

FLUSHED BITUMEN SURFACES

1. INTRODUCTION

This Technical Note provides advice on avoiding flushed bitumen in sprayed seal surfaces. Flushed, bleeding and smooth sprayed seal surfaces can result in reduced skid resistance and increased water spray, and may create additional problems in applying subsequent treatments.

Techniques for preparation, design and construction of sprayed seals and correction of flushed surfaces are not described in detail in this note, and further guidance on specific issues may be obtained from the references listed below.

2. WHAT IS A FLUSHED SEAL?

A smooth bitumen surface can be the result of aggregate stripping, leaving the binder exposed, or result from an excess of bitumen and/or aggregate embedment so that the aggregate is totally or substantially submerged in binder. While these represent opposite states, many of the principles involved in the selection, design and construction of sprayed seals are common to avoiding either outcome.

Stripping is usually the direct result of insufficient binder or construction deficiencies (weather conditions, dirty or wet aggregates, or poor cutting practice).

Flushing in sprayed seals can arise from a more complex range of issues. To avoid potential flushing the following factors should be considered:

- Surface preparation prior to seal or resealing
- Selection of treatment;
- Design of treatment; and
- Construction of treatment.

3. SURFACE PREPARATION

Surface preparation should be carried out well in advance of any resealing work, preferably so that the treatment is exposed to 3 months of warm weather, but at least 4 to 6 weeks provided that appropriate materials are used.

Practices that may lead to flushing and bleeding, and should be avoided include:

- The application of a seal over freshly placed cold mix

or hot mix asphalt patches, which allows the embedment of the aggregate into areas of localised flushing and bleeding;

- The application of excessive crack sealing materials that will bleed through the seal;
- The creation of variable texture by using inappropriate surface repair techniques; or
- Excessive use of tack coat when patching.

Important factors to consider when preparing for initial treatments include:

- Ensuring a tightly bound, uniform base surface;
- Ensuring that base materials do not provide potential for excessive aggregate embedment. For example, techniques for improvement in more demanding applications include light stabilisation, armour coating or importation of better quality base materials;
- Ensuring appropriate moisture content of underlying pavement prior to sealing. For example, crushed rock base should be dried back to a maximum moisture saturation level of 65% (70% for gravel pavements).



Figure 1 Flushing along the centre-line as a result of patching too close to resealing

4. SELECTION OF TREATMENT

Surfaces with variable texture present greater difficulty than uniform textured surfaces. This is partially addressed by the design technique adopted, but may also require preliminary treatment, or alternative treatments such as:

- Correction of bleeding or flushed areas (e.g. solvent, solvent plus aggregate, hot aggregate, high pressure water treatment, etc.);
- Pre-spraying of coarse textured areas to compensate for texture difference;

- Application of a small sized aggregate seal as a short term corrective treatment;
- Correction of surface shape, particularly rutting, that may allow binder to flow into depressions;
- Use of polymer modified binders to improve aggregate retention or to reduce risk of bleeding in some conditions;
- Use of bitumen emulsion binders that avoid the need for high cutter content in cool conditions.

In some instances a sprayed seal may not be an appropriate treatment, and hot mix asphalt, slurry surfacing, or even removal of the existing surfacing may provide a better solution.

Resealing at too-frequent intervals (i.e. before the binder has oxidised sufficiently) may also be a factor in a build-up of a binder-rich aggregate mixture that results in embedment and flushing of subsequent sprayed seal treatments.

5. DESIGN OF TREATMENT

Where surface texture and operating conditions are uniform, design is a straightforward combination of aggregate average least dimension (ALD), traffic volume, surface allowances and other special allowances. The importance, however, of accurate assessment of each of these input factors cannot be over emphasised.

Conditions that may require special design consideration to avoid flushing include:

- Variations in surface texture, particularly the presence of flushed areas where excessive aggregate embedment may occur. These conditions may also influence selection and pretreatment requirements as referred to above.
- Localised traffic influences – e.g. variations in lane usage and concentrations of slow moving, turning or heavy traffic.

6. CONSTRUCTION OF TREATMENT

Construction factors to be considered to avoid flushing or stripping of sprayed seals include:

- Achievement of design binder application rate;
- Achievement of design aggregate application rate;
- Uniform operation of all spray jets across the full width of spray bar;
- Precoating of aggregates. Dusty or inadequately precoated aggregates can lead to stripping, excessive precoating material can lead to bleeding;
- Weather conditions;
- The risk of stripping is increased in cold damp conditions and in shaded areas;
- Cool weather involves high proportions of cutter oil, which increases the risk of bleeding in hot weather.

Work on heavily trafficked roads and shaded areas should be done in favourable weather conditions to avoid the need for high cutter levels;

- Appropriate cutting practice. Use of sufficient cutter (including use of adhesion agents as appropriate) to provide adequate adhesion in cool conditions while avoiding softening and bleeding as a result of excessive cutter;
- Monitoring newly completed seals in first few days, particularly intersections and turning areas, and in hot conditions. Timely gritting to correct minor bleeding or overturning of aggregate can avoid pick-up and more serious failures.



Figure 2 Wheelpath flushing

7. REFERENCES

GeoPave Technical Notes

- 18 Treatment of Flushed Seals Using Chemical Solvents
- 19 Treatment of Flushed Seals Using High Pressure Water
- 23 Pre-Spraying of Sprayed Seal Surfaces

Austrroads Pavement Reference Group/Australian Asphalt Pavement Association Pavement Work Tips

- 1 Priming and Primer Sealing
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- 18 Sprayed Sealing – Selection of Initial Treatments
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