URBIS

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2024/1485

Date: 1 August 2024

Queensland Government

TRANSPORT IMPACT MEMORANDUM

Client	EDQ	**Date**	22 July 2024
Project	Northshore Hamilton – RAL Application	**Project No:**	P0042473
Prepared By:	Lee Flueckiger Alice Shi, RPEQ 22028	**Reviewed By**	Andy Johnston, RPEQ 24764

1. BACKGROUND

Urbis has been engaged by Economic Development Queensland (EDQ), to provide traffic and transport advice across the development of the Northshore Hamilton design stages. ADG Consulting Engineers are undertaking the civil design of the intersections and roads, with Urbis providing policy and peer review.

A report was prepared on the 13th June 2023 that assessed the 20% Design of the Northshore Hamilton masterplan development against the original Transport Master Plan Northshore Hamilton Priority Development Area (Ref: QTT17008), dated 23 September 2021 and referenced by the EDQ Northshore Hamilton PDA Development Scheme.

On 24th June 2024, the Minister for Economic Development Queensland issued a Further Issues Letter requesting additional clarification of items between the 95% Design by ADG Consulting Engineers, the Urbis 20% Design Report, and the Transport Masterplan Northshore Hamilton. The below table lists the transport related items and where the appropriate response is located within this Transport Memorandum.

Table 1-1 Schedule of IR Item Responses

Item	Further Issues	Response / Page
4.a	Submit an updated Traffic Impact Assessment (TIA) for the ROL application that addresses inconsistencies between the submitted Master plan, 20% concept design report and concept drawings. It is noted that most of the cross sections A-R & C1-C2 are either nominated to be 'generally in accordance' or 'differ' from the Transport Masterplan. For the changes in road width and additional lanes, applicant to demonstrate the requirement for the changes, and that no impacts occur on other road-reserve design requirements.	
4.a.i	The following issues are noted:	Response pages;

Item	Further Issues	Response / Page
	▪ Section A – Theodore St, central lanes narrower than masterplan (3.3m vs 3.5m)	Page 7 – Section A
	▪ Section B - Brett Street - general traffic lane widths have been updated to be 3.5m and 3.3m rather than 3.5m and 3.5m	Page 8 – Section B
	▪ Section C – Macarthur Avenue South 4 lane - general traffic lane widths have been updated to be 3.5m and 3.3m rather than 3.5m and 3.5m.	Page 9 – Section C
	▪ Section D – Brett St, all four lanes narrower than masterplan (3.3m vs 3.5m).	Page 8 – Section B
	▪ Section E – Cullen Avenue two additional lanes, (4 vs 2).	Page 9 – Section E
	▪ Section F – Curtin Avenue – have been updated to 4.0m general traffic lanes.	Page 10 – Section F
	▪ Section H/G – MacArthur Avenue South, West of Theordore St, central lanes narrower than masterplan (3.3m vs 3.5m).	Page 9 – Section C
	▪ Section G – Cullen Avenue (Central) – have been updated to 3.5m general traffic lane and 1.5m chevron, and 2 x 3.3m general traffic lanes.	Page 9 – Section E
	▪ Section I – MacArthur Avenue South, West of Theordore St – lanes wider, (5.0m vs 3.5m).	Page 9 – Section C and Table 2-5.
	▪ Section K – Cullen Avenue - two lanes narrower than masterplan (3.3m vs 3.5m).	n/a – Cullen Avenue does not form part of this package.
	▪ Section L – Curtin Avenue (part 1) - two lanes wider than masterplan (4m vs 2.75m).	Page 10 – Section F
	▪ Section L – Curtin Avenue (part 2) - No parking lanes provided despite 2 x 2.5m lanes required by masterplan – Removal/reduction of on street parking to be justified.	Page 11 – Section i
	▪ Section N – Road 1 (part 1)- shared travel lane wider than masterplan (6m vs 5.5m)	Page 10 – Section H
	▪ Section N – Road 1 (part 2) – Only 1 parking lanes provided despite 2 x 2.5m lanes	Page 10 – Section H

Item	Further Issues	Response / Page
	required by masterplan – Removal/reduction of on street parking to be justified.	
	▪ Section Q – Karakul St, Road 5, Road 6 - shared travel lane wider than masterplan (6m vs 5.5m).	Page 13 – Section L
	▪ Section R – Riverfront lanes, Road 2,3,4,7,8,9 - shared travel lane wider than masterplan (6m vs 5.5m).	Page 14 – Section N and Section M
	▪ Section C1 & C2 – Riverfront Lanes (part 1) - shared travel lane wider than masterplan (6m vs 5.5m).	Page 14 – Section N and Section M
	▪ Section C1 & C2 – Riverfront Lanes (part 1) - Only 1 parking lanes provided despite 2 x 2.5m lanes required by masterplan – Removal/reduction of on street parking to be justified.	Page 14 – Section N and Section M .
	▪ Section H, Section L, Section M – textured surface/cycle streets currently being reviewed by Council.	This is a DTMR guidance for cycle street infrastructure.
4.a.ii	Clarify if U-turn facilities have been considered in the intersection models and phasing.	Across the intersection design and geometry, there are no u-turns permitted at any intersection. The road network is structured as such that it is easy for a vehicle to circulate a block without the need for a u-turn.
4.a.iii	Some movement conflicts have been identified in the following intersections which can potentially impose safety risks: ▪ S6 – conflicts in phase A & B, ▪ S7 – conflicts in phase A, ▪ S8 &9 – no phasing allocated to phase F, ▪ S10 – no phasing plan provided, ▪ S11 - conflicts in Phase A & no phasing allocated to phase B, ▪ S12 &13 - no phasing plan provided. An updated SIDRA analysis will be required to incorporate the proposed speed reductions to identify any flow effects on	S6 (Kingsford Smith Dr / Brett St), S8/9 (MacArthur Ave / Finnegan St / Wharf Cl), S12 (MacArthur Ave / Cedar Rd), and S13 (MacArthur Ave / Barcham Rd), are not within the assessment area and have been redacted from this report. Design of these intersections is ongoing. Nevertheless, S12 and S13 are priority controlled with no phasing applicable.

Item	Further Issues	Response / Page
	the roads and signalised intersections performance, as an integrated network.	The latest intersection forms, including S7, and S11 are within Appendix C. Conflicting movements, such as filtered right turns have been removed from S7 (MacArthur Ave North / Brett St). Phasing for S11 (MacArthur Ave / Cycle St) phase B has been amended, however phase A retains the filtered right turns. The right turns are held back at the start of the phase with a red arrow drop off. Furthermore, the volume of turning traffic is low, below 25vph. S10 (MacArthur Avenue / Road 5), is a priority controlled intersection and as such has no phasing plan.
4.a.iv	The Master Plan – section 7.3 identifies modal shift strategies. Clarify if the proposal will include the strategies outlined in 7.1.2 (Performance based parking) and 7.1.3 (Low emissions vehicle parling prioritisation). If so, provide additional details on specific locations for low emissions vehicles and how the performance based parking would work.	This application and reporting only refers to the road design and RAL across the area of assessment, bound by Cullen Ave, Road 1, the Brisbane River, Cedar Road, and Theodore Street. The application of Modal Shift Strategies highlighted within the 2021 Transport Masterplan has is not relevant upon this RAL and road design application. These items are relevant to how the Development Scheme is implemented and is instead more relevant to the future development parcels rather than the road reserve being created.

Item	Further Issues	Response / Page
4.a.v	Master Plan Inconsistencies It is noted that inconsistency exists between the submitted Master Plan document, the 20% design report and the drawings dated 11/06/2024. The applicant is to justify the inconsistencies noted in the submitted Traffic Master Plan and clarify how these inconsistencies are dealt with in the 20% design report for the following noted items: ▪ Typical Section B, Brett St – Design widths not consistent with District Rd figures, 3.2m turn lane proposed, however 3.5m required. ▪ Typical Section E, Curtin Avenue – Road reserve listed as 20.3m but titled 18.5m (20m min). No bicycle lanes provided. ▪ Typical Section F, Road 1 – Inconsistency with neighbourhood road figures. Lane width 3.4m less than required 3.5m and bicycle lane shown as 1.3m wide with 2.0m minimum required. It is not possible to have 2m cycle path and 3.5m wide car lane concurrently without encroaching on other cycle lane. Road reserve noted as 18.0m with 20m minimum. ▪ Typical Section G, Karakul Street, Road 5, Road 6, and Macarthur Avenue north (West) – Appears to not be consistent with local road figures. Lane width 3.4m less than 3.5m required, bicycle lane shown as 1.3m wide with 2.0m minimum required. Not possible to have 2m cycle path and 3.5m wide car lane concurrently without encroaching on other cycle lane. ▪ An additional signalised intersection on Macarthur Avenue has been included in the Traffic Master Plan that was not identified in the Development Scheme. Provide justification the change from the Development Scheme.	Within the section reviews of Item 4.a.i and Section 2 of this report, the design comparison has been updated to reflect the Transport Masterplan and the cross-sections within this application. The level of differentiation is minimal and where minor discrepancies occur, justification is provided in each comment section. The development scheme does not appear to show Finnegan St / Macarthur Avenue as a signalised intersection. However, the Transport Masterplan 2021 does show, model, and assess this intersection as a signalised 4-way intersection.
4.b	Several proposed driveway access points are noted to be in close proximity to signalised intersections. Applicant to demonstrate that this will not cause safety or queuing length issues. Demonstrate the proposed haul road location (including vehicle crossovers) will not compromise the operational safety of MacArthur Ave. Where space is	Driveways within the assessment area are highlighted within Figure 5-1. Driveways presented within the development plans are indicative

Item	Further Issues	Response / Page
	constrained, applicant is to provide details for driveway type, width and relevant standards. Alternatively, only address the above requirements for application critical crossovers. All remaining crossovers will be marked as ‘not approved’.	locations, with the final designs of each driveway to be determined and assessed along side subsequent development applications. Assessment of the indicative driveway locations to the standards outlined within the BCC TAPS are outlined within Table 5 1.
4.d.i	Council require full pedestrian protection from right turn movements for all signalised crossings.	There are no right turns coinciding with pedestrian crossing phases within the signal phasing for any site. For discussion on Phasing see page 3.1. Intersection configurations are enclosed in Appendix B.
4.d.ii	New Roads 3, 4, 8 and Macarthur Ave intersections need to provide cycle off ramp for bikes on new roads heading north to access cycle tracks.	Noted and can be red pen mark ups to the approved drawing set.

2. DESIGN STANDARDS – CROSS SECTIONS

Cross sections refer to the ADG drawing package NSH_CIV_SK_0_0300 Rev 03 dated 17.05.24, included in Appendix A.

Typical road midblock configurations are listed for comparison in the following tables, with the ADG drawing package henceforth referred to as the April 2024 Design. The turn lanes at intersections have not been included as these have been assessed within the intersection design.

The assessment key is as follows:

- ✓ Compliant with the Transport Masterplan 2021
- ○ Generally in accordance with the advice provided by Brisbane City Council, AustRoads, and/or The Department of Transport and Main Roads Guidelines.
- ✗ Differs from the Masterplan and Brisbane City Council Standard Drawings. Road component designed to fit the local environment and in accordance with appropriate design standards.

Table 2-1. Section A – Theodore Street

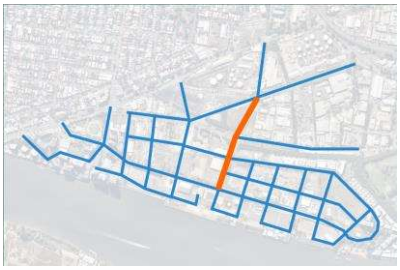
Section B	**Transport Masterplan**	**April 2024 Design**		
Road hierarchy	District Road	District Road	✓	
Traffic Lanes	4 Lanes @ 3.5m	4 Lanes Kerbside Lane 3.5m Central Lane 3.5m	✓	
Parking Lanes	No Parking Lanes	No Parking Lanes	✓	
Comments	Advice provided by BCC supports a 3.3m central lane and is consistent with BCC Standard Drawings BSD-1022 – Major Road Corridor 4 Traffic Lanes. However, the final April 2024 design retains 3.5m as per original masterplan design.			

Table 2-2 Section B – Brett Street

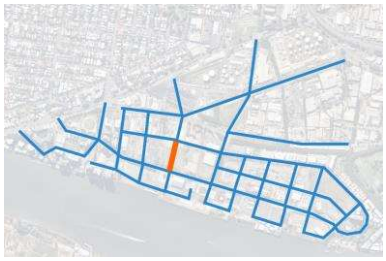
Section F	Transport Masterplan	April 2024 Design		
Road hierarchy	District Road	District Road	✓	
Traffic Lanes	2 Lanes @ 3.5m	3 lanes @ 3.5m NB inner lane @ 3.2m	○	
Parking Lanes	No Parking Lanes	No Parking Lanes	✓	
Comments	Due to minor changes in trip distribution, the optimal intersection form reported by SIDRA analysis was for these channelised lanes to be constructed as full length lanes in lieu of short lanes. Analysis of the Brett Street / MacArthure Ave intersection is provided in Section 4. To ensure that 4-lanes would fit within the road reserve, the northbound inner lane has been designed with a reduced width of 3.2m. While this is lower than the typical lane width specified within the BCC Standard Road Sections, a turning lane can be a minimum 3.0m as per Austroad Guide to Road Design. This design solution has also been through a review with the BCC with no issues flagged. Furthermore, the SIDRA model reports that operations are acceptable.			

Table 2-3 No section provided – Brett Street

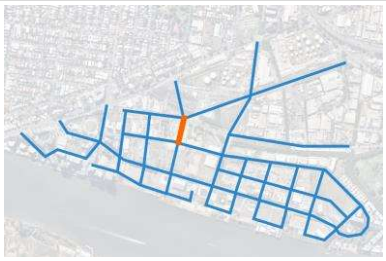
Section E	Transport Masterplan	April 2024 Design		
Road hierarchy	District Road	District Road	✓	
Traffic Lanes	2 Lanes @ 3.5m	2 Lanes @3.5m	✓	
Parking Lanes	No Parking Lanes	No Parking Lanes	✓	
Comments	The IR response from EDQ was inaccurate and stating that this section has 4 lanes rather than 2 lanes in either direction. This road has localised widening to provide turn treatments at the intersections as appropriate to the SIDRA Modelling undertaken to support the Masterplan and provided in the 20% report.			

Table 2-4 Section C MacArthur Avenue South, West of Theodore Street

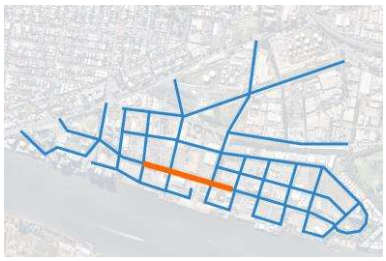
Section H/G	Transport Masterplan	April 2024 Design		
Road hierarchy	Suburban Road	Suburban Road	✓	
Traffic Lanes	4 Lanes @ 3.5m	4 lanes @ 3.5m	✓	
Parking Lanes	2 Lanes @ 2.5m	2 lanes @ 2.5m	✓	
Comments	Advice provided by BCC supports a 3.3m central lane and is consistent with Standard Drawings BSD-1022. However, it should be noted that the final April 2024 design retains 3.5m as per original masterplan design.			

Table 2-5 No Section Provided - MacArthur Avenue South, East of Road 6

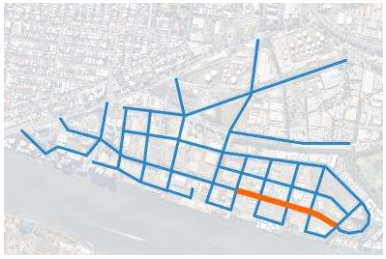
Section I	Transport Masterplan	April 2024 Design		
Road hierarchy	District Road	District Road	✓	
Traffic Lanes	2 Lanes @ 3.5m	2 lanes @ 3.5m	✓	
Parking Lanes	2 Lanes @ 2.5m	2 lanes @ 2.5m	✓	
Comments	n/a			

Table 2-6 Section E Cullen Avenue

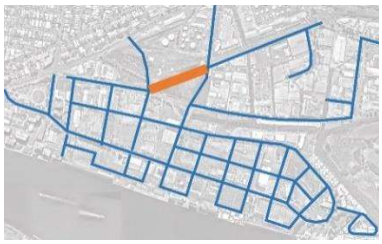
Section K	Transport Masterplan	20% Design Proposal		
Road hierarchy	District Road	District Road	✓	
Traffic Lanes	3 Lanes @ 3.5m	2 lanes @ 3.5m 1 lane @ 3.3m	○	
Parking Lanes	No Parking	No Parking	✓	
Comments	Advice provided by BCC supports a 3.3m lane widths are consistent with advice received from BCC and Standard Drawings BSD-1022. Narrower lanes did not impact significantly upon the intersection performance, see Section 4 SIDRA, and provide greater green space pedestrian and cycling facilities in the verge.			

Table 2-7 Section F Curtin Avenue

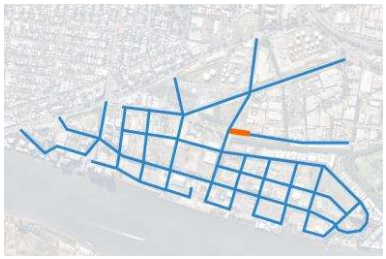
Section L	Transport Masterplan	April 2024 Design		
Road hierarchy	Neighbourhood Road	Neighbourhood Road	✓	
Traffic Lanes	2 Lanes @ 2.75m	2 lanes @ 4.2m	○	
Parking Lanes	2 Parking lanes @ 2.5m	No Parking	✗	
Comments	The area accessed by this road will retain its industrial character int the development scheme. The proposed road design at the intersection has been reconfigured to better match and cater for the industrial nature of Curtin Ave. The current design of Curtin Avenue is industrial with an 8.0m carriageway by the intersection with Theodore Street to accommodate larger service vehicles. The Transport Masterplan recommendation of 2.75m lanes (5.5m two way carriageway) was suitable for a local residential road only, and not appropriate for ongoing industrial operation. Within the adopted section, the median is not proposed for the full length of Curtin Ave. On-street parking may still be retained outside of the immediate area on approach to the Theodore Street intersection and outside the scope of this application.			

Table 2-8 Section G – Karakul Street, Road 5, Road 6

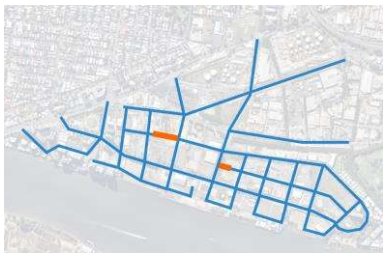
Section Q	Transport Masterplan	April 2024		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	Shared Travel Lane 6.0m	○	
Parking Lanes	2 lanes @ 2.5m	2 lanes @ 2.5m	✓	
Comments	Local road form adopted is consistent with DTMR Cycling Infrastructure Program, Technical Requirements 2017, and TRUM Part 8, for cycle street design. A wider shared travel lane is a safer outcome for the interaction of cyclists and vehicles. The 6.0m lane consists of two 1.3m textured surface areas for visual 'narrowing' of the street for a better a safe system approach. These textured areas are not 'cycle lanes', nor were they ever intended to be cycle lanes in the Transport Masterplan. This was always intended to be a cycle street and the design has been updated to ensure it matched TRUM.			

Table 2-9 Section H - Road 1

Section N	Transport Masterplan	April 2024		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	Shared Travel Lane @ 6.0m	○	
Parking Lanes	2 lanes @ 2.5m	1 Lane @ 2.5m	✗	
Comments	Local road form adopted is consistent with DTMR Cycling Infrastructure Program, Technical Requirements 2017, and TRUM Part 8, for cycle street design. The 6.0m carriageway consists of two 1.3m textured surface areas for visual 'narrowing' of the street for encouragement of lower speeds better a safe system approach. These textured areas are not 'cycle lanes', nor were they ever intended to be cycle lanes in the Transport Masterplan. This was always intended to be a cycle street and the design has been updated to ensure it matched TRUM. The road reserve opportunity in this location was limited and therefore the design had to balance what would be the most appropriate use of space in this area. The second parking lane was also removed to make room for increased verge and planting canopy. This better caters towards a cycle street design and a safe system approach of reducing cars/parking hazards on the road.			

Table 2-10 Section i – Curtin Avenue West

Section O	Transport Masterplan	20% Design Proposal		
Road hierarchy	Neighbourhood Road	Neighbourhood Road	✓	
Traffic Lanes	Not Specified	2 lanes @ 3.0m	✓	
Parking Lanes	No parking	1 lane @ 2.5m	✓	
Comments	Lanes widths were not previously specified, and the proposed addition of on-street parking on one side does not significantly impact the design proposal. This design is consistent with the surrounding Local Roads.			

Table 2-11 Section J MacArthur Avenue North, West of Theodore Street

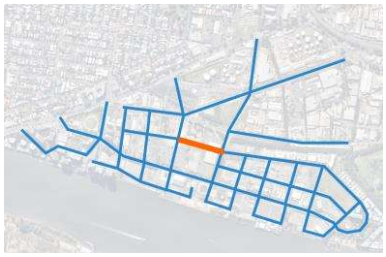
Section J	Transport Masterplan	April 2024 Design		
Road hierarchy	District Road	District Road	✓	
Traffic Lanes	2 Lanes @ 3.5m	2 lanes @ 3.5m	✓	
Parking Lanes	2 Lanes @ 2.5m	No Parking	○	
Comments	On-street parking lanes have been removed due to the introduction of the raised pedestrian crossing midblock between Theodore Street and Brett Street. Consultation with BCC and other determined that on street parking in the vicinity of the school would result in safety and operational issues at drop off an pick up times. Removing on-street parking will ensure clear pedestrian sightlines in what will likely be a high pedestrian area based on the projected adjacent land uses (school etc).			

Table 2-12 Section J – Road 4

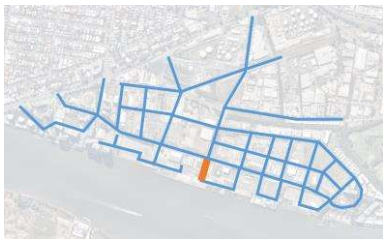
Section J	Transport Masterplan	April 2024 Design		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	5.0m Lane and 3.5m Lane	○	
Parking Lanes	2 lanes @ 2.5m	No Parking	○	
Comments	This section is new and was not highlighted individually within the transport masterplan. Road 4 leads into a riverfront lane that is a cycle street design, the lane widths shown in Section J depict the required characteristics for road 4 to tie into the intersection with MacArthur Avenue at one end and the Riverfront Lane at the other. No parking is proposed due to the spatial constraints of the road reserve and nor is it appropriate on approach to the larger intersection.			

Table 2-13 Section K – Road 3

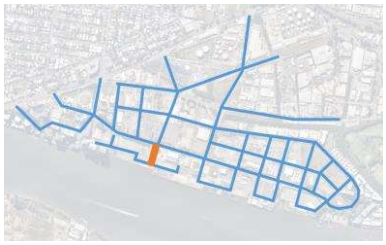
Section J	Transport Masterplan	April 2024 Design		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	3.7m Lane, 3.5m Lane, and 3.0m turn lane	○	
Parking Lanes	2 lanes @ 2.5m	No Parking	○	
Comments	This section is new and was not highlighted individually within the transport masterplan. Road 4 leads into a riverfront lane that is a cycle street design, the lane widths shown in Section J depict the required characteristics for road 4 to tie into the intersection with MacArthur Avenue at one end and the Riverfront Lane at the other. No parking is proposed due to the spatial constraints of the road reserve and nor is it appropriate on approach to the larger intersection. A turning lane can be a minimum 3.0m as per Austroad Guide to Road Design. This design solution has also been through a review with the BCC with no issues flagged.			

Table 2-14 Section L – Road 5, 6, Macarthur Ave North East, Karakul St

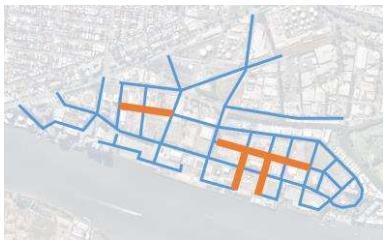
Section R	Transport Masterplan	April 2024		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	Shared Travel Lane 6.0m	○	
Parking Lanes	2 lanes @ 2.5m	2 lanes @ 2.5m	✓	
Comments	Local road form adopted is consistent with DTMR Cycling Infrastructure Program, Technical Requirements 2017, and TRUM Part 8, for cycle street design. A wider shared travel lane is a safer outcome for the interaction of cyclists and vehicles. The 6.0m lane consists of two 1.3m textured surface areas for visual 'narrowing' of the street for a better a safe system approach. These textured areas are not 'cycle lanes', nor were they ever intended to be cycle lanes in the Transport Masterplan. This was always intended to be a cycle street and the design has been updated to ensure it matched TRUM.			

Table 2-15 Section M – Road 2, 3, 4, 7, 8, 9

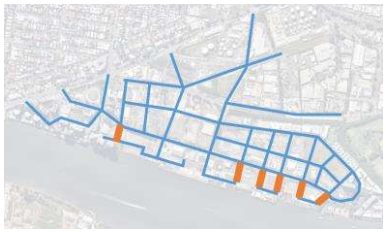
Section R	**Transport Masterplan**	**April 2024**		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	Shared Travel Lane 6.0m	○	
Parking Lanes	2 lanes @ 2.5m	2 lanes @ 2.5m	✓	
Comments	Local road form adopted is consistent with DTMR Cycling Infrastructure Program, Technical Requirements 2017, and TRUM Part 8, for cycle street design. A wider shared travel lane is a safer outcome for the interaction of cyclists and vehicles. The 6.0m lane consists of two 1.3m textured surface areas for visual 'narrowing' of the street for a better a safe system approach. These textured areas are not 'cycle lanes', nor were they ever intended to be cycle lanes in the Transport Masterplan. This was always intended to be a cycle street and the design has been updated to ensure it matched TRUM.			

Table 2-16 Section N – Riverfront Lanes

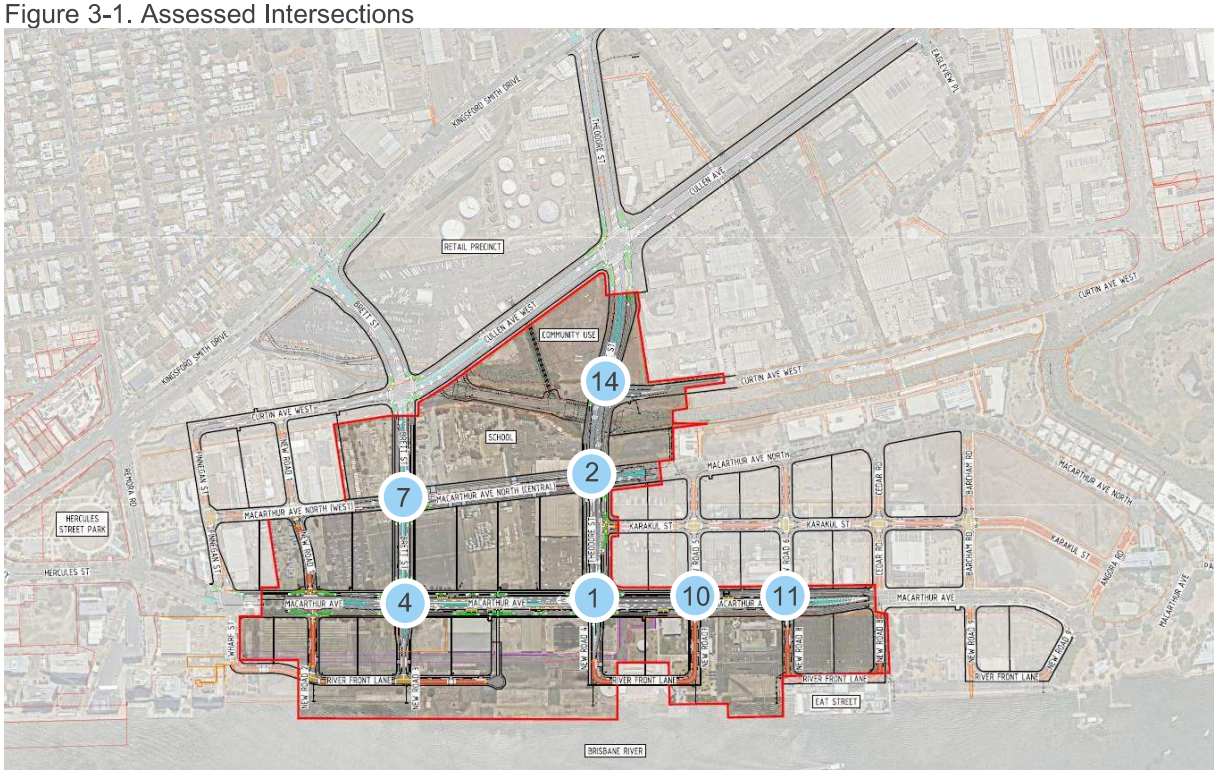
Section C1 & C2	**Transport Masterplan**	**April 2024**		
Road hierarchy	Local Road / Cycle Street	Local Road / Cycle Street	✓	
Traffic Lanes	Shared Travel Lane 5.5m	Shared Travel Lane 6.0m	○	
Parking Lanes	2 lanes @ 2.5m	1 lane @ 2.5m	✗	
Comments	Local road form adopted is consistent with DTMR Cycling Infrastructure Program, Technical Requirements 2017, and TRUM Part 8, for cycle street design The second parking lane was also removed to make room for increased verge and planting canopy. This better caters towards a cycle street design and a safe system approach of reducing cars/parking hazards on the road. Some of the space regained by a single parking lane is utilised for the wider shared travel lane. The wider shared travel lane is a safer outcome for the interaction of cyclists and vehicles. The 6.0m lane consists of two 1.3m textured surface areas for visual 'narrowing' of the street for encouragement of lower speeds better a safe system approach. The rationalsiation of parking in this area also improves mode share opportuntites by reducing car use.			

