Pavement Management (PM) Update

Pavement Management Inventory and Ranking

November 12, 2019

Ramon D. Gavarrete, P.E.
Public Works Director

Brian M. Singleton, P.E.
Asst. Public Works Director

Inventory Needs vs. Funding

Paved roads (locals, collectors, arterials): approximately 700 centerline miles

Resurfacing Target:
35 to 49 centerline miles per year

$12.25 M to $17.75 M required annually

FY19 Adopted - $3.68 M
FY20 Adopted - $3.95 M
FY21 Proposed - $3.89 M
FY22 Proposed - $4.45 M
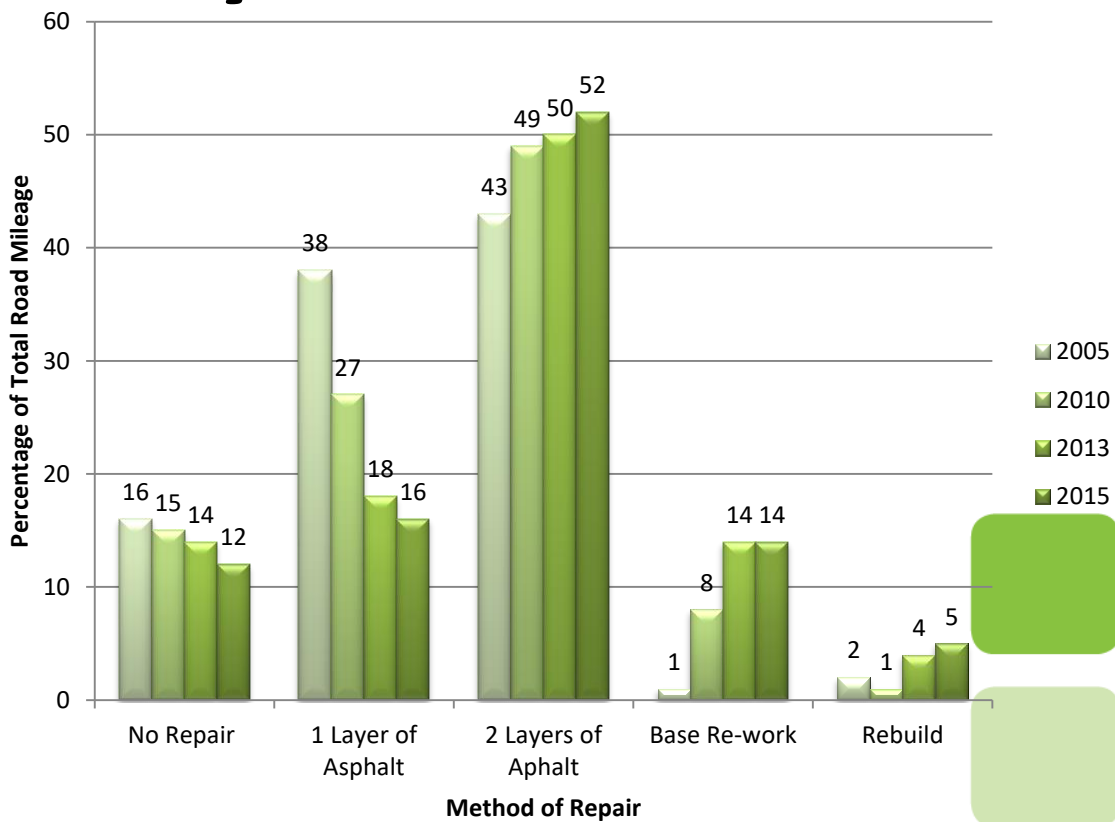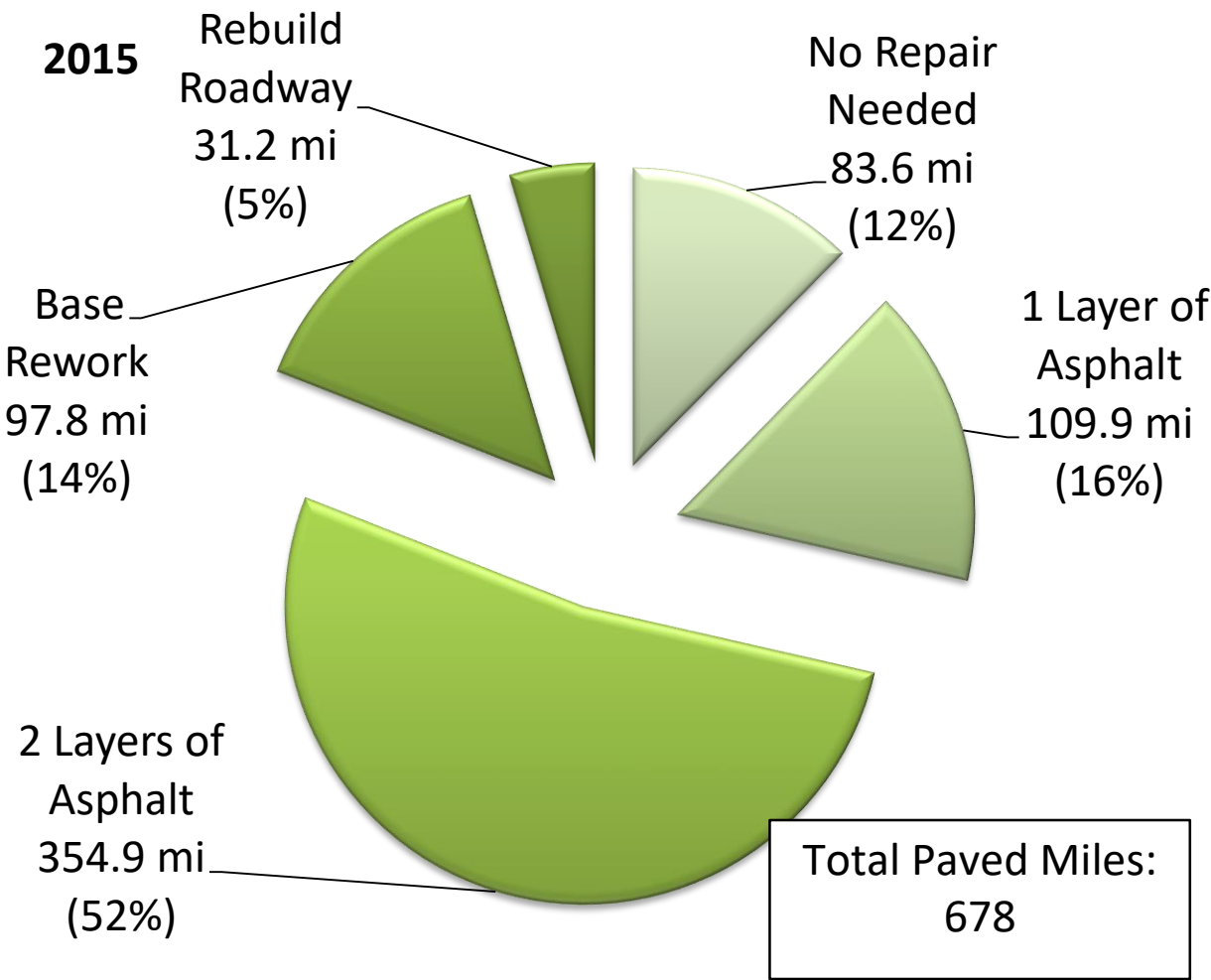**FY23 Proposed - $3.71 M**
FY24 Proposed - $4.54 M

Inventory Condition Backlog Continues to Grow

Pavement Condition Inventory vs. Time

2015

Rebuild Roadway 31.2 mi (5%)

No Repair Needed 83.6 mi (12%)

1 Layer of Asphalt 109.9 mi (16%)

Base Rework 97.8 mi (14%)

