



Traffic Impact Assessment

**5 and 15 Rynan Avenue, Edmondson Park
Traffic Impact Assessment**

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1. Introduction

TRAFFIX has been commissioned by KMT Constructions Pty Ltd to undertake a traffic impact assessment in support of a development application relating to a residential development consisting of three (3) residential flat buildings containing 110 apartments located at 5 and 15 Rynan Avenue, Edmondson Park. This is in addition to an existing DA that has already been approved on the same site, which consists of a residential flat building containing 82 apartments. A total of four (4) residential flat buildings are proposed, containing 192 apartments. The development is located within the Liverpool City Council LGA and has been assessed under that council's controls.

This report documents the findings of our investigations and should be read in the context of the Statement of Environmental Effects (SEE) prepared separately. The development is a minor development and does not require referral to the RTA under the provisions of SEPP (Infrastructure) 2007.

The report is structured as follows:

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



2. Location and Site

The site is situated on the southern side of Camden Valley Way and lies within the sector bounded by Cowpasture Road to the west and the Hume and South Western Motorways to the east. It is also due north of Edmonson Park railway station and approximately 35 kilometres north of the Sydney CBD.

The site has a rectangular configuration and currently accommodates two residential properties with a combined site area of 6,610.72m². It has a northern frontage of approximately 275 metres to Camden Valley Road, a southern site boundary of approximately 275 metres, an eastern boundary of approximately 149 metres to Rynan Avenue and a western boundary of approximately 149 metres

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.

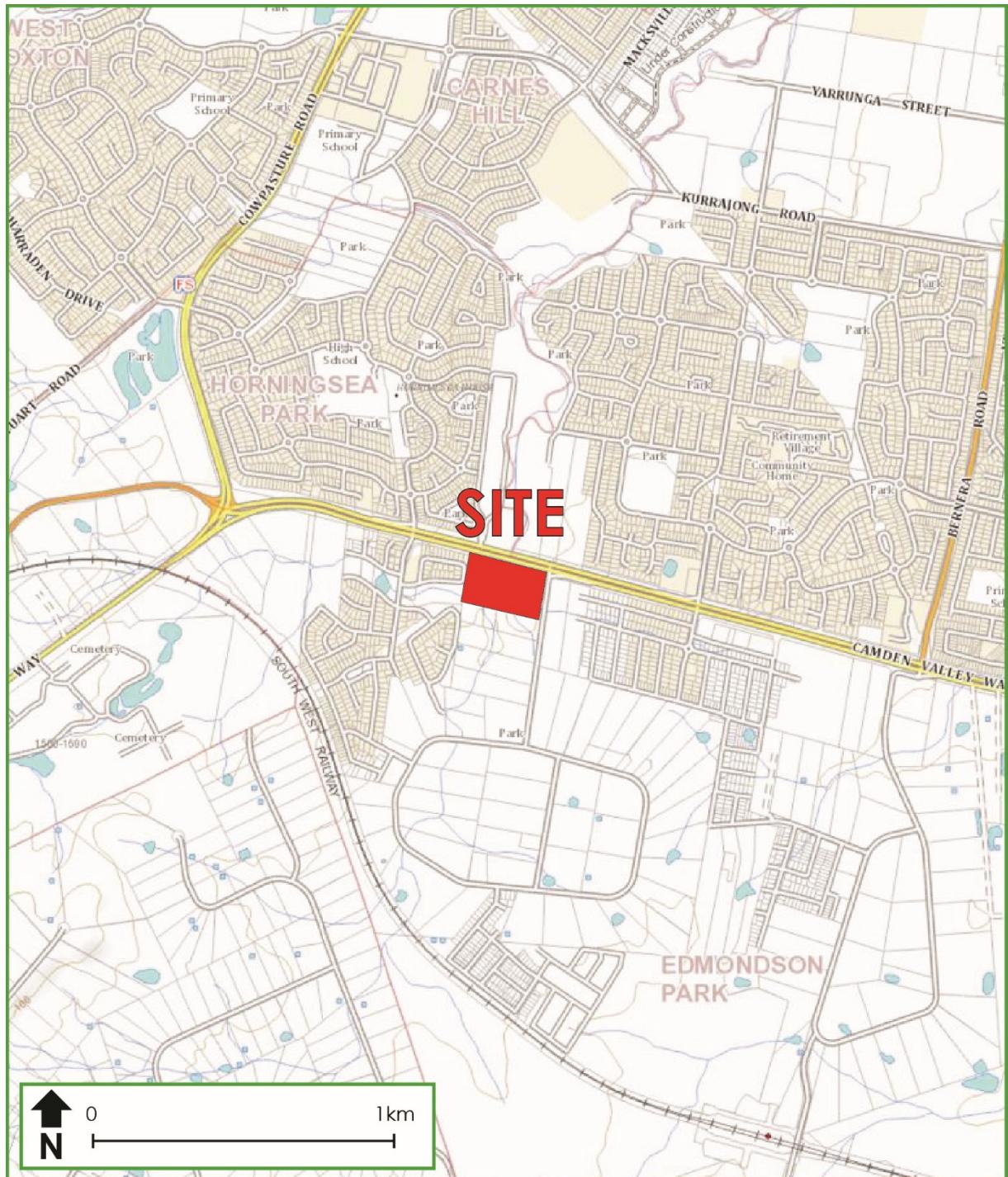


Figure 1: Location Plan



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:

- ➊ Hume Motorway: an RTA State Road (M5) that generally runs in a north-south direction. The Hume Motorway carries 52,310 vpd in the vicinity of the site and provides direct access to Camden Valley Road. No Stopping restrictions apply along its length during the AM and PM Peak periods. The Hume Motorway is generally subject to a 110km/h speed zoning in the vicinity of the site and generally carries four lanes of traffic in either direction within a separated carriageway of width 38.0 metres.
- ➋ South Western Motorway an RTA State Road (M31) that runs in a north-south direction. The South Western Motorway carries 62,003 vpd in the vicinity of the site and provides direct access to Camden Valley Road. No Stopping restrictions apply along its length during the AM and PM Peak periods. The Hume Motorway is generally subject to a 100km/h speed zoning in the vicinity of the site and generally carries two lanes of traffic in either direction within a separated carriageway of width 40.0 metres.
- ➌ Camden Valley Way: an RTA State Road (MR 620) that runs in an east-west direction. Camden Valley Way carries 35,380 vpd in the vicinity of the site. No Stopping restrictions apply along its length during the AM and PM Peak periods. Camden Valley Way is generally subject to a 70km/h speed zoning in the vicinity of the site and generally carries two lanes of traffic in either direction within a separated carriageway of width 29.0 metres
- ➍ Cowpasture Road: an RTA State Road (MR 648) that runs in a north-south direction. Cowpasture Road Way carries 22,115 vpd in the vicinity of the site. No Stopping restrictions apply along its length during the AM and PM Peak periods. Camden Valley Way is generally subject to a 70km/h speed



zoning in the vicinity of the site and generally carries two lanes of traffic in either direction within a separated carriageway of width 20.0 metres

④ Rynan Road

a local road that runs in a north-south direction. There are not any parking restrictions along its length in the AM or PM peak periods. Rynan Road is generally subject to a 50km/h speed zoning in the vicinity of the site and generally carries one lane of traffic in either direction within a combined carriageway width of 8.0 metres

It can be seen from **Figure 3** that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