3. INTERSECTION DESIGN

The development does not propose any significant changes to the control type of intersections over the Transport Masterplan with one exception, Theodore Street / Curtin Avenue West. This intersection was subject to a road safety review, enclosed in Appendix C, which recommended that the intersection is upgraded to signal control to better manage the conflicts with right turning vehicles out of Curtin Avenue.

Intersections within the assessment area are highlighted in Figure 3-1 below.

Figure 3-1. Assessed Intersections

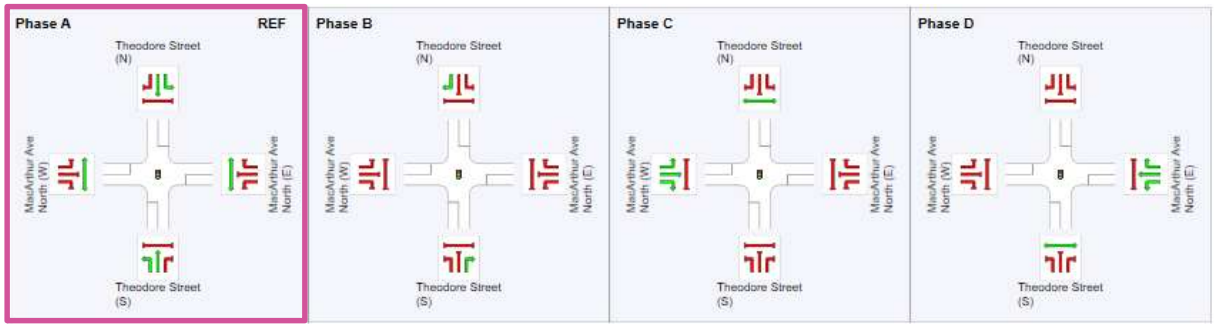


Across the intersection design and geometry, there are no u-turns permitted at any intersection. The road network is structured as such that it is easy for a vehicle to circulate a block without the need for a u-turn.

3.1. SIGNAL PHASING

Signal phasing for all signalised intersections is inclusive of pedestrian protection. This includes all areas where vehicles are turning left against a pedestrian crossing within the same phase, such as at Theodore Street / MacArthur Avenue North within Phase A of the below sequence.

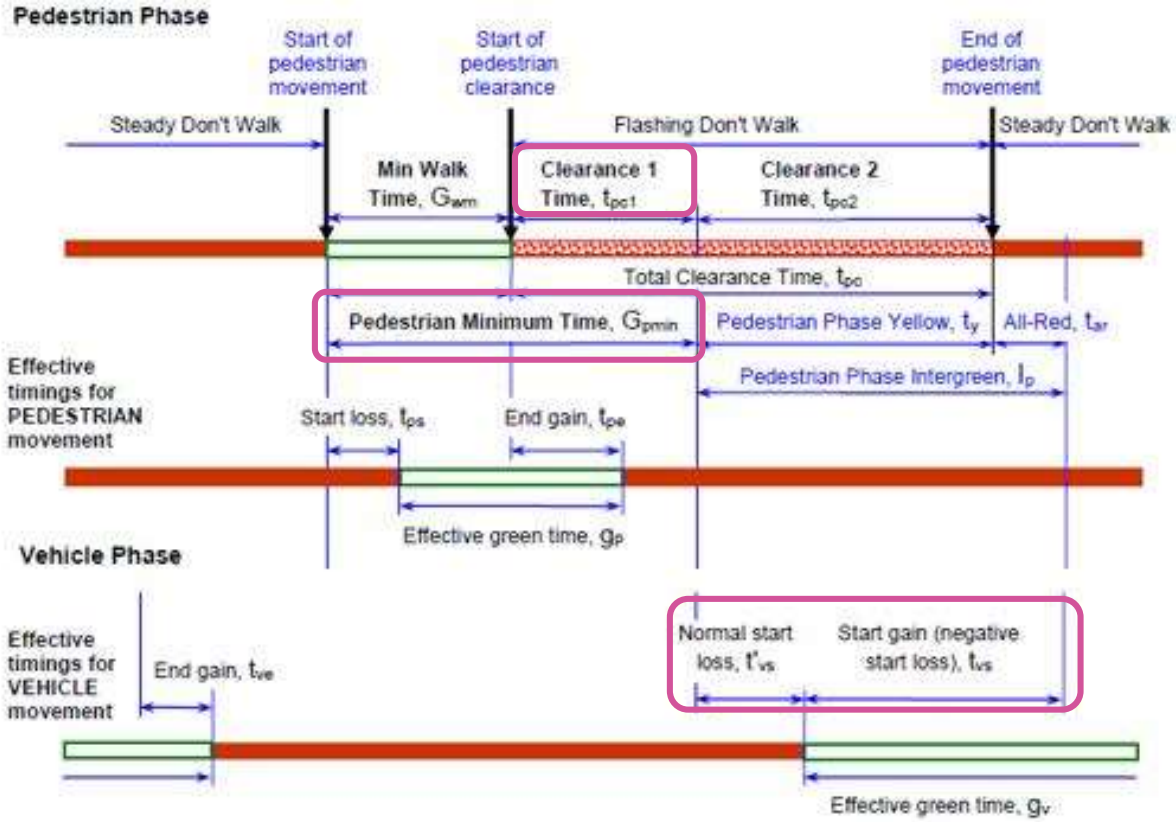
Figure 3-2. Theodore Street / MacArthur Avenue North SIDRA Phasing Diagram



To ensure that the pedestrian crossing is protected (red arrow for vehicles while pedestrians cross) either the Pedestrian Minimum Time or Clearance 1 Time is manually input. Manually setting the

Clearance 1 time to the length required to walk the crossing distance ensures that the last ped to start walking on the green signal (Min Walk Time) is provided sufficient time to make the entire crossing before a green arrow is shown. This is demonstrated in Figure 5.7.11 of the SIDRA User Guide and extracted in Figure 3- Pedestrian Timings3-3 below.

Figure 3- Pedestrian Timings3-3



Source: SIDRA

The addition of these measures to the signal phases has a minor impact to the intersection performance. This is explored further within the following section 4 SIDRA Results.

Within all intersection and phasing designs, there are no instances of a Right Turn and a conflicting Pedestrian crossing occurring within the same phase. Enclosed in Appendix B is a summary of all intersection configurations and SIDRA Phasing within the study area.

All intersection configurations within the study area have been updated to match the associated Civil cross-sections and required lane widths. These are summarised in Appendix B, including modifications to any signal phasing through the developed design.

4. SIDRA Results

The primary differences highlighted between the 2021 Transport Masterplan and the developed design for the study area relate to:

- Minor changes in lane width, identified through the cross-section reviews of Section 2 and, Appendix B intersection forms.
- Application of lower speed limits throughout the site, for 50km/h to all roads other than Mixed Use & Cycle Streets which are 30km/h. This was undertaken in consultation with BCC, where it was agreed that a reduced speed was appropriate given its a built up urban area and the resulting safety benefits for pedestrians and cyclists, which are likely to be prevalent in the area.

The difference in speed limits between the 2021 Transport Masterplan and the applied speed limits are shown in Table 4-1.

Table 4-1 Speed Limit Comparison

Design Criteria	Approved Transport Master Plan	Applied Alternative
Suburban Road	60-70km/h	50km/h
District Road	60km/h	
Neighbourhood Road / Local Road	50km/h	
Mixed Use / Cycle Street	30km/h	30km/h

- Progressive amendments to intersection turning lane lengths for spatial constraints and vehicle capacity. The network of vehicle flows/movements was informed by mesoscopic (Saturn) modelling for the 2031 partial development yield.

To demonstrate the impacts of these successive changes between the 2021 Transport Masterplan, the progressive lane width / speed limit investigations, and the inclusion of pedestrian protection are tabulated below for 2 key sites within the network, being the Theodore St / MacArthur Ave North intersection and the MacArthur Ave / Brett St intersection.

Table 4-2 Intersection Degree of Saturation Comparison

Intersection	Peak	2021 Models	20% Design	20% Design with			April 2024 Design
				Changed Lane Width[1]	Changed Speed Limit[2]	Ped Protection[3]	
Theodore St / MacArthur Ave North	AM	0.74	0.529	0.527	0.529	0.538	0.538
	PM	0.47	0.529	0.538	0.529	0.532	0.613
MacArthur Ave / Brett St	AM	0.23	0.348	0.353	0.348	0.336	0.336
	PM	0.26	0.336	0.341	0.336	0.325	0.341

Note: The April 2024 scenario is inclusive of all design changes within the progressive SIDRA modelling. [1] Comparing 3.3m lanes vs 3.5m lanes. [2] Comparing 60km/hr approach / exit speeds to 50km/hr approach / exit speeds. [3] Comparing the pedestrian protection (outlined in Section 3.1) with

standard pedestrian timing parameters. [4] Comparing the difference between the 2021 models and all variables combined.

The key difference between the prior modelling (2021 model) and the results demonstrated within the current assessment is the inclusion of pedestrian protection measures where vehicles are turning left across a crossing. The effect of this measure is apparent when comparing the Speed Limit and Lane Width scenarios to the Ped Protection results, where the only change that has had a notable effect is the pedestrian protection. Neither the lane width nor speed limits made a substantial difference to the operation of the intersections.

Variation between the 2021 Transport Masterplan and the all inclusive Pedestrian Protection results occur largely due to the progressive geometric changes of the design development. As highlighted earlier, these geometric changes have been informed by both the Saturn modelling, the spatial requirements of vehicle queue lengths, and cadastral restrictions. A summary of the applied changes to the intersection forms and phasing is enclosed in Appendix B, the SIDRA outputs for the results of Table 4-2 are enclosed in Appendix D.

5. DRIVEWAYS

Driveways within the assessment area are highlighted within Figure 5-1 below. These driveways are identified as to maintain existing access to these properties in the most appropriate location. Further assessment would be required at the DA for each parcel to determine access for future development. Assessment of the indicative driveway locations to the standards outlined within the BCC TAPS are outlined within.

All driveway locations and forms are indicative and intended to highlight the best suited locations for each lot for coordinating road and verge design. Ultimately the individual crossover designs will be determined as the lot development applications are prepared and submitted for approval.

Figure 5-1. Driveway locations

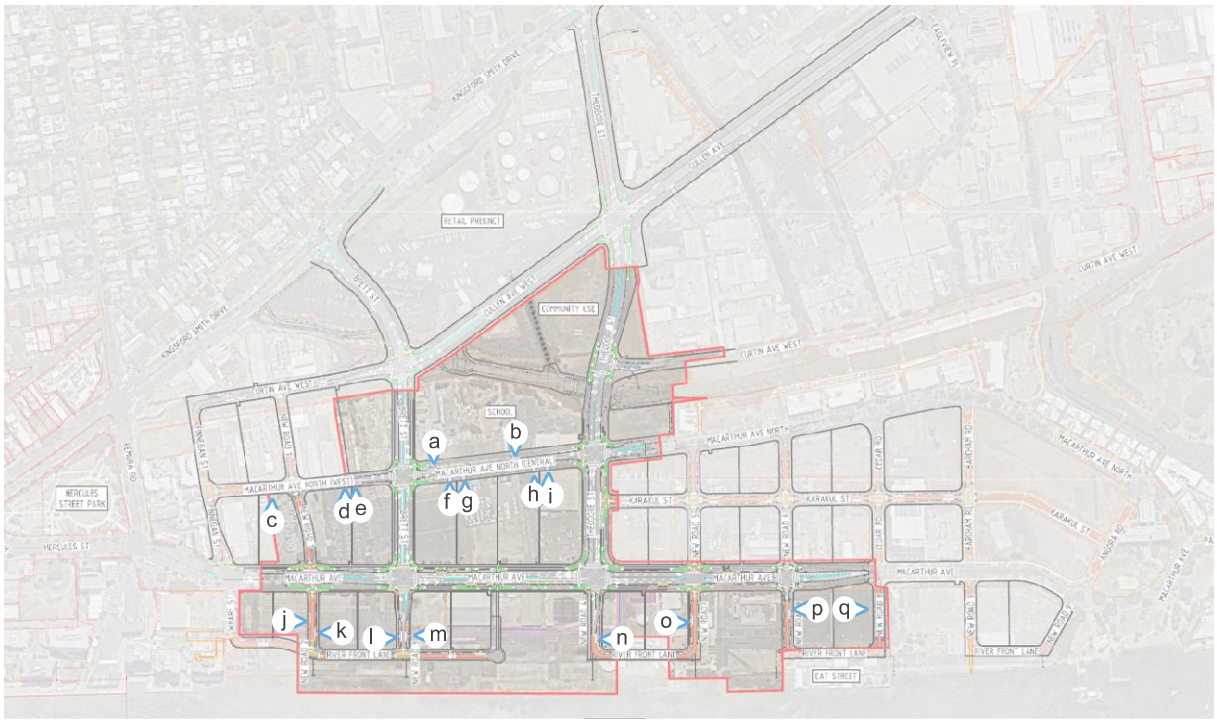


Table 5-1. Driveway Assessment – BCC TAPS Requirements

	Intersection Proximity	**Sight Distance**	**Movements**	**Comments**
A – MacArthur North	20.0m from a Major intersection – Departure side	>100m straight approach, other approaches signal controlled	Left In – Left Out Median Controlled	Suitable location and form
B – MacArthur North	100m to a Major Intersection	>100m East >150m West	All Movements	Location is indicatively shown across the start of a short turn lane. This is not expected to compromise the efficiency or safety of the access.
C – MacArthur North (West)	30m to a minor intersection	>100m East on straight approach, other movements slowed on approach due to turning through the intersection	All Movements	Suitable location and form
D – MacArthur North (West)	60m to a major intersection 2.0m between driveways	>100m straight approach, other approaches signal controlled	All Movements	Driveway separation ensures 2.0m between the splays as indicated in BCC TAPS, at the property boundary driveway separation is greater than 9m. This is considered to be an acceptable outcome that is unlikely to compromise the safety or operation of the driveways.
E– MacArthur North (West)	50m to a major intersection 2.0m between driveways	>100m straight approach, other approaches signal controlled	All Movements	On road line marking requirements to support all movements are to be determined at the time of development application. Driveway separation ensures 2.0m between the splays as indicated in BCC TAPS, at the property boundary driveway separation is greater than 9m. This is considered to be an acceptable outcome that is unlikely to compromise the safety or operation of the driveways.
F – MacArthur North (Central)	45m to a major intersection	>100m straight approach, other	All Movements	On road line marking requirements to support all movements are to be

	Intersection Proximity	Sight Distance	Movements	Comments
	5.0m between driveways	approaches signal controlled		determined at the time of development application.
G – MacArthur North (Central)	55m to a major intersection 5.0m between driveways	>100m straight approach, other approaches signal controlled	All Movements	Suitable location and form
H – MacArthur North (Central)	55m to a major intersection 6.0m between driveways	>100m straight approach, other approaches signal controlled	All Movements	Suitable location and form
I – MacArthur North (Central)	45m to a major intersection 6.0m between driveways	>100m straight approach, other approaches signal controlled	All Movements	Suitable location and form
J – New Road 2	40.0m from a major intersection. 40.0m from a minor intersection	40m sight distance for a 30km/h speed limit (cycle street). Also bound by intersections which result in slower vehicle approaches around a bend on a raised platform.	All Movements	Suitable location and form
K – New Road 2	70.0m from a major intersection. 20.0m from a minor intersection	20m sight distance on the southern approach (cycle street), however the intersection results in slower vehicle approaches around a bend on a raised platform.	All Movements	Suitable location and form
L – New Road 3	70.0m from a major intersection. 20.0m from a minor intersection	20m sight distance on the southern approach, however the intersection results in slower vehicle approaches around a bend on a raised platform on a raised platform.	All Movements	Suitable location and form
M – New Road 3	70.0m from a major intersection. 20.0m from a minor intersection	20m sight distance on the southern approach, however the intersection results in slower vehicle approaches around a bend on a raised platform.	All Movements	Suitable location and form

	Intersection Proximity	Sight Distance	Movements	Comments
N – New Road 4	70.0m from a major intersection.	20m sight distance on the southern approach (cycle street), however the curvature of the road results in slower vehicle approaches around a bend.	All Movements	Suitable location and form
O – New Road 7	40.0m from a major intersection.	60m sight distance for a 30km/h speed limit (cycle street)	All Movements	Suitable location and form
P – New Road 8	40.0m from a major intersection.	40m sight distance for a 30km/h speed limit (cycle street). The northern intersection results in slower vehicle approaches around a bend.	All Movements	Suitable location and form
Q – New Road 8	40.0m from a major intersection.	40m sight distance for a 30km/h speed limit (cycle street). The northern intersection results in slower vehicle approaches around a bend.	All Movements	Suitable location and form

6. CONCLUSION

There are no significantly notable changes that impact the design intent for the development area. The design within this April 2024 package has proposed:

- Reduced speed limits to support an urban environment with a high pedestrian and cyclist population. This was determined through negotiations with Brisbane City Council.
- Road cross-sections generally consistent with the Transport Master Plan. There have been minor design changes required to support the further iterations of the transport modelling, geometric and cadastral constraints as well as to maximise tree planting. However, none of these amendments has altered the road network connections. SIDRA modelling has been undertaken to ensure all modifications are within assessed limits.
- As per the road cross sections, there were minor variations to intersection forms to better fit the design intent of the development area and optimise traffic performance in the assessed 2031 scenarios. This includes the signalisation of Curtin Avenue West following a road safety assessment.

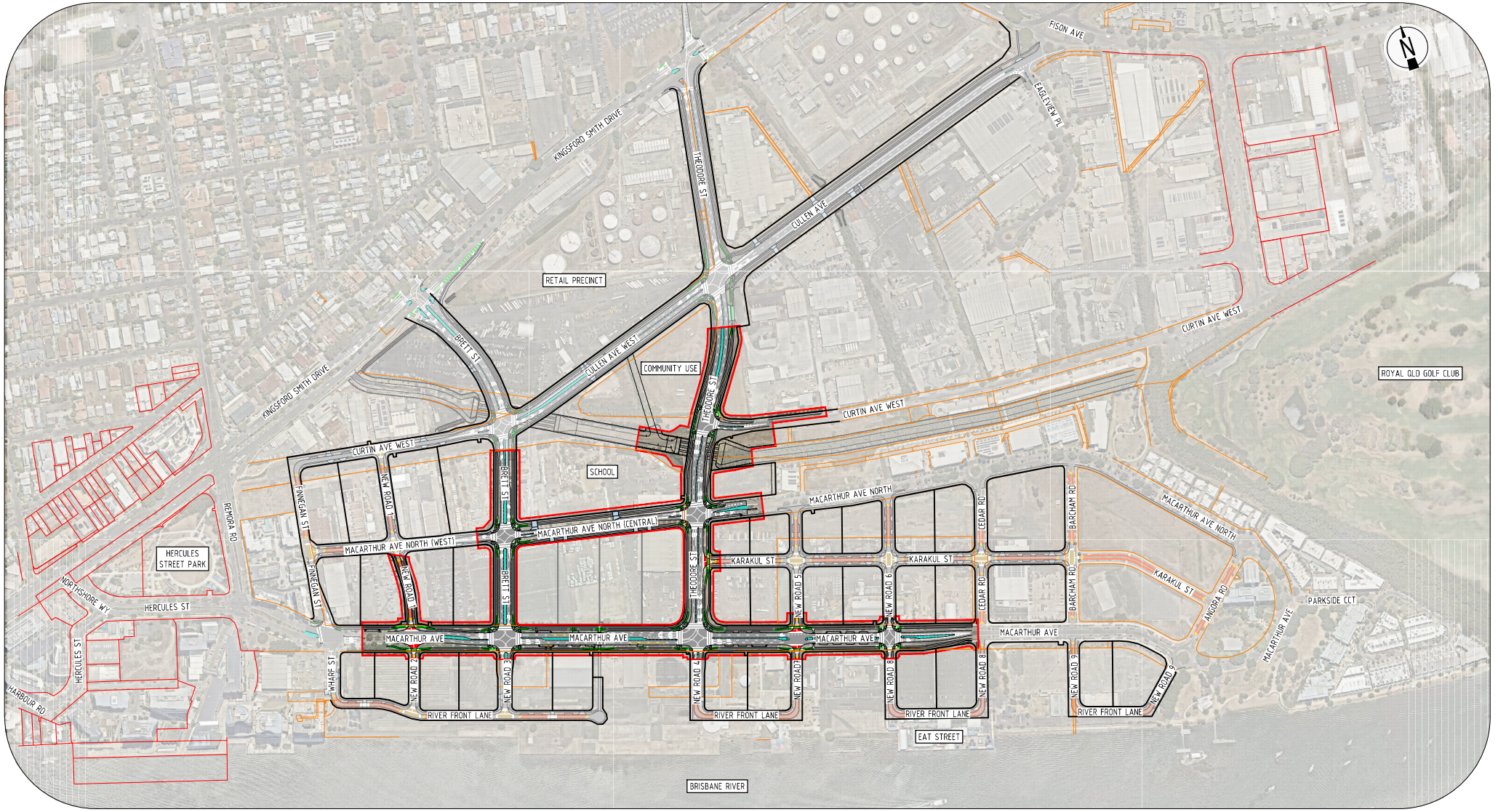
The design proposal is not likely to result in any significant worsening of the local road network and still meets the design intent and requirements specified by the Transport Masterplan for the Hamilton PDA.

APPENDIX A – DEVELOPMENT PLANS

NORTHSHORE HAMILTON

MAJOR ROADS PACKAGE

RECONFIGURATION OF LOT



LOCALITY PLAN

NOT TO SCALE

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND	Discipline: CIVIL		Status: APPROVAL
Project Name: NORTHSHORE HAMILTON MAJOR ROADS PACKAGE CONCEPT ROAD DESIGN HAMILTON, QLD 4007	Designed By: CO	Checked By: WS	Approved By: DS
	Project No.: 26575	Drawn By: AB	Scale at A1: N.T.S

Title: RECONFIGURATION OF LOT
COVER SHEET

Drawing No.: NSH_CIV_SK_0_0300
Revision: 02

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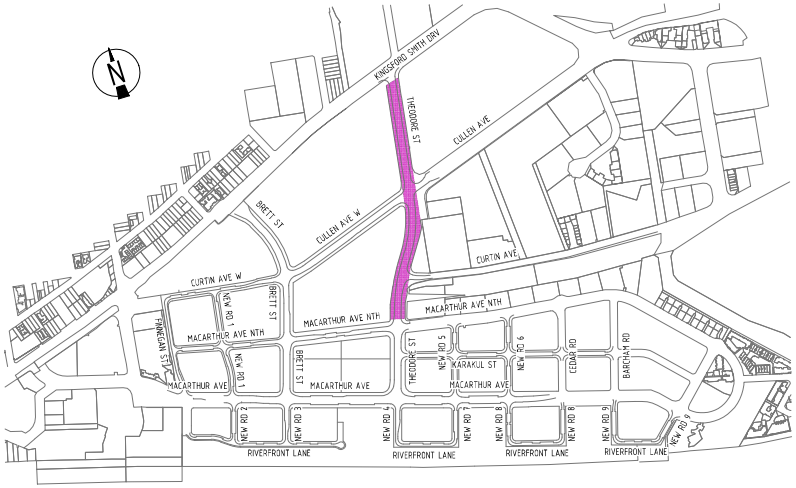

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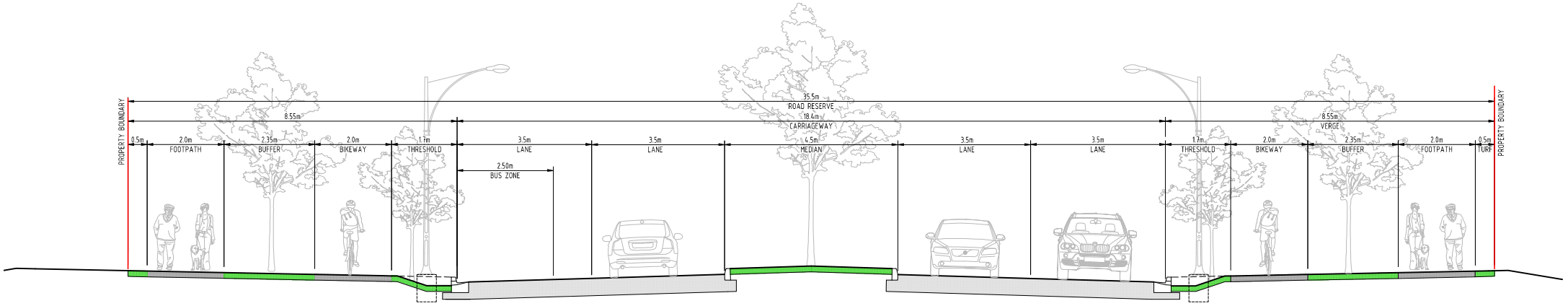

TYPICAL SECTION A - THEODORE STREET
35.5m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

T:1300 657 402 E: info@adgce.com W: www.adgce.com
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Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
THEODORE STREET

Drawing No.: NSH_CIV_SK_0_0331
Revision: 02

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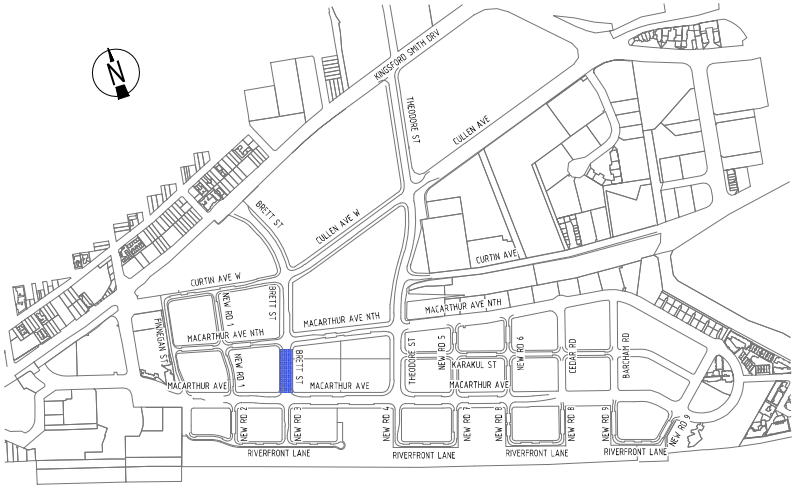

