SYDNEY CATHOLIC EDUCATION OFFICE

TRAFFIC AND PARKING ASSESSMENT FOR DEVELOPMENT APPLICATION FOR MASTERPLAN CLANCY CATHOLIC COLLEGE, WEST HOXTON.

Prepared by:

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Job No.: 1139/15
Report No.: 17/15 **JULY, 2015**

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1.0 INTRODUCTION

1.1 Background

This Traffic and Parking Report has been prepared for the Catholic Education Office Archdiocese of Sydney for a Development Application for building works included in the Masterplan drawings prepared by Fulton Trotter, Architects.

A Development Application No. **288/05** was approved by Liverpool City Council on 7/3/2005 for building works shown on plans prepared by Fulton Trotter, Architects. The traffic report prepared by ORaP-TTW Pty Ltd stated that **97** *parking spaces* needed to be provided for a **1000** pupil secondary school according to School Facilities Standards. However, the Liverpool City Council **DCP No. 3** *Parking and Service Provision* required **1 space** per **2** staff and **1 space** per **30** students. The proposal included **99** staff and **1030** students, thus requiring **85** spaces based upon DCP No. 3.

The Development Consent Condition 3 required **119** car parking spaces including **3** spaces for disabled drivers.

1.2 Scope of Report

Part 1 of the *Brief* was for the *Concept Masterplan and DA documentation for the Masterplan*. The following tasks have been carried out and include *additional information* requested by Council at a *Pre-DA meeting* held on **10th June 2015**.

Part 1:

1.1 Assess brief and prepare fee proposal

1.2 Initial site inspection during peak student arrival or departure periods to observe bus usage, traffic circulation, student 'Kiss and Ride', traffic controls, parking restrictions on frontage streets, site photos and confirm survey tasks.

1.3 The survey Programme included the following surveys:-

- Design of Surveys, prepare Survey Forms and brief the supervisor.
- Intersection Traffic Volume Counts at **3 i**ntersections in the **peak** am and pm *arrival* and *departure periods* **7.30 - 9.00am** and **2.30-4.00pm.**
- *Bus Zone* in Carmichael Drive – bus *arrival and departure times* in the *peak* periods, *number* of students carried, name of bus company.

1.2 (Continued)

- 'Kiss and Ride' in Carmichael Drive. Arrival and departure times of all parents' vehicles, number of children dropped off or picked up in the peak arrival and departure periods.
- Traffic Generation counts of *all vehicles entering and exiting* from the College in the peak AM and PM arrival and departure periods.
- Parking Accumulation counts in all of the off-street car parks and on-street including Carmichael Drive, Moondarra Avenue, Riddell Street and Montefiore Street from 7:30am to 9:00am and 2:30 – 4:00pm on one day.

3.0 Analysis and Preparation of Traffic Report for D.A. Submission:

3.1 Review survey data and assess peak hour traffic volumes.

3.2 **SIDRA** Analysis of existing traffic conditions and *future conditions* at **3** tee intersections.

3.3 Analysis *bus patronage*, 'kiss and ride' AM and PM, parking accumulation, peak traffic generation.

3.4 Provide advice on location and design to increase staff parking to meet current D.A. requirements for proposed staff and student increase.

3.5 Prepare *Traffic Management Plan* for 'special events' in the Performance Theatre and Gathering Space for around *250* and *1400 persons* respectively.

3.6 Review access for Major Events.

3.7 Prepare Traffic Impact Report for .D.A**.**

3.8 Respond to any queries raised by *Council during the D.A. assessment* period and *attend meetings*, as necessary with Council.

1.2 (Continued)

Comments and Additional Information requested in Pre-D.A. Minutes.

Car Parking:	Part 1 of the Liverpool Development Control Plan 2008 outlines the parking requirements based on the proposed number of students and staff. Any variation to the required car parking shall be accompanied by written justification, demonstrating that the objectives of the controls are achieved.
Traffic and Access	Comments from Council's Engineers regarding traffic and transport are as follows:- • The proposed access road is to match into existing access road. • The application must demonstrate that access, car parking and manoeuvring details comply with AS 2890 Parts 1 & 6 and Council's Development Control Plan.
Traffic	The following information is to be submitted with any application: o Details of the layout and dimensions of the proposed internal road, including vehicular turning manoeuvres and swept path analysis; o Details of traffic circulation, line marking and signposting for traffic management of the proposed road; o Details of internal street lighting for the proposed road; and o Details of the on and off street car parking provision, control and management.

2.0 EXISTING TRAFFIC CONDITIONS

2.1 Road Inventory and Parking

An inventory has been made of all signposted parking signs, student drop-off and pick-up zones, Bus zones, marked school crossing and Stop and Give Way signs in the streets surrounding Clancy College.

The pavement widths of all streets within the survey area were measured and are noted on **Sheet 2** of Drawing No. **1139-15**. Moondarra Drive has *150mm. K* and *G* on both sides. The kerb on the street side adjacent to the College site is *150mm K* and *G*. In other streets 'roll kerb and gutter' is on the *residential frontage*.

The number of on-street parking spaces in *Time Restricted* and '*Unrestricted'* areas have been measured and the *number of spaces* in each area are noted on **Sheet 2** of Drawing No. **1139-15**.

On Street Parking Spaces:
***'No Restriction'*– 97** comprising:-

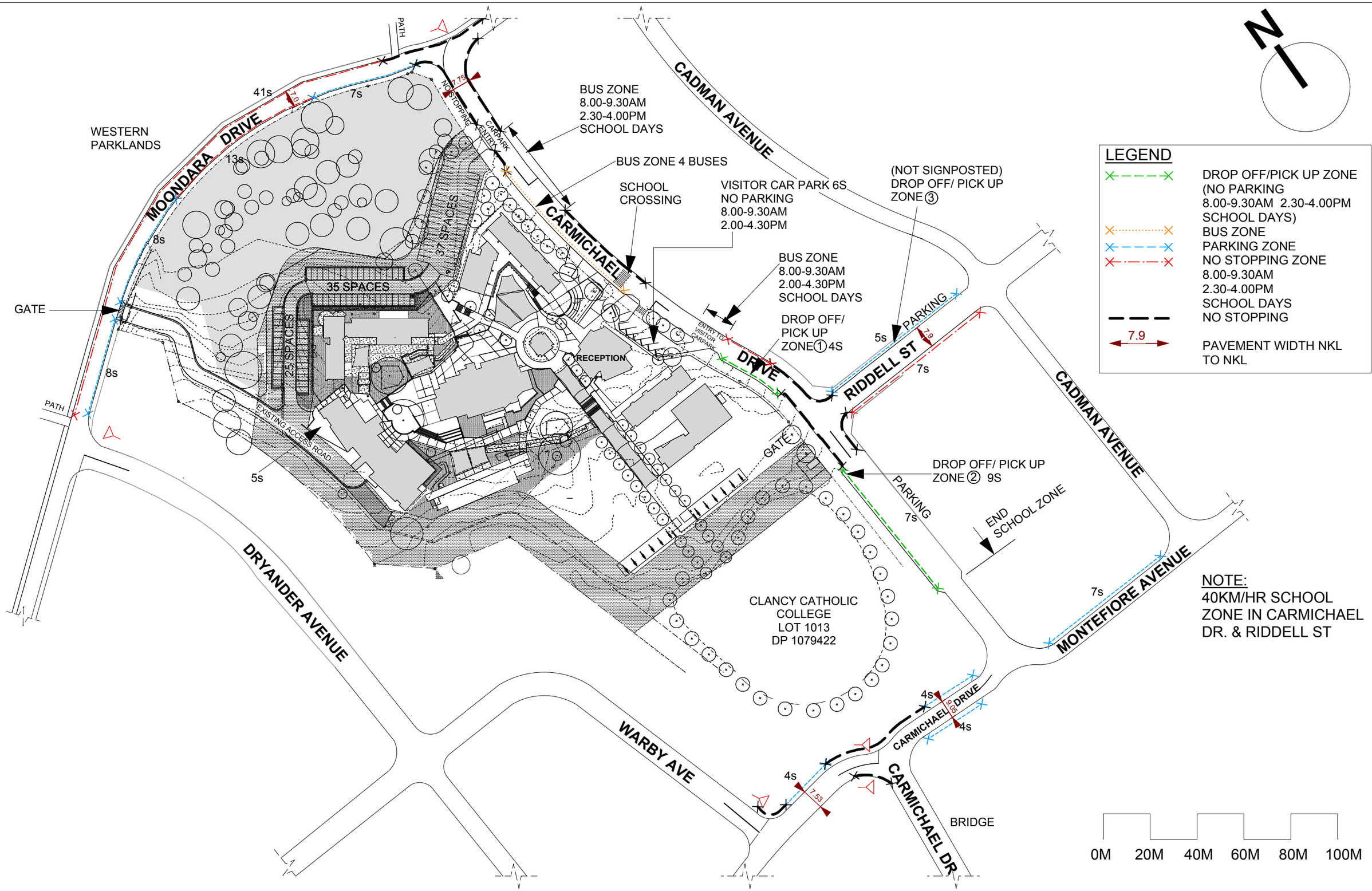
Moondarra Drive	**23**	(College Frontage)
Carmichael Drive	**7**	(Residential)
Montifiore Ave.	**7**	(Residential)
Riddell Street	**5**	(Residential)
Dryander St	**30**	College Frontage
Warby Ave	**13**	College Frontage
Carmichael Drive (N)	**4**	College Frontage
Carmichael Drive (S)	**4**	Non Residential
Moondarra Dr. (N) West of Carmichael Dr.	**4**	College Frontage

On-Street Spaces – Time Restricted
'No Stopping' or ***'No Parking'*** **8:00 – 9:30am** and **2:30 – 4:00pm Schooldays.**

Moondarra Drive – (Western Parklands)	**(Road pavement too narrow for parking North Side)**
Moondarra Drive – (College Frontage)	**13**
Riddell Street Residential	**7**
Carmichael Drive – (College Frontage) AM/PM DROP-OFF	**13**
	33

2.2 Public Transport

Clancy College is serviced by **Interline Bus Services** that operate on the following *morning* and *afternoon routes*. Where routes are shown with a '*forward slash'* this means a '*transfer from one route to another*', to pass the college in Carmichael Drive.



