

TRANSPORTATION RESEARCH BOARD

# Pavement Maintenance Before Preservation

**November 22, 2021**

**@NASEMTRB**  
**#TRBwebinar**

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**REGISTERED CONTINUING EDUCATION PROGRAM**

**#TRBwebinar**

# Learning Objectives

1. Discuss why maintenance before preservation is necessary
2. Identify maintenance options



# Pavement Maintenance Before Preservation

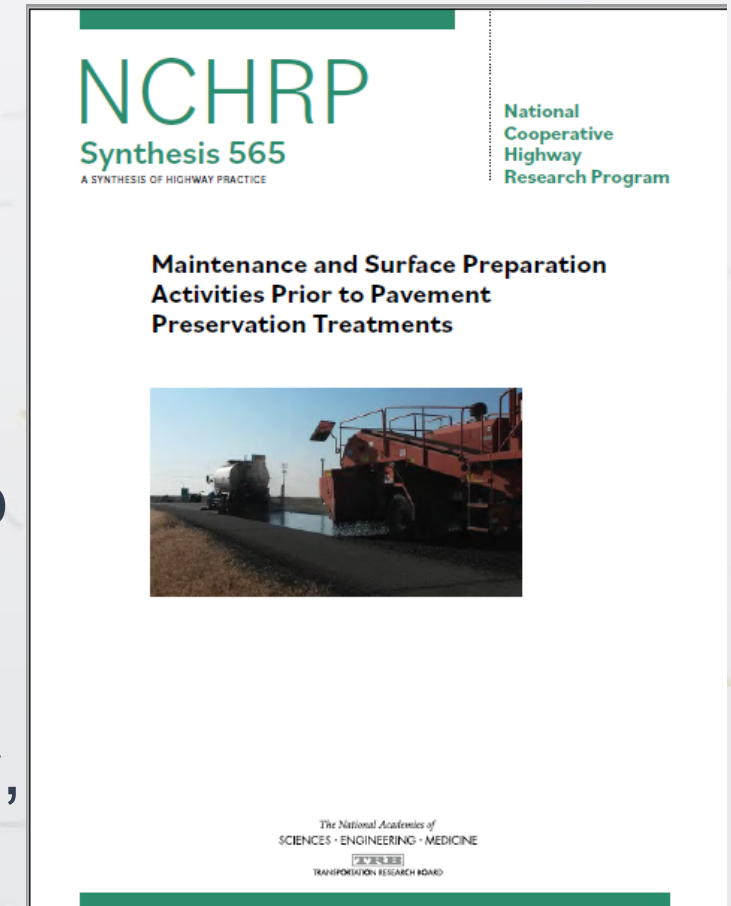
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SPONSORED BY TRB STANDING COMMITTEES ON PAVEMENT  
MAINTENANCE, PAVEMENT MANAGEMENT SYSTEMS, AND  
PAVEMENT PRESERVATION

November 22, 2021

# Background

- NCHRP 5116 led to NCHRP Synthesis 565
- Synthesis co-authored by David Peshkin and Greg Duncan, Applied Pavement Technology, Inc.
- Content driven by a literature review, a survey completed by 45 of 50 agencies, and follow-up interviews
- Case examples developed with input from Georgia, Washington State, Indiana, Kentucky, New Jersey, and Montana



# The Need

- While pavement preservation programs are widespread, good guidance on all aspects of preservation is not
- Successful pavement preservation hinges on many factors, including project selection and treatment selection; during construction it also hinges on weather, skills of construction crew, materials, and other factors
- One factor common to success is extent to which necessary maintenance and surface preparation are performed prior to preservation treatment construction

# Synthesis Objectives

Related to maintenance and surface preparation activities prior to preservation treatments...

- Document types of activities
- Identify methods used to determine need
- Describe techniques to complete the activities
- Summarize practices used to track maintenance and surface preparation

# Presentation Content

- Identify key findings from survey of agency practices related to synthesis objectives
- Become familiar with practices from two agencies participating in case examples
- Identify knowledge gaps
- Explore recommendations for future research



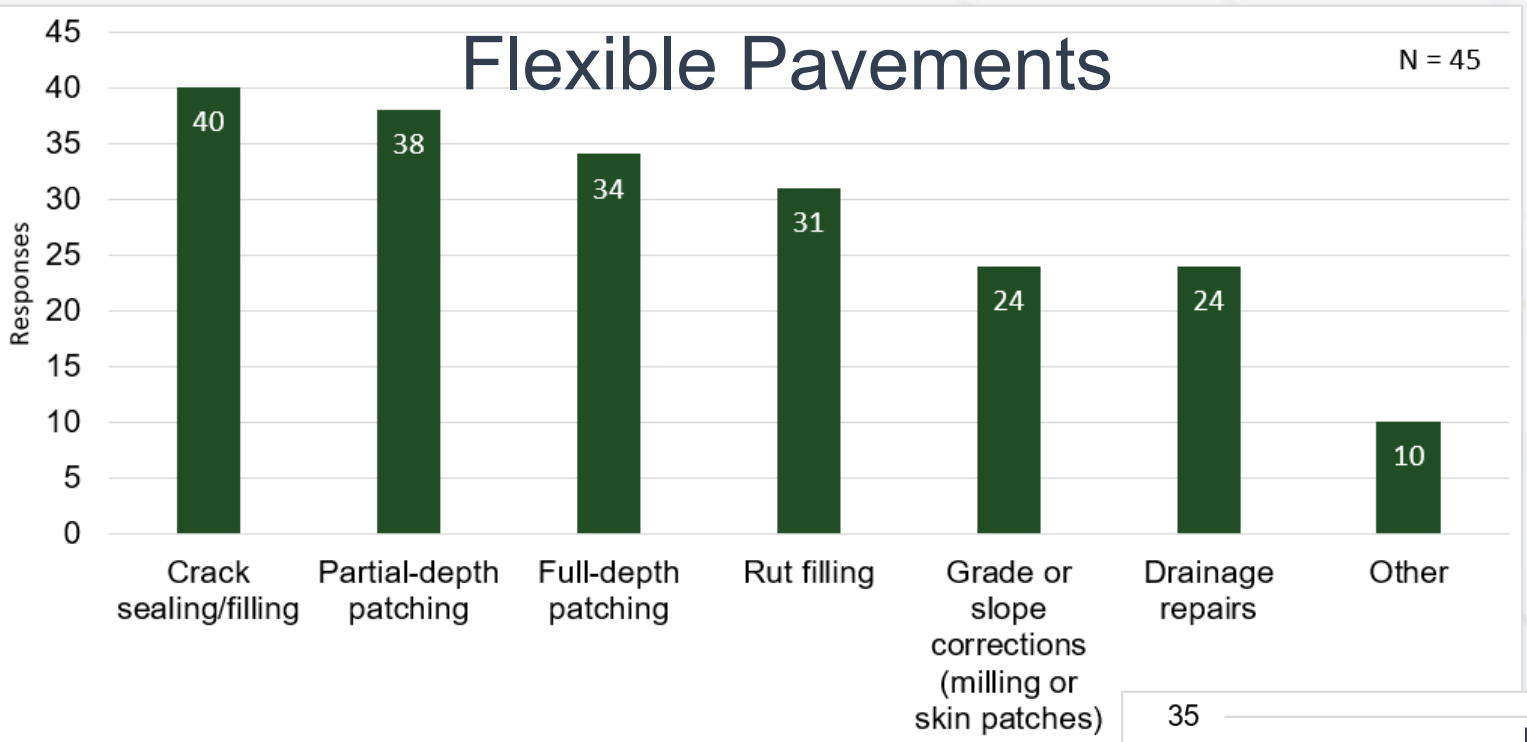
# Definitions

- **Maintenance** : correction of pavement defects such as crack sealing and patching
- **Surface Preparation** : actions taken to improve smoothness, geometrics, cross-slope or bond prior to the application of an edge-to-edge preservation treatment (e.g., milling, micromilling, diamond grinding, rut filling)

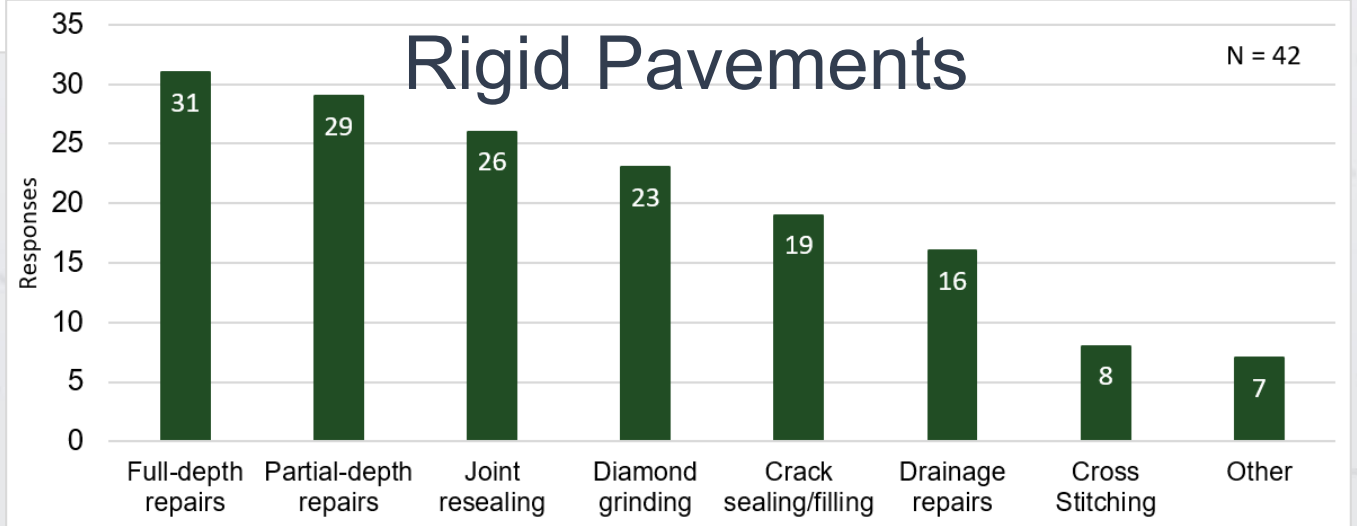
# Lee Road 159 Micro Surface without and with Crack Sealing Prior to Placement