2 Layers of Asphalt 354.9 mi (52%)
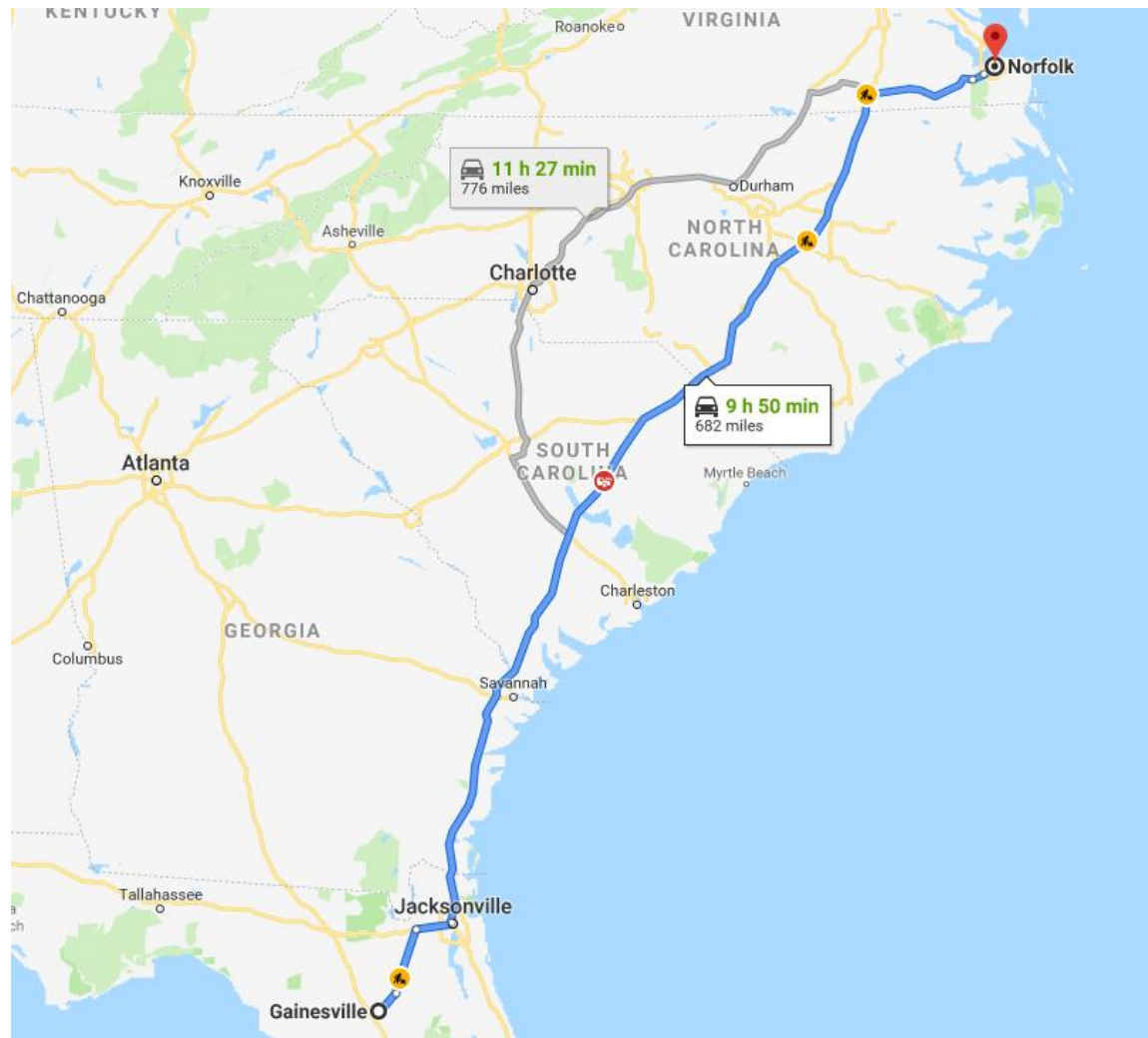
Total Paved Miles: 678

Inventory Condition Backlog Continues to Grow

Update scheduled for 2020
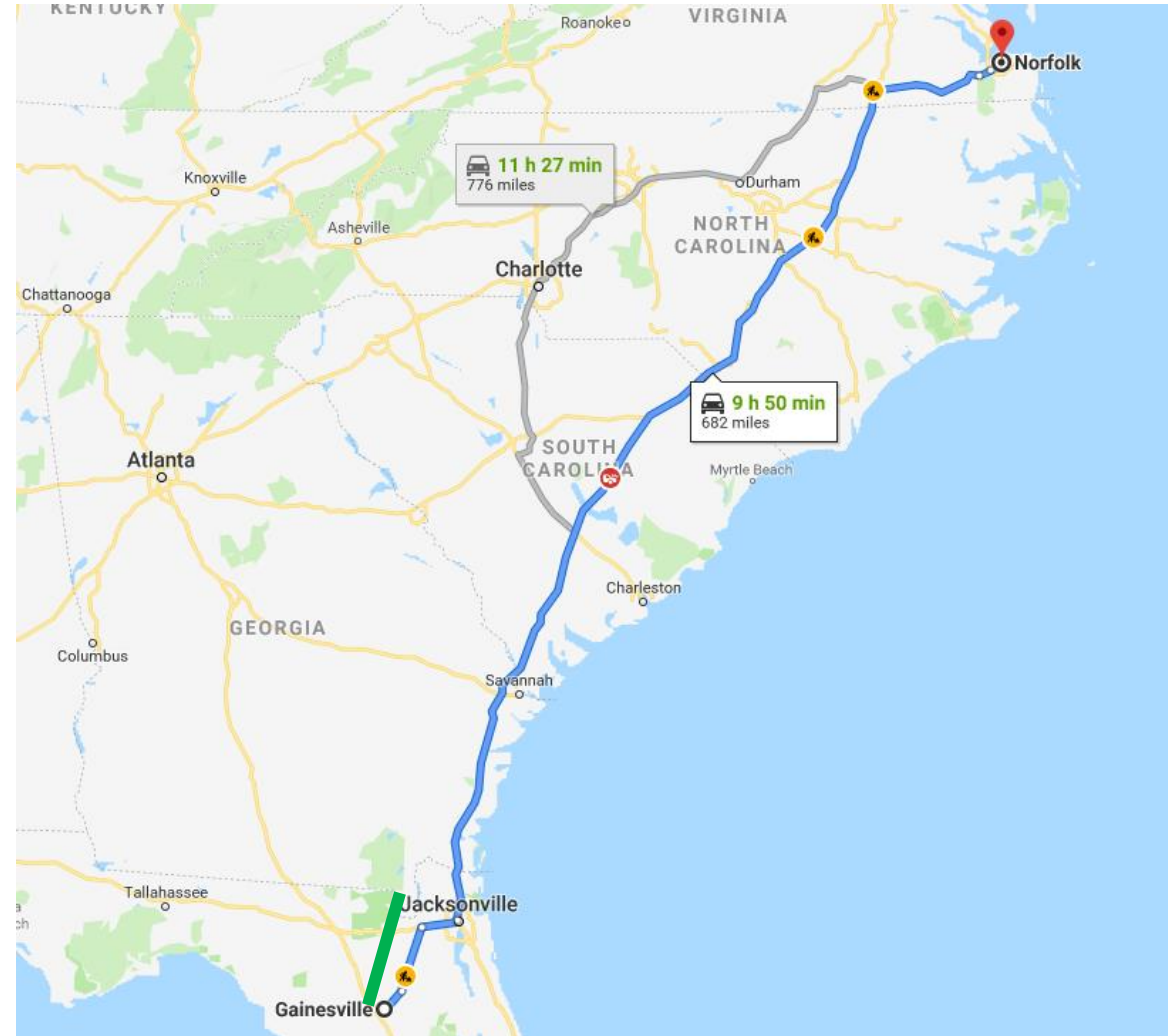
3

Pavement Condition Inventory

Alachua County's paved inventory stretches from Gainesville to Norfolk, VA

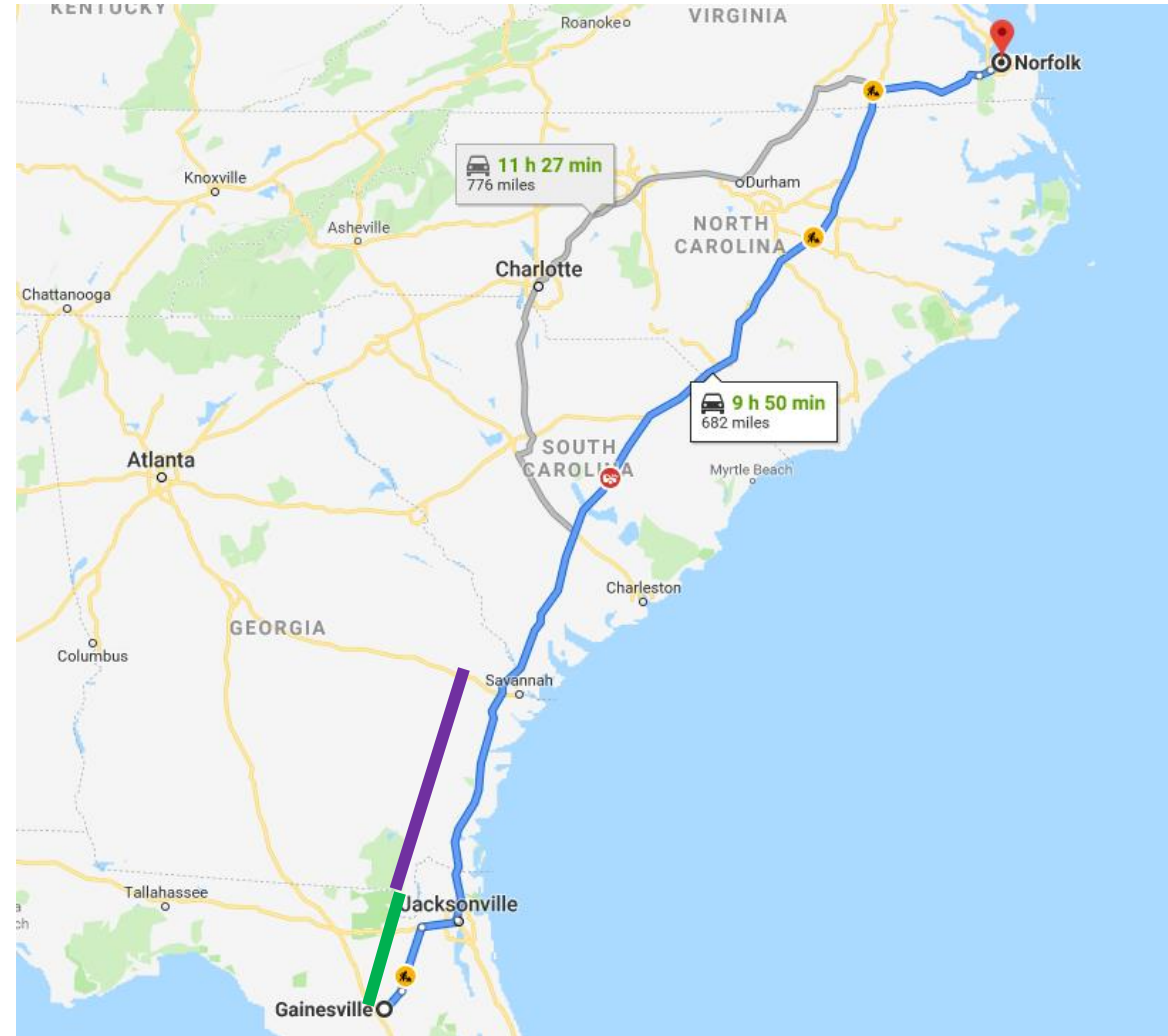**Approximately a 10 hr drive straight at legal operating speed**

