



WALGA

Updates to the Incremental Cost Guides for Additional Freight Tasks on Sealed and Unsealed Roads – Technical Basis

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Summary

The user guides *Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks*, published in 2015 and *Estimating the Incremental Cost Impact on Unsealed Local Roads from Additional Freight Tasks*, published in 2019 have been reviewed and updated. The updates required a review of the unit rates for treatments, validation of the costing tool, and generation of new marginal cost rates and charts. The work included the development of a calculator to simplify the process for practitioners to calculate the marginal costs.

The costing tool for sealed roads was developed originally from the Austroads (2015) *Freight Axle Mass Limits Investigation Tool* (FAMLIT), whereas a purpose-built NTRO tool was employed for unsealed roads. A thorough validation process was undertaken to ensure that the settings in the tool, as used in the original Guides, were correct. The tool was found to differ to a small degree, however overall it was confirmed and checked, and found able to be used for the new marginal cost derivations.

Unit rates for common treatment types were provided by WALGA (processed from a survey conducted by the LG Grants Commission). The unit rates for treatments dated 2024 were compared with the original rates used in the guides across the 4 cost zones. Due to the range of variation between unit rates and cost zones, after review and consideration of options, the following approach was taken to applying escalation factors:

- For sealed roads, an average escalation factor by cost zone was chosen as the basis for all new unit rates. The escalation factors applied were 1.71 for cost zone 1, 1.68 for cost zone 2, 1.76 for cost zone 3 and 1.73 for cost zone 4. The escalation factors were then applied to the 2015 unit rates and new unit rates derived for the 2024 analysis with these informing the development of a new set of relationships between the annual no. of equivalent standard axles (ESA) to estimate reconstruction and overlay (or rehabilitation) costs for varying haul tasks. New marginal cost charts were then developed for the guides, covering the range of selected scenarios and resulting in 64 charts in the Sealed Cost Guide.
- For unsealed roads, the responses by cost zone were inconsistent with what was considered to be a more comprehensive survey in 2017, and an average escalation factor was adopted across all cost zones of 1.56 and applied in the generation of the 15 charts in the Unsealed Cost Guide. The average unit rate for regravelling is reported and there is functionality to allow users to adjust to suite actual rates if known. This approach is the same as that applied in the 2019 Unsealed Guide, recognising that materials availability can vary considerably even within a single cost zone.

To support the Guides, a calculator was developed in a macro-enabled Excel workbook. The calculator was validated by entering the worked examples from the Guides and comparing the outputs from the calculator to the outputs reported in the Guides. This showed minor variations (+3% to -2%) between the 2015 based values for the Sealed Cost Guide and slightly larger variations (-7% to -12%) for the 2019 values in the Unsealed Cost Guide. The values are attributed to margins of error in the manual selection of values off the original charts, while the calculator is referencing the original values. The validation was deemed successful, and the calculator was then updated with the 2024 marginal cost data from the FAMLIT tool and released.

Contents

- 1. Introduction 1
- 2. Validation of the Prior Tools 1
 - 2.1 FAMLIT tool for sealed roads 1
 - 2.2 NTRO tool for unsealed roads 3
- 3. Review of Unit Rate Data 3
 - 3.1 Sealed Roads 3
 - 3.2 Unsealed Roads 8
- 4. How the WALGA Road Wear Cost Calculator was Developed 9
- 5. References 10
- Appendix A Previous and Updated Unit Rates 11

1. Introduction

NTRO were appointed by WALGA to review and update the user guides *Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks*, published in 2015 (WALGA & ARRB 2015) and *Estimating the Incremental Cost Impact on Unsealed Local Roads from Additional Freight Tasks*, published in 2019 (WALGA & ARRB 2019). These will be referred to in this report as the 'Sealed Cost Guide' and 'Unsealed Cost Guide' respectively, or collectively as 'the Guides' with each replaced by second editions (WALGA & NTRO 2025a and 2025b).

The purpose of the review was to update the unit rates that drive the methodology, and to simplify or improve the process and explanation for practitioners. The work also included the provision of a new calculator tool.

This technical report explains the process in reviewing and updating the guides, with the new guides with the main tasks being:

1. validation of the tool settings and models used in the original versions of the guides, by first reviewing the model content and running the tool for a selection of scenarios and verifying that all outputs were correct
2. detailed review of the original and revised unit rates data and the associated cost versus ESA relationships for reconstruction and overlay (or rehabilitation) activities for sealed roads, and selection of the most suitable basis for the updates
3. generation of the new tool outputs, generation of graphs and tables and quality control checks
4. creation of a spreadsheet calculator for users, called the WALGA Road Wear Cost Calculator.

As used in the original Guides, the Austroads (2015a & 2015b) *Freight Axle Mass Limits Investigation Tool* (FAMLIT), being a macro-enabled spreadsheet tool, was used for the derivation of the marginal costs, whereas a purpose-built NTRO tool was employed for unsealed roads. For an explanation of FAMLIT and marginal cost theory, readers should refer to the Guides' introductions and appendices, and the respective technical basis documents (Evans, Michel & Toole, 2015 and Hore-Lacy & Toole 2019).