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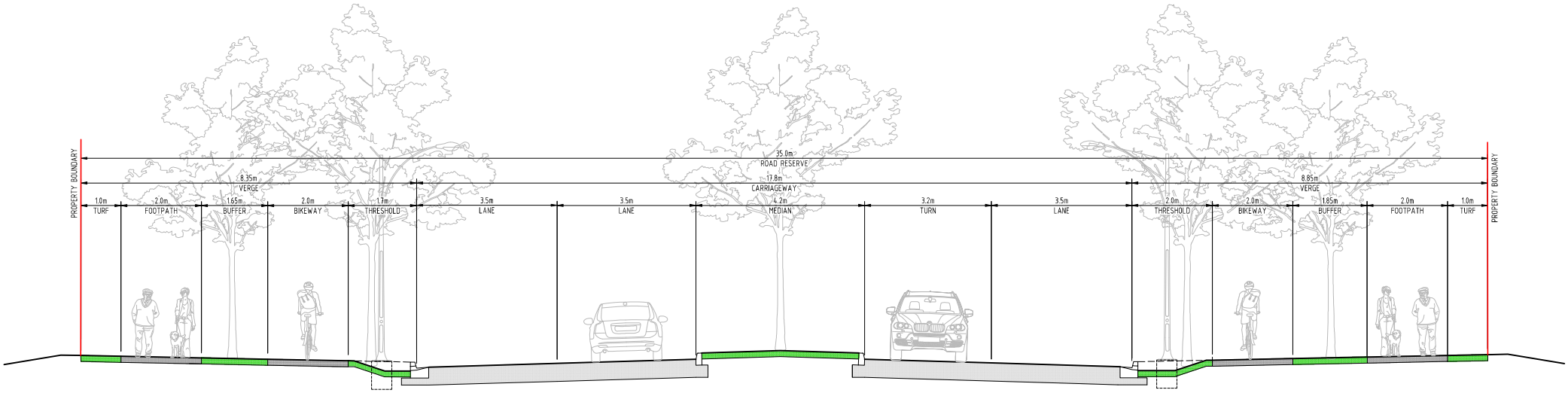

TYPICAL SECTION B - BRETT STREET
35.0m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

Discipline	Status
CIVIL	APPROVAL

Designed By	Checked By	Approved By
CO	WS	DS

Project No.	Drawn By	Scale at A1
26575	AB	1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
BRETT STREET

Drawing No.: NSH_CIV_SK_0_0332
Revision: 02

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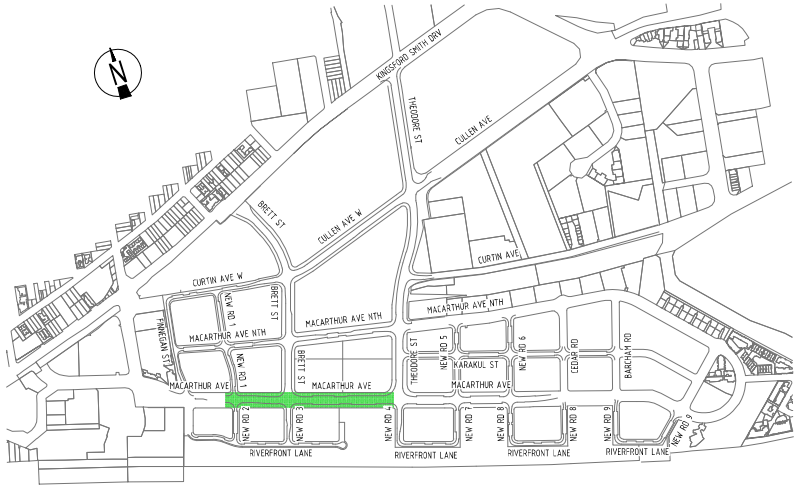

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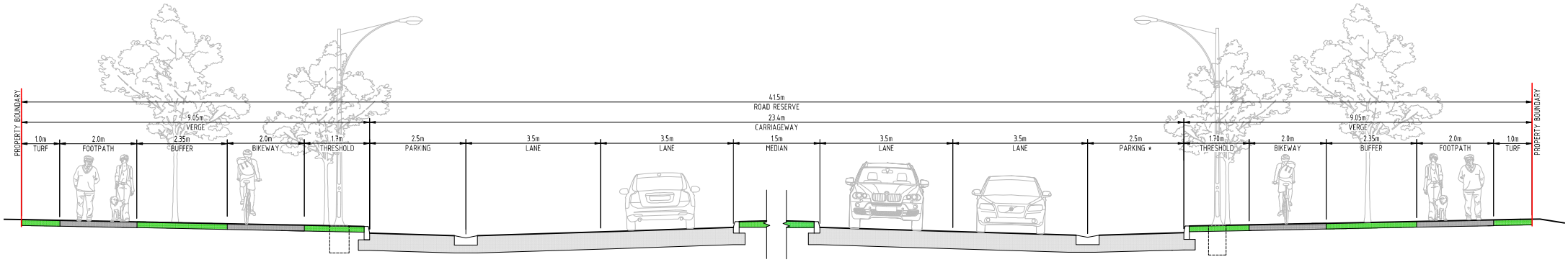

TYPICAL SECTION C - MACARTHUR AVENUE 4-LANE
41.5m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Discipline: CIVIL
Status: APPROVAL
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
MACARTHUR AVENUE

Drawing No.: NSH_CIV_SK_0_0333
Revision: 02

PLOT DATE: 2/8/2024 12:53 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

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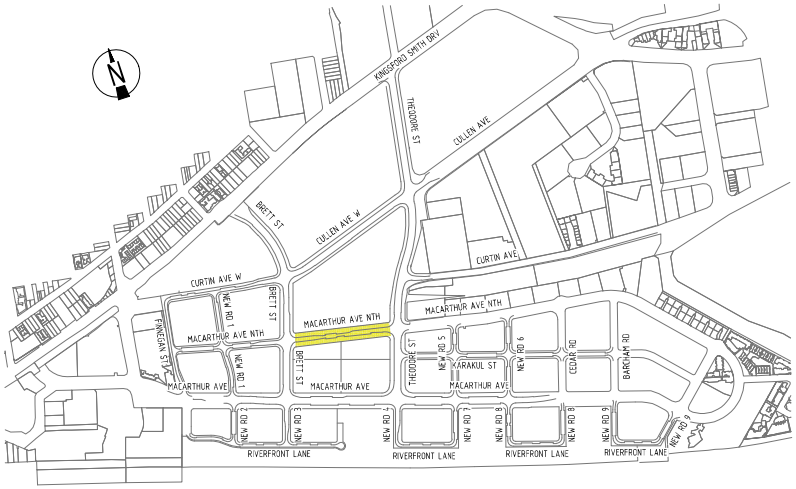

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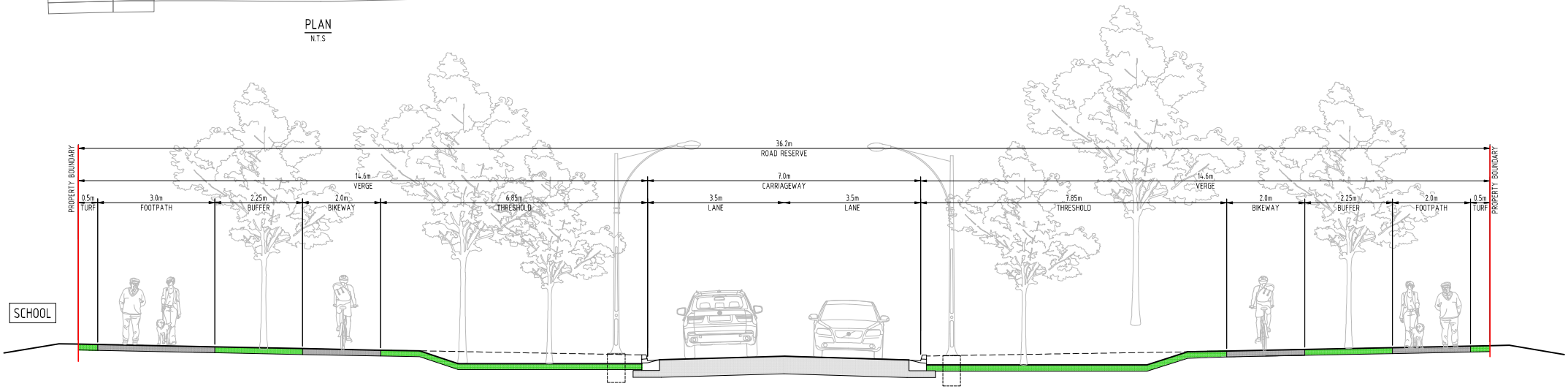

TYPICAL SECTION J - MACARTHUR AVENUE NORTH *(CENTRAL)*
36.2m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

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AT ORIGINAL SIZE (A1)

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Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON MAJOR ROADS PACKAGE CONCEPT ROAD DESIGN HAMILTON, QLD 4007
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
MACARTHUR AVENUE NORTH

Drawing No.: NSH_CIV_SK_0_0334
Revision: 02

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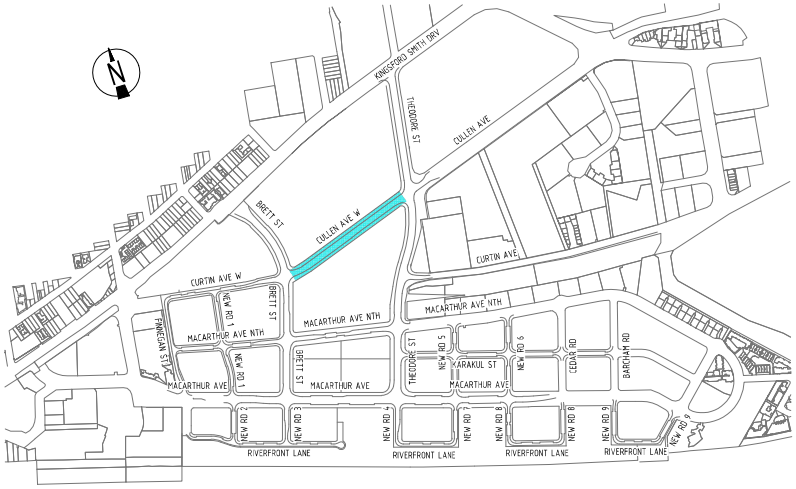

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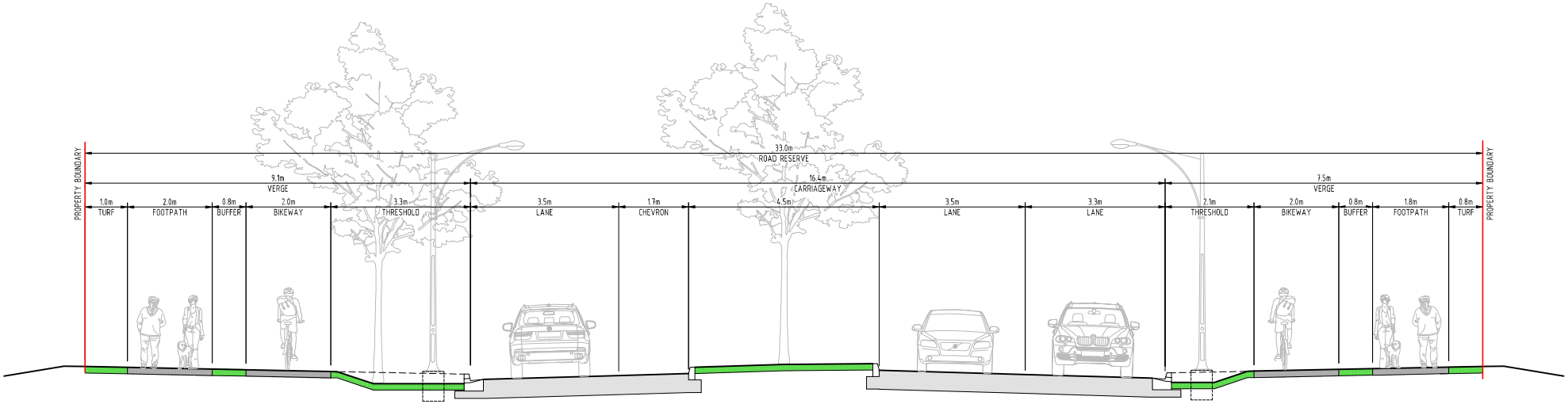

TYPICAL SECTION E - CULLEN AVENUE *(CENTRAL)*
33.0m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
CULLEN AVENUE CENTRAL

Drawing No.: NSH_CIV_SK_0_0335
Revision: 02

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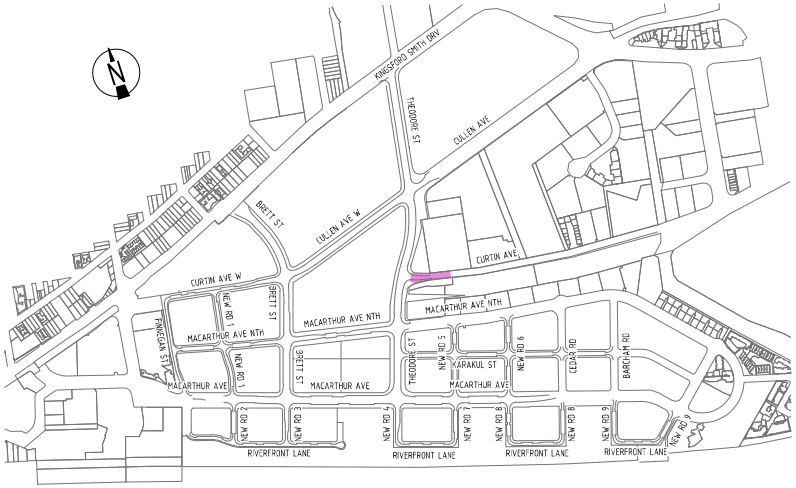
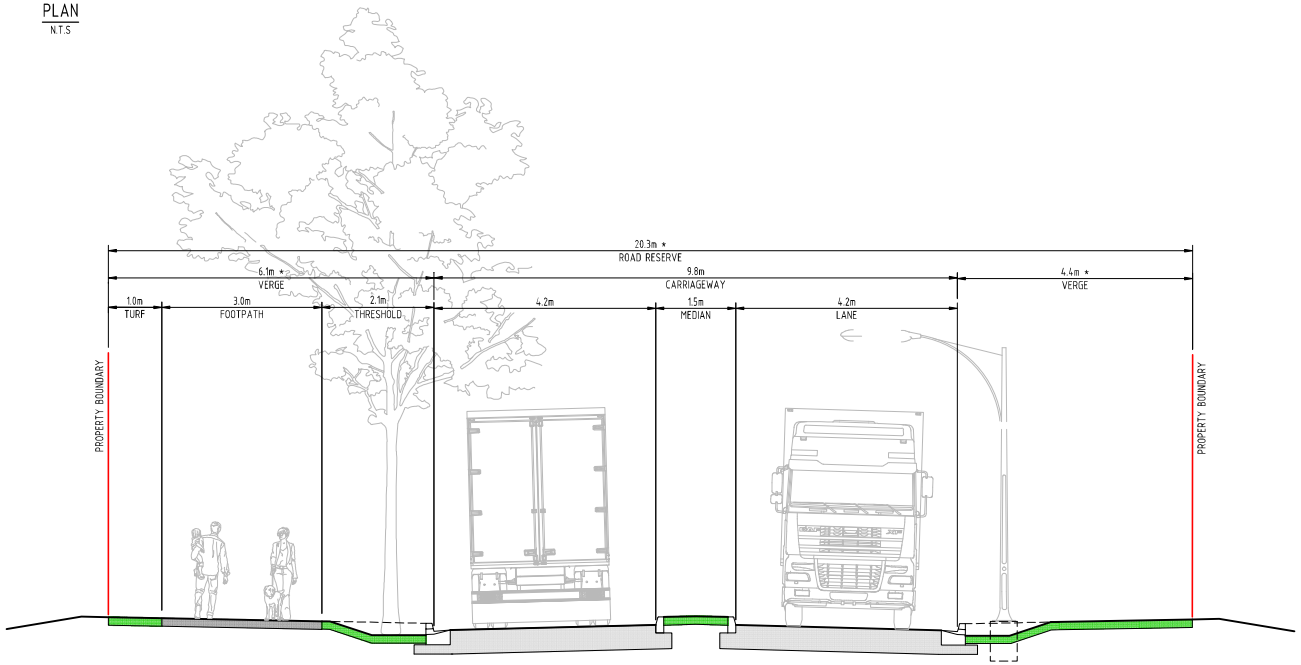


PLAN
N.T.S



TYPICAL SECTION F - CURTIN AVENUE
18.5m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON MAJOR ROADS PACKAGE CONCEPT ROAD DESIGN HAMILTON, QLD 4007
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
CULLEN AVENUE

Drawing No.: NSH_CIV_SK_0_0336
Revision: 02

PLOT DATE: 2/8/2024 12:54 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

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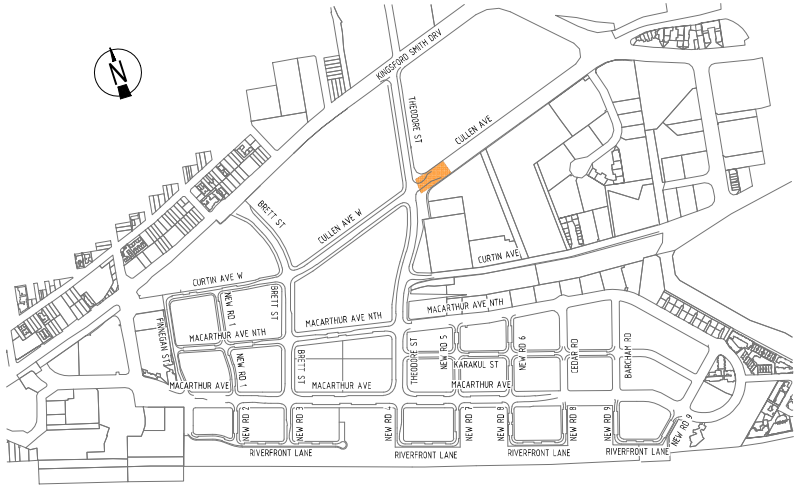
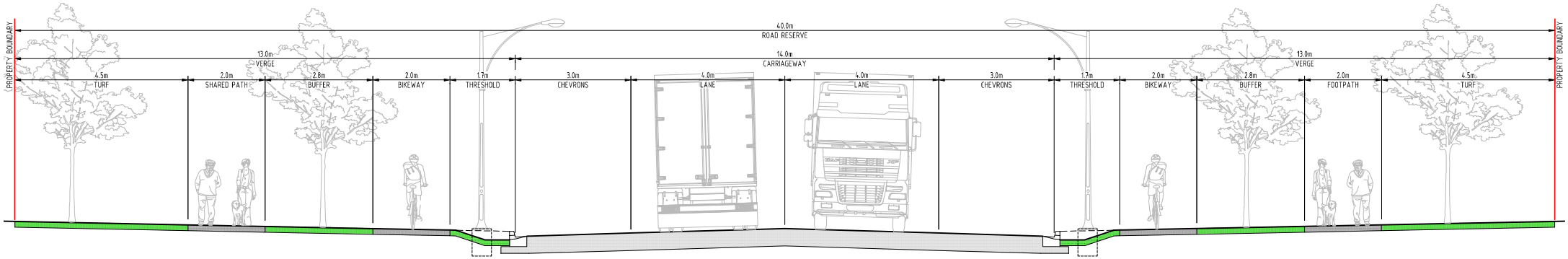


PLAN
N.T.S



TYPICAL SECTION G - CULLEN AVENUE *(EAST)*
40.0m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

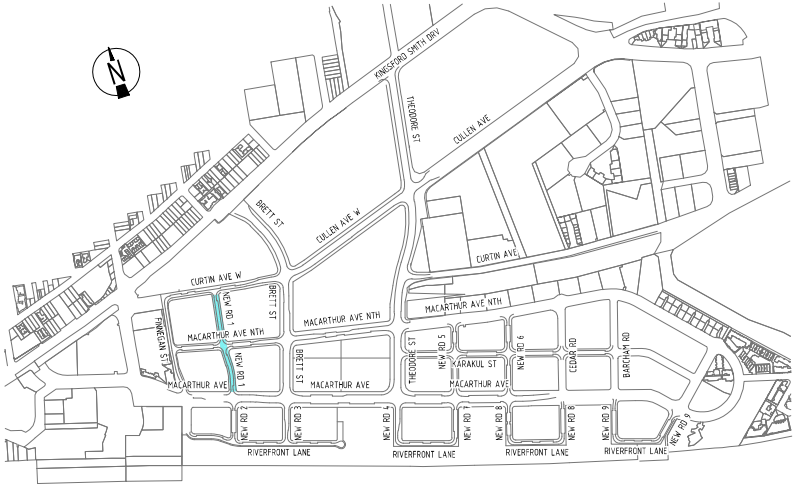
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
CULLEN AVENUE EAST

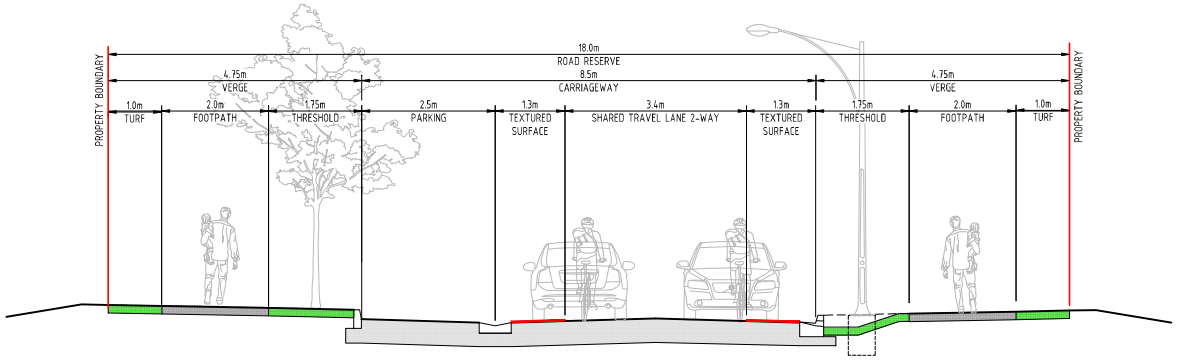
Drawing No.: NSH_CIV_SK_0_0337
Revision: 02

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

PLOT DATE: 2/8/2024 12:54 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG



PLAN
N.T.S



TYPICAL SECTION H - ROAD 1
18.0m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

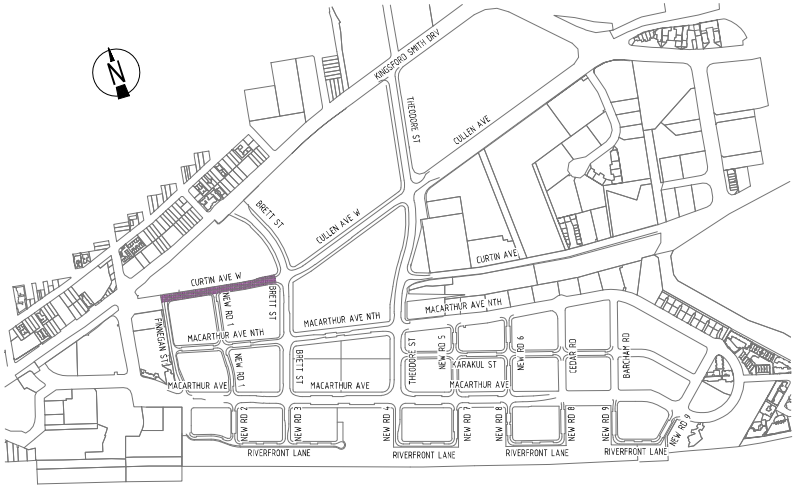
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
ROAD 1

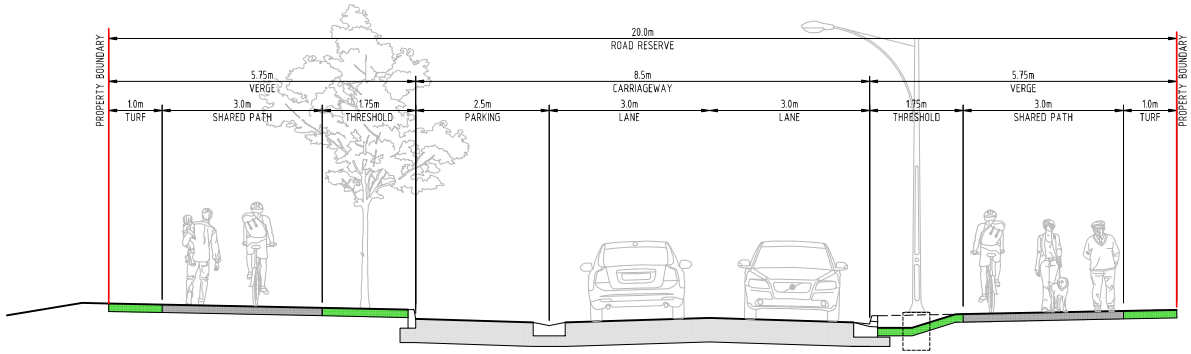
Drawing No.: NSH_CIV_SK_0_0338
Revision: 02

PLOT DATE: 2/8/2024 12:54 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm



PLAN
N.T.S



TYPICAL SECTION I - CURTIN AVE WEST (FINNEGAN ST TO BRETT ST)
20.0m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

ADG
T:1300 657 402 E: info@adgce.com W: www.adgce.com
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Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

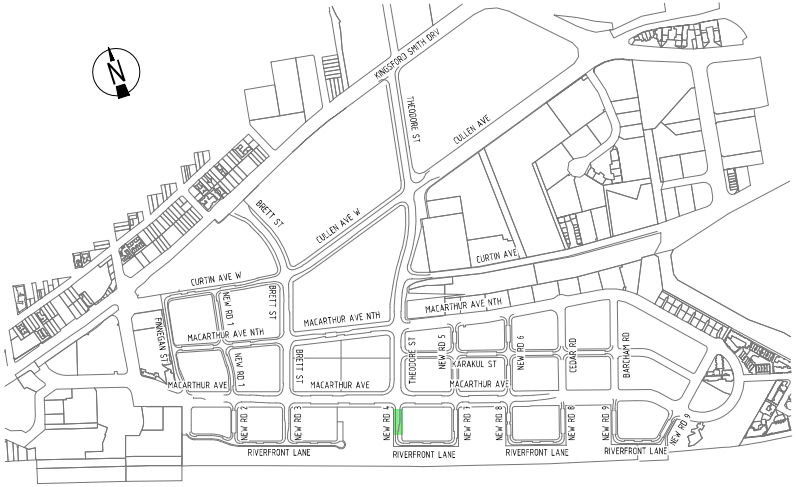
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
CURTIN AVENUE WEST