Pavement Condition Inventory

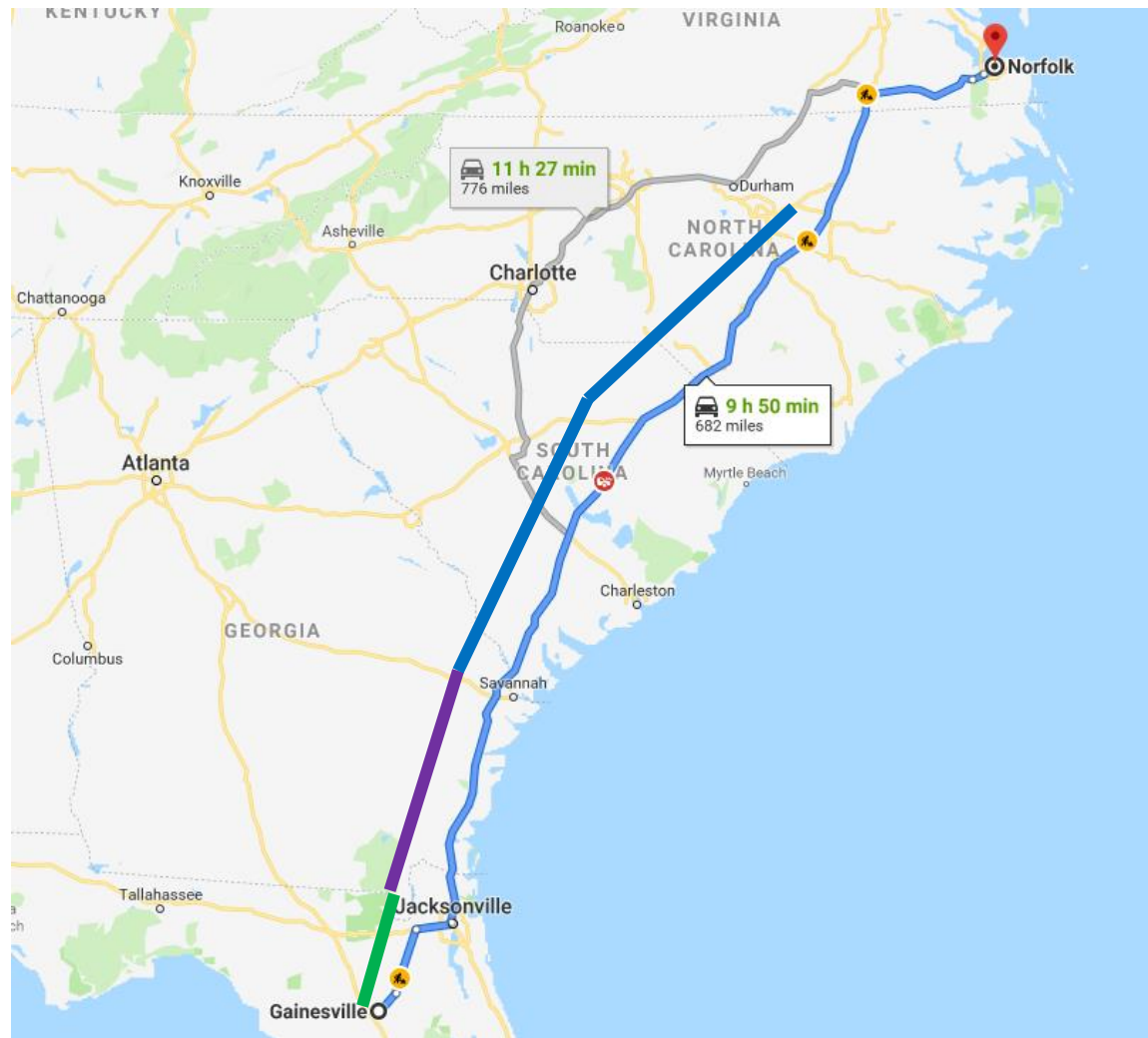**GNV to JAX – Excellent**

1.5 hrs – 83 miles

5

Pavement Condition Inventory

JAX to Savannah – Good
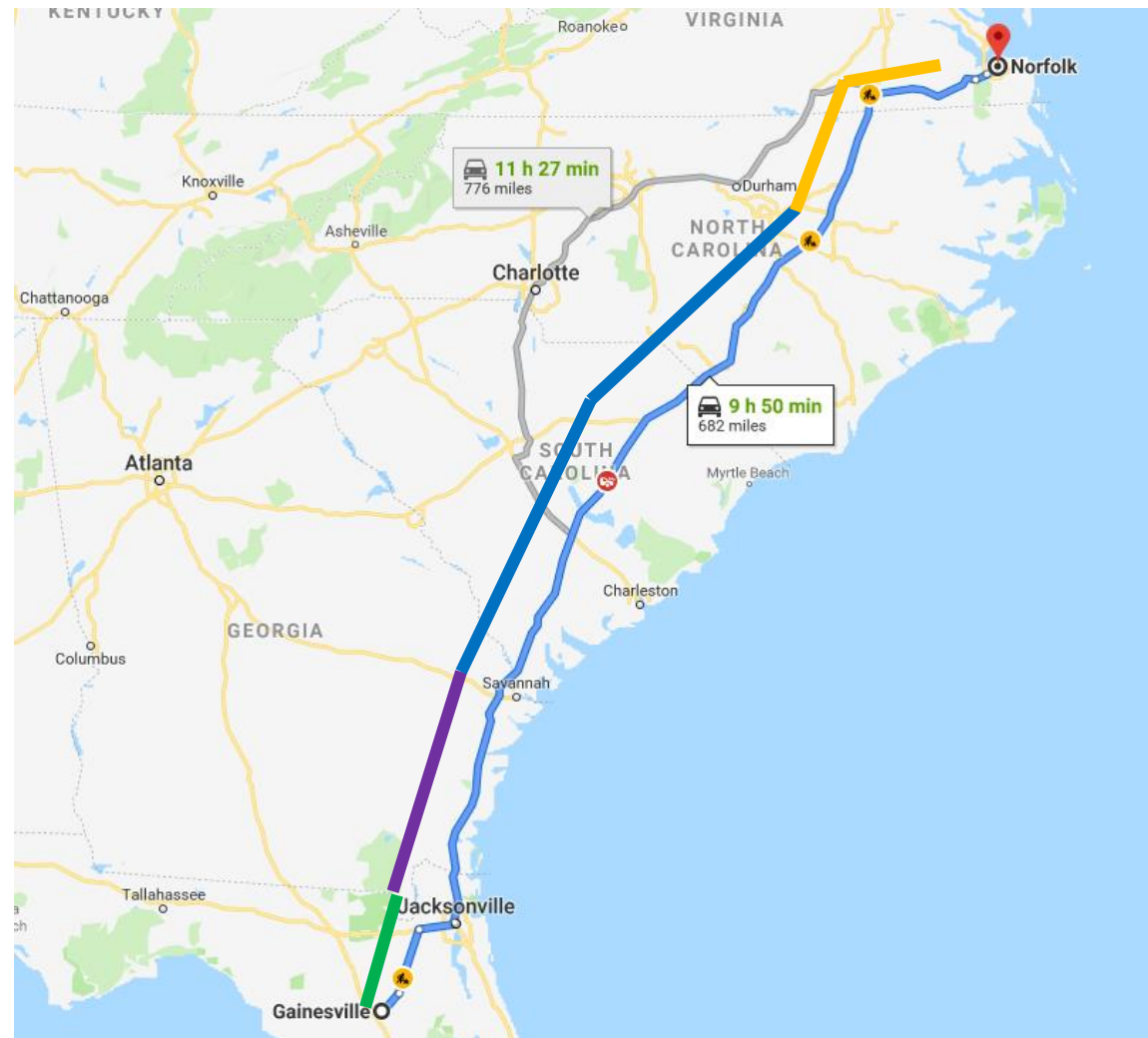
1.75 hrs – 110 miles

Pavement Condition Inventory

Savannah to Raleigh – Fair

4.75 hrs – 355 miles
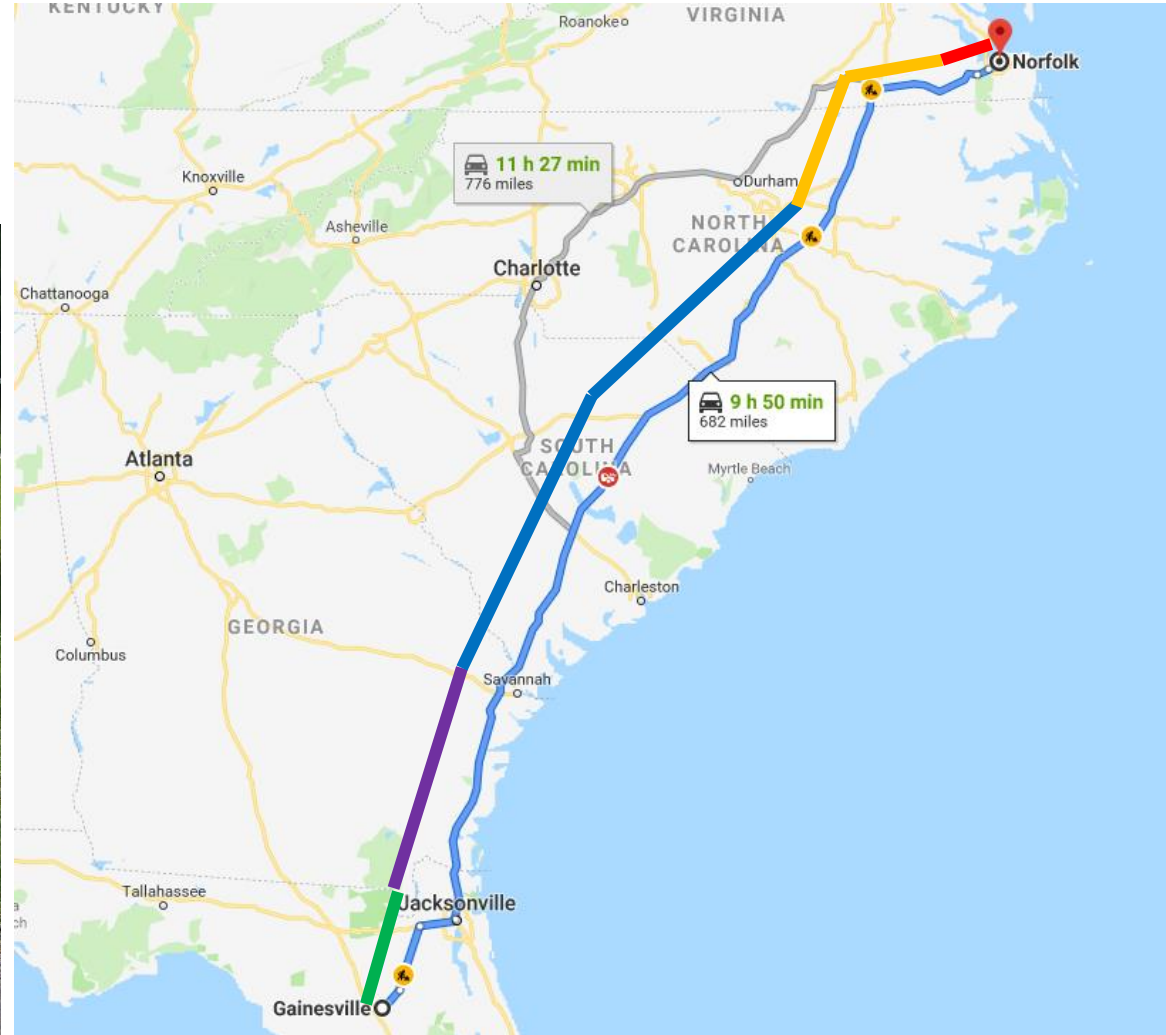
Pavement Condition Inventory