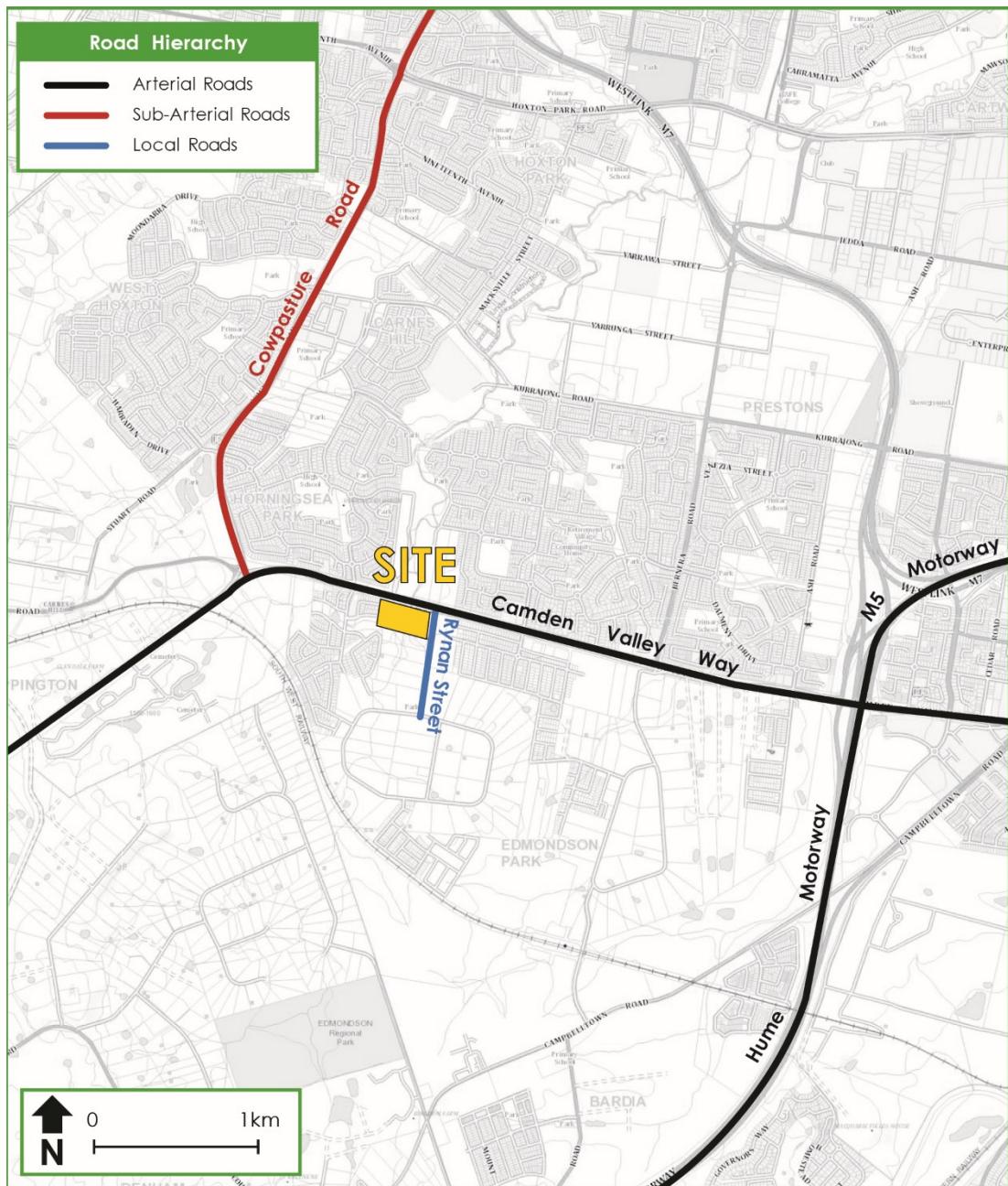


Figure 3: Road Hierarchy



3.2 Public Transport

The site is well located to take advantage of the numerous public transport services that serve the local area. The existing train and bus services that operate in the locality are shown in **Figure 4**.

Standard transport planning guidelines state that a development is advantageously located to benefit from rail if it is within 800 metres walking distance of a train station. In this regard, the site is approximately 3km walking distance from Edmonson Train Station to the south of the site. Although this train station is located outside of the 800 metre advantageous walking distance, it is nevertheless accessible for many trip types, most notably the journey to work.

Current transport planning guidelines also state that a development is advantageously located to benefit from bus services if it is within 400 metres walking distance of a bus stop. As **Figure 4** shows, there are bus stops within 400 metres walk of the site, providing access to Routes 851 and 852 between Carnes Hill and Liverpool via Prestons, Route 855 between Austral and Liverpool, Route 856 between Bringelly and Liverpool, Route 857 between Narellan and Liverpool, and Route 864 between Carnes Hill and Glenfield.

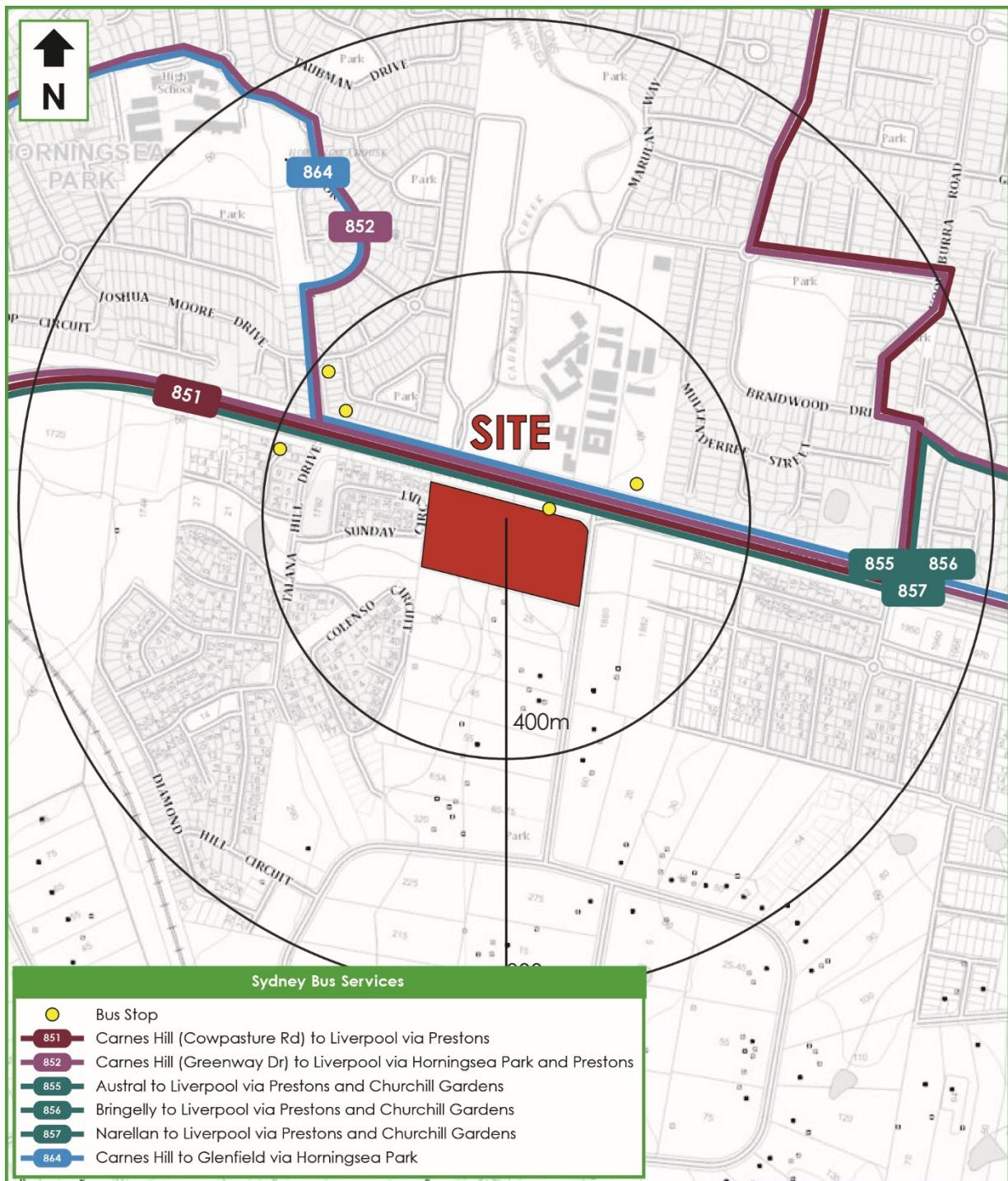


Figure 4: Public Transport



3.3 Existing Site Generation

The existing single residential dwelling will generate approximately one (1) vehicle trip per hour during the AM and PM peak periods and a total of nine (9) daily vehicle trips, based on the application of the RMS Guidelines.



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 for which approval is now sought comprises the following components:

- ② Demolition of all existing structures;
- ② Construction of four (4) residential apartment buildings consisting of 82 apartments in building A (which has already been granted DA approval, and will only be included in this report for the purposes of traffic generation), 82 apartments in buildings B and C, and 28 apartments in building D with the following attributes:
 - Building B and C
 - 20 x one (1) bedroom apartments
 - 49 x two (2) bedroom apartments
 - 13 x three (3) bedroom apartments
 - Building D
 - Four (4) x one (1) bedroom apartments
 - 21 x two (2) bedroom apartments
 - Three (3) x three (3) bedroom apartments.
- ② The provision of two (2) basement car parking levels shared for buildings B and C with a total of 144 spaces, and one (1) basement car parking level for building D with a total of 49 spaces.

The traffic and parking impacts arising from the development are discussed in Sections 5 and 6. Reference should be made to the plans submitted separately to Council which are presented at reduced scale in **Appendix B**.



5. Parking Requirements

5.1 Council Controls

The Liverpool City Council DCP requires parking for residential apartments to be determined at the rates shown in **Table 1**:

Table 1: Council Parking Rates and Provision

Type	B and C	D	Council Parking Rates	Spaces Required for B and C	Spaces Required for D	Spaces Provided for B and C	Spaces Provided for D
1 bedroom	20	4	1 space per unit	20	4	144	49
2 bedrooms	49	21	1.5 spaces per unit	73.5	32		
3 bedrooms	13	3	2 spaces per unit	26	6		
Visitor	82	28	1 spaces per 4 units	20.5	7		
Totals				140	49	144	49

It can be seen from Table 1 that there is a requirement to provide a total of 140 spaces for buildings B and C, and 49 spaces for building D. This provision includes visitor parking. In response, the development proposes to provide a total of 144 spaces for buildings B and C, and 49 spaces for building D. In summary, this provision is appropriate and meets the requirements of Liverpool City Council, thereby ensuring that all normal demands will be readily accommodated on site.

