

DESIGN STANDARDS FOR RURAL ROADS GUIDELINE



1 Scope

This guideline applies to all rural roads under the jurisdiction of Rockhampton Regional Council, but is not applicable to roads required as a result of an application under the *Planning Act 2016*.

2 Purpose

The purpose of this guideline is to provide design standards to be applied to rural roads.

3 Related Documents

3.1 Primary

Rural Road Network Policy

3.2 Secondary

Local Government Act 2009

Planning Act 2016

Capricorn Municipal Development Guidelines

Lower Order Road Design Guidelines, Institute Public Works Engineering Association Queensland

Rural Roads Network Procedure

4 Definitions

To assist in interpretation, the following definitions apply:

AADT	Annual average daily traffic
CMDG	Capricorn Municipal Development Guidelines
Council	Rockhampton Regional Council
MUTCD	Manual of Uniform Traffic Control Device
Region	Rockhampton Regional Area defined by the Local Government Areas of Queensland.
Road	As defined in section 59(2) of the <i>Local Government Act 2009</i> .
Rural Road	A road classified as either a rural arterial, rural major collector, rural minor collector or rural access road in Council's adopted Road Hierarchy.
Unsealed Road	A road that has no bitumen based or concrete sealed surface.
VPD	Vehicles per day

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5 Guideline – Design Standards

The design standards in this guideline are to be applied to the upgrading of any existing rural road and any new rural roads constructed within the Region.

5.1 Category 1 – Minimum Standard Seals

Roads under this category receive a layer of CBR 40 compacted gravel pavement and a two coat bitumen seal.

The following issues are considered when developing a minimum standard seal design:

- (a) Minimum standard seal roads should not carry excessive amounts of traffic. A road with an AADT greater than 500 vpd should be constructed to Category 2 – Full Road Design Standard.
- (b) Minimum standard seal roads should not carry excessive amounts of heavy traffic. If commercial vehicle counts are greater than 20% of AADT, the road should be constructed to Category 2- Full Road Design Standard.
- (c) The thickness of the pavement layer shall be in accordance with Appendix A – Second Design Standard with a minimum compacted thickness of 150mm.
- (d) Solid base – the proposed road must have a solid, well compacted road base able to support the proposed overlay for the expected traffic loads. Having a solid road base minimises future pavement failures if the road is sealed.
- (e) The road must have reasonable gradients, vertical/horizontal alignment and sight distance that will not compromise safety if sealed. Horizontal and vertical geometry elements are to be provided in accordance with Operational Class 150 of the Category 4 – Unsealed Lower Order Rural Road Standard.
- (f) If the road has poor alignment and/or geometry then these elements are to be corrected or appropriate risk mitigation measures undertaken as part of the Minimum Standard Seal Project.
- (g) Drainage elements are to be provided in accordance with Operational Class 150 of the Category 4 – Unsealed Lower Order Rural Road Standard.
- (h) A nominal crossfall of 3% is to be provided to minimise future pavement failures.
- (i) Cross-section element widths shall be in accordance with Table 1: Minimum Standard Seal Element Widths.
- (j) Road furniture is to be provided in accordance with the MUTCD. Any deviation from the MUTCD is to be supported by an appropriate risk assessment and mitigation strategy.

Table 1: Minimum Standard Seal Element Widths

Element Width	Design AADT			
	<150	150-250	251-500	>500
Formation	Refer to Category 4 – Unsealed Lower Order Rural Road Standard	6.5m	8.0m	Refer to Category 2 – Full Road Design Standard
Traffic Lanes		6.5m (2 x 3.25)	6.5m (2 x 3.25)	
Total Shoulder		0.0m	1.5m	
Sealed Shoulders		0.0m	0.0m	

5.2 Category 2 – Full Road Design Standard

Roads under this category require formation and pavement widening, full depth pavement and a two coat bitumen seal.

