



Project Title

Pavement Rehabilitation Analysis: A Life-Cycle Cost and Long-Term Performance Comparison of Full Depth Reclamation and Overlays

Study Timeline

July 2021 - June 2024

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Further Resources

Final Report link
Other links
(QR codes work well)

Is pavement recycling worth it? An analysis of life-cycle costs and long-term performance

Introduction or Problem Statement

To reduce the environmental impact of transportation, Departments of Transportation (DOTs) are incorporating cold-recycling technologies such as Full-Depth Reclamation (FDR) as an alternative for pavement rehabilitation. One of the limitations hindering the deployment of FDR is the limited information available on the material properties of these mixtures. The objective of this project is to analyze the long-term performance and life-cycle costs of FDR and compare this rehabilitation solution with traditional overlays.

Methods or Action Taken

In this study, a set of reference sections rehabilitated using FDR and traditional overlay across the state of Colorado were analyzed. Historical information of costs, maintenance history and pavement conditions were characterized using statistical analyses. This information was then incorporated into a probabilistic life-cycle analysis using Monte Carlo simulations to account for the uncertainty in the model inputs. Outputs related to life-cycle costs, long-term condition, and cost-effectiveness were estimated for both FDR and overlay pavements.

Conclusions and Recommendations (or Next Steps)

Overall, FDR was found to be a more cost-effective rehabilitation solution than overlays. FDR pavements have significantly lower life-cycle costs than overlay pavements. On average, the life-cycle cost of FDR pavements is \$178,243/in-mi less expensive than overlay pavements, resulting in a potential cost saving of 30%. FDR pavements also have a better long-term performance than overlays. Over the 10 years analysis, FDR pavements have an average roughness, measured in terms of the International Roughness Index (IRI) of 104 in/mi, compared to 124 in/mi for overlays.

This analysis is limiting the characterization of these alternatives to direct costs and long-term condition terms. Future research analyzing the environmental impacts of these alternatives is recommended to fully capture the benefits of FDR rehabilitation. Our analysis also found some unexpected trends and inconsistencies in the historical pavement condition data that would be worth exploring further. Future research is needed to propose a more accurate process to measure and characterize pavement deterioration.

Potential Impacts and Benefits

This study provides a comparative analysis of the life-cycle costs and long-term performance of recycled pavements using FDR in comparison to traditional overlays. Based on the results of this study, FDR pavements are not only more environmentally friendly, but also result in economic savings and better long-term performance than traditional overlays. These findings suggest that in-place recycling techniques, such as FDR, have broader benefits that should be considered when evaluating pavement rehabilitation alternatives.