Raleigh to Suffolk – Poor

1.5 hrs – 98 miles

Pavement Condition Inventory

Suffolk to Norfolk – Very Poor

0.5 hrs – 31 miles

Pavement Condition Inventory

GNV to JAX – Excellent

1.5 hrs – 83 miles

JAX to Savannah – Good

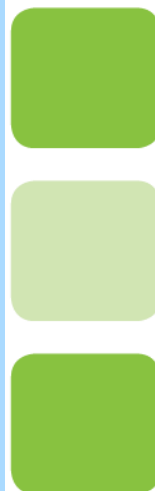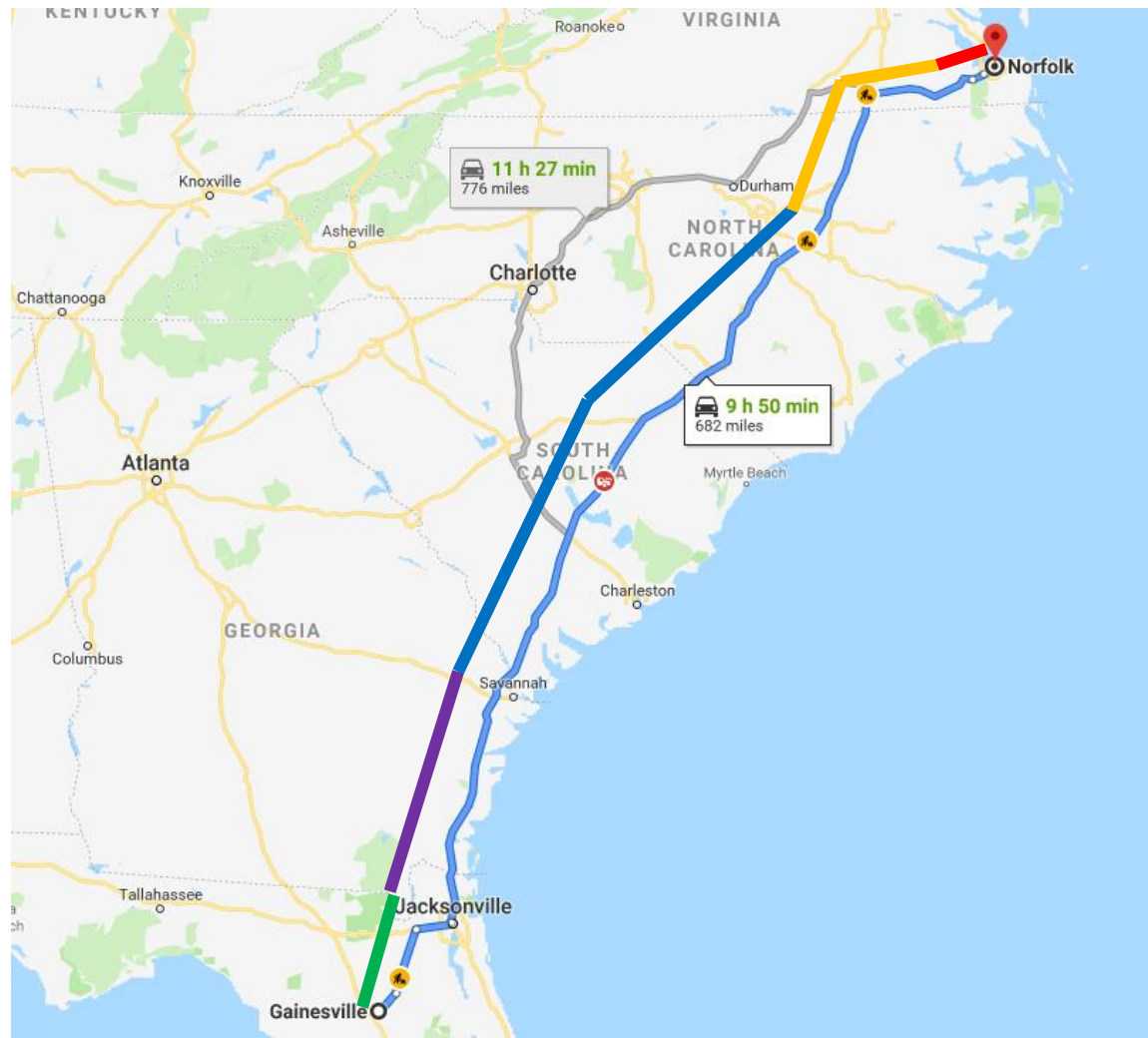**1.75 hrs – 110 miles**

Savannah to Raleigh – Fair

4.75 hrs – 355 miles

Raleigh to Suffolk – Poor

1.5 hrs – 98 miles

Suffolk to Norfolk – Very Poor

0.5 hrs – 31 miles

Ranking Methodology

Factor	BoCC Approved 2011	BoCC Approved 2017
Pavement Condition	55%	65%
Deterioration Rate	25%	10%
Traffic Volumes	10%	25%
Crash Rate	10%	Tie-Breaker
Adjustments	Previous Commitments	2 list; Full Depth Reclamation or Mill & Resurface

Worst-First Approach

All funding goes to bottom end of inventory

2015

Rebuild Roadway 31.2 mi (5%)

No Repair Needed 83.6 mi (12%)

1 Layer of Asphalt 109.9 mi (16%)

Base Rework 97.8 mi (14%)

