

NEW SOUTH WALES  
DEVELOPMENT DESIGN  
SPECIFICATION

D1

**GEOMETRIC ROAD DESIGN  
(Urban and Rural)**

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## Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

<b>Amendment Sequence No.</b>	<b>Key Topic addressed in amendment</b>	<b>Clause No.</b>	<b>Amendment Code</b>	<b>Author Initials</b>	<b>Amendment Date</b>
1	Major Revision as per Aus-Spec Bulletin Board Release 10	All	AMO	SPM	April 2003
2	Revisions as per Aus-Spec Bulletin Board releases 11 & 12	All	AMO	SPM	May 2003
3	Table D.1.5 Characteristics of Roads in Residential Subdivision Road Networks	D1.14	AM	SPM	June 2003
4	Carriageway widths for rural roads	D1.27	AM	SPM	June 2003
5	Guide posts	D1.35	A	SPM	September 2003
6	Use of Council road chainages	D1.06 (e)	A	SPM	September 2003
7	Collector street design speed reduced to 50kph	D1.09 (3)	M	SPM	September 2003
8	Byron Council road widths added and Council names changed	D1.27 (1)	AM	SPM	September 2003
9	Byron Council road widths added and Council names changed in Table D 1.5	D1.14 (1)	AM	SPM	September 2003
10	Turning areas	D1.30	A	SPM	September 2003
11	Industrial road widths	D1.31	A	SPM	September 2003
12	Cul-de-sac dimensions	D1.32	A	SPM	September 2003
13	Hammerhead turning areas	D1.33	A	SPM	September 2003
14	Batter slopes	D1.36	A	SPM	September 2003
15	Kerb return design radii	D1.34	A	SPM	September 2003
16	Amended for new Clarence Valley Council	D1.27	M	SPM	April 2004
17	Amended for new Clarence Valley Council	D1.27	M	SPM	May 2004
18	Amend Richmond Valley Council to accord with other councils and widen seal width for roads up to 150vpd	T1.27	OM	SPM	January 2006
19	Add note (2) regarding reduced standard at discretion of DOES	D1.27	A	SPM	January 2006
20	Rural residential radius amended to 10m and note (2) added	Table D1.12	A	SPM	January 2006
21	Add clarification on lots to be served by axe handles and rationalise carriageway and pavement widths	D1.33 & Table D1.13	A	SPM	January 2006
22	Planning for bushfire note added and additional notes regarding serving more than 2 dwellings added	D1.33.2 Table D1.13	A	SPM	October 2006

<b>Amendment Sequence No.</b>	<b>Key Topic addressed in amendment</b>	<b>Clause No.</b>	<b>Amendment Code</b>	<b>Author Initials</b>	<b>Amendment Date</b>
22	Austrroads intersections added	Fig D1.6	A	SPM	February 2008
23	Internal driveway standards handbook	D1.37	A	ID	July 2010
24	Private access way standards handbook	D1.38	A	ID	July 2010
25	Reference and Source Documentation	All	A	RS	August 2013
26	Austrroads & RTA / RMS references, Contents table update, Batter Slope tables	Contents table, D1.23 – 25, D1.34 & D1.36	OM	ID/MK	June 2018
27	Asphalt use in Steep Terrain	D1.10	A	MK	December 2019

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**DEVELOPMENT DESIGN SPECIFICATION D1  
GEOMETRIC ROAD DESIGN (Urban and Rural)**

**GENERAL**

**D1.01 SCOPE**

- |  |   |
|--|---|
| <p>1. This section sets out the specifications developed specifically for the design of subdivision roadworks using principles of street design to ensure safety and improved amenity and to reduce pedestrian/vehicular conflicts.</p>  | <p><b><i>Subdivision<br/>Roadworks</i></b></p>                  |
| <p>2. A fundamental requirement of the design process is for designers to determine the vehicle speed which is deemed acceptable for a particular subdivision or section of road. The concept of designing to regulatory street speeds is contrary to the current principles of subdivision road design.</p> | <p><b><i>Acceptable<br/>Vehicle Speed</i></b></p>               |
| <p>3. All relevant design principles must be integrated in the development of the road network. A careful balance is required between maximising amenity, safety and convenience considerations and those related to the drivers' perception of driving practice.</p>  | <p><b><i>Integrated<br/>Design<br/>Principles</i></b></p>       |
| <p>4. The words "street" and "road" are interchangeable throughout all parts of this Specification.</p>  |   |
| <p>5. For the purpose of this Specification the definition of terms used to define the components of the road reserve shall be in accordance with AS 1348.1 and AMCORD.</p>  | <p><b><i>Road Reserve<br/>Component<br/>Definitions</i></b></p> |

AS 1348.1 terms:

- |             |   |
|-------------|---|
| Carriageway | - That portion of the road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes.       |
| Footpath    | - The paved section of a pathway (verge).   |
| Pathway     | - A public way reserved for the movement of pedestrians and of manually propelled vehicles (AMCORD verge).                          |
| Pavement    | - That portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic. |
| Shoulder    | - The portion of the carriageway beyond the traffic lanes and contiguous and flush with the surface of the pavement.                |

AMCORD term:

- |        |   |
|--------|---|
| Verge: | - That part of the road reserve between the carriageway and the road reserve boundary. It may accommodate public utilities, footpaths, stormwater flows, street lighting poles and plantings. |
|--------|---|

**D1.02 AIMS**

1. The provision of a road system within a subdivision is to be designed so as to achieve the following aims:
  - Provide convenient and safe access to all allotments for pedestrians, vehicles

and cyclists.

- Provide safe, logical and hierarchical transport linkages with existing street system.
- Provide appropriate access for buses, emergency and service vehicles.
- Provide for a quality product that minimises maintenance costs.
- Provide a convenient way for public utilities.
- Provide an opportunity for street landscaping.
- Provide convenient parking for visitors.
- Have appropriate regard for the climate, geology and topography of the area.

### **D1.03 REFERENCE AND SOURCE DOCUMENTS**

#### **(a) Council Specifications**

All Specifications for Design and Construction.

#### **(b) Australian Standards**

AS 1428	-	Design for access and mobility.
AS 1348	-	Road and traffic engineering – Glossary of terms, Roads and traffic engineering
AS 2890	-	Parking facilities: All Parts
AS 1158	-	Road lighting: All Parts
SAA HB69.14	-	Guide to traffic engineering practice - Bicycles.
AS/NZS 3845	-	Road safety barrier systems.
AS1100.401	-	Technical Drawing - Engineering survey and engineering survey design drawing

#### **(c) State Authorities**

Roads and Traffic Authority NSW - Road Design Guide.

Department of Housing - Road Manual, 1987.

Department of Urban Affairs (formerly Environment) and Planning - Technical Bulletin 12 (1981), Residential Road Widths.

#### **(d) Other**

AUSTROADS                      Guide to Road Design – All Parts

The Institute of Municipal Engineering Australia, Qld Division - 1993: Design Guidelines for Subdivisional Streetworks.

ARRB Special Report No. 33, L E Comerford: A Review of Subdivision Road Design Criteria.

Commonwealth Department of Housing and Regional Development – 1995: Australian Model Code for Residential Development. (AMCORD). A National Resource Document for Residential Development.

Stapleton, C 1984: Streets Where We Live – A Manual for the Design of Safer Residential Estates.

Stapleton, C 1988, Dept of Transport South Australia: Planning & Road Design for New

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Residential Subdivisions.

Brindle, R 1988, ARRB: Planning & Design of the Local Distributor.

Colman, J 1978, ARRB: Streets for Living.

Pak-Poy Kneebone – 1989: Research Study into Road Characteristics for Residential Development.