5.2 Disabled Parking

Council DCP requires disabled parking to be supplied at a rate of two (2) per 100 spaces, which equates to a requirement of four (4) spaces within the car park for buildings B and C, and two (2) spaces within the car park for building D. In response, 13 spaces are provided in buildings B and C, and two (2) spaces are provided in building D, thereby meeting the DCP requirement for disabled parking spaces. These spaces are 2.4 metres wide with a 2.4 metre wide shared area and therefore meets the requirements of AS 2890.6 (2009).



5.3 Bicycle Facilities

The DCP does not stipulate a requirement for bicycle parking to be provided within the development. In response, the development does not provide any bicycle parking spaces.

5.4 Servicing

Council DCP requires the site to have service access for removalists and garbage servicing. In response, the site provides temporary bin holding areas adjacent to the access driveways for buildings B, C and D in order for garbage collection to be undertaken from the roadside on the new street using Council's nominated truck. Access will not be provided for the garbage truck to access the basement car park levels. The new road system will operate in a one-way direction in the southerly direction, and therefore should minimise traffic impacts as vehicles will be able to overtake the garbage truck without possible conflict of on-coming traffic. Furthermore, a loading bay will also be provided on-street to the north of buildings B and C, which will accommodate removalist vehicles, as well as other large vehicles. The site provision represents a slight departure from Council's DCP, and if required a waste consultant should be contacted to provide further advice on waste management for the site.



6. Traffic Impacts

6.1 Trip Generation

The development falls within the definition of a high density residential development under the RMS Guideline. The RMS has published a Technical Directive, in May 2013, updating the trip generation and parking information based on surveys taken of developments within the Sydney Metropolitan region of different densities and situated within areas of different transportation characteristics.

From the high density residential developments surveys, developments within Liberty Grove were found to be representative of the proposed site. This is due to lack of train services within reasonable walking distance but with bus services available in immediate vicinity of the site. As a result, the expected trip generation rates found from this development have been used to forecast the trip generation of the proposed development. The peak hour trip rates stated are as follows:

- ④ 0.28 trips per unit during the AM Peak period; and
- ④ 0.41 trips per unit during the PM Peak period.

The application of the above rates to the schedule of units discussed in Section 4 of 192 units and adapting a split of 20/80 in the AM period and vice versa in the PM results in the following trip generation related to the development:

- ④ 54 trips, consisting of 11 in and 43 out during the AM Peak period; and
- ④ 79 trips, consisting of 63 in and 16 out during the PM Peak period.

Taking into consideration the existing traffic generation of one (1) vehicle trip per hour in the AM and PM peak period, this represents a net traffic increase of 53 trips in the AM peak, and 78 trips in the PM peak.



6.2 Peak Period Intersection Performances

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken of the most critical intersection immediate adjacent to the site, being the intersection of McIntosh Road with Fisher Road immediately north of the site. These were undertaken between the 7-9AM and 4-6PM peak periods.

The results of these surveys 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:



Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	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 below. Reference should also be made to the SIDRA outputs provided in **Appendix D** which provide detailed results for individual lanes and approaches.

Table 2: Intersection Performance: AM and PM Peak Hour

Intersection Description	Control Type	Period	Scenario	Degree of Saturation (v/c)	Intersection Delay (sec)	Level of Service
Camden Valley Way / Rynan Avenue	Signals	AM Peak	Existing	0.651	10.6	B
			Future	0.653	11.1	B
		PM Peak	Existing	0.754	13.6	B
			Future	0.761	14.0	B



It can be seen from **Table 2** that the intersection operates satisfactorily under both the existing 'base case' and 'with development' scenarios, with a level of service B during both peak periods and with moderate delays. The proposed development will have no measurable impacts on key intersections analysed above which will continue to operate as presently occurs and with similar delays and queues.

6.3 Residential Amenity

The potential impacts of the development on the amenity of existing residents is most appropriately assessed having regard to traffic volumes on affected road sections, based upon the concept of 'environmental capacity'. In doing so, it must be acknowledged that the concept of the 'environmental capacity' of a road is not an exact science. It is dependent upon many factors, including the function (classification) of the road, historic traffic levels, traffic composition (notably the percentage of heavy vehicles), vehicle speeds, road widths, road gradients, road surface conditions, distances to building façades and type of building construction. In addition, individual people have different responses to the prevailing conditions so that circumstances that one person finds unacceptable may be acceptable to another. These variables are set out in Section 4.3 of the *RMS Guide to Traffic Generating Developments*.

Nevertheless, the RMS has formulated design criteria for local and collector residential streets that take due account of amenity and safety considerations. These include an environmental goal and a maximum goal for a collector road as follows:

Road Class	Environmental Goal (veh/hr)	Maximum Volume (Veh/hr)
Local Street	200	300
Collector Street	300	500

In this regard, it is noted that Rynan Avenue acts as a local road and as such has an environmental capacity of 300 vehicles per hour as defined in the RTA's Guide to Traffic Generating Developments. The existing volumes along Rynan Avenue, directly adjacent to the site are in the order of 56 veh/hr based on the AM peak hour survey data that was collected at this location. Accordingly the proposed



increase of 54 veh/hr will result in only a minor absolute increase in volumes and will remain under the RMS's environmental goal of 200 vehicles per hour.

As such, the residential amenity of Rynan Avenue will not be adversely affected and the road will continue to operate with a local road function, with volumes that are commensurate with this function. Volumes to the east of the proposed site access will not be impacted.



7. Access & Internal Design Aspects

7.1 Access

The proposed development at buildings B and C requires a Category 2 Driveway under AS 2890.1 (2004), being a combined entry-exit driveway of width 6.0 to 9.0 metres. In response, the proposed development at buildings B and C proposes a combined entry-exit driveway of width 6.6 metres for the first 6 metres due to the requirement for a median strip to accommodate an intercom, which tapers in to 6 metres for the remainder of the driveway. Access is gained from a new street.

The proposed development at building D requires a Category 1 Driveway under AS 2890.1 (2004), being a combined entry-exit driveway of width 3.0-5.5 metres. In response, the proposed development at building D proposes a combined entry-exit driveway of width 6.6 metres for the first 6 metres due to the requirement for a median strip to accommodate an intercom, which tapers in to 5.5 metres for the remainder of the driveway. Access is also gained from a new street.

Swept path analysis has been undertaken of the site access, as is permissible under AS 2890.1 (2004), demonstrating satisfactory operation and this is included in **Appendix C**. The design complies with the requirements of AS 2890.1 (2004) and will ensure satisfactory operation.

7.2 Internal Design

The internal basement car park generally complies with the requirements of AS 2890.1 (2004) and the following characteristics are noteworthy:

7.2.1 Parking Modules

- ② All residential parking spaces have been designed in accordance with a Class 1A user and are provided with a minimum space length of 5.4m a minimum width of 2.4m and a minimum aisle width of 5.8m.
- ② All spaces located adjacent to obstructions of greater than 150mm in height have been provided with an additional width of 300mm.



- ④ The dead-end aisle is provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- ④ The disabled parking spaces are designed in accordance with AS2890.6. The space is provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.
- ④ Stacked parking spaces will be assigned to the same residential unit, and vehicles can manoeuvre in and out of these spaces within the car park boundary.

7.2.2 Ramps

- ④ The ramp associated with the residential basement car parks have a maximum gradient of 25% (1 in 4) with transitions of 12.5% (1 in 8).
- ④ The entrance/exit section of both entry/exit ramps have been designed with a gradient of 5% (1 in 20) for six (6) metres.

These provisions satisfy the requirements of AS 2890.1 (2004) for the car park;

7.2.3 Clear Head heights

- ④ A minimum clear head height of 2.2m has been provided for all areas within the basement car parks as required by AS2890.1. A clear head height of 2.5m has been provided above the disabled space as required by AS2890.6.

7.2.4 Other Considerations

- ④ All columns have been located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).
- ④ Appropriate visual splays have been provided in accordance with the requirements of Figure 3.3 of AS2890.1 at all accesses.
- ④ A swept path analysis of all critical movements has been undertaken to confirm geometry and compliance with the relevant standards. The swept path assessment is included in **Appendix C**.

In summary the internal configuration of the basement car park has been designed in accordance with AS2890.1. 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:

- ② The traffic generation arising from the proposed 192 residential unit development has been assessed as a net increase over and above existing traffic conditions. The increase is 53 veh/hr in the AM peak period, and 78 veh/hr in the PM peak period. These trips will be split into both directions and can be readily accommodated, with minimal impacts on the surrounding road system;
- ② With 111 off-street parking spaces, the development will contain all parking demands within the site and in particular, it complies with the minimum parking requirement under the Liverpool City Council DCP. Provision of these within the basement levels will ensure that residents and visitors have convenient and safe access.
- ② The proposed car park complies with the requirements of both AS 2890.1 (2004). The car park has also been assessed using the computer program Auto Track, as permitted by AS 2890.1 (2004) and operates safely and efficiently. Any minor adjustments to ramp swept paths can be altered at construction certificate stage;
- ② The proposed servicing arrangements are considered acceptable on traffic grounds in the circumstances, for the reasons discussed and provides an appropriate planning outcome. If required by Council, a waste consultant should be contacted to provide additional advice.
- ② The residential amenity of this development will not be adversely affected and the road will continue to operate with a local road function, with volumes that are commensurate with this function.
- ② The proposed development will create moderate impacts that can be accommodated, while embracing the policies of the Liverpool City Council DCP.

