TRAFFIC AND PARKING IMPACT ASSESSMENT OF THE PROPOSED CHILD CARE CENTRE AT 25 HARDY AVENUE, WAGGA WAGGA

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Transport Planning, Traffic Impact Assessments, Road Safety Audits, Expert Witness

230524.01FA - 19 September 2023

Development Type: **Child Care Centre**

Site Address: **25 Hardy Avenue, Wagga Wagga**

Prepared for: **Brenham Pty Ltd c/- Innovate Architects**

Document reference: **230524.01FA**

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1 INTRODUCTION

M^CLaren Traffic Engineering was commissioned by *Brenham Pty Ltd c/- Innovate Architects* to provide a traffic and parking impact assessment of the proposed Child Care Centre at 25 Hardy Avenue, Wagga Wagga as depicted in **Annexure A**.

1.1 Description and Scale of Development

The proposed development has the following characteristics relevant to traffic and parking:

- Child care centre accommodating 72 children and 15 staff members consisting of the following age split:
    - 30 children between 0-2 years old (staff assigned at 1 per 4 children, or 8 staff);
    - 23 children between 2-3 years old (staff assigned at 1 per 5 children, or 5 staff);
    - 19 children between 3-5 years old (staff assigned at 1 per 10 children, or 2 staff).
- Vehicular access is proposed via a two-way driveway providing access to an at-grade parking area, accommodating 18 car parking spaces including:
    - Eight (8) visitor car parking spaces, including one (1) accessible space;
    - Ten (10) staff car parking spaces.

1.2 State Environmental Planning Policy (Transport and Infrastructure) 2021

The proposed development does not qualify as a traffic generating development with relevant size and/or capacity under *Clause 2.122* of the *SEPP (Transport and Infrastructure) 2021*. Accordingly, formal referral to Transport for NSW (TfNSW) is unnecessary, and the application can be assessed by City of Wagga Wagga Council officers.

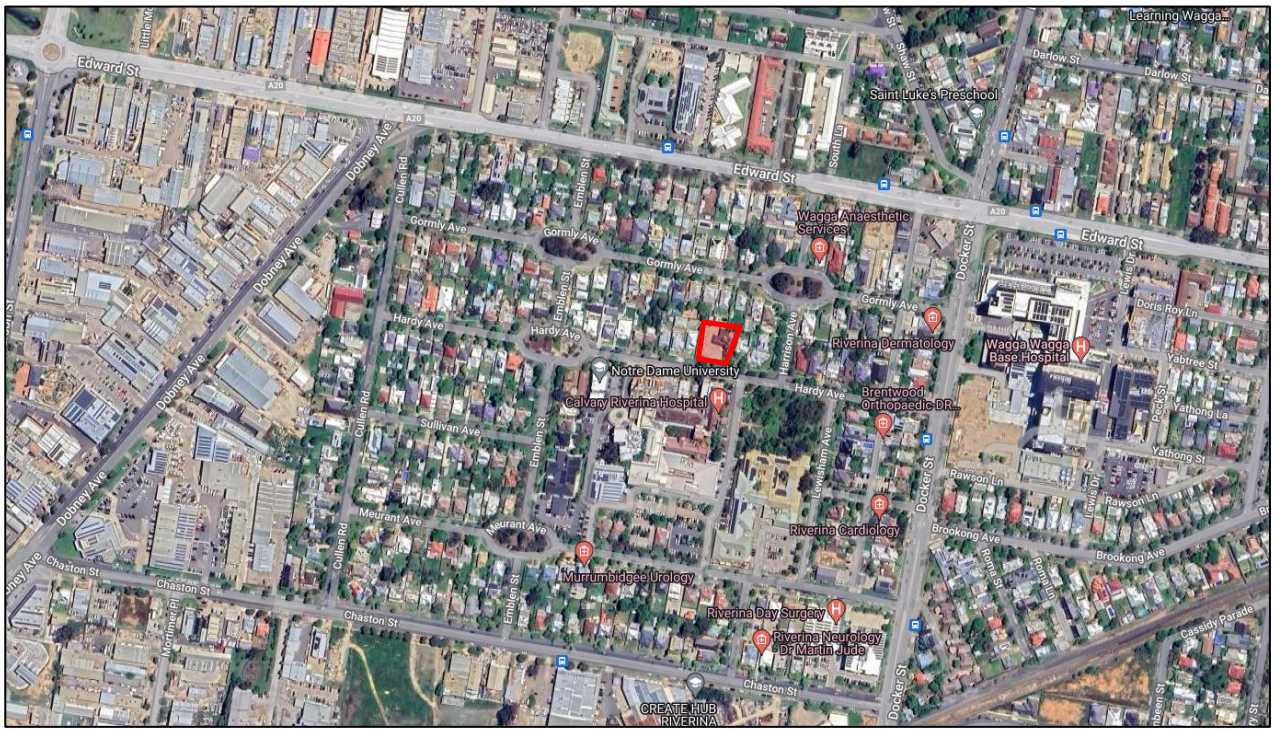
1.3 Site Description

The subject development is currently zoned *R1 – General Residential* under the *Wagga Wagga Local Environmental Plan 2010.* The subject site is currently occupied by a Medical Centre and has a single street frontage to Hardy Avenue to the south.

The site is generally surrounded by low density residential dwellings with Calvary Riverina Hospital located directly to the south of the subject site and Wagga Wagga Base Hospital location approximately 300m to the east of the subject site.

1.4 Site Context

The location of the site is shown on an aerial photo and a street map in **Figure 1** and **Figure 2** respectively.



Site Location

FIGURE 1: SITE CONTEXT – AERIAL PHOTO

Site Location

FIGURE 2: SITE CONTEXT – STREET MAP

2 EXISTING TRAFFIC AND PARKING CONDITIONS

2.1 Road Hierarchy

The road network servicing the site has characteristics as described in the following sub-sections.

2.1.1 Hardy Avenue

- Unclassified LOCAL Road.
- Approximately 9m wide carriageway facilitating two-way traffic flow and kerbside parking permitted on the southern side of the road.
- No signposted speed limit, default 50km/h speed limit applies.
- Parking restrictions are as follows:
    - Unrestricted kerbside parking permitted along the southern side of the road, west of Harrision Avenue;
    - "*No Parking*" restrictions along the northern side of the road, west of Harrison Avenue;
    - Unrestricted kerbside parking permitted along the northern side of the road, east of Harrison Avenue;
    - "*No Parking*" restrictions along the southern side of the road, east of Harrison Avenue.

2.1.2 Emblen Street

- Unclassified LOCAL Road.
- Approximately 9m wide carriageway facilitating two-way traffic flow and kerbside parking on both sides of the road.
- No signposted speed limit – 50km/h speed limit applies.
- Unrestricted kerbside parking permitted along both sides of the road.

2.1.3 Harrison Avenue

- Unclassified LOCAL Road.
- Approximately 9m wide carriageway facilitating two-way traffic flow and kerbside parking on both sides of the road.
- No signposted speed limit – default 50km/h speed limit applies.
- Unrestricted kerbside parking permitted along both sides of the road.

2.1.4 Docker Street

- TfNSW Classified REGIONAL Road (No. 211).
- Approximately 19m wide carriageway facilitating two (2) traffic flow lanes in each direction separated by 1.5m wide raised median with kerbside parking permitted along both sides of the road.
- Signposted 50km/h speed limit.
- 'No Stopping' restrictions on the western side of the road before Dwyer Ave.
- Parking restrictions are as follows:
    - Signposted "2P" parking restrictions (between 8:30am to 6:30pm, Monday to Friday & 8:30am to 12:30pm, Saturday) along the Wagga Wagga Hospital frontage;
    - Signposted "2P" parking restrictions (between 8:30am to 6:30pm, Monday to Friday & 8:30am to 12:30pm, Saturday) along the western side of the street, north of Gormly Avenue;
    - Unrestricted kerbside parking permitted along the western side of the street, south of Gormly Avenue.

2.2 Existing Traffic Management

- Left-in, left-out only priority controlled intersection of Hardy Avenue / Emblen Street;
    - Central median facilitating clockwise circulating vehicles.
- "Give Way" controlled intersection of Hardy Avenue / Docker Lane.
- Priority controlled intersection of Hardy Avenue / Harrison Avenue.
- Priority controlled intersection of Hardy Avenue / Lewisham Avenue.
- Priority controlled intersection of Hardy Avenue / Docker Street.

2.3 Existing Traffic Environment

Turning movement count traffic surveys were conducted at the intersections of Emblen Street / Hardy Avenue and Hardy Avenue / Harrison Avenue from 7:00am to 9:30am and 3:00pm to 6:00pm on Thursday, 27 July 2023 representing a typical operating weekday. The full survey results are shown in **Annexure B** for reference.

2.3.1 Existing Road Performance

The performance of the surrounding intersections under the existing traffic conditions has been assessed using SIDRA INTERSECTION 9.1, **Table 1** summarises the resultant intersection performance data, with full SIDRA results reproduced in **Annexure C**.

It should be noted that while the intersection of Hardy Avenue / Emblen Street is not strictly a roundabout, it is anticipated that the intersection would operate with the same characteristics as a roundabout and has therefore been modelled as a roundabout within SIDRA.

