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Main Roads Supplement to the Austroads Guide to Road Design

Part 4A: Unsignalised and Signalised Intersections

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Contents

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Amendments

Revision Number	Revision Date	Description of Key Changes	Section / Page No.
1	December 2011	Guideline developed.	All
1A	December 2011	Tables 3.1 and 3.2 corrected.	3.2.1 and 3.2.3
1B	February 2012	Drawings 200531-0006 and 200531-0007 amended.	10.6.4
1C	February 2012	Drawings 200531-0006 and 200531-0007 amended.	10.6.4
1D	August 2012	Mew clause 4.1 “General” amended.	4.1
1E	September 2012	Figure 4.22 - Separation Line removed.	4.6

1F	November 2012	Drawings 200131-0084, 200131-0085 and 200131-0086 amended.	6.2.3
1G	April 2013	Figure 6.1 - Text "Edge of Shoulder" amended to "Edge of Lane".	6.2.1
1H	May 2013	Contact person changed to Kyle Smith.	Header
1I	June 2014	Links to Road Trains at Rural Intersections Drawings added. Figure 4.22 updated.	4.1 and 4.6
1J	June 2014	Figure 4.22 amended.	4.6
1K	October 2014	Reference Figure 10.10 Example (a) and (b) - Position of stop line for motor vehicle lane changed from 4m to 5m. Example (d) - Length of the bicycle head start storage facility changed from 4m to 5m.	10.6.4
1L	October 2014	Re-link drawings 200531-0006 and 200531-0007.	10.6.4
1M	August 2015	1st Paragraph amended.	4.6
1N	June 2016	Drawing 200731-0071 amended.	9.2 and 9.3
1O	August 2016	Table 6.2 - Minimum Island widths amended.	6.2
1P	August 2016	Drawings 200531-0006 and 200531-0007 amended.	10.6.4
1Q	January 2017	Contact person changed to Nick De La Motte.	Header
1R	April 2018	Drawings 201431-0001 and 201431-0002 amended.	4.1
2	July 2018	Updated to supplement Austroads Guide to Road Design (GRD) Part 4A (2017) release.	ALL
2A	September 2018	Drawings 201431-0001 and 201431-0002 amended.	4.1
2B	January 2019	Drawings 201431-0001 and 201431-0002 amended.	4.1
2C	February 2019	Document hierarchy clarified.	All
2D	November 2019	Drawings 200131-0084, 200131-0085 and 200131-0086 amended.	6.1.3
3	December 2023	Updated to supplement Austroads Guide to Road Design (GRD) Part 4A (Edition 3.2 – May 2023) release.	ALL
3A	July 2025	SISD wording updated, Pedestrian Sight Distance requirements amended and guideline drawing added, acceleration distance guidance added, raised island advice amended, CHR(S) wording updated, and guidance added for AUL(S) treatment.	3.2.2, 3.3, 5.3, 6.1.2, 7.2.3 and 8

PURPOSE

This Supplement has been developed to be read as a supplement to the Austroads Guide to Road Design (GRD) Part 4A: Unsignalised and Signalised Intersections (2023), a copy of which can be obtained via the Austroads website.

In Western Australia, Main Roads' policies, guidelines and standards take precedence over Austroads Guides and Standards Australia Standards. National Guides and Standards take precedence over International Guides and Standards, unless specifically stated otherwise.

This Supplement has the same structure as the equivalent Austroads Guide and only additional requirements, clarifications, or practices different from Austroads appear. Where appropriate, this Supplement may also contain additional sections and figures not covered by Austroads, but the numbering sequence found in the Austroads Guide remains. Figures and tables in this Supplement replace those with the same figure or table number in the equivalent Austroads Guide.

This guideline applies to all new works on roads managed by Main Roads. It is noted that many existing intersections were constructed to the design standards of the time and do not necessarily meet all current design requirements. Whilst it is not economically feasible to upgrade existing intersections each time revisions are made to design standards, Project Managers should consider making improvements whenever major works are completed in the vicinity of existing intersections.

It is important for Road Planners and Designers to be aware of the effects that different types of intersection control may have on delays to traffic (under various traffic demand situations) and the resultant emissions. A range of factors should be taken into consideration when deciding the most appropriate traffic management treatment at any given intersection. These are outlined in the Guide to Road Design Part 4B: Roundabouts, the Guide to Traffic Management Parts 6 and 10, and the Main Roads Supplement to Austroads Guide to Road Design Part 4 - Intersections and Crossings - General.

1 INTRODUCTION

Main Roads has no supplementary comments for this section.

2 LAYOUT DESIGN PROCESS

2.2 Alignment of Intersection Approaches

2.2.2 Vertical Alignment

The general requirement is that the maximum grade for at least the last 30m from the intersection edge of pavement is 3%. It is good practice that this requirement is applied at all intersections – particularly where there are a high number of trucks.

Reference Figure 2.5, Approach Sight Distance (ASD) is the minimum level of sight distance to be provided at intersections. ASD is measured from a driver's eye height (1.1m) to object height (0.0m), which ensures that a driver is able to see any line marking and kerbing at the intersection.

2.2.4 Superelevation at or near intersections

Intersection design must consider instability of heavy vehicles. Refer to Austroads GRD Part 4A, Appendix B for assessment of critical truck turning speeds. Where truck operating speeds are likely

to exceed those provided in Table B2, measures should be considered to reduce truck speeds or mitigate the risk.

The maximum effective adverse crossfall for turning movements at intersections is 5%. At intersections with higher speed turning movements (i.e. traffic signal controlled intersections) the safe effective adverse crossfall may need to be less than the maximum.

3 SIGHT DISTANCE

3.1 General

In addition to the sight distance requirements in Austroads GRD Part 4A, the following sight distance checks should be made:

- Intersections with restricted lateral sight distance (for Stopping Sight Distance);
- Intersections on or near crest vertical curves (for Approach Sight Distance);
- On approaches to speed change and lane drop areas (for Approach Sight Distance);
- On the approaches to underpasses (for Stopping Sight Distance); and
- On the approaches to railway level crossings (for Approach Sight Distance)

Intersections should be positioned in safe locations using the Sight Distance criteria in Section 3.2. The sight distance values shown in Table 3.1 of the Austroads document should be increased generally for design on unsealed roads. Refer to Australian Road Research Board - Unsealed Roads - Best Practice Guide (2020).

3.2 Sight Distance Requirements for Vehicles at Intersections

3.2.1 Approach Sight Distance (ASD)

Where it is unreasonable or extremely difficult to achieve ASD, then as an absolute minimum, Stopping Sight Distance (SSD) should be provided.

In the application of Table 3.1, the following guidance is provided:

- A reaction time of 2.5s shall be used as the Main Roads desirable minimum.
- A reaction time of 2.0s shall be used as the Main Roads absolute minimum but must be accompanied with a “departure from standards” approval through Manager Road and Traffic Engineering Branch.
- Absolute minimum reaction time should not be used in combination with other minimum design standards.
- A reaction time of 1.5 seconds shall not be used in Western Australia.

