MAROOCHY SHIRE COUNCIL PLANNING SCHEME POLICY NO. 5

Operational Works

Contents

Appendices

3.1 Water Supply

Introduction

Maroochy Shire Council supports the Water Services Association of Australia (WSAA) National Codes initiative to develop national codes for water supply, sewerage and sewage pumping stations. Benefits of the national codes include the development of best practices, the encouragement of innovation and minimisation of capital costs through standardisation of components used in water supply and sewage collection systems.

The supplementary manuals have been developed to define the particular requirements of Maroochy Shire Council in relation to the WSAA National Codes. Only details that differ from that of the WSAA National Codes are provided. The other manuals are:

- Supplementary Manual to the Water Supply Code of Australia – WSA 03-2002;
- Supplementary Manual to the Sewerage Code of Australia – WSA 02-2002; and
- Supplementary Manual to the Sewage Pumping Station Code of Australia – WSA 04-2005.

3.1.1 Relevant Code Requirements

This section relates to acceptable measures A1.1 (a), (b) and (c) and A1.2 for performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works. It sets out standards and potential information requirements for the provision of a reticulated water supply system.

In applying the following standards, applicants should also have regard to requirements set out in section 7 (Integrated Water Management) of this policy.

3.1.2 Standards

3.1.2.1 Usage

This supplementary manual shall be read in conjunction with, and take precedence over, the WSAA Water Supply Code of Australia – WSA 03-2002 to define the technical requirement of Maroochy Shire Council and Maroochy Water Services (the 'Water Agency') in relation to the planning, design and construction of water supply systems.

Water meters

All new unit type development whether single or multi-storey are to be provided with individual water meters. The cost of the installation of the water meters will be borne by the developer and the water meters will be supplied by Council. Primary water meters should be located within the immediate Title boundary.

Council may request that in multi-storey strata title unit developments of three (3) storey or more, individual meters shall be connected with remote reading counters located at the ground floor level or for two storey unit developments, all individual meters shall be located at the ground level above ground.

3.1.2.2 Part 1: Planning and Design

a) Pt 1 –1.5.2 Water Agency

Add to WSAA requirement:

For development proposals, the Water Agency may request that a water supply network analysis be undertaken to determine (a), (b) and (c).

b) Pt 1 – 2.1 System Planning Process

Add to WSAA requirement: The designer shall liaise with the Water Agency prior to commencement of the design.

c) Pt 1 – 2.2 Demands

Replace WSAA requirement with: Water demands shall be determined in accordance with the MSC Planning Scheme Policy No. DC1, Table 2(a) and Table 2(b).

d) Pt 1 – 2.2.3 Peak Demands

Replace WSAA requirement with: The designer shall liaise with the Water Agency to obtain the peak demand factors.

e) Pt 1 – 2.3 System Configuration (a) & (b)

Add to WSAA requirement: Where deemed necessary by the Water Agency, existing asbestos cement water mains shall be replaced along the full frontage of any proposed development site or where affected by any development works.

Replacement of existing water mains will be required in commercial, industrial and high density residential precincts where existing mains fronting any proposed development are less than 150mm diameter. Mains shall be replaced along the full frontage of the proposed development site prior to the placement of any site sheds or construction materials over or adjacent to the water main.

f) Pt 1 – 2.4.2 Network Analysis

Add to WSAA requirement: The Water Agency will undertake, at the designer's expense an assessment, and establish any adverse impacts, of the proposed developments on the existing system using the Water Agencies hydraulic model.

The designer shall provide details of the proposed system development and demands to allow completion of this assessment. Alternatively, the Water Agency may require the designer to carry out this assessment. Network analyses are to include all pipes in the network model.

g) Pt 1 – 2.4.3 Operating Pressures

Add to WSAA requirement: The minimum desirable service pressure shall be 220kPa at the water meter. The maximum service pressure shall be 800kPA.

h) Pt 1 – 3.2.2 Minimum Pipe Sizes

Add to WSAA requirement: Pipe sizes shall not be less than DN150mm diameter for high density residential and rural residential precincts.

i) Pt 1 – 3.2.4 Fire Flows

Replace WSAA requirement with: Fire flows shall comply with the requirements specified in 'Guidelines for Planning and Design of Urban Water Supply Schemes' Chapter 21A, 1997, Dept of Natural Resources and Mines. The water supply scheme must be capable of supplying the following fire flow demands above maximum hour demand: Commercial Industrial Precincts – 30 litres per second at 12 metres residual pressure. Residential Precincts – 15 litres per second at 12 metres residual pressure.

j) Pt 1 – 3.7.2 Minimum Pressure Class

Replace WSAA requirement **with**:

The minimum pipe and fitting pressure class for reticulation mains shall be Class 16.

k) Pt 1 – 4.1.1 Design Tolerances

Add to WSAA requirement:

Horizontal alignment shall be referenced to GDA mapping co-ordinates.

l) Pt 1 – 4.3 Location of Water Mains

Add to WSAA requirement:

Reticulation water mains shall generally be located within the road reserve on a 1.45 metre alignment from the property boundary.

In general, water mains are not to be constructed on private property, however, in instances where this is unavoidable it will be necessary to provide an easement of minimum 3.0 metres width registered for the benefit of the Council on the title of the land. The main is to be constructed centrally within the easement. A wider easement may be necessary in some instances, as determined by the Water Agency, to ensure adequate access for maintenance purposes.

m) Pt 1 – 4.3.2 Water Mains in Road Reserves

Add to WSAA requirement:

Mains shall be located to provide a minimum 0.5 metres horizontal clearance from existing or proposed footpaths and 1.0 metres horizontal clearance from all landscaping.

Consideration shall be given at land reconfiguration stage to ensure road reserves are of adequate width to provide required clearances between all services and improvements.

o) Pt 1 – 4.4 Shared Trenching

Replace WSAA requirement:

Water mains shall not be co-located with other services.

p) Pt 1 – 4.5 Duplicate Mains

Add to WSAA requirement:

Water mains are to be provided on both sides of the road in the case of divided carriage ways, commercial, industrial and high density residential precincts.

q) Pt 1 – 4.7 Connection of New Mains to Existing Mains

Add to WSAA requirement:

All works on the existing reticulation system shall be considered 'live works' and will be constructed by the Water Agency at the contractors cost. These works shall be clearly delineated on the drawings and shown in sufficient detail such that the works can be readily constructed. The connection point to the existing system shall be located to minimise disruption of supply to customers and be subject to Water Agency approval.

r) Pt 1 – 4.8.3 Temporary Ends of Water Mains

Add to WSAA requirement:

Water mains shall be constructed across the full frontage of any property being developed.

s) Pt 1 – 4.9 Property Services

Replace WSAA Standard Drawings WAT – 1106, WAT – 1107 and WAT – 1109 with MSC Standard Drawings MWD 350, MWD 355 and MWD 360.

Add to WSAA requirement:

Ductile iron pre-tapped fittings and service pipework shall be installed by the developer at the time of lot reconfiguration in accordance with MSC Standard Drawing MWD 360. Conventional tapping bands may be utilized for pipe diameters where pre-tapped fittings are not available. Property service connections shall only be installed on reticulation mains with a diameter less than or equal to 300 mm. Property connections shall be installed in accordance with Maroochy Shire Council's standard drawings. Conduits shall be provided under all roads to carry water services to properties on the opposite side to the main. Conduits shall be as follows:

Neighbourhood and hill slope residential – 1 x 100mm diameter conduit for every second lot,

Mixed housing – 1 x 100mm diameter conduit for each lot.

Conduits shall be installed in accordance with MSC standard drawings and at an alternate position to power and/or telecommunication services. Conduits shall extend 300mm beyond the footpath edge on the property side. Kerb markers shall be placed in accordance with MSC standard drawings. If, as may occur at corner properties, electrical pilar boxes are located on both side boundaries, the property service connection shall be placed at the RP boundary truncation point. Community title schemes shall be provided with a single service to the boundary of the property. All internal works will be privately owned and the responsibility of the body corporate.

t) Pt 1 – 4.10.4 Clearance from Structures

Replace WSAA requirement with:

Other structures deemed satisfactory to be constructed over or adjacent to Council's water supply must be made to protect the infrastructure from physical damage and to allow Council access when necessary.

u) Pt 1 – 5.4.2 Pipe Cover

Add to WSAA requirement:

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Where site works either reduce the depth of cover below the minimum, or increase the depth of cover to invert above 1.5 metres, the water main shall be re-laid to maintain the required depth.

v) Pt 1 5.5.1 Geotechnical Considerations

– General

Add to WSAA requirement:

Considerations to include the existence of acid sulphate soils (ASS) and possible acid sulphate soils (PASS). Refer to Vol. 4, 2.1.3 Code for Assessment and Management of Acid Sulfate Soils.

w) Pt 1 – 6.1.4 Installation

Replace WSAA Standard Drawings WAT– 1301, WAT – 1304 and WAT – 1309 with MSC Standard Drawings MWD 320, MWD 365 and MWD 330.

x) Pt 1 – 6.2.1.1 Stop Valves – General

Replace first paragraph of WSAA requirement:

When extending an existing water main, a stop valve may only be installed at the junction of the existing and new water mains if approved by the Water Agency.

y) Pt 1 – 6.2.3 Stop Valves for Reticulation Mains

Add to WSAA requirement:

Stop valves are required on each side of all mains crossing railway reserves, major roads and on mains traversing easements.

z) Pt 1 – 6.2.5 1 Stop Valves – Location and Arrangements – General

Add to WSAA requirement:

Stop valve locations shall be in accordance with Arrangement 1.

Zone valves shall be in accordance with Arrangement 3(b).

aa) Pt 1 – 6.3.2 Pressure Reducing Valves

(PRVs)

Add to WSAA requirement:

PRVs shall be designed in accordance with the relevant Maroochy Shire Council MSC standard drawing.

ab) Pt 1 - 6.4.1 Air Valves – Installation Design Criteria

Replace WSAA Standard Drawing WAT – 1302 with MSC Standard Drawings MWD 320 and MWD 325

ac) Pt 1 – 6.7 Swabbing Points

Add to WSAA requirement:

Swabbing points will generally only be required on large diameter or lengthy transfer mains. The Water Agency will advise any requirements on a case by case basis.

ad) Pt 1 – 6.8 Hydrants

Add to WSAA requirement

Hydrants shall be installed as follows:

- Location – opposite common RP boundaries, generally installed at crests or sags and end of mains.
- Spacing – maximum 80 metres
- Orientation – spring hydrants shall be oriented with bolts parallel to the water main.

ae) Pt 1 6.8.8 Hydrant Locations

Replace WSAA Standard Drawings WAT –1300 with MSC Standard Drawing MWD 365.

Replace WSAA Standard Drawing WAT 1301 with MSC Standard Drawing 320.

Replace WSAA Standard Drawing WAT 1302 with MSC Standard Drawings MWD 320, MWD 325.

3.1.2.3 Part 2 - Products and Materials

a) Pt 2 – 8.4 Product Standards and Specifications.

Add to WSAA requirement:

The following materials are approved for use in the construction of water reticulation and trunk main systems.

Table of Approved Pipe Materials

Diameter	Function	Material				
Material Description		Copper	PVC-O	PE	DICL	MSCL
WSSA Purchase Specification		AS3500	PS-210	PS-207	PS-234	PS-203
DN20 - DN50	Water Service	Approved	N/A	PE80B PN16	N/A	N/A
DN50 - DN100	Water Service	Approved	N/A	N/A	N/A	N/A
DN63	Water Main Cul de sac only	N/A	N/A	PE80B PN16	N/A	N/A
DN100 - DN150	Water Main	N/A	PN16	N/A	PN 35	N/A
DN150 - DN300	Water Main	N/A	N/A	N/A	PN 35	N/A
DN375 - DN750	Water Main	N/A	N/A	N/A	PN 35	Note 1

3.1.2.4 Part 3: Construction

a) Pt 3 – 11.5.4 2 Traffic Management

Replace WSAA requirement with: A traffic management plan shall be prepared for all projects. Details to be presented in accordance with section 7.6 of this Policy.

b) Pt 3 – 15.1.4 Laying

Replace WSAA Standard Drawing WAT –1101 with MSC Standard Drawing MWD380.

c) Pt 3 – 15.2.3 Bending Pipe

Replace WSAA requirement with: Cold bending of PE pipe to manufactures specifications is permitted. Cold bending of all other pipes is not permissible.

d) Pt 3 – 15.5 Thrust and Anchor Blocks and Restrained Joints

Delete WSAA Standard Drawing WAT–1206.

Add MSC Standard Drawing MWD 310.

e) Pt3 – 15.6 Property Services and Water Meters

Replace WSAA Standard Drawings WAT–1106 to WAT – 1109 inclusive with MSC. Standard Drawings MWD 350, MWD 355 and MWD 360.

f) Pt3 – 15.11.1 Installation.

Replace WSAA Standard Drawings WAT-1301 to WAT – 1306 with MSC Standard Drawings MWD 320 and MWD 325.

g) Pt3 – 15.11.2 Valve Chambers for Large Diameter Mains

Replace WSAA Standard Drawings WAT – 1308 and WAT – 1309 with MSC Standard Drawings MWD 330.

h) Pt3 – 15.16 Location Markers

Replace WSAA Standard Drawing WAT – 1300 with MSC Standard Drawing MWD 365.

i) Pt 3 – 22 Connections to Existing Water Mains

Replace WSAA requirement with:

All works that may involve connection to or modifications of the existing water supply system shall be undertaken by the Water Agency at the applicant's expense. Water mains are considered to be live once accepted 'on maintenance' by the Water Agency.

No person, other than authorised Water Agency employees, shall operate any existing valve or draw water from any existing main without the authority of the Water Agency.

3.1.3 Specifications

All relevant details are applied under Water Services Association of Australia (WSAA) National Code.

3.1.4 Standard Drawings

WSAA Drawing Numbers		Remarks
All		The Water supply Code of Australia WSA 03 drawings detail a number of infrastructure options and arrangements. A number of these options are not compatible with current MSC practice. The acceptance, modification or deletion of the WSAA drawings is set out below.
WAT-1100	Not adopted	Use MWD 385 – drawing under development
WAT-1101	Not adopted	Use MWD 380 – drawing under development
WAT-1102	Adopted	Valve to be directly off tee
WAT-1103	Adopted	Valve to be directly off tee
WAT-1104	Adopted	1.) 63 OD PE water mains in cul de sac heads only. 2.) 63 OD PE water mains to be looped using entire head of cul de sac.
WAT-1105	Adopted	
WAT-1106	Not adopted	Use MWD 350, MWD 355 and MWD 360.
WAT-1107	Not adopted	Use MWD 355
WAT-1108	Not adopted	Use MWD 360
WAT-1200	Adopted	
WAT 1201	Adopted	
WAT-1202	Adopted	
WAT-1203	Adopted	
WAT-1204	Adopted	
WAT-1205	Adopted	
WAT-1206	Not adopted	
WAT-1207	Adopted	
WAT-1208	Adopted	
WAT-1209	Adopted	
WAT-1210	Adopted	
WAT-1211	Adopted	
WAT-1212	Adopted	
WAT-1213	Adopted	
WAT-1214	Adopted	
WAT-1300	Not adopted	Use MWD 365
WAT-1301	Not adopted	Use MWD 320
WAT-1302	Not adopted	Use MWD 320 & MWD 325
WAT-1303	Not adopted	Use MWD 320 & MWD 325
AT-1304	Not adopted	Use MWD 320 & MWD 325
WAT-1305	Not adopted	Use MWD 320 & MWD 325
WAT-1306	Not adopted	Use MWD 320 & MWD 325
WAT-1307	Adopted	
WAT-1308	Not adopted	
WAT-1309	Not adopted	Use MWD 330
WAT-1310	Adopted	
WAT-1311	Adopted	
WAT-1312	Adopted	
WAT-1313	Adopted	
WAT-1400	Adopted	
WAT-1401	Adopted	
WAT-1402	Adopted	
WAT-1403	Adopted	
WAT-1404	Adopted	
WAT-1405	Adopted	
WAT-1406	Adopted	
WAT-1407	Adopted	
WAT-1408	Adopted	
WAT-1409	Not adopted	

Public Utilities		Remarks
MSC-R-0100		Public utilities in Verges, Service Corridors & Alignments

3.2 Sewerage

3.2.1 Relevant Code Requirements

This section relates to acceptable measures A1.1(a), (b) and (c) and A1.2 for performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works. It sets out standards and potential information requirements for the provision of a reticulated sewerage system

In applying the following standards, applicants should also have regard to requirements set out in section 7 (Integrated Water Management) of this policy.

All on-site sewerage systems require relevant approval from Maroochy Shire. All applications are to comply with the Plumbing and Drainage Act (2002), Standard Plumbing and Drainage

Regulation (2003), Australian New Zealand Standard-on-site domestic-wastewater management (AS/NZS 1547:2000), and Queensland Plumbing and Wastewater Code (Department Local Government, Planning, Sport and Recreation).

3.2.2 Standards

The key standards applied to water supply and reticulation is the Water Services Association of Australia (WSAA) National Codes. Maroochy Shire Council has applied supplementary details applicable to specific conditions outlined in the policy.

3.2.3 Design & Construction of Reticulated Sewerage

This policy shall be read in conjunction with, and take precedence over, the WSAA Sewerage Code of Australia – WSA 02-2002 to define the technical requirement of Maroochy Shire Council and Maroochy Water Services (the 'Water Agency') in relation to the planning, design and construction of reticulated sewerage systems.

Council generally does not support the construction of buildings over sewers.

3.2.3.1 Part 1: Planning and Design

a) Pt 1 – 1.4.2 Objectives of the Sewerage System

Add to WSAA requirement:

Sewerage system provisions to include:

- Extension of sewers to upstream property boundaries of development sites.
- Sewage pumping stations will not be approved where a reticulated gravity system could be provided.

b) Pt 1 – 2.3 – Planning Parameters

Replace WSAA loading rates with:

Average daily loading shall be determined by the product of the estimated EP draining to the point of design interest and the loading rate in L/EP/day. The equivalent population and loading rates shall be determined in accordance with the MSC Planning Scheme Policy DC1, Tables 2(a) and Table 2(b).

c) Pt 1 – 3.2.2 – Traditional design Flow

Estimation Method

Replace WSAA requirement with: Design flows shall be determined in accordance with the MSC Section 3 of the Maroochy Water Services Water and Sewerage Network Analysis 2004.

d) Pt 1 – 4 – Detail Design

Add to WSAA requirement:

The minimum pipe size for sewer reticulation shall be 150mm diameter.

e) Pt 1 – 4.2.3 – Sewer Layout

Add to the WSAA requirement:

Where practicable all sewers are to be located as shown in the following table:

Table - Preferred Sewer Alignments

Location	Alignment
Roadway	On application
Footpath	On application – not usually favoured, except for commercial areas
Private Properties (side boundaries)	1.0 metres
Private Properties (rear and front boundaries)	1.5 metres

Sewers in industrial precincts are to be located at the front of lots where possible. Sewers in commercial precincts should be located within the road reserve, where possible. Sewers are to be constructed to serve the entire area of each lot within the development site and are to be extended to the boundaries of the site to serve existing lots and potential development sites upstream.

In flat areas, sewers are to be designed to serve properties on both sides of the sewer.

f) Pt 1 – 4.2.5 – Easements

Add to WSAA requirement:

All sewers located within private property shall be contained within a minimum 3 metre wide easement. Sewers in excess of 3 metres deep shall be contained within a minimum 4 metre wide easement. Unless otherwise agreed with the Water Agency, sewers shall be located centrally in the easement.

g) Pt 1 – 4.3.4 – Public and Private Property

Add to WSAA requirement:

Maintenance structures on private property shall generally be 1.0 metres from side boundaries and 1.5 meters from front and rear boundaries.

h) Pt 1 – 4.3.5 – Changes in Direction Using a Maintenance Hole

Replace WSAA requirement with: The maximum change in direction at a maintenance hole shall be 90 degrees unless otherwise approved by the Water Agency.

i) Pt 1 – 4.3.7 – Horizontal Curves in Sewers

Replace WSAA requirement with: Horizontal curves in sewers are not permitted.

j) Pt 1 – 4.3.8 – End of Lines (NEW)

Replace WSAA requirement with: Sewers are to be designed to terminate at a MH or TMH, except for branch lines less than 15 metres in length that serve no more than one lot.

k) Pt 1 – 4.4.4 – Clearance from Structures

Replace WSAA requirement with:

Buildings must provide at least 1.5 metres horizontal clearance from the outermost projection of the structure to the nearest edge of any existing or proposed infrastructure.

Other structures deemed satisfactory to be constructed over or adjacent to Council's sewerage infrastructure must be made to protect the infrastructure from physical damage and to allow Council access when necessary.

Proposals to construct within 1.5 metres of infrastructure – 150mm diameter or less:

The Water Agency's consent is required to construct within 1.5 metres of water supply or sewerage infrastructure and will only be considered where it is demonstrated that clauses 1 or 2 below cannot be achieved:

1. The building or other structure is redesigned, or relocated to provide a minimum 1.5 metre horizontal clearance from the existing infrastructure to the outermost projection of the proposed structure.

Or

2. Existing infrastructure is relocated, with the approval of the Water Agency, to provide a minimum 1.5 metres horizontal clearance from the outermost projection of the proposed building or other structure.

Where it is demonstrated that clauses 1 and 2 cannot be achieved, the Water Agency may consider giving consent to construct within 1.5 metres of the infrastructure subject to any or all of the following requirements:

- Submission of a structural footing design prepared and certified by a registered professional engineer, demonstrating that the building or other structure does not impose any load on the infrastructure.
- Any footings of the building or structure which are within the zone of influence of the infrastructure are to extend at least 300mm below Line B (refer Figure 1) either with piers or a continuous footing located a minimum horizontal distance of 1.0 metre clear of the pipe.
- Replacement of the existing pipe work with DICL or an approved PVC-U pipe material to ensure a future life in excess of 50 years.
- Design of the building or structure to permit its easy removal for access to Maroochy Shire Council's infrastructure if required.
- A pre and post construction video inspection of the affected sewerage infrastructure.
- Lodgement of a security bond, as determined by Council under bonding requirements, to cover potential damage to the infrastructure as a result of the proposed building works.
- Construction of a maintenance hole immediately upstream and/or downstream of the structure.
- Completion of a Deed of Indemnity, by the owner, legally indemnifying Council against any future structural failure, repair or reinstatement works.
- Payment of the prescribed application fee.

Proposals to construct within 1.5 metres of infrastructure larger than 150mm diameter. For infrastructure larger than 150mm diameter, building within 1.5 metres of infrastructure is not permitted. The infrastructure is to be relocated or the building designed to provide a minimum 1.5 metre horizontal clearance from the outermost projection of the structure to the nearest edge of the pipe.

Proposals to construct 1.5 metres or greater from infrastructure. The foundations of any structure, located 1.5 metres or a greater horizontal distance from water supply or sewerage infrastructure, but within Zone B (refer Figure 1) are to extend a minimum 300mm below Line B either with piers or a continuous footing.

There are no requirements for structures outside the zone of influence.

Consent from Water Agency not required
The following structures do not require consent from the Water Agency, however the design considerations of this code still apply:

- Any structure located 1.5 metres, or a greater horizontal distance, from water supply or sewerage infrastructure
- Any demountable fence
- Masonry fences less than 1.0m high
- Retaining walls less than 1.0m high
- A single demountable garden shed with wall lengths of less than 3.0 metres and which do not have a concrete slab floor.

Other Considerations

No excavation or filling shall be undertaken over or adjacent to water supply or sewerage infrastructure without the consent of the Water Agency. Where consent is obtained, any affected maintenance holes or fittings shall be adjusted as required.

Council generally does not support the construction of buildings over sewers.

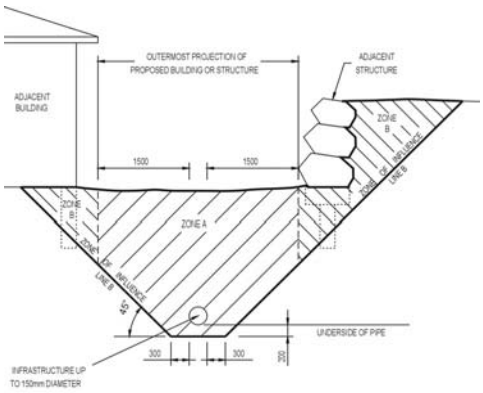


FIGURE 1

Ground surface levels must not be altered in a way causing ponding of water over any maintenance hole.

A sewer connection point must have:

- A clear area of at least 2m x 2m maintained around the sewer connection;
- A minimum horizontal clearance of 1m from any building;
- A minimum unobstructed vertical clearance of 2.4m.

Unrestricted access must be maintained to water supply and sewerage infrastructure at all times.

l) Pt 1 – 4.4.5 – Underground Structures and Services

Add to WSAA requirement:

Sewerage mains crossing stormwater culverts or pipes in excess of 300mm diameter are to be laid or replaced with PVC-U class 12 pipe for the full extent of the crossing plus 1.5 metres either side. Spigot ends of the class 12 pipe are to be chamfered to provide a smooth transition of flows.

m) Pt 1 – 4.5.3 – Minimum Air Space for Ventilation

Replace WSAA requirement with: Minimum air space in sewer mains shall be in accordance with section 3 of the Maroochy Water Services Water and Sewerage Network Analysis 2004.

n) Pt 1 – 4.5.7 – Minimum Grades for Self Cleansing

Replace WSAA table 4.6 with:

Minimum grades for reticulation sewers shall be as shown in the following table:

Diameter	Minimum Grade
150mm (up to 2 lots)	1 in 80
150mm (3 – 5 lots)	1 in 100
150mm general (6 or more lots)	1 in 150
225mm	See WSA02 Table 4.6
300mm	See WSA02 Table 4.6

Sewers shall not be upsized to take advantage of flatter grades.

o) Pt 1 – 4.5.8 – Minimum Grades for Slime Control

Add to WSAA requirement:

Unless otherwise agreed with the Water Agency, the minimum grade of sewerage mains of 300 diameter and greater shall ensure that a slime stripping velocity is achieved.

p) Pt 1 – 4.6.1 – Vertical Alignment of Sewers

- General

Add to WSAA requirement:

Sewers shall not be in excess of 5 metres deep.

q) Pt 1 – 4.6.2 – Long Section Design Plan

Replace first paragraph of WSAA requirement with:

Vertical alignments of sewers shall be shown on the longitudinal section of the design drawings.

r) Pt 1 – 4.6.3 – Minimum Cover Over Sewers

Add to WSAA requirement:

Additional sewer depth may be required in lots and footpaths where future access driveways could be constructed. In exceptional circumstances, a minimum 0.6 metres pipe cover may be approved in road reserves subject to construction in DICL or PVC-U Class 18 pipe from maintenance hole to maintenance hole.

s) Pt 1 – 4.6.4 – Lot Servicing Requirements

Add to WSAA requirement:

Where development is proposed on allotments currently serviced by combined house drainage systems, the applicant will be responsible to upgrade the system to current sewerage standards. This responsibility may extend to any affected adjacent properties.

The use of private sewage pump stations is not acceptable for any proposed development within Council's sewerage headworks planning areas.

t) Pt 1 – 4.6.5.4 –Depth of Connection Point

Replace part (b) and (d) of WSAA requirement with:

Sewer connections shall not be in excess of 1.5 metres deep. Replace WSAA Standard Drawing SEW– 1109 with MSC Standard Drawings MWD 125 and MWD 130.

u) Pt 1 – 4.6.7 – Vertical Curves

Replace WSAA requirement with: Vertical curves are not permitted.

v) Pt 1 – 4.6.8 – Compound Curves

Replace WSAA requirement with: Compound curves are not permitted.

w) PT 1 – 5.2 – Limitations of Connection to Sewers

WSAA Standard Drawings SEW – 1409 to SEW – 1411 inclusive (not adopted).

x) Pt 1 – 5.3.1 – Methods of Property

Connection – General

Replace WSAA requirement with: House drainage connections shall comply with MSC standard drawings and approved WSAA Standard Drawing.

Replace WSAA Standard Drawing SEW– 1107 with MSC Standard Drawings MWD 125 and MWD 130.

y) Pt 1 – 5.6 – Location of Connection Points

Add to WSAA requirement: Connection points shall be located a minimum of 1.0 metres inside the property boundary and otherwise in compliance with WSA02 Section 5.6.

For battleaxe allotments, where the sewer house connection lies within the access strip, sanitary house drainage is to be extended along the access strip, at a minimum grade of 1 in 60, to a point 1 metre inside the main body of the lot prior to construction of the driveway.

z) Pt 1 – 5.7 – Y – Property Connections

Replace WSAA requirement with: Y – property connections will only be considered within road reserves.

aa) Pt 1 – 5.8 – Length of Property Connection Sewers

Replace WSAA requirement with: The maximum length of a house connection, measured from the reticulation sewer to the boundary of the property to be served, shall be 5.0 metres

ab) Pt 1 – 6.1 - Types of Maintenance Structures

WSAA Standard Drawings SEW – 1307 and SEW – 1315 (not adopted).

ac) Pt 1 – 6.5 - Special Considerations for Connection of New Sewers to Existing Sewers

WSAA standard Drawing SEW – 1502 (not adopted).

ad) Pt 1 – 6.6.2 – Types of MH Construction

WSAA Standard Drawing SEW – 1307 (not adopted).

ae) Pt 1 – 6.6.8 – Ladders, Step Irons and Landings

Replace WSAA requirement with: Fixed internal access arrangements are not required in maintenance holes servicing sewers. Stainless steel safety bars and landings shall be provided in maintenance holes servicing sewers of 400mm diameter and greater.

af) Pt 1 – 6.6.9 – MH Covers

Add to WSAA requirement: Bolt down metal access covers (water tight type) shall be specified on MH's located:

On all MH covers below the 1: 100 ARI flood level;

On all MH covers on sewers of 450mm diameter or greater;

On all MH covers within roadways;

On all MH covers designated by the Water Agency.

ag) Pt 1 – 7.2 – Boundary Traps

Replace WSAA requirement with: Boundary traps are not required.

ah) Pt 1 – 7.3 – Gas Check MHs

Replace WSAA requirement with: Gas check MHs are not required.

ai) Pt 1 – 7.9.2 Design Parameters for Emergency relief Structures (ESRs).

Replace WSAA Standard Drawing SEW –1412 with MSC Standard Drawing MWD 135.

aj) Pt 1 – 8 – Structural Design

Add to WSAA requirement: Concrete encasement of sewerage mains is not permitted.

3.2.3.2 Part 2 Products and Materials

a) Pt 2 – 10.4.1 Product Standards

Add to WSAA requirement:

The following materials are approved for use in the construction of sewerage systems.

Diameter Function		Material								
Material Description		PVC-U	VC	GRP	CONCRETE PVC lined	ABS	PP	PE	PVC-0	DICL (Note 8)
WSAA Purchase Specification (note 9)		PS-230	PS-231	PS-232	-	PS-238	-	PS-207	PS-210	PS-234
Applicable Notes		2,3,4	1,4	1,4,5	1,4	1,4,5	1,4	1,5	1,4,6,7	4,6,7
DN 100	House connection	SN10	CS 34	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DN 150	House connection	SN8	CS 34	N/A	N/A	SN 8	N/A	SN 8	PN 16	PN 35
DN 150	Sewer	SN8	CS 34	N/A	N/A	SN 8	N/A	SN 8	PN 16	PN 35
DN 225	Sewer	SN8	MCN 160	N/A	N/A	SN 8	N/A	SN 8	PN 16	PN 35
DN 300	Sewer	Min Class 12	MCN 120	SN 10000	N/A	SN 8	SN 10	SN 8	PN 16	PN 35
DN 375 – DN450	Sewer	N/A	MCN 95	SN 10000	N/A	SN 8	SN 10	SN 8	N/A	PN 35
DN 525	Sewer	N/A	MCN 95	SN 10000	N/A	SN 8	SN 10	SN 8	N/A	PN 35
DN 600	Sewer	N/A	MCN 95	SN 10000	CLASS 3	SN 8	SN 10	SN 8	N/A	PN 35

Notes:

1. *Pipe classes specified are minimums only. The designer shall confirm pipe class suitability by structural analysis.*
2. *Class SN 8 is acceptable for sewers up to max. 3.0m depth. Sewers in excess of 3.0m deep to be constructed from PVC-U class12 series 1 pipework.*
3. *Pipe to be solid wall type, maximum 3.0m lengths.*
4. *Rubber ring seal only.*
5. *Suitable for specific uses only, as approved by the Water Agency.*
6. *For use in sewerage pressure pipeline systems.*
7. *Sewerage pressure pipeline fittings shall be fusion bonded polymer encapsulated ductile iron cement lined.*
8. *DICL pipes shall be protected against chemical attack by an approved method such as Calcium aluminate cement mortar lining*
9. *WSSA Product Purchase Specifications are available to down load at www.wsaa.asn.au*

3.2.3.3 Part 3: Construction

a) Pt 3 – 13.5.4.2 – Traffic Management

Replace WSAA requirement with:

A traffic management plan shall be prepared for all projects.

b) Pt 3 – 17.1.4 Laying

WSAA reference to SEW – 1103 (not adopted).

c) Pt 3 – 17.7 Property Connection Sewers

Replace WSAA Standard Drawing SEW 1109 with MSC Standard Drawings MWD 125 and MWD 130.

d) Pt 3 – 17.8 – Dead Ends

Replace WSAA Standard Drawing SEW – 1109 with MSC Standard Drawings MWD 125 and MWD 130.

e) Pt 3 – 17.9 – Marking of Property Connection Sewers and Dead Ends

Replace WSAA Standard Drawings with MSC standard Drawings MWD 130 and MWD 125.

f) Pt 3 –17.12 – Bored Pipes Under Roads, Driveways and Elsewhere

g) Pt 3 -18.1 – Maintenance Holes (MHs) - General

WSAA Standard Drawing SEW 1307 (not adopted).

WSAA Standard Drawing SEW – 1400 (not adopted).

h) Pt 3 - 19.1 – Maintenance Shafts (MS and TMS) and Inspection Openings (IO) – General. Replace WSAA referenced standard drawings with MWD 160, MWD 125, MWD 130, SEW - 1314, SEW - 1316 and SEW – 1317.

i) Pt 3 - 19.2 – Sealing Caps

Replace WSAA Standard Drawing SEW – 1106 with MSC Standard Drawing MWD 125 and MWD 130.

j) Pt 3 – 19.3 - Covers

Replace WSAA Standard Drawings SEW – 1106 and SEW – 1109 with MSC Standard Drawings MWD 125 and MWD 130.

k) Pt 3 – 20.6 – Concrete Embedment and Encasement

WSAA to the Standard Drawing SEW – 1400 (not adopted).

l) Pt 3 – 22.4 – Air Pressure and Vacuum Testing of Sewers

Add to WSAA requirement: Vacuum testing shall be undertaken on all sewers and maintenance holes.

m) Pt 3 – 22.6 – Deflection (Ovality) Testing of Flexible Sewers

Add to WSAA requirement: Deflection testing shall be undertaken on all flexible sewers 300mm diameter and larger, or as requested by the Water Agency.

n) Pt 3 – 22.7 – CCTV Inspection

Add to WSAA requirement: CCTV inspection shall be undertaken on all sewers 225mm diameter and larger or as requested by the Water Agency.

o) Pt 3 – 24 – Connection to Existing Sewers

Replace WSAA requirement with: All works that may involve connection to or modification of the existing sewerage system are known as 'live sewer works'.

Typical works include:

- new connections to existing maintenance holes, and sewers;
- connection of a new maintenance hole over an existing sewer or dead end;
- extension or relaying existing sewers;
- replacement of sewers;
- raising or lowering of existing maintenance holes;
- other works on existing sewers and maintenance holes.

'Live sewer works' shall be clearly identified on the drawings. All 'live sewer works' shall be undertaken by the Water Agency at the applicant's expense. Sewer mains are considered to be live once accepted 'on maintenance' by the Water Agency.

p) Pt 3 – 27 – Excavation or Filling over Existing Sewers

Where Water Agency approval is granted to alter the existing ground surface level over an existing sewer:

- house connections on the sewer are to be altered to the minimum depth capable of draining the entire property;
- maintenance holes affected by the works are to be altered as required.

3.2.4 Specifications

All relevant details are applied under Water Services Association of Australia (WSAA) National Code.

3.2.5 Standard Drawings

Table – standard Drawings

wsAA Drawing umbers		Remarks
		The Sewerage Code of Australia WSA Standard Drawings detail various infrastructure options and arrangements. A number of these options are not compatible with current MSC practice. The acceptance, modification or deletion of the WSA drawings is set out below.
SEW-1100	Not Adopted	Drawing under development
SEW-1101	Adopted	
SEW-1102	Not Adopted	
SEW-1103	Not Adopted	
SEW-1104	Adopted	1) Use IO Interface method 2)150mm sewer to IO 3) Use IO alternative position
SEW-1105	Not Adopted	Use MWD 160 - Drawing under development
SEW-1106	Not Adopted	Use MWD 125, MWD 130
SEW-1107	Not Adopted	Use MWD 125, MWD 130
SEW-1108	Adopted	Use 45º junction laid on back at the IO. 'Y' – connection pipework to be 150mm diameter SN8.
SEW-1109	Not Adopted	Use MWD 125 and MWD 130
SEW-1200	Adopted	
SEW-1201	Adopted	
SEW-1202	Adopted	
SEW-1203	Adopted	
SEW-1204	Adopted	
SEW-1205	Adopted	
SEW-1206	Adopted	
SEW-1207	Adopted	
SEW-1208	Adopted	
SEW-1300	Adopted	
SEW-1301	Adopted	
SEW-1302	Adopted	
SEW-1303	Adopted	
SEW-1304	Adopted	
SEW-1305	Adopted	
SEW-1306	Adopted	
SEW-1307	Not Adopted	
SEW-1308	Adopted	
SEW-1309	Adopted	
SEW-1310	Adopted	
SEW-1311	Adopted	
SEW-1312	Adopted	
SEW-1313	Adopted	
SEW-1314	Adopted	
SEW-1315	Not Adopted	
SEW-1316	Adopted	
SEW-1317	Adopted	
SEW-1400	Not Adopted	
SEW-1401	Adopted	
SEW-1402	Adopted	
SEW-1403	Adopted	
SEW-1404	Adopted	
SEW-1405	Adopted	
SEW-1406	Adopted with Modification	Excluding Option 2
SEW-1407	Adopted	
SEW-1408	Adopted	
SEW-1409	Not Adopted	
SEW-1410	Not Adopted	
SEW-1411	Not Adopted	
SEW-1412	Not Adopted	Use MWD 135
SEW-1500	Adopted	
SEW-150 1	Adopted	
SEW-1502	Not Adopted	

Public Utilities		Remarks
MSC R-0100		Public Utilities in Verges, Service Corridors & Alignments

3.2.6 Design & Construction of Sewerage Pumping Stations

Usage

This supplementary manual shall be read in conjunction with, and take precedence over, the WSAA Sewerage Pumping Station Code of Australia – WSA 04-2005 to define the technical requirement of Maroochy Shire Council and Maroochy Water Services (the 'Water Agency') in relation to the planning, design and construction of reticulated sewerage systems.