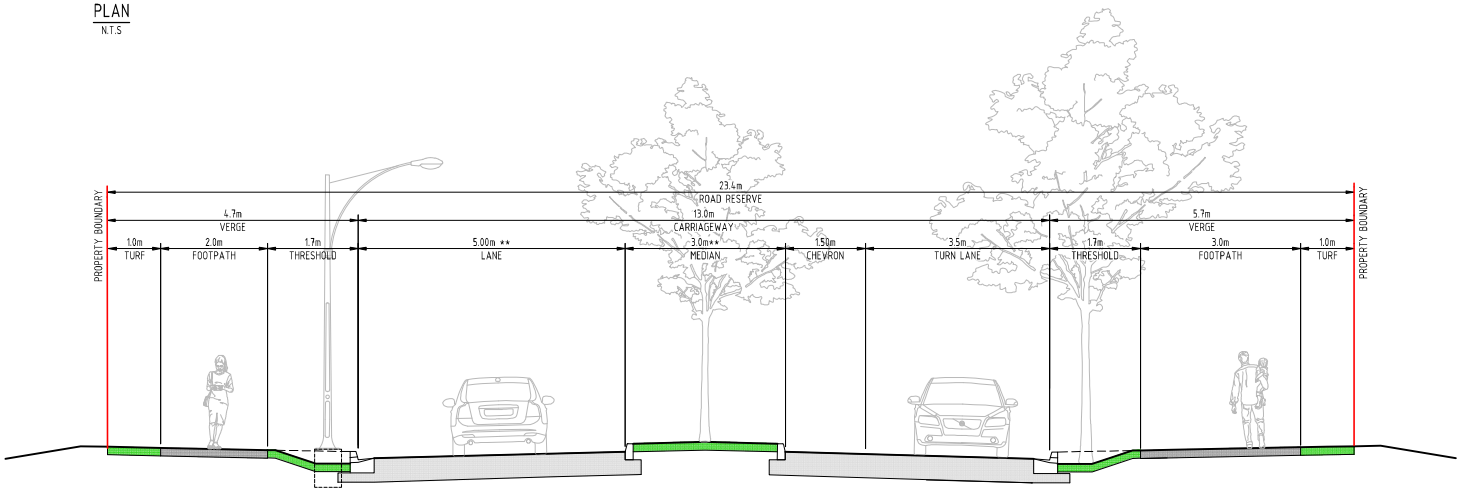
Drawing No.: NSH_CIV_SK_0_0339
Revision: 02

PLOT DATE: 2/8/2024 12:54 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0339 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm



PLAN
N.T.S



TYPICAL SECTION J - ROAD 4 (INTERSECTION)
22.00m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Environmental Management ISO 14001:2015

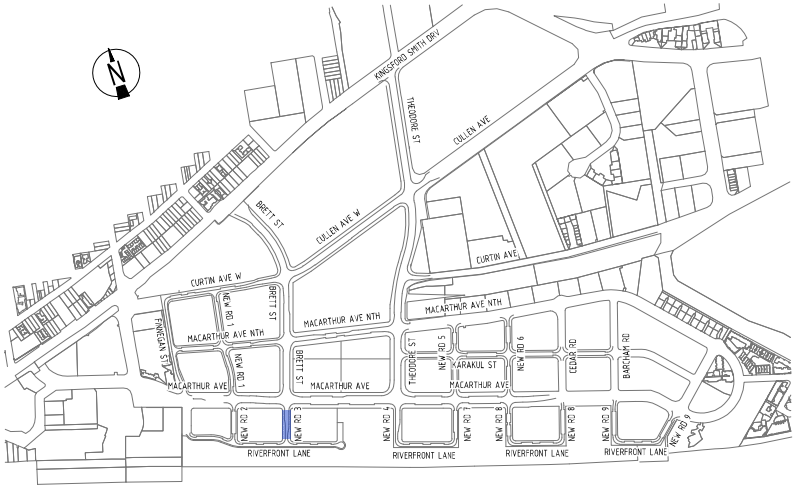
Client: ECONOMIC DEVELOPMENT QUEENSLAND
Discipline: CIVIL
Status: APPROVAL
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
ROAD 4

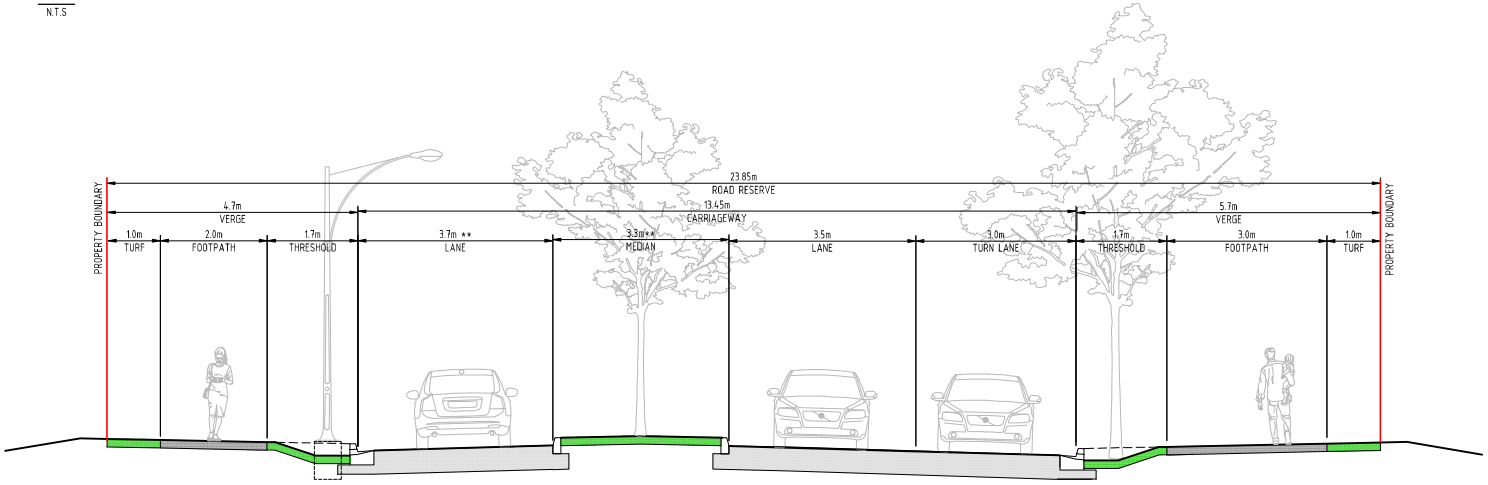
Drawing No.: NSH_CIV_SK_0_0340
Revision: 02

PLOT DATE: 2/8/2024 12:54 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm



PLAN
N.T.S



TYPICAL SECTION K - ROAD 3 (INTERSECTION)
22.00m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

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Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

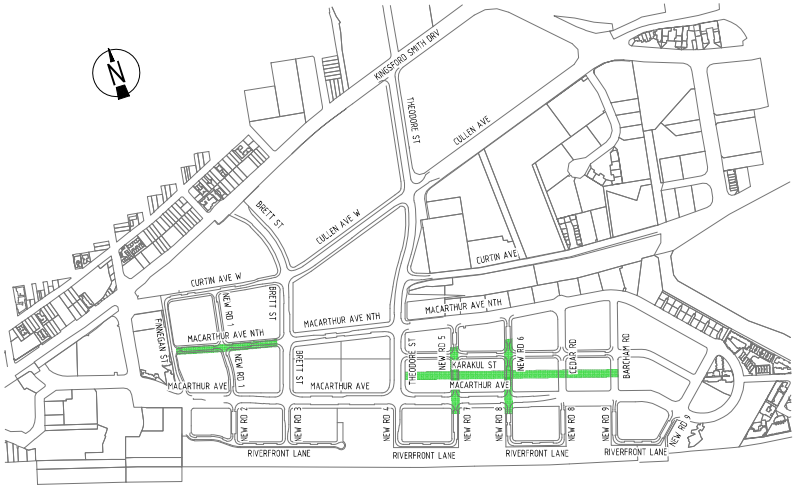
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
ROAD 3

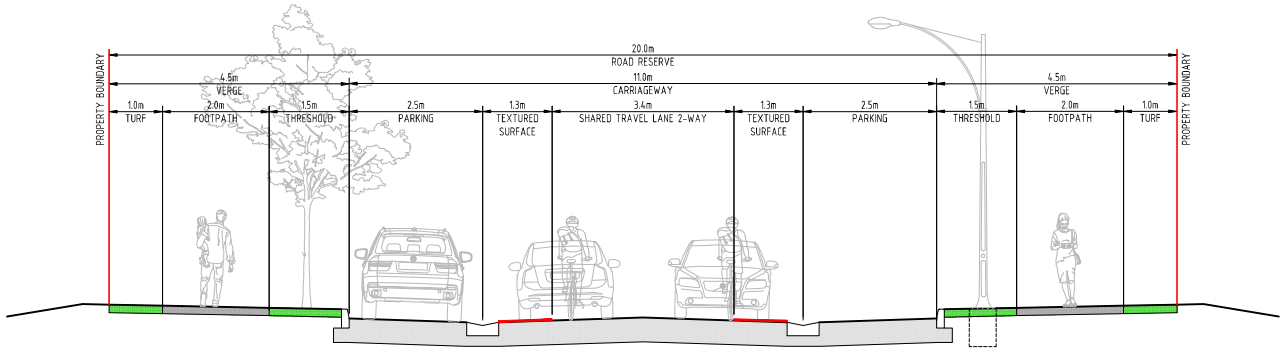
Drawing No.: NSH_CIV_SK_0_0341
Revision: 02

PLOT DATE: 2/8/2024 12:54 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm



PLAN
N.T.S



TYPICAL SECTION L
KARAKUL STREET, ROAD 5, ROAD 6, AND MACARTHUR AVENUE NORTH *(WEST)*
20.0m ROAD CORRIDOR @ PARKING AREAS
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

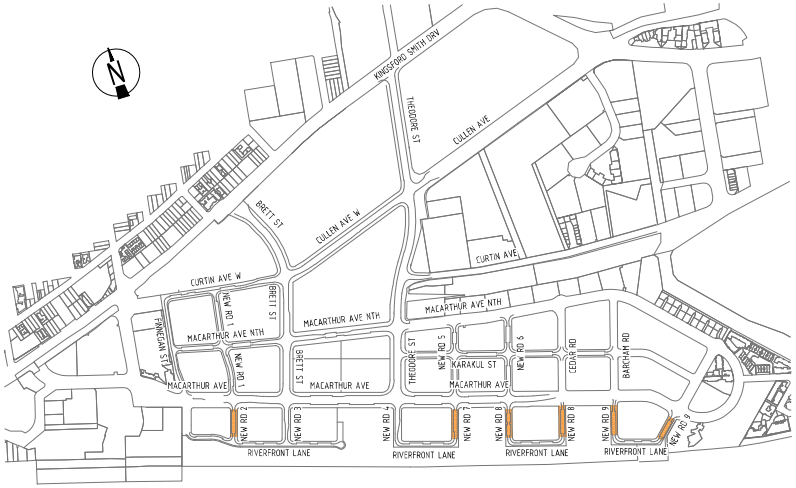
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
MACARTHUR AVE NW
KARAKUL ST, ROAD 5 & 6

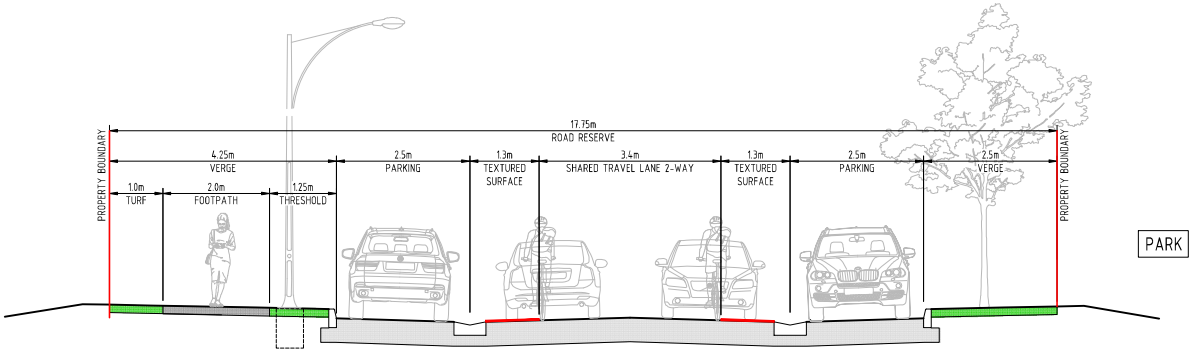
Drawing No.: NSH_CIV_SK_0_0342
Revision: 02

PLOT DATE: 2/8/2024 12:55 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm



PLAN
N.T.S



TYPICAL SECTION M - RIVERFRONT LANES
ROAD 2, 3, 4, 7, 8, 9
17.75m ROAD CORRIDOR (PARALLEL PARKING)
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

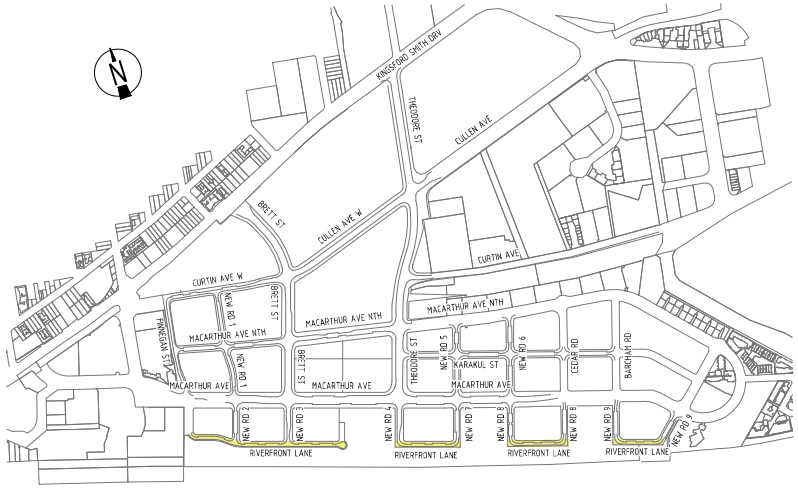
Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
RIVERFRONT LANES
ROAD 2, 3, 4, 7, 8, 9

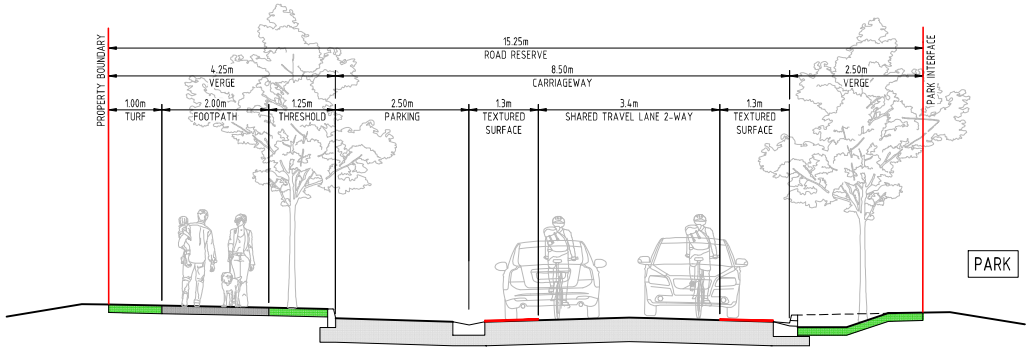
Drawing No.: NSH_CIV_SK_0_0343
Revision: 02

PLOT DATE: 2/8/2024 12:55 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm



PLAN
N.T.S



TYPICAL SECTION N - RIVERFRONT LANES
15.25m ROAD CORRIDOR
SCALE 1:50

ISSUED FOR
APPROVAL

Rev	Date	Description	By	Chk
02	08.02.24	ISSUED FOR APPROVAL	CO	DS
01	31.01.24	ISSUED FOR DISCUSSION	CO	DS

SCALE 1:50
AT ORIGINAL SIZE (A1)

T:1300 657 402 E: info@adgce.com W: www.adgce.com
Quality Assurance ISO 9001:2015 | Work Health Safety ISO 45001:2018
Environmental Management ISO 14001:2015

Client: ECONOMIC DEVELOPMENT QUEENSLAND
Project Name: NORTHSHORE HAMILTON
MAJOR ROADS PACKAGE
CONCEPT ROAD DESIGN
HAMILTON, QLD 4007

Discipline: CIVIL
Status: APPROVAL
Designed By: CO
Checked By: WS
Approved By: DS
Project No.: 26575
Drawn By: AB
Scale at A1: 1:50

Title: RECONFIGURATION OF LOT
TYPICAL ROAD CROSS SECTION
RIVERFRONT LANES

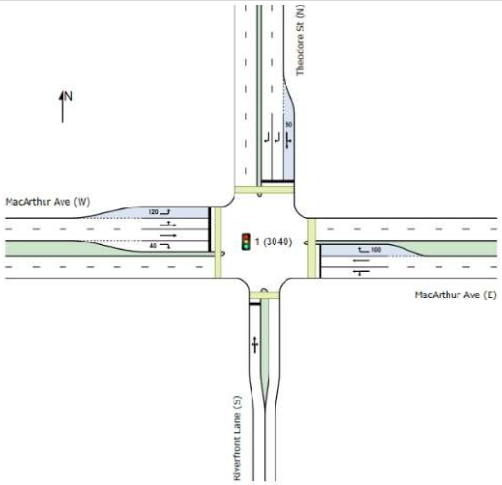
Drawing No.: NSH_CIV_SK_0_0344
Revision: 02

PLOT DATE: 2/8/2024 12:55 PM FILENAME: J:\BNE\26000\26575\CIVIL\DWG\SK-SKETCHES\SK0331 ROL TYPICAL ROAD CROSS SECTIONS.DWG

FULL SIZE ON ORIGINAL 0 10 20 30 40 50 60 70 80 90 100mm

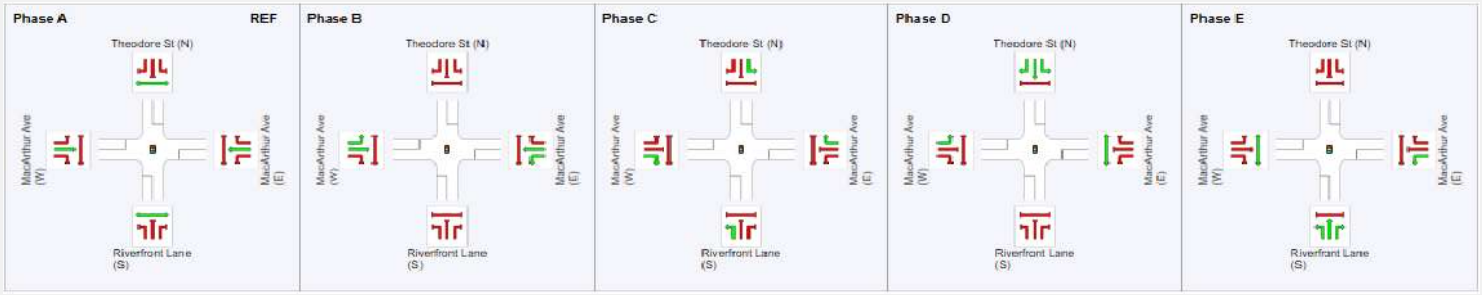
APPENDIX B – SIDRA INTERSECTION MODELS & PHASING COMPARISION TO 2021 TRANSPORT MASTERPLAN

Site 1. MacArthur Avenue & Theodore Street	
Comments	Phasing remains the same but sequence timings rebalanced. The intersection form has increased for vehicle demands
Northern Approach	Two right turn lanes. The straight and left turn are a short lane
Southern Approach	N/A
Eastern Approach	Right turn lane length extended from 40m to 100m
Western Approach	Addition of Left turn lane at 104m

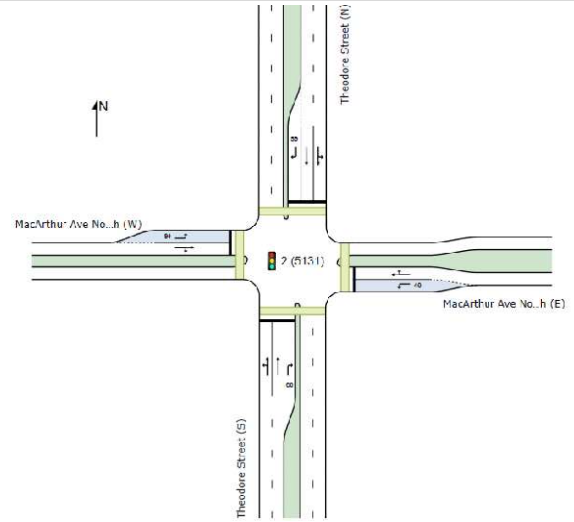


Phasing

Phase	A	B	C	D	E
Phase Change Time (sec)	0	26	46	58	84
Green Time (sec)	20	14	6	20	60
Phase Time (sec)	26	20	12	26	66
Phase Split	17%	13%	8%	17%	44%
Phase Frequency (%)	100.0	100.0	100.0	100.0	100.0

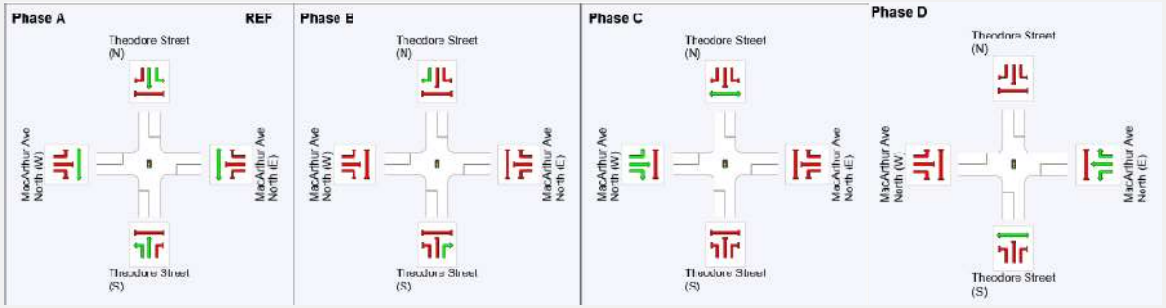


S2. MacArthur Avenue North & Theodore Street	
Comments	
Northern Approach	N/A
Southern Approach	N/A
Eastern Approach	Addition of short left land at 40m long and a wider median as reflected within the road cross-sections
Western Approach	Addition of a short left turn lane at 95m long.

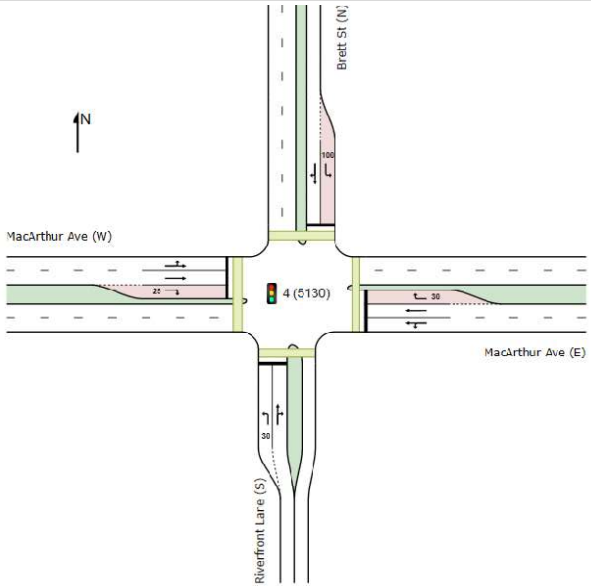


Phasing

Phase	A	B	C	D
Phase Change Time (sec)	0	34	69	100
Green Time (sec)	28	29	25	44
Phase Time (sec)	34	35	31	50
Phase Split	23%	23%	21%	33%
Phase Frequency (%)	100.0	100.0	100.0	100.0

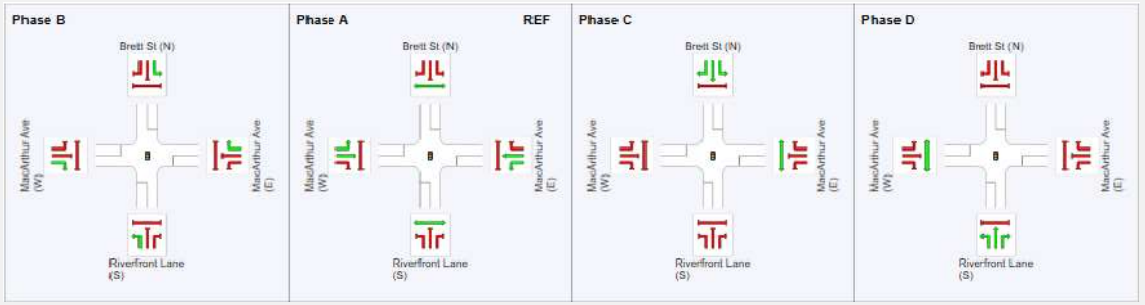


S4. MacArthur Avenue & Brett Street	
Comments	Geometry and phasing changes for spatial constraints and more efficient operation.
Northern Approach	Flipped short lane to the left turn and reduced to 100m length.
Southern Approach	Left turn lane has been reduced to 30m
Eastern Approach	Reduction of right turn lane length to 30m
Western Approach	Reduction of right turn lane length to 25m

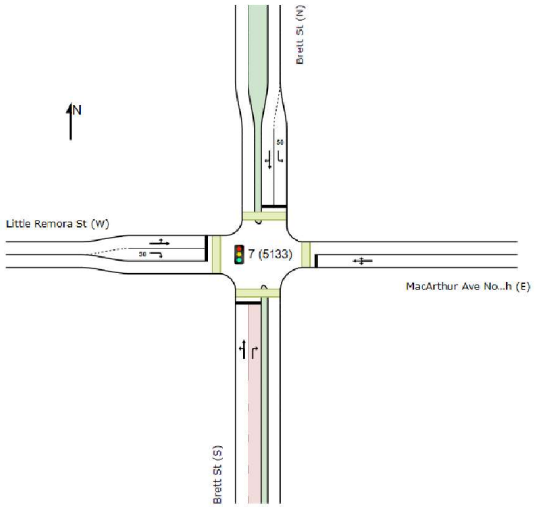


Phasing

Phase	B	A	C	D
Phase Change Time (sec)	138	0	86	112
Green Time (sec)	6	80	20	20
Phase Time (sec)	12	86	26	26
Phase Split	8%	57%	17%	17%
Phase Frequency (%)	100.0	100.0	100.0	100.0

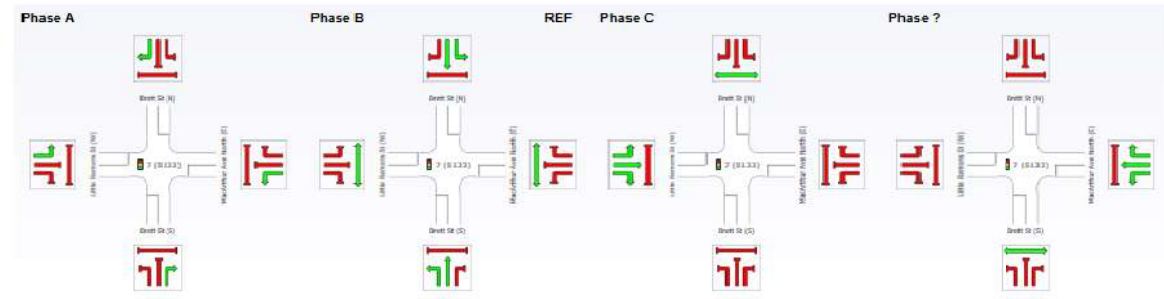


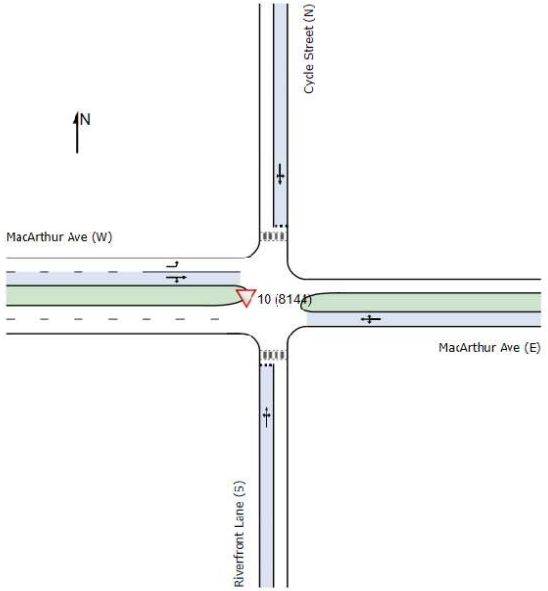
S7. MacArthur Ave & Brett Street	
Comments	
Northern Approach	The short lane has been flipped to the left turn, while the straight through and right are combined in a single continuous lane.
Southern Approach	Reconfigured for two full length lanes, with straight and left combined and a separate right turn lane.
Eastern Approach	The median has been removed and a single approach and departure lane is provided. This is due to the narrowing on the street form for speed and pedestrian protection.
Western Approach	Addition of a short right turn lane at 30.0m