Design Speed (km/h)	Based on Approach Sight Distance for a car[1] $h_1 = 1.1, h_2 = 0, d = 0.36^2$			
	$R_T = 2.0s$		$R_T = 2.5s$	
	ASD(m)	K	ASD(m)	K
40	40	7.2	45	9.3
50	55	13.8	62	17.5
60	73	24.0	81	29.8
70	92	38.9	102	47.5
80	114	59.5	126	71.6
90	139	87.3	151	103.8
100	165	123.6	179	145.3
110	193	170.1	209	198.0
Truck stopping capability provided by the minimum crest curve size[4]	**$d = 0.22, h_1 = 2.4m, h_2 = 0m$**			

Table 3.1: Approach Sight Distance (ASD) and corresponding minimum crest vertical curve size for sealed roads (S<L)

Notes to Table 3.1:

1. If the roadway is on a grade, calculate the Approach Sight Distance (ASD) values using the correction factors in Table 3.4 (or use Equation 1 in Section 3.2.1) by applying the average grade over the braking length.
2. A coefficient of deceleration (d) of 0.36 shall be used in Western Australia.

3.2.2 Safe Intersection Sight Distance (SISD)

Main Roads requires that the viewing point on the minor road approach is measured 5.0m (absolute minimum of 3.0m) from the hold line, or in the absence of a hold line from the projected major road face of kerb or edge of seal. Adoption of a value between 3.0m and 5.0m must be accompanied by a "departure from standards" approval through Manager Road and Traffic Engineering Branch.

For vehicles on the minor road consideration should be given to observation angles (i.e. Maximum of 110° to the left and 120° to the right).

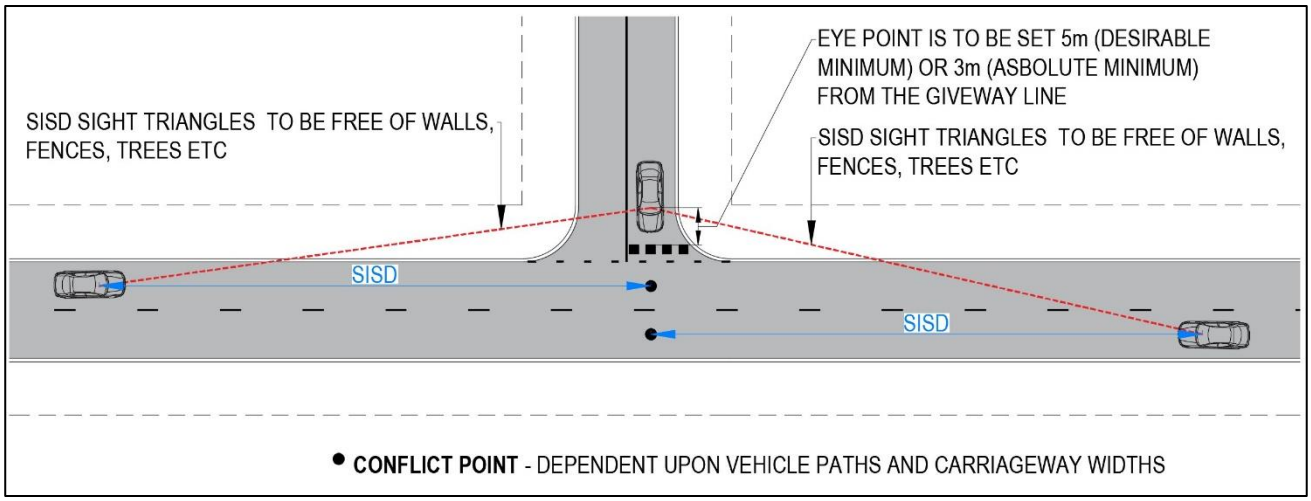


Figure 3.2 (Plan Only): Safe Intersection Sight Distance (SISD)

Design Speed (km/h)		Based on Safe Intersection Sight Distance for cars[1] h_1 = 1.1, h_2 = 1.25[5], d = 0.36[2]			
		R_T = 2.0s[4]		R_T = 2.5s[4]	
		SISD(m)	K	SISD(m)	K
40		73	5.7	79	6.6
50		97	10.0	104	11.5
60		123	16.0	131	18.3
70		151	24.2	161	27.4
80		181	34.9	192	39.3
90		214	48.6	226	54.4
100		248	65.6	262	73.2
110		285	86.6	300	96.1
Minimum SISD capability provided by the crest vertical curve size[3]	**Truck**	**d = 0.29, h_1 = 2.4m, h_2 = 1.25m[5], observation time = 3.0s**			

Table 3.2: Safe Intersection Sight Distance (SISD) and corresponding minimum crest vertical curve size for sealed roads (S<L)

Notes to Table 3.2:

1. If the roadway is on a grade, calculate the safe intersection sight distance (SISD) values using the correction factors in Table 3.4 (or use Equation 2 in Section 3.2.2) by applying the average grade over the braking length.
2. A coefficient of deceleration (d) of 0.36 shall be used in Western Australia.
3. These check cases assume the same combination of design speed and reaction time as those listed in the table.
4. A reaction time of 2.5s shall be used as the Main Roads desirable minimum. A reaction time of 2.0s shall be used as the Main Roads absolute minimum but must be accompanied with a "departure from standards" approval through Manager Road and Traffic Engineering Branch. A reaction time of 1.5 seconds shall not be used in Western Australia.
5. Where roadside safety barriers are in the vicinity of an intersection and may partially restrict the view of approaching vehicles, SISD shall be provided to an object cut-off height for front turn indicators (i.e. h_2 = 0.65m).

3.2.3 Minimum Gap Sight Distance (MGSD)

Safe Intersection Sight Distance (SISD) and Minimum Gap Sight Distance (MGSD) represent separate and independent sight distance models. Main Roads standard practice is to adopt Safe Intersection Sight Distance (SISD) as the sight distance model at intersections.

Minimum Gap Sight Distance (MGSD) is only to be adopted at signalised intersections to determine whether a filtered right turn movement is acceptable (Austroads GRD Part 4A Table 3.5 - Right turn from major road). As per the notes below Table 3.5, the Critical Gap Acceptance Time (ta) must be adjusted for this movement based on the crossing distance specific to the site and its geometric layout. For every 3.5m added to the crossing distance, 1 second shall be added to Critical Gap Acceptance Time (ta). Designers should note that where opposing right turns are present, it is unlikely that sight distance is achieved, unless the opposing right turn lanes are offset to the right of each other.

The figure below shows an example of where a filtered right turn would not be considered acceptable given Minimum Gap Sight Distance is not achieved (opposing vehicle blocking sight lines).

