



Pavement Warranties in Highway Construction

Project Selection and Evaluation

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Warranty Background



Pavement Warranty Study

NCHRP 10-68

- Scope
 - Literature review -reports, guidelines, and specification documents
 - Targeted interviews
 - Project selection tool
 - “Best-practice” guidelines
 - Technical guide specification revisions

Warranty “Pressure”

- DOT Internal Decision
 - Most (MS, WI, IN, CO, FL)
- Legislative Mandate
 - LA, MI, OH, IL
- Industry
 - Suppliers, Bonding

Warranty Types

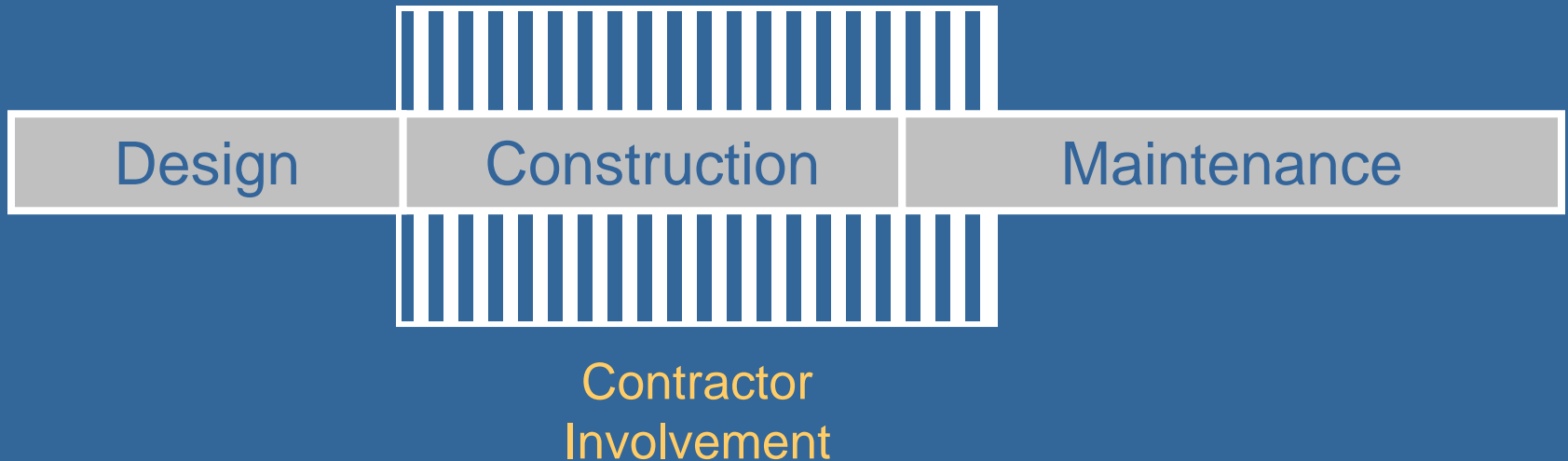
- Type 1
 - material and workmanship
- Type 2
 - short-term performance
- Type 3
 - long-term performance

Pavement Warranty Definitions

Type 1: Material & Workmanship

- Typically 5 years or less
- Traditional delivery (D-B-B)
- Prescriptive specifications
- No contractor design responsibility
- Warrantor responsible for defects related to materials & workmanship under its control

