Armidale Dumaresq
Development Control Plan 2012

Section 2 Site Analysis and General Controls

Chapter 2.11 Engineering

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Part 1 General matters

1.1 Introduction

This is a supplementary chapter that reflects the development controls, diagrams and information in the current Chapter C1 Urban Residential Development and Subdivision Code of DCP 2007 and will apply in the interim period between the commencement of DCP 2012 and the finalisation of the revised Engineering Code. The Engineering Code is currently under revision with an expected effective implementation date in August 2013. On endorsement of the revised Engineering Code, this Chapter will be revoked.

This chapter is to be read in conjunction with all relevant chapters in DCP 2012. All relevant matters relating to the development must be addressed in the development application, the SEE and on site analysis plans and site plans. The site analysis process may highlight the requirement for specialist reports to be undertaken.

1.2 Objectives

The objectives of this chapter are:

O.1 To supplement current engineering guidelines and information for the construction of roads, footpaths, bus routes and cycleways.

1.3 Land to which this chapter applies

This chapter applies to all zones in the local government area:

Part 2 Street Networks

The following street component for each type of street are as specified in *Table 1: Characteristics of Street Types* (Appendix 1).This table identifies the following:

a) carriageway widths;
b) verge widths;
c) parking within street reserve;
d) kerb type;
e) pedestrian cyclist facilities.

2.1 Network structure and linkages

S.1 The street network has a clear structure and component streets conform to their function in the network.

S.2 Streets link with other streets that are no more than two levels higher or lower in the hierarchy.

S.3 The network has clear physical distinctions between each type of street. These distinctions are based on function, legibility, convenience, traffic volumes, vehicle speeds, public safety and amenity.

S.4 The design features of each type of residential street encourage driver behaviour appropriate to the primary function of the street.

S.5 Junctions along residential streets are spaced to create safe and convenient vehicle movements.

S.6 The street network takes account of the topography and vegetation, respects any existing or potential site assets, and takes advantage of opportunities for views.

S.7	The street network takes account of natural drainage and open space systems.
S.8	Streets do not operate as through traffic routes for externally generated traffic.
S.9	Emergency and/or footpath connections are provided into residential area with only one road access and more than 30 allotments.
2.2	**Geometric design**
S.10	The horizontal and vertical alignments satisfy safety criteria and reflect physical land characteristics and major drainage functions. Horizontal and vertical alignment criteria may be satisfied by complying with the following: a) Longitudinal gradients do not exceed 12% in general Curve super elevation does not exceed 5%. b) For downgrades of 5-10% street design should be based on an increase of the maximum speed of 5 km/h. For downgrades >10%, this maximum speed should be increased by 10 km/h. c) Crossfall on street pavement is generally 3%, otherwise 2.5-5%.
S.11	Geometric design for intersections, roundabouts and slow points is consistent with the vehicle speed intended for each street.
S.12	Sufficient area is provided at the head of a cul-de-sac for waste disposal vehicles to make a 3 point turn.
Kerb radii at intersections and junctions are kept to a minimum, subject to: a) satisfying required turning manoeuvres b) keeping pedestrian crossing distances to a minimum c) controlling the speed of vehicles.	
S.13	Kerb radii do not exceed 6m, except if required to accommodate turning vehicles.
S.14	Turning vehicles are accommodated using turning templates, to enable the following turns to be made in a single forward movement: a) between collector and access streets, the design heavy rigid vehicle (turning path radius 11m) using any part of the pavement. b) between access streets, the b99 design car (turning path radius 7.5m), using the correct side of the pavement only.
S.15	Siting conditions on land abutting major and minor distributor roads ensure that all vehicles can enter or leave the street in a forward direction.
2.3	**Traffic speed and volume management**
S.16	The street network limits the length of time local drivers need to spend in a low speed environment.
S.17	The street network is designed to reduce traffic speeds and volumes to acceptable levels, with most dwellings fronting streets with low volumes.
S.18	Intersections within the street network are either roundabouts or other appropriate traffic management treatments to slow and control traffic.
2.3.1	**Traffic speed and volume reduction techniques**
S.19	Speed and volume reduction techniques are used to achieve desired speeds, as part of a design for the whole street environment in accordance with Austroads Local Area Traffic Management Guidelines, and include the following principles:

a) street 'leg' length is limited to control vehicle speeds;

b) introducing bends - where bends are introduced to control speeds to 20 km/h or less, the deflection angle in the change of the alignment of a street or pavement is at least the angle determined from *Table 2: Street Leg Length and Design Speed (Appendix 2)*.

