PQI Range	Overall Performance	# of Sections	Length (LN-MI)	% of Network
PQI < 20	Failed	5	1.0	2
$20 \leq \text{PQI} < 50$	Poor	44	8.5	18
$50 \leq \text{PQI} < 70$	Fair	89	14.8	32
$\text{PQI} \geq 70$	Good	132	22.8	48



# Needs Assessment

## Optimal Rehabilitation Strategy

- Need Year
  - Theoretical Deterioration Curve
- PQI Trigger
- Treatment Type

# Recommended Treatments

## Maintenance & Rehabilitation Options

- Crack Seal





# Recommended Treatments

## Maintenance & Rehabilitation Options

- Crack Seal
- Overlay



# Recommended Treatments

## Maintenance & Rehabilitation Options

- Crack Seal
- Overlay
- Full Milling and Overlay
- Edge Milling & Overlay





# Recommended Treatments

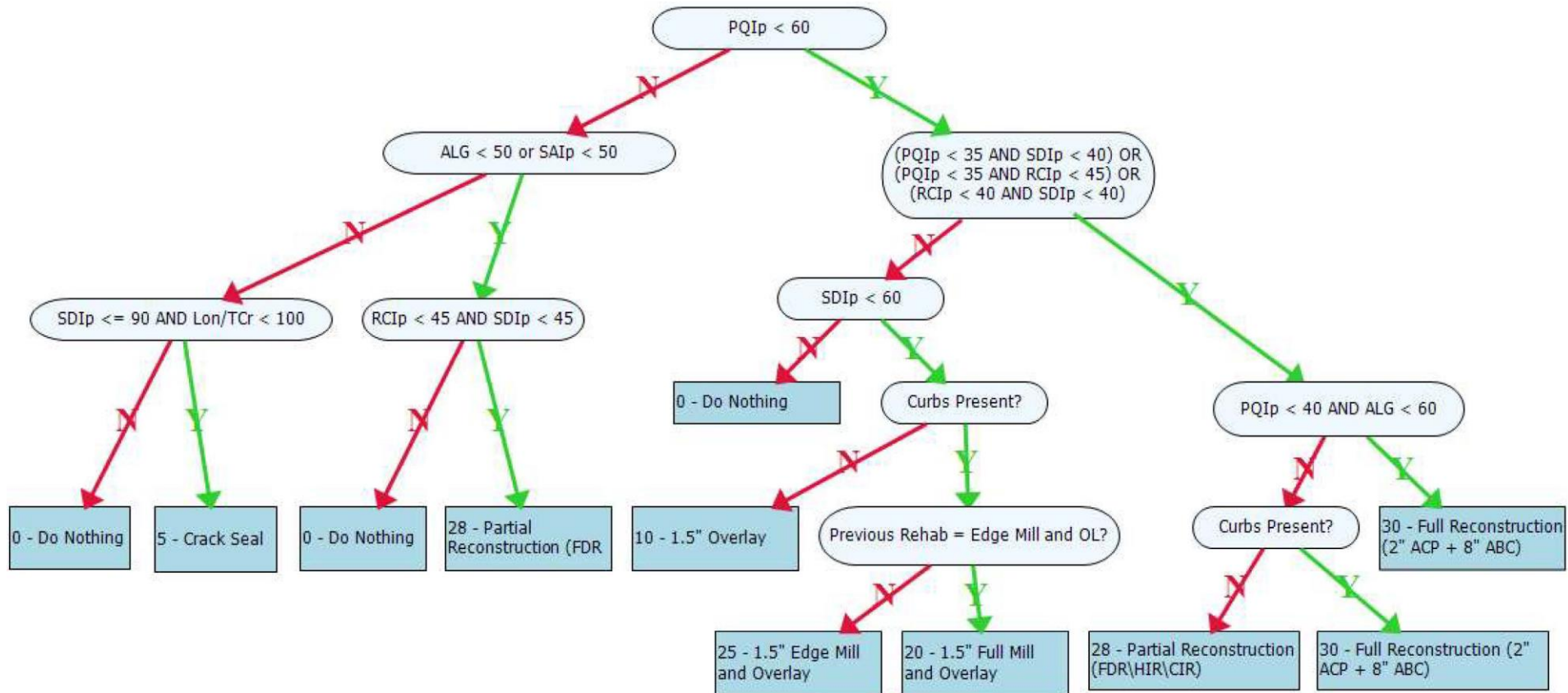
## Maintenance & Rehabilitation Options

- Crack Seal
- Overlay
- Full Milling and Overlay
- Edge Milling and Overlay
- Full Reconstruction