It is therefore concluded that the proposed development is supportable on traffic planning grounds and will operate satisfactorily.



Appendix A

Photographic Record



View looking south of the subject site from Rynan Avenue at its intersection with Camden Valley Road



View of Rynan Avenue looking north from the subject site to its intersection with Camden Valley Road.





View of Rynan Avenue looking south from the subject site.



View looking at the intersection of Camden Valley Road and Rynan Avenue looking south from Camden Valley Road.





View looking at the intersection of Camden Valley Road and Rynan Avenue looking west from Camden Valley Road.



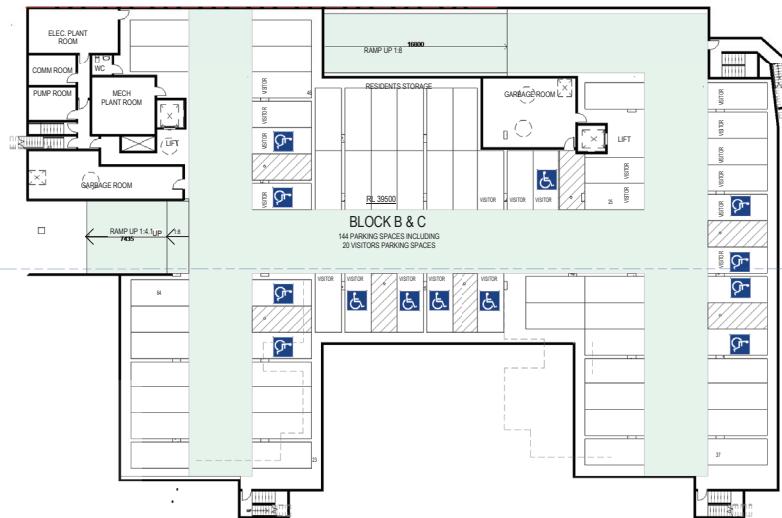
View looking at the intersection of Camden Valley Road and Rynan Avenue looking north from Rynan Avenue



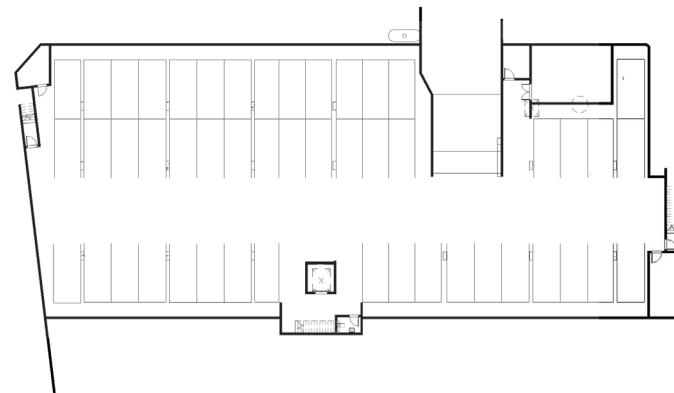


Appendix B

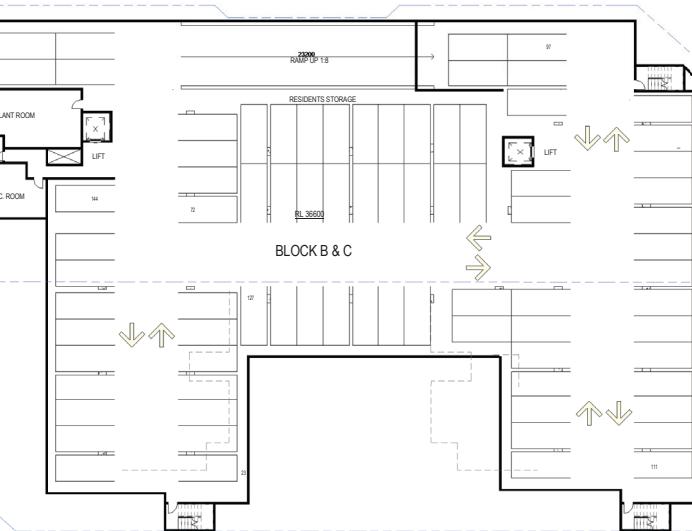
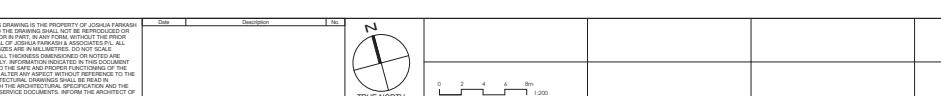
Reduced Plans



NEW ROAD RESERVE - ROAD 1



1 B&C BASEMENT 1
1:200



2 B&C BASEMENT 2
1:200

PRELIMINARY

5 - 15 RYNNAN AVENUE
EDMONDSON PARK, NSW

EDMONDSON PARK, NSW

CLIENT
KMT CONSTRUCTIONS PVT LTD

KMT CONSTRUCTIONS Pty Ltd PROPOSED RESIDENTIAL DEVELOPMENT AT 5-15 RYAN AVENUE, FRANKSTON EAST

ARCHITECT: JOSHUA FARKASH & ASSOCIATES PTY LTD DRAWING TITLE: AVENUE, EDMONDSON PARK

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BASEMENT FLOOR PLANS
BUILDING B C & D

A-2101

DEVELOPMENT STATISTICS
BUILDING A
SITE AREA 3735 SQ M

OPEN SPACE (25%)
REQUIRED AREA 933.75 SQ. M

OPEN SPACE
PROVIDED AREA 1241.23 SQ.M

DEEP SOIL (25%)
REQUIRED AREA 223.43 SQ M

DEEP SOIL
PROVIDED AREA 596.22 SQ.M

DEVELOPMENT STATISTICS
BUILDING B & C (5-15 RYAN AV)
SITE AREA 6448 SQM

OPEN SPACE (25%)
REQUIRED AREA 1612 SQ. M

OPEN SPACE
PROVIDED AREA 1321 SQ.M

DEEP SOIL (25%)
REQUIRED AREA 403 SQ M

DEEP SOIL
PROVIDED AREA 641 SQ.M

FSR - Building A 1:50 FSR - Building B & C 1:50

DEVELOPMENT STATISTICS
BUILDING D (15 RYAN AV)
SITE AREA 2175 SQ M

OPEN SPACE (25%)
REQUIRED AREA 543.75 SQ. M

OPEN SPACE
PROVIDED AREA 1032 SQ.M

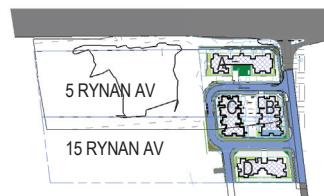
DEEP SOIL (25%)
REQUIRED AREA 135.9 SQ M

DEEP SOIL
PROVIDED AREA 424.9 SQ.M

FSR - Building D 1:50

LEGEND:
■ COMMUNAL OPEN SPACE (NOT DEEP SOIL)
■ COMMUNAL OPEN SPACE (DEEP SOIL)
■ PRIVATE OPEN SPACE (NOT DEEP SOIL)
■ PRIVATE OPEN SPACE (DEEP SOIL)
■ NEW VERGE
■ NEW FOOTPATHS
■ NEW ROADWAY