c) introducing slow points - where slow points are used to allow speeds greater than 20 km/h, the length of street between two bends or slow points complies with the distances specified in *Table 3: Minimum Deflection Angles for Speed Control to 20 km/h (Appendix 2)*

d) slow points including either horizontal or vertical deflection are designed to slow traffic to design speeds;

e) slow points and carriageway narrowings are designed to take into account the needs of cyclists, by ensuring speed compatibility, adequate space for concurrent passage or off street diversions;

f) landscape design, on street parking and streetscape design are used to complement speed restriction measures;

g) the verge provides safe sight distances, taking into account expected vehicle speeds and pedestrian and cyclist movements.

2.3.2 Speed restriction devices

Where speed reduction devices are part of a design for the total street environment, devices conform to those in *Figure 2: Deflection Angles for Speed Control (Appendix 4).*

S.20 Where speed restriction devices are used in isolation, they include:

a) full horizontal displacement of the vehicle path

b) swept vehicle paths to have a 20m radius

c) constriction on exit rather than on entry (otherwise there is a risk that the device may be short cut)

d) additional pavement treatment behind the kerb for large vehicles

e) line marking and Signposting.

2.3.3 Speed and safe sight distances

S.21 Safe sight distances, based on vehicle travel speeds, exist at property access points, pedestrian and cyclist crossings and at junctions and intersections -see *Figure 3: Street Design and Visibility (Appendix 5).*

S.22 Sight distances at pedestrian and cyclist crossings and at junctions/intersections, and from driveways conform to AS2890 Parking Facilities and and AustRoad Guidelines.

2.3.4 Speed and carriageway width

S.23 The design facilitates safe use by providing a carriageway width which allows vehicles to proceed safely at the operating speed intended for that level of street by:

a) making allowances for restrictions caused by on street parking;

b) providing a horizontal and vertical alignment which is not conducive to excessive speeds;

c) promoting the safety of pedestrians at bus stops and other crossing points;

d) promoting the safety of cyclists in streets and at crossing points.

2.4 Street crossings

Safe street crossings are to be provided for all street users with safe sight distances and adequate pavement markings, warning signs and safety rails (where appropriate for cyclists).

S.24 Where traffic volumes exceed 3000 vpd or speeds exceed 50 km/h, safe crossings are created with the use of pedestrian refuges, slow points, thresholds or other appropriate mechanism.

S.25 Pram and wheelchair crossings are provided at all kerbs and are adequately designed for this purpose as well as assisting sight impaired people.

S.26 Footpaths are constructed to provide a stable surface that is easily maintained. Footpaths are to be constructed using concrete or pavers to the requirements of Council's Engineering Code.

2.5 Verge widths

The verge width is outlined in *Table 1: Characteristics of Street Types* (Appendix 1).

S.27 The verge width may be increased where necessary to allow space for larger scale landscaping, indented parking, future carriageway widening, retaining walls, cycle paths or overland flow paths.

2.6 Street reserve

S.28 The street reserve width is sufficient to cater for all street functions, including:

a) safe and efficient movement of all users;
b) provision for parked vehicles;
c) provision of landscaping;
d) location, construction and maintenance of public utilities.

2.7 On-street parking

S.29 On–street parking is provided in accordance with projected needs which are determined by:

a) the number and size of probable future dwellings;
b) the carparking requirements of likely future residents;
c) availability of public transport;
d) likely future on-site parking provisions;
e) locations of non residential uses such as schools and shops;
f) the occasional need for overflow parking.

