TRAFFIC IMPACT ASSESSMENT

21 Canterbury Road, Punchbowl
Proposed Mixed Use Development

Reference: 19.439p01v02
Date: December 2019

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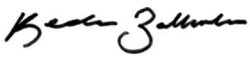
DOCUMENT VERIFICATION

Job Number	19.439			
Project	21 Canterbury Road, Punchbowl			
Client	CMT Architects Australia			
Revision	Date	Prepared By	Checked By	Signed
v02	12/12/2019	Hayden Dimitrovski	Kedar Ballurkar	

CONTENTS

1. INTRODUCTION

TRAFFIX has been commissioned by CMT Architects Australia to undertake a Traffic Impact Assessment of a proposed mixed-use development at 21 Canterbury Road, Punchbowl. The development application seeks approval for the construction of a three-storey building containing 13,100m^2 gross floor area of retail, commercial and club floor space. The development is situated within the Canterbury Bankstown local government area and has been assessed under the Bankstown Development Control Plan 2015.

This report documents the findings of our investigations and should be read in the context of the Statement of Environmental Effects prepared separately. The proposed development is of a scale that will require referral of the development application to the Roads and Maritime Services under the provisions of State Environmental Planning Policy (Infrastructure) 2007.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Presents the overall study conclusions

2. LOCATION AND SITE

The subject site is known as 21 Canterbury Road, Punchbowl and is located on the north-western corner of the intersection Canterbury Road and Punchbowl Road. It is also located about 1.3 kilometres southwest of Punchbowl Railway Station.

The site is irregular shaped in configuration and has a site area of approximately 1.8 hectares. It has a southern frontage to Canterbury Road measuring approximately 100 metres in length and an eastern frontage to Punchbowl Road measuring approximately 110 metres in length. The site is otherwise bounded by low density residential developments to the north and northwest and by an industrial (retailing) development to the southwest.

The existing development on-site comprises of a two storey club with a gross floor area of approximately 5,500m^2. A large at-grade parking area is served by two separate access driveways on Punchbowl Road, approximately 90 metres north of Canterbury Road, for entry and exit. These access driveways permit all turning movements from Punchbowl Road. An unused access driveway is also present on Canterbury Road, near the western site boundary.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**. Reference should also be made to the Photographic Record presented in **Appendix A** which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

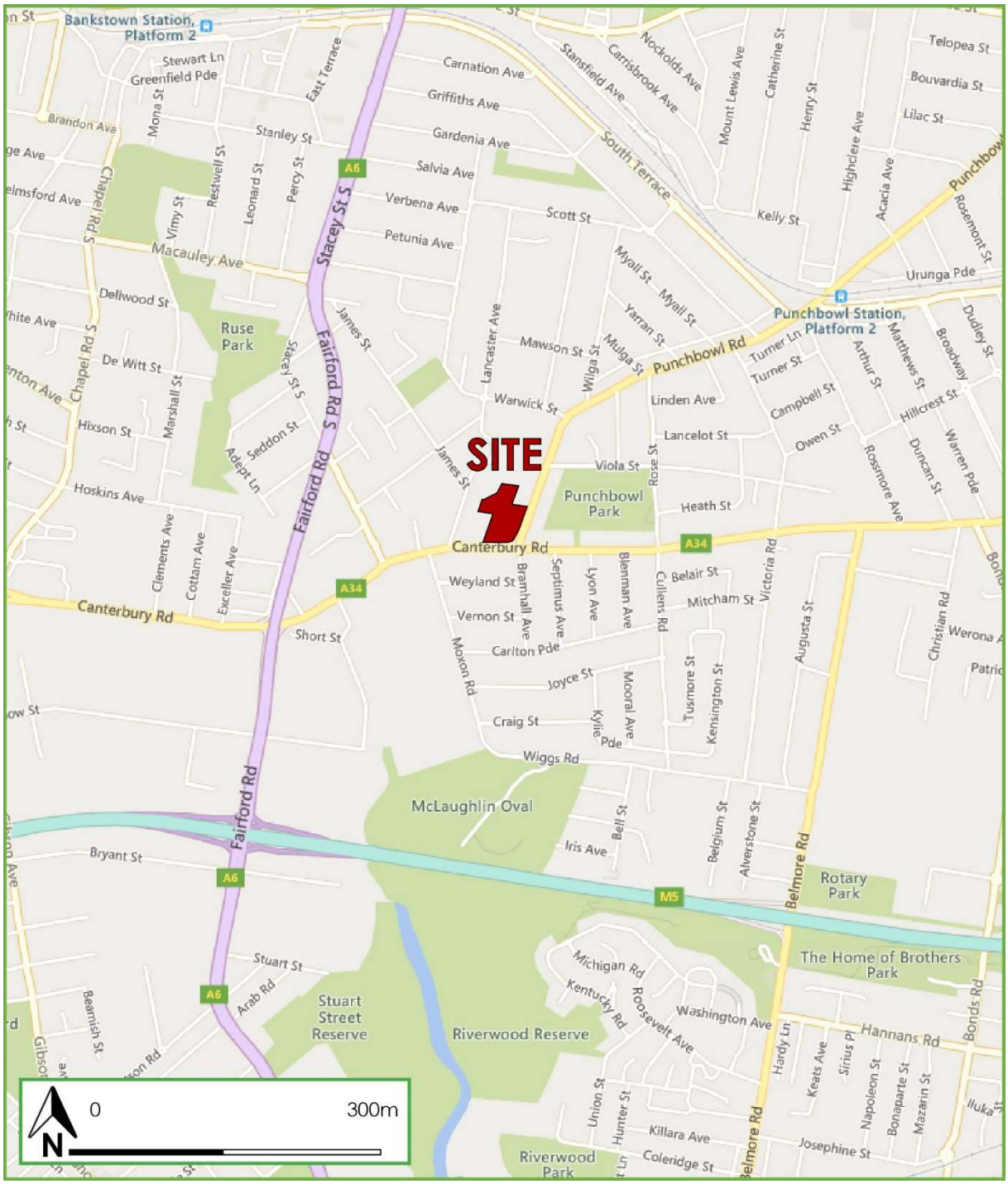


Figure 1: Location Plan

Figure 2: Site Plan

3. EXISTING TRAFFIC CONDITIONS

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads of particular interest:

- Canterbury Road: an RMS Main Road (MR167) that generally runs in an east-west direction, between New Canterbury Road in the east and The River Road in the west. Canterbury Road forms one of Sydney's major east-west corridors carrying approximately 42,200 vehicles per day (2016 AADT) and is subject to a 60 km/h speed limit. 'Clearway' restrictions apply along both kerbsides between the hours of 6:00-10:00am and 3:00-7:00pm Monday to Friday. Canterbury Road accommodates two lanes of traffic in each direction within an undivided carriageway.
- Punchbowl Road: an RMS Main Road (MR549) that runs in a northeast-southwest direction, between Coronation Parade in the north and Canterbury Road in the south. It carries approximately 13,000 vehicles per day (2016 AADT) and is subject to a 60 km/h speed limit. In the vicinity of the site, Punchbowl Road accommodates two lanes of traffic in each direction within an undivided carriageway with the kerbside lanes in both directions used for unrestricted parallel parking.
- Moxon Road: a local collector road that runs in a north-south direction between Canterbury Road in the north and Wiggs Road in the south. It accommodates a single lane of traffic in each direction within an undivided carriageway and has a posted speed limit of 50 km/h. Right turn movements from Moxon Road onto Canterbury are prohibited with an exemption for buses.
- Bramhall Avenue: a local road that runs in a north-south direction between Canterbury Road in the north and Carlton Parade in the south. It accommodates one lane of traffic in each direction within an undivided carriageway and has a posted speed limit of 50 km/h. Access to Canterbury Road from Bramhall Avenue is prohibited, with vehicles only able to enter Bramhall Avenue from this intersection.

It is evident that access opportunities for the site are limited to the arterial road network, either via Canterbury Road or Punchbowl Road.

Figure 3: Road Hierarchy

3.2 Existing Intersection Performance

TRAFFIX has previously assessed the following intersections based on surveys undertaken in 2016:

- Canterbury Road, Punchbowl Road and Bramhall Avenue, and
- Canterbury Road and Moxon Road.

TRAFFIX subsequently undertook a survey of the intersection of Canterbury Road and Punchbowl Road in November 2019, whereby it was found that road network volumes had not increased. Accordingly, the 2019 volumes for the Canterbury Road / Punchbowl Road intersection and 2016 volumes for the Canterbury Road / Moxon Road intersection have been adopted as base case volumes for the purpose of assessing intersection performance during the weekday network peak periods of 7:00am to 9:00am and 4:00pm to 6:00pm.

The intersections were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below in **Table 1**:

Table 1: Intersection Performance Parameters

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals	Give Way and Stop Signs
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 accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table 2** below. Reference should also be made to the detailed SIDRA outputs included in **Appendix B**.

Table 2: Intersection Performance - Existing Volumes

Intersection	Control Type	Period	Intersection Degree of Saturation (DOS)	Average Delay (AVD)	Level of Service (LOS)
Canterbury Road / Punchbowl Road / Bramhall Avenue	Signals	AM	0.901	18.7	B
		PM	0.888	19.9	B
Canterbury Road / Moxon Road	Signals	AM	0.897	30.2	C
		PM	0.918	29.2	C

It is evident that both intersections perform acceptably under existing conditions, where:

- The intersection of Canterbury Road and Punchbowl operates at a Level of Service B, thus indicating spare capacity.

- The intersection of Canterbury Road and Moxon Road operates at a Level of Service of C, thus indicating the intersection is operating satdifactorily.

This analysis serves to provide a comparison of the relative change in the performance parameters as a result of the subject proposal. This is discussed further in Section 6.

3.3 Public Transport

The existing public transport network operating in the locality is illustrated in **Figure 4**. It is evident that the site is located within 400 metres of bus stops on Canterbury Road and Warwick Street that are serviced by routes connecting to key regional centres at Bankstown, Hurstville and Canterbury. These bus routes provide frequent services during weekday peak periods.

