Colston Budd Hunt & Kafes Pty Ltd
as Trustee for C & B Unit Trust
ABN 27623 918 759

Our Ref: JH\7811\jj

19 November 2010

Transport Planning
Town Planning
Retail Studies

Winten Property Group
PO Box 55
CAMMERAY NSW 2062

Attention: Stuart Vaughan
Email: svaughan@winten.com.au

Dear Sir,

RE: PART 3A PROJECT: PROPOSED COMMERCIAL DEVELOPMENT ON SITE BOUNDED BY CHRISTIE STREET, CHRISTIE LANE AND LITHGOW STREET AT ST LEONARDS

1. As requested, we are writing regarding traffic and parking matters raised by the Department of Planning and in submissions in relation to the above development. We have previously prepared a report[1] which was submitted with the Part 3A application.

2. In a letter dated 7 October 2010, and submissions dated 13 September 2010, August 2010, 9 September 2010, 10 September 2010 and 29 October 2010 respectively, Department of Planning, Transport NSW, Australian Dental Association (NSW Branch)/NSW Pharmacy Guild, Traffix, Urbis and the RTA have raised traffic and transport related matters. Other public submissions have also raised other traffic-related matters. These matters, and our responses, are set out below.

Department of Planning

3. On-site parking provision

The on-site car parking provision on site is considered excessive given the accessibility to rail and bus services. To minimize traffic generation in the centre and to encourage use of public transport, the car parking provision per square metre should be reduced to a more appropriate level given the site's close proximity to St Leonards transport interchange, and a justification for the revised car parking provision should be provided in the context of the broader locality.

[1] Traffic and Accessibility Impact Study for Proposed Commercial Development, Christie Street and Lithgow Street, St Leonards, May 2010.

3. As discussed in our previous report, Part D1 of the Lane Cove Development Control Plan indicates that commercial development in St Leonards should provide a maximum of one parking space per 110m^2 for sites within 800 metres of St Leonards railway station.

4. Council's parking rate for commercial development is a comparatively low rate and is intended to limit traffic generation of commercial developments in the St Leonards CBD. By comparison, Council's parking rate for commercial development in other areas is one space per 40m^2.

5. Therefore, the lower rate for the subject site above rates take into account the site's accessibility to public transport, being close to St Leonards railway station and bus services along Pacific Highway. The rate therefore limits the quantum of parking that can be provided, due to public transport accessibility.

6. We note that Council's parking rate is the same as Willoughby Council's rate of one space per 110m^2 for St Leonards, and lower than that previously approved in the Forum development (above St Leonards railway station) of one space per 80m^2. It is also lower than the rate recently adopted for Macquarie Park of one space per 80m^2.

7. We also note that amended plans have been prepared for the development, to address a number of other matters raised in submissions. As a result of those changes, the building has reduced from some 36,650m^2 to some 32,600m^2 and the car parking has reduced from 330 spaces to 294 spaces.

Transport NSW

Transport NSW is concerned with the level of car parking provided in the proposal, given the site's proximity to public transport. Transport NSW recommends the Workplace Travel Plan (WTP), nominated in the proposal, address means to reduce parking demand by promoting public transport, walking and cycling. Other travel demand measures, such car share schemes, should also be considered. It is requested that the WTP be prepared prior to occupation of the building as part of the Conditions of Consent. A brochure on WTPs prepared by the Premier's Council for Active Living is attached for your information.

8. Parking provision is discussed above in paragraphs 3 to 7. A workplace travel plan could be included as a condition of consent. As noted in paragraphs 3.7 to 3.9 of our report submitted with the Part 3(A) application, a work place travel plan will be prepared to meet the specific needs of the site, future tenants and employees.

- *The inconsistency between the Traffic and Accessibility Study and the EA regarding proposed changes to Christie Lane should be further addressed to ensure traffic and pedestrian impacts are adequately addressed.*

9. As noted in paragraph 2.12 of our previous report, Council's planning for the area identifies a new laneway connecting Lithgow Street with Christie Street, south of the site. The existing Christie Lane would become a pedestrian connection only. The northern section of Lithgow Street, between the Pacific Highway and the new laneway, would become a shared zone.

10. Council's proposed link between Christie Street and Lithgow Street does not form part of the subject site. It is not proposed to close Christie Lane in association with the proposed development and the traffic assessment is not based on its closure.

