

TASMANIA GRANTS COMMISSION

# REPORT

## Review of Road Maintenance Costs



Hoblers Bridge Rd, Newstead



Jeff Roorda & Associates  
February 2012  
Ver 1.3

## Review of Road Maintenance Costs

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### Document Control



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## 1. BACKGROUND

The State Grants Commission is responsible for making recommendations to the Treasurer concerning the distribution of Commonwealth financial assistance grants (FAGs) to Tasmanian councils.

One component of the FAGs is the road grant, which is determined using a model called the Roads Preservation Model (RPM). The Commission have undertaken a review of the RPM which assesses the total asset preservation requirement for each council in three road classes: urban sealed, rural sealed and unsealed.

## 2. TASK

One element of the calculation of the asset preservation requirement by the Commission involves a measure of the cost of maintenance. The task required under the Review of Road Maintenance Costs Project is the updating of the contract unit rates and the recalculation of the cost per kilometre measure for each maintenance task as noted in the box below.

The costs of maintenance are a cost per kilometre for various maintenance tasks completed by councils to maintain their local roads. The maintenance tasks noted in the box below have been agreed through consultation with a representative group of council engineers.

All contract unit rates used within the re-calculations are to reflect, as far as practically possible, the same dimensions as are specified in Appendix A, as these road specifications have been agreed upon by council engineers and should not alter.

The Commission has undertaken a data collection with councils and has produced the maintenance costs below. The Commission is concerned that the data collection did not conform to the maintenance methods and profiles in sufficient detail to provide accurate costs to be included in the assessment.

<b>Costs of Maintenance</b>			<b>Cost per Km</b>
<b>Urban Sealed</b>	Rehabilitation	Heavy Patching	\$529,545
		Removal & Replacement	\$988,656
		Structural Asphalt Repair	\$529,937
	Resurfacing	1 Coat Spray Seal	\$59,687
		30mm Asphalt Layer	\$225,444
		Slurry Seal	\$89,580
Other Maintenance		\$5,897	
<b>Rural Sealed</b>	Rehabilitation	Scarify & Overlay	\$186,660
		Removal & Replacement	\$399,286
	Resurfacing	1 Coat Spray Seal	\$45,577
	Other Maintenance		\$3,962
<b>Unsealed</b>	All Maintenance		\$3,016

The tasks may be summarised as:

- update contract unit rates;
- recalculate the cost per kilometre measures;
- ensure that road specifications detailed in Appendices are used; and

task to be completed by Friday 17 February 2012.

### **3. METHODOLOGY**

Valuation rates were sourced from five Councils, Hobart, Brighton, Launceston, Devonport and Burnie. The support from these councils is acknowledged with thanks.

The valuation rates were tabulated into formats suitable for the Grants Commission standard road profiles. The number of available rates ranged from 2 to 5 for the valuation items. The median of the available rates were selected for the review of road maintenance costs. An on-cost of 13% was added to the median rates to allow for design, supervision and project management costs.

The valuation methodology continued the methodology used for the 'Updating of Contact Unit Rates for Roads Preservation Model' Report<sup>1</sup> prepare for the Commission in 2008. The methodology linked the valuation unit rates to the current construction costs for Melbourne as at June 2011 published by the Australian Institute of Quantity Surveyors<sup>2</sup>. This method will enable the Commission to update the Road Maintenance costs annually if required.

### **4. ROAD MAINTENANCE COSTS**

The road maintenance costs derived using the median of available valuation rates are detailed in Table 1. Valuation rates are detailed in Appendices A and B.

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<sup>1</sup> JRA, 2008.

<sup>2</sup> AIQS, 2011, Current Construction Costs, pp A-6 – B-23.

**Table 1: Road Maintenance Costs**

<b>Costs of Maintenance</b>			<b>Cost per Km</b>
<b>Urban Sealed</b>	Rehabilitation	(1) Removal & Replacement	\$1,159,700
		(2) Structural Asphalt Repair	\$547,800
		(3) Heavy Patching	\$461,475
	Resurfacing	30 mm Asphalt Layer	\$189,000
		1 Coat Spray Seal	\$48,720
		Slurry Seal	\$74,760
Other Maintenance		\$4,576	
<b>Rural Sealed</b>	Rehabilitation	(1) Removal & Replacement	\$406,500
		(2) Scarify & Overlay	\$260,100
	Resurfacing	1 Coat Spray Seal	\$34,800
	Other Maintenance		\$2,399
<b>Unsealed</b>	Maintenance	R&R culverts	\$37,100
		Regrading	\$1,010
		Resheeting	\$29,379
		Other maintenance	\$1,750

Urban and rural other maintenance and unsealed all maintenance costs were calculated from the Council's 2010-11 road maintenance expenditures provided to the Commission and sealed and unsealed road lengths in the Commission's Annual Report for 2011-12. These represent actual road maintenance expenditure rates for 2010-11.