TABLE 1: EXISTING INTERSECTION PERFORMANCES (SIDRA INTERSECTION 9.1)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Emblen St / Hardy Avenue	AM	0.02	3.7 (Worst: 11.9)	**A** (Worst: A)	Roundabout	UT from Hardy Avenue
	PM	0.02	4.7 (Worst: 11.9)	**A** (Worst: A)		UT from Hardy Avenue
Hardy Avenue / Harrison Avenue	AM	0.05	1.3 (Worst: 5.7)	**NA** (Worst: A)	Give Way	RT from Harrison Avenue
	PM	0.04	1.7 (Worst: 5.6)	**NA** (Worst: A)		RT from Harrison Avenue

Notes:

(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

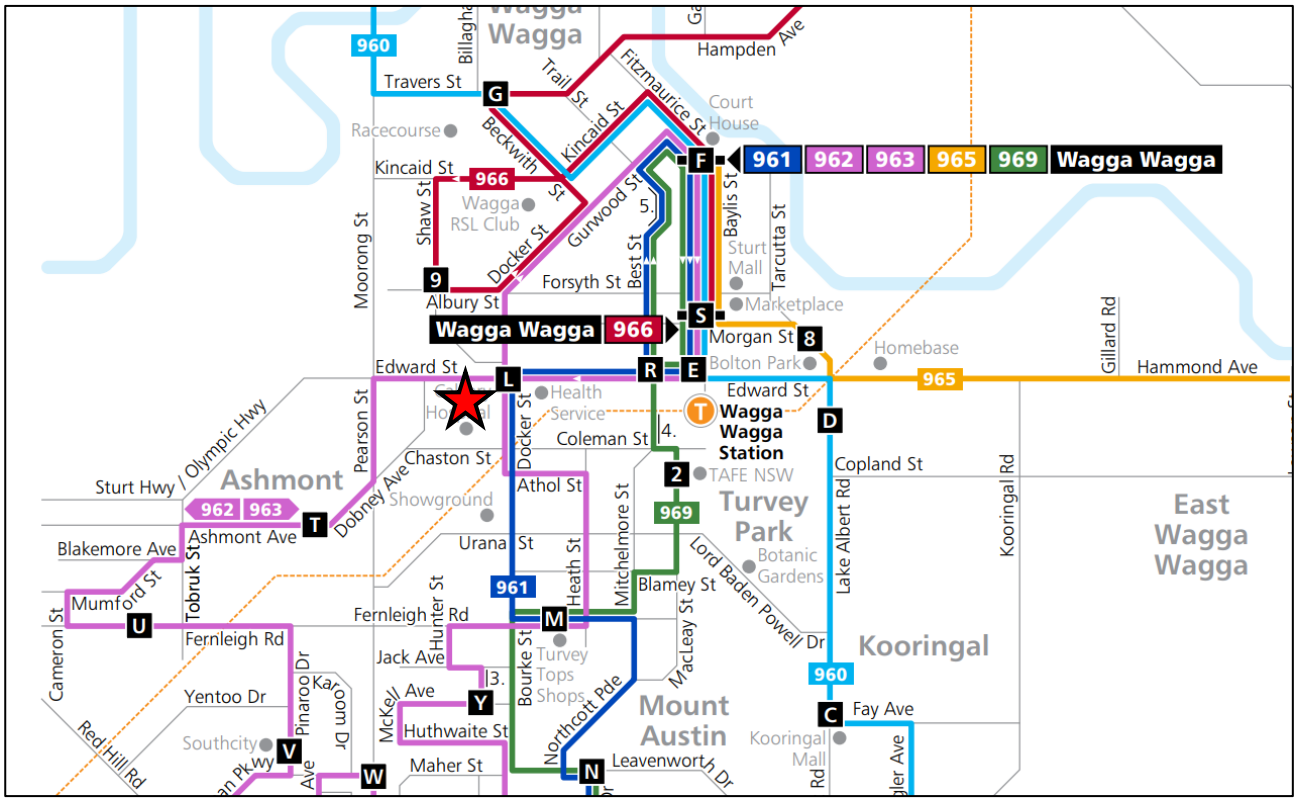
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown, the intersection of Emblen Street / Hardy Avenue currently performs at a Level of Service (LoS) “A” in both the AM & PM peak hour periods. The intersection of Hardy Avenue / Harrison Avenue operates with worst movement LoS “A” in the AM and PM peak hour periods. The LoS “A” performance is characterised by low approach delays and spare capacity.

2.4 Public Transport

The subject site has access to the existing bus stop (ID: 2650193) located approximately 260m walking distance to the east of the site on Docker Street. The bus stop services existing bus routes 961 (Wagga Wagga to Bourkelands to Wagga Wagga) and 962 (Glenfield Park to Wagga Wagga via Ashmont) provided by Busabout Wagga.

The location of the site subject to the surrounding public transport network is shown in **Figure 3**.



Site Location

FIGURE 3: PUBLIC TRANSPORT NETWORK MAP

2.5 Future Road and Infrastructure Upgrades

From City of Wagga Wagga Council Development Application tracker and TfNSW Projects website, it appears that there are no future planned road or public transport changes that will affect traffic conditions within the immediate vicinity of the subject site.

3 PARKING ASSESSMENT

3.1 Council Parking Requirement

Reference is made to the *Wagga Wagga City Council Development Control Plan 2010 (*WDCP 2010*) - Part A Section 2 - Controls that apply to all development,* which designates the following parking rates applicable to the proposed development:

2.2 Off-street parking

Table 1

Preschools and childcare centres *1 space/ 4 children in attendance*

Table 2 presents the parking requirements of the proposal according to Council's above car parking rates.

TABLE 2: DCP PARKING RATES

Land Use	Scale	Rate	Spaces Required	Spaces Provided
Child Care Centre	72 Children	1 per 4 children	18	18

As shown, strict application of the WDCP 2010 requires the provision of **18** car parking spaces. The proposed plans detail the provision of **18** car parking spaces, satisfying WDCP 2010 car parking requirements.

3.2 Parking for People with Disabilities

WDCP 2010 does not outline car parking rates for people with disabilities applicable to child care centre developments. As such, reference is made to *Section D4D6* of the *Building Code of Australia* (BCA) as part of the *National Construction Code 2022* (NCC) which categorises a child care centre as a Class 9b building and therefore requires the provision of car parking for people with disabilities at a rate of:

Class 9b *1 space for every 50 carparking spaces or part thereof.*

In accordance with the BCA requirements, one (**1**) car parking space for people with disabilities is to be provided. The proposed car parking layout details the provision of one (**1**) car parking space designed in accordance with *AS2890.6:2022*, complying with BCA requirements.

3.3 Bicycle & Motorcycle Parking Requirements

WDCP 2010 does not require the provision of bicycle / motorcycle parking. Accordingly, no bicycle / motorcycle parking facilities have been provided, thus satisfying the WDCP 2010 requirements.

3.4 Servicing & Loading

The WDCP 2010 does not specify the requirement for service facilities to be made available within child care centres. It is expected that all deliveries will be undertaken within the proposed car parking area outside peak drop off / pick up times, under a plan of management if necessary. A van (standard B99 design vehicle) or similar can be accommodated within the car parking area, utilising vacant visitor spaces. This is common practice for child care centres and will not noticeably affect operation of the site. It is reiterated that deliveries and other arrivals of similar nature are low in frequency and can be easily managed.

It is expected that site will be serviced by Council's waste collection services from the Hardy Avenue frontage, similar to existing operations.

3.5 Car Park Design & Compliance

The car parking layout as depicted in **Annexure A,** has been assessed to achieve the relevant clauses and objectives of *AS2890.1:2004* and *AS2890.6:2022*. Swept path testing has been undertaken and the results are reproduced within **Annexure D** for reference.

The proposed car parking and vehicular access design achieves the following:

- 5.7m wide two-way driveway facilitating access to Hardy Avenue;
- Minimum 6.2m wide parking aisles;
- Minimum 5.4m long, 2.4m wide spaces for staff;
- Minimum 5.4m long, 2.7m wide spaces for visitors;
- Minimum 5.4m long, 2.4m wide accessible spaces with adjacent associated 5.4m long, 2.4m wide shared space;
- 2.0m x 2.5m pedestrian sight triangles clear of obstructions.

Whilst the plans have been assessed to comply with the relevant standards, it is usual and expected that a design certificate be required at the Construction Certificate stage to account for any changes following the development application.

4 TRAFFIC ASSESSMENT

The impact of the expected traffic generation levels associated with the subject proposal is discussed in the following sub-sections.

4.1 Traffic Generation

Traffic generation rates for the relevant land uses are provided in the *RTA Guide to Traffic Generating Developments (2002)* and recent supplements as adopted by *Transport for NSW* (TfNSW) and are as follows:

> ***3.11.3 Child care centres***
>
> *Long-day care*
>
> *7.00-9.00am* *0.8 peak vehicle trips per child*
>
> *2.30-4.00pm* *0.3 peak vehicle trips per child*
>
> *4.00-6.00pm* *0.7 peak vehicle trips per child*

The resulting AM and PM peak hourly traffic generation is summarised in **Table 3**.

TABLE 3: ESTIMATED TRAFFIC GENERATION

Use	Scale	Peak	Generation Rate	Trips[(1)]
Long-day care	72 Children	AM	0.8 per child	58 (29 in, 29 out)
		PM	0.7 per child	50 (25 in, 25 out)

Notes:
(1) 50/50 inbound/outbound split.

As shown, the expected traffic generation associated with the proposed development is in the order of **58** vehicle trips in the AM peak period (29 in, 29 out) and **50** vehicle trips in the PM peak period (25 in, 25 out).

It should be noted that this impact is conservative as it does not consider the reduction in traffic due to the removal of the existing medical centre.

4.2 Traffic Assignment

The road network, traffic surveys and locations of residential areas surrounding the site have been assessed and the following traffic assignment has been assumed for all traffic to and from the site:

- 50% arrive from / depart to the west via Hardy Avenue;
- 50% arrive from / depart to the east via Hardy Avenue.

4.3 Traffic Impact

The traffic generation outlined in **Section 4.1** & **4.2** above has been added to the existing traffic volumes recorded. SIDRA INTERSECTION 9.1 was used to assess the intersections performance. The purpose of this assessment is to compare the existing intersection operations to the future scenario under the increased traffic load. The results of this assessment are shown in **Table 4**.

TABLE 4: INTERSECTION PERFORMANCE (SIDRA INTERSECTION 9.1)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Emblen St / Hardy Avenue	AM	0.02	3.7 (Worst: 11.9)	**A** (Worst: A)	Roundabout	UT from Hardy Avenue
	PM	0.02	4.7 (Worst: 11.9)	**A** (Worst: A)		UT from Hardy Avenue
Hardy Avenue / Harrison Avenue	AM	0.05	1.3 (Worst: 5.7)	**NA** (Worst: A)	Give Way	RT from Harrison Avenue
	PM	0.04	1.7 (Worst: 5.6)	**NA** (Worst: A)		RT from Harrison Avenue
FUTURE PERFORMANCE						
Emblen St / Hardy Avenue	AM	0.02	4 (Worst: 11.9)	**A** (Worst: A)	Roundabout	UT from Hardy Avenue
	PM	0.02	4.8 (Worst: 11.9)	**A** (Worst: A)		UT from Hardy Avenue
Hardy Avenue / Harrison Avenue	AM	0.06	1.6 (Worst: 5.9)	**NA** (Worst: A)	Give Way	RT from Harrison Avenue
	PM	0.05	1.9 (Worst: 5.7)	**NA** (Worst: A)		RT from Harrison Avenue

NOTES: Refer to **Table 1**.

As shown, the intersections of Emblen Street / Hardy Avenue and Hardy Avenue / Harrison Avenue all retain the same overall level of service under future conditions with minimal delays and additional capacity, indicating that there will be no adverse impact on the existing road network as a result of the proposed development.