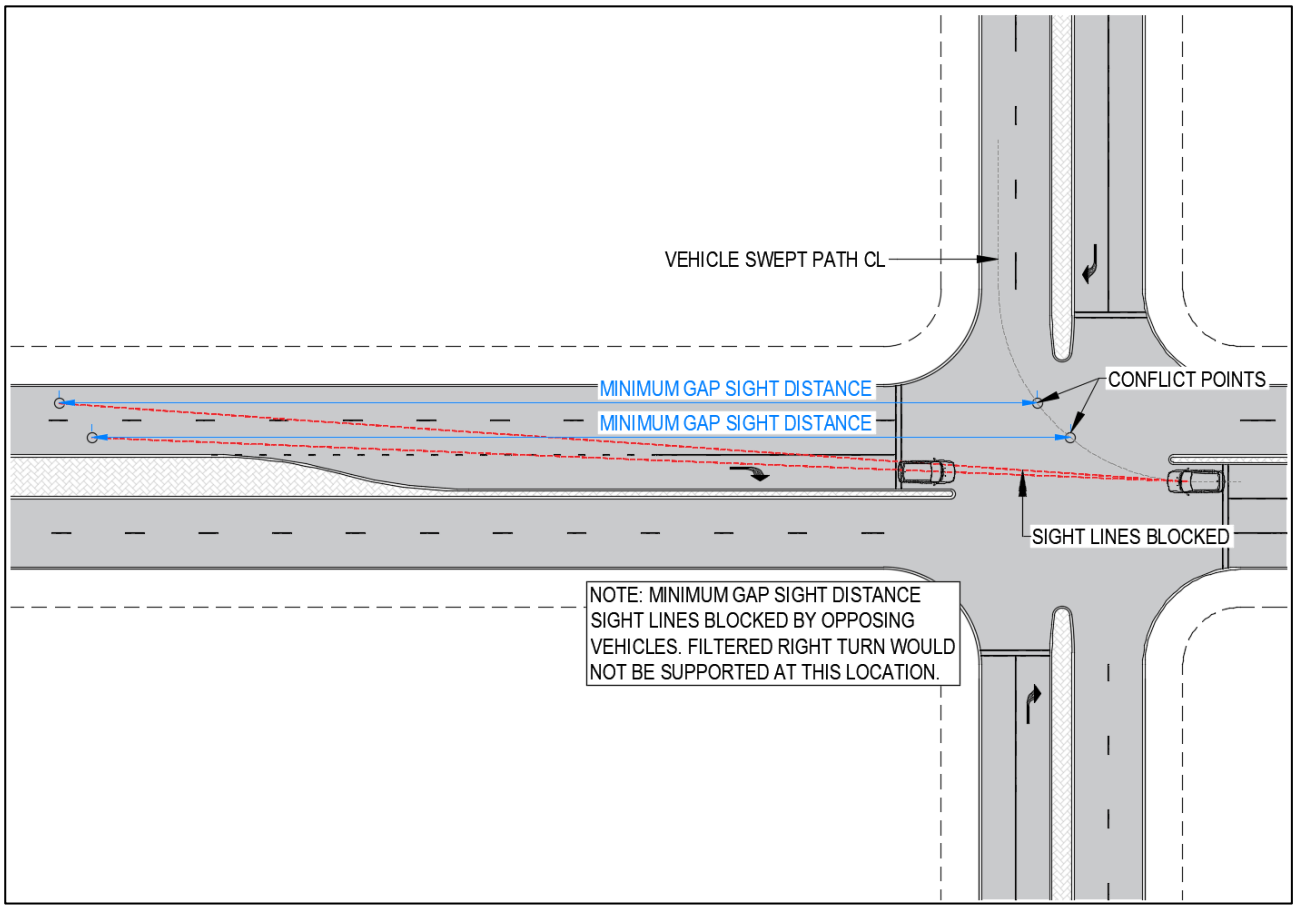


Figure 3.8: Minimum Gap Sight Distance (MGSD) - Failing

3.3 Pedestrian Sight Distance Requirements

Both Approach Sight Distance (ASD) and Crossing Sight Distance (CSD) are to be provided at all marked (zebra/wombat) pedestrian crossings.

CSD shall be provided at all unmarked pedestrian crossings. If the pedestrian crossing is located within a left turn pocket or on the terminating leg of an intersection, it can be assumed that the approaching vehicle will be decelerating and therefore a reduced design speed can be adopted. The selected design speed is dependent on the proposed configuration of the left turn pocket and the left turn condition (stop/giveway or free flow). If the design speed adopted varies from the design speed of the through-road, the Designer must justify the adopted design speed, which should be documented in the Design Report. The designer should note that barriers running against the kerbing of a left turn pocket may hinder CSD and or ASD to the pedestrian crossing at the intersection.

Main Roads Western Australia has developed the following guideline drawing to assist designers in checking for ASD and CSD at pedestrian crossings:

Pedestrian Crossing Sight Distance Checks	
Left turn pocket with crossing near intersection	202331-000063

3.4 Sight Distance at Property Entrances

Safe Intersection Sight Distance should be provided at driveways in accordance with Table 3.2. However, where this is not possible due to constraints, sight distance equal to the Stopping Sight Distance for the design speed of the road shall be provided as an absolute minimum. For information relating to property access refer to the Main Roads Supplement to Austroads GRD Part 4: Intersections and Crossings General and the Main Roads Driveway Policy.

4 TYPES OF INTERSECTIONS AND THEIR SELECTION

4.1 General

The location of Electrical Assets should also be considered during the design process. Further information can be obtained regarding Electrical Assets from documents such as:

- Vehicular Signals
- Lighting Design Guideline for Roadway and Public Spaces

4.2 Intersection Types

The Main Roads Intersection Warrants must be consulted when determining an intersection configuration. The warrants, including a downloadable spreadsheet can be obtained from the Main Roads Supplement to Austroads Guide to Traffic Management – Part 6: Intersections, Interchanges and Crossing Management.

The design of intersections shall be in accordance with the following Main Roads Guideline Drawings:

Intersection Types	
Intersections at Grade 1 of 10 – Example Intersection Treatments	202231-0007
Intersections at Grade 2 of 10 – Main Roads SR and SL Treatments	202231-0008
Intersections at Grade 3 of 10 – Main Road Rural BAR and BAL Treatments	200131-0081
Intersections at Grade 4 of 10 – Main Roads Urban BAR and BAL Treatments	202231-0009
Intersections at Grade 5 of 10 – Main Roads AUR and AUL Treatments	200131-0083
Intersections at Grade 6 of 10 – Main Roads CHR and CHL Treatments	200131-0084
Intersections at Grade 7 of 10 – Main Roads Unsignalised T-intersection with Channelised Left Turns Type CHL Freeflow	200131-0085
Intersections at Grade 8 of 10 – Main Roads Signalised T-intersection	200131-0086
Intersections at Grade 9 of 10 – Main Roads Signalised T-intersection with Right Turn Median Acceleration Lane	200431-0065
Intersections at Grade 10 of 10 – Main Roads Signalised Four Way Intersection with Dual Carriageways on Both Roads	200431-0066
Main Roads Road Train T-Intersection – Example Treatment For 36.5m Road Train	201431-0001
Main Roads Road Train T-Intersection – Example Treatment For 53.5m Road Train	201431-0002

5 AUXILIARY LANES

5.2 Deceleration Lanes

5.2.1 Components of Deceleration Turn Lanes

Main Roads preferred practice for diverge tapers is to use 100m radius back-to-back reverse curves for roads with design speeds of 80 km/h and higher, and to use 50 m radii for design speeds lower than 80 km/h. These radii are based on a turn lane width of 3.5 m.

For wider turn lanes Equation 5 should be used to calculate the taper length for roads with design speeds of 80 km/h and higher, and 80 km/h for roads with design speeds lower than 80 km/h. The values calculated for T should be from TP to TP of the reverse curves, and not IP to IP.

5.2.2 Determination of Deceleration Turning Lane Length

Main Roads preferred practice is to use a deceleration rate of 2.5 m/s^2. Adoption of a higher deceleration rate requires a "departure from standards" approval through Manager Road and Traffic Engineering Branch.

5.3 Acceleration Lane For Cars

5.3.2 Acceleration Distance

The table below is to be used instead of the Austroads table when determining acceleration lanes for cars. This amended table adopts a merge taper rate of 0.6 m/s instead of 1.0 m/s. The acceleration portion of the A dimension has remained unchanged.

