10-28 Lawrence Street,

Freshwater

Transport Impact Assessment

PREPARED FOR LAWRENCE ST PTY LTD | 6 DECEMBER 2024 | 300304343

We design with community in mind

Stantec

Revision

Revision	Date	Comment	Prepared By	Approved By
A	29 November 2024	Final	Helen Aberra Chris White	Steve Manton
B	6 December 2024	Final for Submission	Chris White	Steve Manton

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For and on behalf of

Stantec Australia Pty Ltd

The Forum, Level 9, 203 Pacific Highway, St Leonards NSW 2065

Acknowledgment of Country

In the spirit of reconciliation, Stantec acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples.

Limitations

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1. Introduction

1.1 Background

It is understood that a development application is to be lodged with Northern Beaches Council (Council) for a proposed four-storey mixed-use development on land located at 10-28 Lawrence Street, Freshwater. The proposed development incorporates a blend of residential and retail space (i.e. shop-top housing) and will comprise of 30 high-density residential apartments (including three adaptable apartments) and several retail tenancies on the upper and lower ground levels.

Lawrence St Pty Ltd engaged Stantec in October 2024 to undertake a Transport Impact Assessment for the proposed development.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing traffic and parking conditions surrounding the site
- suitability of the proposed parking in terms of supply (quantum) and layout
- service vehicle requirements
- pedestrian and bicycle requirements
- the traffic generating characteristics of the proposed development
- suitability of the proposed access arrangements for the site
- the transport impact of the development proposal on the surrounding road network.

1.3 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Warringah Development Control Plan (DCP) 2011
- Australian/New Zealand Standard, Parking Facilities (AS 2890)
- traffic and car parking surveys undertaken by Stantec as referenced in the context of this report
- plans for the proposed development prepared by CHROFI
- other documents and data as referenced in this report.

2. Existing Conditions

2.1 Location

The subject site is located at 10-28 Lawrence Street, Freshwater, and is made up of five existing lots. The site of approximately 2,580 square metres has a northern frontage of 83 metres to Lawrence Street and a western frontage of 30 metres to Dowling Street. The southern end of the site is bounded by a strip of low-density residential housing which is accessed from Undercliff Road.

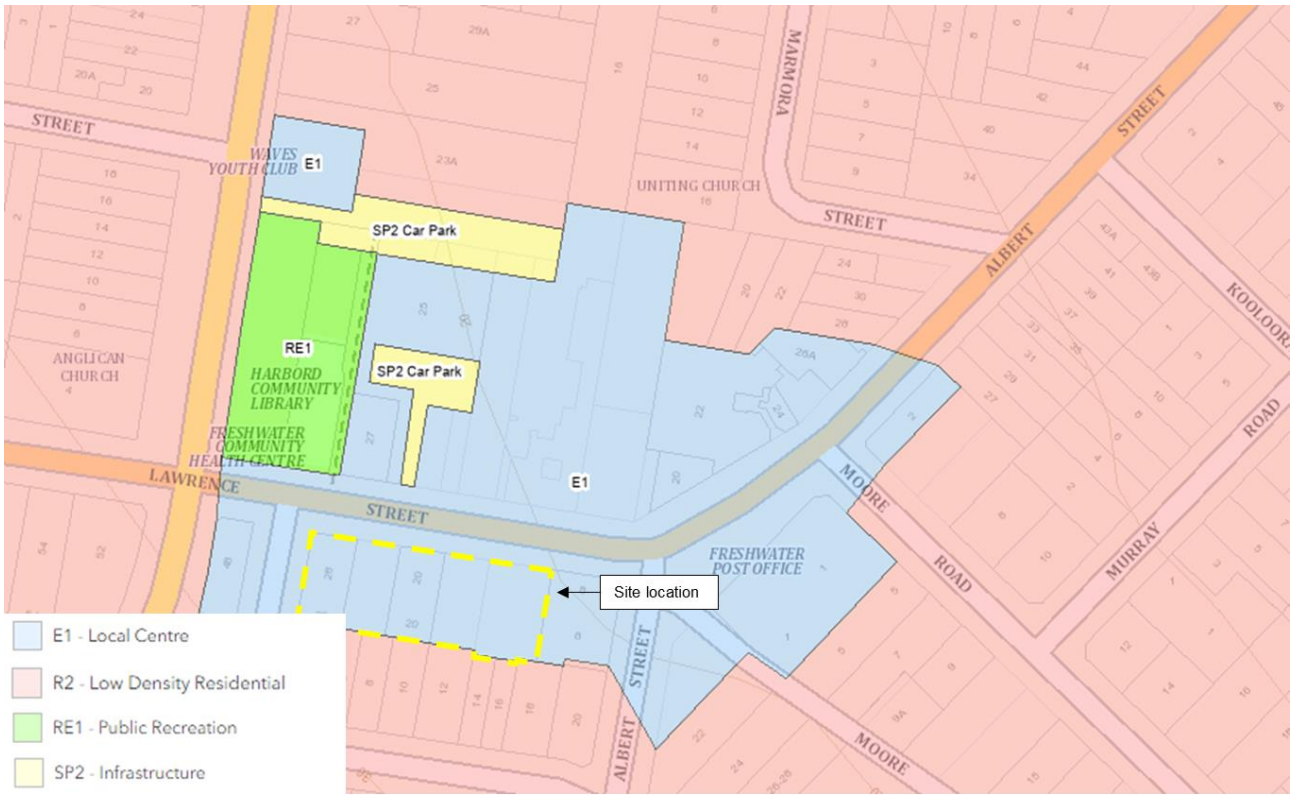
The site is classified as E1 - Local Centre under the Warringah LEP 2011 and is currently occupied by an amalgamated block of five commercial/ retail lots. The existing properties comprise of 3 two-storey walk-up buildings, 1 one-storey building and a retail arcade with rooftop parking. The surrounding properties predominantly consist of low-density residential and local centre uses.

The location of the subject site and its surrounding environs is shown in Figure 2:1, while the LEP land use map is shown in Figure 2:2.

Figure 2:1: Subject site and its environs

Base image source: http://www.street-directory.com.au/

Figure 2:2: Land use map



Base image source: NSW Planning Portal Spatial Viewer (accessed 25 October 2024)

2.2 Road Network

2.2.1 Adjoining Roads

Key roads surrounding the road network include Lawrence Street, Dowling Street, Oliver Street and Albert Street. The surrounding road network and key features are summarised in Table 2:1.

Table 2:1: Surrounding road network

Road	Classification	Description	Photo
Lawrence Street	Local Road	• Two-way road aligned in an east-west direction along the northern boundary of the site. • Approximately 12-metre-wide carriageway with one lane of traffic in each direction. • Posted speed limit of 40km/h due to high pedestrian activity in the area. • Kerbside parking permitted along both sides of the road near the site, with timed restrictions generally in place between 8:30am to 6:00pm Monday to Friday and 8:30am to 12:30pm on Saturday.	

Road	Classification	Description	Photo
Dowling Street	Local Road	• Aligned in a north-south direction along the western boundary of the site. • Approximately 11-metre-wide carriageway with one lane of traffic in each direction. • Posted speed limit of 40km/h due to high pedestrian activity which changes to the default urban speed limit of 50km/h south of the site. • Kerbside parking permitted along both sides of the road near the site, with timed restrictions generally in place between 8:30am to 6:00pm Monday to Friday and 8:30am to 12:30pm on Saturday.	
Oliver Street	Regional Road	• Aligned in a north-south direction west of the site. • Approximately 13-metre-wide carriageway with one lane of traffic in each direction. • Posted speed limit of 50km/h. • Kerbside parking is generally permitted on both sides of the road apart from a short section on the western side of the road marked with No Parking restrictions.	
Albert Street	Local Road	• Aligned in a north-south direction east of the site, transitioning to a northeast-southwest alignment to the east of its connection with Lawrence Street. • Approximately 12-metre-wide carriageway with one lane of traffic in each direction. • 40km/h speed limit within the vicinity of the site due to high pedestrian activity. • Kerbside parking permitted along both sides of the road near the site, with ½P parking restrictions between 8:30am to 6:00pm Monday to Friday and 8:30am to 12:30pm Saturdays.	

2.2.2 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- Oliver Street/ Lawrence Street (signalised)
- Dowling Street/ Lawrence Street (priority-controlled).

2.3 Traffic Volumes

Stantec commissioned traffic movement counts in the vicinity of the site on 24 October 2022 between 6.30am and 9.30am and between 3.00pm and 6.00pm.

The peak hours were found to occur from 8.15am to 9.15am and 4.30pm to 5.30pm, with a conservatively assumed 2 per cent growth rate applied to model existing 2024 conditions. The 2024 volumes are summarised below in Figure 2:3 and Figure 2:4.

Figure 2:3: 2024 AM Peak Hour Traffic Volumes

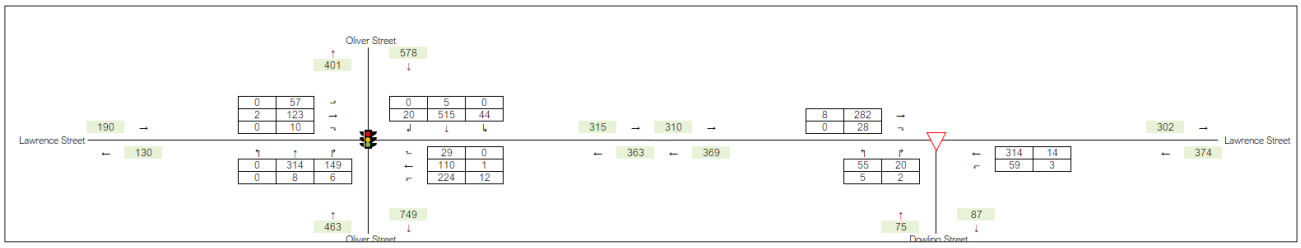
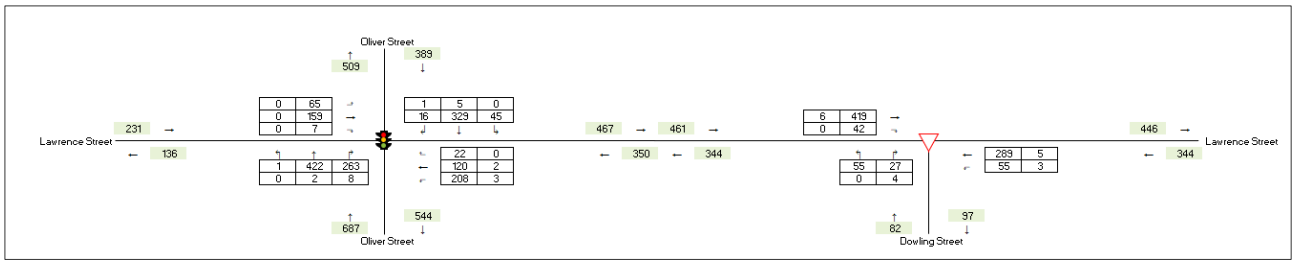


Figure 2:4: 2024 PM Peak Hour Traffic Volumes



2.4 Intersection Operation

The operation of the key intersections within the study area has been assessed using SIDRA INTERSECTION[1], a modelling software package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by TfNSW, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2:2 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 2:2: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but crash study required
D	43 to 56	Near capacity	Near capacity, crash study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2:3 presents a summary of the existing operation of the nearby intersections, with full results presented in Appendix A of this report.

Table 2:3: Existing Operating Conditions

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Lawrence Street/ Dowling Street[1]	AM	0.22	13	3	A
	PM	0.27	16	4	B
Oliver Street/ Lawrence Street[2]	AM	0.46	18	59	B
	PM	0.53	18	65	B

1 Results for a priority-controlled intersection are based on the average delay for the worst performing movement
2 Results for a signalised intersection are based on the average delay for the intersection as a whole

On the basis of the above assessment, it is clear that both intersections currently operate well, with the AM and PM peak hours at LOS B or better. Queuing and delays are minimal, with the DOS indicating that both intersections have plenty of spare capacity to accommodate future traffic demand.

1 Program used under license from Akcelik & Associates Pty Ltd.

2.5 Car Parking

The existing site is a mixed-use retail and commercial/ office development, including 1,284 square metres of retail and 441 square metres of commercial/ office space (GLFA). The existing site provides a total of 18 parking spaces accessed from Dowling Street.

More broadly, Freshwater Village has two council car parks, with three hours of free parking Monday – Saturday and unlimited parking on Sundays. The Oliver Street car park has a total of 43 parking spaces and the Lawrence Street car park has 12 parking spaces.

