VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants
ACN 071 762 537 ABN 88 071 762 537

6 September 2019
Ref 18482

Romanous Constructions Pty Ltd
Level 8, 10 Park Road
HURSTVILLE NSW 2220

Attn: Allen Romanous

Dear Allen,

PROPOSED HOTEL DEVELOPMENT
301-305 KENT STREET, SYDNEY
TRAFFIC AND PARKING MATTERS
SSD 9694

I refer to the Transport for NSW letter dated 3 July 2019 requesting additional information in respect of the above-mentioned development proposal.

The following advice is provided in response to the traffic and parking matters raised in the letter.

Proposed Basement Driveway Access

A detailed analysis of the preferred driveway location was undertaken by *Arup* (17 December 2018). A copy of that report is attached.

Figure 2 of 2 of the *Arup* report compares the hourly pedestrian volumes along the Kent Street and Erskine Street frontages of the site, and clearly demonstrates that pedestrian activity along the Kent Street footpath is significantly *higher* than pedestrian activity along the Erskine Street footpath.

VTP Pty Ltd also undertook surveys of pedestrian activity along the frontages of the site. Over the 6-hour duration of the surveys (6:30-9:30am and 3:30-6:30pm) the surveys counted 5059 pedestrians along the Kent Street footpath, compared with 2387 pedestrians along the Erskine Street footpath, as set out in the table below:

RESULTS OF PEDESTRIAN SURVEYS ON FOOTPATHS ALON GHT ESITE FRONTAGE NUMBER OF PEDESTRIANS PER HOUR					
	Erskine St	**Kent St**		**Erskine St**	**Kent St**
6:30-9:30am	155	277	3:30-4:30pm	241	521
7:30-8:30am	487	917	4:30-5:30pm	393	1038
8:30-9:30am	596	1309	5:30-6:30pm	515	997
	1238	**2503**		**1149**	**2556**

The survey results indicate that pedestrian volumes along the Kent Street frontage of the site are typically more than *double* the pedestrian volumes along the Erskine Street frontage of the site.

Table 2 of the *Arup r*eport also made comparisons with pedestrian volumes recorded at other driveways across footpaths in Kent Street and Pitt Street which identified significantly higher traffic volumes using driveways across footpaths where the pedestrian volumes recorded were also significantly higher than is expected to occur at the subject site.

The Arup report also undertook a queuing assessment of the subject proposal which found that:

- 93.2% of the time during peak hour, no vehicle queue would form at the entrance to the driveway, and

- 99.5% of the time during the peak hour, 1 vehicle or less would be waiting for pedestrians to pass prior to entering the driveway.

VTP Pty Ltd also undertook an analysis of the proposed driveway, using the SIDRA capacity analysis program. The results of that analysis are summarised in table 1 below and the detailed "Movement Summaries" area attached, revealing that:

- in the AM peak the *98th percentile* queue in the left lane of Erskine Street would be 0.3 vehicles waiting for pedestrians to pass prior to entering the driveway, and

- in the PM peak the *98th percentile* queue in the left lane of Erskine Street would be 0.4 vehicles waiting for pedestrians to pass prior to entering the driveway.

In summary, the capacity analysis demonstrates that the *98th percentile* queue length (i.e. which occurs only 2% of the time) at the proposed driveway would be *less than half a vehicle*, and that any momentary queues would be well clear of the Kent Street/Erskine Street intersection which is located some 27m distance from the proposed driveway. As such, it is clear that traffic and bus operations would not be affected in any way by the proposed driveway.

TABLE 1 - RESULTS SIDRA CAPACITY ANALYSIS
PROPOSED SITE ACCESS DRIVEWAY IN ERSKINE STREET

	AM PEAK			PM PEAK		
	Level of Service	**98% Queue**	**Queue Length**	**Level of Service**	**98% Queue**	**Queue Length**
Left-Turn into Site off Erskine St	A	0.3 veh	1.8m	A	0.4 veh	3.1m

Freight and Servicing

It is appreciated that the Council's DCP servicing requirements assumes that there will not be any overlaps in the servicing demands of a hotel building, whereas in reality there is the potential to share the use of the loading dock through a management regime, particularly in circumstances where the entire building will be occupied by a single entity.

