STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION

OVERVIEW OF TREATMENT STRATEGIES

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Overview

- Where we are now
- Where we want to be in the future
- Pavement Preservation
- Pavement Design
- Pavement Rehabilitation

NJDOT Current Pavement Preservation Program

NJ Pavement Facts

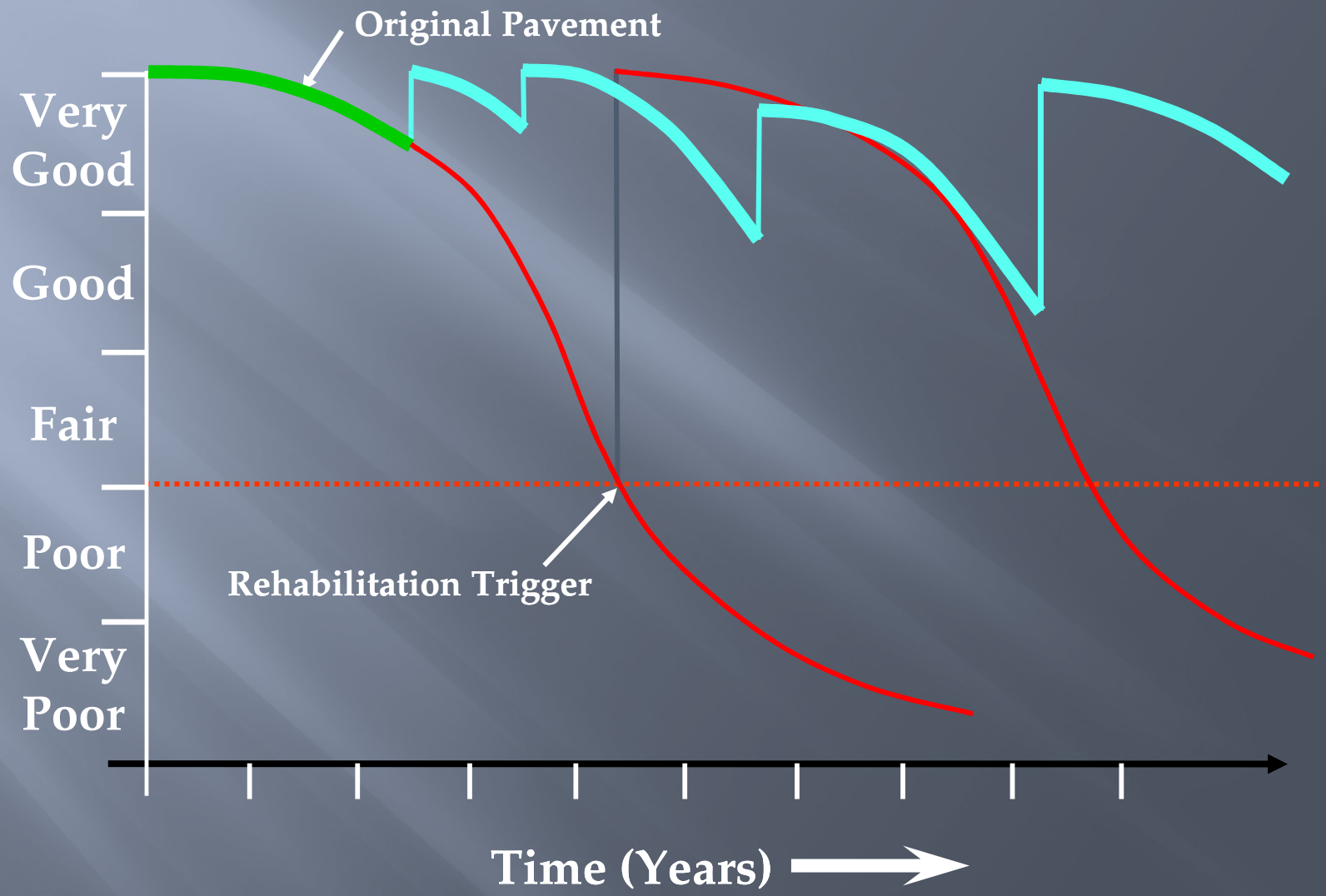
- Network has been neglected over years
- Slipped into a very poor condition
- Over the past several years we've made a major commitment to rehabilitate NJ roads
- We're not done with major rehabilitation yet
- We've made a commitment to do more preventive maintenance
- We need to do more preventive maintenance