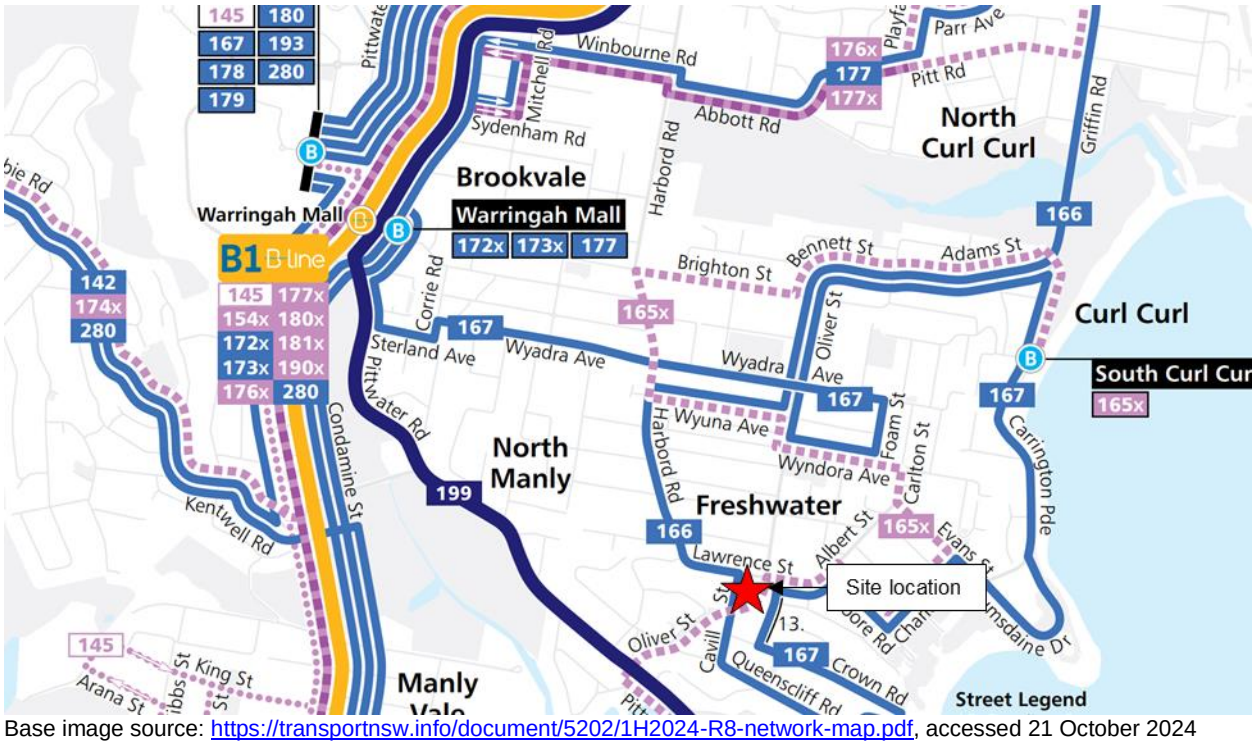
In addition, there are a further two privately-owned existing car parks in Freshwater Village, one containing 57 spaces (the Wilson car park) and the other containing 87 spaces (the Village Plaza car park).

2.6 Public Transport

The site is well-serviced by public transport with five bus stops located within a 200-metre walk. The closest bus stop is located on Lawrence Street directly adjacent to the northern frontage of the site and is serviced by the 167 and 165X bus routes. The 167-bus route operates every 20 minutes during peak periods, and every 30 minutes during the off peak, while the 165X-bus route runs every 10 minutes in the morning and afternoon. The 167 and 165X bus routes provide access to key locations like Wynard Station and Warringah Mall.

A review of the public transport available near the site is shown indicatively in Figure 2:5.

Figure 2:5: Surrounding public transport network



Base image source: https://transportnsw.info/document/5202/1H2024-R8-network-map.pdf, accessed 21 October 2024

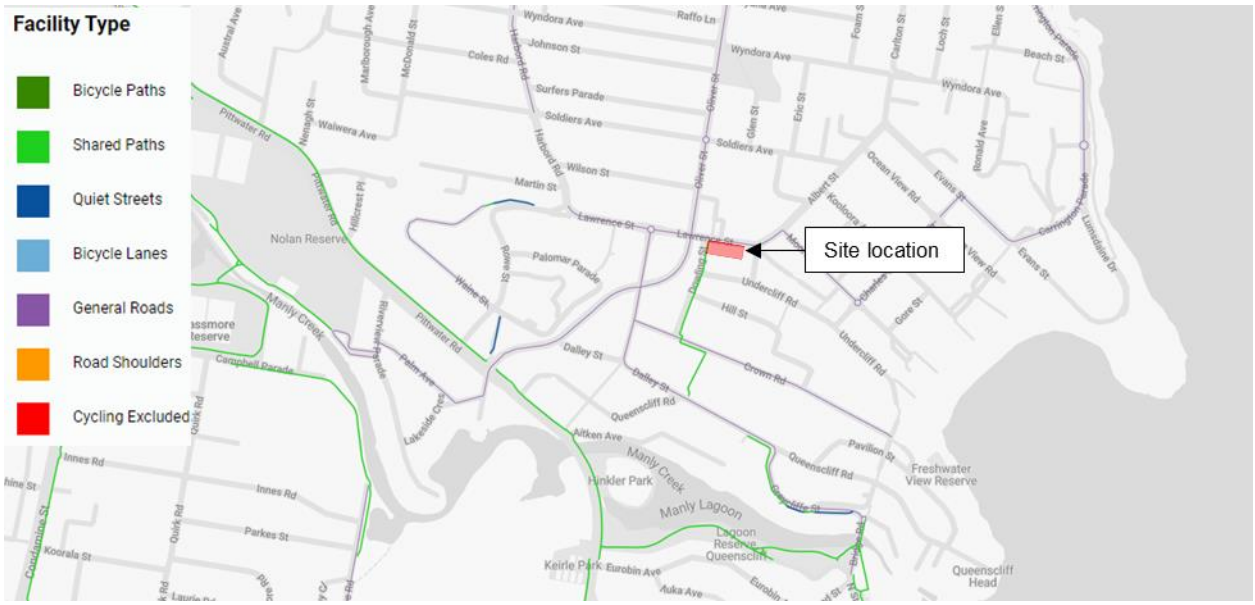
2.7 Walking and Cycling Infrastructure

The local area has well established footpaths, with pedestrian paths typically provided on both sides of the surrounding roads providing good connection to nearby bus stops and commercial areas. Nearer to the site, the Oliver Street and Lawrence Street signalised intersection provides pedestrian crossings on three of the legs, in addition to marked zebra crossings along Lawrence Street.

The site is also well supported by surrounding cycling infrastructure, with numerous shared paths near the site on roads such as Dowling Street and Pittwater Road. Dedicated cycle lanes are limited, with cyclists required to cycle in a mixed traffic arrangement when shared paths are not available.

The surrounding cycling infrastructure is shown in Figure 2:6.

Figure 2:6: Surrounding cycling network



Base image source: Cycleway Finder, accessed 10 January 2023

3. Development Proposal

3.1 Land Uses

The proposal includes the construction of a mixed-use residential development that incorporates a mix of retail on the ground floor, with residential apartments and communal areas above. It will consist of 30 high-density residential apartments (including three adaptable apartments) and several retail tenancies.

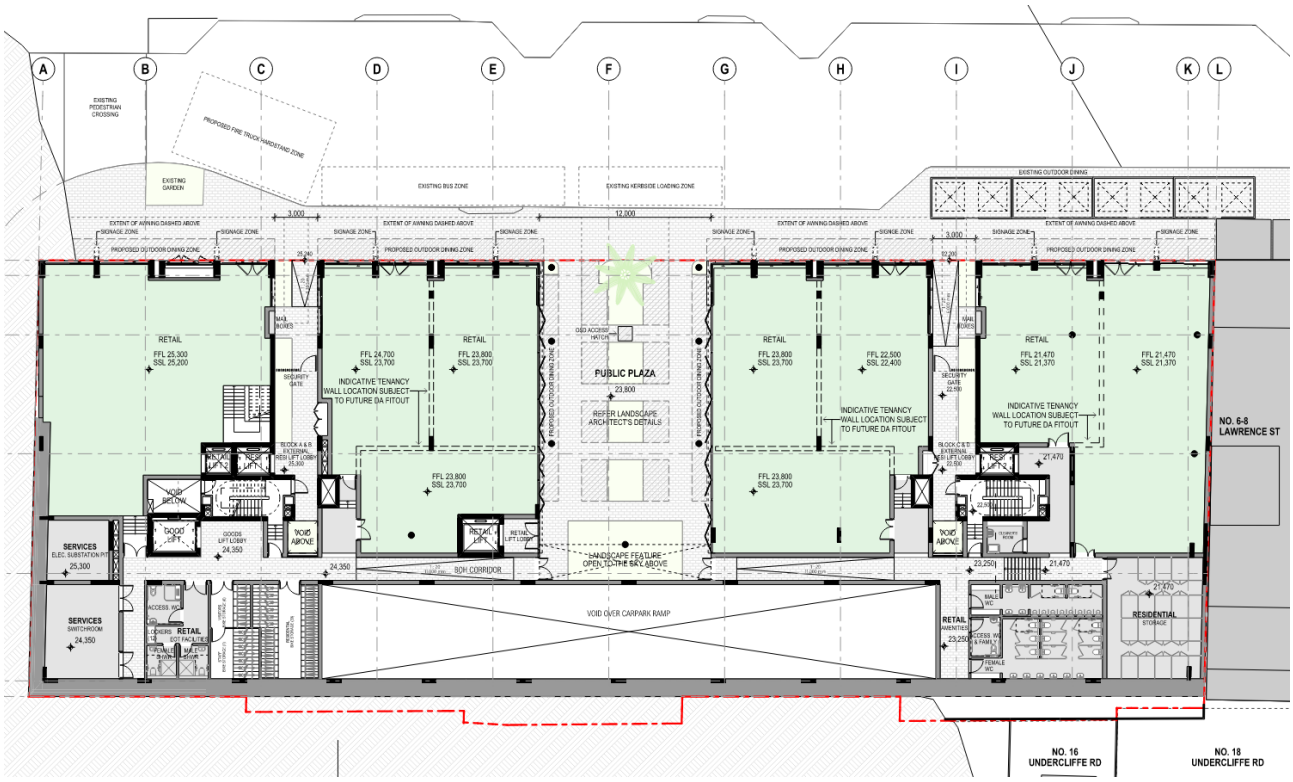
A summary of the development is provided below in Table 3:1.

Table 3:1: Development Schedule

Use	Description	Quantity/ Size
High-Density Residential	1-Bedroom	6 apartments
	2-Bedroom	15 apartments
	3-Bedroom	9 apartments
	Subtotal	**30 apartments**
Retail	Retail	1,291m^2 GLFA / 1,379m^2 GFA

The upper ground floor plan is shown in Figure 3:1.

Figure 3:1: Upper ground floor plan



Source: CHROFI, Drawing Number A-DA-100, Rev 4, 28 November 2024

3.2 Vehicle Access

The site will be accessed via an existing single crossover located on Dowling Street. The site access will provide direct access to two levels of basement parking. The proposed driveway has been widened to accommodate a B99 passenger vehicle entering and exiting the site. The location of the site access is shown in Figure 3:2.

Figure 3:2: Site access arrangements

Base image source: Nearmap

3.3 Vehicle Parking

The proposed development will provide a total of 106 car parking spaces across the two basement levels. Motorcycle parking will also be provided within the basement levels. The breakdown of the parking spaces is shown in Table 3:2.

Table 3:2: Proposed parking provision

Use	Parking spaces
Residential	44 car spaces (including three accessible spaces and three EV spaces)
Retail	62 car spaces (including two accessible spaces and three EV spaces)
Total	**106 car spaces**
Motorcycle	5 spaces

3.4 Loading Areas

Given the constraints at the site, waste collection, servicing and loading are proposed to occur on-street. A signposted Loading Zone is proposed along the western boundary of the site on Dowling Street, just north of the site access driveway.

The proposed on-street Loading Zone is shown above in Figure 3:2.

The suitability of the proposed loading arrangements is discussed in Section 4.6 of this report.

3.5 Bicycle Facilities

The development will provide residents and retail staff with secure bicycle parking on the upper ground level of the development.

Visitor bicycle parking spaces are provided within the end of trip facilities area on the upper ground floor. The end of trip facilities also provide retail staff with appropriate amenities as per DCP requirements.

4. Parking Assessment

4.1 Car Parking Requirements

The car parking provision requirements for different development types are set out in the Warringah Development Control Plan 2011 (DCP 2011). A review of the car parking requirement rates and the floor area schedule results in a suggested parking requirement for the proposed development as summarised in Table 4:1 below.

Table 4:1: Suggested DCP Car Parking Requirements

Use	Description	Quantity/ Size	DCP Parking Rate	Suggested DCP Parking Requirement
Residential	1-Bedroom	6 apartments	1 space per 1 bedroom dwelling	6
	2-Bedroom	15 apartments	1.2 spaces per 2 bedroom dwelling	18
	3-Bedroom	9 apartments	1.5 spaces per 3 bedroom dwelling	14
	Visitor	-	1 visitor space per 5 dwellings or part thereof	6
			Residential subtotal	**44**
Retail	-	1,291m^2 GLFA	5.6 spaces per 100m^2 GLFA	72
			Total	**116 car spaces**

In the table above, it is noted that the retail component of the development has been considered as part of the larger Freshwater Village precinct, which is estimated to contain over 10,000 square metres GLFA of retail where multi-purpose trips will occur. A lower number of people would drive specifically to access the subject site's retail component; instead, it would primarily attract linked trips to nearby uses. Therefore, the parking rate between 10,000 - 20,000 square metres GLFA is considered more appropriate for the broader Freshwater Village precinct and has been applied for the purpose of this parking assessment.

