Section 2
OPERATING ENVIRONMENT

Traffic

Safety

Construction

Climate

Maintenance

Noise

Aesthetics
## SECTION 2
OPERATING ENVIRONMENT

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2.1 GENERAL

The choice of materials and surfacing type depends on the operating environment. The design method and method of application must consider these factors.

This Section describes the factors in the operating environment to be considered in the selection of a treatment. The significant factors are:

- traffic
- construction
- maintenance
- climate
- aesthetics
- noise
- safety
- contractual arrangements.

The selection of suitable types of treatment is described in Section 3.

2.2 TRAFFIC

The volume and composition of the traffic are important considerations in selection of seal type. Increasing truck axle loads and tyre pressures increase the demands on sprayed seals in terms of:

- moving and plucking of aggregate
- pushing aggregate into pavement surfaces
- aggregate breakdown
- aggregate polishing.

Braking, acceleration and turning (or scuffing) forces place increasing demands on the type of surfacing in high stress areas on pavements (intersections, inclines, roundabouts, sharp curves, etc.).

For high stress areas, the use of stronger seals with or without modified binders is one way of improving performance.

At very high levels of stress, surfacing with asphalt should be considered.

2.3 CONSTRUCTION

The construction considerations include:

- existing pavement condition and type
- available equipment
- application under traffic.

(a) Existing Pavement Condition

The condition of the pavement plays an important role in the operating environment of a sprayed bituminous seal and its selection.

A seal must be selected on its ability to cope with the types of pavement distress existing or likely to exist during its life.

Cracks may be stable or subject to temperature or traffic movements.

Cracked pavements may require pretreatment prior to resealing or the use of an appropriate modified binder to retard reflective cracking.

The use of geotextiles in seals over severely cracked pavements may also be cost effective.

The hardness of the existing pavement must be assessed to allow for penetration of the aggregate into the top of the existing pavement.

The existing pavement surface must be assessed to determine allowances for surface texture and absorption.

Absorption of the binder into the sealing aggregate must also be assessed.

(b) Available Equipment

The selected treatment must be able to be applied properly with the equipment available.

The performance of aggregate spreading equipment should be carefully assessed. For large scale works, the use of specialised aggregate spreading equipment (self-propelled spreaders, modified
cocket boxes, etc.) offer substantial economies in terms of more uniform spread rates and less aggregate wastage.

The skill and experience of existing personnel should also be taken into account in selection of the treatment. Personnel in critical activities such as aggregate spreading and binder spraying must be adequately trained.

(c) Application Under Traffic

For applications under traffic the delay in getting traffic onto the new surface may also affect the type of treatment selected and operational procedures chosen, particularly where detours are not available.

If traffic delays are to be minimised, the use of emulsion seals may be limited by the time taken for the emulsion to cure.

2.4 MAINTENANCE

For heavily trafficked roads and areas of high traffic stress the treatment should be designed to reduce delays that future maintenance activities may cause.

In such situations, the use of modified binders and treatments other than sprayed surfacings should be considered on the basis of a life cycle costing analysis.

2.5 AESTHETICS

Aesthetics may be important in some situations.

In residential situations the use of smaller aggregate sizes is often preferred to give a smoother surface.

The use of different coloured aggregates can be used effectively to delineate different areas.

For patching work, similar aggregate colours need to be considered.

2.6 NOISE

Tyre/road noise is an important issue, particularly in urban environments. Generally, the larger the aggregate, the louder the noise.

The use of slurry seals may reduce tyre/road noise levels in some circumstances.

The use of large aggregates can also be effective as a safety mechanism to warn drivers audibly when they have strayed off the main carriageway, e.g. when used on shoulders of rural freeways.

2.7 CLIMATE

Climatic parameters include:

- temperature
- rainfall.

Atmospheric temperature and moisture conditions at the time of spraying and for the following 24 hours impact on the treatment selected.

In hot, dry weather, the range of suitable treatments is large. However, in colder weather, the choices are restricted and the use of emulsions may be preferable, given suitable traffic and construction conditions.

The use of fast evaporating cutter oils in hot binders may also be applicable in colder weather.

Application of hot treatments in cool weather requires substantial amounts of cutter oil. These are not preferred because of:

- cost
- possible future bleeding & stripping problems
- reduction in rate of release of cutter oils.

In hot, dry environments the binder application rate is more likely to be governed by the rate of oxidation of the binder than the effects of traffic.
2.8 SAFETY

The safety aspects in selection of seal type relate mainly to the skid resistance and surface drainage characteristics of the treatment.

For high speed roads larger aggregates are preferred to give greater high speed skid resistance due to better surface drainage capability. However, these surfaces are quite noisy and the skid resistance does depend on the polishing characteristics of the particular aggregate used.

Aggregate polishing is a function of the number of wheel passes. Cars, as well as trucks, contribute significantly to polishing.

As mentioned previously, the different noise characteristics of various aggregate sizes can also be used as a safety warning to drivers.

Safety and handling procedures for the work are covered in Section 6.

2.9 CONTRACTUAL ARRANGEMENTS

The changed role and organisation of the Authority has led to changes in the way that sprayed sealing works are managed, specifically, the contractual arrangements.

Contract management is a function of the type of specification used, and may involve:

- quality control (QC)
- quality assurance (QA)
- performance based contracts.

Sprayed sealing specifications, and hence contracts, are the primary means of allocating risk between the parties involved. The type of specification has implications for both the Authority and contractors in terms of the risk(s) involved in carrying out the work.

Risk Management

The main risks associated with sprayed sealing work are:

- site and weather conditions
- design of the seal
- operational procedures.

This Guide represents good practice, however sprayed sealing may sometimes have to proceed in less than ideal conditions. The need to follow proven design and operational procedures as a means of minimising risk cannot be over-emphasised.

When these are varied prior to undertaking the work, the degree of risk of failure must be assessed and realised before proceeding.

Other risks may be:

- contractor capability
- equipment availability and breakdowns
- materials availability
- occupational health and safety
- travelling public accident exposure and delay
- work delays
- personnel skills.

Where a significant risk is present which could be addressed by a recommendation in this Guide, the RTA should consider the inclusion of the procedure in the Specification.

The use of more specialised materials may require specialised skills and tighter control procedures.

For further details on risk management see the NSW Government's Total Asset Management Manual.
Quality Control (QC) Contracts

Quality control contracts are not normally used. Testing for QC contracts is carried out by the Authority.

Quality Assurance (QA) Contracts

A QA sprayed sealing contract requires the Supplier/Contractor to operate within a quality system environment. A quality plan and quality procedures are intended to provide the quality system for substantially reducing the likelihood of poor performance. The procedures are aimed at:

- controlling the process
- maintaining the validity of the conformance testing
- reporting and disposing of nonconformances.

The Authority normally specifies some of the properties of the end product and some of the means of achieving it. It is incumbent on the Contractor to assure conformance with the specification requirements through inspection and test procedures set out in the Contractor's Quality Plan.

The Authority bears the risk that the parameters will provide the performance required. The Contractor bears the risk associated with supplying product that complies with the specified requirements.

Performance-Based Contracts

Performance-based contracts are not common. They focus on the performance of the finished product in service, as required by the Authority, rather than prescribing the means of achieving the end results.

The Contractor bears the risk associated with the selection of the means of achieving the required performance for a long term maintenance period.