Merge taper lengths shown in the table below are based on a 3.5m lane width.

Design speed of road entered	**Length of acceleration lane A (m) (including length of merge taper)**								**4 sec travel (m) [2]**	**Merge Tm (m) [3]**	**Min. desirable length 4 sec + Tm**
	Design speed of entry curve (km/h)										
(km/h)	0[1]	20	30	40	50	60	70	80			
50	105	90	80	65	-	-	-	-	55	85	140
60	150	135	125	110	80	-	-	-	65	100	165
70	210	195	185	170	140	100	-	-	80	115	195
80	290	275	265	250	220	180	130	-	90	130	220
90	390	375	365	350	320	280	230	155	100	150	250
100	515	500	490	475	445	405	355	285	110	165	275
110	685	670	660	645	615	575	525	395	120	180	300

Table 5.5: Length of acceleration lanes for cars on level grade

Notes to Table 5.5:
1. Length required where a vehicle accelerates from zero speed.
2. 4 second travel length rounded to the nearest 5m interval.
3. Merge taper length rounded up to the nearest 5m interval.
4. For values in the green-shaded areas adopt the minimum desirable length (4 sec + Tm).

5.3.3 Merge Taper Tm

Main Roads has adopted a merge rate of 0.6 m/s at all auxiliary lane tapers. For specific requirements relating to merge tapers refer to Main Roads Supplement to Austroads Guide to Road Design - Part 3 – Geometric Design.

6 TRAFFIC ISLANDS AND MEDIANS

6.1 Raised Traffic Islands and Medians

Raised islands on the centre line of the side road (minor road) approaching intersections are referred to as splitter islands by Main Roads. Raised islands on the centre line of the main carriageway (major road) are referred to as medians by Main Roads.

6.1.2 Raised Medians

Raised splitter islands on side roads are a preferred practice by Main Roads at all intersections, regardless of the intersection type. These islands offer several benefits, including providing refuge for pedestrians, offering a location for signage, improving intersection delineation, and allowing for better control of vehicle swept paths, among others. If a splitter island is not incorporated, the

design report must include justification for its omission, subject to acceptance by the Main Roads Project Manager.

Splitter Islands (excluding roundabout and corner approach islands) shall be constructed as shown in Figure 6.1. The island width ('W') and refuge gap ('X') can be determined from Table 6.4, after assessing usage by pedestrians and cyclists or a combination of both.

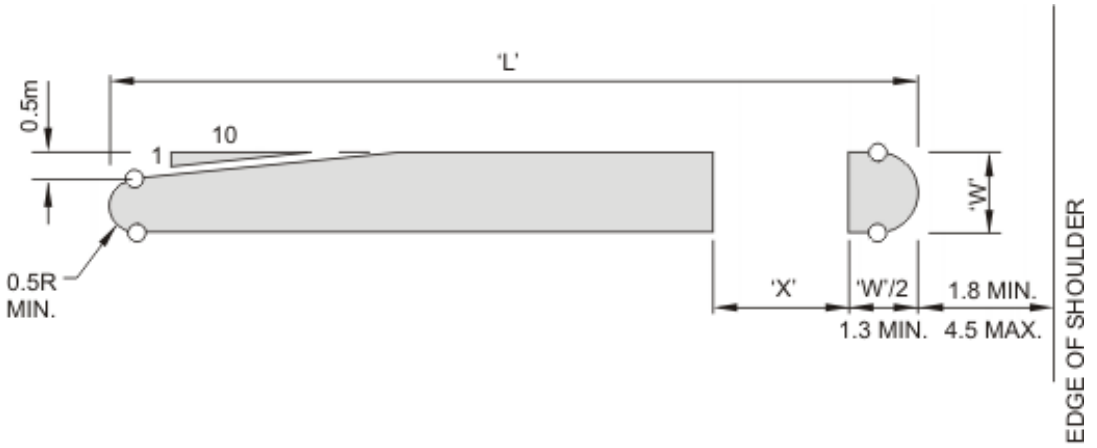


Figure 6.1: Splitter Island Geometry

The length (L) of the splitter island shall be determined from Austroads - GRD Part 4A (2023), Section 6.1.2. Table 6.3.

The values in Table 6.4 below, the "Desirable Minimum" column should be used wherever possible.

Island/Median used for protection/refuge for: -	Island width 'W'		Gap in island 'X' Min (m)
	Desirable Minimum (m)	Absolute Minimum (m)	
Signs or street lighting	2.0	1.5[2]	2.5
Signals[1]- single aspect width	2.0	1.5[2]	2.5
Signals[1]- dual aspect width	2.5	2.0	2.5
Pedestrians	2.5	2.0	2.5
Cyclists	3.0	2.0	2.5
Shelter turning vehicles and traffic signals	6.0	5.5	

Table 6.4: Residual median island widths at urban intersections (W)

Notes to Table 6.4:
1. For traffic signals, the minimum offset to any part of the signal is 0.6m from the kerb face.
2. This width does not allow for a gap in the island for pedestrians.

Where pedestrian crossings are proposed at signalised intersections, Main Roads requires that a section of raised median island is provided in front of the pedestrian crossing within the intersection (bullnose) The only exception to this is where the pedestrian crossing operates as a fully protected phase and there is insufficient space to accommodate the design vehicle swept paths.

Providing a raised nose provides greater safety for vulnerable pedestrians and better delineates the intersection for the design vehicle. Main Roads acknowledges that a raised nose in front of the crossing may not always be possible given design vehicle requirements, existing intersection geometry or site-specific constraints, however if a nose cannot be provided in front of the crossing it must be documented in the design report and accepted by Manager Road and Traffic Engineering and Manager Traffic Management Services as a departure from standards.

6.1.3 Raised High Entry Angle and Free-flow Left-turn Islands

There are three corner approach island types:

- High entry (70°) angle island
- Free flow slip lane (directional) island, and
- Left turn island for signalised intersections.

Examples regarding the use of these islands are shown on drawings 200131-0084, 200131-0085 and 200131-0086.

A High entry angle island shall be designed using the criteria shown in Figure 6.14. Note that if cut through pedestrian access is to be used rather than pedestrian ramps, it is recommended that the minimum island size be increased from 6.0m by 12.0m to 8.0m by 15.0m.

