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A Case for Geotextile Reinforced Seals with Asphalt

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AUSTRALIAN ASPHALT PAVEMENT ASSOCIATION

Paving Fabric Reinforcement in Asphalt

Incorporated in;

- Bitumen sprayed seals
  - Single coat seals
  - Two coat seals
- Asphalt overlays
  - 30-75mm overlays
  - Ultra Thin Asphalt

Paving Fabric Reinforcement in Asphalt

- History
- Where paving fabrics used
- Typical specification
- Design
- Cost benefits
- Applications
- Installation
- Case Studies

History of Fabric Applications

- First geotextile sprayed reseal – Qld 1976
- Trials in SA – 1990
- Trials on low strength base – ALF Bewarrina NSW
- First used in ACT in 1997 (Emulsion seal)
- Asphalt applications around 20 years old

Where Paving Fabrics used

- Arterial Roads - volumes up to 20,000 vpd
- Highways
- Bus Routes
- Municipal Streets
- Low volume low strength pavement roads

Why Paving Fabrics Selected

- Reflective cracking due to high loads
- Pavement shape has not deteriorated
- Environmental cracking
- Failing cement treated base course
- Pavement where total rehabilitation required
- Regional areas - rehab cost prohibitive

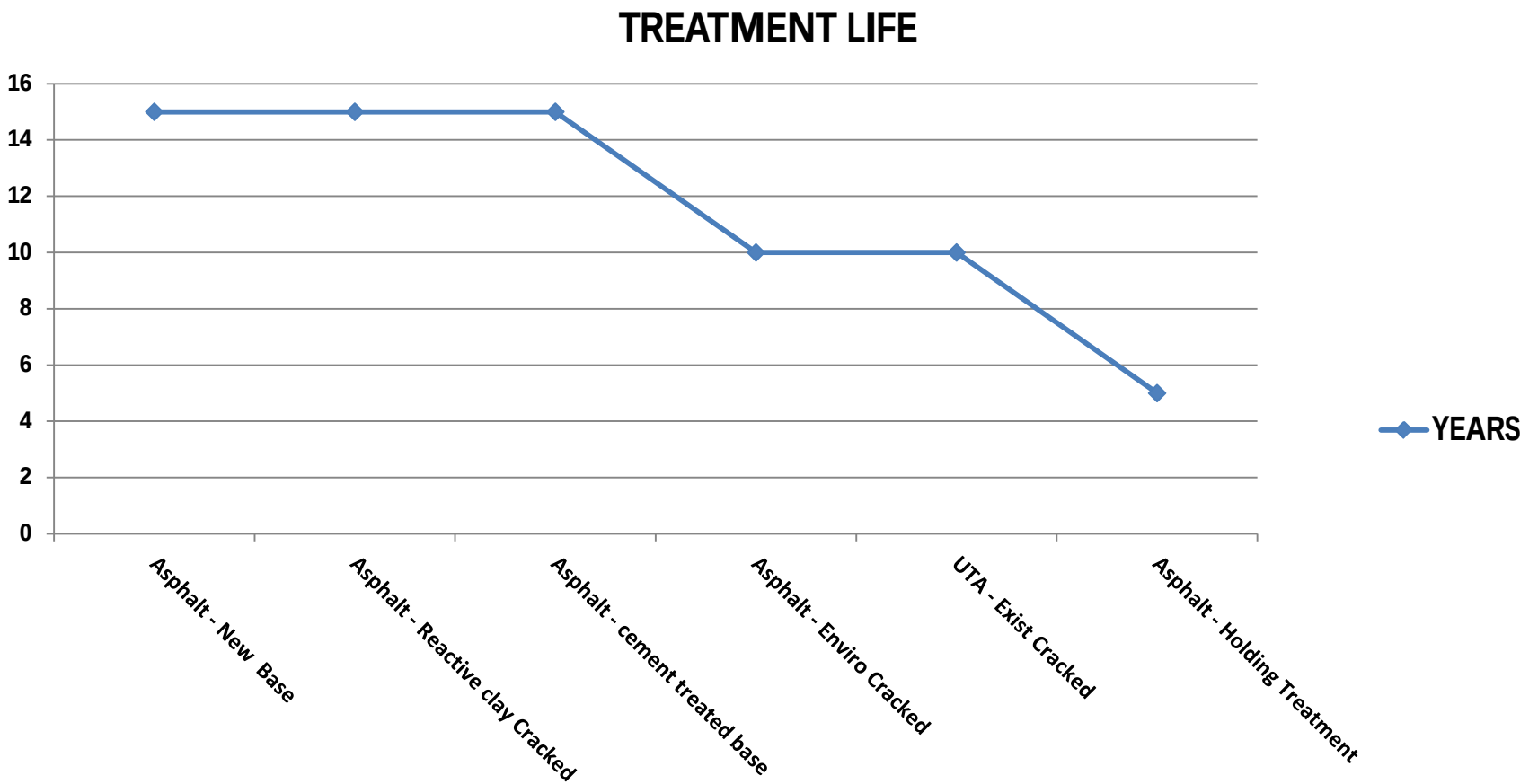
What Paving Fabrics do

- Water proof pavement
- Alleviate Reflective cracking
- Support stone – maintain surface texture