Overall, Table 4:1 indicates that the proposed development should provide 116 car parking spaces including 44 residential spaces and 72 retail spaces. The development proposes a parking provision of 106 spaces, including 44 spaces allocated to residents and 62 spaces allocated for retail uses. Considering the above, the residential parking meets the suggested DCP requirement, while the retail component has a minor shortfall of ten car spaces.

It should be noted that the retail parking rate from the Warringah DCP 2011 is considerably higher when compared to other Northern Beaches Council DCPs. A summary of the retail parking rates contained in other Northern Beaches Council DCPs is provided in Table 4:2 below.

Table 4:2: Comparison of DCP retail car parking requirements

Council	DCP Retail Parking Rate	DCP Retail Parking Requirement
Pittwater 21 DCP	1 per 30m^2 GLFA	43 car spaces
Manly 2013 DCP	1 per 40m^2 GLFA	32 car spaces

As seen in Table 4:2, the Pittwater and Manly DCPs would result in a parking requirement of 43 and 32 car spaces respectively, which is significantly less than the car spaces required under the Warringah DCP 2011. The development provides 62 retail car spaces, which is equivalent to a parking rate of approximately 1 per 20 square metres GLFA. The rate at which the retail parking is proposed (1 per 20 square metres GLFA) is more conservative than both the Pittwater and Manly DCPs.

It is also important to consider the characteristics of the nearby uses, as the development is part of the greater Freshwater Village precinct. It is unlikely that the development would attract a large number of new vehicle trips but rather linked trips to nearby retail uses, residents who live upstairs or residents within close proximity to the site. This means that the site would not have as high of a parking demand as an independent shopping centre or food and beverage tenancy.

Additionally, the site proposes an additional 44 retail parking spaces relative to the existing site, despite the proposed retail GLFA remaining approximately the same as the existing retail GLFA.

Considering the above, providing retail parking at a rate of 1 per 20 square metres (equivalent to approximately 62 car spaces as proposed) is anticipated to more than cater for the demand of the retail uses.

4.2 Accessible Parking Requirements

Accessible parking rates have been sourced from the National Construction Code (formerly Building Code of Australia). The accessible parking requirements indicate that for the proposed retail uses (Class 6), one accessible space is required for every 50 car spaces provided. Based on a retail car parking provision of 62 parking spaces, two accessible parking spaces would be required to support the retail uses. The development provides two accessible parking spaces for retail and therefore meets the NCC requirements.

In addition, three accessible parking spaces have been included within the secure residential parking area for the three adaptable apartments, as per AS4299-1995 (at a rate of one car parking space per adaptable unit).

4.3 Bicycle Parking and Associated Facilities

The Warringah DCP 2011 outlines the requirements for bicycle parking and end-of-trip facilities for various developments, with Table 4:3 outlining the requirements as it relates to the development. It is noted that the DCP states that end of trip (EOT) facilities are not required for the residential component of mixed use buildings.

Table 4:3: Bicycle Parking Requirements

Use	Size	Bicycle Parking Rate		Bicycle Parking/ EOT Requirement	
		High-medium security level (i.e. for residents/ staff)	High-low security level (i.e. for visitors)	High-medium security parking requirement (i.e. for residents/ staff)	High-low security parking requirement (i.e. for visitors)
Residential	30 apartments	1 per dwelling	Visitors: 1 per 12 dwellings	30	3
Retail	1,379m^2	1 per 200m^2 GFA	Visitors: 1 per 600m^2 GFA	7	2
Total				**37**	**5**
Lockers		One clothes locker per bicycle space[1]		7 lockers	
Shower and change cubicles		1 per 7 required bicycle spaces[1]		1 shower cubicle	

[1] For retail staff only

From the above, the following requirements for bicycle parking and EOT facilities are indicated:

- The proposal is required to provide a secure storage space for one bicycle per residential dwelling. The development proposes a total of 30 secure residential bicycle parking spaces on the upper ground floor and therefore complies with Council's requirement.
- The proposal is required to provide 7 secure bicycle parking spaces, 7 clothes lockers and 1 shower cubicle for retail staff. The development proposes a total of 7 secure staff bicycle parking spaces, 12 lockers and 2 shower cubicles within the end of trip facilities area on the upper ground floor and therefore complies with Council's requirements.
- The proposal should provide 5 visitor bicycle parking spaces which are publicly accessible. The development provides 6 visitor bicycle parking spaces on the upper ground floor and therefore complies with Council's requirement.

It is also noted that the development already provides two on-street bicycle hoops on Dowling Street, and benefits from at least nine additional on-street bicycle hoops on Lawrence Street, all within 50 metres of the site. These locations are shown below in Figure 4:1.

Figure 4:1: Surrounding bicycle parking locations

4.4 Motorcycle Parking Requirements

The motorcycle parking provision requirements for different development types are set out in the Warringah Development Control Plan 2011. A review of the motorcycle parking requirement rates and the floor area schedule results in a statutory motorcycle parking requirement of 2 motorcycle parking spaces.

The development proposes a total of 5 motorcycle parking spaces and therefore complies with Council's motorcycle parking requirements.

4.5 Car Parking Layout Review

The car park layout has been reviewed against the requirements of AS 2890. This assessment included a review of the following:

- parking bay and aisle widths
- clearance to adjacent structures
- provision of turnaround facilities
- circulation roads and ramps
- ramp grades
- height clearances
- internal queuing
- pick-up/set-down areas
- parking for persons with disabilities
- motorcycle/motor scooter parking.

The site has been designed to accommodate a B99 vehicle. At the car park access point on Dowling Street, a security shutter is proposed and clear sightlines are to be provided which ensure adequate visibility to pedestrians for exiting vehicles.

Two-way aisle widths of 5.8 to 6.1 metres (higher where parking spaces are opposite a structural element such as a wall) should be provided in addition to a licence plate recognition (LPR) system with boom gates for the retail access controls and a similar LPR system with a roller shutter for the residential parking area. Parking space dimensions of 2.6 x 5.4 metres have generally been provided, in accordance with AS2890. 2.4 x 5.4 metre shared zones have been incorporated next to accessible parking spaces as required. Two-way passing of a B85 vehicle and B99 vehicle is shown on the swept paths in Appendix B.

The proposed car parking layout can operate satisfactorily, subject to the adoption of recommendations discussed in Appendix B.

4.6 Proposed Loading Arrangements

As part of the car park design process, different options were investigated and assessed in order to pursue off-street loading within the site. Given the site has limited manoeuvring space, it was concluded that a turntable would be required

to facilitate off-street loading. In addition, access to the turntable would be required either via the current proposed driveway off Dowling Street or a separate driveway just north of this driveway. However, there were a number of issues identified with this option including the conflict between light and heavy vehicles, unsupportable ramp grades, loss of on-street parking and swept path conflicts.

As such, an on-street Loading Zone is proposed on Dowling Street, just north of the site access driveway. It is noted in Council's Pre-lodgement Meeting Notes that use of the existing Loading Zone on Lawrence Street to the north of the site cannot be relied upon, as Council has future plans to remove this Loading Zone in favour of an extended Bus Zone.

In terms of loss of parking, there is no difference between providing a signposted Loading Zone on Dowling Street (which would result in the loss of two on-street parking spaces) and providing a separate on-site loading access driveway (which would also result in the loss of two on-street parking spaces).

In addition, Council's Waste Services have advised in the Pre-lodgement Meeting Notes that without a dedicated on-street Loading Zone on Dowling Street, waste collection would be undertaken from the middle of the traffic lane. This presents safety concerns and traffic flow issues on Dowling Street, especially given that Dowling Street is a bus route in both directions.

With the proposed implementation of a Loading Zone on Dowling Street, there are minimal traffic flow impacts anticipated due to the width of loading vehicles. Dowling Street is approximately 11 metres wide, which means it can accommodate 2.5 metre parking lanes and 3.0 metre travel lanes.

5. Traffic Impact Assessment

5.1 Traffic Generation

Traffic generation estimates for the proposed development have been sourced from the new 2024 Guide to Transport Impact Assessments, which supersedes the former 2002 Guide to Traffic Generating Developments and 2013 Technical Direction TDT 2013/04a.

For the following traffic assessment, it is important to note that the 2022 traffic surveys included the traffic generated by the site's existing office and retail tenancies. Therefore, to accurately assess the impact of the new development, the net traffic generation has been calculated and used in this assessment.

Estimates of peak hour traffic volumes resulting from the proposal are set out in Table 5:1.

Table 5:1: Traffic Generation Estimates

Scenario	Description	Size	Traffic generation rate (trips/hour)			Traffic generation estimates (trips/hour)		
			AM	PM	Sat	AM	PM	Sat
Existing	Office	441m^2 GLFA 469m^2 GFA[1]	1.69 per 100m^2 GFA	1.2 per 100m^2 GFA	N/A [2]	8	6	0
	Retail	1,284m^2 GLFA 1,366m^2 GFA[1]	1.78 per 100m^2 GFA	3.71 per 100m^2 GFA	4.61 per 100m^2 GFA	24	51	63
					Subtotal	**32**	**57**	**63**
Proposed	Residential[4]	30 units, 44 parking spaces	0.19P+1.79	0.19P+1.79 [3]	0.34U-1.49 (where U>27)	10	10	9
	Retail	1,291m^2 GLFA 1,379m^2 GFA	1.78 per 100m^2 GFA	3.71 per 100m^2 GFA	4.61 per 100m^2 GFA	25	51	64
					Subtotal	**35**	**61**	**73**
					Net Traffic Generation	**+3**	**+4**	**+10**

(1) Based on the ratio of the proposed retail GFA to proposed retail GLFA, it is assumed that existing GFA = existing GLFA / 0.94
(2) Office spaces are assumed to only generate traffic in peak periods during weekdays only
(3) No traffic generation rate is given for PM peak hour residential trips, therefore the AM peak hour traffic generation rate has been adopted
(4) P = number of off-street parking spaces, and U = number of units

Table 5:1 demonstrates that the proposed development generates 3, 4 and 10 additional vehicles trips in the AM, PM and Saturday peak hours respectively. Considering the low net traffic generated by the site in all peak hours, it is not expected that the site will have a material impact on the function and safety of the road network. Notwithstanding, the traffic impact of the development has been assessed using SIDRA intersection with the outcomes detailed in subsequent sections of this report.

5.2 Traffic Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- distribution of households in the vicinity of the site
- surrounding employment centres, retail centres and schools in relation to the site
- likely distribution of employee's residences in relation to the site
- configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements the existing traffic distributions have been adopted.

5.3 Traffic Impact

The traffic impact on the surrounding road network is expected to be minimal considering the net traffic volumes are very low. As discussed in Section 5.1, the site generates a net traffic volume of 3, 4 and 10 vehicles in the AM, PM and Saturday peak hours respectively. Notwithstanding, for a robust assessment the impact of the development on the future road network has been assessed using SIDRA intersection.

This section provides a brief overview of the road network performance results for a 10-year horizon scenario with and without the development. To extrapolate the background traffic to 2034, a conservative background traffic growth rate of 2 per cent per annum has been assumed and applied to the existing volumes.

Table 5:2 presents a summary of the operation of the key intersections for the 10-year horizon scenario without the development.

Table 5:2: 2034 without development operating conditions

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Lawrence Street/ Dowling Street[1]	AM	0.27	16	5	B
	PM	0.34	21	6	B
Oliver Street/ Lawrence Street[2]	AM	0.63	19	74	B
	PM	0.73	20	85	B

[1] Results for a priority-controlled intersection are based on the average delay for the worst performing movement
[2] Results for a signalised intersection are based on the average delay for the intersection as a whole

The results presented in Table 5:2 indicate that all intersections will continue to operate well without the development, with all peak periods operating at level of service B. Queuing and delays are also minimal, with the DOS indicating the intersections are operating with plenty of spare capacity.

Table 5:3 presents a summary of the operation of the key intersections in 2034 with the net increase in traffic associated with the development included.

Table 5:3: 2034 with development operating conditions

Intersection	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Lawrence Street/ Dowling Street[1]	AM	0.27	16	5	B
	PM	0.34	21	6	B
Oliver Street/ Lawrence Street[2]	AM	0.64	19	75	B
	PM	0.73	20	85	B

[1] Results for a priority-controlled intersection are based on the average delay for the worst performing movement
[2] Results for a signalised intersection are based on the average delay for the intersection as a whole

As expected, the results presented in Table 5:3 indicate that the key intersections will operate under the same conditions with practically no impact. The intersections will continue to operate well, with plenty of spare capacity available within the road network.

The above intersection assessments confirm that the additional traffic generated by the proposed development is not expected to compromise the safety or function of the adjacent road network.

6. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- The proposed development incorporates 30 apartments (including three adaptable apartments) and several retail tenancies.
- The proposed development generates a DCP parking requirement of 116 car parking spaces including 44 residential spaces and 72 retail spaces.
- The proposed supply of 106 car parking spaces represents a minor shortfall when assessed against the Warringah DCP 2011 requirements. This minor shortfall can be supported on the basis that the retail parking requirements set out in the DCP are relatively high when compared to other Northern Beaches DCPs. The proposed parking supply of 106 parking spaces is expected to meet the demand of both the retail and residential components of the development.
- The proposed parking layout is generally consistent with the dimensional requirements as set out in AS2890, subject to the recommendations provided within the report at Appendix B.
- The proposed on-street Loading Zone on Dowling Street just north of the site access driveway can be supported, given the site constraints and lack of feasible alternatives for loading.
- The site is expected to generate up to an additional 3, 4 and 10 vehicles trips in the AM, PM and Saturday peak hours respectively. There is more than adequate capacity in the surrounding road network to cater for the additional traffic generated by the proposed development.

Overall, the proposed development can be supported from a traffic and transport perspective.

Appendix A. SIDRA Results

MOVEMENT SUMMARY

Site: 101 [AM_Lawrence Street/ Dowling Street (Site Folder: 2024 Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Stop (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
South: Dowling Street															
1	L2	All MCs	63	8.3	63	8.3	0.118	8.8	LOS A	0.4	3.2	0.49	0.93	0.49	15.0
3	R2	All MCs	23	9.1	23	9.1	0.118	12.8	LOS A	0.4	3.2	0.49	0.93	0.49	28.7
Approach			86	8.5	86	8.5	0.118	9.9	LOS A	0.4	3.2	0.49	0.93	0.49	18.7
East: Lawrence Street															
4	L2	All MCs	65	4.8	65	4.8	0.218	1.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
5	T1	All MCs	345	4.3	345	4.3	0.218	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
Approach			411	4.4	411	4.4	0.218	0.3	NA	0.0	0.0	0.00	0.03	0.00	24.9
West: Lawrence Street															
11	T1	All MCs	305	2.8	305	2.8	0.187	1.2	LOS A	0.3	2.0	0.11	0.38	0.11	25.0
12	R2	All MCs	29	0.0	29	0.0	0.187	6.4	LOS A	0.3	2.0	0.11	0.38	0.11	37.8
Approach			335	2.5	335	2.5	0.187	1.7	NA	0.3	2.0	0.11	0.38	0.11	25.7
All Vehicles			832	4.1	832	4.1	0.218	1.8	NA	0.4	3.2	0.09	0.27	0.09	24.2

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: 101 [PM_Lawrence Street/ Dowling Street (Site Folder: 2024 Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Stop (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
South: Dowling Street															
1	L2	All MCs	58	0.0	58	0.0	0.147	8.1	LOS A	0.5	3.7	0.53	0.92	0.53	14.9
3	R2	All MCs	33	12.9	33	12.9	0.147	15.6	LOS B	0.5	3.7	0.53	0.92	0.53	28.5
Approach			91	4.7	91	4.7	0.147	10.8	LOS A	0.5	3.7	0.53	0.92	0.53	19.8
East: Lawrence Street															
4	L2	All MCs	61	5.2	61	5.2	0.195	1.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
5	T1	All MCs	309	1.7	309	1.7	0.195	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
Approach			371	2.3	371	2.3	0.195	0.3	NA	0.0	0.0	0.00	0.03	0.00	24.9
West: Lawrence Street															
11	T1	All MCs	447	1.4	447	1.4	0.271	1.2	LOS A	0.4	3.0	0.11	0.38	0.11	25.0
12	R2	All MCs	44	0.0	44	0.0	0.271	6.1	LOS A	0.4	3.0	0.11	0.38	0.11	37.8
Approach			492	1.3	492	1.3	0.271	1.7	NA	0.4	3.0	0.11	0.38	0.11	25.8
All Vehicles			953	2.0	953	2.0	0.271	2.0	NA	0.5	3.7	0.11	0.30	0.11	24.6

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: 1860 [AM_Oliver Street/ Lawrence Street (Site Folder: 2024 Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Oliver Street															
1	L2	All MCs	1	0.0	1	0.0	0.338	17.6	LOS B	7.6	54.5	0.62	0.53	0.62	44.8
2	T1	All MCs	339	2.5	339	2.5	0.338	11.7	LOS A	7.6	54.5	0.62	0.53	0.62	43.1
3	R2	All MCs	163	3.9	163	3.9	*0.430	22.0	LOS B	4.6	33.1	0.74	0.76	0.74	31.2
Approach			503	2.9	503	2.9	0.430	15.1	LOS B	7.6	54.5	0.66	0.61	0.66	40.0
East: Lawrence Street															
4	L2	All MCs	248	5.1	248	5.1	*0.462	27.0	LOS B	8.0	58.6	0.86	0.78	0.86	28.2
5	T1	All MCs	117	0.9	117	0.9	0.278	21.7	LOS B	4.4	30.9	0.79	0.67	0.79	33.8
6	R2	All MCs	31	0.0	31	0.0	0.278	28.0	LOS B	4.4	30.9	0.79	0.67	0.79	30.0
Approach			396	3.5	396	3.5	0.462	25.5	LOS B	8.0	58.6	0.84	0.74	0.84	29.8
North: Oliver Street															
7	L2	All MCs	46	0.0	46	0.0	0.318	17.2	LOS B	7.1	49.8	0.61	0.55	0.61	21.8
8	T1	All MCs	547	1.0	547	1.0	0.318	11.6	LOS A	7.1	49.8	0.61	0.55	0.61	42.8
9	R2	All MCs	21	0.0	21	0.0	0.318	21.8	LOS B	6.7	47.3	0.62	0.55	0.62	44.4
Approach			615	0.9	615	0.9	0.318	12.4	LOS A	7.1	49.8	0.61	0.55	0.61	41.2
West: Lawrence Street															
10	L2	All MCs	60	0.0	60	0.0	0.099	25.8	LOS B	1.6	11.4	0.73	0.72	0.73	38.6
11	T1	All MCs	132	1.6	132	1.6	0.254	24.9	LOS B	4.3	30.1	0.80	0.72	0.80	32.9
12	R2	All MCs	11	0.0	11	0.0	0.254	37.1	LOS C	4.3	30.1	0.80	0.72	0.80	38.7
Approach			202	1.0	202	1.0	0.254	25.8	LOS B	4.3	30.1	0.78	0.72	0.78	35.6
All Vehicles			1716	2.1	1716	2.1	0.462	17.8	LOS B	8.0	58.6	0.70	0.63	0.70	38.0

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: Oliver Street												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Lawrence Street												

P2 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Oliver Street											
P3 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians	150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

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: 1860 [PM_Oliver Street/ Lawrence Street (Site Folder: 2024 Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Oliver Street															
1	L2	All MCs	1	0.0	1	0.0	0.392	15.2	LOS B	9.3	65.3	0.57	0.51	0.57	46.2
2	T1	All MCs	446	0.5	446	0.5	0.392	9.4	LOS A	9.3	65.3	0.57	0.51	0.57	44.3
3	R2	All MCs	285	3.0	285	3.0	* 0.533	18.4	LOS B	7.5	54.0	0.71	0.77	0.71	33.1
Approach			733	1.4	733	1.4	0.533	12.9	LOS A	9.3	65.3	0.63	0.61	0.63	40.8
East: Lawrence Street															
4	L2	All MCs	222	1.4	222	1.4	* 0.509	31.3	LOS C	7.7	54.6	0.92	0.80	0.92	26.6
5	T1	All MCs	128	1.6	128	1.6	0.353	26.3	LOS B	5.0	35.3	0.87	0.71	0.87	31.3
6	R2	All MCs	23	0.0	23	0.0	0.353	34.0	LOS C	5.0	35.3	0.87	0.71	0.87	28.0
Approach			374	1.4	374	1.4	0.509	29.7	LOS C	7.7	54.6	0.90	0.76	0.90	28.1
North: Oliver Street															
7	L2	All MCs	47	0.0	47	0.0	0.198	13.6	LOS A	4.0	28.2	0.50	0.48	0.50	22.6
8	T1	All MCs	352	1.5	352	1.5	0.198	8.4	LOS A	4.0	28.2	0.51	0.47	0.51	44.3
9	R2	All MCs	18	5.9	18	5.9	0.198	18.7	LOS B	3.7	26.6	0.52	0.46	0.52	45.9
Approach			417	1.5	417	1.5	0.198	9.4	LOS A	4.0	28.2	0.51	0.47	0.51	41.9
West: Lawrence Street															
10	L2	All MCs	68	0.0	68	0.0	0.140	30.1	LOS C	2.1	14.5	0.80	0.73	0.80	37.0
11	T1	All MCs	167	0.0	167	0.0	0.367	29.2	LOS C	5.7	40.2	0.87	0.76	0.87	30.8
12	R2	All MCs	7	0.0	7	0.0	0.367	41.1	LOS C	5.7	40.2	0.87	0.76	0.87	37.1
Approach			243	0.0	243	0.0	0.367	29.8	LOS C	5.7	40.2	0.85	0.75	0.85	33.4
All Vehicles			1766	1.3	1766	1.3	0.533	18.0	LOS B	9.3	65.3	0.69	0.63	0.69	37.6

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: Oliver Street												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Lawrence Street												

P2 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Oliver Street											
P3 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians	150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

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: 101 [AM_Lawrence Street/ Dowling Street - no dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Stop (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
South: Dowling Street															
1	L2	All MCs	77	8.2	77	8.2	0.173	9.5	LOS A	0.6	4.6	0.56	0.96	0.56	14.9
3	R2	All MCs	28	11.1	28	11.1	0.173	16.1	LOS B	0.6	4.6	0.56	0.96	0.56	28.5
Approach			105	9.0	105	9.0	0.173	11.3	LOS A	0.6	4.6	0.56	0.96	0.56	18.5
East: Lawrence Street															
4	L2	All MCs	80	5.3	80	5.3	0.266	1.2	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
5	T1	All MCs	420	4.0	420	4.0	0.266	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
Approach			500	4.2	500	4.2	0.266	0.3	NA	0.0	0.0	0.00	0.03	0.00	24.9
West: Lawrence Street															
11	T1	All MCs	373	2.8	373	2.8	0.232	1.2	LOS A	0.4	2.8	0.12	0.40	0.12	24.9
12	R2	All MCs	36	0.0	36	0.0	0.232	8.2	LOS A	0.4	2.8	0.12	0.40	0.12	37.7
Approach			408	2.6	408	2.6	0.232	1.8	NA	0.4	2.8	0.12	0.40	0.12	25.7
All Vehicles			1014	4.0	1014	4.0	0.266	2.0	NA	0.6	4.6	0.11	0.28	0.11	24.2

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: 101 [AM_Lawrence Street/ Dowling Street - with dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Stop (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
South: Dowling Street															
1	L2	All MCs	79	8.0	79	8.0	0.176	9.5	LOS A	0.6	4.7	0.56	0.96	0.56	14.9
3	R2	All MCs	28	11.1	28	11.1	0.176	16.2	LOS B	0.6	4.7	0.56	0.96	0.56	28.5
Approach			107	8.8	107	8.8	0.176	11.2	LOS A	0.6	4.7	0.56	0.96	0.56	18.5
East: Lawrence Street															
4	L2	All MCs	80	5.3	80	5.3	0.266	1.2	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
5	T1	All MCs	420	4.0	420	4.0	0.266	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
Approach			500	4.2	500	4.2	0.266	0.3	NA	0.0	0.0	0.00	0.03	0.00	24.9
West: Lawrence Street															
11	T1	All MCs	373	2.8	373	2.8	0.233	1.2	LOS A	0.4	2.8	0.13	0.40	0.13	24.9
12	R2	All MCs	37	0.0	37	0.0	0.233	8.2	LOS A	0.4	2.8	0.13	0.40	0.13	37.7
Approach			409	2.6	409	2.6	0.233	1.8	NA	0.4	2.8	0.13	0.40	0.13	25.7
All Vehicles			1017	4.0	1017	4.0	0.266	2.1	NA	0.6	4.7	0.11	0.28	0.11	24.2

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: 101 [PM_Lawrence Street/ Dowling Street - no dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Stop (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
South: Dowling Street															
1	L2	All MCs	71	0.0	71	0.0	0.223	8.7	LOS A	0.8	5.6	0.62	0.95	0.64	14.7
3	R2	All MCs	39	10.8	39	10.8	0.223	20.5	LOS B	0.8	5.6	0.62	0.95	0.64	28.1
Approach			109	3.8	109	3.8	0.223	12.9	LOS A	0.8	5.6	0.62	0.95	0.64	19.5
East: Lawrence Street															
4	L2	All MCs	75	5.6	75	5.6	0.238	1.2	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
5	T1	All MCs	378	1.7	378	1.7	0.238	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
Approach			453	2.3	453	2.3	0.238	0.3	NA	0.0	0.0	0.00	0.03	0.00	24.9
West: Lawrence Street															
11	T1	All MCs	546	1.5	546	1.5	0.336	1.2	LOS A	0.6	4.1	0.13	0.40	0.13	24.9
12	R2	All MCs	54	0.0	54	0.0	0.336	7.7	LOS A	0.6	4.1	0.13	0.40	0.13	37.7
Approach			600	1.4	600	1.4	0.336	1.8	NA	0.6	4.1	0.13	0.40	0.13	25.7
All Vehicles			1162	2.0	1162	2.0	0.336	2.3	NA	0.8	5.6	0.12	0.31	0.12	24.5

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.

