LG TRRIP
Local Government Transport Road Research and Innovation Program

Stakeholder Consultation

Catalogue of Standard Pavement Profiles for Local Government Roads in Western Australia

Background

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- Several documents provide information and guidance on available pavement profiles for roads under various LGs across WA.
- There was a need for a unified resource that consolidates pavement profiles for flexible pavements, covering a variety range of traffic volumes and subgrade CBR values.
- This project presents a practitioner's guideline containing a catalogue of pavement profiles, organised into design tables.

Anticipated Benefits

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- **This guideline assists LGs in WA in selecting appropriate pavement profiles relevant to the desired application.**

The overall anticipated benefits of this guideline are as follows:

- ✓ Reduction in the likelihood of inappropriate pavement profile selections and associated failures.
- ✓ Savings in time and cost
- ✓ Possible shared cost and time savings for consulting agencies / contractors to prepare designs during road construction/maintenance projects.
- ✓ Potentially reduction in road closures due to reduced pavement failure following application use of the guideline.
- ✓ Potential environmental benefits from reduced road maintenance requirement following application of the guideline.

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Practitioners Guideline Overview

Background: Basis of Pavement Design Catalogue

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- **Supporting Resources:**

  - Western Australia Local Government Association 2020, Local government guidelines for restoration and reinstatement in Western Australia, WALGA, Perth, WA

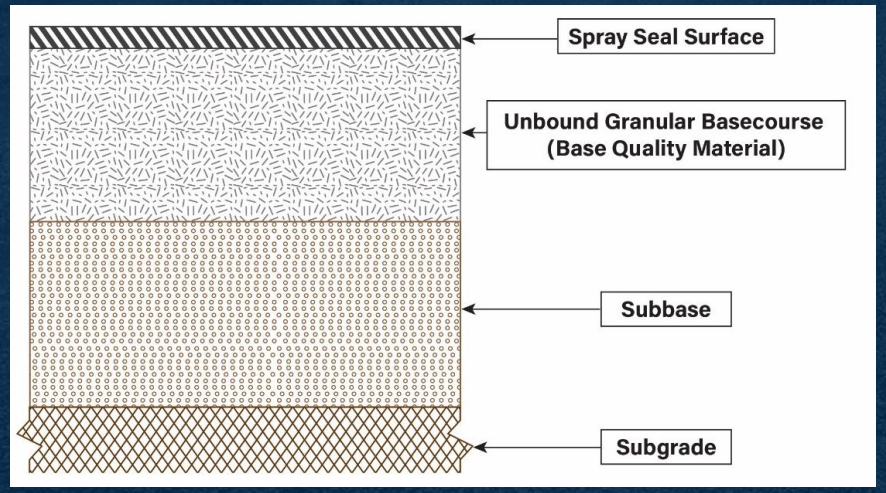
  - Institute of Public Works Engineering Australasia (IPWEA) 2017, Local Government Guidelines for Subdivisional Development, IPWEA, Perth, WA

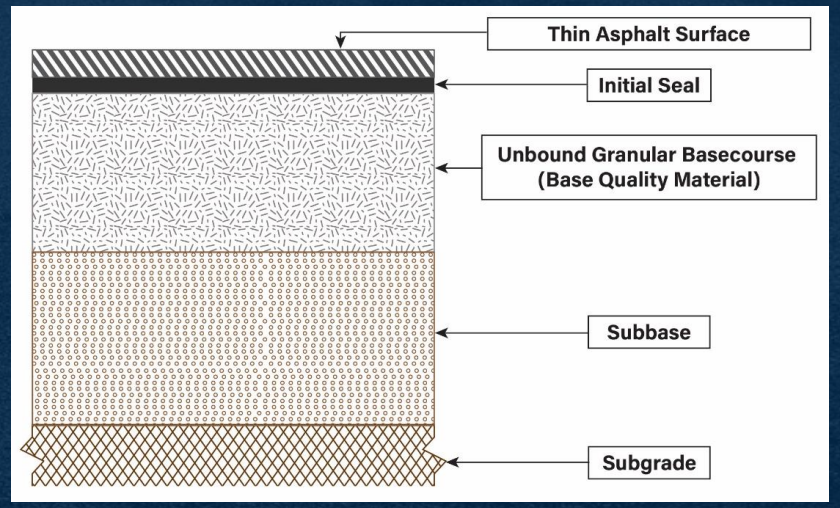
  - Institute of Public Works Engineering Australasia (IPWEA) 2006, Guide to Pavement Profiles in Residential Streets, IPWEA, Perth, WA

