DESIGN GUIDELINES

PINE RIVERS SHIRE COUNCIL

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DG T11

ON-SITE CARPARKING AND SERVICE VEHICLE FACILITIES

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DG T11 – On-SiteCarparking and Service Vehicle Facilities

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ON-SITE CARPARKING AND SERVICE VEHICLE FACILITIES

1.0.0 PURPOSE

1.1.0 INTRODUCTION

These policy guidelines represent the current attitudes of the Pine Rivers Shire Council to a number of specific traffic planning issues likely to arise in the design of on-site car parking and service vehicle facilities for a range of development types. They are intended to be used by designers (developers, architects, planners and engineers) in the formulation of schemes which will be safe, functional, economical and capable of being quickly approved.

Reference sources used in the preparation of this document are listed in Appendix A. Other references which may be of use to the designer are also listed in Appendix A.

These guidelines will apply to all developments requiring approval under the terms of the Town Plan for the Shire of Pine Rivers and should be read in conjunction with other planning policies and Local Laws.

Matters such as road widenings and aesthetic considerations may affect the overall design of car parking and service vehicle facilities. Enquiries regarding these matters and other policies should be directed to the Department of Development and Environment.

2.0.0 AIM OF THIS GUIDELINE

2.1.0 SUMMARY

In summary, the aims of the guidelines are:-

a) to ensure that the car parking, service vehicle and access systems developed are capable of being used for the foreseeable future at a level of safety consistent with community expectations - similar to that of the public road system, and with greater emphasis on the safety of persons than that of property.

b) to ensure that the car parking, service vehicle and access systems developed are capable of being used for the foreseeable future without causing unreasonable congestion on the external road system, and without causing unreasonable detriment to the local community through such effects as excessive on-street car parking, noise generation, or traffic intrusion into residential streets, and;

c) to provide effective and functional design guidelines which will facilitate the formulation of development proposals which are able to be consistently and quickly assessed.

The assessment of proposals by Council Officers will consider the following relative importance of objectives with respect to development design:-

a) levels of safety consistent with the public road system with emphasis on the safety of persons.

b) minimisation of disruption by generated traffic to the operation of the public road system.

c) minimisation of detriment to local amenity caused by parking and traffic intrusion.

d) economy of design.

e) convenience of use.

f) retain existing street parking and property access.

2.2.0 INFORMATION REQUIREMENTS FOR DEVELOPMENT PROPOSALS

For most development applications, it will be sufficient that the proposed design complies with the requirements of these and other relevant guidelines. If a traffic engineering consultant is required to advise on site layout and access, such input should be obtained before the preparation of preliminary designs. Applications for major developments, capable of having significant impact on the external traffic systems or the adjacent community, should be accompanied by a report on the traffic implications of the proposal prepared by an experienced Professional Engineer. Upon request, the Works and Services Department will advise on the need for such reports in specific circumstances, and all responses to applications for Consideration in Principle will identify those proposals for which reports are considered necessary.

Development proposals normally requiring a traffic report are those:-

a) Proposing in excess of 500 low turnover parking spaces, or in excess of 200 high turnover spaces (shops, etc.);

b) With access proposed to a major road, or with a driveway proposed within 100 metres of a signalised intersection, and having in excess of 50 car parking spaces.

c) Having sight distances at any proposed driveway not complying with the requirements set out in Section 3.4 of this Guideline, and;

d) Necessitating significant variation of any of the requirements of this Guideline.

Traffic reports should normally include:-

a) A review of the existing and proposed traffic network and traffic operating conditions based on an appropriate planning horizon-year. (minimum 10 years)

b) Estimates of traffic generations with appropriate directional distributions during selected peak design periods.

c) Predictions of operating conditions with and without the proposed development, including recommendations on external roadworks.

d) An assessment of the access, circulation and parking arrangements proposed, particularly with respect to their compliance with these guidelines, and;

e) A list of all of the assumptions made in the preparation of the report, and a list of the design parameters adopted in the technical analysis.

f) Consideration of traffic operations, parking and any temporary works required during construction.

3.0.0 DEFINITIONS AND TERMINOLOGY

3.1.0 TERMINOLOGY

For the purpose of this document the following definitions apply, some which are illustrated in Figure 3.1.1 following.

- Access Driveway **-** The footpath crossing which provides access to a site and on which vehicles move between the external frontage road and the site boundary. (Can also be an egress driveway)

- Circulation Aisle - An aisle performing the dual function of providing access to car parking and providing access to other aisles.

- Circulation Road - A roadway contained within a development site which does not provide direct access to parking spaces, but distributes traffic between entrance/exit driveways, circulation/parking aisles, and service areas.

- Design Vehicle - The vehicle for which a given development must make on-site provision as described in this guideline.

- Development - The use of land or structure, for one (1) or more of the purposes listed in this guideline, for which definitions are contained in the Town Plan.

- Driveway - See Access Driveway.

- Frontage Road - The road fronting a development from which access is gained via a driveway. Some developments will have more than one (1) frontage road.

- GFA - Gross Floor Area as defined in the Town Plan.

- Loading Dock - The area for loading and unloading of vehicles generally incorporating a raised platform to facilitate operations. Loading and unloading can however, take place from ground level.

- Major Road - A public roadway categorised as: -
  (i) an arterial or sub-arterial road;
  (ii) a road under State control (with the exception of a service road);
  (iii) a road with a national, state or metropolitan route number, and;
  (iv) a road which, in the opinion of the Director of Assets and Infrastructure Services has significant sub-arterial or arterial function or is likely to fall into one (1) or more of the above categories in the foreseeable future.

- Manoeuvring Area - The part of a Service Area, adjacent to service bays, required by service vehicles to manoeuvre into the bays or to a position beside a loading dock.

- Minor Road - Any public roadway not classified as a major road. Minor roads generally are collector and local road types.

- Parking Aisle - A car park aisle used by cars to gain access to a parking space.

- Queuing Area - An area of roadway between the entry or exit driveway and the first conflict point or traffic control point within a car parking area, available for the storage of vehicles in a queue.

- Service Aisle - That portion of roadway between the access driveway and the service area. Service Aisles may form part of the internal circulating road system.

- Service Area - The area on a development site allocated for manoeuvring, standing, loading or unloading of service vehicles.

- Service Bay - A parking bay for service vehicles engaged in loading/unloading and where a loading dock may or may not be provided.

- Service Vehicle - A vehicle used to supply or remove goods or services to/from a development.

- Sight Distance - The distance over which visibility occurs between a driver and an object, or between two (2) drivers, at specific heights above the ground.

- Sight Line - A straight line of clear view between two (2) objects over which sight distance is measured.

3.2.0 DEFINITIONS

- Council – The Pine Rivers Shire Council

- Director, Assets and Infrastructure Services Division - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative

- Manager, Development Services - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative

- Manager, Parks Reserves and Landscape Services - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative

- A Pine Rivers Shire Council engineer - the engineer employed by the Pine Rivers Shire Council to approve, supervise or inspect civil infrastructure construction, or their nominated representative.

- Developer - the company, organisation or person whom, under the provisions of the Planning Scheme, approval has been given to carry out the works and who acts as principal for the purpose of works carried out by contract.

- Consulting Engineer - the registered professional engineering company or registered professional engineer engaged by the principal to carry out the investigation, and design of the civil infrastructure to be constructed by the principal. When engaged for the construction phase, the company or engineer shall act as superintendent for the purpose of works carried out by contract.

- Contractor - as defined in AS 2124, the company, organisation or person engaged to carry out the construction of water supply works.

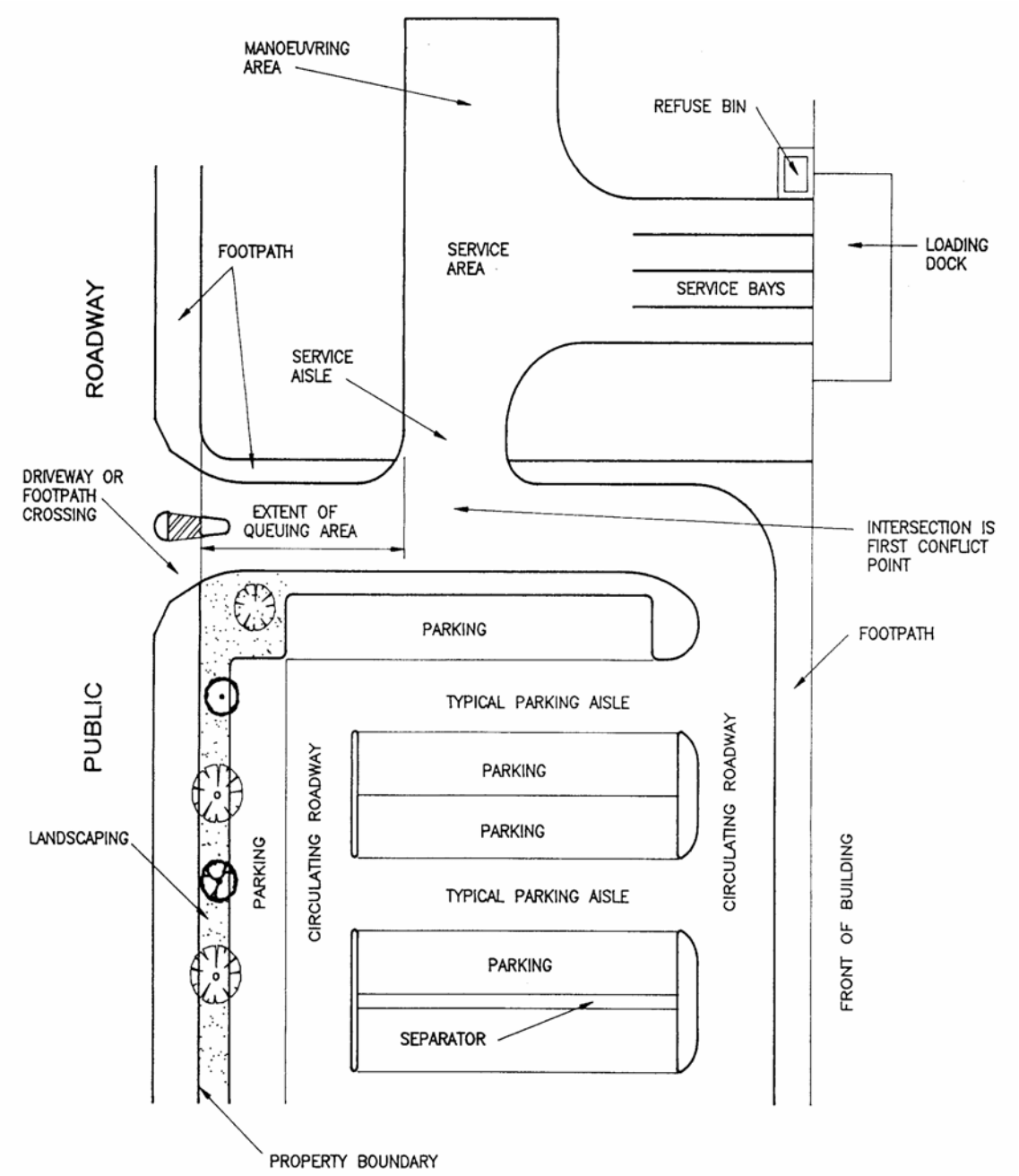

MANOEUVRING AREA
REFUSE BIN
LOADING DOCK
SERVICE AREA
SERVICE BAYS
FOOTPATH
ROADWAY
SERVICE AISLE
DRIVEWAY OR FOOTPATH CROSSING
EXTENT OF QUEUING AREA
INTERSECTION IS FIRST CONFLICT POINT
PARKING
FOOTPATH
PUBLIC
TYPICAL PARKING AISLE
PARKING
PARKING
LANDSCAPING
PARKING
CIRCULATING ROADWAY
CIRCULATING ROADWAY
FRONT OF BUILDING
TYPICAL PARKING AISLE
PARKING
SEPARATOR
PROPERTY BOUNDARY

Figure 3.1.1

4.0.0 SITE ACCESS

4.1.0 GENERAL

Access driveways usually perform the dual function of providing access for parking as well as for service vehicles.

The number of proposed access points should be the minimum necessary. Generally, only a single driveway (entrance/exit) will be approved. All developments must provide internal traffic circulation to avoid the use of the public road system for movements between sections of a site. However, for large developments it may be appropriate to separate car and service vehicle access, particularly where commercial-vehicle traffic is significant or where pedestrian safety can be improved by such a design. (Refer Figure 4.1.0).

Major traffic-generating developments with access via signalised intersections or roundabouts may need to dedicate some land as public roadway to ensure lawful priority of traffic movements with respect to the Traffic Act.

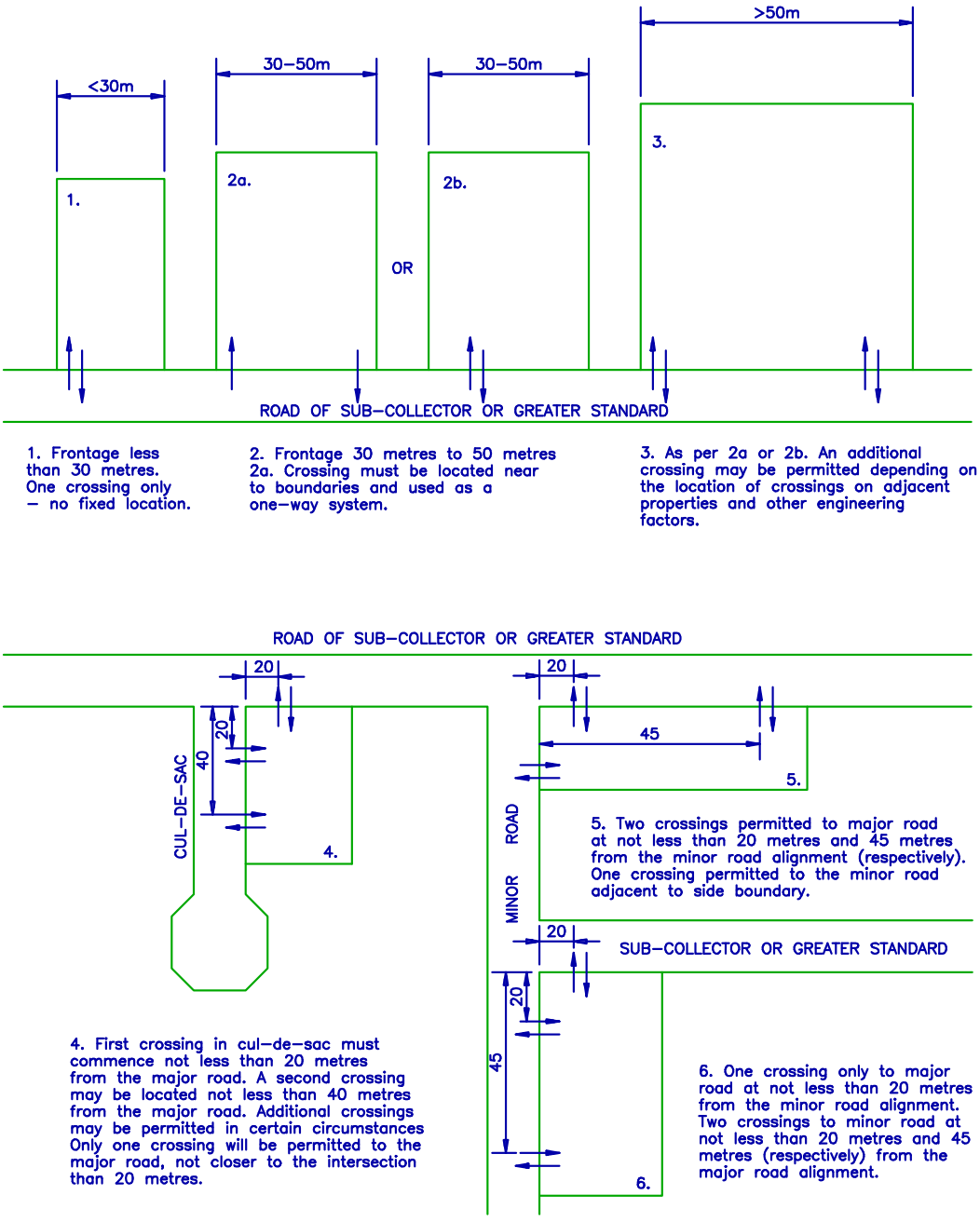


Figure 4.1.0

LOCATION OF MINOR DRIVEWAYS

4.2.0 LOCATION

An access driveway creates a minor intersection and its configuration must satisfy the basic traffic design criteria for all intersections with regard to driver behaviour, safety of pedestrians and vehicle characteristics.

