

PERFORMANCE REQUIREMENTS - WARRANTIES

Guidelines for the Use of Highway Pavement Warranties

Presented by:

Sidney Scott, P.E.

Vice President, Trauner Consulting
Services, Inc.

*2009 FHWA 1ST Annual Conference on Transportation
Construction Management
Orlando, FL
February 10, 2007*

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

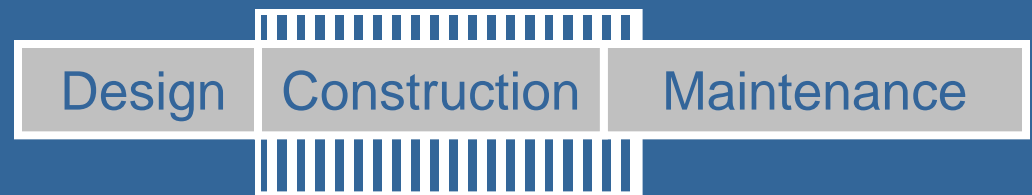
Specifications

- 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



Contractor
Involvement

Pavement Warranties Definitions

Type 2 – Short-Term Performance

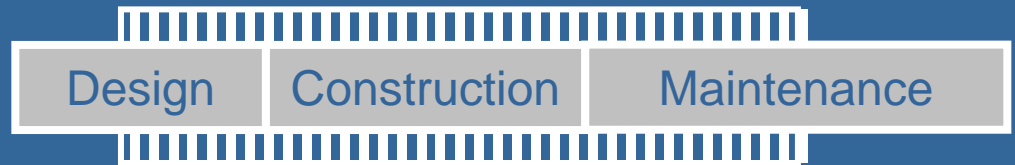
- Five to seven years
- Mix of prescriptive and performance specifications
- Traditional (D-B-B) or Alternative delivery (D-B or multi-parameter)
- Increased control of material selection, mix design, equipment selection, traffic control, and aspects of structural design
- Responsibility for correcting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