2 Layers of Asphalt 354.9 mi (52%)

Total Paved Miles: 678

Pavement Structure

Friction & structure course

Base

Stabilization
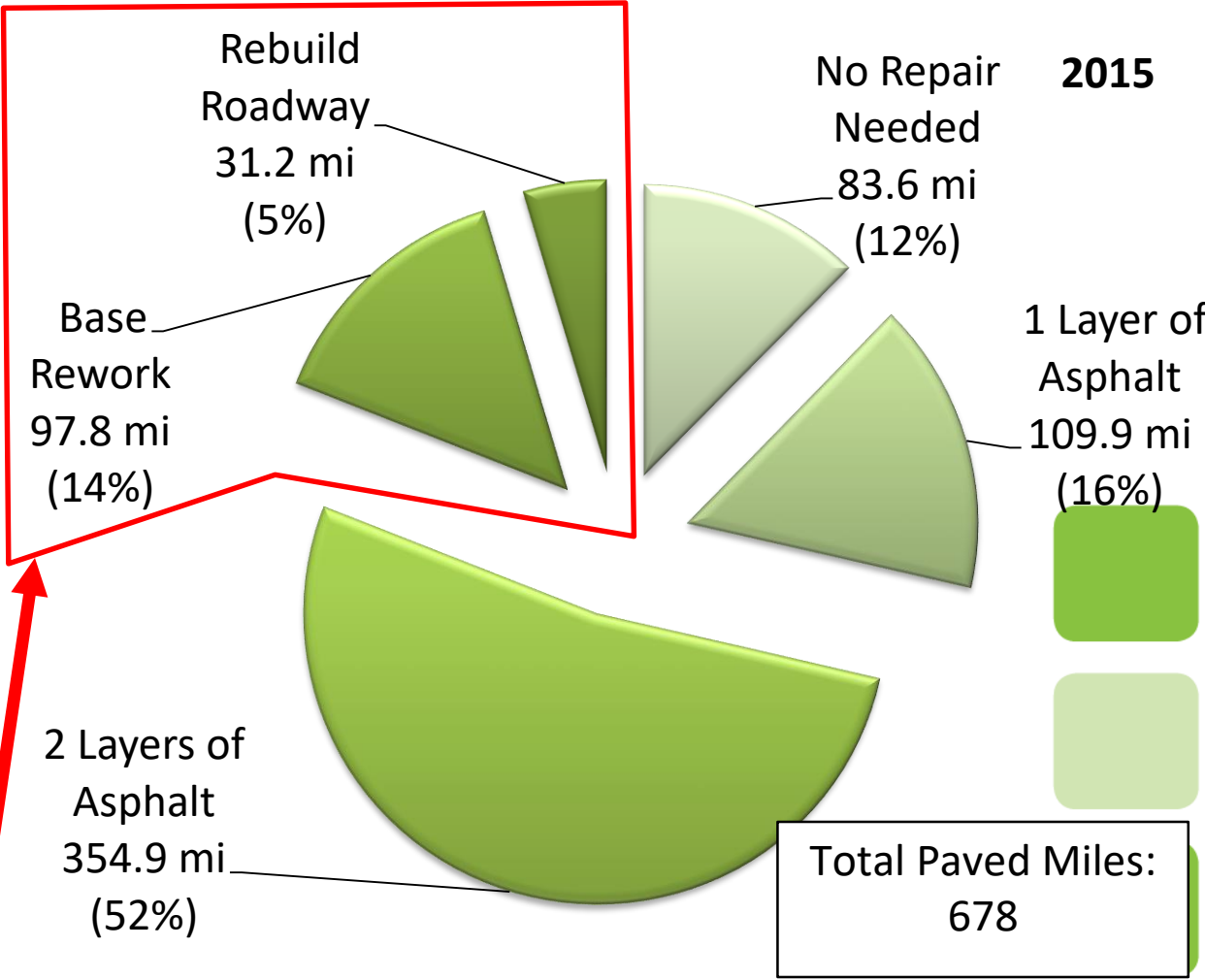
Sub-grade
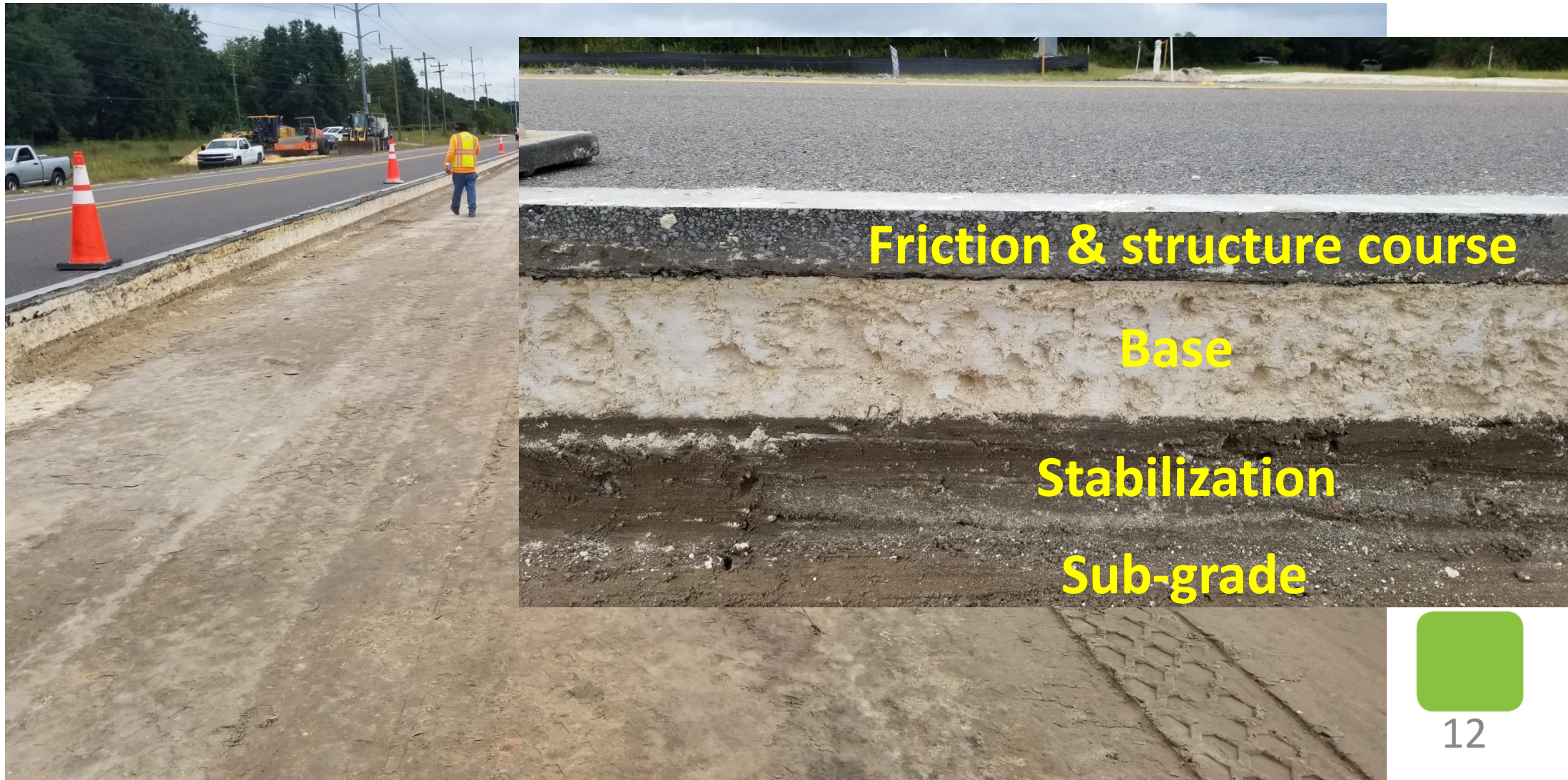
Pavement Structure
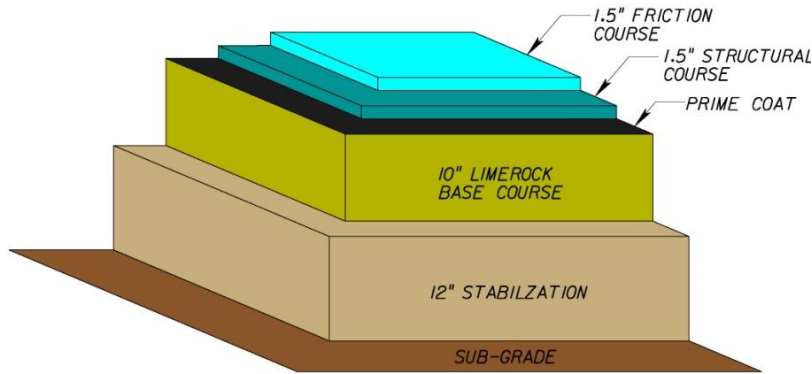
- **Goal**
  - **Sound foundation to support roadway loading & to keep water for infiltrating from the top to the bottom**

13

Pavement Structure Failures vs. Repair Types
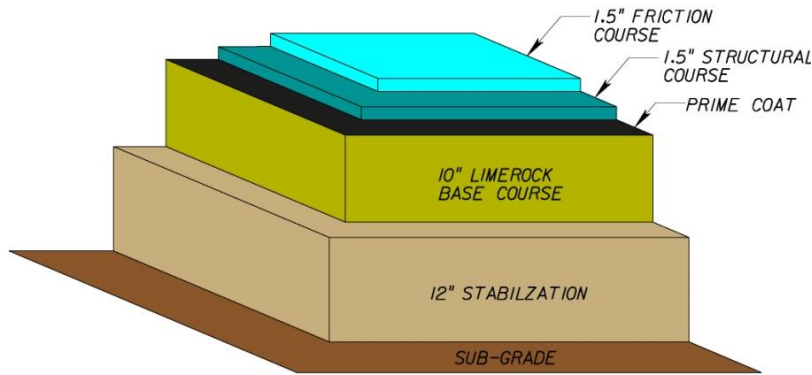
- **Friction course – Shingles**
  - **Excellent – 83 miles**
- **Structure course – Felt/moister barrier**
  - **Good – 110 miles**
- **Base course – Decking**
  - **Fair – 355 miles**
- **Stabilization – Trusses**
  - **Poor – 98 miles**
- **Sub-grade – Building Interior**
  - **Very Poor – 31 miles**