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The following issues are considered when developing a full road design:

- (a) Roads that qualify for this category do not meet one or all of the evaluation criteria set for a Category 1 – Minimum Standard Seal.
- (b) Full road design roads are roads with an AADT greater than 500 or have greater than 20% commercial traffic in the range of 100–500 AADT. The AADT of the road must be known so the appropriate pavement width for full design can be selected from Table 2 – Full Design Element Widths.
- (c) The thickness of the pavement layer shall be in accordance with CMDG Design Specification D2 – Pavement Design with a minimum compacted thickness of 200mm.
- (d) Horizontal and vertical geometry, lighting, intersections and clear zone elements are to be provided in accordance with CMDG Design Specification D1 – Road Design.
- (e) If the road has poor alignment and/or geometry then these elements are to be corrected or appropriate risk mitigation measures undertaken as part of the Full Design Road Project.
- (f) Drainage elements are to be provided in accordance with Table 2: Full Design Element Widths.
- (g) Cross-section element widths shall be in accordance with Table 2: Full Design Element Widths.
- (h) Road Furniture is to be provided in accordance with the MUTCD. Any deviation from the MUTCD is to be supported by an appropriate risk assessment and mitigation strategy.

Table 2: Full Design Element Widths

Element Width	Design AADT			
	<500	501-1,000	1,001-3,000	3,001-8,000
Formation	8.0m	8.0m	10.0m	10.0m
Traffic Lanes	6.5m (2 x 3.25)	6.5m (2 x 3.25)	7.0m (2 x 3.5)	7.0m (2 x 3.5)
Total Shoulder	1.5m	1.5m	3.0m	3.0m
Sealed Shoulder	0m	0.5m	1.0m	1.5m
Crossfall	3%	3%	3%	3%
Flood Immunity	Q2	Q5	Q10	Q20
Trafficable Immunity	Q5	Q10	Q20	Q50

5.3 Category 3 – Intermittent Seal Standard

Roads deemed suitable for an intermittent seal as a dust suppressant receive a two coat bitumen seal for a maximum length of 200 metres, adjacent to the habitable dwelling affected.

The following issues are considered when developing an intermittent seal design:

- (a) The existing formation is to be widened where required to accommodate the required 150mm thick compacted layer of minimum CBR 40 pavement layer.
- (b) The existing road must have a solid, well compacted road base able to support the proposed overlay for the expected traffic loads. Having a solid road base minimises future pavement failures if the road is sealed.
- (c) The road must have reasonable gradients, vertical/horizontal alignment and sight distance that will not compromise safety if sealed. Horizontal and vertical geometry elements are to be provided in accordance with the operational class for the road as identified in Category 4 – Unsealed Lower Order Rural Road Standard.

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- (d) If the road has poor alignment and/or geometry then these elements are to be corrected or appropriate risk mitigation measures undertaken as part of the Intermittent Seal Project.
- (e) Drainage elements are to be provided in accordance with the operational class of the road as identified in the Category 4 – Unsealed Lower Order Rural Road Standard.
- (f) A nominal crossfall of 3% is to be provided to minimise future pavement failures.
- (g) Cross-section element widths shall be in accordance with Table 1: Minimum Standard Seal Element Widths.
- (h) The requirement for road furniture is to be assessed on a case by case basis.

5.4 Category 4 – Unsealed Lower Order Rural Road Standard

The unsealed lower order rural road standard is to be applied to rural roads with AADT less than 150 vpd.

The following issues are considered when developing a design for an unsealed lower order rural road:

- (a) The main geometric design standards for the unsealed rural road shall be in accordance with Table 3: Main Geometric Design Standards for Unsealed Roads.
- (b) If the road has poor alignment and/or geometry then these elements are to be corrected or appropriate risk mitigation measures undertaken as part of the project.
- (c) Road furniture is to be provided in accordance with the MUTCD. Any deviation from the MUTCD is to be supported by an appropriate risk assessment and mitigation strategy.