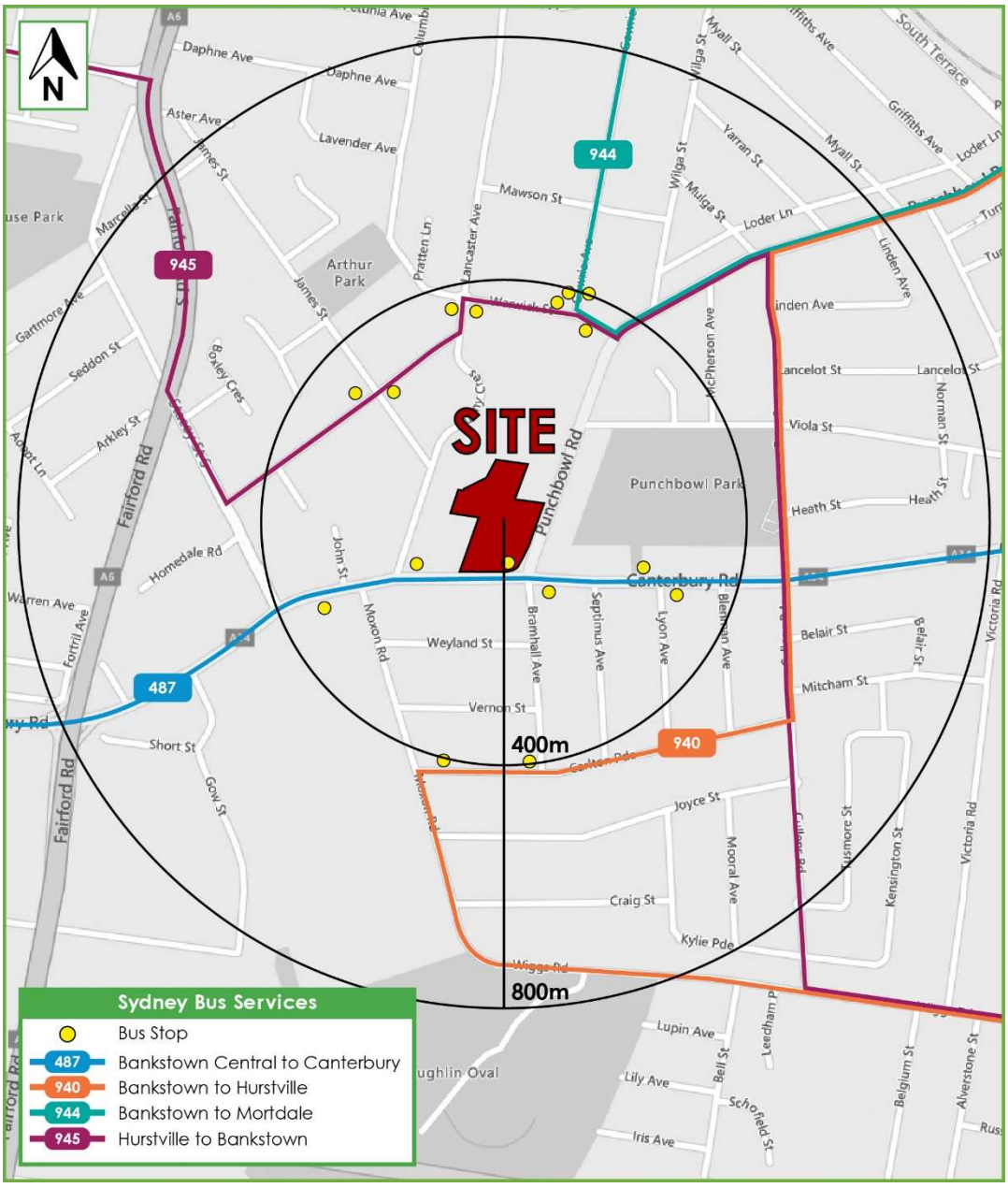


Figure 4: Public Transport

4. DESCRIPTION OF PROPOSED DEVELOPMENT

A detailed description of the proposed development is provided in the Statement of Environmental Effects prepared separately. In summary, the development application seeks approval for the demolition of all existing structures on-site and for the construction of a three-storey mixed use development (with two basement levels) comprising of:

- 4,650m^2 gross floor area of retail space, consisting of:
  - A supermarket containing 3,000m^2 gross floor area; and
  - Ground floor tenancies containing a total of 1,650m^2 gross floor area;
- A ground floor club containing 1,750m^2 gross floor area of space; and
- 6,750m^2 gross floor area of commercial space.

The proposed development will contain the following parking facilities:

- A total of 413 car parking spaces, consisting of:
  - 214 parking spaces within two basement levels; and
  - 199 parking spaces in an at-grade parking area to the north of the structure.
- A loading dock suitable for two (2) 8.8m Medium Rigid Vehicles.
- An indented bay on the ground floor circulation road extending for 14m.

Vehicular access to the site is proposed from Punchbowl Road and will be regulated to left-in and left-out movements only. This may be enforced by the construction of a median island on the centre of the carriageway.

The parking requirements and traffic impacts arising from the proposed development are discussed in **Section 5** and **Section 6** respectively. Reference should be made to the architectural drawings prepared by CMT Architects Australia.

5. PARKING REQUIREMENTS

5.1 Car Parking – DCP Rates

Part B5 (Parking) of the Bankstown Development Control Plan (DCP) 2015 stipulates the following car parking requirements for the respective uses of the proposed development:

- Shops (Developments of greater than or equal to 4,000m^2 gross floor area):
  - A parking survey should be carried out by the applicant, to assess the appropriate level of parking for developments greater than 4,000m^2 gross floor area.
- Business Premises / Office Premises:
  - 1 car parking space per 40m^2 gross floor area of the premises.
- Club (non-listed):
  - Development not included in the schedule of car parking standards must submit a parking study for Council's consideration. A qualified traffic consultant must prepare the parking study.

It is evident that the DCP does not prescribe specific parking rates for the particular land uses (and scale). Accordingly, there is no nominal minimum parking requirement for the proposed development and an assessment of the parking demands generated is provided in the following section.

5.2 Car Parking – Demand Based Assessment

In order to estimate the total parking demand of the proposed development, parking rates for each component have been established based on the following methodology:

- Supermarket: Under the RMS Guide to Traffic Generating Developments, a peak parking rate of 4.2 spaces per 100m^2 gross leasable floor area is stipulated for supermarkets. This rate has been adopted for the proposed 3,000m^2 gross floor area supermarket (equivalent to gross leasable floor area).
- Retail: Under the RMS Guide to Traffic Generating Developments, a peak parking rate of 4.5 spaces per 100m^2 gross leasable floor area is stipulated for specialty and secondary retail stores. This rate has been adopted for the proposed retail tenancies which have a combined

1,650m^2 gross floor area supermarket (equivalent to gross leasable floor area).

- Commercial: The parking rate of 1 space per 40m^2 gross floor area has been adopted as prescribed under the DCP for an office premises.
- Club: Prior to the Bankstown RSL Club relocating to 1 Meredith Street in Bankstown, TRAFFIX undertook parking surveys of the existing operation at 32 Kitchener Parade, Bankstown in 2015. Over a seven day period, it was found that the club generated a parking demand of 1 space per 18.6m^2 of public floor area, based on a maximum of 215 cars counted on Saturday evening and the pre-existing club development containing 3,899m^2 of public floor area.

  This rate was found to be near identical to the average parking demand rate of 1 space per 17.4m^2 gross floor area for the following club developments previously surveyed by TRAFFIX:

  - El Cortez Hotel, Canley Heights
  - Pittwater RSL Club, Mona Vale
  - Guildford Leagues Club, Guildford
  - Mt Annan Hotel, Mount Annan
  - Ettalong Bowling Club, Ettalong

  Accordingly, the Bankstown RSL Club rate of 1 space per 18.6m^2 public floor area has been adopted, noting that it will be conservative when applied to the total gross floor area of the club development.

  It is clarified that surveys were undertaken for Club Punchbowl on a Saturday evening in November 2019, however it was found that the development was underutilised, with only functions occurring (no bar or restaurant activity). The results of a travel mode questionnaire are presented in **Appendix C** which confirms a car occupancy rate of 2.7 persons per car out of a sample of 293 guests. This is

The adopted parking rates have been cumulatively applied to the proposed development in **Table 3**.

Table 3: Parking Demands – Nominal (Unrealistic) Cumulative Assessment

Type	GFA	Parking Rate	Source	Spaces Required	Spaces Provided
Supermarket	3,000m²	4.2 spaces per 100m² GFA	RMS	126	413
Retail	1,650m²	4.5 spaces per 100m² GFA	RMS	74	
Commercial	6,750m²	1 space per 40m² GFA	DCP	169	
Club	1,750m²	1 space per 18.6m² GFA	Survey	94	
			Totals	**463**	**413**

It is evident that the proposed development has been assessed to generate a cumulative parking demand for 463 parking spaces. Notwithstanding, it is expected that the total parking demand at any time will be substantially less, noting that:

- The commercial tenancies will experience peak demands only on weekdays during the day; and
- The retail tenancies and club will experience peak demands during weekends on certain weeknights (e.g. Thursdays and Fridays).

Accordingly, reduction factors have been applied to estimate the non-cumulative parking demands during weekdays and weekends/weeknights in **Table 4** and **Table 5** respectively.

Table 4: Weekday Parking Demands – Realistic Assessment

Type	GFA	Parking Rate	Reduction Factor	Spaces Required	Spaces Provided
Supermarket	3,000m²	4.2 spaces per 100m² GFA	40%	50	413
Retail	1,650m²	4.5 spaces per 100m² GFA	40%	30	
Commercial	6,750m²	1 space per 40m² GFA	N/A	169	
Club	1,750m²	1 space per 18.6m² GFA	40%	38	
			Totals	**287**	**413**

Table 5: Weekend/Weeknight Parking Demands – Realistic Assessment

Type	GFA	Parking Rate	Reduction Factor	Spaces Required	Spaces Provided
Supermarket	3,000m²	4.2 spaces per 100m² GFA	N/A	126	413
Retail	1,650m²	4.5 spaces per 100m² GFA	N/A	74	
Commercial	6,750m²	1 space per 40m² GFA	10%	17	
Club	1,750m²	1 space per 18.6m² GFA	N/A	94	
			Totals	**311**	**413**

It is evident that the proposed development generates a maximum parking demand for 311 parking spaces when assessed non-cumulatively and this would occur during weeknights and weekends. Accordingly, the overall parking provision for 413 spaces will be ample in accommodating all car parking demands and without reliance on the on-street parking network, even during 'non-design' peaks that exceed the 85th percentile demand level. This level of provision is also only 10% lower than would occur under a cumulatively assessment methodology.

5.3 Accessible Parking

Part B4 of the DCP requires accessible parking to be provided at a rate of one car space per 100 car spaces provided. This equates to a requirement for four (4) accessible parking spaces when applied to the cumulative requirement for 379 car parking spaces. In response, there is potential to provide four (4) accessible parking spaces on Basement 1 by providing shared areas (accounted for in the total car parking provision), thus complying with the requirements of the DCP.

5.4 Bicycle Parking

With respect to bicycle parking, Part B5 of the DCP stipulates that '*Council may require development to provide appropriate bicycle parking facilities either on–site or close to the development as identified in Australian Standard 2890.3–Bicycle Parking Facilities*'. Whilst the plans do not indicate provision for bicycle parking, this could be incorporated in response to a Condition of Consent should Council require.

5.5 Service Vehicle Parking

Part B4 of the DCP stipulates that for commercial/retail developments exceeding 500m^2, the following loading facilities should be provided:

- At least one off-street parking space for delivery/service vehicles; and
- Additional off-street parking spaces or a loading dock depending on the size, number, and frequency of delivery/service vehicles likely to visit the premises.

In response, the proposed development provides the following loading facilities:

- A loading area on Basement 1 capable of accommodating two (2) 8.8m Medium Rigid Vehicles to unload concurrently;
- Three (3) courier bays on Basement 1, suitable to accommodate a B99 vehicle (these have been accounted for separately to the total car parking provision); and
- A 14.0m pick-up and drop-off bay on the Ground Level, suitable for two (2) 6.4m Small Rigid Vehicles to park.

It is expected that these provisions can satisfy the demands of the proposed development with appropriate management, noting that the supermarket accounts for the majority of retail space and could consolidate delivery of stock. In this regard, a Loading Dock Management Plan could be drafted prior to issue of an Occupation Certificate, which would include all details regarding management and scheduling of the loading area to ensure that all demands can be accommodated on-site.

These provisions are considered to be satisfactory, noting that each space can accommodate a large sized vehicle, with many retail and commercial tenancies also having fixed and regular requirements, thus allowing the potential for deliveries to be scheduled. In this regard, a Loading Dock Management Plan could be drafted prior to issue of an Occupation Certificate, which would include all details regarding management and scheduling of the loading area to ensure that all demands can be accommodated on-site.