Landscape Calculation 1:200



1 SITE PLAN - KEY PLAN - Ground 1:250



PRELIMINARY

5 - 15 RYAN AVENUE
EDMONDSON PARK, NSW
MULTI-UNIT RESIDENTIAL DEVELOPMENT

CLIENT
KMT CONSTRUCTIONS Pty Ltd

PROPOSED RESIDENTIAL
DEVELOPMENT AT 5-15 RYAN
AVENUE, EDMONDSON PARK

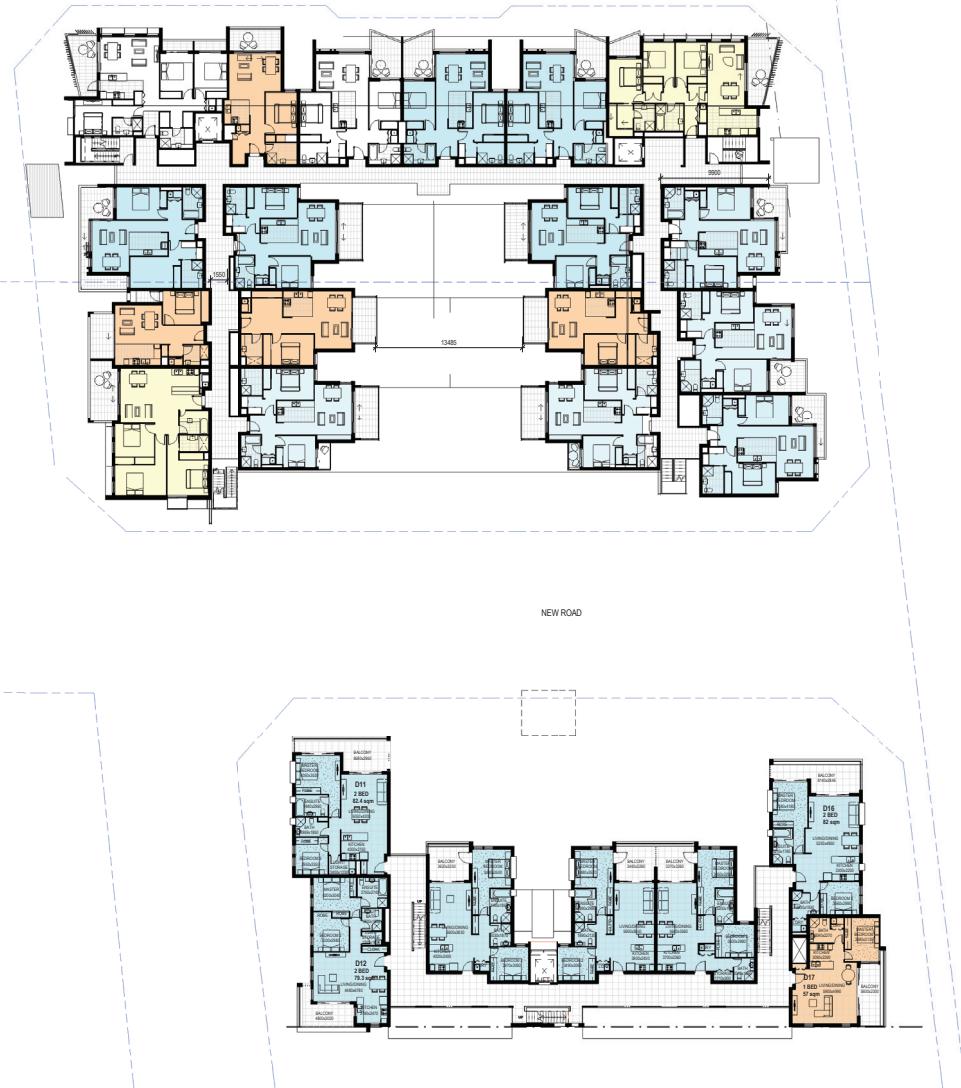
DRAWING TITLE
GROUNDFLOOR PLAN BLDG
B,C & D

DRAWING No. - Ref.
A-2102

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0 2 4 6 8m 1:200



1 B&C LEVEL 1
1:200



TRUE NORTH

0 2 4 6 8m
1:200



2 B&C LEVEL 2
1:200

PRELIMINARY

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Date	Description	No.
	TRUE NORTH	

5 - 15 RYAN AVENUE
EDMONDSON PARK, NSW
MULTI-UNIT RESIDENTIAL DEVELOPMENT

CLIENT
KMT CONSTRUCTIONS Pty Ltd

PROJECT
PROPOSED RESIDENTIAL
DEVELOPMENT AT 5-15 RYAN
AVENUE, EDMONDSON PARK

DATE PLOTTED
02/10/15
1:200
DRAWING TITLE
LEVEL 1 & 2 FLOOR PLANS
BLDG B,C&D

DRAWING No. / Rev.
A-2103



1 B&C LEVEL 3
1:200



2 B&C LEVEL 4
1:200

PRELIMINARY

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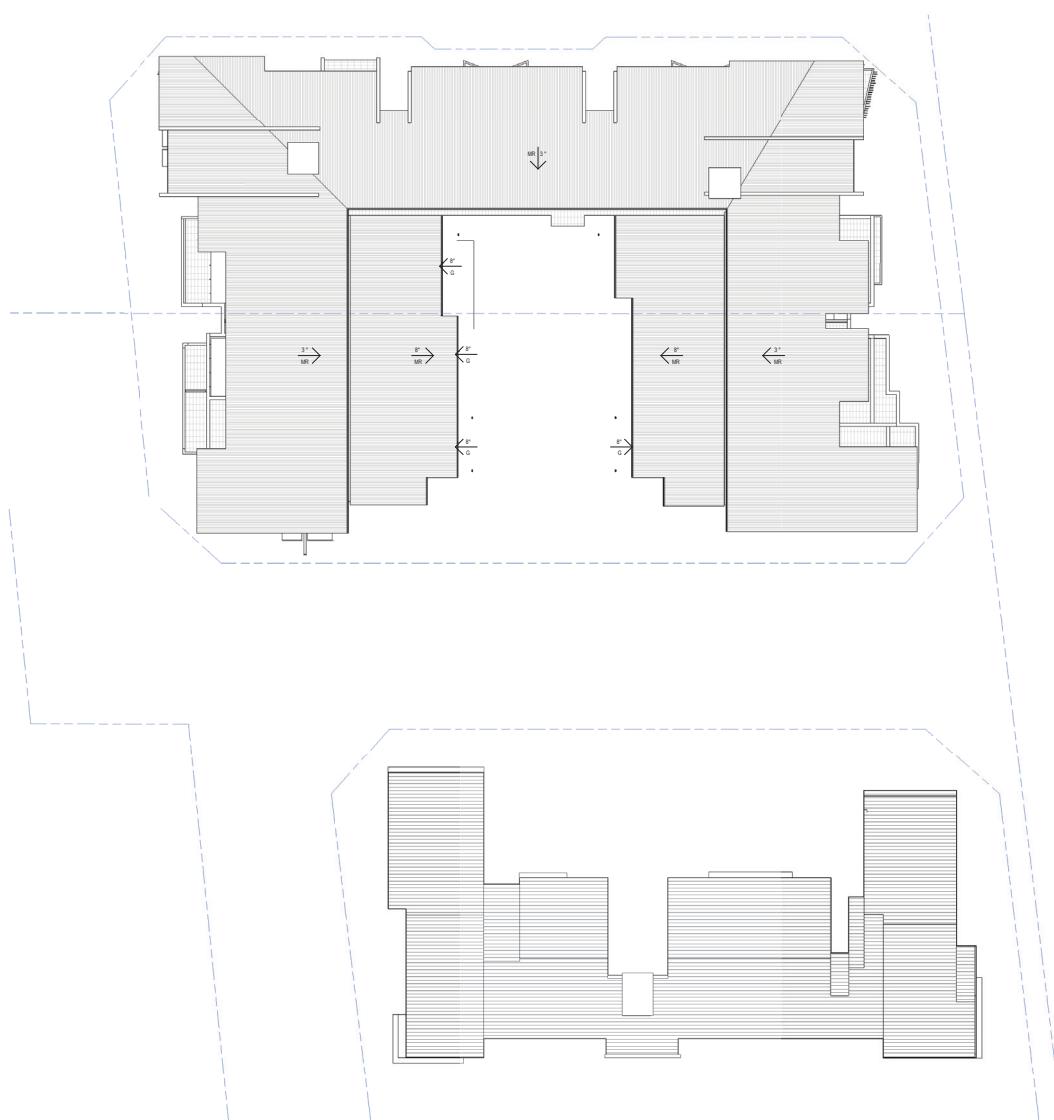


TRUE NORTH

5 - 15 RYAN AVENUE
EDMONDSON PARK, NSW
MULTI-UNIT RESIDENTIAL DEVELOPMENT

CLIENT
KMT CONSTRUCTIONS Pty Ltd

PROJECT
PROPOSED RESIDENTIAL
DEVELOPMENT AT 5-15 RYAN
AVENUE, EDMONDSON PARK
DRAWING TITLE
LEVEL 3 & 4 FLOOR PLANS
BLDG B,C&D
DRAWING No. / Rev.
Check Author ID-23655
DATE PLOTTED 02/15/16
1:200
S1000R1000
DRAWING No. A-2104
A-2104
DRAWING No. A-2104
A-2104