S.30 On–street parking is designed and located to:

a) conveniently and safely serve users, including pedestrians, cyclists and vehicles;
b) enable efficient use of car spaces and accessways including adequate manoeuvrability between the street and lots;
c) fit in with any adopted street network and hierarchy objectives, and any related traffic management plans;
d) achieve relevant streetscape objectives.

S.31 One on street parking space is to be provided for every two dwellings. These are to be located against the kerb or in parking bays constructed within the verge, located within 60m of each allotment.

2.8 Driveway access to individual lots

S.32 The carriageway and verge width allows for unobstructed access to individual lots, even when a car is parked on the opposite side of the street.

S.33 Driveway egress movements do not create a safety hazard.

S.34 Lot design enables driveways on major collector streets and streets which carry more than 3000 vpd to be designed to promote forward movement of vehicles across the verge - *Figure 4: Options for Access onto Limited Access Road (Appendix 6)*

2.9 Traffic noise

S.35 Streets and lots are located so that dwellings are not subject to unacceptable levels of traffic noise.

S.36 Traffic noise is assessed under Chapter 2.8 Noise of this DCP 2012.

Part 3 Footpaths and cycleways

3.1 Location

The location of footpaths and cycleways in a street reservation is determined by vehicle speeds and volumes.

S.1 Footpaths are provided on one side of streets with traffic volumes between 300 vpd and 2000 vpd, and on both sides of streets with traffic volumes over 2000 vpd.

S.2 No footpaths are required on streets with a traffic volume <300 vpd as pedestrians can share with vehicles in a low speed environment.

3.2 Design

S.3 The following matters must be addressed in the design of footpaths and cycleways:

a) protection of pedestrians and cyclists from parked vehicles and vehicles moving along the street and on driveways;

b) the impact of the positioning of footpaths and cycleways on postal delivery;

c) lighting;

d) opportunities for casual surveillance;

e) the location of physical services;

f) cross falls;

g) landscaping;

h) whether there is any development fronting that part of the street;

i) the alignment of paths:

i) provides cyclist and pedestrian safety;

ii) is varied to preserve trees and other significant features;

iii) focuses on vistas and landmarks to add visual interest where they exist.

3.3 Construction

S.4 Footpaths or shared paths are designed and constructed of appropriate width, longitudinal gradient and sight distance to cater for the number of projected pedestrians and cyclists, and user types (eg the aged, the very young, people with prams and people with disabilities).

S.5 Collector streets on which there is access to lots or where there is a planned pedestrian or cyclist path are provided with a separate path on each side clear of the carriageway

	pavement.
S.6	A pedestrian (only) footpath, where required, is 1.2 metres wide and has a maximum grade to be no greater than that of adjacent street and preferably under 5%.
S.7	Footpaths are widened to 1.4 metres minimum in the vicinity of meeting points, schools, shops and other activity centres.
S.8	Cycle paths and shared footpaths have widths in accordance with relevant Austroads guidelines.
S.9	Maximum longitudinal gradient of cycle paths to be no greater than that at any adjacent street pavement.
S.10	Construction and on-going maintenance should be designed to be cost effective in the long term.

Part 4 Bus routes

4.1 Bus routes

Bus routes have a carriageway width that:

S.1	Allows for the movement of buses unimpeded by parked cars
S.2	Safely accommodates cyclists.
S.3	Avoids cars overtaking parked buses.
S.4	The geometry of streets identified as bus routes provides suitable turning manoeuvres, sight distances, kerb radii at intersections, longitudinal grade, cross-fall and parking for buses (as determined from appropriate design documents), and has maximum carriageway widths within the ranges specified in *Table 1: Characteristics of Street Types (Appendix 1).*
S.5	Bus stops are, or are planned for, 300 m spacings where the route serves residential development. The bus stop bay is to be designed to meet the current relevant AUSTROADS Guidelines and in accordance with Council Policies POL 141 Rural Bus Stops and POL 185 Bus Shelters within the Urban Areas.