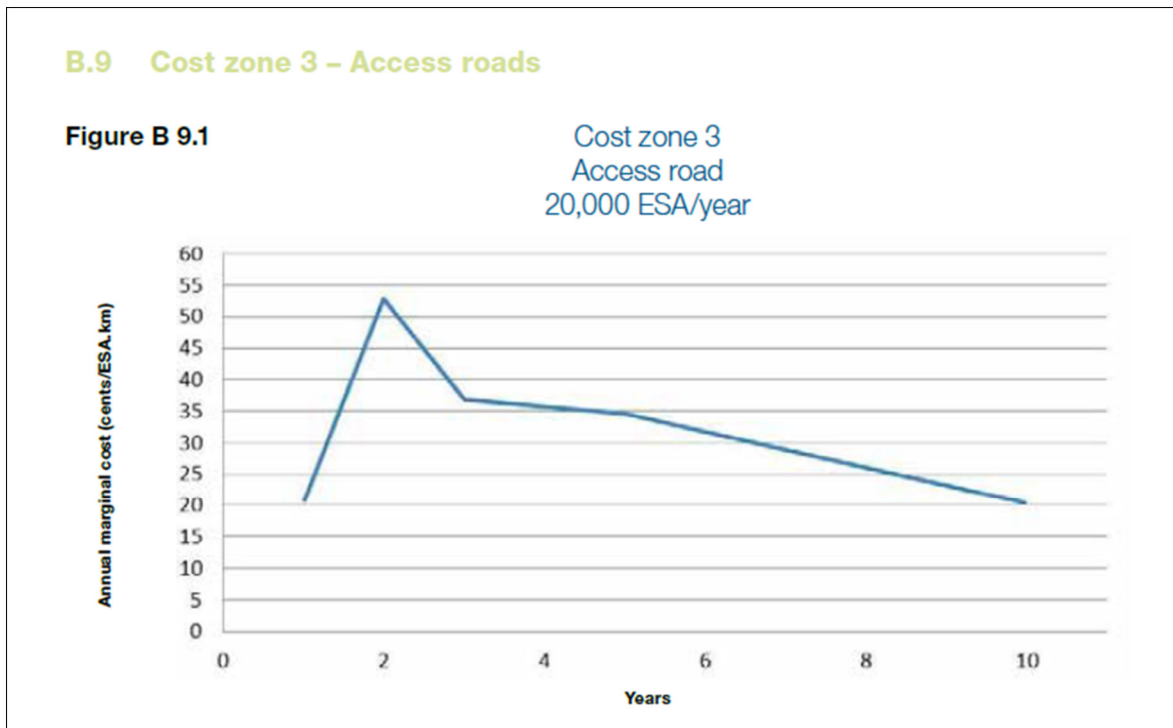
2. Validation of the Prior Tools

2.1 FAMLIT tool for sealed roads

The FAMLIT tool (Austroads 2105 a and 2015b) that was used to derive the marginal cost values in the sealed guide was accessed and validated. The purpose of validating the tool was to reconfirm the models employed and tool settings and confirm that the outputs were generating correctly.

The process for confirming the outputs were correct involved selecting a set of run details that could be used to validate the outcomes estimated by the tool and reported in the former guide. The run details that were used were for an access road located in cost zone 3 with a loading of 20,000 ESA/year, as shown in Figure 2.1.

Figure 2.1: Screenshot of Figure B 9.1 taken from the draft Sealed Cost Guide



The estimated costs for the five (5) loading durations, based on Figure 2.1, are determined by reading off the chart as is shown in the examples in the guide. The estimated costs from Figure 2.1 are shown in Table 2.1.

Table 2.1: Estimated marginal costs from the chart in Figure 2.1

Time period	Estimated Cost (cents/ESA.km)
1 Year	20.5
2 Years	53.0
3 Years	36.0
5 Year	34.5
10 Years	20.0

The FAMLIT tool was run with the settings preset in the tool. These were the same settings used in generating the 2015 results.

The results of the loading durations are shown in Figure 2.2. The marginal costs estimated for the Access Road category are highlighted in yellow and they confirm that the tool outputs match those in Table 2.1.

Figure 2.2: Summary results for the re-created analysis results for the 5 loading durations

