BITUMINOUS SLURRY SURFACING

INTRODUCTION

This Technical Note provides a description of the types of slurry surfacing and their application.

Bituminous slurry surfacing is a mixture of well graded crushed aggregate, mineral filler, emulsified bitumen and water applied to a pavement as a surface treatment.

The two principal forms of slurry surfacing are slurry seal and micro-surfacing.

Slurry seal is used as a thin wearing course or corrective treatment on lightly trafficked pavements, typically on residential streets, bicycle paths or pedestrian areas.

Micro-surfacing is a form of slurry surfacing that includes polymer modification of the emulsified bitumen to provide greater wear resistance as well as enabling the use of larger aggregates and the placement of thicker layers. Micro-surfacing is suited to heavier trafficked applications and is the principal form of slurry surfacing used by VicRoads.

APPLICATIONS

The primary applications of slurry surfacing are:

- As a thin surfacing for lightly trafficked pavements. Slurry surfacing provides a surface of uniform texture, free of loose stones associated with sprayed seals and with the ability to correct minor shape variation in the underlying surface.
- As a corrective treatment of surfaces with large texture variation. Slurry surfacing is largely unaffected by the texture of the underlying surface and can therefore be used for surfacing of pavements with variable texture, either as a finished surface treatment or as a corrective treatment prior to application of a sprayed seal.
- As a shape correction prior to application of a sprayed seal e.g. correction of surface rutting in the wheelpaths of rural pavements prior to resurfacing. It can also result in some improvements to the longitudnal shape.
- Other, less common, applications of slurry surfacing include:
  - Use as a 'Cape seal'. The slurry surfacing, usually micro-surfacing, is used to fill the voids in a sprayed seal consisting of a large sized aggregate thereby providing a surface with good resistance to heavy traffic turning movements. This has been used in remote areas as an alternative to asphalt surfacing especially at high stress locations such as intersections.
  - In conjunction with the addition of organic fibres to provide greater reinforcement of the slurry surfacing.
  - In conjunction with colour additives for decorative and delineation works.

Typical macrotexture depths obtained from slurry surfacing as a finished surfacing are shown in Table 1.

Table 1: Typical macrotexture of micro-surfacing

Size (mm)	Depth (Volumetric Sand Patch Method) (mm)
3	0.3 – 0.5
5	0.6 – 0.8
7	0.9 – 1.2
10	1.3 – 1.8

For most slurry surfacing applications, size 7 mm mixes are used. Size 10 mm mixes may be used as a micro-surfacing where greater thicknesses (up to 50 mm) are required in rut filling applications. 5 mm mixes may be used in thin surfacing applications. 3 mm mixes are not commonly used.

Slurry surfacing does not provide substantial resistance to reflective cracking. On pavements showing cracking or high deflections, it should only be used as a shape or surface correction treatment prior to application of an appropriate seal (depending on current and original pavement condition) or as a Strain Alleviating Membrane Interlayer (SAMI) when an asphalt wearing surface is to be applied.

SPECIFICATIONS

VicRoads specifications for slurry surfacing are contained

in Standard Specification Section 427 – Bituminous Slurry Surfacing.

Additional guidelines for design, specification and use of slurry surfacing are contained in Austroads AP-T26 – Guidelines and Specification for Bituminous Slurry Surfacing.

The principal provisions of the specification requirements are summarised below.

Aggregates

The aggregates used in a slurry surfacing must meet the same quality requirements as aggregates used in hot mix asphalt. Crushed aggregate is important as the fractured faces allow particles to seat and lock together to improve strength and resist movement. Crusher fines used in slurry surfacing should have a minimum value of Degradation Factor - Crusher fines of 60.

The binder used in slurry surfacing is a bitumen emulsion based on bitumen conforming to AS 2008 Residual bitumen for pavements. For micro-surfacing, polymer modified bitumen emulsion binders are used.

Mix Design

The mix is designed in the laboratory to ensure optimum performance and compatibility of the materials, since some good quality materials may be incompatible when mixed together. Mix testing is performed to determine the mixing and application characteristics of the constituents and the optimum binder content. As slurry seals and micro-surfacing are a mixture of various materials, any change in a single component may change the performance of the system.

Laboratory specimens are made from these mixes and tested for the following performance related parameters:

- Wear loss (Austroads AG:PT/T272 – Determination of abrasion loss of bituminous slurry (wet track abrasion test)) determines resistance to traffic abrasion after soaking in water. A one hour soak is used for traffic levels less than 3,000 vehicles per lane per day (v/l/d) and a six day soak for traffic levels greater of 3,000 v/l/d or greater.

- Traffic time (Austroads AG:PT/T271 – Determination of set and cure for bituminous slurry (cohesion test)) is used to identify how quickly the mix develops adequate cohesion to enable the mix to be opened to traffic.

- Excess binder content (Austroads AG:PT/T273 – Determination of excess binder in bituminous slurry (loaded wheel test)) is applicable to slurry seal mixtures intended for use on traffic levels greater than 3,000 v/l/d. It is not applicable to micro-surfacing where adequate resistance to flushing under heavy traffic is provided by the use of polymer modified bitumen emulsions.

Where field samples are required for compliance testing, they should be sampled in accordance with (Austroads AG: PT/T221 – Sampling of slurry).

MIXING AND PLACEMENT

Bituminous slurry surfacing is mixed and applied to existing pavements by a specialist machine (Figures 1 and 2) that carries all components, mixes them on site, and spreads the mixture onto the road surface. Materials are continuously and accurately measured and then thoroughly combined in the machines mixer.

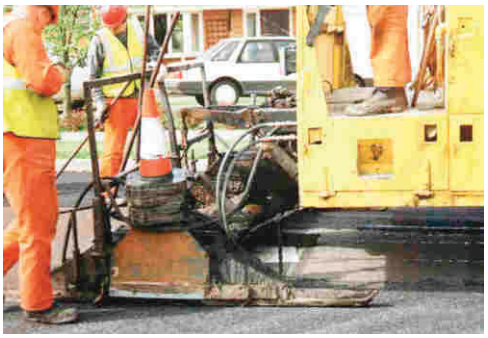

Figure 1: Slurry surfacing spreader box

Figure 2: Placing slurry surfacing

As the machine moves forward the mixture is continuously fed into a full width "surfacing" box which spreads the mixture to the width of a traffic lane in a single pass. For rut correction a specially designed "rut" box, is used to deliver the largest aggregate particles into the deepest part of the rut, this provides maximum stability in the wheelpaths.

REFERENCES

Australian Standard 2008 (1997) Residual bitumen for pavements

VicRoads Standard Specifications for Road and Bridgeworks Section 427 – Bituminous Slurry Surfacing

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