This code shall be read in conjunction with Council's Standard Specification "Supply and Installation of Electrical Equipment for Pumping Stations". Where discrepancies exist the Council specification shall have precedence.

Refer to Tables of Standard Drawings for relevant adopted drawings.

Part 1: Planning and Design

a) Pt 1 – 5.2.6 Landscaping

Add to WSAA requirements:

Landscaping works require an Operational Works approval

b) Pt 1 – 5.3.2 Inlet MH design

Replace WSAA requirement with:

House overflow monitoring/telemetry equipment not required

c) Pt 1 – 5.4.2 Sizing

Replace WSAA requirement with:

The wet-well diameter shall be a minimum of 2.4m

d) Pt 1 – 6.6.5 Junction Boxes

Junction Boxes are not permitted

e) Pt 1 – 6.8.1 Pump Starters and Variable Speed Drives

Autotransformers are not permitted

f) Pt 1 – 7.3.1 Power and Control Cubicle

Aluminium/zinc coated steel sheet not permitted

g) Pt 1 – 7.3.2.4 Degree of Protection

The switching mechanism component shall be rated at a degree of protection of IP42.

h) Pt 1 – 8.3.1 Pumping Control

Interlock control is not required.

i) Pt 1 – 8.3.5 Pump Starts and Interlocks

Interlock control is not required.

j) Pt 3 – 21.4.6 (a) Mains Requirements

Item (a) is not required.

k) Pt 3 – 21.4.8.1 Underground Cable Installation

Method (b) is the required method.

l) Pt 3 – 21.7.2 Control circuit wiring

Replace WSAA conductor requirement with:

Use flexible PVC coated tinned 30/0.65 copper conductors of minimum size 1.5mm2 with 250 V grade insulation.

Extra low voltage devices are coloured orange.

m) Pt 3 – 21.8.2 Conduits

Hot dip galvanised saddles are not permitted.

n) Pt 3 – 36.4.2.2 Low pressure air testing

Replace WSAA requirement with: Vacuum testing is required for gravity sewers

Table of Standard Drawings		Remarks
SPS-1100	Adopted	
SPS-1101	Not Adopted	Use MWD 501 & 506
SPS-1102	Not Adopted	Use MWD 501 & 506
SPS-1103	Not Adopted	Use MWD 503 & 512
SPS-1104	Adopted	
SPS-1200	Not Adopted	Use MWD 501 & 506
SPS-1201	Not Adopted	Use MWD 501 & 506
SPS-1202	Not Adopted	Use MWD 501 & 506
SPS-1203	Not Adopted	Use MWD 501 & 506
SPS-1204	Not Adopted	Use MWD 501 & 506
SPS-1205	Adopted	
SPS-1300	Not Adopted	Use MWD 503, 508 & 509
SPS-1301	Not Adopted	Use MWD 502
SPS-1302	Not Adopted	Use MWD 502, 503, 507, 508 & 509
SPS-1303	Not Adopted	
SPS-1304	Not Adopted	Use MWD 503, 508 & 509
SPS-1305	Not Adopted	Use MWD 503, 512 & 515
SPS-1306	Not Adopted	Use MWD 502, 503, 505, 508 & 514
SPS-1307	Not Adopted	Use MWD 502 & 507
SPS-1308	Not Adopted	Use MWD 516 & 519
SPS-1309	Not Adopted	Use MWD 502 & 507
SPS-1310	Adopted	

Table of Standard Drawings		Remarks
SPS-1400	Adopted	
SPS-1401	Adopted	
SPS-1402	Adopted	
SPS-1403	Adopted	
SPS-1404	Not Adopted	Use MWD 135
SPS-1405	Adopted	
SPS-1500	Adopted	
SPS-1501	Adopted	
SPS-1502	Adopted	
SPS-1503	Adopted	
SPS-1504	Adopted	
SPS-1505	Not Adopted	Use MWD 505 & 511
SPS-1506	Adopted	
SPS-1507	Adopted	
SPS-1508	Adopted	
SPS-1600	Adopted	
SPS-1601	Adopted	
SPS-1602	Adopted	
SPS-1603	Adopted	
SPS-1604	Adopted	
SPS-1605	Adopted	
SPS-1606	Adopted	

3.3 Street Lighting

3.3.1 Relevant Code Requirements

This section relates to acceptable measure A1 .5 for performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works. It sets out standards and potential information requirements for the provision of street lighting.

3.3.2 Standards

All works are to be designed and constructed to ENERGEX standard and approval. Lighting on declared roads is to be provided in accordance with the requirements and approval of the relevant State Government Department.

The 'Manuals' are to mean the ENERGEX Public Lighting Manuals i.e. 'Construction Manual' and 'Policy, Design and Equipment Manual'.

'Code of Practice' means the current Australian Standard Code of Practice AS1158.1, AS1158.2 and AS1158.4.

3.3.3 Specifications

Specifications applicable in accordance with Energex standard lighting requirements.

Lighting designs for roads are prepared in accordance with the Lighting Category as listed below on roads within all precincts, except Rural and Rural Residential precincts:

Lighting Category	Road Classification
V1	Motorway
V2	Urban Arterial Rural Highway Arterial Main Street
V5	Urban Controlled Distributor Rural Arterial Sub Arterial Main Street
P4	Major Collector Street Industrial Access Industrial Collector
P5	Minor Collector Access Street Access Place Laneway
In accordance with AS 1158.3.1-1999	Bikeway

In Rural Residential precincts

- street lighting is installed at intersections, curves, heads of cul de sacs and locations of potential hazard,
- streets with vehicle movements less than 2400 vpd may be lit with minor lamps,
- streets with vehicle movements greater than 2400 vpd shall be lit in accordance with the road classification in the lighting table (above).

In Rural precincts.

- intersections which have through traffic greater than 1000 vpd are lit with minor lamps,
- intersections which have through traffic greater than 3000 vpd are lit in accordance with the lighting table (above),
- street lighting is provided in accordance with the road classification and the vehicle movements per day where

  (a) the intersection is channelised,

  (b) the intersection has turn or passing lanes,

  (c) a location has a potential hazard,

  (d) a location has a high accident rate.

On roads with kerb and channel, the pole alignment is 0.7m behind the invert of the kerb (for Category P4 and P5 lighting only).

Street light poles are not located adjacent to water crossings.

Street light poles may be placed at a 1.0 metre offset from physically located conduits if no alternative layout is feasible and the access to the property is not affected.

Street light poles are placed on 0.3m alignment in the following circumstances:-

- at the property boundary of hatchet blocks with narrow road frontage, and in cul-de-sac where frontages are narrow.

When joining to existing installations, or extending subdivisional estates in stages, new lamps and brackets match, as near as possible, existing installations.

All major Lamps (as defined in Section 1 of ENERGEX's Policy, Design and Equipment Manual) are aeroscreen type.

Opal sphere lanterns are not used.

Post top and nostalgia lanterns for decorative use are used on P5 category roads (and lower).

Unless joining and conforming to existing lighting, the minimum length of outreach brackets on either a steel column or timber pole is 0.5m.

3.3.4 Standard Drawings

Standard drawings are defined under ENERGEX Public Lighting Manuals i.e. 'Construction Manual' and 'Policy, Design and Equipment Manual'.

Updating of drawing shall remain with the document owner and shall be the responsibility of the user to maintain current version. Relevant drawings are not maintained with Council list of standard drawings.

3.3.5 Specific information requirements

The developer shall provide Council all required approvals and certification applicable from Energex.

4 Movement Networks

4.1 Purpose of this Section

This section is relevant to the assessment of compliance with performance criteria P1 – P8 in Element 2 (Movement Networks) of the Code for Operational Works:

Performance Criteria	Acceptable Measures
P1 Development sites are provided with external roadworks along the full extent of the frontage appropriate to the function and amenity of the road and including: **(a) paved roadway;** **(b) kerb and channel;** **(c) safe vehicular access;** **(d) safe footpaths and bikeways;** **(e) stormwater drainage; and** **(f) conduits to facilitate the provision of street lighting systems and traffic signals.**	**A1.1** Road works design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking*
P2 The reserve width, pavement, edging, street-scaping and landscaping support the intended functions and amenity of the road.	**A2.1** Road works design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*
P3 Road pavement surfaces: **(a) are sufficiently durable to carry wheel loads for parked and travelling vehicles;** **(b) ensure the safe passage of vehicles, pedestrians and cyclists;** **(c) ensure appropriate management of stormwater and maintenance of all weather access; and** **(d) allow for reasonable travel comfort**	**A3.1** Road pavement design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 -Operational Works.*
P4 Pavement edges control vehicle movements by delineating the carriageway.	**A4.1** Road pavement design and construction is undertaken in accordance with *Planning Scheme Policy 5 – Operational Works.*
P5 The verges and footpaths provide **(a) safe access for pedestrians clear of obstructions;** **(b) an access for vehicles onto properties;** **(c) an area for public utility services; and** **(d) provide for people with disabilities by allowing safe passage of wheel chairs and other mobility aids**	**A5.1** Verge and footpath design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*
P6 Bikeways provide safe and attractive cycle routes for commuter and recreational purposes	**A6.1** Bikeway design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking and Planning Scheme Policy No. DC2 Provision of Bikeways and Bicycle Facilities.*
P7 Measures intended to restrain traffic speeds and/or volumes[5]: **(a) avoid stop-start conditions;** **(b) provide for appropriate sight distances;** **(c) avoid increased vehicle emissions;** **(d) minimise unacceptable traffic noise to adjoining land uses;** **(e) maintain convenience or safety levels for cyclists and public transport; and** **(f) are integrated with landscaping and streetscape design.**	**A7.1** Speed control devices are designed and constructed in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*
P8 Constructed roads and paths must be designed to minimise environmental impact	**A8.1** Roadworks design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*

The following subsections set out the standards referred to in these acceptable measures, and related specifications and standard drawings (as appropriate).

Also identified are any specific information requirements for applications in relation to these matters. These information requirements apply in addition to those general requirements identified in section 2 of this policy.

5 Council will not accept the use of speed restriction techniques and devices in place of appropriate road design, in accordance with P7.

4.2 Roadworks, Design & Construction

4.2.1 Relevant Code Requirements

This section relates to acceptable measures A1.1, A2.1 and A8.1 for performance criteria P1, P2 and P8 (respectively) in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of roads.

4.2.2 Standards

4.2.2.1 Austroads Publications

Rural Road Design Manual

Part 1 Traffic Flow

Part 2 Roadway Capacity

Part 3 Traffic Studies

Part 4 Road Crashes

Part 5 Intersections at grade

Part 6 Roundabouts

Part 7 Traffic Signals

Part 8 Traffic Control Devices

Part 9 Arterial Road Traffic Management

Part 10 Local Area Traffic Management

Part 11 Parking

Part 12 Roadway Lighting

Part 13 Pedestrians

Part 14 Bicycles

Part 15 Motorcycles

4.2.2.2 Australian Rainfall and Runoff

4.2.2.2.1 Soil Erosion and Sediment Control for Queensland

4.2.2.2.2 EPP Water Policy

4.2.2.3 Cement and Concrete Association

Concrete Pavement Design for Residential Streets Road Note 62 - Skid Resistance of Decorative Paving Interlocking Concrete Road Pavements -A Guide to Design and Construction

4.2.2.4 Queensland Urban Drainage Manual

4.2.2.5 Queensland Department of Main Roads Manuals

Road Planning and Design Manual

Pavement Design Manual

Pavement Rehabilitation Manual

Road Drainage Design Manual

Manual of Uniform Traffic Control Devices

Guide to Pavement Markings

Road Landscape Manual

4.2.2.6 Queensland Streets

4.2.3 Specifications

4.2.3.1 Queensland Aus Spec Development

Specification List

Maroochy Shire Council have developed a regional specification in conjunction with the other following councils to develop a unified specification document:

- Maroochy Shire Council
- Noosa Shire Council
- Cooloola Shire Council
- Redcliffe Council
- Caboolture City Council
- Caloundra City Council
- Pine Rivers Shire Council

The following are sections covered under AUS-SPEC roads section, available on the Maroochy Shire Council web page.

Specification No.	Specification Title
CQS	Quality System Requirements
CQC	Quality Control Requirements
C101	General
C201	Control of Traffic
C211	Control of Erosion and Sedimentation
C212	Clearing and Grubbing
C213	Earthworks
C220	Stormwater Drainage - General
C221	Pipe Drainage
C222	Precast Box Culverts
C223	Drainage Structures
C224	Open Drains including Kerb & Gutter (Channel)
C230	Subsurface Drainage - General
C231	Subsoil and Foundation Drains
C232	Pavement Drains
C233	Drainage Mats
C241	Stabilisation
C242	Flexible Pavements
C244	Sprayed Bituminous Surfacing
C245	Asphaltic Concrete
C247	Mass Concrete Sub base
C248	Plain or Reinforced Concrete Base
C254	Segmental Paving
C255	Bituminous Microsurfacing
C261	Pavement Markings
C262	Signposting
C263	Guide Posts
C264	Non-Rigid Road Safety Barrier Systems (Public Domain)
C265	Boundary Fencing
C271	Minor Concrete Works
C273	Landscaping
C501	Bushfire Protection (Perimeter Tracks)
DQS	Quality Assurance Requirements for Design
D1	Geometric Road Design (Urban and Rural)
D2	Pavement Design
D3	Structures/Bridge Design
D4	Subsurface Drainage Design

Under some AUS SPEC specifications inclusion of Mainroads specifications have been applied.

Table - Queensland Department Main Roads Standard Specifications List

Identification Number	Title	Version	Interim Version
MRS11.02	Introduction to Standard Specifications	12/93	11/98
MRS11.02	Control of Vehicular Traffic at Roadworks	12/93	
MRS11.03	Drainage, Retaining Structures and Protective Treatments	12/93	9/97
SET-MRS11.04	General Earthworks	12/93	9/97
MRS11.05	Unbound Pavements	12/93	9/98
MRS11.06	Reinforced Soil Structures	12/93	5/99
MRS11.07	In Situ Stabilised Pavements	12/93	
MRS11.08	Plant-Mixed Stabilised Pavements	12/93	11/98
MRS11.11	Sprayed Bituminous Surfacing (Excluding Emulsions)	12/93	8/97
MRS11.12	Sprayed Bitumen Emulsion Surfacing	12/93	
MRS11.13	Bituminous Slurry Surfacing	12/93	
MRS11.14	Road Furniture	12/93	12/97
MRS11.15	Noise Barriers		
PM-MRS11.16	Landscaping	12/93	
MRS11.19	Bitumen Cutter Cutback Bitumen	12/93	
MRS11.20	Medium Curing Cutback Bitumen	12/93	
MRS11.21	Bitumen Emulsion	12/93	
MRS11.23	Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisation	12/93	

Identification Number	Title	Version	Interim Version
MRS11.24	Manufacture of Precast Concrete Culverts	12/93	
MRS11.25	Manufacture of Precast Concrete Pipes	12/93	8/97
MRS11.27	Manufacture of Fibre Reinforced Concrete	12/93	
MRS11.28	Contractor's Site Facilities and Camp	12/93	8/97
MRS11.30	Dense Graded Asphalt Pavements	12/93	9/97
MRS11.31	Low Rut Dense Graded Asphalt Pavements		
MRS11.33	Stone Mastic Asphalt Pavements		8/97
MRS11.34	Open Graded Asphalt Pavements	12/93	
MRS11.39	Lean Mix Concrete Sub-base for Pavement		9/98
MRS11.40	Concrete Pavements		9/98
MRS11.41	Specification for Performed Joint Fillers for Concrete Road Pavements and Structures		4/98
MRS11.45	Pavement Marking		8/97
MRS11.50	Specific Quality System Requirements	12/93	8/97
MRS11.51	Environmental Management		
MRS11.55	Use of Explosives in Roadworks		
MRS11.63	Cast-In-Place Piles	12/93	
MRS11.65	Precast Prestressed Concrete Piles	12/93	
MRS11.66	Driven Steel Piles	12/93	
MRS11.67	Bitumen Slip Layer On Piles	12/93	
MRS11.70	Concrete	12/93	8/97
MRS11.71	Reinforced Steel	12/93	8/97
MRS11.73	Manufacture of Prestressed Concrete Members and Stressing Bars	12/93	
MRS11.74	Supply and Erection of Prestressed Concrete Girders and Kerb Units	12/93	
MRS11.75	Supply and Erection of Prestressed Concrete Girders and Reinforced Concrete Deck	12/93	
MRS11.77	Supply and Erection of Steel Girders and Reinforced Concrete Deck	12/93	
MRS11.78	Fabrication of Structural Steelwork	12/93	3/98
MRS11.79	Fabrication of Aluminium Bridge Barriers	12/93	
MRS11.80	Supply and Erection of Bridge Barrier	12/93	
MRS11.82	Bearings, Joints, Fillers and Built-In Items for Bridges	12/93	
MRS11.83	Anti-Graffiti Protection	12/93	
MRS11.84	Painting of Steel Bridges		
MRS11.86	Preparation for Bridge Widening	12/93	
MRS11.91	Ducts and Pits	12/93	8/87
MRS11.92	Traffic Signal and Road Lighting Footings	12/93	11/97
MRS11.93	Traffic Signals		1/98
MRS11.94	Road Lighting		9/97
MRS11.95	Switchboards and Cables		8/97

4.2.4 Standard Drawings

Drawing Number	Addendum	Description
MSC 00		Maroochy Shire Council Standard Drawing Index
MSC 01		Maroochy Shire Council List of Addendums
General		
MSC G-0001		Index of Standard Drawings - General
Fencing and Gates		
IPWEAQ G-0045		Weldmesh Fencing & Control Fence
MR 938		3700mm Steel Gate – installation of Gate and Posts
MR 1351		Motor Grid
Legends		
IPWEAQ G-0080		Legends – Sheet 1
IPWEAQ G-0081		Legends – Sheet 2
Tree Planting		
MSC G-0100		Tree Planting and Root Barriers
Sediment and Erosion		
IPWEAQ D-0040		Sediment Fence, Entry/Exit Sediment Trap
IPWEAQ D-0041		Kerb and Field Inlets, Check Dams & Straw Bale Bank
Floodways		
MR 165M		Flood Gauge Post
MR 725M		Stone Work of Floodways Downstream Side – Gravel Fill
MR 726M		Stone Work at Floodways Downstream Side – Rock Fill
Roads/ streets		
MSC R-0001		Index of Standard Drawings – Road/ Street

The following drawings can be located on the MainRoads website

Guardrails			
Drawing number	**Addendum**	**Description**	
MR1338 1474		Installation of Guardrail	Steel Beam Guardrail - Installation and Setout
MR1339 1475		Installation on bridge approaches and departures	Steel Beam Guardrail - Installation on Bridge and Barrier Approaches
MR1341 1476		Installation for back to back guardrail	Steel Beam Guardrail - Terminal Components
MR1342 1477		Fabrication detail for bolts, nuts and washers	Steel Beam Guardrail - Posts and Blockouts, Soil and Bearing Plates, Slip Base Plate
MR1343 1478		Fabrication details for guardrail panels and panel components	Steel Beam Guardrail - W Beam Anchor Bracket - Delineation Unit - Post on Base Plate - Abraham Blockout

Kerb and Channel		
IPWEAQ R-0080	Yes	Kerb and Channel Profiles, incl. Edges, Median & Invert
IPWEAQ R-0081		Kerb and Channel Drainage Connections
IPWEAQ R-0086	Yes	Type 2 Kerb Ramp to Grass Verges
IPWEAQ R-0087	Yes	Type 3 Kerb Ramp to Concrete/Paved Verges
Driveways		
MSC R-0050		Residential Driveway
IPWEAQ R-0051		Commercial Driveway Type A
IPWEAQ R-0052		Commercial Driveway Type B
MSC R-0056		Rural Driveway

Drainage		
MSC D-0001		Index of Standard Drawings – Drainage
MSC R-0001		Index of Standard Drawings – Road/ Street
IPWEAQ R-0140		Subsurface Drainage
IPWEAQ R-0141		Subsurface Drainage Details at Medians/ Islands
Access Chambers		
IPWEAQ D-0010		Access Chamber – Details 1050mm to 2100mm
IPWEAQ D-0011		Access Chamber – Roof Slabs 1050mm to 2100mm

4.2.5 Specific Information Requirements

Details on what types of materials are accepted by Council are detailed below.

Surfacing other than Bitumen for entry treatments

The pattern of any surfacing (or pattern formed by the joints of any surfacing) shall not cause confusion or be contradictory to the intended or allowable traffic flow. This should be addressed during design planning.

The Maroochy Shire Council wish to avoid materials which may cause maintenance and operational work complications. It is provided for developers and contractors a list of preferred applications which Council consider suitable for whole of life maintenance and appearance considerations.

Should consideration be applied to an alternative treatment, then it is required that associated whole of life and maintenance costs be provided to MSC in conjunction with the submission.

The methods provided below are detailed as methods Council wish to incorporate.

- Asphalt
- Stencilled Asphalt

a) Asphalt

For improved maintenance applications and long term surface management, asphalt surfacing is the preferred surfacing methods considered by Council.

b) Stencilled Asphalt

Council shall consider stencilled asphalt to the details outlined in Appendix F.

Other methods which are not considered as maintenance friendly methods:

c) Concrete/ Stencilled Concrete

Concrete shall have a non skid finish, colour and texture appropriate to its purpose.

White/light coloured cements that would not allow white pavement markings to be easily distinguished are not permitted. Concretes shall be coloured with oxides only. Carbon blacks and organic dyes are not permitted.

Exposed aggregates shall have an appropriate skid resistance. Smooth rounded pebbles will not be permitted. Density and inherit properties of the stone shall be such that for the design traffic and speed, significant polishing of the stone will not occur over the design life of the surface. Skid resistance shall be in accordance with the Concrete Association Publication, Road Note 62 – Skid Resistance of Decorative Paving.

d) Pavers

Pavers or paving tiles shall have a non-skid finish, colour and texture appropriate to their application. Only interlocking concrete pavers (minimum thickness 80mm) shall be used within Council road reserves. For any relaxation of this requirement and why pavers a more suitable surface over Council preferred options, the developer would need to establish to Council's satisfaction the structural integrity and full life cycle costs, including ongoing maintenance, of the proposed paving system to be used.

Pavers shall generally be installed in accordance with the Cement and Concrete Association Publication, Interlocking Concrete Road Pavements - A Guide to Design and Construction.

Clay pavers are permitted on private driveways not maintained by Council.

A cement treated base (CTB) or concrete pavement shall be provided as a base to all pavers. Where a CTB is used, the pavement shall be sealed with a bitumen Prime sealant at 1.0 l/m2. At low points, the sand bedding layer for the pavers shall be drained back to the subsoil drain or the underground drainage system.

4.2.5.1 Linemarking

Line marking shall be in accordance with the Queensland Department of Main Roads, Manual of Uniform Traffic Control Devices (MUTCD) and Queensland Department of Main Roads, Guide to Pavement Markings. Retro Reflective Pavement Markers (RRPM's) shall be applied in accordance with the MUTCD to augment line marking, chevrons and islands.

RRPM's shall be used to augment painted lines markings in accordance with Table 4.5 of MUTCD

4.2.5.2 Signage

Signs shall be in accordance with the Manual of Uniform Traffic Control Devices.

Signposts to be installed set in concrete slab with sleeve and bolted. Vandal proof bolts and fittings are to be used on all permanent signing in accordance with drawing R-0131.

Street naming signs shall be in accordance with drawing R-0130.

4.2.5.3 Subsurface Drainage

Subsurface drainage on roads shall be in accordance with IPWEA, Standard drawings R-0140 and R-0141. Cleaning points shall generally be provided at the end of each line and at each stormwater pit.

4.2.5.4 Access and Driveways

Table - Access and Driveway Design Criteria

Development	Minimum Access Strip Width (m)	Minimum Driveway Width (m)	Passing Bay Requirement	Maximum Grade (%)	Seal	Stormwater Drainage
Residential (1 Lot only)	6	3.0	Yes (5.0m) (No)	25	Yes (Yes)	ARI 2 Underground
Commercial and Industrial	8	6.0	N/A	8	Yes (Concrete)	ARI 10 Underground
Rural Residential	10	3.0 (5.0 formation)	Yes (5.5m on a 7.5m formation)	25	Yes	ARI 2 Culverts and Table Drains

Construction of accesses and driveways will be required on lots with steep slopes to building sites, on lot frontages with visibility constraints and on access strips or access easements serving allotments.

Site access driveways and their splays at the kerb line should not extend beyond the frontage of the site (normal to the frontage) unless a joint access driveway is proposed.

Access to lots should be in accordance with AS2890, R0050 or R0056 with driveways meeting the natural surface level at the from the property boundary. The cross section of the verge should conform to Queensland Streets.

Details are to be clear of available clearances for site distance regarding location of residential and industrial property accesses.

In addition to the other driveway location requirements of this Policy, the type, design and location of site access driveways must be consistent with the requirements of Planning Scheme Policy No. 6-Transport, Traffic and Parking.

4.2.5.5 Road Design Special Conditions

All roads within Urban and Rural Urban shall be AC sealed surfaces.

All rural roads with a grade greater than 16% shall be surfaced with a two coat bitumen seal or AC seal in accordance with the prepared design.

Carriageway crossfall for the traffic lanes on all sealed roads shall be 3% desirable grade.

A minimum of 0.4% longitudinal grade for roads which have kerb and channel.

4.3 Road Pavement Design

4.3.1 Relevant Code Requirements

This section relates to acceptable measures A3.1 and A4.1 for performance criteria P3 and P4 (respectively) in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of road pavement.

4.3.2 Specifications

Maroochy Shire Council has adopted the Regional AUS- SPEC specification series to be implemented in many cases as their key technical specification. Any adjustments shall be defined in the document. Other documents to be applied where AUS-SPEC does not satisfy the requirements of Maroochy Shire Council include the following:

Flexible pavements, sprayed bituminous surfacing, asphaltic concrete or bituminous microsurfacing shall have the following applied.

Queensland Department of Main Roads – Standard Specification Roads:

Flexible Pavements – MRS 11.05 (12/99)

Sprayed Bituminous Surfacing – MRS 11.11 (12/99)

Asphaltic Concrete – MRS 11.30 (12/99), MRS 11.33 (12/99), MRS 11.34 (12/99), MRS 11.36 (12/99)

Other approved specifications shall also be applied where relevant;

Bituminous Microsurfacing – MRS 11.13 (12/99)

4.3.3 Standards

Pavement Design Manual (AR&R)

Pavement Rehabilitation Manual (Mainroads)

Road Drainage Design Manual (Mainroads)

Manual of Uniform Traffic Control Devices

Guide to Pavement Markings (Mainroads)

4.3.4 Specific Information Requirements

4.3.4.1 General Requirements

The general design of pavements shall be based on the provisions of the Austroads publication, 'A guide to the design of new pavements for light traffic (DNPLT) and the Pavement Design Manual'. The area to be sealed shall comprise a gravel depth in accordance with the pavement design. Full pavement depth shall be used on road shoulders.

Temporary turnarounds, such as at a development stage boundary, shall comprise a minimum 150mm deep compacted gravel.

Gravel pavement design depth shall be determined by insitu subgrade testing and design CBR testing applied to be defined on the operational works drawing in addition to the submission of all design calculations outlined.

The design traffic loading shall be shown on the drawings represented by the design CBR (Californian Bearing Ratio) and design ESA's (Equivalent Standard Axles). Pavement calculations and subgrade testing results shall be submitted for approval. Design life shall be 20 years for granular pavements.

Where pavement testing is subject to testing during construction, the final pavement thickness shall be based on laboratory testing of the soaked CBR of the insitu material. The determined thickness shall be shown on the As Constructed Drawings. All testing shall be in accordance with the Standard Civil Works Inspection and Testing Plan (CWITP) Section 2.5.

The applicant shall submit all certified design details and calculations as part of the road design requirements for operational works.

The design traffic loading (ESA) and road classification shall be shown on design drawings.

Pavement design calculations and subgrade/ CBR test results shall be submitted for endorsement prior to placement of gravel.

The testing is to be carried out by a NATA registered testing company. A period of one working week should be allowed for Council processing and approval of the proposed pavement design.

Council will not inspect pavement subgrades or allow the placement of pavement materials until a pavement design has been submitted and approved.

The 'as constructed' drawings shall reflect the actual pavement depths adopted during construction.

4.3.4.2 Design Parameters

The following design traffic shall be used. For any relaxation of the requirements specified below, the developer would need to establish to Council's satisfaction the structural integrity and full life cycle costs, including ongoing maintenance, of the proposed system to be used.

Estimated standard axles (ESA) for various road classifications as shown below shall be used in the design of the pavement. Flexible pavement thickness for roadways shall be based on the following:

- Up to 5 x 10^5 Equivalent Standard Axles (ESA's) – Australian Road Research Board

  Special Report No. 41 (1989) – A Structural Design Guide for Flexible Residential Street Pavements (95% Confidence Limit). (ARRB SR 41); (Figure 13.8.2(A);
- In excess of 5 x 10^5 ESA's – Queensland Department of Transport Pavement Design Manual.

For all new roads including road widening and reconstruction, pavement thickness must be determined in accordance with Fig 13.8.2(A) Austroads A Guide to the Design of New Pavement for Light Traffic or Department of Main Roads Pavement Design Manual for ESA's > 5 x 10^5 except that the minimum pavement thickness and number of design Equivalent Standard Axles (ESA's) for the various road hierarchies shall be in accordance with the table shown below:-

Street/ Road Type	No. of Lots	ESA's (2)	Min. Pav. Thickness (mm)	Min. AC thickness (mm) (6)	Min. Tot. Thickness (mm)	Min. Road Base (CBR) (4)	Min. Sub Course (CBR) (7)
Access Place/ Access Street	0-75	5 x 10^4	200	30	230	60	45
Collector Street	76-300	3.0 x 10^5	250	30	280	60	45
Trunk Collector	301-1000	2.0 x 10^6	250	30(1)	280	80	45
Industrial Access	120 or 12ha max	1.5 x 10^6	250	45(1)	295	80	45
Industrial Collector	300 or 30ha max	3.3 x 10^6	300	45(1)	345	80	45
Arterial	Use the Department of Main Roads Pavement Design Manual to determine design traffic ESA's and pavement structure. As a minimum, pavement thickness must be 300mm with a 45mm asphalt wearing surface.						
Major Arterial							

Notes:

1. 10mm primer seal required (assume thickness 5mm);
2. ESA's calculated in accordance with ARRB Special Report 41 AND AUSTROADS pavement design manual;
3. For staged development where construction traffic associated with subsequent stages will use pavements constructed in preceding stages, the design traffic loading must be increased to take account of that construction traffic.
4. Minimum base thickness to be 125mm Type 2.1 material for CBR 80 and 100mm Type 2.2 material for CBR60.
5. For rural roads, the road wearing surface may be reduced to a two coat bitumen seal.
6. Type of AC to be DG10 for 30 mm thickness and DG14 for 45mm
7. Upper subbase course to be a Type 2.3 material for min CBR 45.

For any relaxation to these requirements, a full mechanistic pavement design must be undertaken by a RPEQ experienced in pavement design in accordance with Austroads Pavement Design Manual. The design must address as a minimum the structural integrity and full life cycle costs, including ongoing maintenance, of the proposed pavement system.

4.3.4.3 Traffic Generation

In some instances it will be necessary to undertake independent assessment of ESA's. The following information is tendered in relation to the above

Residential

Traffic generation shall be assessed at 10 trips per allotment/ day.

- Lane distribution = for W<5.5m, as the traffic expected to traverse the same section of pavement in both directions.
- 0.5 for W>5.5m

Pavement thicknesses shall be as determined using Fig 13.8.2(A) Austroads DNPLT Manual.

Industrial and Commercial Developments

The design traffic loading shall be calculated by determining traffic generation from the proposed land uses within the development. Full details of these calculations are to be provided with the pavement design. These details are to include sources of traffic generation rates, allotment coverage and vehicle classification distributions. For any variance to this standard, e.g. the traffic generation standards noted in Queensland Streets, the developer will need to submit the appropriate information (calculations) to Council for approval.

4.3.4.4 Existing Streets/Roads

In addition to the determination of traffic generation for the new development, it shall be necessary to determine the existing traffic volumes and classifications. Council may be able to provide such data. If no Council data is available, a minimum of a 12 hour traffic count on one day shall be undertaken by a suitably qualified person and in accordance with Austroads survey standards. This day shall be a normal weekday without any abnormal traffic patterns.

Design life for all granular pavement shall be 20 years.

4.3.4.5 Procedures during Construction

- Inspection & Testing Subgrade Evaluation and Pavement Design.

The applicant/supervising engineer is to arrange for inspection of subgrade pavement to be undertaken with Council officers.

Inspections will be undertaken in accordance with the 'Quality Control and Audit Inspections', as outlined in Planning Scheme Policy No 5 – Operational Works Section 8.4.

Council may undertake audit inspection of any or all of the works without prior notice.

A brief summary of items for inspection will include the following: The applicant/supervising engineer is to submit, as early as possible, subgrade evaluation tests at approximate box level together with recommended pavement depths determined prior to inspection request date.

The testing is to be carried out by a NATA registered testing company .A period of one working week should be allowed for Council processing and approval of the proposed pavement design.

Council will not inspect pavement subgrades or allow the placement of pavement materials until a pavement design has been submitted and approved.

- Subsoil Drainage

The applicant/supervising engineer is to arrange with Council an inspection of the subgrade before pavement materials are placed, to determine if mitre drains are required. Side drains are to be inspected with the subgrade.

- Inspection and Testing by Council

During construction, Council may conduct audit inspections of any or all of the works without prior notification.

The major inspections and their coverage are listed below. The listings are not intended to be exhaustive and Council may require inspection and testing of other items.

Subgrade

Subgrade inspection will generally include:

(a) checking service conduit locations against markers, if kerb and channel is in place;

(b) determination of the location of mitre and side drains;

(c) proof rolling bottom of subgrade box after compaction;

(d) checking of subgrade level and crossfall;

(e) checking all related civil works.

(f) checking of side drains and mitre drains checking testing results of pavement compactions and moisture results before sealing and asphalt.

Note: Certified pavement thicknesses and subgrade compaction test results, and compaction test results for backfill to trenches, are to be available for the inspection.

If Council does not obtain pavement ITP results or carry out an inspection, all details must be submitted at 'On Maintenance' inspection.

Road Pavement

The pre-seal inspection will generally include:

a) Proof rolling of base course gravel and checking of profile after compaction. Compaction test results and gravel quality test results of the base, sub-base and select fill courses are to be available for the inspection. If Council does not obtain pavement ITP results or carry out an inspection, all details must be submitted at 'On Maintenance' inspection.

b) pre-prime inspection of the pavement surface to ensure profile is correct and surface is suitable for priming, in accordance with the requirements of the relevant approved Specifications;

c) side drains and mitre drains checking and testing;

d) checking of conduit markers against service conduits;

e) for spray seal - proposed application rates of prime and binder and spread rates of pre-coated aggregate are to be approved prior to the inspection;

f) for asphaltic concrete – checking of details associated with chip seal (application rate etc); proposed application rates of prime and results of mix acceptance tests are to be approved prior to the inspection;

g) that stormwater drainage works affecting the roadworks have been completed;

h) that all pipe and services crossings of the roadworks have been completed, and certified as correctly located by the applicant/engineer;

i) checking kerb and channel - line and levels checking and certified as within tolerances by the supervising engineer;

j) checking of intersection contouring.

It is the applicant's/supervising engineer's responsibility to ensure that all the necessary details as listed above are complied with prior to asking for an inspection by Council. Failure to do so will delay the prime and incur a reinspection fee.

4.3.5 Pavement Surfacing Requirements

Surfacing of all roads shall generally be with a dense graded asphalt. A bitumen chip seal (10mm aggregate) shall be used in conjunction with all asphalt surfacing.

Asphalt for subdivisional works shall be a BCC Type 2 mix (not included in MRD Standard Specifications Roads). Surfacing in suburban and rural residential, roads bounded by kerb and new subdivisions shall generally be asphalt. Asphalt 50mm thick and greater may be considered as part of the design pavement thickness. Surfacing below asphalt shall consist of prime with surface aggregate.

Other areas shall be a two coat sprayed bitumen seal. Bitumen seals consist of a prime + 2 coat hot bitumen seal consisting of a 16mm aggregate + 10mm aggregate in accordance with prepared seal design.

Surfacing for rural access roads shall be a two coat sprayed bitumen seal.

4.4 Verge And Footpath Design And Construction

4.4.1 Relevant Code Requirements

This section relates to acceptable measure A5.1 for performance criterion P5 in Element 2 (Movement Networks) of the Code for Operational Works.

It sets out standards and potential information requirements for the design and construction of verges and footpaths.

4.4.2 Standards

Footpaths to be built to standard defined in MSC standard drawing.

Where the site (or part of the site) abuts a road or street subject to an approved streetscape improvement works program, frontage works are carried out in accordance with the streetscape improvement program for the full frontage of the site.

4.4.3 Specifications

Specification details defined on MSC standard drawing where applicable.

4.4.4 Standard Drawings

Footpath standard drawing outlined below is available from Maroochy Shire Council webpage:

Footpaths		
IPWEAQ R-0065	Yes	Concrete Strip Footpaths
Verge Construction		
MSC R - 0100		Public Utilities in Verges, Service Corridors and Alignments

4.4.5 Specific Information Requirements

Maroochy Shire Council advise that all operational work details shall advise of proposed footpath and bikeway details.

Developments constructed in stages are to make an allowance for interconnecting access pathways and bikeways.

Conditions to be considered include the following:

- sufficient for pedestrian and bicycle movements;
- have consideration for lighting and safety aspects;
- access for maintenance access and attendance;
- treatment for stormwater management and overland flow considerations;
- maintenance practice and long term maintenance costs of the pathway;
- impact on adjoining neighbours; and
- Compliance with requirements defined in Council bikeway strategic plan.

4.5 Bikeway Design & Construction

4.5.1 Relevant Code Requirements

This section relates to acceptable measure A6.1 for performance criterion P6 in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of bikeways.

4.5.2 Standards

Bikeways to be designed and constructed in accordance with Councils Maroochy Shire Bikeways Plan Review 2003, Development Contribution Policy and AUSTROADS – Part 14 where applicable.

4.5.3 Specifications

CQS	Quality System Requirements
CQC	Quality Control. Requirements
C101	General
C211	Control of Erosion and Sedimentation
C212	Clearing and Grubbing
C213	Earthworks
C242	Flexible Pavements

4.5.4 Standard Drawings

Standard drawing outlined below is available from Maroochy Shire Council webpage:

Bikeways	
IPWEAQ P-0010	Entrance to Road Reserve
IPWEAQ P-0012	Pavement Joints
IPWEAQ P-0013	Slowdown Control, Reserve Curve
IPWEAQ P-0015	Slowdown Control Offset Chicane

4.5.5 Specific Information Requirements

Details provided in conjunction with Transport Traffic and Parking Code requirements.