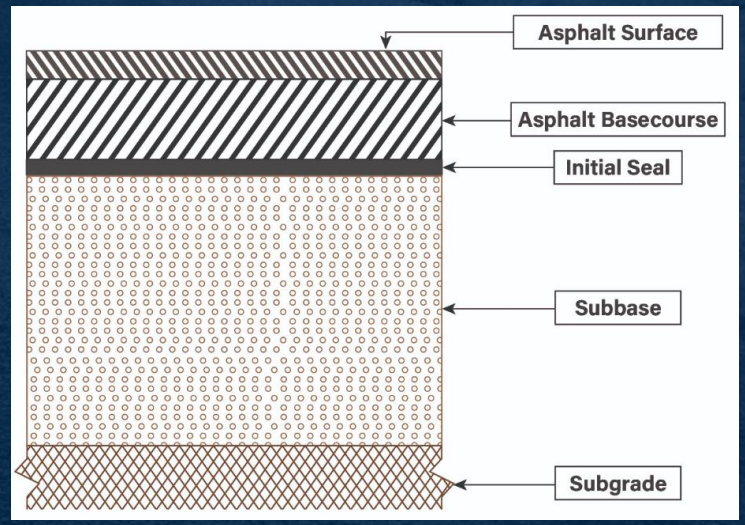
- **This work initially collated and reviewed the available information from LGs in WA, with a specific focus on the pavement profiles for flexible pavements.**
- A request was sent out to WA LGs seeking their existing standards or guidelines for typical road pavement profiles.
- Responses from 22 LGs were received. The responses were categorised based on their sources, essentially grouping similar pavement profiles together.
- This categorisation strategy enabled identifying differences as well as similarities across pavement profiles from different LGs.
- Two broad groupings of pavement profiles emerged, granular basecourse pavements, and asphalt basecourse pavements.

Practitioners Guideline Overview

- **The practitioner's guideline contain a catalogue of pavement profiles for the following pavement configurations:**
  - ✓ Granular basecourse with sprayed seal surfacing
  - ✓ Granular basecourse with thin asphalt surfacing
  - ✓ Asphalt basecourse







Design Catalogue

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- **Design processes were used to establish minimum pavement thickness requirements.**

- **The design tables were developed using a range of subgrade design CBR values and design traffic inputs.**

  - *Appendix A in the Guide presents the determination of Design Traffic and Subgrade Design CBR.*

- **Based on the selected subgrade CBR and design traffic, the user can determine the general material thickness requirements for their specific application.**

✓ Note: The minimum thicknesses for unbound granular layers assume a 100 mm minimum thickness for construction purposes.

Design Catalogue

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- **Design Tables: Granular Basecourse with Sprayed Seal Surfacing**

Table 2: Pavement profiles – granular basecourse with sprayed seal surfacing

Design traffic (ESAs)	Subgrade design CBR (%)	Total pavement thickness (mm)[4]	Pavement composition		
			Subbase thickness (mm)[3]	Basecourse thickness (mm)	Sprayed seal surface[1]
1×10^4	5	250	150	100	Single/Single
	8	200	100	100	
	12	150	0	150	
3×10^4	5	270	170	100	Single/Single
	8	210	110	100	
	12	160	0	160	
1×10^5	5	300	200	100	Single/Single
	8	230	130	100	
	12	200	100	100	
3×10^5	5	340	220	120	Single/Single
	8	260	140	120	
	12	220	100	120	
1×10^6	5	400	260	140	Double/Double
	8	300	160	140	
	12	240	100	140	
3×10^6	5	440	290	150	Double/Double
	8	340	190	150	
	12	260	110	150	
$1 \times 10^{7(2)}$	5	500	330	170	Double/Double
	8	380	210	170	
	12	290	120	170	

1. Specific sprayed seal designs should be adapted based on the materials and local conditions for each case.
2. For traffic volume equal to or greater than 1×10^7, a more considered pavement design reflecting the local materials, traffic and conditions is appropriate.
3. Thicknesses assume a minimum constructable layer thickness of 100 mm.
4. Total pavement thickness is the sum of subbase and basecourse thicknesses.

Design Catalogue

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- **Design Tables: Granular Basecourse with Thin Asphalt Surfacing**

Table 3: Pavement profiles – granular basecourse with thin asphalt surfacing

Design traffic (ESAs)	Subgrade design CBR (%)	Total pavement thickness (mm)[4]	Pavement composition			
			Subbase thickness (mm)	Basecourse thickness (mm)	Initial seal	Asphalt surface thickness (mm) & type[1,2]
1×10^4	5	250	120	100	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	8	230	100	100	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	12	180	0	150	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
3×10^4	5	270	140	100	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	8	230	100	100	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	12	180	0	150	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
1×10^5	5	300	170	100	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	8	230	100	100	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	12	180	0	150	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
3×10^5	5	340	190	120	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	8	260	110	120	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
	12	250	100	120	Single coat emulsion, 5–7 mm aggregate or equivalent	30 mm DG10
		200	0	170		30 mm DG10
1×10^6	5	400	220	140	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
	8	300	120	140	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
	12	280	100	140	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
		240	0	200		40 mm DG14
3×10^6	5	440	250	150	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
	8	340	150	150	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
	12	300	110	150	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
		260	0	220		40 mm DG14
$1 \times 10^{7(3)}$	5	500	290	170	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
	8	380	170	170	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
	12	330	120	170	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG14
		290	0	250		40 mm DG14

1. Stone mastic asphalt (SMA) mix can also be considered.
2. DG: Dense graded asphalt.
3. For traffic volume equal to or greater than 1×10^7, a more considered pavement design reflecting the local materials, traffic and conditions is appropriate.
4. Total pavement thickness is the sum of subbase, basecourse and thin asphalt surface thicknesses.