5 CONCLUSIONS

In view of the foregoing, the subject Child Care Centre proposal at 25 Hardy Avenue, Wagga Wagga (as depicted in **Annexure A**) is fully supportable in terms of its traffic and parking impacts. The following outcomes of this traffic impact assessment are relevant to note:

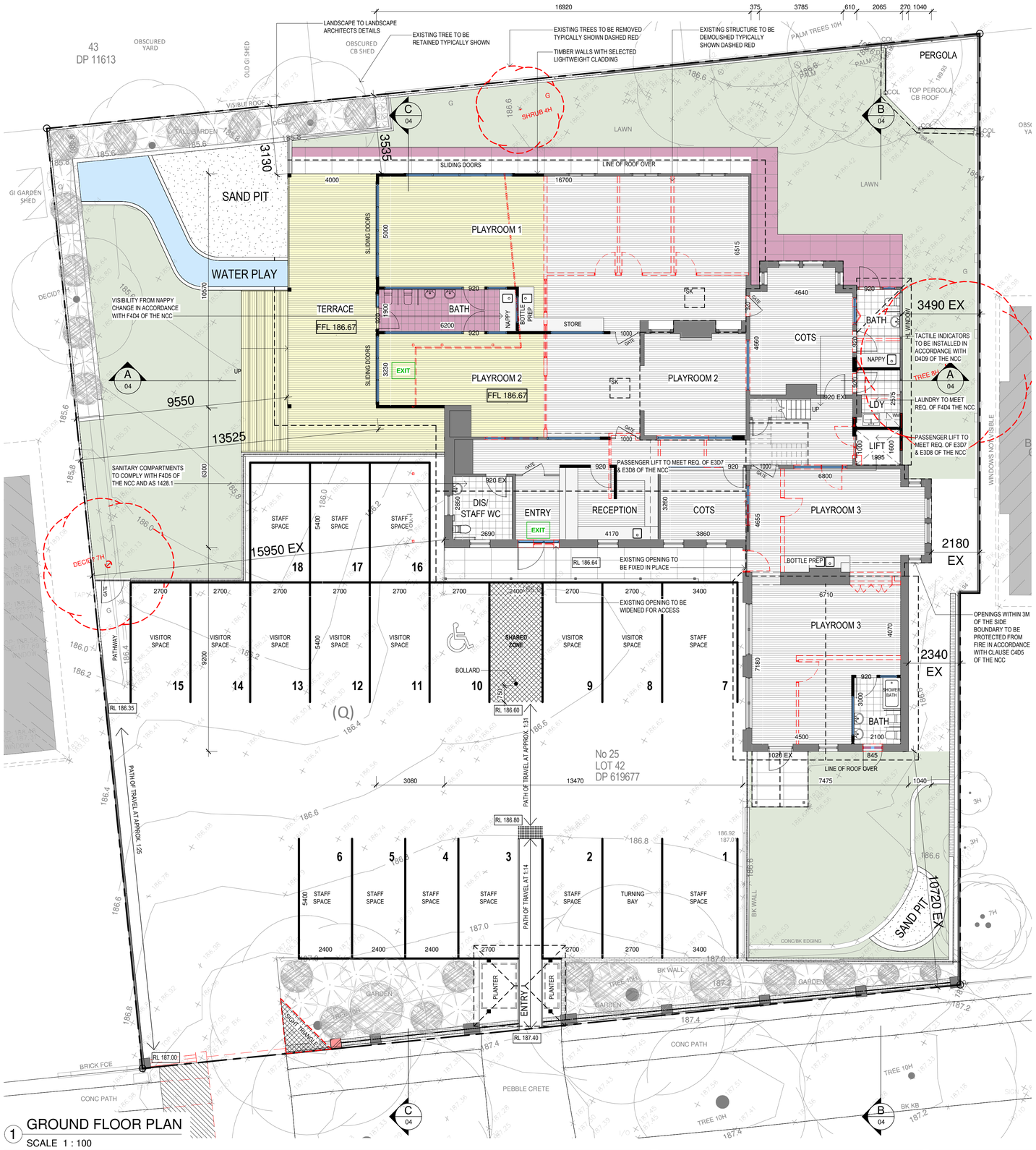
a) The proposal includes the provision of **18** car parking spaces within a proposed carpark, comprised of **10** for staff use and eight (**8**) for visitor use, satisfying WDCP 2010 parking requirements.

b) WDCP 2010 does not require the provision of bicycle and motorcycle parking facilities. As such nil (**0**) bicycle / motorcycle parking spaces have been provided.

c) The parking areas of the site have been assessed against the relevant sections of *AS2890.1:2004* and *AS2890.6:2022* and have been found to satisfy the objectives of each standard. Swept path testing has been undertaken and the results are reproduced within **Annexure D**.

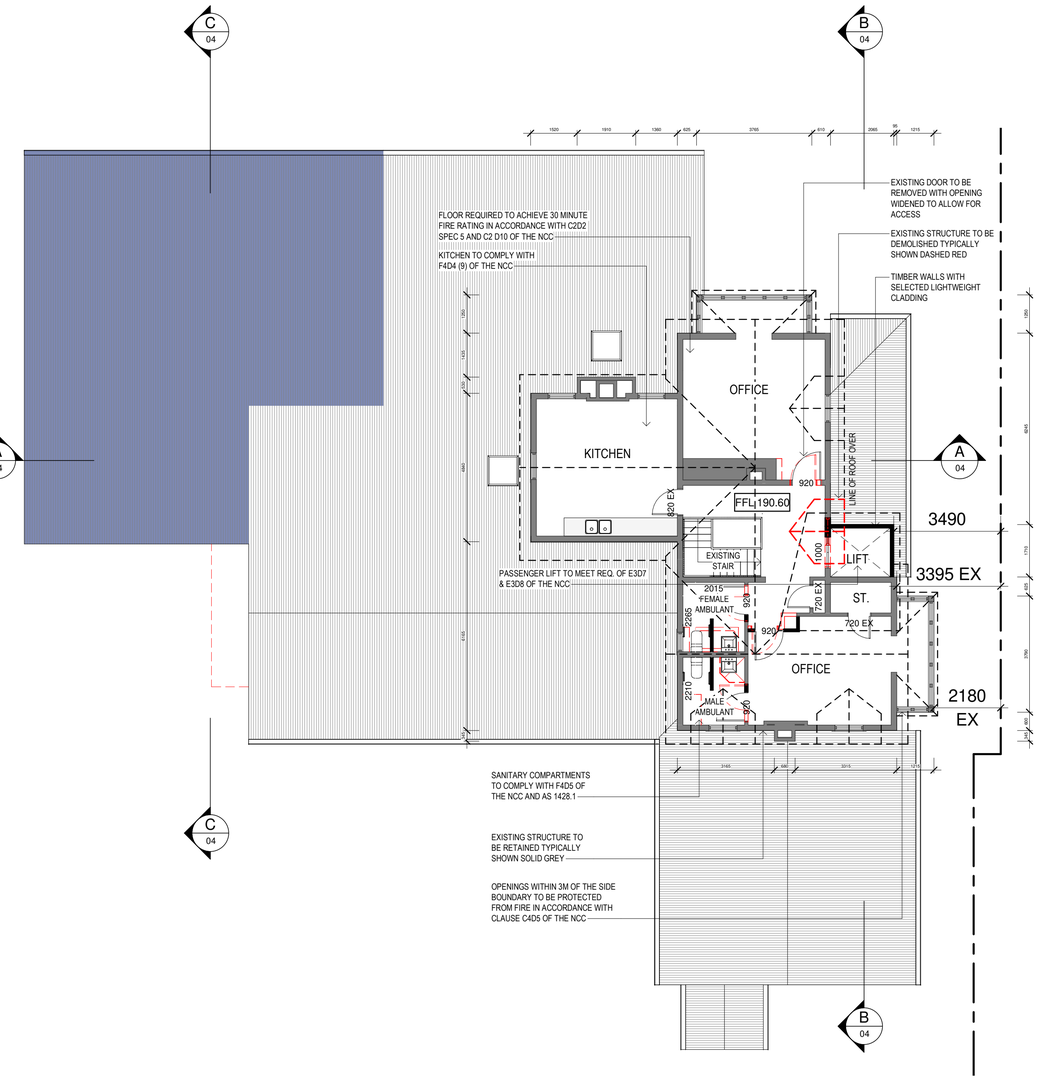
d) The traffic generation of the proposed development has been estimated to be some **58** trips in the AM peak period (29 in, 29 out) and **50** trips in the PM peak period (25 in, 25 out). The impacts of the traffic generation have been modelled using SIDRA INTERSECTION 9.1, indicating that there will be no adverse impact to the performance of the intersections as a result of the generated traffic.

ANNEXURE A: PROPOSED PLANS
(1 SHEET)



1 GROUND FLOOR PLAN

SCALE 1 : 100



2 FIRST FLOOR PLAN

SCALE 1 : 100

NOTE: AUTOMATIC SMOKE DETECTION AND ALARM SYSTEMS TO BE INSTALLED THROUGHOUT THE BUILDING IN ACCORDANCE WITH CLAUSE E2D20 & SPECIFICATION 20 OF THE NCC

NOTE: FIRE SERVICES TO BE PROVIDED IN ACCORDANCE WITH SECTION E OF THE NCC AND THE FOLLOWING STANDARDS:

FIRE HYDRANTS:	AS2419.1-2021
FIRE HOSE REELS:	AS2441-2005
PORTABLE FIRE EXTINGUISHERS:	AS2444-2005
DETECTION:	AS1670.1-2018
EMERGENCY LIGHTING:	AS2293.1-2018
EXIT SIGNAGE:	AS2293.1-2018

COLOUR LEGEND

NOTE: ALL NEW WORKS ARE SHOWN COLOURED

- STEEL, GALVANISED IRON - PURPLE
- TILE - MAROON
- CONCRETE - OLIVE GREEN
- GLASS - LIGHT BLUE
- TIMBER - YELLOW
- BRICK - RED
- FIBRE CEMENT/CEMENT RENDER - LIGHT GREEN

LEGEND

- EXISTING STRUCTURE TO REMAIN
- PROPOSED STRUCTURE
- EXISTING WALLS & STRUCTURES TO BE REMOVED - TYPICAL

NOTE:

All existing & overall dimensions are nominal & subject to verification on site. where any discrepancy occurs between new work & existing dimensions - existing dimensions/work should take preference where necessary - otherwise notify Innovate Architects Pty Ltd.

Selected termite protection to be used on site in accordance with local council's requirements, B.C.A and all relevant Australian Standards.

Smoke detectors to comply with requirements of S20C4 of the NCC and AS 1670.1. Fire and smoke alarms shall be connected to the main power supply.

GENERAL NOTES:

All work to be carried out in accordance with the Building Code of Australia, all Local and State Government Ordinances, relevant Australian Standards, Local Electricity and Water Authorities Regulations and all other relevant Authorities concerned.
All structural work and site drainage to be subject to Engineer's details or certification where required by Council. This shall include r.c. slabs and footings, r.c. and steel beams and columns, wind bracing to AS 1170 and AS4055, anchor rods or bolts, tie downs, fixings etc., driveway slabs and drainage to Council's satisfaction.
All timbers to be in accordance with SAA Timber Structure Code AS1720 and SAA Timber Framing Code AS 1684. All work to be carried out in a professional and workmanship like manner according to the plans and specification.