# Needs Assessment

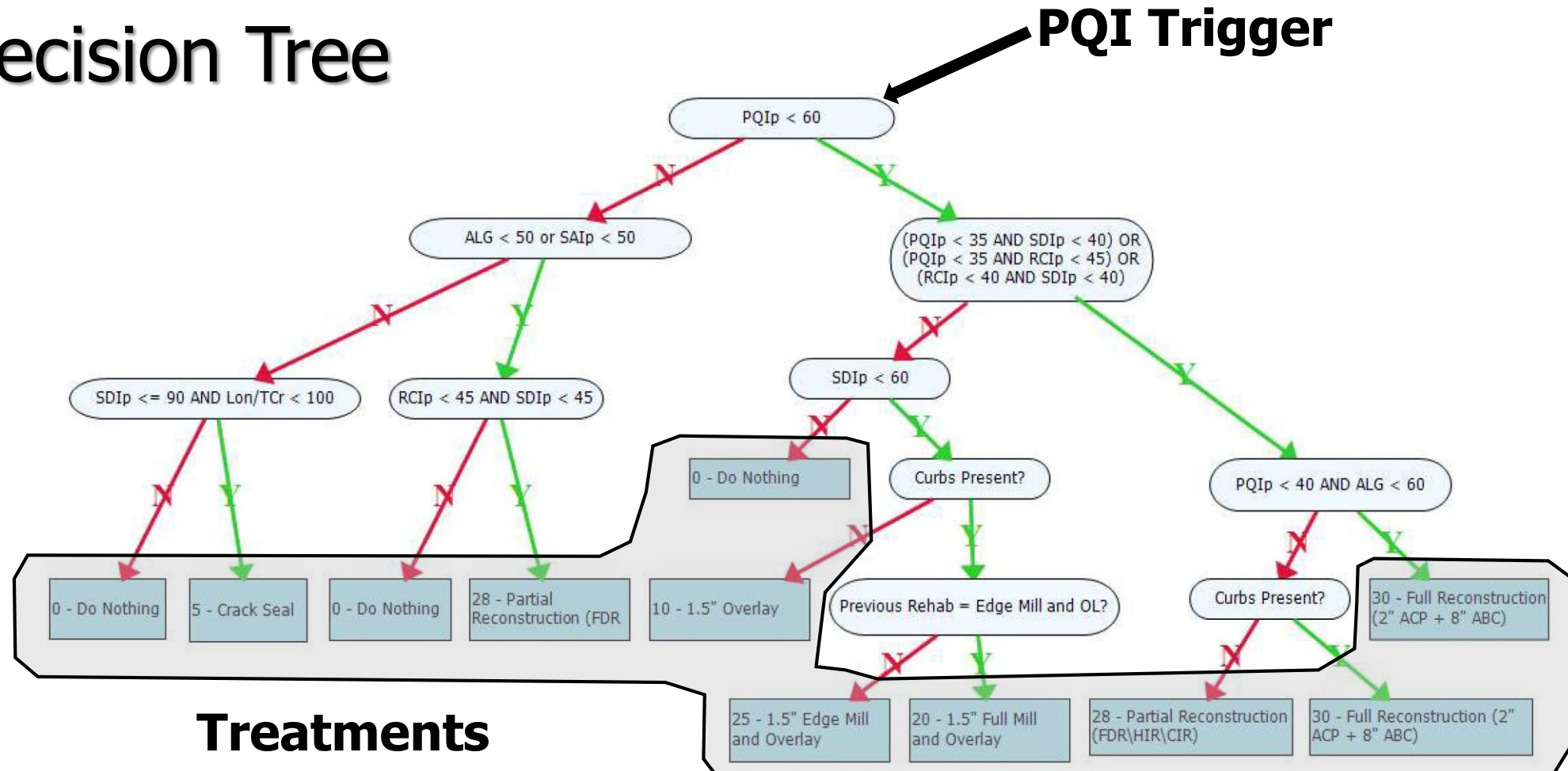
## Decision Tree





# Needs Assessment

## Decision Tree



# Budget Scenarios

- Do Nothing
- \$350,000/Year
- \$500,000/Year
- Needs Analysis Budget
- Maintain 2018 PQI of 67



# Budget Scenarios

**Table 4.19: \$500,000/Year Budget Scenario Results**

Year	Budget Limit	Cost	Cost%	LL-PQI	LL-Def.
2019	\$500,000	\$499,989	100	66	32%
2020	\$500,000	\$499,892	100	65	35%
2021	\$500,000	\$499,967	100	65	36%
2022	\$500,000	\$499,732	100	66	34%
2023	\$500,000	\$499,995	100	66	36%
2024	\$500,000	\$499,828	100	65	36%
2025	\$500,000	\$499,990	100	65	38%
2026	\$500,000	\$499,881	100	64	39%
2027	\$500,000	\$499,908	100	63	37%
2028	\$500,000	\$499,950	100	62	36%
<b>Total</b>	<b>\$5,000,000</b>	<b>\$4,999,132</b>			

**Table 4.20: Needs-based Budget Scenario Results**

Year	Budget Limit	Cost	LL-PQI	LL-Def.
2019	Needs	\$1,961,802	77	12%
2020	Needs	\$206,175	77	14%
2021	Needs	\$296,013	77	14%
2022	Needs	\$623,771	81	3%
2023	Needs	\$173,883	80	3%
2024	Needs	\$83,891	80	2%
2025	Needs	\$135,497	79	1%
2026	Needs	\$17,750	77	3%
2027	Needs	\$59,892	76	2%
2028	Needs	\$146,776	75	2%
<b>Total</b>	<b>Needs</b>	<b>\$3,705,450</b>		

# Budget Scenarios

**Table 4.21: “Maintain 2018 PQI of 67” Budget Scenario Results**

Year	PQI Target	Cost	LL-PQI	LL-Def.
2019	67	\$817,982	67	31%
2020	67	\$382,962	67	33%
2021	67	\$402,071	67	34%
2022	67	\$469,019	67	33%
2023	67	\$569,109	66	34%
2024	67	\$566,481	67	34%
2025	67	\$754,894	67	34%
2026	67	\$851,057	67	32%
2027	67	\$773,519	67	31%
2028	67	\$596,259	67	28%
<b>Total</b>	<b>-</b>	<b>\$6,183,353</b>		



# Budget Scenarios

Analysis Scenario	Total Cost Over 10 years	LL-PQI <sup>1</sup>		LL-Def. <sup>2</sup> (%)	
		2019	2028	2019	2028
Do Nothing	\$ 0	64	40	36	73
\$350,000/Year	\$ 3,497,640	66	57	33	43
\$500,000/Year	\$ 4,999,132	66	62	32	36
Needs Analysis Budget	\$3,705,450	77	75	12	2
Maintain 2018 PQI of 67	\$ 6,183,353	67	67	31	28