Australian Dental Association and NSW Pharmacy Guild

The Concept Plan will result in additional traffic

11. As noted in our report submitted with the Part 3(A) application, traffic increases from the proposed development would be some 70 to 110 vehicles per hour two-way during peak hours.

12. Our assessment found that with the additional traffic from the proposed development, surrounding intersections would operate at levels of service C or better during peak periods. These are satisfactory or better levels of service.

13. We note that the reduction in parking provision of some 10 to 15 per cent compared to the original application would reduce the development's peak hour traffic generation by some 10 to 15 per cent, compared to that assessed in our previous report.

It is likely that the parking demand in surrounding streets will increase as a result of commercial and retail development in the area.

14. In relation to parking on surrounding streets, most on-street parking is time limited and therefore its use would primarily be visitors to the area who require short-term parking, rather than commuters parking all day.

15. The site's location in relation to existing regular bus and rail services provides the opportunity for employees to travel to the site by modes other than car.

Traffix

16. The matters raised in the Traffix submission can be summarised as follows:

a) parking: insufficient justification for the adoption of the maximum parking rates under Council's DCP has been provided and as such does not respond adequately to the DGRs which aim to reduce parking and increase non car travel modes;

17. Parking provision is discussed above in paragraphs 3 to 7.

b) traffic generation: the traffic report lodged as part of the EA documentation adopts a trip rate of 0.4 trips/hr/space which is significantly less than the rate published in the RTA's Guide to Traffic Generating Developments which adopts a rate of 0.8 trips/hr/space during peak periods;

18. We have reviewed the results of a series of surveys of commercial buildings on the lower north shore, which found the following traffic generations:

- ❖ morning peak hours:
  - 0.18, 0.21, 0.3, 0.34 and 0.4 vehicles per hour per space two-way

- ❖ afternoon peak hours:
  - 0.2, 0.23, 0.23, 0.25 and 0.28 vehicles per hour per space two-way

19. The surveys therefore found traffic generations of between 0.18 and 0.4 vehicles per hour per space during peak hours. Our report conservatively assessed 0.4 vehicles per hour per space during peak hours, at the upper end of the range.

20. There are likely to be a number of reasons that commercial development can have a lower traffic generation per parking space since the RTA surveys were undertaken in 1990. However, these would include:

- o increased flexibility in working hours; and
- o in buildings with constrained parking provision (such as in North Sydney and St Leonards), spaces are likely to be allocated to senior personnel who don't necessarily travel during peak hours.

c) residential amenity: no assessment of the environmental amenity of local residential streets and how the current amenity of residents will be affected by the proposed development has been provided;

21. In relation to c), the Roads and Traffic Authority's "Guide to Traffic Generating Developments" defines the following environmental capacity performance standards for local residential streets:

- o Local Roads
  - Environmental goal – 200 vehicles per hour in the peak hour; and
  - Maximum flow – 300 vehicles per hour in the peak hour.

22. Lithgow Street and Oxley Street provide access to residential development. However, they also provide access to and from commercial development, being important roads in the St Leonards CBD. For these reasons, it is considered that the RTA's maximum flow is appropriate to apply.

23. With the proposed development, traffic flows in these streets would remain less than the RTA's maximum flow for a local road. As noted above, with the reduced parking provision of some 10 per cent compared to the original application, peak hour traffic generation would also reduce by some 10 per cent.

d) Christie Lane closure: if this were to occur, all traffic exiting the site would need to turn left into Pacific Highway from Lithgow Street. This will have local impacts that have not been addressed and the performance of this intersection at the highway also requires assessment. This relatively poor level of site accessibility in our view warrants a fundamental rethink concerning the amount of parking that the site is capable of sustaining;

24. Christie Lane would continue to be available for vehicle use for the development, prior to the construction of the new lane. Therefore, access to the development would not be constrained.

e) Lithgow Street shared zone: this section of road is expected to carry 235 veh/hr in the PM peak, of which 90 veh/hr will be associated with the subject site. This is substantially higher than can be considered for a shared zone and accordingly the development in its current form will not be able to co-exist with a shared zone;

25. It is anticipated that the introduction of a shared zone in the northern part of Lithgow Street would occur in conjunction with the introduction of the new lane and the closure of Christie Lane to vehicle traffic. Therefore, alternative routes would be available for this traffic once the shared zone is introduced. In association with the development, a pedestrian crossing could be provided across Lithgow Street at Pacific Highway, if considered appropriate by Council.

f) site access arrangements: the provision of a single access driveway serving cars and trucks is supported in principle. However, no swept path analysis has been provided to demonstrate satisfactory manoeuvring by an 8.8m MRV;

g) external traffic impacts: the report provides no information that would enable the credibility of the traffic assessment to be undertaken relating to intersection performances;

h) internal car park design: the basement car parks need to accommodate uninterrupted two-way flow on all ramps and internal intersections where traffic volumes exceed 30 veh/hr, based on AS 2890.1. No swept path analysis has been undertaken to establish whether this is possible;

i) internal design (service area): the proposed service area requires a swept path assessment to establish whether all docks can be accessed while a truck is present in other docks, with forward entry and exit movement being possible.