Unsealed maintenance costs were calculated from data provided by two councils. Resheeting costs and yearly cycles were extrapolated from the council data to the Commission's unsealed roads Standard Road Profiles.

## **5. VALIDATION**

The derived road maintenance costs shown in Table 1 were compared to median data provided by councils in the Commission's road expenditure survey. The comparison is shown in Table 2.

In most items, the derived road maintenance costs are in line with the median Council costs.

Differences were identified for the following items.

- Urban sealed rehabilitation heavy patching,
- Urban sealed resurfacing slurry seal,
- Rural sealed rehabilitation scarify and overlay.

Checks were made to validate the derived road maintenance costs with the following sources:

- Unit rates provided by Councils in the Commission's 2011 road maintenance cost and life expectancy survey,
- Road maintenance costs developed for the Commission in 2008,
- Road maintenance costs developed for the Commission in 2011.

Variations may be due to:

- Small sample size,
- Variability between the standard work profiles and profiles of costs recorded by councils,
- Variability in application and extent of project management, design and supervision costs.

## **6. CONCLUSION**

It is our opinion that the derived road maintenance costs as shown in Table 1 are representative of road maintenance costs for Councils in Tasmania based on the available unit rate data.

## **REFERENCES**

AIQS, 2011, 'The Building Economist', Sydney.

JRA, 2008, 'Updating of Contract Unit Rates for Roads Preservation Model', Tasmanian Grants Commission, Hobart.

Tasmania State Grants Commission, 2011, 'Annual Report for 2011-12', Hobart.

Review of Road Maintenance Costs

**Table 2: Comparison of Derived Costs with Median Council Costs**

Road Maintenance Cost Items			Derived Costs (\$/km)	Median Council Costs		
				Urban Council	Rural Council	All Councils
<b>Urban Sealed</b>						
Rehabilitation	(1) Removal & Replacement		\$1,159,100	\$1,230,600	\$235,200	\$767,172
	(2) Structural Asphalt Repair		\$547,800	\$630,000	\$462,000	\$504,000
	(3) Heavy Patching		\$461,475	\$432,600	\$432,600	\$432,600
Resurfacing	30 mm Asphalt Layer		\$189,000	\$252,000	\$184,800	\$210,000
	1 Coat Spray Seal		\$48,720	\$50,610	\$46,200	\$46,200
	Slurry Seal		\$74,760	\$114,600	\$71,400	\$100,800
Other Maintenance			\$4,576			
<b>Rural Sealed</b>						
Rehabilitation	(1) Removal & Replacement		\$406,500	\$480,000	\$195,000	\$420,000
	(2) Scarify & Overlay		\$260,100	\$180,000	\$150,000	\$180,000
Resurfacing	1 Coat Spray Seal		\$34,800	\$37,650	\$32,940	\$34,500
Other Maintenance			\$2,399			
<b>Unsealed</b>						
Maintenance	R & R culverts		\$37,100			
	Grading		\$1,010			
	Resheeting		\$29,376			
	Other maintenance		\$1,750			