4.6 Speed Control Device Design & Construction

4.6.1 Relevant Code Requirements

This section relates to acceptable measure A7.1 for performance criterion P7 in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of speed control devices.

4.6.2 Standards

Council's preference is for target speeds to be achieved by road alignment rather than using speed control devices. However, where speed control devices are required the following standards apply:

- Queensland Streets
- Manual Uniform Traffic Control Devices

4.6.3 Specifications

No specific details for construction of speed control devices. However, they are to be constructed using the general road construction standards outlined in this policy.

Regional AUS–SPEC available on Maroochy Shire Council web page.

4.7 Stormwater Drainage

4.7.1 Relevant Code Requirements

This section relates to Element 2 (Movement Networks) of the Code for Operational Works and Element 2 (Water Cycle Management) of the Code for Integrated Water Management. It sets out standards for the design and construction of conventional stormwater drainage systems, which typically do not address current requirements for improvements in stormwater quality. Such requirements may be met by implementing Water Sensitive Urban Design (WSUD). However, WSUD requires alternative approaches and construction methods to conventional stormwater drainage systems. The standards below relate to design and construction of conventional stormwater drainage systems, elements of which will continue to play a role in water sensitive drainage systems. Where water sensitive design elements are used within a drainage system, such elements should be designed in accordance with recognised guidelines (as outlined in Section 7 of this Policy) to provide levels of flood immunity and public safety similar to conventional systems.

4.7.2 Standards

Stormwater drainage is to be designed and constructed in accordance with the following:

- Queensland Urban Drainage Manual (QUDM);
- Overland flow paths are provided at all sag points;
- Side entry gully pits or gully pit/manholes are used in sags;
- Manholes are not located within the carriageway of any street or road; and
- Anti ponding gullies in curves are side entry type, chamber and lintel. Gully pits are not located on kerb returns.

Inter-allotment drainage is to be designed and constructed in accordance with the following:

- Inter-allotment drainage systems are provided to all lots where any part of the lot falls away from the frontage roadway and are designed in accordance with QUDM Section 5.18;
- Easements created over all inter-allotment drainage systems;
- Pipe bedding and backfill are in accordance with Specification No. 4.6 - Sewer Reticulation for PVC-U pipes, and Specification No. 4.5 - Stormwater Drainage for RC and FRC pipes;
- Pipe materials are PVC-U sewer pipe minimum class SH; PVC-U drainage pipe PLASCOR or equivalent, of equivalent class to PVC-U sewer class SH; R.C. pipe class '1' rubber ring jointed; or F.R.C. pipe class 'X' rubber ring jointed;
- PVC-U pipes are either rubber ring jointed or solvent weld jointed. Standard manufacturer's fittings are used in both cases;
- The minimum pipe size for inter-allotment drainage is 225mm diameter;
- Inspection Manholes are cast insitu concrete boxes, or precast FRC or RC pipe systems to the dimensions shown in Table 4.7.2 below;
- FRC and RCP systems are constructed by embedding the lower precast section into a wet cast-insitu concrete base. Cut outs for pipe penetrations are made using concrete saws/drills while minimising damage to the adjacent pipe materials;
- Lids to cast-in-situ manholes are light duty, close fitting bolt down cast iron or galvanised steel, concrete infill type (Gatic Light Duty, Polycrete Broadstel or similar) of approximately the same internal dimensions as the manhole;
- Lids to FRC and RCP manholes are in accordance with the manufacturer's proprietary concrete or concrete infill type;
- Lids match finished surface ground slope and sit 25-50 mm proud, and are marked 'stormwater' impressed into the concrete infill;
- Infill concrete is Class N25;
- PVC-U pipe and kerb adaptors are used where discharge is into the kerb and channel, or for commercial, industrial and community title premises, steel rectangular hollow section hotdip galvanised pipe are used with the pipe being placed on compacted sand bedding and the opening to the kerb is either formed at the time of kerb and channel construction or saw cut and reinstated neatly with mortar;
- Inter-allotment drainage lines are located 0.5 metres from rear or side boundaries within the properties served;
- Manholes are located at a maximum spacing of 100 metres, at changes of grade, at changes of direction, changes of pipe diameter, at ends of lines, and 0.5m to 1.5m from boundaries;

- At least one connection point provided to serve each lot, with a minimum 100 mm diameter located 0.5m to 1.5m from the lowest property boundary and connections are made direct to inspection manholes;
- Connection points on line are in the form of a 'Y' junction, bend, and inspection opening as for a sewer connection with the connection point being capped with a screw on or push on cap;
- Outlets from inter-allotment drainage systems are connected directly to the trunk drainage system by way of a gully or manhole;
- Where there is no trunk drainage system, individual discharge to the street shall be located within 0.5m of the lowest side lot boundary, measured square off the back of kerb and channel
- Easements of minimum width 1.5m are provided over pipes of 225mm diameter or less, and 3m over pipes of 300mm diameter or more;
- The depth of the house connection is determined by the longest run of house drain to the connection point possible within the lot and allowing 0.3 metres cover to the house drain at the head of the line, and allowing a minimum grade of 1 in 100 for the house drain; and
- Materials and construction are in accordance with Council's Standard Specification for Stormwater drainage.

Table 4.7.2 AS/NZ 3500.3 2003

Maximum Depth to Invert (mm)	Boxes - Internal Dimensions (mm)	FRC or RCP Systems
<600	450 x 450	600 mm diameter
>600 <900	600 x 600	900 mm diameter
>900 <1200	600 x 900	1000 mm diameter
>1200	900 x 900	1000 mm diameter
Minimum Wall Thickness	100	N/A

4.7.3 Reserves and Easements

Drainage reserves in accordance with QUDM Section 3.05 are generally required over all natural or similar stormwater flow paths traversing a development site unless specifically approved otherwise. Drainage reserves are to convey the 100 year ARI flood event with an allowance for freeboard, as outlined in QUDM Table 8.02. Easements are required for a constructed or modified waterways:

- With a catchment area of less than 5 ha in residential or commercial areas, or
- With a catchment area of less than 10 ha in industrial and rural residential areas.

Constructed waterways with larger catchment areas are to be placed within drainage reserves. In rural residential & rural areas, Council may agree to place flood prone land under a drainage easement instead of acquiring the land under a drainage reserve, as indicated in Code 8.2, Element 3.1, Part (c) of Maroochy Plan 2000.

Natural waterways are to be placed within drainage reserves. Drainage reserves are to be sized to include buffer widths required by Council's Waterways and Wetlands Code.

A drainage reserve will be required over all areas containing detention basins, gross pollutant traps, wetlands and other stormwater quality improvement devices and verges required to adequately serve or maintain these devices.

Easements in accordance with QUDM (Section 3.04) are required over all municipal drainage systems which traverse private property. All costs associated with the provision of an easement are to be borne by the applicant.

Where overland flow easements are proposed which allows for the passage of stormwater runoff or redirection of flow across the natural land surface such easements will prohibit any activities or works which may obstruct or impede the flow of stormwater runoff, unless prior approval is provided. Designs of overland flowpath must take into account future fencing that may be constructed across the easement. Any fences to be constructed across easements or along the easement boundary are to provide sufficient access for Council's maintenance or future construction, by either the provision of gates or removable sections that are wide enough to allow access. Fencing must be constructed to allow free passage of flow.

5 Public Parks Infrastructure

5.1 Relevant Code Requirements

This section is relevant to the assessment of compliance with performance criterion as defined in two (2) relevant codes defined by MSC.

a) P1 in Element 4 (Pedestrian and Cyclist facilities) of the Code for Reconfiguration of Lots:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 A network of pedestrian ways and cycle routes is provided having regard to: **(a) opportunities to link open space networks and community facilities, including public transport stops, local activity centres and schools;** **(b) likely trip purpose;** **(c) topography;** **(d) cyclist and pedestrian safety;** **(e) cost effectiveness;** **(f) likely user volumes and types; and** **(g) convenience.**	**A1.3** Internal (local) linear linkages are: (a) (i) provided in accordance with Map 1 of the Maroochy Public Parks Strategy if indicated on Map 1; or (ii) provided in suitable locations; and (b) at least 10 m wide, unless forming part of a road reserve; (c) capable of accommodating a combined walking/bicycle path; (d) connected to the local street network; (e) aligned along water courses or water bodies where relevant; (f) broken by access points at least every 100m; and (g) are capable of being maintained in accordance with Planning Scheme Policy No.5 – Operational Works.

b) P1 in Element 6 (Public Parks Infrastructure) of the Code for Reconfiguration of Lots:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 Public parks infrastructure6 is provided that: **(a) is accessible and equitably distributed in a manner appropriate to the proposed settlement or development;** **(b) contributes to the legibility and character of the development;** **(c) allows for a range of uses and activities;** **(d) is cost effective to maintain;** **(e) contributes to stormwater management, visual amenity and environmental care;** **(f) provides opportunities for rest and social interaction; and** **(g) facilitates safe connectivity between areas.**	Where land is provided: **A1.2** Preliminary works are undertaken free of cost to the Council and in accordance with *Planning Scheme Policy No. 5 - Operational Works* so that that the land is useable for its intended purpose.

This element is not relevant to the subdivision of existing or approved buildings.

Descriptions of the type of parks to be provided in the Shire are provided in Planning Scheme Policy DC5 – Public Parks Infrastructure or Infrastructure Charges Schedule for Public Parks Infrastructure.

c) P1 in Element 3 (Public Parks Infrastructure) of the Code for Operational Works:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 Parks are designed to support their intended function, amenity and recreational setting.	**A1.1** Public parks are conceptually designed to the desired standard of service as outlined in Planning Scheme Policy DC5 – Public Parks Infrastructure and designed and constructed in accordance with *Planning Scheme Policy No. 5 - Operational Works*.

[6] *Descriptions of the type of parks to be provided in the Shire are provided in Planning Scheme Policy DC5 – Public Parks Infrastructure or Infrastructure Charges Schedule.*

8 Quality Control & Audit Inspections

Standard Civil Works Inspection and Testing Plan

The major inspections and their coverage are listed in the Standard Civil Works Inspection and Testing Plan (CWITP). The listings are not intended to be exhaustive and Council may require inspection and testing of other items.

During construction and up to the completion of works Council may conduct random audits and inspections, if considered necessary, with or without prior notification.

The Consultant must follow the plan, unless variations are approved and submit certification that the plan has been followed in accordance with the 'As-Constructed' submission documentation.

The following figures provide guidance on the obligations of supervising engineers and procedures for the construction, checking and hand over of works.

8.0 Construction Standards and Tolerances

Element Course	Minimum Thickness	Minimum Density Strength	Horizontal Alignment Tolerance	Vertical Alignment Tolerance	Thickness Tolerance	Shape/Slope Tolerance
General Earthworks Earthworks in Floodprone areas	N/A	95% See ITP	Limits on Plan	+100mm +100 -0	N/A	Min1:100 general and over any 10m down contours, No ponding over 50mm deep
Stormwater Pipes	N/A AS4058	Standard Drawings	+100mm	+25mm	N/A	Uniform pipe grade and +10% of design grade
Manholes/ Pits	In situ 150mm	32Mpa	Lateral +100mm Along line +300mm	+50mm With K & C + 25mm	+100mm – 0mm	Circular/Square/ Rectangular and Vertical +50mm
Subgrade	300mm	100% Standard Compaction	+100mm Road width +200mm -50mm	+25mm -50mm	N/A	Design cross fall +0.5%
Select Fill/ Subgrade Replacement	100mm	100% Standard Compaction Min CBR15	+100mm Road width +200mm -50mm	+25mm -50mm	+25mm	Design Crossfall +0.5%
Subsoil Drains	Width 225mm	N/A	+100mm	Min900mm Below kerb 1 mert	Width -25mm +100mm	Uniform pipe Grade 0.5%min
Conduits	Width 300mm	N/A	+300mm	Min700mm & max 1000 Below top of Kerb	Width -25mm	Uniform grade And straight
Markers	N/A	N/A	+100 from Conduit	N/A	N/A	N/A
Kerb and Channel	Invert 125mm	20Mpa	+100mm Raod width +200mm -50mm	+25mm	Concrete +20mm -10mm	15mm in 3m max And + 10% of Design grade No ponding greater than 5mm
Sub Base	100mm	100% Standard Compaction	+100mm Road width +200mm -50mm	+25mm	+50mm -20mm	25min in 3m max and no ponding Design crossfall +0.5%
Rock Retaining Walls Brisbane City Council	N/A	N/A	+100 mm	+ 100 +100 - 0 Flood Areas		Surface finish +100mm of Design slope No openings > 100m
Base	100mm	100% Standard compaction	+100mm Road Width +200mm - 50mm	+25mm	+25mm - 10mm	15mm in 3m max Crossfall + 0.5% Design

Element Course	Minimum Thickness	Minimum Density Strength	Horizontal Alignment Tolerance	Vertical Alignment Tolerance	Thickness Tolerance	Shape/Slope Tolerance
Surfacing (Compacted)	25mm Or design	92% Standard	+100mm	+25mm	+15mm -0mm	7mm in 3m max
			Road Width +200mm -50mm	+5mm 0mm from lip of Channel		Design Crossfall +0.5%
Road Verges	N/A	95% Standard Compaction	+100mm	+25mm	N/A	=10% of design crossfall
				+25 -0 from top of kerb		
Top soil And Grassing	75mm	N/A	N/A	+100mm	+25mm	As for General Earthworks
				Road verges +25mm		
Water Supply Pipelines	N/A	N/A	+50mm	+50mm -200mm	N/A	To manufacturers Specification
Sewerage Pipelines	N/A	N/A	+150mm	+25mm	N/A	5mm in 8.0m Max no ponding
Access chambers	N/A	N/A	+150mm	Finish lid 100 Mm Above FSL	N/A	Circular
Water Supply Fittings	N/a	N/A	+ 250mm	+ 25mm To FSL (Surface Fittings only)	N/A	N/A

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Pre Start Meetings				Superintendent shall: • Invite relevant staff incorporated with all facets of development to prestart from MSC. • Ensure contractor holds copy of approved design & specification • Outline Performance and standard required • Highlight critical aspects of the approved Design • Provide electronic copy of all final approved design plans accompanied by a 'Document Transmittal Form' • Design Plans to include plan showing boundaries of future development stages • All electronic plans to be in CAD format. Refer 'Specification for the Supply of Digital Geo-referenced Data'.	Council shall: • Outline performance and standard required • Highlight critical aspects of the approved Design • Complete project details on the Prestart meeting Form Appendix C (Water & Sewerage) and Appendix D (Roads & Drainage) • Undertake minutes of pre start meeting to record any specific issues addressed during the meeting; DA representative shall be chairperson for the meeting. Details to be distributed to all key representatives from each unit within Council.
Workplace Health and Safety				Superintendent and contractor shall ensure that compliance with the Workplace Health & Safety Act and other relevant safety legislation the Roadworks Signing Guide and Council's Safety Policy and Manual is maintained throughout construction including specifically: • Correct signing on existing roads • Approved Safety clothing • Adequate protection of the works • Correct use of 'Stop-Go' workers and other traffic control devices • Approved construction plant and equipment	Council shall periodically check the construction site for compliance with health and safety requirements and refer any non-compliance to the Superintendent and where necessary the Contractor directly.

Interlot Drainage

- Location and size of interlot drainage lines
- Invert and surface levels at pits
- Location and size of pits
- Location and size of house connections
- Pipe material details
- Lengths and grades to all interlot drainlines
- Label interlot drainage pits and receiving stormwater structures

Drainage Calculations and Catchment Plan

- North point
- A plan of the development showing the road and lot boundaries
- Existing* and finished surface contours (in different line types) at an interval close enough to define the terrain and allow definition of the subcatchments
- Contours shall extend beyond the limits of the development site to fully define the limits of external catchments
- Subcatchment boundaries, labels and areas
- Line diagram of drainline, manhole, gully and outlet locations
- Labelling of stormwater structures

**where changes may affect adjacent properties*

Erosion and Sediment Control

- Limits of disturbance
- Vegetation retention plans
- Soil maps
- Existing site contour plan
- Final site contour plan
- Construction drainage plans for each stage of earthworks
- Location of temporary drainage, erosion and sediment control measures
- Technical notes possible relating to:
  - site preparation and land clearing
  - erosion control measures
  - material and installation specification and maintenance requirements
  - installation sequence
  - site revegetation and rehabilitation requirements
  - legend for standard symbols used within the plans
- Construction details for various ESC measures
- Operational maintenance procedures and nominated personal responsible

Appendix C: Prestart Meeting Notes

maroochy water services
A Business Unit of Maroochy Shire Council

Date: [Date]	Application No.: [insert]	No. Lots: [insert]
Development: [insert]		
Consultant: [insert]	Supervision By: [insert]	
Contractor: [insert]	Contact Ph No.: [insert]	
Contact Ph No.: [insert]	Council Inspector: [insert]	
OPW Approval Date: [Date]	Contract Start Date: [insert]	
Contract Price: [insert]	Extent of Works: [insert]	
Contract Period: [insert]	Sub Contractors: [insert]	
	Suppliers: [Insert]	

Item No.	Notes
	Present:
1	Construction plans and amendments as per OPW Decision Notice ☐
2	Insurances - Work Cover Public Liability
3	Sewer pipes to be used: Reticulation ..... Deeper than 3.0m ..... Stormwater crossings ..... Other .....
4	Sewer pipe bedding material:
5	Sewer access chambers to be used:
6	Sewer precast bases to be used:
7	Accredited pipe layer and licence number:
8	Water pipes to be used:
9	Water supply pipe bedding: ☐ Sand (DICL Main) ☐ Crusher Dust (DICL Main) ☐ 3mm washed screenings (PVC Main) ☐ Other Approved
10	Pre-tapped water connections (refer MWD 360)
	Construction Advice
	Construction to comply with relevant Maroochy Shire Council and WSAA Standard Drawings (available at http://www.maroochy.qld.gov.au >Council Specifications)
A	"On-maintenance" date will be the date that all infrastructure (roads, drainage, landscaping, water, sewer etc.) is accepted by Council
B	Minimum cover to sewer main: 0.90 m – allotments and footpaths 1.20 m roadways
C	**House connections:** Minimum 1m into property Maximum 1.5m deep PVC 100mm sand surround To be constructed with laying of sewer line
D	Ends of sewer lines and house connections to be marked by 2.0m conduit
E	Levels of existing services and connection points to be verified prior to commencing construction
F	Vacuum test sewers and manholes, Pressure test rising mains
G	Following satisfactory inspection, sewer access chamber covers to be sealed with approved medium
H	Hydrants and valves to be fusion powder coated
I	Water main alignment – 1.45 m from boundary (0.05m tolerance)
J	Minimum cover to water main: 0.60 m cover in footpath, (0.6m below top of kerb) 0.75 m cover under roads
K	Polythene sleeving D.I.C.L. pipe as per Tubemakers specifications
L	Hydrant and valve sets, surrounds, marker posts, road markings, cats eye, and stamped offsets to be provided.
M	Testing water main 1.0 MPa for reticulation mains.
N	Water mains must be flushed, chlorinated, pressure and bacterial tested prior to Council connecting to Council's system
O	Before release of plan of survey, all water supply and sewerage construction works shall be completed to an "on-maintenance" standard
P	Surveyors **preliminary** lot boundary DXF file to Maroochy Water Services for preliminary "as-constructed' plan preparation purposes.

Appendix D: Prestart Meeting Form (Roads and Drainage)

MAROOCHY SHIRE COUNCIL PLANNING SCHEME POLICY NO. 6

Transport Traffic and Parking

Contents

1 Introduction

1.1 Purpose

The Transport, Traffic and Parking Code guides development and the planning and construction of transport, traffic and parking facilities within Maroochy Shire. This policy is intended to provide applicants with more detailed guidance on the standards expected to meet the performance criteria nominated in this code.

If any doubt exists in respect to the interpretation of any part of this policy, the most appropriate interpretation will be that which is most consistent with the stated purpose of the code.

Where development involves traffic and transport related impacts that require any works, remedial treatments or upgrades to State Controlled Infrastructure, the relevant requirements of the particular State Government Agency must be applied in addition to the requirements of this policy. In circumstances where there is a conflict between this policy and a State Government Policy, the requirements of the State Government Policy must be applied.

1.2 Scope

This policy outlines the information requirements that are needed to support a development application that is likely to generate impacts on transport, traffic and parking infrastructure.

It also outlines key planning and design principles for achieving the intent of the Desired Environmental Outcomes (DEO's), the precinct intentions, and development codes in the Maroochy Plan that relate to Transport, Traffic and Parking infrastructure.

Volume 4 of the Planning Scheme contains a range of provisions that seek to achieve safe, convenient, efficient, attractive and legible transport, traffic and parking facilities. These provisions are primarily located in the Transport Traffic and Parking Code, the Code for Reconfiguring Lots, and the Code for Operational Works.

Volume 2 (Strategic Plan) and Volume 3 (Planning areas and Precincts) also contain specific provisions for impact assessable development in relation to Transport, Traffic, and Parking infrastructure.

1.3 Definitions

Road Hierarchy Plan – a plan of development that indicates the proposed hierarchy of roads and streets and how it proposes to integrated with the existing road and street network using the Maroochy Shire Road Hierarchy characteristics outlined in section 4 of this policy.

Public Transport Network Plan - a plan of development that indicates the proposed public transport network, including routes and the proposed location of stops or interchanges. The plan is used to demonstrate how the development intends to meet the Public Transport Network Planning Principles outlined in section 3 of this policy.

Integrated Movement Network Plan – a plan of development that indicates the proposed pedestrian and cyclist network, including proposed treatments. The plan is used to demonstrate how the development intends to meet the Pedestrian and Cyclist Network Planning Principles outlined in section 3 of this policy.

DMR – Department of Main Roads

State Controlled Road – is a road under the control of the Queensland Department of Main Roads

MUTCD – Queensland Manual of Uniform Traffic Control Devices developed by DMR.

vpd – vehicles per day

vph – vehicles per hour

Van – Courier or delivery van as defined in this policy in section 6.3

SRV – Small Rigid Vehicle or small truck defined in AS2890.2

MRV – Medium Rigid Vehicle or medium sized truck defined in AS2890.2

LRV – Large Rigid Vehicle or large sized truck defined in AS2890.2

WCV – Waste Collection Vehicle for Maroochy Shire as defined in this policy in section 6.3.

Coach – Bus or Coach as defined in Austroads Design Vehicles and Turning Path Templates

AV – Articulated Vehicle or 19m Semi-trailer as defined in AS2890.2

Tandem Parking Spaces – refers to a parking arrangement where a vehicle parks behind another vehicle that is parked with its nose or rear against a wall or other obstruction so that it cannot be moved without moving the second vehicle that is blocking it.

85th percentile – term used to specify a design scenario, eg it is often used when referring to design vehicles or design speeds. The 85th percentile car is the size of car that 85% of cars are smaller than, and 85th percentile speed is the speed that 85% of vehicles travel at or below.

30th Highest Hour – is used to specify a design period for transport infrastructure, particularly roads, intersections or carparks. It refers to the circumstances that occur during the 30th highest hour period in a year.

1.4 Expertise Required to Prepare Supporting information

A suitably qualified and experienced Traffic Engineer must undertake detailed Traffic Impact Assessment Reports. However, traffic impact assessment reports for developments that are considered to cause relatively minor traffic impacts may be undertaken by a Civil Engineer or Civil Designer who has a respected background and knowledge in the design and construction of road infrastructure and potential traffic impacts.

Qualified planners or engineers with a background of knowledge and experience in landuse and transport planning must undertake preparation of Road Hierarchy Plans, Public Transport Network Plans and Integrated Movement Network Plans.

1.5 References and Guidelines

- Austroads Guide to Traffic Engineering Practice - all Parts,
- Austroads Rural Road Design,
- Austroads Urban Road Design,
- Austroads Design Vehicles and Turning Path Templates,
- Amcord: *A national resource document for residential development (1995),*
- Queensland Streets: *Institute of Municipal Engineering Australia Queensland Division (1995),*
- AS2890 – Australian Standard for Parking Facilities, all parts,
- Queensland Department of Main Roads - Road Planning and Design Manual,
- Queensland Department of Main Roads – Traffic & Road Use Management (TRUM) Manual,
- Queensland Urban Design Manual (QUDM)
- Queensland Manual of Uniform Traffic Control Devices: *Queensland Department of Main Roads,*
- Liveable Neighbourhoods: *Western Australian Planning Commission (June 2000)*
- Austroads – Cities for Tomorrow:
- Brisbane City Council – Transport, Access, Parking and Servicing Planning Scheme Policy
- Brisbane City Council – Transport and Traffic Facilities Planning Scheme Policy.

Where discrepancies exist between the above references and guidelines, the following order of precedences apply unless specifically stated otherwise in this policy:

- The Queensland Department of Main Roads Road Planning and Design Manual takes primary precedence except for references to rural roads where Austroads Guide to Rural Road Design takes precedence.
- The Queensland Manual of Uniform Traffic Control Devices takes precedence over Austroads publications and Australian Standards.
- Austroads publications take precedence over the Australian Standards with respect to the design of the public road and street systems.
- Queensland Streets is used for the layout and geometric design of streets in residential (urban, rural, and multi-unit) and industrial lot reconfiguratons and development for Community Title uses. Other specific requirements detailed in this policy take precedence over Queensland Streets.

2 Information Requirements - Traffic Impact Assessment Reports

This section is relevant to the assessment of compliance with:

- Footnote 1 of the Transport, Traffic and Parking Code;
- Element 1 (Transport Network), and Element 2 (Road and Street Network)- of the Transport, Traffic and Parking Code;

2.1 General Requirements

All applications must be accompanied by appropriately scaled and dimensioned drawings, clearly showing all aspects of the proposal, specifically including the details of all interfaces with existing and proposed external roads (including relevant features and services, kerb lines, channelisation and line marking), and public transport, pedestrian and cyclist facilities.

As indicated in footnote 1 in the Traffic Transport and Parking Code, traffic impact assessment reports will be required for developments which are assessed as having a significant impact on the operation of the adjacent road network, or where the development proposed is not consistent with the acceptable measures in the Transport, Traffic and Parking Code. The traffic impact assessment report must deal with potential impacts and inconsistencies and identify ways in which the potential impacts and consequences of inconsistencies can be minimised.

For most developments, it will be sufficient that the proposed development is shown to comply with the requirements of this policy and other relevant codes and policies, without the submission of a traffic impact assessment report.

For developments that trigger a referral to DMR based on Guide 3 under the Integrated Planning Act, the applicant must follow the requirements of DMR, in particular the *'Guidelines for Assessment of Road Impacts of Development Proposals'*.

A traffic impact assessment report will be required for developments, which have a potentially significant

impact on the transport or traffic network, particularly those which potentially increase any of the following by 5 percent or more:

a) Peak period or daily total traffic movements through a signalised intersection;

b) Any peak period or daily turning traffic movement (not priority movements) at a priority controlled intersection;

c) Peak period or daily traffic movements on an approach to a roundabout;

d) Peak period or daily traffic movements on a traffic route.

This determination does not apply to intersections where all intersection approach streets are classified as Urban Neighbourhood Collectors Streets or lower in the Maroochy Shire Urban Road and Street Hierarchy.

Traffic impact assessment reports shall also be required for developments that are assessed by Council or its delegate as having the potential to significantly impact on the amenity of existing or planned residential communities, particularly relative to community expectations based on the Maroochy Plan 2000.

Where the subject development is part of an overall development planned for an area (by one or several applicants), whether staged development or independent development, and where the overall development would have significant impacts as defined above, a traffic impact assessment report will be required taking account of the impacts of the overall development and the contribution of the individual components to the total impacts at the various stages of the overall development.

A traffic impact assessment report must assess the impact of the proposed development based on current traffic operations, and based on a ten year planning horizon from the anticipated date of completion. Assessments of future traffic operations must separately assess the impact of the development:

- with the existing transport infrastructure,
- with planned transport infrastructure for which funding has been allocated, and
- with planned or proposed transport infrastructure for which funding has not been allocated.

The likely traffic to be generated from a proposal must be calculated as part of identifying the potential impacts on traffic operation. Council generally accepts the following references on land use trip generation for the purposes of calculating the likely traffic generation of a development:

- DMR Road Planning and Design Manual,
- RTA Guide to Traffic Generating Developments.

Council may also complete other more recent and locally derived traffic generation surveys of land uses from time to time and the results of these surveys should take precedence over the above references. Where a proposal includes a land use that is not covered by the above references, or by specific Council surveys, traffic generation surveys of other similar land use examples must be provided to justify the assumptions made when calculating traffic impacts.

The report must specifically identify ameliorative works that are necessary as a consequence of the proposed development, or the extent of any contribution that the proposed development must make to infrastructure upgradings planned or proposed by Council or relevant State Government Agencies.

There may be instances where other road users (current and future) may benefit from ameliorative works provided by a development proponent. However, it does not necessarily mean that other road users receiving benefits should contribute to the financing of the works, especially if they did not precipitate the timing of provision of those works.

Traffic impact assessments must take account of seasonal variations. In some cases, this will require analyses of traffic operations during off-peak periods, and during peak holiday periods. Generally, design traffic impacts will be assessed on the basis of traffic during the 80th highest hour in the year. New developments must be assumed to be 85th percentile developments in respect of traffic generation potential. Car parking demand estimates for design must be based on sufficient data to reliably estimate the 30th highest hourly demand in the year.

A traffic impact assessment report must address the impact of the proposed development relative to the purpose of the code and must address the compliance of the development with all requirements of the code and this policy, particularly any areas of inconsistency of the proposal with those requirements. Design or development options that ensure consistency with the purpose of the code will be required, even if this impacts on the scale or cost of feasible development.

A traffic impact assessment report must address on-site arrangements, particularly in respect of traffic, pedestrian and cyclist circulation, and the requirements for on-site parking, servicing and public transport facilities, and appropriate integration with existing or planned off-site transport infrastructure.

Traffic impacts are to be assessed based on evaluations of operations during the 80th highest hour in the year and must include safety considerations, degrees of saturation, queue lengths, delays, signal coordination, and the effects of interaction with adjacent intersections. Reports must be supported by statements of the data relied upon, assumptions made and the output of all relevant analyses.

The limits of operation for the different types of intersections are generally accepted as being:

- **signalised intersections** – the intersection degree of saturation (DOS), which represents the proportion of available green time capacity taken up for the critical movement(s), should generally be less than 0.90. This represents 90% of theoretical capacity and is considered a 'practical capacity' beyond which delays increase substantially for modest increases in volume;
- **roundabouts** – the DOS for any movement calculated using the procedures in Austroads Guide to Traffic Engineering Practice, Part 6 should not exceed 0.85; and
- **priority junctions** – the DOS for any movement calculated using the procedures in Austroads Guide to Traffic Engineering Practice, Part 5 should not exceed 0.80.

A 95% confidence limit should generally be used for assessing queue lengths (95th percentile queue length). A greater confidence limit may be appropriate where excessive queue length is likely to cause significant problems.

New traffic facilities must be designed to operate at Level of Service 'D' assessed as described in the Highway Capacity Manual.

Sight distance at intersections must comply with the requirements of the DMR Road Planning & Design Manual, Chapter 13.

All sketch plan or design proposals for site access or roadworks must be based on survey showing all relevant features and drawn to scale.

In masterplanned community developments or developments that propose greater than 100 lots or residential dwellings, development applications must be accompanied with the following plans to demonstrate how the Transport Network planning requirements are proposed to be met:

- **Road Hierarchy Plan** to indicate the proposed road hierarchy and how it proposes to meet the planning requirements detailed in section 3, and how it will integrate with the existing or planned road hierarchy indicated on the Maroochy Shire Road Hierarchy Map.
- **Public Transport Network Plan** to indicate how the planning requirements for public transport outlined in Section 2.1 are proposed to be achieved.
- **Integrated Movement Network Plan** to indicate how the proposed pedestrian and cyclist network achieves the planning requirements outlined in Section 2.2 and how it is intended to integrate with the proposed road hierarchy and public transport network plans.

3 Transport Networks

This section is relevant to the assessment of compliance with:

- Element 1 (Transport System) P1 Element 4, P1, Element 5, P1 and P2 Element 6 of the Transport, Traffic and Parking Code;
- Element 3 (Integrated Movement Networks), P1-P6 Element 4 (Pedestrian and Cyclist Facilities), and Element 5 of the Code for Reconfiguring Lots.

3.1 General

Transport networks in Maroochy Shire must be planned and provided with the following aims in mind:

- To create a system of transport networks that integrate with each other to encourage use of public transport, walking and cycling in preference to private car use by achieving higher levels of convenience and access for the non-car based transport modes.
- To create an interconnected system of streets that provide access to key local features and minimise travel distance on the network.
- To create a simple and legible hierarchy of roads and streets that meet the needs of locals and visitors to the area and has regard to the potential noise and amenity impacts associated with noise sensitive uses.
- To create a safe and convenient system of roads and streets that caters for the requirements of Public Transport, Pedestrians and Cyclists in addition to the motor vehicle.

3.2 Public Transport

Provision must be made on Arterial, Sub-Arterial Roads, and District Collector Streets and occasional Neighbourhood Collector Streets for bus routes to achieve highly accessible, convenient and efficient services. The following guidelines must be followed to ensure that convenient and efficient services can be achieved:

- Public transport routes must be planned concurrently with landuse to ideally achieve an integration of higher density residential uses and key activity centres with public transport nodes. (see Figure 3.1).
- Bus routes are planned and located within 300-400m walking distance to 90% of establishments within urban areas and within 200m of demand responsive routes (see Figure 3.2).
- Streets suitable for bus routes must be no more than 30% longer than those available on the road network for at least 85% of all routes.

Figure 3.1: Landuse and Public Transport Planning

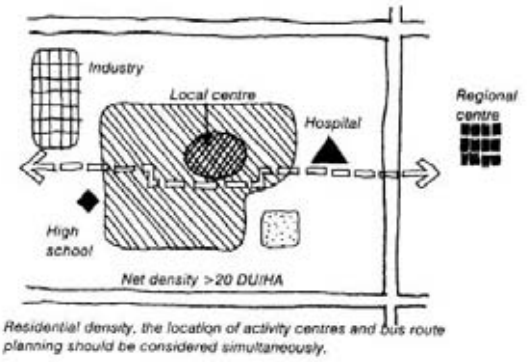
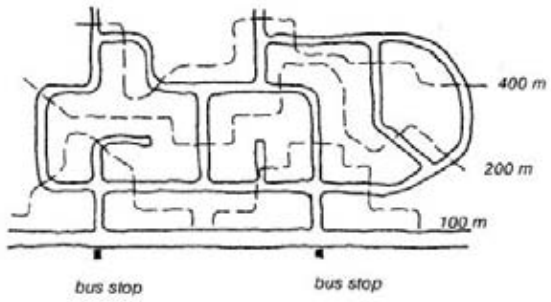


Figure 3.2: Areas served by regular bus routes (90% of houses within 400m of a route).



- Bus Gates', or bus only connections are provided between neighbourhood areas that deliberately don't connect to eliminate potential impacts of high traffic volumes using the street system to move between Arterial Roads. In these circumstances a bus only connection is required to achieve an efficient linear service rather than one that results in a circuitous route or one that doubles back on itself to service the area. (see Figure 3.4)
- Bus routes are planned and located through the centre of neighbourhood areas to maximise potential patronage and minimise walking distances to the route.
- Bus stops are located conveniently for the walkable catchment served at an average spacing of 300-400m to balance accessibility with running time (see Figure 3.2).
- The pedestrian network is designed to minimise walking distances to the nearest public transport route and bus stops are sited with regard to the pedestrian network.
- Bus stops are located at potential key destinations including schools, neighbourhood and town centres, stations, recreational areas, and industrial areas.
- Bus stops are located near traffic lights and median islands on busy roads to facilitate safe pedestrian movement.
- Traffic management devices on bus routes are designed to achieve comfortable movement by buses, ie speed humps, or chicanes and other slow points with 25km/h spot speeds must be avoided on bus routes. Roundabouts and bends with deflection angles greater than 60o are favoured methods of speed management on bus routes.
- Where bus routes need to be located on Neighbourhood Collector Streets to meet bus route planning targets, the Street must be provided using the 'Neighbourhood Collector Street (Bus Route)' cross section detailed in Section 3.6.2.
- Intersections along bus routes must be designed to achieve, as a minimum, the 12.5m wide swept turning path for a single bus unit as out lined in Austroads Design Vehicles and Turning Path Templates.
- Where bus routes link residential areas across any road which carries in excess of 6000vpd, the intersection is designed as a roundabout or with traffic signals to enable a left turn into the road from one area followed by a right turn from the road into the adjoining residential area.
- Retirement Villages should ideally be located within 100m of a proposed bus route.
- Where bus routes are proposed on new roads or on development sites, the separate requirements of the Queensland Department of Transport will also need to be accommodated.

3.3 Road and street Network planning

Maroochy Shire Council, in consultation with relevant State Government Agencies will plan sub-arterial and arterial road and transport facilities, including major pedestrian, cycle and public transport facilities. All development must be consistent with this planning.

The DMR and/or Council will prepare plans for road and transport system upgrades that will incorporate dedicated and/or constructed road widening or new road corridor requirements. Some or all of the planned works may be reasonable requirements of adjoining development. When these works would impact on development sites but the works are not reasonable requirements of that development, the development must not compromise the future corridor.

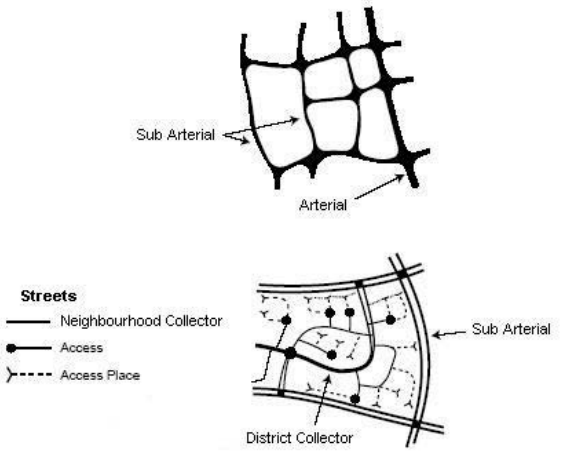
Where access is proposed to a State Controlled Road, or the subject development will have significant impact on a State Controlled Road, the separate requirements of the DMR will need to be accommodated.

The road and street system in Maroochy Shire must achieve a safe, convenient and efficient network of roads and streets that appropriately caters for both current and anticipated local and regional traffic movement and must have regard to potential impacts on noise sensitive land uses. The functional characteristics of the road and street hierarchy for Maroochy Shire are outlined in section 4 of this policy and illustrated in Figure 3.3.