Table 1: Characteristics of Street Types

Appendix 1

Table 1 Characteristics of Street Types

Street Type (7)	Indic. max. traffic vol. (vpd) (1)	Target street speed (km/h)	Carriageway width (metres) (2)	Parking provision within street reserve	Kerb (5)	Foot-path	Cycle-way	Verge width min.(m) each side (6)
Access Place	300	15	6	Carriage-way	Roll-over	Not required	Not required	Total 7m (3)
Access Place: The lowest order of street providing access to sites without any traffic generated by sites in other streets.								
Minor Access Street	1000	30	6	Carriage-way	Roll-over	One side	(8)	Min. 4m each side
Access Street	2000	40	8	Carriage-way	Roll-over or upright	One side	(8)	Min. 4.5m each side
Minor Access Street And Access Street: *Generally streets where the residential environment is dominant, traffic is subservient, speed and volume are low and pedestrian and cyclist movements are facilitated.*								
Local Collector	3000	50 (20 at designated pedestrian/ cycleway crossing) (4)	Site specific design required	Indented to leave 6m min. clear carriage-way	Upright	Both sides	(8)	Min 4.5m each side with adequate road reserve width for widening for future bus route if required
Local Collector: *The collector street collects traffic from access streets and carries higher volumes of traffic. A reasonable level of residential amenity and safety is maintained by restricting traffic volumes and vehicle speeds. Vehicle speeds are controlled by street alignment, intersection design and, in some cases, by speed control measures.*								
Minor or Major Distributor	Site specific design required							
Minor or Major Distributor*: These are the major roads within Armidale. They carry traffic from Regional Roads to the CBD as well as providing links between Regional Roads. They also serve as key routes for local Armidale traffic.* *Major distributors in Armidale include: Barney Street between Markham and Dangar Streets; Beardy Street between Markham and Niagara Streets; Canambe Street between Kentucky and Erskine Streets; Clarks Road/Elm Avenue; Donnelly Street/Queen Elizabeth Drive from the bypass to Marsh Street; Erskine Street; Handel Street; Kentucky Street east of Dangar Street, Link Road; Madgwick Drive; Markham Street; Miller Street; Niagara Street; Rockvale Road; Dumaresq and Rusden Streets between Markham and Marsh Streets.*								

1. *For single allotments apply a traffic generation rate of 10 vpd (vehicle per day). For multi-unit dwellings apply a rate of 6 vpd per dwelling.*
2. *The maximum width within the range needs to be used when bus use is anticipated or when upright kerbs are used. Widening may be required to allow for wider vehicle paths but should not negate the function of bends serving as slow points.*
3. *Typical verge widths of 3.5m each side, with indented parking to within 1.5m of boundary.*
4. *Requires special design and control so that vehicle speeds are reduced progressively.*
5. *Roll-over kerbs are preferred for safety reasons. Upright kerbs may be considered for drainage purposes or in locations where on-street parking should be clearly defined and parking within the verge is not desired.*
6. *Additional width may be required to accommodate cycle path.*
7. *Refer to Council's Policy POL035 – Vehicular Driveway Construction, Maintenance and Location.*
8. *Refer to the Armidale Bicycle Strategy and Action Plan 2012.*

Table 2: Street Leg Length and Design Speed
Table 3: Minimum Deflection Angles for Speed Control to 20 km/h

Appendix 2

Table 2 Street Leg Length and Design Speed*

Street Type	Target Design Speed (km/h)	Maximum Leg Length* Between 20 km/h Slow Points (m)
Minor Access Street	30	75-100
Access Street	40	100-140
Local Collector	50	120-155