NOTE:

Do not scale off the drawings unless otherwise stated and use figured dimensions in preference. All dimensions are to be checked and verified on site before the commencement of any work, all dimensions and levels are subject to final survey and set-out. No responsibility will be accepted by this firm for any variations in design, builder's method of construction or materials used, deviation from specification without permission or accepted work practices resulting in inferior construction. Locate and protect all services prior to construction.

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ISSUE	AMENDMENT	DATE	INT.
A	DEVELOPMENT APPLICATION	SEP 2023	MJ

0 1 2 3 4 5

Client: BRENHAM

Address: 25 HARDY AVENUE, WAGGA WAGGA

Project: ALTERATIONS AND ADDITIONS TO AN EXISTING STRUCTURE AND CREATION OF A CHILDCARE CENTRE

Drawing Title: FLOOR PLANS

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REGISTERED ARCHITECTS
Nominated Architect
Cameron Jones
7143

Architects

MEMBER

Drawn	MJ
Scale	1 : 100@A1
Check	CJ
Issue	A
Date	SEP 2023
Job Number	2866
Sheet	02

DEVELOPMENT APPLICATION

ANNEXURE B: TRAFFIC SURVEY DATA
(2 SHEETS)

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Hardy Ave and Emblen St, Wagga Wagga

GPS	*-35.118384, 147.351332*

Date:	Thu 27/07/23
Weather:	Fine
Suburban:	Wagga Wagga
Customer:	McLaren

North:	Emblen St
East:	Hardy Ave
South:	Emblen St
West:	Hardy Ave

Survey Period	AM:	7:00 AM-9:30 AM
	PM:	3:00 PM-6:00 PM
Traffic Peak	AM:	7:30 AM-8:30 AM
	PM:	3:15 PM-4:15 PM

All Vehicles

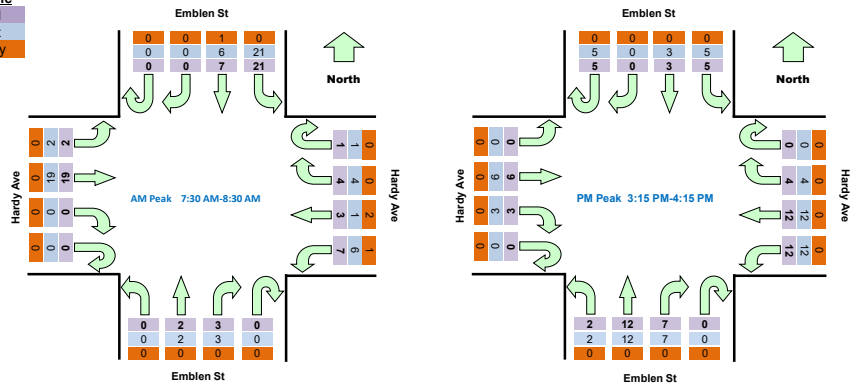
Time		North Approach Emblen St				East Approach Hardy Ave				South Approach Emblen St				West Approach Hardy Ave				Hourly Total	
Period Start	**Period End**	**U**	**R**	**SB**	**L**	**U**	**R**	**WB**	**L**	**U**	**R**	**NB**	**L**	**U**	**R**	**EB**	**L**	**Hour**	**Peak**
7:00	7:15	0	0	0	2	0	0	2	0	0	0	3	0	0	0	6	0	58	
7:15	7:30	0	0	0	3	0	0	0	0	0	0	3	1	0	0	2	0	66	
7:30	7:45	0	0	0	2	1	0	2	1	0	1	0	0	0	0	3	1	69	Peak
7:45	8:00	0	0	5	9	0	1	0	3	0	0	1	0	0	0	6	0	66	
8:00	8:15	0	0	2	7	0	3	1	3	0	1	0	0	0	0	4	0	61	
8:15	8:30	0	0	0	3	0	0	0	0	0	1	1	0	0	0	6	1	52	
8:30	8:45	0	0	1	3	0	0	0	0	0	0	2	0	0	0	1	1	49	
8:45	9:00	1	0	3	5	1	1	2	4	0	1	1	0	0	0	0	1		
9:00	9:15	0	0	0	3	0	1	2	2	0	0	0	0	0	0	4	0		
9:15	9:30	0	0	0	3	0	0	1	0	0	1	0	0	0	0	4	0		
15:00	15:15	0	0	1	4	0	1	2	4	0	1	0	0	0	0	0	0	64	
15:15	15:30	0	0	0	2	0	1	3	3	0	1	2	1	0	1	1	0	71	Peak
15:30	15:45	4	0	1	1	0	1	2	2	0	2	5	1	0	0	1	0	70	
15:45	16:00	1	0	2	1	0	1	3	4	0	0	1	0	0	2	1	0	65	
16:00	16:15	0	0	0	1	0	1	4	3	0	4	4	0	0	0	3	0	65	
16:15	16:30	0	1	1	0	0	1	4	3	0	0	1	0	0	0	3	0	53	
16:30	16:45	0	0	0	2	0	3	1	3	0	2	2	0	0	1	1	0	47	
16:45	17:00	0	0	3	2	0	1	2	1	0	1	4	0	0	0	1	1	39	
17:00	17:15	1	0	1	0	0	3	1	1	0	0	1	0	0	0	0	0	31	
17:15	17:30	1	0	1	1	0	0	2	2	0	0	1	0	0	0	0	0		
17:30	17:45	0	0	1	1	0	1	0	0	0	2	1	0	0	0	0	1		
17:45	18:00	0	0	0	1	0	0	3	1	0	0	1	0	0	0	2	0		

Peak Time		North Approach Emblen St				East Approach Hardy Ave				South Approach Emblen St				West Approach Hardy Ave				Peak
Period Start	**Period End**	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	**total**
7:30	8:30	0	0	7	21	1	4	3	7	0	3	2	0	0	0	19	2	69
15:15	16:15	5	0	3	5	0	4	12	12	0	7	12	2	0	3	6	0	71

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy



TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Hardy Ave and Harrison Ave, Wagga Wag

GPS *-35.118735, 147.353999*

Date:	Thu 27/07/23
Weather:	Fine
Suburban:	Wagga Wagga
Customer:	McLaren

North:	Harrison Ave
East:	Hardy Ave
South:	N/A
West:	Hardy Ave

Survey Period	AM:	7:00 AM-9:30 AM
	PM:	3:00 PM-6:00 PM
Traffic Peak	AM:	7:30 AM-8:30 AM
	PM:	3:00 PM-4:00 PM

All Vehicles

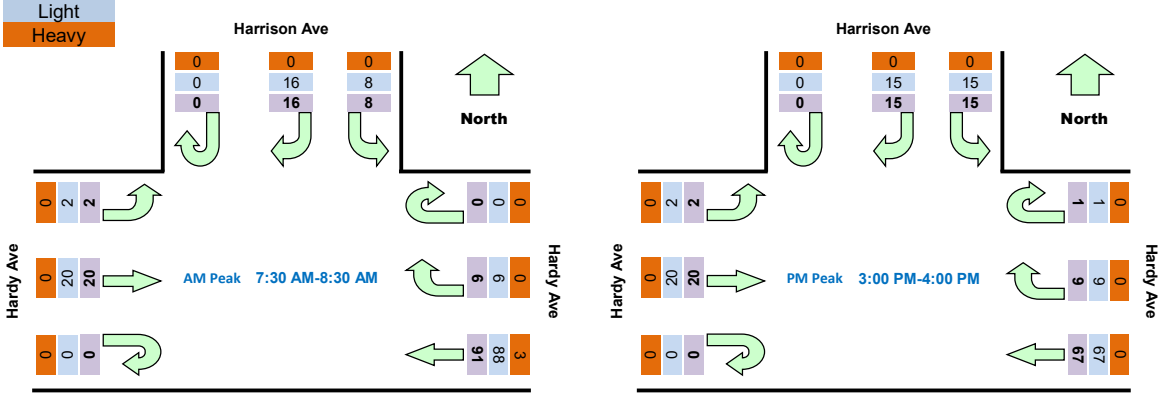
Time		orth Approach Harrison Av			East Approach Hardy Ave			West Approach Hardy Ave			Hourly Total	
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	Hour	Peak
7:00	7:15	0	1	0	0	2	9	0	4	0	106	
7:15	7:30	0	1	3	0	2	11	0	0	2	135	
7:30	7:45	0	1	0	0	1	25	0	5	0	143	Peak
7:45	8:00	0	10	3	0	0	24	0	2	0	143	Peak
8:00	8:15	0	4	3	0	4	28	0	5	1	143	Peak
8:15	8:30	0	1	2	0	1	14	0	8	1	134	
8:30	8:45	0	5	2	0	5	17	0	3	0	133	
8:45	9:00	0	4	5	0	5	24	0	1	0		
9:00	9:15	0	0	3	0	3	27	0	3	0		
9:15	9:30	0	5	1	0	0	15	0	5	0		
15:00	15:15	0	3	3	0	1	17	0	5	2	129	Peak
15:15	15:30	0	3	3	0	3	22	0	2	0	128	
15:30	15:45	0	3	4	0	4	13	0	8	0	117	
15:45	16:00	0	6	5	1	1	15	0	5	0	104	
16:00	16:15	0	2	2	0	4	13	0	9	0	94	
16:15	16:30	0	4	1	0	1	13	1	2	0	86	
16:30	16:45	0	5	0	0	1	7	0	6	0	81	
16:45	17:00	0	2	4	0	1	12	0	4	0	76	
17:00	17:15	0	0	8	0	2	8	0	4	0	65	
17:15	17:30	0	2	3	0	2	8	0	2	0		
17:30	17:45	0	1	3	0	1	7	0	2	0		
17:45	18:00	0	0	1	0	1	7	0	3	0		

Peak Time		orth Approach Harrison Av			East Approach Hardy Ave			West Approach Hardy Ave			Peak
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	total
7:30	8:30	0	16	8	0	6	91	0	20	2	143
15:00	16:00	0	15	15	1	9	67	0	20	2	129

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy



ANNEXURE C: SIDRA RESULTS
(8 SHEETS)

MOVEMENT SUMMARY

Site: 1 [(ExAM) Emblen Street / Hardy Avenue (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Existing AM Peak Period
Emblen Street / Hardy Avenue
Job No. 230524
Site Category: (None)
Roundabout

