Chapter 3 – Road and Path Design Guidelines

Contents

CHAPTER 3 - ROAD AND PATH DESIGN GUIDELINES

3.1 General Introduction

3.1.1 Purpose

This document assists Developers to meet the City of Charles Sturt expectations of the transport network. It seeks to deliver a systematic outcome for our transport network that includes private and public vehicles, cycling and walking to secure desired objectives.

The transport network includes provision for both "purpose" (business, commuting, shopping and other necessity trips) and "recreation" (exercise, amusement and other discretionary trips).

The requirements for transport are closely intertwined with the City of Charles Sturt Development Plan which is consistent with the Metropolitan Adelaide Planning Strategy that facilitates a sustainable city through more compact communities, provision of opportunities for multiple land uses, allowing people a wider range of work choices including working from home and increasing opportunities for non car-based transport (often referred to as active transport – cycling, walking and to a lesser extent, public transport).

Key documents contributing to the formulation of these Design Guidelines are:

- City of Charles Sturt Community Plan – Shaping the Western Suburbs 2027
- City of Charles Sturt Corporate Plan – Shaping the Western Suburbs 2008-2012
- Transport Plan
- Traffic Management Plan
- Planning to Walk in Charles Sturt (in development)
- Active Living: Plan to Cycle
- Footpath Policy (being reviewed)
- Parking Policy (in development)
- Open Space Strategy
- One Planet Living: Greening the Western Suburbs
- Asset Management Plans

Several policies allowing commercial use of footpaths

This Design Guideline uses AUSTROAD guidelines and Australian Standards. The Design Guideline draws from our local community expectation of streets and transport systems and the principles of "Living Neighbourhoods".

3.1.2 Objectives

The objectives of the Design Guidelines are to provide an optimum combination of:

- **Safety: A road network safe for people and property**
- **Amenity: A road network contributing to the character of neighbourhoods**
- **Convenience: A road network easy to use offering transport choice**
- **Environment: A road network improving people lives**
- **Economy: A road network that is value for money**

To encourage design that promotes a sense of place for people and the sharing of streets to meet all of their community, transport and service functions.

The key components of each of the objectives of the Design Guidelines are:

- **Safety**: A road network safe for people and property
  - Prevent vehicle crashes
  - Provide emergency vehicle access
  - Crime Prevention through Environmental Design (CPTED)

- **Amenity**: A road network contributing to the character of neighbourhoods
  - Traffic noise
  - Visual amenity
  - Urban planning

- **Convenience**: A road network easy to use offering transport choices
  - Community access
  - Choice of transport options
  - Minimum travel distances

- **Environment**: A road network improving peoples lives
  - Reduce greenhouse gas emissions
  - Vibrant spaces and better quality of life
  - Improve health and fitness

- **Economy**: A road network that is value for money
  - Reduce transport costs
  - Minimise cost of development
  - Control maintenance and asset replacement costs

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3.2 Residential Street Design

3.2.1 Introduction

This section deals with the residential street network under the care and control of the City of Charles Sturt. Nearly all of these streets carry less than 3,000 vpd with the majority carrying less than 1,000 vpd. They connect to the metropolitan main road network which is under the care and control of the State Government.

The City of Charles Sturt street network primarily comprises local streets having a traffic purpose of providing access to properties along them and within local communities. They are not traffic routes.

Good design of this street network will improve these streets for our local communities by controlling the overall number of vehicles being driven in them and the behaviour of drivers when travelling on them. They will support the active forms of transport (walking, cycling and buses) also used by these communities and connect to the metropolitan main road network safely with low impact upon the through traffic function of those roads.

The regeneration of the local neighbourhood places greater demand upon the available public spaces including Residential Streets and the subsequent demand to balance all their uses. Intrinsically this means controlling "driver" behaviour making the street safe for other transport, recreational and social uses. This brings with it greater demand for improved amenity and urban design for personal safety and security.

Should this Guideline appear to be not consistent with the Australian Road Rules or any relevant Australian Standards or the AUSTROADS "Guide to Traffic Engineering Practice" then the designer must seek clarification from the City of Charles Sturt.

3.2.2 Street Function

The City of Charles Sturt street network has many functions with the most obvious being:

- Access: for all forms of transport.
- Car parking: for visitors.
- Activity place: for social interaction.
- Visual amenity: for character.
- Public lighting: for personal security.
- Stormwater drainage: to prevent flooding.
- Services: for health and quality of life.

Unless driver behaviour is controlled, vehicles easily dominate streets due to the danger they pose. Older street networks were easily overridden by vehicles as people retreated off their streets into their properties. This only made drivers feel they "owned" the streets they were passing through so they travelled faster. This caused people to only use their backyards and to stop parking their vehicles on the street leaving them wide clear straight speedways. Now we are seeing major works retrofitting traffic control devices to control driver behaviour.

To avoid this occurring in new streets they must be designed to support all of their functions by controlling driver behaviour, particularly their attitude to other people socialising, or playing; walking or cycling in the street. With proper design of residential streets a low speed environment should exist so that cyclists and pedestrians may be provided for on the carriageway on the basis of equal sharing with vehicles.

The low speed environment allows residential streets to be designed so that give way situations are the norm with one moving lane and passing opportunities at reasonable intervals provided there are not unreasonable delays.

3.2.3 Traffic Characteristics

The vehicle traffic in residential streets is mainly cars and some light delivery vehicles. There are the occasional large vehicle such as refuse, recycling and green waste service vehicles, building materials and larger delivery vehicles (eg. Furniture delivery and removalist trucks), long trailers such as boats and caravans, and community or school bus services. Some residential streets are used by metropolitan bus services and have special design requirements.

These vehicles are comparatively rare in residential streets and it is not reasonable to design for their convenience. Instead the design in this guideline allows these vehicles to travel in residential streets with reduced speed and passing clearances. ***(Refer to Appendix A)***

3.2.4 Traffic Controls

In South Australia the "***Notice to Council to Use Traffic Controls Devices and Close Roads and Grant Exemptions for Events***" provides the legislative requirements for traffic control devices. Where a traffic control is included the design must comply with that notice to Council.

3.2.5 Traffic Volume

Environmental capacity of streets is the effect that vehicles have upon residential amenity through noise intrusion and air pollution. For residential streets in the City of Charles Sturt an upper limit of 1,000 vpd applies to the Local Streets. Traffic volumes above this level are not well received by local communities.

The Collector Streets are a range of residential streets required for good traffic distribution and function. Bus and Residential Collector Streets have residential properties with frontage to the collector. The upper vehicle limit is 3,000 vpd and dependent upon the vehicle mix in these streets the impact upon residential amenity and access to properties becomes apparent. Designers should ensure that dwellings along Bus and Residential Collector Streets are designed so that sleeping and quiet areas of the dwelling are remote from the street frontage. The use of high solid fences (greater than 1.2 metres in height) is not encouraged as they prevent passive overview of streets for personal safety of people using them and reduces social contact with neighbours and the local community.