Access to developments is preferred via minor roads, rather than major roads, provided the traffic generated by the development will not compromise the amenity of that road.

Driveways and their splays shall not protrude across shared property boundaries, or the projection of such a boundary line to the carriageway, except where joint property access is proposed. In such cases, it may be necessary to develop shared access arrangements with adjacent sites, where access difficulties exist, or where limits are required on the number of access points on major roads.

Driveways across footpaths carrying more than 300 pedestrians during the busiest hour of normal weekday will be accepted only where it can be satisfactorily demonstrated that pedestrian priority is unlikely to be threatened. Access will not be permitted through bus stops and taxi ranks. Alteration to these or other allocated kerbside uses shall be at the expense of the developer.

The following design constraints should be considered when determining the location of access driveways: -

- driveway type proposed.
- characteristics of frontage road (type, vertical and horizontal geometry, traffic volumes).
- location of intersections, median openings, other driveways etc.
- control of vehicle speed (external and internal to the site).
- sight distance requirements.
- potential vehicle queues within site and on frontage roads.
- requirements of Queensland Department of Transport (if relevant).
- location of existing services, bus stops, taxi ranks, traffic control devices, significant trees, and catchpits etc.
- where a proposed driveway conflicts with an existing catchpit, the impact the removal of the catchpits lintel will have on the road flooded width is to be investigated in accordance with Council's standards and, if necessary, an additional catchpit constructed.
- other Council Policy requirements, e.g. landscaping, retention of existing on-street parking.

4.2.1 Major Driveways

Driveways accessing major developments, particularly Type 2 and 7 driveways (see Section 5) should be located with consideration of the above constraints and in consultations with the Department of Works and Services.

4.2.2 Minor Driveways

The location of other (minor) driveways is normally not critical provided they are in accordance with Table 4.2.0. Driveways will only be permitted within the restricted areas where it can be satisfactorily demonstrated that safety and operational standards are not compromised.

Table 4.2.0
LOCATION OF MINOR DRIVEWAYS

TYPE OF FRONTAGE ROAD	ADJACENT FEATURE	MINIMUM SEPARATION OF MINOR DRIVEWAY FROM ADJACENT FEATURE
Minor	Minor Intersection	20.0 metres from intersection
	Major Intersection	20.0 metres from intersection
	Median Break	10.0 metres from median nose
	Other Driveway	3.0 metres along kerb
	Traffic Signals	Clear of queue areas and turning lanes
Major	Minor Intersection	20.0 metres from intersection
	Major Intersection	30.0 metres from intersection
	Median Break	15.0 from median nose
	Other Driveway	15.0 along kerb
	Traffic Signals	Clear of queue areas and turning lanes

Distances from intersections should be measured along the property boundary from the point at which the frontage property boundaries intersect, disregarding any existing or proposed truncations. (Refer to Figure 4.1.0).

4.3.0 EXTERNAL CONSIDERATIONS

Each access location acts as a mini intersection and should be designed accordingly. (Refer to Austroads "Guide for Traffic Engineering Practise"). Proposals for access to major roads will usually be restricted to left-in/left-out traffic movements. Construction of a central median may be required to ensure right turns in/out of the site are not possible.

Where right-turn lanes are required for access to a development, road widening and resultant land dedication may be necessary.

Median breaks will generally not be approved on arterial or sub-arterial roads to provide ingress/egress to private property. However, median breaks to allow right-turn and U-turns will normally be provided at regular intervals. Breaks will only be specifically considered for major commercial developments where: -

a) The entrance/exit is such that it can function as a public street with respect to priority controls (land dedication as road will often be necessary to achieve this).

b) The spacing of the major intersections so formed is considered satisfactory and does not prejudice plans for future major traffic control, and;

c) The disruption to through traffic overall would be greater without the median break than it would if no break was provided.

Single median breaks should be used to provide access to more than one (1) contiguous development, either by positioning the break opposite a driveway on a common boundary, or via internal access easements to which the Council will be a party.

The Council always maintains the right to construct central medians or close any median break if this is considered necessary to improve traffic operating conditions.

4.4.0 SIGHT DISTANCE

All driveways should be located and constructed so as to provide sight distances not less than those shown in Table 4.4.0, measured from a point outside the edge of the through carriageway as shown in Figure 4.4.0.

Table 4.4.0

SIGHT DISTANCE FOR ACCESS DRIVEWAYS IN URBAN AREAS

SPEED ENVIRONMENT (km/hr)	SIGHT DISTANCE metres)
50	80
60	110
70	130
80	165

Sight distance is measured from 1.15m eye height to 1.15m.

However, driveways accessing minor roads may be accepted with sight distances less than those described above but greater than the minimum requirement described below, where it can be satisfactorily demonstrated that there is no practical alternative, and that safety will not be unreasonably compromised.

Table 4.4.1

MINIMUM SIGHT DISTANCE

SPEED ENVIRONMENT (km/hr)	STOPPING SIGHT DISTANCE (metres)
50	40
60	55
70	70
80	95

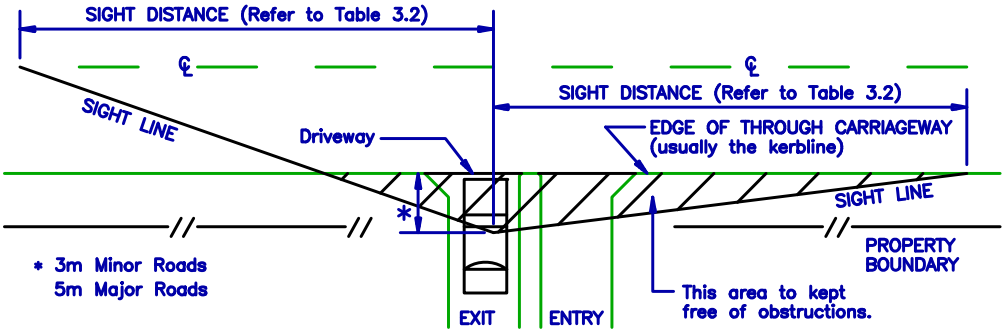


Figure 4.4.1

Stopping sight distance is measured from 1.15m eye height to zero.

Trucks require significantly longer gaps in traffic than cars to complete crossing, merging and turning manoeuvres. However, because of increased conspicuity and driver eye height compared with cars, it is considered reasonable that sight distance for service vehicles be generally in accordance with Table 4.4.0.

To ensure adequate visibility between vehicles on a driveway and pedestrians on the footpath, splays shall be provided at the property boundary as shown in Figure 4.5.0.

4.5.0 PROVISION FOR QUEUES

Entry and exit driveways shall provide for queues of vehicles so that queues do not disrupt traffic operations on the external streets. No parking manoeuvres should occur within the defined queue area, nor should there be any internal intersections within this area. Entry queues are of primary importance since they have the potential to most readily disrupt external traffic, but exit queues can also disrupt internal circulating traffic, thereby blocking entry lanes.

The extent of the design queuing area will be a function of a number of factors, including:-

- The size of the car parking area and the design turnover rates.
- The type and capacity of any control facility.
- The importance of the external street, and;
- The design of the car parking area beyond the queuing area.

In the absence of more reliable site-specific data, the queue requirements shown in Table 4.5.0 should be used as a preliminary guide. In some unusual design situations, greater queue provisions may be required.

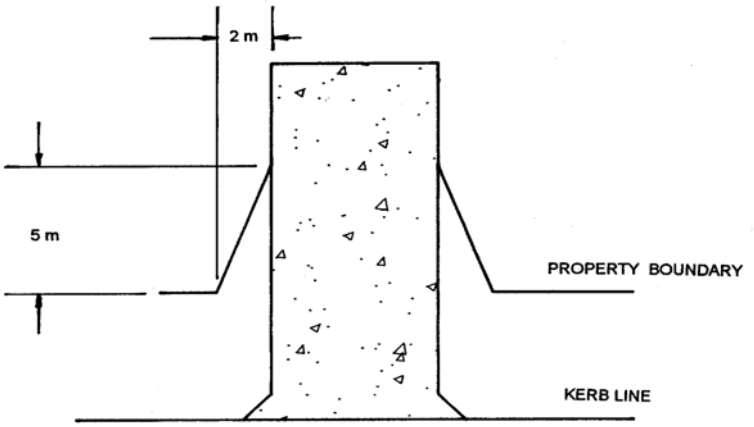


Figure 4.5
SIGHT LINES / OTHER AREAS

Table 4.5.0
MINIMUM QUEUING PROVISIONS

CAR PARKING AREA CAPACITY (Spaces)	NUMBER OF VEHICLES IN QUEUE
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 250	7
Greater than 250	7 plus 1% of capacity over 250 spaces (rounded upwards).

The minimum queue provision for any car parking area is one (1) vehicle at the entry and the exit. Each vehicle shall be assumed to occupy 6.0 metres in length measured from the property boundary. Where the footpath width exceeds 3.5 metres, the excess footpath width may be able to be incorporated in the queue length required.

Queuing space for vehicles must be provided at drive-in takeaway facilities associated with fast food stores and hotel drive-in bottle shops as specified in the Town Plan.

Where control facilities such as card readers, ticket machines etc. are provided, normal provision for queues should be made from that control point. Any such machines should be positioned on a central median behind which will protect them from damage by vehicles.

4.6.0 DIRECTIONAL SIGNS

Signs shall be provided on site to clearly indicate the existence and location of access points to car parking areas: -

a) where such parking areas are located at the rear of a development.

b) where access to the car parking area is not from the main frontage road.

c) where there are multiple access points serving different car parking area.

d) where visitor parking is provided for multi-unit residential developments and is not visible from the frontage road or access driveway.

e) where access/egress is via one-way driveways.

4.6.1 Design of Signs

All traffic/parking control signs and pavement markings shall conform with the requirements of the relevant Council Standards or the Manual of Uniform Traffic Control Devices (Queensland) - see Appendix A.

Where developments are expected to generate vehicular movements during hours of darkness, self-illuminated and/or reflectorised signs complying with current State or National standards should be provided.

Appropriate signage may include pavement markings.

5.0.0 DRIVEWAYS

5.1.0 GENERAL

The type and width of driveway appropriate for a development depends on:-

a) the volume of traffic generated by the development.

b) the type of road to which access is sought.

c) the existing and predicated future traffic volumes of the road to which access is sought.

d) the number of car parking spaces served by the driveway.

e) the size and type of the largest vehicle likely to use the driveway on a regular basis (usually a service vehicle).

f) the number of service bays served by the driveway.

Driveways will be constructed to the satisfaction of the Director of Assets and Infrastructure Services and in accordance with P.R.S.C. Standard Drawings.

Many arterial roads are under the control of the Queensland Department of Transport therefore its separate design requirements will need to be determined.

Table 5.1.0

EXAMPLE TRAFFIC GENERATION RATES	
Factory	1 v.p.h. / 100m^2 G.F.A.
Office	2 v.p.h. / 100m^2 G.F.A.
Retail	7 v.p.h. / 100m^2 G.F.A.
Medical Centre	13. v.p.h. / 100m^2 G.F.A.

For more detailed generation rates, refer to the Traffic Authority of New South Wales - "Policies, Guidelines and Procedures for Traffic Generating Developments" 1984.

5.2.0 DRIVEWAY SELECTION

A driveway type should be selected according to its function with regard to car parking or service vehicle requirements, or both. The following procedure is recommended for this purpose:-

a) Determine driveway function and select driveway type from relevant table:
- cars only, Table 5.2.0.
- service vehicles only, Table 5.2.1.

b) Where a driveway provides access for both cars and service vehicles, a driveway suitable for both functions should be selected.

Standard driveway types are shown in Figure 5.2.0. For major developments which generate large volumes of traffic, and for which the use of a standard driveway would cause unacceptable delays or hazard to traffic, a fully channelised intersection may be required.

5.2.1 Driveways for Car Parking Areas

Each driveway of a car parking area having multiple points of access should be designed on the basis of the number of spaces effectively served by that driveway. The driveway type should then be selected using the following table:-

Table 5.2.0
DRIVEWAY SELECTION FOR CAR ONLY

TURNOVER RATE OF CAR PARKING AREA	TYPE OF FRONTAGE ROAD	TYPE OF DRIVEWAY			
		NUMBER OF SPACES IN CAR PARKING AREA			
		1 TO 25	25 to250	251 to 500	> 500
Low/Med	Minor	1	2,3 & 4	7A	7C
Low/Med	Major	2 (6.5m)	7A	7B	7C
High	Minor	2,3 & 4 (7.5m)	7A	7B	7C
High	Major	2 (7.5m)	7B	7B	7C

For entry or exit-only driveways, Type 5 and Type 6 driveways should be used.

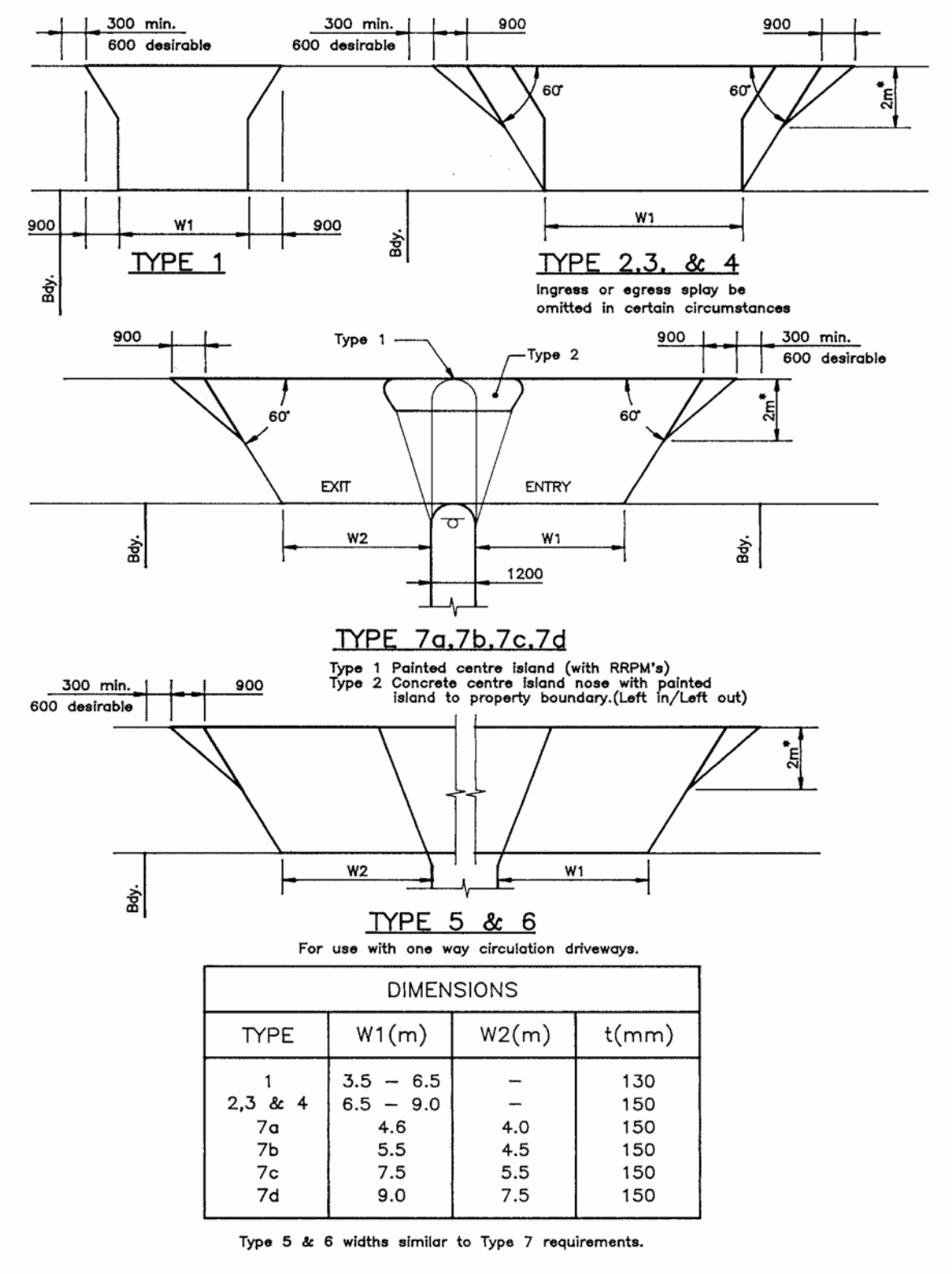
NOTES:-

1. Low to medium parking turnover rates are likely to be generated by residential, industrial and commercial developments. High parking turnover rates are likely to be generated by entertainment, transport, retail, and fast food developments.