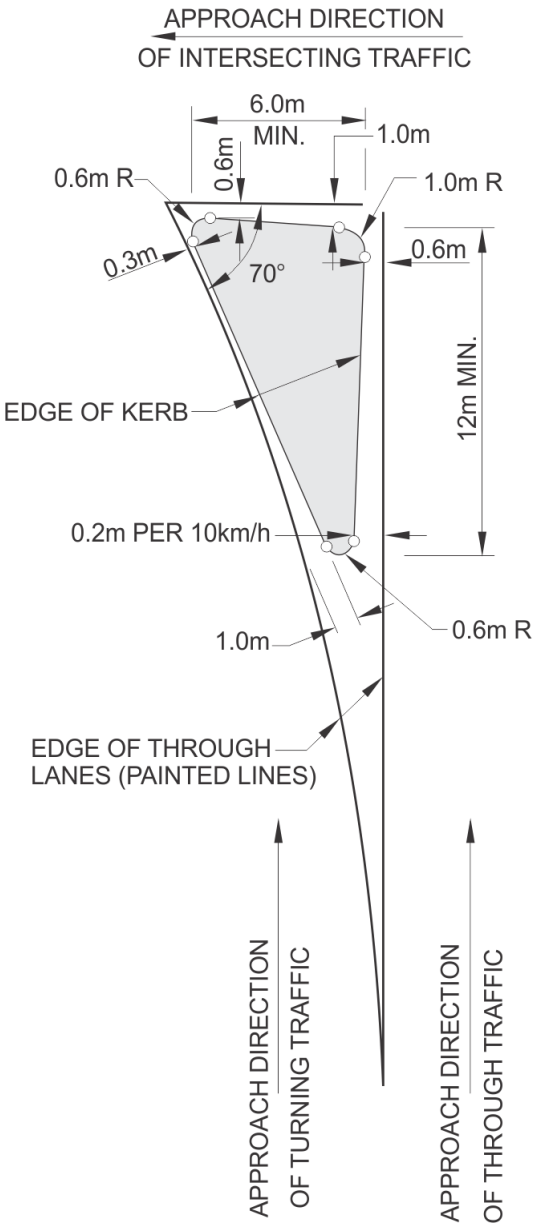


Figure 6.14: High Entry Angle Island

Where an exclusive cycle lane runs adjacent to an island, the island may be placed parallel to the cycle lane with a 0.3m offset as shown in Figure 6.15 provided the cycle lane width exceeds the 0.2m per 10km/h offset criteria.

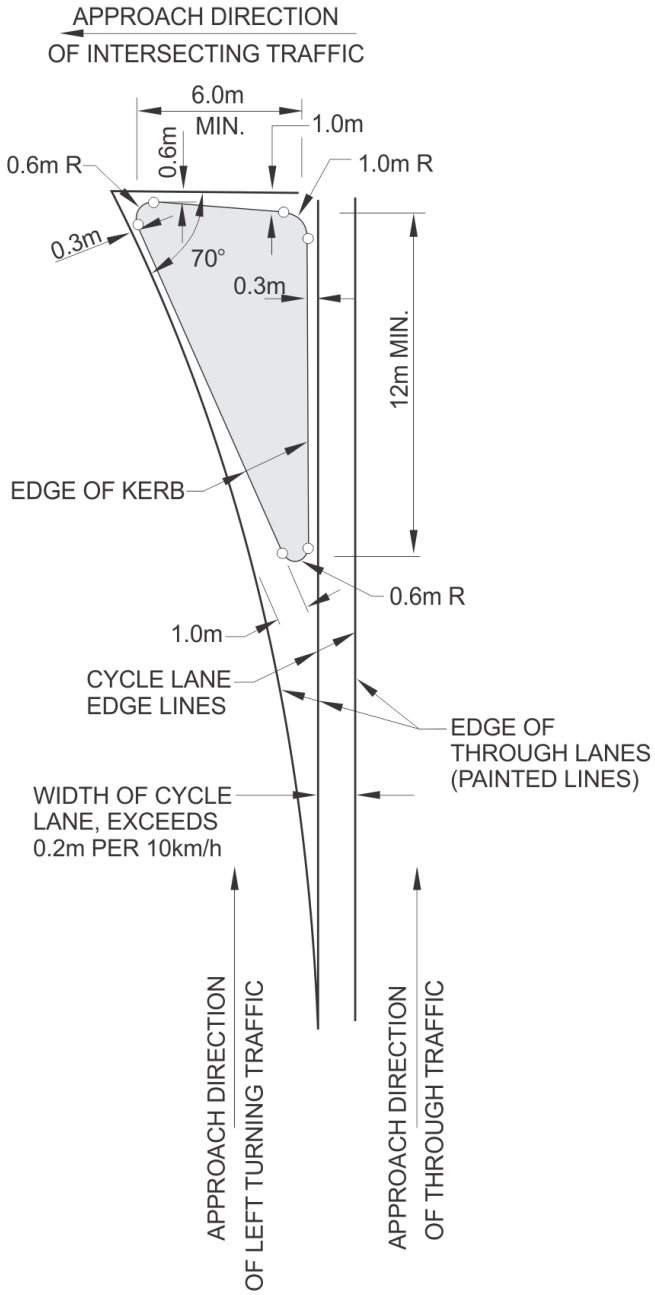


Figure 6.15: High Entry Angle Island with Adjacent Cycle Lane

The free flow slip lane island shall be designed using the criteria shown in Figure 6.16 and must exit into its own lane on the crossroad. The island has an extended parallel departure nose which ensures that vehicles are aligned correctly in the acceleration lane prior to merging.