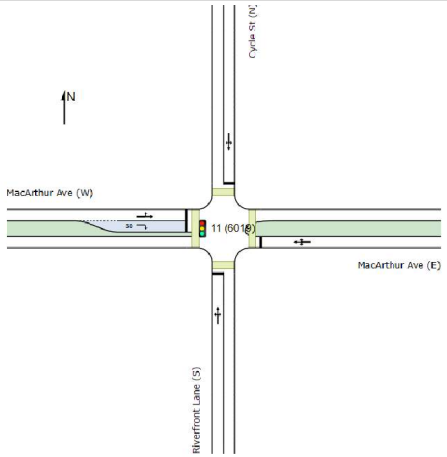
Phasing

Phase	A	B	C	?
Phase Change Time (sec)	105	0	23	56
Green Time (sec)	39	17	27	43
Phase Time (sec)	45	23	33	49
Phase Split	30%	15%	22%	33%
Phase Frequency (%)	100.0	100.0	100.0	100.0



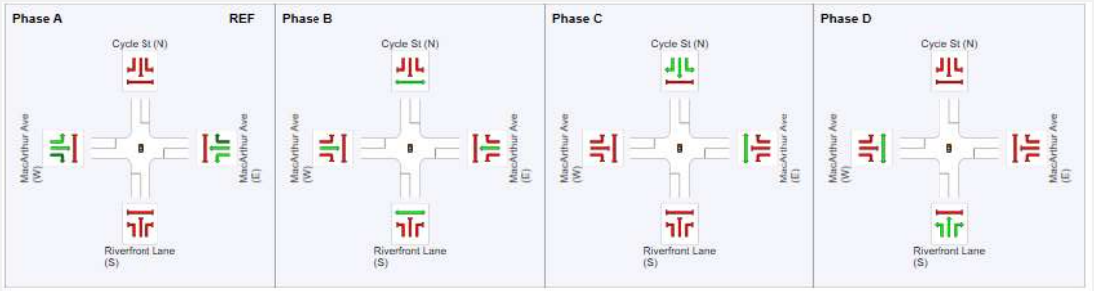
S10. MacArthur Ave & Cycle St		
Comments	Not previously modelled for the Transport Masterplan.	
Northern Approach	All turns permitted	
Southern Approach	All turns permitted	
Eastern Approach	Two land carriageway with left turns only form the left lane	
Western Approach	Single lane approach into dual lane departure.	
Phasing	N/A	

S11. MacArthur Ave & Cycle St	
Comments	
Northern Approach	N/A
Southern Approach	N/A
Eastern Approach	N/A
Western Approach	Addition of 30.0m Channelised Right Turn

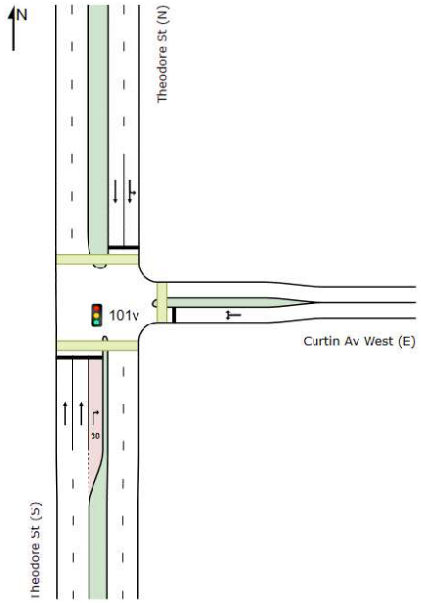


Phasing

Phase	A	B	C	D
Phase Change Time (sec)	0	67	84	112
Green Time (sec)	61	11	22	32
Phase Time (sec)	67	17	28	38
Phase Split	45%	11%	19%	25%
Phase Frequency (%)	100.0	100.0	100.0	100.0

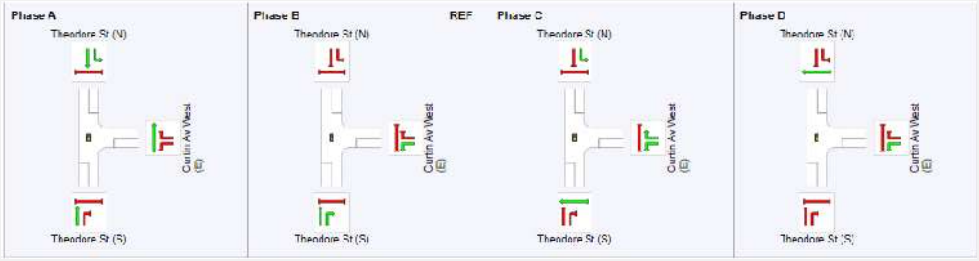


S14. Theodore St / Curtin Avenue West	
Comments	This site has been subject to a design and safety review, see Appendix C. The outcome of this safety assessment determined that the intersection should be converted to a Signal Control.
Northern Approach	Signal Control
Southern Approach	Signal Control
Eastern Approach	Signal Control
Western Approach	N/A



Phasing

Phase	A	B	C	D
Phase Change Time (sec)	123	0	44	97
Green Time (sec)	21	38	47	20
Phase Time (sec)	27	44	53	26
Phase Split	18%	29%	35%	17%
Phase Frequency (%)	100.0	100.0	100.0	100.0



APPENDIX C – THEODORE ST / CURTIN AVE SAFETY ASSESSMENT

URBIS

NORTHSHORE HAMILTON THEODORE CURTIN SAFETY ASSESSMENT

Client : EDQ

Date: 19 July 2023

1.0 INTRODUCTION

Purpose

This safety assessment relates to the intersection of Theodore Street and Curtin Avenue West, located within Northshore Hamilton. Safety Assessments are conducted to evaluate the level of risk inherent within a design, be that existing or new infrastructure.

Of particular concern at this location are the right turn movements of heavy vehicles (B-doubles) onto Theodore Street which has been identified as a potential danger due to the crossing of multiple traffic lanes by large vehicles.

This report will analyse the safety of the intersection's existing and proposed infrastructure against the risk assessment criteria specified by the DTMR's Guide to Traffic Impact Assessments (GTIA).

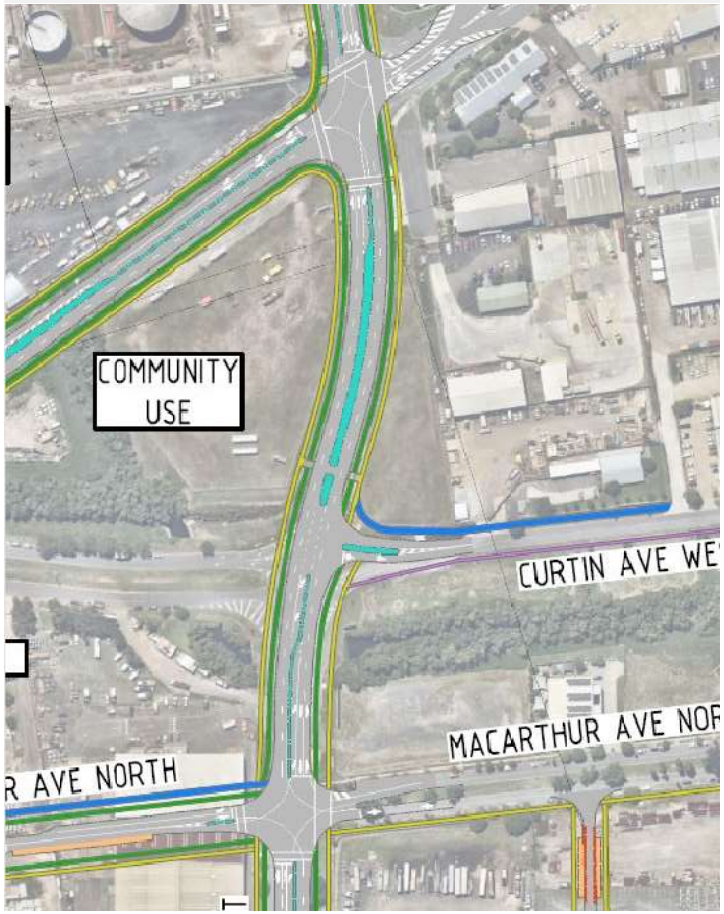
Three design options are assessed as well as the existing intersection form. One of the options is the 20% interim design which is shown to the right. Comparison of the existing design and proposed design risks can identify if there has been a net improvement to safety from the modifications. The design with the lowest risk score will be recommended in place of the existing design.

Reference is made to the Northshore Hamilton Transport Masterplan (2021) prepared by Cardno, and the 20% Interim Design Report (2023) prepared by Urbis for the current design proposal of the local road network and anticipated traffic.

It is noted that the 50% design is in development and demonstrates more detail around the pedestrian / cyclist path crossing at the intersection. This informs the safety assessment.

Existing Intersection

Current Proposal – 20% Interim Design



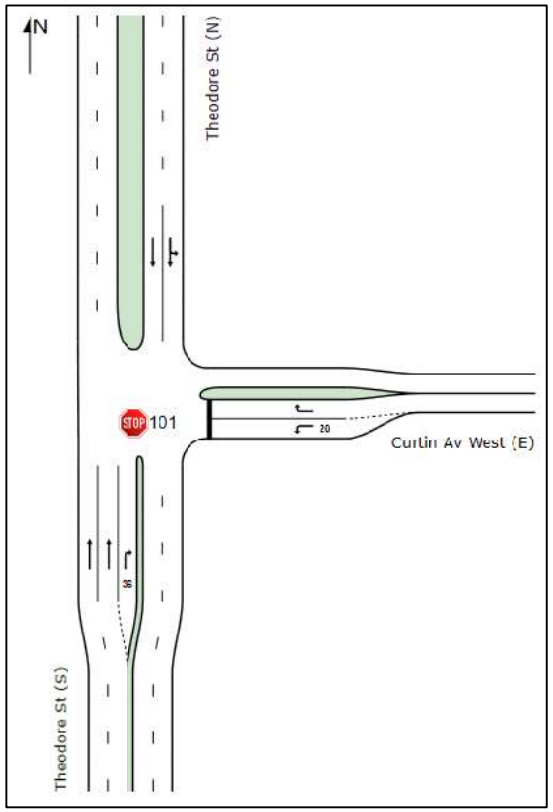
1.1 INTERSECTION DESIGN OPTIONS

Applied within the Northshore Hamilton 20% Interim Design is the D1. Proposed Priority Controlled intersection detailed below. For performance, Urbis have added a short-Left Turn lane to the design.

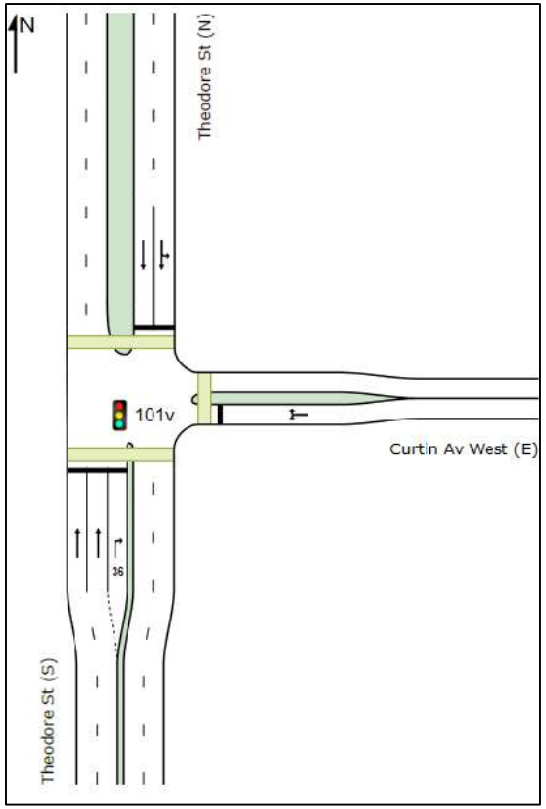
Within this assessment, comparison will be made to two other proposed intersection designs, D2. a signalised alternative with all movements controlled, and D3. simplifying the operation to Left In / Left Out only.
All proposed design options result in the removal of the western approach consistent with the Transport Masterplan, simplifying the form to a typical T intersection.

In terms of costs of construction, D1 Priority controlled presents the base line scenario, being the proposed form as part of the 20% design. D3 Left In/Left Out is similar in construction costs to D1, with the level of works being equivalent. However, D2 Signalised intersection, will incur a moderate to high cost of construction (estimated at up to $450,000-$600,000) as there is no existing signalised infrastructure.

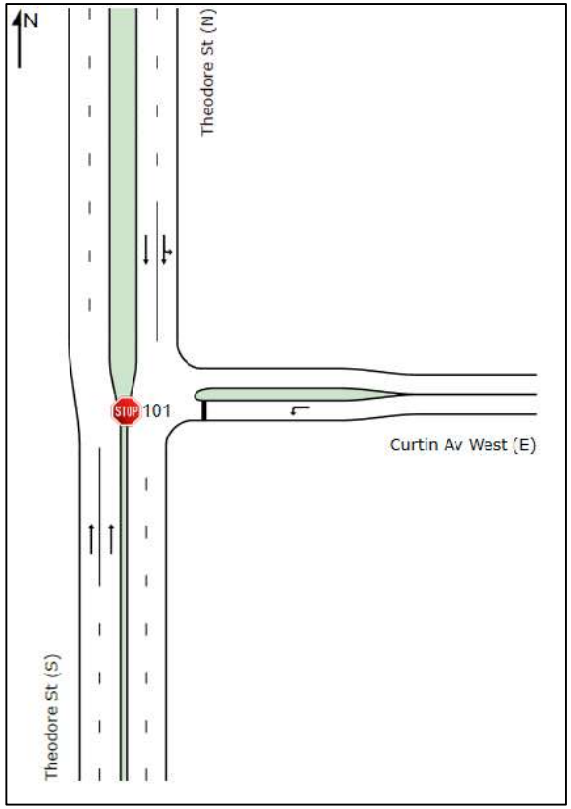
D1. Proposed Priority Controlled



D2. Signalised Alternative



D3. Left In – Left Out Alternative



2.0 CRASH DATA

Queensland Government crash database was examined for the five-year period, 2016 – 2021 (the most recent 5 years of data available), to understand if any crash trend exists at the key intersections and on the surrounding road network.

The recommended standard for identifying if a significant crash risk is present along a road is 3 casualties (fatal or serious injury), across a 5 year period, particularly those that share a common trend or pattern.

A summary of the crash data can be found in Table 1, while the corresponding crash locations are visually represented in Figure 1.

There are three crashes recorded, none of which were fatalities or required hospitalisation.

- Crash 321001 is listed as Barcham Road with a lower speed limit (50km/h) which aligns with Barcham Road, indicating that this crash has been mapped incorrectly. This crash is therefore excluded from the assessment.
- Crash 347059 was between two vehicles from the two adjacent approaches, one driving straight through on Curtin Ave, the other continuing through on Theodore Street. This occurrence would not occur again under the design proposals reducing to a 3-way T intersection.

This leaves the one crash across the 5-year period (crash 354525) which is not a significant risk indicator for a safety assessment. Further, since the crash occurred in 2020, the intersection has undergone minor works to change priority to Theodore St and improve line marking for improved driver legibility.

It is considered that the number and severity of the crashes themselves do not warrant significant safety concerns at the intersection.

Crash Data

Table 1. Crash Data by QLD Gov.

Crash Ref Number	Crash Severity	Year	Type	DCA Code	DCA Desription
321001	Medical treatment	2018	Angle	202	Veh'S Opposite Approach: Thru-Right
347059	Medical treatment	2019	Angle	101	Veh'S Adjacent Approach: Thru-Thru
354525	Medical treatment	2020	Angle	104	Veh'S Adjacent Approach: Thru-Right

Crash Locations

Figure 1. Crash Locations

3.0 GEOMETRIC DESIGN

Sight Distance

Available sight distances related to the proposed intersection design have been assessed via a desktop study.

Assessment is made against the safe intersection sight distance (SISD) and approach sight distance (ASD) requirements as per the specifications identified in Austroads' Guide to Road Design Part 4A: Unsignalised and Signalised Intersection (2021).

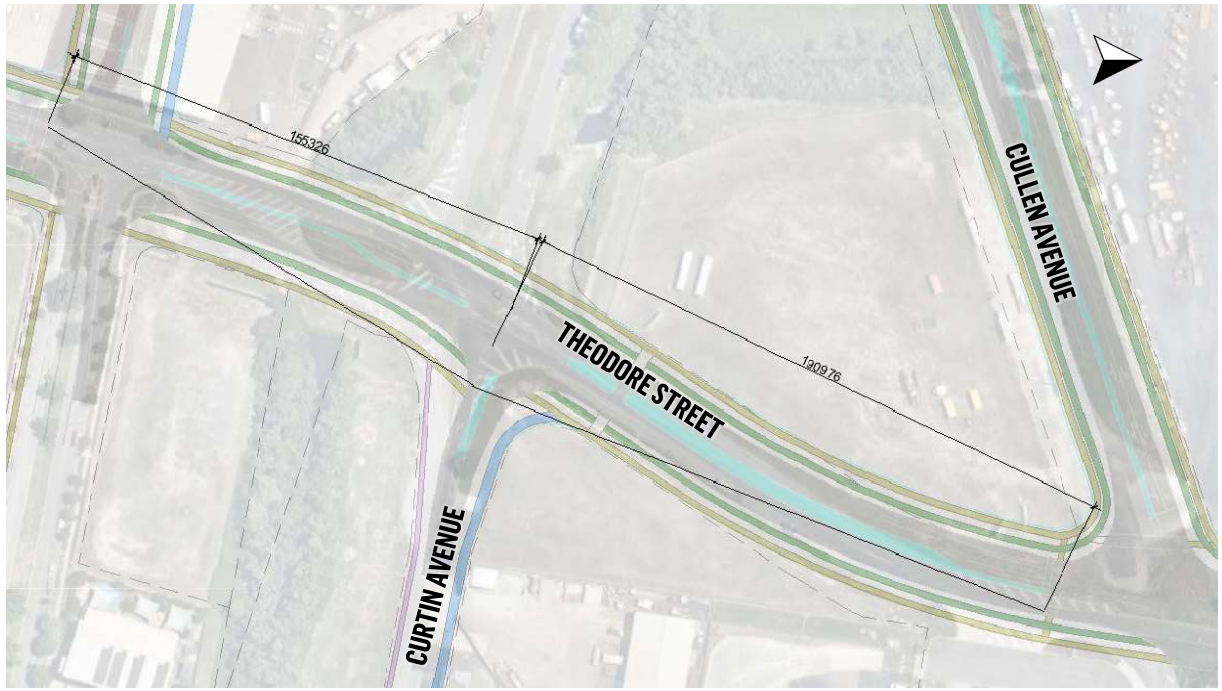
It is assumed that the new road grades will remain relatively consistent with the existing design (mostly flat and level). Urbis has referenced the 20% design issue for the proposed intersection and road configuration, ADG Drawing NSH_CIV_FL_0_0200, see attached.

Within the 20% Interim Design Report conducted by Urbis, the speed of Theodore Street within this road segment was posted as 60km/h. Therefore, the design speed of 70km/h is adopted. The resulting SISD and ASD requirements, with a nominal reaction time (R_t) of 2.0s, are 151m and 97m, respectively.

Figure 2 shows the sight distances available from the intersection to the adjacent intersection as 155.3m to the South and 191.0m to the North. This meets the requirements of Austroads for SISD. Furthermore, intersection phasing will at times increase the observation time available as vehicles accelerate from a stop towards the conflict point.

Assuming the road levels and alignment remain consistent, the ASD requirements are also met by the proposal.

Figure 2. Safe Sight Distance Assessment (Distances shown in mm)



3.0 GEOMETRIC DESIGN

Turn Warrants

Considering the likely design traffic scenarios listed within Northshore Hamilton for 2031, Urbis has prepared the turn warrant assessments in Figure 3 and Figure 4.

Turn warrants are used to identify appropriate turn treatments while balancing construction costs, in order to mitigate the possibility of rear-end crashes by removing decelerating vehicles from the through traffic lanes. A channelised turn shorter than the required deceleration length results in vehicles slowing while still in the through lanes.

Under the assessments shown, neither the AM or PM peak hour traffic volumes warrant significant treatments to the Left turns into Curtin Ave, resulting in a Basic Left (BAL) treatment.

Right turns, as permitted in the D1 and D2 proposals, trigger a Short Channelised Right (CHRs) treatment.

D1 and D2 provided a CHRs with a total length of 40m. This is comprised of 30m lane length and 10m taper.

This is design is appropriate for a 60km/h design speed with no storage length. However, Austroads recommends adopting a 70km/h design speed, further increasing the standard design requirements to total length of 55m plus storage.

A SIDRA assessment of the queueing created by the right turn movement is required to quantify if the shorter 30m lane is appropriate to cater for the operation of the intersection. The results of the SIDRA assessment is discussed in Section 5.1.

Design Traffic Volume Parameters and Turn Treatment Results

Figure 3. AM Peak Hour Turn Warrants

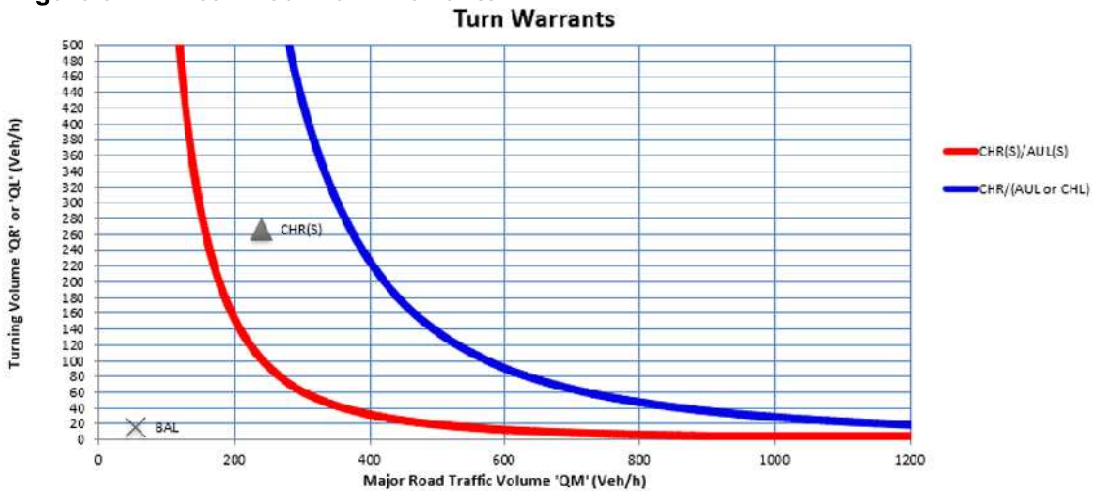
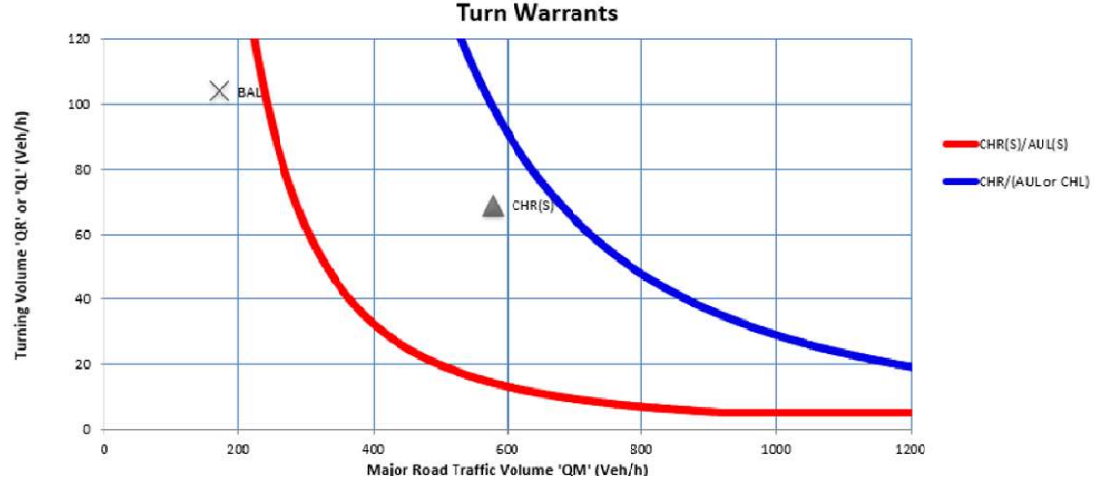


Figure 4. PM Peak Hour Turn Warrants



4.0 INDUSTRIAL PRECINCT - HEAVY VEHICLES

Heavy Vehicle Routes

Heavy vehicles present a safety risk along any roadway. Due to their size, constrained maneuverability, restricted driver visibility to immediate surrounds and being typically the largest vehicle permitted within the priority development area (PDA), the B-Double sized vehicles are of notable interest. The National Road Safety Strategy states:

> *"While heavy vehicles crash less often than other vehicles, these crashes are more likely to result in a death or serious injury"*

Curtin Avenue is a link to an existing industrial precinct which is planned to remain as the PDA develops. The NHVR classifies Curtin Avenue as a nominated route for B-Double sized vehicles, unrestricted up to 20.0m and restricted up to 26.0m.

It is noted that within the Transport Masterplan (2021), Theodore Street south of Curtin Avenue and the western areas of the PDA, are nominated to be declassified from B-Double routes to standard vehicle access (i.e. articulated vehicle). As such, B-Doubles will not be permitted to utilise the road network to the south of the Theodore St / Curtin Ave intersection.

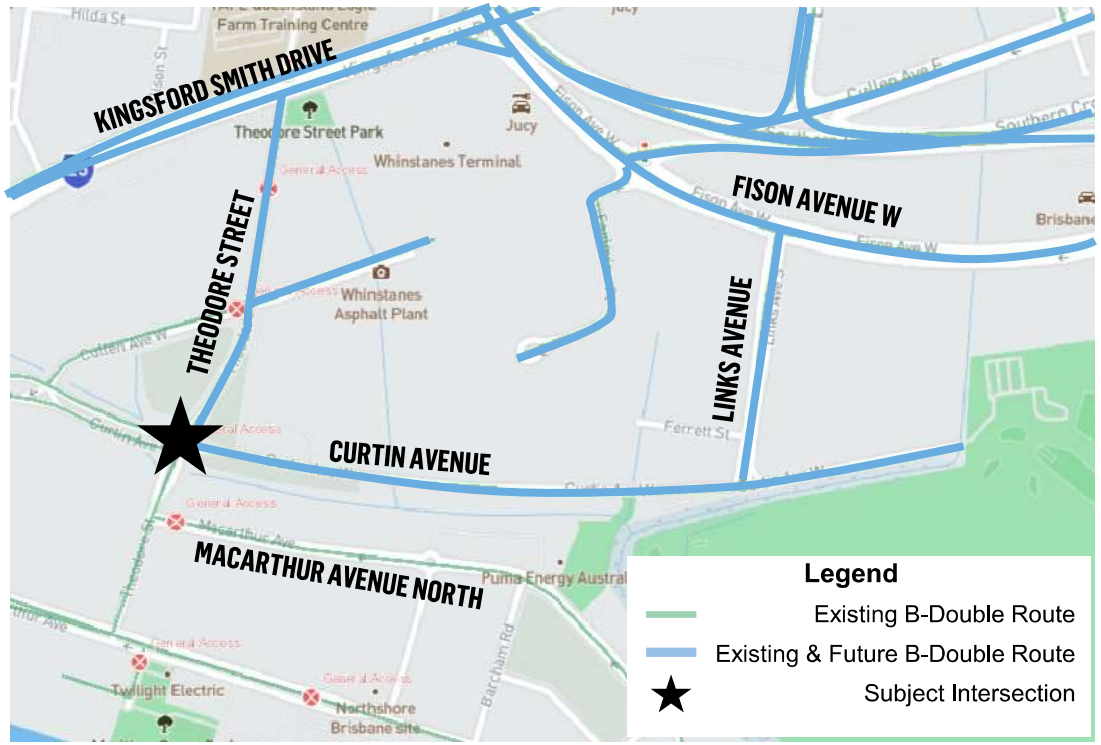
Implementation of Design 3, a Left In Left Out access would remove these movements and push all B-Double trips to access Curtin Avenue via Fison Avenue West.