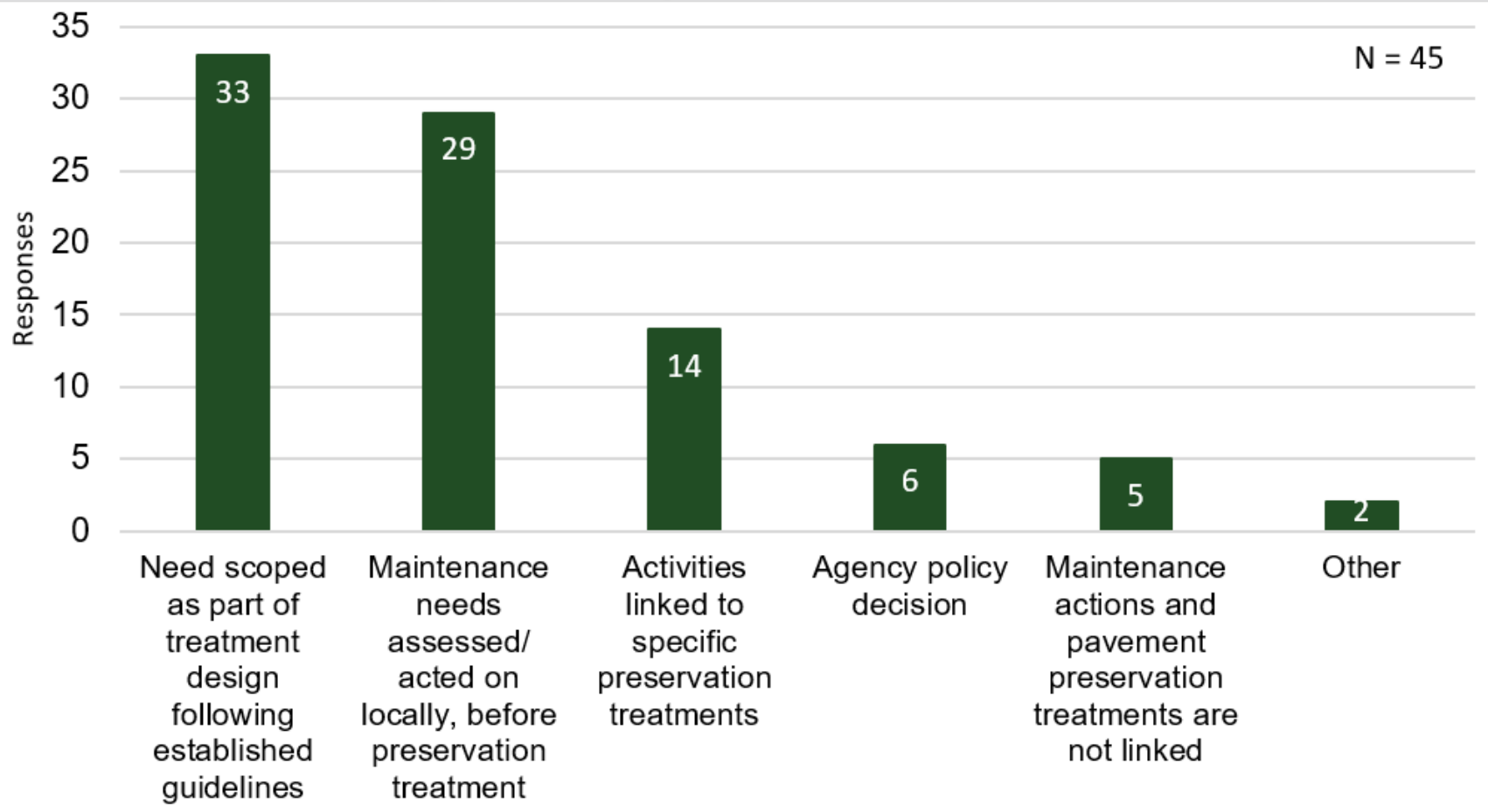
Photos courtesy of NCAT



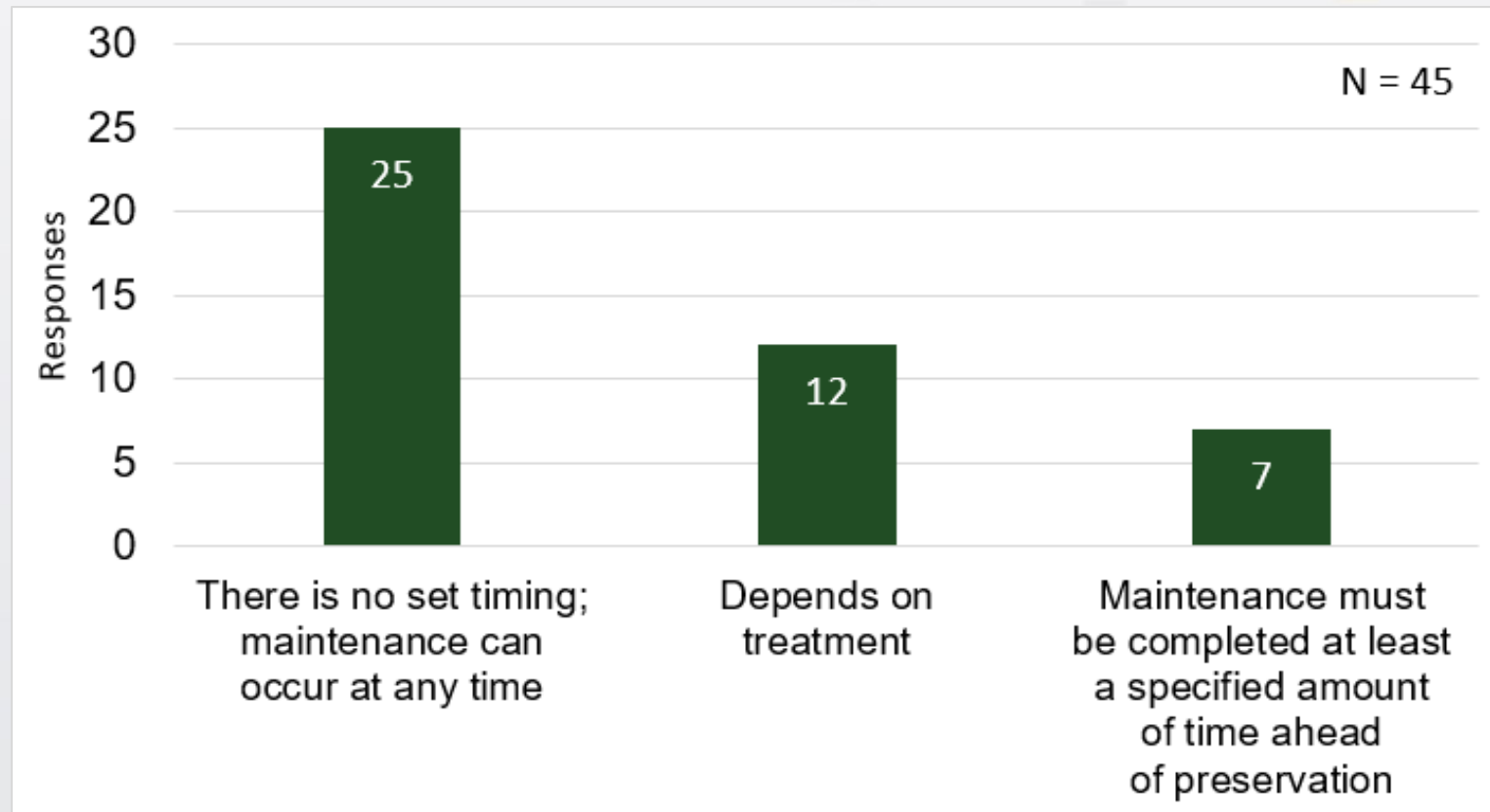
Most Commonly Used Maintenance Treatments