**APPENDIX A Base Cost Data**

Source 1		Base Data	Year			Ref
Building Economist, Journal of the Australian Institute of Quantity Surveyors			Jun-11			
		Edition	Dec-11			
Item No.	Page			MELB		
1080	B-18	100 mm corrugated slotted PVC pipe including backfilling with rubble		\$26.69	/m	
		<b>Subsurface drain</b>	Adj factor 169%	\$45.00	/m	A
1297	B-21	Two coats of bitumen and gravel surfacing inc priming		\$10.34	/m2	
		Derivation of cost rates				
		<b>Primer seal</b>	Adj factor 43%	\$4.45	/m2	B
		<b>Sprayed seal (1 coat 10mm)</b>	Adj factor 56%	\$5.80	/m2	C
		<b>Sprayed seal (1 coat 14mm)</b>	Adj factor 56%	\$5.80	/m2	D
		<b>Slurry seal (15 mm)</b>	Adj factor 86%	\$8.90	/m2	E
		<b>2 coat seal</b>	Adj factor 100%	\$10.30	/m2	F
1299	B-21	100 mm unreinforced concrete path including joints, formwork and lightly brushed surface		\$36.49	/m2	
		<b>Footpath</b>	Adj factor 310%	\$113.00	/m2	G
1307	B-21	525 x 250 mm in-situ concrete kerb		\$54.74	/m	
		<b>Kerb and channel</b>	Adj factor 197%	\$108.00	/m	H
1371	B-22	Surface excavation to reduce levels and removal from using public roads, distance < 3 km depositing to spoil		\$9.12	/m3	
		Derivation of cost rates				
		<b>Boxing out in constrained space</b>	Adj factor 296%	\$27.00	/m3	I
		<b>Dig outs (50 mm)</b>	Adj factor 1261%	\$115.00	/m3	J
1400	B-23	150 mm layer approved crushed stone base course		\$12.16	/m2	
		Derivation of cost rates - allow + 50 mm to cover uneven surface				
		<b>Sub base 200 mm layer</b>	Adj factor 177%	\$21.50	/m2	K
		<b>Sub base 300 mm layer</b>	Adj factor 251%	\$30.50	/m2	L
		<b>Base 100 mm layer</b>	Adj factor 103%	\$12.50	/m2	M
		<b>Base 150 mm layer</b>	Adj factor 144%	\$17.50	/m2	N
		<b>Gravel resheets</b>	Adj factor 34%	\$4.08	/m2	O
1403	B-23	25 mm hot rolled asphaltic concrete wearing course inc primer coat		\$12.06	/m2	
		Derivation of cost rates				
		<b>Thin asphalt overlay (30mm)</b>	Adj factor 187%	\$22.50	/m2	P
		<b>50 mm asphalt overlay</b>	Adj factor 315%	\$38.00	/m2	Q

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		<b>50 mm asphalt fill</b>	Adj factor	514%	<b>\$62.00</b>	/m2	<b>R</b>
		<b>100 mm asphalt overlay</b>	Adj factor	514%	<b>\$62.00</b>	/m2	<b>S</b>
1409	B-23	Class 'X' concrete pipe including excavation average 1.5 m deep under roadway 400 mm diameter			<b>\$127.72</b>	/m	
		450 mm diameter	Adj factor	493%	<b>\$630.00</b>	/m	<b>T</b>
1412	B-23	Concrete headwall to suit pipe up to 750 mm dia	Adj factor	77%	<b>\$729.81</b>		<b>U</b>
		<b>450 mm dia culvert 10 m</b>	(S x 10)		\$6,300.00		
		<b>2 headwalls</b>	(T x 2)		\$1,120.00		
		<b>450 mm dia culvert plus headwalls</b>			<b>\$7,420.00</b>		<b>V</b>
1433	B-23	Tracked tractor Drott Cat 953 As proxy for Cat 12H Grader			<b>\$924.00</b>	/day	
		<b>Grader</b>			<b>\$924.00</b>	/day	
		reform table drains	Adj factor	0.18%	<b>\$1.65</b>	/ m	<b>W</b>
		scarify pavement	Adj factor	0.42%	<b>\$3.90</b>	/ m2	<b>X</b>
		grading unsealed roads	Adj factor	109.31%	<b>\$1,010</b>	/ km	<b>Y</b>

Source 2

### Tas Grants Commission CDCS Sheets

Year **2010-11**

Urban Sealed Roads Total Maintenance Exp.	<b>\$13,594</b>	(000)	<b>Z</b>
Rural Sealed Roads Total Maintenance Exp.	<b>\$10,539</b>	(000)	<b>ZA</b>
Unsealed Road Total Maintenance Expenditure	<b>\$18,059</b>	(000)	<b>ZB</b>

Source 3

### Tas Grants Commission 2010-11 Annual Report Appendix B

#### Sealed Road Length

Urban Sealed Roads	<b>2,971</b>	km	<b>ZC</b>
Rural Sealed Roads	<b>4,393</b>	km	<b>ZD</b>

#### Unsealed Road Length

Urban Unsealed Road Length	<b>185</b>	km	
Rural Unsealed Road Length	<b>6,775</b>	km	
<b>Total Unsealed Road Length</b>	<b>6,960</b>	km	<b>ZE</b>

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## Review of Road Maintenance Costs

