2005 Pavement Performance Prediction Symposium

Adhesion and Cohesion of Asphalt in Pavement

Cheyenne, Wyoming
June 22 – 24, 2005

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Nebraska Department of Roads

STPD-43-2(106)
NE Highway #43
Adams to Bennett

- Let to Contract = January 13th , 2000
- Length of Project = Approximately 15.0 mi.
- SP-2 Superpave Mixture = 51,400. tons
- PG 58-28 Binder = 2,700. tons
- Mill ½” existing & replace with 3½” SP-2
- ADT = 2,045 with 9% Trucks

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  - $N_{ini.}$ = 7
  - N_{des} = 76
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Air Voids = 3.6%

PG58-28 Test Results

Average of 24 Field Samples

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Note: 1 sample failed PAV Specifications

Dates of Construction

- May and June of 2000

July Arrives
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Calls are coming in to our office asking us to come out and watch the project's wheel paths turn dark, as the asphalt is flushing to the surface!!

Pictures of Hwy 43

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This project was "tied" to 2 other State Highway Spur overlays.

A Change Order/ Supplemental Agreement was approved to require the use of

PG 64-22

binder for the other 2 locations.

No flushing occurred on these 2 projects.

What's Next?

We cold milled ½" of the surface off of Hwy 43 and to date the surface has not flushed again.

We applied a 1" OGFC on a 3 mile segment for test and evaluation in 2002. It is performing as expected.

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  - Cores from flushed areas
  - Cores from non-flushed areas
  - Original PG Binder samples

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    - Binder analyzed by Differential Scanning Calorimetry (DSC)
    - Binder viewed by Environmental Scanning Electron Microscope

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- There was “lower boiling” material in extracted core vs. original binder.
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- More small molecular size material in top of flushed core than in original binder.

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- Lower molecular weight material is interfering in the crystallization of the wax material present in the original binder.
- There is an indication of the presence of Carbon Black, possibly crumb rubber?

In Summary

"The results do not find any conclusive evidence as to the cause of the asphalt problem on Highway 43 but the analyses show some very unusual chemical properties of the asphalt that most likely contribute to the problem. We (WRI) have become aware of some other states that have experienced similar problems at about the same time."

Adhesion or Cohesion Problem?

Not your usual problem!

Special Thanks

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- Bob Traudt – Project Manager, Nebraska Department of Roads

Questions?