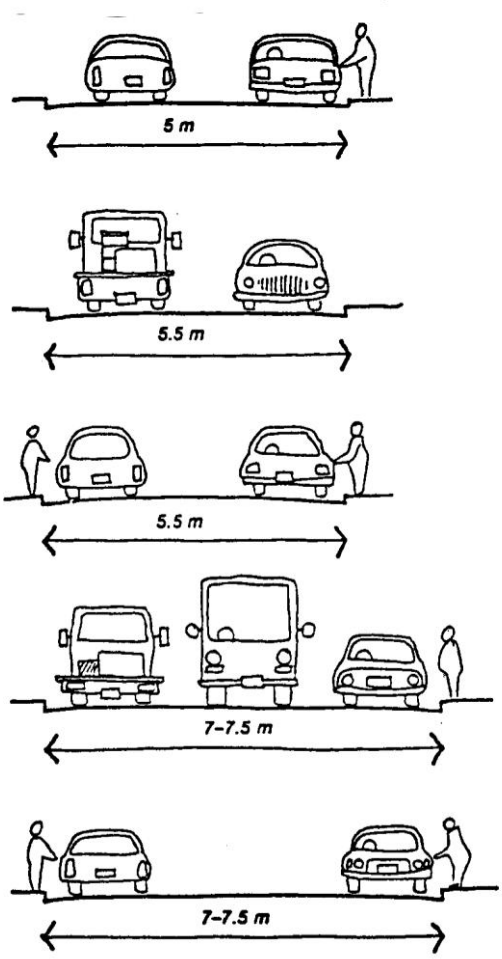
** Leg length is defined as the distance between intersections or junctions, or points and locations where vehicles must slow to a maximum of 20 km/h*

Table 3 Minimum Deflection Angles for Speed Control to 20 km/h

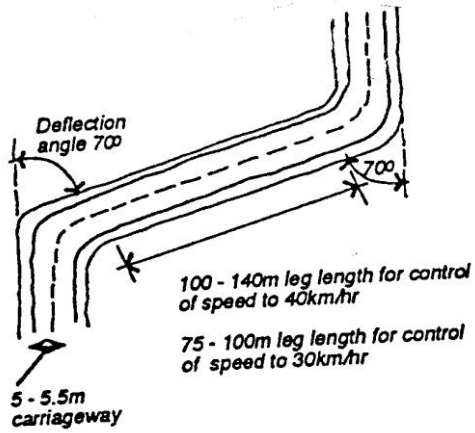
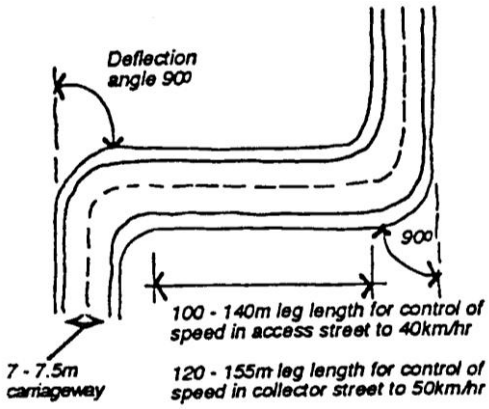
Bend Type	Street Pavement Width (m)*	
	5.0-6.0	7.0-7.5
Single Bend	70°	90°
Chicane (two reverse single bends)	45°-45°	60°-60°

** Wider pavements may be reduced to 3.5m carriageways at bends by use of medians*

1Appendix Carriageway Width Alternatives

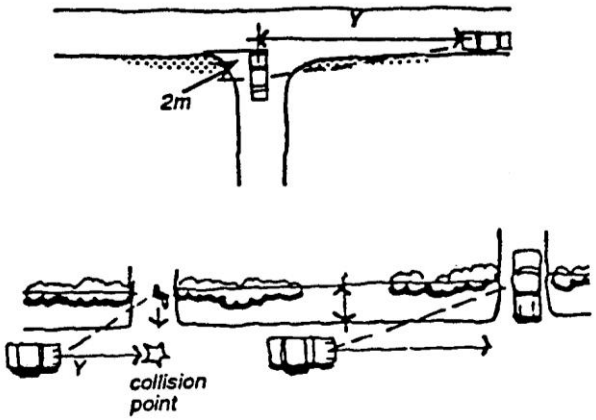
	A 5m wide carriageway allows a car to pass a parked car or a moving car. A 5.5m wide carriageway allows a moving car to pass a truck, but is clearly too narrow for cars to park opposite each other without blocking the street. A 7.0-7.5m wide carriageway is wide enough for two vehicles to pass each other while passing a parked car. It is wide enough for a moving car to pass between two parked cars, but is clearly not wide enough for two moving vehicles to pass at once.