<sup>1</sup> LL-PQI1 = Lane-Length weighted PQI

<sup>2</sup> LL-Def. = Lane-Length weighted deficiency

# Proposed Work Plan

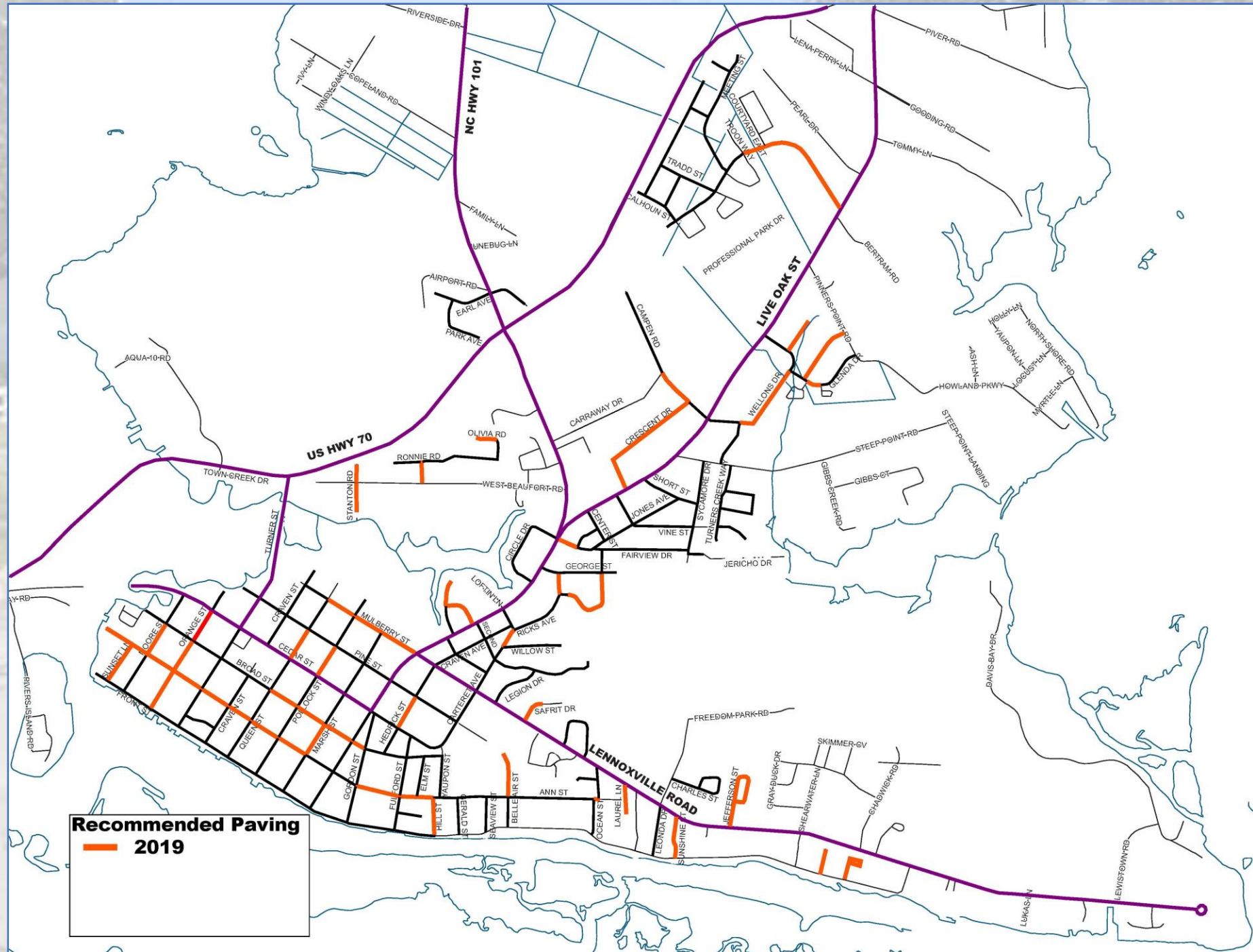
## Needs Based Budget Scenario

Summary of Recommended Street Work Plan											
Section No.	Street Name	Segment	Proposed Treatment - Unlimited Budget Scenario								
			2019	2020	2021	2022	2023	2024	2025	2026	2027
2220	Sunset Ln	Front St-317 Ft N of Front St		1.5" Overlay							
2230	Sunset Ln	317 N of Front St-Ann St		1.5" Overlay							
2240	Moore St	Front St-Ann St	Crack Seal		Crack Seal			Crack Seal			
2250	Moore St	Ann St-Broad St	1.5" Edge Mill & Overlay								
2260	Moore St	Broad St-Cedar St					1.5" Edge Mill & Overlay				
2270	Orange St	Front St-Ann St	1.5" Edge Mill & Overlay								
2280	Orange St	Ann St-Broad St	1.5" Edge Mill & Overlay								
2290	Orange St	Broad St-Cedar St	1.5" Edge Mill & Overlay								
2300	Orange St	Cedar-N End			1.5" Overlay						
2310	Turner	Front St-Middle Ln									
2320	Turner	Middle Ln-Anne St		Crack Seal					Crack Seal		
2330	Turner	Ann St-Broad St			Crack Seal		Crack Seal		Crack Seal		Crack Seal
2340	Turner	Broad St-272 ft. N of Broad St				1.5" Edge Mill & Overlay					
2350	Turner	272 ft. N of Broad St-Cedar St	Crack Seal		Crack Seal		Crack Seal		Crack Seal		Crack Seal
2360	Turner	Cedar St-Pine St	Crack Seal		Crack Seal		Crack Seal				