In rare circumstances in the City of Charles Sturt, a Trunk Collector catering for up to 9,000 vpd may be required. The Council preference is that the Trunk Collectors be designed out of the street network, but where this is not possible; the Council may approve this category of Collector Street. No residential properties will have frontage to Trunk Collectors, parking is not allowed and wide landscaped verges are required to hide high solid fences (up to 2.0 metres) used to prevent traffic noise intrusion onto the residential properties. Designers should ensure that dwellings adjacent to Trunk Collector are designed with noise attenuation and amelioration measures.

3.2.6 Trip Generation and Distribution

Trip generation and distribution is important to determine the number of vehicles using the street network being proposed.

Trip generation is to be based upon separate dwellings with their own allotment. Unless otherwise approved, "equivalent" dwellings must be calculated using Table 1.

Table 1

EQUIVALENT DWELLINGS	
Separate dwellings or duplexes	1.0
Flats, units, townhouses likely for single family occupancy	0.6
Luxury units or likely multi-family occupancy	1.0
Aged care facilities – per unit	0.4
Local shops – per 100m^2 of gross floor area	6.0
Local sporting and recreational facilities	10.0
Local primary school	50.0

The purpose of trips is to be used to determine the trip distribution. Unless otherwise approved, the purpose of trips must be calculated using Table 2.

Table 2

PURPOSE OF TRIPS	
Local shops	2
Local schools	1
Commuting to work	4
Major retail centres	2
Other	1
TOTAL	10

The equivalent dwellings factor and the purpose of trips must be used to calculate traffic volumes in each street. Where the street is a Bus Collector, the additional bus trips must be added to the calculation. Each street junction or intersection is a "split" point where the direction of the facilities causing the trip purpose will guide the direction allocated to vehicles.

3.2.7 Traffic Speed

The design speed of Residential Streets is the "maximum" speed that the 85% vehicle is likely to reach in that street. The speed of a vehicle varies as it travels along the street and the speed at any point is called the "spot" speed. A combination of geometric design, street cross section, traffic control devices, curved alignments and length of straights are used to control vehicle speed. Experience has shown that intersections and junctions without speed control have limited impact upon vehicle speed.

The design speeds used for each Residential Street category must be achieved using these measures. Although Bus Collectors and Residential Collectors have a design speed of 50kmh being the urban speed limit, designers are encouraged to design for 40kmh being the speed at which the severity of injury for pedestrians and cyclists changes from moderate to serious. During the life of these streets the City of Charles Sturt anticipates that the general urban speed limit could be further reduced to 40kmh and it is prudent to avoid necessary retrofitting of traffic control devices which is currently occurring in older design streets.

The spot speed of a vehicle affects the sight distance required to stop the vehicle to avoid a collision and impacts upon the clear verge width, the need for corner cut-offs and the distance between street intersections and junctions.

3.2.8 Residential Street Classification

Access Place - a short cul-de-sac

Access Cul-de-sac - a single "no through" street

Access Street (i) - a single or "loop" street providing connection to other streets

Access Street (ii) - a single or "loop" street providing connection to other streets

Bus Collector - a street with residential allotment access planned as a metropolitan bus route

Residential Collector - a street with residential allotment access that usually connects an Access Street to the main road network

Trunk Collector - a street with no residential allotment access that connects a Collector Street to the main road network

Other than Trunk Collectors, all other Residential Streets must have at least 75% of allotments with frontage to the street with dwellings facing the street. Where an allotment contains multiple dwellings, at least 75% of those dwellings with frontage to the street must face the street.

Table 3

LOCAL STREETS				
	Access Place	**Access Cul-de-sac**	**Access Street (i)**	**Access Street (ii)**
Traffic catchment (max) (1)	5 allotments	10 allotments	50 allotments	100 allotments
Design speed (max)	30kmh	40kmh	40kmh	40kmh
No. of lanes	2(2)	2(2)	2	2
Carriageway type	Two-way	Two-way	One-way or two-way	One-way or two-way
Pavement width	6.0m	6.0m	7.50m	8.0m
Reserve width (min) (3)	11.0m	13.0m	13.0m	15.0m
Verge width (min)	2.5m	2.5m	2.5m	3.5m
Kerb type	Vertical (5)	Vertical (5)	Vertical	Vertical
Pathways	Not required (6)	Not required (6)	<150 m length, then one side, otherwise two sides	<150 m length, then one side, otherwise two sides
Parking	Pavement – one side and indented bays	Pavement – one side and indented bays	Pavement – two sides	Pavement – two sides
Pavement gradient -max -min	 12% 0.4%	 12% 0.4%	 12% 0.4%	 12% 0.4%
Pavement cross-fall -max -min	 1:40 1:33	 1:40 1:33	 1:40 1:33	 1:40 1:33
Sight distance (min)	50m	60m	60m	60m

Table 4

COLLECTOR STREETS			
	Bus	**Residential**	**Trunk**
Traffic catchment (max) (1)	No minimum 300 allotments	300 allotments	900 allotments
Design speed (max)	50kmh	50kmh	50kmh
No. of lanes	3	3	2
Carriageway type	Two-way	Two-way	Two-way
Pavement width	9.5m	9.0m	9.0m
Reserve width (min) (3)	17.5m	17.0m	20.0m (4)
Verge width (min)	3.5m	3.5m	4.5m
Kerb type	Vertical	Vertical	Vertical
Pathways	Both sides - pedestrian or shared use path (7)	Both sides - pedestrian or shared use path (7)	Both sides - pedestrian or shared use path (7)
Parking	Pavement	Pavement	No provision (8)
Pavement gradient -max -min	 12% 0.4%	 12% 0.4%	 12% 0.4%
Pavement cross-fall -max -min	 1:40 1:33	 1:40 1:33	 1:40
Sight distance (min)	80m	80m	80m

NOTES:

1. Based on 10 vpd per single dwelling residential allotments.
2. Single lane width may be approved by Council subject to parking provision and verge width adjustment.
3. Preferred is (reserve width – pavement width) divided by two, with the minimum used to allow indented parking bays and/or shared use paths, heavily pedestrian paths or bus stops.
4. Include Access Restriction Strips of 0.100 metres wide.
5. Layback rollover kerbing may only be approved by the Council where parking bays are provided off the carriageway pavement.
6. Pathways are required where the Place or Cul-de-sac links via a walkway to the pedestrian or cycling network or where the street provides access to open space reserves.
7. Provision of shared use paths or cycle-ways is dependent upon the Council pedestrian/cycling network plans.
8. No direct residential allotment frontage permitted.