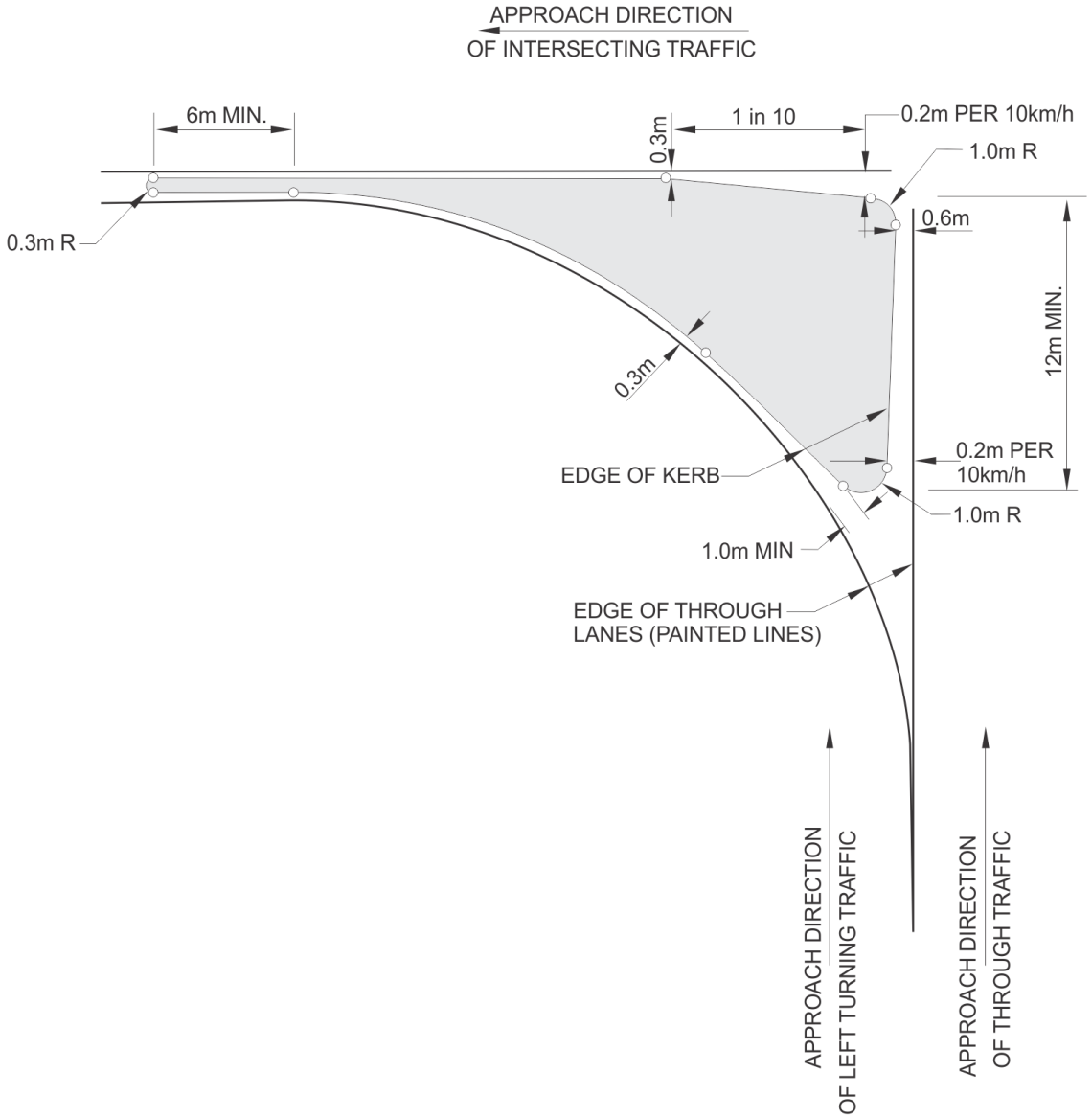


Figure 6.16: Free Flow Slip Lane Island

An alternative shown at Figure 6.17 shows a cycle lane cutting through the island to cross to the left of the acceleration lane at 90 degrees.

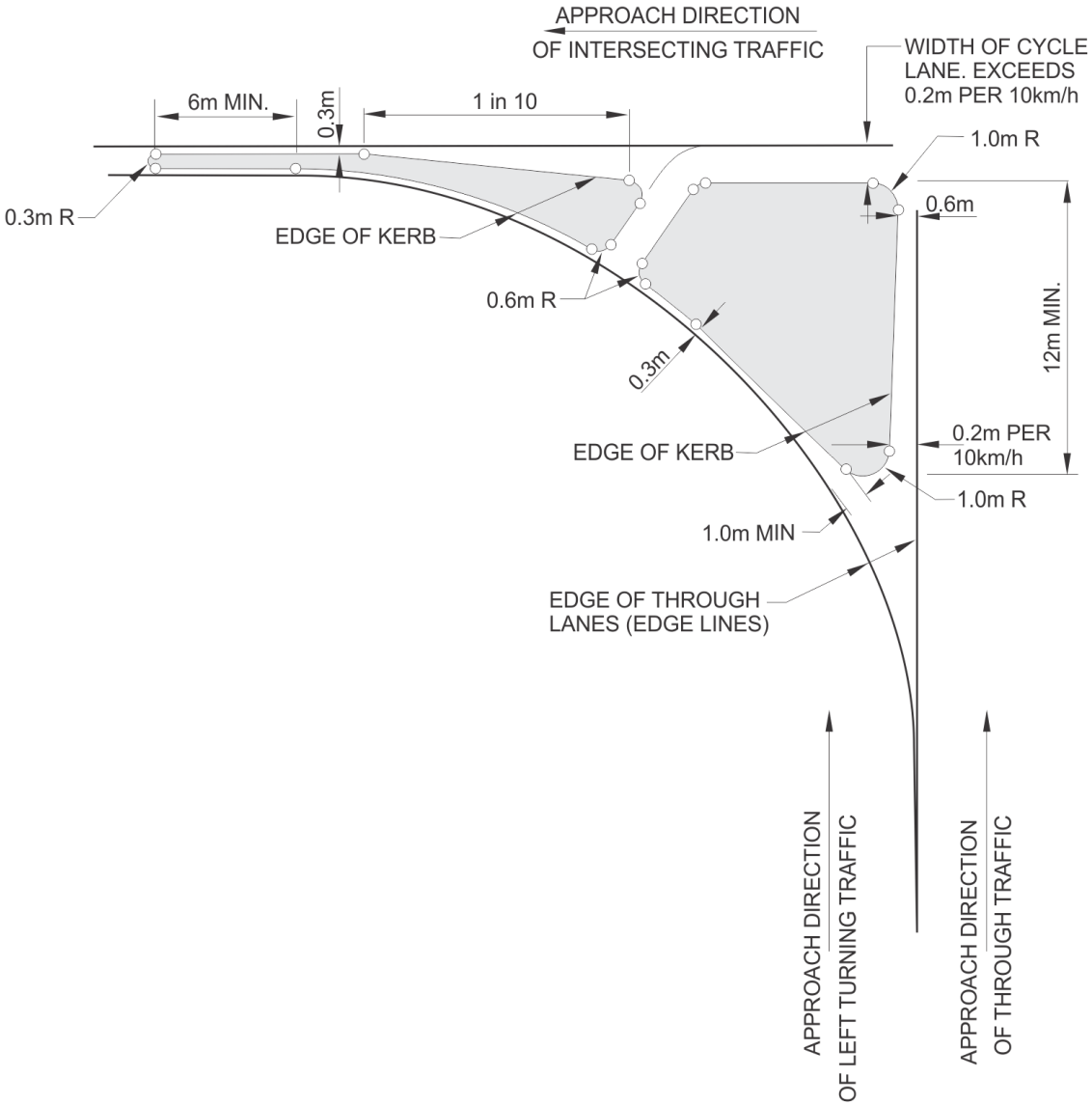


Figure 6.17: Free Flow Slip Lane Island with Cycle Lane

Figure 6.18 shows a left turn island for use only when the left turn movement is signalised.

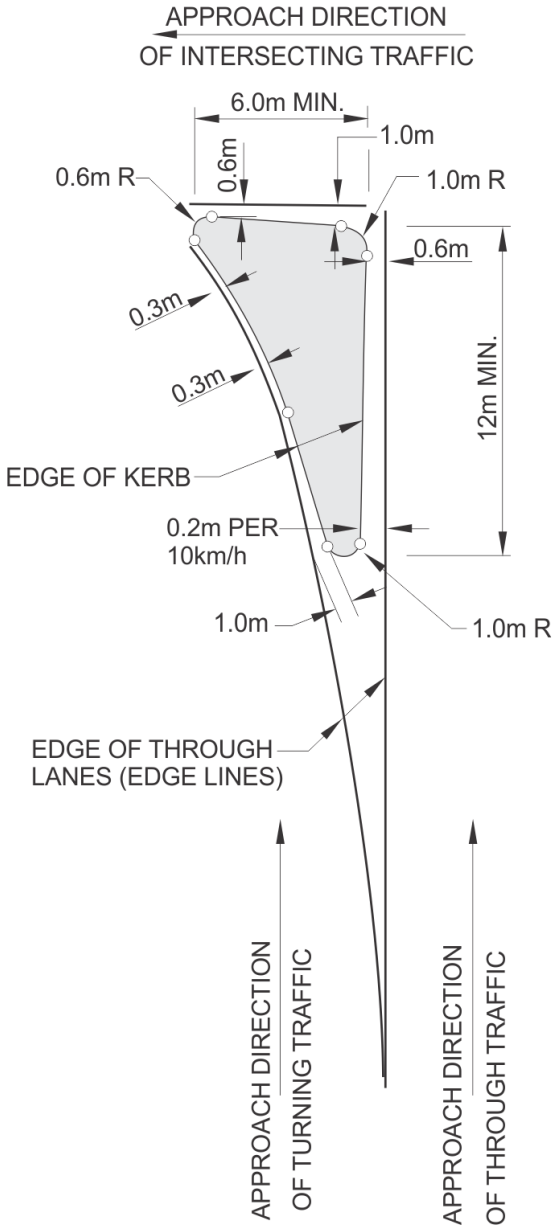


Figure 6.18: Left Turn Island for Signalised Intersections

Seagull islands are used in the median opening at 'T' intersections - where the median width is 10 metres or greater - to fill the large expanse of pavement and give direction to turning traffic. The seagull island shall be designed using the criteria shown in Figure 6.19.

