

# Research Summary

## Field Implementation of Rubberized Chip Seal

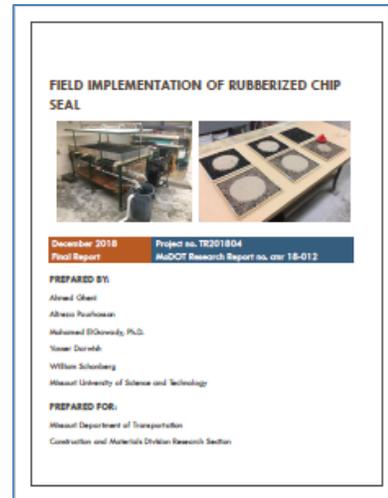
Chip seals have been widely used as a pavement maintenance surface treatment due to its competitive cost and construction time. Recently, the research team developed a rubberized chip seal where natural aggregate is replaced with crumb rubber obtained from recycled tires.

During this study, laboratory chip seal specimens and a field chip seal section with different crumb rubber replacement ratios were prepared. A total of 108 chip seal laboratory specimens were prepared to investigate aggregate retention using six tests: the standard sweep test, modified sweep test, Vialit test, modified Vialit test, Pennsylvania test, and modified Pennsylvania test.

The crumb rubber showed a remarkable performance in aggregate retention measured using the Vialit and Pennsylvania tests.

The macrotexture of the laboratory specimens was investigated using the sand patch and image processing methods and how that reflects on the skid resistance. The values of the mean texture depth (MTD), which is a measure for pavement macrotexture of rubberized chip seal specimens, were significantly higher than that of the conventional chip seal.

However, a reduction in the British Pendulum Number (BPN) was recorded with an increase in the crumb rubber replacement ratio. However,



after a period of more than a year of service life in an experimental section road, the chip seal segments with 25% and 50% crumb rubber replacement ratios recorded much higher BPN compared to that of the conventional chip seal segment.

A rubberized chip seal section, having up to a 50% crumb rubber replacement ratio by volume, was constructed successfully using standard procedures and equipment. However, it was necessary to use a steel roller compactor instead of a rubber tire compactor to compact the chip seal.

This section was monitored for its texture, skid resistance, and aggregate dislodge over a period of one year. The MTD increased significantly with an increase in the rubber content where the MTD of rubberized chip seal with 50% replacement ratio was increased by 77% compared to the conventional chip seal. Raveling distress was also observed due to snowplowing actions. No damage or any sort of distress was observed in the wheel paths due to traffic loads.

Therefore, this study concluded that crumb rubber can be used in the chip seal as a partial replacement of mineral aggregates up to 50%. It is recommended also to increase the curing time for chip seal, regardless of aggregate type, to at

least six hours to improve the performance of the chip seal.

*“Crumb rubber can be used as an alternative for coarse aggregate in the construction of a chip seal. It outperformed the trap rock chip seal in all investigation aspects.”*

### ***Project Information***

**PROJECT NAME:** Field Implementation of Rubberized Chip Seal

**PROJECT START/END DATE:** September 2017-December 2018

**PROJECT COST:** \$54,167

**LEAD CONTRACTOR:** Missouri University of Science and Technology

**PRINCIPAL INVESTIGATOR:** Mohamed ElGawady

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