6. TRAFFIC AND TRANSPORT IMPACTS

6.1 Existing Site Generation

A survey was undertaken of the existing site accesses during the AM peak period (7:00am – 9:00am) and PM peak period (4:00pm – 6:00pm) on Thursday 14 November 2019, which revealed negligible traffic volumes. It is concluded that the existing club development is underutilised on weekdays and therefore no discount has been applied to the proposed development traffic volumes that would ordinarily form a net increase over existing conditions.

6.2 Development Trip Generation

The impacts of the proposed development on the external road network have been assessed having regard for the indicative yield scenarios as summarised in **Section 4** above. This assessment has been undertaken in accordance with the requirements of the RMS Guide to Traffic Generating Developments (2002) and the RMS Technical Direction TDT2013/04a. As such, the traffic generation rates published in the RMS Guide have been adopted for each individual land use the results of which are summarised below.

6.2.1 Supermarket

The RMS Guide specifies a trip rate of 15.5 vehicle trips per 100m^2 of GLFA in the Thursday PM peak period for supermarkets. However, this rate is based on historical data based on supermarkets trading late only on Thursdays. The characteristics of supermarkets have changed substantially in the following ways:

- Large format supermarkets now open late during all nights of the week, which spreads activity as opposed to having concentrated peaks such as on Thursday nights.
- Small format supermarkets near employment centres and public transport destinations allow workers to make frequent walk in trips for groceries, thus reducing the need for car based trips.

Accordingly, a trip rate of 12.5 vehicle trips per 100m^2 GLFA during the PM peak period is considered to appropriately reflect the traffic generated by the proposed 3,000m^2 supermarket. When also assuming that AM peak period volumes would be 33% of the PM peak period volumes (mainly staff arrivals), the following traffic generation will arise:

- 104 vehicle trips per hour during the AM peak period (83 in, 21 out); and
- 315 vehicle trips per hour during the PM peak period (158 in, 157 out).

6.2.2 Retail

The RMS Guide specifies a trip rate of 4.6 trips/100m^2 of GLFA for secondary retail uses within a shopping cente and this has therefore been adopted during a Thursday PM peak period. When assuming the AM peak period equates to 33% of the PM peak period generation (accounting mainly for staff arrivals), the proposed 1,650m^2 GFA of retail space results in the following trip generation:

- 25 vehicle trips per hour during the AM peak period (20 in, 5 out); and
- 76 vehicle trips per hour during the PM peak period (38 in, 38 out).

6.2.3 Commercial

The Technical Direction TDT 2013/04a, provides revised trip generation advice for a number of land uses based on survey data obtained since 2009. One of the land uses covered by TDT 2013/04a is office blocks. The average Sydney weekday trip rates provided by TDT 2013/04a have been adopted for assessing the traffic generating potential of the commercial floor area of the proposed development. The relevant trip rates are as follows:

- 1.6 vehicle trips per 100m^2 of GFA during the AM peak period; and
- 1.2 vehicle trips per 100m^2 of GFA during the PM peak period.

Application of these trip rates to the 6,750m^2 of commercial GFA, and adopting an 80:20 split, results in the following predicted trip generation volumes:

- 108 vehicle trips per hour during the AM peak period (86 in, 22 out); and
- 81 vehicle trips per hour during the PM peak period (16 in, 65 out).

6.2.4 Club

The RMS Guide does not specify a trip generation rate for clubs and recommends using similar developments to determine a trip generation rate for the proposed development. Accordingly, TRAFFIX has previously surveyed the Cabra-Vale Diggers Club in Canley Vale

during 2016 where it was established that this club development generated a 2.38 vehicle trips per 100m^2 of GFA during the site peak hour. This rate has been applied to the PM peak period and the AM peak period discounted rate of 33% to account for staff arrivals. The proposed 1,750m^2 club development is therefore estimated to generate the following traffic volumes:

- 14 vehicle trips per hour during the AM peak period (11 in, 3 out); and
- 42 vehicle trips per hour during the PM peak period (34 in, 8 out).

6.2.5 Combined Generation

The combined generation of the proposed mixed-use development can be summarised as follows:

- 272 vehicle trips per hour during the AM peak period (217 in, 55 out); and
- 577 vehicle trips per hour during the PM peak period (277 in, 300 out).

6.3 Traffic Distribution

The proposed vehicular access for the development will be restricted to left in and left out movements only. Therefore, all traffic entering the development will arrive northbound on Punchbowl Road via Canterbury Road and exit northbound to Punchbowl Road.

Traffic arriving to the site from the north via Punchbowl Road may enter Rose Street and Canterbury Road to turn right back on to Punchbowl Road and enter the development. Alternatively drivers may turn right from Punchbowl Road onto Canterbury Road, and thereafter perform a detour via Stacey Street, Lancaster Avenue and James Street to renter Canterbury Road before turning left onto Punchbowl Road.

As evidenced below from the directional splits from the intersection of Canterbury Road and Punchbowl Road, the amount of development traffic required to undertake this detour will be comparatively low:

- The surveys showed 20% of traffic approaching the intersection of the traffic originated from Punchbowl Road and 80% was from Canterbury Road in both directions.
- The directional split of traffic on Canterbury Road turning on to Punchbowl Road was 83% eastbound and 17% westbound.

Accordingly, the expected splits for arrivals to the site are summarised in **Table 6**.

Table 6: Arrivals Distribution

Arrival Routes	Percentages
Canterbury Road (East)	13.6%
Canterbury Road (West)	66.4%
Punchbowl Road (via Rose St)	10%
Punchbowl Road (via Stacey St, Lancaster Ave, James St and Canterbury Road)	10%

Traffic departing the site must turn left on Punchbowl Road. In order to access Canterbury Road, a detour via Warwick Street/Lancaster Avenue/Stacey Street or via Viola Street/Rose Street will occur, which will have no direct reliance on the intersection of Canterbury Road and Punchbowl Road.

6.4 Peak Period Intersection Performance

The development volumes have been applied to the network model discussed in Section 3.2, which has been expanded to include the proposed site access driveway. This additional traffic has been distributed according to the abovementioned splits with the results of software modelling for future conditions summarised in **Table 7**. Reference should be made to the SIDRA Outputs in **Appendix B** for detailed information on individual movements.

Table 7: Intersection Performance - Existing and Development Volumes

Intersection	Control Type	Period	Scenario	Intersection Degree of Saturation (DOS)	Average Delay (AVD)	Level of Service (LOS)
Canterbury Road / Punchbowl Road / Bramhall Avenue	Signals	AM	Existing	0.901	18.7	B
			Development	0.912	20.8	B
		PM	Existing	0.888	19.9	B
			Development	0.895	21.6	B
Canterbury Road / Moxon Road	Signals	AM	Existing	0.897	30.2	C
			Development	0.999	51.7	D
		PM	Existing	0.918	29.2	C
			Development	1.005	51.5	D
Punchbowl Road / Vehicular Access	Priority	AM	Development	0.413	6.2	A
		PM	Development	0.291	6.2	A

It is evident that the above intersections will continue to perform adequately with the addition of the development volumes. It is argued however that the assessment remains very conservative for the following reasons:

- It does not take into account linked trips from base case traffic on the road network whom would divert to the development.
- No discount has been applied for the traffic that could be generated under the existing approved use of the site as a club development.
- The proposed development will introduce a sizable walking catchment of customers from the 6,750m^2 gross floor area of office space.

A summary of performance for each intersection is provided below:

- Canterbury Road / Punchbowl Road: This intersection experiences a LoS of B in the AM and PM peak periods for both scenarios, with the development traffic only increasing the average delay by 1.7 seconds. This indicates that the intersection is not sensitive to the particular

movements associated with the proposed development. In particular, vehicle movements on the south approach on Punchbowl Road are unaffected due to the left-in and left-out arrangement for the site access.

- Canterbury Road / Moxon Road: The intersection experiences an increased in the LoS from C to D during both peak periods with a maximum increase in the average delay by 22.3 seconds. The intersection would continue to perform within capacity.
- Punchbowl Road / Site Access: This intersection has a LoS of A, which is based on the worst performing movement associated with the left turn movement from the site access driveway. This confirms that there is ample gap opportunity to turn onto the northbound lanes of Punchbowl Road.

In summary the traffic impacts of the proposed development are considered acceptable, having regard for the left-in and left-out site access arrangement from Punchbowl Road which will result in minimal delays at the intersection with Canterbury Road. Accordingly, no upgrades are considered warranted for the proposed development (besides the construction of a median island on Punchbowl Road across the site access).

7. ACCESS AND INTERNAL DESIGN ASPECTS

7.1 Access

The proposed development provides 413 parking spaces with access to Punchbowl Road (arterial road). It therefore nominally requires a Category 4 access facility under AS2890.1 (2004), which is defined as having an entry access driveway with a width between 6.0m to 8.0m and an exit access driveway with a width between 6.0m to 8.0m. The entry and exit access driveways are to have a separation between 1m to 3m.

Notwithstanding, Clause 3.2 of the Standard permits a departure from these driveway widths should the traffic flow on the access driveway be more accurately known. In this regard, the proposed access will be restricted to left-in and left-out only, and thus only one entry lane and one exit lane will be required.

In response, the proposed development will provide an entry only access driveway of width 5.0m and exit access driveway of width 5.0m, which has been separated by a 1.2m median. The access arrangements have been tested for the largest design vehicle to enter the site, being an 8.8m Medium Rigid Vehicle, with the results in **Appendix D** demonstrating adequate geometry. Accordingly, the geometric design of the access driveways for the proposed development are considered to be satisfactory and will also perform acceptably based on the software modelling assessment in Section 6.

It is finally noted that a median could be installed on the centreline of Punchbowl Road in order to enforce left-in and left-out movements at the site access driveway. In this regard, it is evident from the aerial image in **Appendix D** that the median would not affect the access driveways for opposing properties, where any future development of those sites will also likely be subject to a left-in and left-out arrangement. It is also clarified that Punchbowl Road has an existing median on approach to Canterbury Road thereby demonstrating that the 12.8m carriageway width can continue to accommodate four trafficable lanes with the median island.

7.2 Internal Design

The internal car park generally complies with the requirements of AS2890.1 (2004), AS2890.2 (2018) and AS2890.6 (2009) with the following noteworthy:

7.2.1 Parking Modules

- 205 parking spaces in Basement Level 2 have been designed in accordance with a Class 3 user, and are provided with a minimum space width of 2.6m, space length of 5.4m and aisle width of 5.8m.
- 199 parking spaces in the northern at-grade car park shall be design in accordance with a Class 3 user are to be provided with a minimum space width 2.6m, space length of 5.4m and aisle width of 5.8m
- 6 parking spaces in Basement 1 have been designed in accordance with a Class 1A user and are provided with a minimum space width of 2.4m, space length of 5.4m and aisle width of 5.8m.
- Four (4) accessible parking spaces in Basement 1 have been designed in accordance with AS2890.6 (2009) and are provided with a minimum space width of 2.4m, space length of 5.4m and is adjacent to a shared area with a width of 2.4m.
- All spaces located adjacent to obstructions of greater than 150mm in height are provided with an additional width of 300mm.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1 (2004). Turning bays have been provided for all blind aisles exceeding 6 parking spaces.