- Bridge cracks and inhibit reflective cracking by;
  - Utilising tensile strength of the geotextile
  - Utilising elastic recovery properties of bitumen

Specifications

Sealmac Properties	Test Standard	Units		PF1	PF2
Mass	AS3706.1	g/sqm	MARV Typical	140 147	184 200
Thickness	AS3706.1	mm	MARV Typical	1.43 1.58	1.86 2.09
Wide Strip Tensile MD / XMD	AS3706.2	kN/m	MARV Typical	8.9/7.4 10.6/9.0	13.9/10.5 16.3/12.5
Wide Strip Elongation MD / XMD	AS3706.2	%	MARV Typical	42/52 55/65	47/56 57/67
Trapezoidal Tear MD / XMD	AS3706.3	kN	MARV Typical	245/215 290/255	305/280 412/348
Minimum Melt Temp.	-	Degrees C		240	240
Bitumen Retention @ 160 degºC	ASTM D6140	litres/sqm	Typical	1.0	1.4
Standard roll sizes	Widths Lengths	metres		2,3,4,6m 150,300,450m	2,4,6m 150, 300m

Paving Fabrics Life Benefit



Paving Fabrics life cycle benefit

Asphalt incorporating Paving Fabric

- Can double life of standard seal treatment
- Additional investment balances out over 15 years
- Savings in maintenance – longer life span
- Allows asset management plan choice
- Safety – increased surface stability and enhanced skid resistance

Design

Bitumen Retention

- Specifications; Min rate 0.9 – 1.1l/sqm (140g/sqm)
- Tested to ASTM D6140 modified for 160 deg.
- Absorption consistent with manufactured mass and density
- High Melting point of >240 deg.
  - prevents shrinkage
  - provides consistent bitumen absorption