ISSUE	DATE	APPD	COMMENTS
A	28/4/15	KC	NO STOPPING ZONE, BUS ZONE ADDED. PARKING SPACE NUMBER AMENDED

SITE PLAN BY FULTON TROTTES ARCHITECTS
DRAWING NO.: AWD101
PROJECT NO.: 7023WH06

plot date : 28/4/15
file name : 1139-15- site plan__280415_KC.vwx

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CLIENT:
CLANCY CATHOLIC COLLEGE
TRAFFIC AND PARKING DESIGN

201 CARMICHAEL DRIVE, WEST HOXTON, NSW

SITE PLAN

SCALE	PASSED	DATE
1:1500	EMMC	28.04.15

DESIGN	LMA	JOB No. 1139-15	SHEET No. 02	ISSUE A
DRAWN	EMMC			
CHECKED	EMMC	DATE FIRST ISSUED 23.03.15	OF	

2.2 (Continued)

MORNING BUS ROUTES:

Route Number	FROM	Route Number.	FROM
1038 / 1008	Kelvin Park Rossmore	852	Liverpool Prestons
1028	Badgerys Creek Austral	1041	Horningsea Park Prestons
1026 / 1032	Austral Rossmore	1053 1015	Prestons Prestons
1040 / 1032	Rossmore		
1008	Austral Leppington		
854	Liverpool Hoxton Park		
852 / 854	Prestons Horningsea Park		

AFTERNOON BUS ROUTES:

Route Number	TO
2064	Prestons.
2040	Prestons.
2065	Prestons.
2080	Prestons.
2082	Prestons.
2039	Horningsea Park Hoxton Park
854	Ex Greenway Dr. to Liverpool Station.
2015	Austral Rossmore
2015 / 2032	Bringelly Kelvin Park / Ex Rossmore P. School.
2015 / 2057	Austral. Rossmore. Rutleigh Park / Ex Austral P. School
2015 / 2033	Gurner Avenue

2.3 Peak Hour Traffic Volumes

Traffic volumes were made at the following intersections from **7:30 – 9:30** AM and **2:30 – 4:30PM** on *Thursday 26/3/2015.*

Moondarra Drive / Carmichael Drive.
Carmichael Drive / Riddell Street.
Carmichael Drive /Montefiore Avenue.

The turning movements at the **3 intersections** are shown in **Figure 1**. The peak hour movements were **7:30 – 8:30AM** and **3:15 – 4:15PM**.

2.4 Intersection Performance

All intersections have been analysed using **SIDRA Version 6**.

The network performance is determined by the Level of Service (**LoS**) Average Vehicle Delay (**AVD**), Degree of Saturation (**DoS)** and maximum delay on the critical movement at the intersections during peak hours. The Level of Service criteria for intersections are explained in **Table 4.2** taken from the **RTA Guide to Traffic Engineering Developments**.

Table 4.2 (RTA Guide to Traffic Generating Developments)
Level of Service criteria for Intersections.

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 TO 28	Good with acceptable delays spare capacity	Acceptable delays & spare capacity
C	29 TO 42	Satisfactory	Satisfactory, but accident study required
D	43 TO 56	Operating near capacity	Near capacity & accident study required
E	57 TO 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

The results of the analysis are set out in **Table 2.4. Analysis Summary.**

The SIDRA 6 computer printouts are included in **Appendix B**. All intersections are operating at **Level of Service A**.

3.0 EXISTING COLLEGE FACILITIES AND USE

3.1 College Student Enrolment and Site Development

The existing buildings, driveways, car parking, asset protection zone, easement for drainage and oval are illustrated in **Drawing EX101** which is included in **Appendix A**.

The student enrolment in **2015** is **1097.**

Year	No. Students
7	191
8	208
9	197
10	197
11	158
12	146
Total	**1097**

However, the student attendance for various reasons is *usually lower* than the number enrolled. For example, the numbers present on the survey days were:-

Wednesday 25/03/2015 : 1046.
Thursday 26/03/2015 : 1058.

3.2 Staff Numbers

The current maximum staff number including casuals rostered is **101**. The number rostered varies from day to day, as shown below:-

Roster of Full Time and Part Time Workers: Total of 101 Staff.

Monday		Tuesday		Wednesday		Thursday		Friday	
Full Time	*85*	*F/T*	*85*	*F/T*	*85*	*F/T*	*85*	*F/T*	*85*
Part Time	*12*	*Part Time*	*12*	*Part Time*	*14*	*Part Time*	*12*	*Part Time*	*9*
Total	*97*	*Total*	*97*	*Total*	*99*	*Total*	*97*	*Total*	*94*

3.3 Hours of Operation

Staff hours are **8:00AM – 4:00PM** Monday to Friday. School hours are **8:30AM** to **2:55PM** (Monday, Wednesday and Friday). **8:35am – 2:30pm** (Tuesday).

3.4 Off-Street Parking – Provision and DCP 3 Requirement.

3.4.1 Provision

The number of linemarked and sealed car parking spaces at Clancy College have been checked.

3.4 (Continued)

There are **97 spaces** for staff in **3** *parking areas* along the main driveway including **2** spaces marked for *drivers with a disability*. There are **6** marked spaces in the Visitor Car Park including **1 space** for *drivers with a disability*. The visitor car park is not accessible from **8:00** to **9:30AM** and from **2:30** to **4:00PM** on school days. The parking spaces in *each parking* area are noted on **Sheet 2** of **Drawing 1139-15**.

There are in addition **5 unmarked** but *sealed spaces* in front of **Block F** used by staff. Hence, the total provision is **108 spaces**.

3.4.2 DCP3 Requirements

Liverpool City Council **DCP No. 3 – Parking and Service Provision** was in effect when the *Consent was granted on 7/9/2005*. The requirement for Educational Establishments was **1 space per 2 staff members** and **1 space per 30 students**.

The traffic and Parking Report Ref: V41267 UT dated 18/8/2004 prepared by URaP-TTW Pty Ltd, stated that *the parking requirement for 99 staff and 1030 students was **85 spaces***. However, the *School Facilities Standards* required **97 parking spaces** for a secondary school with **1000** pupils. The report concluded that some **100 parking spaces** *will be required for the completed development* (final stage).

It is unclear why **Condition 3** of the Consent required that ***119** car parking spaces* must be provided.

3.5 Driveway Access and Signposted Speed Limit

The driveway access at Carmichael Drive is controlled by a sliding gate that is operated by remote control for *security reasons*. Access is only available to staff (**Photo P4**).

The circulation driveway through the car parks is two-way (**Photo P5**) and a **10 km/hr** speed limit is *signposted for pedestrian safety*.

3.6 Travel Modes to College by Students

The following surveys were conducted on Wednesday 25/3/15.

(i) Students Walking to School:

A survey of students walking at the school crossing in Carmichael Drive and at an unmarked crossing near the intersection at Moondarra Drive was made from:-

7:30 – 8:15AM	walking *to* school.
2:45 – 3:30PM	walking *from* school.

PHOTO P1 **View north of School Zone Signage at Southern End of Carmichael Drive.**
25/3/15

PHOTO P2 **Marked School Crossing in Carmichael Drive.**

PHOTO P3 **View south of End School Zone Signs in Carmichael Drive.**

PHOTO P4 **Access to Clancy College Staff Car Park from Carmichael Drive.**

PHOTO P5 **View of Car Park Adjacent to Gate.**

PHOTO P6 **Students Dropped-Off in Zone 3.** **Wednesday 25/3/2015**

3.6 (Continued)

(ii) School Bus Zones in **Carmichael Drive – 4 Bus spaces** and **1 bus space** on **eastern side. Refer Sheet 2 of Drawing 1139-15.**

- o The number of each bus was recorded.
- o The time of arrival and departure.
- o Number of students dropped off between 7:30 to 8:30AM.
- o Number of students picked up by each bus between 2:30 to 3:30PM.

(iii) Parent Drop-Off and **Pick-Up by Car.**

There are **2** indented kerbside' Drop-Off' and 'Pick-Up' Zones **1** and **2** in Carmichael Drive that are signposted- and a **third** Zone in Riddell Street that is not signposted. Refer to **Sheet 2** of Drawing No. **1139-15.**

Zone 1 - 4 spaces.
Zone 2 - 9 spaces.
Zone 3 - Riddell Street.
Morning Drop-Off 7:30 to8:15AM
Afternoon Pick-Up 2:45 to 3:30PM.

(iv) Survey Results.

Travel Mode	AM	School Arrival	Travel Mode	PM	School Departure
	No.	**%**		**No.**	**%**
Walk	221	26.6	Walk	227	28.7
Dropped of by Bus	242	29.2	Picked up by Bus	317	40.0
Dropped off by Car.	367	44.2	Picked up by Car.	148	18.7
TOTAL	**830**	**100%**	**TOTAL**	**792**	**100%**
Students Attending School :			**1046**		
Sample Size	**AM 79.35%**			**PM 75.72%**	

The time for a vehicle to drop-off passengers and move off was **less** than **1 minute** in the **AM school arrival**.

Parking Accumulation

The number of cars parked on-street and on site were surveyed on Thursday 26/3/15. The results for morning and afternoon are in the following **Tables 3.6.1** and **3.6.2**.

3.6 (Continued)

Table 3.6.1 Number of Parked Cars:

TIME MORNING

Location	Number of Spaces	7:30	7:45	8:00	8:15	8:30	8:45
ON-STREET							
No Restriction	97	11	11	11	11	12	9
Time Restricted	33	0	0	0	0	0	0
ON-SITE							
Staff	97+(5)	29	51	74	97	99	102
Visitor	6	1	1	1	1	1	2

Table 3.6.2

TIME AFTERNOON

Location	Number of Spaces	2:30	2:45	3:00	3:15	3:30	3:45	4:00	4:15	4:30
ON-STREET										
No Restriction	97	NA	17	20	9	7	8	11	5	3
Time Restricted	33	NA	0	0	0	0	0	0	0	0
ON-SITE										
Staff	97+(5)	91(4)	92(4)	89(3)	78(3)	66(3)	60(1)	58(1)	41(1)	28(1)
Visitor	6									

Note (4) *Number of vehicles parked in informal area in front of Block F*

3.7 Traffic Generation

The traffic movement *by direction* in and out of the off-street car park at the access gate in Carmichael Drive were counted on *Thursday 26/03/15*.