NJDOT Future Pavement Preservation Program

Pavement Preservation

Pavement Preservation is "a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations." *Source: FHWA Pavement Preservation Expert Task Group*

The Pavement Preservation Concept



Pavement Preventive Maintenance

"Planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without increasing the structural capacity)." *Source: AASHTO Standing Committee on Highways*

Approximate Cost of Treatments (per lane mile)

- Preventive Maintenance - $30,000
- Minor Rehabilitation - $350,000
- Major Rehabilitation - $500,000
- Reconstruction - $1,500,000

NJ motorists demand and *deserve* easy mobility on safe, smooth, well maintained roads.

Pavement Preservation

- Focus shift from pavement rehabilitation to pavement preservation
- Perpetual Pavements (50+ year design)
  - Confine distresses to upper pavement layers
  - Periodic removal and replacement of surface layer
- Project Selection- timing is critical
  - Best for pavements with slow rates of deterioration
- More frequent, less expensive treatments
- Minimal increase to pavement structure

Pavement Preservation

- Purpose of Pavement Preservation :
  - Extending pavement life
  - Improving ride quality
  - Correcting surface defects
  - Improving safety characteristics
- Treatments
  - Patching - polymer modified material
  - Crack Filling - overband
  - Cold surface seals - microsurfacing
  - Thin HMA overlay < 1.5" thick
  - Concrete Pavement Rehab (CPR)

Benefits

- Safety
- Shorter Construction Disruptions
- Improved Roadway Quality
- Cost Savings for Vehicle Maintenance
- Long-Term Public Perception
- Long-Term Department Saving