A separate Loading Dock Management Plan will be prepared as part of the Stage 2 DA to ensure that the truck and light commercial service vehicle bays will satisfactorily accommodate the typical servicing schedule provided in Table 2.

Table 2: Typical Hotel Servicing Schedule

Item	Frequency	Time
Linen	Once per day	Midday (TBC)
Food and Beverage	One per day	Morning (TBC)
Waste Removal	Once per day	Early Morning (TBC)

Accordingly, all servicing needs of the building will be pre-scheduled to ensure all inbound commercial vehicles will have a vacant service bay ready, such that there will never be an instance where these vehicles will need to circulate the local road network to wait for a servicing bay to be vacated.

Passenger Pick-up and Drop-off for Point to Point Transport and Coaches

The proposed development makes provision for 2 drop-offs/pick-ups spaces on the lower ground floor level of the car parking area, in accordance with DCP requirements. In addition, there are a further 2 parking spaces located on the ground floor level adjacent to the designated drop-off/pick-up spaces which could *also* be utilised for drop-off/pick-up uses, should the need ever arise.

It is noted that all of the parking spaces located on the ground floor could accommodate a range of vans and minibuses (eg. the 12-14 seater Toyota Hi Ace minibus). In addition, the proposed loading bay could also be used to accommodate a larger minibus (eg. A 22 seater Toyota Coaster), noting that the loading bay is only expected to be used perhaps 3 times per day. The Loading Dock Management Plan could be used to make provision for those larger 22 seat minibuses, should the need ever arise.

It is noted in this regard that a hotel was recently approved at 7-9 Wilmot Street, Sydney which did not make any provision for drop-off/pick-up spaces, minibuses or large coaches.

By comparison, the subject development makes provision for drop-off/pick-up parking spaces in accordance with the DCP requirements which could also be used to accommodate smaller minibuses.

TfNSW concerns could therefore be adequately addressed by a development consent condition specifying “All buses dropping-off or picking-up hotel patrons must do so using the lower ground floor level car parking area. Buses exceeding 7m in length must not be used for dropping-off or picking-up hotel patrons”.

Waste Vehicle Parking

The proposed development will not be serviced by any vehicle larger than a 6.4m SRV truck to collect waste.

TfNSW concerns can be addressed by appropriately specifying “no vehicles larger than 6.4m SRV are to service the site” in the development conditions of consent.

Construction Pedestrian and Traffic Management

A preliminary Construction Traffic Management Plan is contained within the DA traffic report and is deemed fit-for-purpose for the current stage of the application.

A detailed Construction & Pedestrian Traffic Management Plan will be prepared at CC stage in response to the detailed DA consent conditions which will specify in detail Council’s requirements for the CPTMP, in accordance with TfNSW requirements.

I trust the above advice provided in this letter satisfies your requirements. Please do not hesitate to contact the undersigned should you have any queries or require any further information regarding the above.

Yours faithfully

Thomas Yang
Traffic Engineer (NER)
Varga Traffic Planning Pty Ltd

Subject 301 Kent Street Vehicle Access and Pedestrian Impact

Date 17 December 2018 Job No/Ref 265669-00

1 Introduction

Arup has been engaged by Architectus on behalf of Romanous Pty Ltd to undertake a transport and pedestrian assessment for the driveway serving the proposed future hotel located at 301 Kent Street, Sydney.

It is proposed that the 301 Kent Street site in the Sydney CBD be demolished to facilitate the construction of a 26-storey hotel building with a retail component and roof-top bar and terrace. The development will have frontages on both Erskine Street and Kent Street. It is proposed that a driveway access point be provided off Erskine Street.

This document summarises key issues associated with the vehicle cross over point, specifically addressing pedestrian/ vehicle interaction and the design of the driveway.

2 Pedestrian Assessment

2.1 Pedestrian Volumes

To understand current pedestrian activity levels at the site, Arup commissioned TTM Group to undertake pedestrian volume surveys on Friday 9th December 2018 at the locations shown in Figure 1, which include:

- 35-39 Erskine Street, southern side (shown in Photograph 1)
- 305 Kent Street, western side (shown in Photograph 2)

The surveyed pedestrian activity levels are shown in Figure 2.