The **peak** hours were **7.30 – 8.30am** and **3.30-4.30pm**.
The **entry** and **exit volumes** were:-

Peak Hour	IN	OUT	TOTAL
7.30-8.30am	**73**	**4**	**77**
3.30-4.30pm	**1**	**39**	**40**

The turning movements are shown in **Figure 1.**

The **SIDRA** analysis shows in **Table 2.4** that this tee intersection with Carmichael Drive is operating at **Level of Service A** in *both* peak hours.

3.8 College Events Generating Visitor Parking

The list of events to be held during the college year 2015 and expected attendance at each event and the duration of each event are listed below. The 'Mother's Day Mass' is held in the *undercroft* and adjacent area near **Block B** and **Block B Level 1**.

Function	Attendance			Duration of Event	*Busiest* Hour Attendance		Visitor & Teacher Parking Demands	Venue
	Parents	Students	Teachers		Parents	Teachers		
Welcome to new Parents New Enrolments	200 200		30 30	7-7.30pm 7.30-8pm	200 200	30 30	130 130	Block G Block G
Year 11 Assessment Information Night	320		45	7-8pm	320	45	205	Block K
Year 10 Information Night	400		30	7-8pm	400	30	230	Block J
Open Day April	400 -450	300 - 350	100	11am-2pm	200	100	200	Whole Campus
Years 11 & 12 Parent/Teacher Interviews	320	300	85	3.30pm-8.30pm	100	85	185	Block K
Mother's Day Mass	200	1100	100	11am-12.30pm	200	100	200	RPD Undercroft Block B Level 1
Years 7,8,9 & 10 Parent/Teacher Interviews	350	350	90	12pm – 8.30pm	80	90	170	Blocks J and B.
Years 7,8,9 & 10 Parent/Teacher Interviews	150	150	90	3.30 -8.30pm	60	90	150	Blocks J and B
Year 11, 2016 Subject Selection Night	400		45		400	45	245	Block K
Year 7, 2016 Subject Information Night	200 200		30 30	7-8pm 8-9pm	200 200	30 30	130 130	Block G Block G
Year 12 Parent/Teacher Interviews	200		45	3.30pm-8.30pm	100	45	95	Block K
Year 9, 2016 Subject Selection Information Night	300		45	7-8pm	300	45	195	Block J
HSC 2016 Assessment Information Night	300		45	7-8pm	300	45	195	
Arts & Culture Night	450-500		90	6.30pm-9.30pm	150-170	90	165-175	
Special Education Awards Night	70			7-8pm	70		35	
HSC Drama Night	20			7-8pm	20		10	
HSC Music Night	20			7-8pm	20		10	
Father's Day Breakfast	200			7.30am-9.am	200		180	

Notes: ***1. The parent attendance numbers and car parking demand are estimates only.***

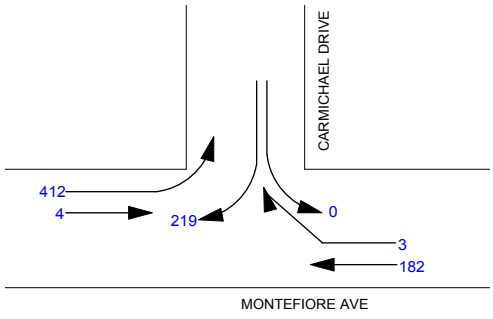
2. There have been no complaints by residents about School Visitors parking on-street.

4.0 PROPOSED MASTERPLAN FACILITIES

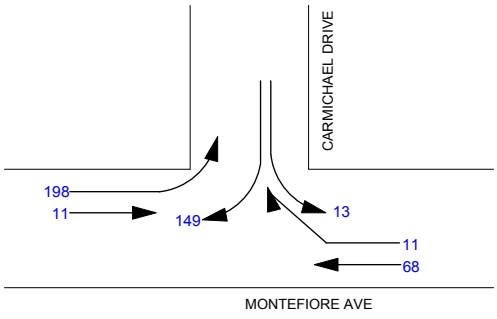
4.1 Proposed Masterplan Works

The scope of the master plan is as follows:

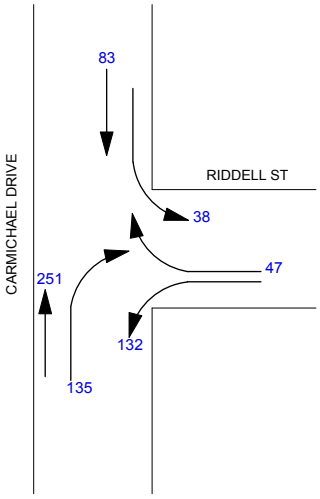
- **Alterations and additions to the existing Block A Administration Building** – including new entry and interview rooms (DA-A-201).
- **Alterations and additions to the existing Block B Science/GLA building** – refurbishment to convert existing spaces into Science labs, construct new GLA on the ground floor and new science lab on the first floor, new stair and enclosure/extension of the existing verandah (DA-B-201),
- **Alterations and additions to Block C Music Building** to include new music practice and storage rooms, enclosure to existing verandah, new lift and stair and verandah link to Block G (DA-C-201).
- **Alterations and additions to the existing Block J Year 9 & 10 Building** – including modifications to the envelope of a breakout space to allow wider circulation on the verandah (DA-J-202)
- **Alterations and additions to the existing Block F TAS Building** – including enclosure of existing covered outdoor area and, classroom extension to create new workshop (DA-F-201).
- **Alterations and additions to the existing Block K Year 11 & 12 Building** – including modifications to the envelope of a breakout space to allow wider circulation on the verandah (DA-K-201).
- **Alterations and additions to the existing Block H Staff/Library Building** – including refurbishment of existing canteen area into staff study space, refurbishment of existing staff offices, and extension to staff office area and lounge area (DA-H-201).
- **New Canteen with undercroft and Flexible Learning Areas building** adjoining Block K (DA-K-201 & DA-K-202).
- **New Art and Fitness Building** – along the western boundary including GLA's, Art Studios, Fitness Room, change rooms, kiln room and lift (DA-N-201).
- **Alterations and additions to the existing Block G** – (currently a multipurpose space) to create a Lecture Theatre with tiered seating and extension to include new Dance Studio and change rooms (DA-M-201).
- **New Gallery space** – located between the Lecture Theatre and Gathering Space to be an entry foyer, flexible learning area, and exhibition space, including a food servery and storage (DA-M-201).
- **New Gathering Space** – (multipurpose hall) which includes a performance stage, control box on mezzanine floor, multi-purpose indoor sports court, storage and amenities. This space will be used for mass, assemblies, performances and sport (DA-M-201 & DA-M-202).
- **External works** – 2 x new outdoor multi-purpose courts located along the western boundary with extension to existing access-way (DA-101 Proposed Site Plan).
- **Roadway –** extension to the existing roadway from the existing TAS building to the (future) canteen and playing courts, with truck turning and parking.



7:30-8:30AM
THUR 26-3-15



3:15-4:15PM



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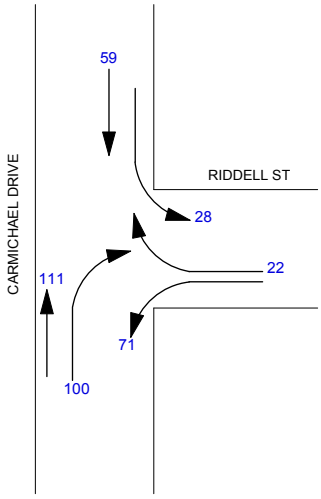
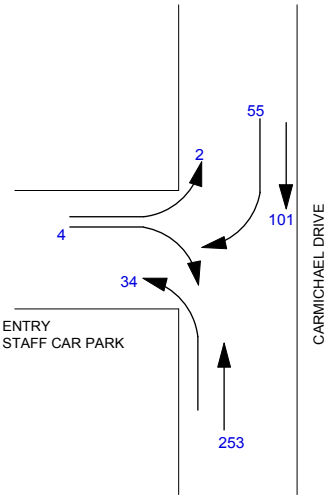


3:00-4:00PM



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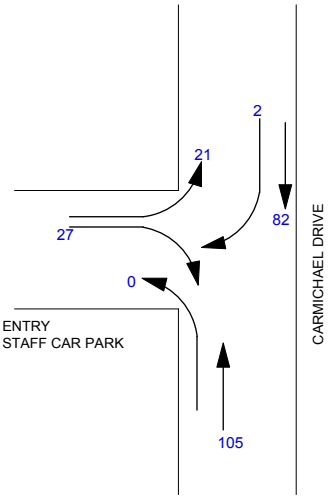

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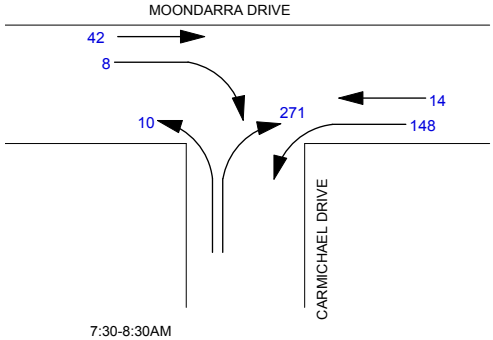
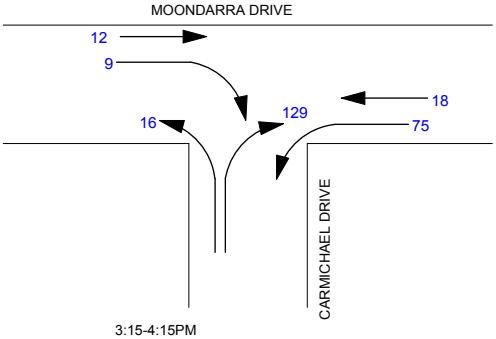


7:30-8:30AM



3:15-4:15PM

FIGURE 3 ESTIMATED FUTURE PEAK INTERSECTION TRAFFIC VOLUMES

4.2 Staff Numbers and Student Enrolment

The *maximum* number of *students* is to reach **1150** and the *maximum* number *teachers* and *casuals* is expected to **peak** at **103**.