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Source 4

### Tas Councils Survey

#### Grading

Average grading frequency **2.0** times/yr ZF

Average grading cost **\$1,010** /km  
see item Y above

#### Resheeting

Average resheeting cycle **2.0** yrs ZG

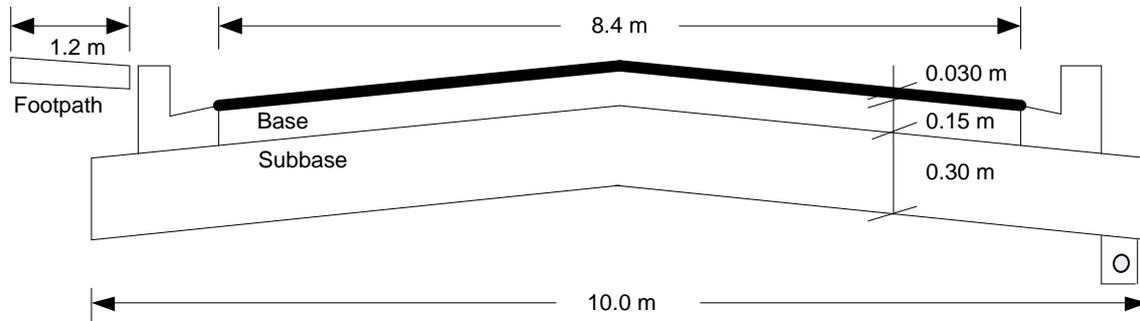
Average resheeting cost **\$29,400** /km  
\$4.08 /m<sup>2</sup>  
See item O above

Other maintenance **\$1,750** /km ZH

## APPENDIX B Road Maintenance Costs

### Urban Sealed Rehabilitation

(1) Removal and replacement of sealed sub-base and base pavement. 30 mm asphalt surfacing, kerb and channel, footpath (1 side) including excavating and laying 100 mm subsurface drain

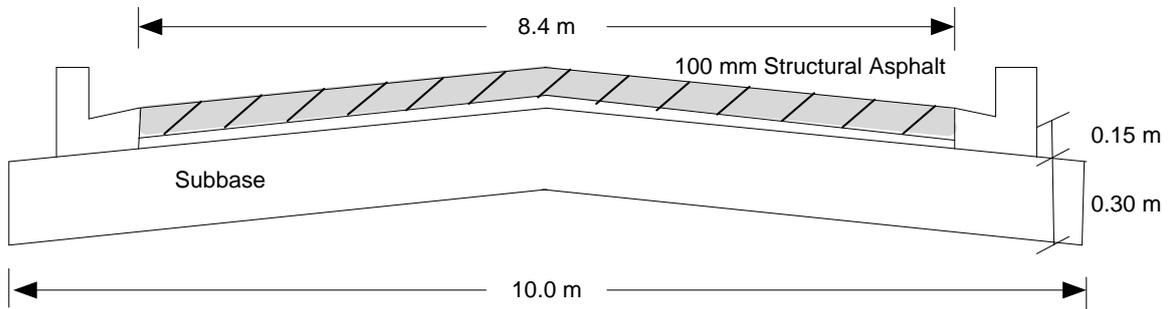


Urban Sealed – Rehabilitation (1)

Urban Sealed Rehabilitation (1)		Reference	
Boxing out (0.45 m x 10.0 m x 1 m)	4.5 m <sup>3</sup> / m	I	\$27.00 /m <sup>3</sup>
Subbase pavement layer (300 mm) (10 m x 1 m)	10 m <sup>2</sup> / m	L	\$30.50 /m <sup>2</sup>
Kerb & channel (2 sides)	2 lin m / m	H	\$108.00 / m
Pavement base layer (150 mm) (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	N	\$17.50 /m <sup>2</sup>
30 mm asphalt seal (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	P	\$22.50 / m <sup>2</sup>
Sub-surface drain (1 side)	1 lin m / m	A	\$45.00 / m
Footpath (1.2 m wide, 1 side)	1.2 m <sup>2</sup> / m	G	\$113.00 /m <sup>2</sup>
<b>Cost per lineal metre</b>			
Boxing out	(4.5 m <sup>3</sup> x I\$)		\$121.50 / m
Subbase pavement layer	(10 m <sup>2</sup> x L\$)		\$305.00 / m
Kerb & Channel	(2 x H\$)		\$216.00 / m
Pavement base layer (150 mm)	(8.4 m <sup>2</sup> x N\$)		\$147.00 / m
30 mm asphalt seal	(8.4 m <sup>2</sup> x P\$)		\$189.00 / m
Sub-surface drain	(1 x A\$)		\$45.00 / m
Footpath	(1.2 x G\$)		\$135.60 / m
Total		AA	\$1,159.10 / m
<b>Cost per kilometre</b> [1,000 x AA\$]			<b>\$1,159,100 / km</b>

**Urban Sealed Rehabilitation**

(2) Boxing out 100 mm depth of base course pavement layer, and making a structural repair with 100 mm of asphalt surfacing.