An example of this is shown on Main Roads Guideline Drawing 200131-0085.

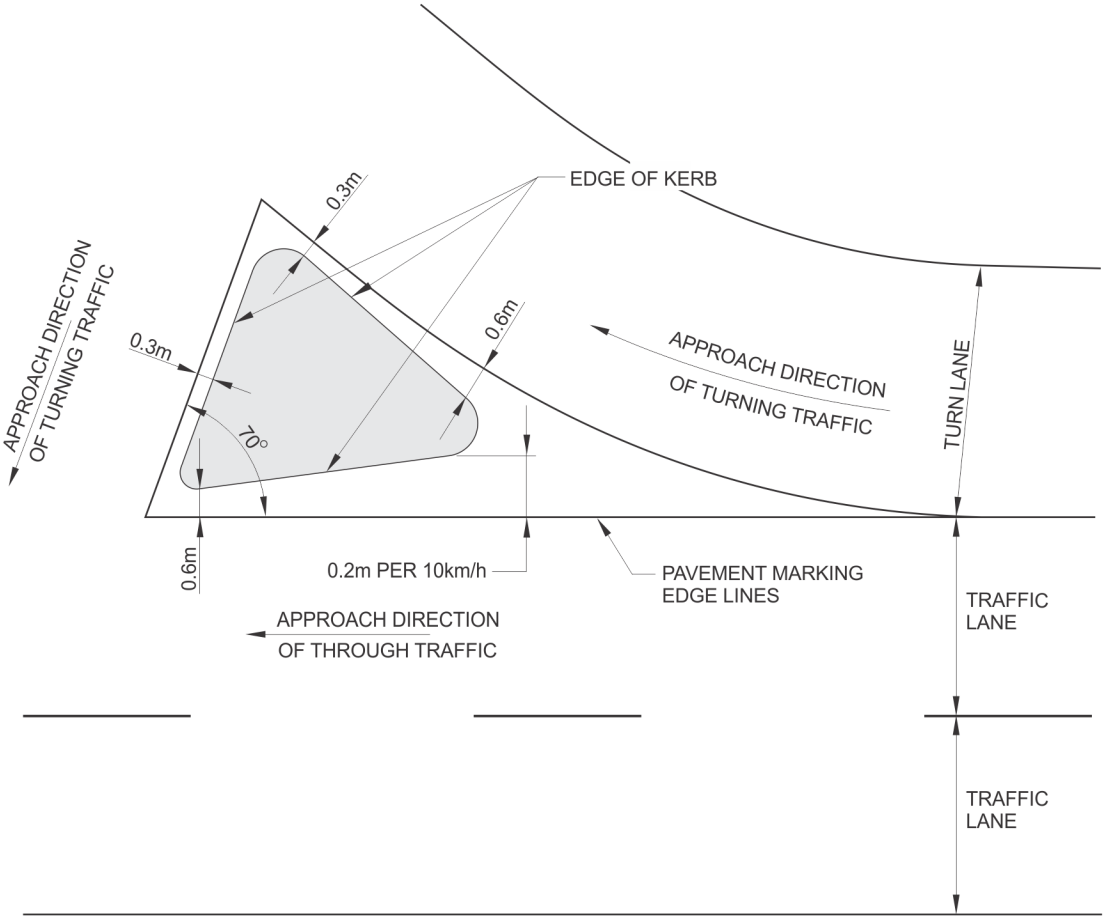


Figure 6.19: Seagull Island (Minimum Island Area 10m^2)

Where intersections include kerbed medians or kerbed islands, street lighting should be provided.

6.4 Road Width between Kerbs and between Kerb and Safety Barrier

6.4.1 General

Main Roads requires a 0.5m clearance between the design vehicle body envelope and the face of kerb/edge of seal. This envelope shall be included on all swept paths.

To enable stopped vehicles to be passed, the desirable minimum through carriageway width between kerbs is 6.0m. The absolute minimum through carriageway width between kerbs is 5.5m. The desirable minimum width for single lane one-way traffic carriageways (including shoulder) should be 6.0m with an absolute minimum width of 5.5m.

6.5 Kerb and Channel

Main Roads preferred practice is not to use kerb and channel.

7 RIGHT-TURN TREATMENTS

Refer to Section 4 of this document for Main Roads Intersection Types.

7.2 Rural Right-turn Treatments – Undivided Roads

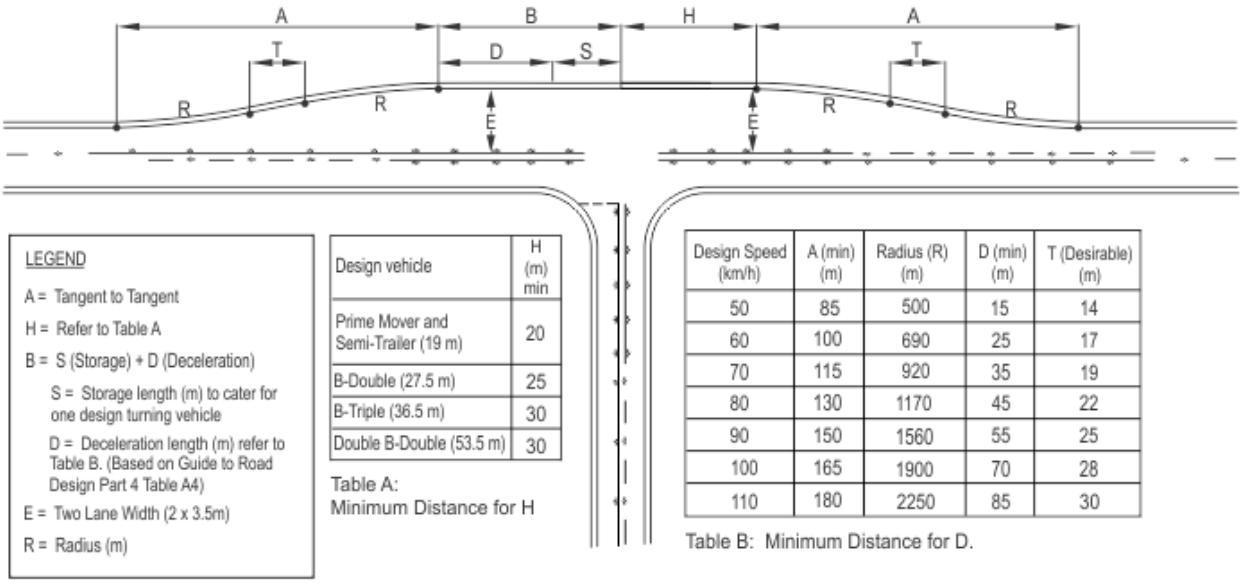
7.2.2 Auxiliary Right-turn Treatment (AUR)

Main Roads preferred intersection treatment for most roads is a CHR/CHL, AUR/AUL or a Roundabout.

The AUR turn treatment works well partially because in Western Australia the lane marking differs from other states. The type AUR is a relatively low cost and low maintenance solution to solving high rear-end major accident rates.

Main Roads does not support the use of a lane separation line at AUR intersections.