#### D1.04 CONSULTATION

- |   |  |
|---|--|
| 1. Designers are encouraged to consult with the Council and other relevant authorities prior to or during the preparation of design. Designers should in addition to requirements of this Specification ascertain specific requirements of these authorities as they relate to the designs in hand. | <b><i>Council, Other Authorities</i></b> |
| 2. Public consultation on designs shall be provided where such action is required by Council's current policy.  | <b><i>Public Consultation</i></b>        |
| 3. The Designer shall obtain service plans from all relevant public utility authorities and organisations whose services may exist within the area of the proposed development. These services are to be plotted on the relevant drawings including the plan and cross-sectional views.             | <b><i>Public Utilities</i></b>           |

#### D1.05 PLANNING CONCEPTS

- |  |   |
|--|---|
| 1. In new areas (as distinct from established areas with a pre-existing road pattern) each class of route should reflect its role in the road hierarchy by its visual appearance and related physical design standards. Routes should differ in alignment and design standard according to the volume of traffic they are intended to carry, the desirable traffic speed, and other factors.   | <b><i>Road Hierarchy</i></b>  |
| 2. The road pattern and width must be in conformity with that shown on any relevant Development Control Plan. In areas not covered by these plans, the pattern and width(s) will be determined by Council on their merits.   | <b><i>Conformance with DCP</i></b>  |
| 3. The road network for residential developments should have clear legibility.   | <b><i>Legibility</i></b>  |
| 4. The road network should reinforce legibility by providing sufficient differentiation between the road functions.  | <b><i>Differentiation</i></b>   |
| 5. Distinct landmark features such as watercourses, mature vegetation or ridge lines should be emphasised within the structural layout so as to enhance the legibility.  | <b><i>Landmark Features</i></b>   |
| 6. Whilst legibility can be enhanced by introduced physical features such as pavement and lighting details, the road network should by its inherent design and functional distinction provide the necessary legibility.  | <b><i>Introduced Features</i></b>   |
| 7. The maximum number of turning movements at intersections or junctions that a driver should be required to undertake to reach a particular address within the development should be minimised.   | <b><i>Intersection Turning Movements</i></b>                              |
| 8. There will be special constraints and costs associated with the design of roads through or adjacent to land known to be salt affected. Early planning shall consider avoiding detrimental interference with land known to be salt affected. Adjustments in horizontal and vertical line shall be considered to avoid recharge of subsurface water within or adjacent to the road reserve. Consultation with the relevant land and water | <b><i>Salinity Prevention, Early Planning, Mandatory Consultation</i></b> |

resource authority shall be mandatory under the above circumstances.

9. Appropriate native deep-rooted species should be selected for plantings in association with road reserve works. Plantations should be of sufficient size and density, multiple row belts and relatively close spacings are recommended, to be effective in their desired role of lowering the groundwater table.

**Landscaping,  
Salinity  
Prevention**

## D1.06 DRAWING REQUIREMENTS

### (a) Reduction Ratios

1. All plans for urban design are to be reduced to 1:500. Rural designs may be reduced to 1:1000.

	Urban	Rural
Longitudinal Sections	1:500 H 1:100 V	1:1000 H 1:200 V
Cross Sections	1:100 Natural	1:200 Natural
Intersections	1:200 and Contoured	1: 200 and Contoured
Cross section intervals	Every 10 to 20m	Every 20 to 50m

### (b) Drawing Sheets

1. Separate sheets should be provided for but are not limited to:

- a. Cover sheets
- b. Plan views
- c. Longitudinal sections
- d. Cross sections
- e. Structural details
- f. Standard drawings
- g. Erosion and sediment control plan

### (c) Drawing Presentation

1. Drawings are to be presented on A1 sheets unless otherwise authorised. They are to be clear and legible and prepared in consistent lettering and style and shall be in accordance with AS1100.401. Council has the authority to refuse drawings that do not meet these drafting requirements. Drawings copied from other works will not be accepted. All drawings shall be clearly referenced with notations and tables as appropriate. The Designer should always be mindful that apart from being a permanent record and legal document, drawings should be easily read and understood by the Contractor, and others involved in the construction of the Works. Terminology should be kept in 'plain English' where possible.

**Clear and  
Legible,  
Permanent  
Record,  
Legal  
Document**

2. The scope and sequence of drawing sheets shall comply with the example provided in Annexure DQS-B of the Specification for QUALITY ASSURANCE REQUIREMENTS FOR DESIGN.

**Compliance**

**(d) Certification**

1. Drawings shall bear the signature of the design consultant and shall where required by the Council be certified as complying with the appropriate design specifications (D1 to D12). The certificate shall be in the format detailed in Annexure DQS-A of the Specification for QUALITY ASSURANCE REQUIREMENTS FOR DESIGN.

**Design Consultant**

**(e) Certification**

1. All design drawings shall reflect the road chainages used by Council on designs for existing roads.

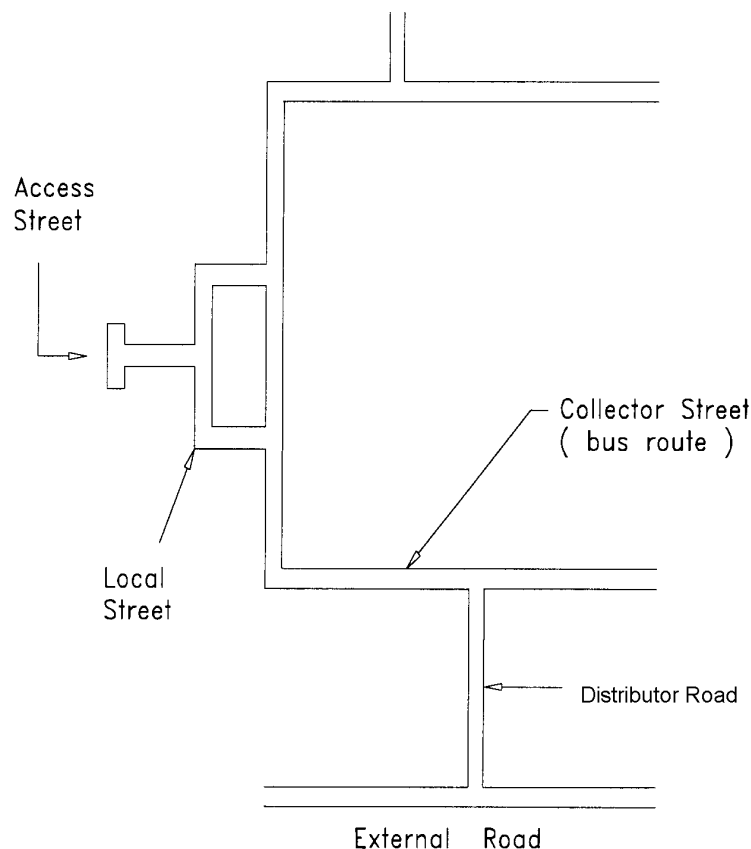
**Council Road Chainages**

**URBAN DESIGN CRITERIA**

**D1.07 ROAD HIERARCHY**

1. A hierarchical road network is essential to maximise road safety, residential amenity and legibility. Each class of road in the network serves a distinct set of functions and is designed accordingly. The design should convey to motorists the predominant function of the road. A typical hierarchy is shown on Figure D1.1.

