

RETHINKING PAVEMENT PERFORMANCE IN COLD CLIMATES

Glenn Highway HiMA section, 2019 (installed 2017)

Studded tires are essential for winter safety in many regions, but they can greatly accelerate pavement wear. In Alaska, a performance-driven approach using advanced asphalt technology demonstrates how infrastructure can be designed to withstand real-world conditions while extending service life.

CHALLENGE

Studded tire wear presents a systemic and costly infrastructure issue across Alaska and the Pacific Northwest. Municipalities face ongoing deterioration driven by repeated tire stud contact, particularly in urban corridors where traffic is concentrated. Research estimates mitigation costs at approximately \$203.2 million over 20 years, highlighting the scale of the challenge.

Traditional solutions, including harder aggregates and optimized mix designs, have delivered incremental gains but fail to address the root cause of accelerated rutting. Studded tire wear from passenger vehicles can exceed the deformation caused by heavy truck loads, requiring a shift in how pavements are designed and evaluated.

Partner: Alaska Department of
Transportation & Public Facilities

Market: Paving

Product(s): HiMA™

Highlights

- Applied in high-traffic areas with traffic volumes of 10,000 to 15,000 vehicles per day
- Designed for location-specific dominant stressors
- Approximately 33% reduction in rutting vs. conventional asphalt
- Validated performance across multiple projects, including city streets and highways

50%

Increase in Pavement Life

before resurfacing required, as shown in side-by-side testing

SOLUTION

To address this challenge, the Alaska Department of Transportation & Public Facilities (DOT&PF) focused their approach on finding a solution that met the needs of traditional rutting concerns around heavy truck loads, but also addressed the issues caused by studded tires.

The DOT&PF implemented a high-performance polymer-modified asphalt using a highly-modified asphalt binder. The PG 64E 40 HiMA™ binder was applied in the wearing course of Anchorage's 5th and 6th Avenues, one of the city's most demanding traffic environments where traffic volumes can reach up to 10,000 to 15,000 vehicles per day.

Rather than relying on incremental improvements, this solution focused on fundamentally enhancing resistance to abrasion and rutting caused by studded tire contact. The formulation was designed to maintain surface integrity in low temperatures while enduring high traffic volumes.

This performance-driven approach reflects a broader shift toward designing pavements for real-world stressors instead of idealized load conditions.

IMPACT

After four years of service, the HiMA binder demonstrated strong performance, with rut depths of approximately 0.204 inches and 0.198 inches on Anchorage's primary corridors. These results confirm sustained durability under regular studded tire exposure and multiple winter cycles.

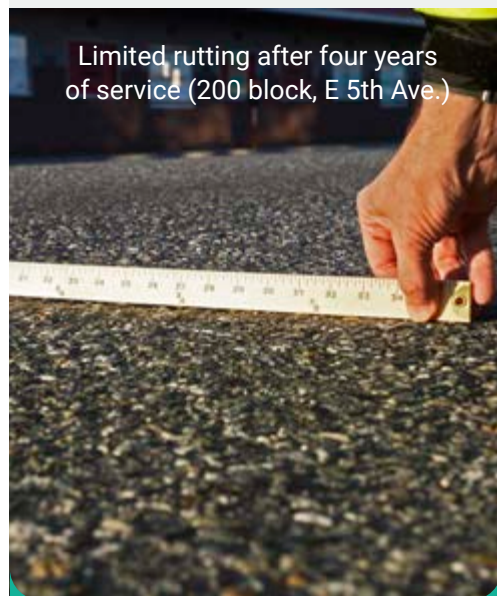
Additional validation on the Glenn Highway showed a clear advantage over conventional materials, with rutting reduced from 0.32 inches to 0.21 inches. This improvement translates to significantly longer service intervals, reduced maintenance frequency, and improved life cycle economics for road owners.

CONCLUSION

Alaska's experience demonstrates that pavement performance improves when infrastructure is designed to meet real-world conditions. By adopting advanced polymer-modified asphalt solutions, agencies can extend pavement life, reduce costs, and maintain safety in even the most demanding environments.

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Limited rutting after four years of service (200 block, E 5th Ave.)



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