Urban Sealed - Rehabilitation (2)

**Urban Sealed Rehabilitation (2)**

Reference

Boxing out (100 mm) (0.1 m x 10.0 m x 1 m)	1 m <sup>3</sup> / m	I	\$27.00 / m <sup>3</sup>
Asphalt overlay (100 mm) (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	S	\$62.00 / m <sup>2</sup>

**Cost per lineal metre**

Boxing out	(1.0 m <sup>3</sup> x I\$)	\$27.00 / m
Asphalt overlay	(8.4 m <sup>2</sup> x S\$)	\$520.80 / m
<b>Total</b>		<b>AB \$547.80 / m</b>

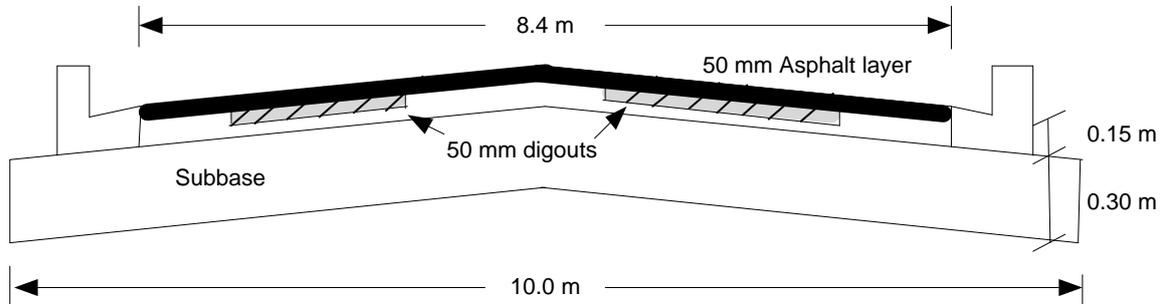
**Cost per kilometre**

[1,000 x AB\$]

**\$547,800 / km**

**Urban Sealed Rehabilitation**

(3) Heavy patching and retention of existing road profile, involving the digging out of structurally failed areas (up to 25 per cent of total area) and filling with 50 mm layer of fine crushed rock or asphalt, then resurfacing total area with 50 mm asphalt layer.



Urban Sealed - Rehabilitation (3)

**Urban Sealed Rehabilitation (3)**

Reference

Dig out failed areas (25% x 50 mm x 8.4 m x 1 m)	0.105 m <sup>3</sup> / m	J	\$115.00 /m <sup>3</sup>
Fill with 50 mm asphalt (25% x 8.4 m x 1 m)	2.1 m <sup>2</sup> / m	R	\$62.00 /m <sup>2</sup>
Asphalt overlay (50 mm) (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	Q	\$38.00 /m <sup>2</sup>

**Cost per lineal metre**

Boxing out	(0.105 m <sup>3</sup> x J\$)	\$12.08 / m
Fill with asphalt	(2.1 m <sup>2</sup> x R\$)	\$130.20 / m
Asphalt overlay	(8.4 m <sup>2</sup> x Q\$)	\$319.20 / m

Total	AC	\$461.48 / m
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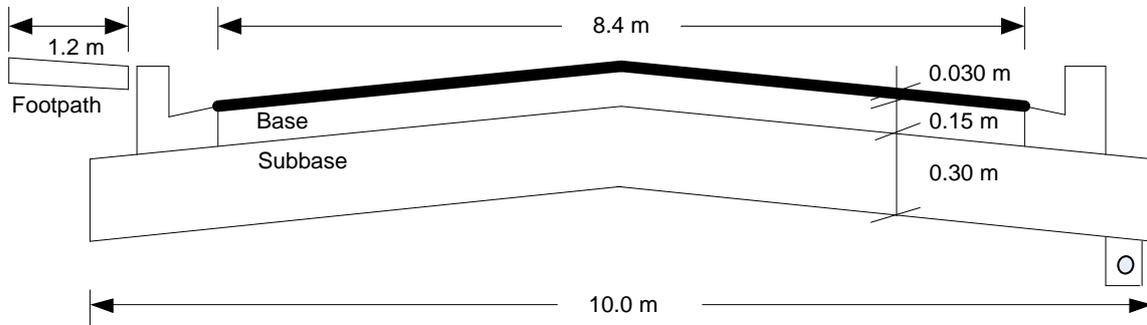
**Cost per kilometre**