**Functionality**



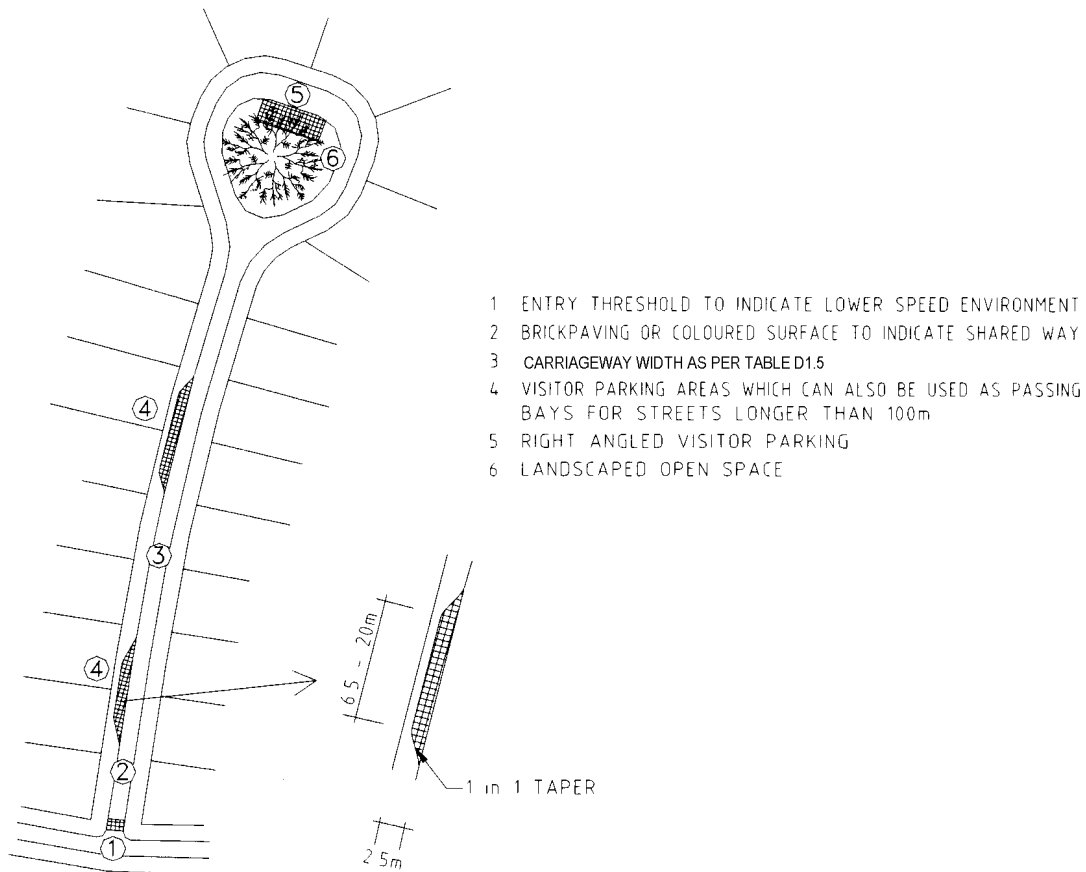
**Figure D1.1 - Typical Road Hierarchy**

2. Four distinct levels of roads are:

- Access Street
- Local Street
- Collector Street
- Distributor Road.

3. The lowest order road (access street) having as its primary function, residential space - amenity features which facilitate pedestrian and cycle movements, and where vehicular traffic is subservient in terms of speed and volume, to those elements of space, amenity, pedestrians and cyclists. The features of a typical access street are shown in Figure D1.2.

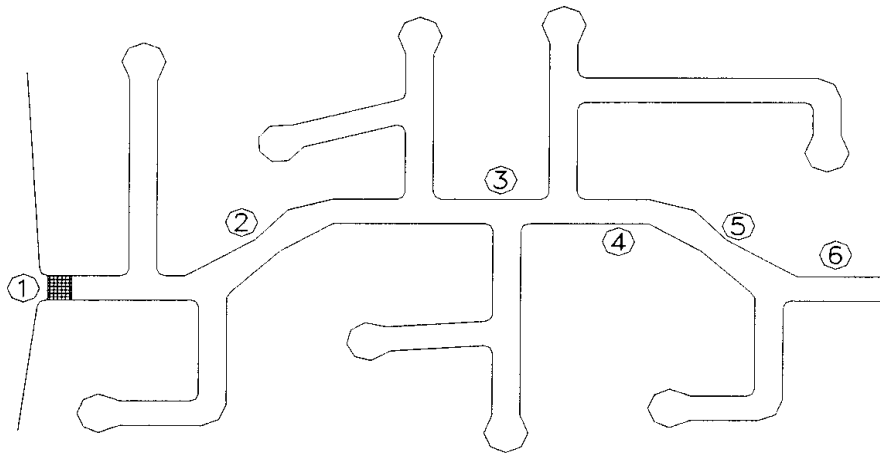
**Access Street**



**Figure D1.2 - Access Street**

4. The next level road (local street) as a local residential street should provide a balance between the status of that street in terms of its access and residential amenity functions. Resident safety and amenity are dominant but to a lesser degree than access streets. A typical local street is illustrated in Figure D1.3.

**Local Street**

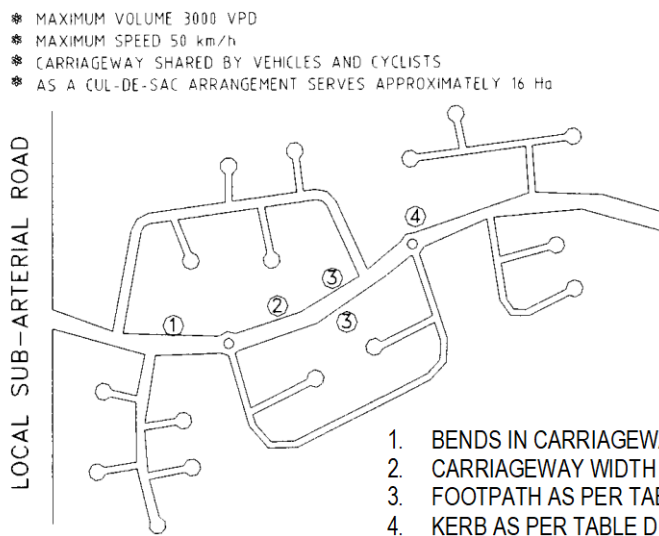


- 1 ENTRY THRESHOLD SIGNIFIES ENTRY TO LOWER SPEED ENVIRONMENT
- 2 BENDS IN CARRIAGEWAY CONTROL SPEED
- 3 SHORT SECTIONS OF STRAIGHT CARRIAGEWAY CONTROL SPEED
- 4 CARRIAGEWAY WIDTH AS PER TABLE D1.5
- 5 FOOTPATH ON ONE SIDE AS PER TABLE D1.5
- 6 KERB AS PER TABLE D1.5

Figure D1.3 - Local Street

- 1. The second highest order road (collector street) has a residential function but also carries higher volumes of traffic collected from lower order streets. A reasonable level of residential amenity and safety is maintained by restricting traffic volumes and speeds, however, amenity and resident safety do not have the same priority as access or local streets. A typical collector street is shown in Figure D1.4.

**Collector Street**

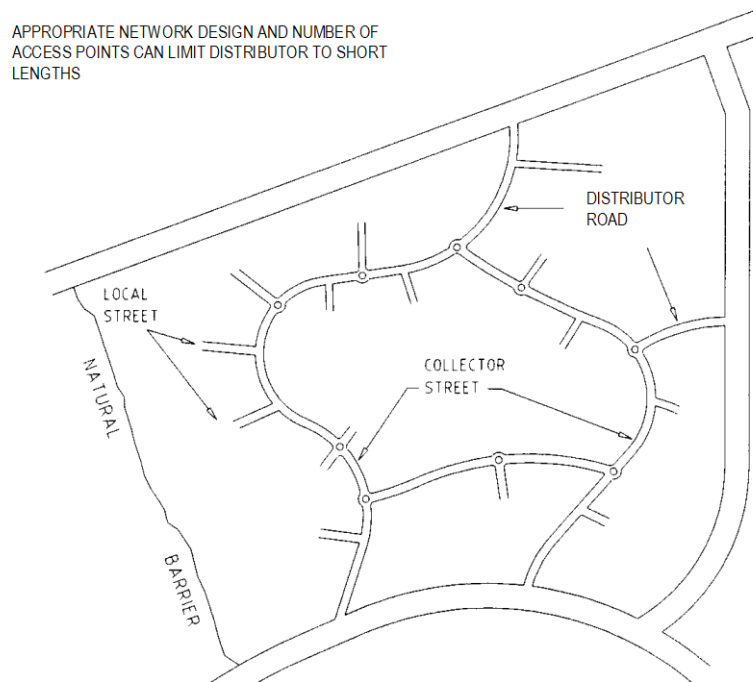


- 1. BENDS IN CARRIAGEWAY CONTROL SPEED
- 2. CARRIAGEWAY WIDTH AS TABLE D1.5
- 3. FOOTPATH AS PER TABLE D1.5
- 4. KERB AS PER TABLE D1.5

Figure D1.4 - Collector Street

6. The highest order road (Distributor road) within a residential development should have as its main function the convenient and safe distribution of traffic generated by the development. Direct access should not be provided for single dwelling allotments but access can be provided to multi-unit developments and non-residential land uses. The Distributor should serve only the development and should not attract through traffic. Figure D1.5 shows the layout of a Distributor road.