2Appendix Deflection Angles for Speed Control

Access Street

Access Street or Collector Street


3Appendix Street Design and Visibility

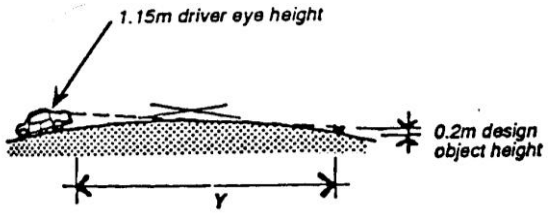
a) Priority Junctions and Driveways



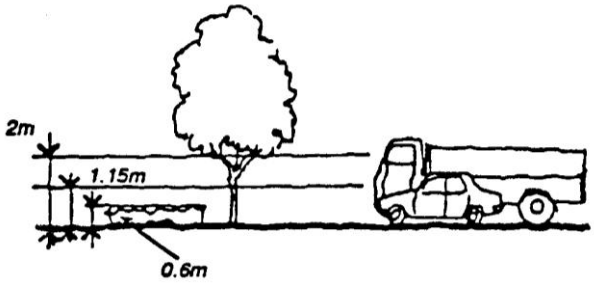
Visibility uninterrupted by fixed objects to be provided over entire shaded area. Hilly terrain may require junctions to be moved onto or well away from crests to satisfy sight distance requirements.

Stopping distance Y is directly related to speed. Increased speed requires increased verge width to improve visibility of people or cars coming out of driveways or at intersections.

b) Vertical Curves



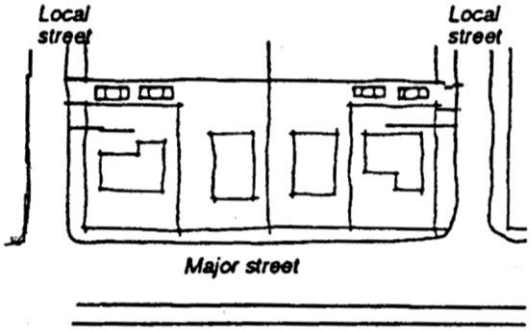
c) Carriageway Edge



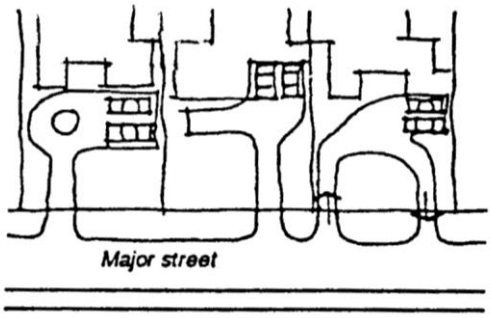
Planting with foliage in the height range of 0.6m to 2m should not restrict the available sight distance to less than Y on streets with frontage access. 1.15m represents the standard driver eye height.

4Appendix Options for Access onto Limited Access Roads

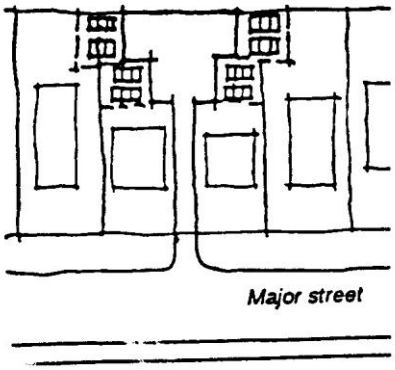
Lots with car access from side street



Wide lots allow for large driveways so vehicles can enter and exit forwards



Shared driveways reduce the number of entry points and allow vehicles to enter and exit forwards



Adding a rear lane provides vehicle access for houses fronting a major street.