[1,000 x AC\$]

**\$461,475 / km**

**Urban Sealed Resurfacing**

- (1) 30 mm asphalt layer
- (2) One coat spray seal with 10 mm aggregate; or
- (3) 15 mm slurry seal



Urban Sealed – Resurfacing

**Urban Sealed Resurfacing**

Reference

Asphalt overlay (30 mm) (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	P	\$22.50 /m <sup>2</sup>
Spray seal (1 coat 10mm aggregate) (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	C	\$5.80 /m <sup>2</sup>
15 mm slurry seal (8.4 m x 1 m)	8.4 m <sup>2</sup> / m	E	\$8.90 /m <sup>2</sup>

**Cost per lineal metre**

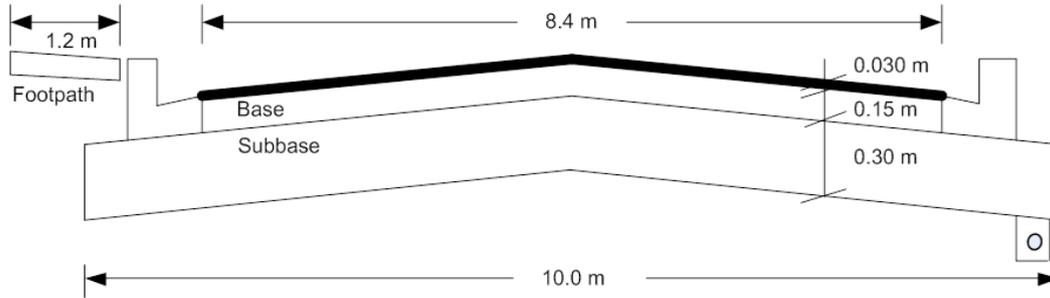
Asphalt overlay (30 mm)	(8.4 m <sup>2</sup> x P\$)	<b>AD</b>	\$189.00 / m
Spray seal (1 coat 10mm aggregate)	(8.4 m <sup>2</sup> x C\$)	<b>AE</b>	\$48.72 / m
15 mm slurry seal	(8.4 m <sup>2</sup> x E\$)	<b>AF</b>	\$74.76 / m

**Cost per kilometre**

Asphalt overlay (30 mm)	[1,000 x AD\$]	<b>\$189,000 / km</b>
Spray seal (1 coat 10mm aggregate)	[1,000 x AE\$]	<b>\$48,720 / km</b>
15 mm slurry seal	[1,000 x AF\$]	<b>\$74,760 / km</b>

**Sealed Other Maintenance**

Other routine maintenance e.g. potholes, edge breaks, guardrail and sign maintenance, footpath maintenance etc. (excludes roadside vegetation management)



Urban Sealed - Other Maintenance

**Urban Sealed Road Maintenance Expenditure**

	Reference	
2010-2011	Z	\$13,594 (000)

**Urban Sealed Road Length (Appendix 4 SGC Annual Report 2010-11)**

Total	ZC	2,971 km
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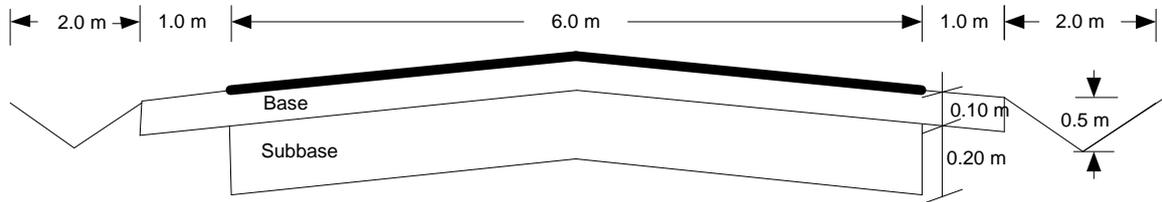
**Urban Sealed Maintenance Cost**

[Z / ZC]

**\$4,576 / km**

**Rural Sealed Rehabilitation**

(1) Removal and replacement of sub-base and base, cross road drainage culverts (450 mm dia x 10 m with two end walls), 5 culverts per km, trimming, compaction and resurfacing with prime and two coat seal and reform table drains.



