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Appendices

1. Introduction

GHD has been commissioned by Sapphire Developments Pty Limited to examine traffic and transport issues associated with the construction and post-development operation of the redevelopment of the Pelican Beach Resort at 740-742 Pacific Highway, Sapphire Beach. This Preliminary Traffic Study is provided to assess the traffic and access issues regarding the proposed development, which is to be lodged with the Department of Planning.

The proposed development would involve the demolition of the 114 room Pelican Beach Resort to be replaced at completion with 117 dwellings, recreational/communal facilities and 234 car parks. The dwellings will consist of a mixture of apartments, town houses and houses. The development is expected to cater for a combination of short stay tourists and permanent residents.

The report details the existing traffic and transport conditions in the vicinity of the site and examines the effects resulting from the proposed development. This preliminary assessment draws on existing data and an assessment of existing and post-development intersection operation. Ongoing consultation with the RTA will aim to provide long term access to the development as per the RTA's Coffs Harbour Pacific Highway Planning Strategy.

2. Existing Conditions

2.1 Site Description and Surrounding Land Uses

The site is located at 740-742 Pacific Highway, Sapphire Beach (Lots 100 & 101 DP 629555 and Lot 2 DP 800836). The site is occupied by the Pelican Beach Resort which comprises a 114 room hotel and a restaurant.

Road access to the site will be provided via the existing access road and intersection with the Pacific Highway. This intersection and access road services two other traffic-generating developments, namely the Quality Resort Nautilus which includes 75 villas and a restaurant and also a medium to high-density residential development as shown in Figure 2.1.

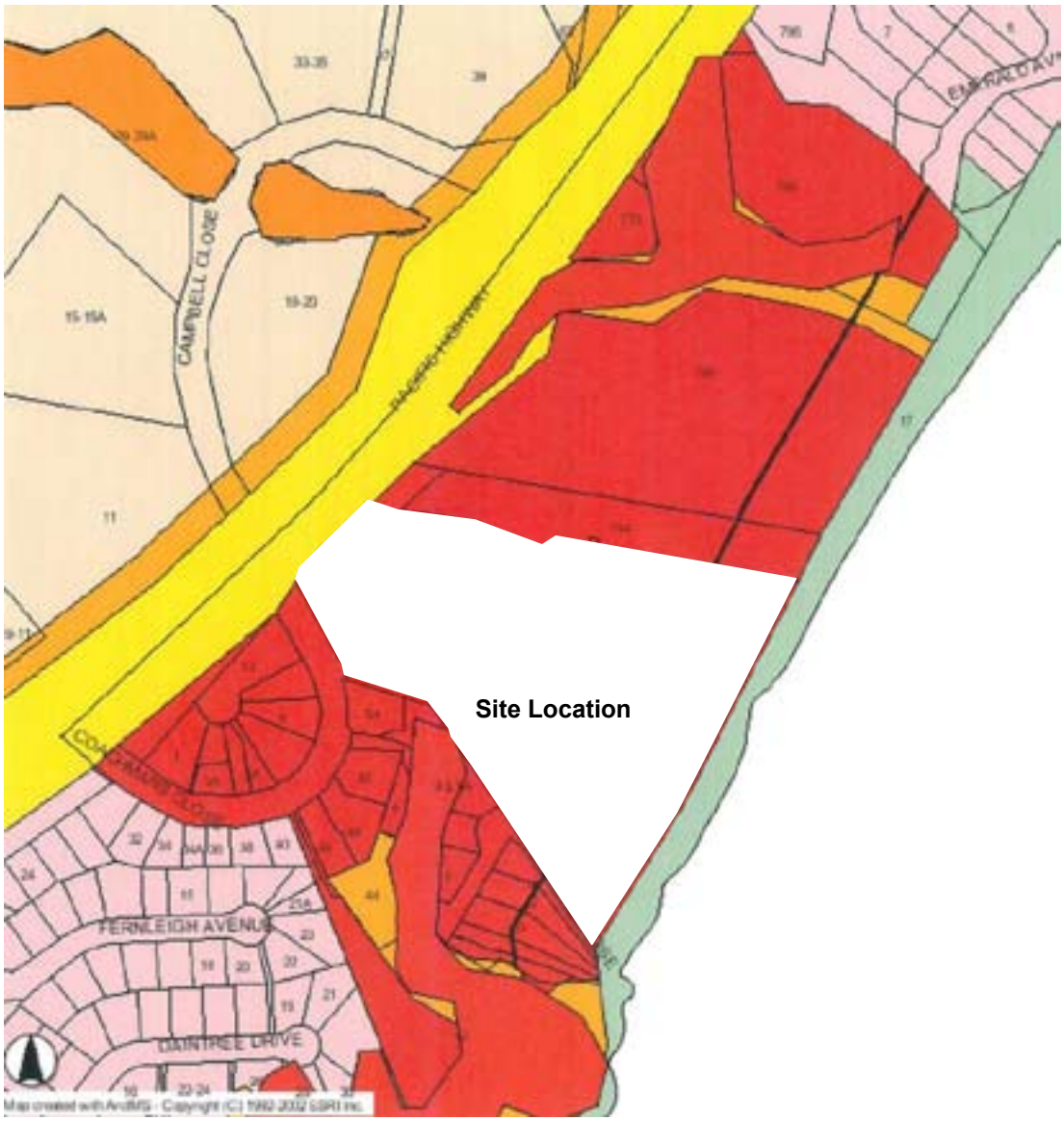
Figure 2-1 Site Location and Surrounding Landuses