7.2.2 Ramps

- The ramp leading from the Ground Level to Basement 1 (Loading Dock) has a minimum width of 6.5m with 300mm kerbs provided each side to walls. It has a maximum gradient of 1:6.5 (15.4%) with transitions of 4.0m at 1:12 (8.3%). A vertical clearance test has been undertaken in accordance with AS2890.2 (2018) with the results in **Appendix E** demonstrating no scraping for a Medium Rigid Vehicle, which is the largest design vehicle to enter the site.
- The ramp leading from Basement 1 to Basement 2 has been designed wholly in accordance with the requirements for a circular ramp under Figure 2.9 of AS2890.1 (2004) with 3.9m lanes separated by a central 600mm wide median. The inside edge of the inside lane has a maximum gradient of 1:5 (20%) with transitions of 2.0m at 1:8 (12.5%).
- The circulation road extending from the exit access driveway shall have a maximum grade of 1:20 (5%) for the first 6.0m.

7.2.3 Head Height Clearance

- A minimum head height clearance of 2.2m is to be provided for all circulation and parking areas, in accordance with AS2890.1 (2004).
- A minimum head height clearance of 2.5m is to be provided above all accessible parking spaces and shared areas in accordance with AS2890.6 (2009).
- A minimum head height clearance of 4.5m is to be provided under AS2890.2 (2018) for a Medium Rigid Vehicle, or high enough to accommodate the largest design vehicle to enter the development (e.g. waste contractor).

7.2.4 Loading

- A designated loading area has been provided on Basement 1 which comprises of 425m^2. A swept path analysis in **Appendix D** confirms that two (2) Medium Rigid Vehicles may enter and exit the loading area independently. When parked, each truck will be afforded a minimum space width of 3.5m.
- A 14m indented bay on the Ground Level may accommodate two (2) 6.4m Small Rigid Vehicles and is afforded a compliant 3.0m space width for parallel parking. A swept path analysis in **Appendix D** confirms that this vehicle may perform a U-turn on the circulation road in order to exit the site without reversing.

7.2.5 Other Considerations

- 2.0m x 2.5m sight distance triangles are to be maintained on each side of the exit access driveway in accordance with Figure 3.3 of AS2890.1 (2004).

7.3 Summary

In summary, the internal configuration of the car park has generally been designed in accordance with AS2890.1 (2004), AS2890.2 (2018) and AS2890.6 (2009). It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

8. CONCLUSIONS

In summary:

- The development application seeks approval for the construction of a three-storey mixed use development at 21 Canterbury Road in Punchbowl. It will contain 4,650m^2 gross floor area of retail space, 6,750m^2 gross floor area of commercial space and a club comprising of 1,750m^2 gross floor area.
- The Bankstown Development Control Plan 2015 requires a parking assessment to be undertaken. In response, 413 spaces are proposed which is higher than the expected peak demand of 311 spaces based on the analysis; but slightly less than the 463 spaces that would be required under a cumulative worst case scenario where no account is taken of the peak times of demand of individual land use components.
- The proposed development has been assessed to generate 272 vehicle trips per hour during the AM peak period and 577 vehicle trips per hour during the PM peak period. Software modelling has been undertaken at key intersections at Canterbury Road / Punchbowl Road and Canterbury Road / Moxon Road, with the results demonstrating that these intersections will continue to perform within capacity. The results are attributable to a left-in and left-out arrangement for the proposed site access on Punchbowl Road.
- The design of car parking and loading facilities generally complies with AS2890.1 (2004) and AS2890.2 (2018), with a swept path analysis undertaken for critical movements. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

This Traffic Impact Assessment therefore demonstrates that the subject application is supportable on transport planning grounds. TRAFFIX anticipates an ongoing involvement during the development approval process.

APPENDIX A

Photographic Record

View looking west along Canterbury Road at the intersection with Punchbowl Road and the site.

View looking south along Punchbowl Road at the intersection with Canterbury Road.

View looking south along Punchbowl Road towards the intersection with Canterbury Road and site.

View looking north along Punchbowl Road at the existing site and vehicular access.

View looking east along Cantebruy Road towards the intersection with Punchbowl Road and the site.

View looking east Canterbury Road at the intersection of Punchbowl Road.

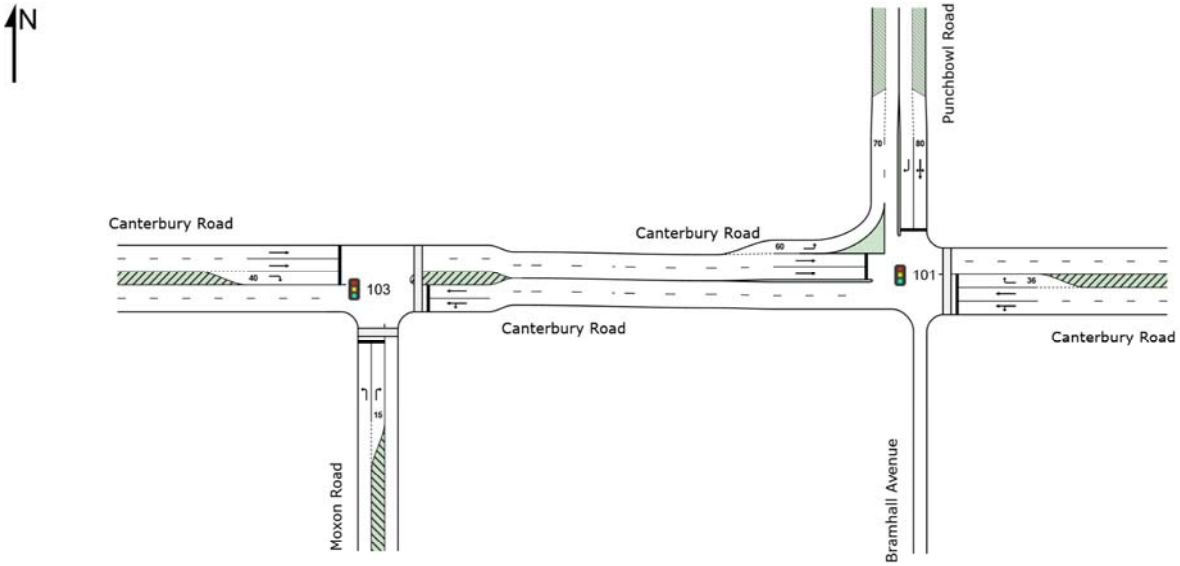
APPENDIX B

SIDRA Outputs

NETWORK LAYOUT

Network: N101 [N01 Moxon Canterbury Punchbowl EX AM]

New Network
Network Category: (None)



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	J01 Punchbowl Rd, Canterbury Rd | Existing | AM
103	NA	J02 Moxon Rd, Canterbury Rd | Existing | AM

USER REPORT FOR NETWORK SITE

Project: 19.439m01v03 TRAFFIX 21 Canterbury Road, Punchbowl **Template: Movement Summary**

Site: 101 [J01 Punchbowl Rd, Canterbury Rd | Existing | AM] **Network: 1 [N01 Moxon Canterbury Punchbowl EX AM]**

Intersection: Punchbowl Road, Canterbury Road and Brmhall Avenue
Scenario: Existing
Period: AM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, C
Output Phase Sequence: A, C

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Canterbury Road														
4	L2	5	0.0	5	0.0	0.511	14.5	LOS B	10.4	78.0	0.46	0.43	0.46	48.0
5	T1	966	8.8	966	8.8	0.511	8.5	LOS A	10.4	78.0	0.44	0.40	0.44	44.7
6	R2	103	3.1	103	3.1	0.336	17.3	LOS B	2.0	14.5	0.46	0.71	0.46	49.9
Approach		1075	8.2	1075	8.2	0.511	9.4	LOS A	10.4	78.0	0.44	0.43	0.44	46.1
North: Punchbowl Road														
7	L2	23	0.0	23	0.0	0.901	87.4	LOS F	12.5	94.0	1.00	0.98	1.31	31.0
8	T1	9	0.0	9	0.0	0.901	81.9	LOS F	12.5	94.0	1.00	0.98	1.31	30.4
9	R2	440	9.8	440	9.8	0.901	87.9	LOS F	12.5	94.0	1.00	0.98	1.31	26.9
Approach		473	9.1	473	9.1	0.901	87.8	LOS F	12.5	94.0	1.00	0.98	1.31	27.2
West: Canterbury Road														
10	L2	628	8.5	628	8.5	0.359	5.7	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	1094	10.1	1094	10.1	0.408	5.3	LOS A	5.7	43.1	0.26	0.23	0.26	53.1
Approach		1722	9.5	1722	9.5	0.408	5.5	LOS A	5.7	43.1	0.16	0.34	0.16	54.7
All Vehicles		3269	9.0	3269	9.0	0.901	18.7	LOS B	12.5	94.0	0.37	0.46	0.42	43.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 103 [J02 Moxon Rd, Canterbury Rd | Existing | AM]

Network: 1 [N01 Moxon Canterbury Punchbowl EX AM]

Intersection: Moxon Road and Canterbury Road
Scenario: Existing
Time Period: AM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog
Phase Times specified by the user
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Moxon Road														
1	L2	486	9.0	486	9.0	0.617	38.6	LOS C	16.3	122.9	0.82	0.84	0.82	43.1
3	R2	1	100.0	1	100.0	0.029	87.7	LOS F	0.0	0.6	0.99	0.60	0.99	31.6
Approach		487	9.2	487	9.2	0.617	38.7	LOS C	16.3	122.9	0.82	0.83	0.82	43.1
East: Canterbury Road														
4	L2	24	9.0	24	9.0	0.807	40.0	LOS C	24.9	188.0	0.87	0.80	0.87	45.2
5	T1	1382	9.0	1382	9.0	0.807	34.9	LOS C	25.2	190.4	0.87	0.80	0.87	24.0
Approach		1406	9.0	1406	9.0	0.807	35.0	LOS C	25.2	190.4	0.87	0.80	0.87	24.9
West: Canterbury Road														
11	T1	1721	9.0	1721	9.0	0.897	19.5	LOS B	41.4	312.5	0.69	0.70	0.74	17.0
12	R2	568	9.0	568	9.0	0.738	43.6	LOS D	17.2	129.8	0.89	1.04	1.31	41.7
Approach		2289	9.0	2289	9.0	0.897	25.4	LOS B	41.4	312.5	0.74	0.78	0.89	32.9
All Vehicles		4183	9.0	4183	9.0	0.897	30.2	LOS C	41.4	312.5	0.79	0.79	0.87	33.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK SITE

Project: 19.439m01v03 TRAFFIX 21 Canterbury Road, Punchbowl **Template: Movement Summary**

Site: 102 [J01 Punchbowl Rd, Canterbury Rd | Existing | PM] **Network: 2 [N01 Moxon Canterbury Punchbowl EX PM]**

Intersection: Punchbowl Road, Canterbury Road and Bramhall Avenue
Scenario: Existing
Period: PM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, C
Output Phase Sequence: A, C