# How Maintenance Decisions Are Made



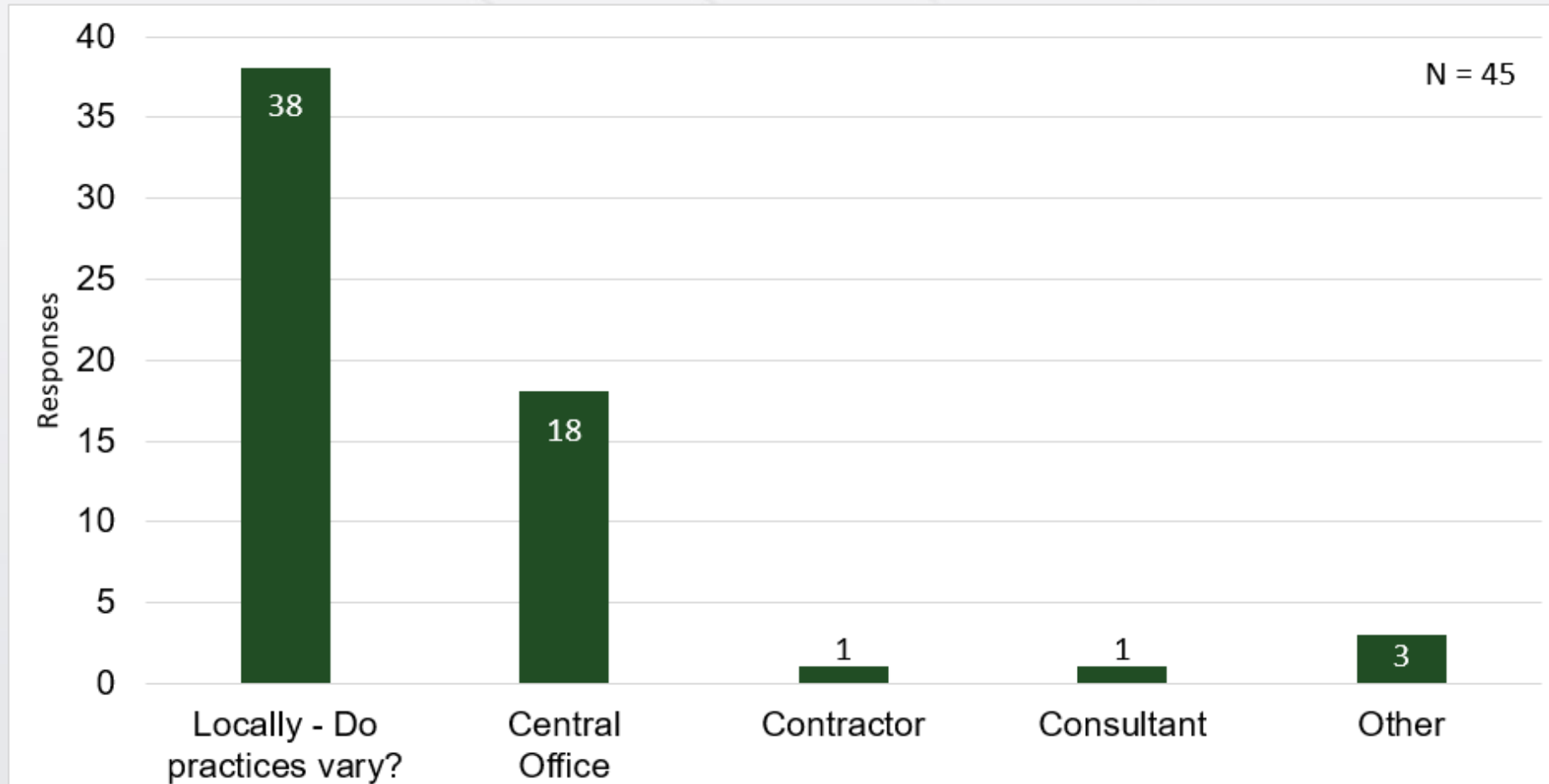
# Timing Maintenance Decisions



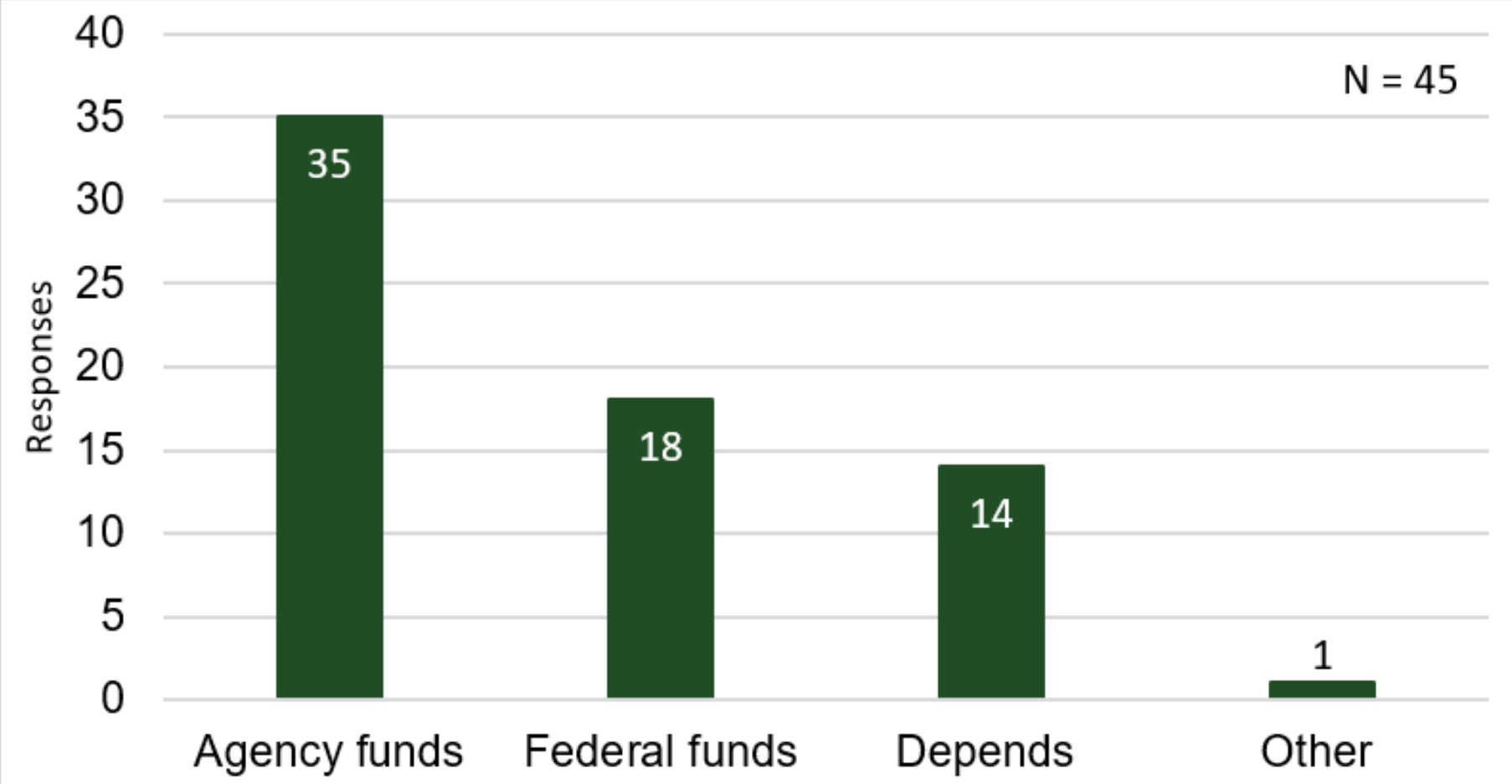
## Target Time Intervals

- Less than 6 months = 3
- Between 1 and 2 years = 2
- Other = 3

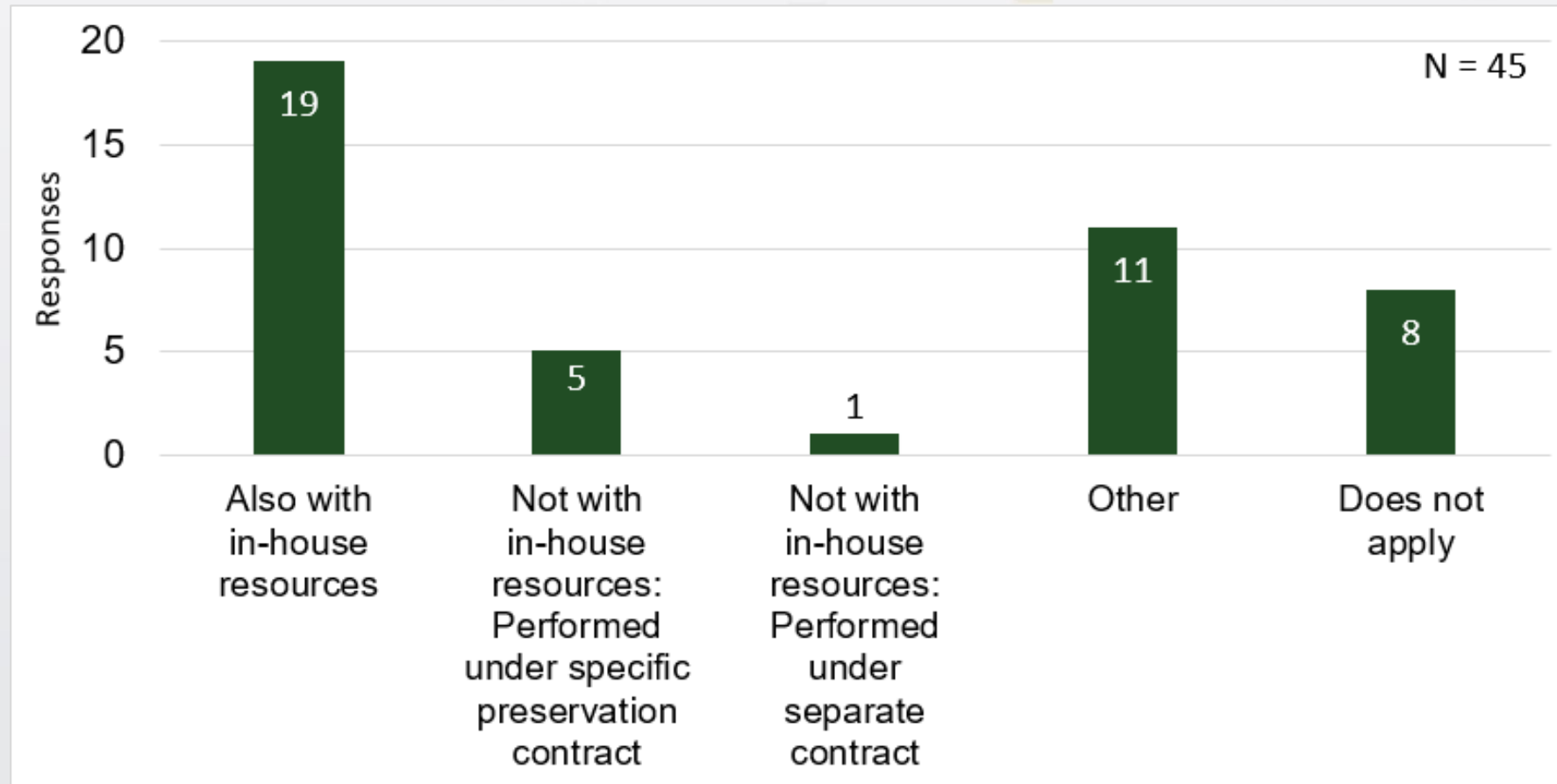
# Who Decides the Need?