26. With regards to f), h) and i), we agree that the design of the access driveway, ramps and internal circulation should appropriately provide for cars and service vehicles. We note that the current proposal is a concept plan for which a further detailed project application will be required. These matters would therefore be most appropriately addressed at the time that a project application is made for the development.

27. In relation to g), copies of our SIDRA output summaries are attached to this letter.

Urbis

The Environmental Assessment Report addresses amalgamation to a degree. In particular, the inability to amalgamate with 82 and 84 Christie Street and 71 – 73 Lithgow Street. Even if it was accepted no viable scheme can be developed, serious consideration should be given as to whether the long term prejudicing of both 84 Christie Street and a new laneway is an acceptable long term planning and traffic management outcome.

28. As discussed above in paragraphs 21 to 25, the development would operate satisfactorily in traffic terms prior to the introduction of the new lane way.

RTA

PUBLIC TRANSPORT

1. *The proposed development is likely to generate significant public transport trips during peak periods. Further information and/or analysis shall be provided to the satisfaction of DoP and Transport NSW demonstrating that the existing public transport system can cope with the increase in public transport demand.*

29. The NSW Transport Plan and Metropolitan Strategy require developments to utilise public transport and not rely on private cars. It is anticipated that CityRail and Sydney Buses will make the necessary increases to the services operating to St Leonards in accordance with demands.

PEDESTRIANS

2. *It is estimated that the proposed development would generate 600 pedestrian movements from the train station to the site in the AM peak period and reverse in the PM peak period. The Environmental Assessment Report indicates that pedestrian movements across Pacific Highway at the signalised crossings at Pacific Highway/Christie Street and Pacific Highway/Herbert Street intersections would be primary movements. The impact of additional pedestrian movements at these intersections should be assessed in further detail.*

30. As noted in our report submitted with the Part 3A application, there is a pedestrian connection under the Pacific Highway at Lithgow Street to connect to the railway station. This would be the primary connection for pedestrians between the site and the railway station.

31. However, we note that 600 pedestrians is equivalent to an average of some six pedestrians per cycle at the traffic signals at Pacific Highway/Christie Street and Pacific Highway/Herbert Street over a two hour period. Such low pedestrian flows would not have significant implications on the operations of these intersections.

3. It is unclear from the Traffic Report and the Environmental Assessment Report whether a link between Christie Street and Lithgow Street south of the site will be provided. The RTA would need this clarified prior to providing comments regarding the shared-zone proposals on Albert Avenue and Christie Lane.

32. Council's proposed link between Christie Street and Lithgow Street does not form part of the subject site. It is anticipated that this link will be provided in association with the redevelopment of a site to the south.

TRAFFIC GENERATION AND DISTRIBUTION

4. The traffic report indicates a traffic generation rate of 0.2-0.4 veh/space. From the RTA's understanding, these rates are based on surveys of existing sites in North Sydney and not St Leonards. Further justification should be provided why North Sydney Rates can be adopted for St Leonards. Alternatively, revised traffic generation rates based on surveys of existing sites in St Leonards can be adopted for the analysis.

33. This matter is discussed in paragraphs 18 to 20 above. We confirm that the surveyed building are located in North Sydney. Additionally, we note that North Sydney and St Leonards are:

- close to one another;
- are served by the same railway line;
- are served by many of the same bus services; and
- provide CBDs with high density commercial development.

5. Further clarification should be provided explaining why more traffic would be arriving from Oxley Street than Pacific Highway in the AM peak.

34. As vehicles can not turn right into Christie Street or Oxley Street from Pacific Highway (southbound), Christie Lane is one-way eastbound and Lithgow Street is one-way northbound along the site frontage, all vehicles accessing the development will use Oxley Street and Lithgow Street.