All new developments, including residential, commercial, and industrial, must plan and provide a network of Roads and Streets using the following principles:

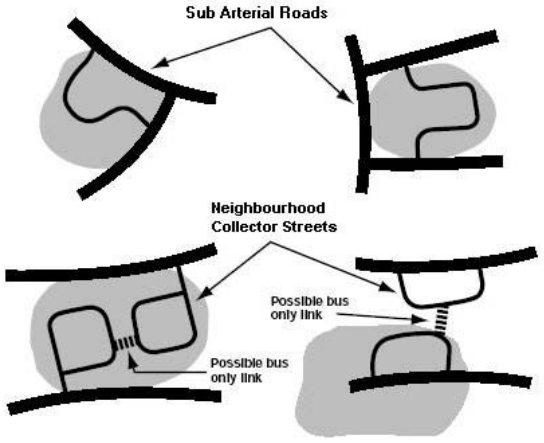
- In Urban Areas a network of Arterial and Sub-Arterial Roads spaced at 1 to 1.5km is generally required as a guide, with actual need dependant on landuse density and topography. The road system should be more convenient for long distance traffic than the local street network.
- Sub-arterial Roads and District Collector Streets form the spines of towns and neighbourhoods rather than the edges, which have little development. These roads are appropriate for mixed use, shopping and community activities and help to integrate landuses.
- Local Streets should be provided to support short trips for local traffic moving within and between neighbourhoods. They should also be designed to discourage traffic travelling long distances (i.e. beyond adjacent neighbourhoods) from passing through.
- The street system should be site responsive and highly interconnected, with good external connections. It should integrate developments into their surroundings, including with existing and future development on adjacent and other nearby sites. A highly connected system of streets is desirable to maximise choice of travel rather than the alternative of creating an unconnected system of culs-de-sac that concentrate traffic movement to one point and potentially results in more circuitous and inefficient traffic movement on the street system. However interconnected street systems require careful design to ensure that they do not create potential for unintended through traffic using the street system as a shortcut.
- District Collector Streets must achieve convenient access to a group of neighbourhoods but must also be carefully planned to prevent shortcuts through residential neighbourhoods except for buses (see Figure 3.4).
- The street system must also be legible and logical. It must be designed to ensure that motorists don't lose their sense of direction and can find their way to and from the nearest District Collector Street or Sub-Arterial road with relative ease. This is generally achieved by limiting the number of turns that a driver needs to make to 3 or less between the furthest point in the neighbourhood and the nearest Road or District Collector Street (see Figure 3.5). The street layout should support a consistent approach to traffic priority at intersections. Higher order streets should not change direction at intersections with lower order streets, particularly at roundabouts.

Figure 3.3: Local Arrangement for District Collectors to exclude through traffic (except buses)



- The street system must facilitate walking, cycling and use of public transport for access to daily activities, and enable relatively direct local vehicle trips within and between neighbourhoods and to local activity nodes.
- The street system must be convenient to use, minimise driver impatience and reduce the propensity for drivers to travel at excessive speed by limiting the time that drivers spend travelling in a low speed restrictive environment. This is achieved by limiting travel distance from the furthest lot in the catchment to the nearest District Collector Street or Sub-Arterial Road to 700m in Urban areas and 2000m in Rural Residential Areas.
- The street system must provide a reasonable degree of connectivity and access convenience, and an alternative access route for emergency use. This is achieved by providing an alternative street access in residential areas for all 'precincts' having more than 100 lots. Street layouts should allow a minimum of two access routes for all industrial subdivisions.

Figure 3.4: Illustrative layout of Roads and streets in Hierarchy



3.4 Pedestrian and Cyclist Network Planning

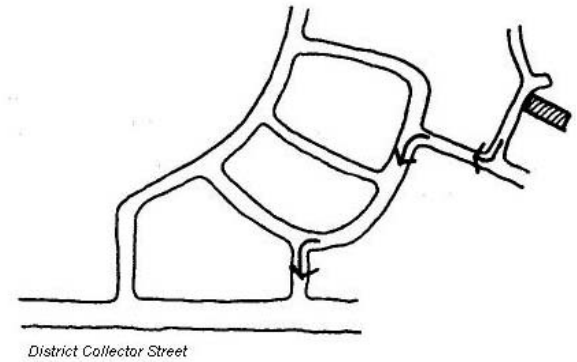
Pedestrian and Cyclist networks must be planned to provide safe and convenient connections to key local attractions, particularly to transport nodes, schools and commercial centres. Provision of a well designed and planned pathway network will encourage people to walk and cycle rather than relying on the car for shorter distance trips. In terms of cycling, the provision of pathways is particularly important for children and other inexperienced cyclists. Direct paths must be provided to local activity centres and schools using lower-order streets and the open space system. Wherever possible the pedestrian and cycleway network must be designed to achieve shorter travel distances than those available via car, particularly for shorter distance trips (up to 1km).

Many commuters and other longer-distance and experienced cyclists prefer cycling on roads, rather than on pathways. Therefore all roads and streets, with the exception of highways and motorways, must be designed to cater for on-road cyclists regardless of whether an adjacent shared pathway is present or is required to be provided.

A comprehensive pathway network, in addition to adequate provision for cyclists on roads and streets, will ensure that an integrated pedestrian and cyclist system is developed for all types of users. To plan and provide safe, convenient and attractive pedestrian and cycle networks, the following guidelines must be used:

- All networks must be designed to provide for safe and convenient movement of pedestrians and cyclists for recreation and commuting purposes including provision for the aged, young children, people with prams, and people with disabilities.

Figure 3.5: Maximum of three turning movements from houses to nearest District Collector street/ Arterial Road.



Linkages must be provided to open space networks and community facilities including public transport stations/ stops, local activity centres and schools.

- Attention must be given to providing pedestrian and cycle paths with casual surveillance. Routes along back ways that are hidden from view must be avoided. Paths must also be well lit in accordance with AS1158.3.1.
- The path network must be designed and provided according to the *Austroads Guide to Traffic Engineering Practice Part 13 'Pedestrians', and Part 14 'Bicycles'*. This includes path clearances and gradients.
- Facilities for cyclists on roads and streets must be designed and provided according to the *Austroads Guide to Traffic Engineering Practice Part 14 'Bicycles'* and the MUTCD.
- Pedestrian and cyclist infrastructure is located on the Urban road and street system in accordance with Table 4.4.1 and the acceptable solutions outlined in Section 4.5.1 and 4.5.2 unless a specific alternative is required in accordance with Maroochy's Bikeway Policy DC2.
- Generally pedestrian or cycle paths are not required on Access Streets or Access Places as these streets are designed to create a low speed shared street environment. However they are required if a key pedestrian or cyclist route needs to traverse an access street to achieve a convenient and efficient connection as part of broader network planning requirements.
- Footpaths may be omitted from one side of the street only where:
  - There is no development fronting that part or side of the street and the path is not required as part of broader network planning requirements to achieve direct connections to public transport or activity nodes.
  - Topography or vegetation precludes provision, or
  - Vehicle speeds are very low, and the future traffic volume will be less than 1000vpd
- Where it is expected that commuter cyclists are likely to use an Arterial or Sub-arterial road to access key employment centres, either segregated off-road paths or exclusive on road cycle lanes must be provided in addition to footpaths to separate the large speed differential that exists between pedestrians and higher speed commuter cyclists.
- Controlled crossing points such as refuges, slow points, thresholds or traffic signals, must be provided as appropriate where pedestrian and cyclist routes are proposed to cross roads or streets with traffic volumes higher than 3000vpd or traffic speeds greater than 50km/h, or at logical sites within the pedestrian and cycle network. The selection of facilities to be used in the control and protection of pedestrians crossing roads and streets must be in accordance with the MUTCD and the DMR Traffic and Road Use Management (TRUM) Manual.

Changes in paving colour or texture must not be introduced at locations where there is a pedestrian desire line to cross a road or street. This creates a safety hazard as some pedestrians may incorrectly perceive the change in paving as assigning priority to pedestrians over vehicles.

- The general minimum path widths are 1.5m for pedestrian footpaths and 2.5m for shared use paths. An absolute minimum shared path width of 2m will only be considered where significant constraints exist limiting the construction of a wider path and there is very low use at all times on all days. In commercial areas, the verges are fully paved.
- Paths must be widened at potential conflict points or junctions or in areas of high use (such as major commuting and recreational paths) based on the recommended widths outlined in *Austroads Guide to Traffic Engineering Practice Part 13 'Pedestrians' and Part 14 'Bicycles'*. The width of the gap in raised traffic islands at pedestrian crossing locations should generally be at least 3m.
- Kerb ramps must be provided at all kerbs including facilities for people with vision impairments as outlined in *Austroads Guide to Traffic Engineering Practice Part 13 'Pedestrians' and Part 14 'Bicycles',* and AS 1428. Where a kerb ramp is provided as part of a development, the corresponding kerb **ramp/s** on the opposite side of the **road/s** should also be provided.
- In circumstances where on road cycle lanes are needed and a slow point is required to achieve speed management targets on streets, the slow point must be provided to allow safe continuation of the cycle lane through the slow point.

4 Road Hierarchy

This section is relevant to the assessment of compliance with:

- Element 2 (Road and Street Network) - of the Transport, Traffic and Parking Code;
- P4, P6, and P7 in Element 3 (Integrated Movement Networks), P1 in Element 4 (Pedestrian and Cyclist Facilities) and P2 and P4 in Element 5 (Public Transport) of the Code for Reconfiguring Lots; and
- P1, P2, P5 and P6 in Element 2 (Movement Networks) of the Code for Operational Works.

4.1 General

The Maroochy Shire road hierarchy is shown on Map 1 attached to this Policy. This Map indicates the road and street hierarchy and known future intentions at the time the map was prepared. This hierarchy is likely to change in time due to the influences of further development and decisions that are made by Council to address immediate impacts and longer term planning requirements. Therefore, notwithstanding the road hierarchy on Map 1, it is essential that development applications review and consider the current and likely future hierarchy of the surrounding road network, and the impacts of the proposed development on this road hierarchy, based on the hierarchy principles and characteristics outlined further in this Policy.

Within this Policy and the Transport Traffic and Parking Code, the road hierarchy is broken into the two broad categories of *streets* and *roads*, which are defined in Sections 4.2, and 4.3 below.

Road hierarchy planning is intended to provide a safe, efficient and convenient road system providing for the movement of people and goods while minimising the adverse impacts of traffic flow, particularly on residential amenity and pedestrian safety.

It is intended that the classification system – a hierarchy of road types – should be used when describing and classifying roads by function for planning purposes. Classifying roads in this way recognises that not all roads are the same. At one extreme, the long-distance driver expects to be able to drive quickly without encountering potential conflicts with pedestrians, intersections and turning vehicles. At the other extreme, residential access streets are designed to give priority to the social and recreational needs of the people living there, rather than through-traffic.

Classifying roads thereby enables the identification of the required characteristics of the road and the traffic it carries, so that appropriate planning and design standards (such as width, geometry, degree of access permitted, junction priority, etc.) can be chosen.

Maroochy's Road and Street Hierarchy is structured in a tiered system to define the primary purpose of each element, its relationship between the road system and the land uses it serves, how it is proposed to be managed and its design requirements. The tiers relate to Function, Role, Management and Design of each roadway type and are defined as follows:

- **Function** – describes the primary purpose of the roadway type, whether to carry through traffic or to provide property access;
- **Role** – describes the relationship between the roadway type and the landuse it serves. This tier of the hierarchy is common to traditional road hierarchy concepts
- **Management** - relates to the policies that need to be introduced to achieve the desired role of each roadway type, such as defining how roadway types should connect in the network and the access management techniques that apply.
- **Design** – outlines the detailed design characteristics that need to be followed to achieve the Function, Role and Management objectives of each element.

Table 4.1.1 summarises traffic and access principles for Maroochy's road hierarchy elements and their objectives

Table 4.1.1 - Maroochy Road Hierarchy Elements and their Objectives.

<table>
<tr><th colspan="10">TIER 1: FUNCTION</th></tr>
<tr><th colspan="5">Roads</th><th colspan="5">Streets</th></tr>
<tr><td colspan="5">• To carry through traffic</td><td colspan="5">• To provide local property access
• To collect local traffic</td></tr>
<tr><th colspan="10">TIER 2: ROLE</th></tr>
<tr><th colspan="3">Arterial Roads</th><th colspan="4">Sub Arterial Roads</th><th colspan="2">Collector Streets</th><th>Local Streets</th></tr>
<tr><td colspan="3">• through traffic movements between settled areas
• longer distance traffic movements within settled areas
• line haul public transport task
• primary freight and dangerous goods routes
• regional / district cycle movements</td><td colspan="4">• connections between local areas and arterial roads
• connections for through traffic between arterial roads
• access to public transport
• through movement of public transport
• regional / district / local cycle movements
• pedestrian movements
• access to developments</td><td colspan="2">• carry traffic having a trip end within a local neighbourhood or district area
• direct access to properties
• access to public transport
• pedestrian movements
• district / local cycle movements</td><td>• direct access to properties
• pedestrian movements
• local cycle movements</td></tr>
<tr><th colspan="10">TIER 3: MANAGEMENT</th></tr>
<tr><th>Highway/ Motorway</th><th>Arterial Roads</th><th>Arterial Main Street</th><th>Distributor Road</th><th>Controlled Distributor</th><th>Sub Arterial Main Street</th><th>District Collector</th><th>Neighbourhood Collector</th><th>Access Street</th><th>Access Place</th></tr>
<tr><td colspan="10">The aim of management policies for these categories will be to facilitate:</td></tr>
<tr><td>• Longer distance traffic movements
• Regionally and nationally significant movements
• Restricted access</td><td>• Longer distance traffic movements through the region
• Main connection between suburbs and employment/ shopping centres</td><td>• Longer distance traffic movements through the region
• Access to commercial properties through town or village centres</td><td>• Connection of local areas to arterial roads
• Access to major developments
• Generally restricted access</td><td>• Connection of local areas to arterial roads
• access to properties (certain existing cases)
• control of some aspects of traffic operations to ameliorate impacts</td><td>• connection of local areas to arterial roads
• access to commercial properties
• preservation of aspects of local amenity in balance with traffic operations</td><td>• connection of residential streets with traffic carrying roads
• access to grouped properties
(new urban only)</td><td>• connection of residential streets with traffic carrying roads
• access to individual adjacent properties</td><td>• access to individual adjacent properties
• access to local area</td><td>• access to individual adjacent properties</td></tr>
<tr><th colspan="10">TIER 4: DESIGN</th></tr>
<tr><td colspan="10">Refer to Section 4.4 for the Design Characteristics for the various elements of Maroochy's Functional Road Hierarchy</td></tr>
</table>

4.2 Streets

The primary function of streets is to provide access to individual properties or developments and collect local traffic. They comprise the bulk of the overall road and street network. Streets should provide access to more major roads, but should not provide for any through traffic movement between major roads.

The street network includes the hierarchy categories of access places, access streets, neighbourhood collector streets and district collector streets. Streets can serve residential, rural, commercial, industrial and rural residential uses. Specific additional and alternative requirements for commercial, industrial and rural residential streets are contained in Sections 4.6, 4.7 and 4.8.

4.2.1 Local Access streets and Access Places

The objective of local access streets and access places is to provide direct access to properties. In residential areas, these must be in a form to encourage a liveable and safe street environment where the motor vehicle is secondary to the pedestrian and cyclist. Through traffic must be discouraged on these streets.

The catchment for Urban Residential Access Streets must be limited to less than the equivalent of 75 detached dwelling lots and therefore traffic volumes must not exceed 750vpd. In urban areas speed environments of 40km/h or less must be achieved to ensure amenity is compatible with abutting residences. To achieve a traffic speed environment less than 40km/h, speed management techniques must be introduced to reduce street leg lengths to 120m or less, provided that end conditions reduce traffic speed to 25km/h or less. On Access Streets in Rural Residential areas, higher speeds of 40km/h to 50km/h are more appropriate.

Access Places are generally short dead-end streets that serve up to 15 lots. The speed environment in these streets is 30km/h or less.

These streets are not appropriate for bus services in urban areas; however school bus services may need to operate on Access Streets in rural areas.

In urban residential areas street widths have traditionally been narrow in the past to achieve increased levels of residential density. These streets have narrow two lane cross-sections. One of the lanes is used for parking and the other is used for traffic movement, or alternatively if there are no vehicles parked on the street both lanes are used for traffic movement. Specific provision for parking (such as marked parking lanes or indented parking bays) was not usually made except in turning areas or where higher density uses exist and kerb space cannot meet anticipated on-street parking requirements.

However, the liveability of these narrow streets has been criticised in recent times with a desire expressed to widen these streets and create more on-street parking areas. Therefore the creation of indented parking bays on one side of the street at a time (alternating from one side to the other) in addition to two travelling lanes is encouraged in these areas. Alternatively, a 7.5m wide carriageway could be considered. Careful design is required to ensure that speed management objectives are still achieved.. A wider reserve is also needed to accommodate the desired cross-section with indented parking spaces.

In commercial and industrial areas higher traffic volumes can be tolerated on access streets. In these areas fewer lots are served, however the nature of industrial and particularly commercial uses in town and village centres have higher trip generating potential per lot compared to urban residential uses. Significantly higher heavy vehicle proportions and tolerances for environmental factors such as noise are generally accepted on Access Streets in Industrial areas.

4.2.2 Neighbourhood Collector streets

The objective of Neighbourhood Collector Streets is to provide for circulation of traffic having a trip end within a local neighbourhood area. These streets are generally located within a specific local area and do not provide for through traffic which does not have a trip end within the area.

These streets provide a connection between Access Streets and traffic carrying roads. In Urban Residential Areas amenity and safety are the most important consideration, as these streets are also intended to provide direct access to properties. Through traffic must be discouraged on these streets and heavy vehicle movement must be limited to occasional local delivery or service trips only.

The catchment area for Urban Neighbourhood Collector Streets must be limited to less than the equivalent of 300 detached dwelling lots and therefore traffic volumes must not exceed 3,000vpd. In Urban Areas speed environments of 50km/h or less are required to ensure compatible amenity with abutting residences is achieved. Speed management techniques must be introduced to reduce street leg lengths to 140m or less, provided that end conditions reduce traffic speed to 25km/h or less, to achieve speeds lower than the nominated maximum 50km/h traffic speed environment. On Neighbourhood Collector streets in Rural Residential areas, higher speeds of 60km/h are more appropriate.

Urban Neighbourhood Collector streets are two-lane, two-way streets that generally consist of a three lane carriageway width to allow for on

street parking. Either kerbside lane can be used for parking. When a kerbside lane is unoccupied by parked vehicles it is able to be used for traffic movement. If If vehicles park adjacent to each other in kerbside lanes, through traffic movement is restricted to one lane, which is considered appropriate in the resulting low speed low volume traffic environment. No specific provision needs to be made for parking such as marked parking lanes or indented parking bays unless the street forms part of a planned bus route.

These streets are suitable for occasional use by buses, such as infrequent school bus services. However, if a regular bus service needs to be allowed for to meet Public Transport Network Planning requirements, an alternative cross-section must be introduced such as the 'Neighbourhood Collector (Bus Route)' cross section outlined in Section 4.5.2.3. This cross section must provide on street parking lanes for cars and bus stops separate from the traffic lanes.

Speed management devices such as speed humps or chicanes that create 25km/h or less spot speeds should not be installed on Bus Routes. Speed management principles for Urban Neighbourhood Collector Streets with bus routes must be achieved by using roundabouts at intersections, or tight bends with angles greater than 60° to limit street leg lengths less than 140m. Curve widening should be provided on tight bends, along with median islands to control vehicle paths. Kerb buildouts should also be provided at regular intervals along Neighbourhood Collector (Bus Route) Streets to narrow the effective width of the street and enhance landscaping opportunities.

Intersections on neighbourhood collector streets must be either priority T, or roundabout controlled and must be spaced at intervals greater than 60m to minimise the potential for conflicting turning movements at intersections and to achieve appropriate reaction times for traffic entering from side streets.

Pedestrian movements need to be catered for off the roadway by constructing a footpath on one side; however traffic volumes should be sufficiently low to enable shared local cycle movements on street.

'Collector streets perform similar roles in Commercial Town and Village centre areas and Industrial areas. Generally higher traffic volumes can be tolerated on streets in these areas (refer Sections 4.6 and 4.7), and fewer lots are served due to the higher trip generating potential of commercial and industrial uses. Significantly higher heavy vehicle proportions and tolerances for environmental factors such as noise would be acceptable on such streets in industrial areas.

4.2.3 District Collector streets

Where required, these streets provide a connection between a district, or group of neighbourhoods, and traffic carrying roads. Due to the size of some development catchments it may be difficult to restrict traffic volumes on neighbourhood collector streets to acceptable environmental amenity levels for frontage residential lots. Traffic flow levels commonly achieved at the major point of access to urban residential neighbourhood areas are 3,000 veh/day but may be up to 7,000 veh/day. This category caters for a group of urban residential neighbourhood areas where traffic volumes of 3,000 veh/day are likely to be exceeded.

These streets are generally needed as a major point of access to urban residential areas with catchments greater than 300 lots and up to 700 lots. They have a maximum speed environment of 60km/h to ensure a reasonable balance of safety, amenity and travel time is achieved. In rural areas speeds of up to 80km/h may be acceptable. Heavy vehicle movement must be restricted to access only in residential areas.

It is desirable that these streets maintain frontage access to minimise potential safety and security concerns by creating casual surveillance. However, due to the higher speed environment and traffic volumes experienced, a range of frontage management techniques must be implemented where frontage access is permitted to address potential traffic noise, amenity and safety impacts. These techniques include building setbacks, fence construction, street alignment and cross section elements, provision for bicycles and on-street parking lanes, sight distances to and from individual driveways and reducing the need for reversing from driveways. Frontage management techniques for District Collector Streets are outlined further in Section 4.4.3.

Bus routes are generally required on district collector streets to achieve public transport planning requirements. Where parking lanes are not provided, indented set-down bays are required at regular intervals to provide for designated bus stops or to enable buses to stop at regular intervals as required.

Footpaths and cycle lanes must be provided on both sides of the street in urban areas, but are not generally required in rural areas.

Intersections must be spaced at no less than 80m to 100m in urban areas to minimise the potential for conflicting turning movements at intersections and to achieve appropriate reaction times for traffic entering from side streets. These streets also have two lane cross-sections.

Speed Management must be achieved by introducing tight bends with angles greater than 60° or roundabouts at intersections to limit street leg lengths to 180m, provided that end conditions of 25km/h or less are achieved. Curve widening should be provided on tight bends, along with median islands to control vehicle paths.

Street planning and construction is undertaken in accordance with Table 4.5.1 of this Policy.

4.3 Roads

The primary function of roads is to carry traffic, and to provide direct access to major developments in specific circumstances, particularly where the adverse amenity impacts of those developments gaining access via local roads would be unacceptable.

The major road network includes main streets, sub-arterial roads, arterial roads and motorways. Many major roads that provide inter-regional access are generally State Controlled Roads.

Main streets, sub-arterial roads and arterial roads are generally used by public transport bus services.

Ideally, there would always be a clear distinction in the road hierarchy between streets and major roads. However, road networks are constantly in a state of transition in respect of:

- Network developments, particularly new connections or substantial upgradings, and
- Changes in traffic flow patterns or volumes resulting from land or road network development.

Consequently, at different interim stages of network and urban development, streets may carry traffic volumes that are undesirably high, or at an undesirably high speed, for a street of that type and/or geometry. Further, because more appropriate alternative routes have not yet been developed, traffic routes with the alignment, cross section or frontage access characteristics of local streets may, for a number of years, function as sub-arterial or arterial traffic routes.

However, new development proposals should not create or exacerbate such circumstances.

Throughout this policy, all roads other than streets shall be treated as roads.

4.3.1 Sub Arterial Main street

This road category is directed at existing situations where a group of commercial land uses exists, generally on both sides of a stretch of sub-arterial road. A decision needs to be made dependent on the value of these uses, whether on these stretches of road the traffic carrying and access functions should coexist, or whether a bypass or parallel route upgrade is warranted.

On these sub-arterials the traffic environment may be restricted to improve the amenity for pedestrians and users of the adjacent developments. Measures may be taken to reduce some traffic use of the road, for example during peak periods, and there may be opportunities to bypass freight movements.

This category is generally appropriate as a bus route, and indented parking bays must be provided where required to reduce delays to through traffic caused by parking manoeuvres. This category is generally inappropriate as a dangerous goods route.

Speeds on these road stretches must be managed to improve amenity for pedestrians and abutting land uses, and should be no greater than 50km/h. Volumes should desirably be no greater than 15,000vpd so that vehicles can manoeuvre to and from on-street parking bays without creating unreasonable delays for through traffic. These roads generally have a two lane cross-section which may be divided or undivided. A central median is desirable to reduce potential delays and conflicts that are caused by vehicles that wait in the middle of the road to turn right into abutting property accesses. A central median treatment should be accompanied by upgrades of nearby intersections (eg. roundabouts or u-turn facilities at traffic signals) to cater for increased U-turns created as a result of eliminating right turn movements into abutting properties.

Pedestrian movement must be catered for on both sides with crossing at controlled points, and with bicycle lanes on road (or wide kerbside lanes or shared bicycle / parking lanes) where possible to avoid mixing with denser pedestrian traffic. Intersections must be controlled by traffic signals or roundabouts, although priority T intersections may also be appropriate. Intersections may be closely spaced along these roads as a result of past planning and land use decisions, however it is desirable that a minimum spacing of 150m be achieved to avoid queue interactions between intersections. The characteristics of Sub Arterial Main Streets are summarised in Table 4.5.1.

4.3.2 Controlled Distributor Roads

These roads are Sub-Arterial Roads and connect between local residential, commercial, or industrial areas and arterial roads. These roads carry through traffic and must be more convenient than using streets. Therefore a high level of efficiency and safety must be achieved. Generally, sub-arterial roads do not serve the longer distance regional movements and terminate at arterial roads rather than provide continuity across arterials.

These roads generally exist in urban areas where past planning decisions have resulted in abutting land uses that are not compatible with the nature of through traffic movement that occurs on sub-arterial roads.

By definition these are roads where an aspect, such as speed, volume, or access is controlled. Controls may be:

- Limiting speed where direct residential frontage exists;
- Limiting volumes to avoid road widening or excessive pressure on abutting uses
- Limiting heavy vehicle usage to protect the amenity of abutting uses;
- Limiting speed and/or usage of particular vehicle types where alignment constraints exist, particularly in rural areas.
- Limiting access points and reducing intensification of traffic on existing access points.

Ideally these roads should not have direct property access to minimise potential delays and conflicts to improve the safety and efficiency of through traffic movement. On roads where access to adjacent land uses exists, measures must seek to achieve safe access operation while retaining the convenience and efficiency of the route for through traffic. This may include the creation of a lower speed environment, but it must not be so low that it will increase the use of lower order streets elsewhere. Other measures include the protection of adjacent parking by indented bays, bicycle paths, and landscaping. Longer term aims must seek to reduce the quantity of accesses when further land use development opportunities arise. Dedicated bicycle lanes are the preferred treatment for on-road cycling, however wide kerbside lanes or shared bicycle / parking lanes, may need to be considered in existing constrained locations.

If side street access or other reasonable alternatives are not available, access for major developments, schools, and commercial uses may be considered along these routes provided access is consolidated and controlled through channelisation or traffic signals. Examples of frontage access treatments are outlined in Section 4.5.4 - frontage access techniques for Sub-arterial and Arterial Roads.

Intersections should desirably be spaced at 300m to achieve efficient traffic movement, however in many instances a minimum spacing of 150m may be required. 150m is a minimum spacing to achieve efficient traffic movement and to minimise queue interactions between adjoining intersections.

Traffic speeds of 60km/h to 70km/h should be achieved on these roads to achieve efficient traffic movement.

On street parking may be required in some locations as required by existing abutting land uses, however on-street parking should be restricted on these roads to improve the efficiency of through traffic movement.

4.3.3 Distributor Roads

Distributor Roads are Sub-Arterial Roads that connect traffic through and around suburbs. They provide a major connection between local residential, commercial, or industrial areas and arterial roads. These roads carry through traffic and must be more convenient than using streets, and therefore a high level of efficiency and safety must be achieved. Generally, sub-arterial roads do not serve the longer distance regional movements and terminate at arterial roads rather than provide continuity across arterials.

These roads are generally needed in new large master planned community areas where a need for a sub-arterial road connection is identified based on broader road network planning principles.

Traffic volumes must not be affected by amenity as abutting land uses must be non-sensitive to traffic noise. In rural areas dwellings must be set well back from the road.

Access must be restricted, and can be managed through, for example, side streets, or rear access lanes or easements. These treatments must be pursued as part of any new development. Access for major developments may be provided along these routes provided that they are controlled through auxiliary lanes and channelisation, roundabouts, or traffic signals where appropriate. In rural areas, individual lot access may be acceptable due to the larger lot sizes and potential greater access spacing. However, auxiliary lanes or wider road shoulders will need to be constructed in accordance with the DMR Road Planning & Design Manual to achieve safer operating conditions near accesses in rural areas.

A higher speed environment is desirable on these roads to achieve a more attractive route than the street system. Speed environments of 70km/h are required in Urban Areas. Higher speeds of 80km/h and 100km/h are more appropriate in rural areas.

These roads may serve as secondary freight routes. Selected routes may be appropriate for dangerous goods movement. They could accommodate coach traffic between centres in rural areas and passenger transport sweeper routes in urban areas. Bus Stops must be located separately from through traffic lanes.

In urban areas, footpaths are required on both sides with pedestrian crossings at controlled points. On road bicycle lanes are incorporated into the road shoulders in both urban and rural areas.

The appropriate intersection types are at grade intersections such as traffic signals, roundabouts and occasional channelised priority T intersections with auxiliary lanes. In rural areas, roundabout or priority control intersections with auxiliary lanes are generally appropriate. Major intersections must be spaced at 300m in Urban or Rural Areas. In Urban areas channelised priority intersections may be acceptable at a minimum 150m spacing.

4.3.4 Arterial Roads

The primary objective of Arterial Roads is to provide major through routes for traffic. All longer distance traffic movement to, from and within settled areas should be directed onto the arterial roads. Arterial roads also serve a line haul function for urban public transport. These corridors should provide for regional and longer-distance cycle movements.

Urban arterials cater for the major movement of town and city traffic and rural arterials cater for traffic travelling between centres.

Generally, arterial roads have high design standards and no direct frontage access. However, there are often instances of existing arterials catering for longer distance traffic, but due to past land use decisions, multiple access points occur, often including residential property accesses. Any works undertaken should be directed towards enhancing the traffic carrying capability and safety, and/or ameliorating traffic impact on adjacent amenity. Longer term access limitations and landuse amalgamation would be pursued so that the traffic carrying role would be progressively enhanced. For urban arterial roads, the policy is to pursue no direct access.

Examples of treatments for minimising direct access to properties fronting Arterial Roads are outlined in Section 4.5.4 - frontage access techniques for Sub-arterial and Arterial Roads.

To facilitate efficient traffic movement, a higher speed environment is desirable. Limits of between 70 and 80km/h in urban areas are recommended, as speeds in excess of this are generally not appropriate with intersections at grade and high traffic volumes. A higher speed environment between 80 and 100km/h can often be achieved in rural areas, which reduces time for the longer distances travelled.

These roads may provide the primary freight routes and often provide secondary freight routes. Selected routes may be appropriate for dangerous goods movement. They accommodate inter urban and inter centre coach traffic and Regional Passenger Transit bus traffic under line haul mode. Any bus stops should be separate from the through traffic lanes.

Pedestrian and shared pathway facilities must be located separately from the carriageways. Additional protection must be provided on high speed facilities. On-road cycling is catered for on wide shoulders. Pedestrian crossings must be provided at signalised intersections, and otherwise at controlled points. Grade separation may be appropriate in some instances.

Intersections are generally configured at grade for this management type. Signalised (preferred) or roundabout control is generally appropriate in urban areas, although high volumes may necessitate grade separation. In rural areas, roundabout or priority control is generally appropriate, although high volumes may necessitate grade separation or in certain instances signalisation. Intersections should be spaced a minimum of 500m in urban areas, and at least 1km in rural areas due to higher speed environments.

Cross section for this management category is generally volume driven, however divided carriageways are desirable to optimise safety and driver comfort. A two lane undivided cross section may be appropriate for a lower volume facility, provided there are sufficient passing opportunities particularly in rural areas.

Abutting land use should preferably be less noise sensitive or urban areas alternatively should include building and site designs that minimise impacts from adjacent traffic flows. In rural areas land uses should be set well back, preferably greater than 30m.

4.3.5 Arterial Main Street

This category is directed at existing situations in urban areas, including town and village centres,where a group of residential and/or commercial land uses exists, generally on both sides of an arterial road. A decision needs to be made, dependent on the value of these issues, whether on these stretches of roadway the traffic carrying and access functions should coexist, or whether a bypass or parallel route upgrade is warranted. If it is decided that these functions should coexist, whether in the shorter or longer term, management measures will need to be developed as part of a local traffic management plan to address this mix.

It must be recognised that traffic volumes may be so high that amenity to roadside activities is limited. However, as these roads are arterials, actions must not seek to moderate traffic volumes other than by bypassing. Speeds on these facilities must be kept sufficiently low to provide for safe pedestrian crossing at controlled points and to maintain environmental amenity for adjacent land uses, but still allow for efficient traffic movement. Streetscaping would assist in ameliorating visual and acoustic land use impacts.

This category is generally appropriate as a bus route, in which case indented bus bays must be provided where appropriate to reduce delay to through traffic. Opportunities must be sought to bypass freight movements. This category is generally inappropriate as a dangerous goods route.

These roads must provide for pedestrian movement on both sides with crossing at controlled points, and with bicycle lanes on road to avoid mixing with denser pedestrian traffic. Intersections may be closely spaced along these facilities due to past planning and land use decisions, although spacing to avoid queue interaction must be a minimum of 150m.

4.4 Highways/Motorways

These roads serve regionally and nationally significant movements and longer distance movements between suburbs or settled areas. To provide for a high standard of travel, speed environments of 100km/h or more are desirable. Frontage access is not appropriate. If it does exist on highways due to historic events, then any works undertaken must enhance the traffic carrying capability of the highway in terms of both volume and speed. Reduction of direct access from abutting land use must be pursued as opportunities for redevelopment arise.

These roads provide the primary freight routes and dangerous goods routes (except through populated areas) and carry coach traffic between centres and regular public transport (RPT) bus traffic under line haul mode. Pedestrian and cycle facilities must be located separately from the carriageways and protected accordingly. Crossing provision must be grade separated.

Grade separated intersections are desirable for all facilities in this management category. Those located on urban facilities must be spaced greater that 2km apart, and on rural facilities between 4 and 8km, with a maximum spacing of 12km. Intersections at grade on existing highways must be spaced no less than 1km and are generally found to be between 1km and 2km in urban environs.

Cross section for this management category is generally volume driven, although divided carriageways are desirable to optimise safety and driver comfort. A two lane undivided cross-section may be appropriate for a lower volume rural highway, provided there are sufficient passing opportunities.

Abutting land use types must be non-sensitive to vehicular traffic and generally must not have frontage or direct access to the roadway. Uses associated with traffic such as highway service centres with amenities may be determined to be appropriate in some rural locations based upon needs assessment. In such cases these would be provided with high quality direct access.

4.5 Summary of Urban Road and street Hierarchy Characteristics

The design and functional characteristics of the different classes of Urban Roads and Urban Residential Streets in the road hierarchy are as set out in Table 4.5.1. These characteristics may be varied for certain commercial/ industrial roads and rural and rural residential roads, as set out in Sections 4.6, 4.7, 4.8 and 4.9. Notwithstanding these characteristics and the acceptable solutions in Sections 4.5.1 and 4.5.2, where works are required to be undertaken on or to extend an existing road or street, the reserve and pavement widths utilised should match those of the existing road or street where they are greater than the acceptable solutions.

