



Florida Department of
TRANSPORTATION

Asphalt Contractors Association of Florida

Annual Conference

Research Update

Wayne A. Rilko. P.E.
Florida Department of Transportation
Bituminous Mix/Binder Engineer
September 13, 2016
wayne.rilko@dot.state.fl.us

Field Projects

Enhanced Durability/Increased Density (I-75 South of I-10)

FHWA. 10 projects. Each site, control section using standard compaction techniques.

Test section with improved compaction techniques using the same equipment.

If desired, another test section using additional equipment, improved procedures, etc. to achieve improved in-place density.

Field Projects

Enhanced Durability/Increased Density



Field Projects

Enhanced Durability/Increased Density

Most states' in-place density requirements are based on what levels of in-place density could be achieved.

FHWA estimates: A 1% decrease in air voids improves **fatigue performance** by 8.2 to 43.8% and **rutting resistance** by 7.3 to 66.3%.

NCAT estimate: A 1% reduction in in-place air voids can **extend the service life** by conservatively 10%.

Field Projects

20% RAP, 40% RAP SR-21
(Blanding Blvd. South of Jacksonville)



Field Projects

20% RAP, 40% RAP

Two 500 ton test sections: one with 20% RAP content and one with 40% RAP content.

Appropriate binders. 20% RAP with a PG 58-22 binder. 40% RAP with a PG 52-28 binder.

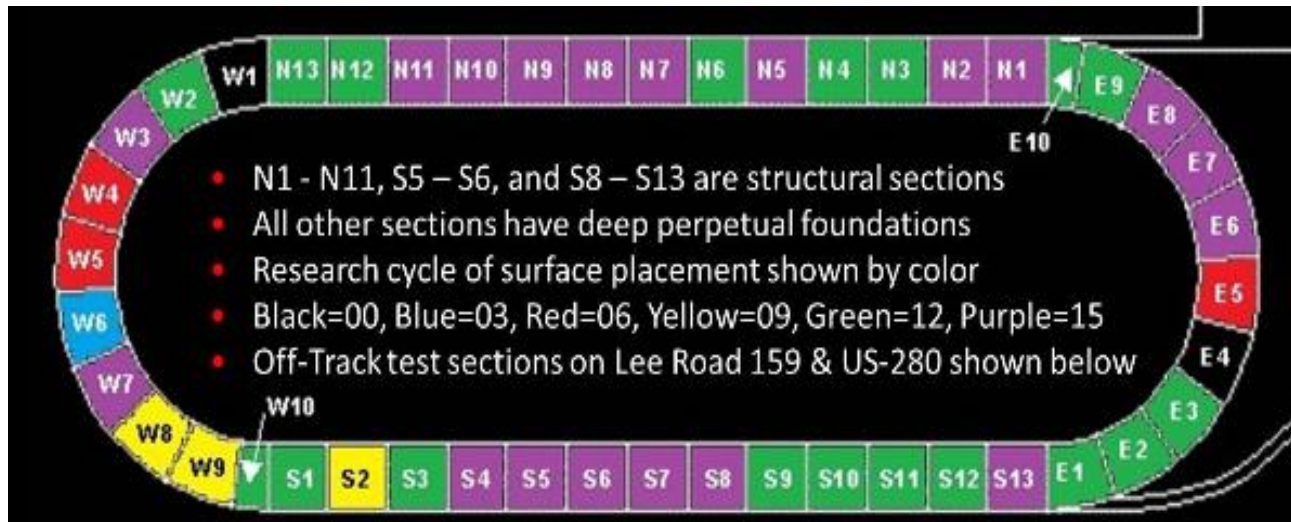
Performance testing to be conducted by the Louisiana Transportation Research Center at the Louisiana State University.

Current NCAT Pavement Sections

- Constructed July 2015
- Two test track sections E7 & E8
 - Split to get four test sections
- Two binder types, three RAP %
 - PG 76-22 (PMA) w/ 20%, 25%, and 30% RAP
 - PG 58-28 (PMA) w/ 30% RAP



NCAT FDOT Sections



Two quadrants, E7 and E8.
Two projects per quadrant.
2,000,000 ESALs into 10,000,000
total ESAL project

NCAT FDOT Sections

Quadrant: E Section: 7A

- Research Objective: **SBS-Modified PG76-22**
- Granite/Sand, **20% RAP**

Quadrant: E Section: 7B

- Research Objective: **SBS-Modified PG76-22**
- Granite/Sand, **25% RAP**
- More cracking when compared to the 20% RAP mix.