Conversely D1 and D2, which allow right turns, exposes a B-Double to 4-lanes of traffic across this movement.

Effective mitigation of this risk can be determined through a safety assessment. This will cover a series of design solutions that will address different risks and subsequently assesses the effectiveness of their mitigation strategies.

Heavy Vehicle Routes by NHVR – 25/26m B-Double Routes

Figure 5. NHVR Route Planner – Permitted HV Routes



5.0 SIDRA MODELLING RESULTS

2031 SIDRA Models – Adjacent Intersections

Referring to the Urbis 20% Interim Design Report, SIDRA assessments were undertaken at the adjacent intersection for the 2031 assessment year.

Of interest to this safety assessment is the queue lengths of each approach to/from the subject site. These results are summarised in Table 2.

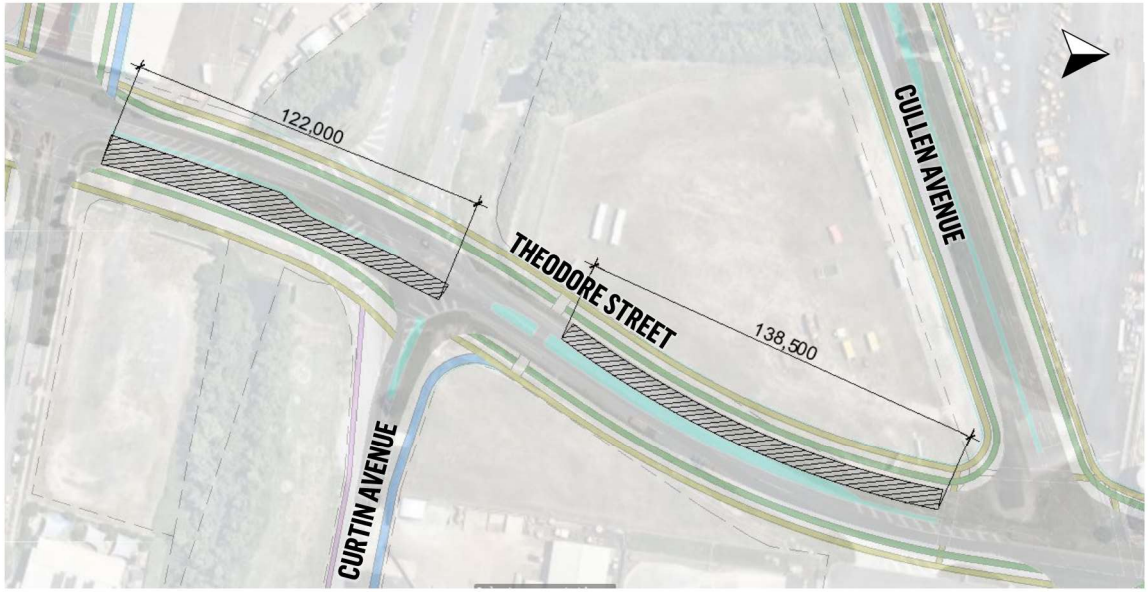
The peak period of note is the PM peak hour, which has the longest queue lengths. This shows that the queue from the southern intersection, MacArthur Avenue North / Theodore Street, is likely to extend partially across the subject intersection of Curtin Avenue.

Potential mitigation solutions could involve a 'Keep Clear' area, to allow continued access and egress around the queued vehicles. Sight distance of vehicles approaching from the south would be impeded by the queued vehicles, but the departing car could stand within the median.

Furthermore, while there is storage space within the median for a car, the storage space would be insufficient for larger trucks.

Table 2. SIDRA Results of Adjacent Sites

SCENARIO	NORTHERN APPROACH		SOUTHERN APPROACH		EASTERN APPROACH		WESTERN APPROACH	
DoS - Degree of Saturation (%) *Delay of Critical Approach Movement (s)* *95th Percentile Queue Length (m)* *Critical Movement of Approach*	*95th Queue (m)*	*Crit Movement*	*95th Queue (m)*	*Crit Movement*	*95th Queue (m)*	*Crit Movement*	*95th Queue (m)*	*Crit Movement*
S2. MacArthur Ave N / Theodore St AM	48.9	N-L	119	S-R	111	E-R	26	W-L
S2. MacArthur Ave N / Theodore St PM	122	N-T	114	S-R	58	E-R	45	W-L
S3. Cullen Ave / Theodore St AM	33.3	N-L	65	N-R	85	E-L	7	W-L
S3. Cullen Ave / Theodore St PM	79.2	N-L	139	S-R	229	E-L	34	W-R



5.1 SIDRA MODELLING RESULTS

2031 SIDRA Models – Subject Site

All scenarios are modelled with traffic as per the 2031 design scenario. For the LiLO option, the banned right turn volumes have been added to the diverted movements.

30% Extra Bunching is applied to the northern and southern approaches to account for the proximity of adjacent signalised intersections which models approaching traffic flows to arrive in platoons.

Priority Control

- Performance of the Eastern Approach during the PM Peak hour is within theoretical capacity for DOS however above the performance threshold of 0.80. Delays are on the cusp of the acceptable threshold (42 seconds). While operation is generally acceptable to 2031, there is limited scope for future growth.
- To improve the intersection performance, Urbis recommends a Give-way instead of a stop arrangement. A give-way with a 'Keep Clear' zone will improve the gap acceptance of vehicles and lower the delay time for the eastern approach.

Table 2. SIDRA Results of Subject Site Designs

SCENARIO	NORTHERN APPROACH				SOUTHERN APPROACH				EASTERN APPROACH			
DoS - Degree of Saturation (%) *Delay of Critical Approach Movement (s)* *95th Percentile Queue Length (m)* *Critical Movement of Approach*	*DoS*	*Delay (s)*	*95th Queue (m)*	*Crit Movement*	*DoS*	*Delay (s)*	*95th Queue (m)*	*Crit Movement*	*DoS*	*Delay (s)*	*95th Queue (m)*	*Crit Movement*
D1, AM Priority Control Stop	0.35	5.7	0	N-L	0.22	6.2	7.3	S-R	0.16	18.9	4.8	E-R
D2, AM Priority Control LiLo Stop	0.04	5.7	0	N-L	0.06	0	0	S-T	0.06	8.4	1.9	E-L
D3, AM Signalised Control	0.37	76	33.9	N-L	0.38	40.8	95.4	S-T	0.27	85.6	35.5	E-L
D1, PM Priority Control Stop	0.13	5.8	0	N-L	0.09	8.0	2.4	S-R	0.87	42.6	75.1	E-R
D2, PM Priority Control LiLo Stop	0.13	5.8	0	N-L	0.09	0	0	S-T	0.44	9.0	21.2	E-L
D3, PM Signalised Control	0.82	82.4	131	N-L	0.82	91	58.6	S-T	0.51	41.2	163	E-L

Priority Control – LiLo

- Performance of the intersection design is well within operational limits across all movements and approaches due to the simplified design.

Signalised Control

- Operationally, the intersection is within acceptable limits, with a maximum degree of saturation of 0.82, less than the acceptable threshold of 0.90.
- However, on the southern approach, right turn delays approach 91s, with a queue length of 47m, exceeding the CHRs provision.
  - As a result there is a 29% chance of blocking occurring to the through lanes from the right turn demand.
  - This could potentially be mitigated to some degree with coordination with the adjacent signal groups.

6.0 SAFETY ASSESSMENT

In accordance with the Department of Transport and Main Road (DTMR) Guide to Traffic Impact Assessments (GTIA) (2018), a road safety assessment has been undertaken to evaluate the potential impacts of the various intersection configurations. This has been based on the DTMR GTIA safety risk score matrix (Figure 9.3.2(a)), a copy of which is outlined in Figure 6. The rating descriptors are defined in Tables 3 and 4.

The issues identified have been assigned a risk rating using the risk score matrix. These issues were then assigned an appropriate mitigation measure (if required). Table 5 on the following pages outlines the risk assessment.

Risk scores are calculated as likelihood x consequence level.

The GTIA specifies:

"the objective is to return the risk score back to 'without-development' levels and below 'high' level with the proposed mitigation measures."

Table 3: Potential consequence

Rating Measure	Descriptor
1	Property Only
2	Minor Injury
3	Medical Treatment
4	Hospitalisation
5	Fatality

Table 4: Potential Likelihood Descriptor

Rating Measure	Descriptor	Occurrence
Almost Certain (5)	Very likely. The event is expected to occur in most circumstances	Once per quarter
Likely (4)	There is a strong possibility the event will occur	Once per quarter to once per year
Possible (3)	The event might occur at some time	Once per year to once every three years
Unlikely (2)	Not expected, but there's a slight possibility it may occur at some time.	Once every three years to once every seven years
Rare (1)	Highly unlikely, but it may occur in exceptional circumstances. It could happen, but probably never will.	Less than once every seven years

Figure 6: Safety risk score matrix

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

L: Low risk
M: Medium risk
H: High risk

6.1 RISK ASSESSMENT

	Existing				Priority Controlled				Signalised				Left In – Left Out			
Risk item	Likelihood	Consequence	Risk Score		Likelihood	Consequence	Risk Score	Comments	Likelihood	Consequence	Risk Score	Comments	Likelihood	Consequence	Risk Score	Comments
Turn treatments for Right turning traffic from Theodore Street; rear end collision, angle collision.	2	3	M (6)		2	3	M (6)	A CHR treatment is an improvement over existing design, however right turning traffic will need to cross two lanes compared with existing layout having one opposing lane.	1	3	L (3)	Signal controls all movements to separate conflicting movements.	1	3	L (3)	Movement banned, traffic volumes are diverted via Fison Avenue or via a Left In at Curtin Ave. The increased traffic at these diverted locations is not assessed. Overall, there is no net improvement to the local road network.
Right turning traffic from Curtin Avenue across Theodore St traffic; angle collision with through traffic, side swipe, and through-right crashes	3	4	M (12)		1	4	M (4)	SIDRA analysis indicates that delays will be on the border of acceptable limits (42 sec) which will increase as the PDA develops beyond 2031. This can lead to driver frustration resulting in drivers taking unsafe gaps. If designed as a give way intersection, operations will improve however a Keep Clear section should be implemented. The removal of the 4th leg is a significant improvement to vehicle safety.	1	4	M (4)	Signal controls conflicting movements. Risk can be mitigated by phasing right turns separately from through traffic (i.e. not allowing filtering right turns). Queues should keep clear of a signalised intersection.	2	3	M (6)	Movement banned, traffic volumes are diverted via Fison Avenue or via Brett Street to KSD. 2031 assessments for Brett Street intersections and KSD are not favorable to increased traffic volumes, which would worsen operations.
B-Double vehicles right turn out of Curtin Avenue across increased lanes and traffic volumes; risk of truck / car collisions.	2	4	M (8)		2	4	M (8)	While adjacent signalised intersections also create gaps in traffic via platooning, whether the gaps are sufficient for a B-Double (larger than standard HV) has not been quantitively assessed as the mix of HV configurations is not known. There is no storage space for a B-Double or any larger service vehicle within the Median, requiring gaps across all 4 lanes of traffic.	1	4	M (4)	Signal control can mitigate the risk by phasing right turns separately from through traffic. Queues should keep clear of a signalised intersection.	1	4	M (4)	Movement banned. However, all large heavy vehicles must use Fison Avenue for access and egress of the precinct. Fison Avenue is designed as an industrial collector and should be suitable to accommodate the heavy vehicle traffic. However, the impact of the higher volumes at external intersections has not been quantitively assessed. Overall, there is no net improvement to the local road network.

6.1 RISK ASSESSMENT

	Existing				Priority Controlled				Signalised				Left In – Left Out			
Risk item	Likelihood	Consequence	Risk Score		Likelihood	Consequence	Risk Score	Comments	Likelihood	Consequence	Risk Score	Comments	Likelihood	Consequence	Risk Score	Comments
Pedestrian & cyclist crossing movements, collision with vehicles at crossing points	3	4	M (12)		2	4	M (8)	The proposed design does not prioritise pedestrian / cyclist crossings at the intersection. A refuge island is provided for pedestrian protection however priority remains with vehicles. The crossing point is set back from the through road which may limit crossing sight distance between pedestrians and drivers. There are no changes to heavy vehicle volumes or movements. For HV entering Curtin Avenue, the limited sight distance coupled with the longer deceleration distances could result in potential conflicts.	1	4	M (4)	Signalised crossings in all directions provide pedestrian protection, minimising the likelihood of potential collision. Painted crossings increase visibility of conflict points for greater driver awareness. There are no changes to heavy vehicle volumes or movements. Being signal controlled, vehicles will not block the intersection due to opposing pedestrian and cyclist movements.	1	4	M (4)	The proposed design does not prioritise pedestrian / cyclist crossings at the intersection. A refuge island is provided for pedestrian protection however priority remains with vehicles. The crossing point is set back from the through road which may limit crossing sight distance between pedestrians and drivers. Removal of right turns will reduce the number of vehicle approach directions and reduce potential conflict points with pedestrians. Heavy vehicle movements are drastically reduced in this scenario. For HV entering Curtin Avenue, the limited sight distance coupled with the longer deceleration distances could result in potential conflicts.

7.0 SUMMARY

The existing intersection design provides a total risk score of 38. The proposed intersection designs all lower the overall risk of the intersection as follows:

- 20% Interim Design, Priority Controlled – risk score 26
- Signalised Intersection Design - risk score 15
- Left In, Left Out Intersection Design - risk score 17

Design 1 – Priority Controlled Intersection

- While this design option retains all turning movements to and from Curtin Avenue, the risk score is almost double the signalised treatment.
- The greatest risks result from the large heavy vehicles (B-Doubles) both to other vehicles and pedestrian/cyclists at the intersection. A refuge island is provided, However, the crossing point is set back from the through road which may limit crossing sight distance between pedestrians and drivers.
- Right Turns out of Curtin Avenue are marginally improved over the existing design. The increase in traffic lanes results in the increase of critical gap acceptance. 'Keep-Clear' and Give-way control will improve performance and visibility, but there remains limited surplus capacity for future traffic growth.
- Overall safety is improved across the board compared with the existing design, but the scope for future growth is limited.

Design 2 – Signalised Intersection

- A signalised design is the lowest risk option for intersection design as all movements are controlled and protection can be provided for pedestrians.
- The vast majority of the risks and safety concerns created by the additional development traffic and heavy vehicles are mitigated. Keeping in mind that signalising the intersection is the maximum and costliest treatment option.
- B-Double routes can be retained from Kingsford Smith Drive, Theodore Street to Curtin Street and vice versa.
- Bearing in mind that signalising the intersection can induce delays to through traffic on Theodore Street, SIDRA results indicate that the signalised form will operate within acceptable thresholds and will improve performance for Curtin Avenue traffic above the priority controlled form.
- Urbis consider the relative trade off of Theodore Street performance to overall safety to be appropriate.

Design 3 – Left In / Left Out Intersection

- This option presents the second lowest risk score. Many of the benefits to this arrangement match the priority controlled option.
- The advantage with this option is the removal of right turns reduces the number of conflict points at the intersection.
- B-Doubles could still be permitted to enter via Theodore Street, however egress would be diverted via Fison Avenue.
- The main detriment is that drivers would be inconvenienced by the removal of the right turns and a portion of the vehicle traffic would likely be redirected throughout the Northshore PDA area, worsening network performance for other intersections.
- This is not a preferred outcome as the most likely route for these vehicles would be via MacArthur Avenue North which is designed as a main street with a pedestrian crossing, potentially compromising safety.

7.1 SUMMARY CONTINUED

Overview

All the assessed design options achieve the objectives outlines by the GTIA, with all options reducing risk scores from the existing arrangement. Furthermore, there are no ‘high’ risk items identified for any of the options within the assessment.

The all turns permitted priority-controlled design of option D1 is a reasonable improvement over the existing infrastructure. Due to the increase in through traffic lanes on Theodore Street, risks for right turning traffic, particularly heavy vehicles, out of Curtin Avenue remain moderate, decreasing from a score of 12 to 4 compared to the existing design.

The safety of the proposed pedestrian and cyclist arrangements is reduced in comparison to the rest of the Northshore PDA area, as a priority crossing is not provided. However, as an industrial street the risk to road users of a B-double sized vehicle giving way to a crossing, is likely higher than the crossing itself. As a mitigation measure the proposed design does include a refuge island.

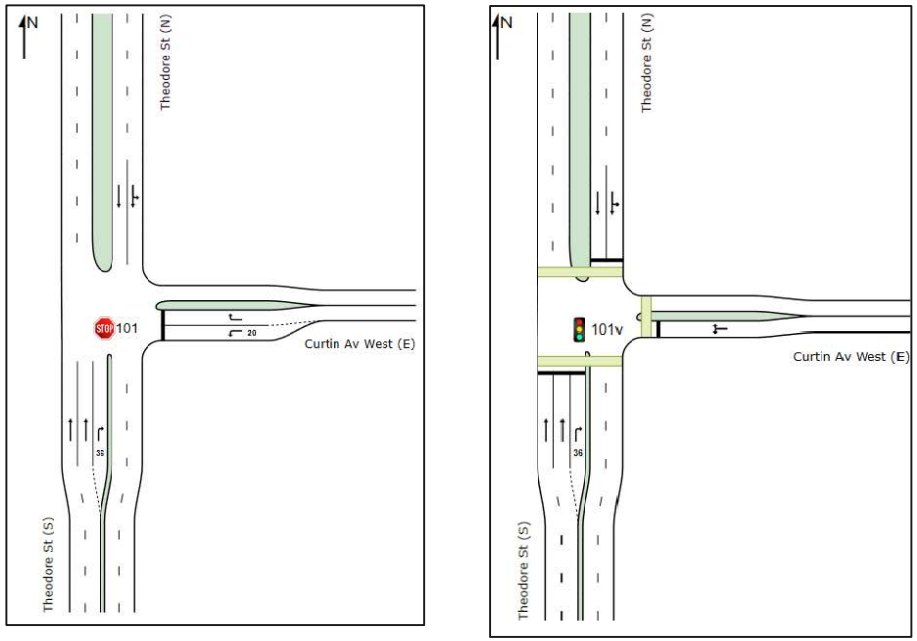
The priority-controlled arrangement would be an improvement over the intersection’s current form in safety and performance, as per the guidelines of the GTIA safety assessment.

On the other end of the spectrum, restricting movements to a Left In/Left Out design (D3) would reduce potential conflicts. However, it would also redirect traffic through other parts of the Northshore PDA, and would divert B-doubles to Fison Avenue, which will not provide a net improvement for the network.

The signalised option (D2) is considered to be the safest form of risk mitigation for this site. This design not only has the lowest risk outcome for turning movements and heavy vehicles, but also offers substantial pedestrian and cyclist protection over the other proposals by separating the movements from the vehicle traffic. However, this also presents the most costly option in terms of construction and maintenance costs.

From a practicality and network sense, the proposal of D1 Priority Intersection and D2 Signalised Intersection are considered to be feasible for implementation.

Figure 6. Design Options, D1 Priority and D2 Signalised



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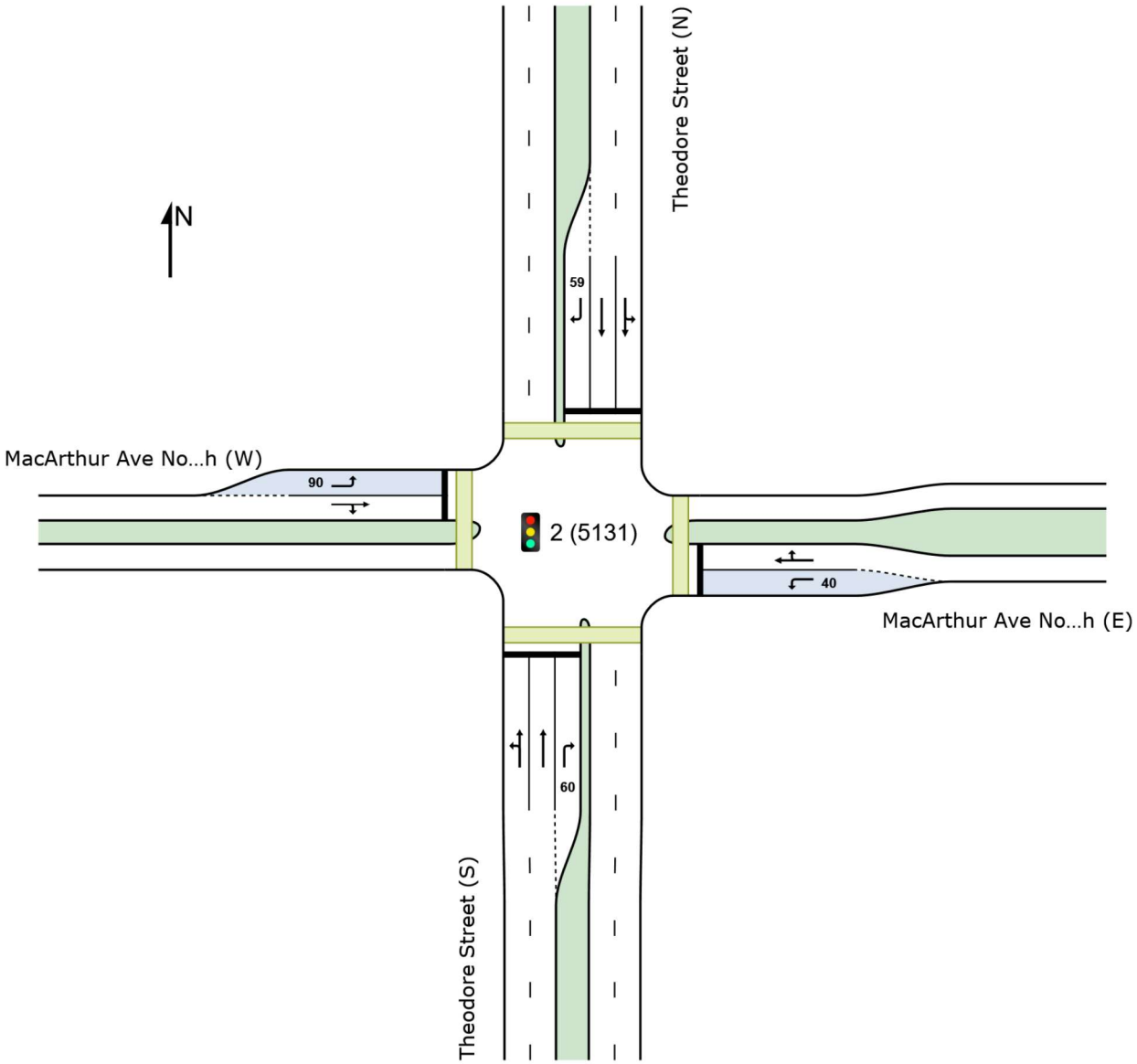
APPENDIX D SIDRA RESULTS

SITE LAYOUT

Site: 2 (5131) [2_S1_AM Theodore St_MacArthur Ave North (Site Folder: Base AM)]

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

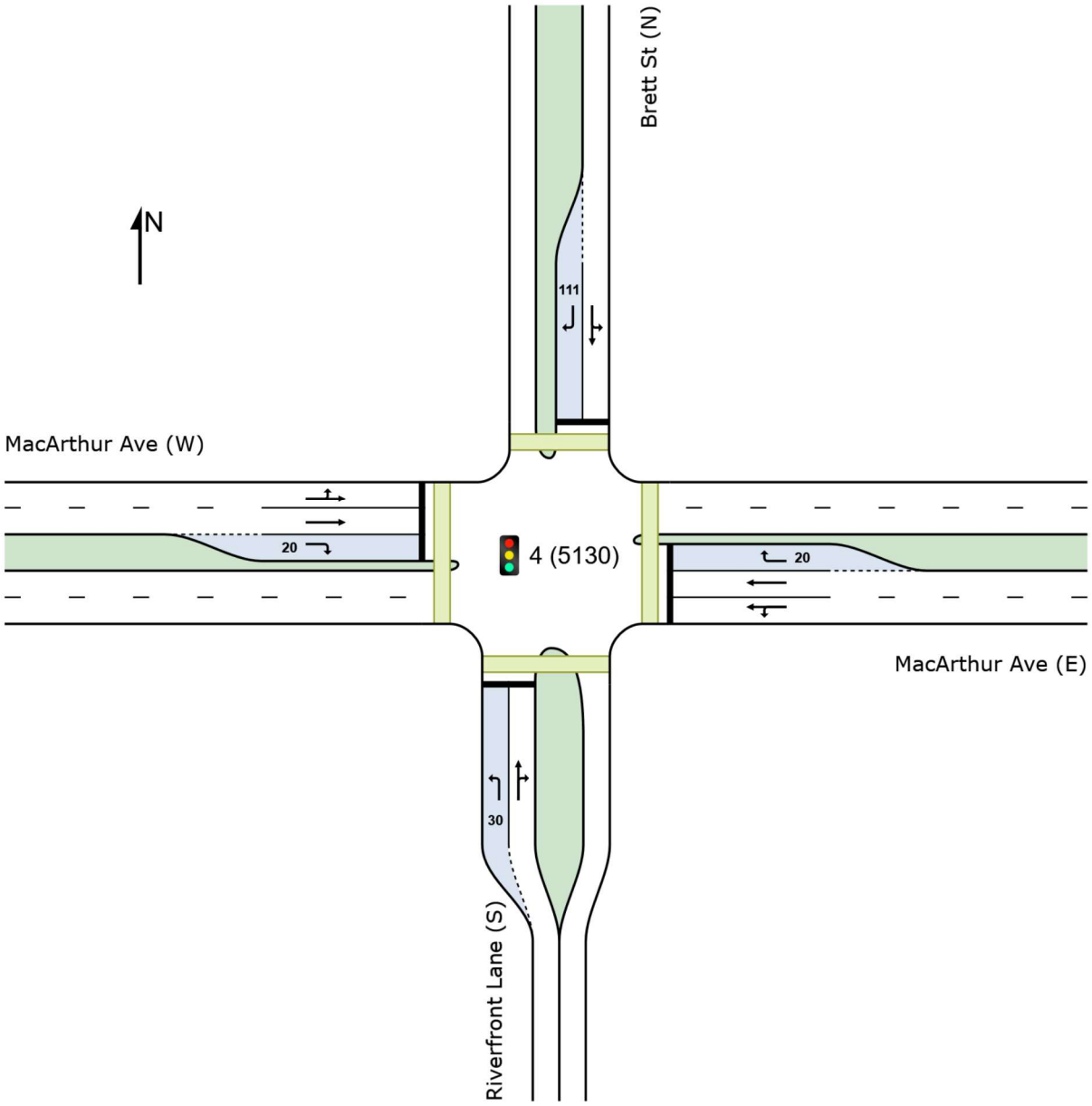


SITE LAYOUT

Site: 4 (5130) [4 S1_AM MacArthur Ave_ Brett St (Site Folder: Base AM)]