A typical type AUR treatment is illustrated in the Figure 7.17 below. Note that the widening (diverge) taper radii shall be designed as per the radii shown therein.



Design vehicle	H (m) min
Prime Mover and Semi-Trailer (19 m)	20
B-Double (27.5 m)	25
B-Triple (36.5 m)	30
Double B-Double (53.5 m)	30

Table A:
Minimum Distance for H

Design Speed (km/h)	A (min) (m)	Radius (R) (m)	D (min) (m)	T (Desirable) (m)
50	85	500	15	14
60	100	690	25	17
70	115	920	35	19
80	130	1170	45	22
90	150	1560	55	25
100	165	1900	70	28
110	180	2250	85	30

Table B: Minimum Distance for D.

Figure 7.17: Typical Main Roads AUR Type Treatment

Notes to Figure 7.17:

1. The values in Table B are based on a lateral movement width of 3.5m.
2. Lateral movement length 'A' is based on a diverge rate of 0.6m/s rounded up to the nearest 5m. Tangent Length 'T' is based on 'A'/6. Radius 'R' is based on the formulae below. All these values should be recalculated if the lateral movement width is altered from the tabulated 3.5m.
3. The following formulae is used to calculate the radius (R):

$$R = \frac{1}{4w}(A^2 + w^2 - T^2)$$

Where:

w = Lateral movement width (m)
A = Lateral movement length (m)
T = Tangent length (m)

4. The calculated radii do not need to comply with Main Roads adverse radii criteria as this design feature is considered equivalent to a driver negotiating a diverge.
5. The methodology adopted for calculating 'T' is to ensure an aesthetic outcome.
6. If the main alignment is curved, then lateral movement length 'A' must govern the design.

7.2.3 Rural Channelised T-junction – Short Lane Type CHR(S)

Main Roads' preference is to use an AUR treatment in lieu of the CHR(S) turn treatment. The adoption of a CHR(S) treatment shall only be considered where there are demonstrated severe geometric constraints and shall be accompanied by a "departure from standards" approval through Manager Road and Traffic Engineering Branch. A CHR(S) treatment is not suitable for high volume sites, road train routes, areas with steep longitudinal grades or where visibility to the treatment is restricted. Adjustments are to be made to the lateral movement length A to accommodate a turn lane width as per the MRWA Supplement to AGRD Part 3, Sections 4.2.5 and 4.2.6. Grade correction must be applied in accordance with Table 5.3.

8 LEFT-TURN TREATMENTS

8.2 Rural Left-turn Treatments

8.2.3 Rural Auxiliary Left-turn Treatment – Short Turn Lane [AUL(S)] on the Major Road

The adoption of an AUL(S) treatment shall only be considered where there are demonstrated severe geometric constraints and shall be accompanied by a "departure from standards" approval through Manager Road and Traffic Engineering Branch. Like the CHR(S) treatment, an AUL(S) treatment is not suitable for high volume sites, road train routes, areas with steep longitudinal grades or where visibility to the treatment is restricted. Grade correction must be applied in accordance with Table 5.3. The physical taper should be designed in accordance with Section 5.2.1 of this document.

9 U-TURN TREATMENTS

9.1 General

Refer to the Policy and Application for 'U-turn Permitted' Signs at Traffic Signal Controlled Intersections, for Main Roads requirements.

9.2 Rural Roads

Refer to Main Roads Drawing 200731-0071 for details of signs and pavement markings.

9.3 Urban Roads

Refer to Main Roads Drawing 200731-0071 for details of signs and pavement markings.

10 SIGNALISED INTERSECTIONS

10.2 Sight Distance

For information regarding sight distance requirements at intersections refer to Section 3 of this document.

10.3 Signal Operation Considerations

10.3.2 Proximity to Other Intersections

Main Roads preferred practice is that intersection proximity is typically determined on the basis of at least five seconds of travel time between an intersection and the start of auxiliary lanes for the next downstream intersection.

When planning locations for new intersections this separation distance should not be solely referred to. Other issues such as road hierarchy, function and operation also need to be considered.

10.4 Intersection Layouts

10.4.2 Service Road Treatments

In reference Figure 10.3 the following treatments are not preferred practices used by Main Roads:

- In the top left quadrant, the traffic island separating the left turning lane from through lanes is not supported.
- In the top left quadrant, the egress should be separated by a minimum length of 10m of parallel kerb.
- In the bottom right quadrant, the left turn lane consisting of taper only is not supported.
- In the bottom right quadrant, the egress from the service road blending into the taper for the left turning lane should be separated by a minimum length of 10m of parallel kerb.

10.6 Cyclist Facilities

10.6.1 On-road Bicycle Lanes

Bicycle lanes on signalised intersection approaches

Main Roads does not support the use of exclusive right turn lanes for bicycles. Right turn head start facilities may be provided at particular locations however access to these facilities is via bicycle lanes located to the left of the leftmost through lane. Bicycles are not allocated an exclusive space through the intersection. Refer to Main Roads Standard Drawings 200531-0006 and 200531-0007 for further details. Note that right turn head start storage facilities for bicycles are not used where there is more than one through lane for motor vehicles.

Head start and expanded storage areas

Reference Figure 10.9 Example (a):

Main Roads position the stop line for motor vehicles 5m back from the adjacent bicycle stop line (in accordance with Main Roads Standard Drawing 200531-0006).

Reference Figure 10.9 Example (b):

Main Roads position the stop line for all motor vehicle lanes 5m back from the bicycle stop line (in accordance with Main Roads Standard Drawing 200531-0006), not with the through/right motor vehicle lanes further forward than the left turn lane as shown in the example.

Reference Figure 10.9 Example (c):

Main Roads would typically provide a left turn head start storage facility in conjunction with the bicycle through lane.

Main Roads does not support the use of exclusive right turn lanes for bicycles. The right turn head start storage facility would be accessed via the exclusive bicycle lane located to the left of the leftmost through lane. Refer to Main Roads Standard Drawings 200531-0006 and 200531-0007 for further details. Right turn head start storage facilities for bicycles are not used where there are more than one through lane for motor vehicles.

Reference Figure 10.9 Example (d):

Main Roads does not support the use of Hook Turn facilities for bicycles. Refer also to Figure 10.10. The length of the bicycle head start storage facility shall be 5m in accordance with Main Roads Standard Drawings 200531-0006 and 200531-0007. Right turn head start storage facilities for bicycles are not used where there is more than one through lane for motor vehicles.

Left-turn bypass treatment

Main Roads does not support the use of left turn bypass facilities (as shown in Figure 10.11), due to land constraint issues and conflict with services. Proposals to use such facilities shall be treated on a case-by-case basis taking into account the aforementioned issues and interaction with other road users such as pedestrians.

Bypass of T-intersection

Main Roads does not support the use of bypass treatments at intersections. Proposals to use such facilities shall be treated on a case-by-case basis and may result in modification to the treatment shown in Figure 10.12.

APPENDIX A EXTENDED DESIGN DOMAIN (EDD) FOR INTERSECTIONS

Application of EDD will require the explicit approval of Manager Road and Traffic Engineering Branch.

APPENDIX B TRUCK STABILITY AT INTERSECTIONS

Main Roads has no supplementary comments for this section.

APPENDIX C SWEPT PATHS FOR ROAD TRAINS AT HIGH ENTRY ANGLE LEFT

Main Roads has no supplementary comments for this section.