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: 101 [PM_Lawrence Street/ Dowling Street - with dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Stop (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
South: Dowling Street															
1	L2	All MCs	72	0.0	72	0.0	0.225	8.7	LOS A	0.8	5.7	0.62	0.96	0.64	14.7
3	R2	All MCs	39	10.8	39	10.8	0.225	20.6	LOS B	0.8	5.7	0.62	0.96	0.64	28.1
Approach			111	3.8	111	3.8	0.225	12.9	LOS A	0.8	5.7	0.62	0.96	0.64	19.4
East: Lawrence Street															
4	L2	All MCs	75	5.6	75	5.6	0.238	1.2	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
5	T1	All MCs	378	1.7	378	1.7	0.238	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	24.9
Approach			453	2.3	453	2.3	0.238	0.3	NA	0.0	0.0	0.00	0.03	0.00	24.9
West: Lawrence Street															
11	T1	All MCs	546	1.5	546	1.5	0.338	1.2	LOS A	0.6	4.3	0.13	0.40	0.13	24.9
12	R2	All MCs	57	0.0	57	0.0	0.338	7.7	LOS A	0.6	4.3	0.13	0.40	0.13	37.7
Approach			603	1.4	603	1.4	0.338	1.8	NA	0.6	4.3	0.13	0.40	0.13	25.7
All Vehicles			1166	2.0	1166	2.0	0.338	2.3	NA	0.8	5.7	0.13	0.31	0.13	24.5

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.

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: 1860 [AM_Oliver Street/ Lawrence Street - no dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Oliver Street															
1	L2	All MCs	1	0.0	1	0.0	0.412	18.2	LOS B	9.8	69.9	0.65	0.57	0.65	44.5
2	T1	All MCs	414	2.5	414	2.5	0.412	12.3	LOS A	9.8	69.9	0.65	0.57	0.65	42.8
3	R2	All MCs	199	4.2	199	4.2	*0.634	27.2	LOS B	6.7	48.7	0.86	0.83	0.89	28.7
Approach			614	3.1	614	3.1	0.634	17.2	LOS B	9.8	69.9	0.72	0.65	0.73	39.0
East: Lawrence Street															
4	L2	All MCs	303	5.2	303	5.2	*0.564	27.9	LOS B	10.2	74.3	0.90	0.81	0.90	27.8
5	T1	All MCs	142	0.7	142	0.7	0.358	22.7	LOS B	5.6	39.5	0.83	0.70	0.83	32.9
6	R2	All MCs	38	0.0	38	0.0	0.358	31.1	LOS C	5.6	39.5	0.83	0.70	0.83	29.3
Approach			483	3.5	483	3.5	0.564	26.7	LOS B	10.2	74.3	0.87	0.77	0.87	29.3
North: Oliver Street															
7	L2	All MCs	56	0.0	56	0.0	0.391	17.8	LOS B	9.1	64.3	0.64	0.58	0.64	21.7
8	T1	All MCs	667	0.9	667	0.9	0.391	12.4	LOS A	9.1	64.3	0.65	0.59	0.65	42.3
9	R2	All MCs	25	0.0	25	0.0	0.391	25.0	LOS B	8.6	60.8	0.66	0.59	0.66	43.8
Approach			748	0.8	748	0.8	0.391	13.2	LOS A	9.1	64.3	0.65	0.59	0.65	40.8
West: Lawrence Street															
10	L2	All MCs	74	0.0	74	0.0	0.122	26.0	LOS B	2.0	14.2	0.74	0.73	0.74	38.6
11	T1	All MCs	161	2.0	161	2.0	0.323	25.3	LOS B	5.4	38.1	0.82	0.74	0.82	32.6
12	R2	All MCs	14	0.0	14	0.0	0.323	38.7	LOS C	5.4	38.1	0.82	0.74	0.82	38.4
Approach			248	1.3	248	1.3	0.323	26.3	LOS B	5.4	38.1	0.79	0.74	0.79	35.4
All Vehicles			2094	2.2	2094	2.2	0.634	19.0	LOS B	10.2	74.3	0.74	0.67	0.74	37.4

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: Oliver Street												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Lawrence Street												

P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Oliver Street												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

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: 1860 [AM_Oliver Street/ Lawrence Street - with dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Oliver Street															
1	L2	All MCs	1	0.0	1	0.0	0.412	18.2	LOS B	9.8	69.9	0.65	0.57	0.65	44.5
2	T1	All MCs	414	2.5	414	2.5	0.412	12.3	LOS A	9.8	69.9	0.65	0.57	0.65	42.8
3	R2	All MCs	200	4.2	200	4.2	*0.637	27.3	LOS B	6.8	49.1	0.86	0.83	0.90	28.7
Approach			615	3.1	615	3.1	0.637	17.2	LOS B	9.8	69.9	0.72	0.65	0.73	38.9
East: Lawrence Street															
4	L2	All MCs	305	5.2	305	5.2	*0.568	28.0	LOS B	10.2	74.9	0.90	0.81	0.90	27.8
5	T1	All MCs	142	0.7	142	0.7	0.358	22.7	LOS B	5.6	39.5	0.83	0.70	0.83	32.9
6	R2	All MCs	38	0.0	38	0.0	0.358	31.1	LOS C	5.6	39.5	0.83	0.70	0.83	29.3
Approach			485	3.5	485	3.5	0.568	26.7	LOS B	10.2	74.9	0.87	0.77	0.87	29.3
North: Oliver Street															
7	L2	All MCs	56	0.0	56	0.0	0.391	17.8	LOS B	9.1	64.3	0.64	0.58	0.64	21.7
8	T1	All MCs	667	0.9	667	0.9	0.391	12.4	LOS A	9.1	64.3	0.65	0.59	0.65	42.3
9	R2	All MCs	25	0.0	25	0.0	0.391	25.0	LOS B	8.6	60.8	0.66	0.59	0.66	43.8
Approach			748	0.8	748	0.8	0.391	13.2	LOS A	9.1	64.3	0.65	0.59	0.65	40.8
West: Lawrence Street															
10	L2	All MCs	74	0.0	74	0.0	0.122	26.0	LOS B	2.0	14.2	0.74	0.73	0.74	38.6
11	T1	All MCs	161	2.0	161	2.0	0.324	25.3	LOS B	5.4	38.1	0.82	0.74	0.82	32.6
12	R2	All MCs	14	0.0	14	0.0	0.324	38.7	LOS C	5.4	38.1	0.82	0.74	0.82	38.4
Approach			248	1.3	248	1.3	0.324	26.3	LOS B	5.4	38.1	0.79	0.74	0.79	35.4
All Vehicles			2097	2.2	2097	2.2	0.637	19.1	LOS B	10.2	74.9	0.74	0.67	0.74	37.4

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: Oliver Street												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Lawrence Street												

P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Oliver Street												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

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: 1860 [PM_Oliver Street/ Lawrence Street - no dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Oliver Street															
1	L2	All MCs	1	0.0	1	0.0	0.477	15.9	LOS B	12.1	85.2	0.62	0.55	0.62	45.8
2	T1	All MCs	544	0.4	544	0.4	0.477	10.1	LOS A	12.1	85.2	0.62	0.55	0.62	43.9
3	R2	All MCs	346	2.4	346	2.4	* 0.728	24.7	LOS B	11.8	84.2	0.84	0.87	0.92	29.8
Approach			892	1.2	892	1.2	0.728	15.8	LOS B	12.1	85.2	0.70	0.67	0.73	39.3
East: Lawrence Street															
4	L2	All MCs	271	1.2	271	1.2	* 0.618	32.2	LOS C	9.7	68.6	0.95	0.82	0.95	26.2
5	T1	All MCs	156	1.4	156	1.4	0.450	27.6	LOS B	6.3	44.6	0.90	0.75	0.90	30.5
6	R2	All MCs	28	0.0	28	0.0	0.450	37.6	LOS C	6.3	44.6	0.90	0.75	0.90	27.3
Approach			455	1.2	455	1.2	0.618	31.0	LOS C	9.7	68.6	0.93	0.79	0.93	27.6
North: Oliver Street															
7	L2	All MCs	58	0.0	58	0.0	0.245	13.9	LOS A	5.1	36.0	0.51	0.49	0.51	22.6
8	T1	All MCs	427	1.2	427	1.2	0.245	8.8	LOS A	5.1	36.0	0.53	0.49	0.53	44.0
9	R2	All MCs	21	5.0	21	5.0	0.245	21.9	LOS B	4.7	33.3	0.55	0.49	0.55	45.4
Approach			506	1.2	506	1.2	0.245	9.9	LOS A	5.1	36.0	0.53	0.49	0.53	41.6
West: Lawrence Street															
10	L2	All MCs	83	0.0	83	0.0	0.171	30.3	LOS C	2.5	17.8	0.81	0.74	0.81	36.9
11	T1	All MCs	204	0.0	204	0.0	0.454	29.9	LOS C	7.2	50.5	0.89	0.78	0.89	30.5
12	R2	All MCs	9	0.0	9	0.0	0.454	43.1	LOS D	7.2	50.5	0.89	0.78	0.89	36.8
Approach			297	0.0	297	0.0	0.454	30.4	LOS C	7.2	50.5	0.87	0.77	0.87	33.1
All Vehicles			2149	1.0	2149	1.0	0.728	19.6	LOS B	12.1	85.2	0.73	0.67	0.75	36.8

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.
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: Oliver Street												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Lawrence Street												

P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Oliver Street												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

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: 1860 [PM_Oliver Street/ Lawrence Street - with dev (Site Folder: 2034)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Oliver Street															
1	L2	All MCs	1	0.0	1	0.0	0.477	15.9	LOS B	12.1	85.2	0.62	0.55	0.62	45.8
2	T1	All MCs	544	0.4	544	0.4	0.477	10.1	LOS A	12.1	85.2	0.62	0.55	0.62	43.9
3	R2	All MCs	348	2.4	348	2.4	* 0.732	25.0	LOS B	11.9	85.3	0.85	0.87	0.93	29.7
Approach			894	1.2	894	1.2	0.732	15.9	LOS B	12.1	85.3	0.71	0.67	0.74	39.2
East: Lawrence Street															
4	L2	All MCs	272	1.2	272	1.2	* 0.621	32.2	LOS C	9.7	68.9	0.95	0.82	0.95	26.2
5	T1	All MCs	157	1.3	157	1.3	0.452	27.6	LOS B	6.3	44.9	0.90	0.75	0.90	30.5
6	R2	All MCs	28	0.0	28	0.0	0.452	37.6	LOS C	6.3	44.9	0.90	0.75	0.90	27.3
Approach			457	1.2	457	1.2	0.621	31.0	LOS C	9.7	68.9	0.93	0.79	0.93	27.6
North: Oliver Street															
7	L2	All MCs	58	0.0	58	0.0	0.245	13.9	LOS A	5.1	36.0	0.51	0.49	0.51	22.6
8	T1	All MCs	427	1.2	427	1.2	0.245	8.8	LOS A	5.1	36.0	0.53	0.49	0.53	44.0
9	R2	All MCs	21	5.0	21	5.0	0.245	21.9	LOS B	4.7	33.3	0.55	0.49	0.55	45.4
Approach			506	1.2	506	1.2	0.245	9.9	LOS A	5.1	36.0	0.53	0.49	0.53	41.6
West: Lawrence Street															
10	L2	All MCs	83	0.0	83	0.0	0.171	30.3	LOS C	2.5	17.8	0.81	0.74	0.81	36.9
11	T1	All MCs	205	0.0	205	0.0	0.457	29.9	LOS C	7.3	50.8	0.90	0.78	0.90	30.5
12	R2	All MCs	9	0.0	9	0.0	0.457	43.1	LOS D	7.3	50.8	0.90	0.78	0.90	36.8
Approach			298	0.0	298	0.0	0.457	30.5	LOS C	7.3	50.8	0.87	0.77	0.87	33.1
All Vehicles			2155	1.0	2155	1.0	0.732	19.7	LOS B	12.1	85.3	0.74	0.67	0.75	36.8

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.
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