2. On minor roads, residential (Type 1) driveways less than the 6.0 metres wide are acceptable for streetscape enhancement, providing normal manoeuvring and queuing requirements are satisfied.

3. Car parking areas containing over 500 spaces or generating more than 1000vpd should be assessed for the need of an appropriately designed channelised access roadway.

4. Where no kerb and channel exists for the frontage of the property, and is not required to be constructed as a condition of development, the Director of Assets and Infrastructure Services may permit the use of bitumen sealed turnout construction in accordance with the relevant PRSC Standard Drawing.



DIMENSIONS			
TYPE	W1(m)	W2(m)	t(mm)
1	3.5 – 6.5	–	130
2,3 & 4	6.5 – 9.0	–	150
7a	4.6	4.0	150
7b	5.5	4.5	150
7c	7.5	5.5	150
7d	9.0	7.5	150

Type 5 & 6 widths similar to Type 7 requirements.

Figure 5.2.0

DRIVEWAY TYPES

5.2.2 Driveways for Service Vehicles

Driveway types for service vehicles are determined according to the relevant design vehicle nominated in Column 2 of Table 7.2.0. The appropriate driveway can then be selected from Table 5.2.1.

Table 5.2.1

DRIVEWAY SELECTION FOR SERVICE VEHICLES (TURN PATH CRITERIA)

	TYPE OF DRIVEWAY			
	FRONTAGE ROAD	**MINOR ROAD**	**MAJOR ROAD**	**MAJOR ROAD**
	GENERATED TRAFFIC	**N/A**	**< 100 VPD**	**> 100 VPD**
	NOMINATED DESIGN VEHICLE	**DRIVEWAY TYPE**		**DRIVEWAY TYPE**
	VAN	1 (6.5M)		7A
Car & Trailer	(C&T)	1 (6.5M)		7A
Small Rigid Vehicle	(SRV)	2 (6.5M)		7B
Medium Rigid Vehicle	(MRV)	2 (7.5M)		7B
Large Rigid Vehicle	(HRV)	2 (7.5M)		7B
Refuse Collection Vehicle	(RCV)	2 (7.5M)		7C
	COACH	2 (9.0M)		7D
17m Articulated Vehicle	(AV)	2 (9.0M)		7D

Where traffic is required to be restricted to left in/out movements only, a Type 2 centre island should be used. (See Figure 5.2.0).

For entry or exit-only driveways, Type 5 and Type 6 driveway should be used.

Where the volume of traffic generated by a development contains a substantial proportion of service (commercial/industrial) vehicles and exceeds 500 vpd, then a channelised access roadway may be required in place of a standard driveway.

6.0.0 LAYOUT OF CAR PARKING AREAS

6.1.0 GENERAL

On-site car parking areas should be designed to ensure they are safe and convenient to use, thereby encouraging their use in preference to on-street parking. This can be achieved through consideration of the following design principles.

"Mandatory Design Principles" (Section 6.2.1) are intended to satisfy the primary objectives of traffic and user safety and shall be incorporated in all car parking areas. The application of "Desirable Design Principles" (Section 6.2.2) as minimum requirements will produce safe car parking layouts which are convenient to use. Some typical plan layouts of car parking facilities are shown in Appendix C.

6.2.0 DESIGN PRINCIPLES

6.2.1 Mandatory Design Principles

a) Restrict vehicles to low speeds in the vicinity of pedestrian activity. This should be achieved through use of appropriate road geometry or physical devices designed to limit speed.

b) Provide sight distances, appropriate for the likely operating speeds in all areas of potential pedestrian / vehicle and vehicle/vehicle conflict. In particular, sight distances of at least 2.5 seconds of travel time at the likely prevailing speed for conflicting movements shall be available. This will often require splayed corners on structures and careful treatment of landscaping and sign placement in areas of potential conflict.

c) Ensure no reversing of vehicles, particularly service vehicles, shall occur in areas of high pedestrian activity.

d) Ensure on-site traffic congestion does not impact on the external traffic system.

e) Provision of landscaping in accordance with Local Planning Policy LP 17 incorporating shade trees where practical.

6.2.2 Desirable Design Principles

a) Design for a progressive reduction in speed environment in moving between the road and a parking space.

b) Avoid dead-end aisles, and design for efficient and simple space search patterns.

c) Avoid cross intersections.

d) Ensure that aisles intersect circulation roads and circulation aisles as near to right angles as possible (intersection geometry is unlikely to be satisfactory at angles less than 75 degrees).

e) Provide a clearly defined pedestrian network which: -
   (i) closely follows demand lines.
   (ii) ensures that pedestrian movements through car parking areas are along aisles rather than across them.
   (iii) minimise the potential for vehicular/pedestrian conflict.
   (iv) minimises likely vehicle operating speeds and congestion levels at the conflict points, and;

(v) provides for pedestrian and vehicular queues at the conflict points.

f) Avoid long straights on circulation roadways, and large areas of open car parking areas which encourage high operating speeds and shortcutting when the car parking area is not full. Separators between parking rows are often necessary.

g) The maximum length of parking aisles should be 100 metres unless satisfactory measures are adopted to ensure vehicle speeds are kept low.

h) Where necessary, provide for relatively uncongested public transport and service vehicles movement through the site, without using parking aisles.

i) Provide adequate site lighting for vehicles and pedestrians and avoid abrupt changes in lighting levels during both day and night operations.

j) Provide adequate queuing areas for drive-through facilities which will not block primary circulation roadways or site access driveways (occasional queuing in parking aisles is normally of little consequence).

k) Ensure on-site traffic congestion does not hinder satisfactory operation of car parking facility.

l) Ensure that the design provides for all storage areas, fire escapes, loading areas, refuse collection areas, etc., in compliance with the requirements of the overall project design.

m) Speed humps shall not be located in entry/exit queuing areas, and should not be necessary in a well designed car parking area. If speed humps are provided, their geometry should be as described in Figure 6.2.1.

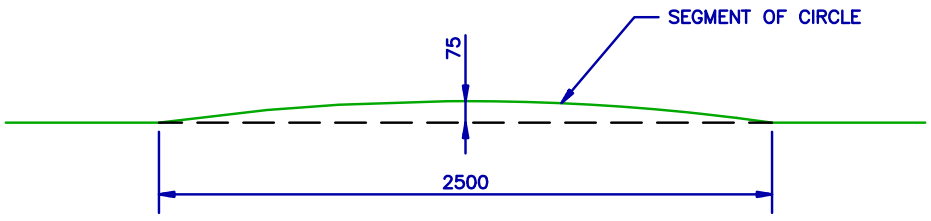


Figure 6.2.1

6.3.0 LOCATION OF CAR PARKING AREAS

All car parking spaces should be located on the site so as to be more convenient to use than alternative on-street spaces. This is often more a function of building design and placement than it is of car parking area design. Spaces may be made more attractive by a variety of measures such as increased security or the provision of shelter, but the primary determinant should be taken as the minimisation of walking distances between the parked vehicle and the desired pedestrian entrance to the building. Normally, it will be acceptable if a small number of off-street spaces (up to a maximum of approximately 10 percent) involve walking distances from the building entrances greater than the closest on-street spaces.

Public parking spaces should not generally be located inside security fences, nor in likely outdoor storage areas, nor in areas likely to be used for heavy vehicle manoeuvring (particularly opposite and adjacent to loading doors), nor out of sight at the rear of buildings. Public and visitor car parking spaces should be clearly visible from the street. A minimum of 40% of the total site parking requirement shall be clearly visible from the street, with the remainder becoming visible or adequately sign posted as entering vehicles move through the front car parking area first seen from the street, or as otherwise specified in the Town Planning Scheme.

6.4.0 ON-SITE CIRCULATION

6.4.1 General

Car parking areas should be designed on the basis of a hierarchy of internal roadways which range from those primarily providing for vehicle movement, to those which primarily provide for access to parking spaces. The descending order of roadway importance should be: Circulation Roads, Circulation Aisles and Parking Aisles.

6.4.2 Circulation Roads

Circulation roads connect entrance/exit driveways with circulation/parking aisles and so do not provide direct access to parking spaces.
Minimum widths of straight circulation roads shall be in accordance with Table 6.4.1.

Table 6.4.1

MINIMUM WIDTHS OF STRAIGHT CIRCULATION ROADS

TYPE OF CIRCULATION ROAD	WIDTH OF CIRCULATION ROAD
One-way, one-lane	3000mm (5000mm if over 20m long)
One-way, two-lane	6000mm
**Two-way, one-lane	5000mm (up to 25 vehicles per hour)*
Two-way, two-lane	6200mm (26 to 100 vehicles per hour)*
	6500mm (101 to 300 vehicles per hour)*
	7500mm (over 300 vehicles per hour)*

* For example vehicle generation rates, refer to Section 5.1.0.

** Two-way usage of a one-lane circulation road may be permitted in small, low turnover, car parking areas where it can be demonstrated that:-

a) The two-way one-lane section is more than 15 metres from the footpath crossing and no longer than 40m.
b) Any congestion generated will not extend onto the street.

c) It can operate at a satisfactory level of safety, and;

d) Pedestrian safety is not compromised.

e) Delays produced will not encourage parking in inappropriate locations elsewhere.

f) Adequate visibility of vehicles entering the circulation road .

Additional turning lanes should be provided where necessary.

Straight ramps shall have the same dimensions as straight circulation roads.

Dimensions shall be measured to kerb faces with a clearance from the kerb face of not less than 300mm to obstructions such as walls, columns, fences, buildings, other structures, or property boundary. If a median is proposed, it should be not less than 450mm wide provided it can be clearly seen, and not less than 1000mm wide if it needs to carry signs.

Many circulation roads also carry buses and service vehicles. The dimensions above relate to their function as access roadways for car parking areas and greater widths may be required to accommodate larger vehicles. (See Section 8).

6.4.3 Circulation Aisles

Circulation aisles provide access to parking spaces and to other aisles.

In small, low turnover car parking areas, typically having less than 50 spaces, two-way circulation aisles may be only 6200mm wide, but in all other design situations, they shall be not less than 6500mm wide. Circulation aisles are inappropriate in those parts of larger car parking areas which have high turnover rates.

Note: Aisle width dimension apply to 90° angle parking.
(Refer to Austroads "Guide to Traffic Engineering Practice" for other parking angles.

6.4.4 Parking Aisles

Parking aisles provide access to parking spaces. In general, all parking aisles are to provide for two-way traffic movement and the minimum width of two-way parking aisles shall be 6200mm.

The minimum width of two-way parking aisles providing access to high turnover spaces (2700mm wide) should be 7000mm.

One-way aisle arrangements will only be permitted where it can be satisfactorily demonstrated that a two-way aisle arrangement would be impractical, and appropriate design will ensure one-way aisles will only be used for one-way traffic operation.

Terminated aisles should extend not less than 1000mm beyond the last parking space in the aisle to allow for manoeuvres into and out of that parking space.

The maximum length of parking aisles shall be 100 metres unless provisions are made to ensure speeds are minimised.

Note: Aisle width dimensions apply to 90° angle parking. (Refer to Austroads "Guide to Traffic Engineering Practise" for other angles especially in one way situations.)

6.4.5 Curved Aisles / Roads / Ramps

Two design situations necessitate consideration of turning vehicles - curved roadways and ramps, and the provision for turning movements at intersections. The standard of design adopted depends on the frequency of likely vehicular conflict between opposing streams of traffic. Design standards appropriate for cars are set out in Figure 6.5.0.

Curves and intersections generally should be designed such that turning vehicles have no need to cross the centre line (whether marked or not) of circulation roads or circulation aisles. However, it can be assumed that vehicles can safely cross the centre line of parking aisles which provide access to less than 50 car parking spaces.

The width and turning geometry of all roadways and ramps should take account of likely maximum operating speeds. Templates are provided in Appendix B to aid designers in making appropriate allowances for the swept-path of turning vehicles.

6.5.0 SIGHT DISTANCE

The minimum sight distance at all areas of pedestrian/vehicle and vehicle/vehicle conflict shall be in accordance with Table 6.5.0.

Table 6.5.0
MINIMUM SIGHT DISTANCES AT CONFLICT POINTS

LOCATION OF CONFLICT POINT	MINIMUM SIGHT DISTANCE	
	For Pedestrians	For Vehicles
Circulation Roads (CR)	3.0 metres	20 metres
Circulation Aisles (CA)	2.5 metres	15 metres
Parking Aisles (PA)	2.0 metres	10 metres
At Two-Way Right Angle Turns		10 metres

Measurement of these sight distances is depicted in Figure 6.5.0.

NOTE: - No reversing of vehicles, particularly service vehicles, should occur in areas of high pedestrian activity.