Material & Workmanship Warranties



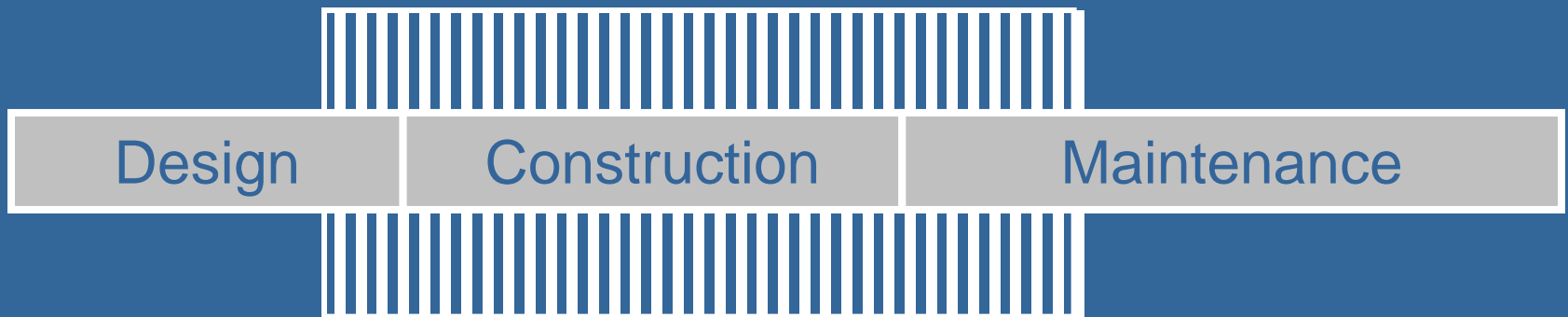
Length: 5 years or less

Pavement Warranty Definitions

Type 2: Short-Term Performance

- Range 5-10 years
- Mix of prescriptive and performance specifications
- Traditional (D-B-B) or Alternative delivery (D-B or multi-parameter bidding)
- Increased control of material selection, mix design, equipment selection, traffic control, and aspects of structural design
- Responsibility for correcting deficiencies under contractor control