1 Year																			
Road Category	Length	Avg Condition (SNP)			Avg Condition (RI)			Total Undiscounted Agency Costs			Total Discounted Agency Costs			Total Discounted SARs (million)			MC per MSAR		
		Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB
District Distributor	3.00	4.59	4.59	4.59	3.16	3.16	3.16	1,217,929	1,239,903	1,239,903	467,420	489,393	489,393	3.64	3.70	3.70	0	371613	371613
Regional Distributor	3.00	4.06	4.07	4.07	3.21	3.21	3.21	915,988	937,962	937,962	317,837	339,811	339,811	1.09	1.15	1.15	0	371613	371613
Local Distributor	3.00	3.40	3.43	3.43	3.72	3.66	3.66	723,962	600,052	600,052	245,055	267,550	267,550	0.18	0.24	0.24	0	380422	380422
Access Road	3.00	2.87	2.93	2.93	3.79	3.57	3.57	693,273	648,592	648,592	226,650	263,194	263,194	0.04	0.10	0.10	0	618034	618034
																		0.20601	0.20601
2 Years																			
Road Category	Length	Avg Condition (SNP)			Avg Condition (RI)			Total Undiscounted Agency Costs			Total Discounted Agency Costs			Total Discounted SARs (million)			MC per MSAR		
		Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB
District Distributor	3.00	4.59	4.59	4.59	3.16	3.17	3.17	1,217,929	1,240,085	1,240,085	467,420	489,564	489,564	3.64	3.75	3.75	0	193583	193583
Regional Distributor	3.00	4.06	4.07	4.07	3.21	3.21	3.21	915,988	938,144	938,144	317,837	339,981	339,981	1.09	1.21	1.21	0	193583	193583
Local Distributor	3.00	3.40	3.47	3.47	3.72	3.60	3.60	723,962	600,235	600,235	245,055	270,748	270,748	0.18	0.30	0.30	0	224605	224605
Access Road	3.00	2.87	2.87	2.87	3.79	3.72	3.72	693,273	657,905	657,905	226,650	408,103	408,103	0.04	0.15	0.15	0	1586244	1586244
																		0.52875	0.52875
3 Years																			
Road Category	Length	Avg Condition (SNP)			Avg Condition (RI)			Total Undiscounted Agency Costs			Total Discounted Agency Costs			Total Discounted SARs (million)			MC per MSAR		
		Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB
District Distributor	3.00	4.59	4.59	4.59	3.16	3.17	3.17	1,217,929	1,240,207	1,240,207	467,420	489,670	489,670	3.64	3.80	3.80	0	134009	134009
Regional Distributor	3.00	4.06	4.12	4.12	3.21	3.12	3.12	915,988	915,242	915,242	317,837	341,470	341,470	1.09	1.26	1.26	0	142336	142336
Local Distributor	3.00	3.40	3.48	3.48	3.72	3.57	3.57	723,962	600,417	600,417	245,055	272,758	272,758	0.18	0.35	0.35	0	166847	166847
Access Road	3.00	2.87	2.96	2.96	3.79	3.66	3.66	693,273	658,088	658,088	226,650	409,787	409,787	0.04	0.20	0.20	0	1102981	1102981
																		0.36766	0.36766
5 Years																			
Road Category	Length	Avg Condition (SNP)			Avg Condition (RI)			Total Undiscounted Agency Costs			Total Discounted Agency Costs			Total Discounted SARs (million)			MC per MSAR		
		Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB
District Distributor	3.00	4.59	4.60	4.60	3.16	3.16	3.16	1,217,929	1,240,573	1,240,573	467,420	489,959	489,959	3.64	3.90	3.90	0	86884	86884
Regional Distributor	3.00	4.06	4.14	4.14	3.21	3.09	3.09	915,988	915,008	915,008	317,837	343,091	343,091	1.09	1.35	1.35	0	97347	97347
Local Distributor	3.00	3.40	3.47	3.47	3.72	3.47	3.47	723,962	704,370	704,370	245,055	289,396	289,396	0.18	0.44	0.44	0	170026	170026
Access Road	3.00	2.87	3.20	3.20	3.79	3.69	3.69	693,273	617,307	617,307	226,650	496,270	496,270	0.04	0.30	0.30	0	1039335	1039335
																		0.34644	0.34644
10 Years																			
Road Category	Length	Avg Condition (SNP)			Avg Condition (RI)			Total Undiscounted Agency Costs			Total Discounted Agency Costs			Total Discounted SARs (million)			MC per MSAR		
		Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB	Base	AIA	AIB
District Distributor	3.00	4.59	4.66	4.66	3.16	3.07	3.07	1,217,929	1,240,370	1,240,370	467,420	505,562	505,562	3.64	4.08	4.08	0	85832	85832
Regional Distributor	3.00	4.06	4.18	4.18	3.21	3.03	3.03	915,988	939,484	939,484	317,837	347,731	347,731	1.09	1.54	1.54	0	67270	67270
Local Distributor	3.00	3.40	3.56	3.56	3.72	3.34	3.34	723,962	810,960	810,960	245,055	355,416	355,416	0.18	0.63	0.63	0	248350	248350
Access Road	3.00	2.87	3.40	3.40	3.79	3.68	3.68	693,273	618,221	618,221	226,650	496,841	496,841	0.04	0.48	0.48	0	608025	608025
																		0.20267	0.20267

The results confirmed that:

- the tool was set to run for 'Moderate' strength pavements only. This means there was no change in weighting for weak, moderate, and strong pavements
- the settings used in the tool differed to a small degree to those documented in the previous technical basis report ('Technical Basis for Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks' (Evans, Michel & Toole, 2015)).