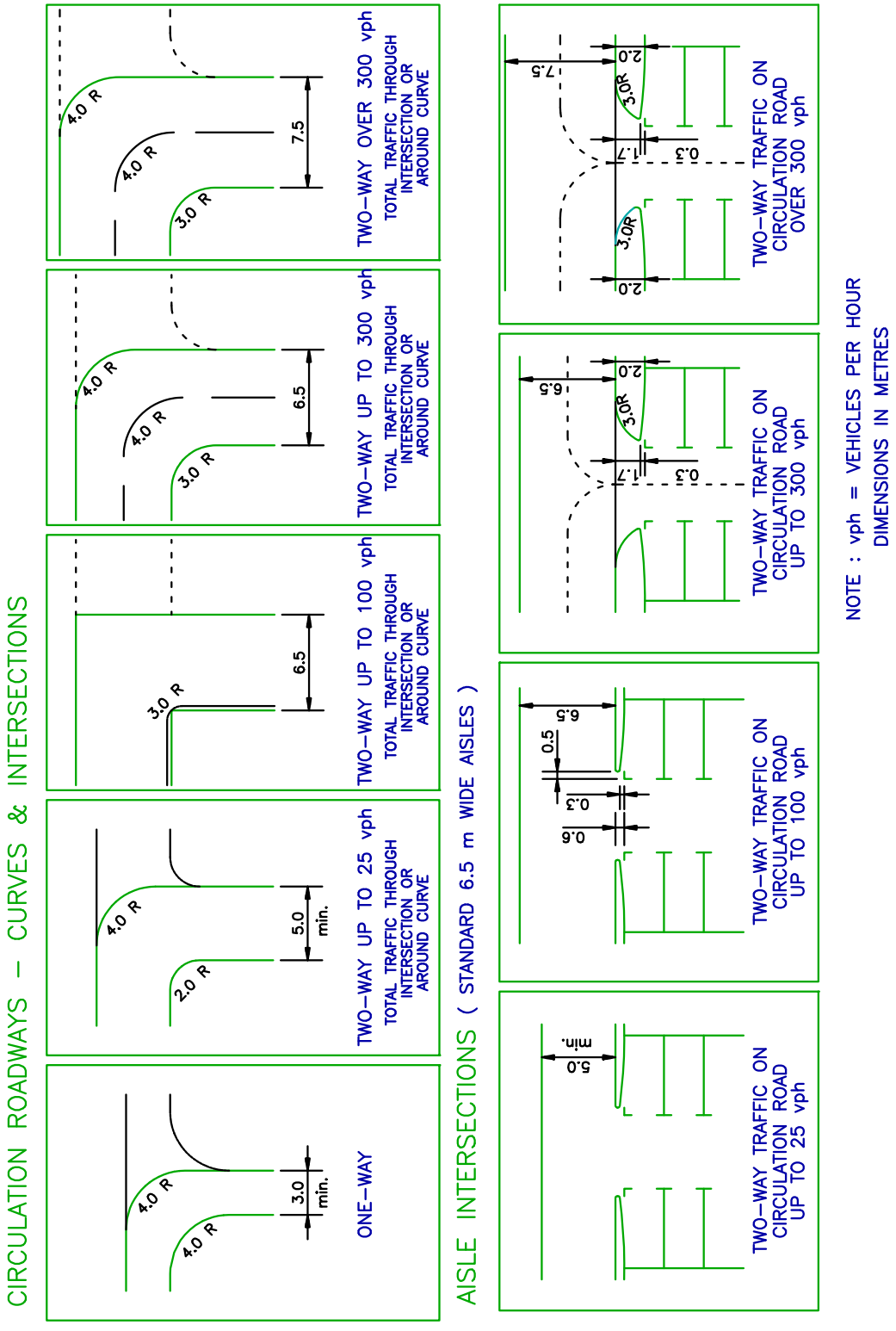
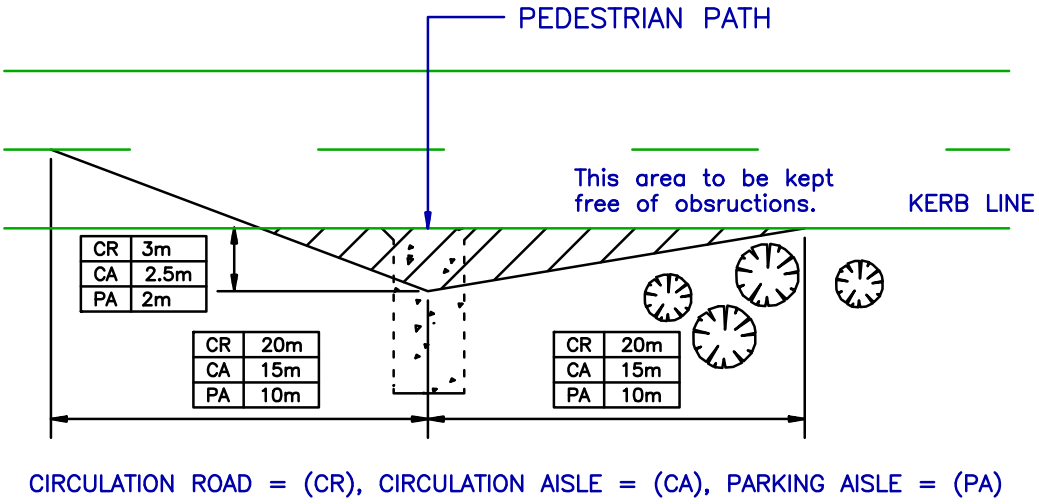


Figure 6.5.0

PROVISION FOR TURNING VEHICLES



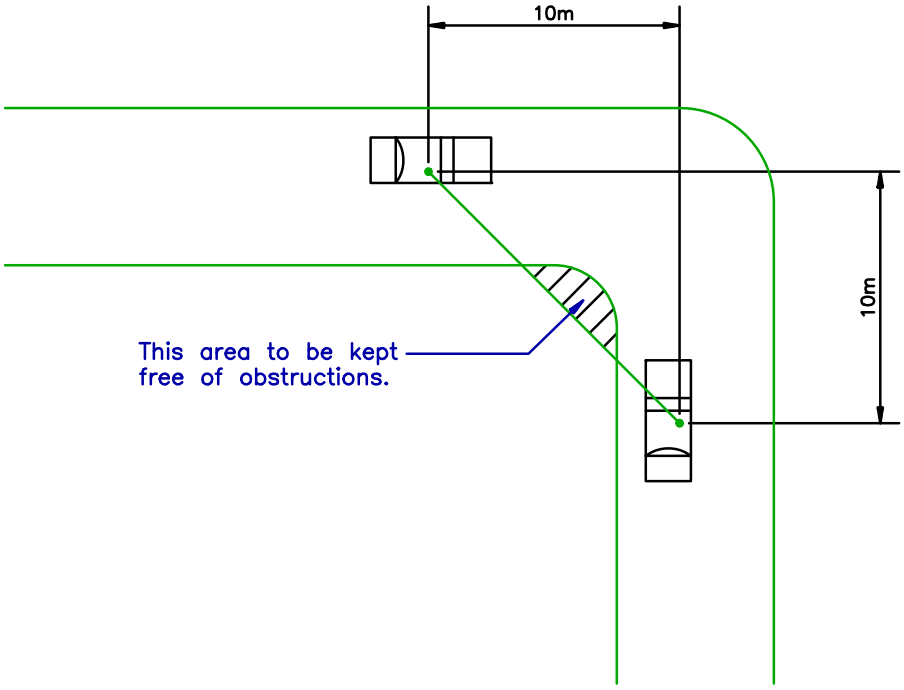


Figure 6.5.1

LOCATIONS OF SIGHT LINES AT CONFLICT POINTS

6.6.0 GRADIENTS

Minimum gradients of car parking areas are defined by drainage requirements, and depend on the type of surface and its roughness (refers AS 2890.1), generally 1 percent.

Maximum gradients are defined by consideration of vehicle performance, user comfort, likely operating speeds and, in some cases, the manoeuvrability of prams, wheelchairs and shopping trolleys.

Desirable maximum gradients are shown in Table 6.6.0. These grades should only be exceeded in extraordinary circumstances. Gradients are defined for the purpose of this section as the maximum total gradient incorporating longitudinal and transverse components.

Table 6.6.0
MAXIMUM GRADIENTS

LOCATION	MAXIMUM GRADIENT
Parking areas for people with disabilities	1 in 40 (2.5%)
Parking spaces, circulation and parking aisles in:-	
Public car parking area (prams and shopping trolleys likely).	1 in 15 (6.7%)
Tenant car parking area in residential building.	1 in 15 (6.7%)
Public car parking area (prams/trolleys unlikely)	1 in 12 (8.3%)
Employee car parking area	1 in 10 (10%)
Straight circulation road and ramp	1 in 6 (16.7%)
Curved circulation road or ramp (at inside kerb)	1 in 6 (16.7%)
Circulation road, ramp or driveway within 6.0 metres of a property boundary, traffic control point or marked pedestrian crossing. (Refer Section 3.5).	1 in 20 (5%)
Uphill queue area	1 in 12 (8.3%)
Superelevation on curved roadway or ramp camber	1 in 12 (8.3%)

The component of the gradient in the car parking area across parking spaces should not exceed 1 in 20 (5%). Where gradients steeper than this are encountered, some large car doors become difficult to control and minor damage to cars may result.

At changes of grade of 1 in 12.5 (8%) or more, a transition should be provided with length in metres equal to one fifth of the percentage change of grade. The transition can be straight or a vertical curve. At changes of grade, the required clear height should be maintained at all points.

6.7.0 HEIGHT CLEARANCE

To permit access for all vehicles expected to use the car parking area, the minimum clear height between the floor and any overhead obstructions shall be 100mm above design vehicle. The minimum clear height shall be appropriately and clearly signed and measured to the lowest appurtenance on the ceiling (fire sprinklers, services, lighting fixture, signs etc.).

Where arrangements are made to divert over-height vehicles within the car parking area, the minimum headroom may be reduced to 2.1 metres. The reduced height and alternative route shall be clearly signed.

Particular attention should be paid to the headroom available at the beginning or end of a ramp, due to the reduction in clear height which occurs when a car bridges the change of grade.

6.8.0 CAR PARKING SPACES

6.8.1 Widths of Parking Spaces

The minimum widths of car parking spaces shall be as indicated in Table 6.8.0 for the types of car parking area users described. The widths described have been based on considerations of door opening requirements and frequency of use. Refer also to Figure 6.10.0.

Parking areas which are shared by different categories of users shall have spaces of the greatest width required by any of the user types. Different car parking areas on the one site can provide for different categories of users provided the user types are adequately and clearly separated. For example, an employee car parking area may have narrower spaces than a visitor car parking area on the same site.

Some spaces, particularly those near entrance/exit driveways, may need to be wider (up to 3200mm) to allow satisfactory access to the space since such spaces can only be practically approached by a vehicle making a minimum radius turn.

Table 6.8.0

MINIMUM UNOBSTRUCTED SPACE WIDTHS

CLASS OF SPACE	MINIMUM WIDTH OF SPACE (mm)	EXAMPLES OF USER TYPES
1	2400	Reserved parking with low turnover rates, such as employee car parking areas at industrial and commercial premises.
2	2600	Public car parking areas with moderate turnover rates, such as suburban shops and medical centres. Reserved spaces where passengers and goods can be expected to be loaded or unloaded, such as tenant car parking areas in residential buildings. Visitor parking at commercial, industrial and residential premises.
3	2700	Small public car parking areas with high turnover rates (typical duration of stay 30 minutes of less), particularly shopping centres up to 1000 square metres GFA, kiss'n'ride areas, fast food stores, child care etc.
4	3200	Parking spaces reserved for people with disabilities.

Note: These figures apply to 90° angle parking. (Refer to Austroads "Guide to Traffic Engineering Practise" for other parking angles.)

6.8.2 Lengths of Parking Spaces

Except for parallel parking spaces, all bays shall be not less than 5400mm long.

Tandem parking spaces (combined length or 10800mm) may be acceptable in some situations as follows: -

- Residential developments where both spaces are attached to one unit; and
- Reserved car parking areas where both spaces are allocated to a single tenant.
- Any other uses as resolved by Council from time to time.

Tandem spaces are not appropriate in visitor or public car parking areas.

Fully enclosed spaces shall be 600mm longer to allow for pedestrian access around the vehicle with the garage doors closed.

The normal length of a **parallel** parking space shall be 6000mm, this length being reduced to 5500mm when the space is at the open end of the row of spaces, or increased by 300mm if closed by a kerb at one end, and by 600,, if closed by a kerb at both ends. Lengths of parallel parking spaces are depicted diagrammatically in Figure 6.8.1.

6.8.3 Clearance Around Parking Spaces

All parking spaces shall be basically rectangular in shape. However, there may be some intrusions into the rectangular form of the parking space by columns or other structures provided that such intrusions are at the closed end of the space and within defined limits. Additional areas outside the rectangular form must be clear of structures to allow for door openings and the turning manoeuvre into the space. The allowable intrusions and the additional clearance areas, which may be an unoccupied part of an adjacent space, are shown on Figure 6.10.0.

In most car parking areas, provision should be made for door openings on both sides of the vehicle. However, in permanently reserved, long term employee car parking areas for industrial and commercial uses, provision need be made for door openings on one side only.

6.8.4 Designated Parking Spaces

Where parking spaces have been specially provided for a designated vehicle class or category of user, they shall be clearly signed to indicate that specific vehicle class or user, e.g. visitor parking, people with disabilities, taxi, motorcycles, bicycles. Standard symbolic messages are preferred where appropriate.

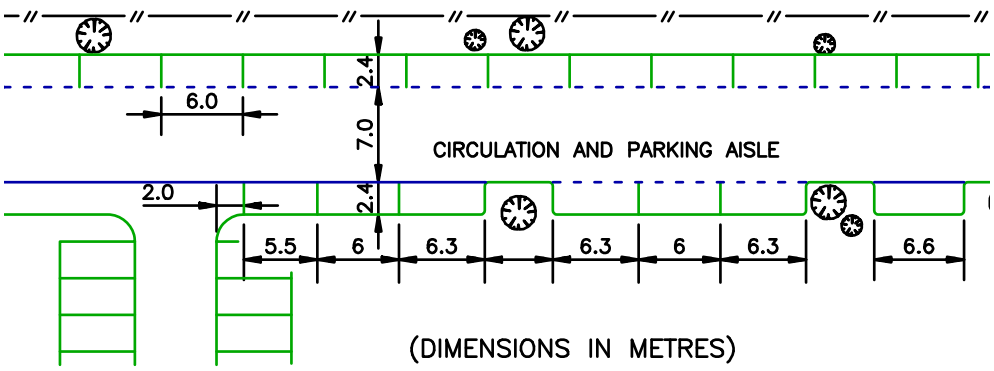


Figure 6.8.1

PARALLEL PARKING

6.9.0 PROVISION FOR VEHICLE OCCUPANTS WITH DISABILITIES

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

The demand for these additional requirements varies with land-use/development type. Generally, parking spaces for vehicle occupants with disabilities should be provided at a rate of one space per hundred ordinary parking spaces, except for the development types listed in Table 6.10.0, for which the number specified should be provided or as required by legislation.

6.10.0 PARKING SEPARATORS/WHEEL STOPS

Parking bay median islands or separators shall be provided to maintain separation between circulation roads and parking bays. Separators less than 1metre in width and not landscaped shall be provided with a suitable device to indicate a hazard for vehicular traffic.

In small car parking areas, less than 50 cars, the raised island separators may be omitted and replaced with painted chevron linemarking.

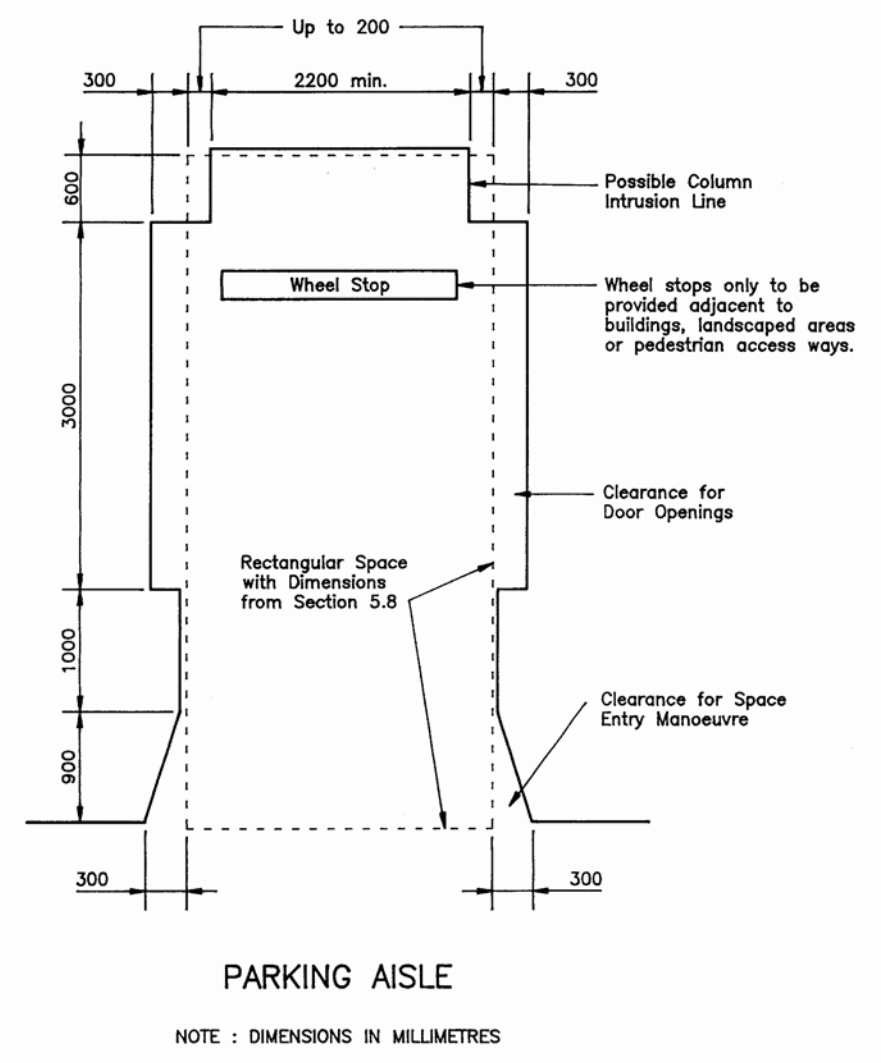


Figure 6.10.0

CLEARANCE AROUND CAR PARKING SPACE

The use of wheel stops may be approved where it can be satisfactorily demonstrated that they will not cause parked vehicles to extend into the aisle. If wheel stops are used, they shall be located 1000mm from the closed end of the parking spaces, with no obstructions higher than 100mm within the 1000mm overhang area. Pedestrian areas shall be set back at least 1000mm from the face of the stop. The area of overhang shall not be considered to form part of the required landscape area, which may be required under any Council law or policy, whatever the surface treatment.