4.3 Driveway Extension

The sealed driveway is to be extended from Block **F** to Block **N**, the canteen and to the *gate* at the *northern end* of the playing courts and overflow parking. It is understood that the driveway is to be **widened** to **8 metres** to meet the requirement of the **NSW Fire and Rescue Service**. This is *wider* than all of the streets *providing access* to Clancy College.

4.4 Off-Street Parking Provision and DCP 2015 Requirement

As shown on the *proposed* Site plan, **6** /*90 degree angle* sealed and line-marked car parking spaces are to be provided in *front* of **Block F** and a further **15** *parallel car parking spaces* are to be provided on the *eastern* side of the driveway extension. Total *on-site parking* is to be increased from 108 to **124** spaces.

As **119 spaces** is the *Consent requirement* for the existing college staff of **99** and **1030** students, it follows that parking for the *additional staff* (**4**) and *students* (**120**) should *comply* with the requirement for *Educational Establishments* in *Table 13 Part 1 Section 20* **Car Parking and Access** in the **Liverpool DCP 2015 Part 1**. The requirement is **1 space** per staff number and **1 space** per **30** students plus *loading facilities* for a coach.

The additional parking requirements are:-

4 Staff - 4 spaces.
120 Students - 4 spaces.

Hence, the total on site parking requirement is **127 spaces**.

As discussed in Section 3.4, the *maximum* number of Staff present on any day in a typical week was **99** compared with the Staff Roster of **101**. In addition, on the **2 survey** days in March, the number of students present was **1046** and **1058** compared with the *enrolment* of **1097**.

It follows that **124 on site parking spaces** are **adequate** to meet the **maximum demand** on any day for the *future staff* of **103** and peak student enrolment of **1150**. The Bus Zone in Carmichael Drive has the *space* for **4 buses** to set down / pick up passengers.

The additional **90** *degree angle parking space* and the *parallel parking space* dimensions are to comply with **AS/NZS 2890.1 – 2004**. Parking bays are to be *marked* with **approved** *line marking* ***paint*** **80mm wide** to **AS 1742.11**

4.5 Visitor Parking for Multi-purpose Hall/Gallery/Lecture Theatre Special Events

When the new 'playing courts' are constructed a total of **56** overflow parking spaces can be provided for *after school hour* events. As shown in Section 2.1, there are a total of **78** *time restricted parking spaces* available on-street on non residential street frontages and **33 spaces** that are available at *night* but signposted *'No Parking'* and '*No Stopping'* during the **8:00 – 9:30AM** and **2:30 – 4:00PM** 'school arrival' and 'departure periods', respectively. The **total** on-site parking available *afte*r school hours is **180 spaces**.

Hence, the *total* number of *parking spaces available* is **291**.

The parking requirement in the **DCP** for an *Entertainment Facility* is **1 space** per **6 seats**. For **1400 seats**, the parking requirement is **234 spaces**. However, a multi-purpose Hall at Clancy College may not generate this demand when the large majority of the audience are students. For a night concert / play, the parking requirement could approach **234** assuming the hall/gallery lecture theatre are filled to capacity. Hence, the available parking is *more than adequate* for the peak demand.

An Event Manager and a Management Plan may be required when capacity or near capacity crowds are expected to attend an event in these combined facilities. Management of *vehicular circulation* and *parking* may be required to be under the *supervision* of **1** or **2** *Parking Marshalls* equipped with *mobile phones* or *two-way radios.*

4.6 Swept Paths for Delivery Vehicles

It is understood that small rigid vehicles (**SRV**) will be required from time to time for deliveries to the school canteen in Block **N.** Swept path modelling using Autoturn shows that an SRV can *drive in to the turning head*, *reverse to unload* and *drive out* in a *forward* direction. The turning movements are shown in **Sheet 1** of **Drawing 1139-15**.

4.7 Traffic Circulation for NSW Fire & Rescue Vehicle

The Scania Aerial Pumper will be able to enter the access gate in Moondarra Drive, continue to the playing courts, pass through the gates at each end, complete a *360 degree turn on the oval* and drive in a *forward direction* along the service driveway to exit in Moondarra Drive.

4.8 Future Traffic Generation

The 'traffic movements' at the Carmichael Drive *access gate* due to the increase in internal parking spaces from **102** to **124** is expected to result in an *increase* of **21.5%** to the *peak hour Counts*, shown in **Figure 1**. The ***estimated*** *peak hour movements* are shown in **Figure 3.** **SIDRA** Modelling is *not required* for the *small increases* at all intersections.

5.0 IMPACTS OF THE PROPOSED FACILITIES

5.1 Traffic Impacts

The minor increases in peak intersection traffic movements on school days may increase the delay in the right-turn from Carmichael Drive northern approach to the limit of **Level of Service A** but all other movements are expected to remain at Level of Service A, providing good operation and spare capacity.

We have not been able to observe traffic conditions during the College events listed in Section 3.8. Events during school hours are spread over several hours to reduce traffic impacts and traffic volumes after 6:00pm at night are much lower.

The pavement width of **6.48** metres in Moondarra Drive is *too narrow* for **2-way** traffic movements and kerbside parking on both sides. Our observations during a number of visits to the College showed that *no vehicles* were parked on the *northern western parklands side*.

The Management Plan when capacity crowds are expected in the multi-purpose hall/gallery/lecture theatre will *advise visitors* not to park on the *northern side* of Moondarra Drive.

5.2 Parking

The parking spaces to be provided on site *comply* with the current **Liverpool Council DCP**.

For special events held in the multi-purpose hall/gallery/lecture theatre combined, the *available* on-site and on-street parking on the *College frontage* in Carmichael Drive and Moondarra Drive, (**258** spaces) *are more than adequate* to meet the **DCP** requirement of **236 spaces** for a *capacity crowd* of **1400**. A further **43 spaces** are available on the eastern sides of Dryander and Warby Avenue where shown on **Sheet 2** of Drawing No. **1139-15**.

5.3 Vehicular Access

The *existing access* to the staff car parks from Carmichael Drive is operating with 'spare capacity' and the Level of Service is not expected to change. The internal driveway is signposted for **10Km/hour** and is *safe for pedestrians* and has *spare capacity*.

The existing service entrance in Moondarra Drive is mainly for *service vehicles* and has very *few movements* at busy school arrival and departure times.

5.4 Pedestrian Safety

The signage restricts vehicle speed to **10Km/hr** along the 'circulation driveway' within the College Campus. It is recommended that the extended service driveway to the Canteen be signposted for **10Km/hr**.

The majority of students cross Carmichael Drive at the school crossing. However, our surveys on Wednesday 25/3/15 showed that many students crossed Carmichael Drive at the intersection with Moondarra Drive. The Counts were:-

TIME	Number of Students and Vehicle Movements			
	School Crossing		Unmarked Crossing	
	Students	Vehicles	Students	Vehicles
7:30 – 8:30AM	164 *	412	82	426
2:15 – 3:30PM	154	159	73	163

NOTE: * 25 students crossed from the Bus on the eastern side of Carmichael Drive.

It is recommended that approval be sought from the RMS for a Zebra Crossing in Carmichael Drive.

APPENDICES

APPENDIX A

CARMICHAEL DRIVE

CARMICHAEL

Car Park Entry

Pedestrian Crossing

Existing Visitor Car Park

Existing School Entry

Street Parking

RAD 66
ARC 27.515

Existing electrical substation
Existing main switch board
Vehicular Access Gate

3m clearance line from substation
6m clearance line from substation
Street Parking

110

Metal Fence

Western Sydney Parklands

Metal Fence

Cumberland Plain Woodland

LIMIT OF RESTRICTED AREA

Existing Car Park

Existing Block B - Science
2 Storeys

Undercroft

Existing Block A - Administration
GF RL 58.77
1 Storey

Existing verandah

Existing Block C - Music
GF RL 55.46
1 & 2 Storeys

Existing Block G - Performing Arts
GF RL 55.25
1 Storey

Existing Playing Courts

Existing Demountable Buildings

Existing Oval

ASSET PROTECTION ZONE

26.000

Existing Arbour

Existing Shade Sails

Existing Arbour

Existing Block B - Science
2 Storeys
GF RL 59.53

RPD
Lot 1013
DP 1079422

Existing Block D Chapel
1 Storey

Existing Demountable Buildings

ASSET PROTECTION ZONE

EASEMENT TO DRAIN WATER 10 WIDE

26.000

SITE BOUNDARY

Existing Block H - Library/Staff
GF RL 58.90
2 Storeys

Existing Block J - Year 7 & 8
GF RL 58.50
2 Storeys

Existing Block K - Year 11 & 12
GF RL 57.18
2 Storeys

Existing Car Park

Existing Car Park

Metal Fence

152.08

Existing Vegetation

MOONDARRA DRIVE

RAD 141.5
ARC 152.935

Existing Block F - TAS Building
GF RL 57.27
2 Storeys

LIMIT OF RESTRICTED AREA

ASSET PROTECTION ZONE

20.000

34.945

26.26

Existing Access Road

EASEMENT TO DRAIN WATER 10 WIDE

ARC 99.22
RAD 211.165

SITE BOUNDARY

Lot 1014
DP 1079422

Existing Vegetation

Vehicular Access Gate

5.75

26.435

Existing Vegetation

DRYANDER AVE

SITE PLAN LEGEND

- Existing Building
- Proposed New Buildings/Additions
- Existing Landscaping
- Proposed Hard Landscaping
- Proposed Soft Landscaping
- Existing Site Boundary
- Existing Fencing
- Existing Light Pole
- Proposed Neighbouring Dwellings
- Existing Asset Protection Zone
- Existing Bus Pickup & Drop off Zone
- Existing Street Car Parking

REV.	DESCRIPTION	DATE	INIT.
D	PRE-DA ISSUE	05.05.15	MT
C	CONSULTANT ISSUE	24.04.15	BM
B	CONSULTANT ISSUE	20.03.15	BM
A	CONCEPT DESIGN	09.03.15	BM

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CLIENT: Catholic Education Office Archdiocese of Sydney

PROJECT: Clancy Catholic College Stage 6

ADDRESS: 201 Carmichael Drive
West Hoxton, NSW

DRAWING: **EXISTING SITE PLAN**

Figured dimensions take precedence over scale dimensions. Contractors must verify all dimensions on site before commencing any work or making shop drawings.