The outcome of the validation was that the tool was confirmed and checked, and able to be used for the new marginal cost derivations following the derivation of new 2024 unit rates and the cost-ESA relationships for pavement reconstruction and Overlay/rehabilitation.

2.2 NTRO tool for unsealed roads

No changes were made to the NTRO unsealed road tool with the exception that 2024 unit rate data was applied based on the review described in section 3.

3. Review of Unit Rate Data

3.1 Sealed Roads

The LG Grants Commission performed a survey of Local Governments in 2014 to collect unit rates for road construction and maintenance functions. WALGA used the results of this survey as the basis to determine proposed revised rates for this project. A sample of the updated rates provided by WALGA is shown in Table 3.1 for Cost Zone 1 only. Similar tables for the other Cost Zones were provided and are included in the analysis described below and documented in Appendix A.

Table 3.1: Original rates for sealed roads from 2015 (left value) and new 2024 rates in bold red (right value) for cost zone 1

Road category	Routine maintenance (\$/m ²)	Reseal (\$/m ²)	Overlay (\$/m ³)	Reconstruction (\$/m ²)
District distributor	0.49/ 0.70	6.40/ 16.8	450	60.00/ 90.0
Regional distributor	0.45/ 0.61	6.40/ 16.8	350	44.00/ 78.0
Local distributor	0.41/ 0.54	6.20/ 10.0	330	39.00/ 66.0
Access road	0.33 / 0.49	5.90/ 8.5	290	32.00/ 54.0

Note: No values were provided in 2024 for overlays.

The survey results highlighted the need to further review the rate of escalation proposed for each of the treatment types, to ensure that unit costs applied for the 2024 analysis would result in an escalated marginal cost compared to that which was estimated as part of the 2015 study. It was also necessary to derive suitable rates for the overlay treatments, as these were not supplied. Therefore, a detailed analysis of the provided unit rate data was undertaken to assess the magnitude of escalation that was proposed. It would be expected that as the estimates presented in the Guides are approximately 10 years old, a significant amount of indexation would have occurred.

A detailed review of the previous study confirmed the following and informed the changes made:

- Routine maintenance: The estimation of routine maintenance costs in 2015 used the relationships reported in the ARRB/NTRO report ARR390 'Predicting the Performance of Australia's Arterial and Sealed Local Roads' (Martin & Choummavong 2017). It was determined that the formulation of the expression did not adequately represent the expected range of costs that were provided by WALGA in 2024, with the estimated unit rates from the ARR390 method resulting in maximum expenditures that are approximately 50% of the supplied rates. To address this deficiency, the new 2024 unit rates were used to estimate costs as a function of loading. The functions applied in the 2024 analysis are shown Figure 3.1.
- Reseals: These were shown to have changed significantly as shown in Table 3.1, and therefore the new rates were adopted in the 2024 analysis.
- Reconstruction: A set of derived cost functions were applied in 2015 to permit the escalation of costs estimated for treatments during the additional loading period, with the relationships derived using the base costs and annual loading for each road category. These were rederived for each cost zone to reflect the new 2024 unit rates, with the functions applied in the 2024 analysis shown in Figure 3.2**Error! Reference source not found..**
- Overlays: In 2015, overlay costs (in \$/m³) were supplied by cost zone, and incorporated in the FAMLIT analysis software which used an overlay cost based on the required strengthening need for the base and each additional loading scenario. In the absence of new data an overlay cost of 75% of the equivalent reconstruction cost was adopted for the 2024 analysis. was

Figure 3.1: Routine maintenance cost functions for each cost zone for sealed roads