Table 6.10.0

NUMBER OF PARKING SPACES FOR VEHICLE OCCUPANTS WITH DISABILITIES

DEVELOPMENT	SIZE	NUMBER OF DISABLED PARKING SPACES
Business	> 500m^2 G.F.A.	1 space/4500m^2 GFA
Bank	> 500m^2 G.F.A.	1 space
Restaurant	> 500m^2 G.F.A.	1 space/300m^2 GFA
Shop	< 50000m^2 G.F.A	1 space/1200m^2 GFA
	> 50000m^2 for that floor area	1 space/1500m^2 GFA

Number of spaces indicated above may be varied for specific uses which may attract persons likely to have disabilities e.g. medical centres, hospitals etc.

6.11.0 PROVISION FOR BICYCLES AND MOTORCYCLES

Parking facilities for bicycles and motorcycles should be located close to main pedestrian entrances and should be signed to encourage effective usage.

6.11.1 Bicycles

For all convenience stores, shops, recreational/sporting developments such as skating rinks and venues operating electronic games, suitably designed bicycle racks should be provided at the rate of:-

- one rack space for every 50m^2 of Gross Floor Area; or
- two racks spaces per electronic game machine; or
- four rack spaces;
- whichever is greater.

Suitable provisions for bicycle parking can often be made in small, convenient areas not usually accessible to motor vehicle traffic. Spaces should be positioned within 6 metres of building entries where possible, and within an absolute maximum distance of 20 metres.

Details of bicycle facilities may be sought from reference publications listed in Appendix

6.11.2 Motorcycles

Motorcycles presently represent about 2% of total vehicular traffic. Therefore, specially marked and signed areas for motorcycles parking should be provided within car parking areas at approximately this rate to promote more effective use of the available parking area.

Motorcycle parking stall dimensions should not be less than 2.5m X 1.35m.

7.0.0 PROVISION FOR SERVICE VEHICLES

7.1.0 GENERAL

A major consideration in the design of a development is the provision for servicing by commercial vehicles. Access and on-site facilities are required for service vehicles performing functions such as:-

a) goods/merchandise deliveries
b) refuse collection
c) building maintenance/repair
d) fuel deliveries
e) armoured/security services
f) courier services
g) bus/coach transport
h) furniture removal/delivery

Developments should be designated to accommodate the largest service vehicle likely to access the site.

The relevant service vehicles and their operational requirements should initially be considered when assessing a site's suitability for development, and receive more detailed attention when designing the site layout.

Provision should be made when establishing servicing requirements, for possible changes in site activity that could occur without building alteration or application to Council.

If a site does not have sufficient area or length of frontage to allow the design vehicle to service the site, the proposed activity may be considered unsuitable.

7.2.0 DESIGN VEHICLE SELECTION

Table 7.2.0 lists the development types recognised under the Town Plan and the corresponding design vehicles for which provision should be made. Provision may be varied from that specified, particularly for multiple use/activity developments or for the unique characteristics of a purpose-built development. In such cases, advice from the Department of Works and Services should be sought.

Design vehicle types are nominated in Table 7.2.0 (Columns 2,3,4) for each development type. The vehicle nominated in Column 2 should be used for access driveway design, as described in Section 5.2.2, and adequate on-site standing area as described in Section 7.2.1. The vehicles nominated in Columns 3 and 4 should be used for design of on-site servicing facilities as described in Sections 7.2.2 and 7.2.3.

Drawings in Appendix B show the design vehicle types to which reference is made in this guideline and the corresponding dimensions and turning paths for the design of site access, internal roadways and manoeuvring areas.

7.2.1 Occasional Access

Site access should be provided for vehicles which occasionally service a site as part of its normal operation. Examples of this type of servicing are a furniture removal van at a residential or office development and a refuse collection vehicle at a licensed club.

Provision for servicing by the vehicle type nominated in Column 2 of Table 7.2.0 should ensure that: -

- ❖ the vehicle can stand wholly contained within site
- ❖ reverse manoeuvres are limited to one only, either to or from the site.
- ❖ the swept path of the vehicle does not have a greater overall width than the access driveway.

7.2.2 Major Road Access

Where access to a site is via a major road, provision should be made for servicing by the design vehicle nominated in Column 3 of Table 7.2.0 to ensure it can:-

a) enter and leave the site in a forward direction.

b) traverse the site on circulation roads/aisles to access service areas.

c) manoeuvre on-site to allow parking and loading/unloading in a designated service area.

7.2.3 Minor Road Access

Where site access is via a minor road, on-site manoeuvring and full loading bay provision for the largest design vehicle is not essential. Therefore, the design vehicle nominated in Column 4 of Table 7.2.0 may be used for the design of on-site servicing provisions, as per (a), (b) and (c) above, subject to the following: -

- ❖ the column 3 (major road) design vehicle can stand wholly contained within the site without occupying any designated queue areas, or blocking access to more than 50% of car parking spaces.
- ❖ any on-street manoeuvring by the column 3 (major road) design vehicle can be limited to reversing on or off the site in one movement only.
- ❖ the swept path of the column 3 (major road) design vehicle may cover the overall width of a two-way undivided driveway.

Table 7.2.0

DESIGN VEHICLE FOR DEVELOPMENT TYPE

COLUMN 1	DESIGN VEHICLE (Refer Appendix B)		
	COLUMN 2	COLUMN 3	COLUMN 4
DEVELOPMENT TYPE	OCCASIONAL ACCESS	REGULAR ACCESS	
		MAJOR ROAD	MINOR ROAD
Accommodation Units	RCV	MRV	SRV
Agriculture	AV	AV	HRV
Airstrip	AV	AV	AV
Bulk Garden Supplies	AV	AV	AV
Business/Office	RCV	Refer 6.3.1	
Camping Grounds	RCV	COACH	SRV
Car Park	MRV	SRV	SRV
Caravan Park / Transportable Home Village	AV	RCV	MRV
Caretaker's Residence	VAN	VAN	VAN
Cemetery	MRV	MRV	SRV
Child Care Centre	VAN	VAN	CAN
Cluster Housing	HRV	HRV	VAN
Commercial Services	HRV	MRV	SRV
Concrete Batching Plant	AV	AV	AV
Contractors Depot*	AV	HRV	MRV
Crematorium	MRV	MRV	SRV
Educational Establishment	COACH	COACH	COACH
Hardware Shop	HRV	HRV	SRV
Hospital/Institution	RCV	RCV	HRV
Hotel (see Section 6.3.3)*	AV	AV	RCV
			SRV
INDUSTRY (Refer Notes)			
- Extractive Industry	AV	AV	AV
- General Industry	AV	AV	AV
- Service Industry	AV	HRV	MRV
- Hazardous or Offensive Industry	AV	AV	HRV
- Home Industry	AV	HRV	MRV
- Rural Industry	AV	HRV	MRV
Intensive Recreation	HRV	MRV	SRV

For definitions of design vehicles refer to Appendix B - Tables B1 and B26.

Table 7.2.0

DESIGN VEHICLE FOR DEVELOPMENT TYPE (Continued)

COLUMN 1	DESIGN VEHICLE (Refer Appendix B)		
	COLUMN 2	COLUMN 3	COLUMN 4
DEVELOPMENT TYPE	OCCASIONAL ACCESS	REGULAR ACCESS	
		MAJOR ROAD	MINOR ROAD
INTENSIVE ANIMAL HUSBANDRY			
- Cattery	RCV	RCV	SRV
- Dairy	AV	MRV	MRV
- Kennels	RCV	RCV	SRV
- Piggery	HRV	HRV	HRV
- Poultry Farm	HRV	HRV	HRV
Motel (see Section 7.3.3) *	RCV	SRV	SRV
Motor Sport	AV	AV	AV
Multiple Dwelling	HRV	HRV	VAN
Office			
Place of Assembly +			
- if music/concert	RCV	RCV	HRV
- otherwise	RCV	RCV	SRV
Place of Entertainment	RCV	RCV	MRV
Place of Worship	RCV	RCV	SRV
Produce Store	AV	AV	HRV
Radio Station	AV	HRV	MRV
Relocatable Home Park	AV	AV	AV
Restaurant (see Section 7.3.2) +	RCV	MRV	SRV
Retail Nursery	HRV	MRV	MRV
Retirement Village	RCV	MRV	SRV
Service Station	AV	AV	AV
Shop	AV	AV	HRV
Showroom	AV	AV	HRV
Store	RCV	RCV	MRV
Take-Away Food Store / Fast Food Delivery Service	RCV	RCV	MRV
Theme Park	COACH	COACH	COACH
Undertaker's Establishment	RCV	RCV	SRV
Vehicle Sales Yard/Heavy Vehicle Sales/Car Depot	AV	AV	AV
Veterinary Hospital/Clinic	MRV	SRV	SRV
Warehouse	AV	AV	AV

NOTES: -

On-site refuse collection for cluster housing developments is to be referred to the Pine Rivers Shire Council's Manager Community Response for consideration.

* Provision should be made for on-site refuse collection for these residential uses. Areas provided for manoeuvring, loading and unloading of the design vehicle may include areas nominated as car spaces.

\+ Areas provided for manoeuvring may include areas nominated as car parking spaces.

1. Where a development is contained within the General Industry or Service Industry Zone, and has a site area in excess of 1000 square metres and a frontage greater than 25 metres, the design vehicle shall be that pertaining to General Industry.

2. Where a development is contained in an General Industry or Service Industry Zone, and has an area less than 2500 square metres, a frontage of less than 25 metres and does not access a major road, relaxation of requirements for on-site manoeuvring of the design vehicle may be considered.

3. Where the Gross Floor Area of a General Industry development is divided into separate units, and the nominated design vehicle is an AV, normal provision must be made for the AV on the site and provision must also be made for servicing each unit with a vehicle no lesser than an MRV.

4. The provision of refuse collection for all development types should be referred to the Manager Health Services for consideration.

7.3.0 NUMBER OF BAYS REQUIRED

The minimum numbers of on-site service bays to be provided for Offices, Shops, Supermarkets, Restaurants and Hotels, are described below. Requirements may vary from those specified, particularly for multiple use/activity developments, and the prescribed distribution of service vehicle types may need to be varied according to the unique characteristics of a particular development.

As a guide, the total number of bays for multi-use developments can be determined by addition of the required bays for the individual development components. It is recognised that large multiple-use developments with centralised service vehicle areas require fewer service bays than the sum of the individual requirements. In such cases, or where the applicant for development wishes to make provision for fewer service vehicles, the advice of an experienced Professional Traffic Engineer should be sought.

7.3.1 Business

Table 7.3.1

GROSS FLOOR AREA (m^2)	SERVICE BAYS REQUIRED			
	VAN	SRV	MRV	LRV
0 - 999		1		
1000 - 2499	1		1	
2500 - 3999	2	1	1	
4000 - 5999	3	1	1	
6000 - 7999	4	1	1	
8000 - 9999	4	2	1	
10 000 - 14 999	4	2	1	
15 000 - 19 999	5	2	1	
20 000 - 34 999	5	2	2	
35 000 - 49 999	5	2	2	1
50 000 - 64 999	6	2	2	1
65 000 - 79 999	6	2	3	1

NOTES: -

1. The majority of VANS accessing business developments will be courier vehicles. Provision for these and taxis should be positioned near main building entrances and can be in the form of short-stay layby areas. Bays provided for couriers and taxis should be clearly visible from access driveways and/or frontage road(s).

2. Where emergency power generating facilities are to be installed, provision for fuel delivery is required (refer 8.11.0).

3. Developments exceeding 1000m^2 GFA should provide for access and on-site standing of an HRV (i.e. furniture removal van). A dedicated service bay is not required.

7.3.2 Shops, Supermarket, Restaurant

Table 7.3.2

GROSS FLOOR AREA (m^2)	SERVICE BAYS REQUIRED				
	VAN	SRV	MRV	HRV	AV
0 - 199		1			
200 - 599	1		1		
600 - 999	1	1	1		
1000 - 1499	2	1	1		
1500 - 1999	2	1	1		
2000 - 2799	2	2	2		
2800 - 3599	2	2	2	1	
3600 - 4399	3	2	2	1	
4400 - 6499	3	2	2	1	1
6500 - 8499	4	2	2	1	1
8500 - 11 499	4	3	2	1	1
11 500 - 14 749	5	3	2	1	1
14 750 - 17 999	5	3	3	1	1
18 000 - 20 999	6	3	3	1	1
21 000 - 23 999	6	3	3	2	1
24 000 - 26 999	6	3	3	2	2
27 000 - 29 999	6	3	3	3	2
30 000 - 32 999	7	3	3	3	2
33 000 - 35 999	7	3	4	3	2
36 000 - 38 999	8	3	4	3	2
39 000 - 41 999	9	3	4	3	2
42 000 - 44 999	10	3	4	3	2

NOTES:

1. Where floor gross area exceeds $200m^2$ it is expected provision should be made for on-site refuse collection.

2. The following requirements shall apply to Shopping Centres.

   a) The above table shall be applied to each individual retail component comprising the development.

   b) The service bays related to each component should be located immediately adjacent to the component.

   c) Speciality shops in a shopping centre with a gross floor area less than $200m^2$ shall be grouped together and treated as a single retail component for the purpose of applying the above table. For this purpose, MRV class vehicles shall be provided for in lieu of HRV and AV class vehicles.

7.3.3 Hotel / Motel

Table 7.3.3

NO. OF BEDROOMS	SERVICE BAYS REQUIRED			
	VAN	SRV	MRV	HRV
0 - 199	1		1	
200 - 399	1		1	1
400 - 599	1	1	1	1
600 - 799	1	2	1	1

NOTES: -

1. In addition to the above requirement, the following provision should be made for public areas such as bar, tavern, restaurant, meeting rooms, and convention rooms etc: -

   1 MRV per 6000m^2
   1 VAN per 1000m^2

2. Provision must be made for on-site refuse collection in all developments of this type.

3. Short-stay layby areas should be provided for tourist coaches, passenger set-down, couriers (VANS) and taxis near main building entrances and should be clearly visible from access driveways and/or road(s).

4. Hotels with large public function areas should consider provision of site area for standing of television relay vehicles.

8.0.0 SERVICING FACILITY LAYOUT

8.1.0 GENERAL

Adequate facilities for servicing developments should be provided on-site to ensure loading/unloading activities do not occur on-street and compromise the safety and capacity of the public road system.

The design of site layouts should provide for the operational requirements of service vehicles. Such requirements are based on vehicle dimensions and turning paths for which design templates can be derived and are provided in Appendix B. There are two (2) types of templates:-

a) Manoeuvring templates for movements made at stalling speeds and used for design of service areas.

b) Turning templates for movements at low speed and used for driveway and internal roadway design.

Where purpose-built vehicles are to be used, the designer should engage the services of an experienced Professional Engineer for the purpose of conducting field trials to establish the extent of required manoeuvring areas.

8.2.0 LOCATION

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

Service areas should be separated from areas of passenger vehicle or pedestrian movement.

8.3.0 SERVICE AISLES

Service aisles are roadways connecting service areas with driveways, and may be part of the internal circulation road system. Required widths for straight sections of service aisles are given in Table 8.7.0. The width of curved sections should be determined by the swept path of the relevant design vehicle.