Table 4.5.1 Urban Roads and Urban Residential Streets

CRITERION	Roads				
	Arterial Road			Sub Arterial Road	
	Highway/Motorway	Arterial Road	Main Street	Distributor	Controlled Distributor
FUNCTIONAL CHARACTERISTICS					
Dominant Linkage	Regional	Urban City or Town	Urban City or Town	Suburban or District	Suburban or District
Traffic Carrying Function	Longer distance traffic travelling through the region	Major Access route through large Cites and Towns	Major Access route through large Cities and Towns with direct access to adjacent commercial uses	Main Suburban Access Route through new Communities	Main Suburban Access Route through existing areas
Traffic Volume	No limit	15000 to 65000 vpd	15000 to 35000 vpd	3000 to 35000 vpd	3000 to 20000 vpd
Frontage Access	Nil	Restricted, major developments only. Apply frontage access techniques to existing accesses (see Section 4.5.4)	Restricted, access to commercial uses only. Apply frontage access techniques to existing accesses (see Section 4.5.4)	Restricted, only major developments	Restricted, no new access. Apply frontage access techniques to existing accesses (see Section 4.5.4)
Speed Environment	100 km/hr	70 to 80 km/hr	50 or 60 km/hr	60 or 70 km/hr	50 or 60 km/hr
Intersects with:	Arterials, sub-arterials	Highways, arterials, sub-arterials, collectors	Arterials, sub-arterials, collectors	Highways, arterials, sub-arterials, collectors	Highways, arterials, sub-arterials, collectors
Truck Route?	Yes	Yes	Inappropriate except for access	Yes	Yes
Dangerous Goods Route?	Yes	Yes	Inappropriate except for access	Selected routes only	Selected routes only
Public Transport	Routes, not stops	Routes and stops	Routes and stops	Routes and stops	Routes and stops
Cycle Facilities	Regional, off-road only	Off-road and on-road	Off-road and on-road	Off-road and on-road	Off-road and on-road
Pedestrian Facilities	Grade separated, separate from road	Shared paths both sides	Footpaths both sides	Shared paths both sides	Shared paths both sides
FRICTIONAL CHARACTERISTICS					
Intersection treatments	Grade separated	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T
Pedestrian Crossings	Grade separated	Grade separated, signalised or refuge	Signalised or refuge	Signalised or refuge	Signalised or refuge
Minimum Intersection spacing	> 2km	> 500m	> 150m	300m	150m
Reserve Width	40 – 100m	30 – 65m	37-45m	25-35m	20 – 30m
Number of Moving Lanes	Two-way, 2 to 6 lane	Two-way, 2 to 6 lane	Two-way, 2 or 4 lane	Two-way, 2 or 4 lane	Two-way, 2 or 4 lane
Parking Lanes	Breakdown only	Breakdown only	Parking lane or indented parking both sides	Breakdown only	Parking lane with restrictions or indented parking both sides
Typical Longitudinal Drainage	Swale drain	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel
Verge Width (min)	N/A	5m	4.5m	5m	4m
Carriageway cross-section	Volume driven, specific advice must be sought	Volume driven, specific advice must be sought	See Section 4.5.1 for Acceptable solutions	See Section 4.5.1 for Acceptable solutions	See Section 4.5.1 for Acceptable solutions
Desirable Maximum Grade	Specific consideration	5%	5%	8%	8%
Absolute Maximum Grade	Specific consideration	6%	7%	10%	10%

Table 4.5.1 Urban Roads and Urban Residential Streets

CRITERION	Roads	Streets			
	Sub Arterial Roads	Collector Streets		Local Streets	
	Main Street	District Collector	Neighbourhood Collector	Access Street	Access Place
FUNCTIONAL CHARACTERISTICS					
Dominant Linkage	Town or Village Centre	District Cell	Neighbourhood cell	Individual sites	Individual sites
Traffic Carrying Function	Main suburban access route through towns or villages with direct access to adjacent commercial uses	District access and frontage access with special management characteristics	Neighbourhood access and frontage access up to 300 lots	Frontage access up to 75 lots	Frontage access up to 15 lots
Traffic Volume	3000 to 15000 vpd	3000 to 7000 vpd	1000 to 3000 vpd	0 to 1000 vpd	0 to 150 vpd
Frontage Access	Restricted, commercial access only. Apply frontage access techniques to existing accesses (see Section 4.5.4)	In accordance with frontage access techniques (see Section 4.5.3)	Yes	Yes	Yes
Speed Environment	40 or 50 km/hr	60 km/hr	50 km/hr	30 or 40 km/hr	<30 km/hr
Intersects with:	Arterials, sub-arterials, collectors, access streets	Arterials, sub-arterials, collectors, access streets	Sub-arterials, collectors, access streets	Access streets, access places	Access streets
Truck Route?	Inappropriate except for access	Inappropriate except for access	No	No	No
Dangerous Goods Route?	Inappropriate except for access	No	No	No	No
Public Transport	Routes and stops	Routes and stops	Routes and stops	Nil	Nil
Cycle Facilities	Off-road and on-road	Off-road and on-road	On-road (shared)	On-road (shared)	On-road (shared)
Pedestrian Facilities	Footpaths both sides	Shared path one side, footpath one side	Footpaths both sides if bus route, one side otherwise	Nil, unless part of a specific network route	Nil, unless part of a specific network route
FRICTIONAL CHARACTERISTICS					
Intersection treatments	Signal, roundabout, priority T	Roundabout, Priority T, Signal	Roundabout, Priority T	Priority T	Priority T
Pedestrian Crossings	Signalised or refuge	Signalised or refuge	Refuge	No specific provision	No specific provision
Desirable Intersection spacing	150m	80-100m	40-60m	40m	15m
Reserve Width	20-30m	20-25m	16-20m (20m required for bus routes)	16-16.5m	14-14.5m
Number of Moving Lanes	Two-way, 2 lane	2	1 or 2 (2 required on bus routes)	1 or 2	1 or 2
Parking Lanes	Parking lane both sides	Parking lane both sides	2 or 1 (parking lane both sides on bus routes)	Parking unmarked or indented on one side	Parking unmarked or indented on one side
Typical Longitudinal Drainage	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel
Verge Width (min)	4m	5m	4.25-4.5m	4.25m	4.25m
Carriageway cross-section	See Section 4.5.1 for Acceptable solutions	See Section 4.5.2 for Acceptable solutions	See Section 4.5.2 for Acceptable solutions	See Section 4.5.2 for Acceptable solutions	5.5-6m
Desirable Maximum Grade	8%	8%	12%	12%	12%
Absolute Maximum Grade	10%	12%	16% (12% required on bus routes)	16%	16%

Notes to Table 4.5.1

a) There will be existing routes that do not have all of the characteristics expected for their role in the hierarchy, which is primarily dependent on function of the route in the network, rather than its design or construction characteristics. However, newly proposed roads will be expected to have all the listed characteristics.

b) Specific reference should be made to the acceptable solutions in Sections 4.5.1 and 4.5.2 for specific cross-section requirements.

c) It is desirable to retain the frontage of residential access to district collector routes. The provision of parking lanes and other measures to maintain appropriate safety and amenity standards, such as those outlined in Section 4.5.3 will be required.

d) In the planning of streets where high density residential development is likely, particular attention will be necessary to the provision of on-street parking, usually requiring wider pavements and reservations. Assuming that the off-street parking requirements described in Schedule 2 to the Transport, Traffic and Parking Code are achieved, on-street parking must be provided at a minimum rate of 2 spaces per 3 detached houses, plus one space per three 3 or 4 bedroom attached dwelling units, plus one space per four 1 or 2 bedroom attached dwelling units.

e) Frontage access, which is described as restricted, will be carefully controlled to minimise the number, location and external impact of access points, particularly if site access is also available to other roads. This may necessitate shared site access driveways, or the construction of controlled site access intersections. Site access will only be permitted where it can be demonstrated that the access proposed will not have an unreasonable impact on the safety and operation of the traffic, transport, pedestrian and cyclist networks. Acceptable solutions are outlined in Section 4.5.

f) Where access is described as restricted, median widths will depend on signage or traffic control requirements, and the need for the incorporation of turn lanes.

g) To achieve the speed environments described in Table 4.5.1 for urban residential streets, speed management techniques, possibly including speed control devices, will be necessary, in a fully integrated design.

h) Verges are measured from the kerb invert (outside edge of shoulder in the case of swale drains) to the reserve boundary, excluding cut / embankment batter slopes. Verge widths will depend on the needs for off-road cyclist facilities, pedestrian paths and service corridors.

i) Reserve widths will need to be increased accordingly where cut / embankment batter slopes are required to achieve the road formation.

j) Footpaths wider than 1.5 metres and shared paths wider than 2.5 metres will be required where high pedestrian and/or cyclist volumes are expected. Verge and reserve widths are to be increased accordingly. In commercial and high activity areas, verges should be fully paved. This is to ensure consistency with Section 7.

k) Footpaths should be located to form part of a logical and convenient pedestrian network. Footpaths should be provided on both sides of Neighbourhood Collector Streets and on one or both sides of Access Streets on sections where pedestrian demand is likely due to the layout of the street and pedestrian network and/or the location of activity nodes and facilities (eg. adjacent to or near a school, bus stop, neighbourhood centre, or at a roundabout).

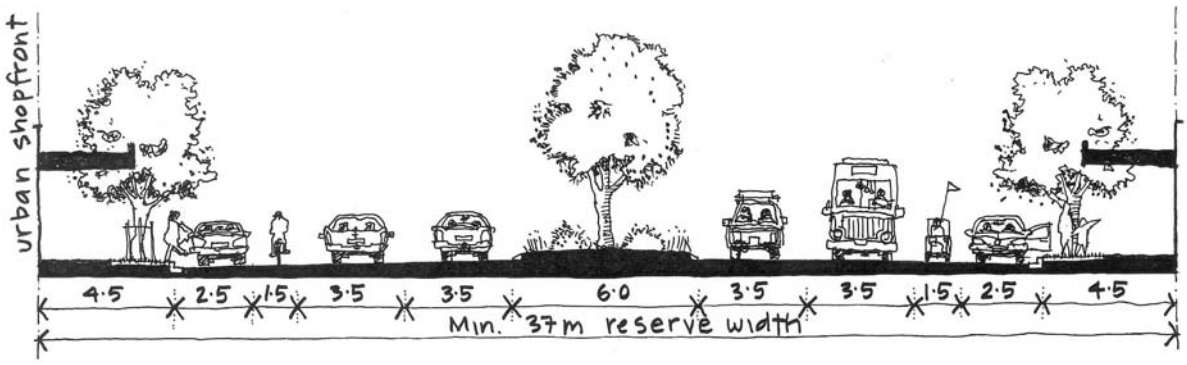
l) Under constrained circumstances and where limited heavy vehicle use is expected, grades greater than 16% but no greater than 20% may be accepted on Access Streets and Places for one short length of 50m over the entire street length.

m) Grades approaching intersections must not exceed 3% over the extent of the required stopping sight distance.

4.5.1 Acceptable solutions for Urban Road Cross-sections

The following cross sections are acceptable solutions for the various types of Urban Road classifications outlined in the Urban Road and Residential Street Hierarchy Table 4.5.1.

4.5.1.1 Arterial Main Street



Notes:

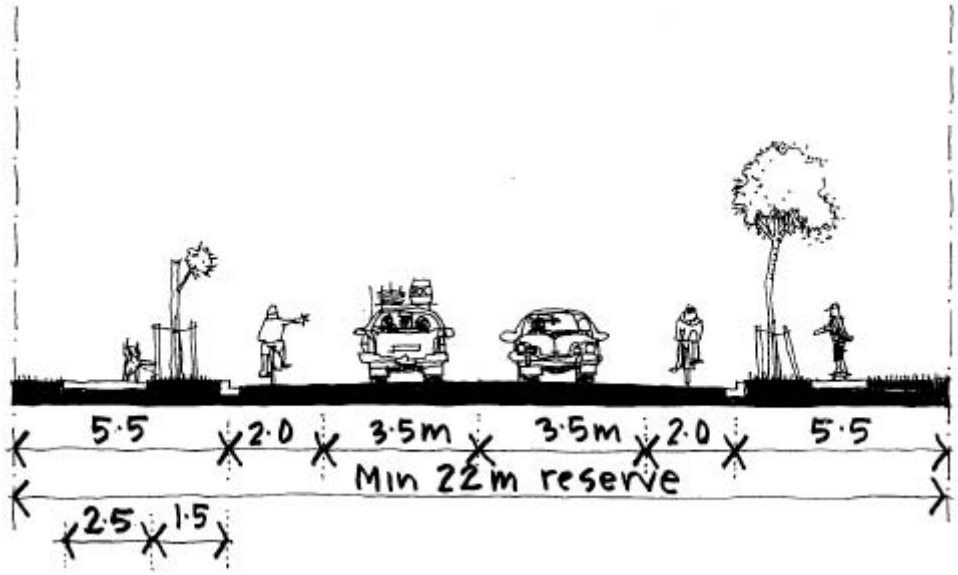
1. This cross section generally applies where 4-lane divided Arterial Roads pass through commercial precincts in Town and Village Centres. Many established Arterial Main Streets may differ from this illustrated example.
2. Cycle lanes may not be achievable on some existing reserves through existing developed areas. All efforts must be made to achieve an alternative on-road treatment such as advisory treatments or wide kerbside lanes (where there is no on-street parking), in accordance with Austroads Guide to Traffic Engineering Practice Part 14. Where a suitable on-road treatment cannot be achieved, an alternative convenient route must be provided. Off-road facilities within the same corridor are not desirable in main streets to avoid mixing with denser pedestrian traffic that generally exists in these areas.
3. Car park connections between rear car parks must be achieved to assist in minimising on-street parking activity and to assist in minimising the quantity of direct access points.
4. On street parking bays may be indented. Parking bays must be individually marked in accordance with AS2890.5 and the Queensland MUTCD. Parallel parking bays must be marked in a 'paired' format to enable vehicles to arrive in parking bays in a forward motion. This arrangement is needed to reduce delays caused by reverse parking manoeuvres. 'Paired' parking format means that parking bays are provided in groups of 2 with a 1 .5m gap between each pair of bays. The minimum length of each parking bay is 6.5m.
5. Parking is generally parallel but may also be angle where space in the reserve is available to achieve angle parking on-street in accordance with AS2890.5
6. The design vehicle for Arterial Main Streets in an AUSTROADS Semi-trailer.
7. Verges have footpaths paved for the full width in accordance with applicable Urban Design Guidelines.
8. A 6m wide median is necessary for landscaping, pedestrian refuge, and to accommodate right turn lanes at intersections.

4.5.1.2 Distributor Road (4 lane, No direct Access)

Notes:

1. Distributor Roads are generally provided as new roads in large Master-planned Community Areas where a need is identified from broader road network planning principles.
2. This typical divided cross-section is required where traffic volumes up to 35,000vpd are anticipated.
3. Direct property access and kerbside parking are restricted on the Distributor Road cross-section. Access to major development sites may be acceptable provided that the access is controlled through channelisation and turn lanes, with traffic signals where necessary, and the nominated intersection spacing is achieved.
4. Potential noise impacts are likely to arise in the vicinity of noise sensitive uses along these roads. For assessment of noise impacts and requirements for noise attenuation refer to *Planning Scheme Policy No. 7 - Acoustic Environment Assessment*.
5. On road cycle lanes are incorporated into the road shoulder and must be continued through intersections.
6. This road may be constructed in stages. One carriageway may be constructed to enable operation as a two lane two-way road as the first stage. This will require the overall carriageway width of the first carriageway to be increased to a minimum of 9.6 metres to allow 2 x 3.3 metre traffic lanes and 2 x 1.5 metre shoulders / on road cycle lanes in the interim. The second carriageway or duplication may occur at a later date when traffic conditions are likely to require the construction of the second carriageway.
7. The design vehicle for a Distributor Road is an AUSTROADS Semi-trailer.
8. Semi-mountable kerb is required in speed environments > 60km/h.

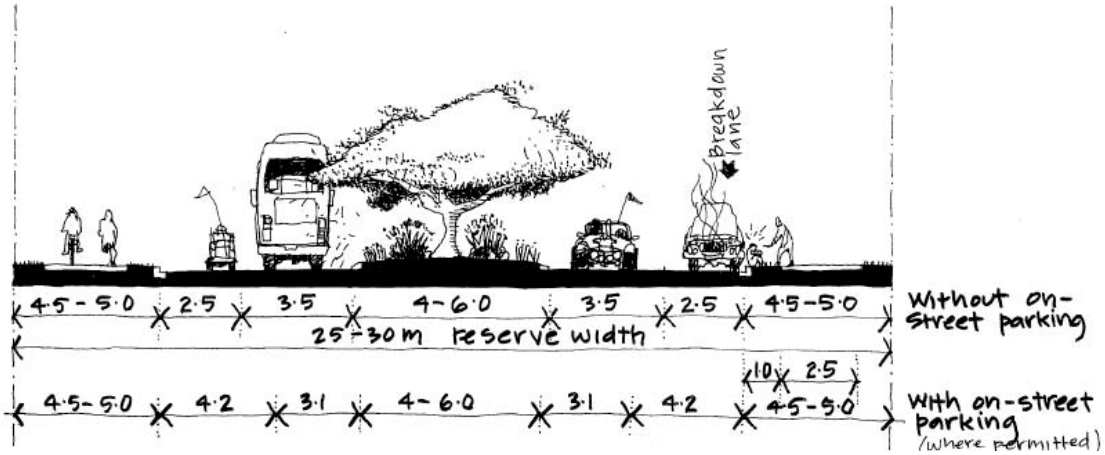
4.5.1.3 Distributor Road (2 lane, no direct access)



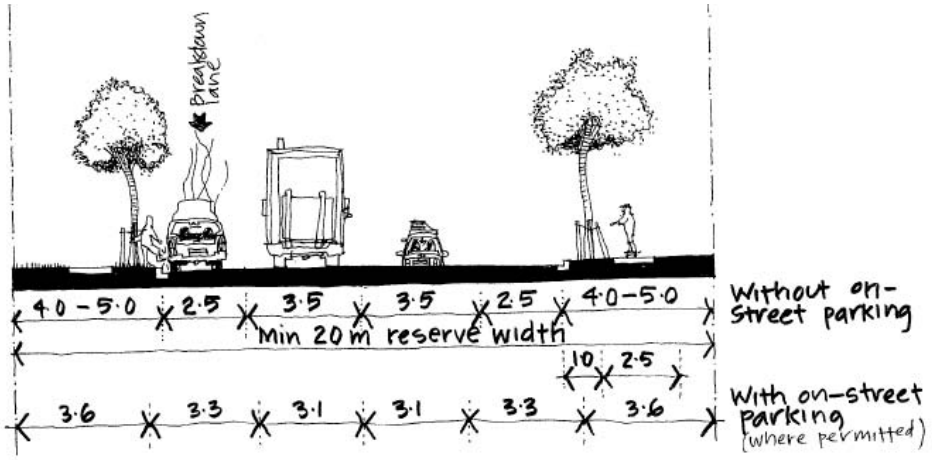
Notes:

1. Distributor Roads are generally provided as new roads in large Masterplanned Community Areas where a need is identified from broader road network planning principles.
2. This 2 lane cross section is appropriate for traffic volumes up to 15,000vpd.
3. Direct property access and kerbside parking are restricted on this Distributor Road cross-section. Access to major development sites may be acceptable provided that the access is controlled through channelisation and turn lanes, roundabout, or traffic signals and the nominated intersection spacing is achieved.
4. Potential noise impacts are likely to arise in the vicinity of noise sensitive uses along these roads. For assessment of noise impacts and requirements for noise attenuation refer to *Planning Scheme Policy No. 7 - Acoustic Environment Assessment*
5. The design vehicle for a Distributor Road is an AUSTROADS Semi-trailer.
6. On road cycle lanes are incorporated into the road shoulders and must be continued through intersections.
7. Widening is required at intersections to achieve additional turning lanes and channelisation is needed to manage expected traffic demands. This will require increased reserve widths. Intersection geometric requirements must be determined in accordance with the DMR Road Planning & Design Manual.
8. Semi-mountable kerb is required in speed environments > 60km/h.

4.5.1.4 Controlled Distributor Road (*Preferred*)



4.5.1.5 Alternative Controlled Distributor Road *(Constrained Reserves in Existing Developed Areas)*

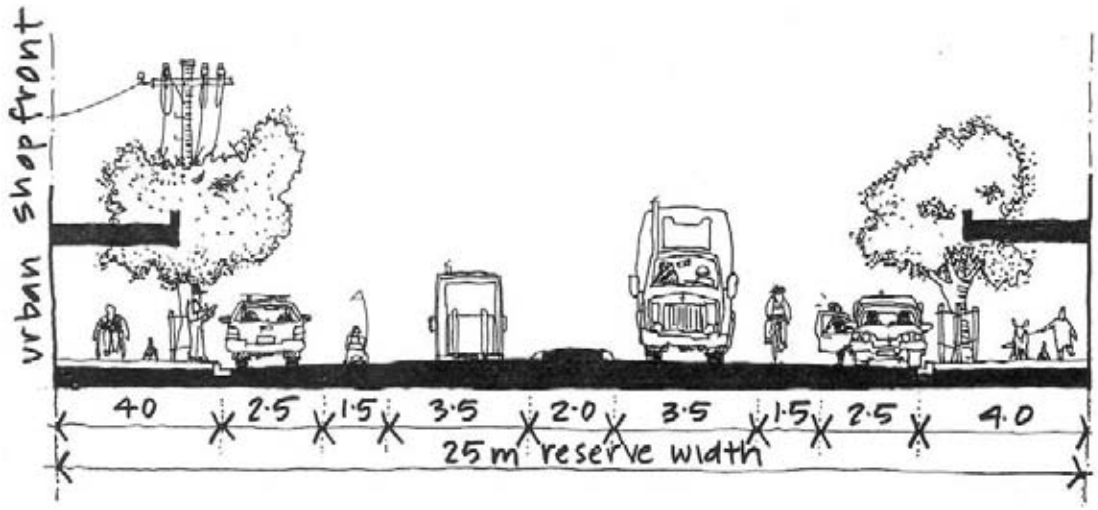


Notes:

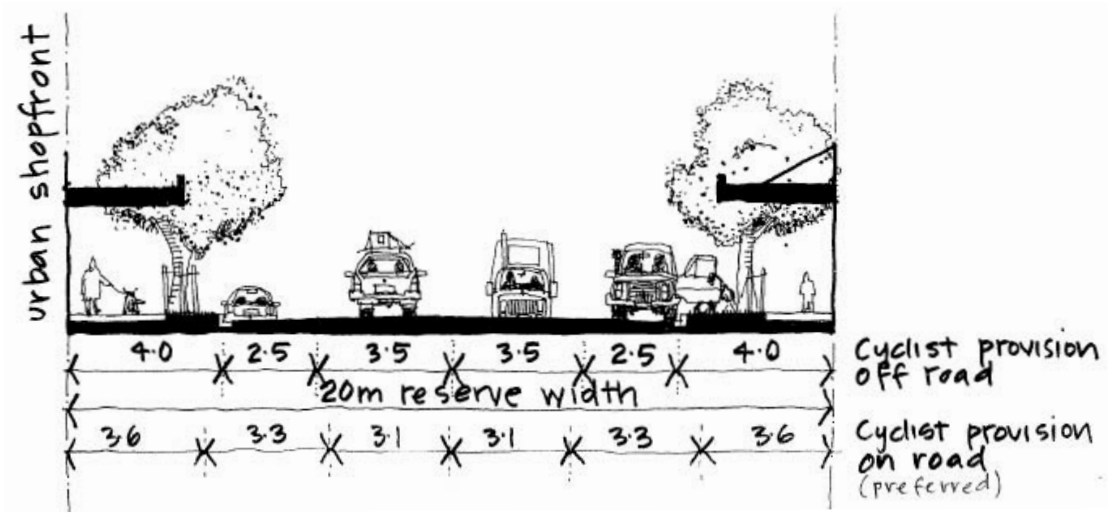
1. Controlled Distributor Roads are generally existing roads through Urban Areas that have a Sub-Arterial Road Function, and direct access points exist for historical reasons.
2. Frontage access techniques in accordance with Section 4.5.4 must be achieved for new development that fronts Controlled Distributor Roads.
3. The Alternative Controlled Distributor Road (4.5.1.5) cross-section represents the absolute minimum widths for the various cross-sectional elements and should only be used in existing constrained reserves where the presence of existing continuous development prevents a wider reserve from being obtained. All efforts must be made to achieve a reserve width and cross-sectional element widths as close to the preferred Controlled Distributor Road (4.5.1.4) as possible
4. Potential noise impacts are likely to arise in the vicinity of noise sensitive uses along these roads. For assessment of noise impacts and requirements for noise attenuation refer to Planning Scheme Policy No. 7 - Acoustic Environment Assessment.
5. Controlled Distributor Roads often have existing parallel kerb side parking where demanded by adjacent uses. This parking should not be maintained adjacent to new developments and should be restricted or used for breakdown purposes to improve the safety and efficiency of traffic movement.

6. Cycle lanes may not be achievable on some existing carriageways through developed areas, particularly where on-street parking is retained for historical reasons. All efforts must be made to achieve an alternative on-road treatment such as advisory treatments (where there is on-street parking) or wide kerbside lanes (where there is no on-street parking), in accordance with Austroads Guide to Traffic Engineering Practice Part 14. Where a suitable on-road treatment cannot be achieved, off-road shared paths (2.5m widths) must be provided on both sides of the road.
7. The design vehicle for Controlled Distributor Roads is an AUSTROADS Semi-Trailer.
8. The desirable minimum verge width is 5.0m, however a 22m wide reserve is needed to achieve this. Where a 22m wide reserve cannot be achieved in existing developed areas, the absolute minimum verge width is 3.5m.
9. Widening is required at intersections to achieve additional turning lanes and channelisation is needed to manage expected traffic demands. This will require increased reserve widths. Intersection geometric requirements must be determined in accordance with the DMR Road Planning & Design Manual.
10. Semi-mountable kerb is required in speed environments > 60km/h.

4.5.1.6 Sub-Arterial Main Street (Preferred)



4.5.1.7 Alternative Sub-Arterial Main Street (Constrained Reserves in Existing Developed Areas)



Notes:

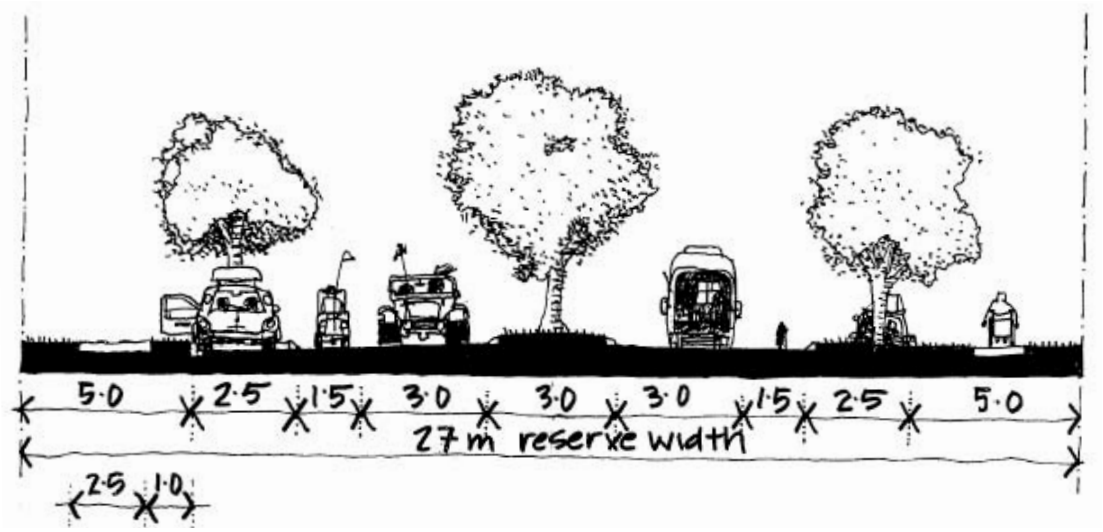
1. These cross-sections generally exist where sub-arterial roads pass through town and village centre precincts. These are typical examples only. Many established main streets may differ from these illustrations. Each of the desirable reserve and cross-sectional element widths of the preferred Sub-Arterial Main Street cross-section 4.5.1.6 should be achieved wherever possible.
2. Where cycle lanes cannot be achieved on established main streets, all efforts must be made to achieve an alternative on-road treatment such as advisory treatments (such as shown on the Alternative Sub-Arterial Main Street above) or wide kerbside lanes (where there is no on-street parking), in accordance with Austroads Guide to Traffic Engineering Practice Part 14. Where a suitable on-road treatment cannot be achieved, an alternative convenient route must be provided. Off-road facilities within the same corridor are not desirable in main streets to avoid mixing with denser pedestrian traffic that generally exists in these areas.
3. Car park connections between rear carparks must be achieved to assist in minimising on street parking activity and to minimise the quantity of direct access points.

4. On street parking lanes may be indented. Parking bays must be individually marked in accordance with AS2890.5 and the MUTCD. Bays must also be marked in a 'paired' format to minimise on street reverse parking manoeuvres by enabling vehicles to arrive in parking bays in a forward movement. 'Paired parking' format means that parking bays are provided in groups of two with a 1.5m gap between each pair of bays. The minimum length of each parking bay is 6.5m.
5. Right turns must be minimised or restricted by a double line or desirably by a 2.0m wide median if space permits. However, right turns must only be restricted if an alternative u-turn can be performed safely at a nearby roundabout or traffic signals.
6. Parking is generally parallel but may also be angle where space in the reserve is available to achieve angle parking on street in accordance with AS2890.5.
7. The design vehicle for sub-arterial main streets is an AUSTROADS semi-trailer.
8. Verges have footpaths paved for the full width in accordance with applicable Urban Design guidelines.

4.5.2 Acceptable solutions for Urban Residential street Cross-sections

The following cross sections provide acceptable solutions for the various types of Urban Road classifications outlined in the Urban Road and Residential Street Hierarchy Table 4.5.1.

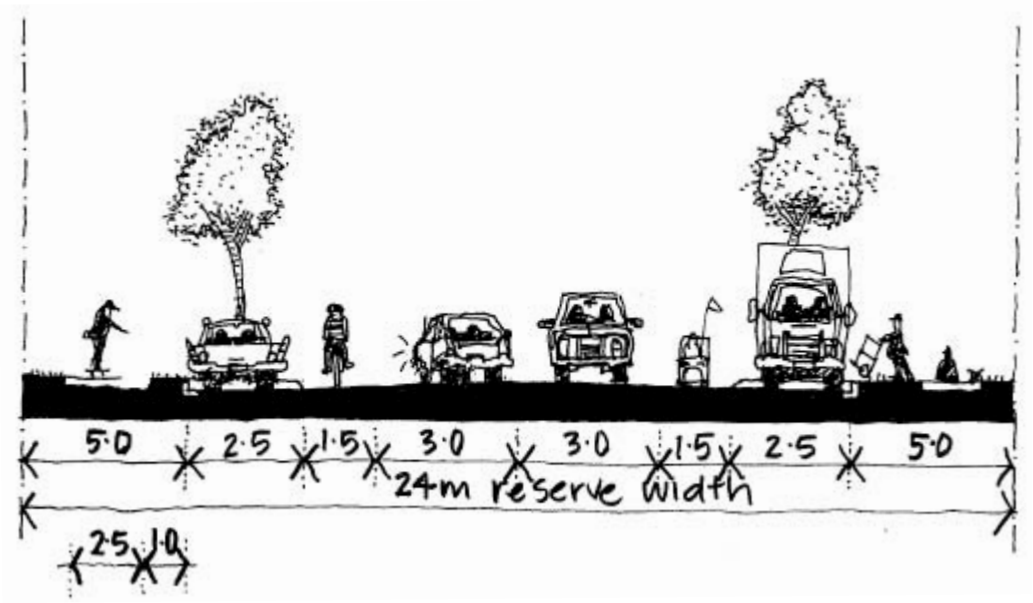
4.5.2.1 District Collector (*Divided*) – Up to 7000 vpd



Notes:

1. This cross-section applies where traffic volumes up to 7000 vpd are anticipated.
2. Access management techniques in accordance with Section 4.5.3 must also be applied to this cross-section.
3. Speed control devices must not be used on District collector streets. Target maximum design speeds must be achieved by tight curves (min inside radius 10m) or roundabouts at intersections (with minimum outer radius of 15m).
4. The kerb must be built out into the parking lanes to create landscaped kerb buildouts at regular intervals of approximately 80m. Driveways must be constructed as part of the development roadworks for lots with a kerb buildout on their frontage.
5. Where parking lanes are not provided, indented bus stops must be constructed at convenient locations, usually at 120m – 200m intervals.
6. Sufficient sight distance to approaching traffic must be achieved for on-street parking and potential driveway locations near bends.
7. Edge lines, buildouts and landscaping visually reduce road width.
8. Where the speed limit on District Collector Streets is greater than 60km/h, the minimum bike lane width must be 2 metres.
9. Design vehicle for typical District Collectors is AUSTROADS large rigid truck/bus.

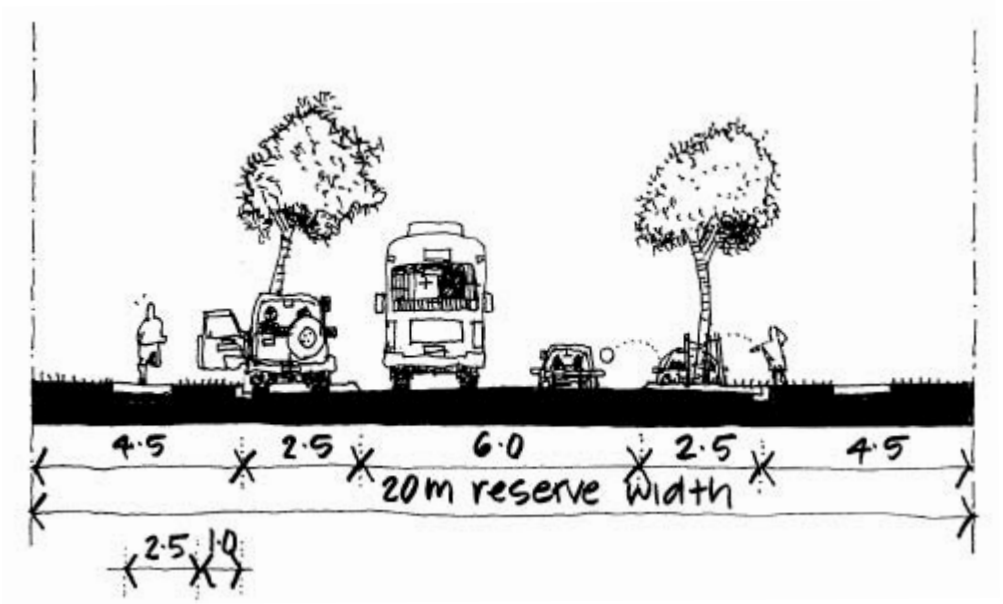
4.5.2.2 District Collector – Up to 5000 vpd



Notes:

1. This cross-section applies where traffic volumes up to 5,000 vpd are anticipated.
2. Access management techniques in accordance with Section 4.5.3 must be applied to this cross-section also.
3. Speed control devices must not be used on District Collector Streets. Target maximum design speeds must be achieved by using tight curves (min inside radius 10m) or roundabouts at intersections (with min outer radius of 15m).
4. The overall carriageway is typically 11 metres wide. The kerb must be built out into the parking lanes to create landscaped kerb buildouts at regular intervals of no more than approximately 140m. Driveways must be constructed as part of the development roadworks for lots with a kerb buildout on their frontage. Kerb buildout locations must not prevent a through vehicle from passing to the outside of a vehicle waiting to turn right into a driveway.
5. Where parking lanes are not provided, indented bus stops must be constructed at convenient locations, usually at 120m – 200m intervals.
6. Sufficient sight distance to approaching traffic must be achieved for on-street parking and potential driveway locations near bends.
7. Edge lines, buildouts and landscaping visually reduce road width.
8. Where the speed limit on District Collector Streets is greater than 60km/h, the minimum bike lane width should be 2 metres.
9. Design Vehicle for *typical* District Collectors is AUSTROADS Large Rigid Truck/Bus.

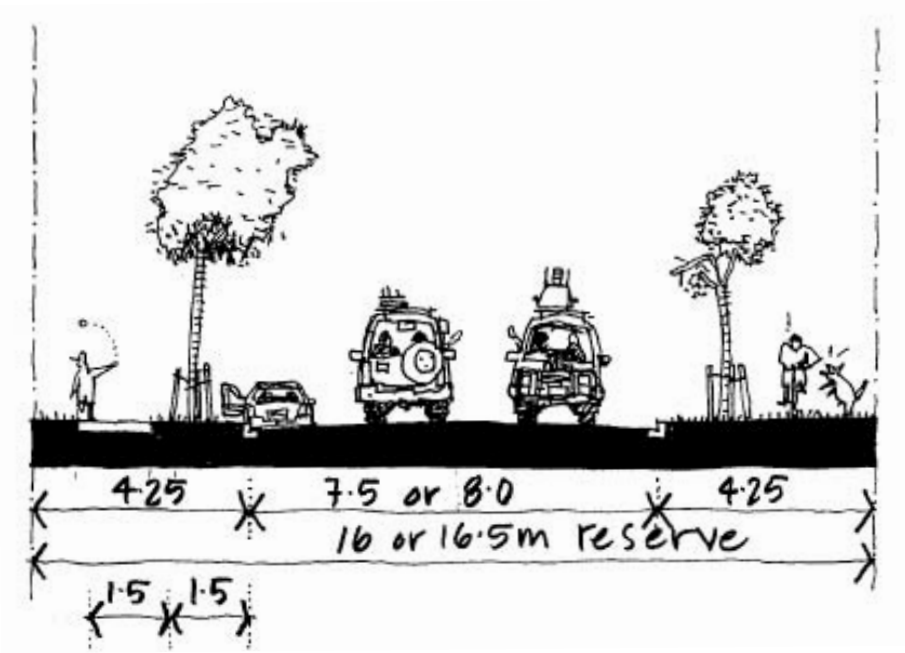
4.5.2.3 Neighbourhood Collector Street (Bus Route)



Notes:

1. A minimum 1.8m wide concrete footpath is required on both sides of Neighbourhood Collector Streets with Bus Routes.
2. Where a shared off-road path needs to be accommodated within the reserve of a Neighbourhood Collector Street to meet wider cycle network planning needs, the verge must be widened to a minimum 5.0m and the reserve width must be widened to a minimum 20.5m.
3. Speed control devices must not be used on bus routes. Target design speeds must be achieved by using tight curves (min inside radius 10m) or roundabouts at intersections (with a minimum outer radius 15m).
4. The overall carriageway is typically 11 metres wide. The kerb must be built out into the parking lanes to create landscaped kerb buildouts at regular intervals of no more than approximately 120m. Driveways must be constructed as part of the development roadworks for lots with a kerb buildout on their frontage.
5. Sufficient sight distance to approaching traffic must be achieved for on-street parking and potential driveway locations near bends.
6. Edge lines, build-outs and landscaping visually reduce road width.
7. Design vehicle for typical bus routes is AUSTROADS Large Rigid Truck/Bus.

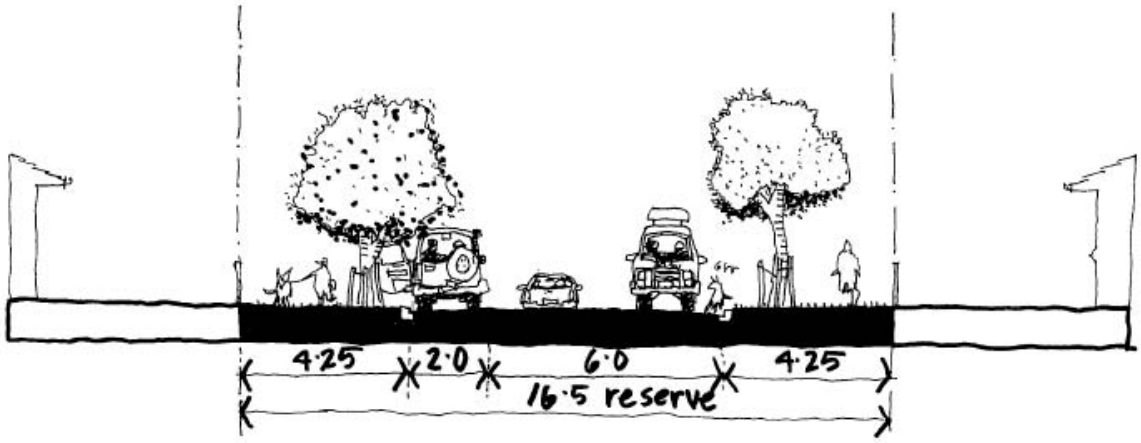
4.5.2.4 Neighbourhood Collector Street (Non-Bus Route)



Notes:

1. A 16.5m wide reserve is required if an 8.0m wide carriageway is used.
2. 8.0m wide carriageways must be used where a maximum design speed of 50 km/hr is achieved.
3. 7.5m wide carriageways must be used where a maximum design speed of 40 km/hr is achieved.
4. Where the speed limit on Neighbourhood Collector Streets is greater than 50km/h (e.g. some existing streets), a cross-section similar to the District Collector Street should be used.
5. A minimum 1.8m wide concrete footpath must be constructed on both sides of all Neighbourhood Collector Streets. Its alignment must be offset from the carriageway by more than 1.5m. Side of street to be constructed is optional, however it should be located where it is most convenient for use.
6. Where a shared off-road path needs to be accommodated within the reserve of a Neighbourhood Collector Street to meet wider cycle network planning needs, the verge must be widened to 5.0m and the reserve width must be widened to 17.5m

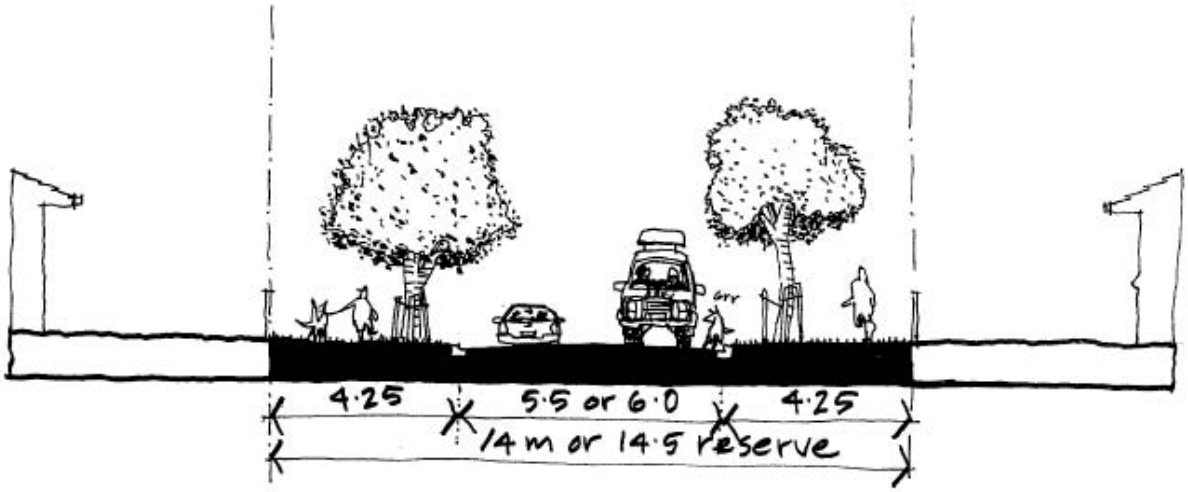
4.5.2.5 Access Streets



Notes:

1. 6.0m wide carriageways must be used where a maximum design speed of 40 km/hr is achieved.
2. Where the speed limit on Access Streets is greater than 50km/h (e.g. some existing streets), a cross-section similar to the District Collector Street should be used
3. A minimum 1.8m wide concrete footpath must be constructed on one side of all Access Streets. Its alignment must be offset from the carriageway by more than 1.5m.
4. On-street parking in Access Streets is desirably indented on one side only with indents alternating from one side to another along the street. An exception to this requirement will exist where indented parking areas are needed on both sides to meet on street parking requirements where small lots or lots with narrow frontages (less than 17m) exist. On street parking spaces are provided at a minimum rate of 2 spaces per 3 detached dwellings.
5. The road reserve will need to be widened to 16.5m where indented parking spaces are provided.