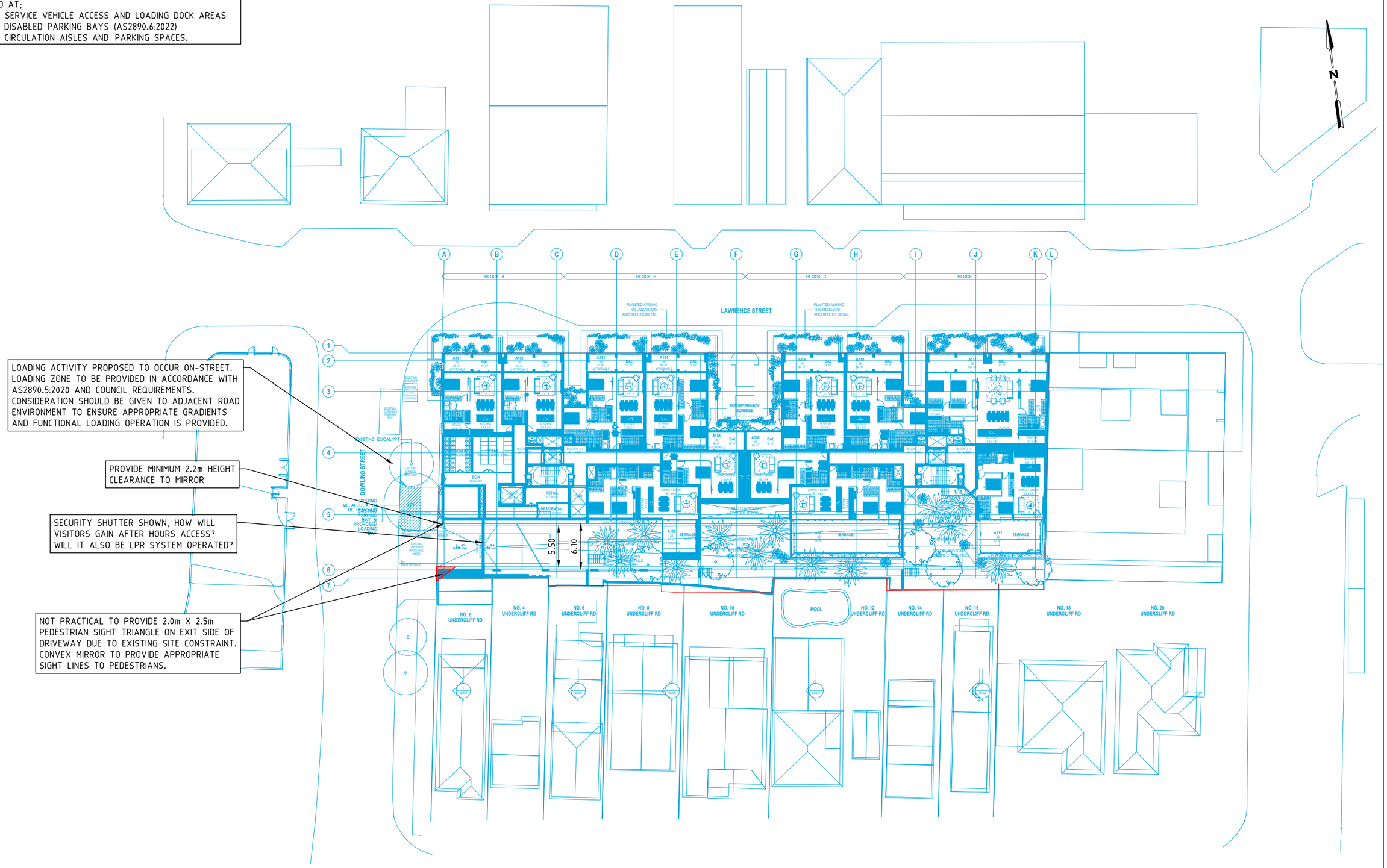
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Oliver Street												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Lawrence Street												

P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Oliver Street												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

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.

Appendix B. Design Review and Swept Path Assessment

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.



LOADING ACTIVITY PROPOSED TO OCCUR ON-STREET. LOADING ZONE TO BE PROVIDED IN ACCORDANCE WITH AS2890.5:2020 AND COUNCIL REQUIREMENTS. CONSIDERATION SHOULD BE GIVEN TO ADJACENT ROAD ENVIRONMENT TO ENSURE APPROPRIATE GRADIENTS AND FUNCTIONAL LOADING OPERATION IS PROVIDED.

PROVIDE MINIMUM 2.2m HEIGHT CLEARANCE TO MIRROR

SECURITY SHUTTER SHOWN, HOW WILL VISITORS GAIN AFTER HOURS ACCESS? WILL IT ALSO BE LPR SYSTEM OPERATED?

NOT PRACTICAL TO PROVIDE 2.0m X 2.5m PEDESTRIAN SIGHT TRIANGLE ON EXIT SIDE OF DRIVEWAY DUE TO EXISTING SITE CONSTRAINT. CONVEX MIRROR TO PROVIDE APPROPRIATE SIGHT LINES TO PEDESTRIANS.

ARCHITECTURAL BASE IN BLUE
DRAWING A-DA-101
REVISION 04
BY CHROFI
DATE RECEIVED 03.12.2024

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WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DESIGNED M.RIMAC	DESIGN CHECK S.MANTON
APPROVED BY S.MANTON	DATE ISSUED 4 DECEMBER 2024

SCALE A3 0 2.5 5 10 1:500
CAD FILE NO. 300304343-03-P4.DWG

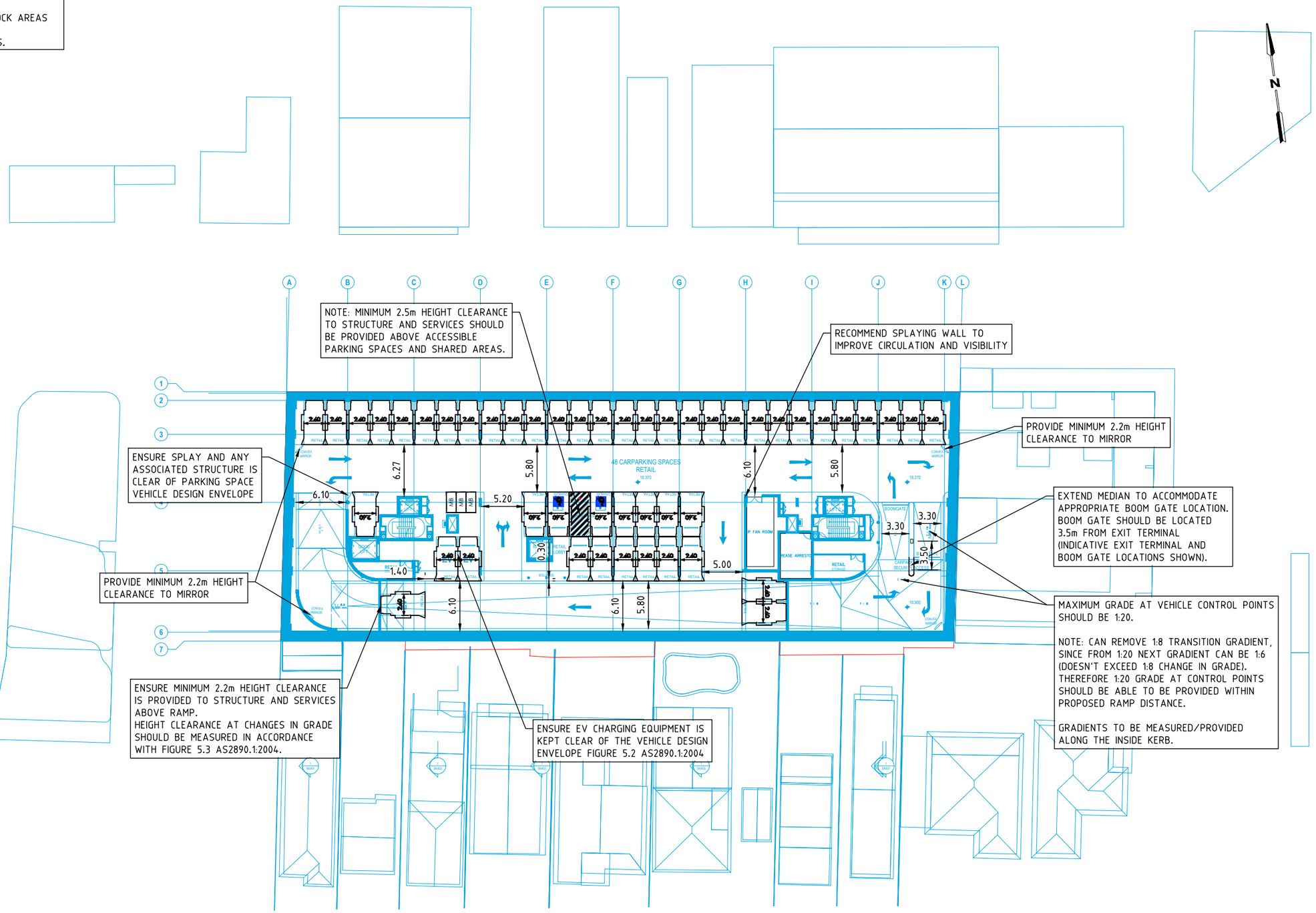
FRESHWATER VILLAGE
FIRST FLOOR

CAR PARK COMPLIANCE REVIEW

DRAWING NO. 300304343-03-01 SHEET 01 OF 09 ISSUE P4

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.

WHERE WHEEL STOPS ARE PROVIDED, THEY SHOULD BE LOCATED 0.9m FROM THE END OF SPACE WITH NO OR LOW KERB, OR 1.1m FROM A HIGH WALL FOR REAR IN PARKING. MEASURED TO THE POINT OF CONTACT WITH VEHICLE TYRE.



ARCHITECTURAL BASE IN BLUE
DRAWING A-DA-098
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BY CHROFI
DATE RECEIVED 03.12.2024

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DESIGNED M.RIMAC	DESIGN CHECK S.MANTON
APPROVED BY S.MANTON	DATE ISSUED 4 DECEMBER 2024

SCALE A3 0 2.5 5 10 1:500
CAD FILE NO. 300304343-03-P4.DWG

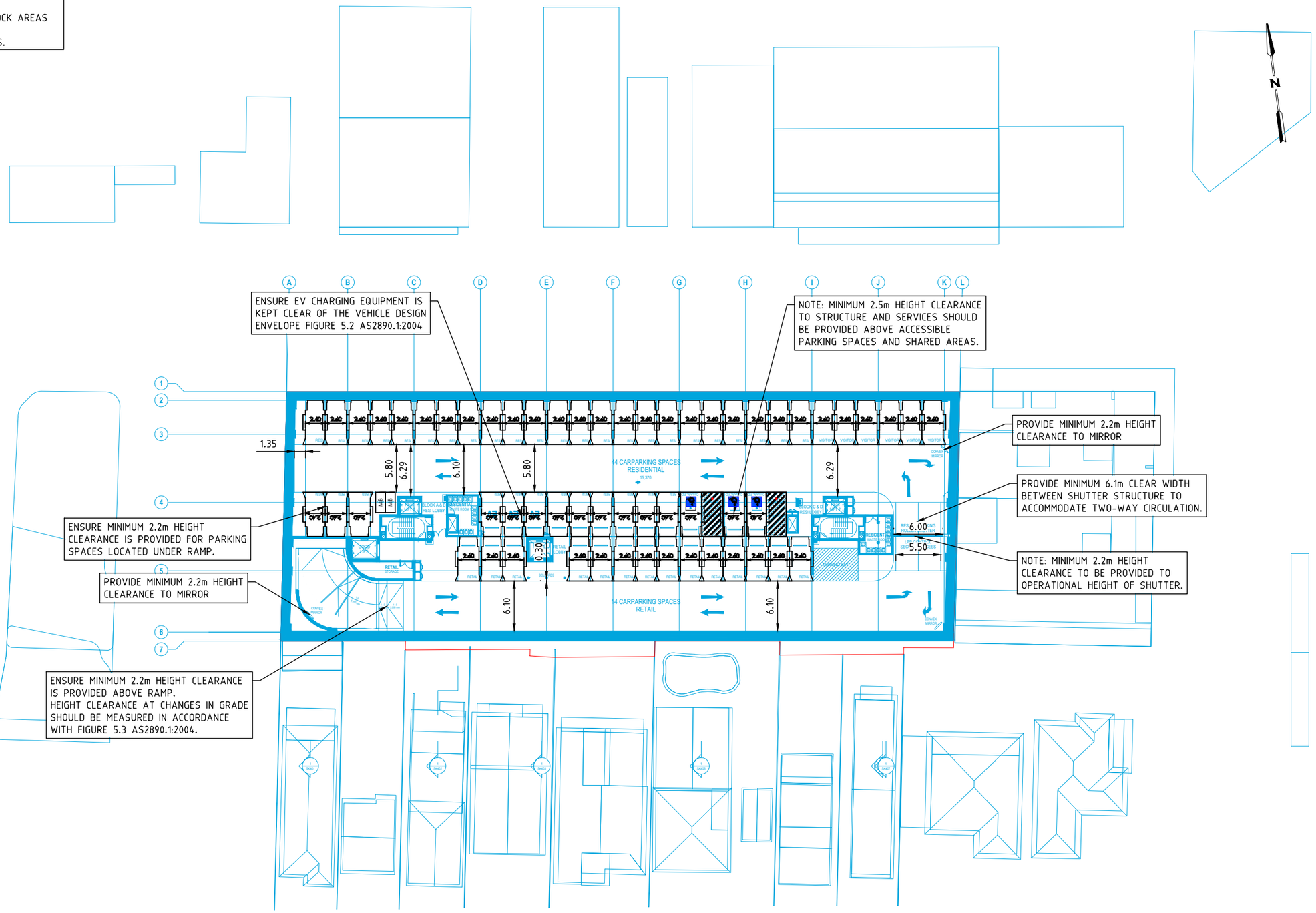
FRESHWATER VILLAGE
BASEMENT 1

CAR PARK COMPLIANCE REVIEW

DRAWING NO. 300304343-03-02 SHEET 02 OF 09 ISSUE P4

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.