NCAT FDOT Sections

Quadrant: E Section: 8A

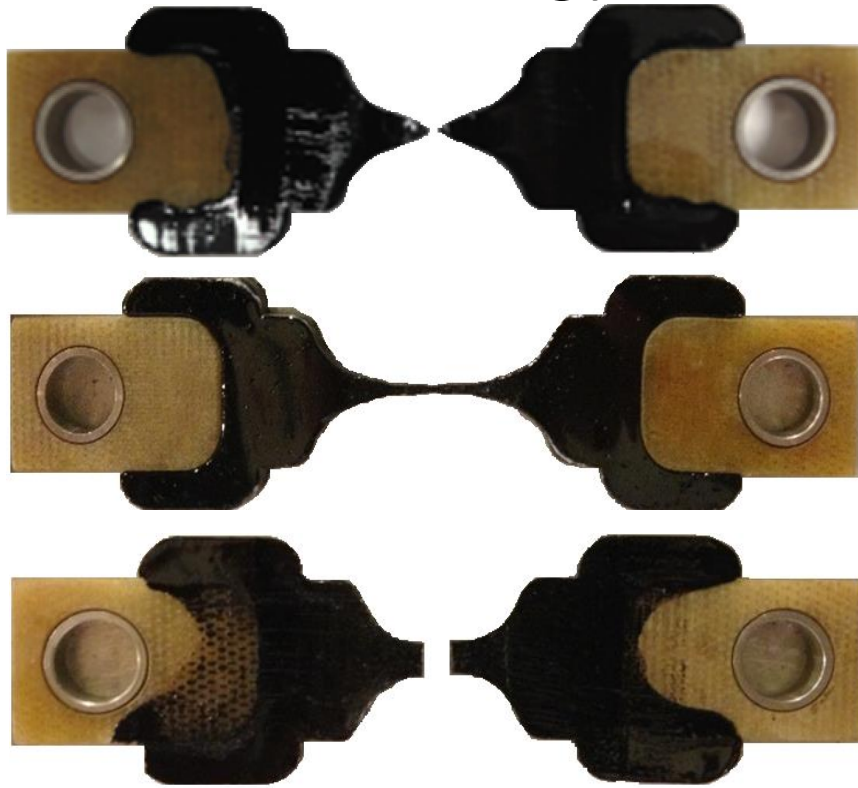
- Research Objective: **SBS-Modified PG76-22**
- Granite/Sand, (highest) **30% RAP**
- Little or no cracking

Quadrant: E Section: 8B

- Research Objective: Softer **SBS-Modified PG 58-28**
- Granite/Sand, (highest) **30% RAP**
- Minor cracking, slightly more than PG 76-22 SBS.

Contract Research Completed

Binder Fracture Energy (UF)



Specimen Fractured Properly; Specimen Failed to Fracture; Premature Fracture Failure

Contract Research Completed

Binder Fracture Energy (UF)

Developed in research conducted for the FDOT.

AASHTO to adopt as a provisional test method,
"Determining the Fracture Energy Density of Asphalt
Binder Using the Binder Fracture Energy (BFE) Test."

Contract Research Completed

Understanding the Mechanisms of Raveling to Extend OGFC Service Life (TTI)

The Cantabro loss test was the best predictor of the durability of the mixtures when compared to observed field performance.



LA Abrasion drum for 300 revolutions without steel spheres

Contract Research On Going

Asphalt Pavement Interface for Enhanced Bond Strength (UF)

Near-surface longitudinal cracking may be related to debonding between asphalt layers

Localized interface debonding in the wheelpath can initiate longitudinal cracks that propagate to the surface?

Contract Research On Going

Evaluation of Reflective Cracking Mitigation Treatments Using the Composite Specimen Interface Cracking Test (UF)

CSIC Test

Identify an effective alternative to the ARMI interlayer

Less expensive than a geotextile system

Fracture-Tolerant and Shear-Resistant (FTSR) interlayer

Contract Research On Going

High Reclaimed Asphalt Pavement (RAP) Asphalt Mixes for Low Volume Roads (TTI)

Develop a mix design method for low volume roads
(ADT < 750 vehicles/day)

Central plant production

Cold or hot production process

High quantities of RAP (60-100%)

Contract Research On Going

Recycled Asphalt Shingles(RAS) on Binder Performance (UF)

Two RAS, two RAP, two virgin binders, and two rejuvenators.

Asphalt content, aggregate gradation and continuous grades.

- The RAS binder was too stiff to properly characterize.
- High temperature continuous grade could be obtained by using a special DSR.
- It was practically impossible to obtain the low temperature continuous grade.

Contract Research On Going

Long Term Aging of Binders Containing RAP (FIU)

Aging of the asphalt binder is among most critical parameters.

Asphalt binder becomes hard, brittle and prone to cracking.

Rejuvenating is the process of restoring original properties of an aged asphalt binder by adding a recycling agent (rejuvenator.)

Contract Research Completed

Laboratory 'Texas' Overlay (FSU)

Simplified procedure to obtain the fracture properties of mixtures.

Correlation relationships between the crack indices and the fracture properties were developed.

Controlled environmental chamber with heating or cooling capabilities between 5°C to 40°C.



Contracted Research Ongoing

Evaluation of Asphalt Pavement Interface Conditions for Enhanced Bond Performance (UF)

Three-dimensional representation of the pavement structure subjected to a moving load.

Time-dependent response of the asphalt layer.

Stress components (shear, horizontal, vertical stresses) in both transverse and longitudinal cross-sections

Contracted Research Upcoming

- Evaluation of FC-5 with PG 76-22 HP to Reduce Raveling
- Enhanced Characterization of RAP for Cracking Performance



Thank You