8.4.0 SERVICE AREAS

A service area consists of space allocated for manoeuvring, standing and loading or unloading of service vehicles. Its size is determined by the addition of its components: manoeuvring area; service bays; loading docks, and refuse collection zones. Figure 8.7.0 shows the areas necessary for manoeuvring into and out of loading bays and is suitable for preliminary design purposes. Areas such as this are required where drive-through servicing facilities are not provided. Detailed site design should utilise the templates provided in Appendix B.

Where the volume of service vehicle traffic is significant, it is desirable to design a manoeuvring area larger than the minimum required in order to promote easier and more efficient vehicle movements.

Manoeuvring into a service bay should be possible with all other bays occupied.

Some typical car parking and service area layouts are shown in Appendix C. Service and manoeuvring areas should be signed and delineated to encourage correct utilisation and

discourage or restrict the parking of non-service vehicles within their boundaries.

The configuration of the manoeuvring area should allow the design vehicle to dock or park in service bays with only one reverse movement. When a service vehicle is required to reverse into a loading dock, the design should maintain the truck driver on the inside of the turning movement as shown in Figure 7.2. This approach to design will ensure that the truck driver's view of the loading bay is not obscured by parts of the vehicle or the truck load.

Designs necessitating turns through angles greater than 120° at minimum radii by articulated or large rigid vehicles can cause tyre, pavement or vehicle structural damage and therefore should be avoided.

Table 8.4.0

DESIGN VEHICLE	A	B	C	D	E
SRV	7.0	11.0	4.0	7.0	5.0
MRV	8.0	13.0	5.0	8.0	7.0
LRV	10.0	16.0	6.0	9.0	9.0
AV	23.0	21.0	8.0	18.0	14.0

(Dimensions in Metres)

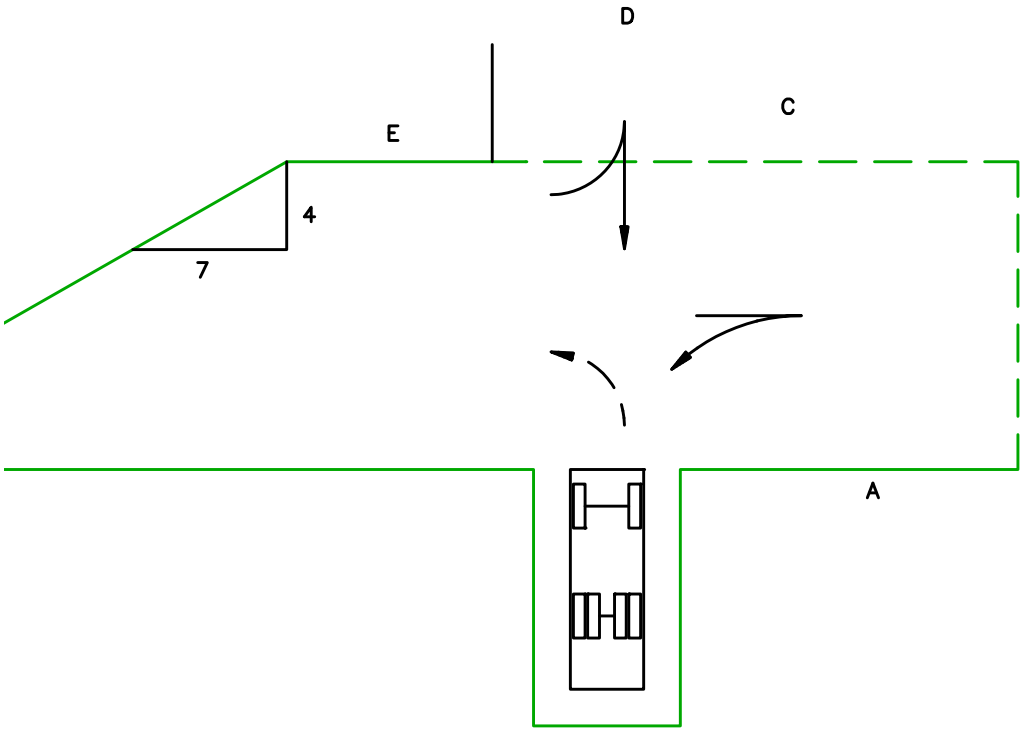


Figure 8.4.0
MANOEUVRING AREA : PRELIMINARY DESIGN

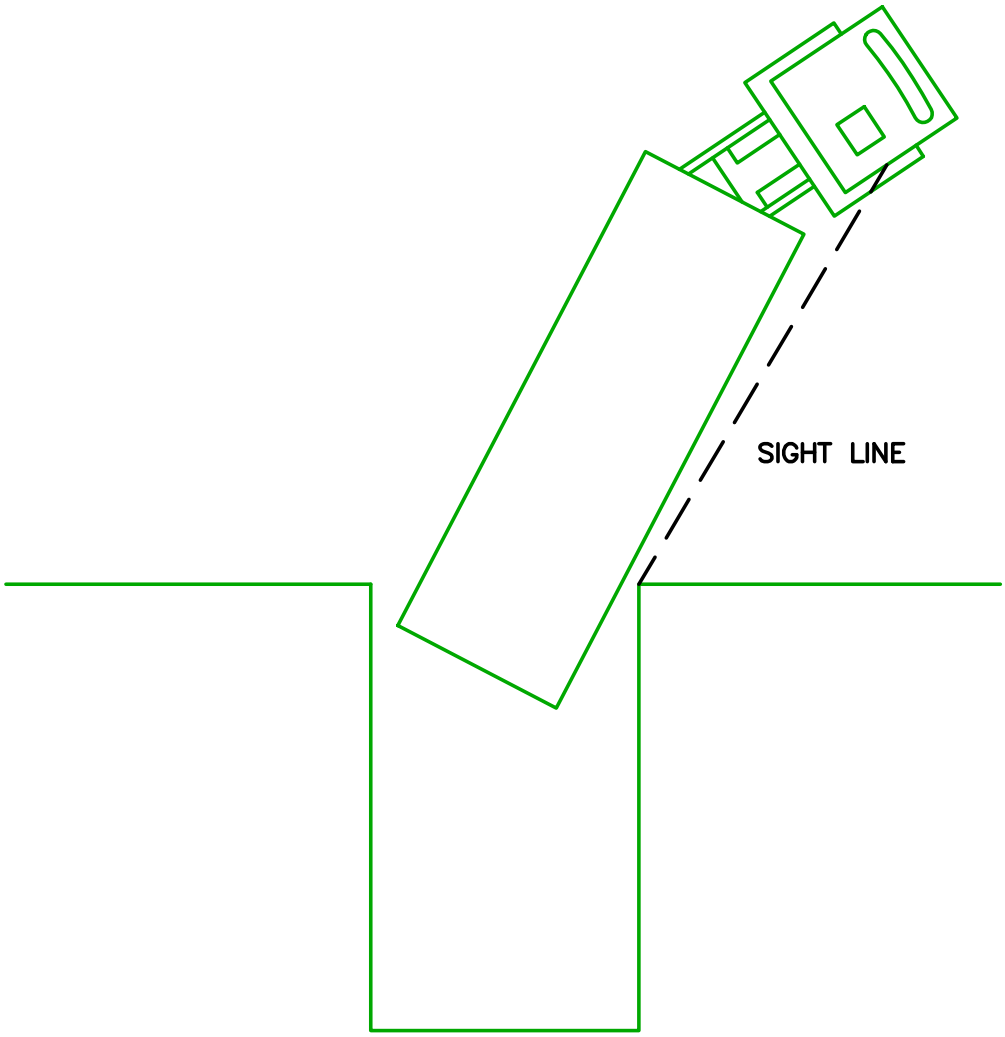


Figure 8.4.1

PREFERRED APPROACH TO SERVICE BAYS

8.5.0 PROVISION FOR QUEUES

Provision should be made to ensure service vehicles entering a site do not queue across footpaths or onto external roads. Also queuing of traffic exiting a site should be accommodated within the property boundaries for both entry and exit.

The site design should prevent any manoeuvring, or intersections of internal roads, occurring within the defined queuing area. Internal roads or aisles shared by service vehicles and cars should be designed to cater for the queuing requirements of both.

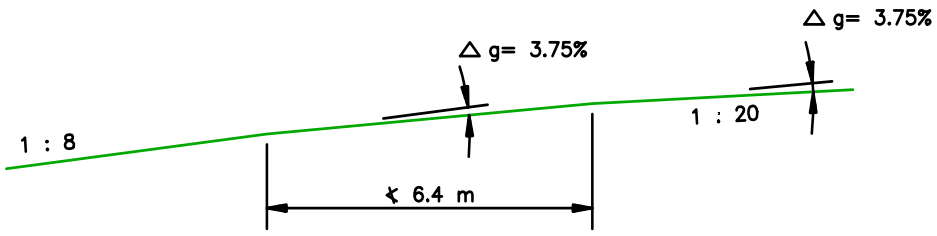
8.6.0 SIGHT DISTANCE

Sight distance applicable to service vehicles shall comply with the requirements described in Section 4.4.0.

8.7.0 GRADIENTS

For maximum permissible gradients, refer Table 8.7.0.

Changes of surface gradient should not exceed an algebraic change of more than 5% (1:20). Where this would be exceeded, a grade transition should be provided. This is to prevent scraping of vehicle undersides or structural damage to articulated vehicle's towing connections. (See Figure 8.7.0). A method of designing a grade transition assumes that the grade change does not exceed 5% (1:20) over a minimum horizontal distance equal to the length of the longest vehicle expected to traverse the site. (See example below).



Algebraic change of gradient = 1:8 - 1:20 = 12.5% - 5.0% = 7.5% > 5%.
Therefore, adopt intermediate gradient = 7.5% ÷ 2 + 5% = 8.75% or approximately 1:11 over 6.4 metre horizontal projection (assuming vehicle length = 6.4 metres).

Figure 8.7.0

NOTE: -

1. The design of pavements with transverse gradients exceeding 5% should be avoided as damage to vehicles and buildings may result from the displacement of the upper portion of the vehicle body or load.
2. The maximum change of grade able to be traversed by car-carrier types of AV is in the order of 2% due to a lower than normal under-carriage clearance.

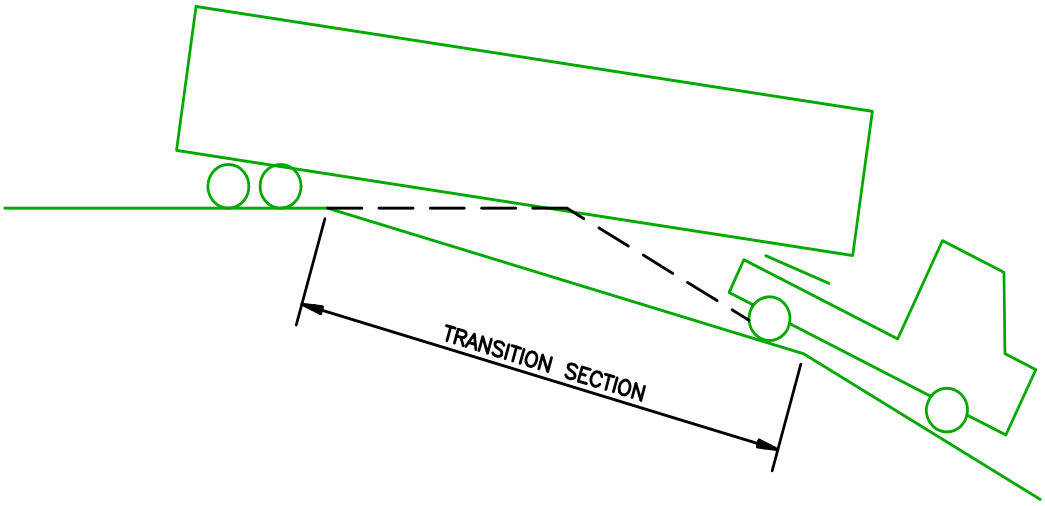


Figure 8.7.1
GRADE TRANSITION

Table 8.7.1
DESIGN DIMENSIONS FOR SERVICE AISLES AND BAYS

	DESIGN VEHICLE							
	VAN	**C & T**	**SRV**	**MRV**	**LRV**	**RCV**	**COACH**	**AV**
Minimum Service Aisle Width (m)								
- one way	4.5	4.5	4.5	4.5	4.5	4.5 6.5	4.5	4.5
- two way	6.5	6.5	6.5	6.5	6.5		6.5	6.5
Minimum Vertical Clearance (m) (1)	2.3	2.3 (2)	3.5	4.5	4.5	4.5 (3)	4.5	4.5
Minimum Bay Width (m) Loading/Standing	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Minimum Bay Length (m) Loading/Standing	5.4	14.5	7.0	9.0	11.0	10.5 (4)	13.0	17.5
Platform Height (m) (5)	____	____	0.75-0.9	0.95-1.1	1.1-1.4	____	____	1.1-1.4
Maximum Gradient								
- general surface	1:20	1:20	1:20	1:25	1:25	1:25	1:25	1:25
- manoeuvring								
- aisles, loading bays								
Ramps								
- straight	1:6	1:6	1:8	1:10	1:10	1:10	1:10	1:10
- curved	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve	As for straight and measured at inside of constructed curve
- queuing area	1:10	1:10	1:10	1:25	1:25	1:25	1:25	1:25
- traffic control point	1:20	1:20	1:20	1:25	1:25	1:25	1:25	1:25

NOTES: -

1. At changes in grade the required clearance height should be maintained at all points (refer Figure 7.4).

2. Special trailers (e.g. house-floats and caravans) may require greater clearance height.

3. Operating Clearances: Front Load 6.1m, Side Load 6.7m, Rear (roll-off) 7.1m.

4. Dimension is exclusive of bin storage area.

5. Applicable only where loading dock is provided.

6. Grade is relative to that of bin storage area.

7. Service aisles designed for reversing of vehicles should adopt the gradients specified for manoeuvring.

8.8.0 HEIGHT CLEARANCE

The minimum height clearance required for each design vehicle is given in Table 8.7.1. The minimum clear height shall be appropriately and clearly signed and measured from the floor to the lowest appurtenance on the ceiling (fire sprinklers, services, lighting fixtures, signs, etc.).

Care should be exercised in building design to ensure adequate ceiling height clearance is retained throughout any grade transition. (See Figure 8.7.1). Areas of a site where height clearance change shall be clearly signed. Any facility to divert over-height vehicles should also be clearly signed.

Additional height clearance is required for refuse collection vehicles when lifting refuse receptacles. This is dependent on the type of collection system used and varies as indicated in the notes under Table 8.7.1.

8.9.0 SERVICE BAYS

The bay dimensions relevant to each design vehicle are given in Table 8.7.1. The width dimensions provide approximately 0.5 metres clearance each side of a vehicle to allow cabin door opening, clearance for mirrors etc, and access to load restraints. The bay length dimensions provide similar clearances for access to loads and variations in overall vehicle size.

8.10.0 REFUSE COLLECTION

Access for refuse collection vehicles to bins or compactors should be maintained at all times. Where evidence from a refuse collection contractor indicates collection will occur outside normal service/delivery or business times, it may be permissible to allow refuse collection vehicles to utilise service bays or parking spaces for access.

The minimum vertical clearance required for a refuse collection vehicle is 4.5 metres. Operational clearance dimensions are provided in Table 8.7.1 for various types of collection systems. Any application proposing to utilise a waste collection system requiring clearances less than 4.5 metres for vehicle movement, must include a letter from the proposed waste collection Contractor giving full details of the proposed system.

Where disposal of industrial or commercial liquid wastes by discharge to road tankers is necessary, the road tanker should be able to stand on-site and comply with all other relevant Regulations.

8.11.0 PROVISION FOR FUEL DELIVERIES

Provision for fuel deliveries for any purpose (e.g. emergency power plant etc.) shall comply with the relevant current Australian Standards "Flammable and Combustible Liquids Regulations" and Council Ordinances.