DIRECTOR	DRAWN	CHECKED
GI	BM	GI

PROJECT NUMBER	DRAWING NUMBER	REVISION
7023WH11	EX101	D

1 **PLAN**
Existing Site Plan
SCALE: 1:500

150mm @ fullsize | 100 | 50

50 | 100 | 150mm @ fullsize

plot date: Tuesday, 5 May 2015 file location: P:\projects\7023 CEO Archdiocese of Sydney\7023WH11 Clancy College Stage 6\DRAWINGS\1. Current Architectural\7023WH11.pln

CARMICHAEL DRIVE

MOONDARRA DRIVE

DRYANDER AVE

Existing Electrical substation
Existing main switch board
Existing Vehicular Access Gate
3m clearance line from substation
6m clearance line from substation
Street Parking
New building at First Floor level
Street Parking
New verandah
New metal fence
New masonry wall
110
Metal Fence
RAD 66
ARC 27.515
T028
1:33
New A/C condenser with screening located under verandah
New entry courtyard
New stair and landing
RL 53.500
Carpark Entry
Carpark Exit
New dedicated accessible park with shared zone - lines to be remarked to suit
Pedestrian Crossing
Car Park Entry
Existing Visitor Car Park
Existing School Entry
Pedestrian Entry
Western Sydney Parklands
Metal Fence
Cumberland Plain Woodland
LIMIT OF RESTRICTED AREA
Existing Car Park 37 Spaces
RAD 141.5
ARC 152.935
Existing Block B - Science
2 Storeys
Undercroft
1 Storey
Existing Block A - Administration
GF RL 58.77
1 Storey
Existing Block C - Music
GF RL 55.46
1 Storey
Existing Block G - Lecture Theatre
GF RL 55.300
1 Storey
Proposed Block M - Hall
GF RL 55.350
1 Storey
Existing Amenities
GF RL 55.240
Existing Oval
ASSET PROTECTION ZONE
26.000
New entry courtyard
Path
New retaining walls, gardens and ramps
T09
New stair and landing
1:16
New stair
RPD
Lot 1013
DP 1079422
New ramp
Existing Block B - Science
2 Storeys
GF RL 59.53
2 Storeys
Existing Block D Chapel
1 Storey
New landscaping
Ramp
T34
Typical metal wire fencing to outdoor courts
Batter earth to allow fire truck access to Oval
Undercroft
Lift
Proposed Block L - Visual Arts/Fitness
GF RL 55.330
2 Storeys
Approx. line of fill to court level shown dashed
Max Fill = 700mm
Retaining wall
T.O.W 53.000 B.O.W 53.000
Proposed Block N - Canteen
2 Storeys
Canteen
Delivery Bay
Retaining wall
T.O.W 56.500
Retaining wall
T.O.W 56.700
Retaining wall
Proposed Playing Courts & Overflow Parking
T38
T38a
EASEMENT TO DRAIN WATER 10 WIDE
SITE BOUNDARY
Existing Vegetation
Existing Block F - Year 7 & 8
GF RL 59.50
2 Storeys
Existing Car Park 35 Spaces
1 Storey
Existing Block J - Year 11 & 12
GF RL 57.18
2 Storeys
Proposed Access Road
Approx. line of cut to level road shown dashed
Max Cut = 1000mm
T38b
Metal Fence
A52-08
T43a
T43b
T43c
T43d
T44a
T44b
T44c
T44d
T44e
T45a
34.945
26.26
Existing Block F - TAS Building
GF RL 57.27
2 Storeys
Existing Car Park 25 Spaces
LIMIT OF RESTRICTED AREA
ASSET PROTECTION ZONE
FOR NEW WORK TO EXISTING BUILDINGS
ASSET PROTECTION ZONE
Proposed car parking
21 Spaces
T49a
T49b
Existing Access Road
EASEMENT TO DRAIN WATER 10 WIDE
ARC 99.22
RAD 211.165
SITE BOUNDARY
Approximate location of Notable Trees
Vehicular Access Gate
5.75
26.435
Lot 1014
DP 1079422
Existing Vegetation

SITE PLAN LEGEND

- Existing Building
- Proposed New Buildings/Additions
- Existing Landscaping
- Proposed Hard Landscaping
- Proposed Soft Landscaping
- Existing Site Boundary
- Existing Fencing
- Existing Light Pole
- Proposed Neighbouring Dwellings
- Existing Asset Protection Zone
- Existing Bus Pickup & Drop off Zone
- Existing Street Car Parking
- Existing Trees
- Proposed Trees

REV.	DESCRIPTION	DATE	INIT.
DA	CLIENT SIGN-OFF FOR DA ISSUE	26.06.15	MT

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CLIENT: Catholic Education Office Archdiocese of Sydney

PROJECT: Clancy Catholic College Stage 6

ADDRESS: 201 Carmichael Drive
West Hoxton, NSW

DRAWING: **PROPOSED SITE PLAN**

Figured dimensions take precedence over scale dimensions. Contractors must verify all dimensions on site before commencing any work or making shop drawings.

DIRECTOR	DRAWN	CHECKED
GI	BM	GI

PROJECT NUMBER	DRAWING NUMBER	REVISION
7023WH11	DA101	DA

1 PLAN
Proposed Site Plan
SCALE: 1:500

150mm @ fullsize | 100 | 50

plot date: Friday, 26 June 2015
file location: P:\projects\7023 CEO Archdiocese of Sydney\7023WH11 Clancy College Stage 6\DRAWINGS\1. Current Architectural\7023WH11.pln

APPENDIX B

APPENDIX B

Table 2.4

1139-15-CLANCY COLLEGE SIDRA ANALYSIS SUMMARY

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
EXISTING PERFORMANCE						
Montefiore Ave and Carmichael Drive	AM	0.488	13.9s	**A** (Worst: A)	Give-Way	RHT from Carmichael Drive (North Approach) 13.9s
Montefiore Ave and Carmichael Drive	PM	0.239	4.8s	**A** (Worst A)	Give Way	RHT from Carmichael Drive (North Approach) 7.1s
Carmichael Drive and Riddell Street	AM	0.254	7.2	**A** (Worst A)	Give Way	RHT from Riddle Street 7.2s
Carmichael Drive and Riddell Street	PM	0.139	3.2	**A** (Worst A)	Give Way	RHT from Riddle Street 6.0s
Carmichael Drive and Staff Car Park Entry	AM	0.152	1.4s	**A** (Worst A)	Give Way	West RHT from Car Park Entry 9.0s
Carmichael Drive and Staff Car Park Entry	PM	0.057	1.2s	**A** (Worst A)	Give Way	West RHT from Car Park Entry 6.2s
Moondarra Ave and Carmichael Ave	AM	0.151	2.2s	**A** (Worst A)	Give Way	RHT from Carmichael Drive (North Approach) 8.8s
Moondarra Ave and Carmichael Ave	PM	0.077	1.7s	**A** (Worst A)	Give Way	RHT from Carmichael Drive (North Approach) 6.5s

NOTES:
(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets

INTERSECTION SUMMARY

Site: AM-EX MA-CD

MONTEFIORE AVENUE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	857 veh/h	1028 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.488	
Practical Spare Capacity	52.0 %	
Effective Intersection Capacity	1628 veh/h	
Control Delay (Total)	1.55 veh-h/h	1.86 pers-h/h
Control Delay (Average)	6.5 sec	6.5 sec
Control Delay (Worst Lane)	13.9 sec	
Control Delay (Worst Movement)	13.9 sec	13.9 sec
Geometric Delay (Average)	3.6 sec	
Stop-Line Delay (Average)	2.9 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	3.8 veh	
95% Back of Queue - Distance (Worst Lane)	26.6 m	
Total Effective Stops	461 veh/h	553 pers/h
Effective Stop Rate	0.54 per veh	0.54 per pers
Proportion Queued	0.31	0.31
Performance Index	17.5	17.5
Travel Distance (Total)	471.2 veh-km/h	565.5 pers-km/h
Travel Distance (Average)	550 m	550 m
Travel Time (Total)	13.5 veh-h/h	16.2 pers-h/h
Travel Time (Average)	56.6 sec	56.6 sec
Travel Speed	35.0 km/h	35.0 km/h
Cost (Total)	389.75 $/h	389.75 $/h
Fuel Consumption (Total)	44.6 L/h	
Carbon Dioxide (Total)	111.5 kg/h	
Hydrocarbons (Total)	0.186 kg/h	
Carbon Monoxide (Total)	6.59 kg/h	
NOx (Total)	0.194 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	411,284 veh/y	493,541 pers/y
Delay	743 veh-h/y	892 pers-h/y
Effective Stops	221,259 veh/y	265,510 pers/y
Travel Distance	226,193 veh-km/y	271,432 pers-km/y
Travel Time	6,467 veh-h/y	7,760 pers-h/y
Cost	187,078 $/y	187,078 $/y
Fuel Consumption	21,399 L/y	
Carbon Dioxide	53,498 kg/y	
Hydrocarbons	89 kg/y	
Carbon Monoxide	3,162 kg/y	
NOx	93 kg/y	

