Bituminous Research Update 2019

Wayne Rilko
Bituminous Engineer
Asphalt Contractors Association of Florida
Annual Conference
December 11, 2019
Recently Completed Contracted Research

Evaluation of FC-5 with High Polymer to Reduce Raveling (Texas A&M Transportation Institute)

Compare the durability of OGFC mixtures: polymer modified PG 76-22 and High Polymer modified binders.

Life-cycle cost analysis determined the advantages of HP binders would translate into cost savings.
Determine the Structural Coefficient for Asphalt Mixes Containing High Polymer Binder (University of Nevada Reno)

PG 76-22 (PMA) mixtures = 0.44 structural coefficient.

Increasing the polymer content (high polymer mixes) = 0.54 structural coefficient.

Additional testing is planned.
Evaluation of Roadway Worms/Distortions
(Applied Research Associates, Inc.)

• Determine the contributing cause(s) for roadway worms/distortions.
• Identify their impacts on pavement lifespan.
• Develop rehabilitation strategies to prevent these distortions from occurring.
Many projects require extensive field work by the FDOT’s SMO and DMOs and the research consultants.
Study of the Potential Benefits of Anti-Strip Additives on Granite Based FC-5 Asphalt Mixture (NCAT)

• These mixtures currently contain 1% hydrated lime.

• Determine if adding a liquid anti-strip, additional hydrated lime, or both improves performance and longevity of granite FC-5 mixtures.
Development of a Procedure for Evaluating and Approving Liquid Anti-Strip Agents
(Texas A&M Transportation Institute)

- Laboratory evaluation process for determining the effects of liquid antistrip agents on the stability of asphalt mixtures during and after construction.
Active Contracted Research Projects

Enhanced Characterization of RAP for Cracking Performance (University of Florida)

- Perform additional tests to characterize RAP for PG 76-22 mixture inclusion.
- More specifically, can we put more RAP in structural courses that contain PG 76-22 binder?
- Can RAP be used effectively in high polymer mixes?
Evaluation of the Cracking Performance of Asphalt Binders at Intermediate Temperatures (University of Florida)

- Binder plays a critical role in the cracking resistance. Cracks typically initiate and propagate through the binder or the interface between binder and aggregate, as opposed to fracture through the aggregate.
- Load-induced fatigue cracking can be either bottom-up or top-down.
Investigation of the Impact of Milling and Construction on Bond Strength of Remaining Thin (scab) Layers (University of Florida)

- If the depth of milling is close to the interface between previously paved HMA lifts, a thin layer of the upper lift may be left behind (scab).
- If these scabbed layers are not removed, will the new HMA be properly bonded to the pavement structure?
Active Contracted Research Projects

Design and Performance of Open-Graded Friction Course (OGFC) Mixtures Containing Epoxy Asphalt (NCAT)

• Raveling is a durability issue. Once the distress begins, it progresses rapidly.
• Previous research has shown that the properties of asphalt binders can be significantly improved by adding epoxy resins.
Active Contracted Research Projects

Laboratory Testing Protocol to Evaluate Alternative Materials for use in Modifying Asphalt Binders and Asphalt Mixtures
(Texas A&M Transportation Institute)

• A laboratory testing protocol to properly assess new asphalt mixture additives.
• Determine if their performance is equal to or better than SBS modified (PG 76-22) mixtures.
• Both asphalt binder and mixture tests will be used to evaluate asphalt binder additives.
In-house Research

Heavy Vehicle Simulator (HVS) 10 Studies (Phase 1, 2020 ~ 2021)

- Single Lift Deep Mill/Fill (6-inch)
- 9.5/12.5 mm Mix Study
  - $N_{des} = 50$, VMA $> 14.5$ @ higher density (93-94%)
  - $N_{des} = 50$, VMA $> 14.5$ @ lower density (90-91%)
  - Air voids = 4%
In-house Research

HVS 10 Studies (Phase 1, 2020 ~ 2021)

- Binder Study (alternative modifier, terpolymer)

- Scabbing Study
  ✓ Scabbing impact on interlayer bonding strength: (0.25 in, 0.5 in, 1 in thicknesses)
In-House Research

Pie Plate Imaging

Florida Method FM 5-588 is currently done by visual examination to determine the optimum asphalt binder content of OGFC mixes.

Alternative Quantification: Pie Plate Image Processing

✓ Optimum asphalt binder %. Area, aggregate type, and sampling error adjustment.
In-house Research

IDEAL-CT
Procedure

Florida Method FM 1-T 168
Sampling Bituminous Paving Mixtures

Raise and rotate the quartering device approximately 45 degrees.

Scoop the correct mass for the VT sample from Quarters 5 and 8.
Scoop the correct mass for the RT sample from Quarters 6 and 7.
NCAT Test Track

- Continuation of the group cracking study
- Continuation of the RAP study. 20, 25, and 30% with PG 76-22 (PMA) and 30% with PG 64-28 (PMA)
NCAT Test Track

2018 Construction
Density study: 88%, 90%, 92%, and 94% sections
TL D, PG 76-22 (PMA), 20% RAP, 1.5” thick
Thank you!

Wayne A. Rilko, P.E.
Bituminous Engineer
Florida Department of Transportation
State Materials Office
Gainesville, FL 32609
E-mail: wayne.rilko@dot.state.fl.us