**Distributor Road**



**Figure D1.5 - Distributor Road**

**D1.08 ROAD NETWORK**

1. The design features of each type of road convey to the driver its primary functions and encourage appropriate driver behaviour (refer Figure D1.2 to D1.5).
2. Traffic volumes and speeds on any road should be compatible with the residential functions of that road.
3. The maximum length of an access street should ensure its status as a residential place is retained, where the traffic, in terms of speed and volume will enable the integration of pedestrian, bicycle and vehicular movements. This length will also ensure that residential convenience is not unduly impaired as a result of speed restraints.
4. The length of Distributor within a development should be minimised.
5. The time required for drivers to travel on all streets within the development should be minimised.
6. Where access streets form part of a pedestrian or bicycle network, access links should provide suitable connectivity with adjoining access streets or open space systems so as to ensure such pedestrian and bicycle network are functionally efficient.
7. The road network should ensure that no road links with another road which is more than two levels higher or lower in the hierarchy. In exceptional circumstances roads may link with others that are more than two levels apart, however, no access street or local street should have access to an access-controlled arterial road.

**Compatibility**

**Access Street**

**Distributor**

**Travel Time**

**Pedestrian or Bicycle Network**

**Road Links**

8. Connections between internal roads should be T-junctions or controlled by roundabouts. The spacing of T- junctions shall be in accordance with Chapter 5 of Austroads Guide to Traffic Engineering Practice, Intersections at Grade.

**Internal Road Connections**

9. The road layout should conform to the requirements of the external road network and satisfy the transport provisions of an outline development plan.

**Transport Provisions**

10. The external road network should be designed and located to provide routes which are more convenient for potential through traffic within the network. Major roads should be provided at intervals of no more than 1.5 km and should be complete and of adequate capacity to accommodate through network movements. The internal road system should not provide through routes that are more convenient than the external road network.

**External Road Network**

**D1.09 DESIGN SPEED**

1. Design speed is generally used as the basic parameter in the specification of design standards, determining the minimum design value for other elements. The NSW Roads and Traffic Authority bases its current design standards on a travel speed rather than a design speed. Travel speed identifies a speed/horizontal radius relationship. This approach is intended for roads of a minimum travel speed of 60 km/h. The maximum speed limit in NSW for built-up areas is 50 km/h as default speed limit and this should be used in calculating design values which depend on speed, (e.g. collector and sub-arterial roads) however, in difficult topography, the design speed may be reduced. Vehicular speeds are also limited by road intersections as well as changes in horizontal and vertical alignment.

**RMS Guidelines**

2. Adoption of a low design speed discourages speeding, however, where vertical or horizontal curves of low design speed are located in otherwise high speed sections (tangents) the result is a potentially dangerous section of road. It should be recognised that in low standard roads, operating speeds will tend to be in excess of arbitrary speed standards. 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.

**Low Speeds**

**Hazardous Features**

3. Generally the following design speeds should be adopted:

Access Street	40 km/h
Local Street	40 km/h
Collector Street	50 km/h
Distributor Road	60/80 km/h

4. The need for road safety barriers shall be assessed and designed in accordance with AS/NZS 3845.

**Road Safety Barriers**

**D1.10 LONGITUDINAL GRADIENT**

1. A general minimum gradient of 0.5 per cent should be adopted. In very flat conditions it may be reduced to 0.3 per cent subject to specific Council approval. Where underground drainage with gully pits or other special works are used it is preferable to allow near level grades rather than reverting to the unsatisfactory device of introducing artificial undulations. Variable crossfall may be necessary to produce the required grade in the gutter. Maximum recommended grades are shown in Table D1.1.

**Flat Terrain**

**Table D1.1**

	Local Access	Collector	Distributor	Rural
Desirable maximum percentage*	12	10	8	10
Absolute maximum percentage*	16	12	10	12

\* maximum length 150 m on straight alignment.

2. Longitudinal grade of the minor street on the approach to an intersection 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 steep grade on a minor side street is undesirable if vehicles have to stand waiting for traffic in the major road. **Intersections**

3. Turning circles in cul-de-sacs on steep grades should have grades less than 5 per cent. **Cul-de-Sacs**

4. Roads with a longitudinal gradient 16% or greater shall not use Asphaltic Cement as a pavement material. Approval for an alternative material must be obtained from Council. **Steep Terrain**

**D1.11 HORIZONTAL CURVES AND TANGENT LENGTHS**

1. The horizontal alignment of a road is normally in a series of tangents (straights) and curves which may be connected by transition curves. The choice of the horizontal alignment is normally determined from the design speeds for a particular street within the road hierarchy as described in Clause D1.09. 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 which progressively tighten produce an uncomfortable sense of disorientation and alarm. Sudden reverse curves which drivers cannot anticipate also have a potential to cause similar conditions. **Speed/Radius Relation**

2. Where speed restriction is provided by curves in the street alignment the relationship between the radius of the curve and the desired vehicle speed is given in Table D1.2 (a). **Speed Restriction**

3. To determine appropriate lengths for tangents between speed restrictions, which may be curves, narrow sections or other obstructions, Table D1.2 (b) is recommended. **Tangent Length**

4. Sight distance on curves is determined by formula, values of which are tabulated in RMS Road Design Guide.

**Table D1.2 (a)  
Speed/Radius Relationship**

Desired Vehicle Speed (km/h)	Curve Radii (m) on Road Centreline	
	Curvilinear Alignment (no tangents)	Isolated Curve Alignment (with tangent sections)
20	15	10
25	20	15
30	30	20
35	50	30
40	90	40
45	105	50
50	120	60
55	140	70
60	160	80



**Table D1.2 (b)**  
**Speed/Tangent Length Relationship**

Desired Vehicle Speed in Curve  (km/h)	Maximum Advisable Tangent Length (m) between Curves or Restrictions Appropriate to a Selected Design Speed.						
	DESIGN SPEED						
	25	30	35	40	45	50	60
20 or less	40	75	100	120	140	155	180
25	-	45	75	100	120	140	165
30	-	-	45	80	100	120	150
35	-	-	-	50	80	100	135
40	-	-	-	-	55	80	120
45	-	-	-	-	-	60	105

NOTE:  
Tables D1.2 (a) and D1.2 (b) are derived from AMCORD.

**D1.12 VERTICAL CURVES**

- Vertical curves will be simple parabolas and should be used on all changes of grade exceeding 1 per cent. The desirable minimum design speed is 60 km/h. The length of the crest vertical curve for stopping sight distance should conform to RMS Road Design Guide. These standards are based on 1.5 second's reaction time which provides a reasonable safety margin for urban conditions, where drivers' reaction time is usually considered to be lower than in rural conditions. **Criteria**
- For adequate riding comfort, lengths of sag vertical curves should conform to the RMS Road Design Guide. As residential roads are usually lit at night, the criterion for designing sag vertical curves is a vertical acceleration of 0.05g for desirable riding comfort, and 0.10g for minimum riding comfort. The minimum lengths for sag vertical curves are shown in Table D1.3. **Riding Comfort**

**Table D1.3 Minimum Length of Sag Vertical Curves**

	Local access (m)	Collector (m)	Distributor (m)
Minimum vertical curve	25	35	50
Absolute minimum vertical curve (to be applied at road junctions only)	6 (15LCC)	12 (15LCC)	20

- Junctions of roads should be located at a safe distance from a crest, determined by visibility from the side road. Location of a side road at a crest should only occur if there is no suitable alternative. **Side Road Junctions**
- 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 (expressed as a percentage) has been suggested. This is to avoid water ponding in excessively flat sections of kerb and gutter. A minimum grade of 0.5 per cent should be **Sag Curves**

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maintained in the kerb and gutter. This may require some warping of road cross sections at sag points.

