



# FNQROC DEVELOPMENT MANUAL

## DESIGN MANUAL

D1

## ROAD GEOMETRY

Version No. 03/17

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## GENERAL

### D1.01 SCOPE

1. This section sets out the minimum standards developed specifically for the design of roadworks using principles of street design to ensure safety and improved amenity and to reduce pedestrian/vehicular conflicts.
2. This Manual will be read in conjunction with the Institute of Public Works Engineering Australia publication Design Guidelines for Subdivisional Street works 'Queensland Streets'. Council will consider principles adopted within Design Guidelines for Subdivisional Street works - 'Complete Streets'.

### D1.02 AIMS

1. The geometry of a road is to be designed so as to achieve the following aims:
  - a. Provide convenient and safe access to all allotments for pedestrians, vehicles and cyclists.
  - b. Provide appropriate access for buses, emergency and service vehicles.
  - c. Provide a convenient way for public utilities.
  - d. Provide an opportunity for street landscaping.
  - e. Provide convenient parking for visitors.

### D1.03 REFERENCE DOCUMENTS

**Note: Where Acts or reference documents are updated, reference should be made to the current version.**

#### Australian Standards

- AS1742 Manual of Uniform Traffic Control Devices -
- AS1428 Design for Access and Mobility
- AS2890 Parking Facilities

#### Department of Transport and Main Roads

- Road Planning and Design Manual
- Manual of Uniform Traffic Control Devices (MUTCD).
- Technical Notes

#### Disability Discrimination Act

#### Disability Standards for Accessible Public Transport

#### The Institute of Public Works Engineering Australia, QLD Division. (IPWEA)

- Design Guidelines for Subdivisional Streetworks, - 'Queensland Streets'

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- Complete Streets – Guidelines for Urban Street Design.

### AUSTROADS

- Guide to the Geometric Design of Rural Roads.
- Guide Policy for the Geometric Design of Major Urban Roads.
- Guide to Road Design
- Guide to Traffic management
- Guide to Road Safety

### Joint Venture for More Affordable Housing

- Australian Model Code for Residential Development. (AMCORD)

### Transport Operations (Road User Management) Act

## D1.04 CONSULTATION

1. Designers are encouraged to consult with the Council and other relevant authorities prior to or during the preparation of the design. Designers should in addition to requirements of this manual ascertain specific requirements of these authorities as they relate to the designs in hand.

## ROAD DESIGN CRITERIA

### D1.05 DESIGN SPEED

1. For geometric design of roads, design speeds shall be as nominated in Table D1.1 unless specified otherwise by Council. Developments should be designed with a road layout to achieve the desired speed environment. The use of Traffic Control Devices in lieu of a suitable road layout is not preferred.
2. Adoption of a low design speed discourages speeding, attention should be given to ensuring that potentially hazardous features are visible to the driver and adopting traffic engineering measures which will help a driver avoid errors of judgement.
3. Design speeds shall be calculated on largest radius track between kerb and centreline unless a physical constraint is incorporated in the design to maintain vehicle tracking in traffic lane.

### D1.06 LONGITUDINAL GRADIENT

1. A general minimum gradient of 0.5 per cent should be adopted for all roads, which will ultimately include kerb and channel. In very flat conditions where approved by Council it may be reduced to 0.3 per cent.
2. A desirable minimum gradient of 1.0 per cent should be adopted for all roads, which will have earth table drains, except where approved otherwise by Council, in exceptional cases.
3. Roads constructed, without kerb and channel, completely in embankment may have zero grade.
4. Maximum grades shall be as nominated in Table D1.1
5. Longitudinal grade through intersections should not exceed 4 per cent, the actual gradient being dependent on the type of terrain. Design of the road alignment and the grades used are interrelated. A grade on a side street more than 4% is undesirable if vehicles have to stand waiting for traffic in the priority road.
6. Turning circles in cul-de-sacs on steep grades shall have grades less than 5 per cent.
7. Where minimum radius crest vertical curves are used local widening is to be provided to facilitate safe ingress/egress from properties.

### D1.07 HORIZONTAL ALIGNMENT

1. Horizontal alignment shall generally comply with the requirements of 'Queensland Streets', Department of Main Roads or AUSTRROADS manuals, as applicable.
2. Designers should ensure that, for a given design speed, the minimum radius of curvature utilised is such that drivers can safely negotiate the curve. Curves that progressively tighten produce an uncomfortable sense of disorientation and alarm. Sudden reverse curves that drivers cannot anticipate also have a potential to cause similar conditions.
3. The horizontal alignment shall ensure adequate sight distances taking into account construction of solid fencing on property boundaries.