Shorter-Term Performance Warranties



Contractor
Involvement

Length: 5 to 10 years

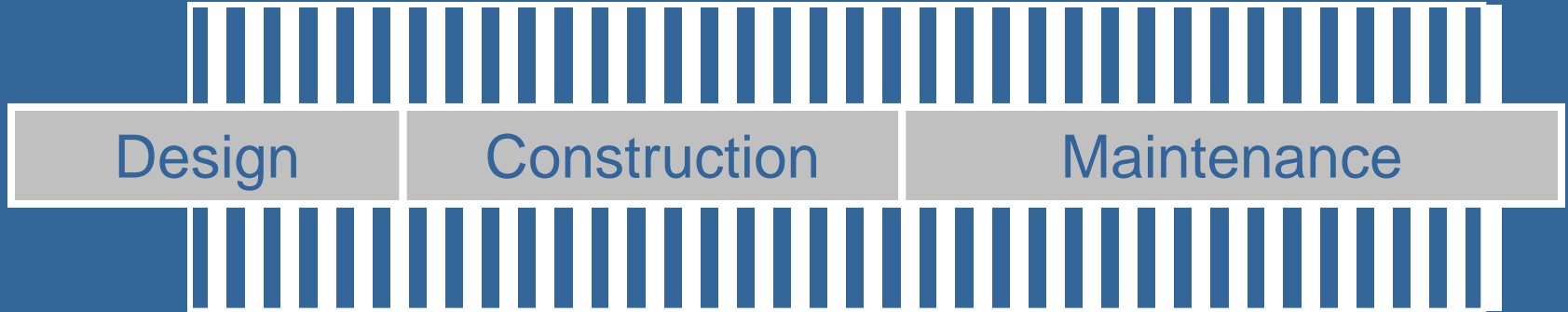
Pavement Warranty Definitions

NCHRP 10-68

Type 3: Long-Term Performance

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

Long-Term Performance Warranties

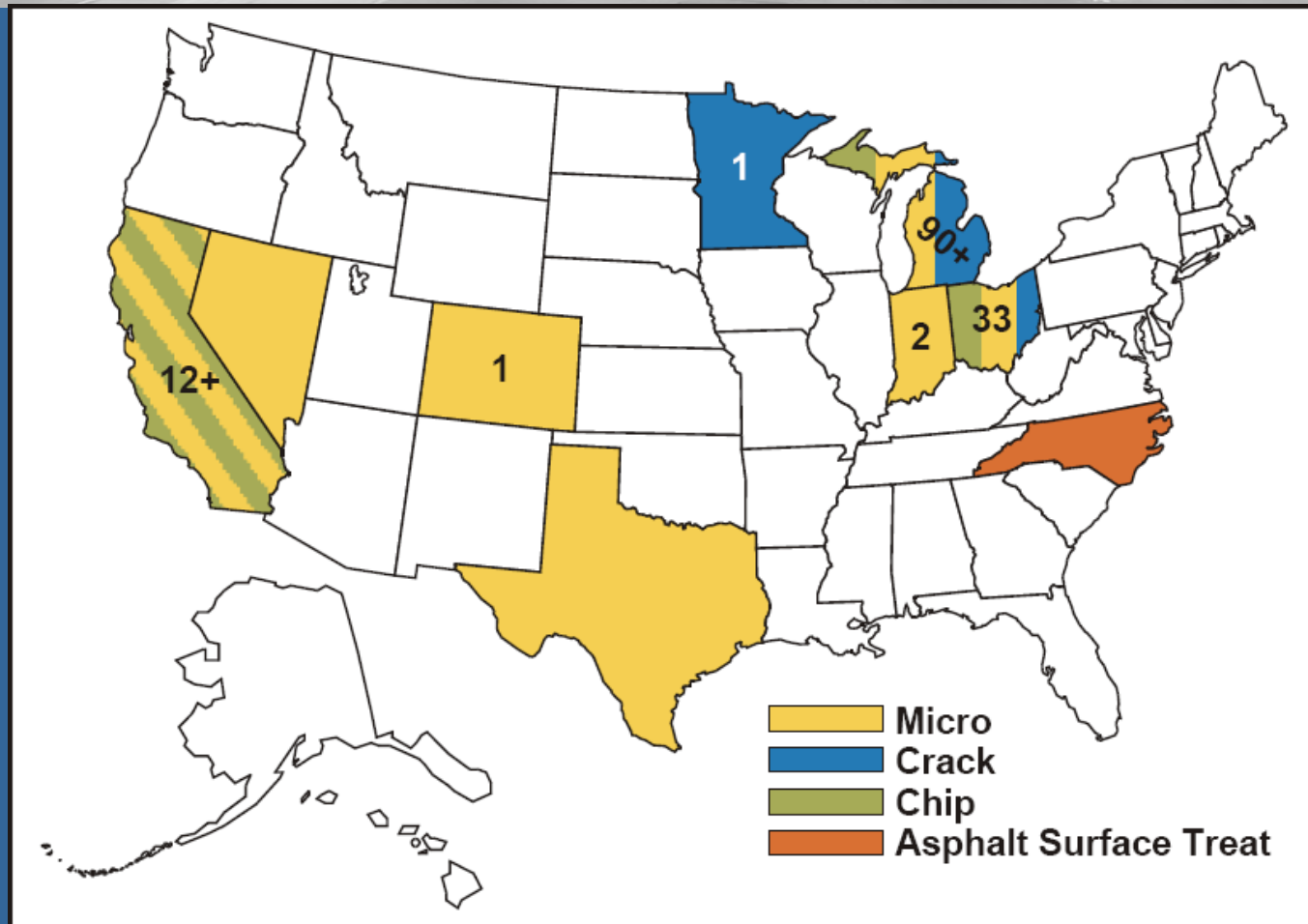


Contractor
Involvement

Length: More than 10 years

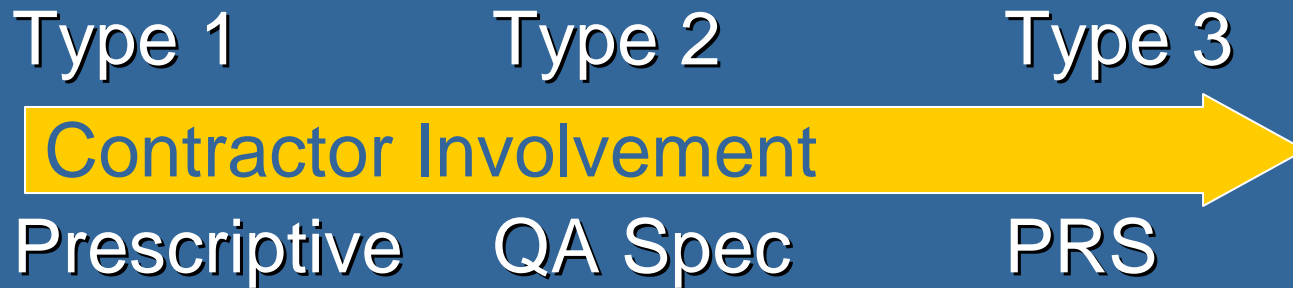
Microsurfacing/Crack Treatment/Chip Sealing Warranties