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Table 3: Main Geometric Design Standards for Unsealed Roads

Guidelines for the Main Geometric Design Standards for Unsealed Roads																			
Road Operational Classification	150			125			100			75			30			10			Note
Typical Traffic Counts	125-150			100-125			75-100			30-75			10-30			<10			
Terrain type¹	Flat	Rolling	M'tain	Flat	Rolling	M'tain	Flat	Rolling	M'tain	Flat	Rolling	M'tain	Flat	Rolling	M'tain	Flat	Rolling	M'tain	1
Main geometric characteristic - based on safety, cost and environmental considerations																			
Operating speed value km/h¹³	80	70	50	70	50	30	70	50	30	60	40	20	60	40	20	n/a	n/a	n/a	13
Cross-section elements																			
number of traffic lanes	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
minimum cross fall unsealed road	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	
maximum superelevation % ²	6	8	10	6	8	10	6	8	10	6	8	10	6	8	10	n/a	n/a	n/a	2
minimum traffic lane width m ³	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
minimum shoulder width m	0.25	0	0	0	0	1	1.25	1	0.75	1	0.75	0.5	0.5	0.25	0	0	0	0	
minimum carriageway width (lanes + shoulder) m	6.5	6	6	6	6	5	5.5	5	4.5	5	4.5	4	4	3.5	3	3	3	3	
Horizontal geometry																			
minimum radius curve m ⁵	320	250	140	250	100	35	250	100	35	170	60	15	170	60	15	n/a	n/a	n/a	5
minimum stopping sight distance m ⁶	150	120	70	120	70	30	120	70	30	90	50	30	90	50	30	n/a	n/a	n/a	6
minimum meeting sights distance m ⁷	290	230	130	230	130	60	230	130	60	180	100	60	180	100	60	n/a	n/a	n/a	7
Vertical geometry																			
maximum vertical grade % ⁸	6	8	12	6	8	12	6	8	12	6	8	12	6	8	12	n/a	n/a	n/a	8
minimum crest vertical curve K values ⁹	50	30	10	30	10	5	30	10	5	19	8	2	19	8	2	n/a	n/a	n/a	9
minimum sag vertical curve K values ¹⁰	11	8	4	8	4	3	8	4	3	6	3	2	6	3	2	n/a	n/a	n/a	10
Drainage																			
Cross Road Drainage Immunity ¹¹	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11
Longitudinal Drainage Immunity ¹²	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12
RCP & RCBC desirable length ¹⁴	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	4.8	4.8	4.8	4.8	4.8	4.8	14
Floodway desirable width ¹⁴	6.5	6.5	6.5	6.5	6.5	6.5	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	14

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NOTES:

- 1 Flat, rolling or mountainous terrain
 - 2 The maximum superelevation values will need to take into account the use of the road by high loaded heavy vehicles, speed and curve radii
 - 3 In cases where there are a high percentage of heavy vehicles (>20%) minimum lane widths can be increased by 0.5m
 - 5 Values rounded up. For minimum radius curves widening on the inside of a curve may be necessary to accommodate longer vehicles.
 - 6 Based on a reaction time of 2 seconds and surface coefficients relating to unsealed surfaces and values rounded up. Values based on flat grades and allowances will need to be made for up and down grades.
 - 7 This is mainly a requirement of single lane two-way roads. Values rounded up.
 - 8 In some cases higher grades of up to 20% can be allowed for short sections (about 150m). Keep grades on unsealed roads lower due to ravelling and scouring of surface.
 - 9 Calculation of this values is to be based on information contained in Austroads (2003). The lengths of the vertical curve (L) is based on the production of K multiplied by the algebraic difference in grades percentage A (i.e. $L = K \times A$).
 - 10 Sag values are based on comfort on control criteria.
 11. Class 10, 30 & 75 roads will require suitable gravel or hard surface treatments at gullies and creek crossing
 12. Class 10, 30 & 75 roads shall have formation 300mm above natural surface or 300mm deep table drains
 13. Operating Speed values are based on the 85th percentile Speed
 14. Minimum lengths and widths may need to be extended at curve widenings and intersections etc.
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6 Review Timelines

This guideline is reviewed when any of the following occur:

- (a) The related information is amended or replaced; or
- (b) Other circumstances as determined from time to time by the General Manager Regional Services.