### D1.08 VERTICAL CURVES

1. Vertical curves should be used on all changes of grade where the algebraic change of grade exceeds:
  - a. Access Place, Access Street, Collector Streets - 1.0 per cent
  - b. Sub Arterial Streets - 0.6 per cent
2. The length of the crest vertical curve for stopping sight distance should conform to 'AUSTROADS guidelines, TMR Road Planning and Design Manual and Queensland Streets' (in order of hierarchy),.
3. For adequate riding comfort, lengths of sag vertical curves should conform to 'AUSTROADS guidelines, TMR Road Planning and Design Manual and Queensland Streets' (in order of hierarchy), Every effort should be made to provide vertical curves as long as possible, for improved appearance.
4. Drainage poses a practical limit to the length of sag curves and a maximum length (in metres) of 15 times the algebraic sum of the intersecting vertical grades should be adopted. This is to avoid water ponding in excessively flat sections of kerb and channel. A minimum grade of 0.5 per cent shall be maintained in the kerb and channel.
5. In general, a minimum 10m vertical curve shall be provided where the side road joins the through road at three way intersections.
6. The tangent point of a vertical curve in the side road shall be located at, or outside of, the kerb line of the through road. Council may approve the use of a concrete invert in lieu of a vertical curve where the side road is an Access Place and the algebraic change of grade is less than 6.0 per cent.
7. The three dimensional coordination of the horizontal and vertical alignment of a road should be aimed at improved traffic safety and aesthetics. The following principles should be applied:
  - a. The design speed of the road in both horizontal and vertical planes should be of the same order.
  - b. Combined horizontal and vertical stopping sight distance and minimum sight distance should be considered three dimensionally.
  - c. Sharp horizontal curves shall not be introduced at or near the crest of a vertical curve.
  - d. Horizontal curves should leave the vertical curve and be longer than the vertical curve.
  - e. A short vertical curve on a long horizontal curve or a short tangent in the grade line between sag curves may adversely affect the road's symmetry and appearance.

### D1.09 CROSSFALLS

1. Carriageway crossfalls for streets shall conform to the requirements of 'Queensland Streets'.
2. Generally pavement crossfalls on straight roads shall be:

Pavement Type	Crossfall
Bituminous seal coat	3 per cent
Asphaltic concrete pavement	3 per cent
Cement concrete pavement	3 per cent
Paved surfaces	3 per cent
Gravel	5 per cent
3. Median Crossfalls - The maximum crossfall on grassed medians on divided roads shall be desirably 1 in 6 with an absolute maximum of 1 in 4. Refer also Department of Main Roads Design Manuals. However, at median openings, the pavement crossfall should not exceed 5 per cent.



Table D1.1 Street and Road Hierarchy - Deemed to Comply Requirements

Road Hierarchy Classification <sup>8, 13</sup>	Type	Standard Drawing	Catchment Size (no of dwellings)	AADT (vpd)	Reserve Width (Min) <sup>1,2,6,7</sup>	Carriageway Width <sup>1,3,10</sup> (Min)	Verge Width <sup>9</sup> (Min each side)	Footpath	Max Grade (Desirable)	Design Speed (km/h)	Lighting Category	
Access Place (CRC and DSC only) <sup>14</sup>	1	S1005	0- 25	0-190	14.5m	5.5m sealed	4.5m	not req'd	16% <sup>4</sup> (12%)	30	P4	
Access Street (TRC, MSC, CRC & DSC only) <sup>14</sup>	2	S1005	26-90 <sup>11</sup>	200-740 <sup>12</sup>	15.5m	6.5m sealed	4.5m	1 side	16% <sup>34</sup> (12%)	30	P4	
Low Density Residential (CRC and MSC only)	3	S1005	n/a	n/a	20m	7.0m sealed with 1.0m wide gravel shoulders <sup>5</sup>	5.5m	Not req'd	16% <sup>3</sup> (12%)	60	P4	
Residential Street (excl TRC, MSC, DSC & CRC)	4	S1005	0 – 90	0 - 740	16.5m	7.5m sealed	4.5m	1 side <sup>12</sup>	16% <sup>34</sup> (12)	40	P4 <sup>16</sup>	
Collector Road	Minor <sup>15</sup>	5	S1006	91 - 300	750-2990	16.5m	7.5m <sup>2</sup>	4.5m	1 side	10% (8%)	50	P3
	Major <sup>15</sup>	6	S1006	301 – 600	3000-5999	20m	11m	4.5m	1 side	10% (8%)	60	V5
Sub Arterial/Arterial <sup>9, 15</sup>	No median	7 <sup>17</sup>	S1007	>600	>6000	25m	16m	4.5m	both sides	8% (6%)	60	V3
	2 lane median divided	8				28m	2 x 5.5m separated by a 5m median	6m				
	4 lane median divided	9				31m	2 x 8.5m separated by a 5m median	4.5m				
	4 lane median divided with parking	10				40m	2 x 12.4m separated by a 5m median if no centre parking	5.1m				
Industrial Access Street	11	S1009	<8Ha		21m	12m	4.5m	not req'd	10% (6%)	60	P4	
Industrial Collector Street	12	S1009	<30Ha		23m	14m	4.5m	Not req'd	8% (6%)	60	P3	
Rural												Refer Table D1.4 for details of Rural Road Elements