5. The three dimensional coordination of the horizontal and vertical alignment of a road should be aimed at improved traffic safety and aesthetics. Economic considerations often require a compromise with aesthetic considerations. The following principles should be applied:

**Horizontal and Vertical Alignment Coordination**

- The design speed of the road in both horizontal and vertical planes should be of the same order.
- Combined horizontal and vertical stopping sight distance and minimum sight distance should be considered three dimensionally.
- Sharp horizontal curves should not be introduced at or near the crest of a vertical curve. A horizontal curve should leave the vertical curve and be longer than the vertical curve.
- A short vertical curve on a long horizontal curve or a short tangent in the gradeline between sag curves may adversely affect the road's symmetry and appearance.

### D1.13 SUPERELEVATION

1. The use of superelevation in association with horizontal curves is an essential aspect of geometric design of roads with design speeds in excess of 60 km/h. Local access roads, which are designed for speeds of 40 km/h or less and with curves of 60m radius or less generally have the pavement crowned on a curve instead of superelevation. Design standards for such curves have little meaning as drivers usually cut the corners and rely on friction to hold them on a curved path. As the radius of the curve falls, friction becomes more important than superelevation.

**Low Design Speed, Crowned Pavement**

2. The maximum superelevation for urban roads of higher design speeds should be 6 per cent. Any increase in the longitudinal grade leading to excessive crossfall at intersections should be considered with caution. While it is desirable to superelevate all curves, negative crossfall should be limited to 3 per cent.

**High Design Speed**

3. In general, curve radii larger than the minimum and superelevation rates less than the maximum should be used where possible. The minimum radius of curves is determined by the design speed, the minimum superelevation (or maximum adverse crossfall) at any point on the circular portion of the curve, and the maximum coefficient of side friction which allows safe lane changing. This is 0.15 where there is positive superelevation and 0.12 where there is adverse crossfall. The coefficient of side friction depends upon the type and condition of tyres, the pavement, and on speed.

**Criteria**

4. Recommendations for minimum curve radii (in metres) on major urban roads under varying superelevation/crossfall are shown in Table D1.4.

**Table D1.4 Minimum Radius of Curvature**

	Design Speed km/h	60	70	80
Minimum Superelevation (%)	5	145	195	255
	4	150	205	265
	3	160	215	280
	2	170	230	300
	1	180	245	315
Maximum Crossfall (%)	0	190	260	340
	1	260	355	460
	2	285	390	505
	3	315	430	560

(Source: NAASRA (Now AUSTRROADS), Guide policy for the geometric design of major urban roads.)

5. Plan transitions are desirable on superelevated curves for appearance and to provide a convenient length in which to apply the superelevation. On urban roads, superelevation may be conveniently applied to the road cross section by shifting the crown to 2m from the outer kerb. The axis of rotation of the cross section for urban roads will normally be the kerb grading on either side which best enables access to adjacent properties and intersections. On the outside of superelevation, or where the longitudinal grade of the gutter is less than 0.5 per cent, a crossfall of 63mm in a 450mm wide gutter may be adopted.

***Transitions,  
Offset Crowns***

**D1.14 ROAD RESERVE CHARACTERISTICS**

1. The cross section of the road reserve must provide for all functions that the road is expected to fulfil, including the safe and efficient movement of all users, provision for parked vehicles, acting as a buffer from traffic nuisance for residents, the provision of public utilities and streetscaping. Table D1.5 details characteristics of the road reserve.

***Cross Section  
Provisions***

## GEOMETRIC ROAD DESIGN

**Table D.1.5 Characteristics of Roads in Residential Subdivision Road Networks**

Road Type	Maximum Traffic Volume (vpd) <sup>(1)</sup>	Maximum Speed <sup>(2)</sup> (km/h)	Carriageway Width (m) <sup>(3)(10)</sup> Min	Parking Provisions Within Road Reserve	Kerbing <sup>(4)</sup>	Footpath Requirement <sup>(15)</sup> minimum	Bicycle path Requirement	Verge Width (m) minimum (each side)	Minimum Road Reserve Width (m)
Access Street	100	40	6	Carriageway	Mountable	No	No	3	14
Local Street	2000	50	7-9	Carriageway	Mountable	Network Dependent	Network Dependent	3.5	15-17
Collector Street	3000	50	11	Carriageway	Mountable	One side <sup>(16)</sup>	Network Dependent	3.5	18
Distributor Road	3000+	60	13	Carriageway	Upright	One Side	Network Dependent	3.5	20

**NOTES:**

1. For single dwelling allotments apply traffic generation rate of 10 vehicles per day (vpd)/allotment (equivalent to approximately one vehicle per hour (vph) in the peak hour) unless a lower rate can be demonstrated. Lower rates can be applied to multi-unit dwellings based on locally derived rates.
2. See Clauses D1.09 and D1.11 on designing for specific operating speeds.
3. Widening required at bends to allow for wider vehicle paths (using AUSTRROADS Turning Templates).
4. Where kerbing is not required a flush pavement edge treatment can be used. Maximum carriageway widths required if barrier kerbing used.
5. Requires:
  - (i) Provision for widening to 5.0m if necessary in the future.
  - (ii) Verge parking as noted with scope for additional spaces.
6. Minimum width required to provide for pedestrians, services, drainage, landscape and preservation of existing trees. Add additional width on one side for future widening of carriageway to 5.0m if required. For two lane carriageway design, no provision for widening required.
7. A minimum of one footpath on one side of the street to be constructed initially with provision to construct a second footpath if required by residents in the future.

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## GEOMETRIC ROAD DESIGN

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8. Reduced speeds are required at designated pedestrian/bicycle crossing. A speed of 20 km/h is desirable, achieved by the road design principles outlined in this Specification.
9. Barrier kerbing may be used if required for drainage purposes without reducing the carriageway width.
10. On bus routes, 7.0m travelled way with 2.0m wide indented parking and bus bays defined by kerbed protuberances. Where bicycle way can be anticipated, a bicycle lane is required along the kerb.
11. Speed on Distributor road not to exceed legal limit.
12. If required, to be provided in parking areas which can be exited in a forward direction.
13. Required only if part of a pedestrian/bicycle network.
14. Provide adequate road reserve width for widening of carriageway for future bus route if required.
15. Minimum widths required are in Table D9.1

- |  |   |
|--|---|
| <p>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. (Refer to Clause D1.21 for bus routes.)</p> | <p><b>Operational Aspects</b></p>         |
| <p>3. The safety of pedestrians and cyclists where it is intended they use the carriageway must also be assured by providing sufficient width.</p>   | <p><b>Pedestrians, Cyclists</b></p>       |
| <p>4. The carriageway width should also provide for unobstructed access to individual allotments. Drivers 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.</p>   | <p><b>Access to Allotments</b></p>        |
| <p>5. The design of the carriageway should discourage drivers 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.</p>  | <p><b>Discourage Speeding</b></p>         |
| <p>6. Appropriate verge width should be provided to enable the safe location, construction and maintenance of required footpaths and public utility services (above or below ground) and to accommodate the desired level of streetscaping. Wherever possible services should be located in common trenches.</p>   | <p><b>Verge Width</b></p>                 |
| <p>7. 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.</p>  | <p><b>Sight Distance Across Verge</b></p> |
| <p>8. Stopping sight distances and junction or intersection sight distances, provided by the verge, should be based on the intended speeds for each road type.</p>   |   |

**D1.15 CROSSFALL**

1. Desirably, roads should be crowned in the centre. Typical pavement crossfalls on straight roads are:

<i>Pavement Type</i>	<i>Crossfall</i>
Bituminous seal coat	3 per cent
Bituminous concrete pavement	2.5 per cent
Cement concrete pavement	2 per cent

(Source: NAASRA (Now AUSTRROADS), Guide policy for geometric design of major urban roads.)