Figure 1: Pedestrian Survey Locations

Photograph 1: Erskine Street, Sydney

Photograph 2: Kent Street, Sydney

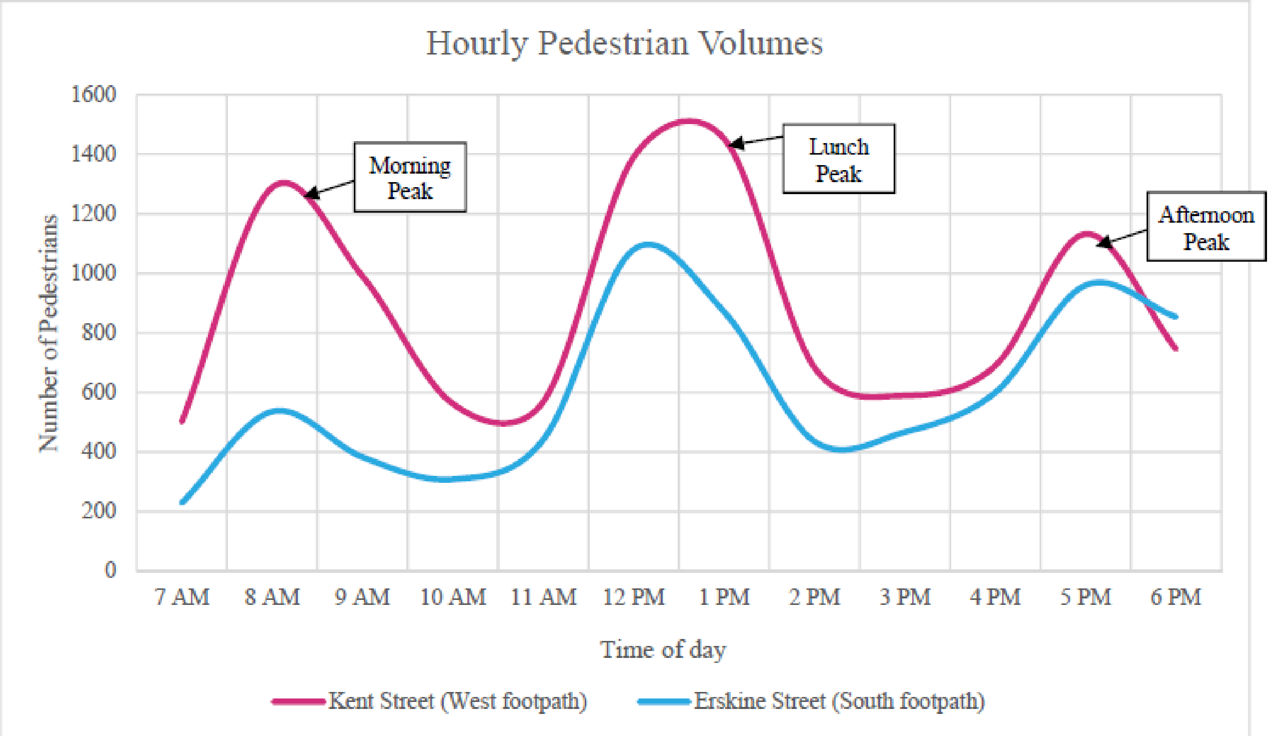


Figure 2: Hourly Pedestrian Volumes

As shown in Figure 2, the pedestrian volume on Erskine Street was found to be consistently less throughout the day compared with Kent Street, particularly in the morning and lunch peak hours. Therefore a driveway access on Erskine Street serving the hotel would result in significantly less conflicts between pedestrians and vehicles throughout the day when compared to Kent Street. Thus, Erskine Street presents itself as a better alternative for the location of the driveway.

Furthermore, Arup undertook a spot count in the morning peak to further understand pedestrian volumes on both sides of Erskine Street. This is shown in Table 1.

Table 1: Erskine Street Pedestrian Volumes

Erskine Street South Morning Pedestrian Volume	**Erskine Street North Morning Pedestrian Volume**	**Difference**
562	640	14% more pedestrians on Erskine Street North

As shown in Table 1, Erskine Street North was observed to have a greater number of pedestrians than Erskine Street South. It is expected that this is in part due to the fact that there is no pedestrian crossing available on the south side of the Erskine Street/ York Street intersection. This is shown in Figure 3.