**Notes:**

1. Carriageway (and reserve) widening shall be provided on bends in accordance with Queensland Streets.
2. Widening of carriageway to 10m shall be required on all bus routes, and a minimum road reserve of 18m provided.
3. Carriageway widths are measured from the invert of the kerb and channel on one side of the carriageway to the invert of the kerb and channel on the opposite side of the carriageway.
4. The absolute maximum grade shall be 20% for a maximum length of 60m. The maximum length of grades less than 20%, but not less than 16%, shall be 60m plus 25m for each 1% the grade is less than 20%. The maximum length of any grade greater than 16% shall be 160m.
5. Where the ultimate traffic catchment exceeds 30 allotments and Council considers bicycle use likely, shoulders shall be sealed to provide a total seal minimum width of 9.0m.
6. Road reserve widths may require widening to accommodate table drains, provision for services, on-street car parking provision & bus bays.
7. Minimum reserve width must be provided, irrespective of minimum verge and carriageway widths specified.
8. In CRC - For CBD streets between Florence St, Wharf St, McLeod St, & The Esplanade, refer to CBD Streetscape Masterplan policy.
9. The road cross section type for this category shall be provided by the Council or Relevant Authority (DMR). Traffic volumes shall be identified in a traffic management report.
10. Where the road is nominated as part of the bikeway network, allowance for bike lanes shall be added to this width (minimum bikeway width is 1.5m, or 2.0m where the design speed is > 60km/h).

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11. For TRC and MSC catchment size is 0 – 74 dwellings
12. For TRC and MSC the AADT is 0 – 740
13. For TRC and MSC – For Rural Residential, lot sizes between 2,000m<sup>2</sup> and 10,000 m<sup>2</sup>, the above provisions apply with the exception of street lighting, footpath and asphalt surfacing.
14. Design Speed for Access Place and Access Street is lower than the default urban speed limit of 50km/h, however, a design speed of 30km/h for access place and access Street is deemed to be a safe operating speed.
15. Design speed shall be greater than or equal to the posted speed limit.
16. For Cook Shire Council; V5 instead of P4
17. Type 7 cross section only applies to constrained road corridors due to existing development. It is not acceptable in greenfield situations.

4. For roundabouts detailed consideration of crossfall is required taking into account diameter, heavy vehicle turning etc.
5. For Intersection detailed consideration of crossfall is required to take into account longitudinal grades and the implication for high vehicles turning through an intersection.

#### **D1.10 CARRIAGEWAY WIDTH**

1. Minimum carriageway widths for all streets shall be as nominated in Table D1.1.
2. The carriageway width must allow vehicles to proceed safely at the operating speed intended for that level of road in the network and with only minor delays in the peak period. This must take into consideration the restrictions caused by parked vehicles where it is intended or likely that this will occur on the carriageway. Vehicles include trucks, emergency vehicles and, on some roads, buses.
3. The safety of pedestrians and cyclists where it is intended they use the carriageway must also be assured by providing sufficient width and visibility.
4. The carriageway width should also provide for unobstructed access to individual allotments. Motorists should be able to comfortably enter or reverse from an allotment in a single movement, taking into consideration the possibility of a vehicle being parked on the carriageway opposite the driveway.
5. The design of the carriageway should discourage motorists from travelling above the intended speed by reflecting the functions of the road in the network. In particular the width and horizontal and vertical alignment should not be conducive to excessive speeds.
6. Appropriate road reserve width should be provided to enable the safe location, construction and maintenance of required paths and public utility services (above or below ground) and to accommodate the desired level of streetscape.
7. Where a "split level" road is proposed, a stable form of retaining structure such as reinforced concrete, crib block, gabion or masonry walling (or other approved alternative) is required between upper and lower road levels. Carriageway widths are to be exclusive of the plan area of the retaining structure. Excessive earth batters will not be permitted.
8. Traffic islands shall be designed in accordance with the current Department of Main Roads or AUSTRROADS Design Manuals.
9. Where a bicycle lane is adjacent to kerb and channel a minimum width of 1.5m must be provided; measured from the face of kerb and minimum 1.2m from the edge of the interface between the carriageway and channel.