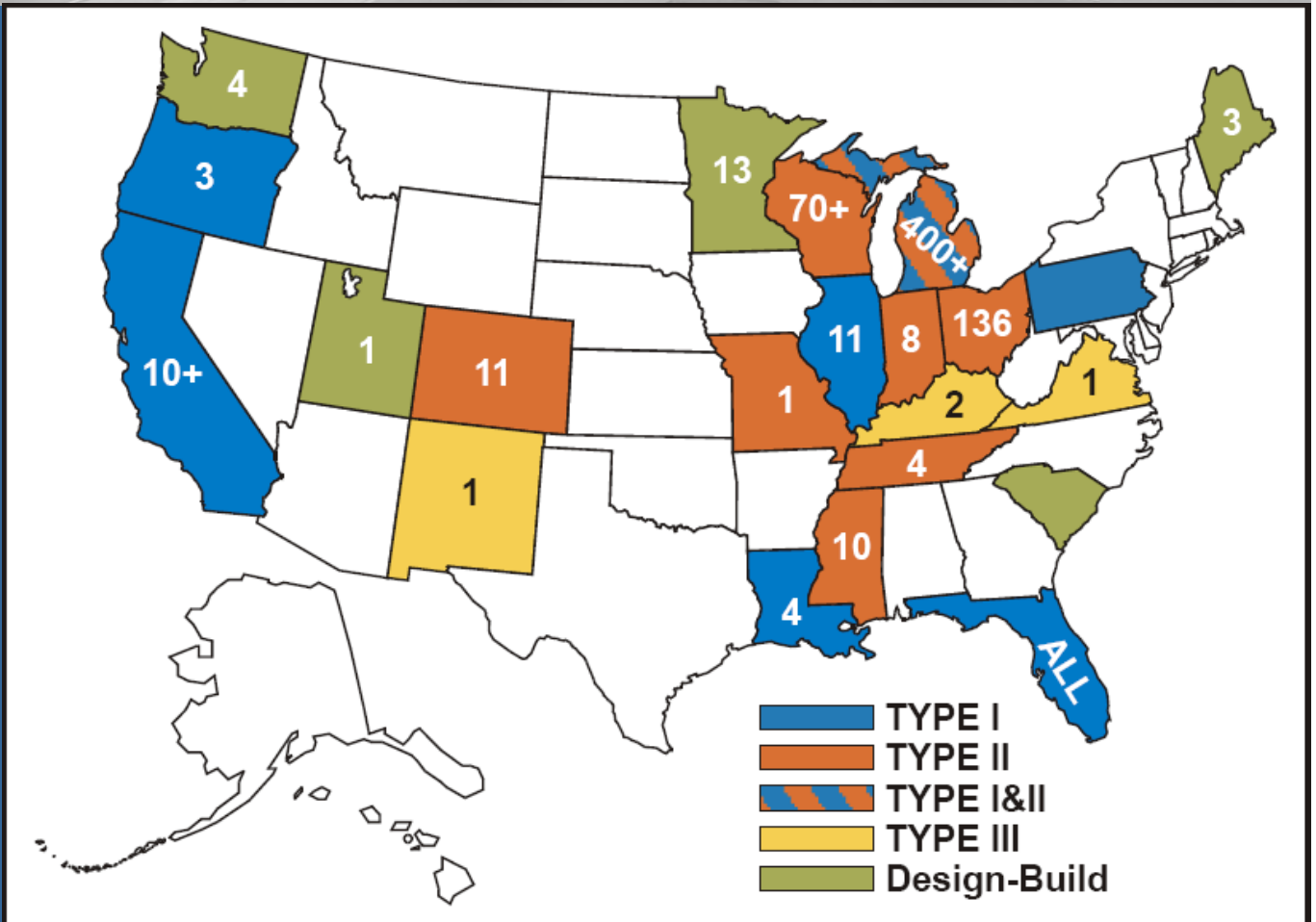


Contractor Involvement

Pavement Warranties

HMA Pavement

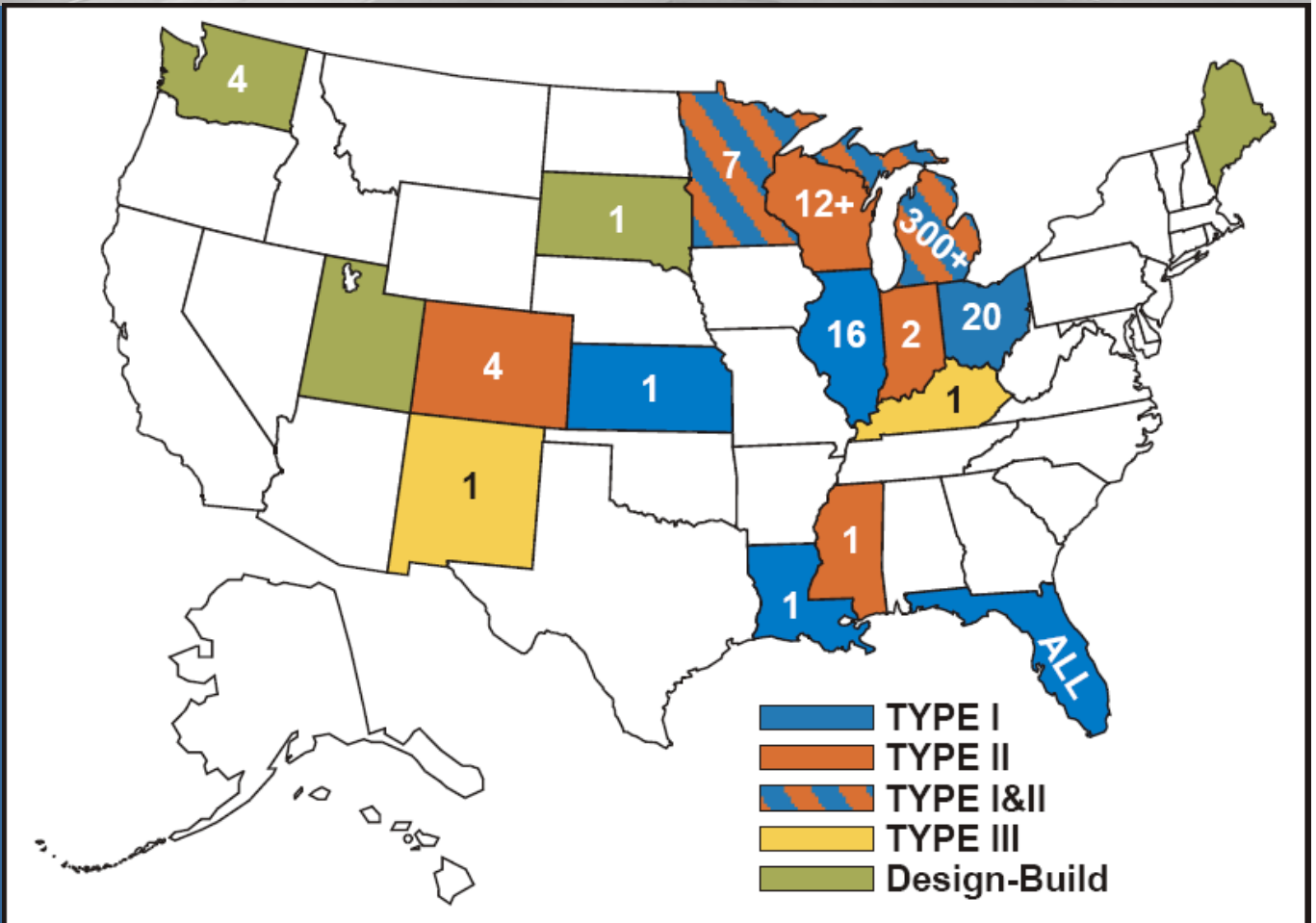
- 22 states
- 700+ projects
- Ranges: 1 to 25 yrs
- No bidders: MD, AL
- Dropped: ID, HI
- Planning: MT