Installation

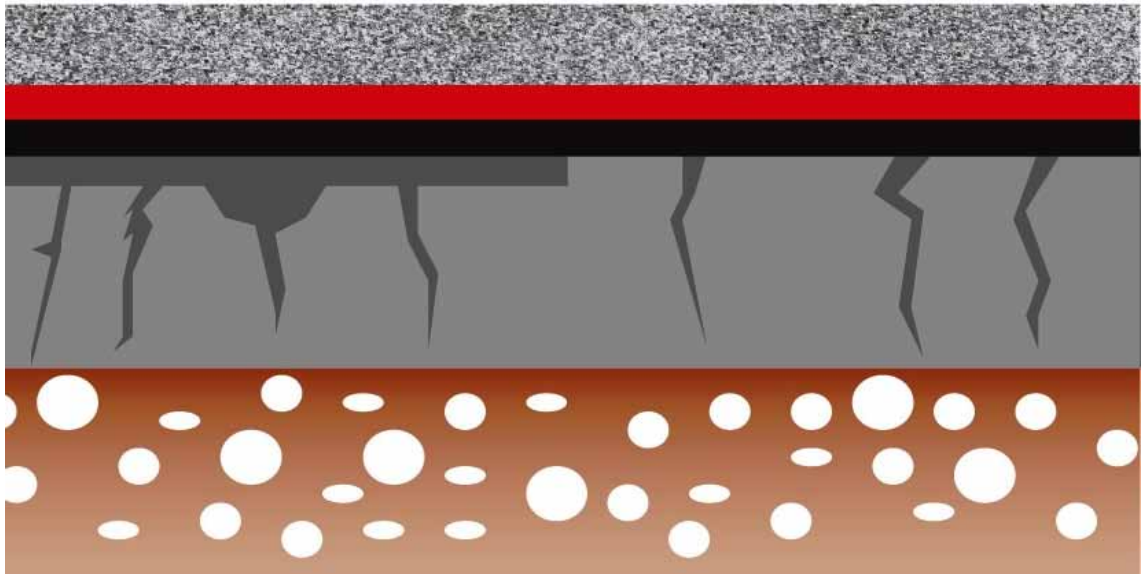
Bitumen Application

- Tack coat sprayed @ ~ 1.0l/sqm
- Application rate of tack coat adjusted for existing surface texture
- Dependant on weather & surface conditions
  (min. 20 degrees)
- No cutter or flux oil added to the binder (under fabric)
- Asphalt temp draws bitumen from beneath paving fabric

Applications

Asphalt Overlay

Asphalt
Paving fabric
Binder



Paving Fabrics Cost

Cost comparison

- 50mm asphalt ~$20.00/sqm
- Fabric SAMI in 50mm asphalt ~$23.00/sqm
- Cost of rehabilitation >$30.00/sqm

Paving Fabrics life cycle Benefit

Asphalt Surfacing

- Waterproofing of new overlay
- Extends life of standard seal treatment
- Additional investment ~10% of 50mm asphalt cost
- UTA 15mm – 25mm

- - Used for practical benefits – match to existing levels

Case Study

Asphalt surfacing – South Tce Adelaide

Adelaide City Council
Paved 1996
PF1 Sealmac
40mm Asphalt

Case Study

Asphalt surfacing – South Tce

Age – 13 years
Spec – Increase in pavement life

Case Study

Asphalt surfacing – South Tce

City of Enfield

Enfield Rebuilds South Terrace

Enfield Council's expertise in a special type of road construction has lead to Adelaide Council and some contractors engaging us to work on their roads.

We've adapted our own machinery and developed a technique with a special fabric which is laid on the road and then covered with bitumen.

We've used this fabric extensively on roads in the reactive clay soil areas east of Hampstead Road. These soils are notorious for cracking and buckling roads.

The fabric strengthens the bitumen and reduces cracking, which means the road will last longer and cost less to maintain!

FROM LEFT TO RIGHT
WALLY, HARRY, ON MACHINE, ALLAN
RON & FAR RIGHT PHIL.
AUG. 1994

Enfield Council expertise was used to help rebuild South Terrace, Adelaide.

Case Study

University Drive - Sturt S.A.

§Resealed 1999

§Asphalt; 40mm
(up to 100mm for correction)

§Paving Fabric; PF1

§Bond coat; C170

§Area; 20,000 sqm

Case Study

University Drive Sturt S.A.

§Condition 2009

§Specification;
- Control reflective cracking

- Severe crocodile cracking

- Waterproofing critical to control tree root ingress

Case Study

Vasey St Greenacres S.A.

§Resealed 1994

§Asphalt; 30mm

§Paving Fabric; PF1

§Bond coat; C170

§Area; 4,000 sqm

Case Study

Vasey St Greenacres S.A.

§Condition 2009

§ Laid on 40mm FCR Base

§Specification;
- Control reflective cracking

- Severe cracking evident in area

- Waterproofing critical to reactive clay sub-grade

Case Study

Midland Hwy - Bendigo, Victoria

Asset Owner;	Vic Roads
Sealed;	2007
Asphalt;	15mm UTA
Paving Fabric (SAMI)	Sealmac PF1
Bond coat;	C170
Area;	~5,000 sqm