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: Emblen St (S)															
1	L2	All MCs	1	0.0	1	0.0	0.005	3.9	LOS A	0.0	0.1	0.06	0.52	0.06	43.7
2	T1	All MCs	2	0.0	2	0.0	0.005	2.7	LOS A	0.0	0.1	0.06	0.52	0.06	33.3
3	R2	All MCs	3	0.0	3	0.0	0.005	9.2	LOS A	0.0	0.1	0.06	0.52	0.06	45.1
Approach			6	0.0	6	0.0	0.005	6.2	LOS A	0.0	0.1	0.06	0.52	0.06	41.1
East: Hardy Avenue (E)															
4	L2	All MCs	7	14.3	7	14.3	0.010	2.4	LOS A	0.0	0.4	0.06	0.44	0.06	46.5
5	T1	All MCs	3	66.7	3	66.7	0.010	3.0	LOS A	0.0	0.4	0.06	0.44	0.06	41.8
6	R2	All MCs	4	0.0	4	0.0	0.010	9.5	LOS A	0.0	0.4	0.06	0.44	0.06	35.1
6u	U	All MCs	1	0.0	1	0.0	0.010	11.9	LOS A	0.0	0.4	0.06	0.44	0.06	41.1
Approach			16	20.0	16	20.0	0.010	5.1	LOS A	0.0	0.4	0.06	0.44	0.06	42.1
North: Emblen St (N)															
7	L2	All MCs	22	0.0	22	0.0	0.023	3.0	LOS A	0.1	0.7	0.11	0.41	0.11	46.4
8	T1	All MCs	7	14.3	7	14.3	0.023	2.2	LOS A	0.1	0.7	0.11	0.41	0.11	45.3
9	R2	All MCs	1	0.0	1	0.0	0.023	8.4	LOS A	0.1	0.7	0.11	0.41	0.11	31.9
Approach			31	3.4	31	3.4	0.023	3.0	LOS A	0.1	0.7	0.11	0.41	0.11	45.6
West: Hardy Avenue (W)															
10	L2	All MCs	2	0.0	2	0.0	0.014	2.3	LOS A	0.1	0.4	0.06	0.30	0.06	33.0
11	T1	All MCs	20	0.0	20	0.0	0.014	2.6	LOS A	0.1	0.4	0.06	0.30	0.06	51.7
12	R2	All MCs	1	0.0	1	0.0	0.014	9.5	LOS A	0.1	0.4	0.06	0.30	0.06	50.1
Approach			23	0.0	23	0.0	0.014	2.9	LOS A	0.1	0.4	0.06	0.30	0.06	49.9
All Vehicles			76	5.6	76	5.6	0.023	3.7	LOS A	0.1	0.7	0.08	0.39	0.08	45.6

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.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

MOVEMENT SUMMARY

Site: 2 [(ExAM) Hardy Avenue / Harrison Avenue (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Existing AM Peak Period
Hardy Avenue / Harrison Avenue
Job No. 230524
Site Category: (None)
Give-Way (Two-Way)

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
East: Hardy Avenue (E)															
5	T1	All MCs	96	3.3	96	3.3	0.054	0.0	LOS A	0.0	0.3	0.01	0.04	0.01	58.9
6	R2	All MCs	6	0.0	6	0.0	0.054	5.5	LOS A	0.0	0.3	0.01	0.04	0.01	49.3
Approach			102	3.1	102	3.1	0.054	0.3	NA	0.0	0.3	0.01	0.04	0.01	58.4
North: Harrison Avenue (N)															
7	L2	All MCs	8	0.0	8	0.0	0.020	5.4	LOS A	0.1	0.5	0.12	0.56	0.12	39.1
9	R2	All MCs	17	0.0	17	0.0	0.020	5.7	LOS A	0.1	0.5	0.12	0.56	0.12	40.2
Approach			25	0.0	25	0.0	0.020	5.6	LOS A	0.1	0.5	0.12	0.56	0.12	39.9
West: Hardy Avenue (W)															
10	L2	All MCs	2	0.0	2	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.05	0.00	34.6
11	T1	All MCs	21	0.0	21	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	58.7
Approach			23	0.0	23	0.0	0.012	0.5	NA	0.0	0.0	0.00	0.05	0.00	55.8
All Vehicles			151	2.1	151	2.1	0.054	1.3	NA	0.1	0.5	0.03	0.13	0.03	54.6

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

MOVEMENT SUMMARY

Site: 1 [(ExPM) Emblen Street / Hardy Avenue (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Existing PM Peak Period
Emblen Street / Hardy Avenue
Job No. 230524
Site Category: (None)
Roundabout

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: Emblen St (S)															
1	L2	All MCs	2	0.0	2	0.0	0.016	4.0	LOS A	0.1	0.5	0.10	0.44	0.10	45.0
2	T1	All MCs	13	0.0	13	0.0	0.016	2.7	LOS A	0.1	0.5	0.10	0.44	0.10	34.3
3	R2	All MCs	7	0.0	7	0.0	0.016	9.3	LOS A	0.1	0.5	0.10	0.44	0.10	46.3
Approach			22	0.0	22	0.0	0.016	5.0	LOS A	0.1	0.5	0.10	0.44	0.10	39.5
East: Hardy Avenue (E)															
4	L2	All MCs	13	0.0	13	0.0	0.018	2.4	LOS A	0.1	0.6	0.07	0.37	0.07	50.5
5	T1	All MCs	13	0.0	13	0.0	0.018	2.7	LOS A	0.1	0.6	0.07	0.37	0.07	50.1
6	R2	All MCs	4	0.0	4	0.0	0.018	9.5	LOS A	0.1	0.6	0.07	0.37	0.07	36.5
6u	U	All MCs	1	0.0	1	0.0	0.018	11.9	LOS A	0.1	0.6	0.07	0.37	0.07	42.5
Approach			31	0.0	31	0.0	0.018	3.8	LOS A	0.1	0.6	0.07	0.37	0.07	48.0
North: Emblen St (N)															
7	L2	All MCs	5	0.0	5	0.0	0.012	3.0	LOS A	0.1	0.4	0.09	0.52	0.09	42.7
8	T1	All MCs	4	25.0	4	25.0	0.012	2.2	LOS A	0.1	0.4	0.09	0.52	0.09	40.2
9	R2	All MCs	1	0.0	1	0.0	0.012	8.3	LOS A	0.1	0.4	0.09	0.52	0.09	31.2
9u	U	All MCs	5	0.0	5	0.0	0.012	11.0	LOS A	0.1	0.4	0.09	0.52	0.09	26.2
Approach			16	6.7	16	6.7	0.012	5.8	LOS A	0.1	0.4	0.09	0.52	0.09	35.8
West: Hardy Avenue (W)															
10	L2	All MCs	1	0.0	1	0.0	0.006	2.4	LOS A	0.0	0.2	0.11	0.41	0.11	31.6
11	T1	All MCs	6	0.0	6	0.0	0.006	2.7	LOS A	0.0	0.2	0.11	0.41	0.11	48.6
12	R2	All MCs	3	0.0	3	0.0	0.006	9.6	LOS A	0.0	0.2	0.11	0.41	0.11	46.9
Approach			11	0.0	11	0.0	0.006	4.7	LOS A	0.0	0.2	0.11	0.41	0.11	46.3
All Vehicles			79	1.3	79	1.3	0.018	4.7	LOS A	0.1	0.6	0.09	0.42	0.09	43.0

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.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

MOVEMENT SUMMARY

Site: 2 [(ExPM) Hardy Avenue / Harrison Avenue (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Existing PM Peak Period
Hardy Avenue / Harrison Avenue
Job No. 230524
Site Category: (None)
Give-Way (Two-Way)

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
East: Hardy Avenue (E)															
5	T1	All MCs	71	0.0	71	0.0	0.041	0.0	LOS A	0.0	0.3	0.02	0.06	0.02	58.5
6	R2	All MCs	7	0.0	7	0.0	0.041	5.5	LOS A	0.0	0.3	0.02	0.06	0.02	48.8
Approach			78	0.0	78	0.0	0.041	0.5	NA	0.0	0.3	0.02	0.06	0.02	57.7
North: Harrison Avenue (N)															
7	L2	All MCs	16	0.0	16	0.0	0.023	5.4	LOS A	0.1	0.6	0.10	0.55	0.10	39.2
9	R2	All MCs	16	0.0	16	0.0	0.023	5.6	LOS A	0.1	0.6	0.10	0.55	0.10	40.4
Approach			32	0.0	32	0.0	0.023	5.5	LOS A	0.1	0.6	0.10	0.55	0.10	39.8
West: Hardy Avenue (W)															
10	L2	All MCs	2	0.0	2	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.05	0.00	34.6
11	T1	All MCs	21	0.0	21	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	58.7
Approach			23	0.0	23	0.0	0.012	0.5	NA	0.0	0.0	0.00	0.05	0.00	55.8
All Vehicles			133	0.0	133	0.0	0.041	1.7	NA	0.1	0.6	0.03	0.18	0.03	52.8

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

MOVEMENT SUMMARY

Site: 1 [(FutAM) Emblen Street / Hardy Avenue (Site Folder: Future)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Future AM Peak Period
Emblen Street / Hardy Avenue
Job No. 230524
Site Category: (None)
Roundabout

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: Emblen St (S)															
1	L2	All MCs	1	0.0	1	0.0	0.009	3.9	LOS A	0.0	0.3	0.07	0.58	0.07	41.8
2	T1	All MCs	2	0.0	2	0.0	0.009	2.7	LOS A	0.0	0.3	0.07	0.58	0.07	32.2
3	R2	All MCs	9	0.0	9	0.0	0.009	9.3	LOS A	0.0	0.3	0.07	0.58	0.07	43.3
Approach			13	0.0	13	0.0	0.009	7.7	LOS A	0.0	0.3	0.07	0.58	0.07	41.4
East: Hardy Avenue (E)															
4	L2	All MCs	7	14.3	7	14.3	0.012	2.4	LOS A	0.1	0.5	0.06	0.41	0.06	47.2
5	T1	All MCs	6	33.3	6	33.3	0.012	2.8	LOS A	0.1	0.5	0.06	0.41	0.06	45.3
6	R2	All MCs	4	0.0	4	0.0	0.012	9.5	LOS A	0.1	0.5	0.06	0.41	0.06	35.6
6u	U	All MCs	1	0.0	1	0.0	0.012	11.9	LOS A	0.1	0.5	0.06	0.41	0.06	41.6
Approach			19	16.7	19	16.7	0.012	4.7	LOS A	0.1	0.5	0.06	0.41	0.06	43.6
North: Emblen St (N)															
7	L2	All MCs	22	0.0	22	0.0	0.023	3.1	LOS A	0.1	0.8	0.13	0.41	0.13	46.2
8	T1	All MCs	7	14.3	7	14.3	0.023	2.3	LOS A	0.1	0.8	0.13	0.41	0.13	45.1
9	R2	All MCs	1	0.0	1	0.0	0.023	8.4	LOS A	0.1	0.8	0.13	0.41	0.13	31.8
Approach			31	3.4	31	3.4	0.023	3.1	LOS A	0.1	0.8	0.13	0.41	0.13	45.4
West: Hardy Avenue (W)															
10	L2	All MCs	2	0.0	2	0.0	0.016	2.4	LOS A	0.1	0.5	0.07	0.29	0.07	32.9
11	T1	All MCs	23	0.0	23	0.0	0.016	2.7	LOS A	0.1	0.5	0.07	0.29	0.07	51.6
12	R2	All MCs	1	0.0	1	0.0	0.016	9.5	LOS A	0.1	0.5	0.07	0.29	0.07	50.0
Approach			26	0.0	26	0.0	0.016	2.9	LOS A	0.1	0.5	0.07	0.29	0.07	50.0
All Vehicles			88	4.8	88	4.8	0.023	4.0	LOS A	0.1	0.8	0.09	0.40	0.09	45.6