- 9 states
- 140+ projects



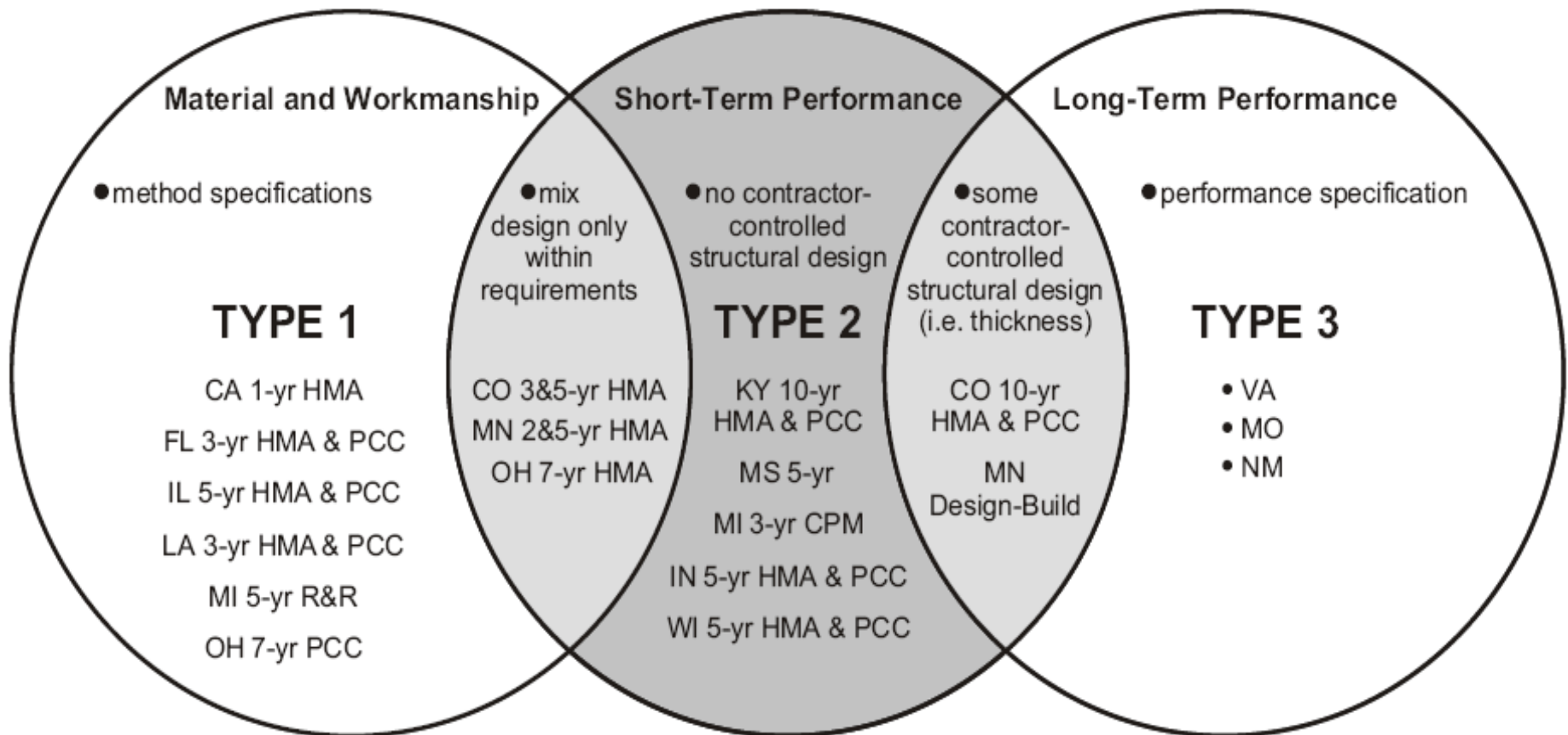
Pavement Warranties

Findings from Specifications



- Type 2
 - Mix Design & Material Selection
- Type 3 (D-B)
 - Structural Design >> Maintenance

Warranty Provision Comparison



Pavement Warranties Project Selection Criteria

- Authority to apply warranties
 - District (CO, MS, OH, WI)
 - Central Office (IN, LA)
 - Collaboration (CA, IL)
- Warranties applied as a standard
 - FL and MI

Pavement Warranties

District Level Application

- Colorado
 - Structural design life, minimum tonnages, primary scope, WIM nearby or included in scope
- Mississippi
 - Base conditions, expected level of competition
- Ohio
 - Simple scope, free of complicating factors that would be classified as outside the control of the contractor, comply with legislation
- Wisconsin
 - Projects with a high chance of success for performing well under the warranty

Pavement Warranties Central Office Application

- Indiana
 - Time-sensitive, highly visible projects
- Louisiana
 - New construction only

Pavement Warranties Collaborative Application

- California
 - Minimum requirements for total combined cracking, transverse cracks, longitudinal cracking, rutting and bleeding
- Illinois
 - Design-life, comply with legislation