Rural Sealed Rehabilitation (1)

**Rural Sealed Rehabilitation (1)**

		Reference	
Boxing out (0.30 m x 6.0 m x 1 m)	1.8 m <sup>3</sup> / m	I	\$27.00 /m <sup>3</sup>
Subbase pavement layer (200 mm) (6 m x 1 m)	6.0 m <sup>2</sup> / m	K	\$21.50 /m <sup>2</sup>
Pavement base layer (100 mm) (8.0 m x 1 m)	8 m <sup>2</sup> / m	M	\$12.50 /m <sup>3</sup>
Primer seal (6 m x 1 m)	6.0 m <sup>2</sup> / m	B	\$4.45 / m <sup>2</sup>
2 coat seal (6 m x 1 m)	6.0 m <sup>2</sup> / m	F	\$10.30 / m
Remove & replace 450 mm culverts (5 culverts / km)	0.005 culverts / m	V	\$7,420 Each
Reform table drains (item)	2 m / m	W	\$1.65 / m

**Cost per lineal metre**

Boxing out	(1.8 m <sup>3</sup> x I\$)	\$48.60 / m
Subbase pavement layer	(6 m <sup>2</sup> x K\$)	\$129.00 / m
Pavement base layer (100 mm)	(8 m <sup>2</sup> x M\$)	\$100.00 / m
Prime seal	(6 m <sup>2</sup> x B\$)	\$26.70 / m
2 coat seal	(6.0 m x F\$)	\$61.80 / m
Remove & replace 450 mm culverts	(0.005 x V\$)	\$37.10 / m
Reform table drains	(2 m x W\$)	\$3.30 / m

Total AG \$406.50 / m

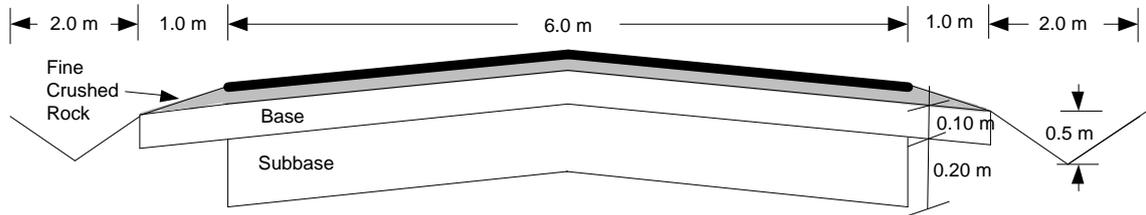
**Cost per kilometre**

[1,000 x AG\$]

**\$406,500 / km**

**Rural Sealed Rehabilitation**

(2) Scarify pavement, remove and replace cross road drainage culverts (450 mm dia x 10 m with two end walls, 5 culverts per km), lay 100 mm fine crushed rock, trimming, compaction and resurfacing with prime and two coat seal and reform table drains.



Rural Sealed Rehabilitation (2)

**Rural Sealed Rehabilitation (2)**

Reference

Scarify pavement (8.0 m x 1 m)	8 m <sup>2</sup> / m	X	\$3.90 /m <sup>2</sup>
Pavement base layer (100 mm) (8.0 m x 1 m)	8 m <sup>2</sup> / m	M	\$12.50 /m <sup>2</sup>
Primer seal (6 m x 1 m)	6 m <sup>2</sup> / m	B	\$4.45 /m <sup>2</sup>
2 coat seal (6 m x 1 m)	6 m <sup>2</sup> / m	F	\$10.30 /m
Remove & replace 450 mm culverts (5 culverts / km)	0.005 culverts / m	V	\$7,420.00 Each
Reform table drains (item)	2 m / m	W	\$1.65 /m

**Cost per lineal metre**

Scarify pavement	(8 m <sup>2</sup> x X\$)	\$31.20 /m
Pavement base layer (100 mm)	(8 m <sup>2</sup> x M\$)	\$100.00 /m
Primer seal	(6 m <sup>2</sup> x B\$)	\$26.70 /m
2 coat seal	(6 m <sup>2</sup> x F\$)	\$61.80 /m
Remove & replace 450 mm culverts	(0.005 /m x V\$)	\$37.10 /m
Reform table drains	(2 x W\$)	\$3.30 /m

