SMA in Pennsylvania

Neal Fannin P.E.
Pavement Materials Engineer
Construction Materials Division
History

- First SMA project placed in 1994 in PA in District 8. (Harrisburg area)
  - Did not perform well

- 1997 District 9 placed their first SMA project.

- 2001 District 9 placed 2 projects
  - 2003 – 1 project
    - 2004 – 1 project
      - 2005 – 1 project
        - 2006 – 2 projects
          - 2007 – 3 projects (6 state wide)

Long Life Asphalt Projects

• 5 Projects paved in 2018

• 6 Projects to be paved 2019 thru 2022
LLAP Current Features

• Asphalt Rich Base Course
  • PWT acceptance includes incentive /disincentive.
  • Design at 3% voids
  • Design 1 gyration level lower than other courses.

• Binder Course
  • PWT acceptance includes incentive /disincentive.
  • DCT and Hamburg Wheel track test required as performance testing

• Base Course
  • PWT acceptance includes incentive /disincentive.

• Wearing Course
  • SMA only
  • 2% density incentive possible
  • DCT and Hamburg Wheel track test required as performance testing
Long Life Asphalt Paving Project

- Pilot Specification Only Included SMA projects
- Rutting Test. (Hamburg Wheel tracking)

- Cracking Tests (DCT, IFIT, SCB, OT,
Long Life Asphalt Projects – DCT data

DCT Performance Diagram

DC(T) Fracture Energy (J/m^2)

Hamburg Rut Depth (mm)

Producer 1
Producer 2
Producer 3
Long Life Asphalt Projects – IFIT data

IFIT Performance Diagram

IFIT Flexibility Index

Hamburg Rut Depth (mm)

Producer 1

Producer 2

Producer 3
Long Life Asphalt Projects – Overlay Test data

![Diagram showing TEX Overlay Test Data for Producer 2 and Producer 3 with Hamburg Rut Depth (mm) and Cycles to Failure axes. The diagram highlights the overlay test data for each producer.](image)
Long Life Asphalt Projects – SCB Test data

SCB Data at -12C and -24C degrees

Hamburg Rut Depth (mm)

Fracture Energy (J/m²)

-24 Degrees C

-12 Degrees C
Compare mix 1 to mix 3

Gradation Chart: Sieve Sizes Raised to 0.45 Power

Sieve Sizes

Percent Passing

Millimeter Scale

Producer 3

Producer 1
Producer 1

- Eff. AC – 6.6%
- VMA – 18.7
- Pass #4 – 38% = 47% retained
- Pass #8 – 22% = 16% retained
- Coarse
  - Type – Calcareous Sandstone
    - Sodium – 1%, LA – 21%
    - Flat & Elongated 3:1 – 8.7%
- Fine
  - Type – Limestone
    - Sodium 5%

Producer 2

- Eff. AC – 6.5%
- VMA – 18.2
- Pass #4 – 39% = 52% retained
- Pass #8 – 21% = 18% retained
- Coarse
  - Type – Sandstone
    - Sodium – 5%, LA – 32%
    - Flat & Elongated 3:1 – 3.0%
- Fine
  - Type – Limestone / Dolomite
    - Sodium 2%

Producer 3

- Eff. AC – 6.2%
- VMA – 18.1
- Pass #4 – 48% = 54% retained
- Pass #8 – 25% = 23% retained
- Coarse
  - Type – Sandstone / Shale
    - Sodium – 2%, LA – 15%
    - Flat & Elongated 3:1 – 1.4%
- Fine
  - Type – Limestone / Dolomite
    - Sodium 2%
Producer 1

Producer 3
Long Life Asphalt Paving Project - IFIT

IFIT Performance Diagram

IFIT Flexibility Index vs. Hamburg Rut Depth (mm)

Lab Samples
Core Samples
Lessons Learned / Challenges

• Limits from one region may not apply in all others.

• Aggregates seem to mater. (Not just liquid asphalt)

• Testing labs that can do the tests are very limited.
Lessons Learned / Challenges

• Implementation will not be quick or simple.
  • Pick performance test(s)
  • Decide on test protocols.
  • Specification pilot(s).
  • Who will be doing testing and how large of an investment is the equipment?
    • Contractors / Producers
    • Special Testing Labs
• Enough lead time between project bid and paving?
• Trained technicians to run testing?
• After the initial rush to get testing done will there be enough tests run to sustain an industry?
Questions?