3.2.9 Lanes

Public lanes must comply with the following conditions:

1. Service less than 20 allotments.
2. Have a design speed of 25kmh.
3. Have a pavement gradient between 0.4% and 12%.
4. Have a cross-fall between 1:40 and 1:33.
5. Meet all the requirements of AS2890.1 and expressly comply with the requirements for width and location of access driveways onto public roadways (Clause 3.2).
6. And where it is intended by the Developer for the lane to be used by Council provided refuse, recycling and green waste service vehicles, then designed for turning movements necessary for these vehicles as required by the Council or its Contractor.
7. The pavement must be designed for the intended traffic with serviceable surface materials that do not give rise to dust or rutting. Generally the surface will be sealed with asphaltic concrete.
8. Corner cut-off requirements are 2.5 metres deep (into lane) and 2.0 metres wide (across frontage of adjacent property).
9. A typical cross section may be a paved verge 1.0–1.5 metres wide along the garage side with light poles, a road pavement generally 6.0 metres wide; a 1.0 metre wide paved footpath.

Where these conditions are not complied with, the lane will not be considered for public Road Reserve. Instead it must be part of a multiple dwelling allotment.

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3.2.10 Intersections

Street intersections are opportunities to design a legible street network and to act as traffic controls through good design. Keeping these opportunities in mind, then street intersections are governed by Table 5.

Table 5

INTERSECTING STREET CLASSIFICATION	
Access Place or Access Cul-de-sac	Access Street (i) or (ii)
Access Street (i) or (ii)	Bus Collector or Residential Collector
Bus Collector or Residential Collector	Trunk Collector or Main Road

Intersections within the Residential Street network have a major role in safety and the City of Charles Sturt only allows:

- T-junctions, where two streets meet (a three way approach/exit), or
- Roundabouts, where two streets cross or three or more streets meet (i.e. four or more ways to approach/exit)

The horizontal sight distance at intersections is a major factor for road user safety. The intersection spacing must be not less than the safe intersection sight distance (SISD) being the distance required for safe stopping at the spot speed of vehicles. Using this principle, the minimum intersection spacing (centre line to centre line) are:

Table 6

INTERSECTION SPACING		
	Spacing distance when the intersection is on the ***same side*** of the through street	Spacing distance when the intersection is on the ***opposite side*** of the through street
Design speed of the through street - 40kmh	60 m (1)	40 m
Design Speed of the through street - 50kmh	80 m (1)	60 m

NOTES:

1. Sourced from AUSTROADS "Guide to Traffic Engineering Practice" Part 5, Table 5.3 Intersection Sight Distance.

   Where traffic controls are included in the design to reduce approach speeds to 20kmh then the intersection spacing may be reduced to 30 metres.

3.2.11 Corner Cut-Off

The minimum verge requirements of Residential Streets must be maintained at corners and intersections. The need for a "corner cut-off" to an allotment adjacent to bends and intersections is dependent upon the sight distance triangle derived from the safe intersection sight distance (SISD) to the vehicle in the through street and the approach sight distance (ASD) for the vehicle in the terminating street. Where a corner cut-off is required at an intersection, the length must not be less than those shown in Table 7. All corner cut-offs must be whole metre measurements and one must be provided on the opposite corner.

Table 7

CORNER CUT-OFF REQUIREMENTS		
Through Street	**Terminating Street (1)**	**Minimum Length**
Access Street (i) or (ii)	Access Place Access Cul-de-sac	Not required
Bus Collector Residential Collector	Access Place Access Cul-de-sac Access Street (i) or (ii)	3 x 3 metres
Trunk Collector Main Road	Bus Collector Residential Collector	4 x 4 metres
Main Road	Trunk Collector Main Road	5 x 5 metres

NOTES:

1. Generally the classification of the "Through Street" will define the minimum length of the corner cut-off. Eg. If the through street is a Main Road and the terminating street is an Access Street the corner cut-off must not be less than 5 x 5 metres.

3.2.12 Turning Areas

The preferred turning area is a standard cul-de-sac 'bulb' which allows parking around the kerb. The design of cul-de-sac shall comply with **Figure A.** It is recognised that the design is wasteful of land and acceptable alternative are in **Figure B**. These do not allow parking within the turning area.

Figure A

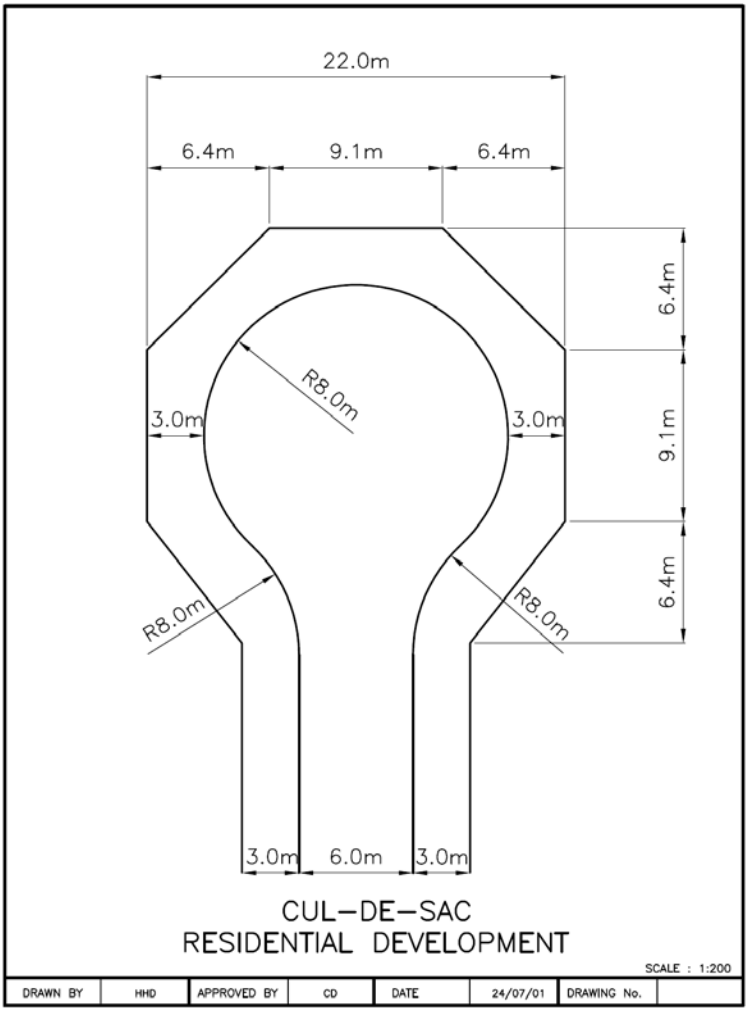
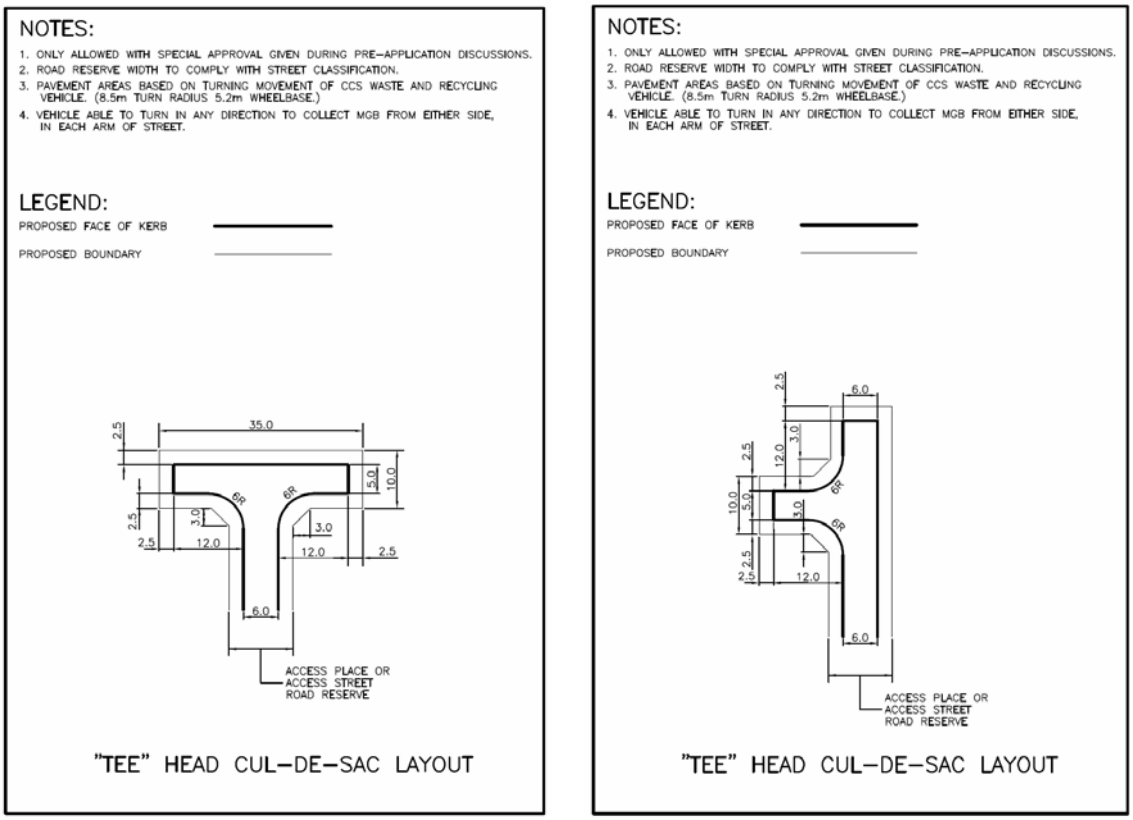