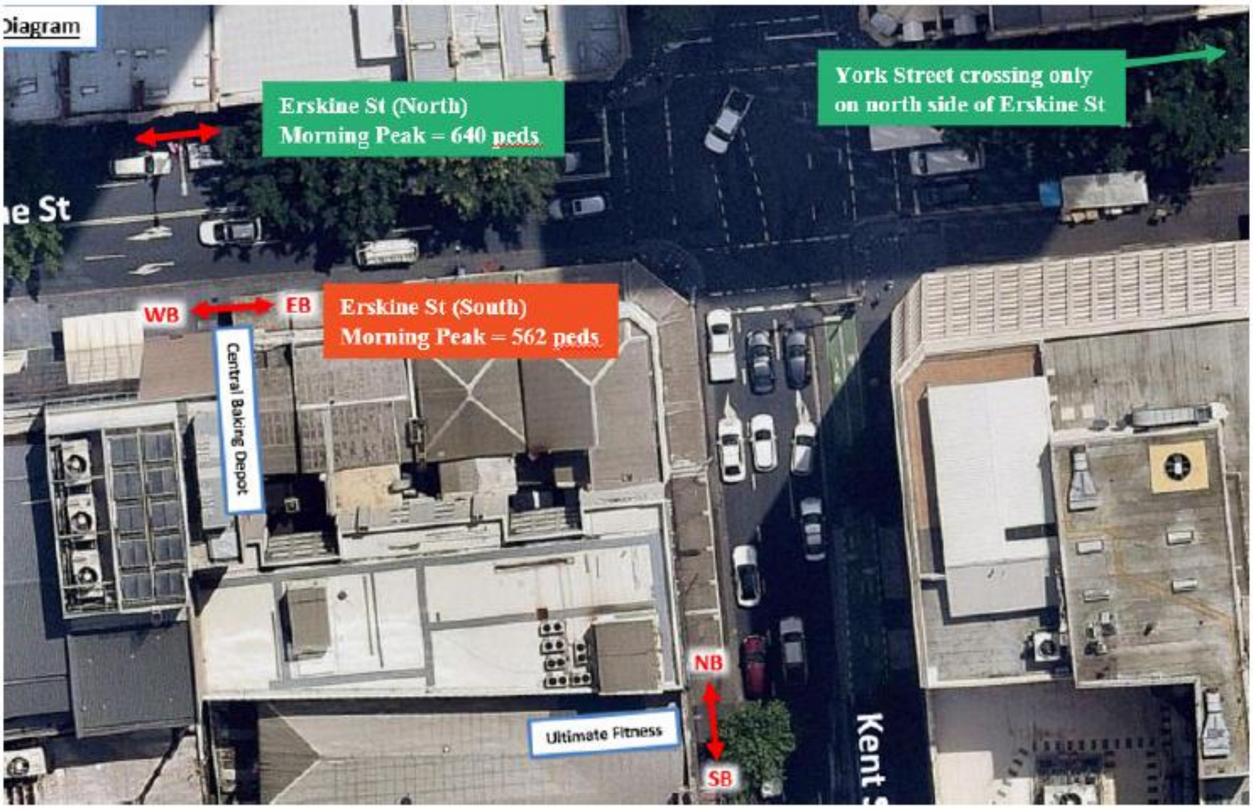


Figure 3: Erskine Street Pedestrian Volumes

As pedestrians are already observed to prefer to walk along the north side of Erskine Street, it is expected that the access driveway on the south side of the road would not negatively impact pedestrian movement.

2.2 Comparison to similar CBD locations

Arup undertook surveys of pedestrian movements across a number of uncontrolled driveway style entrances in the Sydney CBD. These locations are typical driveways in busy CBD environments which accommodate high levels of foot traffic and where motorists and pedestrians are aware of how to interact properly. These included Pitt Street and Kent Street, with the number of pedestrians and vehicles recorded at these locations outlined in Table 2.