# Funding Maintenance and Surface Preparation

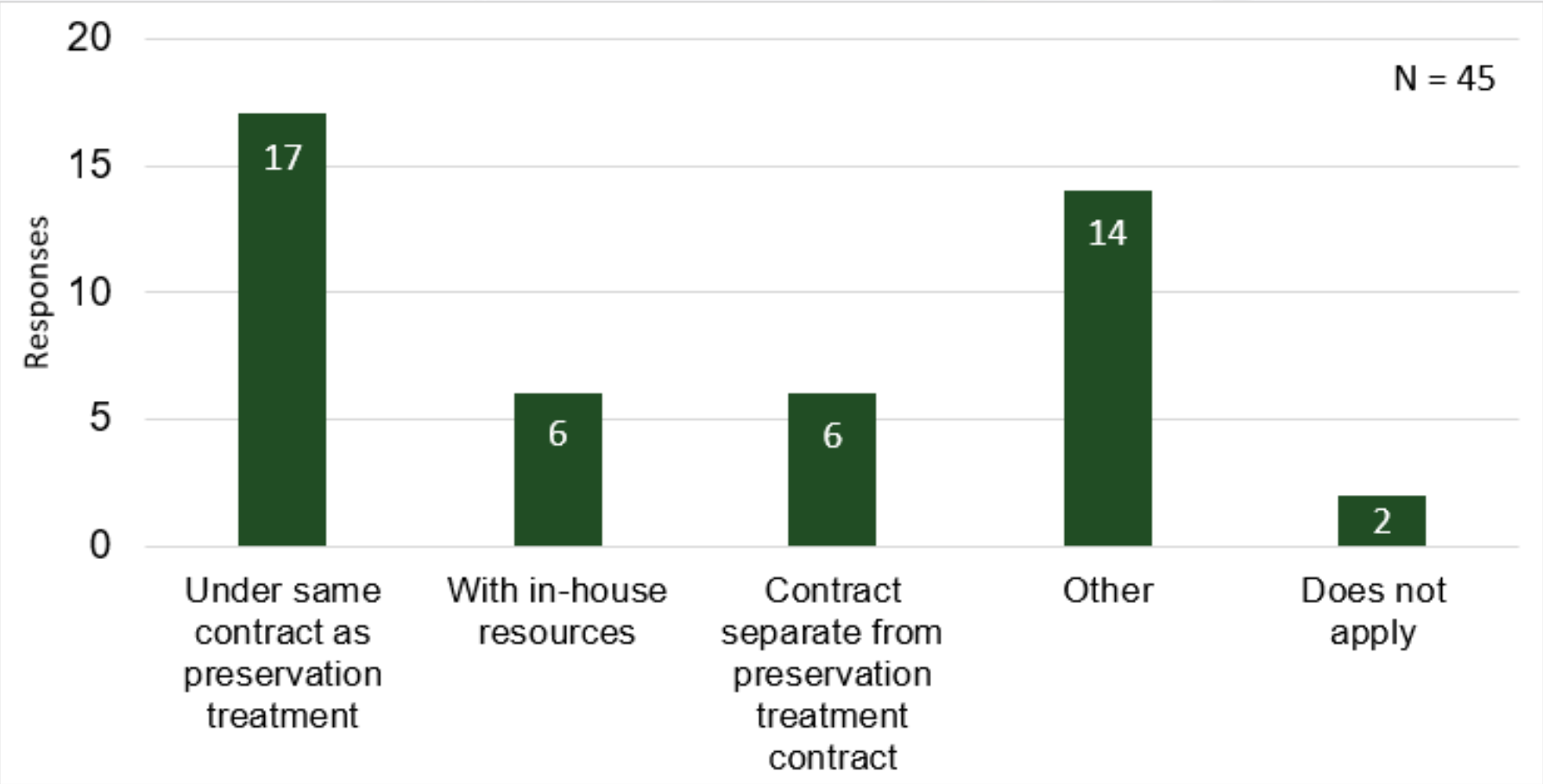


# Responsibility for Completing Pre -Treatment Work: Agency-Applied Preservation Treatment





# Responsibility for Completing Pre -Treatment Work: Contract-Applied Preservation Treatment



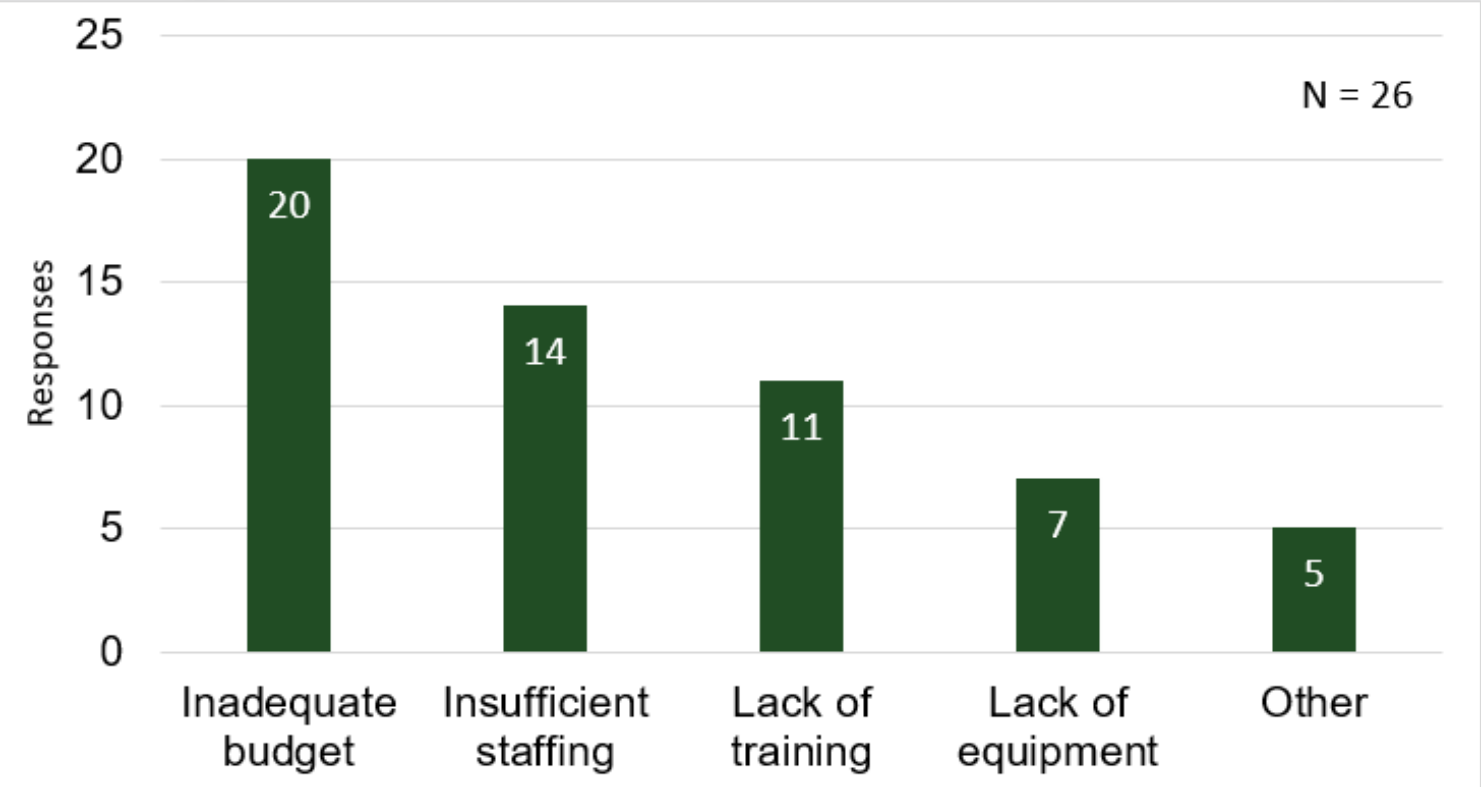
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# POLL