Figure B



3.2.13 Parking

The City of Charles Sturt Development Plan on-street parking requirement is 0.5 spaces per residential allotment. It must be conveniently located within 25 metres of an allotment and a double space available within 50 metres of each allotment for car/trailer combinations and delivery trucks.

The parking provision on-street for residential allotments will generally be parallel to the kerb. Where the residential street design speed is 40kmh and the traffic volume is less than 500 vpd then angle parking is permissible with the preferred angle being 90degrees for easy access from both travelling directions.

Special circumstances apply when the street has frontage to open space or reserve, creek or drainage corridor, community facilities or schools, local shops or sporting areas, railway stations or bus stops additional parking may be required on-street. The provision of on-street parking to meet demand at these locations requires early discussion and approval so that it may be incorporated on-site or on-street with minimal impact upon the adjacent residents.

The parking areas must comply with AS2890.5: On-street parking. The calculation of parking must take into account kerbside restrictions such as kerb ramps, fire plugs and hydrants, traffic controls and centre line marking (where installed on approach to intersections). Access to driveways must be retained and for the purpose of counting the available on-street parking by providing *an effective* driveway cross-over width at the kerbside in accordance with Table 8.

Table 8

EFFECTIVE WIDTH OF DRIVEWAY ACCESS	
Access Place or Access Cul-de-sac	7.0 metres
Access Street (i) or (ii) Bus Collector or Residential Collector	5.0 metres

The provision of the 0.5 spaces per allotment is normally easily achieved with standard residential allotment frontages, however with shorter frontages common with courtyard and villa homes, the requirement may not be achieved unless there is a mix of allotment types.

Centre-of-street car parking will not be approved.

3.2.14 Passing Opportunity

The Residential Streets and Collectors are designed to allow partial restriction by parked vehicles so that drivers must travel at slower speeds and give way according to the road rules when required. Passing opportunity will occur adjacent to driveways. The Trunk Collector is designed for two-way free flowing traffic so passing is not restricted by parking.

3.2.15 Bus Stops

Bus stops must comply with the DDA complying bus stop detail **(refer Appendix B)**

In streets classified as Bus Collectors the bus may stop on the road carriageway and vehicles wait until the bus resumes travel along the route.

In streets classified as Trunk Collectors the bus stop must be indented 2 metres off the carriageway to allow continuous traffic flow. Local widening of the Road Reserve may be required to meet minimum verge widths at these locations. Further guidance is available using the Cement & Concrete Association of Australia Technical Note TN52.

3.3 Pedestrian Network

3.3.1 Introduction

Residential Streets contain much of the Pedestrian Network, however to be useful pedestrian trips should be short and convenient. The practical limit for most “walking for purpose” trips is 15 minute walk, or about 1.5 kilometres for the average person and 30 minutes, or about 4-5 kilometres for “walking for pleasure” which includes fitness and the pedestrian network design must be inclusive of both trip purposes.

The pedestrian network must be permeable and may run between streets using walkways, reserves and open space. All parts of the network must be safe for people of all ages and range of mobility to use and the walking trip must be a pleasurable experience.

Protection of pedestrians from vehicles can be afforded by using lower design speeds, using vertical kerbs, separating footpaths from carriageways using a “safety margin” and crossing points easily identified by both pedestrians and drivers to avoid conflict and injury.

The pedestrian network should be direct using “desire lines” and be complete with similar standards of construction and materials with clear signposts and without any physical or sight obstructions.

Personal safety and security requires good public lighting, active street frontages, footpaths that are not isolated or a "predictor" path where escape is not possible.

So that they can be used at most times, footpaths must have some protection from weather extremes and include places for resting.

To encourage walking for pleasure as a recreational activity the walking trip can be made interesting by including public art, unfolding views, landmarks and places for people watching.

The width of footpaths is an important consideration for convenience with wider footpaths for greater walking demand and demand from other uses such as skateboards, rollerblades and gophers.

3.3.2 Footpaths

Footpaths shall be designed in accordance with AUSTROADS "Guide to Traffic Engineering Practice" Part 13: Pedestrians.