Pavement Warranties

Project Selection Criteria

- **Project Considerations**
 - Project size and scope, existing defects and pavement condition, design-life
- **Other Considerations**
 - Expected level of competition, procurement method, legislative mandates, ability to measure performance

Pavement Warranties Programmatic Criteria

■ DOTs

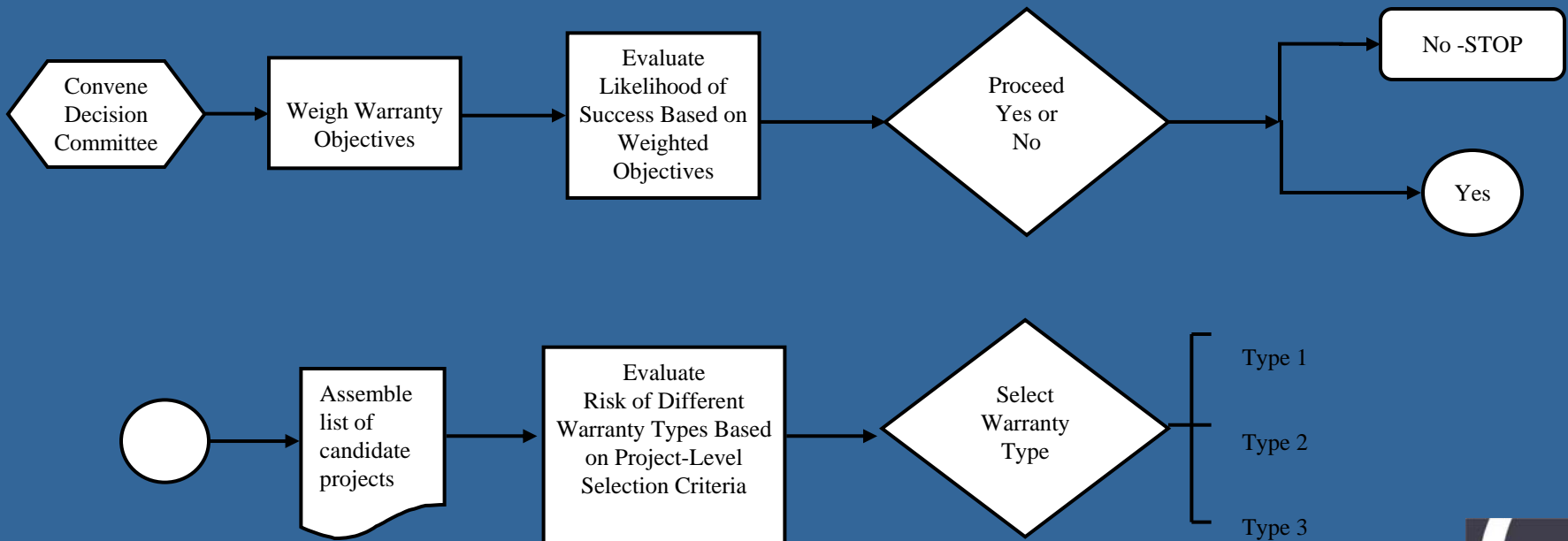
- How to measure performance?
 - Ability to define distresses and correlate to long-term pavement performance
- How to measure success?
 - Perceived versus qualitative benefits

Pavement Warranties Programmatic Criteria

- Contracting Industry
 - Investment in understanding of
 - Design
 - Job Mix Formula
 - Pavement Design
 - Placement Strategies
 - Testing and Inspection
 - Quality Assurance Measures

Warranty Decision Tool

Seven-Step Approach



Warranty Decision Tool

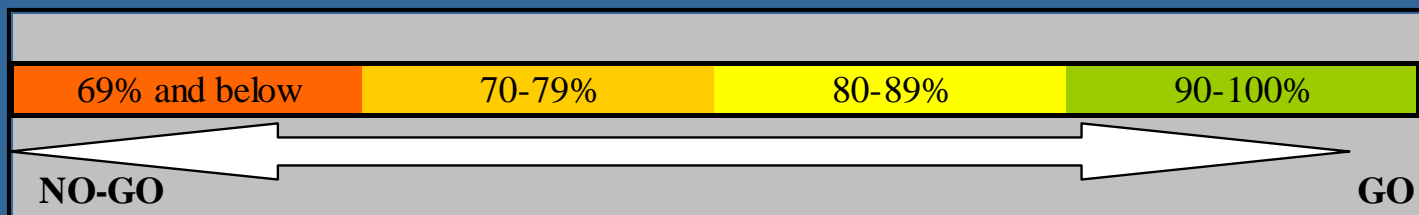
- Identify and Objectives
 - Consistency of the overall network
 - Substantial performance improvements on a specific project
 - Additional assurance against catastrophic failures
 - Contractor innovation
 - Redirect DOT inspection forces
 - Shift responsibility for long-term operation and performance