- |   |  |
|---|--|
| <p>2. There are many factors affecting levels in urban areas which force departures from these crossfalls. Differences in level between road alignments can be taken up by offsetting crown lines or adopting one way crossfalls. Sustained crossfalls should not exceed 4 per cent, although up to 6 per cent may be used where unavoidable. The rate of change of crossfall should not exceed: 6 per cent per 30m for through traffic; 8 per cent per 30m for free flowing turning movements; or 12 per cent per 30m for turning movements for which all vehicles are required to stop.</p> | <p><b>Offset Crown Lines</b></p><br><p><b>Rate of Change</b></p> |
| <p>3. The crossfall on a collector or Distributor road should take precedence over the grade in minor side streets. Standard practice is to maintain the crossfall on the major road and adjust the minor side street levels to suit. The crossfall in side streets should be warped quickly either to a crown or a uniform crossfall depending on the configuration of the side street. A rate of change of grade of two per cent in the kerb line of the side street relative to the centre line grading is a reasonable level.</p>   | <p><b>Precedence</b></p>   |

**D1.16 VERGES AND PROPERTY ACCESS**

1. A suitable design for the verge will depend on utility services, the width of footpath, access to adjoining properties, likely pedestrian usage and preservation of trees. Low level footpaths are undesirable but may be used if normal crossfalls are impracticable. Crossfalls in footpath paving should not exceed 2.5 per cent, in accordance with AUSTRROADS Guide to Road Design. Longitudinal grade usually parallels that of the road and this may be steeper than 5 per cent. **Criteria**

2. Differences in level across the road between road reserve boundaries may be accommodated by: **Options**

- Cutting at the boundary on the high side and providing the verge at normal level and crossfall.
- Battering at the boundary over half the verge width with the half against the kerb constructed at standard crossfall.
- A uniform crossfall across the carriageway.
- The lower verge being depressed below the gutter level.

3. The above measures can be used singularly or combined. The verge formation should extend with a 0.5m berm beyond the road reserve boundary.

4. The Designer shall design a vehicular driveway centreline profile for the property access and check this design using critical car templates, available from Council, to ensure that vehicles can use the driveway satisfactorily. **Driveway Profile**

**D1.17 INTERSECTIONS**

1. The design of intersections or junctions should allow all movements to occur safely without undue delay. Projected traffic volumes should be used in designing all intersections or junctions on Distributor roads. **Traffic Volumes**

2. Intersection design for the junction of subdivision roads with existing state rural or urban roads and national highways should generally be in accordance with the publication AUSTRROADS Guide to Road Design. **State Roads, National Highways**

3. Intersections with state roads or national highways are to be designed, approved and constructed in accordance with the requirements of the State Road Authority. **Approval of State Road Authority**

4. Where major intersections are required to serve a development complete reconstruction of the existing road pavements will be necessary where the speed environment and irregularity of the existing road pavement may endanger the safety of traffic in the locality. **Existing Road Pavement**

5. Intersections should be generally located in such a way that: **Criteria**

- The streets intersect preferably at right-angles and not less than 70°.
- The landform allows clear sight distance on each of the approach legs of the intersection.
- The minor street intersects the convex side of the major street.
- The vertical grade lines at the intersection do not impose undue driving difficulties.

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- The vertical grade lines at the intersection will allow for any direct surface drainage.
  - Two minor side streets intersecting a major street in a left-right staggered pattern should have a minimum centreline spacing of 50m to provide for a possible right-turn auxiliary lane on the major street.
  - A right-left manoeuvre between the staggered streets is preferable, avoiding the possibility of queuing in the major street.
6. Adequate stopping and sight distances are to be provided for horizontal and vertical curves at all intersections. **Sight Distance**
7. Where required, appropriate provision should be made for vehicles to park safely. **Parking**
8. The drainage function of the carriageway and/or road reserve must be satisfied by the road reserve cross-section profile. **Drainage**
9. All vehicle turning movements are accommodated utilising AUSTRROADS Design Vehicles and Turning Templates, as follows: **Turning Movements**
- For intersection turning movements involving Distributor roads, the "design semi-trailer" with turning path radius 15.0m.
  - For intersection turning movements involving local streets or collector streets, but not Distributor roads, the "design single unit" bus with turning path radius 13m.
  - For intersection turning movements on access streets but not involving Distributor roads, collector streets or local streets, the garbage collection vehicle used by the local authority.
  - For turning movements at the head of cul-de-sac access streets sufficient area is provided for the "design single unit" truck to make a three-point turn or, where the length of the cul-de-sac is less than 60m for the "design car" to make a three-point turn. Where driveway entrances are to be used for turning movements, the required area is to be designed and constructed to withstand the relevant loads.
10. Turning radii at intersections or driveways on Distributor road accommodate the intended movements without allowing desired speeds to be exceeded. **Turning Radii**
11. On bus routes 3-centred curves with radii 7.0m, 10.0m, 7.0m are used at junctions and intersections. **Bus Routes**



### D1.18 ROUNDABOUTS

1. Roundabouts are to be approved by the Council and the Roads Traffic Authority. **Approval**
2. Roundabouts should generally be designed in accordance with the requirements of the publication AUSTRROADS Guide to Road Design. Designs adopting alternative criteria will be considered on their merits. Roundabout design should generally comply with the following: **Criteria**
  - entry width to provide adequate capacity
  - adequate circulation width, compatible with the entry widths and design vehicles e.g. buses, trucks, cars.
  - central islands of diameter sufficient only to give drivers guidance on the manoeuvres expected
  - deflection of the traffic to the left on entry to promote gyratory movement
  - adequate deflection of crossing movements to ensure low traffic speeds
  - a simple, clear and conspicuous layout
  - design to ensure that the speed of all vehicles approaching the intersection will be less than 50 km/h.
3. Pavement design shall be in accordance with Specification D2.

### D1.19 TRAFFIC CALMING

1. Traffic calming devices are to be approved by the Council. **Approval**
2. Calming devices such as thresholds, slowpoints, speed humps, chicanes and splitter islands should be designed in accordance with the requirements of the publication AUSTRROADS Guide to Road Design. Devices designs should generally comply with the following: **Criteria**

#### (a) Streetscape

- reduce the linearity of the street by segmentation
- avoid continuous long straight lines (e.g. kerb lines)
- enhance existing landscape character
- maximise continuity between existing and new landscape areas

#### (b) Location of Devices/Changes

- devices other than at intersections should be located to be consistent with streetscape requirements
- existing street lighting, drainage pits, driveways, and services may decide the exact location of devices
- slowing devices are optimally located at spacings of 100-150m.

**(c) Design Vehicles**

- emergency vehicles must be able to reach all residences and properties
- local streets with a 'feeding' function between arterial roads and minor local streets might be designed for a AUSTRROADS Design Single Unit Truck/Bus
- where bus routes are involved, buses should be able to pass without mounting kerbs and with minimised discomfort to passengers
- in newly developing areas where street systems are being developed in line with LATM principles, building construction traffic must be provided for

**(d) Control of Vehicle Speeds**

- 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
- speed reduction can be achieved using devices which shift vehicle paths laterally (slow points, roundabouts, corners) or vertically (humps, platform intersections, platform pedestrian/school/bicycle crossings)
- 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 300m), using appropriate devices, streetscapes, or street alignment to create short sight lines

**(e) Visibility Requirements (sight distance)**

- adequate critical sight distances should be provided such that evasive action may be taken by either party in a potential conflict situation. Sight distances should relate to likely operating speeds
- sight distance to be considered include those of and for pedestrians and cyclists, as well as for drivers
- night time visibility of street features must be adequate. Speed control devices particularly should be located near existing street lighting if practicable, and all street features/furniture should be delineated for night time operation. Additional street lighting shall be provided by the Developer at proposed new speed control devices located away from existing street lighting.

**(f) Critical Dimensions**

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:

- pavement narrowings
  - single lane 3.50m between kerbs
  - 3.75m between obstructions
  - two lane 5.50m minimum between kerbs
- bicycle lanes (including adjacent to pavement narrowings) - 1.2m absolute minimum (1.0m in special circumstances in accordance with AUSTRROADS Guide to Traffic Engineering Practice – PART 14, Bicycles.)