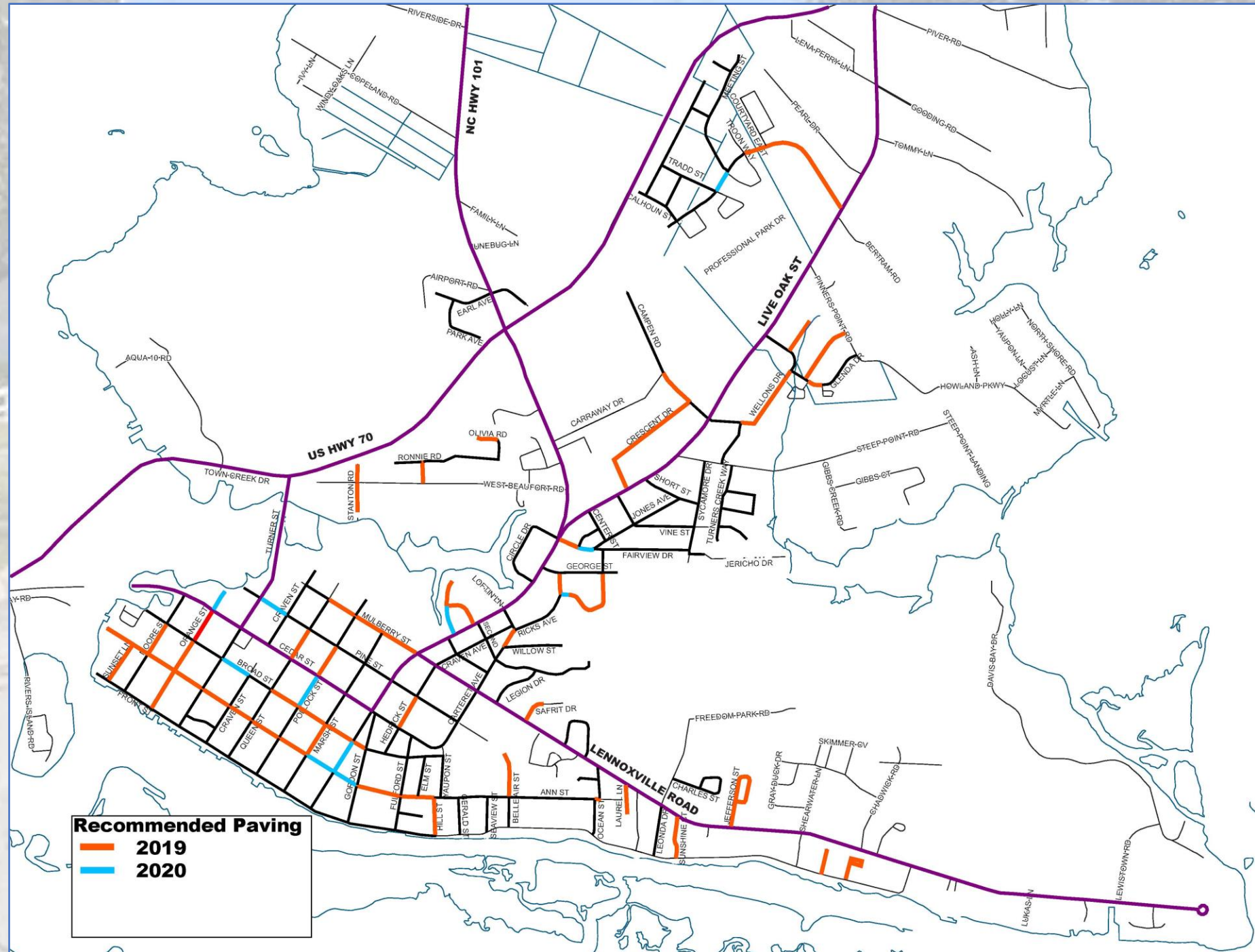
A faded background image of a residential street. On the left, there is a white house with a dark roof. A large tree stands in front of the house. In the foreground, there is a paved road with a yellow curb. The overall image is semi-transparent to allow the text to be clearly visible.