ACCESS

6. It is understood that Lithgow Street and Christie Lane are proposed to operate as shared-zones. The proposed access driveway on Lithgow Street will increase traffic on both Lithgow Street and Christie Lane. To minimise traffic on these roads and improve pedestrian safety, consideration should be given to relocating the access driveway to Christie Street to the satisfaction of Council and DoP.

35. Lithgow Street provides the lowest point of the site and is the most logical location, from this perspective, for the access location.

36. The timing of the implementation of the shared zone in the northern part of Lithgow Street will be a matter for Council. However, it is anticipated that the shared zone would be implemented in association with the new lane and the closure of Christie Lane to vehicle traffic. Therefore, alternative routes would be available for traffic once the shared zone is introduced.

7. All vehicles should enter and exit the site in a forward direction.

To satisfy this requirement swept path analysis should be provided to DoP and Council, demonstrating that cars (B99) and largest trucks can:

- *a. Enter the site in a forward direction;*
- *b. Turn around on-site on the allocated manoeuvring area while all spaces are occupied; and*
- *c. Exit the site in a forward direction.*

37. We agree that vehicles should enter and exit the site in a forward direction. A condition of consent could be included to this effect, including the requirement for vehicle swept paths at the project application stage.

PARKING AND LOADING

8. Car parking provisions, loading bays and bicycle facilities should be provided to Council's satisfaction.

38. These matters are noted and are addressed in our previous report and above in this letter.

9. The access driveway, off-street parking and loading areas associated with the proposed development (including driveways, grades, parking aisle widths & aisle lengths, turning paths, sight distance requirements, and parking bay dimensions) should be in accordance with AS 2890.1 – 2004, AS 2890.2 – 2002 for heavy vehicles and Council requirement.

10. A Loading Dock Management Plan (LDMP) shall be prepared to DoP and Council's satisfaction. The LDMP shall implement appropriate measures to prevent more than one vehicle accessing the loading dock at any one time. The LDMP shall be submitted for approval, prior to the release of the Occupation Certificate.

39. These matters are noted and could be included as conditions of consent. As noted in our previous report, the proposed loading dock will provide for a range of service vehicles, including vans and courier-sized vehicles, as well as small and medium rigid trucks. Five bays will be provided for trucks and five bays for vans and courier sized vehicles. There does not appear to be a need to restrict the number of service vehicles to one at a time.

CONSTRUCTION

11. A Demolition and Construction Traffic Management Plan detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to Council, for approval, prior to the issue of a construction certificate.

12. All demolition and construction vehicle and activities are to be contained wholly within the site or the local road network (subject to Council's approval) as a work zone permit will not be approved on Pacific Highway.

13. All works/regulatory signposting associated with the proposed development are to be at no cost to the RTA.

40. These matters are noted and could be included as conditions of consent.

Other Matters

41. Matters raised in other public submissions include the following:

Many of the local businesses which operate from the commercial properties which front onto Pacific Highway and back on to Christie Lane rely on deliveries to their businesses via Christie Lane. Winten's proposal would cause significant congestion and disruption to pedestrian and vehicular access to Christie Lane and hamper access to the rear of the commercial properties. It would lead to congestion and chaos in Christie Lane for any deliveries being made to the local businesses in this area.

42. Vehicular access to the proposed development is proposed to be provided from Lithgow Street. The existing development on the site has access from Christie Lane and therefore turning movements to and from the site would be removed from Christie Lane as a result of the proposed development.

43. As noted in Figures 2 and 3 of our report submitted with the application, traffic increases in Christie Lane would be some 10 to 55 vehicles per hour during weekday morning and afternoon peak hours. Such low increases would not have significant effects on the operation of Christie Lane.

44. As previously discussed, the reduced parking provision of some 10 per cent would result in a reduction in peak hour traffic generation of the development of some 10 per cent, compared to the original application.

The Traffic Impact Study does not take into account the significant issue of congestion on Chandos Street which provides access to the northern end of Christie Street and will act as a thoroughfare to the proposed development on the southern end. The current traffic chaos particularly during peak hours is intolerable and any increase in the volume of cars can only compound the problem.

45. Chandos Street is some distance from the development. Traffic increases in Chandos Street would be minor and would not have significant effects on its operation.