Generally footpaths will be located adjacent to the residential allotment boundary and located so that no part of the footpath is within a setback distance offering a degree of safety dependent upon the vehicle design speed and is defined in Table 9 to be:

Table 9

SET BACK DISTANCE	
Access Place Access Cul-de-sac Access Street (i) or (ii)	1.0 metres
Bus Collector or Residential Collector	1.5 metres
Trunk Collector	2.5 metres

The requirements for footpaths are detailed in the City of Charles Sturt "Footpath Policy".

Generally capacity issues do not exist in Residential Streets so no specific requirements are listed here other than the width requirements. Using the width axis of the body ellipse each person requires 610 mm of footpath. Generally footpaths in Residential Streets are 1350 mm wide allowing for two persons and two edge distances. Footpaths must be wider where pedestrian demand is higher (e.g. adjacent schools, community facilities, local shops) or the footpath is located adjacent to a kerb where there is a high parking demand in accordance with Table 10.

Table 10

FOOTPATH WIDTH REQUIREMENTS		
Condition	**Width (min)**	**Location**
Peak standard demand (2 people)	1350 mm (1)	Boundary
Peak medium demand (3 people)	1950 mm	Boundary
Peak high demand (4 people)	2550 mm	Boundary
Footpath located next to kerb and high periodic parking demand (eg school)	Peak demand plus safety margin	Kerb
Footpath located next to local shops or community facilities	Peak demand plus safety margin	Full width
Next to indented residential parking bays	1950 mm	Kerb

NOTE:

1. Wider footpath may be required if an Aged Care Facility is close to local shops or community facilities to allow for gopher passing.

2. The timing of footpath construction shall be negotiated with Council but generally will begin at a time when 75%-80% of the building activity in the subject street has been completed.

3.3.3 Road Crossings

The Pedestrian Network must include road crossings commonly used in Adelaide in Residential Streets, namely those specified in Table 11.

Table 11

ROAD CROSSING TYPE		
Road	**Unprotected**	**Protection**
Access Place, Access cul-de-sac,	DDA compliant kerb ramps	Not required
Access Street (i), Access Street (ii)	DDA compliant kerb ramps	Road narrowing to 6.0 metres
Bus Collector, Residential Collector, Trunk Collector	DDA compliant kerb ramps	Median refuge 1.8 metres wide
All roads where pedestrian warrant satisfied		Formal pedestrian crossing

The road crossings must be provided at locations listed in Table 12

Table 12

ROAD CROSSING LOCATION		
Location	**Requirement**	**Comment**
Intersections	In all directions at all corners whether there is a requirement for a footpath or not	
Walkways	Adjacent to the walkway on both sides of the street	Otherwise, subject to approval, barrier fencing at kerbside
Reserves & Open Space	Adjacent to the property side boundary on both sides of the street (1)	Other location may be more suitable if pathway elsewhere
Local shops & community facilities	Adjacent to the property side boundary both sides of the street (1)	Locate near to boundary but away from traffic congestion

NOTE:

1. Subject to discussions, other locations may be approved

3.3.4 Walkways

Walkways shall be provided to link the pedestrians to pedestrian trip generators such as local shops, regional shopping centres, sporting areas, open space and reserve areas and schools where the street network results in a "no through" road condition for vehicles. Walkways are provided to provide direct access for cycling and walking to reduce distance travelled.

Walkways must meet the following requirements:

1. Be straight so pedestrians have a clear view to the other end.
2. Not have "blind" corners creating unacceptable CPTED risks.
3. Be not less than 5 metres in width.
4. Include a paved area at least 3 metres wide.
5. For a 5 metre wide walkway, not more than 60 metres in length. Wider walkways may be approved provided they are at least 10 metres in width.
6. If greater than 60 metres in length then at least 10 metres in width.
7. Have removable and lockable bollards across both entrances spaced not more than 1.5 metres apart to control vehicle access.

3.3.5 Shared Use Paths

Shared Use Paths shall be provided where shown in City of Charles Sturt strategy documents, *refer to Active Living: Plan to Cycle* or where required by AUSTROADS "Guide to Traffic Engineering Practice" Part 13: Pedestrians. The default shared use path widths applying are in AUSTROADS Part 13 section 2.6 which deals with shared use paths.

Table 13

SHARED USE PATH	
All Parks and Reserves	3.0 metres
Adjacent shops and commercial areas	3.0 metres
Where two way cyclists and pedestrians are common	3.0 metres
Where two way cyclists are common with minimal pedestrians	2.5 metres
Where cyclists passing in opposite directions is rare	2.0 metres

All Shared Use Paths shall be designed to AUSTROADS "Guide to Traffic Engineering Practice" Part 14 with particular reference to Section 6.6.1 which specifically deals with these paths. The purpose of the shared use path in residential areas is to provide a safe option for inexperienced cyclists and young cyclists. Generally the path use will be relatively low so a separation line will not be required.

3.3.6 Specifications

Design, construction and materials must comply with City of Charles Sturt specification for footpaths and standard drawings.

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3.4 **Cycle Network** (under development)

3.4.1 Introduction

Refer to Active Living: Plan to Cycle Strategy

http://www.charlessturt.sa.gov.au/webdata/resources/files/Active_Living_Plan_to_Cycle.pdf

3.4.2 Cycle ways

Design to AUSTROADS "Guide to Traffic Engineering Practice" Part 14: Bicycles.

3.5 Utilities

3.5.1 Services

All services must be located underground in designated corridors used widely in South Australia.

Where indented parking is located over underground services then these services must be in sleeves (conduit) to the satisfaction of the service provider to allow easy future replacement.

3.5.2 Public Lighting

All public lighting must be wired to ETSA Utilities standard and all fittings are to be selected from the ETSA Utilities suite of supported items to allow the lighting to be owned and operated by ETSA Utilities and charged to the City of Charles Sturt using the SLUoS tariff.

All lamps shall be Compact Fluorescent Lamp (CFL), or equivalent (eg LED).

All requirements of AS1158 must be complied with, however the minimum illumination levels accepted by the City of Charles Sturt are summarised in Table 14. Higher classification of illumination may be required depending upon the level of pedestrian/cycle activity, the risk of crime and the need to enhance prestige.

Table 14

PUBLIC LIGHTING	
LOCATION	**AS1158.3.1:2005**
Access Place, Access Cul-de-sac Access Street (i), Access Street (ii)	Category P4 (min)
Residential Collector	Category P4 (min)
Bus Collector, Trunk Collector	Category P3 (min)
Any residential street adjacent reserves & open space, local shops or community facilities	Category P3 (min)
Walkways	Category P3 (min)
Footpaths, shared use paths & cycle ways in reserves & open space where shown in the City of Charles Sturt Development Plan or transport plans	Category P3 (min)

All car park areas, hard stand areas and playground areas must be illuminated to levels required in AS1158.

3.6 Industrial Road Design

3.6.1 Introduction

This section deals with the industrial street network under the care and control of Charles Sturt. There are few areas available for industrial redevelopment. Industry brings wealth to our local community so road design for convenient access at all times will speedily convey goods and services to the metropolitan main road network which is under the care and control of the State Government.

