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FDOT's Experience with High Polymer Binder

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What is High Polymer Binder?

- FDOT's premium binder to address severe rutting, bottom-up fatigue (alligator) cracking, and raveling (OGFC)
- Replaced PG 82-22 binder in the July 2017 Specification Workbook

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FDOT High Polymer Requirements

- SBS or SB polymer only
- No Polyphosphoric acid
- More stringent RTFO test residue requirements
- No RAP in HP mixtures

Multiple Stress Creep Recovery, $J_{nr,3.2}$ (d, e, f) AASHTO M 332-14	67°C (Modified binders only)	"V" = 1.00 kPa^{-1} max Maximum $J_{nr,diff}$ = 75%
	76°C (High Polymer binder only)	0.10 kPa^{-1} max
Multiple Stress Creep Recovery, %Recovery (d, e) AASHTO M 332-14	67°C (Modified binders only)	$\%R_{3.2} \geq 29.37\,(J_{nr,3.2})^{-0.2653}$
	76°C (High Polymer binder only)	$\%R_{3.2} \geq 90.0$

Rutting

- Only 0.3% of FDOT's system is deficient due to rutting
- However rutting is a significant safety concern
- Traffic is increasing

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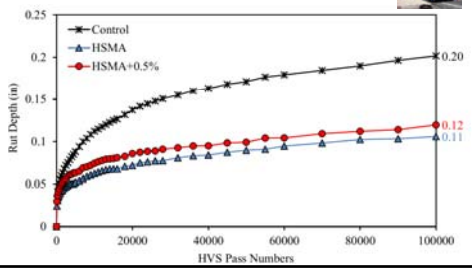
FDOT HVS High Polymer Research

- High polymer vs. PG 76-22 (PMA)



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US 90 Midway Project

- US 90 pilot project was paved in August 2015
- Westbound travel lanes at the I-10 interchange
  - Between two truck stops
  - Rutting up to two inches
- Maintenance project that was programmed to be reconstructed with concrete pavement
- Resurfaced top 2.5" with a single lift of FC-12.5 containing high polymer binder
- Concrete reconstruction delayed

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US 90 Midway Project

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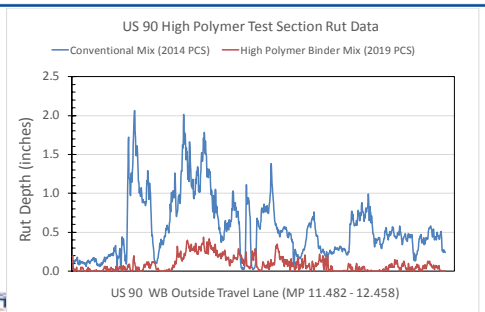
US 90 Project Rut Data



Agricultural Inspection Stations

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High Volume Intersections / Interchanges

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Cost-effective Alternative to Concrete

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Cost-effective Alternative to Concrete

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Bottom Up Fatigue (Alligator) Cracking

- Like rutting, low percentage of deficiencies in FL
- However, very expensive fix, especially when geometrically constrained by curb or guard rail

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High Polymer Research

- Determine the Structural Coefficient for Asphalt Mixes Containing High Polymer Binder (BE321)
  - Research Organization: University of Nevada Reno
- The objective of this project was to determine the additional structural value of high polymer mixtures compared to asphalt mixtures containing PG 76-22 binder.
- Research showed there is roughly a 20% increase in structural capacity for high polymer binder mixtures.

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Bridge Approaches

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Ramps

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Open Graded Friction Course

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Florida State Highway System

- 44,424 lane miles
- 97.4% of pavement is asphalt
- 50.2% of the asphalt pavement is surfaced with an open graded friction course
- Florida does roughly 500,000 tons of OGFC every year

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High Polymer Research

- Evaluation of FC-5 with High Polymer Binder to Reduce Raveling (BE287)
  - Research Organization: Texas A&M Transportation Institute
- The objective of this research was to determine if the use of high polymer binder in FC-5 mixtures (in lieu of PG 76-22 binder) will increase the performance/longevity of FC-5 mixtures.
- Research indicated a minimum of 2 year increase in pavement life for FC-5 mixtures containing high polymer binder.

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Open Graded Friction Course

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Open Graded Friction Course

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High Polymer Projects

- Completed 17 projects with high polymer binder
- Placed over 280,000 tons of high polymer mix in Florida
- First two demonstration projects were built in 2015

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Constructability

- Try to avoid hand work areas, but they can be successfully paved with HP binder
- Contractors have averaged a bonus on all projects except one.
- Smoothness data has been good
  - Average IRI for completed projects has ranged from 33 to 47 at acceptance.

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Lessons Learned

- Limited supply
- HP binder is more difficult to produce
  - Good communication needed to assure timely supply
- Expensive
  - Only use it where you need it
- Finite storage period
  - Allowances provided to minimize storage issue
    - Blend down procedure
    - Usage in non-HP applications with RAP

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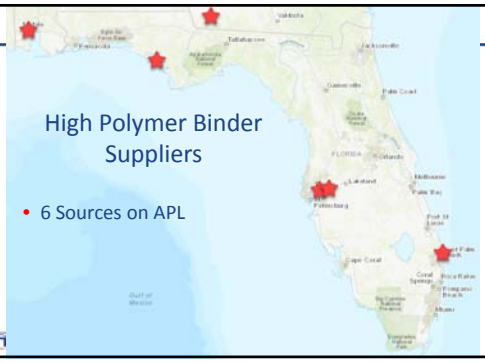
High Polymer Binder Suppliers



- 6 Sources on APL

Lessons Learned

- Limited supply
- HP binder is more difficult to produce
  - Good communication needed to assure timely supply
- Expensive
  - Only use it where you need it
  - Give the contractor options
- Finite storage period
  - Allowances provided to minimize storage issue
    - Blend down procedure
    - Usage in non-HP applications with RAP

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One More Research Project

- Enhanced Characterization of RAP for Cracking Performance (BDV31-977-70)
- Research Organization: University of Florida
- One of the components of this project is to determine if RAP can be utilized in high polymer mixtures without sacrificing performance.
- Project should be completed in 2020

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Thank You