

WMA & RAP and New Technologies

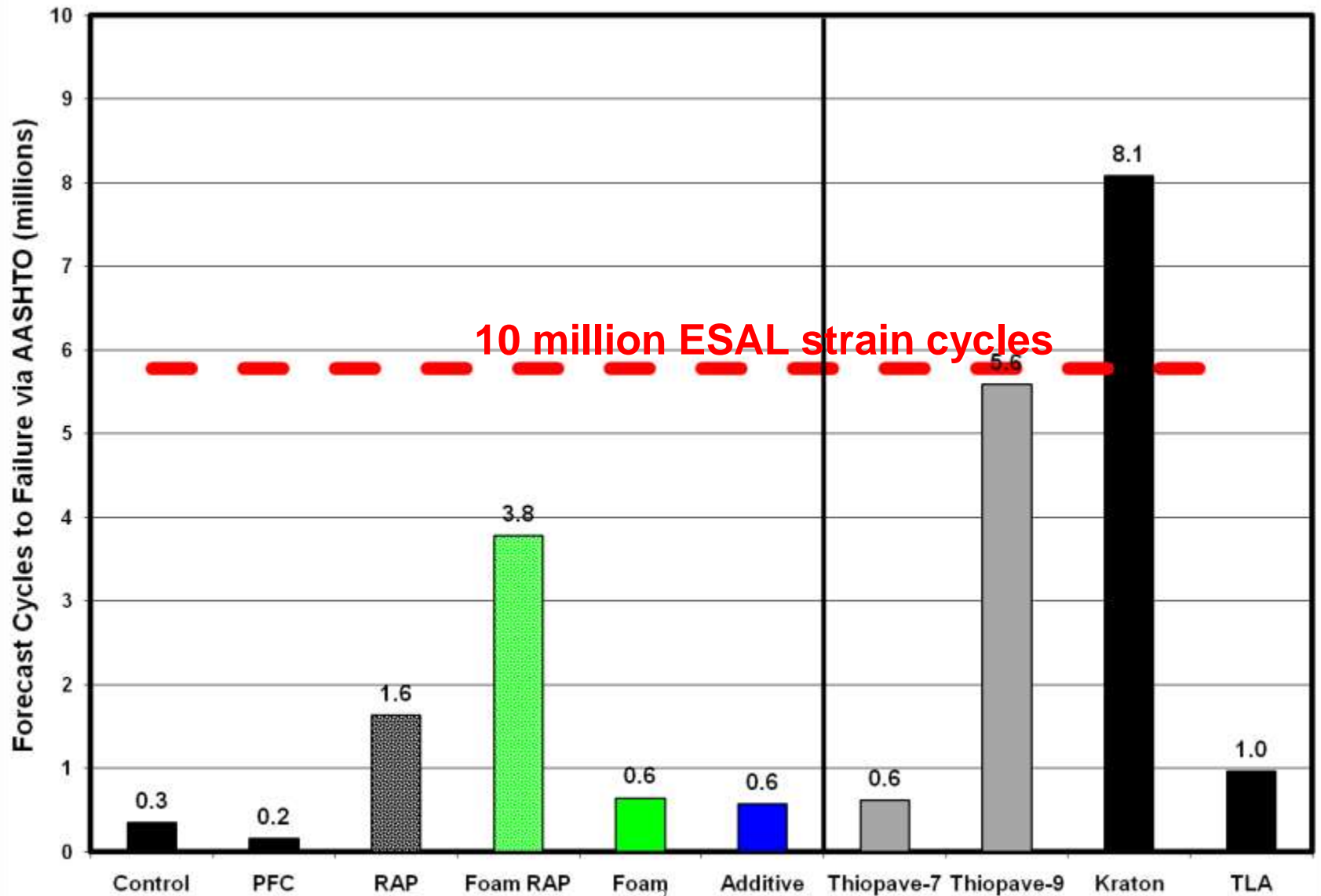
National Center for Asphalt Technology



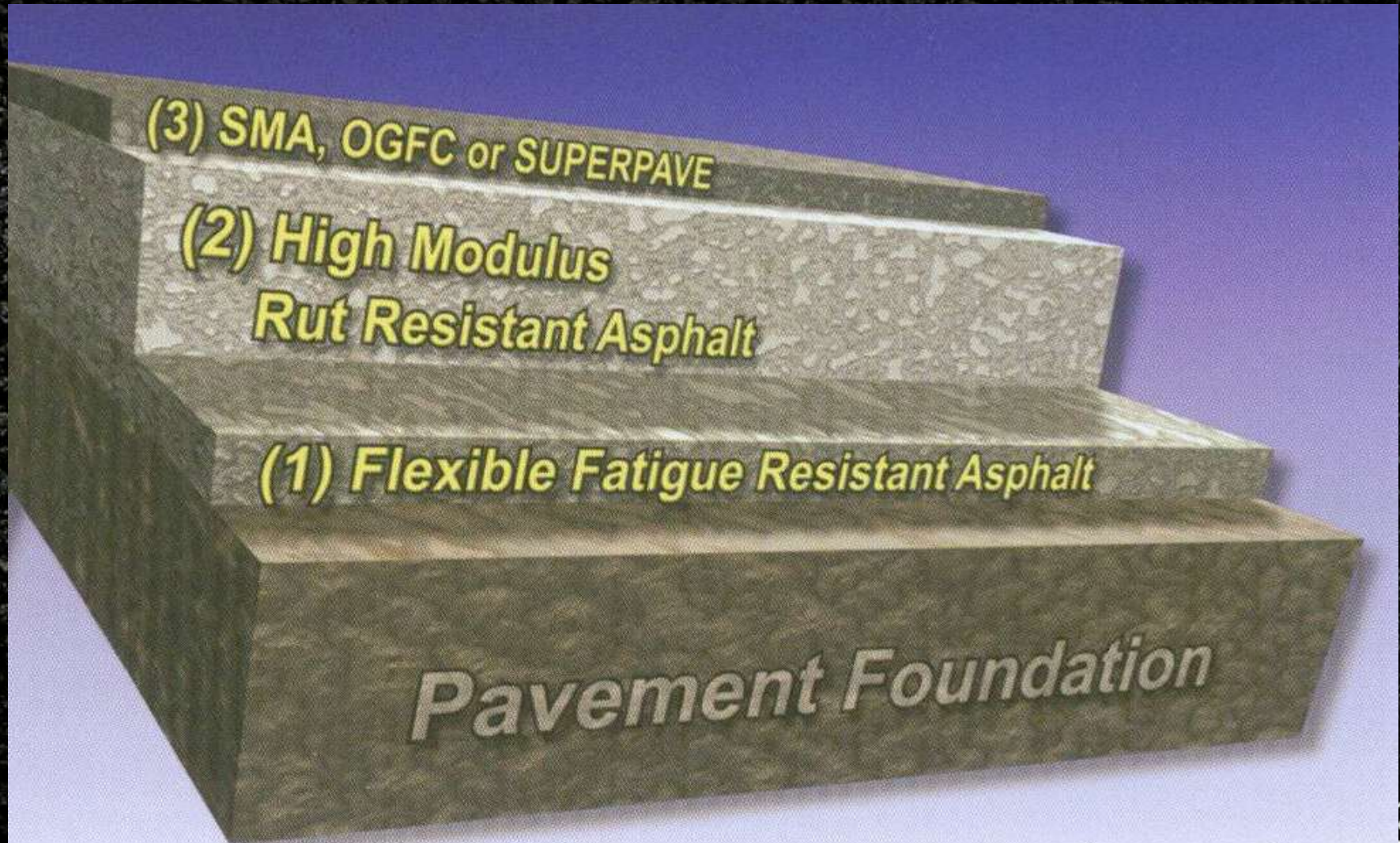
Current NCAT Focus Areas

- Warm mix asphalt
 - High recycled content mixes (RAP & RAS)
 - Alternative binder materials
 - Optimized structural design
 - Pavement preservation
- Automated QC technologies
 - Drainable, quiet pavements

2009 GE+ Fatigue Expectations Actual



Green Group (GG) Experiment



WMA Mix Design

- Drop in additive technologies
 - Mixing/compaction temps via technology provider
- Lab foamers are recommended
 - No way to replicate proprietary technologies
- NCHRP 9-43 “Volumetrics Plus” approach
 - Compactability ($N_{92_{\text{comp-30F}}} / N_{92_{\text{comp}}} \leq 1.25$)
 - T283 (≥ 80 percent) and coating test for moisture
 - FN with criteria as function of traffic
 - Mix above PG grade of recycled materials

RAP Mix Design

- Tier 1: Up to 15% RAP
 - use specified binder grade
- Tier 2: 15%-25% RAP
 - use one full binder grade lower, e.g., PG 58-28 instead of PG 64-22
- Tier 3: Over 25% RAP
 - Extract, recover and grade RAP binder
 - use blending charts to determine required binder grade

WMA+RAP Plant Production

- Plant temperatures (foam/additive)
 - Water injection
 - Additive addition
 - Plant site
 - Terminal blend
 - Combination foam/additive
- Testing (moisture/moisture sensitivity)
- QC/QA
- Cost versus project savings

WMA+RAP Laydown

- Haul time & equipment temperatures
- Temperature behind screed
- Standard HMA best practices
- Significant density differences

WMA+RAP National Perspective

- Federal requirements (9-43)
- Other state specifications/requirements
- Hindsight is 20/20

Shingles

- Processing requirements
- Stockpile practices
- Plant modifications
- Mix quality control
- Mix design specifications
- Source of materials