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_AM Theodore St_MacArthur Ave North (Site Folder: Base AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.520	73.2	LOS F	9.6	72.6	0.97	0.79	0.97	15.5
2	T1	All MCs	280	9.0	280	9.0	*0.520	66.9	LOS E	9.6	72.7	0.97	0.79	0.97	19.3
3	R2	All MCs	280	1.0	280	1.0	*0.519	56.1	LOS D	16.8	118.4	0.88	0.82	0.88	14.8
Approach			561	5.0	561	5.0	0.520	61.5	LOS E	16.8	118.4	0.93	0.80	0.93	17.4
East: MacArthur Ave North (E)															
4	L2	All MCs	1	0.0	1	0.0	0.002	69.4	LOS E	0.1	0.4	0.78	0.60	0.78	14.6
5	T1	All MCs	57	0.0	57	0.0	*0.529	72.2	LOS F	15.6	110.9	0.92	0.82	0.92	16.1
6	R2	All MCs	192	2.0	192	2.0	0.529	75.2	LOS F	15.6	110.9	0.92	0.82	0.92	19.6
Approach			249	1.5	249	1.5	0.529	74.5	LOS F	15.6	110.9	0.92	0.82	0.92	18.8
North: Theodore Street (N)															
7	L2	All MCs	99	3.0	99	3.0	0.430	71.9	LOS F	6.8	48.9	0.97	0.78	0.97	16.6
8	T1	All MCs	5	10.0	5	10.0	0.020	58.4	LOS E	0.3	2.5	0.88	0.58	0.88	20.7
9	R2	All MCs	23	7.0	23	7.0	0.043	44.2	LOS D	1.2	8.7	0.73	0.69	0.73	24.7
Approach			127	4.0	127	4.0	0.430	66.3	LOS E	6.8	48.9	0.92	0.76	0.92	18.1
West: MacArthur Ave North (W)															
10	L2	All MCs	55	0.0	55	0.0	*0.260	69.9	LOS E	3.7	26.1	0.95	0.75	0.95	18.7
11	T1	All MCs	2	0.0	2	0.0	0.012	60.1	LOS E	0.2	1.4	0.89	0.59	0.89	15.2
12	R2	All MCs	1	0.0	1	0.0	0.012	63.4	LOS E	0.2	1.4	0.89	0.59	0.89	15.9
Approach			58	0.0	58	0.0	0.260	69.5	LOS E	3.7	26.1	0.95	0.74	0.95	18.6
All Vehicles			996	3.7	996	3.7	0.529	65.8	LOS E	16.8	118.4	0.92	0.80	0.92	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4 S1_AM MacArthur Ave_ Brett St (Site Folder: Base AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	53.2	LOS D	0.1	0.4	0.82	0.56	0.82	15.3
2	T1	All MCs	1	0.0	1	0.0	0.008	59.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.1
3	R2	All MCs	1	0.0	1	0.0	0.008	61.5	LOS E	0.1	0.9	0.89	0.57	0.89	14.4
Approach			3	0.0	3	0.0	0.008	58.2	LOS E	0.1	0.9	0.87	0.57	0.87	13.3
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.173	26.0	LOS B	6.6	46.3	0.55	0.46	0.55	28.2
5	T1	All MCs	357	1.0	357	1.0	0.173	21.2	LOS B	6.6	46.3	0.55	0.46	0.55	37.5
6	R2	All MCs	1	0.0	1	0.0	0.014	86.9	LOS F	0.1	0.5	0.98	0.59	0.98	13.1
Approach			359	1.0	359	1.0	0.173	21.4	LOS B	6.6	46.3	0.55	0.46	0.55	37.3
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.008	32.6	LOS C	0.1	0.7	0.88	0.60	0.88	20.6
8	T1	All MCs	1	0.0	1	0.0	0.008	50.1	LOS D	0.1	0.7	0.88	0.60	0.88	13.4
9	R2	All MCs	1	0.0	1	0.0	0.004	64.2	LOS E	0.1	0.5	0.88	0.59	0.88	15.4
Approach			3	0.0	3	0.0	0.008	49.0	LOS D	0.1	0.7	0.88	0.60	0.88	16.5
West: MacArthur Ave (W)															
10	L2	All MCs	1	25.0	1	25.0	* 0.348	28.8	LOS C	14.6	104.5	0.61	0.54	0.61	28.4
11	T1	All MCs	708	3.0	708	3.0	0.348	27.8	LOS B	14.6	104.5	0.61	0.54	0.61	35.9
12	R2	All MCs	1	0.0	1	0.0	0.014	95.7	LOS F	0.1	0.5	0.98	0.59	0.98	11.9
Approach			711	3.0	711	3.0	0.348	27.9	LOS B	14.6	104.5	0.62	0.54	0.62	35.8
All Vehicles			1076	2.3	1076	2.3	0.348	25.9	LOS B	14.6	104.5	0.59	0.51	0.59	36.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_PM Theodore St_MacArthur Ave North (Site Folder: Base PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.244	50.9	LOS D	7.6	53.7	0.80	0.66	0.80	19.9
2	T1	All MCs	276	1.0	276	1.0	0.244	44.5	LOS D	7.6	53.8	0.80	0.66	0.80	25.0
3	R2	All MCs	264	0.0	264	0.0	* 0.529	57.7	LOS E	16.3	113.8	0.90	0.82	0.90	14.2
Approach			541	0.5	541	0.5	0.529	51.0	LOS D	16.3	113.8	0.85	0.74	0.85	19.7
East: MacArthur Ave North (E)															
4	L2	All MCs	43	0.0	43	0.0	0.205	71.5	LOS F	2.9	20.4	0.94	0.74	0.94	11.4
5	T1	All MCs	58	0.0	58	0.0	* 0.471	68.3	LOS E	8.2	57.5	0.97	0.79	0.97	14.1
6	R2	All MCs	61	1.0	61	1.0	0.471	71.3	LOS F	8.2	57.5	0.97	0.79	0.97	17.1
Approach			162	0.4	162	0.4	0.471	70.3	LOS E	8.2	57.5	0.96	0.78	0.96	14.6
North: Theodore Street (N)															
7	L2	All MCs	268	0.0	268	0.0	* 0.529	55.2	LOS D	16.6	116.3	0.90	0.83	0.90	19.8
8	T1	All MCs	281	4.0	281	4.0	0.504	54.0	LOS D	16.9	122.6	0.88	0.76	0.88	23.7
9	R2	All MCs	1	1.0	1	1.0	0.002	53.2	LOS D	0.1	0.4	0.74	0.60	0.74	24.2
Approach			551	2.0	551	2.0	0.529	54.6	LOS D	16.9	122.6	0.89	0.79	0.89	21.7
West: MacArthur Ave North (W)															
10	L2	All MCs	17	19.0	17	19.0	0.091	68.5	LOS E	1.1	9.1	0.93	0.69	0.93	18.8
11	T1	All MCs	95	0.0	95	0.0	* 0.369	64.6	LOS E	6.5	45.3	0.96	0.75	0.96	14.6
12	R2	All MCs	1	0.0	1	0.0	0.369	67.9	LOS E	6.5	45.3	0.96	0.75	0.96	15.3
Approach			113	2.8	113	2.8	0.369	65.2	LOS E	6.5	45.3	0.95	0.74	0.95	15.4
All Vehicles			1366	1.3	1366	1.3	0.529	55.9	LOS D	16.9	122.6	0.89	0.76	0.89	19.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4_S1_PM MacArthur Ave_ Brett St (Site Folder: Base PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	53.2	LOS D	0.1	0.4	0.82	0.56	0.82	15.3
2	T1	All MCs	1	0.0	1	0.0	0.008	59.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.1
3	R2	All MCs	1	0.0	1	0.0	0.008	61.5	LOS E	0.1	0.9	0.89	0.57	0.89	14.4
Approach			3	0.0	3	0.0	0.008	58.2	LOS E	0.1	0.9	0.87	0.57	0.87	13.3
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.306	27.8	LOS B	12.6	88.9	0.60	0.52	0.60	27.2
5	T1	All MCs	631	1.0	631	1.0	0.306	26.5	LOS B	12.6	88.9	0.60	0.52	0.60	36.3
6	R2	All MCs	1	0.0	1	0.0	0.014	94.2	LOS F	0.1	0.5	0.98	0.59	0.98	13.1
Approach			633	1.0	633	1.0	0.306	26.6	LOS B	12.6	88.9	0.60	0.52	0.60	36.2
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.008	32.6	LOS C	0.1	0.7	0.88	0.60	0.88	20.6
8	T1	All MCs	1	0.0	1	0.0	0.008	50.1	LOS D	0.1	0.7	0.88	0.60	0.88	13.4
9	R2	All MCs	1	0.0	1	0.0	0.004	64.2	LOS E	0.1	0.5	0.88	0.59	0.88	15.4
Approach			3	0.0	3	0.0	0.008	49.0	LOS D	0.1	0.7	0.88	0.60	0.88	16.5
West: MacArthur Ave (W)															
10	L2	All MCs	102	3.0	102	3.0	* 0.336	28.3	LOS B	13.9	97.8	0.62	0.61	0.62	28.2
11	T1	All MCs	583	0.0	583	0.0	0.336	28.7	LOS C	14.2	99.1	0.61	0.56	0.61	35.4
12	R2	All MCs	1	0.0	1	0.0	0.014	95.2	LOS F	0.1	0.5	0.98	0.59	0.98	11.9
Approach			686	0.4	686	0.4	0.336	28.7	LOS C	14.2	99.1	0.61	0.57	0.61	34.3
All Vehicles			1325	0.7	1325	0.7	0.336	27.8	LOS B	14.2	99.1	0.61	0.55	0.61	35.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_AM Theodore St_MacArthur Ave North - Lane (Site Folder: Lane Width Test AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.515	73.1	LOS F	9.6	72.5	0.97	0.79	0.97	15.5
2	T1	All MCs	280	9.0	280	9.0	*0.515	67.0	LOS E	9.6	72.6	0.97	0.79	0.97	19.3
3	R2	All MCs	280	1.0	280	1.0	*0.527	57.3	LOS E	16.9	119.4	0.89	0.82	0.89	14.7
Approach			561	5.0	561	5.0	0.527	62.2	LOS E	16.9	119.4	0.93	0.80	0.93	17.3
East: MacArthur Ave North (E)															
4	L2	All MCs	1	0.0	1	0.0	0.002	69.3	LOS E	0.1	0.4	0.78	0.60	0.78	14.6
5	T1	All MCs	57	0.0	57	0.0	*0.523	72.0	LOS F	15.6	110.7	0.92	0.82	0.92	16.2
6	R2	All MCs	192	2.0	192	2.0	0.523	75.0	LOS F	15.6	110.7	0.92	0.82	0.92	19.7
Approach			249	1.5	249	1.5	0.523	74.3	LOS F	15.6	110.7	0.91	0.82	0.91	18.9
North: Theodore Street (N)															
7	L2	All MCs	99	3.0	99	3.0	0.425	71.8	LOS F	6.8	48.9	0.97	0.78	0.97	16.6
8	T1	All MCs	5	10.0	5	10.0	0.019	58.4	LOS E	0.3	2.5	0.88	0.58	0.88	20.7
9	R2	All MCs	23	7.0	23	7.0	0.043	44.9	LOS D	1.2	8.7	0.74	0.69	0.74	24.5
Approach			127	4.0	127	4.0	0.425	66.4	LOS E	6.8	48.9	0.92	0.76	0.92	18.0
West: MacArthur Ave North (W)															
10	L2	All MCs	55	0.0	55	0.0	*0.243	68.7	LOS E	3.7	25.8	0.95	0.74	0.95	18.9
11	T1	All MCs	2	0.0	2	0.0	0.012	59.0	LOS E	0.2	1.4	0.88	0.58	0.88	15.4
12	R2	All MCs	1	0.0	1	0.0	0.012	62.3	LOS E	0.2	1.4	0.88	0.58	0.88	16.1
Approach			58	0.0	58	0.0	0.243	68.2	LOS E	3.7	25.8	0.94	0.74	0.94	18.8
All Vehicles			996	3.7	996	3.7	0.527	66.1	LOS E	16.9	119.4	0.93	0.80	0.93	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4 S1_AM MacArthur Ave_ Brett St - Lane (Site Folder: Lane Width Test AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	52.3	LOS D	0.1	0.4	0.82	0.56	0.82	15.5
2	T1	All MCs	1	0.0	1	0.0	0.008	58.9	LOS E	0.1	0.9	0.88	0.57	0.88	10.3
3	R2	All MCs	1	0.0	1	0.0	0.008	60.4	LOS E	0.1	0.9	0.88	0.57	0.88	14.6
Approach			3	0.0	3	0.0	0.008	57.2	LOS E	0.1	0.9	0.86	0.56	0.86	13.5
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.176	27.2	LOS B	6.7	47.6	0.56	0.47	0.56	27.6
5	T1	All MCs	357	1.0	357	1.0	0.176	22.6	LOS B	6.7	47.6	0.56	0.47	0.56	36.7
6	R2	All MCs	1	0.0	1	0.0	0.014	87.5	LOS F	0.1	0.5	0.98	0.59	0.98	13.2
Approach			359	1.0	359	1.0	0.176	22.8	LOS B	6.7	47.6	0.56	0.47	0.56	36.6
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.008	31.5	LOS C	0.1	0.7	0.87	0.60	0.87	21.0
8	T1	All MCs	1	0.0	1	0.0	0.008	49.0	LOS D	0.1	0.7	0.87	0.60	0.87	13.7
9	R2	All MCs	1	0.0	1	0.0	0.004	63.2	LOS E	0.1	0.5	0.88	0.59	0.88	15.6
Approach			3	0.0	3	0.0	0.008	47.9	LOS D	0.1	0.7	0.87	0.60	0.87	16.7
West: MacArthur Ave (W)															
10	L2	All MCs	1	25.0	1	25.0	* 0.353	30.0	LOS C	14.9	107.3	0.63	0.55	0.63	27.8
11	T1	All MCs	708	3.0	708	3.0	0.353	29.5	LOS C	14.9	107.3	0.63	0.55	0.63	35.1
12	R2	All MCs	1	0.0	1	0.0	0.014	96.5	LOS F	0.1	0.5	0.98	0.59	0.98	11.9
Approach			711	3.0	711	3.0	0.353	29.6	LOS C	14.9	107.3	0.63	0.55	0.63	35.1
All Vehicles			1076	2.3	1076	2.3	0.353	27.4	LOS B	14.9	107.3	0.61	0.53	0.61	35.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_PM Theodore St_MacArthur Ave North - Lane (Site Folder: Lane Width Test PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.247	51.7	LOS D	7.7	54.2	0.81	0.66	0.81	19.7
2	T1	All MCs	276	1.0	276	1.0	0.247	45.5	LOS D	7.7	54.3	0.81	0.66	0.81	24.8
3	R2	All MCs	264	0.0	264	0.0	* 0.538	59.0	LOS E	16.4	114.8	0.91	0.82	0.91	14.1
Approach			541	0.5	541	0.5	0.538	52.1	LOS D	16.4	114.8	0.86	0.74	0.86	19.5
East: MacArthur Ave North (E)															
4	L2	All MCs	43	0.0	43	0.0	0.192	70.3	LOS E	2.9	20.2	0.94	0.74	0.94	11.6
5	T1	All MCs	58	0.0	58	0.0	* 0.444	67.1	LOS E	8.1	56.9	0.96	0.79	0.96	14.3
6	R2	All MCs	61	1.0	61	1.0	0.444	70.1	LOS E	8.1	56.9	0.96	0.79	0.96	17.3
Approach			162	0.4	162	0.4	0.444	69.1	LOS E	8.1	56.9	0.96	0.77	0.96	14.8
North: Theodore Street (N)															
7	L2	All MCs	268	0.0	268	0.0	* 0.536	56.0	LOS D	16.7	117.2	0.91	0.83	0.91	19.6
8	T1	All MCs	281	4.0	281	4.0	0.511	55.3	LOS D	17.1	123.6	0.89	0.76	0.89	23.5
9	R2	All MCs	1	1.0	1	1.0	0.002	54.3	LOS D	0.1	0.4	0.74	0.60	0.74	24.0
Approach			551	2.0	551	2.0	0.536	55.6	LOS D	17.1	123.6	0.90	0.79	0.90	21.5
West: MacArthur Ave North (W)															
10	L2	All MCs	17	19.0	17	19.0	0.085	67.4	LOS E	1.1	9.0	0.92	0.69	0.92	19.0
11	T1	All MCs	95	0.0	95	0.0	* 0.347	63.4	LOS E	6.4	44.8	0.95	0.75	0.95	14.8
12	R2	All MCs	1	0.0	1	0.0	0.347	66.7	LOS E	6.4	44.8	0.95	0.75	0.95	15.5
Approach			113	2.8	113	2.8	0.347	64.0	LOS E	6.4	44.8	0.94	0.74	0.94	15.6
All Vehicles			1366	1.3	1366	1.3	0.538	56.5	LOS E	17.1	123.6	0.89	0.77	0.89	19.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4_S1_PM MacArthur Ave_ Brett St - Lane (Site Folder: Lane Width Test PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	52.3	LOS D	0.1	0.4	0.82	0.56	0.82	15.5
2	T1	All MCs	1	0.0	1	0.0	0.008	58.9	LOS E	0.1	0.9	0.88	0.57	0.88	10.3
3	R2	All MCs	1	0.0	1	0.0	0.008	60.4	LOS E	0.1	0.9	0.88	0.57	0.88	14.6
Approach			3	0.0	3	0.0	0.008	57.2	LOS E	0.1	0.9	0.86	0.56	0.86	13.5
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.311	29.0	LOS C	12.9	91.3	0.61	0.53	0.61	26.6
5	T1	All MCs	631	1.0	631	1.0	0.311	28.1	LOS B	12.9	91.3	0.61	0.53	0.61	35.5
6	R2	All MCs	1	0.0	1	0.0	0.014	95.0	LOS F	0.1	0.5	0.98	0.59	0.98	13.2
Approach			633	1.0	633	1.0	0.311	28.2	LOS B	12.9	91.3	0.61	0.53	0.61	35.4
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.008	31.5	LOS C	0.1	0.7	0.87	0.60	0.87	21.0
8	T1	All MCs	1	0.0	1	0.0	0.008	49.0	LOS D	0.1	0.7	0.87	0.60	0.87	13.7
9	R2	All MCs	1	0.0	1	0.0	0.004	63.2	LOS E	0.1	0.5	0.88	0.59	0.88	15.6
Approach			3	0.0	3	0.0	0.008	47.9	LOS D	0.1	0.7	0.87	0.60	0.87	16.7
West: MacArthur Ave (W)															
10	L2	All MCs	102	3.0	102	3.0	* 0.341	29.5	LOS C	14.2	100.3	0.63	0.62	0.63	27.5
11	T1	All MCs	583	0.0	583	0.0	0.341	30.4	LOS C	14.5	101.7	0.63	0.58	0.63	34.7
12	R2	All MCs	1	0.0	1	0.0	0.014	96.1	LOS F	0.1	0.5	0.98	0.59	0.98	11.9
Approach			686	0.4	686	0.4	0.341	30.4	LOS C	14.5	101.7	0.63	0.58	0.63	33.6
All Vehicles			1325	0.7	1325	0.7	0.341	29.4	LOS C	14.5	101.7	0.62	0.56	0.62	34.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_AM Theodore St_MacArthur Ave North - Speed (Site Folder: Speed Test AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.520	72.2	LOS F	9.6	72.6	0.97	0.79	0.97	15.8
2	T1	All MCs	280	9.0	280	9.0	*0.520	66.9	LOS E	9.6	72.7	0.97	0.79	0.97	18.1
3	R2	All MCs	280	1.0	280	1.0	*0.519	55.0	LOS D	16.8	118.4	0.88	0.81	0.88	14.4
Approach			561	5.0	561	5.0	0.520	61.0	LOS E	16.8	118.4	0.93	0.80	0.93	16.6
East: MacArthur Ave North (E)															
4	L2	All MCs	1	0.0	1	0.0	0.002	68.4	LOS E	0.1	0.4	0.78	0.59	0.78	14.3
5	T1	All MCs	57	0.0	57	0.0	*0.529	69.6	LOS E	15.6	110.9	0.92	0.81	0.92	17.0
6	R2	All MCs	192	2.0	192	2.0	0.529	74.2	LOS F	15.6	110.9	0.92	0.81	0.92	18.9
Approach			249	1.5	249	1.5	0.529	73.1	LOS F	15.6	110.9	0.92	0.81	0.92	18.4
North: Theodore Street (N)															
7	L2	All MCs	99	3.0	99	3.0	0.430	70.9	LOS F	6.8	48.9	0.97	0.78	0.97	16.0
8	T1	All MCs	5	10.0	5	10.0	0.020	58.4	LOS E	0.3	2.5	0.88	0.58	0.88	19.3
9	R2	All MCs	23	7.0	23	7.0	0.043	43.1	LOS D	1.2	8.7	0.73	0.68	0.73	24.8
Approach			127	4.0	127	4.0	0.430	65.4	LOS E	6.8	48.9	0.92	0.76	0.92	17.5
West: MacArthur Ave North (W)															
10	L2	All MCs	55	0.0	55	0.0	*0.260	71.1	LOS F	3.7	26.1	0.95	0.75	0.95	18.8
11	T1	All MCs	2	0.0	2	0.0	0.012	60.1	LOS E	0.2	1.4	0.89	0.59	0.89	15.8
12	R2	All MCs	1	0.0	1	0.0	0.012	64.6	LOS E	0.2	1.4	0.89	0.59	0.89	16.4
Approach			58	0.0	58	0.0	0.260	70.6	LOS F	3.7	26.1	0.95	0.74	0.95	18.7
All Vehicles			996	3.7	996	3.7	0.529	65.1	LOS E	16.8	118.4	0.92	0.79	0.92	17.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4 S1_AM MacArthur Ave_ Brett St - Speed (Site Folder: Speed Test AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	53.2	LOS D	0.1	0.4	0.82	0.56	0.82	14.9
2	T1	All MCs	1	0.0	1	0.0	0.008	59.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.1
3	R2	All MCs	1	0.0	1	0.0	0.008	61.5	LOS E	0.1	0.9	0.89	0.57	0.89	14.0
Approach			3	0.0	3	0.0	0.008	58.2	LOS E	0.1	0.9	0.87	0.57	0.87	13.1
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.173	25.1	LOS B	6.6	46.3	0.55	0.46	0.55	26.3
5	T1	All MCs	357	1.0	357	1.0	0.173	21.2	LOS B	6.6	46.3	0.55	0.46	0.55	33.3
6	R2	All MCs	1	0.0	1	0.0	0.014	85.8	LOS F	0.1	0.5	0.98	0.59	0.98	12.9
Approach			359	1.0	359	1.0	0.173	21.4	LOS B	6.6	46.3	0.55	0.46	0.55	33.2
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.008	32.6	LOS C	0.1	0.7	0.88	0.60	0.88	19.9
8	T1	All MCs	1	0.0	1	0.0	0.008	50.1	LOS D	0.1	0.7	0.88	0.60	0.88	13.4
9	R2	All MCs	1	0.0	1	0.0	0.004	64.2	LOS E	0.1	0.5	0.88	0.59	0.88	15.0
Approach			3	0.0	3	0.0	0.008	49.0	LOS D	0.1	0.7	0.88	0.60	0.88	16.1
West: MacArthur Ave (W)															
10	L2	All MCs	1	25.0	1	25.0	* 0.348	27.7	LOS B	14.6	104.5	0.61	0.54	0.61	26.7
11	T1	All MCs	708	3.0	708	3.0	0.348	27.8	LOS B	14.6	104.5	0.61	0.54	0.61	32.1
12	R2	All MCs	1	0.0	1	0.0	0.014	94.6	LOS F	0.1	0.5	0.98	0.59	0.98	11.7
Approach			711	3.0	711	3.0	0.348	27.9	LOS B	14.6	104.5	0.62	0.54	0.62	32.0
All Vehicles			1076	2.3	1076	2.3	0.348	25.9	LOS B	14.6	104.5	0.59	0.51	0.59	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_PM Theodore St_MacArthur Ave North - Speed (Site Folder: Speed Test PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.244	49.9	LOS D	7.6	53.7	0.80	0.66	0.80	20.3
2	T1	All MCs	276	1.0	276	1.0	0.244	44.5	LOS D	7.6	53.8	0.80	0.66	0.80	23.1
3	R2	All MCs	264	0.0	264	0.0	*0.529	56.7	LOS E	16.3	113.8	0.90	0.82	0.90	13.9
Approach			541	0.5	541	0.5	0.529	50.5	LOS D	16.3	113.8	0.85	0.74	0.85	18.7
East: MacArthur Ave North (E)															
4	L2	All MCs	43	0.0	43	0.0	0.205	70.5	LOS F	2.9	20.4	0.94	0.74	0.94	11.2
5	T1	All MCs	58	0.0	58	0.0	*0.471	65.7	LOS E	8.2	57.5	0.97	0.78	0.97	14.7
6	R2	All MCs	61	1.0	61	1.0	0.471	70.3	LOS E	8.2	57.5	0.97	0.78	0.97	16.6
Approach			162	0.4	162	0.4	0.471	68.7	LOS E	8.2	57.5	0.96	0.77	0.96	14.6
North: Theodore Street (N)															
7	L2	All MCs	268	0.0	268	0.0	*0.529	54.2	LOS D	16.6	116.3	0.90	0.82	0.90	19.0
8	T1	All MCs	281	4.0	281	4.0	0.504	54.0	LOS D	16.9	122.6	0.88	0.76	0.88	22.0
9	R2	All MCs	1	1.0	1	1.0	0.002	52.1	LOS D	0.1	0.4	0.74	0.59	0.74	24.3
Approach			551	2.0	551	2.0	0.529	54.1	LOS D	16.9	122.6	0.89	0.79	0.89	20.5
West: MacArthur Ave North (W)															
10	L2	All MCs	17	19.0	17	19.0	0.091	69.7	LOS E	1.1	9.1	0.93	0.70	0.93	19.0
11	T1	All MCs	95	0.0	95	0.0	*0.369	64.6	LOS E	6.5	45.3	0.96	0.75	0.96	15.3
12	R2	All MCs	1	0.0	1	0.0	0.369	69.1	LOS E	6.5	45.3	0.96	0.75	0.96	15.9
Approach			113	2.8	113	2.8	0.369	65.4	LOS E	6.5	45.3	0.95	0.75	0.95	16.0
All Vehicles			1366	1.3	1366	1.3	0.529	55.3	LOS D	16.9	122.6	0.89	0.76	0.89	18.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4_S1_PM MacArthur Ave_ Brett St - Speed (Site Folder: Speed Test PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	53.2	LOS D	0.1	0.4	0.82	0.56	0.82	14.9
2	T1	All MCs	1	0.0	1	0.0	0.008	59.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.1
3	R2	All MCs	1	0.0	1	0.0	0.008	61.5	LOS E	0.1	0.9	0.89	0.57	0.89	14.0
Approach			3	0.0	3	0.0	0.008	58.2	LOS E	0.1	0.9	0.87	0.57	0.87	13.1
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.306	26.9	LOS B	12.6	88.9	0.60	0.52	0.60	25.5
5	T1	All MCs	631	1.0	631	1.0	0.306	26.5	LOS B	12.6	88.9	0.60	0.52	0.60	32.4
6	R2	All MCs	1	0.0	1	0.0	0.014	93.1	LOS F	0.1	0.5	0.98	0.59	0.98	12.9
Approach			633	1.0	633	1.0	0.306	26.6	LOS B	12.6	88.9	0.60	0.52	0.60	32.3
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.008	32.6	LOS C	0.1	0.7	0.88	0.60	0.88	19.9
8	T1	All MCs	1	0.0	1	0.0	0.008	50.1	LOS D	0.1	0.7	0.88	0.60	0.88	13.4
9	R2	All MCs	1	0.0	1	0.0	0.004	64.2	LOS E	0.1	0.5	0.88	0.59	0.88	15.0
Approach			3	0.0	3	0.0	0.008	49.0	LOS D	0.1	0.7	0.88	0.60	0.88	16.1
West: MacArthur Ave (W)															
10	L2	All MCs	102	3.0	102	3.0	* 0.336	27.3	LOS B	13.9	97.8	0.62	0.60	0.62	26.6
11	T1	All MCs	583	0.0	583	0.0	0.336	28.7	LOS C	14.2	99.1	0.61	0.56	0.61	31.7
12	R2	All MCs	1	0.0	1	0.0	0.014	94.1	LOS F	0.1	0.5	0.98	0.59	0.98	11.7
Approach			686	0.4	686	0.4	0.336	28.6	LOS C	14.2	99.1	0.61	0.57	0.61	31.0
All Vehicles			1325	0.7	1325	0.7	0.336	27.8	LOS B	14.2	99.1	0.61	0.54	0.61	31.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_AM Theodore St_MacArthur Ave North - Combi (Site Folder: Test Combined AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.453	69.7	LOS E	9.3	70.4	0.95	0.77	0.95	16.4
2	T1	All MCs	280	9.0	280	9.0	*0.453	63.7	LOS E	9.4	70.6	0.95	0.77	0.95	18.8
3	R2	All MCs	280	1.0	280	1.0	*0.527	56.2	LOS D	16.9	119.4	0.89	0.82	0.89	14.3
Approach			561	5.0	561	5.0	0.527	60.0	LOS E	16.9	119.4	0.92	0.79	0.92	16.9
East: MacArthur Ave North (E)															
4	L2	All MCs	1	0.0	1	0.0	0.003	70.6	LOS F	0.1	0.4	0.80	0.59	0.80	13.9
5	T1	All MCs	57	0.0	57	0.0	*0.538	71.0	LOS F	15.8	111.8	0.92	0.81	0.92	16.8
6	R2	All MCs	192	2.0	192	2.0	0.538	75.6	LOS F	15.8	111.8	0.92	0.81	0.92	18.7
Approach			249	1.5	249	1.5	0.538	74.5	LOS F	15.8	111.8	0.92	0.81	0.92	18.3
North: Theodore Street (N)															
7	L2	All MCs	99	3.0	99	3.0	0.385	68.6	LOS E	6.7	47.9	0.95	0.78	0.95	16.3
8	T1	All MCs	5	10.0	5	10.0	0.017	55.5	LOS D	0.3	2.4	0.86	0.57	0.86	20.0
9	R2	All MCs	23	7.0	23	7.0	0.043	43.9	LOS D	1.2	8.7	0.74	0.68	0.74	24.6
Approach			127	4.0	127	4.0	0.385	63.5	LOS E	6.7	47.9	0.91	0.75	0.91	17.8
West: MacArthur Ave North (W)															
10	L2	All MCs	55	0.0	55	0.0	*0.292	73.4	LOS F	3.8	26.6	0.97	0.75	0.97	18.4
11	T1	All MCs	2	0.0	2	0.0	0.013	61.1	LOS E	0.2	1.4	0.90	0.59	0.90	15.7
12	R2	All MCs	1	0.0	1	0.0	0.013	65.6	LOS E	0.2	1.4	0.90	0.59	0.90	16.3
Approach			58	0.0	58	0.0	0.292	72.8	LOS F	3.8	26.6	0.96	0.74	0.96	18.3
All Vehicles			996	3.7	996	3.7	0.538	64.8	LOS E	16.9	119.4	0.92	0.79	0.92	17.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4 S1_AM MacArthur Ave_ Brett St - Combi (Site Folder: Test Combined AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	55.0	LOS D	0.1	0.4	0.84	0.56	0.84	14.6
2	T1	All MCs	1	0.0	1	0.0	0.009	60.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.0
3	R2	All MCs	1	0.0	1	0.0	0.009	62.4	LOS E	0.1	0.9	0.89	0.57	0.89	13.9
Approach			3	0.0	3	0.0	0.009	59.4	LOS E	0.1	0.9	0.88	0.57	0.88	12.9
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.167	24.5	LOS B	6.4	44.9	0.53	0.45	0.53	26.9
5	T1	All MCs	357	1.0	357	1.0	0.167	19.8	LOS B	6.4	44.9	0.53	0.45	0.53	34.0
6	R2	All MCs	1	0.0	1	0.0	0.014	85.1	LOS F	0.1	0.5	0.98	0.59	0.98	12.9
Approach			359	1.0	359	1.0	0.167	20.0	LOS B	6.4	44.9	0.53	0.45	0.53	33.9
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.009	34.7	LOS C	0.1	0.7	0.89	0.60	0.89	19.4
8	T1	All MCs	1	0.0	1	0.0	0.009	52.0	LOS D	0.1	0.7	0.89	0.60	0.89	13.1
9	R2	All MCs	1	0.0	1	0.0	0.004	65.2	LOS E	0.1	0.5	0.89	0.59	0.89	14.9
Approach			3	0.0	3	0.0	0.009	50.6	LOS D	0.1	0.7	0.89	0.60	0.89	15.8
West: MacArthur Ave (W)															
10	L2	All MCs	1	25.0	1	25.0	* 0.336	27.0	LOS B	14.1	101.2	0.60	0.52	0.60	27.4
11	T1	All MCs	708	3.0	708	3.0	0.336	26.1	LOS B	14.1	101.2	0.60	0.52	0.60	32.8
12	R2	All MCs	1	0.0	1	0.0	0.014	93.5	LOS F	0.1	0.5	0.98	0.59	0.98	11.7
Approach			711	3.0	711	3.0	0.336	26.2	LOS B	14.1	101.2	0.60	0.52	0.60	32.7
All Vehicles			1076	2.3	1076	2.3	0.336	24.3	LOS B	14.1	101.2	0.58	0.50	0.58	32.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S1_PM Theodore St_MacArthur Ave North - Combi (Site Folder: Test Combined PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.231	48.9	LOS D	7.4	52.6	0.79	0.65	0.79	20.8
2	T1	All MCs	276	1.0	276	1.0	0.231	42.8	LOS D	7.5	52.7	0.79	0.65	0.79	23.6
3	R2	All MCs	264	0.0	264	0.0	* 0.523	56.5	LOS E	16.2	113.5	0.90	0.82	0.90	13.9
Approach			541	0.5	541	0.5	0.523	49.5	LOS D	16.2	113.5	0.84	0.73	0.84	18.9
East: MacArthur Ave North (E)															
4	L2	All MCs	43	0.0	43	0.0	0.230	72.8	LOS F	3.0	20.8	0.96	0.74	0.96	10.9
5	T1	All MCs	58	0.0	58	0.0	* 0.491	66.8	LOS E	8.2	58.0	0.98	0.79	0.98	14.6
6	R2	All MCs	61	1.0	61	1.0	0.491	71.4	LOS F	8.2	58.0	0.98	0.79	0.98	16.4
Approach			162	0.4	162	0.4	0.491	70.1	LOS E	8.2	58.0	0.97	0.77	0.97	14.4
North: Theodore Street (N)															
7	L2	All MCs	268	0.0	268	0.0	* 0.511	53.1	LOS D	16.4	114.9	0.89	0.82	0.89	19.2
8	T1	All MCs	281	4.0	281	4.0	0.478	65.8	LOS E	16.6	119.9	0.87	0.86	0.87	9.4
9	R2	All MCs	1	1.0	1	1.0	0.002	51.1	LOS D	0.1	0.4	0.74	0.58	0.74	24.3
Approach			551	2.0	551	2.0	0.511	59.6	LOS E	16.6	119.9	0.88	0.84	0.88	12.3
West: MacArthur Ave North (W)															
10	L2	All MCs	17	19.0	17	19.0	0.102	72.0	LOS F	1.1	9.3	0.94	0.70	0.94	18.6
11	T1	All MCs	95	0.0	95	0.0	* 0.384	65.6	LOS E	6.5	45.7	0.96	0.76	0.96	15.2
12	R2	All MCs	1	0.0	1	0.0	0.384	70.2	LOS E	6.5	45.7	0.96	0.76	0.96	15.8
Approach			113	2.8	113	2.8	0.384	66.6	LOS E	6.5	45.7	0.96	0.75	0.96	15.8
All Vehicles			1366	1.3	1366	1.3	0.523	57.4	LOS E	16.6	119.9	0.88	0.78	0.88	14.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4_S1_PM MacArthur Ave_ Brett St - Combi (Site Folder: Test Combined PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	55.0	LOS D	0.1	0.4	0.84	0.56	0.84	14.6
2	T1	All MCs	1	0.0	1	0.0	0.009	60.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.0
3	R2	All MCs	1	0.0	1	0.0	0.009	62.4	LOS E	0.1	0.9	0.89	0.57	0.89	13.9
Approach			3	0.0	3	0.0	0.009	59.4	LOS E	0.1	0.9	0.88	0.57	0.88	12.9
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.295	26.2	LOS B	12.2	86.1	0.58	0.50	0.58	26.1
5	T1	All MCs	631	1.0	631	1.0	0.295	24.8	LOS B	12.2	86.1	0.58	0.50	0.58	33.1
6	R2	All MCs	1	0.0	1	0.0	0.014	92.2	LOS F	0.1	0.5	0.98	0.59	0.98	12.9
Approach			633	1.0	633	1.0	0.295	24.9	LOS B	12.2	86.1	0.58	0.50	0.58	33.0
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	* 0.009	34.7	LOS C	0.1	0.7	0.89	0.60	0.89	19.4
8	T1	All MCs	1	0.0	1	0.0	0.009	52.0	LOS D	0.1	0.7	0.89	0.60	0.89	13.1
9	R2	All MCs	1	0.0	1	0.0	0.004	65.2	LOS E	0.1	0.5	0.89	0.59	0.89	14.9
Approach			3	0.0	3	0.0	0.009	50.6	LOS D	0.1	0.7	0.89	0.60	0.89	15.8
West: MacArthur Ave (W)															
10	L2	All MCs	102	3.0	102	3.0	* 0.325	26.5	LOS B	13.4	94.5	0.60	0.59	0.60	27.3
11	T1	All MCs	583	0.0	583	0.0	0.325	26.9	LOS B	13.8	96.3	0.59	0.55	0.59	32.4
12	R2	All MCs	1	0.0	1	0.0	0.014	93.1	LOS F	0.1	0.5	0.98	0.59	0.98	11.7
Approach			686	0.4	686	0.4	0.325	26.9	LOS B	13.8	96.3	0.60	0.55	0.60	31.7
All Vehicles			1325	0.7	1325	0.7	0.325	26.1	LOS B	13.8	96.3	0.59	0.53	0.59	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

