

# National Cooperative Highway Research Program

## NCHRP 10-68, Guidelines for the Use of Highway Pavement Warranties

*Presented by:*

**Sidney Scott, P.E.**

Vice President, Trauner Consulting  
Services, Inc.

*2007 AASHTO Subcommittee for Construction*

*Biloxi, Mississippi*

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# Pavement Warranties

## NCHRP 10-68

- Project Scope
  - Collect & assess existing research and literature
  - Conduct targeted in-depth interviews
  - Determine quantitative benefits
  - Develop method for project selection
  - Develop national “best-practice” guidelines for asphalt and concrete warranties

# Pavement Warranties Collect & Assess Research

- Global Picture



- How does it apply in here



# Pavement Warranties

## Collect & Assess Research



### Comparison – U.S. and Europe



#### *U.S. Model*

- Smaller, specialty companies compete for bids
- Government hold more control over product development and implementation
- Typically low-bid
- Construction is prescriptive in nature

#### *European Model*

- Large, vertically integrated companies complete for bids
- Industry highly involved in product development and implementation
- Qualifications-based selection used widely
- Construction is more performance-based

# Pavement Warranties

## Collect & Assess Research

- Existing Research: What's used where?
  - Define three types of warranties
    - Material & Workmanship
    - Short Term Performance
    - Long Term Performance
  - Identify and classify state experience
    - Using existing research, evaluations, and specifications

# Pavement Warranties

## Definitions

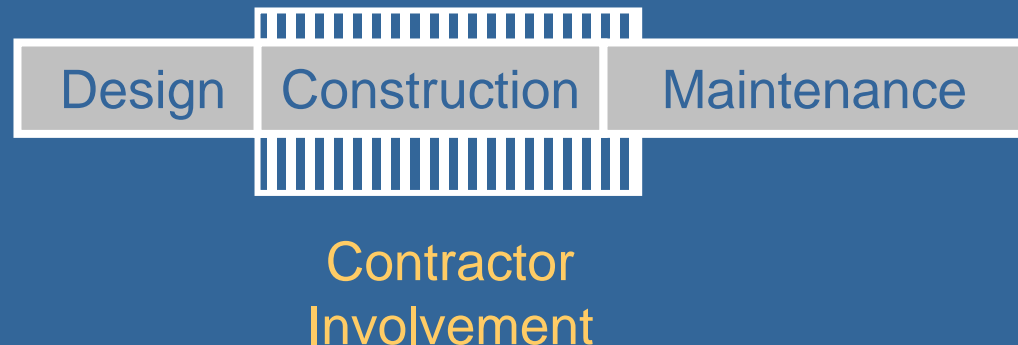
### Specifications

- Method (prescriptive)
  - Require contractor to use specified materials in definite proportions and specific types of equipment and methods to place the material
- Performance
  - State requirements in terms of required results with criteria for evaluating compliance

# Pavement Warranties Definitions

## Type 1 – Material & Workmanship

- Three or less years
- Traditional delivery (D-B-B)
- Prescriptive specifications
- Responsible only for defects within control
- No design responsibility



# Pavement Warranties

## Definitions

### Type 2 – Short-Term Performance

- Five to seven years
- Mix of prescriptive and performance specifications
- Traditional (D-B-B) or Alternative delivery (D-B or multi-parameter)
- Increased control of material selection, mix design, equipment selection, traffic control, and aspects of structural design
- Responsibility for correcting deficiencies under contractor control





# Pavement Warranties

## Definitions

### Type 3 – Long-term Performance

- Greater than 10 years
- Performance specifications
- Alternative Delivery (D-B)
- Contractor control of design
- Responsibility for planned and unplanned maintenance during life of warranty