**Performing Needed Maintenance**

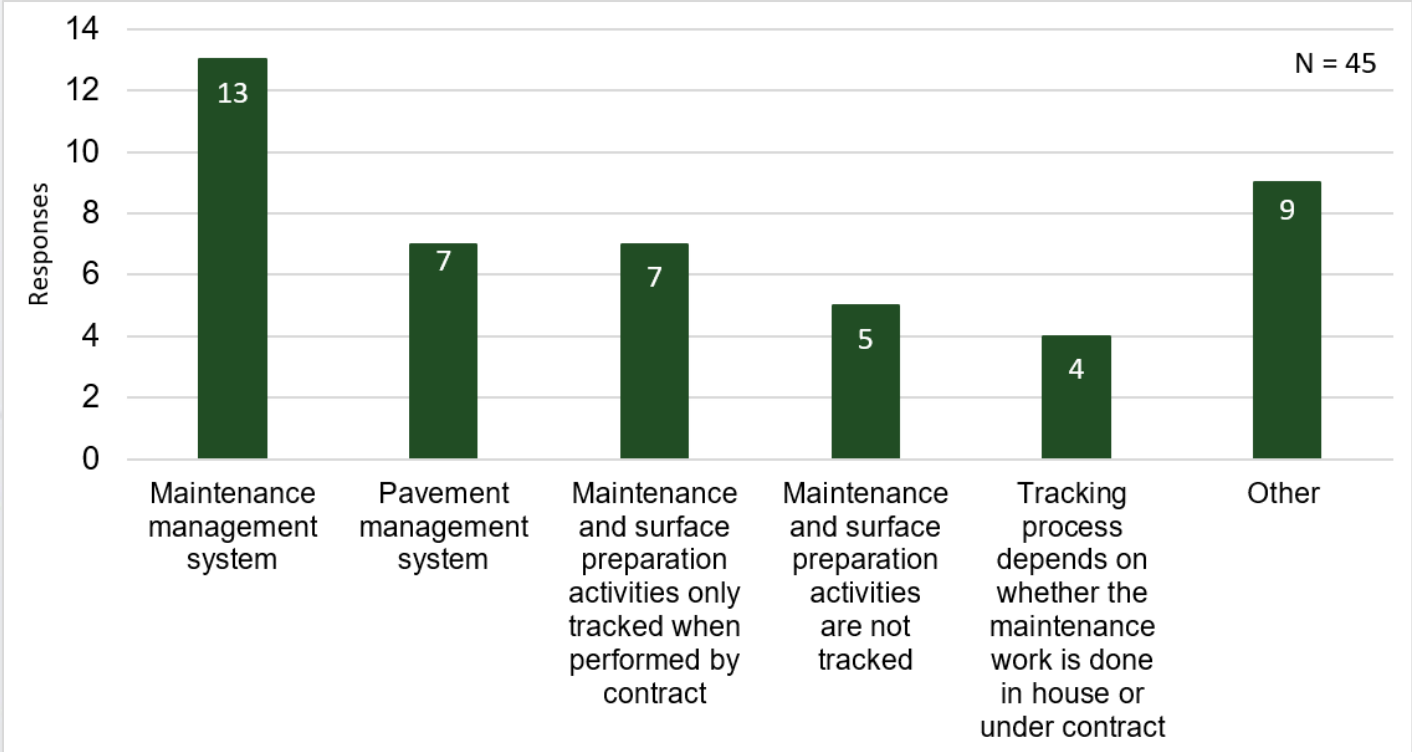
# Is Planned Work Always Completed?

Yes (18) / No (26)



# Is Maintenance Tracked?

No (11%)



# WSDOT's Strategic Preservation Experience



**Kim Schofield, PE**

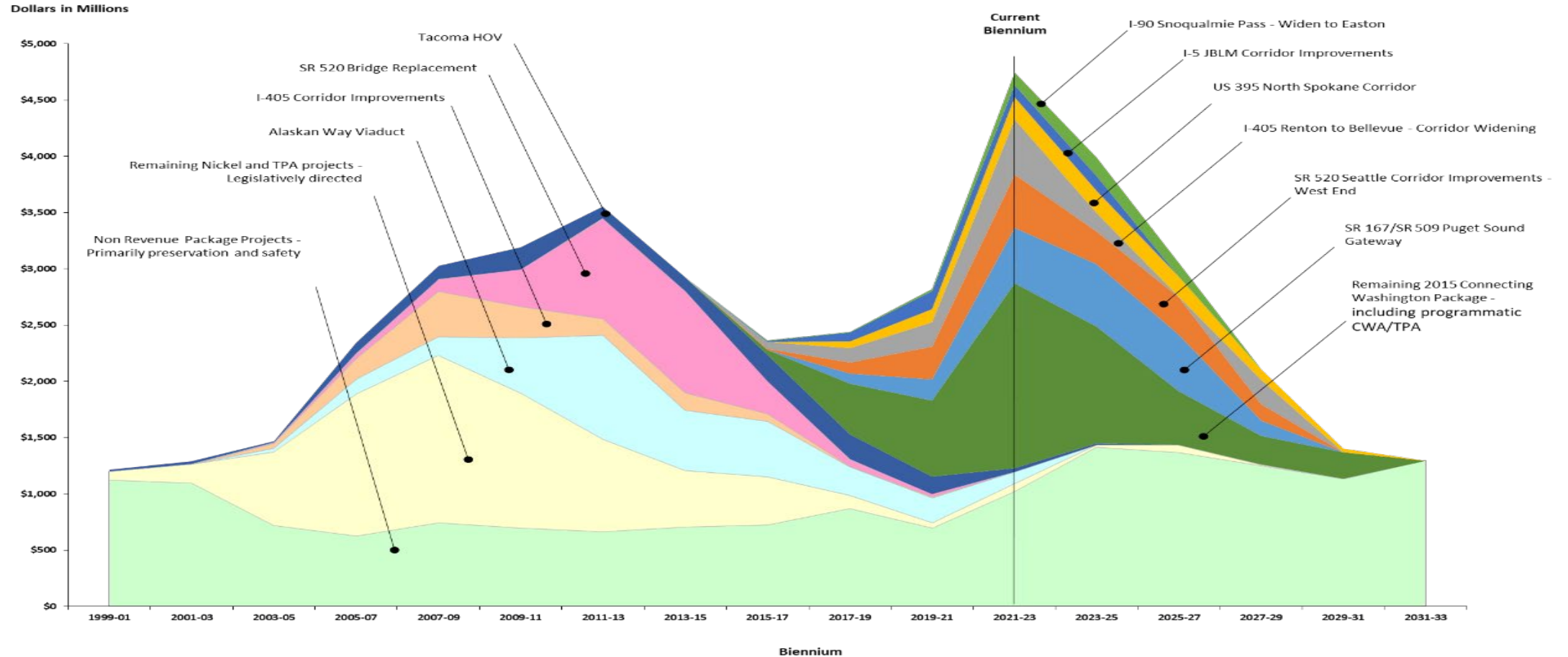
Washington State Department of Transportation  
State Pavement Engineer

# How It All Started

## WSDOT Highway Construction Program with Revenue Packages

### 2022 Agency Request

22DOT001 (Excludes sub-programs 16 and 17)





# One-Touch Policy

- “...is a response to a fiscally constrained capital paving budget that can no longer adequately maintain the public’s investment. This plan is the deliberate use of proven pavement maintenance methods that will extend the life cycle of the entire paving inventory for at least two years...and extend the effectiveness and efficiency of every dollar spent...”