PRELIMINARY



5 - 15 RYAN AVENUE
EDMONDSON PARK, NSW
MULTI-UNIT RESIDENTIAL DEVELOPMENT

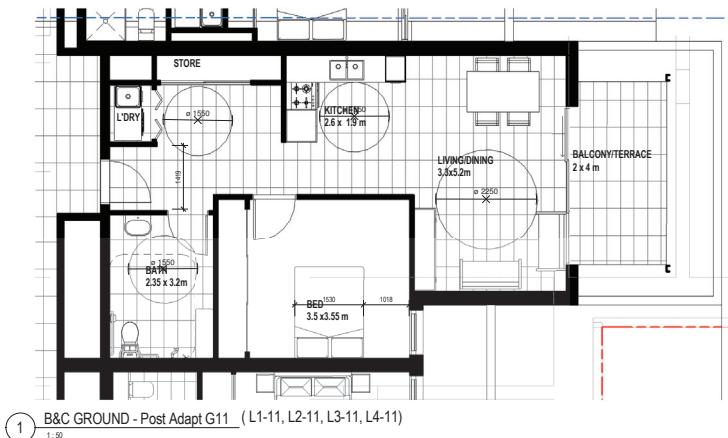
EDMONDSON PARK, NSW

CLIENT
KMT CONSTRUCTIONS PVT LTD

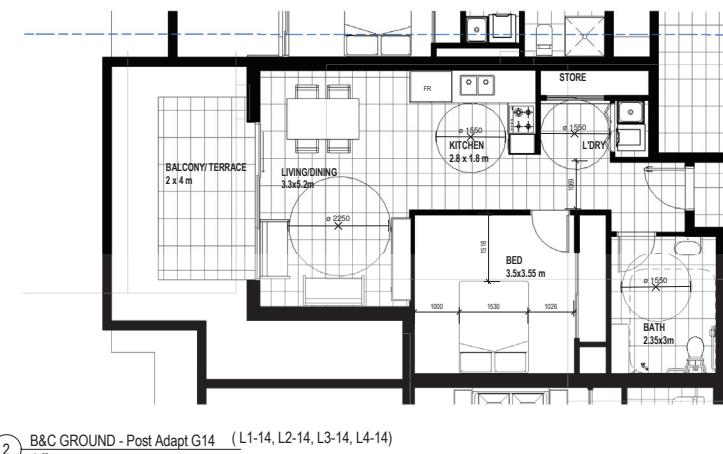
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ARCHITECT  JOSHUA FARKASH & ASSOCIATES PTY LTD	DRAWING TITLE POSE B1A1 B1B1 B1C1 B1D1

JOSHUA PARKHAR & ASSOCIATES PTY. LTD. ABN 19 002 048 088 A.C.N. 002 048 088 LEVEL 4 405 KENT STREET ROOF PLAN BUILDING B-D TEL: (02) 9264 5155 FAX: (02) 9264 5166

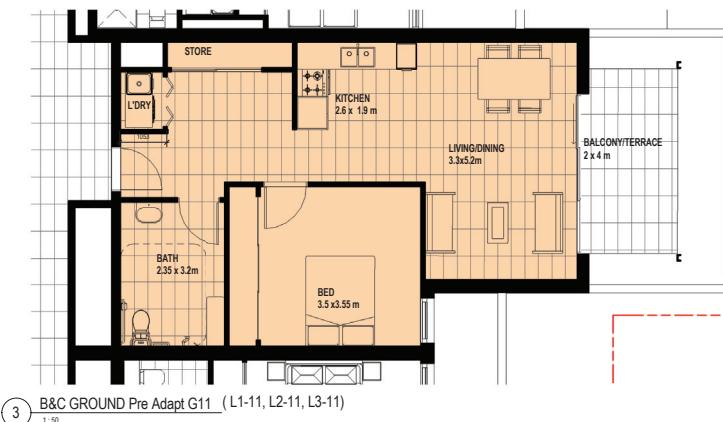
A-2105



1 B&C GROUND - Post Adapt G11 (L1-11, L2-11, L3-11, L4-11)



2 B&C GROUND - Post Adapt G14 (L1-14, L2-14, L3-14, L4-14)



3 B&C GROUND Pre Adapt G11 (L1-11, L2-11, L3-11)
1-50



B&C GROUND Pre Adapt G14 (11-14 | 2-14 | 3-14)