MOVEMENT SUMMARY

Site: AM-EX MA-CD

MONTEFIORE AVENUE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: MONTEFIORE AVENUE											
1	T	192	0.0	0.102	2.3	LOS A	1.1	7.5	0.55	0.00	36.3
3	R	3	0.0	0.102	7.2	LOS A	1.1	7.5	0.55	0.82	35.7
Approach		195	0.0	0.102	2.4	LOS A	1.1	7.5	0.55	0.01	36.3
North: CARMICHAEL DRIVE											
5	L	1	0.0	0.526	13.4	LOS A	3.8	26.6	0.67	0.84	31.3
6	R	229	0.0	0.488	13.9	LOS A	3.8	26.6	0.67	1.02	31.2
Approach		231	0.0	0.488	13.9	LOS A	3.8	26.6	0.67	1.02	31.2
West: MONTEFIORE AVENUE											
4	L	427	0.0	0.232	4.5	LOS A	0.0	0.0	0.00	0.52	36.7
2	T	4	0.0	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		432	0.0	0.232	4.4	LOS A	0.0	0.0	0.00	0.52	36.7
All Vehicles		857	0.0	0.488	6.5	NA	3.8	26.6	0.31	0.54	35.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

INTERSECTION SUMMARY

Site: PM-EX MA-CD

MONTEFIORE AVENUE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	468 veh/h	562 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.239	
Practical Spare Capacity	233.2 %	
Effective Intersection Capacity	1951 veh/h	
Control Delay (Total)	0.62 veh-h/h	0.75 pers-h/h
Control Delay (Average)	4.8 sec	4.8 sec
Control Delay (Worst Lane)	7.1 sec	
Control Delay (Worst Movement)	7.2 sec	7.2 sec
Geometric Delay (Average)	3.8 sec	
Stop-Line Delay (Average)	0.9 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	1.3 veh	
95% Back of Queue - Distance (Worst Lane)	9.2 m	
Total Effective Stops	225 veh/h	270 pers/h
Effective Stop Rate	0.48 per veh	0.48 per pers
Proportion Queued	0.21	0.21
Performance Index	8.8	8.8
Travel Distance (Total)	257.6 veh-km/h	309.2 pers-km/h
Travel Distance (Average)	550 m	550 m
Travel Time (Total)	7.1 veh-h/h	8.5 pers-h/h
Travel Time (Average)	54.6 sec	54.6 sec
Travel Speed	36.2 km/h	36.2 km/h
Cost (Total)	206.44 $/h	206.44 $/h
Fuel Consumption (Total)	23.8 L/h	
Carbon Dioxide (Total)	59.6 kg/h	
Hydrocarbons (Total)	0.099 kg/h	
Carbon Monoxide (Total)	3.49 kg/h	
NOx (Total)	0.103 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	224,842 veh/y	269,811 pers/y
Delay	299 veh-h/y	359 pers-h/y
Effective Stops	108,035 veh/y	129,642 pers/y
Travel Distance	123,665 veh-km/y	148,398 pers-km/y
Travel Time	3,413 veh-h/y	4,095 pers-h/y
Cost	99,093 $/y	99,093 $/y
Fuel Consumption	11,440 L/y	
Carbon Dioxide	28,600 kg/y	
Hydrocarbons	47 kg/y	
Carbon Monoxide	1,678 kg/y	
NOx	50 kg/y	

MOVEMENT SUMMARY

Site: PM-EX MA-CD

MONTEFIORE AVENUE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: MONTEFIORE AVENUE											
1	T	72	0.0	0.047	0.9	LOS A	0.4	2.5	0.35	0.00	37.5
3	R	12	0.0	0.047	5.8	LOS A	0.4	2.5	0.35	0.71	36.1
Approach		83	0.0	0.047	1.6	LOS A	0.4	2.5	0.35	0.10	37.3
North: CARMICHAEL DRIVE											
5	L	14	0.0	0.240	6.7	LOS A	1.3	9.2	0.41	0.52	35.1
6	R	152	0.0	0.239	7.2	LOS A	1.3	9.2	0.41	0.65	34.9
Approach		165	0.0	0.239	7.1	LOS A	1.3	9.2	0.41	0.64	35.0
West: MONTEFIORE AVENUE											
4	L	208	0.0	0.118	4.5	LOS A	0.0	0.0	0.00	0.53	36.7
2	T	12	0.0	0.118	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		220	0.0	0.118	4.2	LOS A	0.0	0.0	0.00	0.50	36.8
All Vehicles		468	0.0	0.239	4.8	NA	1.3	9.2	0.21	0.48	36.2

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

INTERSECTION SUMMARY

Site: AM-EX-CD-RS

CARMICHAEL DRIVE AND RIDDELL STREET
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	715 veh/h	858 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.254	
Practical Spare Capacity	215.3 %	
Effective Intersection Capacity	2817 veh/h	
Control Delay (Total)	0.69 veh-h/h	0.83 pers-h/h
Control Delay (Average)	3.5 sec	3.5 sec
Control Delay (Worst Lane)	7.2 sec	
Control Delay (Worst Movement)	7.5 sec	7.5 sec
Geometric Delay (Average)	2.4 sec	
Stop-Line Delay (Average)	1.0 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	1.9 veh	
95% Back of Queue - Distance (Worst Lane)	13.4 m	
Total Effective Stops	228 veh/h	274 pers/h
Effective Stop Rate	0.32 per veh	0.32 per pers
Proportion Queued	0.24	0.24
Performance Index	12.8	12.8
Travel Distance (Total)	392.2 veh-km/h	470.6 pers-km/h
Travel Distance (Average)	549 m	549 m
Travel Time (Total)	10.7 veh-h/h	12.8 pers-h/h
Travel Time (Average)	53.7 sec	53.7 sec
Travel Speed	36.8 km/h	36.8 km/h
Cost (Total)	307.38 $/h	307.38 $/h
Fuel Consumption (Total)	34.8 L/h	
Carbon Dioxide (Total)	86.9 kg/h	
Hydrocarbons (Total)	0.142 kg/h	
Carbon Monoxide (Total)	4.72 kg/h	
NOx (Total)	0.144 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	343,074 veh/y	411,688 pers/y
Delay	332 veh-h/y	399 pers-h/y
Effective Stops	109,565 veh/y	131,479 pers/y
Travel Distance	188,245 veh-km/y	225,894 pers-km/y
Travel Time	5,117 veh-h/y	6,140 pers-h/y
Cost	147,541 $/y	147,541 $/y
Fuel Consumption	16,689 L/y	
Carbon Dioxide	41,722 kg/y	
Hydrocarbons	68 kg/y	
Carbon Monoxide	2,265 kg/y	
NOx	69 kg/y	

MOVEMENT SUMMARY

Site: AM-EX-CD-RS

CARMICHAEL DRIVE AND RIDDELL STREET
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CARMICHAEL DRIVE											
1	T	258	0.0	0.244	0.6	LOS A	1.9	13.4	0.30	0.00	37.7
4	R	142	0.0	0.243	5.6	LOS A	1.9	13.4	0.30	0.67	36.0
Approach		400	0.0	0.244	2.4	LOS A	1.9	13.4	0.30	0.24	37.1
East: RIDDELL STREET											
5	L	139	0.0	0.254	7.1	LOS A	1.3	9.1	0.30	0.52	35.0
6	R	49	0.0	0.254	7.5	LOS A	1.3	9.1	0.30	0.72	34.8
Approach		188	0.0	0.254	7.2	LOS A	1.3	9.1	0.30	0.58	34.9
North: CARMICHAEL DRIVE											
3	L	40	0.0	0.066	4.5	LOS A	0.0	0.0	0.00	0.63	36.7
2	T	86	0.0	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		126	0.0	0.066	1.4	LOS A	0.0	0.0	0.00	0.20	38.9
All Vehicles		715	0.0	0.254	3.5	NA	1.9	13.4	0.24	0.32	36.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

INTERSECTION SUMMARY

Site: PM-EX-CD-RS

CARMICHAEL DRIVE AND RIDDELL STREET
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	406 veh/h	488 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.139	
Practical Spare Capacity	474.6 %	
Effective Intersection Capacity	2918 veh/h	
Control Delay (Total)	0.36 veh-h/h	0.43 pers-h/h
Control Delay (Average)	3.2 sec	3.2 sec
Control Delay (Worst Lane)	5.6 sec	
Control Delay (Worst Movement)	6.0 sec	6.0 sec
Geometric Delay (Average)	2.7 sec	
Stop-Line Delay (Average)	0.5 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	0.9 veh	
95% Back of Queue - Distance (Worst Lane)	6.5 m	
Total Effective Stops	137 veh/h	165 pers/h
Effective Stop Rate	0.34 per veh	0.34 per pers
Proportion Queued	0.16	0.16
Performance Index	7.2	7.2
Travel Distance (Total)	223.0 veh-km/h	267.6 pers-km/h
Travel Distance (Average)	549 m	549 m
Travel Time (Total)	6.0 veh-h/h	7.2 pers-h/h
Travel Time (Average)	53.1 sec	53.1 sec
Travel Speed	37.2 km/h	37.2 km/h
Cost (Total)	173.18 $/h	173.18 $/h
Fuel Consumption (Total)	19.6 L/h	
Carbon Dioxide (Total)	49.1 kg/h	
Hydrocarbons (Total)	0.080 kg/h	
Carbon Monoxide (Total)	2.66 kg/h	
NOx (Total)	0.081 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	195,032 veh/y	234,038 pers/y
Delay	171 veh-h/y	205 pers-h/y
Effective Stops	65,978 veh/y	79,174 pers/y
Travel Distance	107,041 veh-km/y	128,449 pers-km/y
Travel Time	2,877 veh-h/y	3,452 pers-h/y
Cost	83,128 $/y	83,128 $/y
Fuel Consumption	9,431 L/y	
Carbon Dioxide	23,578 kg/y	
Hydrocarbons	38 kg/y	
Carbon Monoxide	1,278 kg/y	
NOx	39 kg/y	