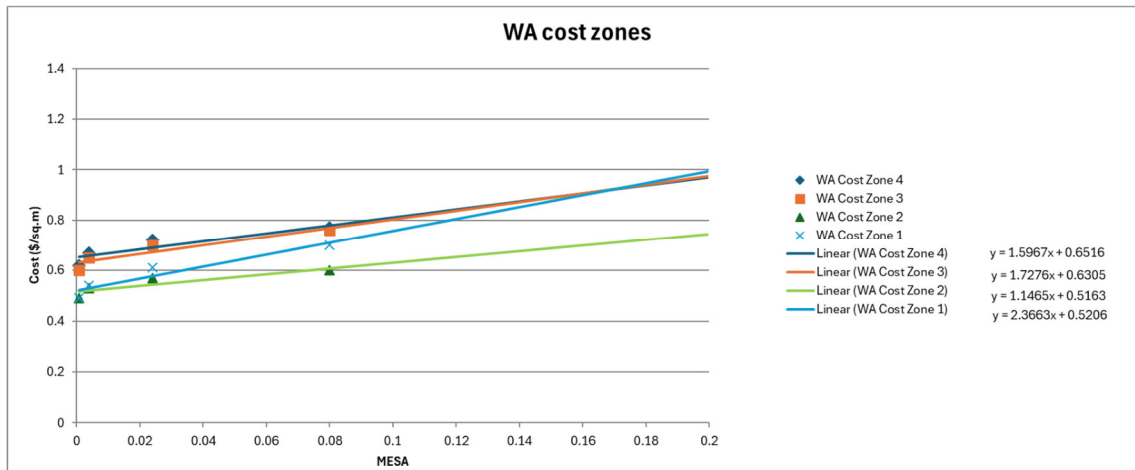
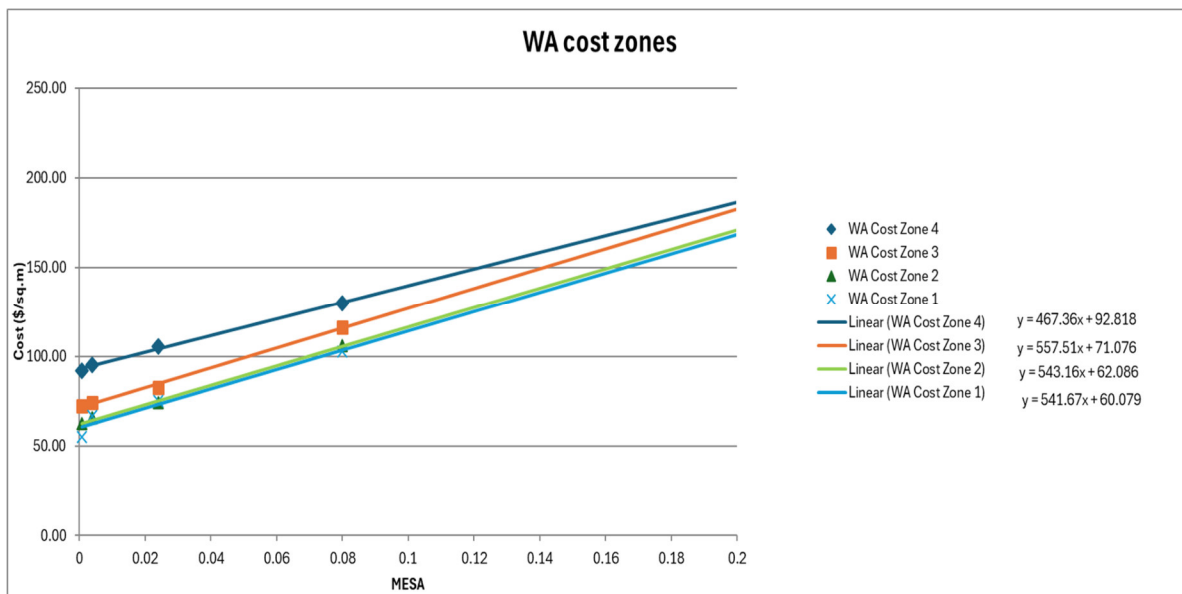


Figure 3.2: Sealed road reconstruction treatment cost function for each cost zone



On the basis of the above, the resulting escalation factors by cost zone, are illustrated in

Table 3.2 noting however that load-cost relationships were utilised in the FAMLIT for routine maintenance, overlay and reconstruction costs, and unit rates used for reseal costs.

Table 3.2: Escalation factors used to convert base 2015 unit rates to 2024 unit rates for sealed roads

Cost zone	Routine maintenance	Reseal	Reconstruction	Average escalation
1	1.40	2.08	1.66	1.71
2	1.76	1.76	1.51	1.68
3	2.00	1.74	1.53	1.76
4	1.87	1.93	1.41	1.73
Average overall	1.76	1.88	1.53	1.72

Table 3.3: 2024 base unit rates for sealed road reconstruction (\$/m²) estimated from the escalation of the 2015 unit rates

Road category	Cost zone 1	Cost zone 2	Cost zone 3	Cost zone 4
Access road	54.72	62.16	72.16	91.69
Local distributor	66.69	65.52	73.92	95.15
Regional distributor	75.25	73.92	82.72	105.53
District distributor	102.60	105.84	116.16	129.75

Following the update of the reconstruction unit rates and the development of the associated cost functions, the tool was run for all 80 scenarios. This provided the suite of marginal cost graphs that were included in the updated Guides.

To ensure that the tool framework was correctly executed and that no errors were generated, all marginal cost estimates for all scenarios in 2015 were compared with the new outputs for 2024. The comparisons were undertaken by cost zone and by road category. Figure 3.3 shows the comparison for cost zone 1 and 20,000 ESA/year.

Figure 3.3: Comparison of the marginal cost estimates by road class for Cost Zone 1 for a sealed road with a loading scenario of 20,000 ESA/year