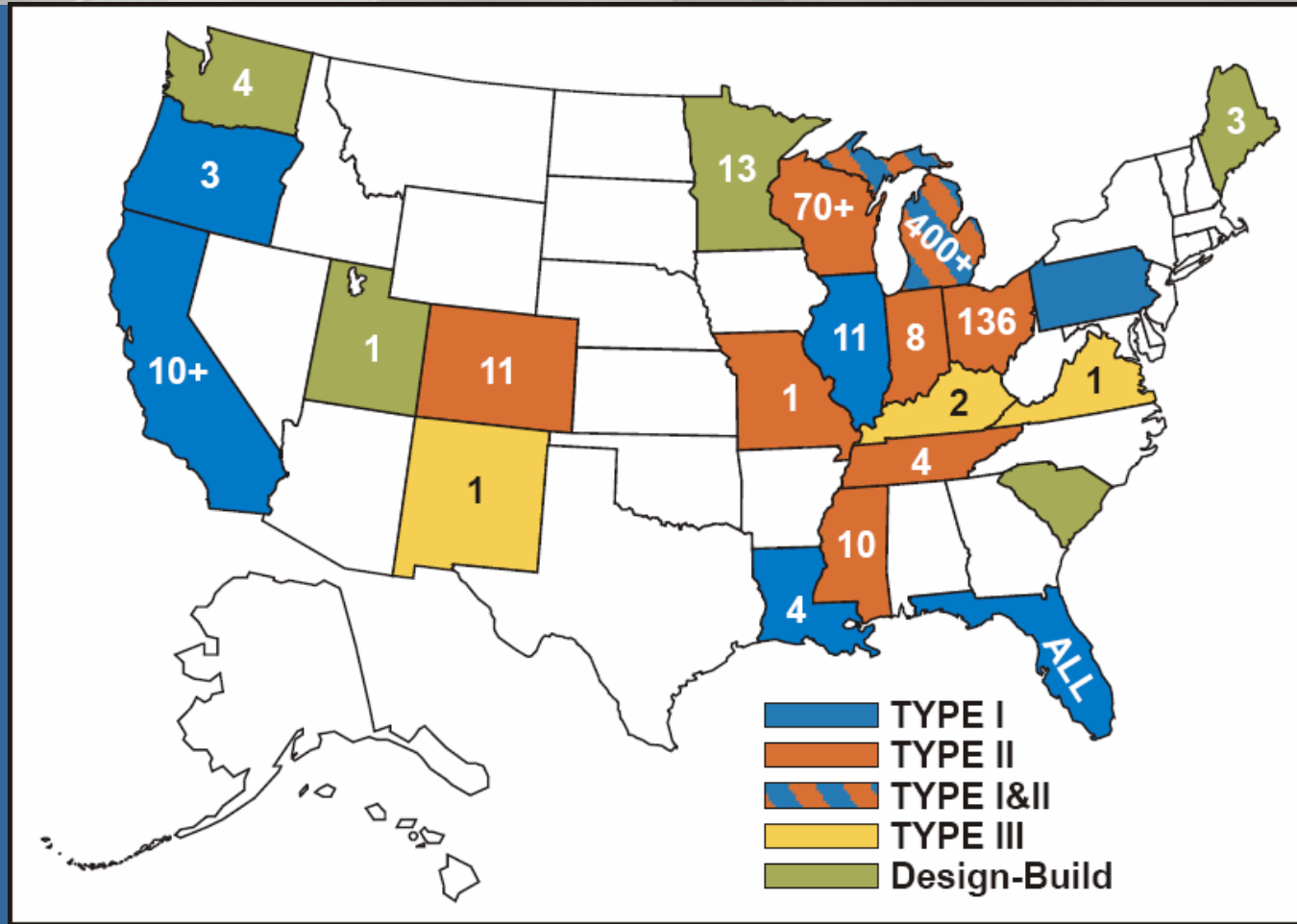


Contractor Involvement

# Pavement Warranties

## HMA Pavement

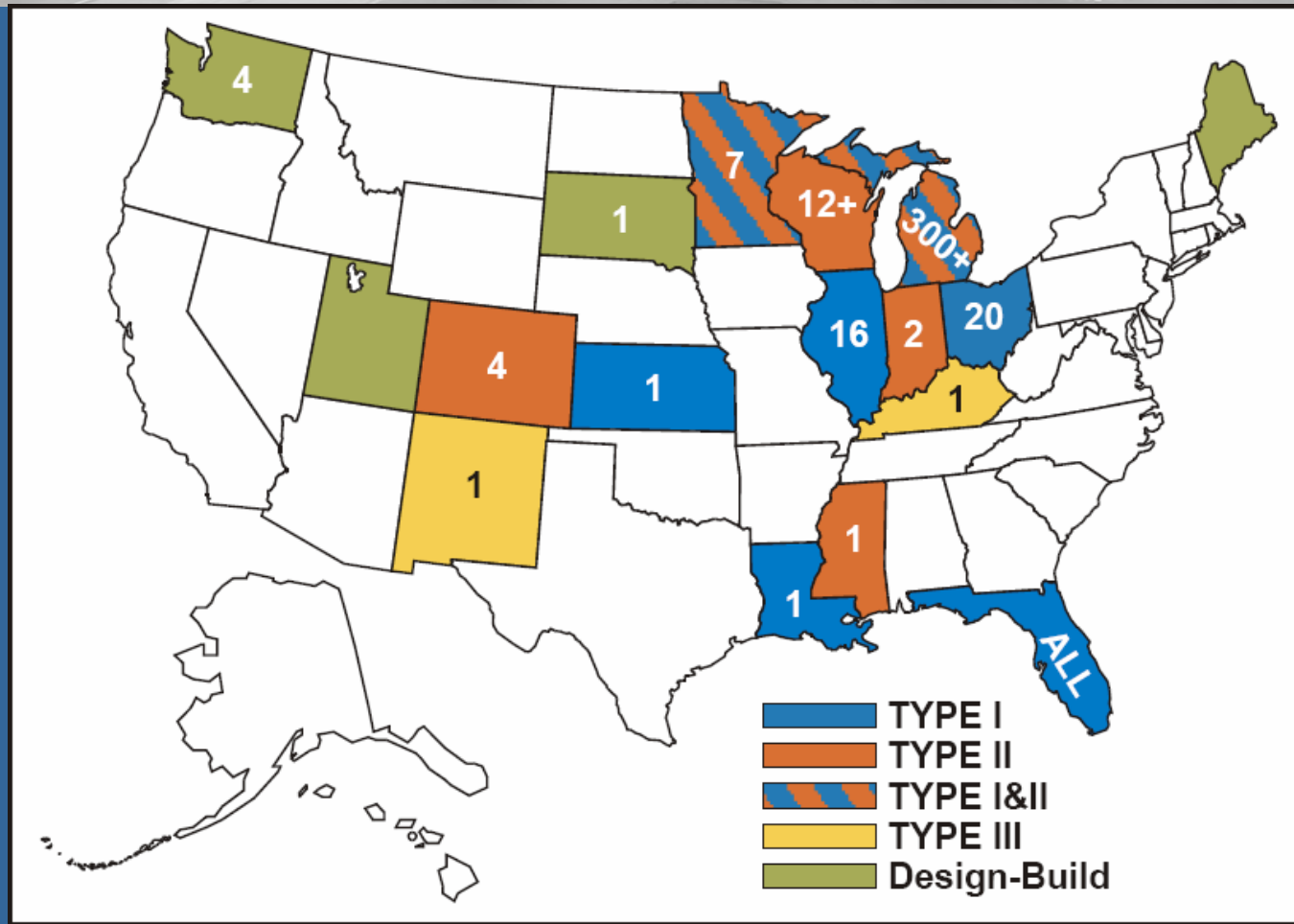
- 22 states
- 700+ projects
- Ranges: 1 to 25 yrs
- No bidders: MD, AL
- Dropped: ID, HI
- Planning: MT



# Pavement Warranties

## PCC Pavement

- 17 states
- 370+ projects
- Ranges: 3 to 20 yrs

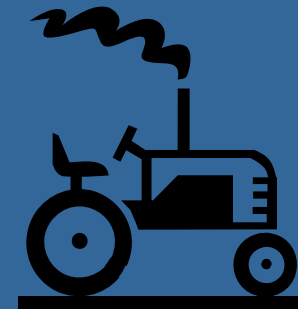


# Pavement Warranties Targeted Interviews

- Michigan, Florida, Ohio
  - More than 100 projects
- Wisconsin
  - More than 80 projects
- Colorado, Illinois, Indiana, Mississippi
  - More than 10 projects
- Louisiana
  - 5 projects
- Iowa
  - Does not use

# Pavement Warranties Targeted Interviews

- How are pavement warranties administered?
  - Business Administration Features
  - Technical Administration Features