Source: GoogleEarth. Accessed 8 August 2006

2.2 Road Network Characteristics

Traffic from the proposed development will access the Pacific Highway (State Highway 10) via the local access road to Pelican Beach Resort and Quality Resort Nautilus. The local road network is shown in Figure 2.2.

Figure 2-2 Site Location



Note: No access to site via Coachmans Close. Source: Coffs Harbour City Council LEP

2.2.1 Functional Road Classification and Local Road Hierarchy

The classification of roads on the existing road network can be used as an indication of the functional role each road plays with respect to the volume of traffic they should appropriately carry. The Roads and Traffic Authority (RTA) has developed a set of road hierarchy classifications detailed in Table 2.1 indicating typical nominal volumes expressed in terms of average annual daily traffic (AADT) served by various classes of roads.

Table 2.1 RTA Functional Classification of Roads

Type of Road	Traffic Volume (AADT)	Peak Hour Volume (vph)
Arterial Road	>15,000	1,500 – 5,600
Sub-Arterial Road	5,000 – 20,000	500 – 2,000
Collector Road	2,000 – 10,000	250 – 1,000
Local Road	<2,000	0 – 250

These classifications will be used in this study to assess the pre and post development capacity of roads in the vicinity of the proposed development.

Pacific Highway (State Highway 10)

The Pacific Highway provides the coastal link between Sydney and Brisbane and has been identified in the Commonwealth Government's AusLink planning as a primary interstate route. The Pacific Highway performs the function of an interstate, inter-regional and local connection at this location.

At the intersection to Pelican Beach Resort, the Pacific Highway is a divided dual carriageway with two lanes in each direction, each approximately 3.5 metres in width.

The RTA has identified pressures on the highway in this area and are developing the Coffs Harbour Pacific Highway Planning Strategy to address access issues and the mixing of local and through traffic. Details of ongoing consultation with the RTA in relation to this strategy are provided in Section 4.4.

Local Access Road to Pelican Beach Resort and Quality Resort Nautilus

A short road provides local access to Pelican Beach Resort, Quality Resort Nautilus and a residential apartment development. This road is a sealed two way road with a total carriageway width of approximately 5 metres.

Campbell Close

Campbell Close is located on the opposite side of the Pacific Highway to the proposed development and is a local access road servicing approximately six rural residential properties.

2.2.2 Existing Traffic Management Controls

The existing road network in the vicinity of the development site comprises a number of important traffic management features, as shown in Table 2.2.