Warranty Decision Tool

- Evaluate Likelihood of Success
 - Relates directly back individual objectives
 - Focuses on programmatic or cultural considerations
 - May not be necessary if warranty program is already established

Warranty Decision Tool

- Decision to Proceed
 - Can stated objectives be accomplished within the programmatic or cultural boundaries



Warranty Decision Tool

- Project-Level Risk Assessment
 - Classify project
 - Pavement Preservation
 - Rehabilitation
 - New Alignment or Full-Depth Reconstruction

Warranty Decision Tool Pavement Preservations

- Possible Warranty Types: 1 and 2

Risk Assessment for Pavement Preservation Project

Description	Type 1	Type 2	Risk Comment
3A.1 Scope	M	L	
3A.2 Surface Conditions	M	M	
3A.3 Level of Accuracy- ESALs	L	L	
3A.4 Mix Design Control	L	H	Contractors have to be given some level of control of the mix in a Type 2 situation
3A.5 Equipment Control	L	H	Contractors have to be given some level of control of the mix in a Type 2 situation
3A.6 Phasing Control	L	M	
3A.7 Thresholds	M	M	
3A.8 Maintenance	L	M	
3A.9 Performance	M	M	

Warranty Decision Tool Pavement Rehabilitation

- Possible Warranty Types: 1 and 2

Risk Assessment Summary for Pavement Rehabilitation Project

Description	Type 1	Type 2	Risk Comments
3B.1 Scope	M	L	
3B.2 Base Conditions	L	L	
3B.3 ESALs Predicted	L	L	
3B.4 ESALs Monitored	L	M	
3B.5 Mix Design Control	H	L	The period is not long enough to shift this responsibility away from the agency
3B.6 Thickness	L	M	
3B.7 Equipment/Application	H	M	The period is not long enough to shift this responsibility away from the agency
3B.8 Phasing Requirements	L	L	
3B.9 Performance Indicators	M	L	
3B.10 Warranty Thresholds	L	L	
3B.11 Maintenance	L	M	
3B.12 Performance Expectation	M	M	

Warranty Decision Tool

New Construction or Reconstruction

- Possible Warranty Types: 1, 2, and 3

Risk Assessment Summary for New Roadway or Major Rehabilitation of the Subgrade

Description	Type 1	Type 2	Type 3	Risk Comments
3C.1 Scope	M	L	M	
3C.2 Foundation Conditions	M	L	M	
3C.3 ESALs predicted	L	L	M	
3C.4 ESALs monitored	L	L	L	
3C.5 Mix Design Control	M	L	L	
3C.6 Structural Design Responsibility	L	M	H	Contractors have to be given some level of control in a Type 3 situation
3C.7 Equipment/Application	H	M	L	Period not long enough to shift this responsibility away from the agency
3C.8 Phasing Requirements	L	M	H	Contractors have to be given some level of control in a Type 3 situation
3C.9 Performance Indicators	M	L	M	
3C.10 Warranty Thresholds	L	L	L	
3C.11 Maintenance	L	M	H	Upfront cost unfavorable if reducing LCC is not priority
3C.12 Performance Expectations	M	M	M	

Summary

- Decision process involves both programmatic and project level considerations
- Assess objectives and apply a warranty type consistent with the characteristics of each contract, project, or program
- Warranties can raise the quality bar
 - Must continue to weigh the required investment against value received

Recommendations

■ DOTs

- Partner with industry (performance parameters, durations, implementation, inspection, etc.)
- Select appropriate projects
- Streamline and automate data collection
- Explore/test alternatives to bonding
- Implement alternative contracts (D-B, best-value and/or special prequalification)
- Measure success based on LCC, post construction assessments

Recommendations

- Industry
 - Participate in warranty policy discussions
 - Become educated on warranty issues and risks
 - Understand investment required for warranty projects
 - View warranty expertise as competitive advantage



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