Table 2: CBD Driveway Access

Location	**Peak Hour Traffic and Pedestrian Flows**		**V * P**
	Vehicles (V)	**Pedestrians (P)**	
Pitt Street opposite Hilton Hotel	204	3,800	775,200
275 Kent Street (Westpac Building)	145	890	129,050
528 Kent Street (Meriton Suites)	63	960	60,480
35-39 Erskine Street, Sydney – Morning Peak	**41***	**562**	**23,042**
35-39 Erskine Street, Sydney – Afternoon Peak	**41***	**967**	**39,647**

* Denotes forecast vehicle flows from the draft traffic assessment for the site (dated 10th August 2018)

While the proposed driveway location on Erskine Street has similar levels of foot traffic to other locations within the CBD, there are forecast to be less vehicles crossing the footpath when compared to other sites. Thus, it can reasonably be expected that the Erskine Street crossover would operate at a similar or better level than the examples presented, and it is not expected that the driveway would have a negative impact on pedestrians on Erskine Street.

3 Queuing Assessment

3.1 Introduction

Queuing theory can be applied to the proposed site access driveway in order to estimate the likely queues. This will help estimate the performance of the driveway and provide an approximation to the probability of vehicles queues at the driveway.

The queuing assessment considers the driveway access point to be a metered flow facility. This is shown in Figure 4.

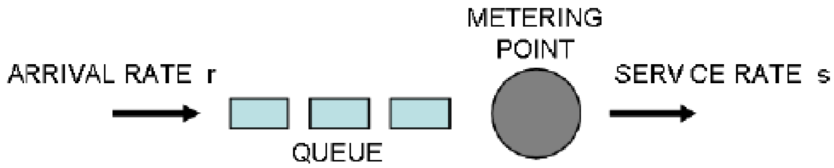


Figure 4: Queuing Theory Principles
Source: Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis

3.2 Assessment

This assessment assumes that vehicles will have a service time of 7 seconds when they are required to give way to a pedestrian. On the other hand, if the vehicle arrives at the driveway to find that there are no pedestrians, a service time of 0 seconds has been assumed. These values are estimations which have been informed by on-site observations at similar CBD locations.

It has also been assumed that not all vehicles will encounter a pedestrian crossing the driveway, thus, only some vehicles will be subject to the service time of 7 seconds. This is considered to be a realistic representation of the on-site conditions, as pedestrians travel in clusters which are partly metered by the traffic signals on Erskine Street.

Arup surveys showed a peak hour pedestrian volume of 967 pedestrians per hour on Erskine Street. Utilising gap acceptance theory, the number of vehicles which would be delayed at the driveway by pedestrians crossing can be calculated.

In this case, the pedestrians are considered the priority stream, while vehicles entering or exiting the driveway wait for pedestrians to cross. Thus, the critical gap is taken as the time for pedestrians to cross the driveway, where vehicles which approach when the pedestrian headway is greater than 7 seconds would not encounter any delay.

The proportion of vehicles which are delayed by pedestrians can be calculated using Equation 1.

Equation 1: Proportion of Vehicles Delayed

Proportion delayed = $1 - e^{-qT}$	where e = mathematical constant q = arrival rate of pedestrians T = critical gap

Source: Equation 8.2.29 Traffic Engineering and Management (Volume 2), Institute of Transport Studies, Monash University, Melbourne 2003.

Based on Equation 1, the proportion of vehicles delayed is equal to 84.7% of all vehicles.

With respect to this result, the methodology presented in the *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* can be utilised for estimating the queue length and delay at metering points, as shown in Table 3.

Table 3: Queuing Assessment

Suffix	Parameter	Value
s_t	Service time (for pedestrians to cross driveway)	7.0 sec
s	Service rate	0.143 veh/sec
r	Arrival rate (Reduced to 84.7% of actual arrival rate)	34.7 veh/hr (0.0097 veh/sec)
ρ	Utilisation rate	0.068
Probability of queue length		
N (veh) Number of vehicles	**P (N) % Probability of N vehicles queue**	**Cumulative Probability**
0	93.2%	93.2%
1	6.3%	99.5%
2	0.4%	100.0%

3.3 Findings

Based on the queuing assessment presented above, the following findings have been identified:

- 93.2% of the time during the peak hour, no vehicle queue would form at the entrance to the driveway
- 99.5% of the time during the peak hour, one vehicle or less would be waiting for pedestrians to pass prior to entering the driveway.