# Strategic Pavement Preservation - Flexible

- Crack Seal
  - Rubberized
  - Mastic
- Chip Seal
  - Full-width
  - Wheelpaths
- Patching
- Thin Overlays
- Blade Patching





# Top Down Cracking



# Chip Seal



# Patching



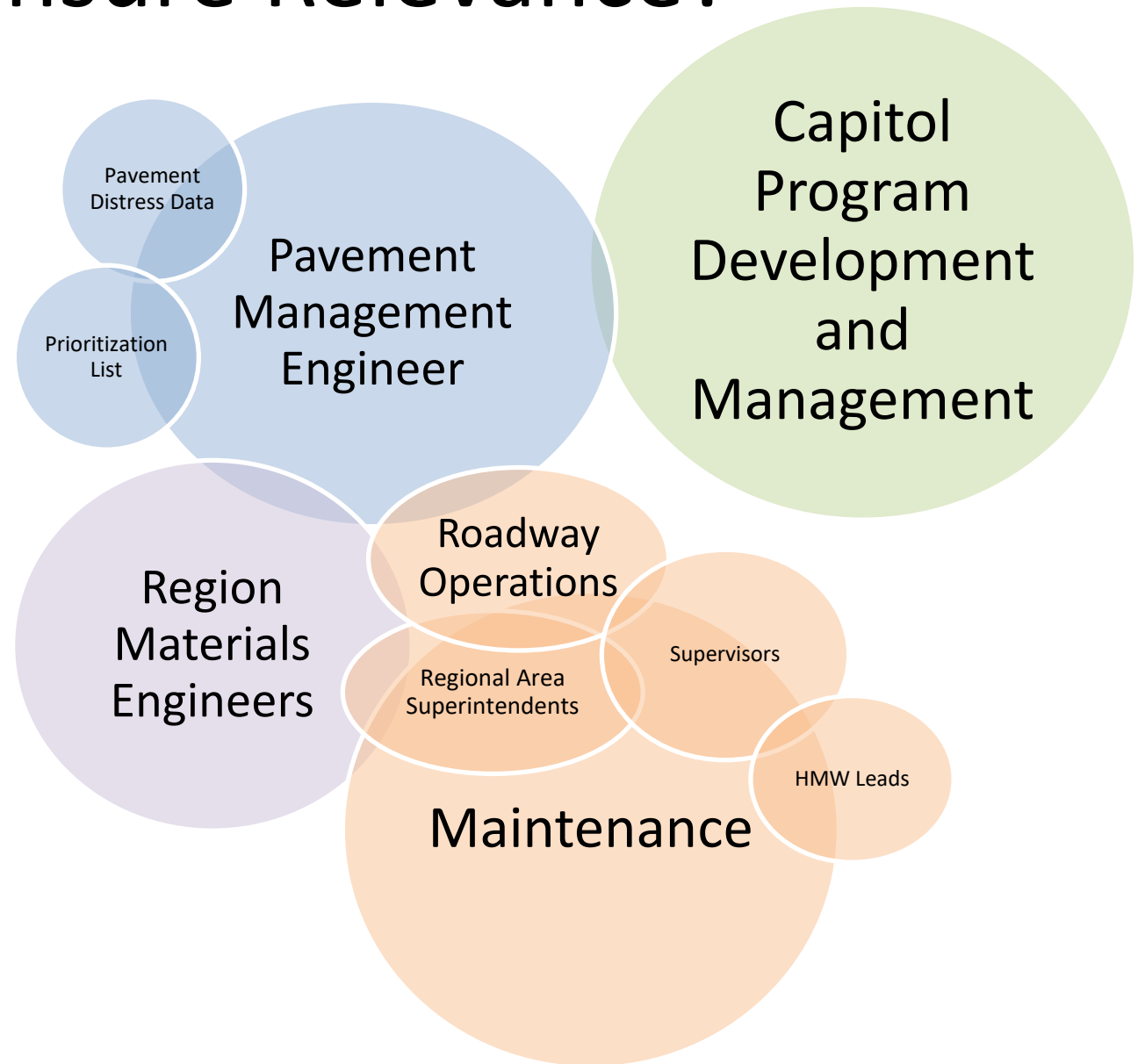
# Strategic Pavement Preservation - Rigid

- Panel Replacement
- Crack/Joint Seal
- Spall Repair
- *Slab Jacking*
- *Grinding*



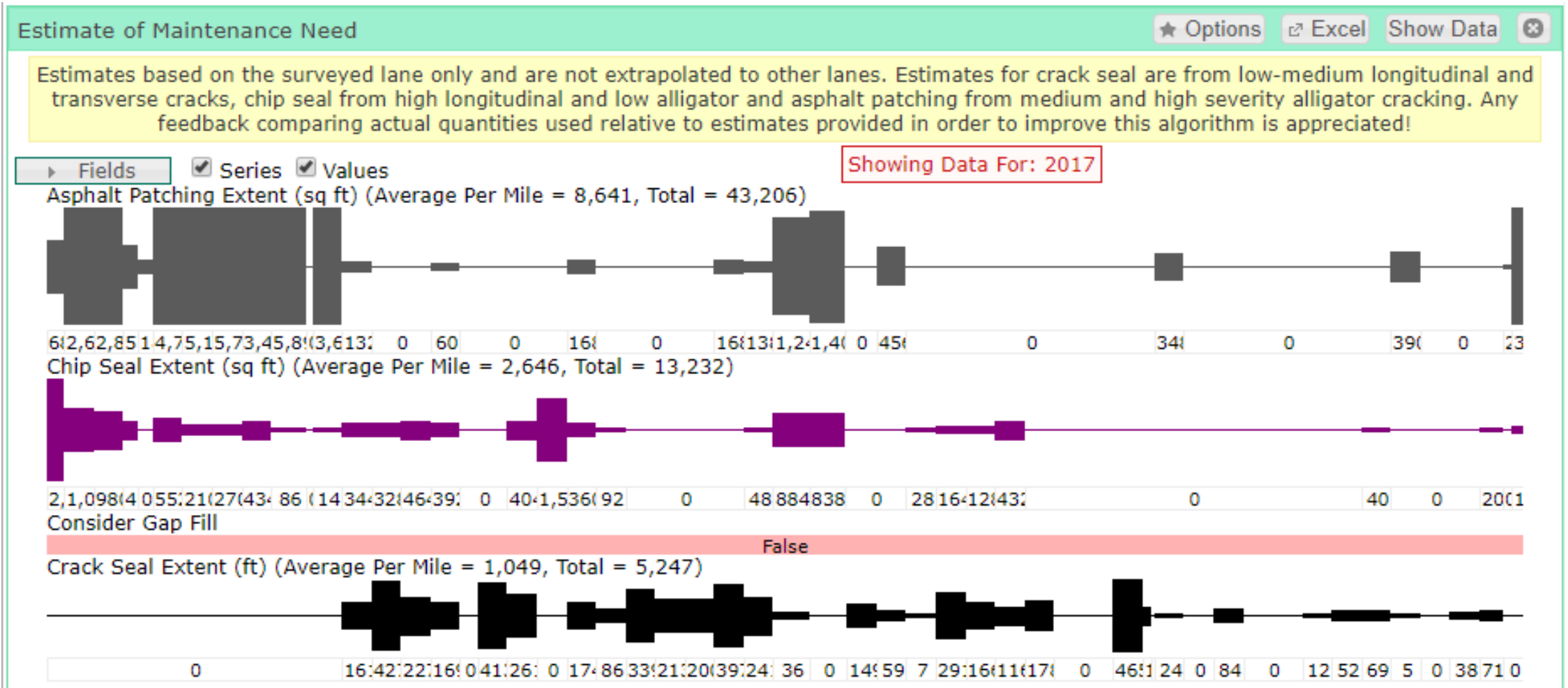
# How Do We Ensure Relevance?

Communication!



# How Do We Determine Location?

## Data!



# Cost-Effectiveness of Strategic Preservation

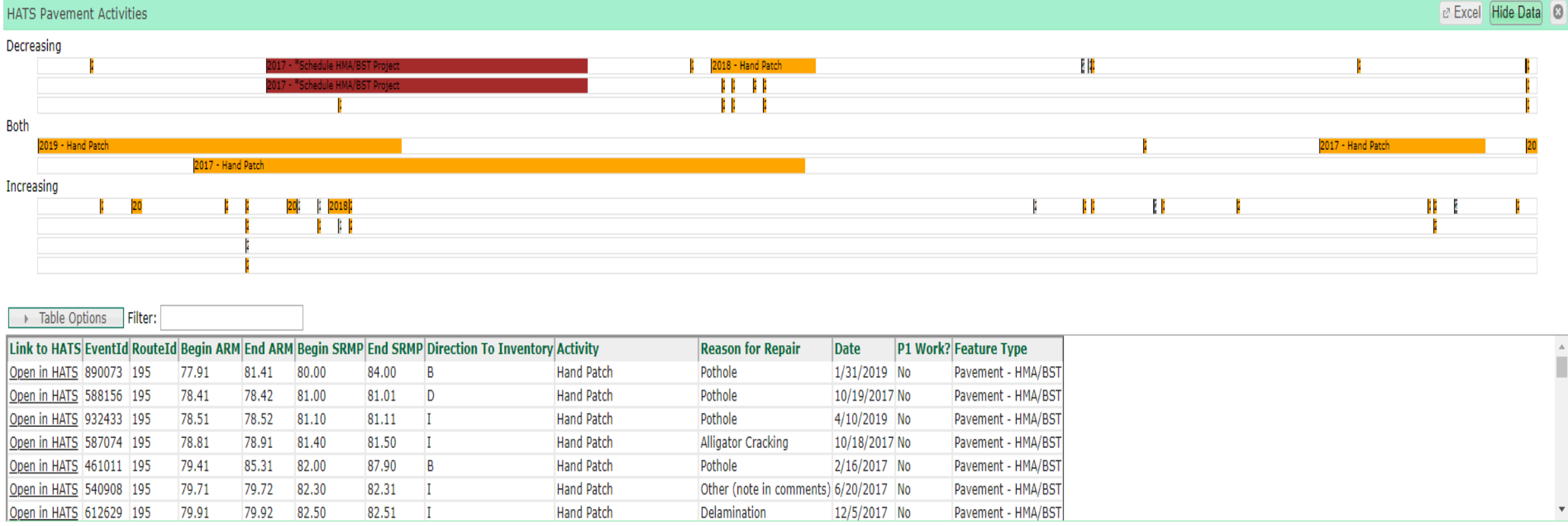
Maintenance/preservation is the single most cost-effective treatment we can do.