Furthermore, the proposal plan will impact on the traffic flow in St Leonards and Lane Cove area. Large amounts of occupants/tenants use motor vehicles as their means to travel between their office and home. This is due to the fact that many people who work nearby actually live in areas that do not have railway links such as Manly and Mosman. While it is

true that railway station is very near the proposed area and most people would think nearby occupants/tenants would use it as the main means of transport, this expectation of behaviour is actually not true. With the considerable amounts of people using motor vehicles to travel in and out, it is highly likely that the existing capacity will not cope with the demands from the freeway via Chandos Street and Chandos Street in order to gain access to the proposed development. Surely, no tenants/occupants would want heavy traffic jam during busy hours every day.

46. As noted in our previous report, as well as rail services, bus services link St Leonards with other areas on the north shore, including Manly and Mosman. Traffic capacity is addressed above in paragraphs 12 and 13.

The proposed car parking is not sufficient to accommodate the increase in jobs on the site.

47. Car parking provision, as well as access to the site by public transport, is addressed above in paragraphs 3 to 7 and 15.

No study has been undertaken on the ability of the public transport system to cope.

48. The NSW Transport Plan and Metropolitan Strategy require developments to utilise public transport and not rely on private cars. It is anticipated that CityRail and Sydney Buses will make the necessary increases to the services operating to St Leonards, in accordance with overall future demands.

49. We trust the above provides the information you require. Finally, if you should have any queries, please do not hesitate to contact us.

Yours faithfully,
COLSTON BUDD HUNT & KAFES PTY LTD

J Hollis
Director

MOVEMENT SUMMARY

Site: Pacific Highway & Oxley Street - ex AM + dev

Pacific Highway & Oxley Street
Existing morning peak hour + development
Signals - Fixed Time Cycle Time = 120 seconds

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	Pacific Highway south										
1	L	210	2.0	0.653	19.2	LOS B	5.7	40.9	0.62	0.76	38.2
2	T	1225	2.0	0.460	8.8	LOS A	17.1	121.7	0.49	0.44	46.5
Approach		1435	2.0	0.652	10.3	LOS A	17.1	121.7	0.51	0.49	45.1
East	Oxley Street east										
4	L	60	2.0	0.337	49.2	LOS D	4.1	29.1	0.86	0.74	23.7
5	T	265	2.0	0.661	47.5	LOS D	15.8	112.2	0.97	0.82	22.5
Approach		325	2.0	0.661	47.8	LOS D	15.8	112.2	0.95	0.81	22.7
North	Pacific Highway north										
7	L	85	2.0	0.323	15.2	LOS B	11.3	80.6	0.43	0.96	42.5
8	T	1200	2.0	0.323	7.7	LOS A	11.4	81.3	0.43	0.38	47.7
Approach		1285	2.0	0.323	8.2	LOS A	11.4	81.3	0.43	0.42	47.4
West	Oxley Street west										
10	L	50	2.0	0.230	49.0	LOS D	3.4	24.5	0.85	0.74	23.8
11	T	90	2.0	0.638	48.0	LOS D	7.0	49.9	0.90	0.71	22.3
12	R	60	2.0	0.638	67.7	LOS E	7.0	49.9	1.00	0.82	20.0
Approach		200	2.0	0.638	54.1	LOS D	7.0	49.9	0.92	0.75	21.9
All Vehicles		3245	2.0	0.661	16.0	LOS B	17.1	121.7	0.55	0.51	39.6

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	36.8	LOS D	0.1	0.1	0.78	0.78
P3	Across E approach	53	5.4	LOS A	0.1	0.1	0.30	0.30
P7	Across W approach	53	5.4	LOS A	0.1	0.1	0.30	0.30
All Pedestrians		159	15.9				0.46	0.46

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Oxley Street - ex PM + dev

Pacific Highway & Oxley Street
Existing afternoon peak hour + development
Signals - Fixed Time Cycle Time = 120 seconds