4.5.2.6 Access Places and alternative Access Street solution



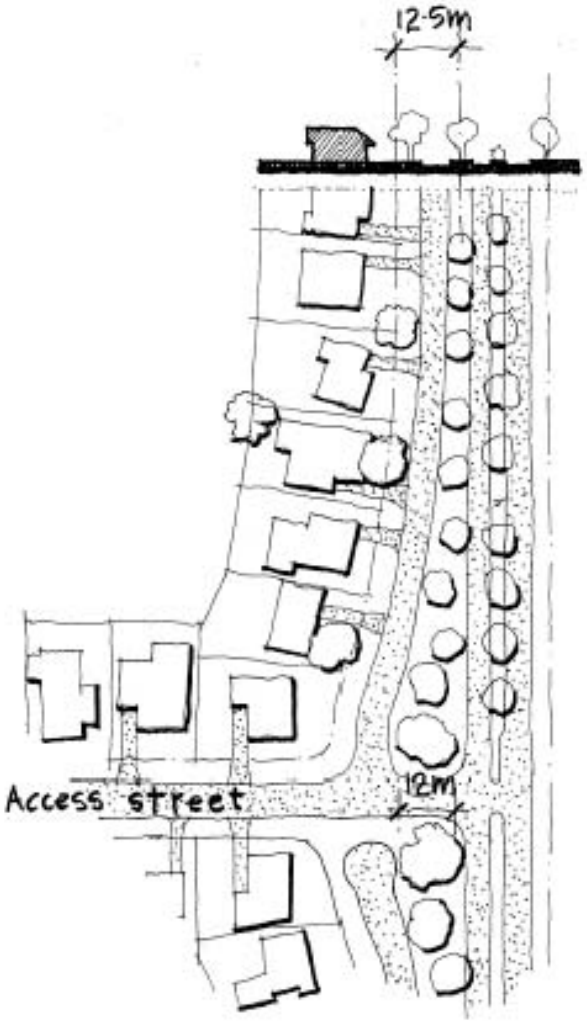
Notes:

1. 14.5m wide Reserve is required if 6.0m wide carriageway is used.
2. 6.0m wide carriageways must be used where a maximum design speed of 40 km/hr is achieved.
3. 5.5m wide carriageways must be used where a maximum design speed of 30 km/hr is achieved.
4. Access Places have lower traffic volumes and a lower maximum design speed of 30 km/hr. Therefore a reserve width of 14m and carriageway width of 5.5m applies to Access Places.
5. On-street parking in Access Places must be achieved at minimum rate of 2 spaces per 3 detached dwellings. Indented parking areas may be needed to meet these demands where lots with narrow frontages exist.
6. The road reserve will need to be widened to 16.5m where indented parking spaces are needed.

4.5.3 Access Management Techniques for District Collector streets

The following access management techniques are examples of acceptable solutions to manage the potential impacts of traffic noise, and safety and residential amenity associated with residential uses having direct access onto District Collector Streets. At least one or more relevant treatments must be introduced where development proposes to have frontage to a District Collector Street.

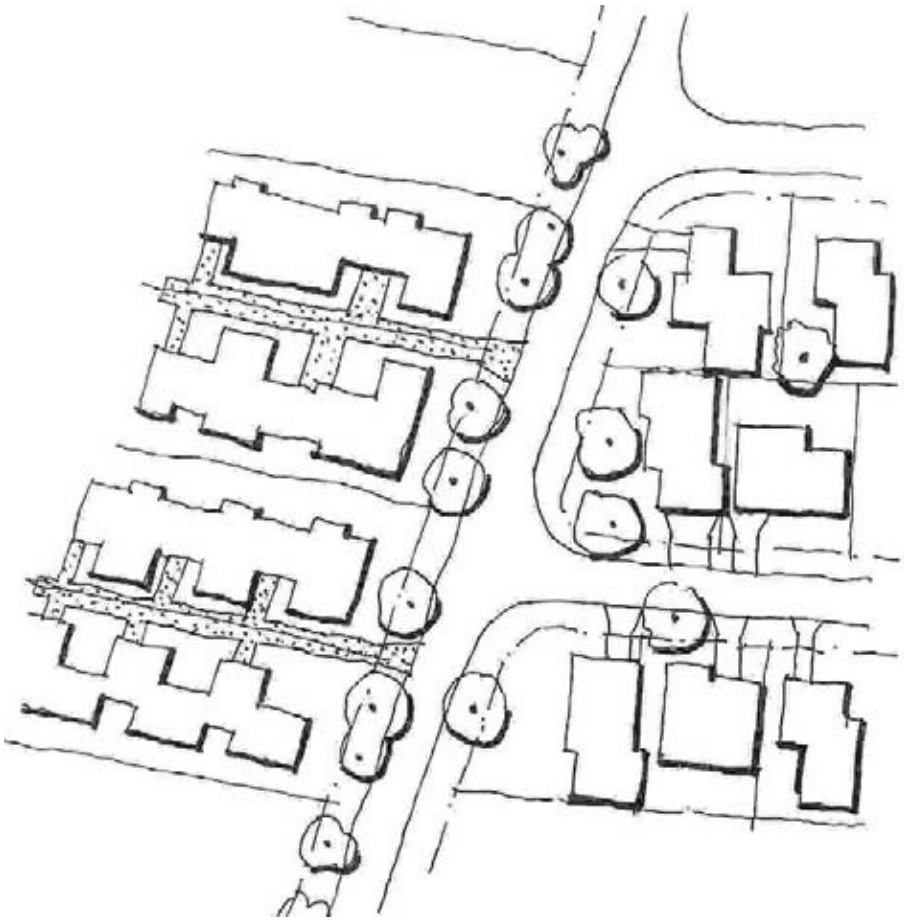
4.5.3.1 Service Road (5,000 - 7,000vpd)



Notes:

1. This option is used where traffic volumes are expected to be between 5,000vpd and 7,000vpd on District Collector Streets, and where proximity of non-residential uses may result in increased frictional effects of slower moving traffic, such as near a local shopping centre or community activity centre.
2. Road reserve widths must be widened an additional 12.5m on each side of a typical District Collector Street cross-section where Service Roads are proposed.
3. Service Roads must have a 4.5m wide verge width with a 6.0m wide carriageway.

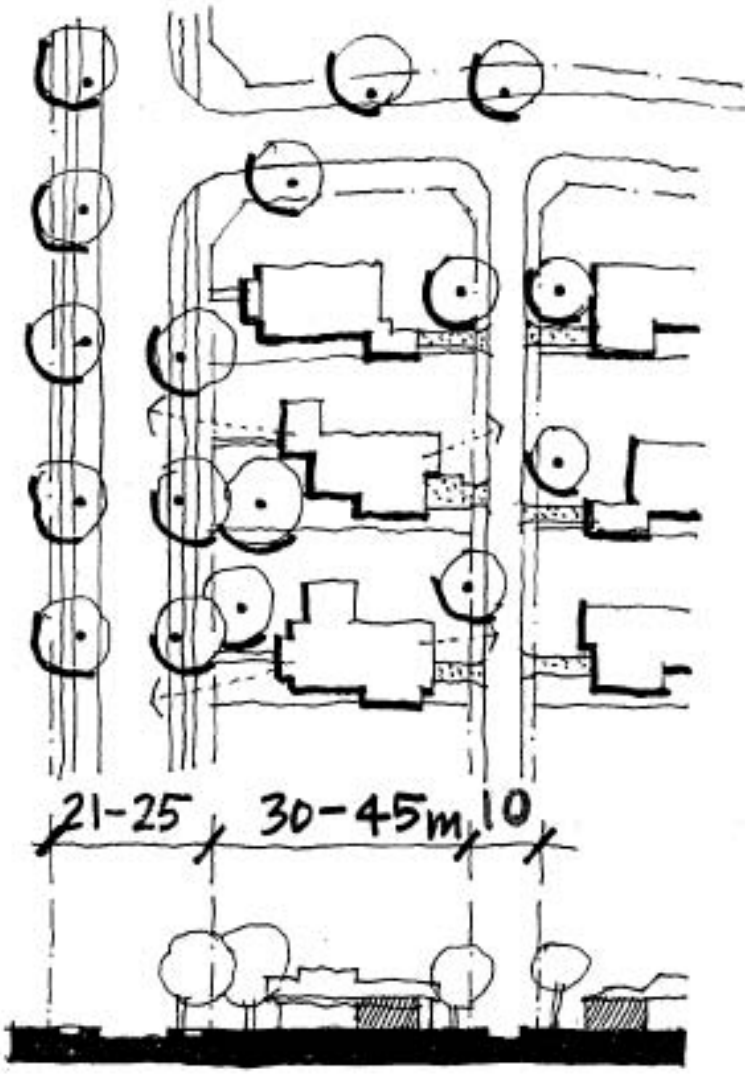
4.5.3.2 Shared Driveways (3,000 – 5,000vpd)



Notes:

1. This option must be implemented where group housing or multi-unit residential developments are proposed on District Collector Streets that are anticipated to carry between 3,000 and 5,000vpd.
2. It is intended to improve safety by reducing the number of potential conflicts on the road system to one point. It also reduces interference with through traffic movement by providing for vehicle parking and manoeuvring away from the road.
3. This technique must be incorporated into structure plans or applications for reconfiguring a lot to ensure that driveways are located safely and at appropriate spacings to minimise potential conflicts near intersections or other proposed or existing driveways, and to minimise conflict with through traffic movement.
4. Driveways must be located in accordance with an approved plan. Agreements are required between adjacent landowners (for reciprocal rights of access) at the planning approval or building approval stages as appropriate.
5. Shared driveways shall be considered as intersections for the purposes of determining driveway and intersection spacing along a District Collectors

4.5.3.3 Rear Lane Access (3,000 – 7,000vpd)



Notes:

1. This option is implemented on District Collector streets carrying between 3,000vpd and 7,000vpd to minimise the impacts of access and parking along the street frontage.
2. Houses address the District Collector street with pedestrian access from the main street frontage and vehicle access and parking activity occurring via the rear lane system.
3. Rear lanes are achieved by construction of a 5.5m wide carriageway in a 10m wide reservation.
4. Increased setbacks greater than 10m along the District Collector Street must also be introduced to reduce noise nuisance and improve safety and amenity.

4.5.3.4 On-site Turnaround (3,000 – 5,000vpd)

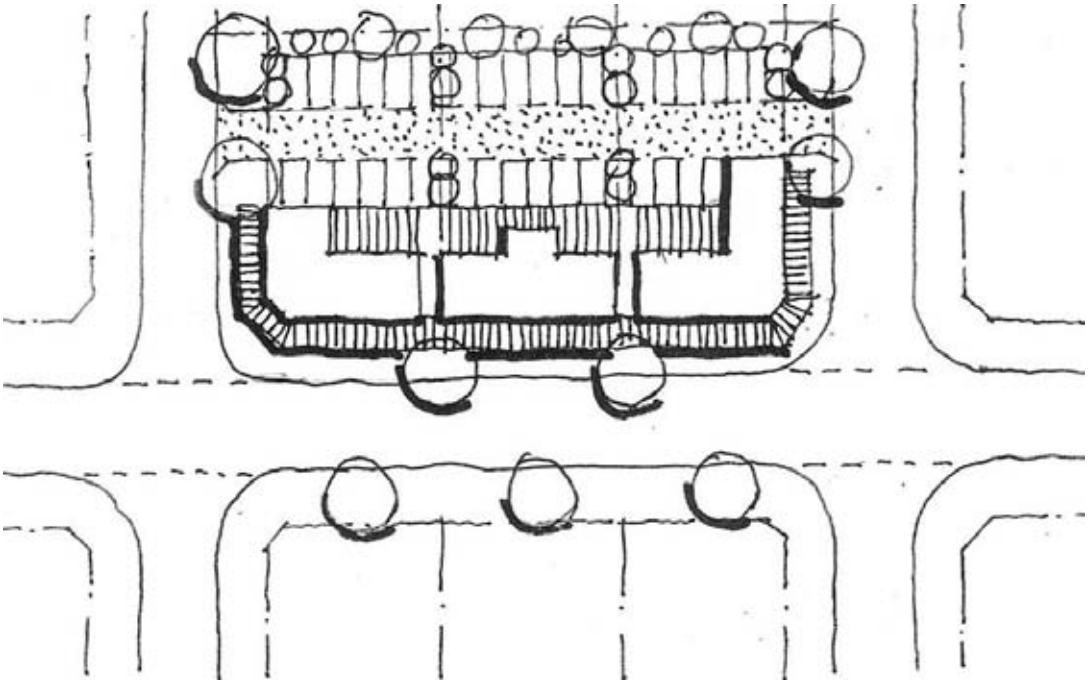
This technique requires the construction of a turnaround facility on site to ensure that vehicles can exit the site in a forward gear.

This technique must be incorporated into Structure Plans or applications for reconfiguring a lot to ensure that turnaround facilities are provided upon planning approval or building approval as appropriate.

4.5.4 Access Management Techniques for Arterial and sub Arterial Roads

As described in Section 4.3, direct property access to Arterial and Sub-arterial Roads is not preferred. The following Access Management Techniques are examples of acceptable solutions to manage the potential impacts of traffic noise, and safety and to reduce the number of direct access points from properties that have existing direct access to Arterial and Sub-arterial Roads, in particular Main Streets and Controlled Distributor Roads.

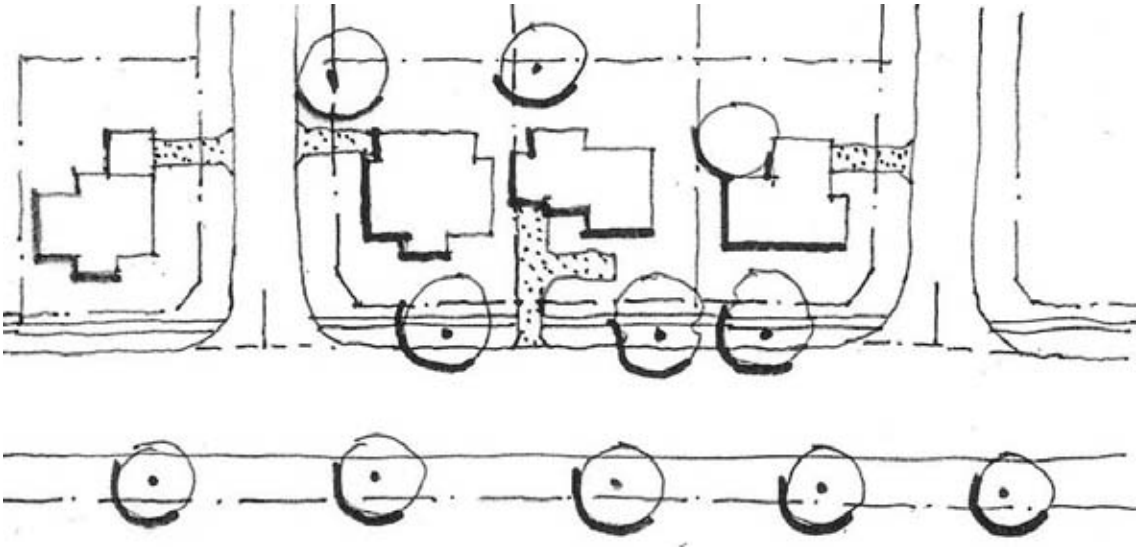
4.5.4.1 Access Easements Through Rear Carparks



Notes:

1. This technique must be introduced where opportunity exists to achieve access to a side street through a neighbouring corner lot.
2. An agreement needs to be reached with neighbouring land-owners (for reciprocal rights of access) at the planning approval or building stages.
3. This technique reduces the number of direct access points to Controlled Distributor Roads by facilitating alternative access to the side street system.

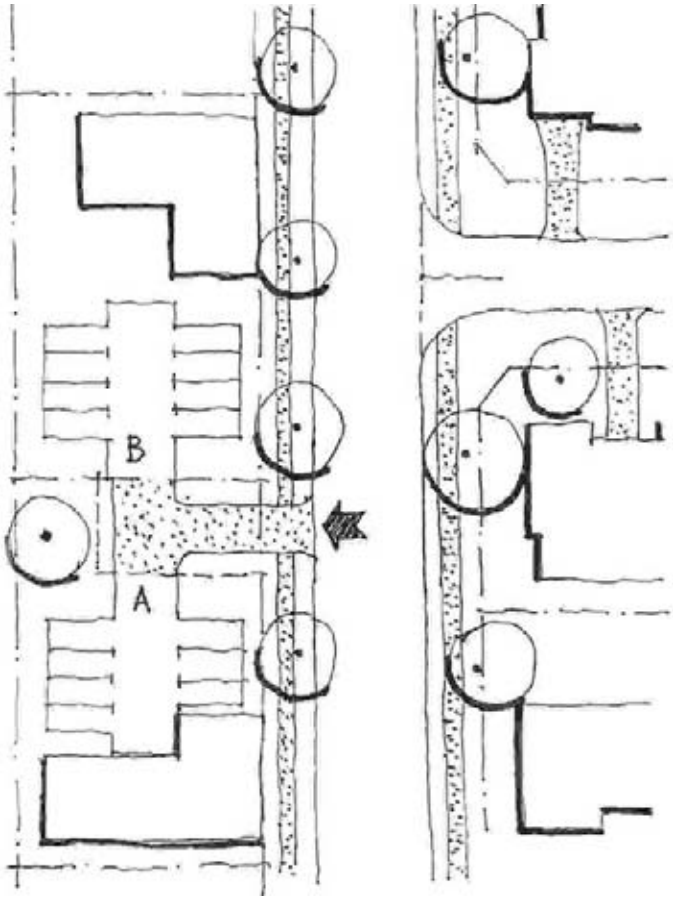
4.5.4.2 Side Road Access and on site Manoeuvring



Notes:

1. Corner lots on Controlled Distributor Roads must achieve access via a lower order side road.
2. Smaller lots with direct frontage and no achievable alternative frontage access technique must provide on site manoeuvring areas to ensure that vehicles access and depart the site in a forward motion.
3. This technique reduces the number of access points on Controlled Distributor Roads to reduce side friction and improve the safety and efficiency of through traffic movement.
4. In most instances, particularly where traffic volumes exceed or are likely to exceed 15,000vpd, right turn movements must be restricted by designing driveways to cater for left turn in and out movements only.

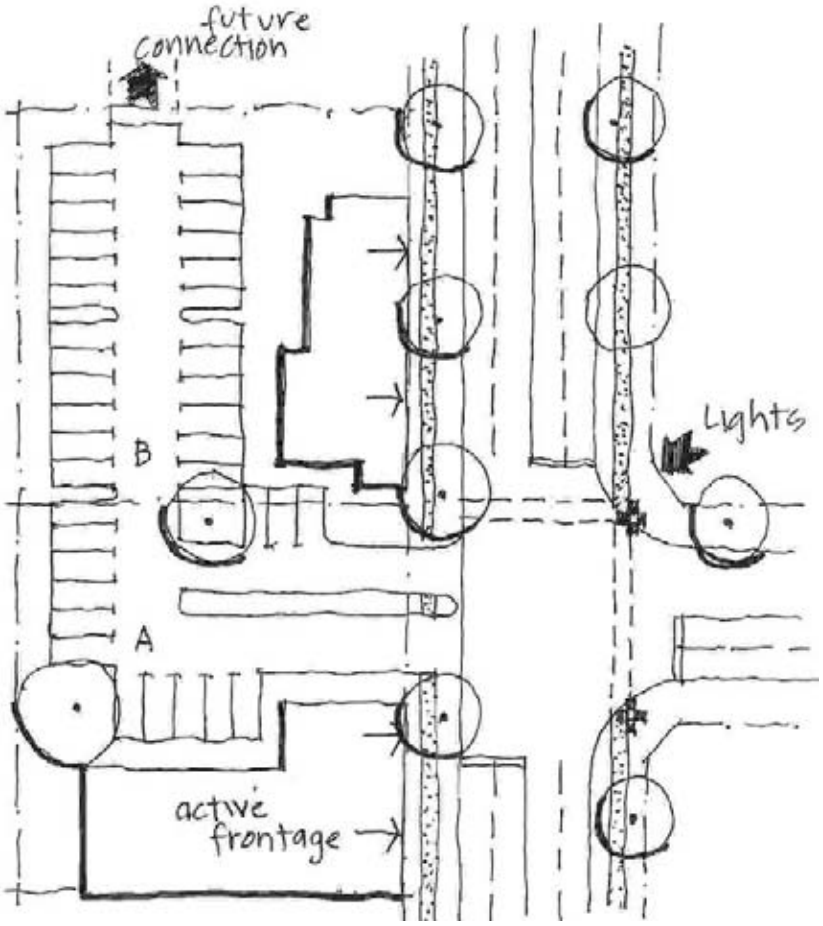
4.5.4.3 Shared Driveways



Notes:

1. This technique reduces the number of direct access points by combining or sharing a single point of access where no other alternative Frontage Access Techniques can be achieved.
2. This technique aims to reduce the number of direct access points and improve the safety and efficiency of access and through traffic movement on the Controlled Distributor Road.
3. In this example an access easement has been created on property A in favour of property B to achieve reciprocal rights of access for the adjoining landowners.
4. In most instances, particularly where traffic volumes exceed or are likely to exceed 15,000 vpd, right turns at the shared access must be restricted by designing driveways that restrict turning movements to left turn in and out only.

4.5.4.4 Consolidation of Access at a Controlled Intersection



Notes:

1. This technique aims to reduce the number of direct access points by consolidating access at one controlled intersection location.
2. To improve the safety and efficiency of through traffic movement, this technique reduces side friction by reducing the number of access points.
3. Fully controlled safe access is achieved to the road system with no restricted turning movements. Developments with traffic signal controlled or roundabout access to the frontage road are to dedicate land as public road to accommodate all intersection infrastructure, including traffic signal loops.
4. Property A would establish the first direct point of access to the controlled intersection. This property must establish reciprocal rights of access for potential adjoining property owners. Property B would achieve access to the controlled intersection via Property A through established reciprocal rights of access. This property must also establish rights of access for other potential neighbouring landowners to achieve access to the controlled intersection.

4.6 Commercial Streets

The design and functional characteristics of commercial streets must have characteristics as set out in Table 4.6.1. These streets are generally planned and provided for in city, town and village centre areas where the predominant abutting land use is commercial.

Table 4.6.1 Commercial Streets

CHARACTERISTICS	Commercial Streets		
	Collector streets		Local streets
	Boulevard street	Collector Street	Access Street
Max. Traffic Volume	12,000vpd	8,000vpd	5,000vpd
Frontage Access	Yes	Yes	Yes
Speed Environment	50km/h	50km/h	40km/h
Cycle Facilities	On-road cycle lanes (2x 1.5m wide)	On-road cycle lanes (2x 1.5m wide)	On-road (shared)
Pedestrian Crossings	Signals or Refuge	Signals or Refuge	No specific provision
Intersections	Priority T, Roundabout or Signals	Priority T, Roundabout or Signals	Priority T, Roundabout or Signals
Reservation width	30m	22m	19m
No. of moving lanes	2	2	2
Pavement Width	Two 7m pavements	13.6m	11m
Median	4m	Nil	Nil
Minimum Verge Width	6m	4.7m	4m
Parking	Parallel both sides (2x 2.5m wide lanes)	Parallel both sides (2x 2.3m wide lanes)	Parallel both sides (2x2.3m wide lanes)

Notes to Table 4.6.1

1. Fully paved verges will be required to the frontage of all developed properties in accordance with relevant Urban Design Guidelines.
2. Traffic catchment areas will be limited so that traffic volumes do not exceed the volumes described in Table 4.6.1.
3. Kerbside parking areas must be defined by line marking and regulatory parking signs in accordance with AS2890.5 and the Queensland Manual of Uniform Traffic Control Devices. Parking must be restricted near intersections and major driveways to ensure that sight distances, and service vehicle turning areas are not compromised.
4. Collector streets expected to carry more than 8000vpd must have a median, with appropriate U-turn facilities or other route choice options.
5. Greater attention must be given to designing commercial streets to cater for higher pedestrian intensity such as wider areas for pedestrian movement and crossing facilities are likely to be necessary, and this may necessitate a lower speed environment. Roundabouts may not be appropriate in some areas with high pedestrian movements.
6. In some cases, intersection designs for commercial streets may not need to accommodate articulated vehicles.
7. Local Streets may have angle parking provided in accordance with the Australian Standard for on-street parking (AS2890.5). Where angle parking is provided the nominated pavement width and street reserve width must be widened to accommodate the design requirements outlined in AS2890.5.
8. Where a high demand for cyclists is expected on local streets, shared on road parking/cycle lanes may be required which will require additional widening of the pavement width and reserve width.
9. The desirable maximum grade for all commercial streets is 6% to achieve suitable access for pedestrians and cyclists and to meet the maximum grade requirements for car park areas
10. Reserve and pavement widths will need to be increased to accommodate intersection requirements

4.7 Industrial Streets

Industrial collector and access streets shall have characteristics as set out in Table 4.7.1.

Table 4.7.1 Industrial Streets

CHARACTERISTICS	Industrial Streets	
	Collector street	Access street
Traffic Catchment	30 ha	8 ha
Max. Traffic Volume	12,000vpd	5,000vpd
Frontage Access	Yes	Yes
Speed Environment	60 km/h	60 km/h
Cycle Facilities	On-road (shared)	On-road (shared)
Intersections	Priority T, roundabout, or traffic signals	Priority T, roundabout
Min. Intersection spacing	100m	60m
Reservation width	22m	20m
No. of moving lanes	2 x 3.5m wide	2 x 3.5m wide
Pavement Width	14m	12m
Median	Nil	Nil
Min Verge Width	4.0m	4.0m
Parking	Parallel kerbside –2 x 3.5m wide lanes delineated by a white edgeline	Parallel kerbside – 2x 2.5m wide lanes, no delineation required.
Pedestrian Facilities	Footpaths both sides	Not required
Grades Desirable Maximum Absolute Maximum Minimum	 6% 8% 0.3%	 6% 10% 0.3%

Notes to Table 4.7.1

1. Concrete footpaths (1.5m wide) must be provided to the frontage of all developed properties that have frontage to Industrial Collector Streets.
2. Traffic catchment areas must be limited so that traffic volumes do not exceed the volumes described in Table 4.6.1, based on design generation rates of 200, 400 and 800 vehicles per day per hectare of site for low, medium, and high intensity development. Bulk warehouses with few employees will be at the low end of the scale and light industry / service industry areas with more employees will be at the upper end of the scale. Generally, smaller lots have higher generation rates per hectare.
3. A typical industrial development with a site area of 8 Hectares is likely to generate 5000vpd. Developments that achieve a traffic catchment area that is greater than 8 Ha (or 5000vpd) must plan for the street system to include a Collector Street to service the area.
4. Kerbside parking areas must be defined by line marking and parking regulation signs as necessary around intersections and major driveways to ensure that heavy vehicle turning areas are not compromised.
5. Industrial collector roads expected to carry more than 8000 vpd must have a median, with appropriate U-turn facilities or other route choice options.

4.8 Rural Roads and streets

Rural roads and streets must be designed and constructed with the characteristics described in Table 4.8.1.

Table 4.8.1

CRITERION	Rural Roads			
	Arterial Roads		Sub Arterial Roads	
	Highway Motorway	Rural Arterial	Distributor	Controlled Distributor
FUNCTIONAL CHARACTERISTICS				
Dominant linkage	Regional	Intra regional	Rural Suburbs or Districts	Rural suburbs or Districts
Traffic carrying function	Longer distance traffic travelling through the region	Major Access route between cities and towns	Major access route between towns and villages	Major access route between towns and villages
Traffic Volume	Volumes not restricted	Volumes not restricted	Volumes not restricted	<8,000vpd
Frontage Access	Nil	Restricted direct access	Restricted direct access	May be individual
Minimum Operating Speed Standard	High (>100km/h)	High (>100km/h)	Intermediate (80km/h – 100km/h)	Intermediate (80km/h – 100km/h)
Truck Route?	Primary freight routes	Primary/secondary freight routes	Secondary routes	Secondary routes
Dangerous goods route?	Primary routes	Selected routes only	Selected routes only	Selected routes only
Public transport facilities	Line haul, priority treatments	Line haul, priority treatments	Bus route	Bus route
Cycle facilities	Regional, off carriageway	Regional, cycle lanes on road shoulder and/ or off carriageway	Regional/local, cycle lanes on sealed road shoulder	Regional/local, cycle lanes on sealed road shoulder
Pedestrian movement facilities	No specific provision	No specific provision	No specific provision	No specific provision
FRICTIONAL CHARACTERISTICS				
Intersection treatments	Grade separated/ priority	Roundabout/ priority	Roundabout/ priority	Roundabout/ priority
Typ. Intersection spacing	4-8km (maximum 12km)	>1000m	>300m	>300m
Reserve Width (not including embankments)	40-100m	40-60m	35-45m	35m
Preferred access control	No access	No access	Combined sites only	Selective access control
Parking provision	No parking on roadway	No parking on roadway	No parking on roadway	No specific provision
Bus stopping provision	None on road	Indented bays where appropriate	Indented bays where appropriate	Indented bays where appropriate
Cross section	Volume driven, could be divided	Volume driven, could be divided	11m sealed 11m formation could be divided	10.5m sealed 10.5m formation
Traffic Lane width	Volume driven, could be divided	Volume driven, could be divided	2 x 3.5m	2 x 3.5m
Shoulder width (full seal each side)	Volume driven	Volume driven	2 x 1.5m	2 x 1.25m
Verge Width (sealed)	Volume driven	Volume driven	2 x 0.5m	2 x 0.5m
Absolute Maximum Grades	5%	6%	7%	8%

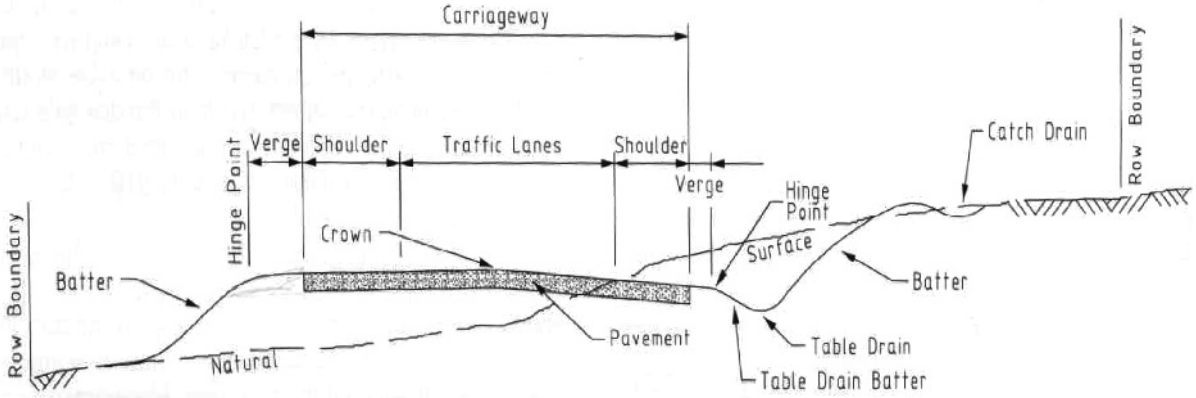
Table 4.8.1

CRITERION	Rural Streets			
	Collector Streets		Local Streets	
	District Collector	Neighbourhood Collector	Access Street	Access Place
FUNCTIONAL CHARACTERISTICS				
Dominant linkage	Rural Districts or groups of Neighbourhoods	Rural Neighbourhoods	Individual Sites	Individual Sites
Traffic carrying function	Major access to rural districts with direct access to rural properties	Access and circulation within rural neighbourhoods with direct access to properties	Direct access to rural properties, up to 50 lots	Direct access to rural properties, up to 12 lots
Traffic Volume	1,000 – 5,000 vpd	500 - 1,000 vpd	150 - 500 vpd	0 - 150 vpd
Frontage Access	May be individual	Individual	Individual	Individual
Minimum Operating Speed Standard	Intermediate (80km/h – 100km/h)	Intermediate (80km/h – 100km/h)	Low (50km/h – 70km/h)	Low (50km/h – 70km/h)
Truck Route?	Access only	Access only	Access only	Access only
Dangerous goods route?	Inappropriate except for access	Inappropriate except for access	Inappropriate except for access	Inappropriate except for access
Public transport facilities	School Bus route	School Bus route	N/A	N/A
Cycle facilities	On-road – sealed shoulders	On-road – sealed shoulders	On-road – sealed shoulders	On-road (shared)
Pedestrian movement facilities	No specific provision	No specific provision	No specific provision	No specific provision
FRICTIONAL CHARACTERISTICS				
Intersection treatments	Roundabout/ priority	Priority	Priority	Priority
Typ. Intersection spacing	>100m	>100m	>100m	Nil
Reserve Width (not including embankments)	30m	25m	20m	20m
Preferred access control	Individual sites	Individual sites	Individual sites	Individual sites
Parking provision	No specific provision	No specific provision	No specific provision	No specific provision
Bus stopping provision	Off carriageway	Off carriageway	Nil	Nil
Cross section	10 m sealed 10 m formation	9.5 m sealed 9.5 m formation	8.7 m sealed 8.7 m formation	6.5 m sealed 6.5 m formation
Traffic Lane width	2 x 3.5m	2 x 3.5m	2 x 3.1	1 x 3.5m
Shoulder width (full seal each side)	2 x 1.0m	2 x 0.75m	2 x 0.75	2 x 1.0m
Verge Width (sealed)	2 x 0.5m	2 x 0.5m	2 x 0.5m	2 x 0.5m
Absolute Maximum Grades	9%	10%	16%	16%

Notes to Table 4.8.1

1. Urban residential subdivisions must not gain access via rural residential local roads.
2. Rural arterial roads and highways must be designed in accordance with the relevant requirements of Austroads Guide to Rural Road Design and the DMR Road Planning and Design Manual.
3. Refer to Section 1.3, Austroads Rural Road Design Guide for further discussion on the concept of operating speed standards.
4. For definition of cross-section elements such as Traffic Lane Width, Shoulder, and Verge widths refer to Fig 4.8.1.
5. MSC requires full width shoulder and verge seal to reduce maintenance costs and to improve moisture conditions under pavements, especially under the outer wheel path.
6. Short lengths of wider shoulder seals or lay-bys are to be provided at suitable locations to provide for discretionary stops
7. Wider shoulders must be provided to accommodate cyclists where a need is identified in the Maroochy Bikeways Strategy.
8. Wider verge widths are required to provide space for installation of road safety barriers, and to achieve horizontal sight distance requirements, or to balance cut and fill.
9. Under constrained circumstances and where limited heavy vehicle use is expected, grades greater than 16% but no greater than 20% may be accepted on Access Streets and Places for one short length of 100m over the entire street length.
10. Grades approaching intersections must not exceed 3% over the extent of the required stopping sight distance.
11. Length of steep grades must be limited using the design requirements of Austroads Guide to Rural Road design.

Figure 4.8.1 Typical Cross Sections



Two Lane Two Way Rural Roads

4.9 Rural Residential Streets

Rural residential streets shall be designed and constructed with the characteristics described in Table 4.9.1.

Table 4.9.1

CRITERION	Rural Roads			
	Arterial Roads		Sub Arterial Roads	
	Highway/Motorway	Rural Arterial	Distributor	Controlled Distributor
FUNCTIONAL CHARACTERISTICS				
Dominant linkage	Refer to Rural Areas Table for details of the Arterial / Sub-Arterial Network			
Traffic carrying function				
Residential access function				
Traffic speed environment				
Heavy traffic movement				
Dangerous goods movement				
Public transport facilities				
Cycle facilities				
Pedestrian facilities				
FRICTIONAL CHARACTERISTICS				
Intersection treatments	Refer to Rural Areas Table for details of the Arterial / Sub-Arterial Network			
Typ. Intersection spacing				
Reserve width (not including embankments)				
Parking provision				
Bus stopping provision				
Max travel distance to the road system				
Verge width				
Sealed pavement width				
Absolute Maximum Grades				

Table 4.9.1

CRITERION	Rural Residential Streets			
	Collector Streets		Local Streets	
	District Collector	Neighbourhood Collector	Access Street	Acceess Place
FUNCTIONAL CHARACTERISTICS				
Dominant linkage	District cell	Neighbourhood cell	Sites	Sites
Traffic carrying function	3000 - 5000 vpd	800 - 3,000 vpd	0 - 800 vpd	0 - 300 vpd
Residential access function	In accordance with frontage access techniques (see Section 4.5.3)	Individual	Individual	Individual
Traffic speed environment	Terrain dependant, =< 100 km/ h	60 km/h (speed control by alignment)	45 km/h with speed control devices	45 km/h with speed control devices
Heavy traffic movement	Access only	Access only	Access only	Access only
Dangerous goods movement	Inappropriate except for access	Inappropriate except for access	Inappropriate except for access	Inappropriate except for access
Public transport facilities	Bus route	School Bus route	N/A	N/A
Cycle facilities	On-road – sealed shoulders	On-road - shared	On-road - shared	On-road shared
Pedestrian facilities	No specific provision	No specific provision	No specific provision	No specific provision
FRICTIONAL CHARACTERISTICS				
Intersection treatments	Roundabout/ priority	Priority	Priority	Priority
Typ. Intersection spacing	>100m	>100m	>100m	Nil
Reserve width (not including embankments)	30m	25m	20m	20m
Parking provision	No specific provision	No specific provision	No specific provision	No specific provision
Bus stopping provision	Off carriageway	Off carriageway	N/A	N/A
Max travel distance to the road system	N/A	800m (2000m in total)	1200m	1200m
Verge width	10m	8m	5.0m min. (7.0m typical)	5.0m min. (7.0m typical)
Sealed pavement width	10 m sealed 10 m formation	8.0 m sealed Driveover kerb	6.0 m sealed Driveover kerb	6.0 m sealed Driveover kerb
Absolute Maximum Grades	9%	16%	16%	16%

Notes to Table 4.9.1

1. Urban residential subdivisions must not gain access via rural residential local roads.
2. The major traffic design issue in rural residential subdivisions is the control of vehicle speed which is made more difficult (if not impossible) if travel distances on local roads are excessive. Even with travel distances constrained in accordance with the requirements of Table 4.9.1, horizontal and vertical alignments and intersection design will need to be closely coordinated to avoid areas of excessive speed. The horizontal geometric design and intersection designs of rural residential streets must be integrated to achieve the speed environments described without the use of specific speed control devices.
3. Higher order rural roads must be designed in accordance with the requirements for major roads described in the rural road and streets hierarchy Table 4.8.1.
4. Where rural district collector streets or Sub-arterial roads pass through rural residential areas, and frontage access is permitted, kerb and channel must be placed on an alignment abutting the nominated 10m width.
5. Where the building envelope in Rural Residential areas is proposed within 15m of a road or street, additional widening is required to accommodate on-street parking at the desirable rate of one space per each lot.
6. Under constrained circumstances and where limited heavy vehicle use is expected, grades greater than 16% but no greater than 20% may be accepted on Access Streets and Places for one short length of 100m over the entire street length.
7. Grades approaching intersections must not exceed 3% over the extent of the required stopping sight distance.

