Guide to repair solutions for seals

Fulton Hogan

JetBlack®

FibreDec®

SERT®

EmulSeal®

SPRAYflex®

Surfix®

Multispray®

BituBase®

UHP Watercutter

8/04/15

Extending the life of your seal

Description	Cause	Treatment

Oxidation

A visibly grey and coarse textured seal. There is a lack of binder filling the voids in the seal. Minor environmental cracking may be present due to embrittlement and some aggregate may have been dislodged by traffic.

As the seal ages, the binder will naturally harden due to the gradual loss of the volatile fraction of the binder.

This binder will become brittle and if left untreated, the seal will suffer future cracking and loss of aggregate (ravelling).

Enrich the seal by replacing the lost bitumen.

For a matt or to a very hungry seal with minor aggregate loss, consider a combined enrichment and rejuvenation of the seal with SERT, or alternatively for a finer textured surface enrich with JetBlack, a seal containing mineral/sand filler to obtain a smoother textured surface.

Aggregate Loss (stripping/ravelling)

A very rough and pitted seal. The binder is exposed as there is a loss of individual aggregates or areas with a complete loss of aggregate. This seal could suffer from lack of skid resistance.

Early stripping may be caused by;

Construction issues

Poor aggregate/binder adhesion due to:

- Binder being too hard / incorrect viscosity prior to aggregate application
- Inadequate rolling
- Incompatible adhesion agent/precoat
- Inadequate cutter addition
- Spreading of too much aggregate (choking)
- Lack of adhesion due to dust or moisture on aggregate
- Wide temperature variation

Design issues

- Insufficient binder for service conditions
- Selection of an incorrect binder in high stress (i.e. turning movement) situations

Latter stage ravelling

- Typically occurs as a result of aging and oxidation of the binder in the seal.

Result of construction issue

Correct construction practise and reseal

- In damp/cool conditions, use an emulsion seal (e.g. Surfix 60 or Surfix 70)
- In high stress situations, use a high stress seal binder such as SPRAYflex (S20E or S45R) or Surfix 70X

Latter stage ravelling

- For high levels of stone loss, reseal
- For low levels of stone loss, consider the use of SERT or JetBlack (see Oxidation above)

Bleeding

Binder is seen on or near the surface of the aggregate in the seal. Bleeding may start as a small blemish and then can eventually cover the whole seal surface (typically not confined to wheel paths). The seal will be frequently sticky in hot weather and glassy in cold/wet conditions. Bleeding can lead to a loss of skid resistance, seal pick-up or tracking of binder.

Bleeding is caused by excessive binder being sprayed:

- For the traffic conditions
- For the size of aggregate used in the seal

Stabilise the seal by gritting (raking) in pre-coated 5-7mm aggregate into the bleeding sections; this should be done in hot conditions.
If seal is stable (no longer bleeding), remove excessive binder by the use of a high pressure UHP Watercutter.

Apply a sandwich reseal at reduced and variable binder application rates with Multispray.

Consider using a tougher binder such as SPRAYflex (S20E, S35E) or Surfix (70, 70X).

Description	Cause	Treatment

Flushing

Similar to bleeding, flushing is binder seen near the surface of the aggregate in the seal but the cause is different. Flushing may start as blemishes in the wheel paths and can eventually cover both wheel paths. The seal will be frequently sticky in hot weather and glassy in cold/wet conditions. Flushing can lead to reduced skid resistance, seal pick-up or tracking of binder.

Flushing may be caused by sealing aggregate being embedded into the pavement by traffic as a result of a soft or wet base immediately prior to sealing.

If seal is stable (not bleeding), remove excessive binder by the use of a high pressure UHP Watercutter.

Alternatively, apply a sandwich reseal at reduced and variable binder application rates with Multispray.

The seal should utilise a modified binder, such as, SPRAYflex (S20E, S35E and S45R) or Surfix 70X.

An initial seal over new road construction should be trafficked for 12 months before application of a larger aggregate seal.