Provision for a fuel delivery tank-vehicle should comply with the requirements for an LRV. Where a development is designed to accommodate a tank-vehicle on site, and delivery will occur outside building operating times, use of an internal aisle or roadway for tank vehicle parking is permissible.

For other times, a separate parking bay should be provided which can be part of a multi-use area (e.g. forecourt, public space etc.).

8.12.0 PROVISION FOR CONSTRUCTION

Where a site gains its access directly from a major road, a clear indication of the development's requirements for vehicular access during the period of the development's construction may be required. Such a submission must contain a statement of the developer's intention with respect to the following:-

- Time period over which construction will occur.
- Kerbside allocations (parking, bus stops, etc.).
- Provision of alternative pedestrian routes, past or around the site.
- Specified hours of loading/unloading required.
- Remote loading areas.
- Employee and visitor parking areas.

Kerbside loading zones must not be used for the storage of goods and/or construction materials and equipment (nor for washing of equipment or vehicles).

APPENDIX A

Related Documents to Aid the Designer

Related documents which may aid the designer follow: -

1. Australian Standard AS 2890.1-1993, Parking Facilities, Part 1: Off Street Car Parking.

2. Australian Standard AS 2890.2-1989, Off-Street Parking, Part 2: Commercial Vehicle Facilities.

3. Australian Standard AS 2890.3-1993, Parking Facilities, Part 3: Bicycle Parking Facilities.

4. Australian Standard AS 1742.1-1986, Manual of Uniform Traffic Control Devices, Part 2: Traffic Control Devices for General Use.

5. Australian Standard AS 1428-1992, Design for Access and Mobility.

6. Traffic Authority of New South Wales "Policies, Guidelines and Procedures for Traffic Generating Developments", 1984.

7. AUSTROADS "Guide to Traffic Engineering Practice", 1986-91.

8. AUSTROADS "Guide to the Geometric Design of Rural Roads", 1989.

9. Queensland Transport "Urban Road Design Manual: Volume 1", 1979.

10. Draft "Guidelines for Access Driveway Layouts on Declared Roads", Main Roads Division, Metropolitan South District, Queensland Department of Transport, 1991.

11. "Making Way for Cyclists", Department of Transport, The Welsh Officer, London, 1989, 338.411 099 431 MAR.

12. "Bicycle Parking, Selection and Siting Guidelines", State Bicycle Committee, Victoria Transport.

13. "Policy for Provision of Bicycle Racks", Department of Works, Brisbane City Council.

Additional sources used in the preparation of this document include the following: -

1. "Design Guidelines for On-Site Carparking and Service Vehicle Facilities" Planning Policy 18.06, Brisbane City Council.

2. "Guidelines for Parking Facility Location and Design", ITE Technical Council Committee 5D-8, ITE Journal, April, 1990.

3. "Transport and Land Development", V. Stover & F. Korpke, ITE Publication, 1988.

4. "Guidelines for the Planning and Design of Road Freight Access to Commercial and Industrial Developments", prepared for VIC ROADS by TTM Consulting Pty Ltd.

5. "Traffic Generating Developments: City Engineer's Requirements", Logan City Council, February, 1987.

6. "Policy Guidelines for Design of Off-Street Car Parks", City Engineer's Department - Traffic Division, Townsville City Council.

7. "Guidelines for Vehicular Servicing of Commercial Developments", prepared for Brisbane City Council by Ove Arup and Partners.

8. "Truck Movement and Access in Urban Areas", K.W. Ogden, Department of Civil Engineering, Monash University.

9. "Handicapped Parking Supply", ITE Technical Council Committee 5D-8, ITE Journal, September, 1988.

APPENDIX B

Design Vehicles

B.1 DESIGN VEHICLES

B.1.1 CARS

The design vehicles used throughout the car parking sections of these guidelines are designated small, medium and large cars. They correspond to cars having critical dimensions approximating to 50th, 85th and 99th percentile dimensions respectively, derived from Australian Standard 2890.1, and the research upon which it was based. The critical dimensions of these vehicles are contained in Table B1.

These composite design vehicles do not necessarily correspond to a particular car. For example, an actual car with a 50th percentile length is likely to be lower than the 50th percentile height dimension. Nevertheless, the composite dimension vehicles are considered to be quite appropriate for design purposes.

Table B1

CRITICAL DIMENSIONS OF ADOPTED DESIGN VEHICLES
(All Dimensions in Millimetres)

DIMENSION	SMALL CAR	MEDIUM CAR	LARGE CAR
Length	4450	4740	5370
Width	1660	1860	1960
Height (determined by van heights)	1900	2100	2300
Wheelbase	2540	2820	3070
Front Overhang	813	813	996
Rear Overhang	1100	1100	1300
Track	1400	1530	1560
Minimum Turn Radii			
At Outside of Body	5560	6600	6900
At Outside of Front Wheel	5100	6100	6400
Minimum Approach Angle	10°	10°	8°
Minimum Departure Angle	8°	8°	8°
Central Ground Clearance	140	140	100
Maximum Swept Path Width	2800	3000	3000
Manoeuvring Template Number	8-60001	8-60002	8-60003

NOTES:-

1. Critical dimensions do not all apply to particular vehicles.

2. Vehicle heights all reflect van heights in current usage, the 99th percentile height including provision for a roof rack.

3. Refer Figure B1 for definition of some dimensions.

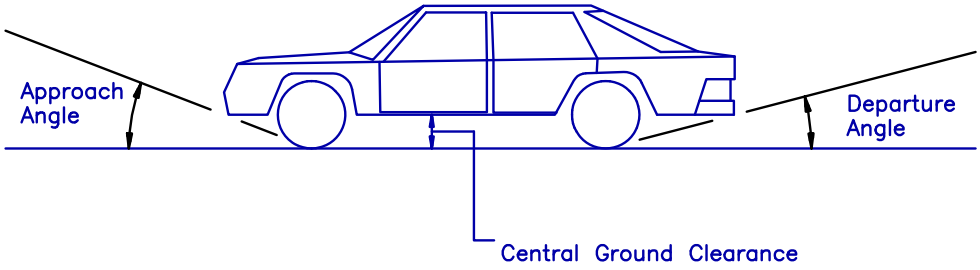


Figure B1

DEFINITIONS

B.1.2 SERVICE VEHICLES

The origins of the design vehicles selected for use in the service vehicle sections of these guidelines are described in Table B2.

Table B2

DESIGN VEHICLE	DRAWING NUMBER	DESCRIPTION / TYPE
C&T	8-60004 8-60005	Car and Trailer, equivalent to AUSTROADS "Car and Caravan" and similar to Department of Harbours & Marine "Car and Boat Trailer".
VAN	8-60006 8-60007	A 99.8th percentile vehicle equivalent to the BCC "large car".
SRV	8-60008 8-60009	Small Rigid Vehicle as in AS 2890.1 but incorporating a body width of 2.33 metres.
MRV	8-60010 8-60011	Medium Rigid Vehicle equivalent to BCC 8.0 tonne truck.
HRV	8-60012 8-60013	HRV Rigid Vehicle as in AS 2890.1.
RCV	8-60014 8-60015	Industrial Refuse Collection Vehicle.
COACH	8-60016 8-60017	Inter-City 12.2 metre Tourist Bus from AUSTROADS.
AV	8-60018 8-60019 8-60020	17.0 metre Articulated Vehicle from AUSTROADS.
DRCV	8-60021	Domestic Refuse Collection Vehicle Included for On-Street Design Purposes.

B.2 TURNING TEMPLATES

Refer to the Design Manual Volume 1 - Part 3 for standard turning template drawings.

These templates are intended for use in the preparation of internal designs. The design of external roadways and intersections will generally be to the appropriate AUSTROADS, Queensland Department of Transport or P.R.S.C. Standards.

B.2.1 CARS

The different design cars will be used in different design situations, as appropriate, and as described in these guidelines.

Generally, the small car should be used for the design of facilities for small cars, the medium car for the design of normal parking spaces and aisles, and the large car for the design of access roadways. The relevant turning path templates are shown in Appendix B. These templates show an additional area required to provide clearance to obstructions. The vehicle paths are inappropriate for design purposes without allowance for working clearances.

B.2.2 SERVICE VEHICLES

Provision for service vehicles in commercial developments is based on the operations requirements of those vehicles. Such requirements are based on vehicle turning paths for which design templates can be derived and are provided in Appendix B.

A minimum horizontal clearance (prescribed below) must be provided outside the vehicle extremities when applying the templates to a plan drawing. The templates are divided into two (2) sets:-

a) Turning templates for access driveway and access way design. These are based on the swept path of the vehicle at a speed higher than stalling speeds. A clearance for varying vehicle characteristics, driver judgement and skill of 500 millmetres to all permanent obstructions should be allowed when using the templates.

b) Manoeuvring templates for Service Area design. These are for manoeuvres undertaken at stalling or minimum speeds. A clearance of 300 millimetres to all permanent obstructions should be allowed when using the templates.

In situations where complex manoeuvres are required by large vehicles in restricted areas, the designer should conduct field trials to establish the manoeuvring areas required and engage the services of an experienced Professional Engineer.

APPENDIX C

Typical Car Parking and Service Area Layouts

Figures C1 to C4 are typical car parking area layouts for the types of developments which are commonly the subject of development applications. The figures are intended to show how the elements of a car parking area are incorporated into the whole design of the car parking area. The figures are also useful as a quick reference for designers who are familiar with the details set out in these guidelines.

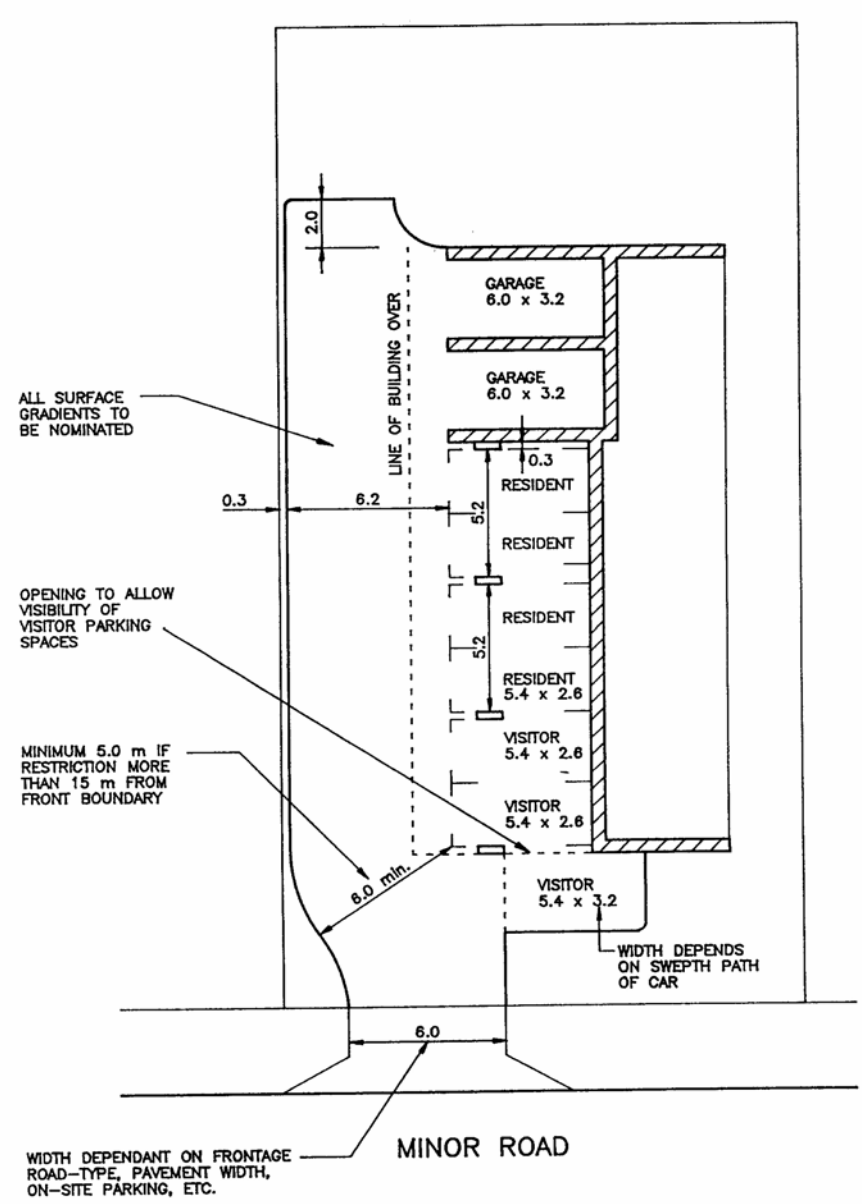


Figure C1

TYPICAL LAYOUT - RESIDENTIAL UNITS (MULTIPLE DWELLINGS)

