CENTER FOR TRANSPORTATION RESEARCH

PROJECT SUMMARY

Texas Department of Transportation

0-7057: Developing Guidelines for Precoating of Aggregates Used in Seal Coats

Background

Seal coats in Texas are unique because most binder is hot applied and aggregates are precoated. Precoating eliminates dust and improves adhesion between aggregate and binder. There are currently no guidelines or specifications in place that allow engineers to specify and accept the quality and extent of binder used to precoat aggregates. Precoating with certain binders can result in poor adhesion and premature failure of the seal coats. Inadequate precoating can result in dusty aggregate that impedes aggregate adhesion.

What the Researchers Did

Researchers investigated the effect of several influencing factors on the performance of precoated aggregates in seal coats based on a thorough literature review and a survey of TxDOT and other state DOT personnel. Researchers evaluated tests that measure the area of surface coating on precoated aggregate and determined that an image analysis technique performed best. They also determined that a lab Sweep test and Vialit test were the best candidates to measure adhesion of aggregate in seal coats. They used these tests to evaluate the influencing factors on aggregate adhesion in a set of laboratory experiments. The experiments included factors of:

- aggregate minerology (limestone, sandstone, rhyolite, and gravel),
- seal coat binder type (2 binders), and
- precoat binder amount (5 different percentages by weight).

An image analysis procedure was developed and used to measure the area of coverage of each precoated aggregate type at each binder precoating level to correlate with the performance tests (Sweep and Vialit).

What They Found

The researchers made the following key observations based on these tests:

1. Precoating of aggregate increases aggregate adhesion according to Sweep test results; this is validated by field test sections.
2. Image analysis can be used to determine the precoat area.
3. Aggregates with no precoat exhibit much more loss when the Sweep test is performed. This means that precoating significantly increases aggregate retention, validating this use of precoated aggregate for hot applied seal coats (Figure 1).
4. Aggregate precoat area above 50% has little effect on aggregate retention, but precoat area above 85% tends to produce clumping. Thus, the optimum precoat area is between approximately 50% and 85%.

Research Performed by:
Center for Transportation Research

Research Supervisor:
Amit Bhasin, CTR

Researchers:
Erica Lopez
Mike Rung
Dheeraj Adwani
Ahman Masad
Darren Hazlett

Project Completed:
08-31-2022

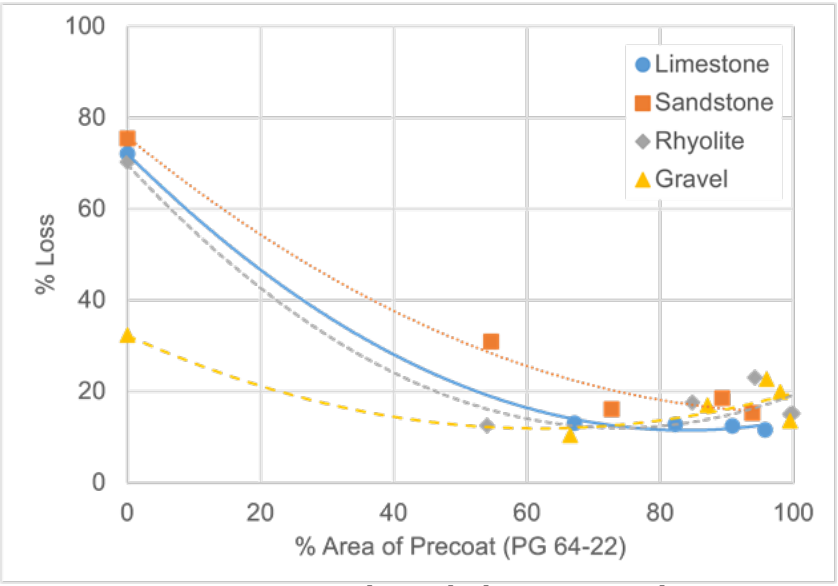

Figure 1. Sweep test results including uncoated aggregate (AC-20-5TR base binder)

What This Means

The project's findings led to the following recommendations:

- Continue the use of precoated aggregate for hot applied seal coats.
- Use precoat percentages by weight of aggregate that correspond to between 50% and 85% of aggregate area coated. This is aggregate specific, as it depends on aggregate absorption and surface area.
- One mechanism of implementation can be to use project materials (aggregate and precoat binder) to precoat samples using different percentages by weight and measure the coated area of each sample. The percent by weight that corresponds to approximately 50% area coverage can be specified for use during construction.

For More Information

Project Manager:
Tom Schwerdt, RTI (512) 466-4186

Research Supervisor:
Amit Bhasin, CTR (512) 471-3367

Technical reports when published are available at **https://library.ctr.utexas.edu.**

Research and Technology Implementation Division
Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483

www.txdot.gov

Keyword: Research