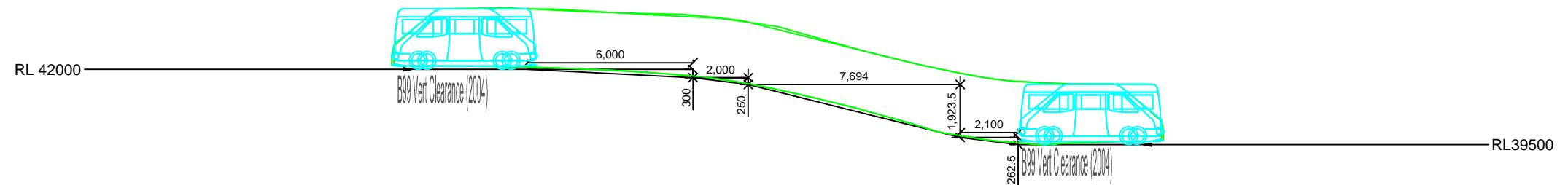


Appendix C

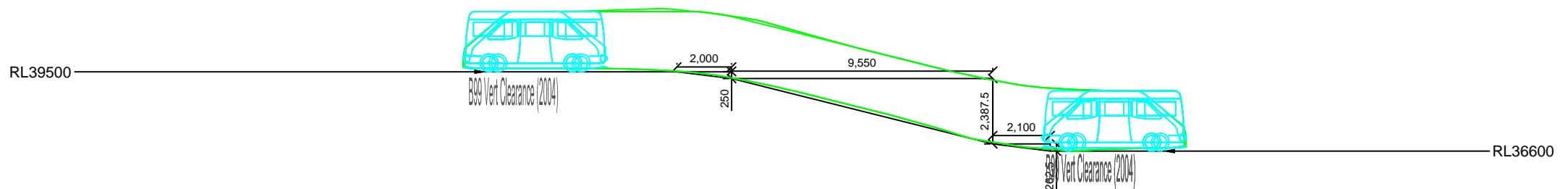
Swept Path Analysis

BUILDINGS B AND C

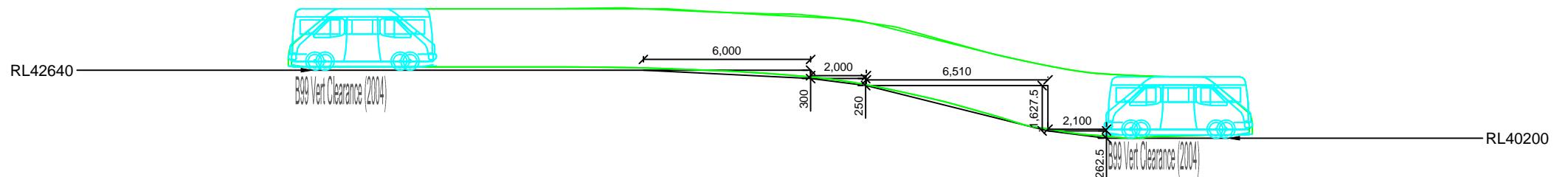
STREET LEVEL TO BASEMENT LEVEL 1



BASEMENT LEVEL 1 TO BASEMENT LEVEL 2

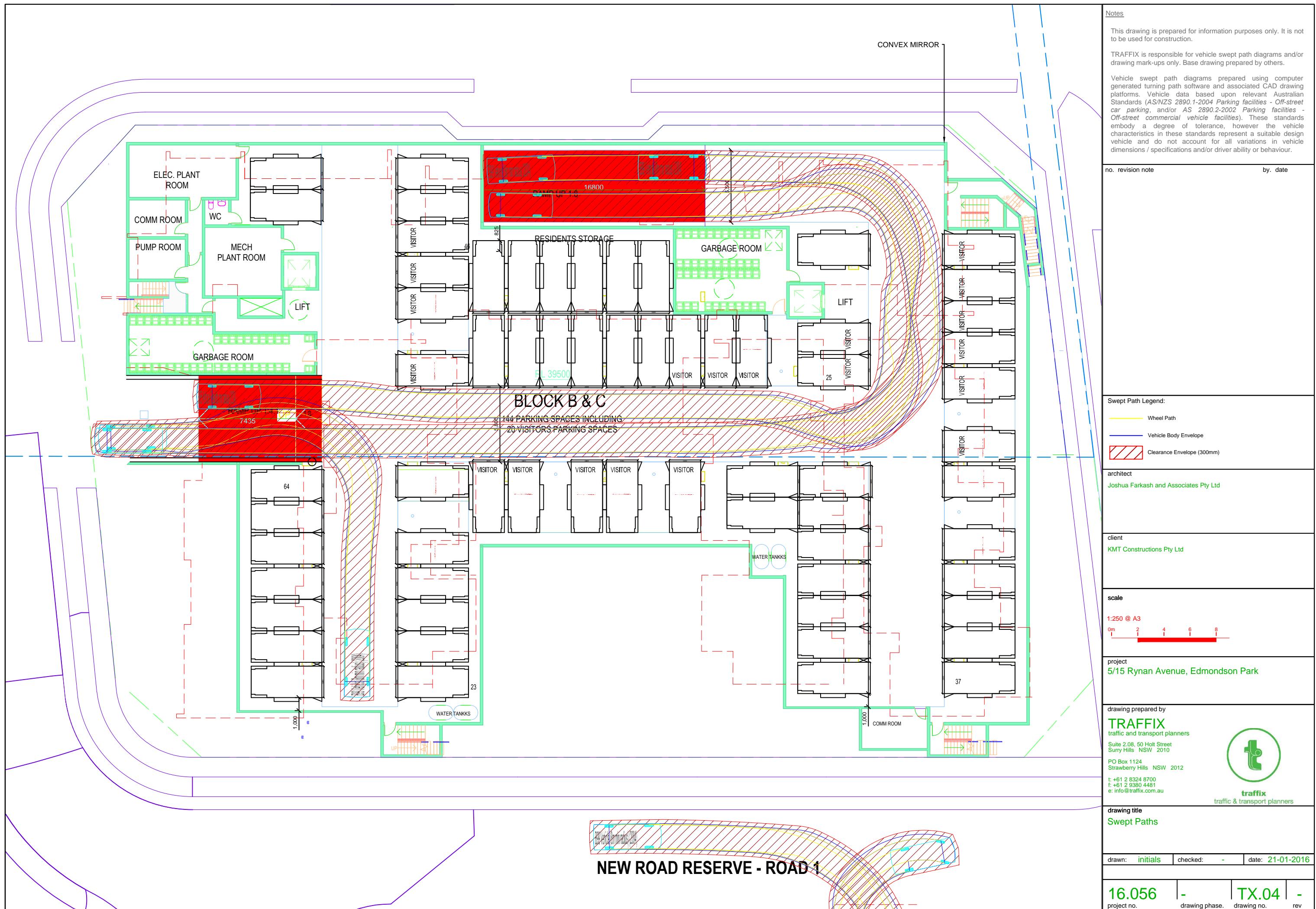


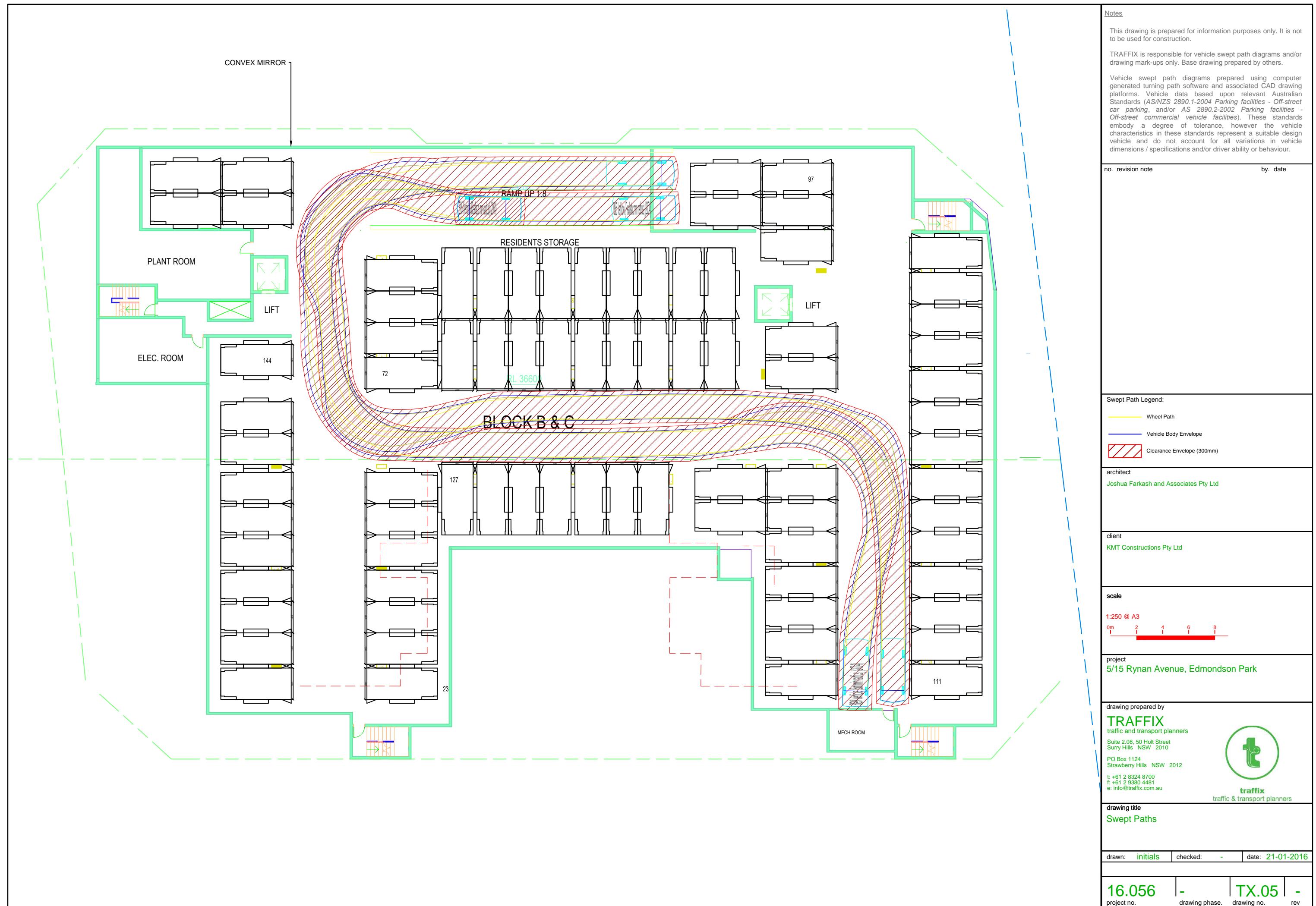
<p>Notes</p> <p>This drawing is prepared for information purposes only. It is not to be used for construction.</p> <p>TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.</p> <p>Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (AS/NZS 2890.1-2004 <i>Parking facilities - Off-street car parking</i>, and/or AS 2890.2-2002 <i>Parking facilities - Off-street commercial vehicle facilities</i>). 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.</p>	
<p>no. revision note</p> <p>by date</p>	
<p>Swept Path Legend:</p> <ul style="list-style-type: none"> — Wheel Path — Vehicle Body Envelope — Clearance Envelope (300mm) 	<p>architect Joshua Farkash and Associates Pty Ltd</p>
<p>client KMT Constructions Pty Ltd</p>	<p>scale 1:200 @ A3</p>
<p>project 5/15 Rynan Avenue, Edmondson Park</p>	<p>drawing prepared by TRAFFIX <small>traffic and transport planners</small> <small>Suite 2.08, 50 Holt Street</small> <small>Sydney Hills NSW 2010</small> <small>PO Box 1124</small> <small>Strawberry Hills NSW 2012</small> <small>t: +61 2 8324 8700</small> <small>f: +61 2 9380 4481</small> <small>e: info@traffix.com.au</small> </p>
<p>drawing title Ramp Grade Requirements</p>	<p>traffix <small>traffic & transport planners</small></p>
<p>drawn: initials</p>	<p>checked: -</p>
<p>date: 21-01-2016</p>	
<p>16.056</p>	<p>- TX.01</p>
<p>project no.</p>	<p>drawing phase, drawing no.</p>
	<p>rev</p>