14

Pavement Failures

Inadequate structural capacity causes rutting

Pavement Failures

Inadequate structural capacity causes rutting

Caused by traffic loading

Pavement is not strong enough to support traffic loads

Preserving pavement is not possible

16

Pavement Failures

Pavement preservation possible prior to getting to this condition

Aged pavement is brittle & cracks. Cracks & water cause potholes

Pavement oxidizes and loses flexibility

⬇

Pavement cracks

⬇

Water intrusion & potholes

Pavement Failures

Combination of aged pavement and inadequate structural capacity

Pavement preservation not possible

Pavement Management Techniques

- **Worst-First – Current Practice**
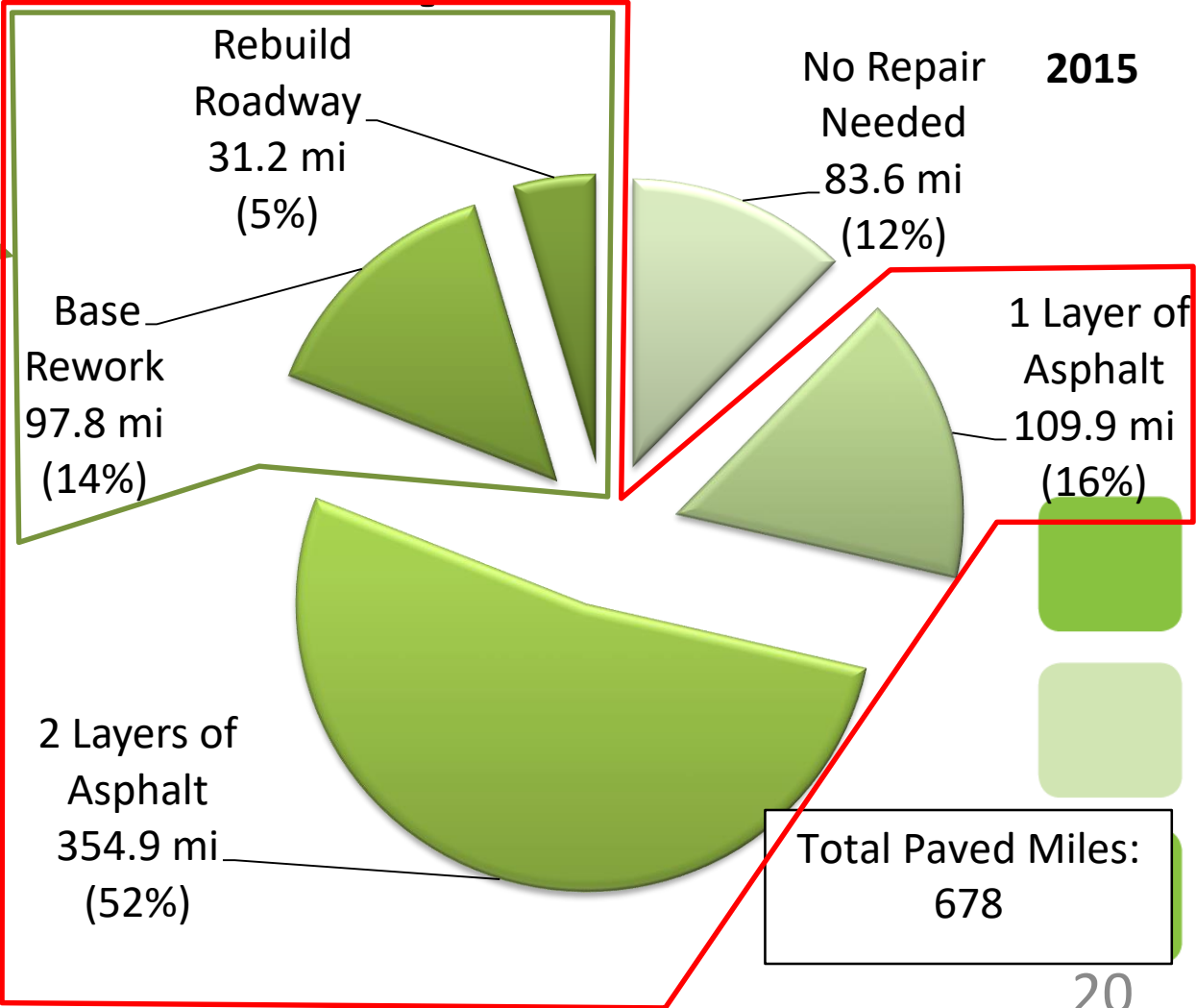 - **Conventional – Most peers utilize this method**
  - **Asset decays and is replaced**
  - **Does not take into account backlog**
  - **Costly**
- **Optimization – Staff recommends PM Study**
  - **Recommended by FHWA (Pavement Preservation)**
  - **Sustainable – Asset protected and left in place**
  - **Fiscally responsible & minimizes backlog growth**
  - **More visibility**
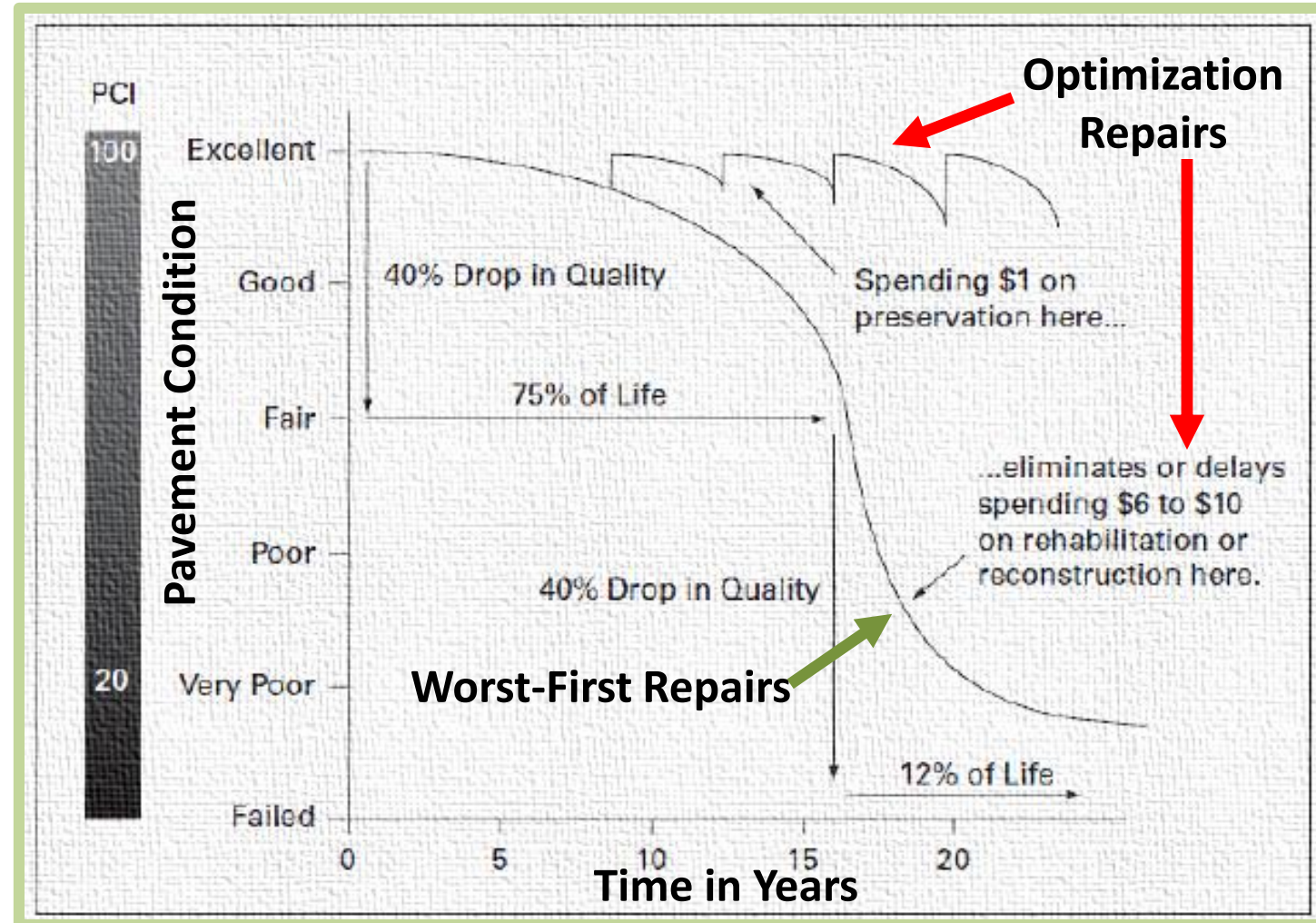
Pavement Management Techniques

Worst-First Approach
All funding goes to bottom end of inventory

Optimization Approach
Funding is spread throughout inventory to minimize backlog

Rebuild Roadway
31.2 mi
(5%)

No Repair Needed
83.6 mi
(12%)

2015

Base Rework
97.8 mi
(14%)

1 Layer of Asphalt
109.9 mi
(16%)

2 Layers of Asphalt
354.9 mi
(52%)

Total Paved Miles: 678

Pavement Management Techniques

- **Pavements can be preserved at a frequent cycle at fraction of the costs without having to replace asphalt**
- **Alternatively pavements can be replaced at the end of the life at a higher cost**
- **Optimization utilizes both repair techniques, splitting the budget between the types of repairs in order to minimize the backlog**