#### **D1.11 VERGES**

1. Minimum verge widths for all streets shall be as nominated in Table D1.1.
2. A suitable design of the verge will depend on utility services, access to allotments, pedestrian usage, tree preservation and stormwater drainage.
3. All verges shall fall from the frontage property boundary to the adjacent kerb and channel with acceptable crossfalls of between 3% - 5%. In the case where the allotment falls away from the road reserve (i.e. the allotment is lower than the level of the road), the verge shall have a minimum fall from the frontage property boundary to the adjacent kerb of 3%.
4. The maximum slope permissible within a road verge is 1 in 4.

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5. The verge when considered in conjunction with the horizontal alignment and permitted fence and property frontage treatments should provide appropriate sight distances, taking into account expected speeds and pedestrian and cyclist movements.
6. Utilities service locations shall be in accordance with the relevant Authorities requirements.
7. Verges shall be covered full width with topsoil to a depth of not less than 40mm and shall be lightly compacted and grassed in accordance with Council's minimum standards and Specifications.

### D1.12 INTERSECTIONS

1. All intersections shall be designed in accordance with AUSTRROADS guidelines and TMR's Road Planning and Design Manual.
2. Intersections with Transport and Main Roads controlled roads shall be designed and constructed in accordance with the requirements of the Queensland Department of Main Roads.
3. The design of intersections should allow all movements to operate safely for the anticipated demand. Projected traffic demands at an existing intersection post development must be calculated using actual current traffic counts as a base. or junctions on collector streets or higher order roads.
4. Truncations shall be provided to real property boundaries in order to maintain minimum verge widths and adequate sight distances taking into account potential for construction of solid fencing on the property boundaries.
5. The turning radii at intersections measured at the kerb invert shall be 9.0m minimum, and accommodate the intended movements without allowing desired speeds to be exceeded.
6. The choice of design vehicle depends on the functional classification, land use and composition of traffic expected to negotiate the intersection. "Austroads Design Vehicle and Turning Path Templates Guide" should be used to select the appropriate design vehicle for the intersection design.
7. Intersection channelisation is to be provided and designed in accordance with the current Department of Main Roads or AUSTRROADS Design Manuals.
8. All channelisation shall be designed to accommodate a design vehicle providing a clearance of not less than 0.6 m between the wheel track and the kerbs at all points, unless specified otherwise by Council.
9. Traffic islands or medians of less than 2m width to be hard surfaced in concrete with a patterned or broomed finish incorporating a coloured pigment in accordance with Council's requirements. This colour should generally be terracotta unless otherwise approved by Council.
10. Traffic islands, which are to be grassed or landscaped, shall be provided with a water service conduit and a perimeter subsoil drainage line connected to the underground drainage system or an open drainage channel.
11. On Collectors, Sub-Arterial and Arterial roads, median breaks will only be permitted at approved intersections.
12. Pavement markings associated with channelisation and signs shall be provided in accordance with the Department of Main Roads - 'Manual of Uniform Traffic Control Devices'.

### D1.13 ROUNDABOUTS

1. Design of roundabouts will generally be in accordance with current Department of Main Roads and relevant AUSTRROADS Guidelines.
2. Roundabout shall only be used at intersection of Collector Streets and Access Streets or higher order roads only. All roundabouts shall have a minimum inscribed circle diameter of 30.0m.
3. Centre islands which are to be grassed or landscaped shall be provided with a water service conduit and a perimeter subsoil drainage line connected to the underground drainage system or an open drainage channel.
4. Landscaping to centre islands to be in accordance with Council minimum standards and Specifications.
5. Roundabouts shall be designed to provide for cyclists. They shall include provision for alternate off road cycle paths on Collector Roads and Sub-Arterial Roads. Roundabouts are to be designed to accommodate the appropriate intersection design vehicle which is dependent on the hierarchies of the intersecting roads. A mountable area in the centre island should be provided to cater for larger vehicles. On all potential bus routes, buses should be able to circumnavigate the roundabout without needing to mount the centre island.

### D1.14 CUL-DE-SAC TURNING AREAS

1. The turning areas at the ends of the cul-de-sac in streets is to be designed in accordance with 'Queensland Streets', excepting as follows:
  - a. Three-point turns (T-Heads) will not be permitted without the prior consent of Council. Council may review site specific alternatives where topography and site constraints exist.
  - b. Where a full turning circle is not provided to the minimum radius below, provision for turning within kerbs for Council's design garbage truck must be demonstrated.
2. Where a full turning circle is provided the minimum kerb radii shall be:
  - a. Approach and departure curves - 15 m
  - b. The turning circle: - 10 m
3. Turning areas at the ends of cul-de-sac in industrial developments shall be full turning circles based on criteria nominated by the Chief Executive Officer for the specific application, with the following minimum kerb radii:
  - a. Approach and departure curves - 30m
  - b. The turning circle: - 15m
4. All turning heads shall have adequate provision for on-street parking at cul-de-sacs in accordance with the Queensland Streets. Provision of parking areas within the verge must not compromise the future connection of services to the allotments.