7 Document Management

Sponsor	Chief Executive Officer
Business Owner	General Manager Regional Services
Policy Owner	Manager Civil Operations
Policy Quality Control	Legal and Governance

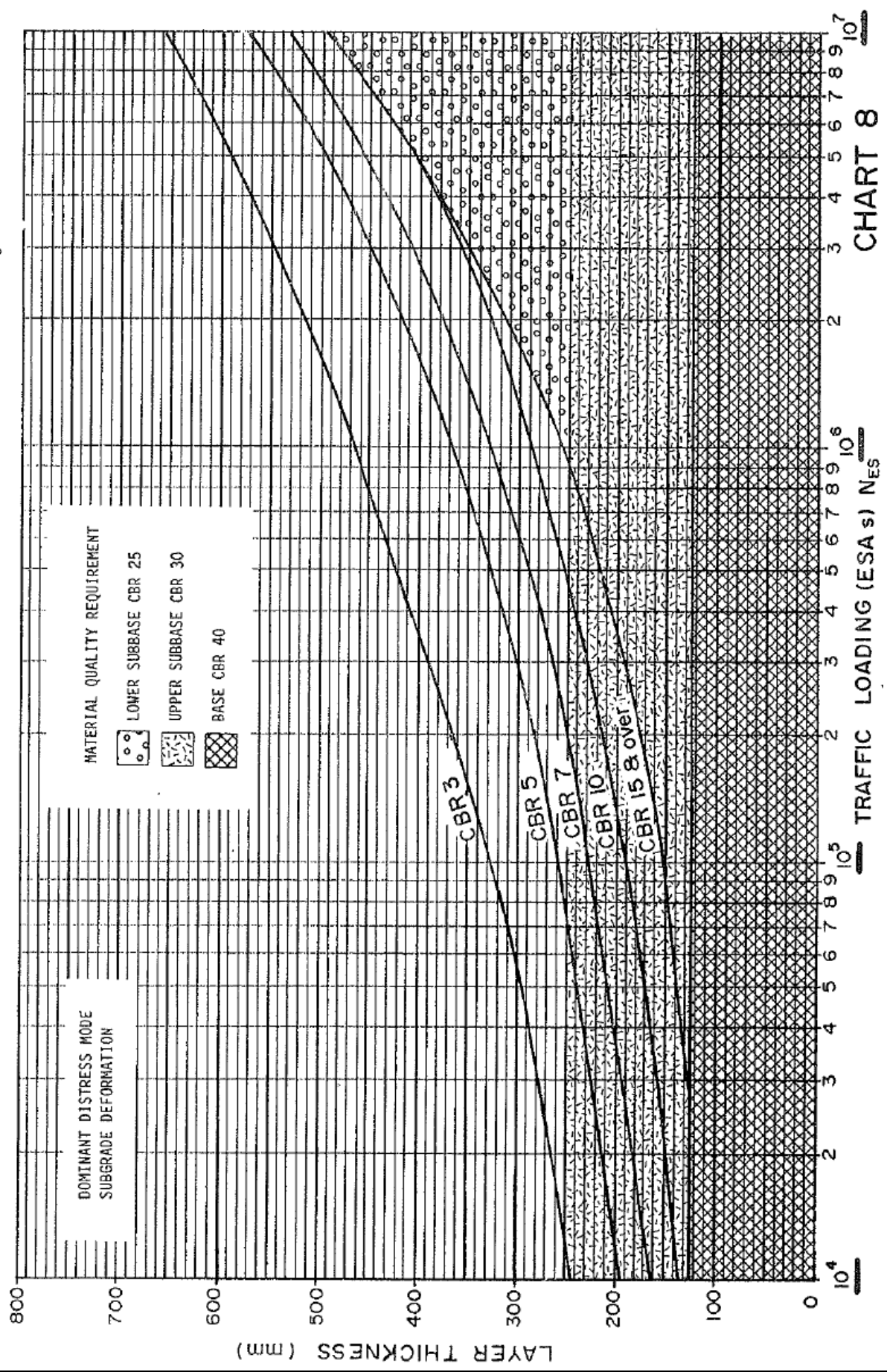


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FULL DEPTH GRANULAR - Second Design Standard
Base CBR 40

Non Standard Granular
 Subgrade



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