

# Ohio Department of Transportation ORIL Research Project Fact Sheet



## Reducing Low-Temperature Cracking on Local Roads

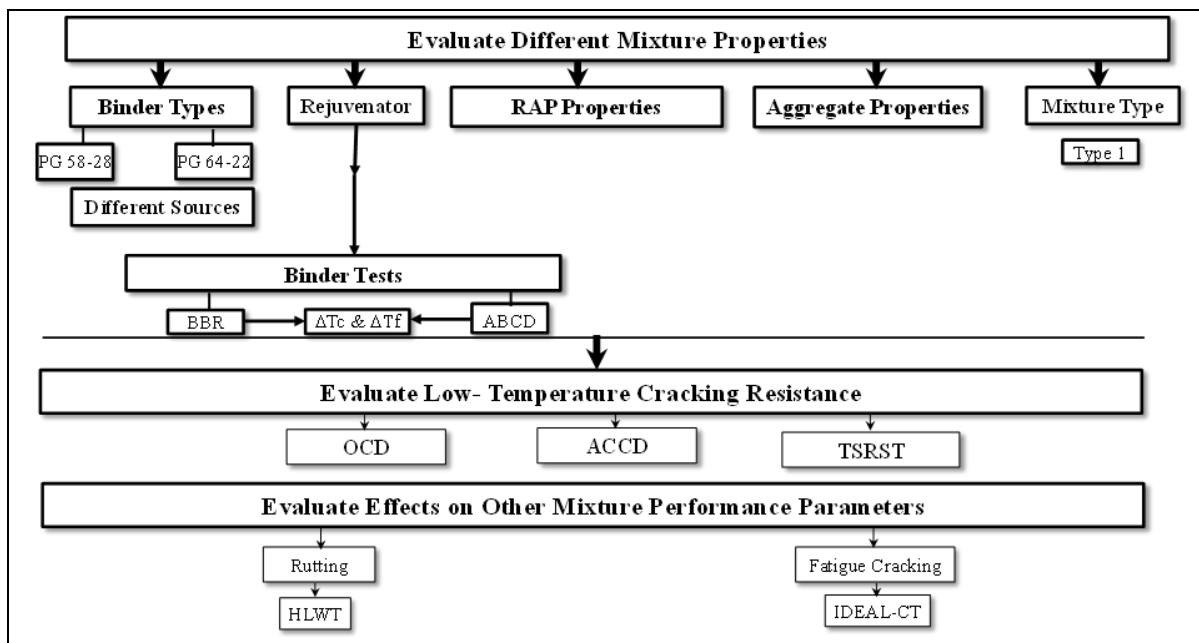
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### The Problem

Roads owned and maintained by local public agencies (LPAs) experience significantly lower traffic volumes and loads from those on state roads. The much lower traffic volumes make low-temperature cracking be the predominant type of distress on asphalt pavements on local roads. The presence of low-temperature cracking allows water to easily penetrate into pavement structures, which leads to early deterioration of the asphalt concrete. Therefore, low-temperature cracking can lead to a significant reduction of the service life and performance of roads owned and/or maintained by LPAs. Research was needed to study the low-temperature cracking of different types of mixes used on local roads. In addition, the effects of the properties of these mixes and their components including asphalt binder, aggregate, and RAP on low-temperature cracking needed to be evaluated.

### What the Researchers Did

A laboratory testing program was conducted to identify the factors that affect the thermal cracking performance of local roadway asphalt mixtures. As shown in figure below, the testing factorial examined the effects of the aggregate, binder, and RAP properties on the low-temperature cracking of asphalt mixtures typically used by local public agencies LPAs. Different tests were conducted on all obtained binders with and without rejuvenators. The low-temperature cracking potential of asphalt mixtures was assessed using various tests. In addition, the propensity of all selected asphalt mixtures to fatigue cracking as well as rutting was examined.



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This research was sponsored through Ohio's Research Initiative for Locals, the Ohio Department of Transportation and the Federal Highway Administration.

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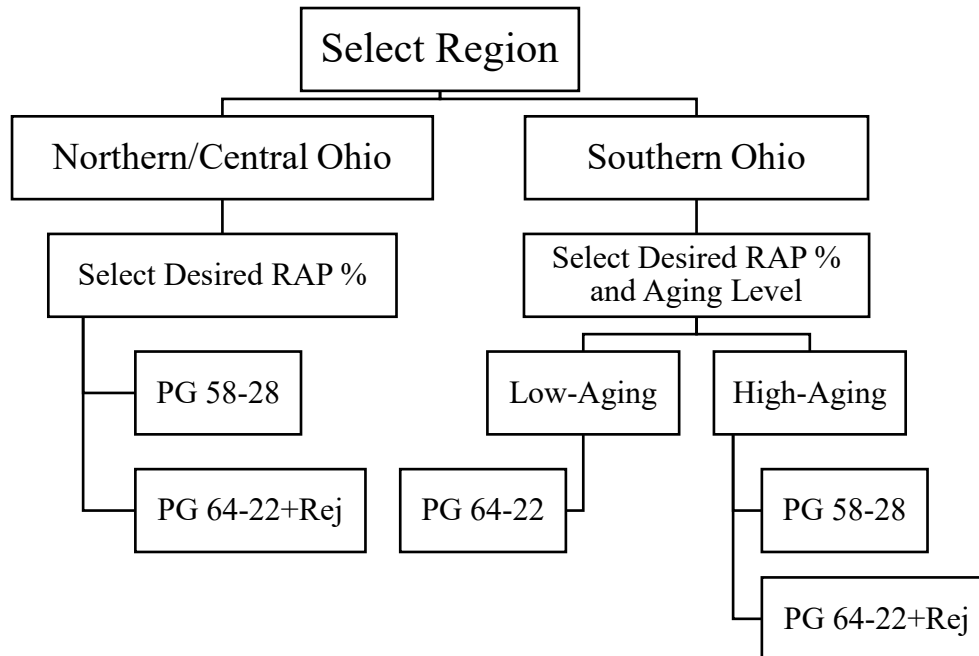


## What They Found

- The results indicated that the binder properties had the most significant effect on asphalt mixtures low-temperature cracking.
- The use of a PG 58-28 binder or PG 64-22 with considered rejuvenators type and dosage improved the low-temperature cracking, fatigue cracking performance while maintaining satisfactory and rutting resistance.
- Increasing RAP content from 20% to 30% showed a slight decline in low-temperature cracking resistance. This decline was more pronounced when using more highly aged RAP material.
- Mixtures with 30% RAP and PG 58-28 binder or PG 64-22 binder with the considered rejuvenator types had better low-temperature cracking resistance than those with 20% RAP and PG 64-22 binder.
- Low-volume roadways in northeastern Ohio experience 12.4% faster Pavement Condition Rating (PCR) degradation compared to southwest Ohio. Northeast Ohio roadways also experienced a 16.1% faster thermal cracking.
- The increased costs of adding rejuvenating agents to PG 64-22 binder should be weighed against the desired performance in terms of low-temperature cracking, fatigue cracking, and rutting.

## What They Recommended

It is recommended to use guidelines shown below to select the binder type for surface course asphalt mixtures to improve their low-temperature cracking resistance.



## Guidelines for Binder Selection

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