MOVEMENT SUMMARY

Site: PM-EX-CD-RS

CARMICHAEL DRIVE AND RIDDELL STREET
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CARMICHAEL DRIVE											
1	T	117	0.0	0.139	0.4	LOS A	0.9	6.5	0.21	0.00	38.3
4	R	105	0.0	0.139	5.3	LOS A	0.9	6.5	0.21	0.63	36.1
Approach		222	0.0	0.139	2.7	LOS A	0.9	6.5	0.21	0.30	37.2
East: RIDDELL STREET											
5	L	75	0.0	0.107	5.5	LOS A	0.5	3.6	0.19	0.50	36.0
6	R	23	0.0	0.107	6.0	LOS A	0.5	3.6	0.19	0.65	35.7
Approach		98	0.0	0.107	5.6	LOS A	0.5	3.6	0.19	0.53	35.9
North: CARMICHAEL DRIVE											
3	L	29	0.0	0.045	4.5	LOS A	0.0	0.0	0.00	0.63	36.7
2	T	57	0.0	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		86	0.0	0.045	1.5	LOS A	0.0	0.0	0.00	0.21	38.8
All Vehicles		406	0.0	0.139	3.2	NA	0.9	6.5	0.16	0.34	37.2

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

INTERSECTION SUMMARY

Site: AM-EX CD-STAFF CARPARK ENTRY

CARMICHAEL DRIVE AND STAFF CAR PARK ENTRY
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	454 veh/h	544 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.152	
Practical Spare Capacity	423.9 %	
Effective Intersection Capacity	2971 veh/h	
Control Delay (Total)	0.17 veh-h/h	0.21 pers-h/h
Control Delay (Average)	1.4 sec	1.4 sec
Control Delay (Worst Lane)	8.9 sec	
Control Delay (Worst Movement)	9.0 sec	9.0 sec
Geometric Delay (Average)	0.8 sec	
Stop-Line Delay (Average)	0.5 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	0.7 veh	
95% Back of Queue - Distance (Worst Lane)	5.2 m	
Total Effective Stops	57 veh/h	68 pers/h
Effective Stop Rate	0.12 per veh	0.12 per pers
Proportion Queued	0.14	0.14
Performance Index	6.9	6.9
Travel Distance (Total)	248.4 veh-km/h	298.0 pers-km/h
Travel Distance (Average)	547 m	547 m
Travel Time (Total)	6.4 veh-h/h	7.7 pers-h/h
Travel Time (Average)	51.2 sec	51.2 sec
Travel Speed	38.5 km/h	38.5 km/h
Cost (Total)	184.64 $/h	184.64 $/h
Fuel Consumption (Total)	20.3 L/h	
Carbon Dioxide (Total)	50.7 kg/h	
Hydrocarbons (Total)	0.081 kg/h	
Carbon Monoxide (Total)	2.36 kg/h	
NOx (Total)	0.077 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	217,768 veh/y	261,322 pers/y
Delay	82 veh-h/y	98 pers-h/y
Effective Stops	27,155 veh/y	32,586 pers/y
Travel Distance	119,213 veh-km/y	143,056 pers-km/y
Travel Time	3,096 veh-h/y	3,715 pers-h/y
Cost	88,629 $/y	88,629 $/y
Fuel Consumption	9,734 L/y	
Carbon Dioxide	24,334 kg/y	
Hydrocarbons	39 kg/y	
Carbon Monoxide	1,131 kg/y	
NOx	37 kg/y	

MOVEMENT SUMMARY

Site: AM-EX CD-STAFF CARPARK ENTRY

CARMICHAEL DRIVE AND STAFF CAR PARK ENTRY
Giveway / Yield (Two-Way).

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CARMICHAEL DRIVE											
3	L	29	0.0	0.153	4.5	LOS A	0.0	0.0	0.00	0.68	36.7
1	T	266	0.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		296	0.0	0.152	0.4	LOS A	0.0	0.0	0.00	0.07	39.6
North: CARMICHAEL DRIVE											
2	T	106	0.0	0.099	1.4	LOS A	0.7	5.2	0.41	0.00	37.0
4	R	47	0.0	0.099	6.3	LOS A	0.7	5.2	0.41	0.72	35.9
Approach		154	0.0	0.099	2.9	LOS A	0.7	5.2	0.41	0.22	36.6
West: CAR PARK ENTRY											
6	L	1	0.0	0.008	8.5	LOS A	0.0	0.3	0.49	0.53	34.0
5	R	3	0.0	0.008	9.0	LOS A	0.0	0.3	0.49	0.65	33.9
Approach		4	0.0	0.008	8.9	LOS A	0.0	0.3	0.49	0.62	33.9
All Vehicles		454	0.0	0.152	1.4	NA	0.7	5.2	0.14	0.12	38.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

INTERSECTION SUMMARY

Site: PM-EX CD-STAFF CARPARK ENTRY

CARMICHAEL DRIVE AND STAFF CAR PARK ENTRY
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	240 veh/h	288 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.057	
Practical Spare Capacity	1268.0 %	
Effective Intersection Capacity	4104 veh/h	
Control Delay (Total)	0.08 veh-h/h	0.10 pers-h/h
Control Delay (Average)	1.2 sec	1.2 sec
Control Delay (Worst Lane)	6.0 sec	
Control Delay (Worst Movement)	6.2 sec	6.2 sec
Geometric Delay (Average)	0.9 sec	
Stop-Line Delay (Average)	0.4 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	0.3 veh	
95% Back of Queue - Distance (Worst Lane)	2.4 m	
Total Effective Stops	25 veh/h	29 pers/h
Effective Stop Rate	0.10 per veh	0.10 per pers
Proportion Queued	0.14	0.14
Performance Index	3.7	3.7
Travel Distance (Total)	131.4 veh-km/h	157.7 pers-km/h
Travel Distance (Average)	547 m	547 m
Travel Time (Total)	3.4 veh-h/h	4.1 pers-h/h
Travel Time (Average)	51.1 sec	51.1 sec
Travel Speed	38.5 km/h	38.5 km/h
Cost (Total)	97.61 $/h	97.61 $/h
Fuel Consumption (Total)	10.7 L/h	
Carbon Dioxide (Total)	26.8 kg/h	
Hydrocarbons (Total)	0.043 kg/h	
Carbon Monoxide (Total)	1.24 kg/h	
NOx (Total)	0.041 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	115,200 veh/y	138,240 pers/y
Delay	39 veh-h/y	47 pers-h/y
Effective Stops	11,760 veh/y	14,112 pers/y
Travel Distance	63,068 veh-km/y	75,682 pers-km/y
Travel Time	1,637 veh-h/y	1,964 pers-h/y
Cost	46,854 $/y	46,854 $/y
Fuel Consumption	5,142 L/y	
Carbon Dioxide	12,855 kg/y	
Hydrocarbons	20 kg/y	
Carbon Monoxide	596 kg/y	
NOx	20 kg/y	

MOVEMENT SUMMARY

Site: PM-EX CD-STAFF CARPARK ENTRY

CARMICHAEL DRIVE AND STAFF CAR PARK ENTRY
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CARMICHAEL DRIVE											
3	L	1	0.0	0.058	4.5	LOS A	0.0	0.0	0.00	0.70	36.7
1	T	111	0.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		112	0.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.01	40.0
North: CARMICHAEL DRIVE											
2	T	86	0.0	0.045	0.4	LOS A	0.3	2.4	0.24	0.00	38.3
4	R	1	0.0	0.046	5.3	LOS A	0.3	2.4	0.24	0.73	36.2
Approach		87	0.0	0.045	0.5	LOS A	0.3	2.4	0.24	0.01	38.3
West: CAR PARK ENTRY											
6	L	18	0.0	0.051	5.8	LOS A	0.2	1.7	0.29	0.49	35.8
5	R	23	0.0	0.051	6.2	LOS A	0.2	1.7	0.29	0.61	35.6
Approach		41	0.0	0.051	6.0	LOS A	0.2	1.7	0.29	0.56	35.6
All Vehicles		240	0.0	0.057	1.2	NA	0.3	2.4	0.14	0.10	38.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

INTERSECTION SUMMARY

Site: AM-EX- MA-CD

MOONDARRA AVE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	507 veh/h	609 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.151	
Practical Spare Capacity	428.3 %	
Effective Intersection Capacity	3351 veh/h	
Control Delay (Total)	0.31 veh-h/h	0.37 pers-h/h
Control Delay (Average)	2.2 sec	2.2 sec
Control Delay (Worst Lane)	7.0 sec	
Control Delay (Worst Movement)	8.8 sec	8.8 sec
Geometric Delay (Average)	0.8 sec	
Stop-Line Delay (Average)	1.4 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	1.4 veh	
95% Back of Queue - Distance (Worst Lane)	10.1 m	
Total Effective Stops	52 veh/h	62 pers/h
Effective Stop Rate	0.10 per veh	0.10 per pers.
Proportion Queued	0.23	0.23
Performance Index	8.1	8.1
Travel Distance (Total)	280.1 veh-km/h	336.1 pers-km/h
Travel Distance (Average)	552 m	552 m
Travel Time (Total)	7.4 veh-h/h	8.8 pers-h/h
Travel Time (Average)	52.2 sec	52.2 sec
Travel Speed	38.1 km/h	38.1 km/h
Cost (Total)	211.55 $/h	211.55 $/h
Fuel Consumption (Total)	24.0 L/h	
Carbon Dioxide (Total)	59.9 kg/h	
Hydrocarbons (Total)	0.097 kg/h	
Carbon Monoxide (Total)	3.10 kg/h	
NOx (Total)	0.097 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	243,537 veh/y	292,244 pers/y
Delay	147 veh-h/y	176 pers-h/y
Effective Stops	24,773 veh/y	29,728 pers/y
Travel Distance	134,446 veh-km/y	161,336 pers-km/y
Travel Time	3,529 veh-h/y	4,235 pers-h/y
Cost	101,546 $/y	101,546 $/y
Fuel Consumption	11,501 L/y	
Carbon Dioxide	28,752 kg/y	
Hydrocarbons	46 kg/y	
Carbon Monoxide	1,487 kg/y	
NOx	46 kg/y	