### D1.15 LOCAL AREA TRAFFIC MANAGEMENT

1. The road network should be designed to manage the movement and speed of traffic in local areas. In this regard any traffic management devices such as thresholds, slow points, speed humps, chicanes and splitter islands should be designed in accordance with the requirements of the relevant AUSTRROADS guidelines and are to be approved by Council.

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2. Devices other than at intersections should be located to be generally consistent with streetscape requirements, existing street lighting, drainage pits, driveways, and services may decide the exact location of devices
3. Emergency vehicles must be able to reach all residences and properties.
4. Where bus routes are involved, buses should be able to pass without mounting kerbs and with minimised discomfort to passengers.
5. Traffic management devices and associated road furniture must not prevent the passage of larger vehicles (ie semi trailers) however their principle function is not to be compromised.
6. In newly developing areas where street systems are being developed in line with LATM principles, building construction traffic must be catered for.
7. Maximum vehicle speeds can only be reduced by deviation of the travelled path. Pavement narrowings have only minor effects on average speeds, and usually little or no effect on maximum speeds.
8. Speed reduction can be achieved using devices, which shift vehicle paths laterally (slow points, roundabouts, corners). The use of vertical devices (i.e. humps, platform intersections, platform pedestrian/school/bicycle crossings) is not desirable and shall only be used where specifically approved by Council.
9. Speed reduction can be helped by creating a visual environment conducive to lower speeds. This can be achieved by 'segmenting' streets into relatively short lengths (less than 200-300m), using appropriate devices, streetscapes, or street alignment to create short sight lines.
10. Adequate critical sight distances should be provided such that either party in a potential conflict situation may take evasive action. Sight distances should relate to likely operating speeds.
11. Sight distances to be considered include those of and for pedestrians, cyclists and property accesses, as well as for drivers.
12. Night time visibility of street features and LATM devices must be adequate and in accordance with Australian Standard AS/NZS.
13. Many devices will be designed for their normal use by cars, but with provision (such as mountable kerbs) for larger vehicles. Some typical dimensions include:
  - a. Pavement narrowing
    - i. Single lane 3.50m between kerbs
    - ii. 3.75m between obstructions
    - iii. Two lane 5.50m minimum between kerbs
  - b. Bicycle lanes (including adjacent to pavement narrowings) - 1.5m minimum
  - c. Plateau or platform areas
    - i. 75mm to 150 mm height maximum, with 1 in 15 ramp slope
  - d. Dimensions of mountable areas required for the passage of large vehicles to be determined by appropriate turning templates.

### D1.16 BUS STOPS

1. Bus stops should be provided on all bus routes so no more than 10 per cent of residents should have to walk in excess of 400 metres to catch a bus. Normally roads above the access street in the hierarchy are designed as bus routes. Table D1.2 details minimum criteria for bus stops.
2. Unless otherwise approved, bus stops shall be constructed in accordance with AUSTRROADS Guide to Traffic Engineering Practice, AS 1742 Manual of Uniform Traffic Control Devices, Disability Standards for Accessible Public Transport and TMR Public Transport Infrastructure Manual (in order of hierarchy)
3. Tactile Ground Surface Indicators (TGSI) are to be installed at all bus stops and shelters in accordance with AS/NZS 1428 Design for access and mobility.

**Table D1.2 Bus Stop Criteria**

Road	Stops (Spacing)	Description
Collector Streets	400 metre <sup>1</sup>	Single Bay
Higher order Road	400 metre	Single Bay and Shelter <sup>2</sup>

Notes:

1. Loop roads with single entry / exits only require stops and bays on one side of the road.
2. Shelters are subject to Council's requirements.

### D1.17 ACCESS TO ALLOTMENTS

1. Criteria for acceptable access to allotments are to be in accordance with standard drawing no. S1015 and S1105.
2. Criteria for acceptable access to steep allotments are to be in accordance with Design Manual D2.
3. All rear access (Hatchet or Battleaxe) allotments or allotments accessed via an easement, shall be provided with a reinforced concrete driveway (or other surface as approved by council in rural areas only) a minimum width of 3.0m, extending the full length of the access leg of the allotment. The driveways shall commence at the adjacent kerb and channel with a standard kerb crossover or at the existing edge of pavement. Conduits for internal allotment services are to be provided adjacent to the concrete driveway for the full length of the driveway unless otherwise approved.
4. Location of accesses and site distance provision must be in accordance with AS2890 – Parking Facilities – Off Street Parking.