# Needs Based Paving Work Plan



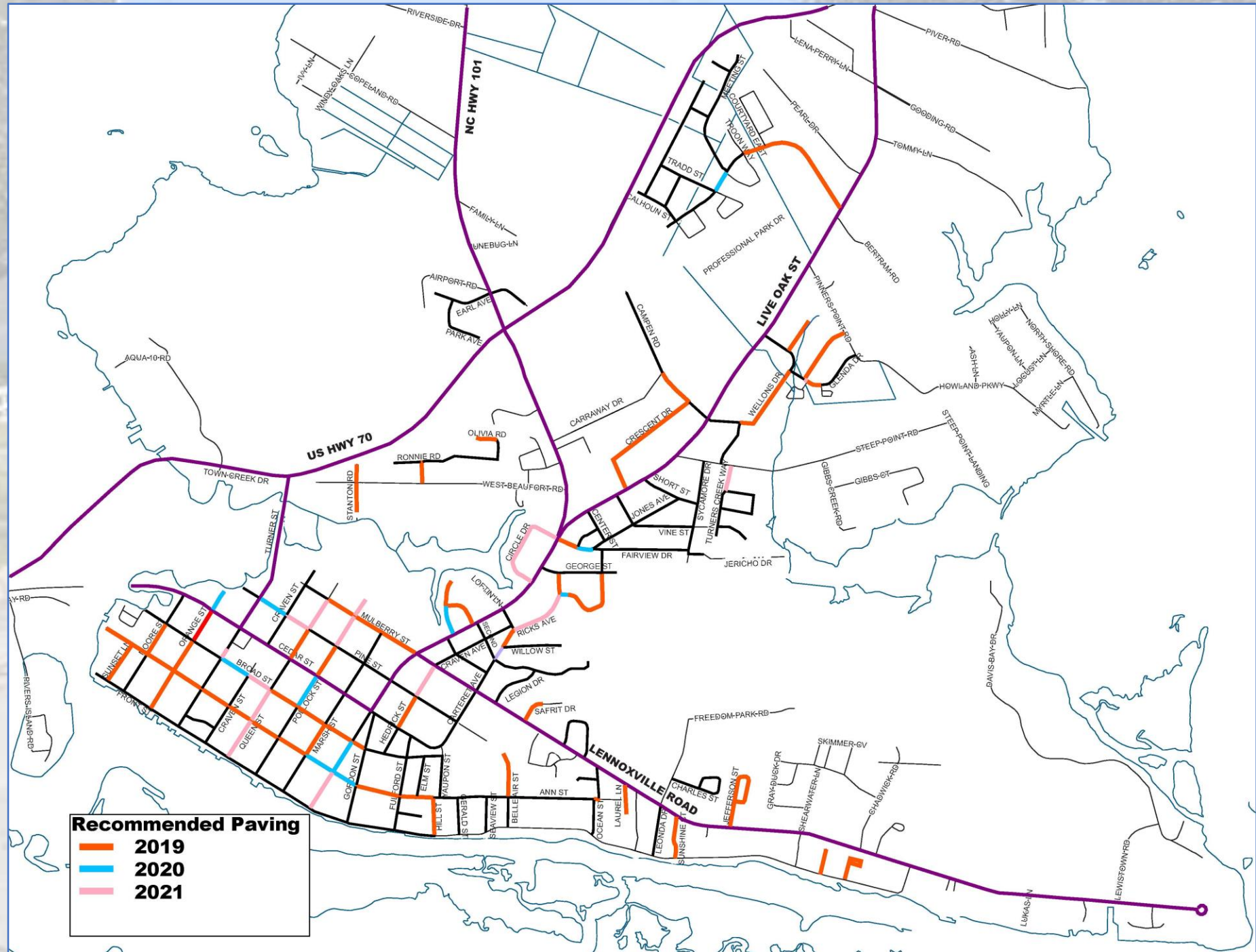


# Needs Based Paving Work Plan



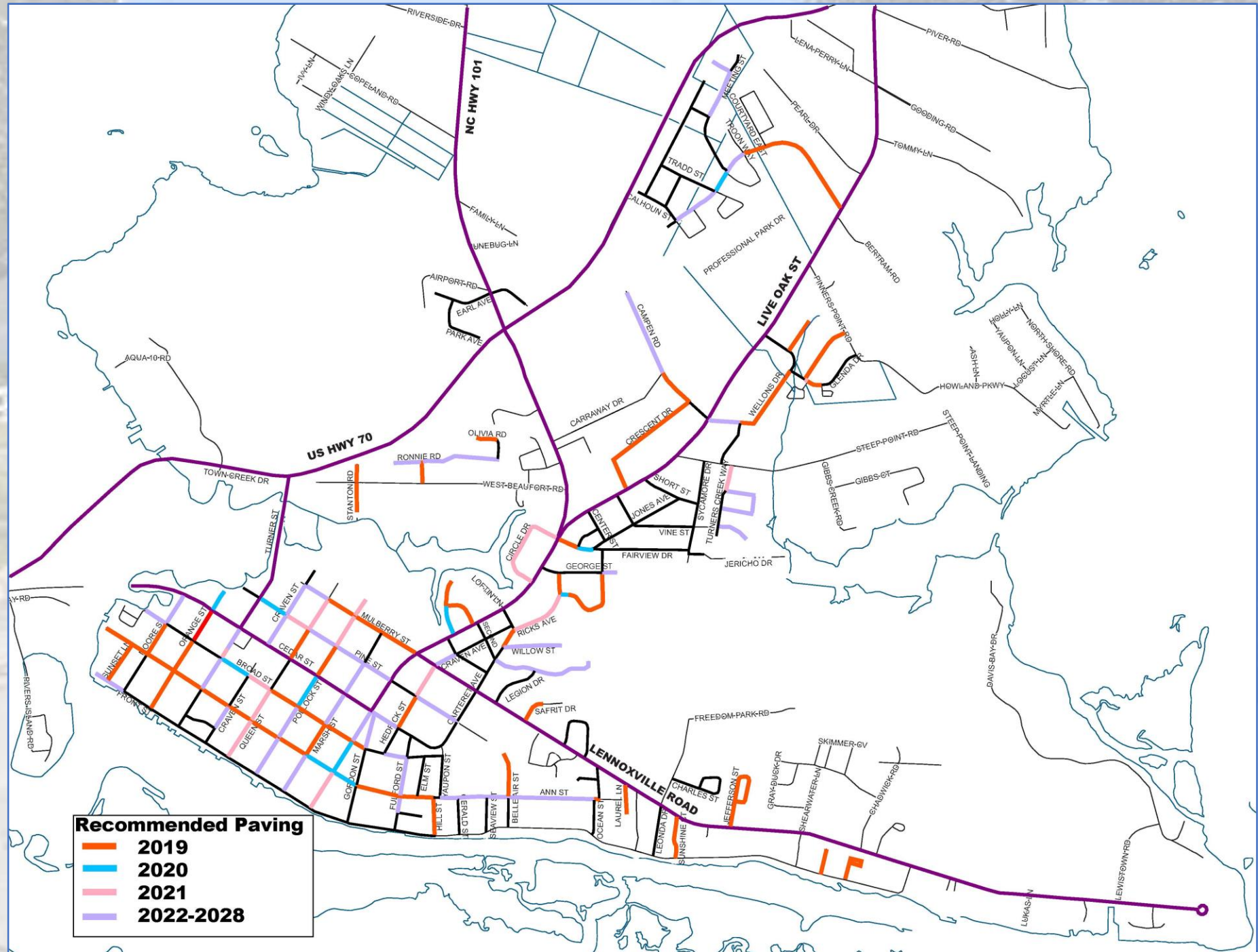


# Needs Based Paving Work Plan





# Needs Based Paving Work Plan





# Subsurface Utility Considerations

## WATER ASSET MANAGEMENT PLAN for



## Town of Beaufort, North Carolina Beaufort - Water AIA Project

March 2019  
Rivers Project No. 2017030



ENGINEERS

PLANNERS

SURVEYORS

LANDSCAPE ARCHITECTS

107 E. Second Street, Greenville, NC 27858 • PO Box 929, Greenville, NC 27835 • Phone: 252-752-4135 • Fax: 252-752-3974  
NCBELS Lic. No. F-0334      www.riversandassociates.com      NCBOLA Lic. No. C-312

## TOWN OF BEAUFORT

## SANITARY SEWER COLLECTION SYSTEM

## 2010 SEWER SYSTEM EVALUATION SURVEY – PHASE I


## BEAUFORT, NORTH CAROLINA


Prepared By:

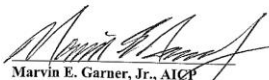
RIVERS & ASSOCIATES, INC.  
Engineers/Planners/Surveyors  
107 East Second Street  
Greenville, North Carolina 27858  
License # F-0334

July, 2010



  
C. Brad Johnson, EIT  
Design Engineer  
Date: 8-2-2010

  
William G. Boyette, P.E.  
Project Engineer  
Date: 8-2-10

  
Marvin E. Garner, Jr., AICP  
Vice President  
Date: 8-2-10

# Subsurface Utility Considerations

- Old Water Lines
  - Galvanized Pipe



# Subsurface Utility Considerations

- Old Water Lines
  - Galvanized Pipe
  - Asbestos Cement Pipe





# Subsurface Utility Considerations

- Old Water Lines
  - Galvanized Pipe
  - Asbestos Cement Pipe
  - Cast Iron Pipe



# Subsurface Utility Considerations

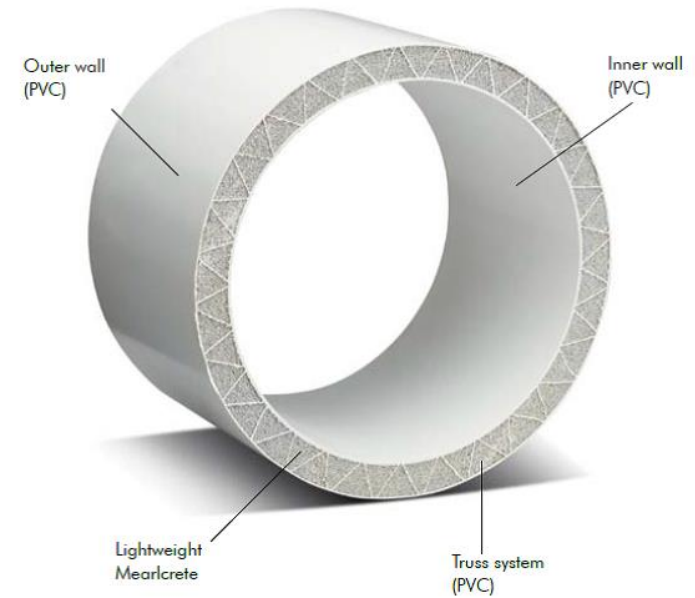
- Old Sanitary Sewer Lines
  - Vitrified Clay Pipe