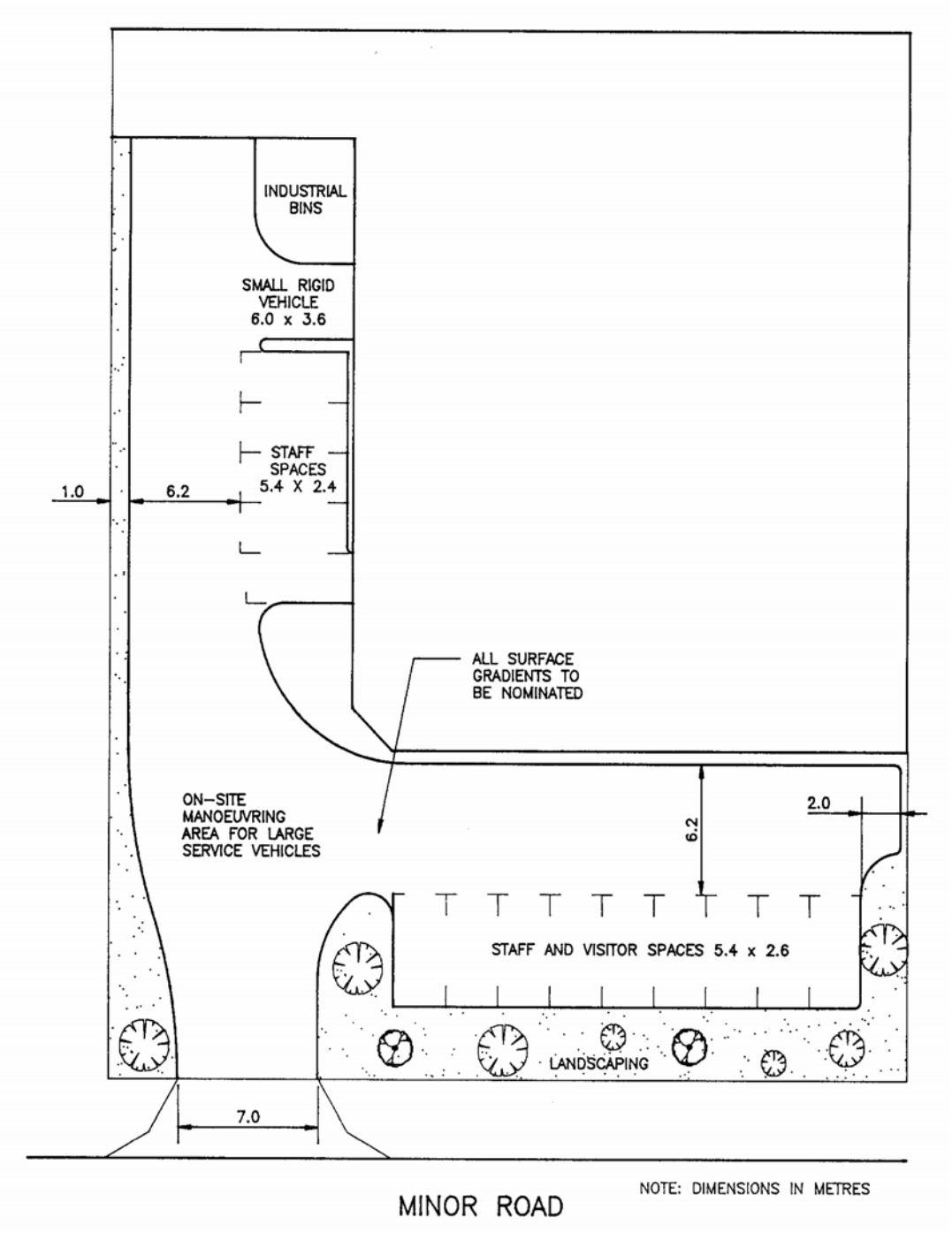


Figure C2

TYPICAL LAYOUT - SMALL INDUSTRIAL DEVELOPMENT

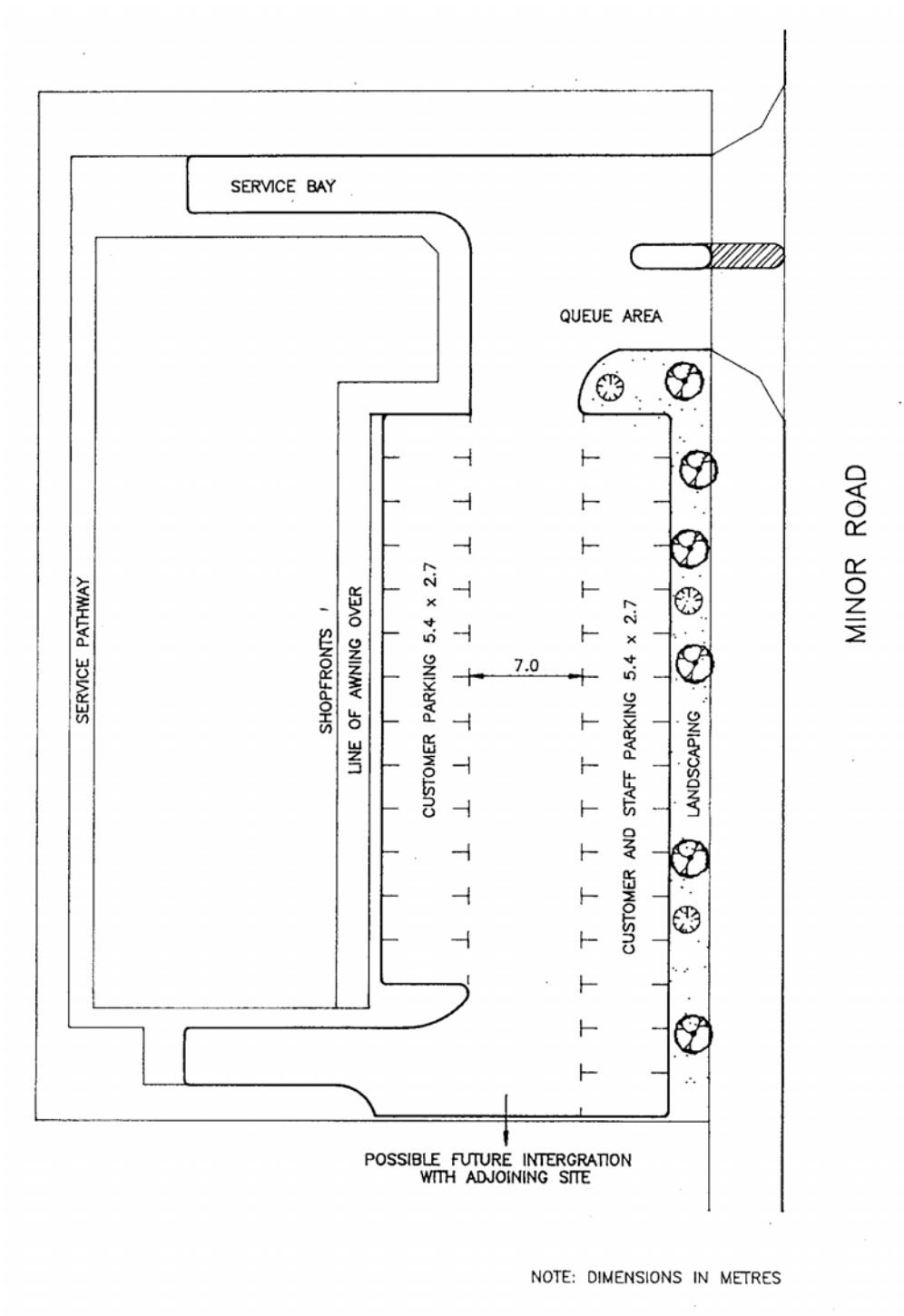


Figure C3/1

TYPICAL LAYOUT - SMALL RETAIL DEVELOPMENT

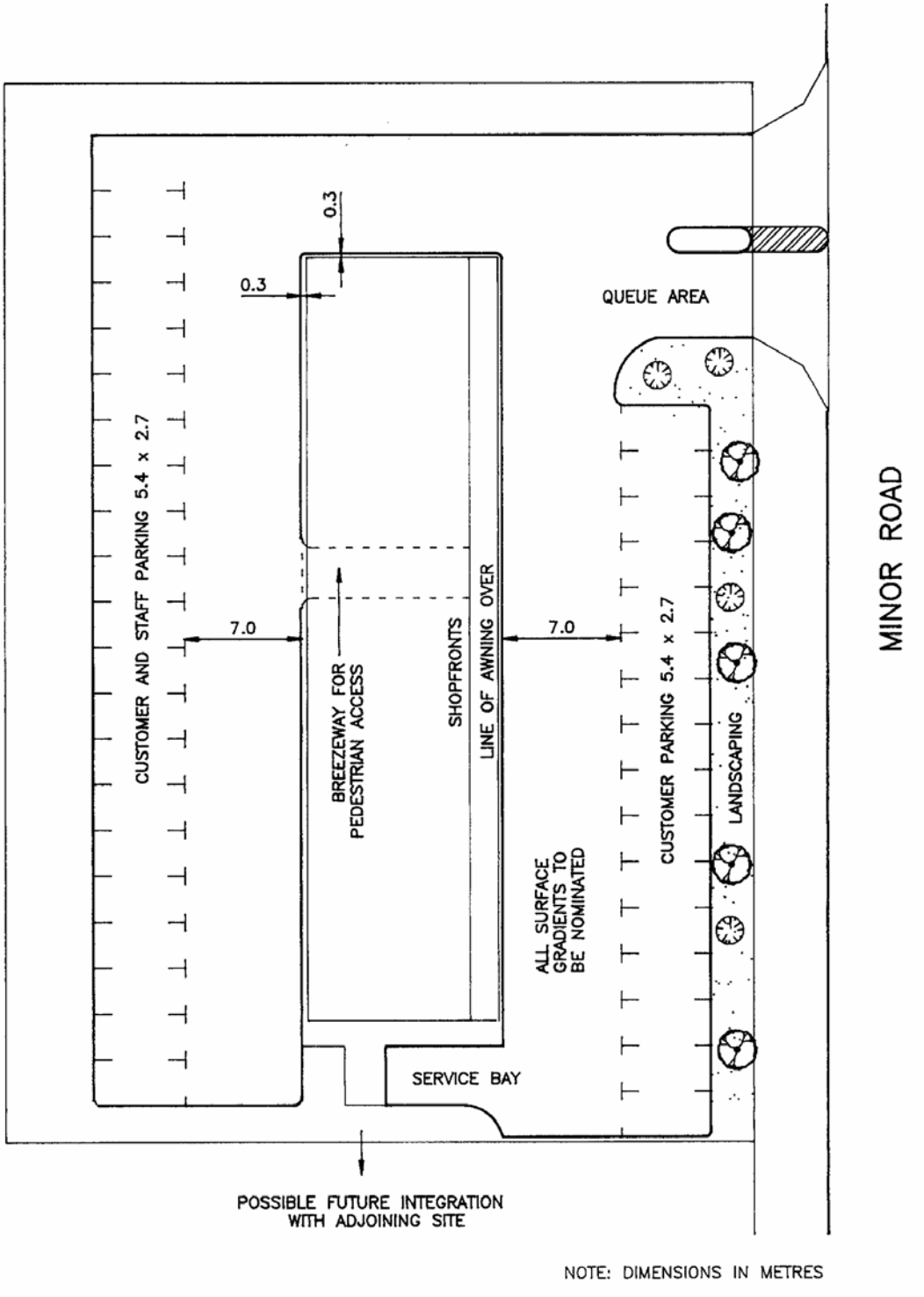


Figure C3/2

ALTERNATIVE LAYOUT - SMALL RETAIL DEVELOPMENT

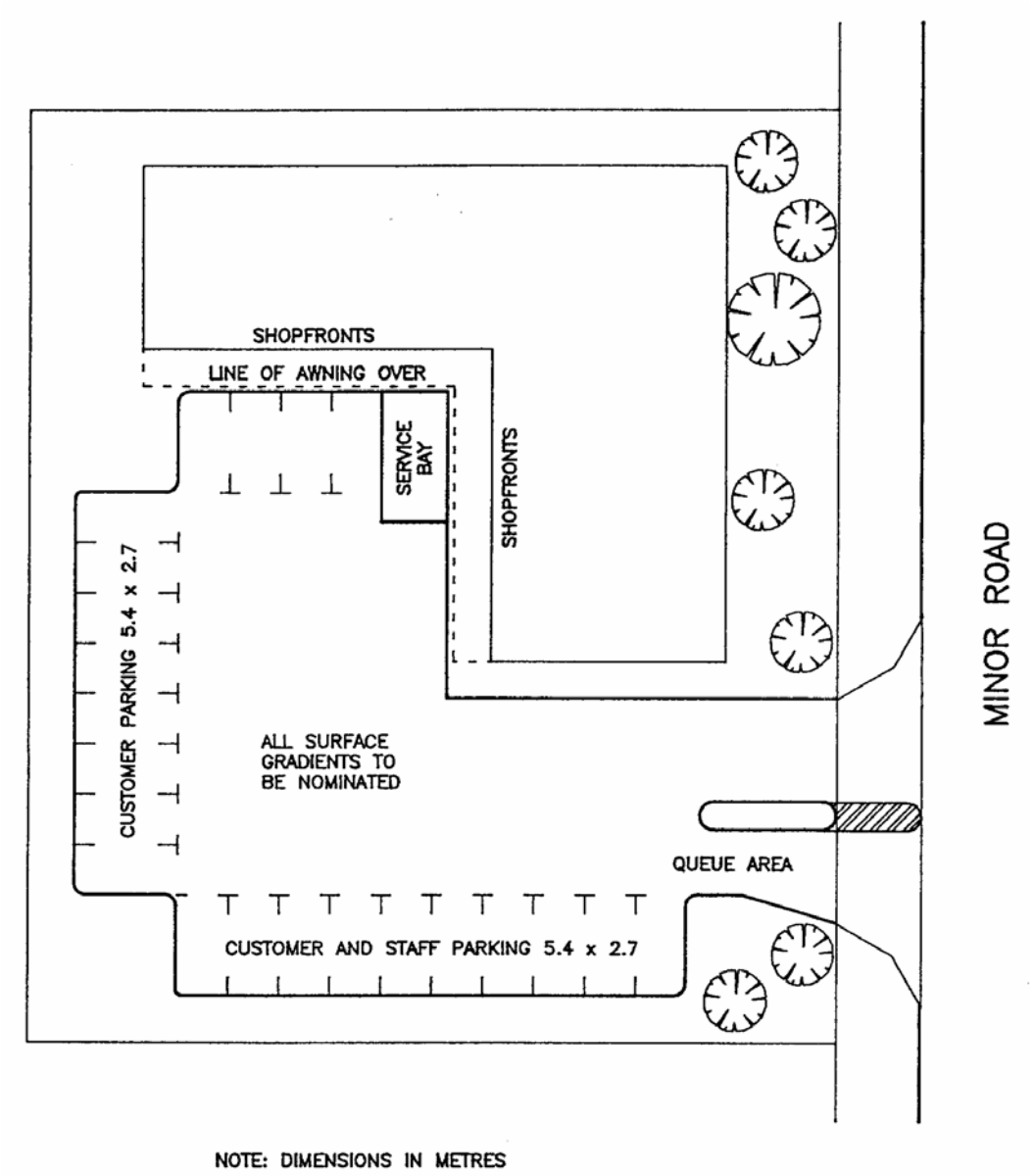


Figure C3/3

ALTERNATIVE LAYOUT - SMALL RETAIL DEVELOPMENT

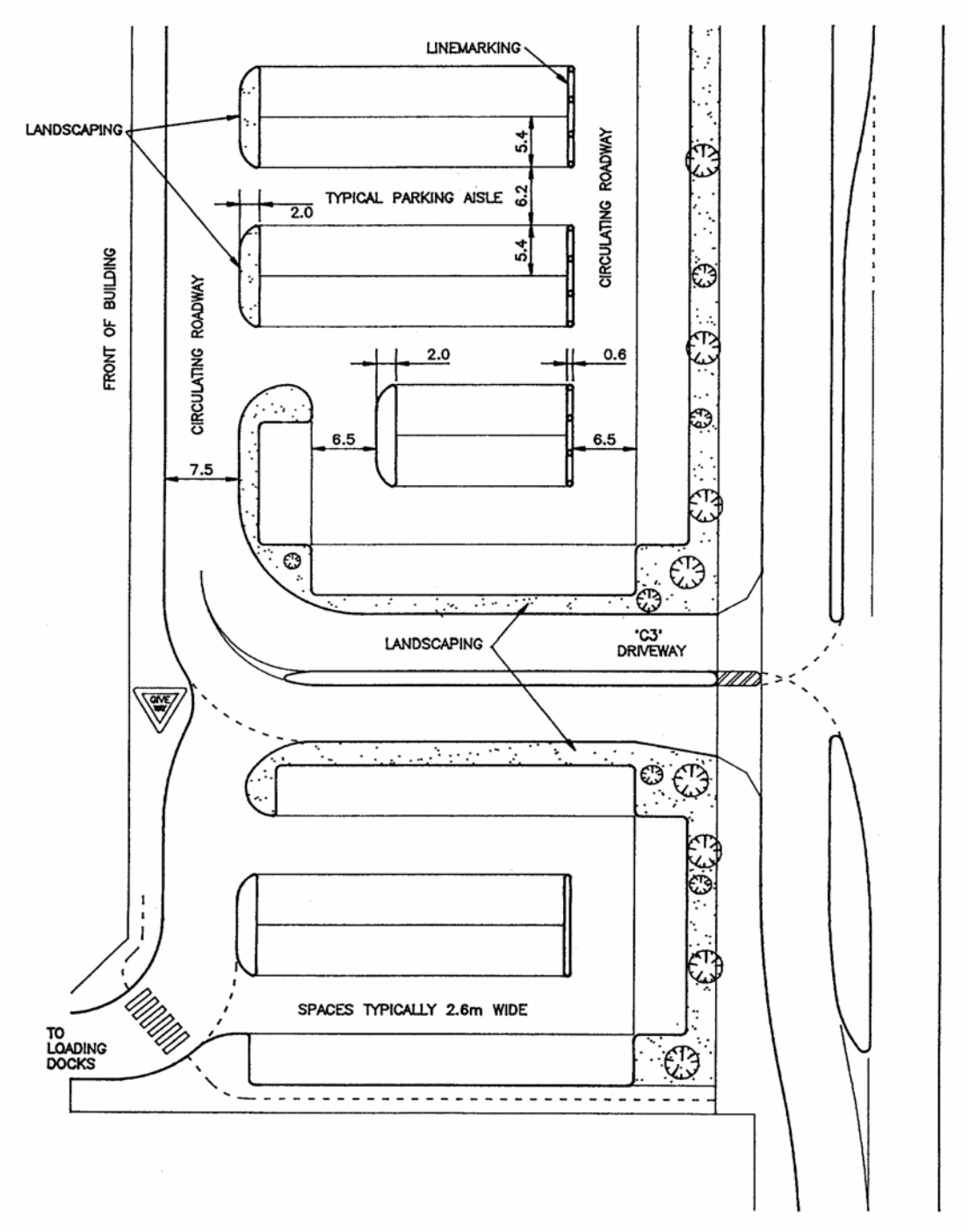


Figure C4

TYPICAL LAYOUT - LARGE RETAIL DEVELOPMENT