### D1.18 PARKING PROVISIONS

1. Parking provisions in accordance with the relevant sections of 'Queensland Streets' shall be accorded with on all roads, except that for Major Collector Street with a traffic generation of 3000 vpd - 6000 vpd,
2. Streets which cannot comply with the on-street parking provisions of 'Queensland Streets', due to reduced allotment frontage widths or carriageway widths, shall make provision for indented or verge parking bays at a minimum frequency of 1 parking bay per 2 allotments. Particular attention should be made to providing adequate provision for on-street parking at cul-de-sacs, turning heads and elbow bends

3. Verge widths are to be maintained alongside indented or verge parking areas. Where necessary, property boundaries shall be adjusted to meet this requirement unless it can be demonstrated that the footpath and all required services can be accommodated within the reduced verge.

**D1.19 PATHWAYS**

1. Unless otherwise approved, pathways will be constructed taking into consideration the Disability Discrimination Act and the Disability Standards for Accessible Public Transport.
2. Where a pathways link is located between allotments, the minimum width of land dedicated to Council shall be 4.0m. Concrete paving is to be for the full width of the pathway link and at least 2.0m wide and extend to the adjacent kerb and channel together with a kerb ramp. Vehicular access is to be restricted at the ends of pathways through the installation of bollards at the property line in accordance with the Councils requirements.
3. Maximum cross fall on all access pathways 2.5% – 3%%
4. Pathways constructed using alternate material (eg Asphalt, Paving blocks) are to be approved by Council.
5. The pathway shall extend to the property boundary remote from the roadway where the path is not connecting two street frontages.
6. Concrete pathways must be curved around street corners.
7. All pathways shall have a non-slip surface; generally this can be achieved by applying a stiff broom to the wet surface. (Alternate methods shall require Council approval).
8. Where a pathway link is used for stormwater drainage overland flow relief it shall have a one way crossfall and be constructed in full width concrete with a layback kerb and channel or approved equivalent along one edge to contain the required flow within the concrete.
9. Pathways are not to be aligned with stormwater pits where a stormwater pit is required to be located at the end of a pathway for overland flow, the pedestrian path is to be offset and appropriate measures provided to guide pedestrians away from the pit and remove any potential hazards.
10. The requirements for pathways to be constructed longitudinally along roads shall be in accordance with Table D1.3.

**Table D1.3 Pathways along Roads <sup>3</sup>**

<b>Road Classification</b>	<b>Pathway Requirements <sup>2</sup></b>
Access Place	Nil (Kerb ramps to intersections only) <sup>1</sup>
Access Street	2.0m wide Pathway on one side of reserve
Residential Street	2.0m wide Pathway on one side of reserve
Collector Streets	2.0m wide Pathway on one side of reserve
Sub Arterial / Arterial	2.0m wide Pathway on both sides of reserve
Industrial	Nil (kerb ramps to intersections only) <sup>1</sup>

Notes:

1. Unless required as part of a pedestrian / cycle network
2. Minimum widths in the above table may be varied with the approval of Council
3. Excluding Cairns Regional Council, the requirements for footpaths maybe waived if approved by council.

11. All pathways shall have appropriate immunity against cross drainage



12. The maximum gradient shall be 16 per cent with a maximum crossfall of 2.5 per cent. Where the pathway is parallel with a road with a grade greater than 16 per cent footpath gradient shall match that of the road.
13. The finished surface level of concrete work shall be not more than 20mm above the finished surface level of adjoining ground and shall finish flush with adjoining hard surfaces.

#### **D1.20 BIKEWAYS**

1. The minimum width of land dedicated to Council for a bikeway shall be 4.0 metres with a minimum 2 metre wide concrete paving in accordance with AUSTRROADS and the Manual of Uniform Traffic control (MUTCD).
2. Bikeways constructed using alternate material (eg Asphalt, Paving blocks) are to be approved by Council.
3. Bikeways located in parks shall be constructed above the flow of a storm of 5 year ARI, unless approved otherwise by Council.
4. Where bikeways connect to or crosses over an Access Street or higher order road, a slow point shall be installed as approved by Council.
5. All bikeways shall have a non-slip surface. Generally this can be achieved by applying a stiff broom to the wet surface. (Alternate methods require Council approval).