Pavement Warranties

PCC Pavement

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



Pavement Warranties

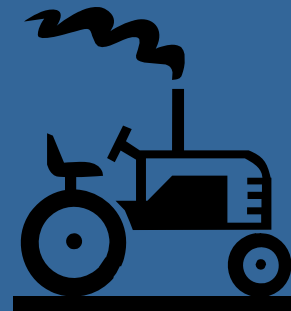
Targeted Interviews

- 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. Not very accurately	L	M	H
What level of control will contractor have over design, means, and methods?			
A. None	L	H	H
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

WARRANTY GUIDELINES

- Rationale for Use
 - Quality
 - Innovation
 - Reduced Dot Inspection/Administration
 - Product Life

WARRANTY GUIDELINES

- Program Considerations
 - Warranty Buy-in
 - Phased Development
 - Measuring & Monitoring Performance
 - Warranty Bonds & Alternatives

WARRANTY GUIDELINES

- Project Considerations
 - Contracting Strategy and Warranty Type
 - Scope of Work
 - Pre-existing Conditions, Quality Management, Construction Phasing/Sequence, Experimental Features
 - Conditions Beyond Contractor Control

WARRANTY GUIDELINES

- Performance Criteria and Thresholds
 - Selecting the Right Distresses/Functional Requirements (HMA & PCC)
 - Selecting the Right Thresholds

WARRANTY GUIDELINES

- Monitoring and Evaluation
 - Monitoring
 - Evaluation Segment Length
 - Exclusions
 - Documentation, Acceptance, Closeout

WARRANTY PROVISIONS

■ Considerations:

- Special provision or std. Spec format
- Contract/Warranty Type
- Bond or Alternatives
- Evaluations and Thresholds
- Payment Options

■ Specification Outline:

- Description
- Warranty Bond
- Performance Evaluation
- Warranty Work
- Maintenance
- Conflict Resolution
- Method of Measurement
- Basis of Payment
- Other Considerations

PERFORMANCE REQUIREMENTS - WARRANTIES

Guidelines for the Use of Highway Pavement Warranties

Presented by:

Sidney Scott, P.E.

Vice President, Trauner Consulting
Services, Inc.

*2009 FHWA 1ST Annual Conference on Transportation
Construction Management
Orlando, FL
February 10, 2007*