



Sustainable Pavement Rehabilitation Using Thin Bonded Overlay Constructed with High Taconite Mix

Project Number 2010-13

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Problem Thin bonded overlay systems have become popular options for pavement preservation and rehabilitation. The City of Duluth has several streets that require functional and structural rehabilitation, and thin bonded overlays may be a viable alternative to traditional overlays for these projects. At the same time, large quantities of locally available taconite tailings, a mining byproduct, could be used to substitute the new mineral aggregate in hot-mix asphalt. However, no standard thin overlay mixes using taconite tailings have been developed or tested in the field.

Solution The City of Duluth constructed three roadway test sections to evaluate the performance of thin bonded overlay mixes containing taconite tailings. One section was constructed using a traditional overlay, and the other two were thin bonded overlay configurations constructed with a spray-paver. The test sections allowed the city to evaluate the thin wearing course and the performance of the new fine-graded asphalt concrete mixture, which contained a significant amount of taconite tailings.

Procedure Twenty-six mixes using taconite tailings were tested, three final mix alternatives were developed, and one was selected for use in the test section projects. The test sections were constructed in September 2012. Immediately following construction, field samples were collected for additional lab tests and to verify the in-place material properties. The test sections were later revisited for a visual survey, and the city plans to make routine follow-up visits.

Results Overall results indicate that the use of taconite tailings in fine-graded asphalt concrete mixtures is a viable option. Early performance has been promising, and continued monitoring is planned. In addition, material production of the taconite mix resulted in significant energy savings and a reduction in carbon dioxide emissions. Although the transportation and construction activities for the taconite mix have higher environmental costs, the overall costs of traditional mixes are still significantly higher.

Approximate Cost \$37,000

OPERA Funding \$10,000

Implementation Although this project only looked at the preliminary performance of the thin bonded wearing course of the mixes containing taconite tailings, the City of Duluth and the University of Minnesota Duluth will continue to monitor the test sections for several more years. Based on the field performance of the thin overlay sections, the city may consider using taconite mixes for future street improvement and rehabilitation projects.

Status Completed

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