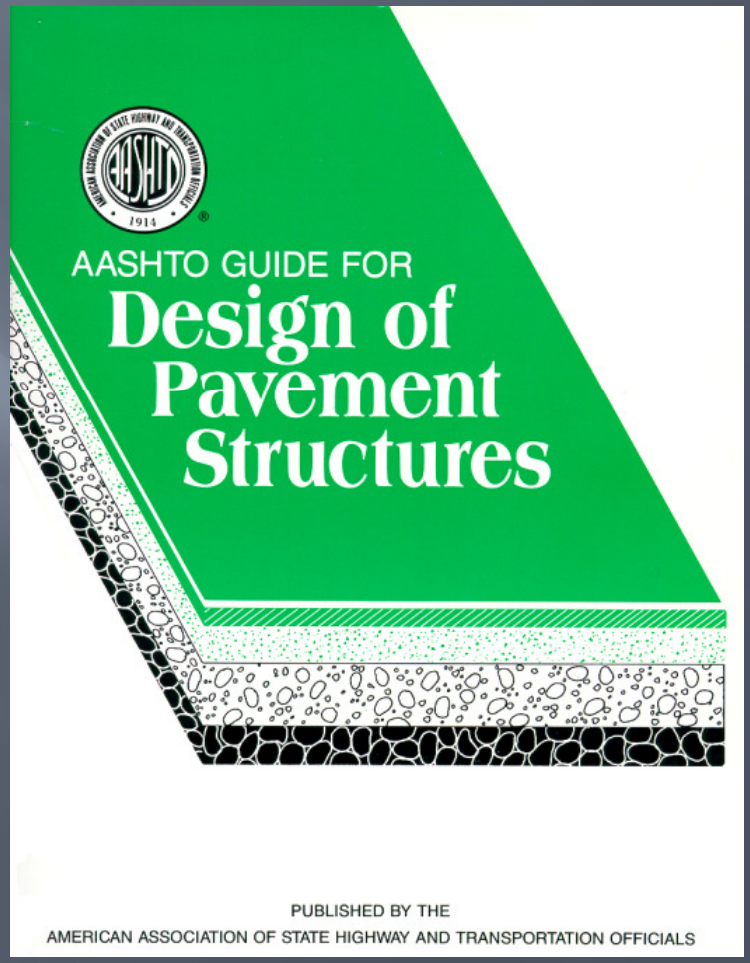
Pavement Design

Purpose of Pavement Design

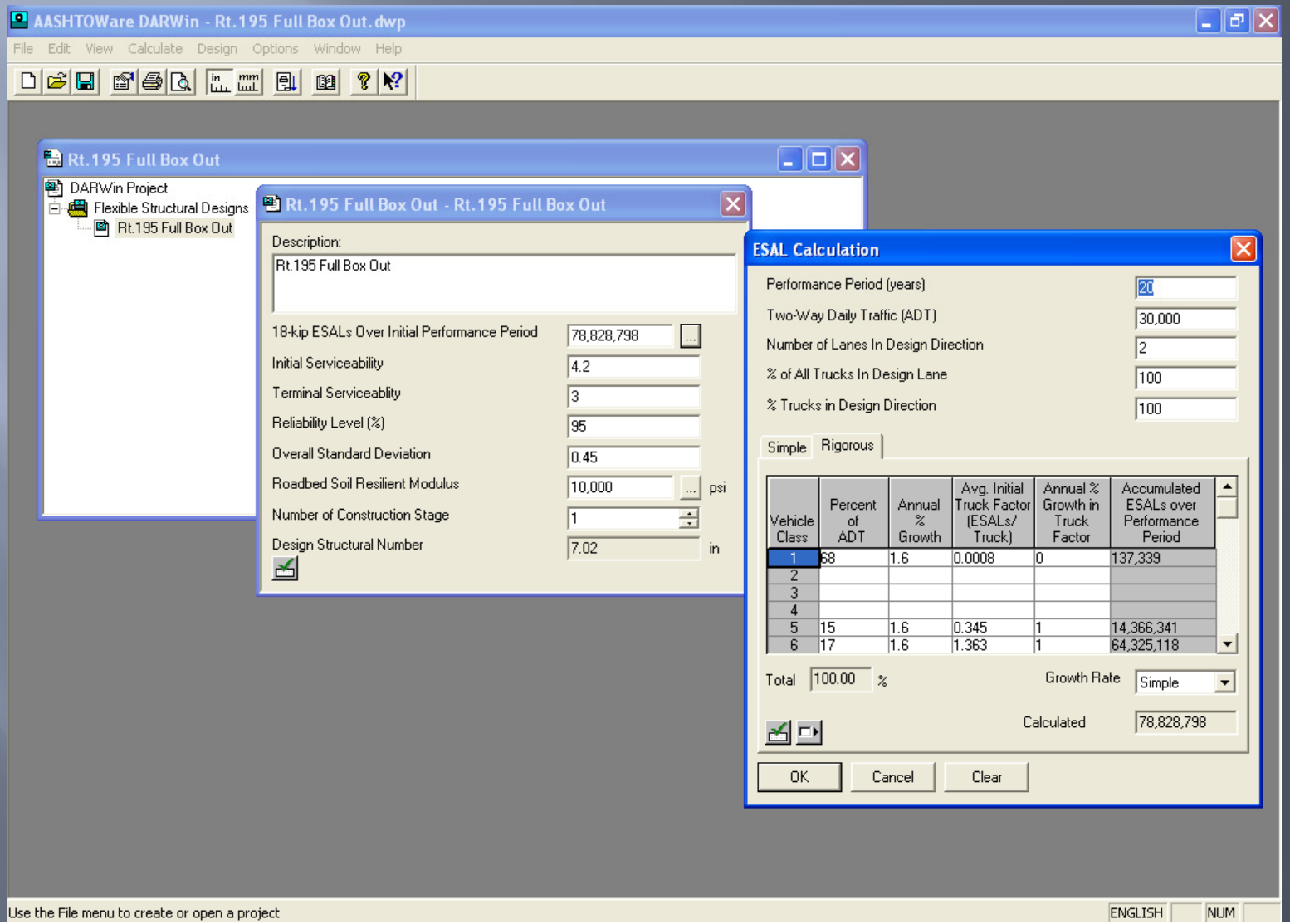
- To provide a structure that protects the subgrade and supports both traffic and environmental loads for a given period at a specified level of serviceability
- Design Considerations
  - Structural
  - Serviceability
  - Frost Penetration