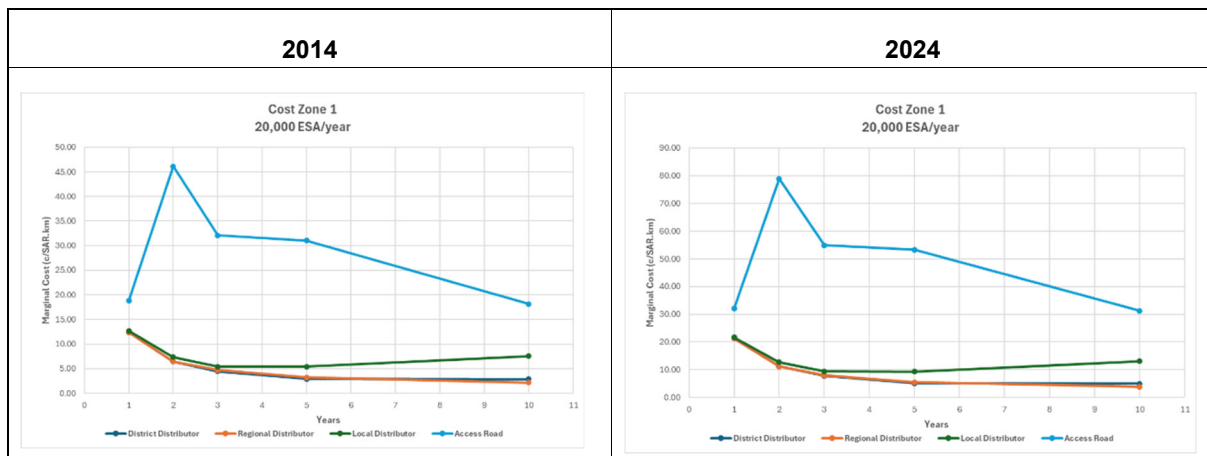
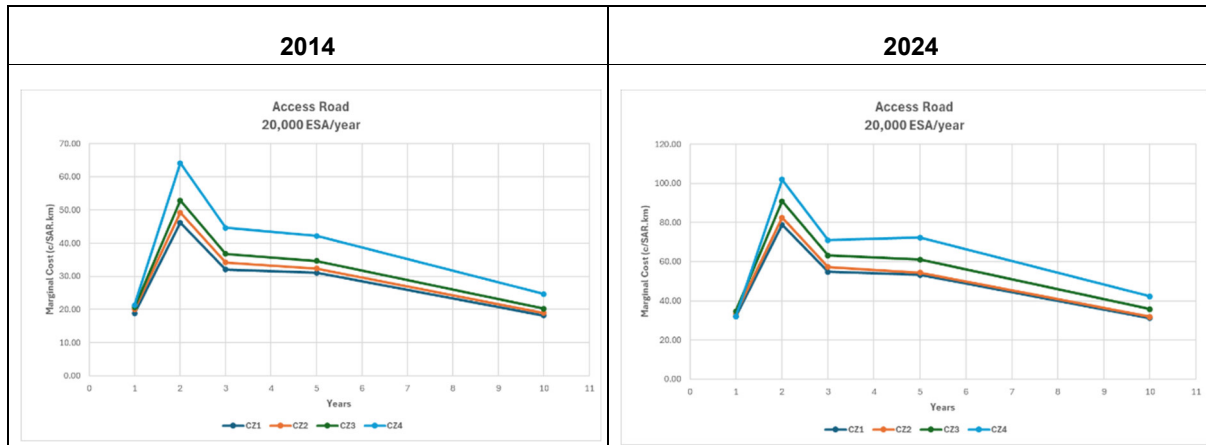


Figure 3.4 shows the comparison for sealed access roads at 20,000 ESA/year.

Figure 3.4: Comparison of the marginal cost estimates by Cost Zone for a sealed Access Road with a loading scenario of 20,000 ESA/year



The comparisons of the charts and values confirms that the tool framework has been correctly applied, and the shape of the curves are consistent, with the 2024 results escalated relative to the 2015 results, as intended.

3.2 Unsealed Roads

Contemporary rates for standard routine maintenance and regravelling/resheeting activities were derived from WALGA (Grants Commission survey) and the 2017 rates are shown in Table 3.4.

Table 3.4: Comparison of rates obtained from 2017 (left value) and 2024 (right value in bold red)

Cost zone	Cost of pothole repairs/spot regravelling (\$ per km/year)	Cost of light grading (\$ per cycle)	Cost of heavy grading (\$ per cycle)	Cost of regravelling / resheeting (\$ per km)
2 Wheatbelt etc	1,105 / 1,798	426 / -	1,886 / -	43,747 / 47,203
3 South West	1,900 / 2,118	1,980 / -	3,644 / -	35,656 / 86,483
4 Remote	924 / 1,943	950 / -	3,405 / -	78,133 / 86,584
Overall Average	1,615 / 1,953	1,399 / -	3,339 / -	52,596 / 73,423

Note: No values were provided in 2024 for light grading or heavy grading.

From the supplied data the following observations were drawn:

- Cost Zone 3 (case-by-case) shows a significant increase over 7 years for regravelling of 135% above previous values, or 2.35 times previous values.
- Cost Zone 4 (GAS/PB/KIM/GF) shows a significant increase over 7 years for routine maintenance of 110%.
- the average escalation (maintenance and regravelling) is 56%, or a factor of 1.56, compared with Statewide escalation of 27% (or 1.27) (Australian Bureau of Statistics 2024).

The individual zone-by-zone escalations vary considerably whereas the average escalation for the 7-year period seemed reasonably consistent with the findings for sealed roads. It is noted that the survey performed by the Grants Commission did not target these categories and the derivation by WALGA likely contributed to the observed variations. Consequently, to arrive at a consistent solution, an average escalation factor of 1.56 was applied to all cost zones as a uniform factor and was applied directly to the 2017 marginal cost rates.