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.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

MOVEMENT SUMMARY

Site: 2 [(FutAM) Hardy Avenue / Harrison Avenue (Site Folder: Future)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Future AM Peak Period
Hardy Avenue / Harrison Avenue
Job No. 230524
Site Category: (None)
Give-Way (Two-Way)

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
East: Hardy Avenue (E)															
5	T1	All MCs	107	2.9	107	2.9	0.060	0.0	LOS A	0.0	0.3	0.02	0.03	0.02	59.0
6	R2	All MCs	6	0.0	6	0.0	0.060	5.5	LOS A	0.0	0.3	0.02	0.03	0.02	49.3
Approach			114	2.8	114	2.8	0.060	0.3	NA	0.0	0.3	0.02	0.03	0.02	58.5
North: Harrison Avenue (N)															
7	L2	All MCs	8	0.0	8	0.0	0.031	5.5	LOS A	0.1	0.7	0.17	0.56	0.17	38.8
9	R2	All MCs	28	0.0	28	0.0	0.031	5.9	LOS A	0.1	0.7	0.17	0.56	0.17	39.9
Approach			37	0.0	37	0.0	0.031	5.8	LOS A	0.1	0.7	0.17	0.56	0.17	39.7
West: Hardy Avenue (W)															
10	L2	All MCs	14	0.0	14	0.0	0.027	5.5	LOS A	0.0	0.0	0.00	0.16	0.00	33.6
11	T1	All MCs	38	0.0	38	0.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	56.3
Approach			52	0.0	52	0.0	0.027	1.5	NA	0.0	0.0	0.00	0.16	0.00	49.0
All Vehicles			202	1.6	202	1.6	0.060	1.6	NA	0.1	0.7	0.04	0.16	0.04	52.2

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

MOVEMENT SUMMARY

Site: 1 [(FutPM) Emblen Street / Hardy Avenue (Site Folder: Future)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Future PM Peak Period
Emblen Street / Hardy Avenue
Job No. 230524
Site Category: (None)
Roundabout

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: Emblen St (S)															
1	L2	All MCs	2	0.0	2	0.0	0.020	4.0	LOS A	0.1	0.6	0.11	0.48	0.11	43.9
2	T1	All MCs	13	0.0	13	0.0	0.020	2.7	LOS A	0.1	0.6	0.11	0.48	0.11	33.5
3	R2	All MCs	13	0.0	13	0.0	0.020	9.3	LOS A	0.1	0.6	0.11	0.48	0.11	45.3
Approach			27	0.0	27	0.0	0.020	5.9	LOS A	0.1	0.6	0.11	0.48	0.11	40.0
East: Hardy Avenue (E)															
4	L2	All MCs	13	0.0	13	0.0	0.020	2.4	LOS A	0.1	0.6	0.07	0.36	0.07	50.7
5	T1	All MCs	16	0.0	16	0.0	0.020	2.7	LOS A	0.1	0.6	0.07	0.36	0.07	50.3
6	R2	All MCs	4	0.0	4	0.0	0.020	9.5	LOS A	0.1	0.6	0.07	0.36	0.07	36.6
6u	U	All MCs	1	0.0	1	0.0	0.020	11.9	LOS A	0.1	0.6	0.07	0.36	0.07	42.6
Approach			34	0.0	34	0.0	0.020	3.7	LOS A	0.1	0.6	0.07	0.36	0.07	48.3
North: Emblen St (N)															
7	L2	All MCs	5	0.0	5	0.0	0.012	3.0	LOS A	0.1	0.4	0.11	0.52	0.11	42.6
8	T1	All MCs	4	25.0	4	25.0	0.012	2.3	LOS A	0.1	0.4	0.11	0.52	0.11	40.1
9	R2	All MCs	1	0.0	1	0.0	0.012	8.4	LOS A	0.1	0.4	0.11	0.52	0.11	31.1
9u	U	All MCs	5	0.0	5	0.0	0.012	11.1	LOS A	0.1	0.4	0.11	0.52	0.11	26.1
Approach			16	6.7	16	6.7	0.012	5.9	LOS A	0.1	0.4	0.11	0.52	0.11	35.7
West: Hardy Avenue (W)															
10	L2	All MCs	1	0.0	1	0.0	0.008	2.4	LOS A	0.0	0.3	0.12	0.38	0.12	31.8
11	T1	All MCs	9	0.0	9	0.0	0.008	2.7	LOS A	0.0	0.3	0.12	0.38	0.12	49.1
12	R2	All MCs	3	0.0	3	0.0	0.008	9.6	LOS A	0.0	0.3	0.12	0.38	0.12	47.5
Approach			14	0.0	14	0.0	0.008	4.3	LOS A	0.0	0.3	0.12	0.38	0.12	47.4
All Vehicles			91	1.2	91	1.2	0.020	4.8	LOS A	0.1	0.6	0.09	0.43	0.09	43.4

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.
Roundabout Capacity Model: SIDRA Standard.
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 Gap.
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.

MOVEMENT SUMMARY

Site: 2 [(FutPM) Hardy Avenue / Harrison Avenue (Site Folder: Future)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Future PM Peak Period
Hardy Avenue / Harrison Avenue
Job No. 230524
Site Category: (None)
Give-Way (Two-Way)

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
East: Hardy Avenue (E)															
5	T1	All MCs	80	0.0	80	0.0	0.045	0.0	LOS A	0.0	0.3	0.03	0.05	0.03	58.5
6	R2	All MCs	7	0.0	7	0.0	0.045	5.6	LOS A	0.0	0.3	0.03	0.05	0.03	48.8
Approach			87	0.0	87	0.0	0.045	0.5	NA	0.0	0.3	0.03	0.05	0.03	57.8
North: Harrison Avenue (N)															
7	L2	All MCs	16	0.0	16	0.0	0.032	5.5	LOS A	0.1	0.8	0.14	0.55	0.14	39.0
9	R2	All MCs	25	0.0	25	0.0	0.032	5.7	LOS A	0.1	0.8	0.14	0.55	0.14	40.1
Approach			41	0.0	41	0.0	0.032	5.6	LOS A	0.1	0.8	0.14	0.55	0.14	39.7
West: Hardy Avenue (W)															
10	L2	All MCs	12	0.0	12	0.0	0.025	5.5	LOS A	0.0	0.0	0.00	0.15	0.00	33.7
11	T1	All MCs	36	0.0	36	0.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	56.6
Approach			47	0.0	47	0.0	0.025	1.4	NA	0.0	0.0	0.00	0.15	0.00	49.7
All Vehicles			176	0.0	176	0.0	0.045	1.9	NA	0.1	0.8	0.05	0.20	0.05	51.0

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

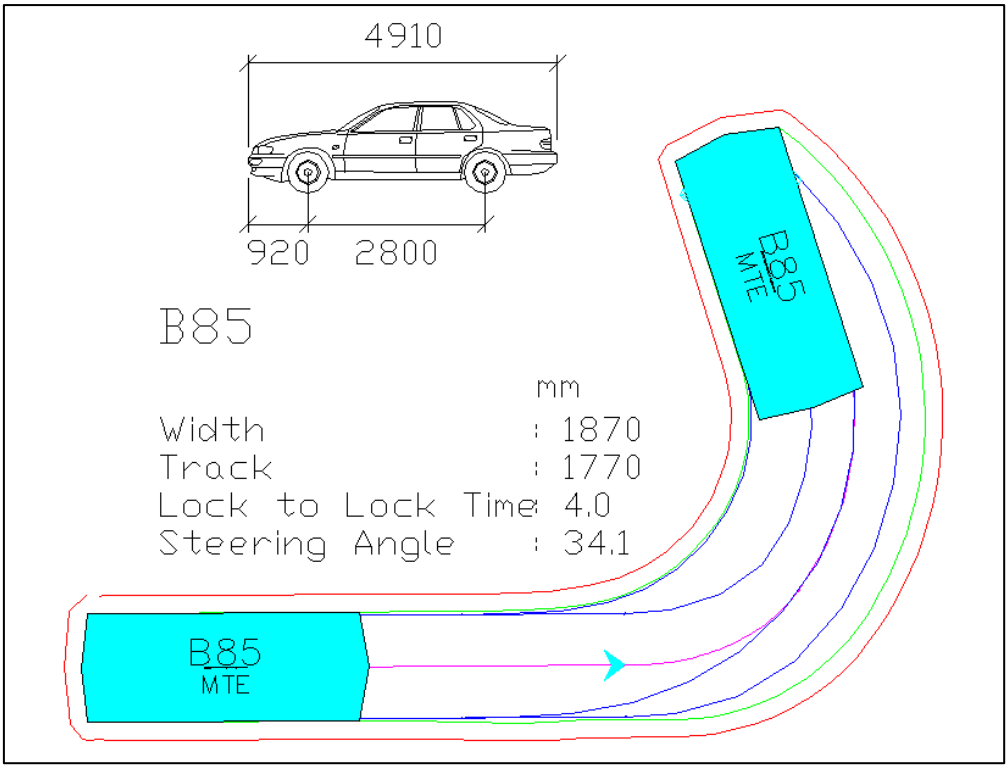
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