Total AH \$260.10 /m

**Cost per kilometre**

**\$260,100 / km**

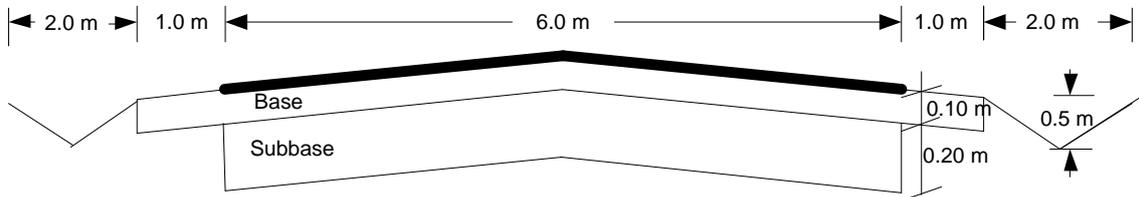
[1,000 x AH\$]

## Review of Road Maintenance Costs

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### Rural Sealed Resurfacing

Resurfacing with one coat spray seal with 14 mm aggregate



Rural Sealed Resurfacing

### Rural Sealed Resurfacing

Reference

1 coat seal (14 mm aggregate) (6 m x 1 m)	6.0 m <sup>2</sup> / m	D	\$5.80 / m <sup>2</sup>
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### Cost per lineal metre

1 coat seal (14 mm aggregate)	(6.0 m <sup>2</sup> x D\$)	\$34.80 / m
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Total		AI \$34.80 / m
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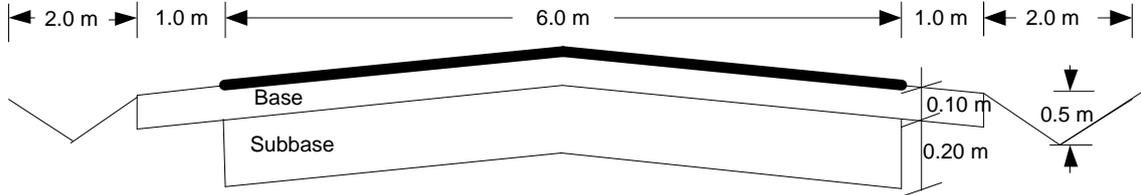
### Cost per kilometre

[1,000 x AF\$]

**\$34,800 / km**

**Sealed Other Maintenance**

Other routine maintenance e.g. pothole patching, shoulder maintenance, guardrail and sign maintenance etc. (excludes roadside vegetation management)



Rural Sealed - Other Maintenance

**Rural Sealed Road Maintenance Expenditure**

2010-2011	Reference ZA	\$10,539 (000)
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**Rural Sealed Road Length** (Appendix 4 SGC Annual Report 2010-11)

Total	ZD	4,393 km
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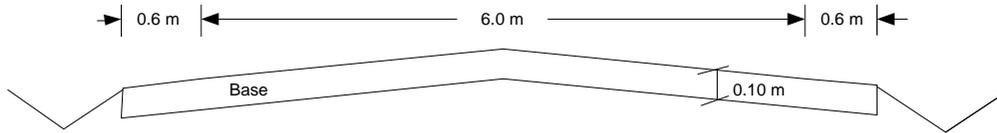
**Rural Sealed Maintenance Cost**

[ZA / ZD]

**\$2,399 / km**

**Unsealed Maintenance**

Removal and replacement of cross road drainage culverts (450 mm dia x 9 m with two end walls, 5 culverts per km), regrading of surface, resheeting of surface, other routine maintenance e.g. table drains, shoulder, guidepost and sign maintenance, etc. (excludes roadside vegetation management)



Unsealed - Maintenance

**Work activities**

1. Removal and replacement of cross road drainage culverts
2. Regrading
3. Resheeting
4. Other routine maintenance (eg table drains, shoulder, guidepost and sign maintenance)

**Urban and Rural Unsealed Maintenance**

Reference

**Removal and replacement of cross road drainage culverts**

Remove and replace culverts	5 culverts / km	V	\$7,420 each
Cost per km	(5 x V\$)		<b>\$37,100 / km</b>

**Regrading (incl plant, labour and overheads)**

Average grading frequency	ZF	<b>2 / yr</b>
Average grading cost	Y	<b>\$1,010 / km</b>

**Resheeting (incl plant, labour and overheads)**

Average resheeting cycle	ZG	<b>2 yrs</b>	
Average resheeting cost	7,200 m <sup>2</sup> / km	O	\$4.08 / m <sup>2</sup>
<b>Average resheeting cost per km</b>			<b>\$29,376 / km</b>
	[7,200 m <sup>2</sup> x O\$]		

**Other maintenance**

Cost per kilometre per annum	ZH	<b>\$1,750 / km</b>
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