

PAVEMENT REHABILITATION WITH BITUMINOUS SURFACING TREATMENTS

INTRODUCTION

In 2001/2002 VicRoads undertook a research project to determine the relative cost-effectiveness of a range of bituminous surfacing treatments compared to traditional methods of improving pavement roughness using structural overlays.

The purpose of this technical note is to outline the outcomes of the study and to provide some guidelines for selecting bituminous surfacing treatments.

PRINCIPAL FINDINGS & CONCLUSIONS

The research project found that:

- In Victoria, bituminous surfacing treatments are used in conjunction with local enhancements to reduce roughness and improve waterproofing, and are often used in environments different to those found in Europe or USA;
- The field performance of bituminous surfacing treatments in Victoria is not well recorded;
- When considering road agency and user costs, many of the bituminous surfacing treatments used in Victoria produce a net economic benefit over the more traditional forms of rehabilitation;
- Each individual site should be assessed, economically evaluated and compared against alternative treatments; and
- The service lives of bituminous surfacing treatments have been estimated and are detailed in the report.

The principal conclusions of the research project are:

- Many bituminous surfacing treatments are economical and are used successfully to reduce roughness and improve waterproofing as alternative treatments to the more traditional methods of pavement rehabilitation;
- The greatest economic benefits to the road agency and road user are obtained with ultra thin open-graded asphalt treatments when used either on their own, in combination with a geotextile reinforced seal and/or with a regulation layer; and
- Prior to applying bituminous surfacing treatments, careful consideration should be given to the condition of the existing pavement and the ability of existing surface/base materials and that of the new surfacing to protect against the entry of moisture.



Bituminous surfacing treatment on a rural road using a regulation followed by a geotextile reinforced seal

BITUMINOUS SURFACING TREATMENTS

The following bituminous surfacing treatments were considered as part of the research:

Slurry surfacing provides a fine textured surface with a certain amount of shape correction capability. It may also be used for rut filling under sprayed seals. Usage is generally limited to more lightly trafficked roads and sound pavements, as the materials have limited flexibility and resistance to reflective cracking.

Sprayed seals with shape correction treatments provide a wearing course (rural granular pavements) or a waterproofing membrane for pavements to be surfaced with asphalt. The highest level of performance as a waterproofing membrane is obtained with geotextile reinforced seals (GRS).

Stone mastic asphalt (SMA) is an alternative to dense graded asphalt for surfacing and shape correction where additional surface texture and flexibility is required, but at higher cost.

Ultra thin open graded asphalt (UTOGA) differs from conventional OGA in the use of a finer grading for additional shear resistance and is placed on a heavy tack coat or sprayed seal membrane to form an integral bond with the underlying surface. Surfaces requiring shape correction should be regulated with dense graded asphalt to enable the UTOGA to be placed as a thin layer of uniform thickness.

The underlying surface should be in good condition or protected with a waterproofing membrane.

Some difficulties have been experienced with early ravelling and damage to UTOGA surfaces by heavy turning movements and specifications for UTOGA surfacing are still under development.



Regulation prior to placement of geotextile reinforced seal.



Final surface of ultra thin open graded asphalt.

Bituminous surfacing treatment on an urban road using a regulation, a geotextile reinforced seal and ultra thin open graded asphalt

Open graded asphalt (OGA) has been extensively used as surfacing on urban freeways in Victoria for some 25 years to reduce surface noise levels and improve visibility in wet conditions and the skid resistance of road surfaces. OGA should be placed on a sound base and is not suitable for intersections where there are high surface shearing forces. The functional life is around 8 years and the effective service life can be as high as 15 years.

Dense graded asphalt (DGA) is a versatile material used in shape correction, structural strengthening and thin surfacing. Potential for cracking must be considered when placing over pavements with higher deflections.

SELECTION OF TREATMENTS

General Requirements

Resurfacing/rehabilitation of pavements is undertaken to improve waterproofing, shape, ride quality, or surface characteristics (spray/noise suppression and/or skid resistance). The selected surfacing treatment must satisfy the required relevant performance characteristics based on analysis of cost, effective service life, and risk in achieving performance outcomes taking into account traffic volumes and the strength, cracking and roughness of the existing pavement.

A detailed guide to the performance characteristics and selection of surfacing types is provided in the Austroads *Guide to Selection of Road Surfacing*.

The following supplementary guidelines are based on the economic analysis using the parameters defined in the research project. Further analysis should be undertaken to determine the most effective site-specific solution.

Granular Pavements

At low levels of roughness and traffic, any of the above surfacing types that satisfy the relevant performance characteristics are suitable, subject to analysis of relative cost, effective service life and risk. At higher levels of roughness, additional regulation is required and weak pavements need to incorporate a waterproofing membrane. At higher traffic levels, asphalt surfacing is preferred but is still generally cost effective in comparison to structural rehabilitation with granular resheet. UTOGA provides higher levels of flexibility for use as thin surfacing on weaker pavements.

Where both high levels of roughness and high traffic levels occur, thin surfacing treatments may have a relatively short effective life, which reduces cost effectiveness, with the result that there may be little, if any, cost benefit in comparison to a traditional granular resheet, particularly on weak pavements.

Asphalt Pavements

At low levels of roughness, any of the treatments that provide the relevant performance characteristics are more cost effective than a thick structural asphalt overlay. At increasing levels of roughness, regulation layers must be incorporated, together with a waterproofing membrane using a geotextile reinforced seal. Where high levels of roughness and traffic occur, a combination of regulation, geotextile reinforced seal, and UTOGA surfacing appears to be the most cost-effective bituminous surfacing treatment on both weak asphalt pavements as well as those with adequate strength.

REFERENCES

- Austrroads (2000) *Guide to the Selection of Road Surfacing AP-63/00*
- VicRoads *Technical Notes 3, 4, 5, 14 and 48*
- VicRoads (1984) *Bituminous Surfacing Manual (currently being updated)*

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