- Costs for strategic preservation treatments performed by maintenance personnel run about \$5,000-\$20,000 per day.
- Pavement life extension is 2-6 years.

Treatment	Cost (1' length of pavement – 12' wide lane)	Expected Service Life Extension in years (max study)
Crack Seal	\$1.14	3-4+ (5)
Chip Seal (WP-rut fill)	\$2.76	2-5+ (4)
Chip Seal (WP-patch)	\$4.44	4-6+ (4)
Chip Seal (full lane)	\$7.08	4-6+ (5)
Blade Patch	\$10.00	2-3+ (3)
Patching (digout)	\$12.49	4-6+ (5)

# How Do We Pass On Knowledge?

Data!





# Annual Pavement Costs

<b>Treatment</b>	<b>Added Life (Years)</b>	<b>Typical Construction Cost*</b>	<b>Typical Annual Cost*</b>
Maintenance	2-6	\$5,000-\$20,000	\$1,500-\$5,500
Chip Seal Rehab	6-8	\$45,000	\$7,000
Asphalt Overlay	10-17	\$250,000	\$18,000
Concrete Grind	10-15	\$175,000	\$15,000
Concrete Dowel Bar Retrofit	15-20	\$600,000	\$35,000
Concrete Reconstruction	50-60	\$2,500,000	\$45,000

\* Per lane mile

# Typical Flexible Pavement Costs

Treatment	Cost	Typical Amount of Work	Approximate Project Cost
Crack Seal	\$0.88/LF	1.3 linear miles/lane mile	\$6,000
Dig Out	\$227/ton	50-80 tons/lane mile	\$10-18,000
Chip Seal	0.59/SF	1 lane mile	\$36,000
Wheelpaths only		1 lane mile	\$20,000

**Minimum** Life Extension: 2-3 years

Seeing 4-6 year life extension for these treatment types.

These costs were tabulated from a research report: WA-RD 871.2



# Typical Rigid Pavement Costs

- Spall Repair – varies with material used and size
  - \$500 - \$1,500
- Half-panel
  - \$8,000
- Full panel replacement
  - \$10,000 - \$15,000



# Strategic Preservation Funding

- 2009-2011 biennium – spent approximately \$2.4 million
- 2013-2015 biennium – spent approximately \$5 million
- 2017-2019 biennium – spent approximately \$17.5 million
- 2021-2023 biennium – will spend approximately \$30 million

# Conclusions

- Strategic Preservation...
  - Works!
  - Cost-effective
  - Extends pavement life
- Best to do it early – as soon as the distress manifests itself



Thank You

Questions?

**Kim Schofield, P.E.**

State Pavement Engineer

360-870-0193

[schofik@wsdot.wa.gov](mailto:schofik@wsdot.wa.gov)