Design Catalogue

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- **Design Tables: Asphalt Basecourse**

Table 4: Pavement profiles – asphalt basecourse

Design traffic (ESAs)[2]	Subgrade design CBR (%)	Total pavement thickness (mm)	Pavement composition			
			Subbase thickness (mm)	Initial seal	Asphalt basecourse thickness (mm) & type	Asphalt surface thickness (mm) & type
≤ 1 x 10^6	< 8	Undertake specific design				
	8	270	200	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG10 or DG14 basecourse	30 mm DG10[1]
		250		Single coat emulsion, 5–7 mm aggregate or equivalent	50 mm DG10 or DG14[1]	
	12	270	200	Single coat emulsion, 5–7 mm aggregate or equivalent	40 mm DG10 or DG14 basecourse	30 mm DG10[1]
		250		Single coat emulsion, 5–7 mm aggregate or equivalent	50 mm DG10 or DG14[1]	
> 1 x 10^6	Undertake specific designs based on subgrade conditions and specific asphalt materials selected					

(1) Designed to 35 Marshall blows for roads with design traffic ≤1 x 10^5, and 50 Marshall blows for roads with design traffic > 1 x 10^5 but ≤1 x 10^6 in accordance with the requirements in IPWEA/AfPA Technical Specification for Supply and Laying of Asphalt Surfacing (IPWEA/AfPA 2023)

(2) For traffic volume equal to 1 x 10^6, specific pavement design is appropriate, and the numbers in this table should be treated as indicative only.

Limitations

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- **This guideline may not be applicable in the following cases:**

When designing a pavement not covered by the configurations provided in Section 3.1

If the selected subgrade CBR and design traffic volume fall outside the parameters presented in the design tables in Section 3.1

For roads with very high traffic volumes, equal to or greater than 1 x 10^7 ESAs

In the above instances, detailed pavement design procedures that account for local materials, traffic and conditions, as outlined in the Austroads *Guide to Pavement Technology Part 2* (2017), should be followed

Additionally, this guideline should not be applied if the selected materials do not comply with the relevant minimum standard specifications as outlined in Section 2.3

Additional Notes

- **Pavement Materials**

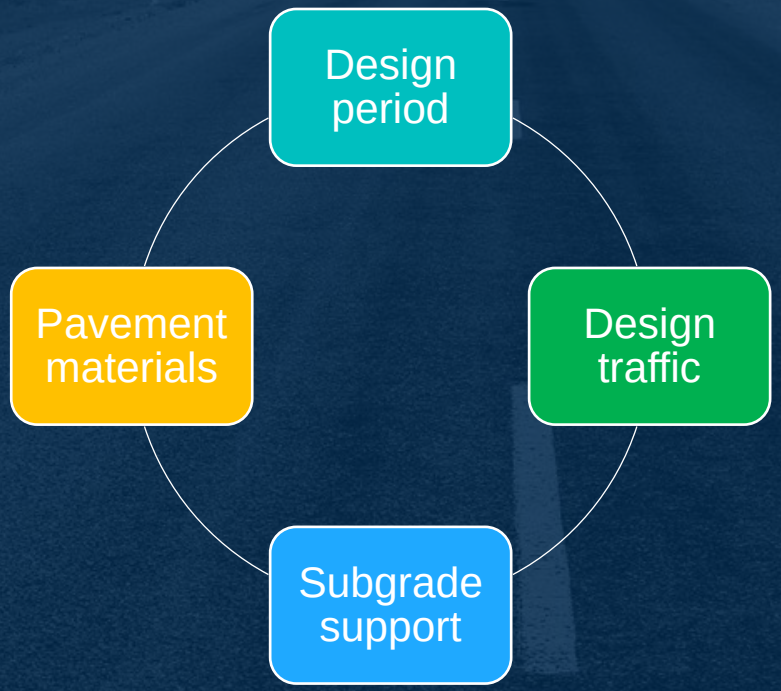
✓ The practitioner must ensure that the correct materials are sourced to meet the required properties for basecourse and subbase specifications.

✓ The relevant specifications are as follows:

- WALGA specification, granular pavement materials (WALGA 2022)
- WALGA specification, sprayed bituminous surfacing (WALGA 2022)
- IPWEA/AfPA technical specification for supply and laying of asphalt road surfacing (IPWEA/AfPA 2022)
- IPWEA/WALGA specification for the supply of recycled road base (WALGA 2016)
- other recognised material specifications.

Additional Notes

- **The guideline provides additional background information on pavement design principles and a concise overview of key factors influencing pavement design and determination of pavement design inputs.**



Guideline Finalisation

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- **Consultation**
  A Stakeholder Consultation with WA LGs was held on 7th November to gather feedback and comments on the draft guideline.

- **Revised Guideline**
  The revised guideline, incorporating the received comments, is being finalised.

- **Final Review**

- **Guideline Publication**