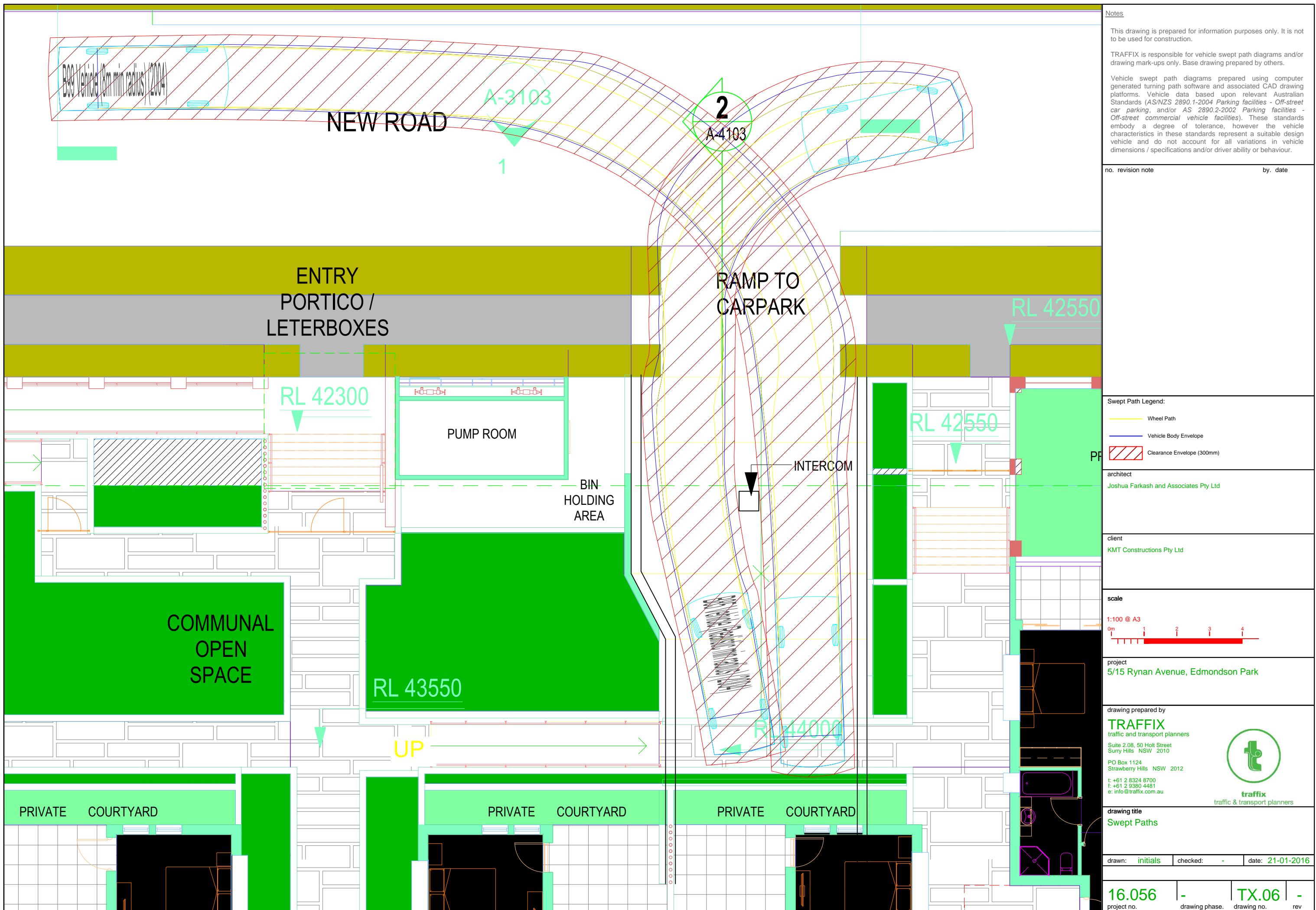
BUILDING D

Notes
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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 <i>Parking facilities - Off-street car parking</i> , and/or AS 2890.2-2002 <i>Parking facilities - Off-street commercial vehicle facilities</i>). 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.
no. revision note by. date
Swept Path Legend:
Yellow line: Wheel Path
Blue line: Vehicle Body Envelope
Red hatched area: Clearance Envelope (300mm)
architect Joshua Farkash and Associates Pty Ltd
client KMT Constructions Pty Ltd
scale 1:200 @ A3 0m 2 4 6 8
project 5/15 Rynan Avenue, Edmondson Park
drawing prepared by TRAFFIX traffic and transport planners Suite 2.08, 50 Holt Street Surry Hills NSW 2010 PO Box 1124 Strawberry Hills NSW 2012 t: +61 2 8324 8700 f: +61 2 9380 4481 e: info@traffix.com.au
drawing title Ramp Grade Requirements
drawn: initials checked: - date: 21-01-2016
16.056 - TX.02 - project no. drawing phase. drawing no. rev













Appendix D

Sidra Intersection Analysis

MOVEMENT SUMMARY

Site: Camden Valley Rynan FU PM

Camden Valley Way - Rynan Avenue

Scenario: Future

Period: PM Peak

Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles										
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Rynan Ave										
1	L2	31	3.8	0.075	41.8	LOS D	1.4	10.2	0.82	0.69
3	R2	33	3.7	0.103	49.6	LOS D	1.6	11.7	0.87	0.71
Approach		63	3.8	0.103	45.8	LOS D	1.6	11.7	0.85	0.70
East: Camden Valley Way										
4	L2	47	1.2	0.034	7.9	LOS A	0.4	2.6	0.20	0.62
5	T1	1775	5.0	0.761	16.9	LOS B	37.0	270.0	0.77	0.71
Approach		1822	4.9	0.761	16.6	LOS B	37.0	270.0	0.75	0.71
West: Camden Valley Way										
11	T1	1047	5.0	0.382	6.6	LOS A	11.4	83.3	0.41	0.37
12	R2	40	1.1	0.214	36.5	LOS D	1.8	12.6	0.78	0.76
Approach		1087	4.9	0.382	7.7	LOS A	11.4	83.3	0.42	0.38
All Vehicles		2973	4.9	0.761	14.0	LOS B	37.0	270.0	0.64	0.59

Level of Service (LOS) Method: Delay (HCM 2000).

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 (Akcelik M3D).

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	11.3	LOS B	0.1	0.1	0.43	0.43	
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		158	39.9	LOS D			0.78	0.78	

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.

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Organisation: TRAFFIX | Processed: Thursday, 3 March 2016 10:59:34 AM

Project: T:\Synergy\Projects\16\16.056\Modelling\16.056s01v1 TRAFFIX 5 Rynan Ave.sip6

MOVEMENT SUMMARY

Site: Camden Valley Rynan FU AM

Camden Valley Way - Rynan Avenue

Scenario: Future

Period: AM Peak

Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles										
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Rynan Ave										
1	L2	29	2.1	0.072	41.7	LOS D	1.4	9.7	0.81	0.68
3	R2	41	1.5	0.128	49.8	LOS D	2.0	14.5	0.88	0.72
Approach		71	1.8	0.128	46.4	LOS D	2.0	14.5	0.85	0.71
East: Camden Valley Way										
4	L2	41	4.1	0.029	7.1	LOS A	0.2	1.2	0.13	0.61
5	T1	1058	5.0	0.448	12.4	LOS B	15.8	115.6	0.56	0.50
Approach		1099	5.0	0.448	12.2	LOS B	15.8	115.6	0.55	0.51
West: Camden Valley Way										
11	T1	1761	5.0	0.653	9.0	LOS A	26.8	195.7	0.56	0.52
12	R2	20	3.9	0.059	18.5	LOS B	0.5	3.8	0.51	0.69
Approach		1781	5.0	0.653	9.1	LOS A	26.8	195.7	0.56	0.52
All Vehicles		2951	4.9	0.653	11.1	LOS B	26.8	195.7	0.56	0.52
All Heavy Vehicle Model Designation.										

Level of Service (LOS) Method: Delay (HCM 2000).

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 (Akcelik M3D).

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	11.3	LOS B	0.1	0.1	0.43	0.43	
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		158	39.9	LOS D			0.78	0.78	

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.

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Organisation: TRAFFIX | Processed: Thursday, 3 March 2016 10:59:34 AM

Project: T:\Synergy\Projects\16\16.056\Modelling\16.056s01v1 TRAFFIX 5 Rynan Ave.sip6

MOVEMENT SUMMARY

Site: Camden Valley Rynan EX PM

Camden Valley Way - Rynan Avenue

Scenario: Existing

Period: PM Peak

Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles										
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Rynan Ave										
1	L2	23	5.0	0.057	41.5	LOS D	1.1	7.8	0.81	0.68
3	R2	24	5.0	0.077	49.3	LOS D	1.2	8.7	0.87	0.70
Approach		47	5.0	0.077	45.5	LOS D	1.2	8.7	0.84	0.69
East: Camden Valley Way										
4	L2	12	5.0	0.008	7.0	LOS A	0.0	0.3	0.11	0.60
5	T1	1775	5.0	0.754	16.9	LOS B	36.3	265.3	0.77	0.71
Approach		1786	5.0	0.754	16.8	LOS B	36.3	265.3	0.76	0.71
West: Camden Valley Way										
11	T1	1047	5.0	0.382	6.6	LOS A	11.4	83.3	0.41	0.37
12	R2	8	5.0	0.046	33.0	LOS C	0.3	2.4	0.70	0.70
Approach		1056	5.0	0.382	6.8	LOS A	11.4	83.3	0.41	0.37
All Vehicles		2889	5.0	0.754	13.6	LOS B	36.3	265.3	0.64	0.59
54.5										

Level of Service (LOS) Method: Delay (HCM 2000).

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 (Akcelik M3D).

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	11.3	LOS B	0.1	0.1	0.43	0.43	
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		158	39.9	LOS D				0.78	0.78

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: Camden Valley Rynan EX AM

Camden Valley Way - Rynan Avenue

Scenario: Existing

Period: AM Peak

Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h		
South: Rynan Ave											
1	L2	13	5.0	0.031	41.0	LOS D	0.6	4.2	0.80	0.65	32.9
3	R2	13	5.0	0.040	48.8	LOS D	0.6	4.5	0.86	0.68	31.4
Approach		25	5.0	0.040	44.9	LOS D	0.6	4.5	0.83	0.66	32.1
East: Camden Valley Way											
4	L2	34	5.0	0.024	7.0	LOS A	0.1	0.8	0.12	0.61	52.6
5	T1	1058	5.0	0.448	12.4	LOS B	15.8	115.6	0.56	0.50	55.8
Approach		1092	5.0	0.448	12.2	LOS B	15.8	115.6	0.55	0.51	55.7
West: Camden Valley Way											
11	T1	1761	5.0	0.651	9.0	LOS A	26.6	194.5	0.56	0.52	59.1
12	R2	16	5.0	0.047	18.4	LOS B	0.4	3.0	0.50	0.68	43.8
Approach		1777	5.0	0.651	9.1	LOS A	26.6	194.5	0.56	0.52	58.9
All Vehicles		2894	5.0	0.651	10.6	LOS B	26.6	194.5	0.56	0.52	57.3

Level of Service (LOS) Method: Delay (HCM 2000).

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 (Akcelik M3D).

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	11.3	LOS B	0.1	0.1	0.43	0.43	
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		158	39.9	LOS D			0.78	0.78	

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.