4. How the WALGA Road Wear Cost Calculator was Developed

The development of a standalone calculator to simplify the process of analysing the marginal costs was undertaken in a macro-enabled Excel workbook. The process used in the calculator was based on the process from the Guides so that using the calculator follows the layout of the Guides.

The calculator was validated by entering the worked examples from the Guides and comparing the outputs from the calculator to the outputs reported in the Guides. Note that the outputs in the Guides were calculated manually, using the values given in the examples.

The calculator was setup with the outputs from the marginal cost tool for all scenarios. This included the different scenario elements of:

- four cost zones
- four road categories (for sealed roads)
- the 5 levels of equivalent standard axles or 4 levels of axle pass quantities for sealed and unsealed roads respectively
- the selected 7 vehicle configurations listed in the Guides
- two loading levels (comprising the base loading and additional loading cases)
- gravel material compliance (for unsealed roads).

Note that the types of treatments are triggered in the tool based on standard deterioration of the roads over the 50-year analysis period as derived in the original FAMLIT for sealed roads and the NTRO unsealed roads tool. In summary, the outputs consisted of the values that are presented in the 64 charts in the Sealed Cost Guide and the 15 charts in the Unsealed Cost Guide.

The calculator was validated for sealed roads against the 2015 treatment rates by running the calculator and checking the values produced against the published values. Once confidence was obtained that the calculator could estimate (within a reasonable margin of difference) the outcomes of the 2015 values, the database was updated with the 2024 unit rates.

A summary table showing the differences obtained for the 4 documented examples contained in the 2015 Sealed Cost Guide and those of the calculator outputs using the 2024 rates are shown in Table 4.1 for information.

Table 4.1: Comparison of marginal costs estimated by the calculator compared to the 2015 Sealed Cost Guide and the 2024 values from the Calculator

Worked example number	Road category or per trip	2015 Guide marginal cost	Calculator marginal cost based on 2015 rates	Variation between 2015 Guide and calculator	Calculator marginal cost based on 2024 rates
1	Local distributor	1.82	1.82	0%	3.04
2	District distributor	0.88	0.86	-2%	1.07
	Regional distributor	0.63	0.63	0%	1.04
3	Regional distributor	0.65	0.67	0%	1.14
	Access road	6.50	6.52	3%	11.90
4	per trip	32.40	31.80	0%	53.32

Note: The marginal cost units for worked examples 1 to 3 is c/tonne.km, while the marginal cost for example 4 is \$/trip.

The differences obtained for the 2 documented examples contained in the 2019 Unsealed Cost Guide and those of the Calculator are shown in Table 4.2.

Table 4.2: Comparison of marginal costs estimated by the calculator compared to the 2019 Unsealed Cost Guide

Worked example number	2019 Guide marginal cost rate	2019 Guide marginal cost adjusted rate	2019 Guide marginal cost	Calculator marginal cost rate based on 2019 rates	Calculator marginal cost adjusted rate	Calculator marginal cost	Variation between 2019 Guide and calculator
1	7.5	7.8	499,305	7.01	7.29	466,591	-7%
2	16.0	N/A	50,423	14.35	N/A	45,188	-12%

Note 1: The marginal cost rate is in cents/axle pass.km.

Note 2: The adjusted rate is due to the example including a local cost of resheeting, which is an option in the Unsealed Cost Guide.

The variations also arise from the need to use a visual estimate of the cost rate from the charts in the 2015 and 2019 guides, whereas the calculator now references the value directly. For this reason, the charts in the new guides now show the value of the data point.

For explanation of how to use of the guide and where to acquire it, please refer to the Guides, available at www.walga.asn.au.

5. References

Austrroads 2015a, Deploy and Refine the Road Wear Modelling Methodologies: FAMLIT Final Report, AP-R501-15, Austrroads, Sydney, NSW.

Austrroads 2015b, Freight and axle mass limits investigation tool (FAMLIT) user guide, AP-R502-15, Austrroads, Sydney, NSW.

Australian Bureau of Statistics 2024, Producer Price Indexes, Australia June Quarter 2024, Canberra, ACT.

Evans, C, Michel N & Toole, T, 2015, Technical Basis for Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks', ARRB Contract Report 009335-3, Australian Road Research / National Transport Research Organisation, Board, Port Melbourne, Vic.

Toole, T & Hore-Lacy, W, 2019, Technical Basis for Estimating the Cost of Road Wear on Unsealed Local Government Roads in Western Australia, ARRB Contract Report PRA16029-2, Australian Road Research / National Transport Research Organisation, Board, Port Melbourne, Vic.

WALGA & NTRO, 2015, User Guide: Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks, Version no 1.0, May 2015, Perth, WA.

WALGA & NTRO, 2019, User Guide: Estimating the Incremental Cost Impact on Unsealed Local Roads from Additional Freight Tasks, Version no 1.0, March 2019, Perth, WA.