# Subsurface Utility Considerations

- Old Sanitary Sewer Lines
  - Vitrified Clay Pipe
  - Truss Pipe

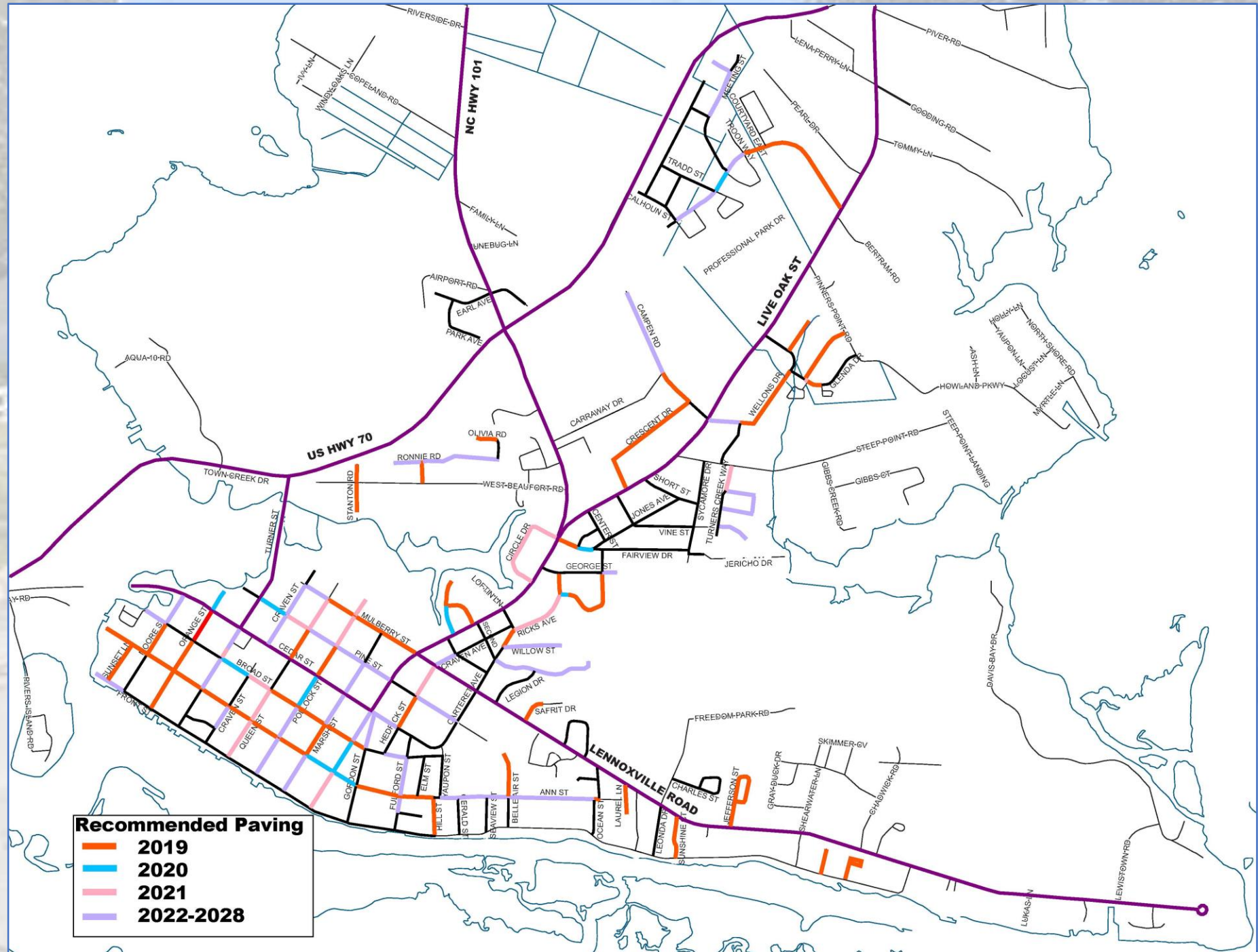


# Subsurface Utility Considerations

- Old Sanitary Sewer Lines
  - Vitrified Clay Pipe
  - Truss Pipe
  - Manholes



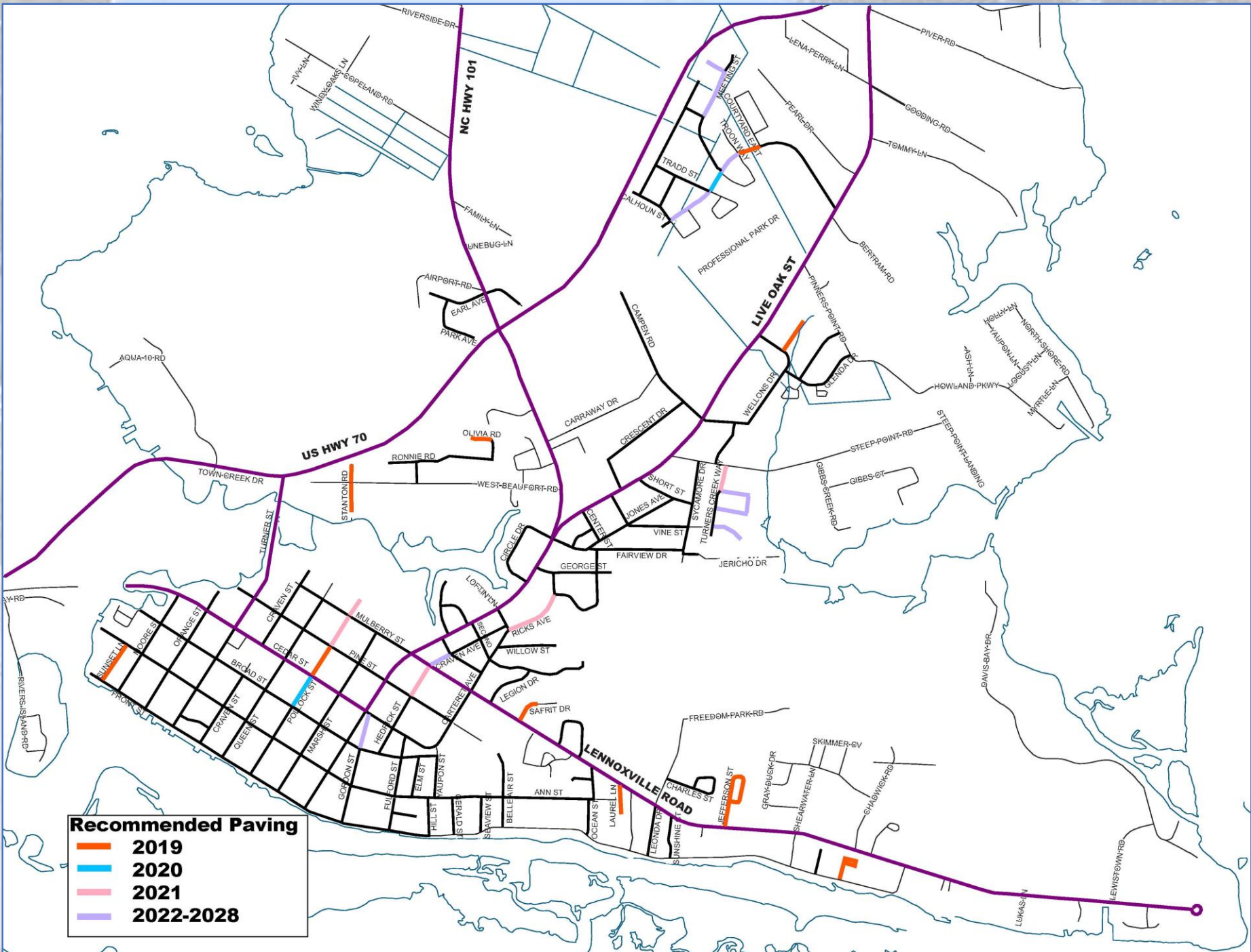
# Needs Based Paving Work Plan





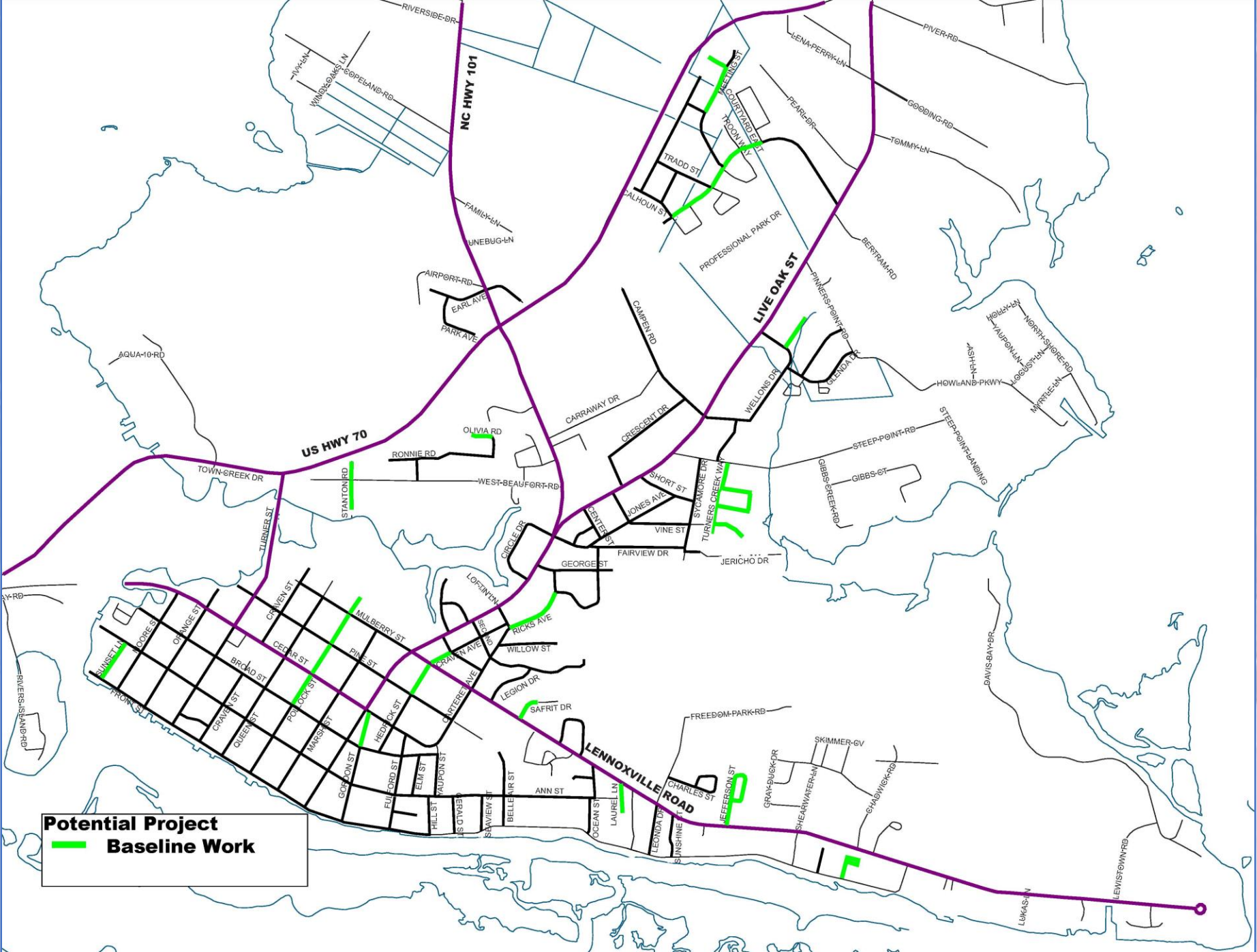
A faded background image of a residential street. On the left, there is a white house with a dark roof. A large tree with green leaves is in the foreground on the right. A paved road with a yellow curb runs along the bottom of the image. The overall scene is slightly out of focus and has a light, airy feel due to the fading.

# Work Plan accounting for Subsurface Utilities





# Work Plan accounting for Subsurface Utilities







# Phase 1 Paving Project

- 2.5± Miles of Baseline Work
- 3.3± Miles of Additional Work
- \$1.3 to \$2 Million Estimated Cost



# Phase 1 Paving Project

## Funding

- Financed

# Future

## Combination Utility Upgrade & Paving Projects

- Allocate repeating funding for construction
  - Example: \$500,000 every 2 years
- Prioritize projects
  - Pavement Need vs Utility Need