Table 2.2 Existing Traffic Management Controls

Sign-Posted Speed Limits:
100 km/h speed limit along Pacific Highway; and
50 km/h speed limit along access to Pelican Beach Resort and Quality Resort Nautilus.
Give Way Control:
Intersection of Pacific Highway with Pelican Beach access and Campbell Close. Pacific Highway has priority.

Intersection of Pacific Highway with Local Access to Pelican Beach Resort and Campbell Close

The unsignalised intersection of Pacific Highway with access road to Pelican Beach Resort provides for all turning movements. The right turn into both Pelican Beach access and Campbell Close is facilitated via right turn lanes (into Pelican Beach access 150 m in length; into Campbell Close 90 m in length). The left turn into both Pelican Beach access and Campbell Close have a left turn lane provided (into Pelican Beach access 50 m in length; into Campbell Close 150 m in length).

2.2.3 Existing Road Condition

The Pacific Highway in the vicinity of the development site is of good quality. Some minor potholing and patching was observed at the commencement of the access road during an onsite inspection. The internal access within Pelican Beach Resort is constructed with inter-locking pavers and is in good condition.

2.2.4 Public Transport, Cycling and Pedestrian Access

Bus Services

An assessment of public transport in the Sapphire Beach area was undertaken by Samsa Consulting (2004): “Public transport in the surrounding area consists solely of bus services. In addition to various school bus services, Ryans Bus Service operates the main public bus service. This travels between Coffs Harbour, Woolgoolga and Grafton on weekdays, with approximately 6 services day. Sapphire and Moonee Beach are major stops along the route.

Although XPT train services operate along the North Coast Railway between Sydney and the North Coast, the closest stop is at Coffs Harbour. There are no further stops north until South Grafton.”

Discussions with Ryans Bus Service indicates that while no formalised bus stop is located on the highway in the vicinity of the location, buses will stop if safe to do so.

In addition to scheduled bus services many resorts in the area operate a courtesy shuttle bus service.

Pedestrian and Cyclist Facilities

Samsa Consulting (2002) also assessed pedestrian and cyclist facilities in the area: "Pedestrian and cyclist facilities are minimal in the area due to the sporadic nature of development, a high-speed road environment along Pacific Highway, and relatively long distances between communities.

It is understood that Coffs Harbour City Council is investigating a cycleway between Coffs Harbour and Woolgoolga, which, it is envisaged, would pass by the development site. Details of whether it would be on-street or off-street are unavailable."

Site inspections have revealed that there are currently no footpaths or cycleways from the area to adjacent communities.

2.3 Existing Peak Hour Traffic Volumes

Traffic volumes and related information have been collected from a number of sources:

- Pacific Highway traffic volumes counts undertaken from 29 May 2001 to 4 June 2001, sourced from Samsa Consulting (2004) "Pacific Bay Resort Development. Road Network and Traffic Assessment";
- Heavy vehicle usage of 10 per cent of total vehicles on the Pacific Highway, sourced from Connell Wagner (2002) "Coffs Harbour Highway Planning, Sapphire to Woolgoolga: Working Paper No. 8 – Traffic and Transport Assessment"; and
- Peak hour turning movements collected by GHD on 1 June 2006 and 6 June 2006 collected for the weekday time periods of 7.30 am to 9.30 am and 3.30 pm to 4.30 pm.

Traffic data was modified for its use in the aaSIDRA traffic. Heavy vehicles were assumed to be 10 per cent of total vehicles for the Pacific Highway.

It is noted that there is a high degree of uncertainty and variability in the existing traffic volumes collected. It is most likely that the existing traffic volumes shown in Figures 2.2 and 2.3 do not represent peak vehicle movements for this intersection. This is based on:

- **Time of year:** The intersection counts were undertaken on weekdays in June outside school holiday periods. Peak traffic volumes are expected on weekends in summer school holidays;
- **Resort occupancy:** The occupancy rate at Pelican Beach Resort was approximately 32% at the time the intersection survey was undertaken. However, the occupancy rates at Quality Resort Nautilus and the residential development are unknown at the time that the intersection survey was undertaken. On average, lower occupancy rates occur at the time of year that the intersection survey was undertaken; and
- **Contribution from each Development:** The intersection survey does not include the origin or destination of vehicles. Hence, the contribution of each development (Pelican Beach Resort, Quality Resort Nautilus and residential apartment development) cannot be determined.