Otherwise, as per bleeding.

Polishing

The exposed surface of the aggregate in the seal is smooth or rounded. The polished areas feel smooth and may be shiny. The difference is typically felt in and out of wheel paths. Polishing results in a loss of skid resistance of the seal surface.

Polishing results from the action of traffic and weathering removing the sharp edges or micro-texture of the aggregate.

Polishing over time is more pronounced for low polishing resistant aggregate or uncrushed natural gravels.

Reseal with high friction aggregate.

For low speed areas consider the use of JetBlack treatment with high friction sand.

Fatigue Cracking (crocodile pattern)

In early stages, fatigue cracking is distinguished as a series of interconnected cracks. It can develop into many-sided, sharp-angled pieces (usually less than 0.3 m on the longest side) to a crocodile pattern in later stages with or without pumping of fines. It typically occurs in the wheel paths and the cracks are rapid moving.

In seals, fatigue cracking is generally caused by:

- Low stiffness base or
- Inadequate pavement strength/thickness or
- Result of oxidised binder

The first two occur associated with rutting; the latter generally has no rutting.

In all cases, the movement of the seal is greater than what can be tolerated by the binder.

If caused by low stiffness base and/or low pavement strength:

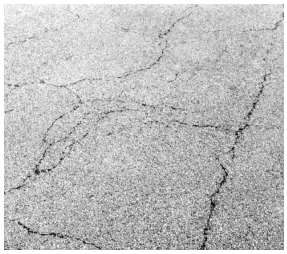
- Consider bitumen stabilisation of existing base (EmulBase+, BituBase foam bitumen)
- SAMI (Strain Alleviating Membrane Interlayer) (SPRAYflex S25E or Surfix 70X) and asphalt overlay

As a holding treatment, consider:

- a SAM (Strain Alleviating Membane) treatment with SPRAYflex (S20E or S45R) or Surfix 70X
- FibreDec seal

Block Cracking

A pattern of cracks that divides the pavement into approximately rectangular pieces. Rectangular blocks range in size from 0.2 m^2 to 10 m^2. These cracks are generally slow moving.



Block cracking typically results from:

- Shrinkage of the underlying base
- Shrinkage in highly oxidised seals with diurnal temperature variations

Block cracks can result in a loss of waterproofing of the seal and accelerated deterioration of the pavement.

Pre-treat by cleaning and filling cracks with EmulSeal cold crack sealant before resealing. This will significantly extend the life of the reseal.

Reseal pavement:

- Consider the use of a SAM seal using SPRAYflex (S10E, S35E, or S45R) or Surfix (70 or 70X)
- If cracking is extensive with large width cracks (up to 5mm), consider the use of FibreDec as a SAM or SAMI.

Environmental Cracking

Characterised by individual cracks which may run longitudinally, transverse or meander throughout the seal. These cracks are generally slow moving.

Environmental cracks can result from:

- The shrinkage of underlying base,
- Shrinkage in an old oxidised seal, or
- Reflection of joints in underlying cementitious material
- Volume change in expansive clay subgrade
- Differential settlement between cut and fill

Structural failure in the pavement is indicated when the cracking is associated with other defects such as rutting.

These cracks can result in a loss of waterproofing of the seal and accelerated deterioration of the pavement.

If structural: see fatigue cracking.

If non-structural: see block cracking.

A trouble-free and smooth journey

A smooth journey

Full service asset management

We offer fence-to-fence infrastructure services solutions tailored to meet your needs. We can identify, prioritise and select the appropriate treatment so that you get the most out of your assets within your budget for the lifetime of your pavement.

Trouble-free

Responding quickly

Fulton Hogan is able to draw on its own extensive resources of people, equipment, materials and technical expertise. This comes to fore in an emergency situation where we are able to respond rapidly and effectively as the situation unfolds.

Integrated Service Agreement

Client: Main Roads WA

Collaboratively with Main Roads WA, Fulton Hogan provides fence-to-fence asset maintenance services for a 4500 km road network.

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