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	Pacific Highway south										
1	L	85	2.0	0.139	21.9	LOS B	5.4	38.7	0.53	0.80	37.0
2	T	1170	2.0	0.534	18.6	LOS B	21.6	153.5	0.69	0.61	38.0
Approach		1255	2.0	0.534	18.8	LOS B	21.6	153.5	0.68	0.63	37.9
East	Oxley Street east										
4	L	60	2.0	0.275	34.4	LOS C	3.3	23.7	0.70	0.72	28.3
5	T	135	2.0	0.196	28.3	LOS B	7.0	49.9	0.73	0.60	28.8
Approach		195	2.0	0.275	30.1	LOS C	7.0	49.9	0.72	0.64	28.6
North	Pacific Highway north										
7	L	55	2.0	0.239	21.1	LOS B	2.2	15.8	0.50	0.70	36.8
8	T	1170	2.0	0.561	19.2	LOS B	23.0	163.5	0.71	0.64	37.6
Approach		1225	2.0	0.561	19.3	LOS B	23.0	163.5	0.70	0.64	37.5
West	Oxley Street west										
10	L	150	2.0	0.570	36.0	LOS C	7.7	55.2	0.74	0.76	27.8
11	T	265	2.0	0.492	31.8	LOS C	14.0	99.7	0.80	0.67	27.1
12	R	85	2.0	0.493	40.8	LOS C	14.0	99.7	0.84	0.84	26.7
Approach		500	2.0	0.569	34.6	LOS C	14.0	99.7	0.79	0.73	27.3
All Vehicles		3175	2.0	0.570	22.2	LOS B	23.0	163.5	0.71	0.65	35.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	24.1	LOS C	0.1	0.1	0.63	0.63
P3	Across E approach	53	12.2	LOS B	0.1	0.1	0.45	0.45
P7	Across W approach	53	12.2	LOS B	0.1	0.1	0.45	0.45
All Pedestrians		159	16.1				0.51	0.51

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Albany St - ex AM + dev

Pacific Highway & Albany Street
Existing AM peak hour + development
Signals - Fixed Time Cycle Time = 110 seconds

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	Pacific Highway south										
2	T	1185	2.0	0.537	15.4	LOS B	20.3	144.5	0.67	0.60	40.3
3	R	90	2.0	0.601	63.2	LOS E	6.5	46.5	1.00	0.79	21.1
Approach		1275	2.0	0.601	18.8	LOS B	20.3	144.5	0.69	0.61	38.0
East	Albany Street										
4	L	30	2.0	0.673	38.5	LOS C	7.8	55.7	0.78	0.81	27.0
6	R	510	2.0	0.670	41.3	LOS C	19.3	137.2	0.89	0.84	26.0
Approach		540	2.0	0.670	41.2	LOS C	19.3	137.2	0.88	0.84	26.1
North	Pacific Highway north										
7	L	495	2.0	0.670	29.0	LOS C	25.3	180.5	0.80	0.86	32.7
8	T	1255	2.0	0.670	25.9	LOS B	25.3	180.5	0.85	0.76	33.3
Approach		1750	2.0	0.670	26.8	LOS B	25.3	180.5	0.84	0.79	33.1
All Vehicles		3565	2.0	0.673	26.1	LOS B	25.3	180.5	0.79	0.73	33.3

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	24.9	LOS C	0.1	0.1	0.67	0.67
P3	Across E approach	53	16.9	LOS B	0.1	0.1	0.55	0.55
All Pedestrians		106	20.9				0.61	0.61

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Albany St - ex PM + dev

Pacific Highway & Albany Street
Existing PM peak hour + development
Signals - Fixed Time Cycle Time = 110 seconds

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	Pacific Highway south										
2	T	1195	2.0	0.542	15.5	LOS B	20.5	146.1	0.67	0.60	40.3
3	R	125	2.0	0.683	62.4	LOS E	8.6	61.3	1.00	0.83	21.3
Approach		1320	2.0	0.683	19.9	LOS B	20.5	146.1	0.70	0.62	37.3
East	Albany Street										
4	L	45	2.0	0.732	41.4	LOS C	8.8	62.7	0.78	0.85	26.0
6	R	545	2.0	0.732	43.2	LOS D	21.5	153.2	0.91	0.86	25.5
Approach		590	2.0	0.732	43.1	LOS D	21.5	153.2	0.90	0.86	25.5
North	Pacific Highway north										
7	L	530	2.0	0.366	11.1	LOS A	9.9	70.4	0.32	0.73	44.8
8	T	1180	2.0	0.733	28.8	LOS C	27.0	192.0	0.90	0.81	31.9
Approach		1710	2.0	0.733	23.3	LOS B	27.0	192.0	0.72	0.78	34.9
All Vehicles		3620	2.0	0.733	25.3	LOS B	27.0	192.0	0.74	0.74	33.7

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	24.9	LOS C	0.1	0.1	0.67	0.67
P3	Across E approach	53	18.0	LOS B	0.1	0.1	0.57	0.57
All Pedestrians		106	21.5				0.62	0.62

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Christie St - ex AM + dev

Pacific Highway & Christie Street
Existing AM peak hour + development
Signals - Fixed Time Cycle Time = 121 seconds