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Canterbury Road														
4	L2	9	0.0	9	0.0	0.569	16.0	LOS B	13.7	100.0	0.52	0.48	0.52	46.7
5	T1	1125	5.1	1125	5.1	0.569	9.8	LOS A	13.7	100.0	0.48	0.44	0.48	43.0
6	R2	93	1.1	93	1.1	0.308	18.4	LOS B	1.9	13.2	0.47	0.71	0.47	49.5
Approach		1227	4.7	1227	4.7	0.569	10.5	LOS A	13.7	100.0	0.48	0.46	0.48	44.4
North: Punchbowl Road														
7	L2	29	0.0	29	0.0	0.888	82.5	LOS F	13.8	100.3	1.00	0.97	1.25	31.9
8	T1	17	6.2	17	6.2	0.888	77.0	LOS F	13.8	100.3	1.00	0.97	1.25	31.2
9	R2	491	4.5	491	4.5	0.888	83.1	LOS F	13.8	100.3	1.00	0.97	1.26	27.7
Approach		537	4.3	537	4.3	0.888	82.9	LOS F	13.8	100.3	1.00	0.97	1.26	28.1
West: Canterbury Road														
10	L2	455	4.4	455	4.4	0.253	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	56.2
11	T1	1144	2.7	1144	2.7	0.415	6.2	LOS A	6.6	46.9	0.28	0.26	0.28	52.1
Approach		1599	3.2	1599	3.2	0.415	6.0	LOS A	6.6	46.9	0.20	0.33	0.20	53.9
All Vehicles		3363	3.9	3363	3.9	0.888	19.9	LOS B	13.8	100.3	0.43	0.48	0.47	42.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 104 [J02 Moxon Rd, Canterbury Rd | Existing | PM]

Network: 2 [N01 Moxon Canterbury Punchbowl EX PM]

Intersection: Moxon Road and Canterbury Road
Scenario: Existing
Time Period: PM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog
Phase Times specified by the user
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Movement Performance - Vehicles

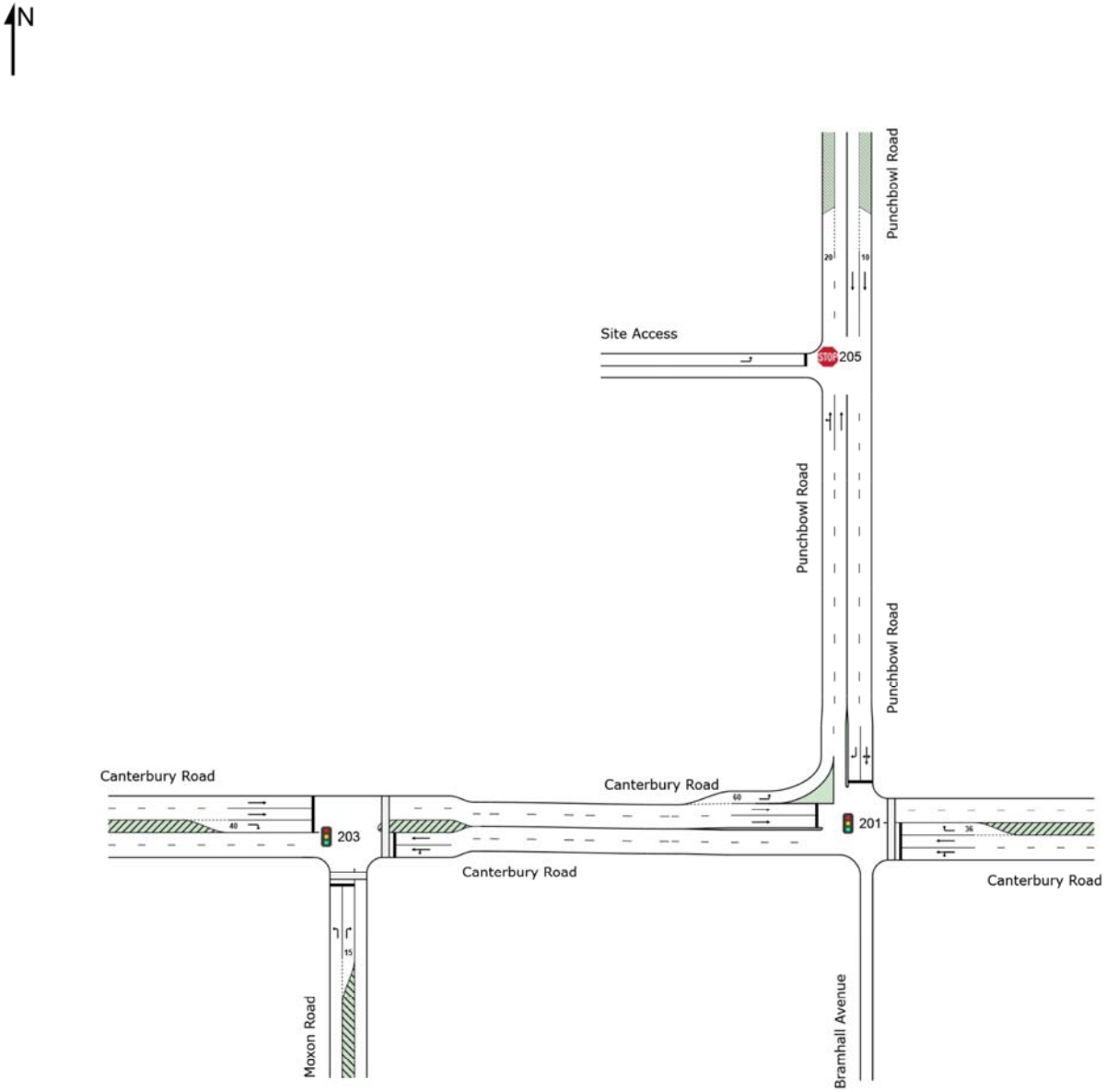
Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Moxon Road														
1	L2	399	5.0	399	5.0	0.632	48.6	LOS D	14.8	107.7	0.89	0.85	0.89	40.4
3	R2	1	100.0	1	100.0	0.029	87.7	LOS F	0.0	0.6	0.99	0.60	0.99	31.6
Approach		400	5.3	400	5.3	0.632	48.7	LOS D	14.8	107.7	0.89	0.84	0.89	40.3
East: Canterbury Road														
4	L2	19	5.0	19	5.0	0.743	30.3	LOS C	24.4	178.0	0.75	0.70	0.75	48.5
5	T1	1588	5.0	1588	5.0	0.743	24.9	LOS B	25.4	185.1	0.77	0.71	0.77	29.0
Approach		1607	5.0	1607	5.0	0.743	24.9	LOS B	25.4	185.1	0.76	0.71	0.76	29.6
West: Canterbury Road														
11	T1	1760	5.0	1760	5.0	0.918	25.1	LOS B	47.8	349.1	0.74	0.76	0.82	14.1
12	R2	355	5.0	355	5.0	0.583	46.6	LOS D	12.0	87.3	0.88	1.02	1.29	40.9
Approach		2115	5.0	2115	5.0	0.918	28.7	LOS C	47.8	349.1	0.76	0.81	0.90	27.1
All Vehicles		4122	5.0	4122	5.0	0.918	29.2	LOS C	47.8	349.1	0.78	0.77	0.85	31.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

NETWORK LAYOUT

Network: N201 [N02 Moxon Canterbury Punchbowl EX+DEV AM]

New Network
Network Category: (None)



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
201	NA	J01 Punchbowl Rd, Canterbury Rd | Future | AM
203	NA	J02 Moxon Rd, Canterbury Rd | Future | AM
205	NA	J03 Punchbowl Rd, Site Access | Future | AM

USER REPORT FOR NETWORK SITE

Project: 19.439m01v03 TRAFFIX 21 Canterbury Road, Punchbowl **Template: Movement Summary**

Site: 201 [J01 Punchbowl Rd, Canterbury Rd | Future | AM] **Network: 4 [N02 Moxon Canterbury Punchbowl EX+DEV AM]**

Intersection: Punchbowl Road, Canterbury Road and Bramhall Avenue
Scenario: Existing + Development (Future)
Period: AM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Canterbury Road														
4	L2	5	0.0	5	0.0	0.605	17.0	LOS B	13.3	100.2	0.55	0.51	0.55	45.9
5	T1	966	8.8	966	8.8	0.605	10.5	LOS A	13.3	100.2	0.50	0.46	0.50	42.2
6	R2	158	2.0	158	2.0	0.592	27.7	LOS B	4.6	32.9	0.68	0.79	0.68	28.4
Approach		1129	7.8	1129	7.8	0.605	12.9	LOS A	13.3	100.2	0.53	0.50	0.53	39.6
North: Punchbowl Road														
7	L2	23	0.0	23	0.0	0.907	87.1	LOS F	9.3	70.0	1.00	0.99	1.32	14.9
8	T1	9	0.0	9	0.0	0.907	82.4	LOS F	9.3	70.0	1.00	0.99	1.32	12.7
9	R2	463	9.3	463	9.3	0.907	87.6	LOS F	9.3	70.0	1.00	1.00	1.32	3.4
Approach		496	8.7	496	8.7	0.907	87.5	LOS F	9.3	70.0	1.00	1.00	1.32	4.3
West: Canterbury Road														
10	L2	803	6.7	803	6.7	0.453	5.7	LOS A	0.0	0.0	0.00	0.52	0.00	45.4
11	T1	1094	10.1	1094	10.1	0.435	9.2	LOS A	10.3	78.4	0.44	0.40	0.44	48.9
Approach		1897	8.7	1897	8.7	0.453	7.7	LOS A	10.3	78.4	0.26	0.45	0.26	48.0
All Vehicles		3522	8.4	3522	8.4	0.907	20.6	LOS B	13.3	100.2	0.45	0.55	0.49	33.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 203 [J02 Moxon Rd, Canterbury Rd | Future | AM]

Network: 4 [N02 Moxon Canterbury Punchbowl EX+DEV AM]

Intersection: Moxon Road and Canterbury Road
Scenario: Existing + Development (Future)
Time Period: AM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog
Phase Times specified by the user
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Moxon Road														
1	L2	486	9.0	486	9.0	0.617	38.6	LOS C	16.3	122.9	0.82	0.84	0.82	43.1
3	R2	1	100.0	1	100.0	0.029	87.7	LOS F	0.0	0.6	0.99	0.60	0.99	31.6
Approach		487	9.2	487	9.2	0.617	38.7	LOS C	16.3	122.9	0.82	0.83	0.82	43.1
East: Canterbury Road														
4	L2	24	9.0	24	9.0	0.829	40.7	LOS C	26.3	198.1	0.89	0.82	0.89	45.0
5	T1	1421	8.9	1421	8.9	0.829	35.9	LOS C	26.8	201.9	0.89	0.82	0.90	23.6
Approach		1445	8.9	1445	8.9	0.829	36.0	LOS C	26.8	201.9	0.89	0.82	0.90	24.5
West: Canterbury Road														
11	T1	1896	8.2	1896	8.2	0.999	68.8	LOS E	86.1	644.6	0.83	1.05	1.15	6.0
12	R2	568	9.0	568	9.0	0.743	44.4	LOS D	17.6	132.3	0.90	1.04	1.33	41.4
Approach		2464	8.4	2464	8.4	0.999	63.2	LOS E	86.1	644.6	0.85	1.05	1.19	19.2
All Vehicles		4397	8.6	4397	8.6	0.999	51.5	LOS D	86.1	644.6	0.86	0.95	1.05	24.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 205 [J03 Punchbowl Rd, Site Access | Future | AM]