4.10 Intersections

Intersections are generally designed in accordance with the requirements of the DMR Road Planning and Design Manual and the Austroads Guide to Traffic Engineering Practice.

Intersection treatments are generally selected as a result of traffic analysis along with safety and operational considerations, undertaken in a traffic impact assessment report as detailed in Section 2 of this policy.

Typically accepted intersection treatments for various types of Urban Roads and Streets are outlined in Table 4.5.1.

No specific turn treatments are required at priority controlled T-intersections where the speed limit is 50km/h or less on Neighbourhood Collector Streets in urban residential areas or on Local Streets in both urban and rural residential areas. The minimum right-turn treatment on District Collector Streets and higher-order roads should be a separate right-turn lane. In all other cases, the minimum left and right turn treatments for intersection safety purposes should be determined in accordance with the warrants detailed in the DMR Road Planning and Design Manual, Where a basic left-turn treatment (BAL) is used on urban roads and streets and no parking lane is provided, a widened area should be provided on the major road prior to the intersection to assist the left-turn movement. The minimum width of the widened area plus the adjacent through lane is 6m.

Separate right turn lanes should be provided on all approaches to signalised intersections, regardless of traffic volumes or hierarchy. The layout, lane configuration and phasing of signalised intersections should consider the most efficient intersection operation for pedestrians and traffic movements during all periods of the day, rather than simply attempting to achieve a degree of saturation during the design traffic peak hour at or below the maximum permissible.

Sight distance on all approaches to roundabouts should be in accordance with the DMR Road Planning and Design Manual. The minimum outside diameter of roundabouts on urban residential streets should generally not be less than 26m where the speed limit is 50km/h or less, and not less than 30m where the speed limit is 60km/h or where the roundabout is on a bus route. The roundabout diameter may need to be increased to allow for situations where the angle between any adjacent roundabout leg is considerably more or less than 90 degrees, there are medians on some or all of the carriageways, or where larger design turning vehicles need to be accommodated.

Kerbed splitter islands should be provided on all roundabout approaches. On urban Local Streets, the general minimum area of kerbed splitter islands is $5m^2$. On urban Neighbourhood Collector Streets and higher-order roads, splitter islands should be of sufficient size to incorporate a pedestrian refuge at least 1 car length

(6m) back from the roundabout holding line. The splitter island should be at least 2m wide at the position of the refuge. The general minimum lane width adjacent to splitter and median islands on urban Neighbourhood Collector and Local Streets is 4.2m.

Roadside hazards must not be placed within the clear zone associated with all roundabouts and their approaches, particularly on the roundabout central island. Roadside hazards include retaining walls, rocks and boulders, trees and shrubs with a maximum ultimate trunk diameter greater than 80mm, and other non-frangible items. The height and profile of the kerb on the roundabout central island should be in accordance with Maroochy Shire Council standard requirements for semi-mountable and mountable kerb.

Provision for U-turns must be made at intersections on streets that include a centre median in the cross section.

Where permitted, site access for larger commercial, residential, retail or mixed use developments onto Urban District Collector Streets or Sub Arterial Roads should address the requirements of intersection design.

4.11 Speed Control

Speed Control must be introduced to Urban Residential Streets and Rural Residential Streets to achieve the maximum target speeds listed in Table 4.5.1 and listed in the notes for the urban residential street cross sections in section 4.5.2. Speed control is required on these streets to achieve a low speed environment that is safe for pedestrians and cyclists and is compatible with the amenity of the residential area.

It is preferable that speed control devices are avoided wherever possible and that the maximum target design speeds are achieved by tight bends (greater than 60°) and by roundabouts at intersections.

Speed Control devices are not accepted on Bus Routes unless they are designed to enable safe and comfortable movement by buses, ie without mounting kerbs or causing buses to swerve.

The guidelines in Queensland Streets for control of traffic speed must be followed when planning and designing street alignments and speed control devices on new residential streets.

In circumstances where speed control devices can't be avoided in order to achieve the maximum target speeds specified in Table 4.5.1 the type of devices specified in Queensland Streets must be used.

Speed control is generally achieved by reducing the length of straight sections of street to:

- 75m or less where the target speed is 30km/h,
- 120m or less where the target speed is 40km/h,
- 140m or less where the target speed is 50km/h

These target lengths are based on the assumption that design speeds of 20km/h or less are achieved on bends, or roundabouts, or at speed control devices.

4.12 On Street Parking

In the planning of streets where high density residential development is likely, particular attention will be necessary to the provision of on-street parking, usually requiring wider pavements and reservations.

Assuming that the off-street parking requirements described in Schedule 2 to the Transport, Traffic and Parking Code are achieved, on-street parking must be provided at a minimum rate of 2 spaces per 3 detached houses plus one space per three 3 or 4 bedroom attached dwelling units, plus one space per four 1 or 2 bedroom attached dwelling units. The opportunity for on street parking should be integral to the design of reserves and in the location of driveways.

At least 75% of the on street spaces required must be located within 25m, and 100% of the spaces required must be located within 40m of the closest lot boundary.

Cul-de-sac and small lot (less than 15m frontage) locations require, in addition, indented bays or other special provision for parking. Additional on-street parking space is also required near parks and other community facilities.

4.13 Flood Immunity

Road Drainage Design

Roads located in flood-prone areas should be designed in accordance with the Queensland Urban Design Manual (QUDM), Average Recurrence Intervals. For the purpose of clarification: the term Major Roads, Arterial, Subarterial Roads and District Collector Streets in Maroochy Plan's Road Hierarchy Map and Minor roads are all other streets.

5 Site Access

This section is relevant to the assessment of compliance with P1-P6 (in Element 3 – Site Access Requirements) of the Transport, Traffic and Parking Code.

5.1 General

Site access driveways will generally be configured as concrete industrial crossings, but may in special circumstances be configured as roadway approaches to traffic signal, roundabout or priority controlled intersections.

Generally, only one site access driveway will provide access to a development. Additional driveways shall only be approved for major developments where it can be demonstrated that the purpose of the code is best met with additional driveways.

Generally, site access driveways will be to the more minor road where a development site has frontage to two or more roads, except where the generated traffic would impact adversely in respect of amenity or safety.

Site access driveways will generally be required to satisfactorily accommodate light vehicles and service vehicles. In some major developments, separate driveways for heavy vehicles may be appropriate where it can be demonstrated that this leads to safer traffic operations or reduced impact on the external road network.

5.2 Driveway Location

Site access driveways and their splays at the kerb line should not extend beyond the frontage of the site (normal to the frontage) unless a joint access driveway is proposed.

In addition to the other driveway location requirements of this Policy, site access driveways for minor developments shall be located consistent with the requirements of Table 5.2.1.

Table 5.2.1

Type of Frontage Road	Adjacent Feature	Minimum Separation of Proposed Minor Driveway from Adjacent Feature (TP to TP along kerb)
Street	Minor intersection	10 metres
	Major intersection	20 metres
	Other driveway	3 metres between extent of splays
	Controlled intersection	Clear of 95th percentile queue areas and turn lanes
Road	Minor intersection	20 metres
	Major intersection	30 metres
	Median break	15 metres (or twice one-way carriageway width, whichever is greater)
	Other driveway	15 metres
	Controlled intersection	Clear of 95th percentile queue areas turn lanes approach tapers

Notes to Table 5.2.1

1. TP is tangent point of curve at intersection or other driveway closest to proposed minor driveway.
2. For the purposes of this Table, a District Collector Street and Industrial Collector Street are classified as Roads.
3. 'Other driveway' relates to driveways on same side only on Streets. On Roads, 'Other driveway' relates to driveways on both sides of undivided carriageways.
4. Where permitted, the minimum separation between driveways for detached dwellings on Roads may be reduced to 3 metres.
5. A major intersection is defined as an intersection controlled by traffic signals or a roundabout, or where a median break is provided on the major road at a priority-controlled intersection of a minor road and a major road.

5.3 Road Planning Considerations

Intersection spacing on major roads must be in accordance with Section 4 of this policy and the requirements of Austroads Guide to Traffic Engineering Practice Part 5, Section 5.

Where right turn ingress is permitted from Arterial and Sub-arterial roads at major developments, a separate right turn lane will normally be required. Turn lanes must be designed in accordance with the DMR Road Planning & Design Manual. The minimum dimensions of a left turn or right turn lane in constrained circumstances should be a 20 metre taper plus a 30 metre parallel storage lane.

Constructed road widening and dedication of land may be necessary as a result of median construction or widening, or the provision of right or left turn lanes associated with the proposed driveway, or to ameliorate traffic volume increases associated with the proposed development pursuant to a traffic impact assessment as described in Section 2 of this Policy.

Even where construction of a median break or a right turn lane is required as a condition of development, Council always retains the right to close a median break at any time in the future to improve safety or network traffic operations.

5.4 Sight Distance Requirements

Sight distances at driveways must comply with the requirements of the DMR Road Planning & Design Manual. Reduced sight distances will only be considered where there is no practical alternative, and where specific traffic design or control measures have been taken to minimise hazards.

Sight distance requirements may require the tapered set-back of buildings or landscaping from the property boundary.

Further, the opening in a building constructed on the front alignment should be set back at least 2.0 metres from each side of the driveway to allow drivers to have minimum visibility of pedestrians on the footpath.

Service vehicles, particularly large trucks require substantially longer gaps in traffic to complete turning, crossing and merging manoeuvres. Where truck volumes are significant, sight distance requirements should be increased to take account of site-specific circumstances.

5.5 Driveway Type selection

Driveways should be constructed generally as shown in Figure 5.5.1, with the driveway type and width defined by Table 5.5.1. For Type 'C' driveways, the first width nominated is the width of the entry driveway, followed by the width of the exit driveway.

Figure 5.5.1

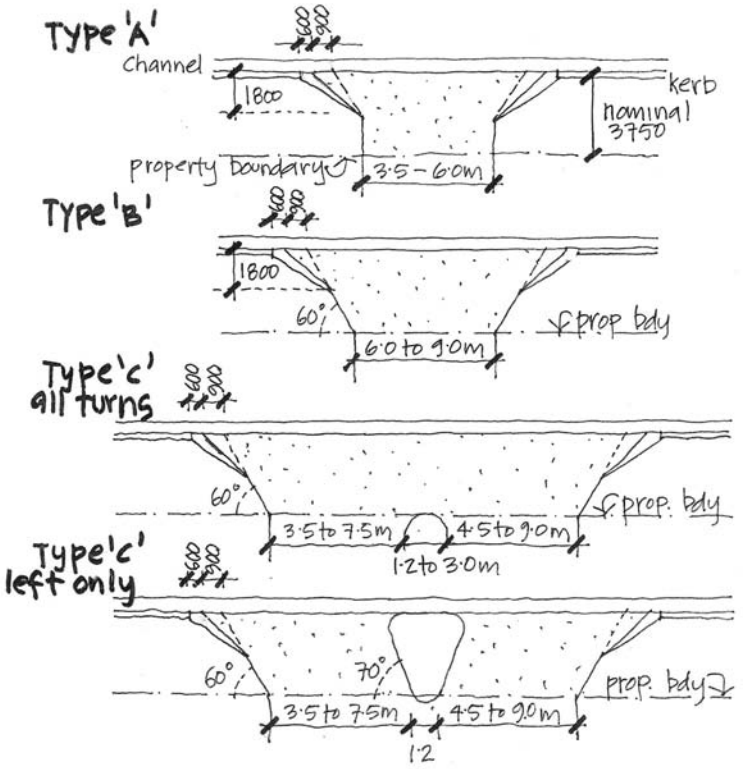


Table 5.5.1

Type of Frontage Road	Driveway Traffic Volume	Driveway Type for Vehicle:					
		Van/Car only	SRV	MRV	LRV	WCV	AV
Street	<25 vph	A6.0	B6.0	B7.0	B7.5	B7.5	B9.0
	>25 vph	B6.0	B7.0	B7.5	B9.0	B9.0	B9.0
Road	<25 vph	B7.0	B7.5	C6.0/4.5	C7.5/6.0	C7.5/6.0	C9.0/7.5
	>25 vph	C4.5/3.5	C5.5/4.0	C6.0/4.5	C7.5/6.0	C7.5/6.0	C9.0/7.5

Note to Table 5.5.1:

1. Traffic volumes described are during design peak period.
2. For the purposes of this Table, a District Collector is classified as a Road.
3. Where traffic volumes are low (typically less than 25 vehicles per hour two-way), it may be appropriate for the driveway width and type adopted to be based on the premise that the largest service vehicles expected to visit the driveway infrequently will use the full width of the driveway.

5.6 Provisions for Queues

5.6.1 Queues at Driveways

Queue lengths are to be measured along the driveway from the property boundary to the first parking space or internal intersection. Queues may be permitted adjacent to low turnover parking spaces in some circumstances. Each queued vehicle will be assumed to occupy a space 6.0 metres long.

The length of a design queue is dependent on a number of factors, including:

- The form of control at the driveway intersection,
- The nature of the external road and the traffic volumes carried,
- The size of the car park and the turnover rate,
- The design of the internal traffic and parking system.

When queue lengths can reasonably be calculated using conventional intersection analysis techniques, the design queue shall be the peak design period 95th percentile queue. In the absence of appropriate queue length calculations, the minimum queue provision on entry and exit shall be as set out in Table 5.6.1. Greater queue provisions may be required in some cases.

Table 5.6.1

Nominal Car Park Capacity	Design Queue Length
5-20	1
21-50	2
51-100	3
101-150	4
151-200	5
201-250	6
251-300	7
Over 300	2.25 percent of nominal capacity (rounded upwards)

The minimum queue provision for any driveway shall be one vehicle at entry and one vehicle at exit.

If a site has more than one driveway, the queue provisions should be calculated on the basis of the proportion of the site served by each driveway.

5.6.2 Gated and Controlled Driveways

The above requirements are based on uncontrolled entry and exit with no gates. At sites with security gates, the design queue is to be accommodated between the property boundary and the gate, and with provision for a light vehicle to turn on the site if declined entry.

At controlled car parks, provision is to be made at all ticket spitters, card readers and pay booths for design queues calculated on the basis of estimated peak entry and exit rates and control facility capacity. At entrances and exits, separate queue provisions will be necessary both inside and outside the control facility.

5.6.3 Internal Queue Provisions

Separate internal queue provisions are necessary at drive-through facilities, particularly fast-food (10 vehicles) and bottle shops (12 vehicles). The queue requirements at other drive-through facilities shall be calculated on the basis of peak period 95th percentile queues.

Queuing lanes shall be not less than 3.0 metres wide (when straight) with separate provision for pedestrian service where necessary, and geometry must facilitate easy ingress and egress. Where queue areas are curved, the queue lanes shall be widened based on the turning paths of 99th percentile cars.

Drive-through facilities for fast food outlets must include provision for short term parking of one or two vehicles diverted from the queue while their orders are being prepared.

5.7 Traffic Control signage

Direction, regulatory, warning and information signs are to be erected on-site to control traffic movements and to warn of potential hazards. Signage also includes pavement markings.

All traffic/parking control signs and pavement markings are to conform to the requirements of the Manual of Uniform Traffic Control Devices (Qld). All signs and line markings are to be self illuminated or reflectorised in accordance with current Queensland and Australian standards.

Direction signage at the site frontage and within the site is to be provided in respect of:

- The location of site access driveways and car parking areas, particularly rear parking areas,
- Where visitor or public parking is not visible from the frontage road or access driveway.

6 Provision For Public Transport

This section is relevant to the assessment of compliance with:

- P1 – P3 in Element 7 (Public Transport Facilities) of the Transport, Traffic and Parking Code; and
- P2 in Element 5 (Public Transport) of the Code for Reconfiguring Lots.

6.1 On-Site Public Transport Facilities

In large developments, particularly high traffic generating uses such as major retail and commercial developments or sporting venues, provision for public transport interchange facilities will be necessary, particularly for bus, and rail public transport facilities. Normally, the separate approval of Queensland Transport will be required for the design of such facilities.

Separate provision will be necessary for taxis.

On major development sites, bus and taxi facilities should be located as close as is practical to pedestrian entry points, with clearly defined and high standard pedestrian connections.

7 Pedestrian Facilities

This section is relevant to the assessment of compliance with:

- P1 and P2 in Element 5 (Pedestrian Facilities) of the Transport, Traffic and Parking Code;
- P1 in Element 4 (Pedestrian and Cyclist Facilities) of the Code for Reconfiguring Lots; and
- P4 in Element 2 (Movement Networks) in the Code for Operational Works.

7.1 Public Pedestrian Facilities

Provision for pedestrians is primarily to be on footpaths within road reservations as covered in Section 3.4 of this policy. This section covers walkways through development sites, subdivisions and open space areas which provide linkages to public transport facilities, schools or important activity nodes. Pedestrian facilities are generally provided in accordance with *Austroads Guide to Traffic Engineering Practice, Part 13 Pedestrians.*

Pedestrian walkways through development sites and estates are to be in reservations having a minimum width of 7.0 metres, with a minimum footpath width of 1.5 metres (in low use scenarios) if only used by pedestrians, or 2.5 metres if also used by cyclists. Wider paths will be required if pedestrian or cyclist volumes are high. In these circumstances wider paths must be provided in accordance with the recommended widths outlined in *Austroads Guide to Traffic Engineering Practice, Part 13 Pedestrians, and Part 14 Bicycles.* Shared pedestrian/ bicycle paths must be designed with care in respect of sight distances and the high speed differential that exists between pedestrians and cyclists.

Walkways are to be as wide and short as possible to enhance their attractiveness, convenience and security. To achieve high levels of safety and security, casual surveillance must be introduced by ensuring that all walkways are clearly visible from roads and/or residences.

7.2 On-Site Pedestrian Facilities

Within development sites, the primary design requirements of pedestrian facilities are:

- Safety, particularly in respect of sight distances at vehicular conflict points, and the avoidance of heavy vehicle routes and reversing areas;
- Security, taking account of lighting and the visibility of the pathway from areas of activity;
- Convenience, particularly in respect of pedestrian paths being close to natural desire lines;
- Design standards in respect of widths, grades and surface treatments. Changes in paving colour or texture should not be introduced on a roadway at locations where there is a pedestrian desire line to cross the roadway. This creates a safety hazard as some pedestrians may incorrectly perceive the change in paving as assigning priority to pedestrians over vehicles.

8 Cyclist Facilities

This section is relevant to the assessment of compliance with:

- Element 6 (Cyclist Facilities) of the Transport, Traffic and Parking Code;
- P1 in Element 4 (Pedestrian and Cyclist Facilities) of the Code for Reconfiguring Lots; and
- P4 in Element 2 (Movement Networks) in the Code for Operational Works.

8.1 On-Site Cyclist Facilities

Requirements for public and on site cyclist facilities are set out in *Planning Scheme Policy DC2 Provision of Bikeways and Bicycle Facilities.*

On site parking requirements for bicycles are detailed in Schedule 1 to the Transport, Traffic and Parking Code. The design and provision of on site bicycle parking facilities must be undertaken in accordance with *Austroads Guide to Traffic Engineering Practice, Part 14 Bicycles.*

8.2 Public Cyclist Facilities

Off road shared use paths in low use scenarios must be a minimum of 2.5m wide. Wider paths are required in

moderate to high use scenarios. In these circumstances the recommended widths outlined in the *Austroads Guide to Traffic Engineering Practice, Part 14 Bicycles* must be applied. Where there is anticipated to be a high volume of commuter cyclists it is desirable that on-road cycle lanes be provided. However in some circumstances routes need to take off road routes and these routes must be provided as either a segregated or separate exclusive bicycle paths to remove the potential conflict that exists between higher speed commuter cyclists and pedestrians. These facilities must also be provided using the recommended widths outlined in the *Austroads Guide to Traffic Engineering Practice, Part 14 Bicycles*.

9 On-site Car Parking

9.1 Car Parking Design and Layout

This section is relevant to the assessment of compliance with P1 and P2 in Element 4 (Car Parking) of the Transport, Traffic and Parking Code.

9.1.1 General

Visitor and public parking spaces shall be located, designed and/or signed so that it is obvious to unfamiliar users that such spaces are available on-site, and it is obvious how they will be accessed. Except where streetscape and landscaping requirements necessitate alternative design solutions, it is desirable that visitor or public parking spaces are visible from the street to encourage utilization of off-street parking rather than on-street parking for this purpose.

Outdoor storage must not occur within parking spaces.

Parking areas and car park access systems must comply with the requirements of AS2890.1 – Off Street Parking except as provided for in this Policy.

Larger car parking areas must be designed on the basis of a hierarchy of internal roadways ranging from those providing only for vehicular circulation to those providing only for access to parking spaces. That is, circulation roadways, circulation aisles (which have shared function) and parking aisles. Queue areas associated with internal or site access intersections must be entirely on circulation roadways.

9.1.2 Basic Design Requirements

All development proposals should meet the following requirements:

1. Restrict vehicle speeds at pedestrian conflict points,
2. Ensure that pedestrians of all ages have clear visibility of approaching vehicles, with sight distances based on the design (85th percentile) vehicle speeds expected. In particular, pedestrians should always have visibility of vehicles for a minimum of 2.5 seconds of travel at the design speed. This will require splayed corners to buildings and careful treatment of landscaping, signage and parking spaces in areas of potential conflict;
3. Ensure that no reversing of service vehicles larger than SRV's occurs in areas where pedestrian traffic is expected,
4. Ensure that the site access and circulation arrangements and the on-site activities do not significantly impact on external traffic operations on the roadway or the footpath. In particular, ensure that car park space search patterns are simple and logical with no need to return to the public road in moving between separate car parking areas,
5. Provide adequate on-site lighting, particularly at pedestrian, site access and intersection areas.

9.1.3 Design Requirements for New Development

Where a development proposal involves the provision of new car parking facilities (rather than the re-use of existing facilities), the following requirements must also be met:

1. Design for a progressive reduction in the speed environment between the external road and the parking space,
2. Avoid dead-end aisles, particularly in larger car parks, and design for simple and efficient search patterns,
3. Avoid usage of one-way roadways or aisles, particularly if contra-indicated usage is reasonably expected,
4. Eliminate cross intersections, and ensure that priorities are clearly defined if they are unavoidable,
5. Ensure that aisles intersect circulation roads and circulation aisles as close as practicable to 90 degrees,
6. Provide a clearly defined pedestrian network to and from and within the site which:
   - Closely follows pedestrian desire lines,
   - Clearly establishes priority at vehicular / pedestrian conflict points,
   - Provides line marking and signage at vehicular / pedestrian conflict points in accordance with the requirements of the Queensland Manual of Uniform Traffic Control Devices (MUTCD),

- Ensures that pedestrians move along aisles rather than across them,
- Minimises the number and severity of vehicular / pedestrian conflicts,
- Minimises vehicle speeds and congestion levels at pedestrian conflict points,
- Provides for appropriate queues of pedestrians and vehicles at the conflict points.

7. Avoid long straight sections of aisles or roadways that encourage high operating speeds and shortcutting when the car park is only partially used,
8. Restrict the length of parking aisles to 100 metres, unless additional measures are adopted to satisfactorily restrict vehicle speeds,
9. Within larger developments, provide for relatively uncongested public transport and service vehicle movements through the site, without using parking aisles,
10. Provide adequate queue space for drive-through facilities which do not interfere with primary circulation routes. Occasional queuing in parking aisles, may be acceptable.
11. Provide turning lanes at intersections to avoid excessive congestion and queue formation,
12. Ensure that appropriate design provision has been made for storage areas, fire escapes, loading areas, refuse collection areas, etc,
13. Minimise the use of speed humps, particularly in entry / exit queue or intersection areas, or across pedestrian paths. If used, speed humps must be positioned so that vehicles are only likely to cross them at right angles.
14. Shade structures are provided or, if shade structures are not proposed, open car parks should have one shade tree expected to reach maturity within ten years for each six parking spaces, with at least one third of the trees in larger unsealed areas rather than the approximately 1 square metre plots which can be accommodated at the common corners of four parking spaces.

9.1.4 Reserved Parking spaces

Only staff or resident parking spaces may be located within secured or gated areas. All visitor and public parking spaces must remain accessible at all times that any approved activity occurs on the site. Further, in mixed use developments where relaxations have been granted in respect to the number of parking spaces provided on the basis of the non-coincidence of individual development component peak parking demands, all of the spaces on the site must remain accessible at all times.

In mixed use developments where it is proposed that staff or resident parking area are proposed to be secured or gated separately from the remainder of the site, an assessment report from a Traffic Engineer must be submitted. This report must demonstrate the adequacy of secured staff or resident parking areas and public parking areas to ensure that sufficient space is available for the public parking and secured parking user demands.

9.1.5 Circulation Roadways

Circulation roadways are the major circulation aisles in car parks that connect site access intersections to other circulation roads, circulation aisles, or parking aisles. Due to the higher traffic volumes on Circulation Roadways they must not provide direct access to parking spaces. They can provide connections between separate car parks.

Minimum widths of straight circulation roadways are to be in accordance with Table 9.1.5.1.

Table 9.1.5.1

Type of Circulation Road	Width of Circulation Roadway
One-way, one-lane	3.5 m 5.0 m if more than 20m long
One-way, two-lane	6.0 m
Two-way, one-lane	5.0 m (only less than 25 vph)
Two-way, two-lane	6.2 m (up to 100 vph) 6.5 m (101 to 300 vph) 7.5 m (over 300 vph)

Notes to Table 9.1.5.1

1. Roadways are to be widened based on turning templates if curved.
2. Circulation roadways or circulation aisles are 6.5 metres wide (minimum) at intersections with parking aisles, based on a 2.0 metre radius on the aisle end island, or a greater width if a lessor or no island is provided.
3. Two-way usage of 5.0 metre wide circulation roadways (or ramps) is permitted in small, low turnover car parks where a delayed vehicle will not interfere with site entry or exit, and where sight distances are adequate for safe operation.

All dimensions are from nominal kerb face to kerb face. Kerbs shall be 100 to 150mm high, with not less than 300mm setback from the kerb face to a solid obstruction such as a wall or column. This setback may be reduced to 150mm if all likely vehicle paths are straight and parallel to the kerb face over the relevant section of circulation roadway.

If parking control or payment facilities are proposed, roadway widths are to be increased by a minimum of 1.2 metres to allow for a median to accommodate such facilities.

The dimensions described in Table 9.1.5.1 relate to usage of a circulation roadway to provide access to car parking spaces. Greater widths may be necessary to accommodate service vehicles or buses.

A curved two-way circulation roadway (or ramp) must have a minimum internal radius of 4.0 metres at the kerb face and a minimum external radius at the kerb face of 11.5 metres.

9.1.6 Circulation Aisles

Circulation aisles can provide access to parking spaces, parking aisles and circulation roadways. At any intersection with a parking aisle, another circulation aisle or a circulation roadway, the minimum width of a circulation aisle shall be 6.5 metres, based on a 2.0 metre radius on the aisle end traffic island, or a greater width if a lesser or no aisle end traffic island is provided.

9.1.7 Parking Aisles

Parking aisles provide access to parking spaces.

Desirably, all parking aisles should provide for two-way traffic and have a minimum width of 6.2 metres, providing access to right angle parking spaces. Angle parking will only be accepted in unusual circumstances, and one-way parking aisles are only acceptable in conjunction with angle parking arrangements.

The minimum width of parking aisles providing access to designated high turnover (less than 1 hour average duration) parking spaces (5.4m by 2.7m) is 7.0 metres.

Dead-end aisles should desirably be avoided wherever possible. Where dead-end aisles can't be avoided, they must service areas that have no more than 12 spaces (6 on each side of the aisle). In these circumstances the aisle must extend 1.0 metres past the last parking space to allow vehicle egress from spaces at the end of the aisle. In any other circumstances where a longer dead-end aisle is unavoidable a turnaround area must be provided at the end of the aisle in the form of a rounded cul-de-sac head or a three point turn area.

9.1.8 Gradients

Minimum gradients of parking areas are defined by surface drainage requirements.

Maximum gradients, taking account of vehicle performance, user comfort, car door opening, and the control of prams, wheelchairs and shopping trolleys, are as set out in Table 9.1.8.1.

Table 9.1.8.1

Location – Design situation	Maximum Gradient
Parking areas for people with disabilities	2.5 percent
Parking spaces, parking aisles and circulation aisles in: • Public parking areas (prams & trolleys likely) • Tenant parking areas in residential buildings • Employee (long term) parking areas	6.7 percent 8.3 percent 10 percent
Straight circulation roadway	16.7 percent
Curved circulation roadway (or ramp)	16.7 percent at inside kerb face
Circulation road, ramp or driveway within 6.0 metres of property boundary, control point or ped. crossing	5 percent
Uphill queue area	8.3 percent
Super-elevation of camber on curved roadway	5 percent

Notes to Table 9.1.8.1

1. The component of the total gradient across a parking space as defined in Table 9.1.8.1 is not to exceed 8.3 percent (to ensure that doors are controllable).
2. At changes of grade, a transition at one half the grade change is required of length in metres one fifth of the percentage change of grade.

9.1.9 Height Clearances

The minimum clear height in a car park generally is to be 2.3 metres, with all principal circulation routes and at least 80 percent of parking spaces having this clear height.

The minimum clear height above any parking space is to be 2.1 metres, subject to appropriate signage in respect of the low clearance.

Clear heights must be measured clear of all appurtenances, including sprinklers, lights, services drains and signs. Additional vertical height clearances will be necessary at sag vertical curves at the ends of ramps to allow for the centre of the vehicle to be higher than over the wheels.

Disabled parking spaces must have a clear height of 2.5 metres from the open end of the parking space to 2.1 metres from the closed end of the space. That is, for a space 5.4 metres by 3.2 metres, the additional height shall be available over an area 3.2 metres wide and 3.3 metres long.

In service vehicle areas the clear high must be a minimum of 4.5m. Where Waste collection activities are proposed in off-street service vehicle areas, additional height clearances are needed to allow for a front loading waste collection vehicle to lift an industrial bin above the vehicle.

9.1.10 Dimensions of Parking Spaces

The dimensions of Parking Spaces must be in accordance with the Australian Standard for Off-street parking AS2890.1.

User class 1A detailed in AS2890.1 is not accepted in carparks designed for commercial or mixed use, retail or community uses where regular public use is expected. This category is only accepted in circumstances where its users intend to park long term in residential, domestic and employee parking situations. Under these circumstances, class 1A spaces must be located in low use areas of car parks that are separated from main entrances, the main circulation aisles, and other high activity areas.

9.1.11 Tandem Parking Spaces

Tandem parking spaces must not be provided in public or customer parking areas. Tandem parking is not desirable but may be considered for:

- Residential developments where both spaces are allocated to one unit,
- Visitors to residential developments where the visitor space is associated only with and behind a resident parking space for the individual unit that they are visiting,
- Reserved parking spaces where both spaces are allocated to a single tenant.

Tandem parking may be permitted in some valet parking operations, but only if adequate additional temporary holding spaces are provided in the forecourt sufficient to accommodate likely peak demands for vehicles dropped-off and/or awaiting collection.

9.1.12 Small Car Spaces

Small car spaces must not be provided in visitor or public parking areas.

In fully reserved or tenant parking areas, up to 5 percent of the required number of spaces may be small car spaces having dimensions of 5.0 metres by 2.4 metres, provided such spaces are appropriately signed as being for small cars only.

9.1.13 Fully Enclosed Spaces (garages)

Where straight entry to a garage is possible (straight for a minimum of 5.0 metres outside the garage), the minimum dimensions shall be 6.0 metres by 3.0 metres, with a minimum opening width of 2.4 metres.

Where entry to the garage is via a turn from a driveway or aisle, the minimum opening width shall be increased to 3.0 metres. If the garage is set back from the aisle, some relaxation of the 3.0 metre opening may be possible based on the turning path of an 85th percentile car.

9.1.14 Disabled User Parking Spaces

Provision of parking and access is made for disabled users in accordance with the requirements of Australian Standards AS1428 and AS2890.1, particularly in respect of parking space width and location, manoeuvring areas, for wheelchairs, gradients, location of stairs, ramps and doorways, and signage.

Parking Spaces for disabled users shall be provided at a rate of one space per 100 parking spaces provided, with a minimum of one space.

9.1.15 Motorcycle Parking Spaces

Motorcycle spaces may replace required car parking spaces at a rate of up to 2 percent of total public or visitor parking provision, provided the spaces are so located as to be more attractive for motorcyclists to use than alternative parking spaces.

Motorcycle spaces are 3.5 metres by 1.3 metres.

9.1.16 Design Cars

The design vehicles used in car park design are generally outlined in the Australian Standard for Off-street parking AS2890.1. However the requirements for small cars compared to medium and large cars are outlined in Table 9.1.16.1.

Table 9.1.16.1

Dimensions	Small Car (50th percentile)	Medium Car (85th percentile)	Large Car (99th percentile)
Length	4500	4750	5350
Wheel Base	2600	2820	3070
Width	1650	1860	1900
Height (from vans)	1900	2100	2300
Front Overhang	900	900	1000
Rear Overhang	1000	1030	1280
Min.turn radius:			
• Inside body	2750	3500	3750
• Outside front wheel	5000	6000	6300
• Outside front corner	5600	6600	6900

Generally, the small car dimensions and templates are used only for designated small car spaces, the medium car is used for the design of individual parking spaces, and the large car is used for the design of access and circulation systems, ramps etc.

The templates shown make no allowance for working clearances, generally required to be approximately 300mm.

9.2 Required on-Site Parking Provision

This section relates to A2. 1 in Element 4 – Car Parking of the Transport, Traffic and Parking Code.

9.2.1 Design Parking Demands

These requirements are intended to satisfy the design peak parking demand for a particular land use without use of on-street parking.

The design peak parking demand is defined as the parking demand estimated for the 30th highest hour of the year. During the busiest hours in the year, excess demand will be satisfied by on-site queuing or overflow to on-street spaces. Parking demand studies intended to demonstrate compliance with this requirement will be based on adequate seasonal variability data.

9.2.2 Number of Parking Spaces Required

The parking space requirements for different land uses are set out in Schedule 2 in the Code for Transport, Traffic and Parking.

A parking space is defined for the purposes of parking provision as the space needed to satisfactorily accommodate a medium (85th percentile) car, together with the means to satisfactorily access that space.

Where the rate for parking provision is not defined, Council will determine the appropriate provision rate,, taking account of information supplied by the applicant, and from other reference sources.

9.2.3 Basis for Consideration of Alternative Parking Rates.

Where an applicant proposes a lesser number of car parking spaces that set out in Schedule 2 in the Code for Transport, traffic and Parking, it will be necessary to satisfactorily demonstrate that a proposed use will generate a design peak parking demand lower that that specified, and that Performance Criterion 1 in Element 7 – Car Parking of the Transport, Traffic and Parking Code will still be met.

A lower amount of parking will not be approved on the basis of the characteristics of a particular tenant unless it can be demonstrated that the site can not be used by other tenants without the need for a code or impact assessable development application.

10 Service Requirements

This section is relevant to the assessment of compliance with P1 in Element 3 (Service Vehicle Requirements) of the Transport, Traffic and Parking Code.

10.1 Access Design Vehicle

Selection

The largest vehicles expected to visit the site more than 20 times per year shall be considered to be regular users of site service facilities, and these vehicles must be accommodated. Lower standards will be accepted for vehicles expected to visit the site only occasionally (less than twenty times per year).

Where regular visits are expected by one service vehicle type, and occasional visits by another service vehicle type, the facility must be designed for both circumstances. For example, if a development site is expected to be regularly visited by an MRV, a vehicle of that size must be able to visit the site without any inconvenience to other users of the site, whereas some inconvenience would be tolerated when an articulated vehicle visited the site only occasionally.

The design service vehicle requirements for individual land use types are set out in Schedule 2 of the Transport Traffic and Parking Code, including requirements for occasional access, regular road access, and regular street access. These requirements relate only to the driveways and site circulation systems. The requirements for on-site service vehicle loading or parking spaces are separately listed in Schedule 3 of the Transport Traffic and Parking Code.

10.2 Loading Bay & Service Area Requirements

The minimum number of service vehicle spaces to be provided on-site is set out in Schedule 3 to the Transport Traffic and Parking Code. The design of loading bays must satisfy the requirements of AS2890.2 Off Street Parking for Commercial vehicles. Service vehicle manoeuvres should occur clear of queue areas and where safety could be compromised. They should not occur in aisles providing access to public or visitor spaces.

10.3 Design Vehicles

The design of internal roadways, circulation areas and service vehicle manoeuvre areas are to provide for the operational requirements of service vehicles of different types as described in Table 10.3.1. Standard turning path templates for Van and WCV design service vehicles are included in Figure 6.3.1. The standard turning path template for a Coach is included in Austroads Design Vehicles and Turning Path Templates. Standard turning path templates for other types of design vehicles are based on AS2 890.2 – Off-street parking for Commercial Vehicle Facilities.

If other vehicle types are expected to use the site, vehicle-specific turning templates, computer generated templates or templates derived from field trials may be used.