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	Pacific Highway east										
4	L	110	2.0	0.429	16.4	LOS B	15.8	112.3	0.48	0.96	41.7
5	T	1585	2.0	0.429	8.9	LOS A	15.9	113.2	0.48	0.43	46.3
Approach		1695	2.0	0.429	9.4	LOS A	15.9	113.2	0.48	0.47	46.0
North	Christie Street north										
7	L	25	2.0	0.551	53.3	LOS D	13.4	95.3	0.94	0.83	23.1
8	T	125	2.0	0.551	46.0	LOS D	13.4	95.3	0.94	0.79	22.6
9	R	290	2.0	0.551	53.2	LOS D	13.4	95.3	0.94	0.82	22.9
Approach		440	2.0	0.551	51.2	LOS D	13.4	95.3	0.94	0.81	22.8
West	Pacific Highway west										
10	L	445	2.0	0.547	14.4	LOS A	18.2	129.9	0.51	0.85	42.6
11	T	1725	2.0	0.547	9.5	LOS A	21.8	155.3	0.54	0.49	45.4
Approach		2170	2.0	0.547	10.5	LOS A	21.8	155.3	0.53	0.57	44.8
All Vehicles		4305	2.0	0.551	14.2	LOS A	21.8	155.3	0.55	0.55	41.2

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	5.7	LOS A	0.1	0.1	0.31	0.31
P3	Across E approach	53	36.5	LOS D	0.1	0.1	0.78	0.78
P5	Across N approach	53	5.7	LOS A	0.1	0.1	0.31	0.31
All Pedestrians		159	15.9				0.46	0.46

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Pacific Highway & Christie Street
Existing PM peak hour + development
Signals - Fixed Time Cycle Time = 122 seconds

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	Pacific Highway east										
4	L	45	2.0	0.455	17.9	LOS B	17.4	124.0	0.52	1.01	40.9
5	T	1695	2.0	0.454	10.4	LOS A	17.5	124.4	0.52	0.47	44.8
Approach		1740	2.0	0.454	10.6	LOS A	17.5	124.4	0.52	0.48	44.7
North	Christie Street north										
7	L	50	2.0	0.565	51.7	LOS D	14.6	103.8	0.93	0.83	23.3
8	T	55	2.0	0.566	44.4	LOS D	14.6	103.8	0.93	0.79	22.7
9	R	390	2.0	0.566	51.6	LOS D	14.6	103.8	0.93	0.83	23.2
Approach		495	2.0	0.566	50.8	LOS D	14.6	103.8	0.93	0.82	23.2
West	Pacific Highway west										
10	L	515	2.0	0.563	14.3	LOS A	18.5	131.9	0.53	0.83	42.5
11	T	1660	2.0	0.564	11.0	LOS A	23.3	165.9	0.58	0.52	43.9
Approach		2175	2.0	0.564	11.8	LOS A	23.3	165.9	0.57	0.60	43.6
All Vehicles		4410	2.0	0.566	15.7	LOS B	23.3	165.9	0.59	0.58	40.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	6.6	LOS A	0.1	0.1	0.33	0.33
P3	Across E approach	53	34.7	LOS D	0.1	0.1	0.75	0.75
P5	Across N approach	53	6.6	LOS A	0.1	0.1	0.33	0.33
All Pedestrians		159	15.9				0.47	0.47

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Herbert St
- ex AM + dev

Pacific Highway & Herbert Street
Existing AM peak hour + development
Signals - Fixed Time Cycle Time = 111 seconds

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	Pacific Highway east										
5	T	1575	2.0	0.688	29.8	LOS C	24.2	172.1	0.89	0.79	31.5
6	R	325	2.0	0.669	38.0	LOS C	11.7	83.3	0.80	0.79	27.8
Approach		1900	2.0	0.688	31.2	LOS C	24.2	172.1	0.88	0.79	30.8
North	Herbert Street										
7	L	635	2.0	0.700	28.9	LOS C	26.9	191.3	0.83	0.85	26.9
9	R	135	2.0	0.630	58.2	LOS E	9.0	64.1	1.00	0.82	19.8
Approach		770	2.0	0.700	34.1	LOS C	26.9	191.3	0.86	0.84	25.3
West	Pacific Highway west										
10	L	180	2.0	0.426	19.4	LOS B	6.1	43.5	0.51	0.73	37.5
11	T	1535	2.0	0.671	29.5	LOS C	23.4	166.7	0.88	0.78	31.6
Approach		1715	2.0	0.671	28.5	LOS B	23.4	166.7	0.84	0.78	32.1
All Vehicles		4385	2.0	0.700	30.6	LOS C	26.9	191.3	0.86	0.79	30.1