Network: 4 [N02 Moxon Canterbury Punchbowl EX+DEV AM]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Punchbowl Road														
1	L2	229	0.0	229	0.0	0.124	4.7	LOS A	0.0	0.0	0.00	0.60	0.00	32.1
2	T1	761	9.1	761	9.1	0.413	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		991	7.0	991	7.0	0.413	1.1	NA	0.0	0.0	0.00	0.14	0.00	58.2
North: Punchbowl Road														
8	T1	511	10.7	511	10.7	0.140	0.0	LOS A	4.0	30.9	0.00	0.00	0.00	60.0
Approach		511	10.7	511	10.7	0.140	0.0	NA	4.0	30.9	0.00	0.00	0.00	60.0
West: Site Access														
10	L2	58	0.0	58	0.0	0.048	6.2	LOS A	0.0	0.0	0.00	1.08	0.00	53.8
Approach		58	0.0	58	0.0	0.048	6.2	LOS A	0.0	0.0	0.00	1.08	0.00	53.8
All Vehicles		1559	8.0	1559	8.0	0.413	0.9	NA	4.0	30.9	0.00	0.13	0.00	58.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK SITE

Project: 19.439m01v03 TRAFFIX 21 Canterbury Road, Punchbowl — **Template: Movement Summary**

Site: 202 [J01 Punchbowl Rd, Canterbury Rd | Future | PM] — **Network: 3 [N02 Moxon Canterbury Punchbowl EX+DEV PM]**

Intersection: Punchbowl Road, Canterbury Road and Bramhall Avenue
Scenario: Existing + Development (Future)
Period: PM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Canterbury Road														
4	L2	9	0.0	9	0.0	0.647	18.1	LOS B	17.3	126.5	0.59	0.55	0.59	45.0
5	T1	1125	5.1	1125	5.1	0.647	11.4	LOS A	17.3	126.5	0.53	0.49	0.53	41.2
6	R2	162	0.6	162	0.6	0.609	29.4	LOS C	5.0	34.9	0.71	0.80	0.71	27.5
Approach		1297	4.5	1297	4.5	0.647	13.7	LOS A	17.3	126.5	0.56	0.53	0.56	38.8
North: Punchbowl Road														
7	L2	29	0.0	29	0.0	0.888	80.7	LOS F	9.7	70.0	1.00	0.97	1.24	15.8
8	T1	17	6.3	17	6.3	0.888	75.9	LOS F	9.7	70.0	1.00	0.97	1.24	13.5
9	R2	520	4.3	520	4.3	0.888	81.4	LOS F	9.7	70.0	1.00	0.97	1.25	3.7
Approach		566	4.1	566	4.1	0.888	81.2	LOS F	9.7	70.0	1.00	0.97	1.25	4.8
West: Canterbury Road														
10	L2	678	3.0	674	3.0	0.371	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	45.4
11	T1	1144	2.7	1138	2.7	0.470	9.7	LOS A	12.2	87.5	0.46	0.41	0.46	48.4
Approach		1822	2.8	1813 N1	2.8	0.470	8.2	LOS A	12.2	87.5	0.29	0.46	0.29	47.8
All Vehicles		3685	3.6	3676 N1	3.6	0.888	21.4	LOS B	17.3	126.5	0.49	0.56	0.53	32.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Site: 204 [J02 Moxon Rd, Canterbury Rd | Future | PM]

Network: 3 [N02 Moxon Canterbury Punchbowl EX+DEV PM]

Intersection: Moxon Road and Canterbury Road
Scenario: Existing + Development (Future)
Time Period: PM Peak Period
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Site User-Given Phase Times)

Timings based on settings in the Network Timing dialog
Phase Times specified by the user
Phase Sequence: TFX
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Moxon Road														
1	L2	344	5.0	344	5.0	0.546	47.0	LOS D	12.2	89.3	0.86	0.83	0.86	40.8
3	R2	1	100.0	1	100.0	0.029	87.7	LOS F	0.0	0.6	0.99	0.60	0.99	31.6
Approach		345	5.3	345	5.3	0.546	47.1	LOS D	12.2	89.3	0.86	0.83	0.86	40.8
East: Canterbury Road														
4	L2	19	5.0	19	5.0	0.752	29.5	LOS C	24.5	178.9	0.75	0.69	0.75	48.7
5	T1	1610	5.0	1610	5.0	0.752	23.8	LOS B	26.1	190.6	0.77	0.71	0.77	29.6
Approach		1629	5.0	1629	5.0	0.752	23.9	LOS B	26.1	190.6	0.77	0.71	0.77	30.2
West: Canterbury Road														
11	T1	1909	4.7	1909	4.7	1.005	76.3	LOS F	88.5	644.7	1.00	1.21	1.34	5.5
12	R2	340	5.0	340	5.0	0.562	46.7	LOS D	11.5	83.9	0.88	1.01	1.28	40.8
Approach		2249	4.8	2249	4.8	1.005	71.9	LOS F	88.5	644.7	0.98	1.18	1.33	14.1
All Vehicles		4223	4.9	4223	4.9	1.005	51.4	LOS D	88.5	644.7	0.89	0.97	1.08	21.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 206 [J03 Punchbowl Rd, Site Access | Future | PM]

Network: 3 [N02 Moxon Canterbury Punchbowl EX+DEV PM]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Punchbowl Road														
1	L2	293	0.0	291	0.0	0.157	4.7	LOS A	0.0	0.0	0.00	0.60	0.00	32.0
2	T1	556	3.2	553	3.2	0.290	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		848	2.1	845[N1]	2.1	0.290	1.6	NA	0.0	0.0	0.00	0.21	0.00	57.1
North: Punchbowl Road														
8	T1	553	4.4	553	4.4	0.146	0.0	LOS A	5.5	39.9	0.00	0.00	0.00	60.0
Approach		553	4.4	553	4.4	0.146	0.0	NA	5.5	39.9	0.00	0.00	0.00	60.0
West: Site Access														
10	L2	316	0.0	316	0.0	0.263	6.2	LOS A	0.0	0.0	0.00	1.08	0.00	53.8
Approach		316	0.0	316	0.0	0.263	6.2	LOS A	0.0	0.0	0.00	1.08	0.00	53.8
All Vehicles		1717	2.5	1713[N1]	2.5	0.290	2.0	NA	5.5	39.9	0.00	0.30	0.00	57.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

APPENDIX C

Travel Mode Survey (Club Development)

Travel Mode Survey

Time	How did you/your group travel to the hotel on this visit ?						
	CD	CP	CPD	Taxi	Bus	Cycle	Walk
16:08	1	1					
16:24	1						
16:26	1	1					
16:31	1	1					
16:35	1						
16:39	1	3					
16:46	1						
17:10							3
17:11	1	4					
17:15				4			
17:18	1	1					
17:20	1						
17:22	1						
17:24	1	3					
17:26	1						
17:27			5				
17:30				2			
17:31	1						
17:32	1	2					
17:39	1						
17:40	1	1					
17:41	1						
17:42	1						
17:48	1	1					
17:52	1						
18:02	1	2					
18:04	1						
18:06	1						
18:12	1	2					
18:14				3			
18:18	1	2					
18:19	1						
18:21	1						
18:23	1	2					
18:25	1	4					
18:27	1	1					
18:29	1	1					
18:33	1	2					
18:34	1	2					
18:36	1	1					
18:37	1	3					
18:39	1						
18:48	1						
18:49	1	3					
18:57	1	4					
18:59	1	1					
18:59	1	2					
18:59	1	3					
19:00	1	4					
19:01	1	1					
19:02	1	2					
19:03	1	3					
19:04	1	1					
19:05	1	2					

19:06	1	1					
19:07	1	2					
19:08	1	1					
19:09	1	1					
19:10	1						
19:11	1	2					
19:14	1	1					
19:15	1	2					
19:16	1	3					
19:17				3			
19:20	1	1					
19:22	1	4					
19:23	1	3					
19:25				3			
19:25	1	1					
19:26	1						
19:28	1	1					
19:28	1	3					
19:28	1	2					
19:29	1	3					
19:29	1	4					
19:29	1	3					
19:31	1	1					
19:32	1	3					
19:32	1	3					
19:33	1	3					
19:33	1	3					
19:33	1	3					
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19:35	1	1					
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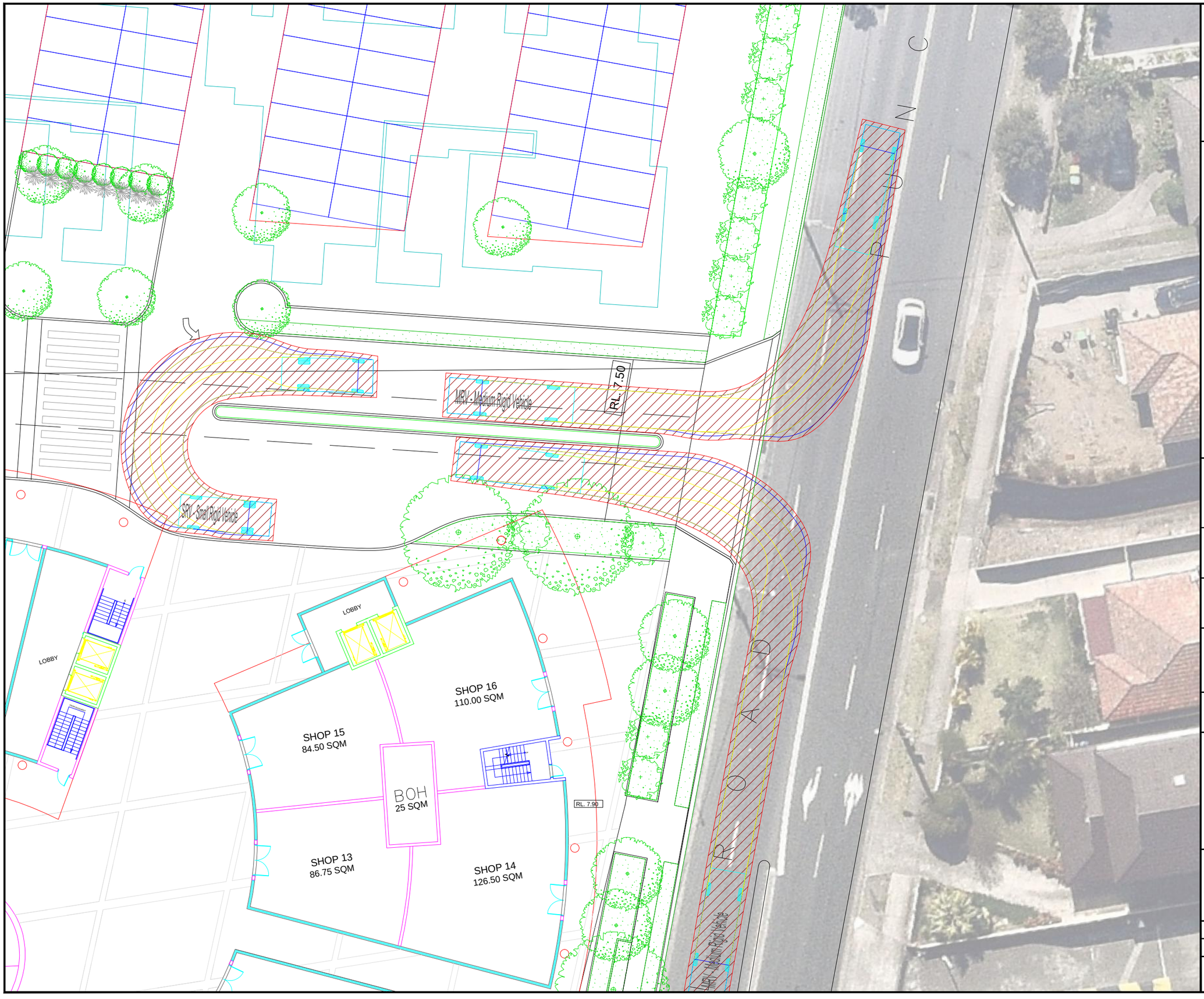
19:38	1	2					
19:38	1	2					
19:39	1	3					
19:39	1	2					
19:40	1	1					
19:45	1	1					
19:46	1	2					
19:47	1	1					
19:48	1	1					
19:49	1	2					
19:49	1	3					
19:49	1	4					
19:50	1	2					
19:50	1	3					
19:51	1	2					
19:52	1	2					
19:53	1	2					
19:53	1	2					
Totals	**99**	**171**	**5**	**15**	**0**	**0**	**3**