The City of Charles Sturt industrial road network primarily comprises local roads having a traffic purpose of providing access to properties along them. They are not traffic routes.

Even though these roads are used primarily for heavy vehicle access, they will support the active forms of transport (walking, cycling and buses) also used by local communities and connect to the metropolitan main road network safely with low impact upon the through traffic function of those roads.

The regeneration of the industrial areas adjacent to residential precincts or that generate vehicle trips through residential precincts places greater demand upon developers to consider how design within the industrial area can influence driver decision making for access to the metropolitan main road network.

Design of industrial roads must control "driver" behaviour making the street safe for other transport, which brings with it greater demand for improved amenity and urban design for personal safety and security.

Should this Guideline appear to be not consistent with the Australian Road Rules or any relevant Australian Standards or the AUSTROADS "Guide to Traffic Engineering Practice" then the designer must seek clarification from the City of Charles Sturt.

3.6.2 Road Function

The City of Charles Sturt industrial road network has many functions with the most obvious being:

- Access: primarily for goods & services.
- Safety: for walking & cycling transport.
- Parking: for deliveries and visitors.
- Visual amenity: for character.
- Public lighting: for personal security.
- Stormwater drainage: to prevent flooding.

3.6.3 Traffic Characteristics

The vehicle traffic in industrial roads is mainly cars with delivery and services provide by heavy and light vehicles. It is not expected that industrial roads will be used by metropolitan bus services but should this occur special design requirements will apply.

With heavy vehicles being the "life blood" of industrial areas design must be for the convenience of these vehicles.

3.6.4 Traffic Controls

In South Australia the "***Notice to Council to Use Traffic Controls Devices and Close Roads and Grant Exemptions for Events***" provides the legislative requirements for traffic control

devices. Where a traffic control is included the design must comply with that notice to Council.

3.6.5 Traffic Volume

This design guideline assumes that environmental capacity is not applicable in industrial roads. Instead traffic flow capacity and convenience are the limiting design parameters.

The limiting design consideration for Collector Roads is likely to be their connection to the main road network.

3.6.6 Trip Generation and Distribution

Trip generation and distribution is important to determine the number of vehicles using the road network being proposed.

Trip generation is to be based upon trips per hectare of industrial allotments. Where the industrial area includes some commercial or retail facilities (eg local shops) the "equivalent" area shall be calculated as 3.7 and 6.7 times the area respectively. To demonstrate this some local shops have a site area of 0.25ha then the "equivalent" area is:

0.25ha x 6.7=1.675ha. Unless otherwise approved, trips must be calculated using **Table 15.**

The equivalent areas factor and the purpose of trips must be used to calculate traffic volumes in each road. Where the road is a bus route, the additional bus trips must be added to the calculation. Each road junction or intersection is a "split" point where the direction of the facilities causing the trip purpose will guide the direction allocated to vehicles.

3.6.7 Traffic Speed

The design speed of Industrial Roads is the "maximum" speed that the 85% vehicle is likely to reach in that road. The speed of a vehicle varies as it travels along the road and the speed at any point is called the "spot" speed. A combination of geometric design, road cross section, traffic control devices, curved alignments and length of straights are used to control vehicle speed. Experience has shown that intersections and junctions without speed control have limited impact upon vehicle speed.

The design speeds used for each Industrial Roads category must be achieved using these measures. Although the Industrial Collector Road has a design speed of 50kmh being the urban speed limit, designers are encouraged to design for 40kmh being the speed at which the severity of injury for pedestrians and cyclists changes from moderate to serious. During the life of these roads the City of Charles Sturt anticipates that the general urban speed limit could be further reduced to 40kmh and it is prudent to avoid necessary retrofitting of traffic control devices which is currently occurring in older design roads.

The spot speed of a vehicle affects the sight distance required to stop the vehicle to avoid a collision and impacts upon the clear verge width, the need for corner cut-offs and the distance between road intersections and junctions.

The out-of-hours use of Industrial Roads by "hoon" drivers and anti-social behaviour is causing a serious problem in the City of Charles Sturt and design limiting speed to 40kmh is seen to be a highly effective measure in reducing these impacts, however design must not compromise safe and efficient access for heavy vehicles.

3.6.8 Industrial Road Classifications

Local Road - a single or "loop" road connecting to a Collector Road.

Collector Road - a road that usually connects a Local Road to the main road network.

Table 15

INDUSTRIAL ROADS			
Daily trip generation rate per hectare (1)			400vpd
Peak hour generation rate per hectare			40vpd
Traffic composition			20% heavy vehicles
	Local Road	**Collector Road**	
Traffic catchment (max)	5 ha	22.5 ha	
Design speed (max)	40kmh	50kmh	
No. of lanes	2	2	
Carriageway type	Two-way	Two-way	
Pavement width	12.0m	14.0m	
Reserve width (min) (2), (3)	19.0m	22.0m	
Verge width (min)	2.5m	3.5m	
Kerb type	Vertical	Vertical	
Pathways	<150 m length, then one side, otherwise two sides (4)	Both sides – pedestrian or shared use path (5)	
Parking	Pavement – two sides	Pavement – two sides	
Pavement gradient -max -min	 12% 0.4%	 12% 0.4%	
Pavement cross-fall -max -min	 1:40 1:33	 1:40 1:33	
Sight distance (min)	60m	80m	

NOTES:

1. This is industrial "site" area and excludes road reserves, parks and open space.
2. Preferred is (reserve width – pavement width) divided by two, with the minimum used to allow indented parking bays and/or shared use paths, heavily pedestrian paths or bus stops.
3. Excludes Access Restriction Strips of 0.100 metres wide where required.

4. Pathways are required where the Local Road links via a walkway to the pedestrian or cycling network or where the street provides access to open space reserves.
5. Provision of shared use paths or cycle ways is dependent upon the Council pedestrian/cycling network plans.

3.6.9 Intersections

Road intersections are opportunities to design a legible road network and to act as traffic controls through good design. Keeping these opportunities in mind, then road intersections are governed by Table 16

Table 16

INTERSECTING STREET CLASSIFICATION	
Local Road	Collector Road
Collector Road	Main Road

Intersections within the Industrial Road network have a major role in safety and the City of Charles Sturt only allows:

- T-junctions, where two streets meet (a three way approach/exit), or
- Roundabouts, where two roads cross or three or more roads meet (i.e. four or more ways to approach/exit)

The horizontal sight distance at intersections is a major factor for road user safety. The intersection spacing must be not less than the safe intersection sight distance (SISD) being the distance required for safe stopping at the spot speed of vehicles. Using this principle, the minimum intersection spacings (centre line to centre line) are:

Table 17

INTERSECTION SPACING		
	Spacing distance when the intersection is on the ***same side*** of the through street	Spacing distance when the intersection is on the ***opposite side*** of the through street
Design speed of the through road - 40kmh	60 m (1)	40 m
Design Speed of the through road - 50kmh	80 m (1)	60 m

NOTES:

1. Sourced from AUSTROADS "Guide to Traffic Engineering Practice" Part 5, Table 5.3 Intersection Sight Distance.

   Where traffic controls are included in the design to reduce approach speeds to 20kmh then the intersection spacing may be reduced to 30 metres.

