Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

0-6926: Methods of Rehabilitating Pavements with Moisture Damaged Asphalt Layers

Background

Stripping is moisture damage to old hot-mix asphalt (HMA) layers that are often buried several inches down in the pavement structure. Texas has many miles of pavements with a moisture-damaged layer near the surface. The typical current permanent repair method is to mill out the stripped layer completely and replace it with new HMA. Recent developments in cold in-place recycling (CIR) and cold central-plant recycling (CCPR) can be considered for addressing this stripping problem while recycling 100 percent of the existing HMA and placing it as a structurally sound black base layer. This project conducted a laboratory and design study to determine if either CIR or CCPR techniques could be considered to recycle moisture-damaged HMA layers in Texas.

What the Researchers Did

Researchers completed the following tasks:

- Literature review on CIR/CCPR mixture designs and requirements.
- Field investigation of each nominated section using ground-penetrating radar.
- Field sampling.
- Laboratory evaluation on lab-designed CIR mixtures and field CIR cores.
- Development of pavement design solutions and construction recommendations.
- Development of guidelines for laboratory testing and enhanced special specifications.

What They Found

Researchers found the following:

- Various equipment and options are available from industry. Depending on work areas, construction situations, and production rates, CIR and CCPR processes can be customized.
- Existing relevant specifications of several agencies were reviewed. General information on weather limitations, recycled asphalt pavement gradation, and equipment capacities was similar among agencies. However, the mix design requirements were different. Also, each state agency has different curing criteria for CIR in either moisture content or curing time. The CIR/CCPR specifications need to be improved for best practices.
- CIR and CCPR are becoming popular methods to rehabilitate existing asphalt pavements, and have been successfully used for even higher traffic volume roadways. Many researchers have reported that CIR/CCPR pavements have performed well.

Research Performed by:
Texas A&M Transportation Institute

Research Supervisor:
Stephen Sebesta, TTI

Researchers:
Soohyok Im, TTI
Younho Rew, TTI

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- Treatment options for CIR mixes can be identified through laboratory tests. Binder type affects the CIR mix performance. The mixture properties are temperature dependent.
- For the materials evaluated in the lab, although stiffness and modulus values were reasonable, lab results suggest rutting performance may be a concern.
- Rutting performance on field CIR cores was similar to HMA (Figure 1), but cracking performance showed poorer results (Figure 2).

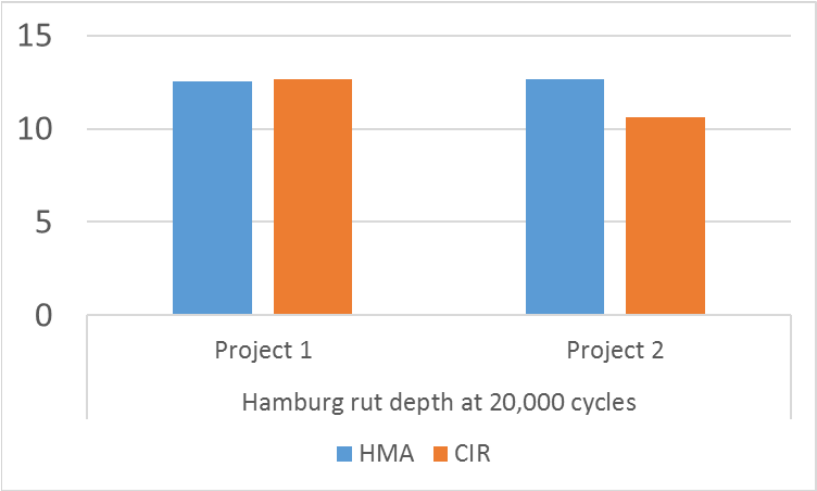

Figure 1. Rutting Performance on Field Mixtures.

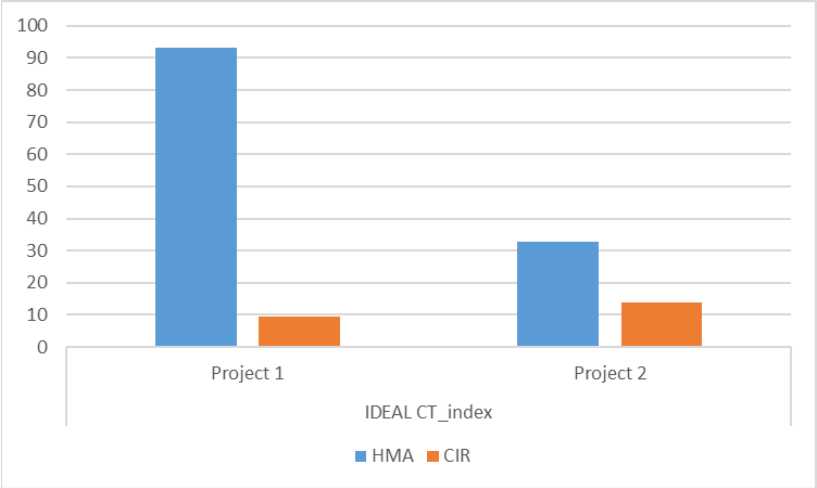

Figure 2. Cracking Performance on Field Mixtures.

What This Means

Based on the findings from this project, researchers recommend the following:

- The most significant recommendation for mix design requirements is to use the indirect tensile strength rather than the Marshall stability test to determine the design binder content.
- Additives may be considered to improve crack resistance if cracking is a concern.
- Lab tests in this research project used multiple approaches to characterize rutting, cracking, and stiffness of CIR mixes. These tests showed the same trends and made sense in context of the expected tradeoffs and interdependencies of rutting, cracking, and mix stiffness. This observation indicates the series of laboratory tests used in this research project are appropriate to characterize CIR mixes.
- The special specification updates recommended in this project should be used for developing CIR/CCPR projects in Texas.

For More Information

Project Manager:
Chris Glancy, TxDOT, 512-416-4747

Research Supervisor:
Stephen Sebesta, TTI, (979) 458-0194

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

www.txdot.gov
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