CD - car driver, **CP** - car passenger, **CPD** - car passenger dropped off - Motor Bike - **Taxi - Public Transport - Cycle - Walk**

APPENDIX D

Swept Path Analysis



Notes:

This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
CMT Architects Australia

Client
Waldron Hill Projects Pty Ltd

Scale / Plan Orientation

0 2.5 5 7.5 10m
1:250 @ A3

Project Description
21 Canterbury Road, Punchbowl

Drawing Prepared By

TRAFFIX
TRAFFIC & TRANSPORT PLANNERS

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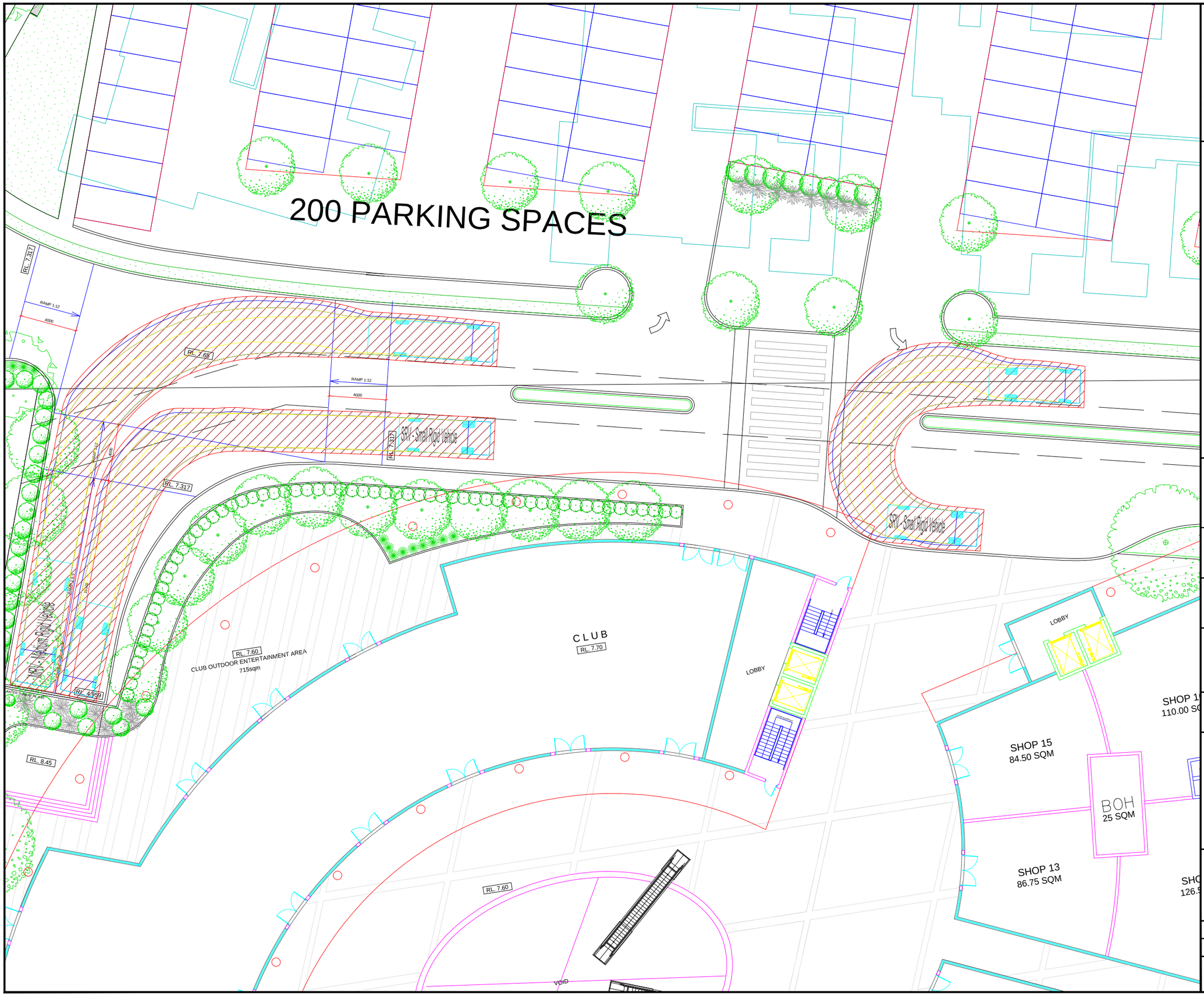
Drawing Title
Swept Path Analysis
Punchbowl Road Access
8.8m Medium Rigid Vehicle

Drawn:	Checked:	Date:
KB	-	19 Nov 19

19.439d03v02 TRAFFIX [191124] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
19.439	DA	TX.01	A



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Rev.	Revision Note	By.	Date

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
CMT Architects Australia

Client
Waldron Hill Projects Pty Ltd

Scale / Plan Orientation

0 4 8 12 16m
1:400 @ A3

Project Description
21 Canterbury Road, Punchbowl

Drawing Prepared By

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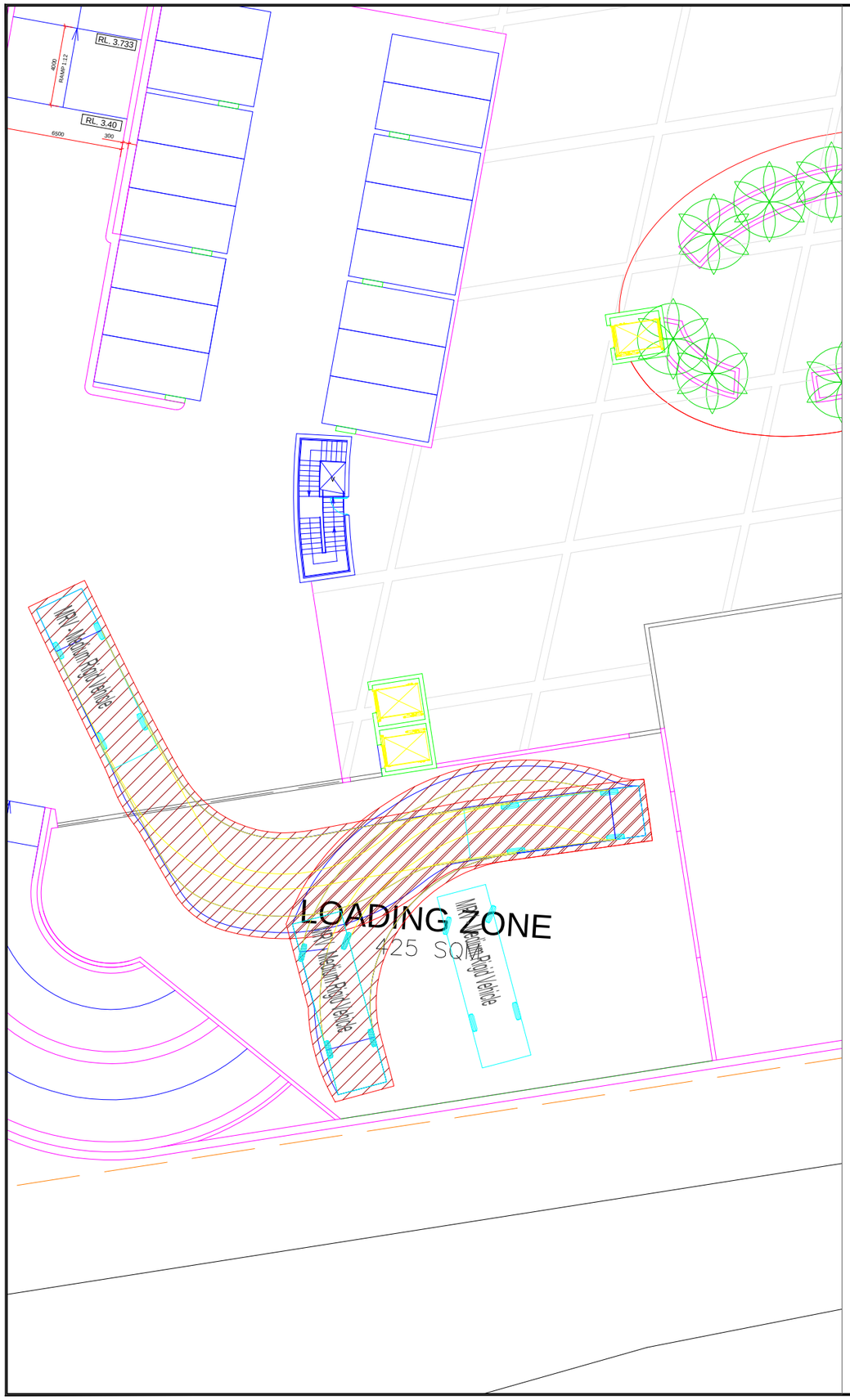
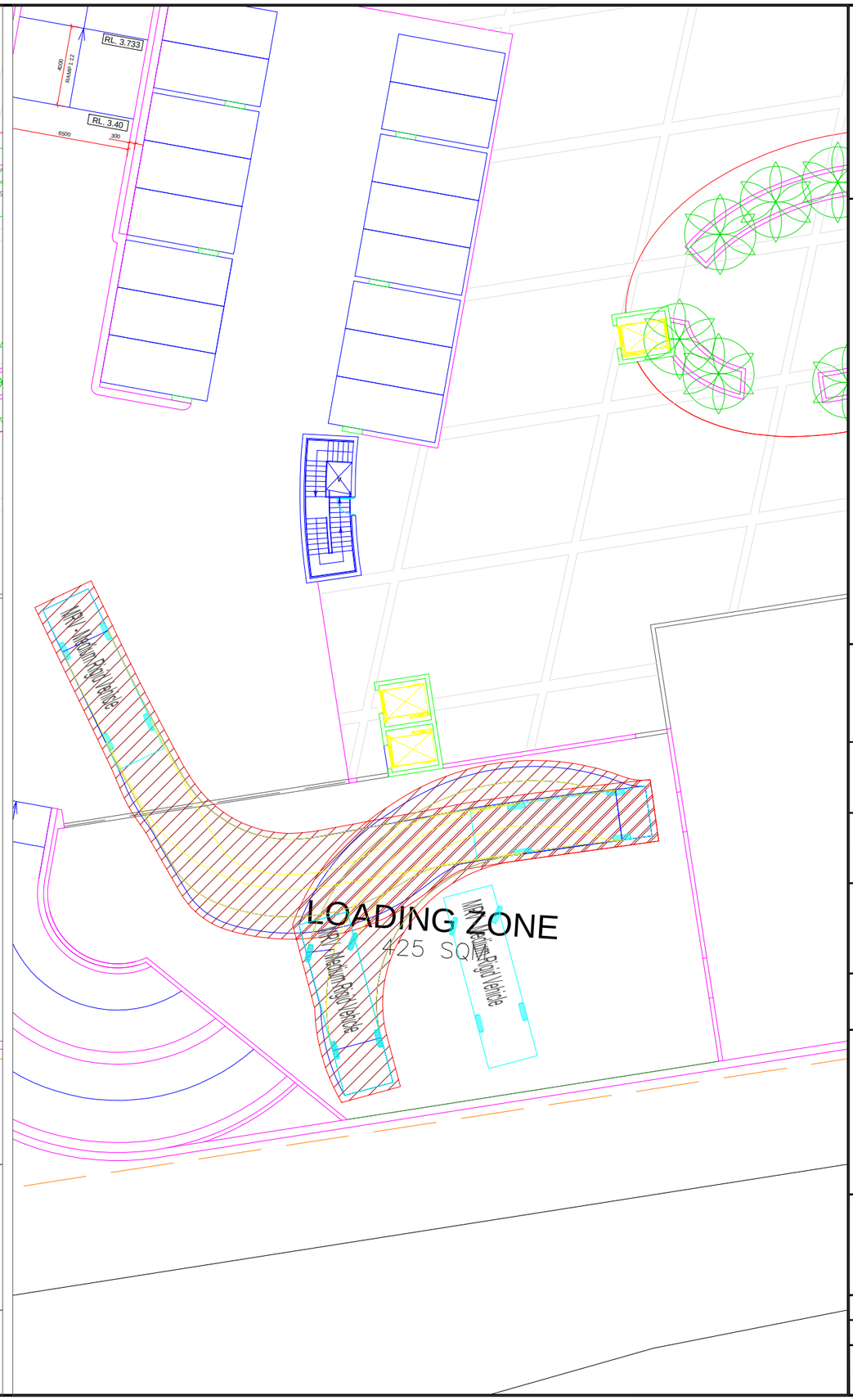
Drawing Title
Swept Path Analysis
Ground Level - Circulation
8.8m Medium Rigid Vehicle
6.4m Small Rigid Vehicle