MOVEMENT SUMMARY

Site: AM-EX- MA-CD

MOONDARRA AVE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CARMICHAEL DRIVE											
4	L	11	0.0	0.150	4.5	LOS A	0.0	0.0	0.00	0.69	36.7
1	T	284	0.0	0.151	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		295	0.0	0.151	0.2	LOS A	0.0	0.0	0.00	0.02	39.9
North: CARMICHAEL DRIVE											
2	T	145	0.0	0.101	3.9	LOS A	1.4	10.1	0.61	0.00	35.8
3	R	15	0.0	0.101	8.8	LOS A	1.4	10.1	0.61	0.82	34.8
Approach		160	0.0	0.101	4.3	LOS A	1.4	10.1	0.61	0.08	35.7
West: MOONDARRA AVE											
5	L	44	0.0	0.050	7.1	LOS A	0.2	1.7	0.38	0.60	36.6
6	R	8	0.0	0.050	6.2	LOS A	0.2	1.7	0.38	0.66	35.6
Approach		53	0.0	0.050	7.0	LOS A	0.2	1.7	0.38	0.61	36.5
All Vehicles		507	0.0	0.151	2.2	NA	1.4	10.1	0.23	0.10	38.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

INTERSECTION SUMMARY

Site: PM-EX- MA-CD

MOONDARRA AVE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	267 veh/h	321 pers/h
Percent Heavy Vehicles	0.0 %	
Degree of Saturation	0.077	
Practical Spare Capacity	945.0 %	
Effective Intersection Capacity	3493 veh/h	
Control Delay (Total)	0.13 veh-h/h	0.15 pers-h/h
Control Delay (Average)	1.7 sec	1.7 sec
Control Delay (Worst Lane)	6.0 sec	
Control Delay (Worst Movement)	6.5 sec	6.5 sec
Geometric Delay (Average)	1.1 sec	
Stop-Line Delay (Average)	0.6 sec	
Level of Service (Aver. Int. Delay)	NA	
Level of Service (Worst Movement)	LOS A	
Level of Service (Worst Lane)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	0.7 veh	
95% Back of Queue - Distance (Worst Lane)	4.7 m	
Total Effective Stops	37 veh/h	44 pers/h
Effective Stop Rate	0.14 per veh	0.14 per pers
Proportion Queued	0.16	0.16
Performance Index	4.2	4.2
Travel Distance (Total)	147.1 veh-km/h	176.5 pers-km/h
Travel Distance (Average)	550 m	550 m
Travel Time (Total)	3.8 veh-h/h	4.6 pers-h/h
Travel Time (Average)	51.7 sec	51.7 sec
Travel Speed	38.3 km/h	38.3 km/h
Cost (Total)	110.38 $/h	110.38 $/h
Fuel Consumption (Total)	12.4 L/h	
Carbon Dioxide (Total)	30.9 kg/h	
Hydrocarbons (Total)	0.050 kg/h	
Carbon Monoxide (Total)	1.54 kg/h	
NOx (Total)	0.049 kg/h	

LOS (Aver. Int. Delay) for Vehicles is not applicable since the average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

LOS Method for individual vehicle movements and lanes: Delay (RTA NSW).

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	128,337 veh/y	154,004 pers/y
Delay	60 veh-h/y	72 pers-h/y
Effective Stops	17,731 veh/y	21,278 pers/y
Travel Distance	70,600 veh-km/y	84,720 pers-km/y
Travel Time	1,843 veh-h/y	2,212 pers-h/y
Cost	52,982 $/y	52,982 $/y
Fuel Consumption	5,932 L/y	
Carbon Dioxide	14,829 kg/y	
Hydrocarbons	24 kg/y	
Carbon Monoxide	739 kg/y	
NOx	23 kg/y	

MOVEMENT SUMMARY

Site: PM-EX- MA-CD

MOONDARRA AVE AND CARMICHAEL DRIVE
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CARMICHAEL DRIVE											
4	L	17	0.0	0.077	4.5	LOS A	0.0	0.0	0.00	0.67	36.7
1	T	132	0.0	0.077	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		148	0.0	0.077	0.5	LOS A	0.0	0.0	0.00	0.08	39.6
North: CARMICHAEL DRIVE											
2	T	78	0.0	0.066	1.5	LOS A	0.7	4.7	0.39	0.00	37.2
3	R	19	0.0	0.066	6.5	LOS A	0.7	4.7	0.39	0.70	35.9
Approach		97	0.0	0.066	2.5	LOS A	0.7	4.7	0.39	0.14	36.9
West: MOONDARRA AVE											
5	L	13	0.0	0.018	6.4	LOS A	0.1	0.6	0.26	0.53	36.9
6	R	9	0.0	0.018	5.6	LOS A	0.1	0.6	0.26	0.58	35.8
Approach		22	0.0	0.018	6.0	LOS A	0.1	0.6	0.26	0.55	36.5
All Vehicles		267	0.0	0.077	1.7	NA	0.7	4.7	0.16	0.14	38.3

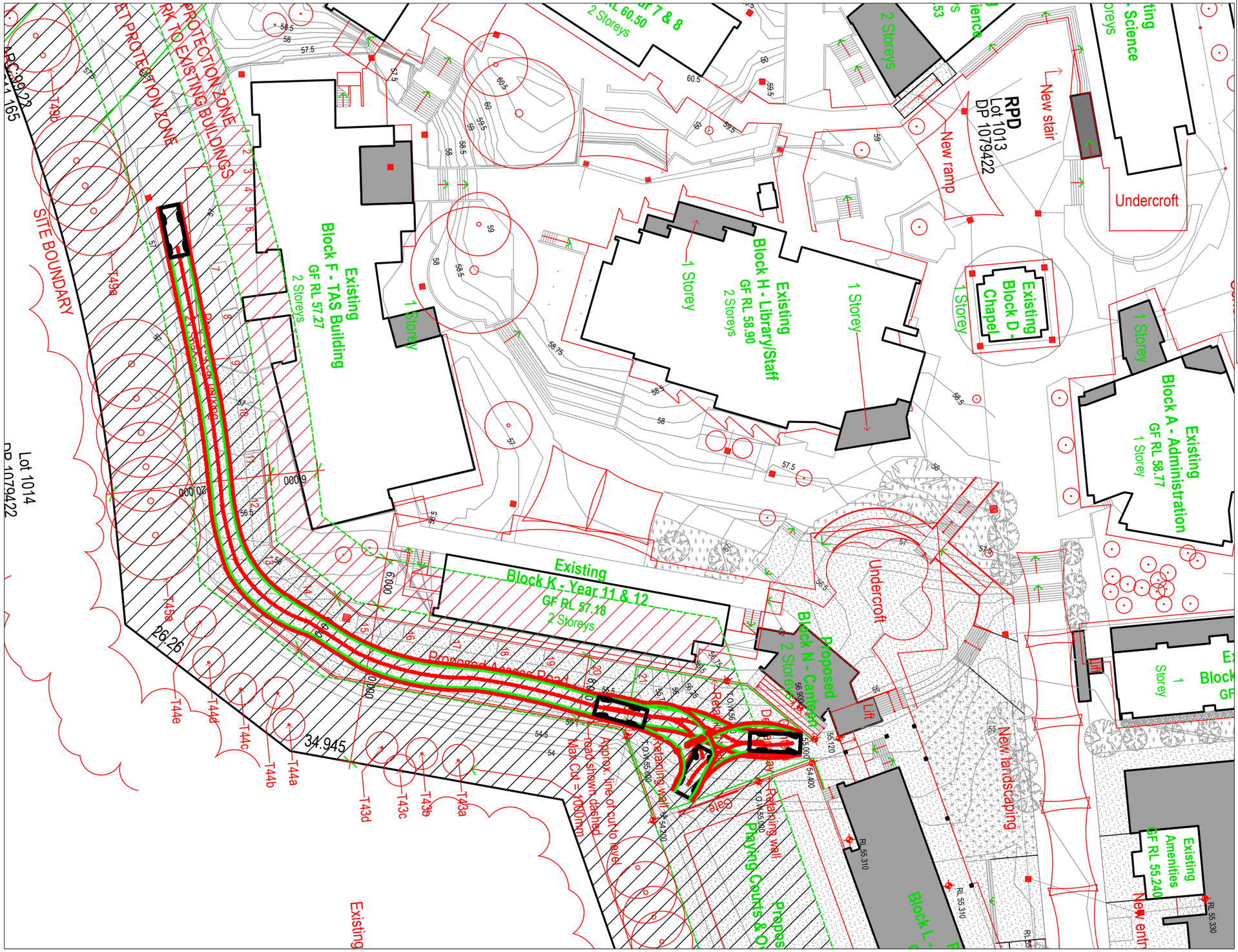
LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).

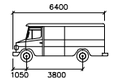
Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

APPENDIX C



VEHICLE PROFILE



SRV mm

Width	: 2300
Track	: 2300
Lock to Lock Time	: 6.0
Steering Angle	: 38.0

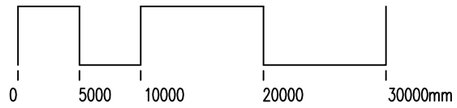


FIGURE 2 SRV TURNING SWEPT PATH

No.	DATE	APPD	

SURVEY BY:

DATUM:

LYLE MARSHALL AND ASSOCIATES PTY. LTD.
CONSULTING ENGINEERS, TRANSPORTATION AND ENVIRONMENTAL PLANNERS
SUITE 2, 352 MILITARY ROAD, CREMORNE N.S.W. 2090 PH.(02) 9953 2599 FAX.(02) 9953 2219
EMAIL: lylemarshall@ozemail.com.au

CLIENT:

SITE PLAN SHOWING SRV SWEPT PATH

SCALE	PASSED	DATE
1:500		JULY 2015

DESIGN	LMA	SHEET No. 1 OF 1	DRAWING No. 1139–15
DRAWN	EMMC		
CHECKED			