The design requirements for these various Service Vehicles are outlined in Table 10.3.1

Table 10.3.1 service Vehicles

	Van	SRV	MRV	LRV	WCV	Coach	AV
Vehicle dimensions	5.4 x 2.0	6.4 x 2.3	8.3 x 2.5	10.7 x 2.5	10.2 x 2.5	12.5 x 2.5	19.0 x 2.5
Service bay dimensions	5.4 x3.0	7.0 x3.5	9.0 x3.5	11.0 x 3.5	10.5 x 2.5	13.0 x 3.5	19.5 x 4.5
Clear height required	2.3	3.5	4.0	4.5	4.5	4.5	4.5
Loading dock height		0.7- 0.9	0.9 - 1.1	1.1 - 1.4			1.1 - 1.4
Max. grad. Manoeuvre Areas	12 %	12 %	8 %	8 %	5 %	5 %	4 %
Min. access road width							
• **One-way**	3.5	3.5	4.0	4.5	4.5	4.5	5.0
• **Two-way**	6.2	6.2	6.5	6.5	6.5	6.5	7.0
Max. grad. access route	16.7 %	16.7 %	12 %	10 %	10 %	10 %	10 %
Max grad. Queue area	10 %	10 %	8 %	8 %	5 %	5 %	4 %

Notes to Table 10.3.1

1. At changes in grade, the height required is to be maintained throughout.
2. Service bay dimension for WCV does not include bin or compactor area.
3. Operating clear heights for WCV - front load 6.1m, side load 6.7m, rear (roll-off) 7.1m.
4. Loading dock heights indicative only, where docks provided.
5. On curved roadways, maximum gradient measured at inside kerb face.
6. 5.0m Height Clearance is required where access to the top of a tall vehicle, eg pantechnicon, or load is required.

10.4 Location and Design of Service Areas

Service areas are to be located close to service entrances (or other building entrances) to ensure that they are able to be conveniently utilised and to discourage the use of parking areas or aisles for loading and unloading.

Service areas are to be separated from public or visitor parking areas and defined pedestrian paths.

Service vehicle access and loading areas must comply with the requirements of AS2890.2.

In all but the smallest developments, service vehicles should be confined to circulation roadways separate from parking aisles. The service area should include all of the space necessary for vehicle manoeuvres in and out of service vehicle parking spaces, including when other adjacent service vehicle spaces are occupied, turning manoeuvres being defined by the templates in Figure 10.4.1, with a maximum of one reversing manoeuvre to enter or leave the space.

When vehicles are required to reverse into a dock, the vehicle should be moving in an anti-clockwise direction so that the driver can see the dock. This is critically necessary for AV's, and desirable for other vehicles although wider bays may compensate for rigid vehicles forced to reverse clockwise.

10.5 Waste Collection

Access for waste collection vehicles to refuse bins or compactors is to be maintained at all times. Where it can be demonstrated that waste collection will occur at specific hours, it may be possible to allow waste collection vehicles to manoeuvre through other service vehicle spaces.

Some waste collection contracts may specify vehicle sizes and heights less than those for a standard WCV. In these circumstances, a full copy of the contract must be provided.

Where disposal of industrial or commercial liquid waste by discharge to road tankers is proposed, the road tanker must be able to stand fully on the site and comply with other access design requirements.

10.6 Fuel Deliveries

Provision for fuel deliveries for any purpose must comply with AS1940 and Council's Local Laws. Fuel will be assumed to be delivered in an LRV sized vehicle, with appropriate access design. Depending on the frequency of deliveries, and deliveries occurring out of hours, the vehicle may stand in a suitable circulation road, aisle or forecourt area.

MAROOCHY SHIRE COUNCIL PLANNING SCHEME POLICY NO. 7

Acoustic Environment Assessment

Contents

1 Introduction

1.1 Purpose

The purpose of this Planning Scheme Policy is to:

- Support the Planning Scheme codes that contain specific provisions relating to acoustic environment amenity;
- Assist applicants by providing defined environmental noise descriptors and limits to be used in determining the respective acoustic environment, relative to proposed development; and
- Identify Council's preferred approach to noise mitigation measures to achieve an appropriate amenity within our environment.

1.2 Scope

This policy provides a framework for assessing acoustic amenity issues consistent with the Desired Environmental Outcomes (DEO's), planning intent and codes of the Maroochy Plan 2000.

Volume 4 of the Planning Scheme contains a range of provisions that seek to protect acoustic environment qualities. These provisions exist as Performance Criteria and Acceptable Measures in a number of codes.

Volume 2 (Strategic Plan) and Volume 3 (Planning Areas and Precincts) also contain provisions relevant to impact assessable development in relation to acoustic amenity.

The codes containing provisions relating to acoustic environment assessment are identified in Table 1.2 below.

Table 1.2: Planning Scheme Codes Containing Provisions for Acoustic Environment Amenity

2. General Land Use and Development Codes	
2.1.7	Code for Development in the Vicinity of the Airport
2.1.8	Code for Protection of Extractive Resources
2.6	Operational Works
3. Codes for Rural Development and Use	
3.1	Agriculture and Animal Husbandry
3.2	Code for Development and Use of Intensive Animal Industries and Aquaculture
3.3	Code for Development and Use of Rural Service Industries

Table 1.2: continued

4. Codes for Residential Development and Use	
4.1	Detached Houses
4.2	Code for the Development and use of Dual Occupancy
4.3	Code for Low-rise Multi-Unit Residential Premises
4.4	Code for Multi-storey Residential Premises
4.5	Caravan and Relocatable Home Parks
4.6	Code for the Development and Use of Motels
4.7	Code for Home Based Business
4.8	Code for Bed and Breakfast Accommodation
4.9	Code for Caretakers Residences
4.10	Code for Retirement Villages
5. Codes for Commercial and Community Development and Use	
5.1	Code for Town and Village Centres
5.2	Local Centres and General Stores
5.3	Code for Child Care Centres
5.5	Code for Markets
5.6	Code for Mixed Use Premises
6. Codes for Industrial Development and Use	
6.1	Code for Industries in Urban Areas
6.2	Service Stations and Car Washing Stations
6.3	Code for Extractive Industry
8. Code for Reconfiguring Lots	
9. Other Codes	
9.2	Code for Telecommunications Facilities

1.3 Definitions

Definitions relevant to Acoustic Environment Assessment under this Planning Scheme are contained within Volume 1, section 3.2 Administrative Definitions. These definitions include:

- Acoustic environment;
- EPP (noise) Environmental values;
- Environmental harm;
- Environmental nuisance;
- Noise sensitive place; and
- Rail corridor land.

1.4 Expertise Required to Prepare Supporting Information

An application involving the need to undertake assessment of the acoustic environment relative to a proposed development will require a competent person to undertake that assessment.

A competent person requires a strong understanding of acoustic environment assessment and appropriate sound level measurement equipment.

A competent person shall:

- Have appropriate tertiary qualifications; or
- Be a member of, or eligible for membership of the Australian Acoustical Society.

2 Noise Assessment

2.1 General

The acoustic environment is a significant component of the amenity of urban and rural localities. New development may impact upon the existing acoustic environment or it may be impacted upon by existing or likely future noise. It is therefore appropriate that the assessment and protection of our acoustic amenity is more practical and effective at the planning phase rather than the implementation of noise mitigation measures post development.

Noise assessment is dependant upon:

1. The individual characteristics of noise;
2. The acoustic environment in which the suitability of the noise is being assessed; and
3. The time of day in which acceptability of the noise is being assessed.

This policy identifies the assessment of the acoustic environment that is reasonable and relevant for proposed development.

2.2 Acoustic Environment

The qualities of the acoustic environment that are to be enhanced or protected under this policy are:

(a) The wellbeing of the community or part of the community, including its social and economic amenity;

(b) The wellbeing of an individual, including the individual's opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise;

(c) The minimising of impacts on a persons ability to sleep within their home by limiting the intrusive interference of noise in their acoustic environment; and

(d) The minimising of impacts on a persons ability to use outdoor recreational space or workplace outdoor space by limiting the intrusive interference of noise in their acoustic environment.

2.3 Noise Emission and Immission

The assessment of acoustic amenity issues relative to development must consider both the impact of noise from (emission) and upon (immission) particular uses.

2.3.1 Noise Emission

Noise emission is the noise generated and emitted from a development or use with potential to impact on other land uses external to that part of the development under consideration. Examples include noise from an industrial development that may impact upon uses such as residential development.

2.3.2 Noise Immission

Noise immission is the impact of noise upon a development, from a source or sources external to the development. Examples include, transportation noise, plant and equipment noise, or industrial noise impacting upon another development or use e.g. residential dwellings.

2.4 Noise Types

Noise is created by a number of different sources and has many different characteristics. A range of noise types are identified in this policy for the purpose of identifying the appropriate noise descriptors and limits for the assessment of sound.

These noise types include:

1. Continuous Steady-State Noise Emission;
2. Continuous Steady-State Noise Immission;
3. Intermittent Time-Varying Noise;
4. Road Traffic Noise;
5. Rail Traffic Noise;
6. Aircraft Noise; and
7. Entertainment Noise.

2.5 Noise Descriptors

The use of a number of noise descriptors is required to assess the qualities of the acoustic environment. These descriptors are outlined below.

Measurements with the following descriptors are determined in accordance with the application of AS 1055.1 utilising the A-weighted sound pressure level. Measurement periods must be over a time period of not less than 15 minutes, using fast response (excluding aircraft noise measurement which utilises the slow response).

L_1 Noise level equalled or exceeded for 1 percent of the measurement period.

L_{10} Noise level equalled or exceeded for 10 percent of the measurement period.

L_{90} Noise level equalled or exceeded for 90 percent of the measurement period. AS1055.1-1997 notes that the L90 is described as the background sound pressure level.

L_{eq} An 'average' measurement, and as per AS1055.1-1997 defined as the value of the sound pressure level of a continuous steady sound state, that within a measurement period, has the same mean square sound pressure as a sound under consideration whose level varies with time.

$L_{oct\ 10}$ For a specified time interval, means the linear (flat) frequency rating for a stated octave band that is equalled or exceeded for 10% of the interval.

$L_{oct\ 90}$ For a specified time interval, means the linear (flat) frequency rating for a stated octave band that is equalled or exceeded for 90% of the interval.

L_{max} Is the maximum noise level recorded during the monitoring period.

$L_{Amax\ adj,T}$ Is the maximum sound pressure level adjusted for impulsiveness and/or tonality for the time period nominated.

3 Noise Descriptors and Limits for Proposed Development

3.1 General

There are a range of differing means to noise assessment that can determine noise limits for the acoustic environment relative to a proposed development. These can include the use of various legislative codes and policies and the use of standards.

This section will identify the noise descriptors and limits that Council will require to be used in the assessment of each noise type (identified in section 2.4) relevant to a proposed development.

These descriptors and limits are specified in Table 3.1.

The table identifies:

(a) Each Noise Type;

(b) Examples of the Source of Noise;

(c) The appropriate Noise Descriptors to be used; and

(d) The specific Noise Limits to be achieved.

The noise limits identified in Table 3.1 are to be achieved to demonstrate compliance with the Planning Scheme codes that contain provisions relating to acoustic environment amenity.

The following sections (3.2 - 3.7) provide further information regarding the noise descriptors and limits, identified for each noise type in Table 3.1, and their use in the assessment of acoustic amenity.

3.2 Continuous Steady-State Noise Emission and Immission

3.2.1 Internal Noise Limits

Table 1 of AS2107 provides noise limits for internal areas occupied by people. It is applicable to assessment of steady-state or quasi-steady state sound emission and immission such as noise from air conditioning, ventilation or refrigeration plant and noise from continuous road traffic, typically highways and arterial roadways.

The AS2107 'minor' and 'major' road categories shall be based on the relevant ambient background (L_{90}) levels provided in AS1055.2 - Appendix A:

(a) Category R1-R2 shall apply to residential sites in areas with negligible or low-density transportation (Local/Collector streets);

(b) Categories R3-R4 shall apply to residential sites near minor roads (Arterial/Sub-arterial Roads) or some commerce or industry; and

(c) Categories R5-R6 shall apply to residential sites near major roads (State Controlled Highways or Motorways) or in commercial districts bordering or within predominantly industrial districts.

Once the Noise Area Category has been determined from measured ambient noise data, the satisfactory and maximum design sound levels from AS2107 shall be determined.

Maximum design sound levels:

(a) Must be applied for all time periods that an activity (excluding residential, see below) may occur in a given building type and area;

(b) For road traffic assessment detail relative to noise immersion sources refer to Section 3.4 Road Traffic Noise; and

(c) For residential buildings, the maximum recommended design sound levels stated in Table 1 of AS2107 apply to living areas and work areas during all time periods. It is acceptable to apply the maximum noise limits for living and work areas to sleeping areas during the day and evening periods. The maximum noise limits for sleeping areas must be achieved during the night period.

Table 3.1: Acoustic Environment Assessment of Proposed Development

Noise Type	Example / Source of Noise	Noise Descriptors	Noise Limits
Continuous Steady-State Noise *Emission**	• Airconditioners • Refrigeration equipment • Industrial plant and equipment • Industrial process	L_{eq}	• Internal Area Limits - AS2107 (see section 3.2.1 below) • External Living Area Limits - (see section 3.2.2 below)
Continuous Steady-State Noise *Immission**	• Airconditioners • Refrigeration equipment • Industrial plant and equipment • Industrial process • Continuous road traffic	L_{eq}	• Internal Area Limits - AS2107 (see section 3.2.1 below) • External Living Area Limits - (see section 3.2.2 below)
Intermittent Time-Varying Noise*	• Carparking noise • Service vehicle operations • Impulse industrial noise • Road Traffic Noise	L_{10}	• Comparison of like descriptors to determine external and internal limits (see section 3.3.1 below)
		L_{max}	• Sleep Disturbance Limits - night 2200hrs-0700hrs (see section 3.3.2 below)
Road Traffic Noise (includes Continuous Steady-State Noise Immission* & Intermittent Time-Varying Noise*)	• Local / Collector Streets	L_{eq} L_{max}	• Internal Area Limits –AS2107 (see section 3.4.5 below) • External Living Area Limits (short term) (see section 3.4.5 below) • Sleep Disturbance Limits - night 2200hrs-0700hrs (see section 3.3.2 below)
	• Arterial and Sub-Arterial Roads	L_{eq} L_{max}	• Internal Area Limits –AS2107 (see section 3.4.5 below) • External Limits (long-term) (see section 3.4.5 below) Sleep Disturbance Limits - night 2200hrs-0700hrs (see section 3.3.2 below)
	• State Controlled Highways and Motorways	L_{eq} L_{max}	• Internal Area Limits- AS2107 (see section 3.4.5 below) • External Limits (long-term) (see section 3.4.5 below) • Sleep Disturbance Limits - night 2200hrs-0700hrs (see section 3.3.2 below)
Road Traffic Noise (Planning Level)	• Local / Collector Streets • Arterial and Sub-Arterial Roads • State Controlled Highways and Motorways	L_{10}, L_{eq} and L_{max}	• As per *the Environmental Protection (Noise) Policy 1997 Schedule 1 - Planning Levels, Section 2 – Public Roads* (see section 3.4.5 below)
Rail Traffic Noise	• Queensland Rail Corridors	L_1, L_{10}	• Comparison of like descriptors to determine external and internal limits (see section 3.3.1 below)
		L_{max}	• Sleep Disturbance Limits - night 2200hrs-0700hrs (see section 3.3.2 below)
Rail Traffic Noise (Planning Level)	• Queensland Rail Corridors	L_{eq} and L_{max}	• As per *the Environmental Protection (Noise) Policy 1997 Schedule 1 - Planning Levels, Section 3 – Railways* (see section 3.5.1 below)
Aircraft Noise	• Maroochy Shire Council Airport and Take-off and Landing Approaches	ANEF and ANEC	• In accordance with planning scheme Code 2.1.7 Code for Development in the Vicinity of the Airport; and • *State Planning Policy (SPP) 1/02 Development in the Vicinity of Certain Airports and Aviation Facilities* and its supporting guidelines
Entertainment Noise	• Amplified or non-amplified music	L_{10} with L_{90}	• Comparison of unlike descriptors to determine limits (see section 3.7 below)
		L_{10} with L_{90}	• Comparison of unlike descriptors, (octave band analysis) to determine limits - night 2200hrs-0700hrs (see section 3.7 below)

** Noise level to be adjusted for Tonality or Impulsiveness in accordance with AS1055.1*

Notes to Table 3.1:

1. For vacant land with future potential for development, the noise limit applies at a nominal building envelope and likely outdoor recreation areas. Where these locations cannot be defined the noise limit should be met at the most affected boundary of the receptor site.

3.2.2 External Noise Limits

AS2107 does not include limits for external areas such as formal outdoor recreation areas eg. School or childcare playground, balconies or courtyards, or pool and BBQ areas.

The following formal outdoor recreation area noise limits apply to continuous steady state noise emission sources such as mechanical plant noise, industrial process noise and road traffic noise from Local and Collector Streets, and Arterial and Sub-arterial Roads and State Controlled Highways and Motorways. Refer to Section 3.4 Road Traffic Noise for achieving external and internal limits in the presence of traffic noise. The external limits stated are based upon the following discussion.

The Environmental Protection (Noise) Policy 1997 Section 11 'Acoustic Quality Objective' is to progressively achieve an ambient level of 55 dB(A) (measured over 24 hours as the longterm L_{eq} outside a dwelling in the area) or less for most of the Queensland population living in residential areas. However, it is important to note, it is not intended that, in achieving the acoustic quality objective, any part of the existing acoustic environment be allowed to significantly deteriorate. *(Qld EPA State Interest Planning Policy for Noise Management in Planning Schemes Ver1 2000 and EPP (noise).*

The World Health Organisation (WHO) guideline values for outdoor living areas are 50-55 L_{eq} (16hr) for moderate to serious annoyance from noise. (Bergland, B, Lindvall, T, and Schwela, D, 1999. *Guidelines for Community Noise, World Health Organisation, Geneva.*)

Subsequently, it is expected that the existing or predicated acoustic environment of any affected development relative to development emission or immersion noise sources be taken into account as part of any assessment. A noticeable deterioration is considered to be a increase of 3 dB(A) above the existing acoustic environment of a 'noise sensitive place' (Hassall, JR & Zavard, K, *Acoustic Noise Measurements*, Bruel & Kjaer, Denmark, January 1979)

In the case of noise emission i.e. industrial premise locating near to a residential area and meeting the 'Acoustic Quality Objective', then assessment must be made of the acoustic environment in the absence of the development operating and in the predicated presence of the development operating. The outcome of residential acoustic environment whilst the emission source operates must aim to not noticeably exceed the L_{eq} level of the residential acoustic environment prior to the introduction of the emission source.

In the case of noise immission i.e. residential premise locating near to an industrial area and meeting the 'Acoustic Quality Objective', assessment must be made of the acoustic environment in the absence of the development operating and the current and possible future immission sources. The outcome of residential acoustic environment whilst the immission source operates must aim to avoid moderate (50 dB(A) L_{eq}) annoyance from noise over the operational time of industry.

3.3 Intermittent Time Varying Noise

3.3.1 Comparison of Like Descriptors

The measurement procedure and determination of potential annoyance from such sources must utilise the following procedures:

(a) The measurement descriptor that must be recorded with the noise source operating is $L_{A10,adj,T}$ for short time duration intermittent noise. Noise level to be adjusted for Tonality or Impulsiveness in accordance with AS1055.1

(b) The measurement descriptor that must be recorded with the noise source inoperative is $L_{A10,adj,T}$ for short time duration intermittent noise.

(c) The determination of the relevant noise emission and extent of limit exceedance for the sources from the two measured conditions require the difference between the noise source operating and the source inoperative.

A noticeable deterioration is considered to be an increase of 3 dB(A) above the acoustic environment (noise source inoperative) of a 'noise sensitive place' *(Hassall, JR & Zavard, K, Acoustic Noise Measurements, Bruel & Kjaer, Denmark, January 1979)*

3.3.2 Sleep Disturbance

The sleep disturbance limits apply to noise sources during the night period (10.00pm to 7.00am) that are neither steady state nor quasi-steady state. Generally, such noise is described as impulsive or time-varying noise.

The World Health Organisation (WHO) has conducted research which suggests that for short duration variable noise sources sleep disturbance may commence within an internal sleeping area when a number of noise events exceed a L_{max} noise level of 45 dB(A) inside the bedroom window. In the case of a hospital ward room the level is 40 dB(A). (Bergland, B, Lindvall, T, and Schwela, D, 1999. *Guidelines for Community Noise, World Health Organisation*, Geneva).

The Users Guide to the *Environmental Protection (Noise) Policy 1997* cites a frequency of 10 to 15 traffic noise events per night between L_{max} 45-50 dB(A) for sleep disturbance to occur. For industrial noise one or two single events per night can trigger sleep disturbance.

An applicable limit is dependant upon the ambient acoustic environment with a higher level being more appropriate in areas of higher ambient noise levels. The Noise Area Categories as applied in AS1055.2-1997 are applicable for this assessment. Where the ambient noise levels during the night period are:

(a) Within the range of the R1, R2 or R3 rating areas it is appropriate to use 45 dB(A) as the sleep disturbance limit that should not be regularly exceeded; and

(b) Where the ambient noise levels during the night period are within the range of the R4, R5 or R6 rating areas it is appropriate to use 50 dB(A) as the sleep disturbance limit that should not be regularly exceeded.

Subsequently, allowing for a 5 dB(A) average noise reduction by the building facade with an opened window then the exterior noise event (measured or predicated at the building façade) minus 5 dB(A) must equate to an internal limit of 45 or 50 dB(A) depending upon the noise area category and noise source i.e. adjustments for tonality or impulsiveness may be necessary. In the case of a hospital the internal limit must equate to 40 or 45 dB(A) depending upon the noise area category and noise source.

3.4 Road Traffic Noise

3.4.1 External limit-Local and Collector Streets

For existing roadways, defined as local and collector streets, which generally do not have continuous traffic flow throughout the day, it is appropriate to apply noise limits that consider impacts during the peak hour periods of the day and evening. Thus, the noise limit (considering 3.2.2 above) applied for external noise levels at formal outdoor recreation areas adjacent to local and collector streets is:

6am to 10pm: Maximum LAeq (1 hour) 55 dB(A)

3.4.2 External Limit-Arterial and Sub-arterial Roads

For existing roadways, defined as arterial and sub-arterial which are characterised by relatively continuous traffic flow throughout the day, it is appropriate to apply noise limits that consider impacts over extended periods of the day, evening and night. Thus, the noise limit (considering 3.2.2 above) applied for external noise levels at formal outdoor recreation areas adjacent to arterial and sub arterial roads is:

6am to 10pm: Maximum LAeq (16 hour) 50 dB(A)

3.4.3 External Limit State Controlled Roads

For existing State Controlled Highways and Motorways which are characterised by relatively continuous traffic flow throughout the day, it is appropriate to apply noise limits that consider impacts over extended periods of the day, evening and night. Thus, the noise criteria applied for the assessment of external noise levels at proposed development adjacent to State Controlled Highways Roads is:

6am to 10pm: Maximum LAeq (16 hour) 50 dB(A)

Note, where a traffic noise assessment is required in regard to the proposed development adjacent to a public road under the jurisdiction of the Queensland Department of Main Roads then the applicant will need to address the Queensland Department of Main Roads Road Traffic Noise Management: Code of Practice to achieve the "Aim of the Code" as stated in the code document. In all cases the applicant must contact the department for the specific traffic noise limits to be addressed.

3.4.4 Internal Limits-Streets and Roads

For the purpose of the proposed development against the Maroochy Planning Scheme the internal road traffic noise limits are stated by:

(a) AS 2107 Table 1;

(b) The Sleep Disturbance Noise Limits (refer 3.3.2 above)

The internal limits must be achieved as specified within road traffic noise sections 3.4.4 for internal living, sleeping and work areas. "Living, Sleeping and Work Areas" means a room that is designed, constructed or adapted for the activities normally associated with domestic living and for this purpose: includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, sunroom and the like; and excludes bathrooms, laundries, water closets, food storage pantries, walk-in wardrobes, corridors, enclosed verandas, hallways, lobbies, photographic darkrooms, clothes drying rooms and office spaces of a specialized nature occupied neither frequently nor for extended periods.

3.4.5 Achieving External and Internal Road Traffic Noise Limits

The external limits must be achieved as specified within road traffic noise sections 3.4.1, 3.4.2 and 3.4.3 for formal outdoor recreation areas. For the purpose of proposed development under the Maroochy Planning Scheme a formal outdoor recreation area refers to balconies/ courtyards and/or the common community area that incorporate swimming pool/tennis courts/BBQ areas/Lawn Bowls and the like. Essentially, those areas where it can reasonably be expected to practically provide, as a result of site planning and/or building acoustic treatments, an acceptable acoustic environment, (refer 2.2 Acoustic Environment).

Traffic noise impacts must be determined by estimating the traffic volume and noise from the roadway(s) to a 10 year planning horizon i.e. 10 years beyond the expected completion of the development. For the purpose of the proposed development against the Maroochy Planning Scheme the assessment of the external and internal road traffic noise limits must be in accordance with –

AS 1055 Parts 1 to 3; & AS 2702;

Where external limits cannot be satisfied by setbacks then acoustically rated external facades or barriers (includes buildings associated with the proposed development) must be used.

Where interior and sleep disturbance noise limits of development affected by road traffic noise cannot be satisfied by setbacks then the development must be treated with acoustically rated barriers and/or building treatments in accordance with AS 3671 to achieve the appropriate design sound level limits as per Table 1 of AS2107.

Any stand alone acoustic barrier construction must be in accordance with Queensland Main Roads Standard Specification for Noise Barriers MRS11.15 (03/05) and as amended. Note barrier and/or building treatments must be compatible with the local streetscape, encourage the creation of active street frontages and consider relevant urban design outcomes.

Maroochy Shire Council reserves the right to not accept the on-going management and maintenance of any approved acoustic barriers at the boundary of private or public land and roads. Subsequently, the on-going management and maintenance is a matter that will be resolved as part of the IDAS process. Council's preference is that the obligation is undertaken wholly by the body corporate or land owner. Where management arrangements cannot be resolved then alternatives to acoustic barrier construction must be achieved.

3.4.6 Road Traffic Noise (Planning Level)

This section outlines the planning limits for new roads and road redevelopment. For proposed new roadways i.e. proposed reconfiguration of a lot and road redevelopment the noise limits are those stated within 'Public Roads' of Schedule 1 of the *Environmental Protection (Noise) Policy 1997*.

New road design and development setback must achieve the limits stated. Where the noise limits are already exceeded at development uses adjacent to the proposed roadway redevelopment then the redevelopment should be designed to not increase existing noise levels by a maximum of 3 dB (A).

The Department of Main Roads Road Traffic Noise: Code of Practice cites the relevant limits with respect to new State-controlled roads and redevelopment of State-controlled roads in proximity to existing or proposed development uses. Applicants should refer to that document for traffic noise assessment relative to Schedule 1 of the *Environmental Protection (Noise) Policy 1997*.

3.5 Rail Traffic Noise

For proposed development adjacent to a railway i.e. proposed reconfiguration of a lot, the noise limits are those determined in accordance with section 3.3.1 and 3.3.2, Comparison of like Descriptors and Sleep Disturbance respectively.

For acoustic assessment of a development adjacent to a railway the applicant should consult with the management authority eg. Qld Rail to ensure they are aware of all existing or proposed noise sources.

3.5.1 Rail Traffic Noise (Planning Level)

This section outlines the planning limits for new rail corridors and rail corridor redevelopment. For proposed new rail corridors i.e. proposed master planned community the noise limits are those stated within 'Railways' of Schedule 1 of the *Environmental Protection (Noise) Policy 1997*.

New rail corridor design and development setback must achieve the limits stated.

Where the noise limits are already exceeded at development uses adjacent to the proposed new rail corridor then the corridor should be designed to not increase existing noise levels by a maximum of 3 dB (A).

3.6 Aircraft Noise

Applicants should have regard to Maroochy Planning Scheme Code 2.1.7 Code for Development in the

Vicinity of the Airport and SPP 1/02 Development in the Vicinity of Certain Airports and Aviation Facilities and its supporting guidelines.

3.7 Entertainment Noise

A different method of assessment is applicable to amplified or non-amplified entertainment noise whereby a comparison of unlike descriptors is more appropriate.

The applicable limits for all indoor and outdoor amplified and non-amplified entertainment noise (as applied by Department of Tourism Racing and Fair Trading – Liquor Licensing Division) are:

(a) For noise during the daytime or evening – the L_{10} measured outside the most exposed part of an affected dwelling does not exceed the background level (L_{90}) by more than 10 dB(A); and

(b) For noise at any other time: the sound pressure level L_{OCT10}, in a full octave band with centre frequencies from 63 Hz to 2 kHz, measured outside the most exposed part of an affected dwelling, does not exceed the background level, L_{OCT90}, by more than 8 dB in 1 or more octave bands.

Amplified entertainment from licensed premises also requires approval from the Department of Tourism, Fair Trading and Wine Industry Development – Liquor Licensing Division. The Division will consider approval for amplified entertainment following Development Approval for the use by a Local Authority.

The Liquor Licensing Division require a noise impact assessment to be conducted including on-site noise testing and certification to demonstrate the appropriate level of entertainment noise for a licensed venue. This testing is generally conducted post development approval and prior to commencement of use of a new premises or following a change to the use of an existing premises.

4 Assessment Methodology and Data Presentation

4.1 Assessment Methodology

In undertaking acoustic studies for development assessment, applicants will be required to adopt a methodology that accords with AS 1055.3 Part 3: Acquisition of data pertinent to land use with respect to general assessment and/or AS2702 specifically with respect to road traffic noise.

As a general guide, a 4 step assessment methodology is provided below to assist applicants in using this policy.

Stage 1 Identify all the noise source/s under consideration (for both immission and emission) and determine whether existing sound pressure levels, predicated sound pressure levels or both are necessary for assessment.

Stage 2 Using the information gathered at Stage 1, identify the appropriate noise descriptors and limits from Table 3.1 and references of this policy for each of the identified noise sources under consideration.

Stage 3 Undertake assessment of all sources at the typical reference time of source activity to account for variations in the use of differing noise sources eg. time of highest traffic density, time of use of intermittent time-varying noise generating plant and equipment (air blast, loading process) or entertainment noise.

State whether noise immission and/or emission will comply with the noise limits identified in Table 3.1. If non-compliant, identify whether noise mitigation measures can be implemented to achieve the limits.

Stage 4 Prepare a detailed assessment report for submission to Council as part of the Development Assessment process. Such a report must specify the proposed attenuation measures in a manner that can form the basis of draft development approval conditions. Mitigation measures must be determined having regard to Section 5 of this policy.

4.2 Data Presentation

As a minimum, the assessment report must include the following sections:

(a) Existing Noise Climate or Traffic Conditions, refer Stage 1 above;

(b) Verification of Noise Calculation/Predication model i.e. accords with the relevant Australian Standard or recognised traffic noise assessment model;

(c) Climate Conditions (wind speed/direction, rain);

(d) Calibration of Instruments;

(e) Site Diagrams & Measurement Locations

(f) Influence of Facades & Partial Noise Barriers;

(g) Noise Model Input Variables and Results or similar; and

(h) Ambient Noise Survey Graphs (noting the relevant descriptors and sound pressure logger results over the measurement time period).

5 Preferred Approach to Noise Attenuation Measures

Council's primary interest is to ensure that potential noise impacts are identified and addressed up front in the planning and design of new development. The design and layout of new development should reflect these considerations. Where development is a Reconfiguration a Lot, or involves the design of a neighborhood, regard must be given to *Planning Scheme Policy No. 9 – Reconfiguring Lots*.

Any noise attenuation measures proposed are required to comply with the performance criteria in the relevant codes which require integration with the local streetscape and building form, creation of active street frontages and discouragement of crime and anti social behaviour.

In general:

(a) Council will prefer solutions that address potential noise impacts through lot layout, design and location[1];

(b) Solutions should be appropriately designed and landscaped to integrate with the local environment;

(c) Council will not prefer measures relying on building property notations for prospective purchasers.

Where used, such notations should reference the specific requirements for the use of building construction for the development as the means of noise attenuation;

(d) The use of stand-alone noise barriers is Council's least preferred noise attenuation treatment. Subsequently, building acoustic treatments, lot design, layout and location should be investigated prior to electing acoustic barriers as a means of noise attenuation.

6 References

- AS1055 – 1997 Parts 1 to 3 – *Acoustics – Description and Measurement of Environmental Noise*
- AS2021 – *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*
- AS2107 – 1987 – *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*
- AS2702 – 1984 – *Acoustics – Methods for the Measurement of Road Traffic Noise*
- AS3671 – *Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction*
- AS/NZS3817 – 1998 – *Acoustics – Methods for the Description and Physical Measurement of Single Impulses and Series of Impulses*
- Berglund B, Lindvall T, Schwela DH (1999) *Guidelines for Community Noise*, World Health Organization, Geneva
- *Brisbane City Plan: Noise Impact Assessment Planning Scheme Policy* (NIAPS Policy)
- State of Queensland, *Environmental Protection (Noise) Policy 1997*
- State of Queensland Department of Environment, (1998) *User's Guide to Queensland's Environmental Protection (Noise) Policy 1997*
- *Qld EPA State Interest Planning Policy for Noise Management in Planning Schemes Ver1 2000 and EPP (noise)*
- Hassall, JR & Zavard, K, *Acoustic Noise Measurements*, Bruel and Kjaer, Denmark. January 1979

1 *AMCORD Element 5.13, Housing on Traffic Routes, provides some guidance on site planning options having regard to minimising the impacts of road traffic noise*

6 Lot Size and Dimensions

6.1 Determining Factors

Many of the principles that will determine the size of standard detached house lots have been identified above. These same principles have been considered in determining the minimum lot sizes and frontages in Table 8.2 of the *Code for Reconfiguring Lots*.

In summary, these include ensuring that the minimum lot sizes and frontages of lots in subdivision is suitable to:

(a) Preserve existing environmental characteristics of the site;

(b) Locate recreation and service (driveways, garage, and car turning, etc) on useable land that minimizes the need for cut and fill;

(c) Ensure existing vegetation is preserved for visual amenity, privacy screening and sunshading;

(d) Achieve good north orientation for buildings which conserves the use of the use of non renewable energy sources;

(e) Prevent overshading of neighbours and loss of neighbouring views;

(f) Ensure that frontage widths are capable of supporting car turning and the appropriate/alternative siting of carports and garages; and

(g) Enable noise mitigation measures to be included on site, in terms of building placement.

In addition to demonstrating compliance with Element 2 of *The Code for Reconfiguring Lots*, the main task of supporting information should be to demonstrate at the Reconfiguration of Lots Application stage that the lots are capable of complying with the provisions of the *Code for the Development of Detached Houses and Display Homes*.

The solutions selected should be identified and addressed in any required *Neighbourhood Analysis Plan* or *Local Area Structure Plan*.

6.2 Small Lot Design

Small residential lots (ie: lots less than 600sqm) can be an important part of the subdivision designer's palette. The resulting increase in density can maximise the economies of providing infrastructure, help provide variety in density, pattern and built form, can enable a more efficient land use and increased design flexibility to unorthodox shaped blocks of land.

The Maroochy Plan aims to strike a balance between the provision of such benefits and the strong community desire to protect the character and the amenity of existing residential neighbourhoods.

The location and frequency of small lot housing occurrence is determined by Volumes 1-3. As discussed above, the location of small lots, as with all increased density, should occur within easy walking distance of a local shop, centre, public space (node) and public services. Additionally, the location of lots on steeper land is not encouraged due to the concentrated effects, which are generally harder to mitigate on steeper land.

The factors that drive the size of small lots are similar to those that determine the size of traditional lots. However, because of the reduced size of the lots, the issues are perhaps more concentrated, with less margin for error.

Consequently, the *Code for the Development of Detached Houses and Display Homes* contains additional Acceptable Measures for buildings on small lots that do not apply to traditional detached house lots. These measures include:

(a) Maximum site cover provisions;

(b) Minimum size and dimensional requirements for private open space;

(c) Specific screening and privacy requirements for a small lot buildings when within certain proximity to existing neighbours; and

(d) Specific location of mechanical equipment in relation to neighbouring private open space, habitable rooms etc.

It is important that in addition to the principles outlined in this Policy, a subdivision design addresses and demonstrates that these specific matters can be accommodated when small lots are included in a subdivision.

While a minimum small lot size has not been specifically stated in the *Code for the Development of Detached Houses and Display Homes*, it is anticipated that it is unlikely that the necessary issues can be adequately addressed on lot sizes less than 200m^2. This is demonstrated in Figure 5.2.1 (a) (below), which shows a small, complying 2 storey cottage on a small lot of this size. Achievable site cover (27%) and gross floor area not including decks (90m^2) is naturally restricted by required setbacks, minimum frontage widths and private open space requirements. Whilst smaller house sizes are possible, which could in turn bring about a smaller lot size, market demand and commercially viability will provide likely constraint.

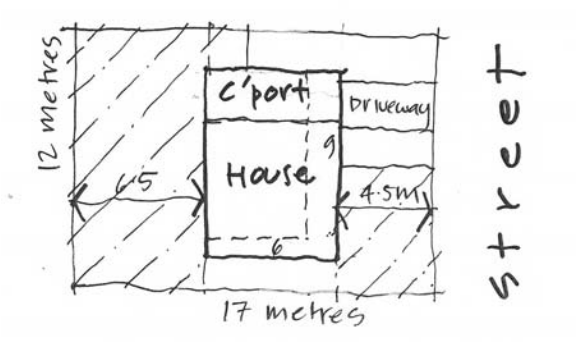


Figure 5.2.1(a) Complying Small Lot – 200m2

As with other areas of this Policy, the various solutions selected by a subdivision designer should be identified and addressed in any required *Neighbourhood Analysis Plan* or *Local Area Structure Plan*.

7 Integrated Movement Networks

Many of the components that form the integrated movement network of a subdivision have been discussed above, where they impact on the form and character of a neighbourhood. For additional information and direction on integrated movement networks refer to *Planning Scheme Policy No. 6 – Transport Traffic and Parking*.

8 Pedestrian and Cyclist Facilities

The general quality and placement of pedestrian and bicycle networks have been well covered above as they play a vital role in determining the form and character of an accessible and equitable neighbourhood. For additional information and direction on the form of pedestrian and cyclist facilities, refer to *Planning Scheme Policy No.6 – Transport Traffic and Parking*, and *Planning Scheme Policy DC2 - Provision of Bikeways and Bicycle Facilities*. Demonstration of the relevant requirements of these policies will also need to be provided in the information supporting the reconfiguring of lots application.

9 Public Transport

Once again the discussion above reinforces the importance of public transport in building an equitable community. For additional information and direction on the form of public transport facilities refer to Refer to *Planning Scheme Policy No. 6– Transport Traffic and Parking*. Demonstration of the relevant requirements of this policy will also need to be provided in the information supporting the reconfiguring of lots application

10 Public Parks Infrastructure

Sections 3 and 4 of this policy touch on the role of parks and infrastructure in the subdivision design process. For additional information and direction on the form of public parks and infrastructure in a subdivision, refer to *Planning Scheme Policy DC5 – Public Parks Infrastructure*. Demonstration of the relevant requirements of this policy will also need to be provided in the information supporting the reconfiguring of lots application.