# Pavement Warranties Targeted Interviews

- Business Administration Features
  - Warranty Authority (district vs. headquarters)
  - Industry Cooperation
  - Effects on Competition
  - Effect on Agency Resources
  - Bonding Issues
  - Procurement Options

# Pavement Warranties Targeted Interviews

- Technical Administration Features
  - Specification Considerations
    - performance criteria, threshold values, quality control, remedial action plan
  - Other considerations
    - Contractor ability/expertise, opportunity for innovation, opportunity for improvement to current roadway performance



# Pavement Warranties Decision Tool

- Challenge: Develop a tool to address a multi-dimensional decision process
  - Business and technical considerations at both the programmatic and project level
  - Multiple warranty types, each aimed at unique goals and outcomes
  - Multiple stakeholders: DOT, industries, sureties, public, politicians



# Pavement Warranties Decision Tool

## Seven-Step Approach

1. Convene decision committee
2. Identify objectives
3. Evaluate likelihood of success based on weighted objectives
4. Decide to proceed
5. Assemble candidate projects
6. Evaluate risk of different warranty types
7. Select warranty type to apply

# Pavement Warranties Decision Tool

## 1. Convene Decision Committee

- Use a team approach
  - Include various stakeholders where appropriate
  - Coordinate among agency departments - (design, construction, materials, maintenance)

# Pavement Warranties Decision Tool

## 2. Identify and weigh warranty objectives

- Common goals include:
  - Ensuring quality
  - Reducing agency inspection responsibilities
  - Promoting innovation
  - Changing business model
  - Improving consistency on pavement network
  - Improving quality on targeted pavements

# Pavement Warranties Decision Tool

3. Evaluate likelihood of success based on weighted objectives
  - Tool produces predicted success rate based on weighted objectives and answers to corresponding questions
  - Model for questions: “yes” answer is favorable to warranty application



# **Pavement Warranties Decision Tool**

## **Inspection Staffing – True or False**

- 1. There is a need to reduce manpower for inspection**
- 2. Agency has historical data to determine indicators and thresholds**
- 3. Contractors possess the knowledge and ability to maintain QC/QA**
- 4. A clear well-structured QC plan has been developed**
- 5. Adequate record controls have been established to document inspection**
- 6. Monitoring can be linked with existing pavement management practices**

# Pavement Warranties Decision Tool

## 4. Decision to Proceed

- Many administrative options in using warranties
- Success requires the right administrative recipe for achieving stated objectives

# Pavement Warranties Decision Tool

## 5. Assemble list of candidate projects

- Key information includes
  - Size, complexity
  - Foundations, sub-base
  - Opportunity for innovation, improvements, changes in traditional roles and responsibilities

# Pavement Warranties Decision Tool

## 6. Evaluate Risk of Different Warranty Types

- Multiple choice questions designed to direct the DOT to the warranty type with the least amount of risk
- Produces a risk matrix based on answers to multiple choice questions



# Pavement Warranties Decision Tool

## ■ Risk Evaluation

How accurately can ESALs be predicted over the life of the warranty period?	Typ 1	Typ2	Typ3
A. New construction, designed by the agency	I	M	II
What level of control will contractor have over design, means, and methods?	I	II	II
What are the foundations/sub-base conditions?			
A. New construction, designed by the agency	L	L	L
B. New construction, designed by the contractor	M	L	L
C. Scope includes rehabilitating pre-existing construction to uniform state	L	L	M
D. Pre-existing construction to be used is uniform, stable and free of defects	L	L	L
E. Pre-existing construction to be used contains moderate defects	M	M	H
F. Pre-existing construction to be used contains severe defects	H	H	H
G. Unknown conditions	H	H	H

# Pavement Warranties Decision Tool

- Risk Matrix

Sample Risk Matrix

	Type 1	Type 2	Type 3	
ESALs	L	M	H	A. Not Accurately
Design Control	L	H	H	A. None
Foundations	L	L	M	C. Repair included in scope

# Pavement Warranties Decision Tool

## 7. Warranty Decision Type

- Risk matrix designed to highlight area where mitigation may be necessary
- Simplification of a decision process designed to facilitate meaningful and organized discussion

# Where do We Go From Here?

## ■ Phase II

- Finalize method for project selection
- Develop national “best-practice” guidelines for asphalt and concrete warranties
- Draft technical provisions

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