Optimization Repairs

Worst-First Repairs

Pavement Management Techniques

Crack Sealing

Rejuvenation

Sealing

Microsurfacing

Hot In-Place Recycle

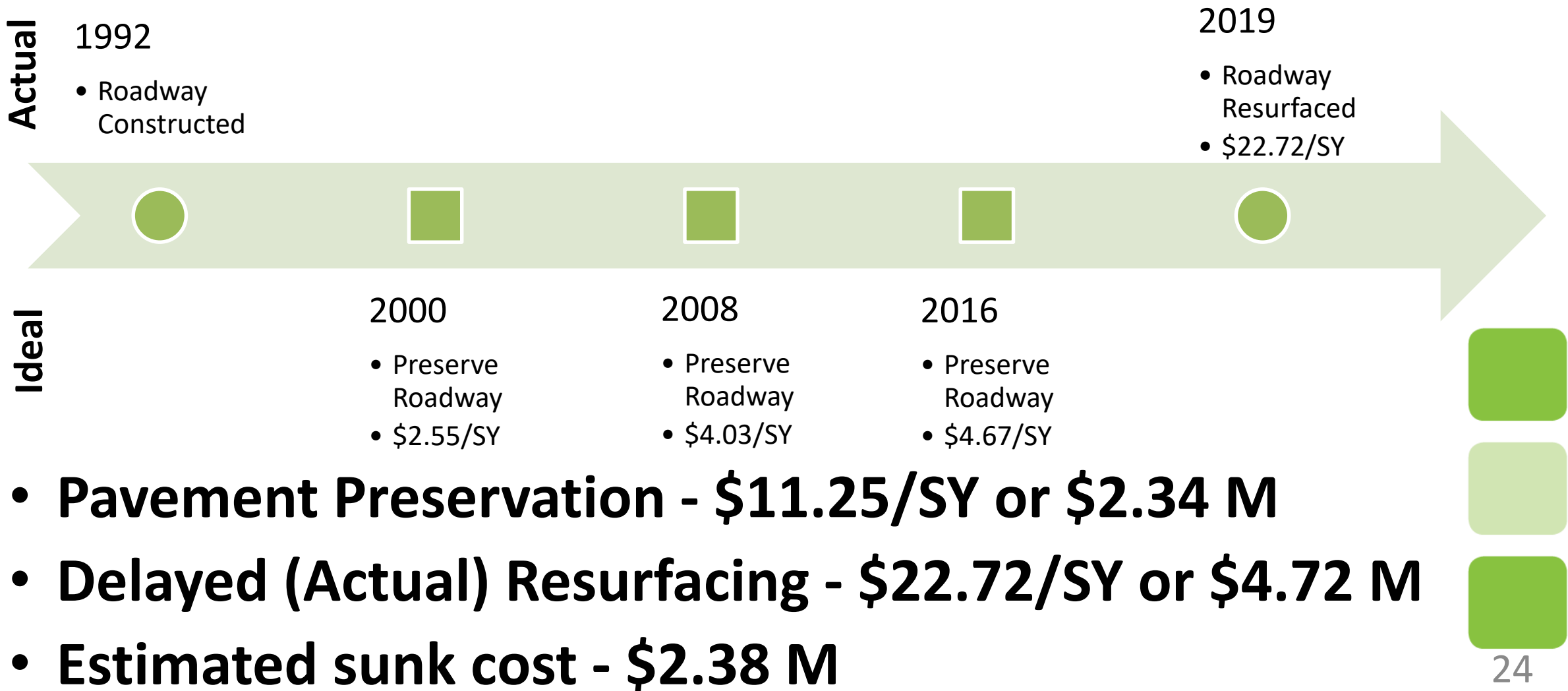**Mill & Resurface**

Cold In-Place Recycle

Full Depth Reclamation / Reconstruction
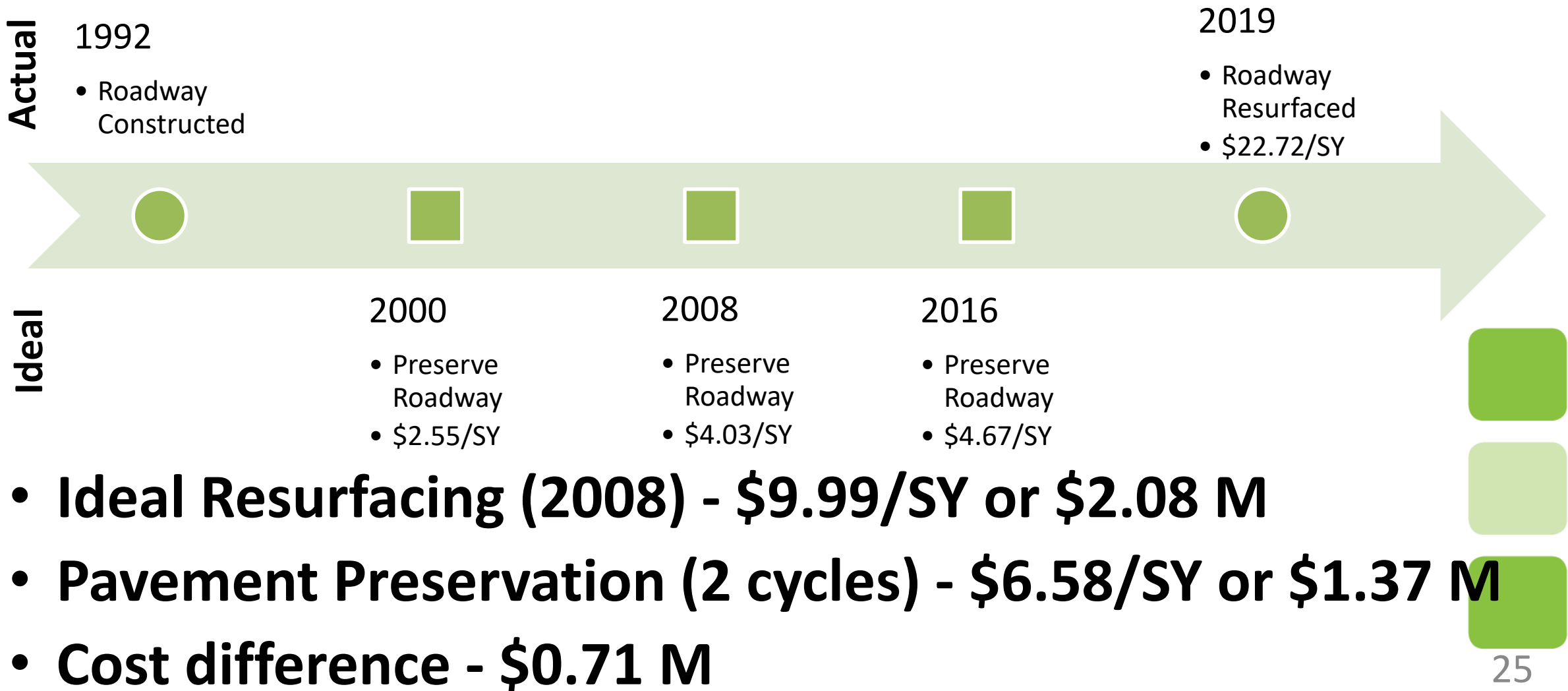
22

Cutting Edge Pavement Management

- **Pavement Preservation Techniques that reduce pollutants**
  - **Rejuvenates asphalt (extends pavement life)**
  - **Self-cleaning, Self-regenerating, air-purifying surface that removes nitrogen oxides (NO$_x$) and volatile organic compounds (VOC$_s$).**

23

Roadway Example – NW 43rd Street

Actual

1992
- Roadway Constructed

2019
- Roadway Resurfaced
- $22.72/SY

Ideal

2000
- Preserve Roadway
- $2.55/SY

2008
- Preserve Roadway
- $4.03/SY

2016
- Preserve Roadway
- $4.67/SY

- **Pavement Preservation - $11.25/SY or $2.34 M**

- **Delayed (Actual) Resurfacing - $22.72/SY or $4.72 M**

- **Estimated sunk cost - $2.38 M**

Roadway Example – NW 43rd Street

Actual

1992
- Roadway Constructed

2019
- Roadway Resurfaced
- $22.72/SY

Ideal

2000
- Preserve Roadway
- $2.55/SY

2008
- Preserve Roadway
- $4.03/SY

2016
- Preserve Roadway
- $4.67/SY

- **Ideal Resurfacing (2008) - $9.99/SY or $2.08 M**
- **Pavement Preservation (2 cycles) - $6.58/SY or $1.37 M**
- **Cost difference - $0.71 M**

Roadway Example – Tale of Two Cities

Bridgeport, Connecticut

Fairfield, Connecticut

October 2018: Photograph Taken

2004: 2.5" Mill and Overlay

No Additional Treatment

2010: Crack Sealing & Conventional Micro

26

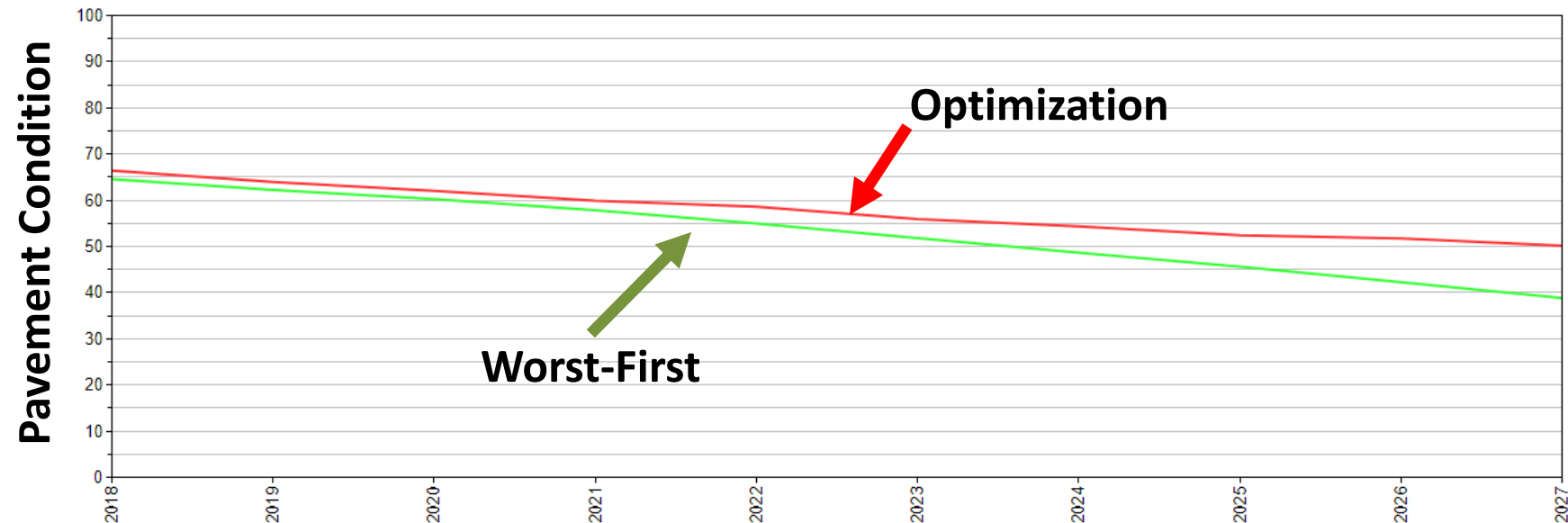# Peer Review – Optimized PM Methodology

- **Polk County**
  - **Fourth largest County**
  - **2,520 centerline miles of paved roadway**
  - **Pre-2015: Avg. 75 miles/year resurfacing**
  - **Optimization: Avg. 170 miles/year preservation & resurfacing (resurfacing reduced)**

Treatment Breakdown prior 2015

Overlays 30%

Mill/Inlay 70%

Rhode Island
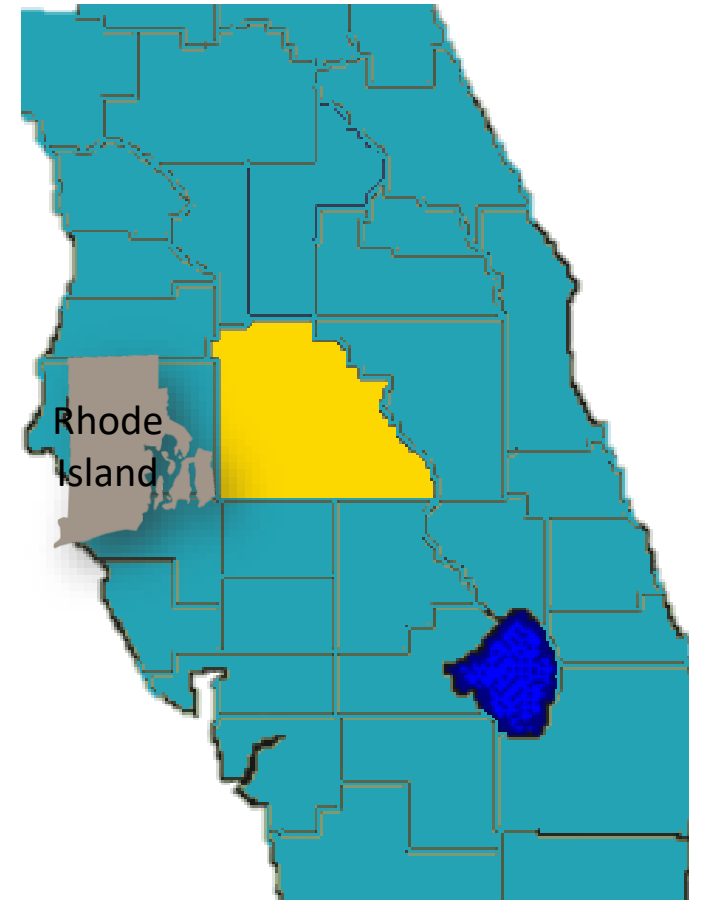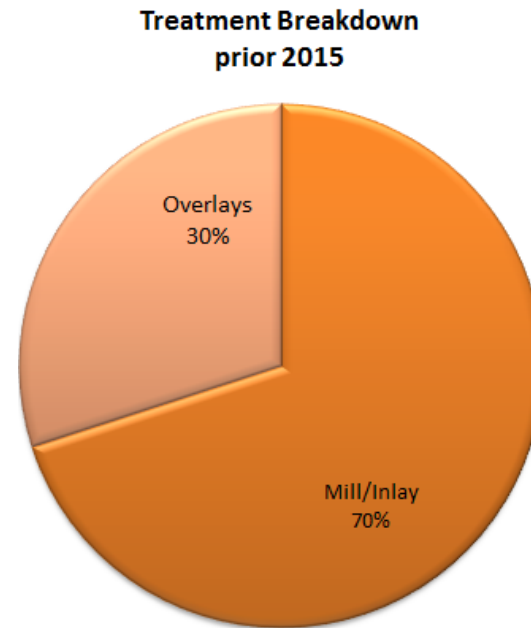
Peer Review – Optimized PM Methodology