WHERE WHEEL STOPS ARE PROVIDED, THEY SHOULD BE LOCATED 0.9m FROM THE END OF SPACE WITH NO OR LOW KERB, OR 1.1m FROM A HIGH WALL FOR REAR IN PARKING. MEASURED TO THE POINT OF CONTACT WITH VEHICLE TYRE.



ARCHITECTURAL BASE IN BLUE
DRAWING A-DA-097
REVISION 04
BY CHROFI
DATE RECEIVED 03.12.2024

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DESIGNED M.RIMAC	DESIGN CHECK S.MANTON
APPROVED BY S.MANTON	DATE ISSUED 4 DECEMBER 2024

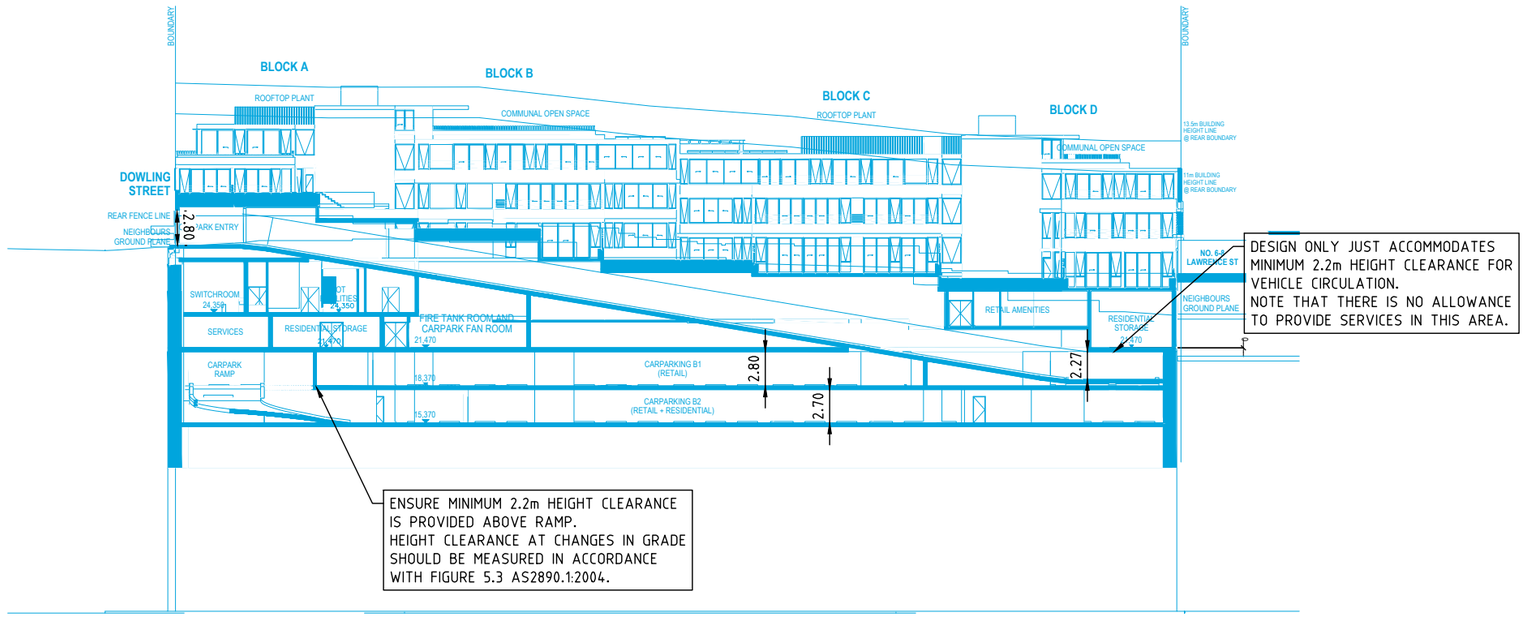
SCALE A3 0 2.5 5 10 1:500
CAD FILE NO. 300304343-03-P4.DWG

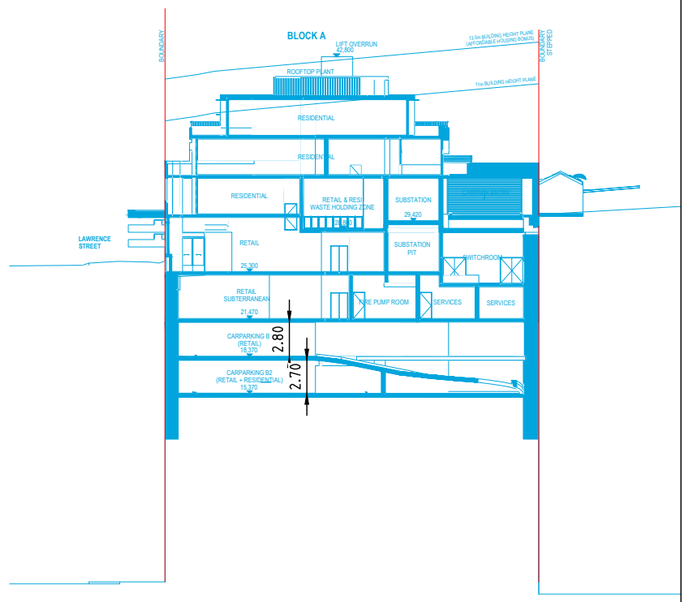
FRESHWATER VILLAGE
BASEMENT 2

CAR PARK COMPLIANCE REVIEW

DRAWING NO. 300304343-03-03 SHEET 03 OF 09 ISSUE P4

MINIMUM HEIGHT CLEARANCES TO STRUCTURE AND SERVICES SHOULD BE PROVIDED AT;
4.5m ABOVE SERVICE VEHICLE ACCESS AND LOADING DOCK AREAS
2.5m ABOVE DISABLED PARKING BAYS (AS2890.6:2022)
2.2m ABOVE CIRCULATION AISLES AND PARKING SPACES.





ARCHITECTURAL BASE IN BLUE
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APPROVED BY S.MANTON
DATE ISSUED 4 DECEMBER 2024
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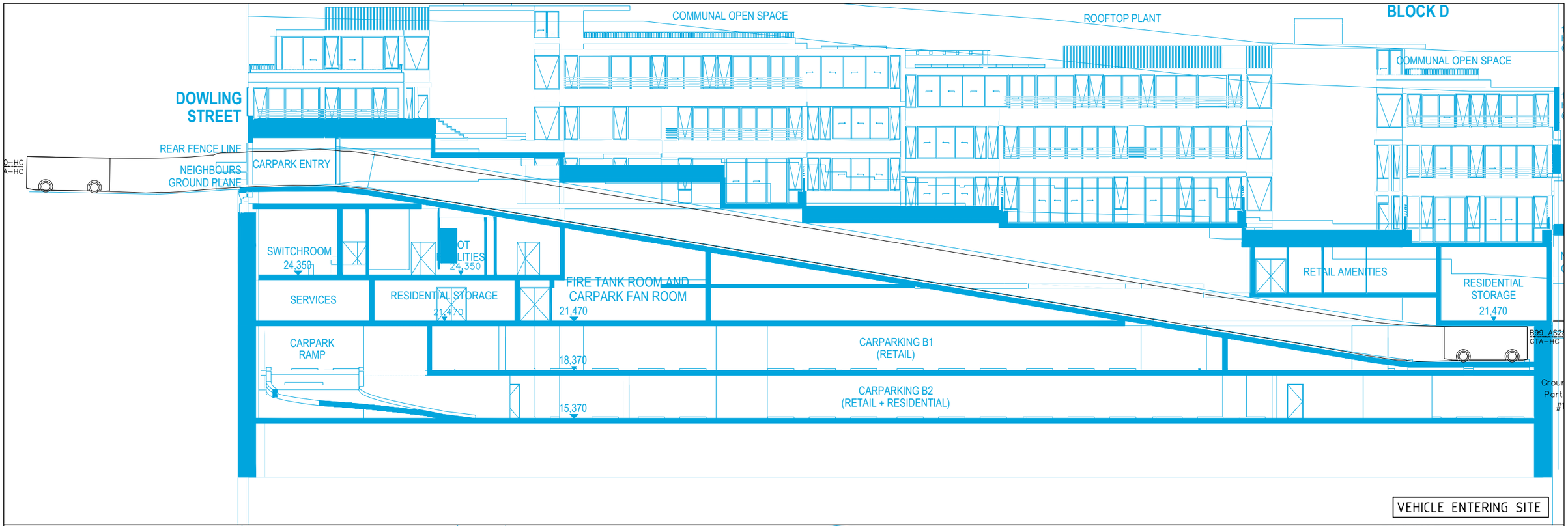
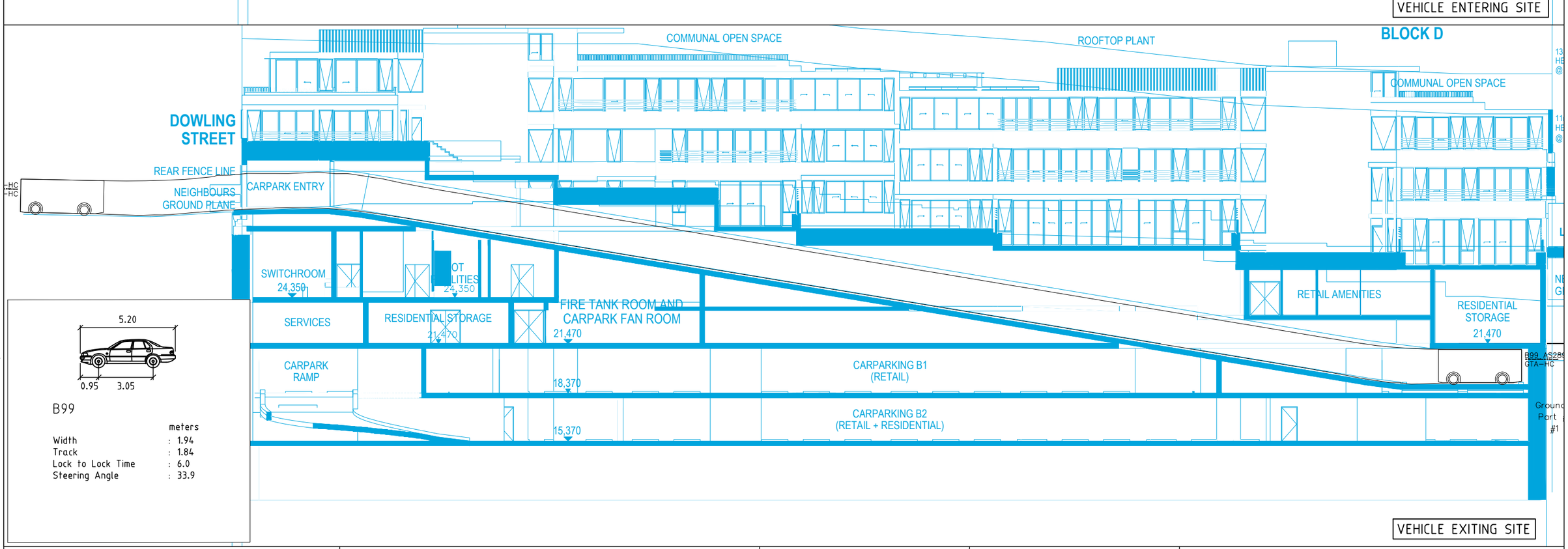
CAD FILE NO. 300304343-03-P4.DWG

FRESHWATER VILLAGE
SECTIONS

CAR PARK COMPLIANCE REVIEW

DRAWING NO. 300304343-03-04 SHEET 04 OF 09 ISSUE P4





B99

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Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

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APPROVED BY S.MANTON	DATE ISSUED 4 DECEMBER 2024

SCALE A3 0 1.25 2.5 5 1:250

CAD FILE NO. 300304343-03-P4.DWG

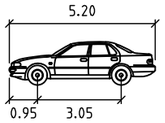
FRESHWATER VILLAGE
SECTIONS
MODIFIED ACCESS RAMP
VEHICLE VERTICAL CLEARANCE ASSESSMENT

DRAWING NO. 300304343-03-05 SHEET 05 OF 09 ISSUE P4

SWEPT PATH KEY

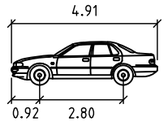
- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

PLOTTED BY RIMAC, MARKO ON 04/12/2024 AT 17:20

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SCALE A3 0 1 2 4 1:200

CAD FILE NO. 300304343-03-P4.DWG

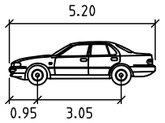
FRESHWATER VILLAGE
FIRST FLOOR
SITE ACCESS
VEHICLE SWEPT PATH ASSESSMENT

DRAWING NO. 300304343-03-06 SHEET 06 OF 09 ISSUE P4

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99

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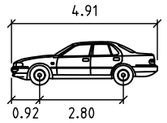
Steering Angle	: 33.9