- plateau or platform areas
  - 75 mm to 150 mm height maximum, with 1 in 15 ramp slope
- width of clear sight path through slowing devices
  - 1.0m maximum

(i.e. the width of the portion of carriageway which does not have its line of sight through the device blocked by streetscape materials, usually vegetation)
- dimensions of mountable areas required for the passage of large vehicles to be determined by appropriate turning templates.

### D1.20 PARKING

- |    |   |                             |
|----|---|-----------------------------|
| 1. | The parking requirements for normal levels of activity associated with any land use should be accommodated on-site.   | <b>On-Site</b>              |
| 2. | All on-site parking should be located and of dimensions that allow convenient and safe access and usage.  |                             |
| 3. | Adequate parking should be provided within the road reserve for visitors, service vehicles and any excess resident parking since a particular dwelling may generate a high demand for parking. Such parking is to be convenient to dwellings.                                   | <b>Road Reserve Parking</b> |
| 4. | The availability of parking should be adequate to minimise the possibility of driveway access being obstructed by cars parked on the opposite side of the street.   | <b>Obstruction</b>          |
| 5. | On single lane access streets parking spaces should be provided within the verge. Such parking should be well defined and an all-weather surface provided. Such parking shall not restrict the safe passage of vehicular and pedestrian traffic.                                | <b>Verge Parking</b>        |
| 6. | Parking spaces provided on the verge or carriageway should be of adequate dimensions, convenient and safe to access.  |                             |
| 7. | For non-residential land uses the opportunity for joint use of parking should be maximised by being shared by a number of complementing uses.   | <b>Joint Use</b>            |
| 8. | All verge spaces and indented parking areas are constructed of concrete, interlocking pavers, lawn pavers, bitumen with crushed rock or other suitable base material and are designed to withstand the loads and manoeuvring stresses of vehicles expected to use those spaces. | <b>Verge Spaces</b>         |
| 9. | The layout and access arrangements for parking areas for non-residential land uses should conform to Australian Standard 2890.  |                             |

### D1.21 BUS ROUTES

- |    |  |                 |
|----|--|-----------------|
| 1. | Bus routes will normally be identified by Council. It is important that the road hierarchy adequately caters for buses. The main criteria in determining the location of bus routes is that <i>no more than 5% of residents should have to walk in excess of 400 metres</i> to catch a bus. Normally roads above the local street in the hierarchy are designed as bus routes. Table D1.6 details minimum criteria for bus route design. | <b>Criteria</b> |
|----|--|-----------------|

**Table D1.6 Bus Route Criteria**

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Road	Stops (Spacing)	Bays
Collector	400 metre *	Single + Shelter
Distributor	400 metre	Shelters**
Arterial	400 metre	Shelters and Bays

\* Loop roads with single entry/exit only require stops and bays on one side road.

\*\* Shelters are subject to Council's requirements.

## RURAL DESIGN CRITERIA

### D1.22 GENERAL

1. In addition to the foregoing sections this section specifically applies to all those sites identified as being suited to rural subdivisions inclusive of rural home sites and hobby farms types of developments.

2. 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 AUSTROADS Guide to Road Design.

**Design Speed**

3. Where appropriate superelevation, widening and centreline shift and their associated transitions are to comply with the RMS Road Design Guide or AUSTROADS Guide to Road Design.

4. Where the table drain is likely to scour a RMS Type SH dish drain or similar structure is to be constructed along the invert. Also for grades of less than 0.8%, the inverts of the drain are to be lined to prevent siltation.

**Table Drain**

5. All rural subdivisions should be designed to restrict access to major roads.

6. Rural residential subdivisions may be required to provide kerb and gutter on both sides of roads, and piped drainage will generally be required. Refer to Council's DCP on subdivision code for guidance.

**Kerb and Gutter**

7. Access should be limited to one point on to local, collector, Distributor or arterial road networks.

**Access**

### D1.23 SIGHT DISTANCES

1. Refer to AUSTROADS Guide to Road Design for Sight, Braking and Stopping distance requirements.

**Stopping Distance**

**Sight Distance**

**Braking Distance**

**D1.24 HORIZONTAL AND VERTICAL ALIGNMENT**

1. Horizontal and vertical curves are to be designed generally to the requirements of AUSTRROADS Guide to Road Design. 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 with the terrain to achieve desirable aesthetic quality and being in harmony with the landform.

**Criteria**

**D1.25 INTERSECTIONS**

1. Intersections should generally be designed in accordance with the publication AUSTRROADS Guide to Road Design. Generally intersections with existing main and local roads will conform to the layouts shown in AUSTRROADS Guide to Road Design. The type of intersection required will depend on existing and planned connecting roads.

**Criteria**

2. Adequate sight distance should be provided at intersections both horizontally and vertically. Each intersection location shall be examined for conformance with the criteria for Sight Distance in accordance with AUSTRROADS Guide to Road Design.

**Sight Distance**

3. Staggered-T arrangements proposed for rural cross-intersections should preferably be of the "right to left" type. This arrangement eliminates traffic queuing in the major road, the need for additional pavement for right turn lanes and greater stagger length associated with "left to right" T-intersections. Figures and discussion on staggered-T treatments are given in AUSTRROADS Guide to Road Design.

**Staggered-T Intersections**

**D1.26 PLAN TRANSITIONS**

1. A plan transition is the length over which widening and shift is developed from the "tangent-spiral" point to the "spiral-curve" point; i.e., the length between the tangent and the curve. In urban road design it is often impracticable to use plan transitions as kerb lines are fixed in plan and any shift requires carriageway widening. Widening on horizontal curves compensates for differential tracking of front and rear wheels of vehicles; overhang of vehicles; and transition paths. Where proposed roads are curved, the adequacy of carriageway width should be considered.

**Widening and Shift on Curves**

**D1.27 CARRIAGEWAYS**

1. Carriageway widths for rural roads should generally be as follows:

**Table T 1.27 – Carriageway and seal widths for rural roads**

Local Government Area	Minor no through road up to 150 AADT	Minor road up to 1000 AADT	Major road over 1000 AADT	Rural Residential
Ballina Byron Kyogle Richmond Valley Clarence Valley	6m seal 0.5m shoulders	150 – 500 AADT 6m seal 1m shoulders 500 – 1000 AADT 7m seal 1.0m shoulders	7.5m seal 1.5m shoulders	6m seal 1m shoulders
Lismore	See City of Lismore Development Control Plan No. 28 - Subdivision			

2. Carriageway width to existing road shall generally be in accordance with Table T1.27 but shall be assessed on merit for individual applications for a reduced standard at the discretion of the Director of Engineering Services or delegated officer

**D1.28 SUPERELEVATION**

1. Use of maximum superelevation will be considered where the radius of the curve in approaching the minimum speed environment. Reference should be made to AUSTRoads Guide to Road Design for superelevation calculation. At low and intermediate ranges of design speed (i.e. below 80 km/h) it is desirable to superelevate all curves at least to a value equal the normal crossfall of straights.

*Design Speed*

**D1.29 SCOUR PROTECTION**

1. Scour protection of roadside drainage and table drains is required. The level of protection will depend on the nature of the soils, road gradients and volume of stormwater runoff. Protection works may involve concrete lined channels, turfing, rock pitching, grass seeding, individually or any combination of these. Geotechnical investigations should be carried out to determine the level and extent of any protection works prior to proceeding to final design stage.