Drawn:	Checked:	Date:
KB	-	29 Nov 19

19.439d03v02 TRAFFIX [191124] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
19.439	DA	TX.02	A





Notes:

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Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
CMT Architects Australia

Client
Waldron Hill Projects Pty Ltd

Scale / Plan Orientation

0 2.5 5 7.5 10m

1:250 @ A3

Project Description
21 Canterbury Road, Punchbowl

Drawing Prepared By

TRAFFIX
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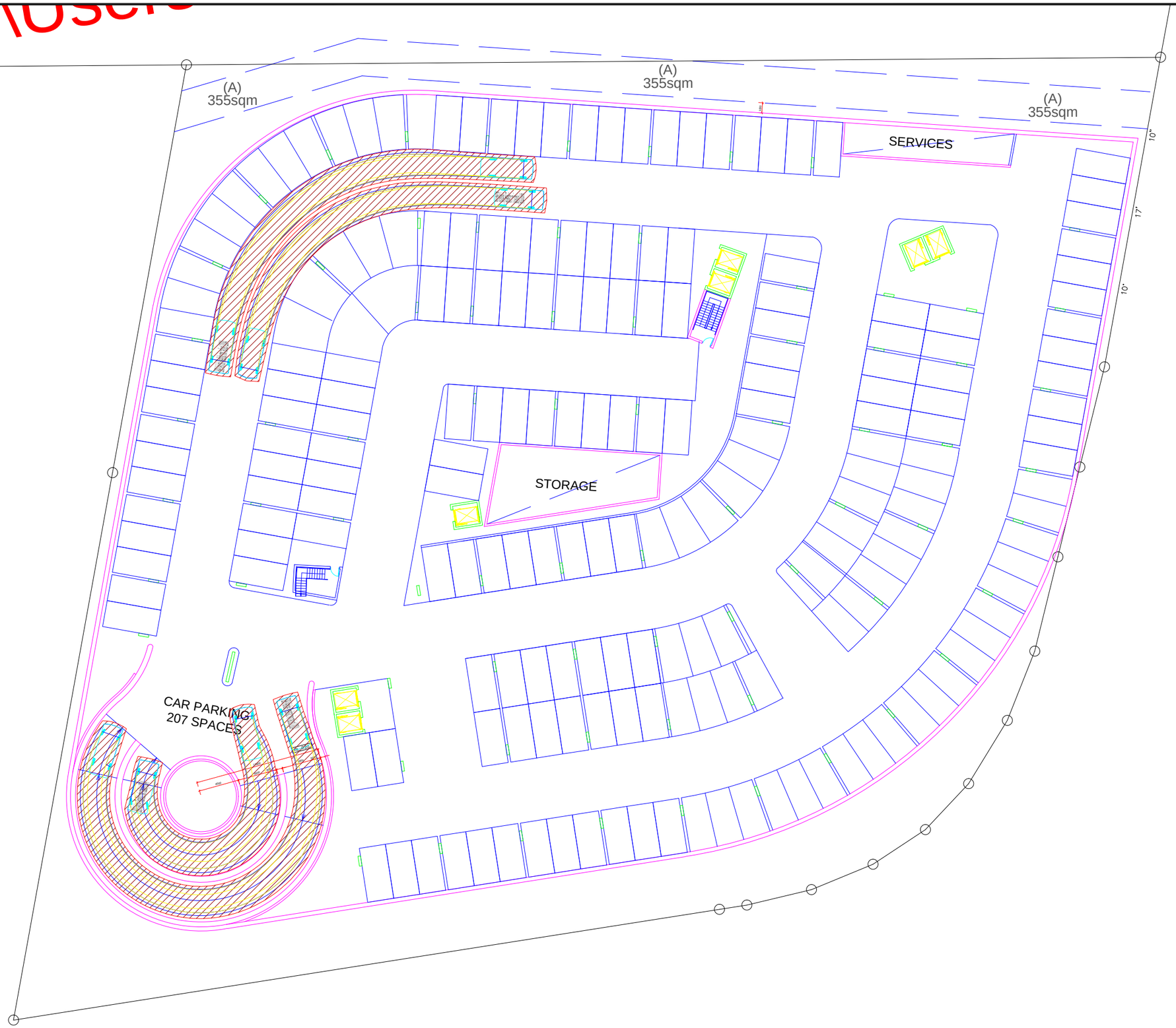
Drawing Title
Swept Path Analysis
Basement 1 - Loading Dock
8.8m Medium Rigid Vehicle

Drawn:	Checked:	Date:
KB	-	29 Nov 19

19.439d03v02 TRAFFIX [191124] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
19.439	DA	TX.03	A



Notes:

This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
CMT Architects Australia

Client
Waldron Hill Projects Pty Ltd

Scale / Plan Orientation

0 4 8 12 16m
1:400 @ A3

Project Description
21 Canterbury Road, Punchbowl

Drawing Prepared By

TRAFFIX
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w: www.traffix.com.au

Drawing Title
Swept Path Analysis
Basement 2
B99 Vehicle
B85 Vehicle

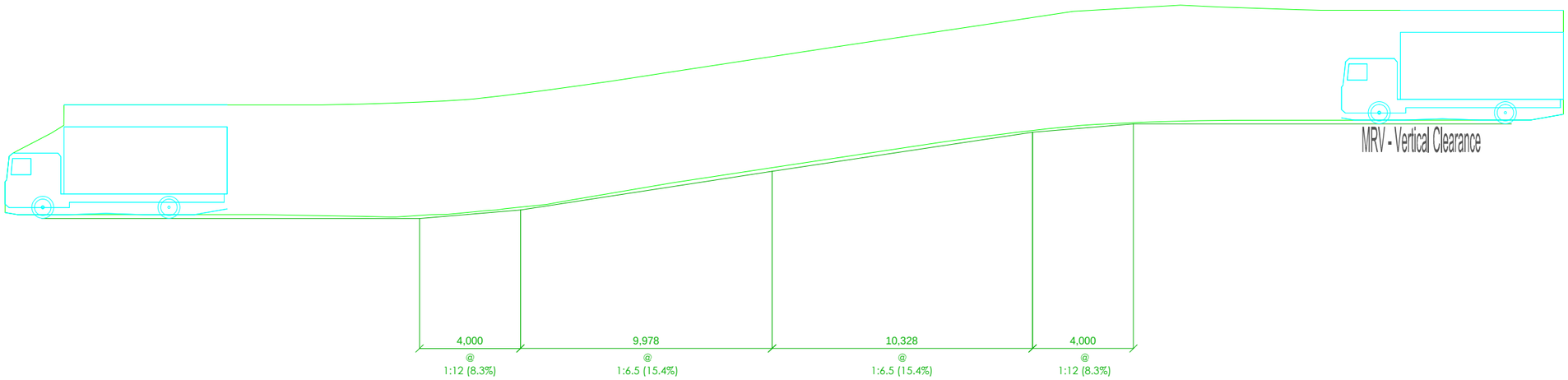
Drawn:	Checked:	Date:
KB	-	29 Nov 19

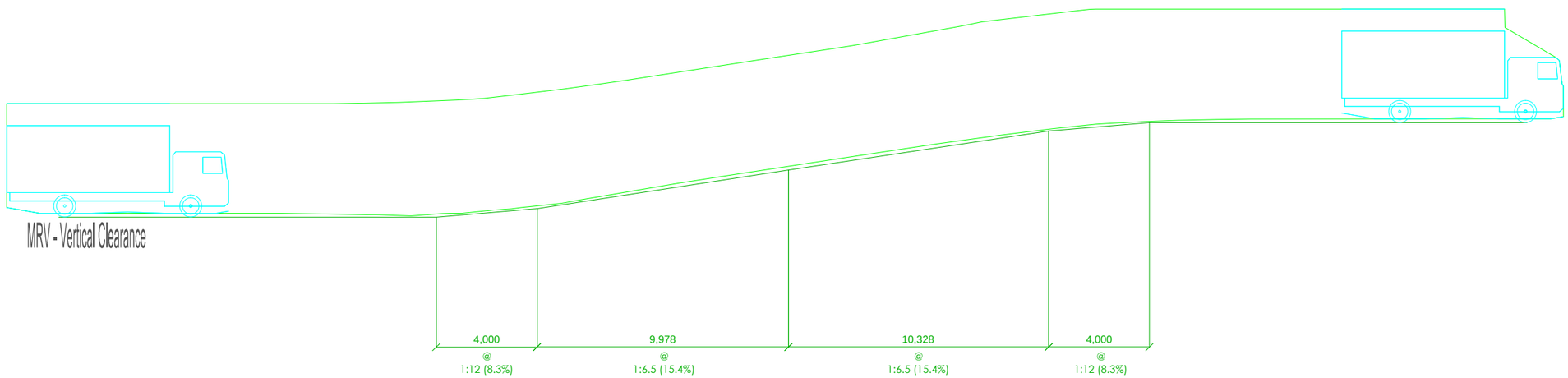
19.439d03v02 TRAFFIX [191124] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
19.439	DA	TX.04	A

APPENDIX E

Underside Clearance Test





Notes:

This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards *(AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
CMT Architects Australia

Client
Waldron Hill Projects Pty Ltd

Scale / Plan Orientation

0 2 4 6 8m

1:200 @ A3

Project Description
21 Canterbury Road, Punchbowl

Drawing Prepared By

TRAFFIX
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Strawberry Hills, NSW 2012

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w: www.traffix.com.au

Drawing Title
Underside Clearance Test
Ground - Basement 1 Ramp
Medium Rigid Vehicle

Drawn:	Checked:	Date:
KB	-	19 Nov 19

19.439d03v02 TRAFFIX [191124] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
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