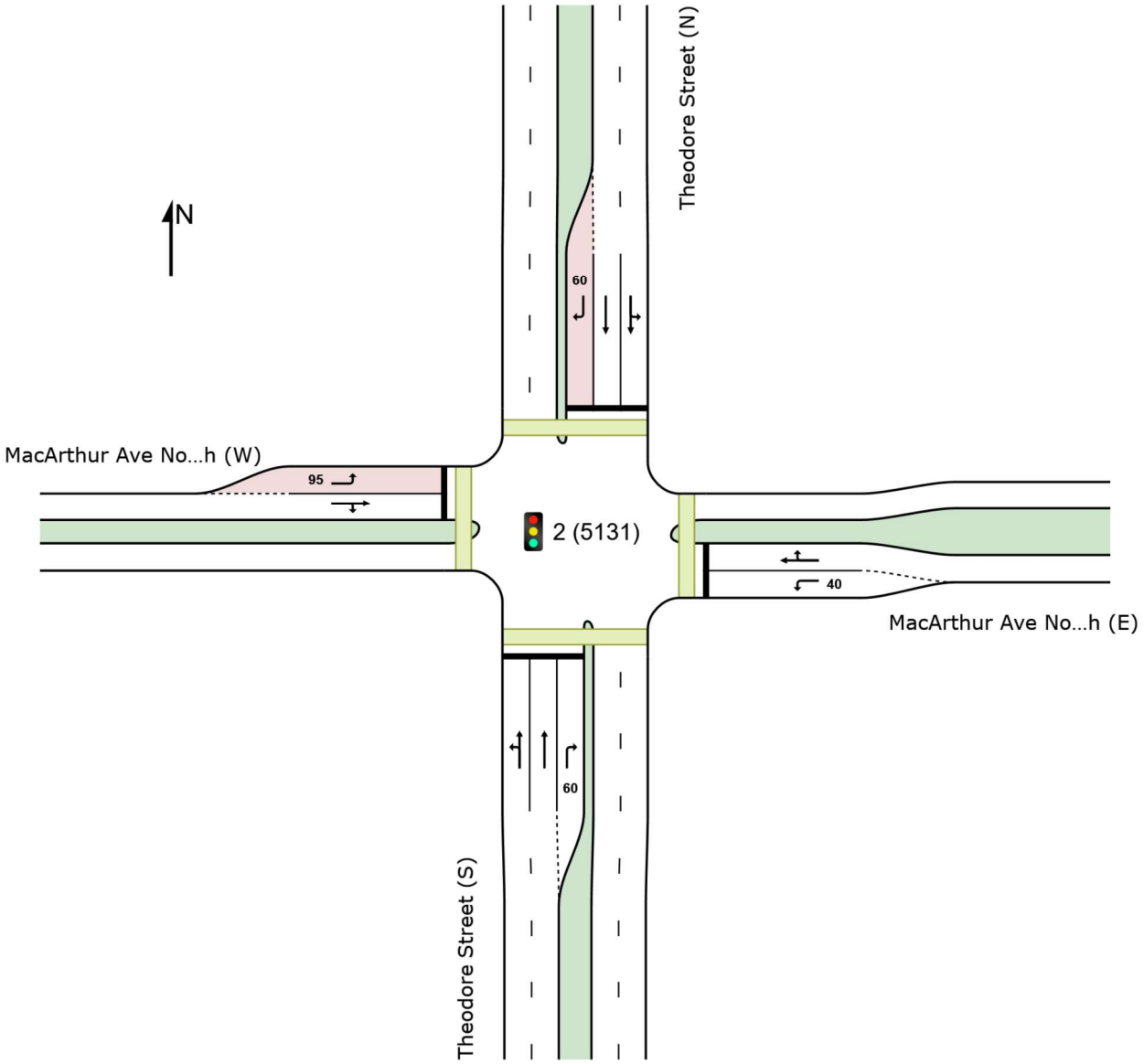
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 2 (5131) [2_S2_AM Theodore St_MacArthur Ave North (Site Folder: April 2024 AM)]

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

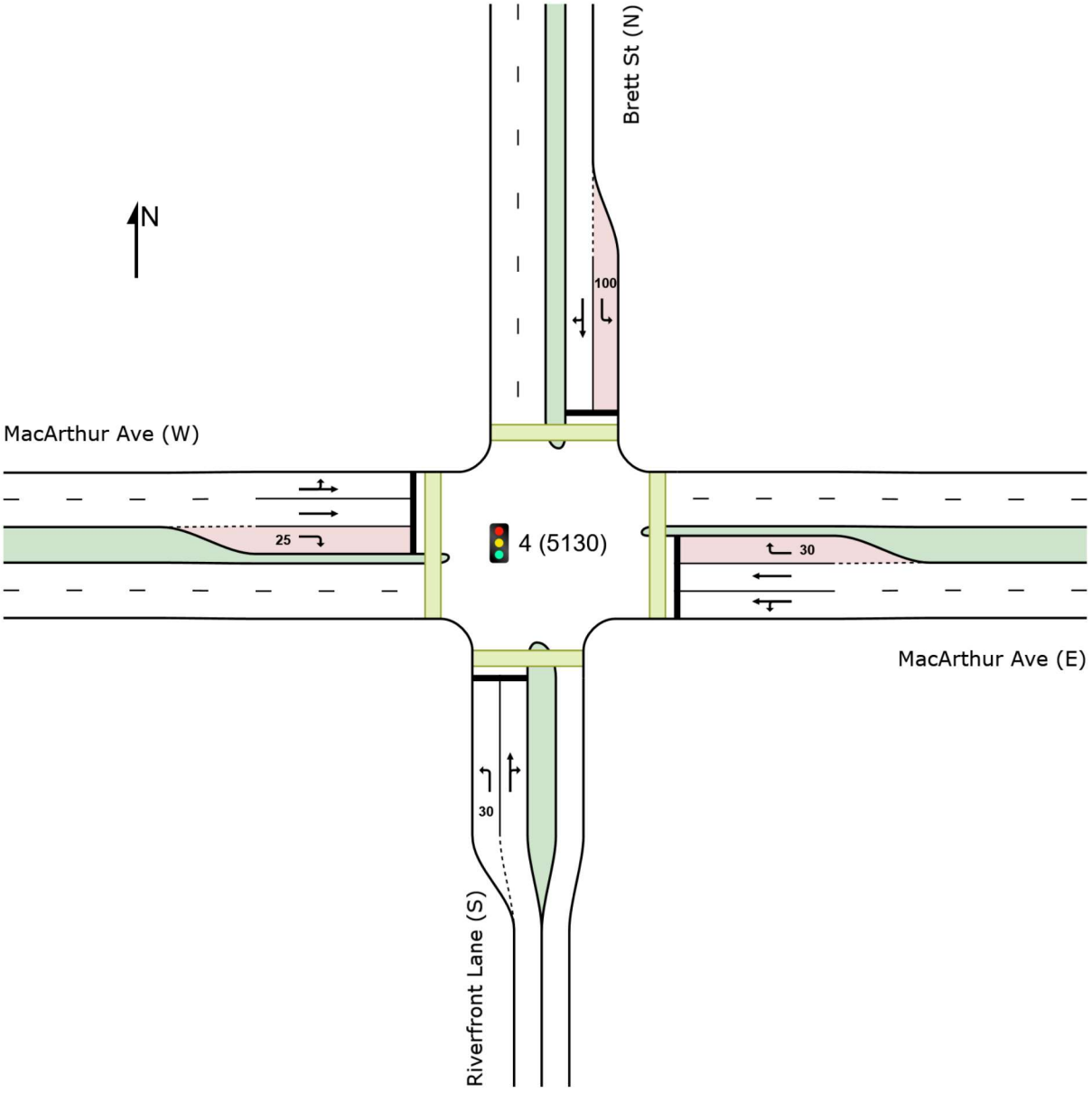


SITE LAYOUT

Site: 4 (5130) [4_S2_AM MacArthur Ave_ Brett St (Site Folder: April 2024 AM)]

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: C:\Users\lflueckiger\Urbis Pty Ltd\P0042473 Northshore - Major Roads - General\02_Workspace\08_Transport Advisory\01_Analysis\SIDRA\P0042473 Intersections 2&4 240715.sip9

MOVEMENT SUMMARY

Site: 2 (5131) [2_S2_AM Theodore St_MacArthur Ave North (Site Folder: April 2024 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.453	69.7	LOS E	9.3	70.4	0.95	0.77	0.95	16.4
2	T1	All MCs	280	9.0	280	9.0	*0.453	63.7	LOS E	9.4	70.6	0.95	0.77	0.95	18.8
3	R2	All MCs	280	1.0	280	1.0	*0.527	56.2	LOS D	16.9	119.4	0.89	0.82	0.89	14.3
Approach			561	5.0	561	5.0	0.527	60.0	LOS E	16.9	119.4	0.92	0.79	0.92	16.9
East: MacArthur Ave North (E)															
4	L2	All MCs	1	0.0	1	0.0	0.003	70.6	LOS F	0.1	0.4	0.80	0.59	0.80	13.9
5	T1	All MCs	57	0.0	57	0.0	*0.538	71.0	LOS F	15.8	111.8	0.92	0.81	0.92	16.8
6	R2	All MCs	192	2.0	192	2.0	0.538	75.6	LOS F	15.8	111.8	0.92	0.81	0.92	18.7
Approach			249	1.5	249	1.5	0.538	74.5	LOS F	15.8	111.8	0.92	0.81	0.92	18.3
North: Theodore Street (N)															
7	L2	All MCs	99	3.0	99	3.0	0.385	68.6	LOS E	6.7	47.9	0.95	0.78	0.95	16.3
8	T1	All MCs	5	10.0	5	10.0	0.017	55.5	LOS D	0.3	2.4	0.86	0.57	0.86	20.0
9	R2	All MCs	23	7.0	23	7.0	0.043	43.9	LOS D	1.2	8.7	0.74	0.68	0.74	24.6
Approach			127	4.0	127	4.0	0.385	63.5	LOS E	6.7	47.9	0.91	0.75	0.91	17.8
West: MacArthur Ave North (W)															
10	L2	All MCs	55	0.0	55	0.0	*0.292	73.4	LOS F	3.8	26.6	0.97	0.75	0.97	18.4
11	T1	All MCs	2	0.0	2	0.0	0.013	61.1	LOS E	0.2	1.4	0.90	0.59	0.90	15.7
12	R2	All MCs	1	0.0	1	0.0	0.013	65.6	LOS E	0.2	1.4	0.90	0.59	0.90	16.3
Approach			58	0.0	58	0.0	0.292	72.8	LOS F	3.8	26.6	0.96	0.74	0.96	18.3
All Vehicles			996	3.7	996	3.7	0.538	64.8	LOS E	16.9	119.4	0.92	0.79	0.92	17.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4_S2_AM MacArthur Ave_ Brett St (Site Folder: April 2024 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	55.0	LOS D	0.1	0.4	0.84	0.56	0.84	14.6
2	T1	All MCs	1	0.0	1	0.0	0.009	60.9	LOS E	0.1	0.9	0.89	0.57	0.89	10.8
3	R2	All MCs	1	0.0	1	0.0	0.009	62.6	LOS E	0.1	0.9	0.89	0.57	0.89	13.9
Approach			3	0.0	3	0.0	0.009	59.5	LOS E	0.1	0.9	0.88	0.57	0.88	13.1
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.167	24.5	LOS B	6.4	44.9	0.53	0.45	0.53	26.9
5	T1	All MCs	357	1.0	357	1.0	0.167	17.8	LOS B	6.4	44.9	0.53	0.45	0.53	34.0
6	R2	All MCs	1	0.0	1	0.0	0.014	81.1	LOS F	0.1	0.5	0.98	0.59	0.98	13.5
Approach			359	1.0	359	1.0	0.167	18.0	LOS B	6.4	44.9	0.53	0.45	0.53	33.9
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	0.004	42.3	LOS C	0.0	0.3	0.88	0.59	0.88	20.3
8	T1	All MCs	1	0.0	1	0.0	0.009	63.9	LOS E	0.1	0.9	0.89	0.61	0.89	10.7
9	R2	All MCs	1	0.0	1	0.0	0.009	65.4	LOS E	0.1	0.9	0.89	0.61	0.89	15.7
Approach			3	0.0	3	0.0	0.009	57.2	LOS E	0.1	0.9	0.89	0.60	0.89	15.4
West: MacArthur Ave (W)															
10	L2	All MCs	1	25.0	1	25.0	* 0.336	27.0	LOS B	14.1	101.2	0.60	0.52	0.60	27.9
11	T1	All MCs	708	3.0	708	3.0	0.336	25.3	LOS B	14.1	101.2	0.60	0.52	0.60	32.8
12	R2	All MCs	1	0.0	1	0.0	* 0.014	92.0	LOS F	0.1	0.5	0.98	0.59	0.98	11.6
Approach			711	3.0	711	3.0	0.336	25.4	LOS B	14.1	101.2	0.60	0.52	0.60	32.7
All Vehicles			1076	2.3	1076	2.3	0.336	23.1	LOS B	14.1	101.2	0.58	0.50	0.58	32.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 (5131) [2_S2_PM Theodore St_MacArthur Ave North (Site Folder: April 2024 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

2_MacArthur Ave North_Theodore Street
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Theodore Street (S)															
1	L2	All MCs	1	0.0	1	0.0	0.272	55.1	LOS D	8.0	56.4	0.84	0.69	0.84	19.3
2	T1	All MCs	276	1.0	276	1.0	0.272	49.9	LOS D	8.0	56.5	0.84	0.69	0.84	21.9
3	R2	All MCs	264	0.0	264	0.0	*0.606	63.9	LOS E	17.1	119.7	0.94	0.83	0.94	13.1
Approach			541	0.5	541	0.5	0.606	56.8	LOS E	17.1	119.7	0.89	0.76	0.89	17.7
East: MacArthur Ave North (E)															
4	L2	All MCs	43	0.0	43	0.0	0.164	66.0	LOS E	2.8	19.6	0.92	0.73	0.92	11.8
5	T1	All MCs	58	0.0	58	0.0	*0.373	60.2	LOS E	7.8	54.7	0.93	0.77	0.93	15.7
6	R2	All MCs	61	1.0	61	1.0	0.373	64.7	LOS E	7.8	54.7	0.93	0.77	0.93	17.5
Approach			162	0.4	162	0.4	0.373	63.4	LOS E	7.8	54.7	0.93	0.76	0.93	15.4
North: Theodore Street (N)															
7	L2	All MCs	268	0.0	268	0.0	*0.613	60.0	LOS E	17.6	123.1	0.95	0.83	0.95	17.8
8	T1	All MCs	281	4.0	281	4.0	0.563	60.4	LOS E	17.8	128.6	0.92	0.79	0.92	20.8
9	R2	All MCs	1	1.0	1	1.0	0.002	57.8	LOS E	0.1	0.4	0.77	0.59	0.77	23.3
Approach			551	2.0	551	2.0	0.613	60.2	LOS E	17.8	128.6	0.94	0.81	0.94	19.3
West: MacArthur Ave North (W)															
10	L2	All MCs	17	19.0	17	19.0	0.073	65.3	LOS E	1.1	8.8	0.90	0.70	0.90	19.7
11	T1	All MCs	95	0.0	95	0.0	*0.292	59.1	LOS E	6.2	43.1	0.92	0.73	0.92	16.3
12	R2	All MCs	1	0.0	1	0.0	0.292	63.7	LOS E	6.2	43.1	0.92	0.73	0.92	16.9
Approach			113	2.8	113	2.8	0.292	60.1	LOS E	6.2	43.1	0.92	0.72	0.92	16.9
All Vehicles			1366	1.3	1366	1.3	0.613	59.2	LOS E	17.8	128.6	0.92	0.77	0.92	18.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Theodore Street (S)												
P1	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
East: MacArthur Ave North (E)												

P2	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
North: Theodore Street (N)												
P3	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
West: MacArthur Ave North (W)												
P4	Full	50	53	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90
All Pedestrians		200	211	67.4	LOS F	0.2	0.2	0.95	0.95	221.2	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 (5130) [4_S2_PM MacArthur Ave_ Brett St (Site Folder: April 2024 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

MacArthur Ave/ Brett St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Riverfront Lane (S)															
1	L2	All MCs	1	0.0	1	0.0	0.003	52.3	LOS D	0.1	0.4	0.82	0.56	0.82	15.1
2	T1	All MCs	1	0.0	1	0.0	0.008	58.9	LOS E	0.1	0.9	0.88	0.57	0.88	11.1
3	R2	All MCs	1	0.0	1	0.0	0.008	60.5	LOS E	0.1	0.9	0.88	0.57	0.88	14.2
Approach			3	0.0	3	0.0	0.008	57.2	LOS E	0.1	0.9	0.86	0.56	0.86	13.5
East: MacArthur Ave (E)															
4	L2	All MCs	1	0.0	1	0.0	0.311	28.1	LOS B	12.9	91.3	0.61	0.53	0.61	24.9
5	T1	All MCs	631	1.0	631	1.0	0.311	26.1	LOS B	12.9	91.3	0.61	0.53	0.61	31.8
6	R2	All MCs	1	0.0	1	0.0	0.014	90.1	LOS F	0.1	0.5	0.98	0.59	0.98	13.5
Approach			633	1.0	633	1.0	0.311	26.3	LOS B	12.9	91.3	0.61	0.53	0.61	31.7
North: Brett St (N)															
7	L2	All MCs	1	0.0	1	0.0	0.004	39.2	LOS C	0.0	0.3	0.86	0.59	0.86	21.2
8	T1	All MCs	1	0.0	1	0.0	0.008	61.9	LOS E	0.1	0.9	0.88	0.61	0.88	11.0
9	R2	All MCs	1	0.0	1	0.0	0.008	63.4	LOS E	0.1	0.9	0.88	0.61	0.88	16.1
Approach			3	0.0	3	0.0	0.008	54.9	LOS D	0.1	0.9	0.87	0.60	0.87	15.8
West: MacArthur Ave (W)															
10	L2	All MCs	102	3.0	102	3.0	*0.341	28.6	LOS C	14.2	100.3	0.63	0.61	0.63	26.8
11	T1	All MCs	583	0.0	583	0.0	0.341	29.3	LOS C	14.5	101.7	0.63	0.57	0.63	31.1
12	R2	All MCs	1	0.0	1	0.0	*0.014	93.2	LOS F	0.1	0.5	0.98	0.59	0.98	11.6
Approach			686	0.4	686	0.4	0.341	29.3	LOS C	14.5	101.7	0.63	0.58	0.63	30.5
All Vehicles			1325	0.7	1325	0.7	0.341	28.0	LOS B	14.5	101.7	0.62	0.56	0.62	30.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Riverfront Lane (S)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
East: MacArthur Ave (E)												

P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
North: Brett St (N)												
P3	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
West: MacArthur Ave (W)												
P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90
All Pedestrians		200	211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200.0	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.