1993 AASHTO Design Guide

- Empirical Design
- Relates to ride
  - Serviceability
  - Subjective
- Considers
  - Subgrade resilient modulus (M_R)
  - Traffic – ESAL's (equivalent 18 kip single-axle loads)
  - Rule-of-Thumb materials properties (new HMA structural coefficient = 0.44)

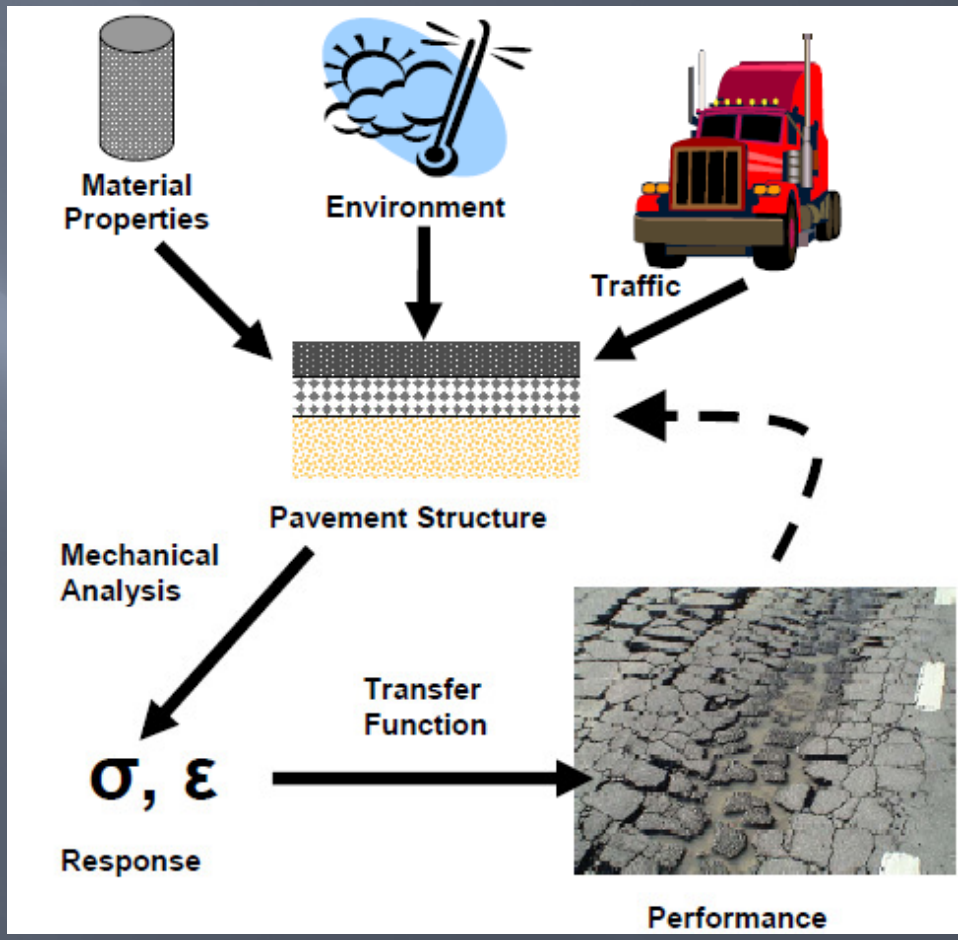


DARWin 3.1 Pavement Design Software



Mechanistic-Empirical Pavement Design

- Considers
  - Mechanical properties of all layers
  - Traffic, climate & observed performance
    - More accurately model pavement structure
    - More accurately predict pavement life



Mechanistic-Empirical Pavement Design

- Can easily incorporate new materials, different traffic and changing conditions
- More accurately described as an analysis tool
- Design to avoid structural failure (i.e. HMA pavement – cracking and rutting)
- For more info. go to: http://www.trb.org/mepdg/

