LG TRRIP

Use of Crumb Rubber Bitumen in Sprayed Seals

Reference: LG TRRIP 07 **Published: April 2025**

The State Road Funds to Local Government Agreement includes a commitment to increase the use of recycled materials in road construction practices. This project responds to this commitment by providing guidelines for Local Governments to incorporate Crumb Rubber Modified Bitumen (CRMB) manufactured from end of life tyres, into sprayed seals as a means of enhancing pavement performance.

Background

Crumb rubber is produced from the shredding and crumbing of end-of-life tyres, offering both an environmentally responsible reuse pathway and performance benefits suited to WA's diverse and often demanding traffic conditions. By harnessing the mechanical properties of CRMB, the project aimed to evaluate its potential to improve pavement durability, reduce cracking, and extend the service life of roads subject to high traffic volumes and heavy loads and also highlight the potential implementation for CRMB in spray seals.

Approach

To support both technical understanding and practical implementation, the project delivered two key outputs:

A **Technical Report** – detailing the scientific, engineering, and regulatory aspects of CRMB in sprayed seal applications, including material properties, specification pathways, and risk considerations.

A **Practitioner's Guideline** – tailored to assist local government practitioners with the implementation of CRMB spray seals, translating technical findings into actionable steps for planning, procurement, and delivery.

This approach ensures that both technical specialists and on-ground practitioners are equipped with the appropriate level of information to support the sustainable use of CRMB in WA's local road networks.

Findings

CRMB Sprays seals provides the following advantages compared to standard bitumen:

Increased elasticity providing resistance to shear stresses from turning movements

Higher softening point reducing susceptibility to flushing in hot climates

Enhanced cohesion and aggregate retention improving road surface durability

Improved crack resistance, mitigating both environmental and traffic-induced cracking

Better performance under extreme stress, accommodating for High traffic volumes and Heavy vehicle loads

References

Austroads 2009, *Guide to pavement technology part 8: pavement construction*, AGPT08-09, Austroads, Sydney, NSW.

Austroads 2015, *Bituminous materials safety guide*, AP-G41-15, Austroads, Sydney, NSW.

Austroads 2017, *Guide to pavement technology part 4F: bituminous binders*, 2nd edn, AGPT04F-17, Austroads, Sydney, NSW.

Austroads 2018, *Guide to pavement technology part 4k: selection and design of sprayed seals*, 1.3 edn, AGPT04K-18, Austroads, Sydney, NSW.

Austroads 2021, *National specification for crumb rubber binders in asphalt and seals,* AP-T359-21, Austroads, Sydney, NSW.

Austroads 2023, *Supply of polymer binders,* Austroads Technical Specification ATS-3110-23, Austroads, Sydney, NSW.

How does this research change the way we think?

This research provides technical background and practical guidance for the incorporation of CRMB in sprayed seals by positioning CRMB as both a performance-enhancing and circular alternative to conventional bitumen.

It encourages local governments to rethink road material selection not only through the cost and availability, but also through lifecycle performance, circular economy outcomes, and alignment with sustainability targets.

By clearly outlining both the benefits and barriers to implementation, the research reframes CRMB as a viable mainstream solution rather than a niche or experimental product. This shift supports more informed decision-making and fosters confidence in the use of recycled materials in regional and urban road networks across WA.

Main Roads Western Australia Specifications

MRWA 2018a, Specification 503 *Bituminous surfacings*

MRWA 2018b, Specification 511 *Materials for bituminous treatments*

MRWA 2023, Specification 509 *Polymer modified bituminous surfacing*

Main Roads Western Australia Test Methods

Test Method WA 201.1:2021, *Sampling and preparation of granulated rubber*

Test method WA 235.1:2021, *Bulk density of granulated rubber*

Test method WA 236.1:2022, *Particle size distribution of granulated rubber*

Test method WA 237.1:2022, *Steel content of granulated rubber*

Austroads Test Methods

AGPT/T131:2006, *Softening point of polymer modified binders*

AGPT/T143:2010, *Particle size and properties of crumb rubber*

AGPT/T144:2006, *Morphology of crumb rubber – bulk density test*

ATM-101:2022, *Method of sampling polymer modified binders, polymers and crumb rubber*

ATS-3110-23, Supply of Polymer Modified Binders