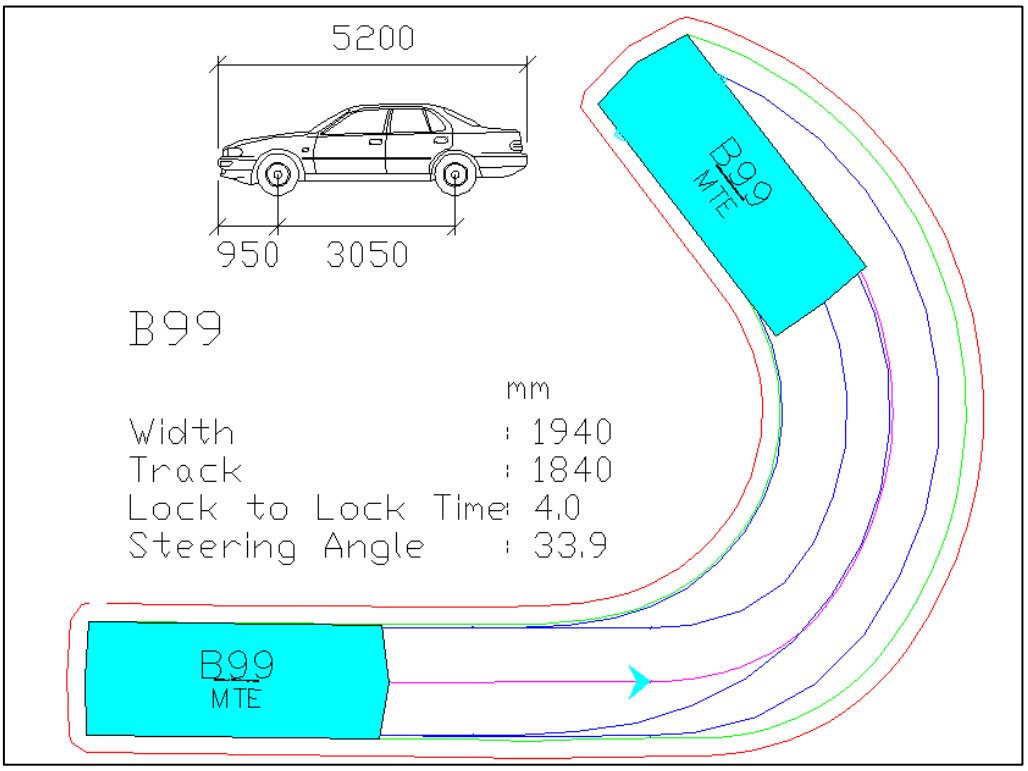
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

ANNEXURE D: SWEPT PATH TESTING
(5 SHEETS)



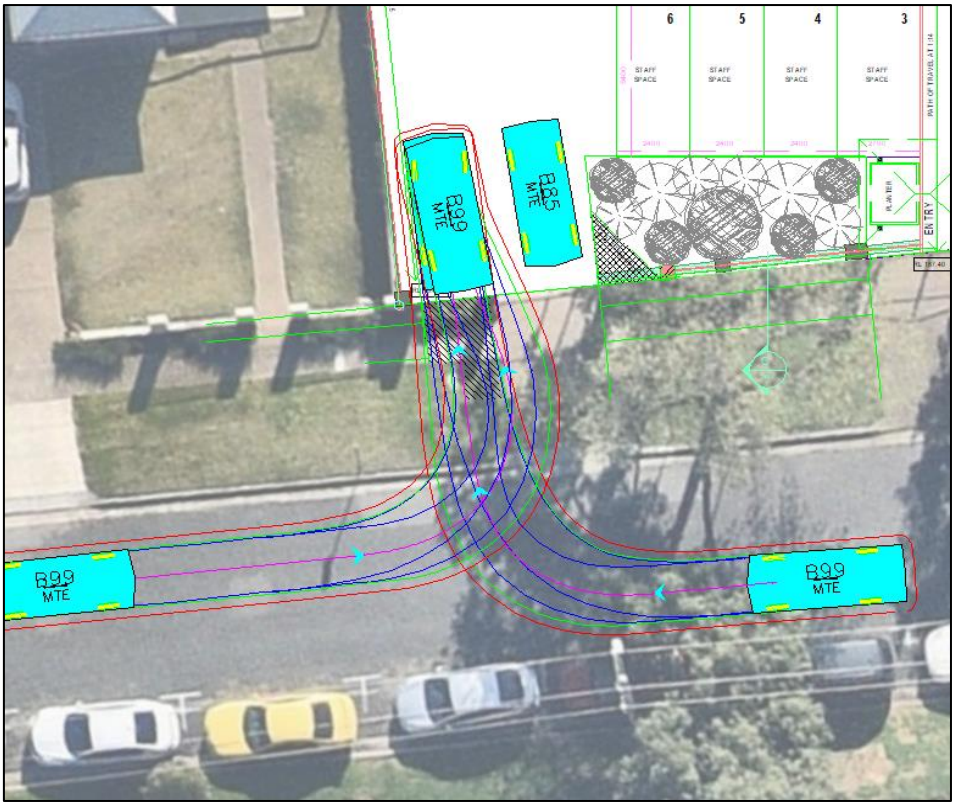
AUSTRALIAN STANDARD 85TH PERCENTILE SIZE VEHICLE (B85)



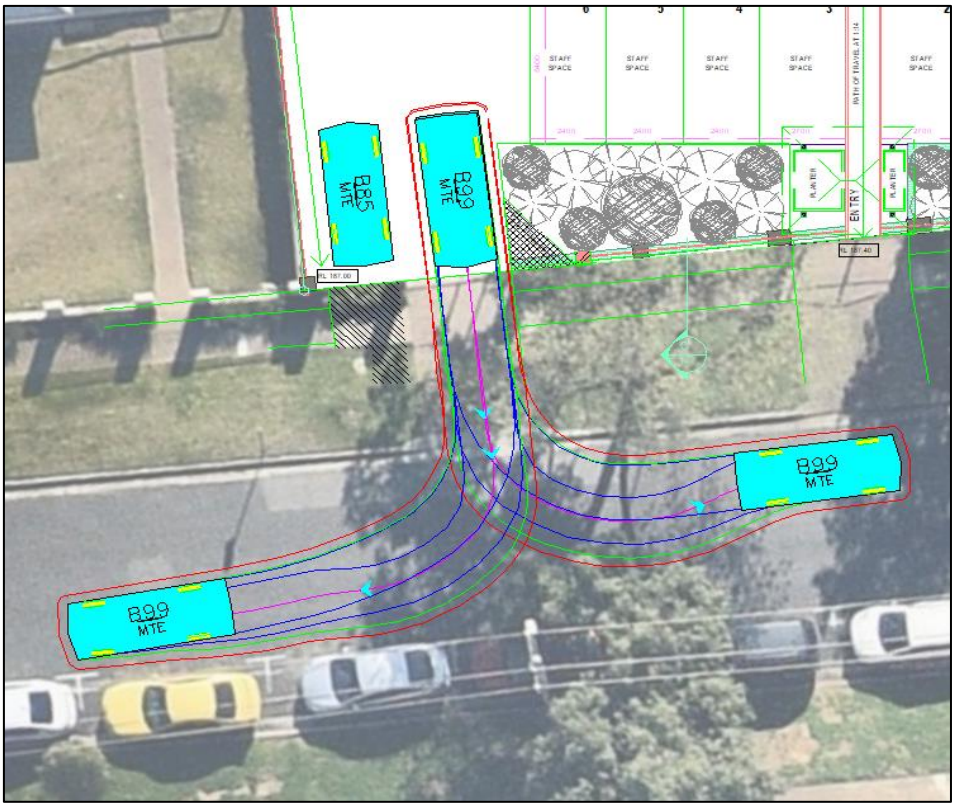
AUSTRALIAN STANDARD 99.8TH PERCENTILE SIZE VEHICLE (B99)

Blue – Tyre Path
Green – Vehicle Body
Red – 300mm Clearance

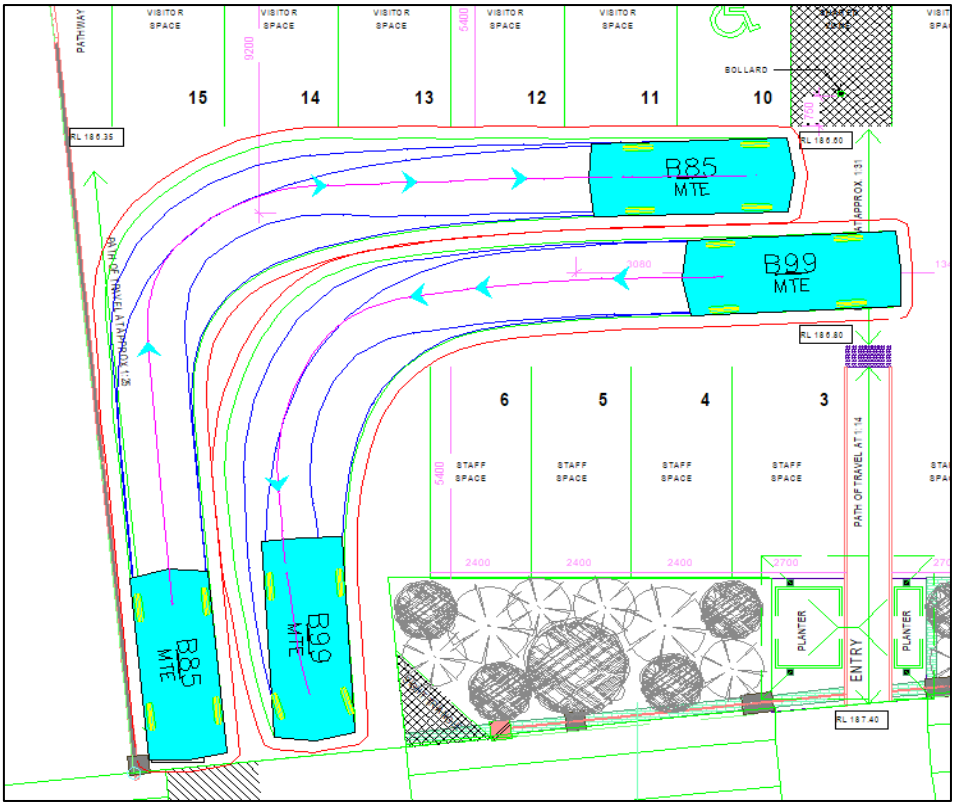
All tests performed at 10km/h on public roads and 5km/h internally.