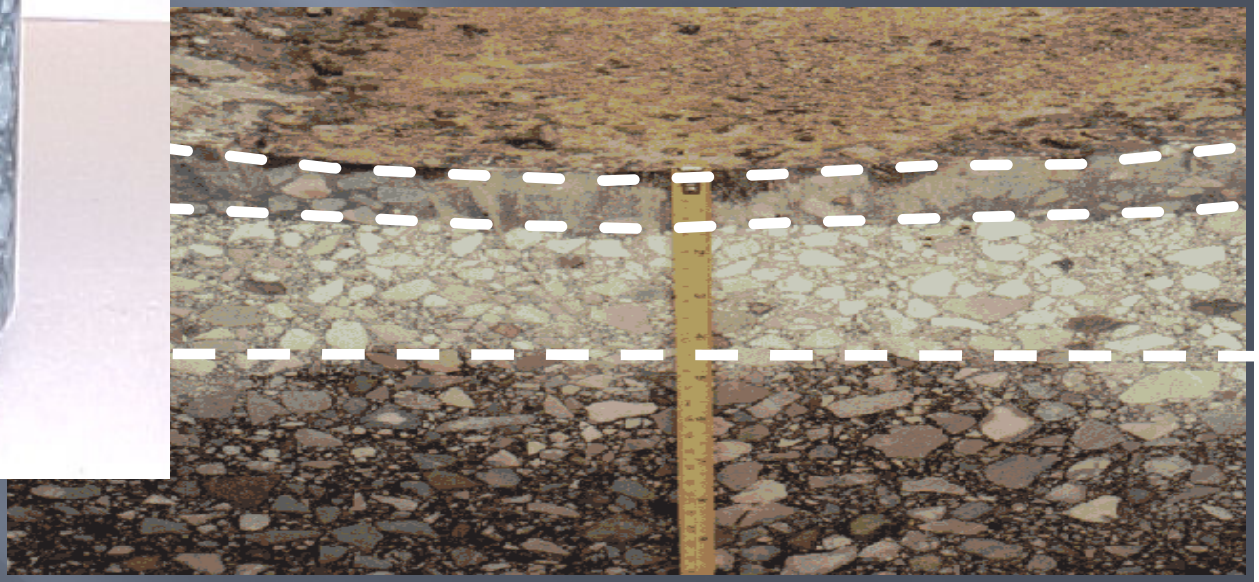
Perpetual Pavement Design

- Design the structure such that there are no deep structural distresses
  - Bottom up fatigue cracking
  - Structural rutting
- All distresses can be quickly remedied from surface
- Result in a structure with 'Perpetual' or 'Long Life'
- Typically HMA thickness ≥ 8 inches
- Structural design life ≥ 50 years