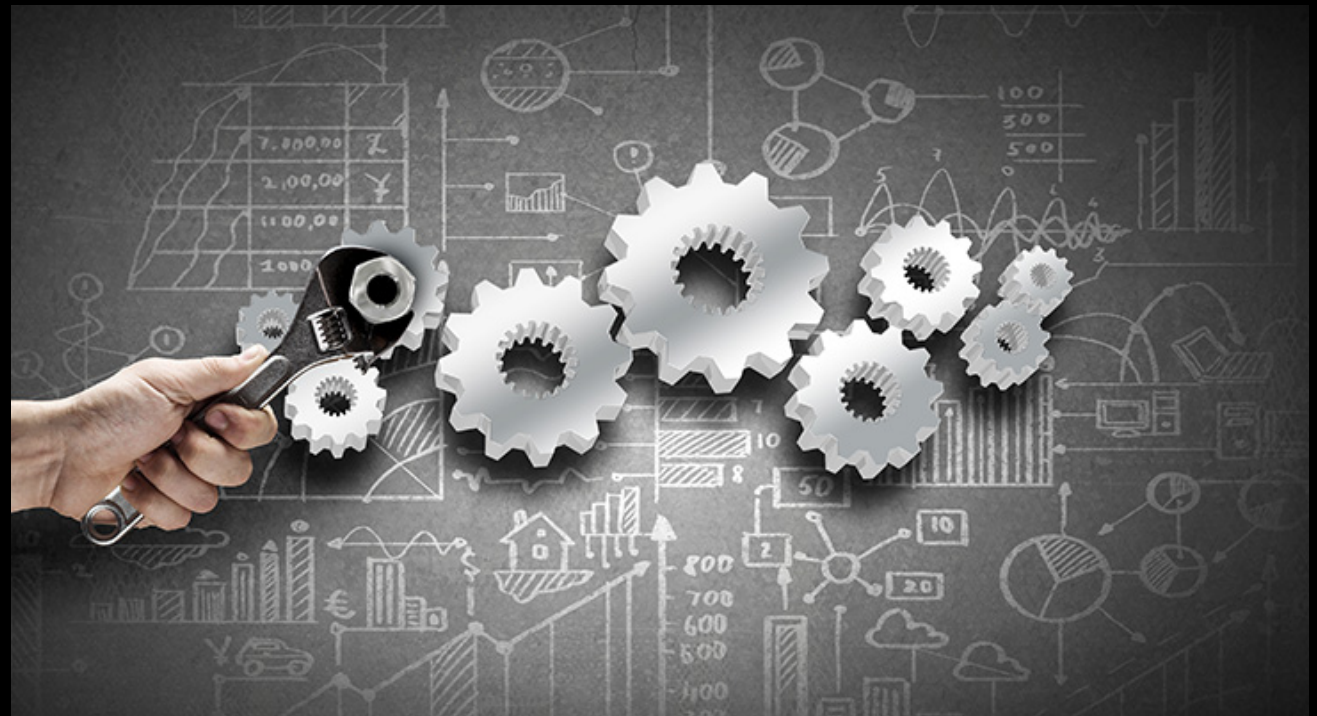




# PM TREATMENT PREPARATION

# PM TREATMENT AND PREPARATION

- PMA
  - Training
  - Selecting
  - Preparing
  - Specifications



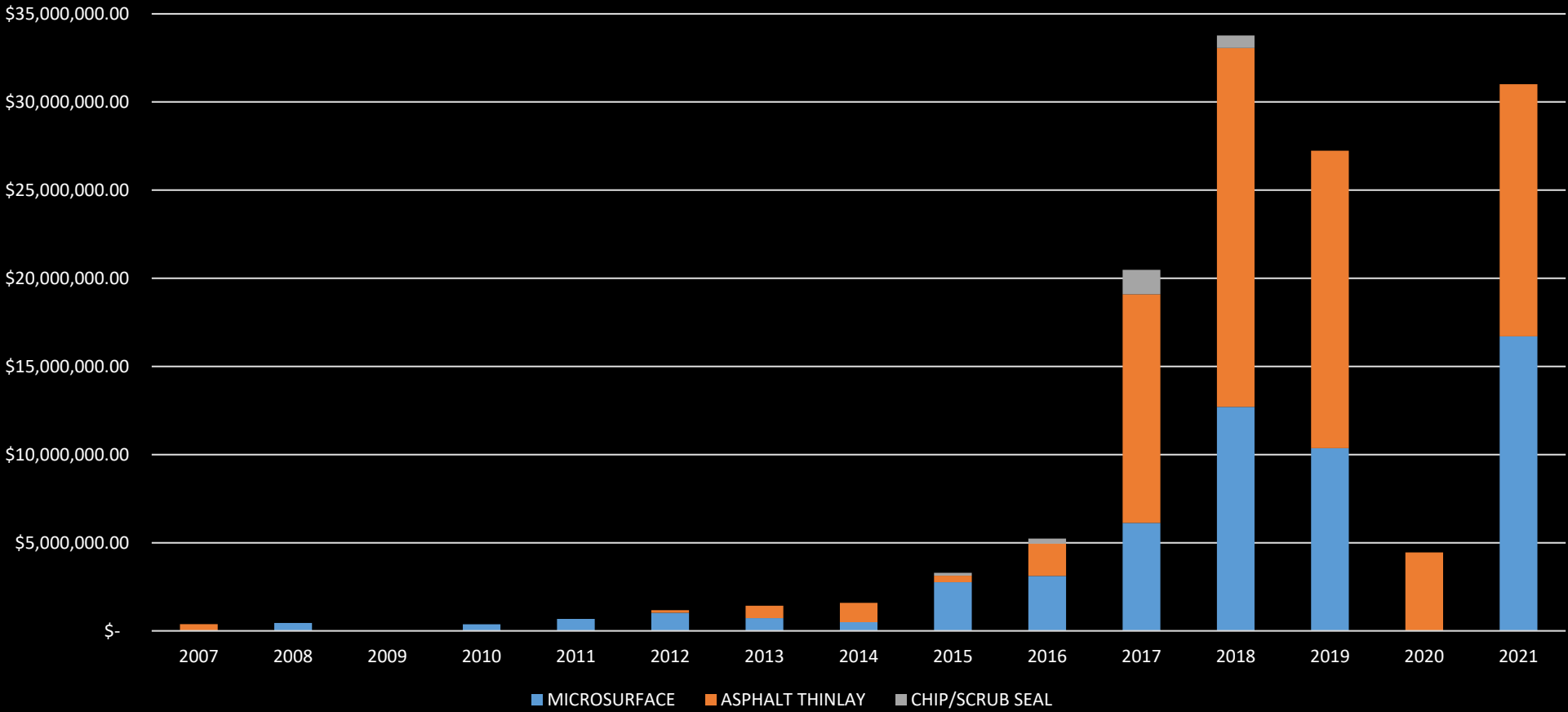


# KY PMA

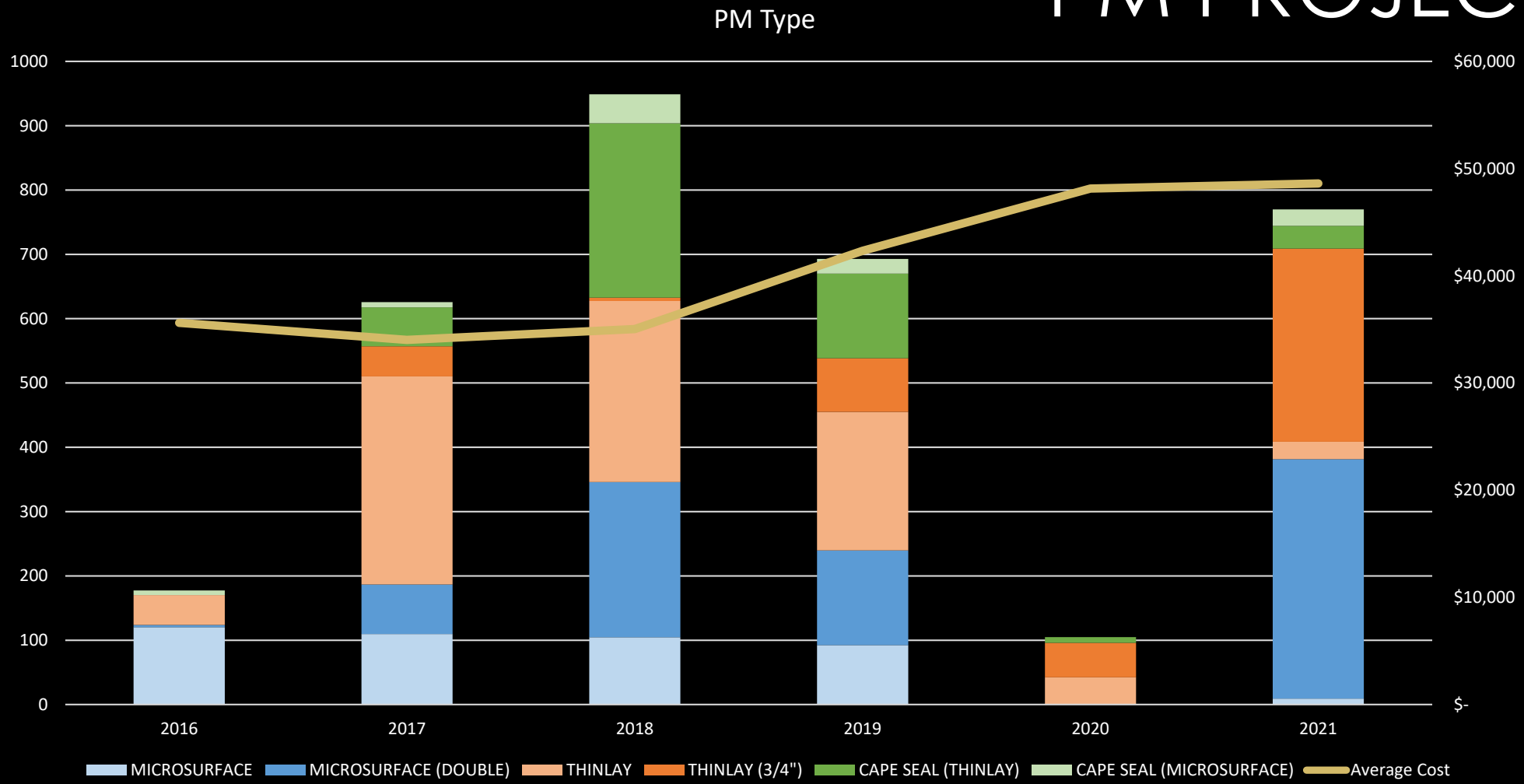
- Preventive Maintenance Alliance
  - Districts, Central Office, Industry
- Training
  - Spring Training for selection and construction
  - Fall Training for project reviews and changes going forward
- Subcommittees

# PROJECT COSTS PROGRAMMED

## AWARDED COSTS



# PM PROJECT TYPE



# MORE MILES LOWER COSTS

- Competition
- Proper Selection
- Proper Site Preparation

# PROPER SELECTION

- Well engineered sections
  - These are corridors
  - Limited access routes
  - Limited curve and grade issues
  - Good subgrade and pavement structure



# PROPER SELECTION

- Proper timing of treatments/multiple treatments
  - Too early or too late = loss of \$\$
  - Spread out your treatments
- Crack seal rule
  - If you wouldn't crack seal, don't micro/thinlay



# PROPER SELECTION

- District ability to prep
  - What can your state forces do prior to application?
  - Be honest with each other



# PROPER SELECTION

- What is the goal of the treatment
  - Preservation
  - Safety
  - Band Aid





# SURFACE PREPARATION

- Understand your treatment
  - Traffic control and curing time
    - Hot applied emulsions
    - Hot mix asphalt
- Notify the locals
  - When what and how long
  - Explain when necessary
- Plans make people happy



# SURFACE PREPARATION

- Pavement work
  - Patching
  - Leveling/rutt-filling
  - Edge keys
- Crack sealing
  - 1/4"
  - 6 months prior



# SURFACE PREPARATION

- Remove pavement markings
  - Paint removal if necessary
  - Thermo
  - Raised or inlaid reflectors
- Cover or replace utilities



# SURFACE PREPARATION

- Clean the surface
  - Broom
  - Vac truck
  - Water flushing
  - Vegetation removal
- Proper tack procedures
- Proper adhesion means you have to get rid of the crap on the surface!



# CONSTRUCTION AND SPECIFICATIONS

- Follow your own guidelines
  - Weather
  - Equipment
  - Material



# QUESTIONS?

Greg Garner  
KYTC  
Division of Maintenance  
200 Mero St  
Frankfort KY 40601  
502 545 0056



# Knowledge Gaps

- Clear links between specific pavement distresses, appropriate maintenance responses, and subsequent preservation treatments
- Lack of consensus on appropriate timing gap between various maintenance actions and subsequent preservation treatments
- Documentation of the effect of maintenance on performance of preservation treatments and poor tracking of the data that might help resolve this

# Suggestions for Future Research

- Document links among pavement conditions, maintenance and surface preparation actions, and preservation treatments
- Identification of condition thresholds beyond which maintenance before preservation is not cost effective
- Means of analyzing impact of failing to perform needed maintenance and surface preparation
- Consistent system data inputs to facilitate communication between MMS, PMS, and other systems
- Guidance on modeling preservation treatment performance based on amount of maintenance and surface preparation



# Today's Panelists

**Moderator: Anita Bush,**  
*Nevada DOT*



**Kim Schofield,**  
*Washington State DOT*



**David Peshkin,**  
*Applied Pavement Technology*

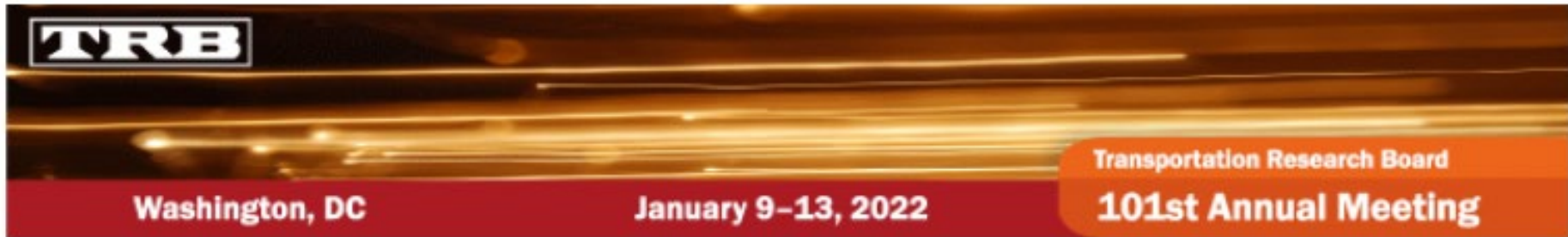


**Greg Garner,**  
*Kentucky Transportation Cabinet*



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