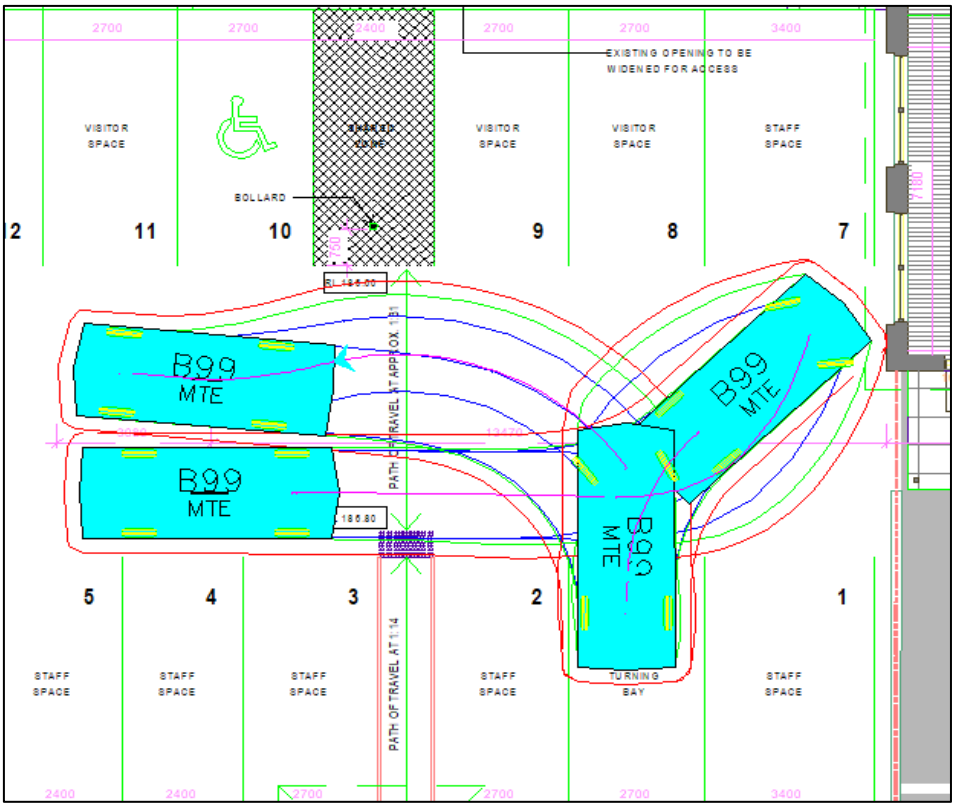
B99 SITE ENTRY
SUCCESSFUL



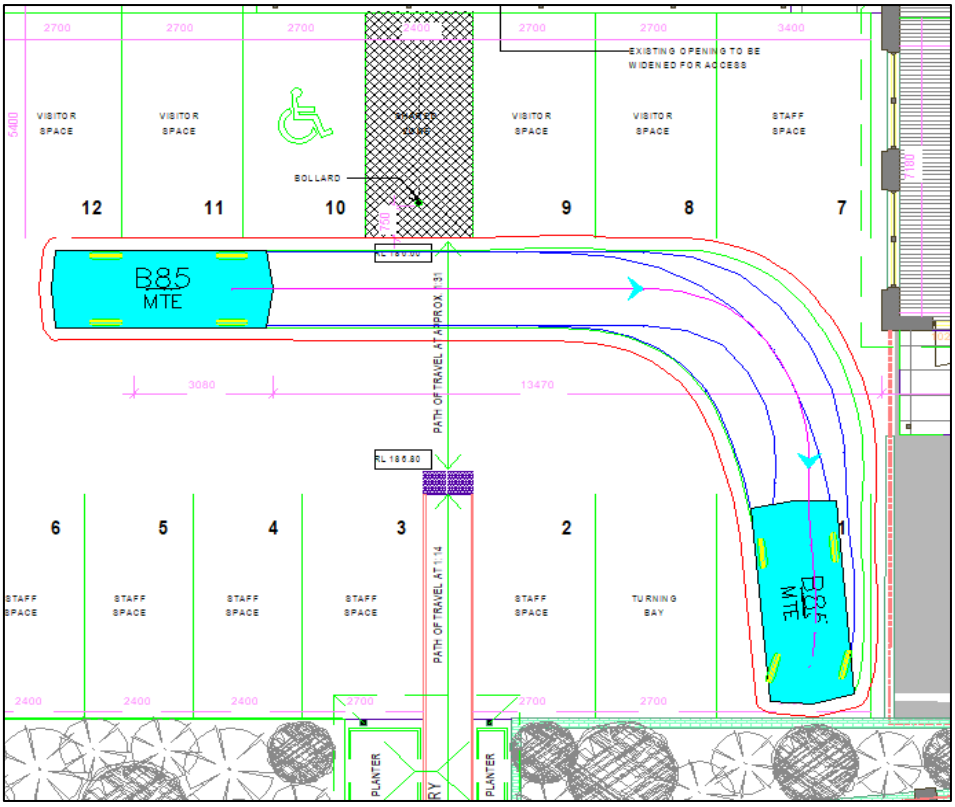
B99 SITE EXIT
SUCCESSFUL

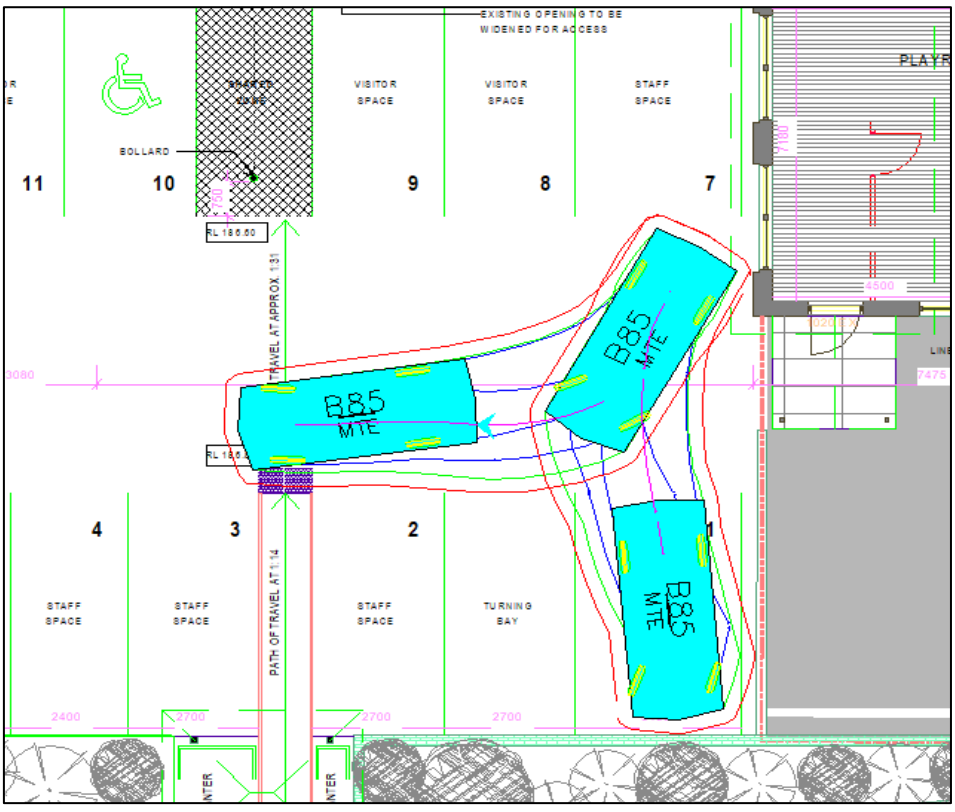


SIMULTANEOUS PASSING WITHIN CAR PARK – B85 ENTRY, B99 EXIT SUCCESSFUL



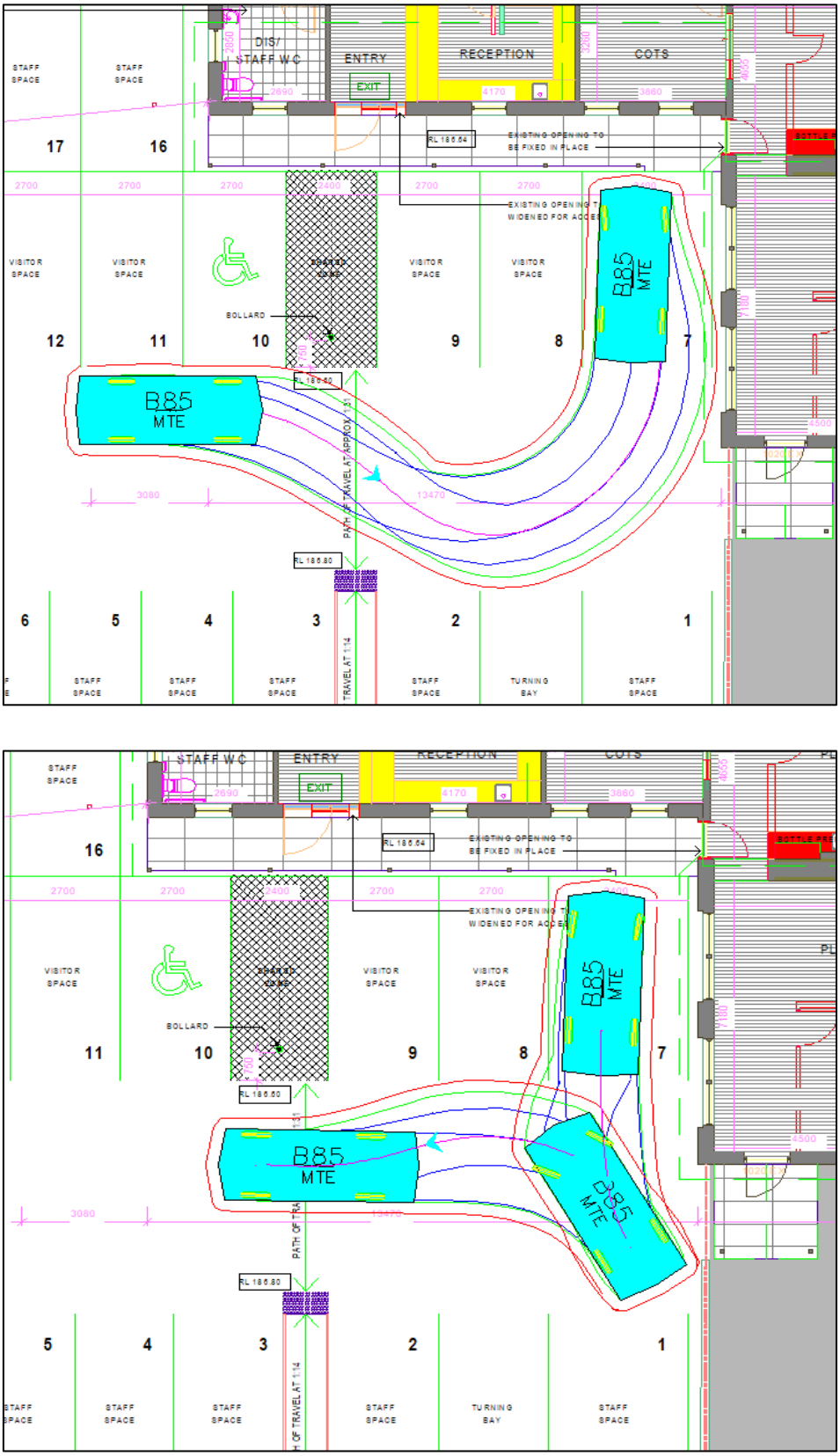
B99 TURNING BAY CIRUCLATION SUCCESSFUL





SPACE 1 – B85 PARKING

SUCCESSFUL – 1 Manoeuvre Forward IN, 2 Manoeuvres Reverse OUT



SPACE 7 – B85 PARKING

SUCCESSFUL – 1 Manoeuvre Forward IN, 2 Manoeuvres Reverse OUT