*Roadside  
Drainage and  
Table Drains*

**SPECIAL REQUIREMENTS**

**D1.30 TURNING AREAS**

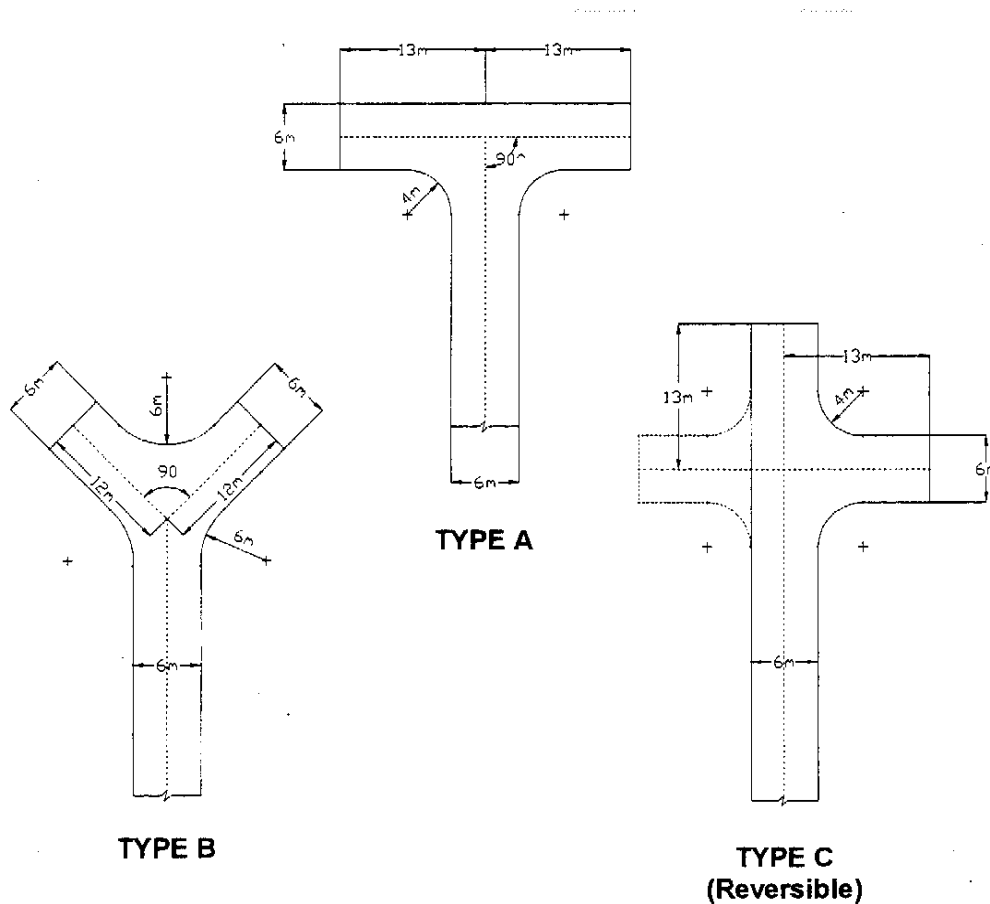
Turning areas shall be provided at the termination of all roadways and shall generally have the dimensions given in Table D1.12.

*Turning Area  
Radii*

The use of hammerhead turning areas in any orientation is not an acceptable treatment within The Lismore City Council area.

*Lismore City  
Council  
Exclusion*

For dimensions and geometry of hammer head turning areas refer to Figure D1.7



**Figure D1.7**  
**Typical Hammerhead Turning Area Treatments**

**D1.31 INDUSTRIAL ROAD WIDTHS**

1. The minimum carriageway widths and verge widths to be provided in industrial areas shall be as presented in Table 1.11. **Minimum Road Widths**
2. All industrial development shall require the provision of parking on site in accordance with the relevant Council DCP but parallel parking on the road may also be permitted in accordance with Table 1.11. **Parallel Parking**

**Table D1.11 – Minimum carriageway and road reserve widths for roads servicing industrial areas**

Minimum carriageway width	Minimum Verge	Parallel parking permitted on road
13	3.5	Yes

**D1.32 CUL-DE-SAC DIMENSIONS**

1. The minimum dimensions for cul-de-sac bowls shall be as presented in Table D1.12

*Minimum Radii*

**Table D1.12 – Cul-de-sac Radii**

Road Type	Minimum Radius (m)
Urban Residential	10
Rural Residential	10
Industrial	15

**D1.33 BATTLE AXE HANDLES**

1. Lots which require access to a street through a narrow access way are commonly termed battle axe lots. Provision must be made to allow for access to the lot for a range of vehicles and allowance must be made for the provision of landscaping and the provision of services. Table D1.12 sets out the minimum standards required to provide an acceptable level of service to residents of battle axe lots. A maximum of two lots only shall be permitted from the handle of battle axe lots whether through a shared ROW easement or through a reciprocal ROW easement.
2. The carriageway and corridor width presented in Table D1.13 are Council's minimum standard. Where Planning for Bushfire Guidelines apply, the higher standard for carriageway and corridor widths shall apply.

*Minimum Widths*

*Maximum lot numbers for access*

*Planning for Bushfire Standards*

**Table D1.13 – Axe handle access widths (serving no more than 2 lots or 2 dwellings)**

Council	Rural residential		Urban residential	
	Carriageway width (m)	Corridor width (m)	Carriageway width (m)	Corridor width (m)
<b>Ballina Byron Clarence Valley Kyogle Richmond Valley</b>	4	7	3	6
<b>Lismore</b>	Refer to DCP No. 28			

Notes: 1. Requirements for access ways serving more than 2 lots or more than 2 dwellings shall be in accordance with AS 2890.1

2. For access driveways which access multi dwelling developments the corridor width shall be a minimum of 3m wider than the carriageway and shall be of sufficient width to accommodate D1.16

**D1.34 KERB RETURN DESIGN RADII**

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1. Kerb return design radii shall be provided generally in accordance with AUSTRROADS Guide to Road Design. Table D1.14 provides a guide to the minimum requirements for kerb return radii for rural and urban situations. **Kerb Return Radii**
2. The design of rural intersections must take account of the swept path for semi-trailers and will require the provision of flares and shoulder widening in addition to the minimum radii given in Table D1.14. Figure D1.8 provides examples of typical treatments for turning lanes at rural intersections. **Shoulder Widening and Flares**

**Table D1.14 – Minimum kerb returns for intersections**

Design Turning Speed (kph)	Rural Intersection (m)	Urban Intersection			
		Accessway (m)	Local Road (m)	Collector Road (m)	Distributor Road (m)
0	15	6	6	8	8
10	15	6	6	8	8
20	15	6	8	10	10
30	15	6	8	10	10

**D1.35 GUIDE POSTS**

1. The design for the setting out of guide posts is contained in Construction Specification C263 Guide Posts. **Guide Post Set Out**
2. Guide posts shall be set out in accordance with the relevant standard drawing. AUSTRROADS Guide to Road Design may be used. **Alternative Austroads Design**

**D1.36 BATTER SLOPES**

1. Batter slopes on all road works shall generally accord with the requirements provided AUSTRROADS Guide to Road Design. **Desirable Batter Slopes**

**Table 1.15 Typical design batter slopes**

	Cut		Fill	
	Desirable	Maximum	Desirable	Maximum
Earth Batter	3:1	2:1	6:1	4:1 <sup>(2)</sup>
Rock batter	0.5:1	0.25:1 <sup>(1)</sup>	-	-
Median	10:1	6:1 <sup>(2)</sup>	10:1	6:1 <sup>(2)</sup>

1. May be steeper if geotechnical conditions permit.
2. Steeper slopes may be considered in combination with safety barriers to protect errant vehicles; however consideration should be given to safe maintenance practices and the surfacing treatment adopted.

(Source: AUSTRROADS Guide to Road Design - Table 4.11: Typical design batter slopes)

2. Batter slopes steeper than those presented in Table 1.15 shall require **Geotechnical**

geotechnical design or certification as being stable, from a professional engineer qualified in geotechnical engineering.

***Certification***

**D1.37 INTERNAL DRIVEWAYS**

***Private driveway design***

The design of private internal must comply with the requirements of the Northern River Region policy document 'HANDBOOK FOR DRIVEWAY ACCESS TO PROPERTY'.

**D1.38 PRIVATE ACCESSWAYS**

***Private access way design***

The design of private accessways must comply with the requirements for accessways provided in AS 2890.1. Additional detail is provided in the Northern Rivers Region policy document 'HANDBOOK FOR DRIVEWAY ACCESS TO PROPERTY'.