- ## Polk County: Optimized vs. Worst-First

Network condition vs. Time
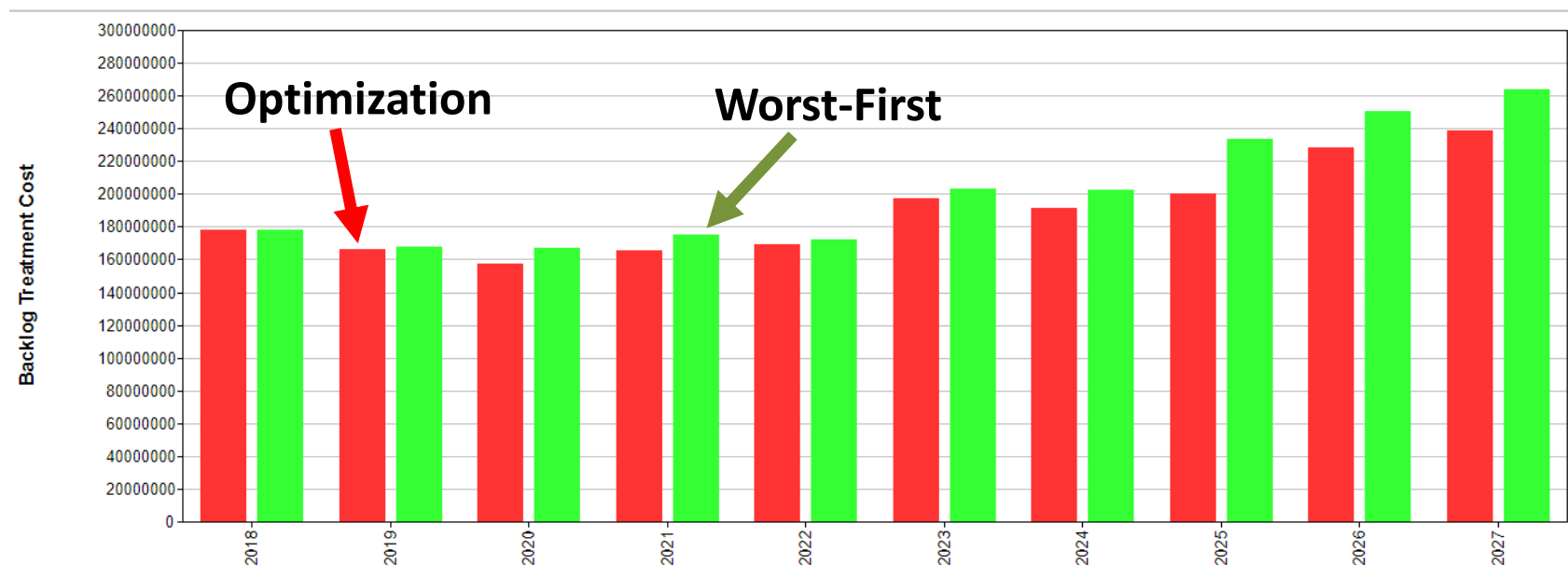

Average PCI in 2027
Optimized PCI: 50
Worst-First PCI: 38

Network Condition Improvement:
12 PCI Points

28

Peer Review – Optimized PM Methodology

- **Polk County: Optimized vs. Worst-First**

Minimize Backlog & Costs to Public

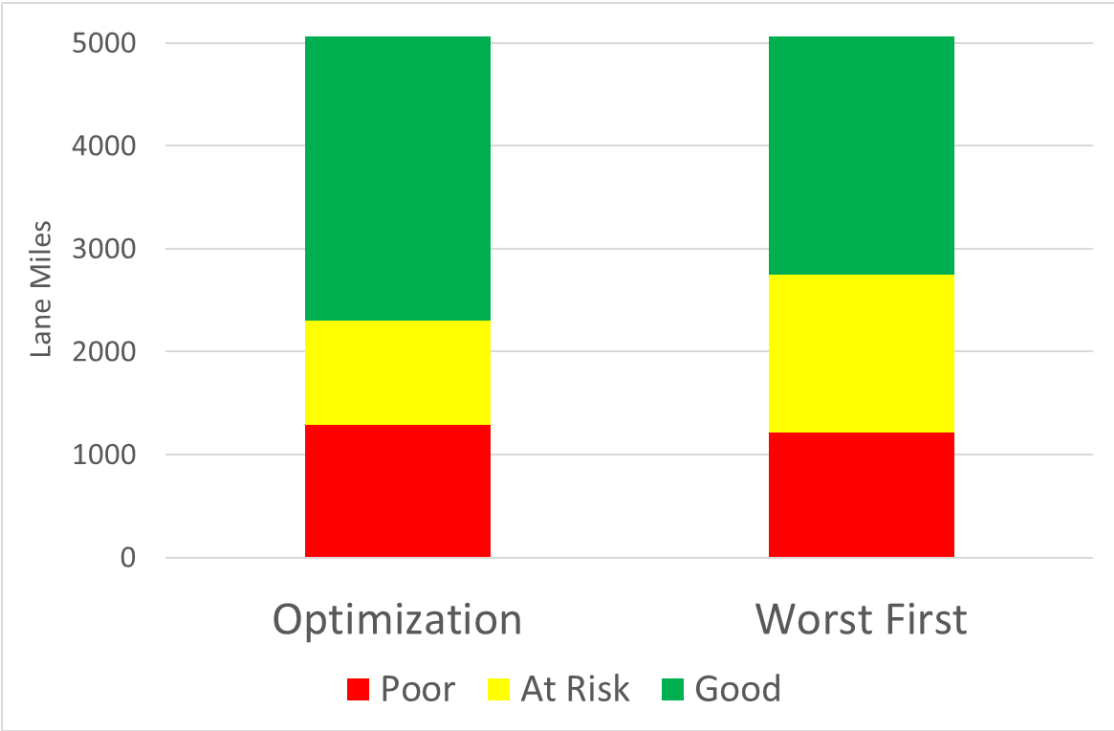**Total Backlog Cost in 2027:**
Optimized: $238.5 Million
Worst-First: $263.9 Million

Money Saved by Improving Management Process:
$25.4 Million

29

Peer Review – Optimized PM Methodology

- ## Polk County: Optimized vs. Worst-First
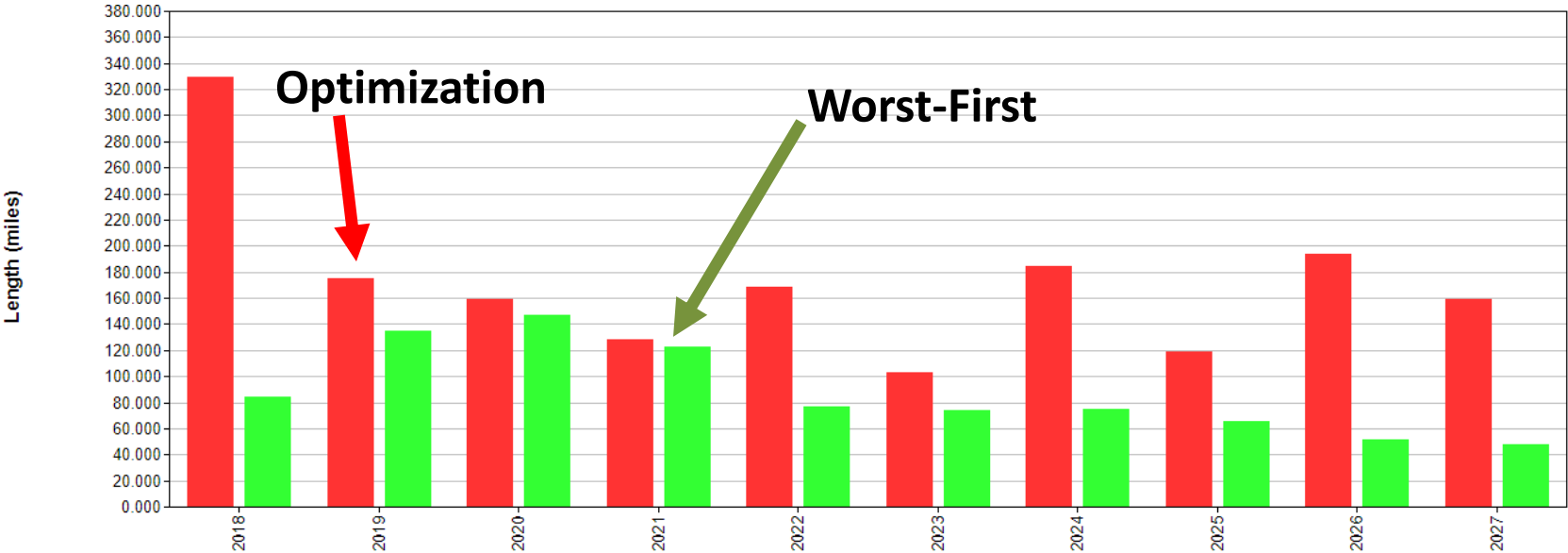
Inventory Condition

Percent Increase of Good Roads by 20% with similar percent Poor Roads

Peer Review – Optimized PM Methodology

- ## Polk County: Optimized vs. Worst-First

Increased Visibility to Public

Total Centerline Miles Treated over 10 Years (2,529 mile network)
Optimized: 1,719 miles (68%)
Worst-First: 879 miles (35%)

% Increase in Roads Repaired: 95%

31

Study Deliverables

- **Updated pavement inventory**
- **Optimized work plan to minimizing future backlog**
- **Ability to run budget scenarios and estimate inventory impacts**

Recommendation

- **Approve Budget Amendment 20-223 funding a Pavement Management Study & Training with Gas Tax Reserves in the amount of $250,000**

- **Present an Optimized Pavement Management Program vs. Worst-First Management Program no later than the FY 2022 Budget Cycle**