Alternative Binder Materials

- Post consumer versus manufacturing waste RAS
- Modification via recycled tire rubber
- Highly polymer modified mixes
- Supplementation with Trinidad Lake pellets
- Sulfur replacement WMA technology
- Improved bond strength via tack practices

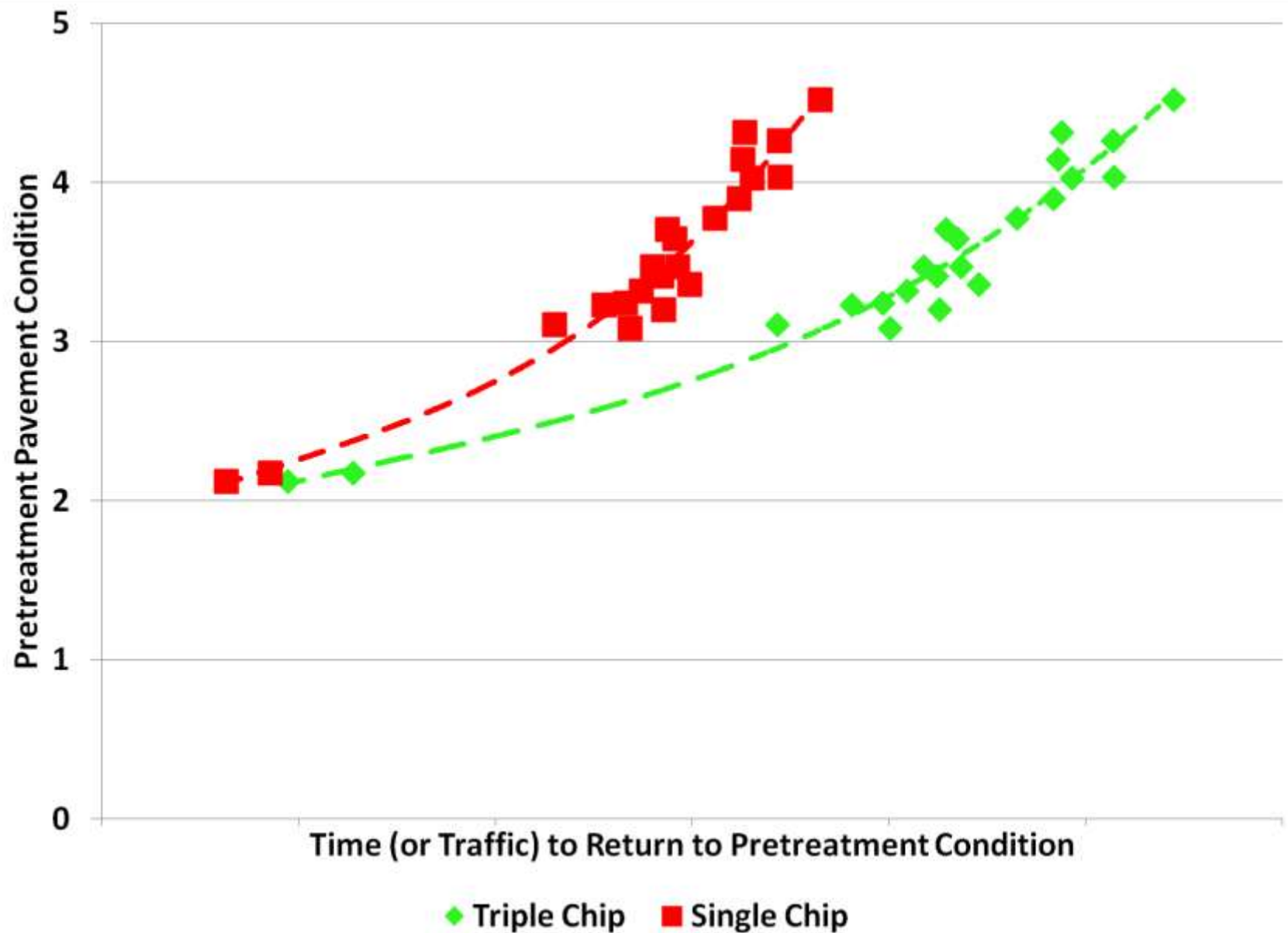
Optimized Structural Design

- M-E design validation / local calibration
 - Perpetual pavements vary from 9 to 14 inches
- Interim layer coefficient recalibration
 - Increase from 0.44 to 0.54 for dense mixes
 - Recommend 0.15 as interim PFC value
- Thinner structures via stiff interlayers
- High polymer mix for construction / rehabilitation

Pavement Preservation

- Reactive versus proactive methodologies
- Combination of plant mix and non-plant mix
- Aggressive pavement management is essential
- Decision trees to identify ideal alternative(s)
- Life cycle as a function of pretreatment condition

Life Cycle of Preservation Alternatives



Questions ?



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