4 Mitigation Measures

To emphasise pedestrian priority along these streets, driveway entrances which are fully integrated with the adjoining footpath are to be provided. The footpath is to be at one continuous level. The treatment will therefore be an area which is designed for pedestrians, across which vehicles can pass slowly. Drivers of vehicles will be guided and encouraged to give way to pedestrians on the footpath as required by law. The crossings would also be designed with consistent pavement material, including a delineation of vehicle paths. Improved lighting and signage indicating the rights of pedestrians will further emphasise pedestrian priority in these areas.

Other than promoting drivers to give way to pedestrians, the driveway should also be designed to balance ease of vehicles in utilising the driveway with minimisation of pedestrian crossing distances.

Photograph 3 illustrates the Westin Hotel porte-cochere in Pitt Street south of Martin Place. This provides a good example of a geometrically constrained (albeit historic columns originally) driveway that works well in busy periods.

Photograph 3: Westin Hotel Porte-Cochere, Sydney

Summary

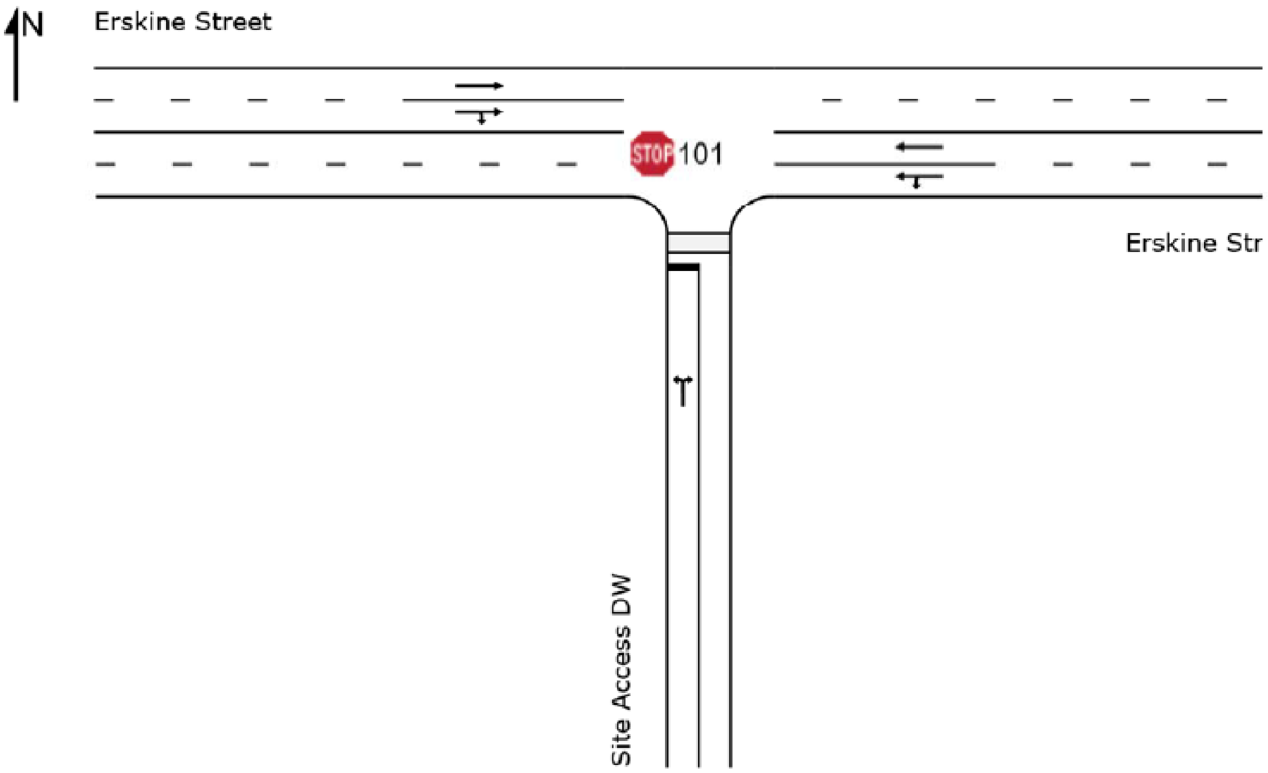
Arup has undertaken an assessment of the potential access driveway on Erskine Street to be provided as part of the redevelopment of the 301 Kent Street site. Key findings of the assessment are as follows:

- Pedestrian volumes are higher on Kent Street than on Erskine Street throughout the day, presenting Erskine Street as a better alternative for the location of the access driveway.
- Pedestrian volumes are higher on the northern footpath of Erskine Street than on the southern footpath, partly due to the fact that there is no pedestrian crossing on the south side of the Erskine Street/ York Street intersection.
- Pedestrian volumes on Erskine Street are similar to other surveyed sites in the Sydney CBD, however the driveway is expected to cater to less vehicles than these locations. Thus, it is expected that the driveway will operate at a level that is similar or better than these locations.
- The draft traffic assessment outlines that most of the vehicles servicing the site will be taxis, some of which will utilise the Kent Street or Erskine Street frontages rather than the drop-off/ pick-up bay in the site. Thus, the number of vehicles utilising the driveway will in reality be lower than the forecasted number.
- The queuing assessment shows that 99.5% of the time during the peak hour, one vehicle or less would be waiting for pedestrians to pass prior to entering the driveway.
- The driveway should be designed to be fully integrated with the adjoining footpath and to promote drivers to give way to pedestrians.

SITE LAYOUT

Site: 101 [Proposed AM]

Erskine Street & Site Access Driveway Intersection
Site Category: (None)
Stop (Two-Way)



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MOVEMENT SUMMARY

Site: 101 [Proposed AM]

Erskine Street & Site Access Driveway Intersection
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	98% Back of Queue Vehicles veh	98% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site Access DW												
1	L2	19	0.0	0.051	9.2	LOS A	0.2	1.4	0.67	0.96	0.67	15.7
3	R2	1	0.0	0.051	27.6	LOS B	0.2	1.4	0.67	0.96	0.67	15.7
Approach		20	0.0	0.051	10.1	LOS A	0.2	1.4	0.67	0.96	0.67	15.7
East: Erskine Street												
4	L2	19	0.0	0.171	11.1	LOS A	0.3	1.8	0.08	0.07	0.08	16.7
5	T1	619	1.1	0.171	0.2	LOS A	0.3	1.8	0.04	0.03	0.04	49.7
Approach		638	1.1	0.171	0.5	NA	0.3	1.8	0.04	0.03	0.04	46.9
West: Erskine Street												
11	T1	282	7.1	0.077	0.1	LOS A	0.0	0.2	0.01	0.00	0.01	49.9
12	R2	1	0.0	0.077	15.7	LOS B	0.0	0.2	0.02	0.01	0.02	16.8
Approach		283	7.1	0.077	0.1	NA	0.0	0.2	0.01	0.00	0.01	49.6
All Vehicles		941	2.9	0.171	0.6	NA	0.3	1.8	0.04	0.04	0.04	45.7

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

MOVEMENT SUMMARY

Site: 101 [Proposed PM]

Erskine Street & Site Access Driveway Intersection
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	98% Back of Queue Vehicles veh	98% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site Access DW												
1	L2	19	0.0	0.119	22.2	LOS B	0.4	3.0	0.87	1.00	0.87	14.8
3	R2	1	0.0	0.119	67.0	LOS E	0.4	3.0	0.87	1.00	0.87	14.8
Approach		20	0.0	0.119	24.4	LOS B	0.4	3.0	0.87	1.00	0.87	14.8
East: Erskine Street												
4	L2	19	0.0	0.197	14.4	LOS A	0.4	3.1	0.14	0.06	0.14	16.7
5	T1	699	1.3	0.197	0.4	LOS A	0.4	3.1	0.06	0.03	0.06	49.5
Approach		718	1.3	0.197	0.8	NA	0.4	3.1	0.06	0.03	0.06	47.0
West: Erskine Street												
11	T1	294	6.5	0.081	0.4	LOS A	0.1	0.7	0.02	0.00	0.02	49.7
12	R2	1	0.0	0.081	26.9	LOS B	0.1	0.7	0.04	0.01	0.04	16.7
Approach		295	6.4	0.081	0.4	NA	0.1	0.7	0.02	0.00	0.02	49.4
All Vehicles		1033	2.7	0.197	1.1	NA	0.4	3.1	0.07	0.04	0.07	45.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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