Case Study

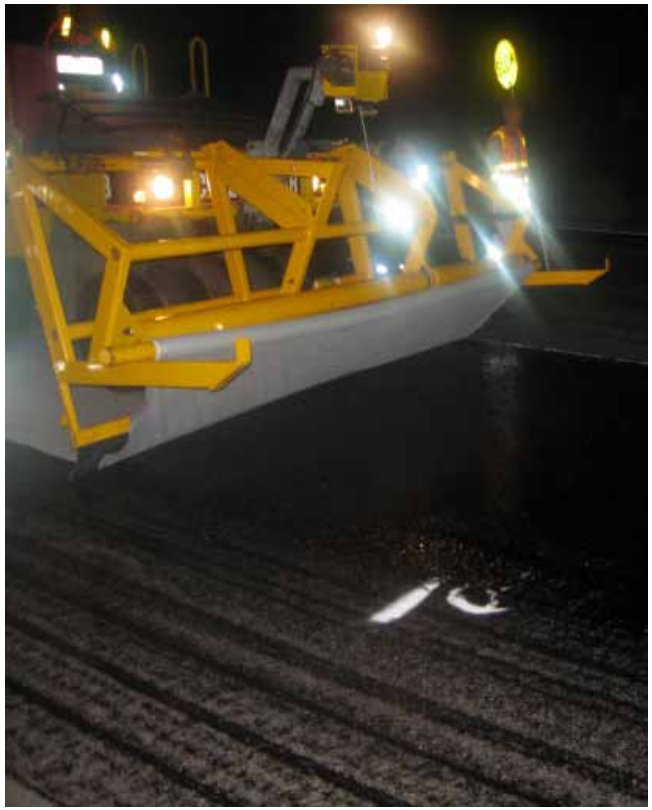
Midland Hwy - Bendigo, Victoria

Poor existing surface
Varied pavement construction
Lane widenings
Regulation and patching of weaker areas
Life expectancy of 10 years
UTA surface incorporating paving fabric SAMI
Quieter surface than sprayed sealing
UTA alternative to deeper asphalt, without the problems Matching fixed water table levels achieved
PF1 insurance to assist in control of reflective cracking Protection from environmental influence

Applications

Vic Roads - Monash Freeway Widening

- Asset Owner; Vic Roads
- Sealed; 2007 - 09
- Paving Fabric; Sealmac PF1
- Bond coat; C170
- SAMI; 10mm
- Asphalt; 20mm UTA
- Area; >500,000 sqm
- VPD; 200,000 VPD



Applications

Vic Roads - Monash Freeway

- New lane widening constructed to provide increased traffic capacity
- existing pavement 100mm Asphalt
- Existing cracking of unbound granular pavement
- A mixed patchwork of pavements over the length of the widening project

Applications

Graham Farmer Freeway - WA

- Asset Owner; WA Main Roads
- Sealed; 2010-11
- Paving Fabric; Sealmac PF2
- Bond coat; C170
- Application; ~3.0l/sqm
- SAMI (D/D) 14/7mm
- Asphalt; 30mm OGA

Applications

Graham Farmer Freeway WA

Existing surface milled 40mm deep to dense graded base layer
Cement treated base in a cracked condition

Firm substrate with no loss of shape and no vertical movement.

Applications

Graham Farmer Freeway WA

SAMI (D/D) - 14/7mm

Asphalt; 30mm OGA

Applications

Graham Farmer Freeway WA

WA Main roads philosophy;
To incorporate as much binder into the SAM as possible to enhance the waterproofing function using a 180g/sqm paving fabric.

WA Press Release; What are the benefits of these works (Mid to long term)?
The new asphalt surface uses new technology and materials that will significantly extend the life span of road surfaces. The new road surface will last 15 years (compared to the previous 10 years), which means the tunnel will not need to close again for similar works until approx. 2026.

Boundary conditions

Milling and Recycling

- Cold asphalt millingincorporating Paving Fabric – no problems
- Chisel teeth preferred at milling speed of 3-6m/min.

De-lamination

- De-lamination of paving fabric can occur if water is present in the base layers

Mechanical Failure

- Mechanical failure of paving fabric can occur if any vertical movement from cracking occurs

Bleeding

- Bleeding through the Asphalt could occur if cutbacks are used in the bond/tack coat

Comments

- “We are selecting paving fabric where there are no other options would work”
- “We are selecting paving fabrics where cost prohibits mandatory pavement rehabilitation”
- “Selection of paving fabric provides a foundation for future sealing treatments”
- “…using paving fabrics helps restore roads to a normal maintenance cycle”
- “We are expecting more and more of paving fabrics”

Thank You