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	19.6	LOS B	0.1	0.1	0.59	0.59
P7	Across W approach	53	24.7	LOS C	0.1	0.1	0.67	0.67
All Pedestrians		106	22.1				0.63	0.63

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Pacific Highway & Herbert St - ex PM + dev

Pacific Highway & Herbert Street
Existing PM peak hour + development
Signals - Fixed Time Cycle Time = 111 seconds

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	Pacific Highway east										
5	T	1940	2.0	0.888	45.6	LOS D	38.3	273.0	1.00	1.03	25.5
6	R	310	2.0	0.667	41.3	LOS C	11.7	83.4	0.84	0.79	26.6
Approach		2250	2.0	0.888	45.0	LOS D	38.3	273.0	0.98	1.00	25.7
North	Herbert Street										
7	L	845	2.0	0.899	44.0	LOS D	49.1	349.8	0.98	0.99	22.7
9	R	200	2.0	0.638	52.8	LOS D	12.0	85.2	0.98	0.82	20.8
Approach		1045	2.0	0.899	45.7	LOS D	49.1	349.8	0.98	0.96	22.3
West	Pacific Highway west										
10	L	115	2.0	0.254	17.0	LOS B	3.7	26.3	0.45	0.71	39.3
11	T	1330	2.0	0.609	29.9	LOS C	20.3	144.3	0.87	0.76	31.5
Approach		1445	2.0	0.609	28.9	LOS C	20.3	144.3	0.83	0.75	31.9
All Vehicles		4740	2.0	0.899	40.2	LOS C	49.1	349.8	0.93	0.92	26.4

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	20.8	LOS C	0.1	0.1	0.61	0.61
P7	Across W approach	53	27.4	LOS C	0.1	0.1	0.70	0.70
All Pedestrians		106	24.1				0.66	0.66

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Oxley Street & Nicholson Street
Existing AM peak hour + development
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	Oxley Street east										
5	T	155	2.0	0.318	0.4	LOS A	2.4	16.9	0.22	0.00	46.7
6	R	320	2.0	0.318	7.2	LOS A	2.4	16.9	0.22	0.67	42.5
Approach		475	2.0	0.318	5.0	LOS A	2.4	16.9	0.22	0.45	43.8
North	Nicholson Street										
7	L	130	2.0	0.208	8.0	LOS A	1.0	7.4	0.19	0.57	42.0
9	R	60	2.0	0.208	8.3	LOS A	1.0	7.4	0.19	0.73	41.7
Approach		190	2.0	0.208	8.1	LOS A	1.0	7.4	0.19	0.62	41.9
West	Oxley Street west										
10	L	5	2.0	0.036	6.4	LOS A	0.0	0.0	0.00	0.89	43.3
11	T	65	2.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		70	2.0	0.036	0.5	LOS A	0.0	0.0	0.00	0.06	49.5
All Vehicles		735	2.0	0.318	5.4	NA	2.4	16.9	0.19	0.46	43.7

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

MOVEMENT SUMMARY

Oxley Street & Nicholson Street
Existing PM peak hour + development
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	Oxley Street east										
5	T	140	2.0	0.130	0.4	LOS A	0.9	6.4	0.24	0.00	46.8
6	R	75	2.0	0.130	7.3	LOS A	0.9	6.4	0.24	0.77	42.7
Approach		215	2.0	0.130	2.8	LOS A	0.9	6.4	0.24	0.27	45.3
North	Nicholson Street										
7	L	505	2.0	0.547	8.0	LOS A	5.0	35.5	0.35	0.61	42.0
9	R	70	2.0	0.547	8.4	LOS A	5.0	35.5	0.35	0.77	41.8
Approach		575	2.0	0.547	8.0	LOS A	5.0	35.5	0.35	0.63	41.9
West	Oxley Street west										
10	L	10	2.0	0.055	6.5	LOS A	0.0	0.0	0.00	0.88	43.3
11	T	95	2.0	0.055	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		105	2.0	0.055	0.6	LOS A	0.0	0.0	0.00	0.08	49.3
All Vehicles		895	2.0	0.547	5.9	NA	5.0	35.5	0.28	0.48	43.5

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.

SIDRA INTERSECTION