NCAT Pavement Test Track

Research Implementation
Implementation Content

- Materials – local aggregates, polymers
- Mixes – gradations, gyrations, balanced designs
- Structures – E, M-E, CR base, rehabilitation
- Construction – WMA, constructability, tack
- Preservation – objective selection
Key Past Findings

• Innovation is possible with quality commitment!
• We can increase RAP, even with polymers, but...
• How to best get higher healthy binder contents
• No easy way to avoid confounding effect of $G_{sb}$
• Volumetrics alone are not enough (cracking)
• Implementation of balanced mix designs (BMD)
• Fracture energy/rate tests relate to each other
• Unaged results relate well to aged.
Targeted Use of High Polymer Mixes
Current Track Research Focus

• Balanced mix design (design and construction)
• Effect of high-to-low density on performance
• Interlayers to reduce reflective cracking
• M-E with lime modification, cement stabilization
• Single pass full depth rapid reconstruction
• Soybean-based biopolymer asphalt modification
• Thinlays and ultra thinlays for preservation
• Validation of laboratory cracking tests (aging).
Cracking Group (CG) Study

BBF  SCB-LA  I-FIT  OT-TX  OT-NCAT

SVECD  DCT  Energy Ratio  Nflex Factor  Cantabro

MnROAD

National Center for Asphalt Technology
at Auburn University
Cracking Group (CG) Study

The image shows a graph with the y-axis labeled as "Flexibility Index". The x-axis lists various conditions and treatments with corresponding flexibility index values:

- N1 (20% RAP Ctrl): 3.6
- N2 (High Dens Ctrl): 1.9
- N5 (Low AC/Dens Ctrl): 2.7
- N8 (Ctrl + 5%RAS): 0.6, 0.1
- S5 (35%RAP w/58-28): 6.3
- S6 (Ctrl w/ HiMA): 1.8
- S13 (15%RAP AZ GTR): 4.5, 3.8, 4.3

Additional information includes logos for MnROAD and NCAT at Auburn University.
Cracking Group (CG) Study

Illinois Flexibility Index Test

- ITP 405/AASHTO TP124
- Conditioning
  - 25°C ± 0.5°C for 2.0 ± 0.5h
- Load Line Displacement Rate
  - 50mm/min

\[ FI = \frac{G_f}{100|m|} \]

\[ G_f = \int_0^{u_f} p(u)du \]

\[ h \cdot L \]

*Units in mm*

Illinois Department of Transportation
Cracking Group (CG) Study

Simple Marshall Press IDT Index vs I-FIT

- I-FIT FI
- Simple Marshall Press IDT Index
Summer 2018 Track Rebuild

MnROAD

National Center for Asphalt Technology at Auburn University
Reflective Crack Prevention
Benefits = \( f(\text{Pretreatment Condition}) \)

- "Fair" Life Extending Benefit
- "Fair" Condition Improving Benefit at End of Year 3

MAP-21 Cracking
- Green = "Good" (<5%)
- Yellow = "Fair" (5% ≤ 20%)
- Red = "Poor" (>20%)
Takeaways

• 2018 Track build was challenging, but successful
• Volumetrics versus performance in BMD mixes
• It is possible to run QC tests real time for BMD
• Good density is easier than bad with good mix/QC
• Full depth rapid rebuilds are viable option, but...
• Diamond grinding and thinlays for smoothness
• Fleet now running at a rate of 100,000 ESALs / wk.
2018 TEST TRACK CONFERENCE

MARCH 23-25, 2021

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