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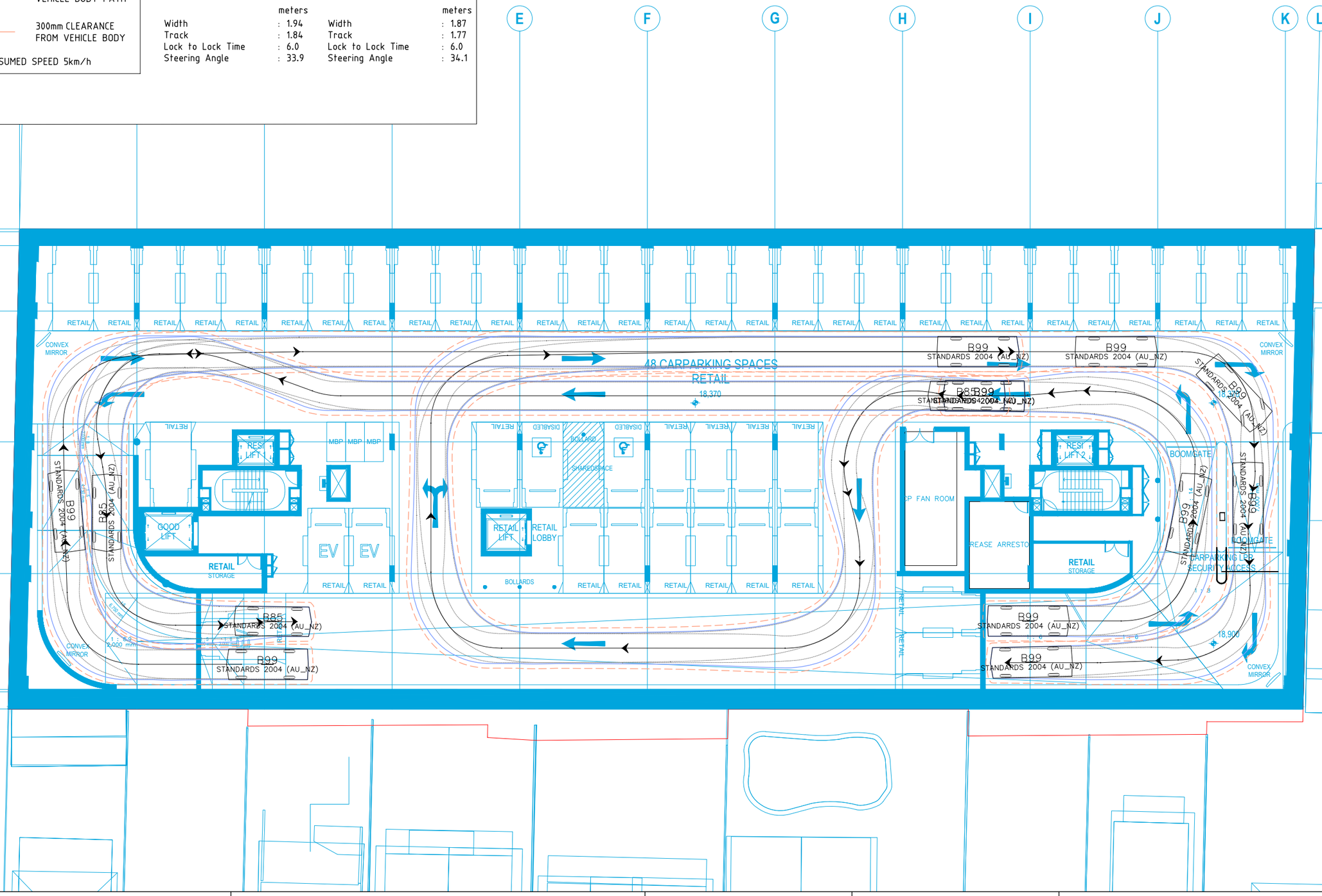
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1



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DESIGN CHECK	S.MANTON
APPROVED BY	S.MANTON
DATE ISSUED	4 DECEMBER 2024
SCALE	A3 — 0 1.25 2.5 5 — 1:250
CAD FILE NO.	300304343-03-P4.DWG

FRESHWATER VILLAGE
BASEMENT 1

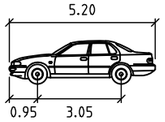
VEHICLE SWEPT PATH ASSESSMENT

DRAWING NO. 300304343-03-07 SHEET 07 OF 09 ISSUE P4

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99

	meters
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Track	: 1.84
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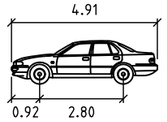
Steering Angle	: 33.9



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	meters
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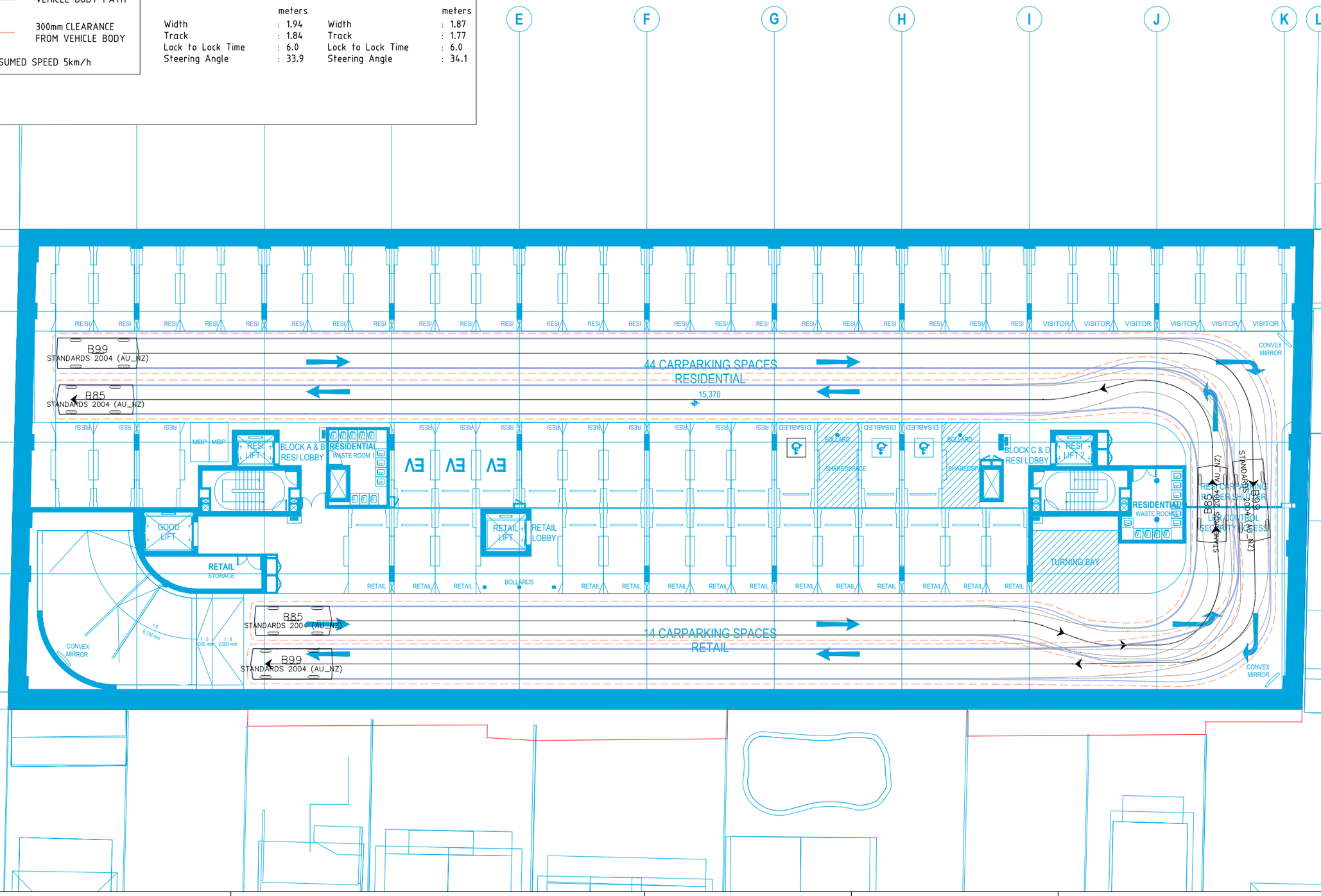
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1



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SCALE A3 0 1.25 2.5 5 1:250

CAD FILE NO. 300304343-03-P4.DWG

FRESHWATER VILLAGE
BASEMENT 2

VEHICLE SWEPT PATH ASSESSMENT

DRAWING NO. 300304343-03-08 SHEET 08 OF 09 ISSUE P4

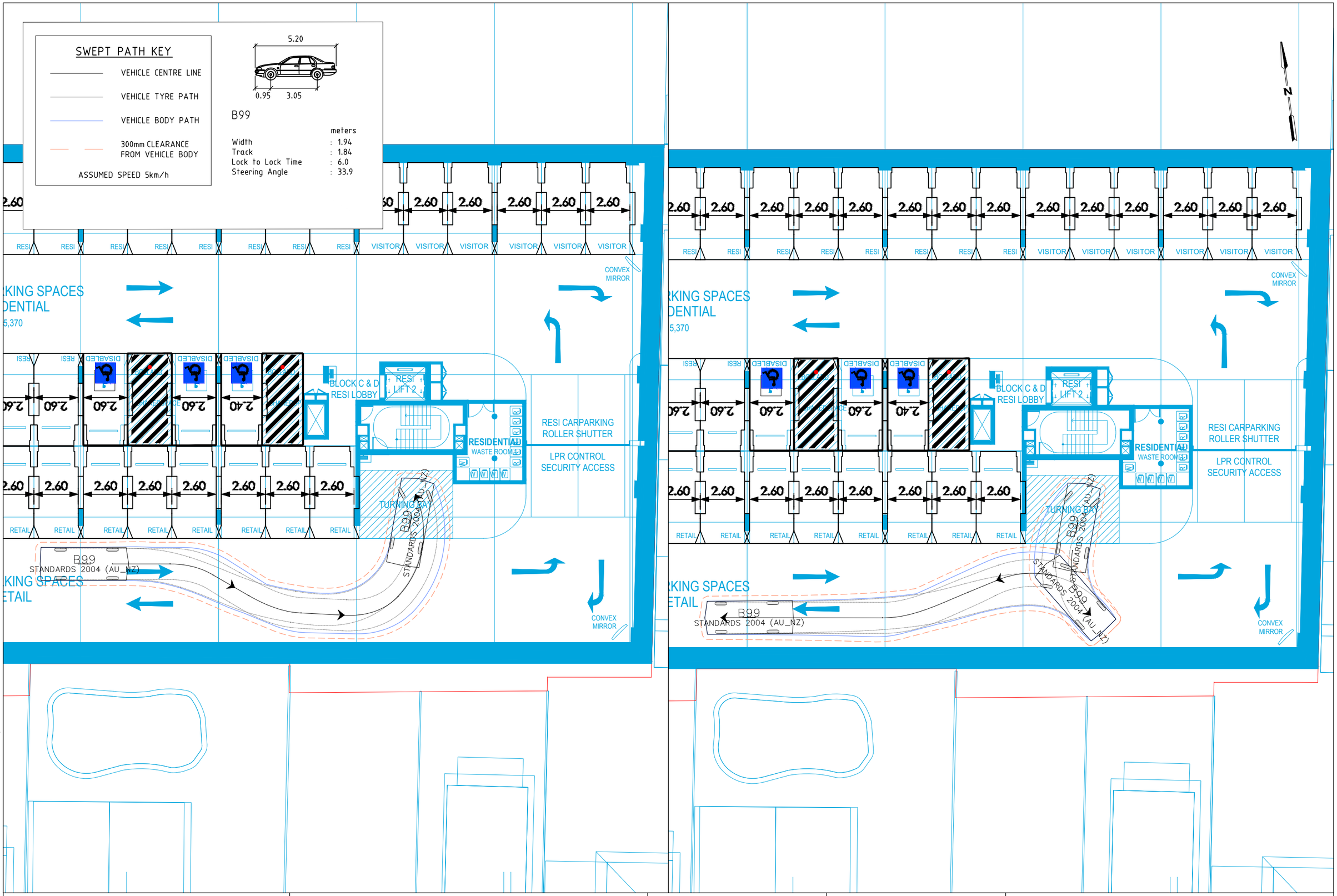
SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9



PLOTTED BY RIMAC, MARKO ON 04/12/2024 AT 17:19

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DESIGNED	M.RIMAC
DESIGN CHECK	S.MANTON
APPROVED BY	S.MANTON
DATE ISSUED	4 DECEMBER 2024
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CAD FILE NO.	300304343-03-P4.DWG

FRESHWATER VILLAGE
BASEMENT 2
TURNING BAY
VEHICLE SWEPT PATH ASSESSMENT

DRAWING NO. 300304343-03-09 SHEET 09 OF 09 ISSUE P4

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