3.6.10 Corner Cut-Off

The minimum verge requirements of Industrial Roads must be maintained at corners and intersections. The need for a "corner cut-off" to an allotment adjacent to bends and intersections is dependent upon the sight distance triangle derived from the safe intersection sight distance (SISD) to the vehicle in the through road and the approach sight distance (ASD) for the vehicle in the terminating road. Where a corner cut-off is required at an intersection, the length must not be less than those shown in Table 18. All corner cut-offs must be whole metre measurements and one must be provided on the opposite corner.

Table 18

CORNER CUT-OFF REQUIREMENTS		
Through Street	**Terminating Street (1)**	**Minimum Length**
Local Road	Local Road	Not required
Collector Road	Local Road	3 x 3 metres
Collector Road	Collector Road	4 x 4 metres
Main Road	Collector Road	5 x 5 metres

NOTES:

1. Generally the classification of the "Through Street" will define the minimum length of the corner cut-off. For example, if the through street is a Main Road and the terminating street is a Local Road the corner cut-off must not be less than 5 x 5 metres.

3.6.11 Parking

The City of Charles Sturt Development Plan requires industrial land to provide on-site parking under "normal" operating conditions. There remains an on-road component during heavy trading times and an expediency of couriers and at times when refurbishment works are occurring. This Design Guidelines recognises wide turning movements of heavy and large vehicles impact upon the availability of kerbside for on-road parking. The kerbside remaining must be able to support large vehicle parking and not obstruct free flowing traffic conditions, therefore 2.5 metre wide parallel parking will be provided on both sides of two-way passing vehicle flow.

Special circumstances apply when a road has frontage to open space or reserve, creek or drainage corridor, or facilities such as local shops, sporting buildings, railway stations or bus stops and additional parking may be required on-road. The provision of on-road parking to meet demand at these locations requires early discussion and approval so that it may be incorporated on-site or on-road with minimal impact upon the adjacent industrial premises.

Driveway cross-overs in industrial areas will generally be approved in accordance with Table 19.

Table 19

DRIVEWAY CROSS-OVERS	
Local Road	6.0 metres
Collector Road	8.0 metres

Centre-of-road car parking will not be approved.

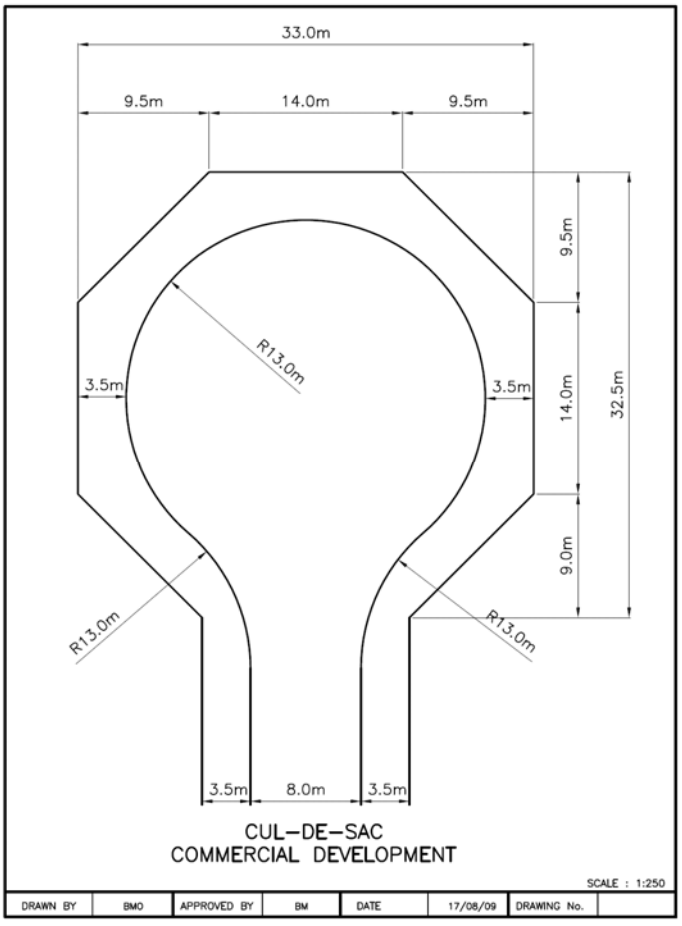
3.6.12 Passing Opportunity

The Industrial Roads are designed with two-way free flowing traffic so passing is not restricted by parking.

3.6.13 Turning Areas

The City of Charles Sturt Development Plan requires industrial land to provide on-site turning areas for "normal" operating conditions; however some drivers do make mistakes and enter the wrong road, park in the road or leave the property in the wrong direction. The turning approach lengths are long and the turning radius large. Due to the length of these kerbs parking will be allowed around cul-de-sac heads. The design of cul-de-sac shall comply with **Figure C.**