WALGA & NTRO, 2025a, User Guide: Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks, Version 2.0, May 2025, Perth, WA.

WALGA & NTRO, 2025b, User Guide: Estimating the Incremental Cost Impact on Unsealed Local Roads from Additional Freight Tasks, Version 2.0, May 2025, Perth, WA.

Appendix A Previous and Updated Unit Rates

A1 Sealed roads

The base unit rates for both the 2015 and 2025 Sealed Guides are shown in Table A1, Table A2, Table A3 and Table A4.

Table A1: Original WALGA supplied base unit rates for sealed roads from 2015 (left value) and new 2024 base unit rates in bold red (right value) for cost zone 1

Road category	Routine maintenance (\$/m ²)	Reseal (\$/m ²)	Overlay (\$/m ³)	Reconstruction (\$/m ²)
District distributor	0.49 / 0.70	6.40 / 16.8	450 / 675	60.00 / 90.0
Regional distributor	0.45 / 0.61	6.40 / 16.8	350 / 585	44.00 / 78.0
Local distributor	0.41 / 0.54	6.20 / 10.0	330 / 495	39.00 / 66.0
Access road	0.33 / 0.49	5.90 / 8.5	290 / 405	32.00 / 54.0

Note: No values were provided in 2024 for overlays, and the quoted values represent 75% of the supplied reconstruction rates based on an assumed 100mm layer thickness.

Table A2: Original WALGA supplied base unit rates for sealed roads from 2015 (left value) and new 2024 base unit rates in bold red (right value) for cost zone 2

Road category	Routine maintenance (\$/m ²)	Reseal (\$/m ²)	Overlay (\$/m ³)	Reconstruction (\$/m ²)
District distributor	0.40 / 0.60	6.80 / 14.0	450 / 583	60.00 / 77.7
Regional distributor	0.32 / 0.57	6.80 / 14.0	350 / 490	44.00 / 65.3
Local distributor	0.27 / 0.53	6.60 / 9.9	350 / 473	39.00 / 63.1
Access road	0.27 / 0.49	6.40 / 9.1	330 / 457	37.00 / 60.9

Note: No values were provided in 2024 for overlays, and the quoted values represent 75% of the supplied reconstruction rates based on an assumed 100mm layer thickness.

Table A3: Original base unit rates for sealed roads from 2015 (left value) and new 2024 base unit rates in bold red (right value) for cost zone 3

Road category	Routine maintenance (\$/m ²)	Reseal (\$/m ²)	Overlay (\$/m ³)	Reconstruction (\$/m ²)
District distributor	0.40 / 0.76	6.60 / 13.6	490 / 604	65.00 / 80.5
Regional distributor	0.35 / 0.70	6.60 / 13.6	370 / 562	47.00 / 75.0
Local distributor	0.33 / 0.65	6.60 / 9.3	370 / 532	42.00 / 70.9
Access road	0.28 / 0.60	5.90 / 8.5	360 / 496	41.00 / 66.1

Note: No values were provided in 2024 for overlays, and the quoted values represent 75% of the supplied reconstruction rates based on an assumed 100mm layer thickness.

Table A4: Original WALGA supplied base unit rates for sealed roads from 2015 (left value) and new 2024 base unit rates in bold red (right value) for cost zone 4

Road category	Routine maintenance (\$/m ²)	Reseal (\$/m ²)	Overlay (\$/m ³)	Reconstruction (\$/m ²)
District distributor	0.42 / 0.77	8.80 / 19.0	530 / 795	70.00 / 94
Regional distributor	0.38 / 0.72	8.80 / 17.0	490 / 652	61.00 / 87
Local distributor	0.35 / 0.67	8.80 / 15.1	480 / 607	55.00 / 81
Access road	0.34 / 0.62	7.50 / 14.3	470 / 555	53.00 / 74

Note: No values were provided in 2024 for overlays, and the quoted values represent 75% of the supplied reconstruction rates based on an assumed 100mm layer thickness.

A2 Unsealed roads

The base unit rates for both the 2015 and 2025 Unsealed Guide are shown in Table A5.

Table A5: Original WALGA supplied base unit rates for unsealed roads from 2015 (left value) and new 2024 base unit rates in bold red (right value)

Cost zone	Cost of pothole repairs/spot regravelling (\$ per km/year)	Cost of light grading (\$ per cycle)	Cost of heavy grading (\$ per cycle)	Cost of regravelling / resheeting (\$ per km)
2 Wheatbelt etc	1,105 / 1,728	426 / 664	1,886 / 2,942	43,747 / 68,245
3 South West	1,900 / 2,964	1,980 / 3,088	3,644 / 5,684	35,656 / 55,623
4 Remote	924 / 1,441	950 / 1,482	3,405 / 5,311	78,133 / 121,887
Overall Average	1,615 / 2,519	1,399 / 2,182	3,339 / 5,209	52,596 / 82,050

Note: The used values for 2024 for all treatments were based on a constant escalation factor of 1.56 applied to the 2015 rates.

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