#### **D1.21 KERB AND CHANNEL**

1. Concrete kerb and channel, and layback kerb and tray shall be provided on both sides of all roads except as otherwise provided for in 'Queensland Streets'.
2. Standard kerbs in accordance with Standard Drawing S1000 shall be used in the following cases:
  - a. Residential Streets – Layback Kerb and Layback Kerb and Channel.
  - b. Medians – Maintenance Strip Kerb.
  - c. Grassed and Landscaped Traffic Islands – Maintenance Strip Kerb
  - d. Concrete Traffic Islands - Semi-mountable Kerb.
  - e. Roundabouts (centre island only), - Maintenance Strip Kerb.
3. Where proposed construction adjoins existing kerb and channel the Designer shall confirm with Council whether the existing profile shall be extended or whether the new construction will be tapered smoothly to the existing kerb and channel.
4. The grading of kerb and channel will normally conform to the road centreline grading. However, at locations where the kerb and channel grading diverts from the centreline grade, such as at intersections or on superelevated curves the following shall apply:
  - a. Minimum channel grade should be 0.5 per cent unless approved other approved by Council.
  - b. Every effort should be made to provide vertical curves as long as possible, for improved appearance.
5. At all changes in horizontal alignment, kerbs and kerb and channel shall be constructed with horizontal curves.
6. To improve appearance where small deflections occur (eg on tapers), horizontal curves shall be as long as possible. Refer also to current Department of Main Roads or AUSTRROADS Design Manuals.
7. Kerb ramps shall be provided at all tangent points of intersection kerb returns, at park entrances and at any other locations where required by Council.

## **ROAD GEOMETRY**

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8. Access crossovers for Industrial, Commercial and Multi Residential site shall be installed in accordance with Standard Drawing S1015.
9. Access ramps are to be provided perpendicular to the carriageway in line with the opposing access ramp on the other side of the carriageway..

### **D1.22 SIGNS AND ROAD MARKINGS** CRC, DSC

1. Permanent signing and road marking shall be in accordance with the current edition of Department of Main Roads 'Manual of Uniform Traffic Control Devices' (MUTCD). Where there is a choice of linemarking colour, then only white or yellow paint is to be used.
2. Edge line RRPMs should be installed 50mm from the edge line on the traffic lane side (i.e. the right hand side of the traffic lane edge line). RRPMs are not to be installed within bicycle lanes or on road shoulders that may be used by cyclists.
3. Temporary or construction signing and road marking shall be in accordance with current edition of Department of Main Roads 'Manual of Uniform Traffic Control Devices' (MUTCD).
4. The relevant sign reference number from the Department of Main Roads MUTCD shall be included on the construction drawings.
5. All signs and pavement markings shall be adequately dimensioned to ensure accurate setting out.
6. Signs located in concrete islands or medians shall be installed with the "V Loc" socket system and fitted with anti-theft bolts.
7. The bottom of all un-sleeved posts shall be flattened prior to placing in concrete footing.
8. Vandal proof bolts and fittings shall be used on all permanent signing.
9. Street Name signs shall be installed in accordance with Standard Drawing S1040.
10. For any new installation of linemarking, two coats of paint is required.
11. Bicycle lane marking must be in accordance with standard drawing S1096.

### **D1.23 ROAD EDGE GUIDE POSTS AND GUARDRAILS**

1. Road edge guide posts shall be provided at all locations where concrete kerb and channel is not constructed eg half road construction, tapers, ends of roads etc.
2. Guide posts shall conform to and be installed in accordance with Department of Main Roads 'Manual of Uniform Traffic Control Devices'.
3. Guardrails shall be installed in accordance with the Department of Main Roads Road Planning and Design Manual.

### **D1.24 PEDESTRIAN FOOT BRIDGES**

1. Pedestrian foot bridges are to be provided where necessary and are to be constructed from concrete, steel, timber or similar suitable material (all steelwork is to be hot dipped galvanised) and shall be provided with handrails / fences for pedestrian safety, if required by relevant Standards.
2. The clear width of all pedestrian bridges shall match the width of the approaching pathway / bikeway but not less than 2m minimum with squeeze points to control access.
3. Designers shall consult with Council at concept stage to confirm location, widths, flood immunity, durability etc.

#### **D1.25 TRAMLINES CROSSINGS**

1. Road crossings are to be constructed in accordance with Queensland Department of Main Roads Standard Drawing 881.
2. Flashing lights and crossing warning signs to the Department of Main Roads standards are to be erected on all new road crossings or crossings where the traffic density will increase because of the development.
3. Prior to commissioning of flashing lights and warning lights appropriate temporary controls including warning signage shall be installed and maintained at all road crossings.

#### **D1.26 FENCING**

1. All fencing located inside the road reserve shall have a minimum height of 1.2m, and shall be of a type that discourages climbing and constructed in accordance with Standard Drawing S1026.
2. A continuous chain wire mesh fence shall be constructed along all interfaces between the development and the tramway reserve and shall be constructed in accordance with Standard Drawing S1026.