FIGURE C



3.6.14 Bus Stops

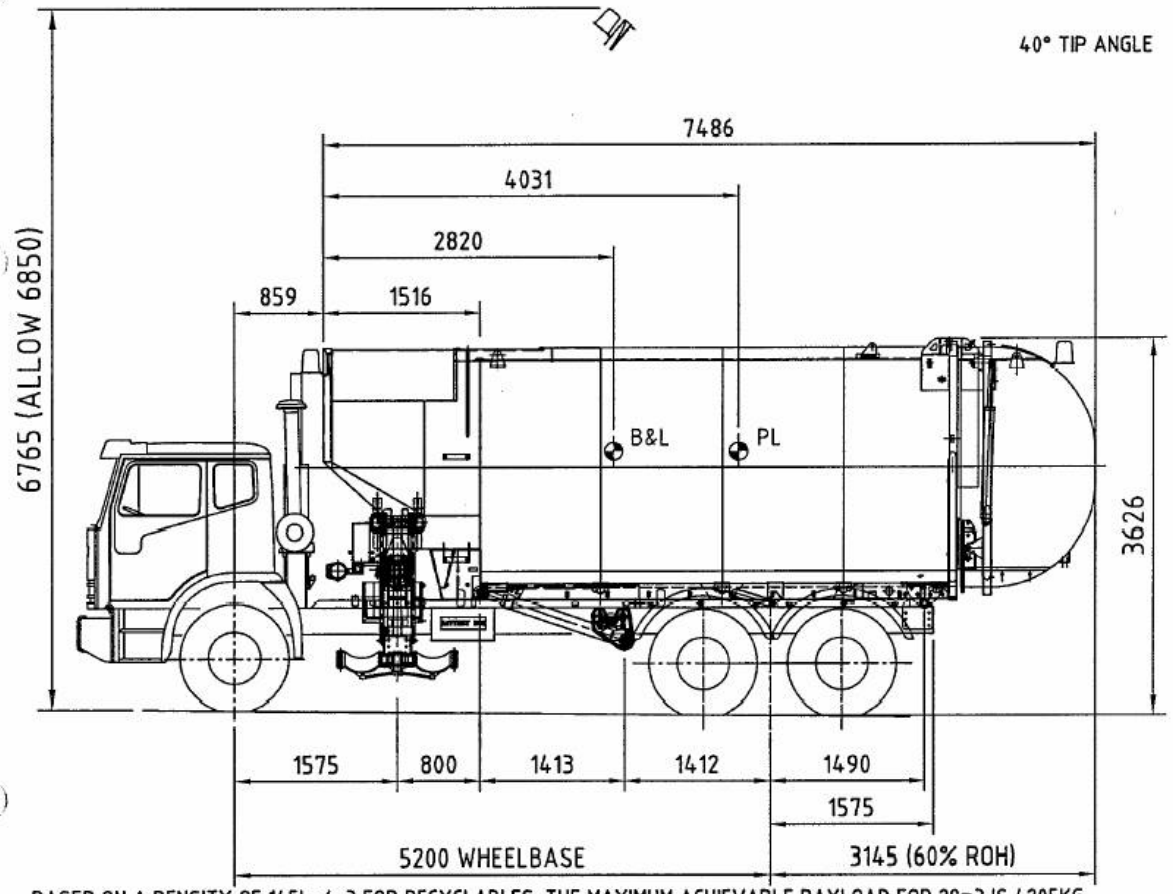
Bus stops must comply with the DDA complying bus stop detail **(refer *Appendix B)***

When metropolitan bus services use Industrial Local Roads the bus may stop on the road carriageway and vehicles wait until the bus resumes travel along the route.

In the Industrial Collector Road buses must stop in an indented area 2 metres off the carriageway to allow continuous traffic flow. Local widening of the Road Reserve may be required to meet minimum verge widths at these locations.

APPENDIX A - REFUSE, GREEN WASTE AND RECYCLING VEHICLE

VCS-2/26A11211



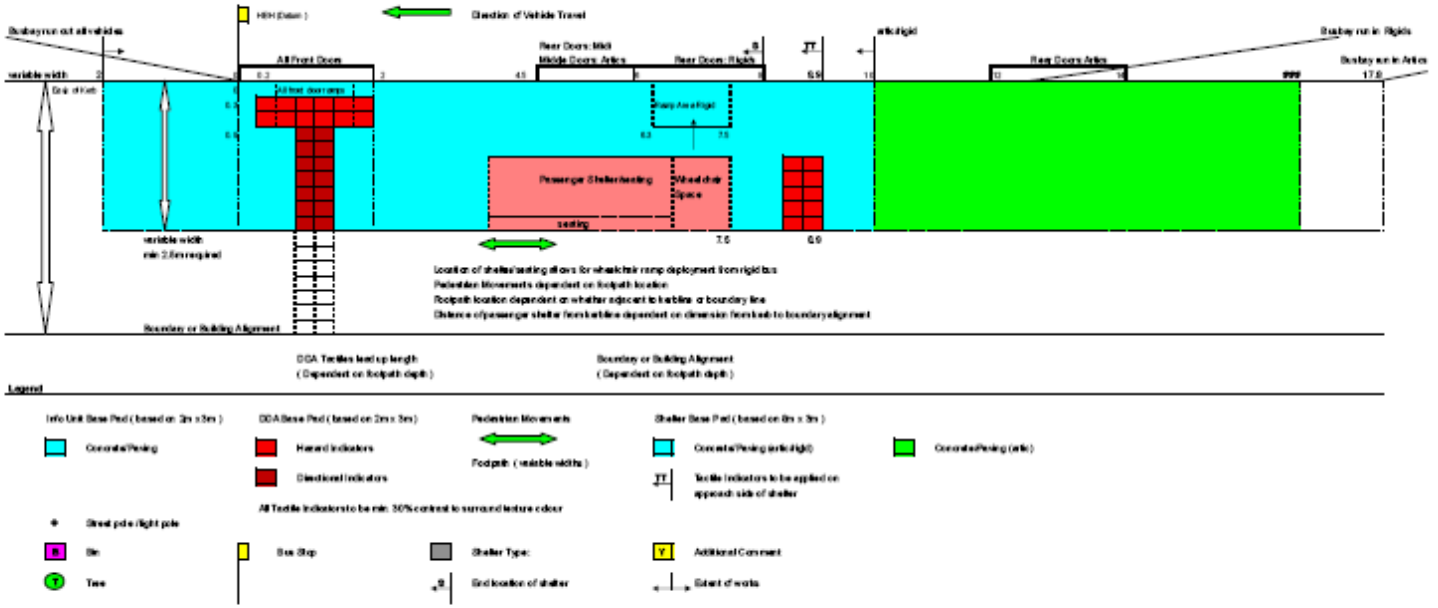
BASED ON A DENSITY OF 145kg/m3 FOR RECYCLABLES, THE MAXIMUM ACHIEVABLE PAYLOAD FOR 29m3 IS 4205KG.

	FRONT	REAR	TOTAL
TRUCK	3780	2990	6770
BODY	1581	3824	5405
Options	0	0	0
TARE	5361	6814	12175
PAYLOAD	614	9686	**10300**
TOTAL	5975	16500	22475
Limited by (front or rear)	*Rear*		

* NOTE: TARE WEIGHT SUBJECT TO OPTIONS

THE PAYLOAD DATA INDICATED ABOVE REFLECTS ONLY THE MAXIMUM PAYLOAD LEGALLY ACHIEVABLE, AND IS NOT IN ANY WAY A RECOMMENDATION OF PAYLOAD OUTCOME FOR RECYCLABLE MATERIALS. PLEASE CONSULT YOUR MJE STATE OFFICE FOR PAYLOAD INDICATIONS APPLICABLE TO THE SPECIFIC MATERIALS TO BE COLLECTED BY SPECIFIC VEHICLES.

APPENDIX B


Direction of Vehicle Travel
All Front Doors
Rear Doors: Mid
Middle Doors: Artics
Rear Doors: Right
Ramp Doors: Artics
Passenger Shelter/seating
Wheelchair Space
seating
Boundary or Building Alignment
Legend
Concrete/Paving
Hazard Indicators
Directional Indicators
Pedestrian Movements
Footpath: (variable widths)
Concrete/Paving (artic/right)
Concrete/Paving (artic)
Street pole/light pole
Bin
Tree
Bus Stop
Shelter Type:
Additional Comment
Extent of works