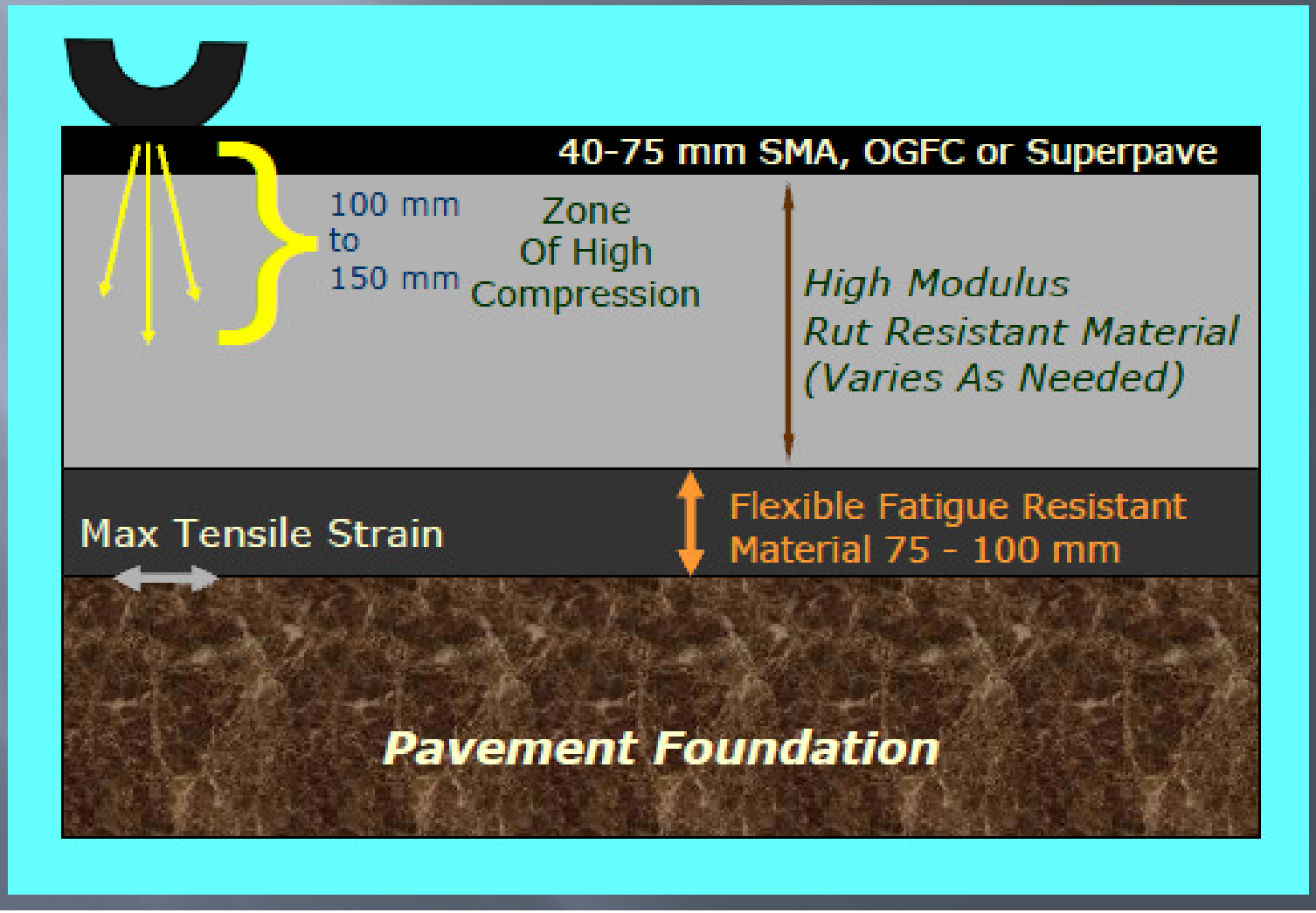
Surface Distresses Only

Top Down Cracking

Non-Structural Rutting



Perpetual Pavement



Pavement Rehabilitation

Pavement Rehabilitation

"Structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capacity. Rehabilitation techniques include restoration treatments and structural overlays." *Source: AASHTO Highway Subcommittee on Maintenance*

Pavement Treatment Goals

- Improve Pavement Condition
- Improve Ride Quality
- Improve Safety
- Extend Life
- Increase Structural Capacity
- Reduce Life Cycle Costs
- Increase Customer Satisfaction
  - Noise Reducing Surface(s)

Rehabilitation Process

- Evaluate Existing Pavement and Conditions
- Evaluate Options
- Construct Project
- Monitor Performance

Major Aspects to Evaluate

- Structural adequacy
- Functional adequacy
- Full Depth Repair needs
- Subsurface drainage adequacy
- Material durability
- Shoulder and ramp condition
- Extent of maintenance activities performed in the past

Major Aspects to Evaluate

- Variation of pavement condition or performance within a project (segmenting)
- Miscellaneous constraints for example:
  - Bridge under-clearance
  - Traffic control restrictions
  - Barrier Curb
  - ROW

Pavement Rehab Types

- HMA and Composite Pavement
  - Functional overlay (mill and pave)
  - Structural Overlay (mill, pave and increase profile)
  - Premium mixes
  - Paving Fabrics for HMA pavements
  - CPR and Reflective Crack Relief Interlayers (RCRI) for Composite
- Concrete Pavement
  - CPR
  - CPR and Overlay (4" desired; researching thin overlays, premium mixes, RCRI)
  - Rubblize and Overlay

Summary

- Our goal is to focus shift from pavement rehabilitation to pavement preservation
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Thank you. Questions?

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