**RURAL DESIGN CRITERIA**

**D1.27 GENERAL**

- In addition to the foregoing sections this section specifically applies to all those sites identified as being suited to rural and rural residential subdivisions inclusive of rural home sites and hobby farms types of developments. For roads within the Rural Living Areas (under FNQ2031) reference should be made to Table D1.1. Table D1.4 details specific road demands for rural roads.

**Table D1.4 Rural Road Elements <sup>8</sup>**

Traffic Volume or Road Class	<100VPD <sup>5,6</sup>	100 – 999 <sup>5</sup>	1000 - 2999 (or rural collector)	>3000 (or sub-arterial)
Road Reserve (flat terrain ≤ 5%)	20m	20m	25m	To be designed in accordance with AUSTRROADS or DMR design guidelines.
Road Reserve <sup>2</sup> (Undulating/Hilly > 5%)	25m	25m	30m	
Formation	8m	8m	10m	
Pavement Width	5.5m	6.5m	8m	
Seal Width	4.5 <sup>1,7</sup>	6.5m	8m (incl. 0.5m sealed shoulders)	
Shoulders <sup>3</sup>	1.25m Approved Select material	0.75m gravel	1m gravel	
Desirable Speed Environment	100kph	100kph	100kph	
Design Speed for Individual Elements (Minimum)	80kph	80kph	80kph	

Notes:

- Cook Shire Council may consider relaxing the requirement to seal rural roads in some instances if there are no adverse impacts i.e. dust.
- In undulating terrain this width shall be increased to enable services to be constructed on accessible flatter land on top and below batters.
- Where the road is a designated on-road bicycle route (signposted and pavement marked) the shoulder provision needs to conform to the AUSTRROADS
- (Intentionally left blank)
- In Cook Shire Council, all rural residential subdivisions within the urban expansion footprint are to comply with Residential Streets – Table D1.1
- In Cassowary Coast Regional Council, the seal and pavement width will be min 6.5m with a shoulder width of 0.75m unless otherwise approved by council
- Tablelands Regional Council will consider reduction of sealed width to 3.5m. For roads with less than 50vpd it will also consider relaxing the requirement for bitumen sealing
- In TRC, this table does not apply to Rural Residential areas where lot size is less than 10,000m<sup>2</sup>. For all Rural Residential areas where lot sizes are generally less than 10,000m<sup>2</sup> refer to the Urban road standards.

- Design speed is to be generally used as the basic parameter of design standards and the determination of the minimum design value for other elements in rural subdivisions is to be based on the concept of a "speed environment" as outlined in AUSTRROADS Guide to the Geometric Design of Rural Roads.

3. Where appropriate superelevation, widening and centreline shift and their associated transitions are to comply with AUSTRROADS Guidelines.
4. Where the table drain will have a flow velocity greater than 2.5m/s or is likely to scour, a stone pitched or suitably lined dish drain is to be constructed along the invert. (Generally table drains steeper than 6 per cent will require scour protection).

#### **D1.28 HORIZONTAL AND VERTICAL ALIGNMENT**

1. Horizontal and vertical curves are to be designed generally to the requirements of AUSTRROADS - Guide to Geometric Design of Rural Roads. These requirements are essential to satisfy the safety and performance of proper road design. Roads having both horizontal and vertical curvature should be designed to conform to the terrain to achieve desirable aesthetic quality and being in harmony with the landform.

#### **D1.29 INTERSECTIONS**

1. Intersections should generally be designed in accordance with the relevant AUSTRROADS Guideline.

#### **D1.30 ACCESS TO ALLOTMENTS**

1. All accesses onto sealed roads are to be sealed as per S1105. Where the access falls from the property towards the sealed road the whole access shall be sealed from the edge of the sealed bitumen to the property boundary. Accesses off gravel roads do not have to be sealed.
2. Drainage under accesses shall be designed and constructed to a size and length as determined by Council. Minimum pipe size – 375mm dia, Minimum length – 4.8m long.
3. All pipe and box culverts under accesses shall have headwalls to protect and retain gravel fill.
4. Precast vertical headwalls with wings are preferred, but insitu cast concrete or grouted stone may be used subject to Council Approval.
5. Precast sloping headwalls to be used on all access where the road design speed is 100km/h or where the culvert is within 4.5m of the traffic lane and the road speed is 80 km/h.
6. Accesses are to be designed to ensure that stormwater runoff from the road and the access discharge to the table drain.
7. Allotment Accesses shall be constructed in accordance with Standard Drawing S1105 unless otherwise approved by Council.