The existing traffic volumes used in the aaSIDRA model are shown in Figure 2-3 and Figure 2-4 for the AM and PM peak respectively.

Figure 2-3 Existing (2006) AM Peak Traffic Volumes

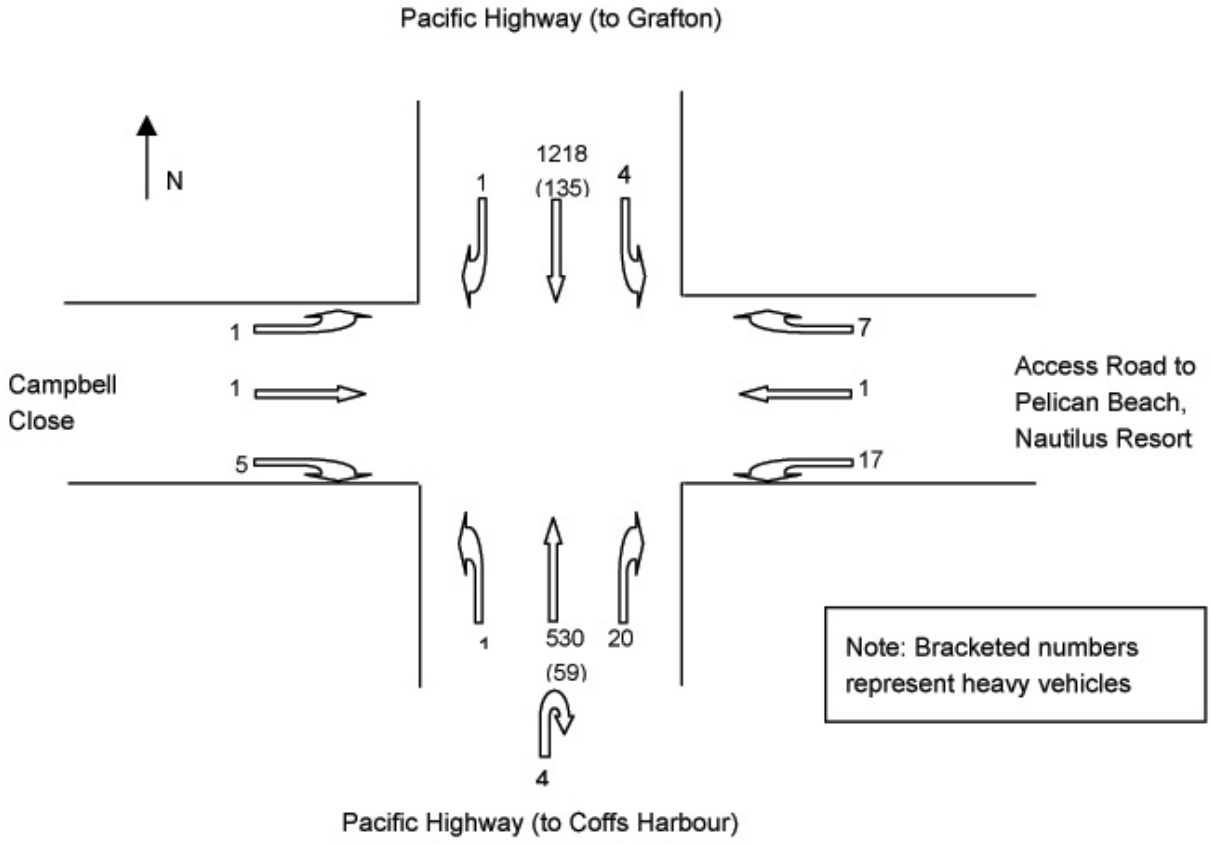
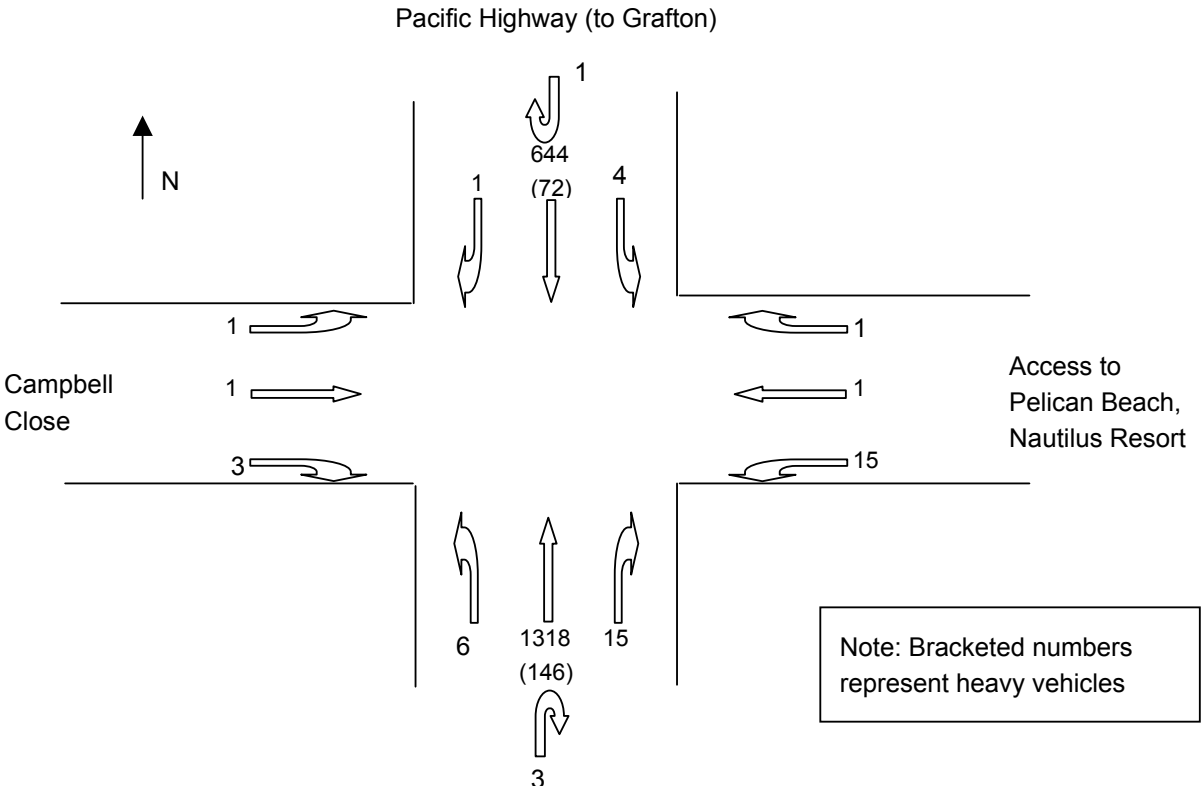


Figure 2-4 Existing (2006) PM Traffic Volumes



2.4 Existing Intersection Performance

The criteria for evaluating the operational performance of intersections is provided by the RTA's *Guide to Traffic Generating Developments 2002* and reproduced in Table 2.3. The criteria are based on a qualitative measure or level of service, which is applied to each corresponding average vehicle delay band.

Table 2.3 Performance Criteria for Intersections

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

Source: RTA Guide to Traffic Generating Developments 2002, Table 4.2.

Traffic volumes shown in Section 2.3 were assessed using the aaSIDRA traffic model to determine the existing peak hour operating performance for the intersection of the Pacific Highway and Pelican Beach Resort entrance. Results for the AM and PM peak period performance of this intersection are presented in Table 2.4.

Table 2.4 Existing Intersection Performance

Intersection Approach	Peak Period	Average Delay (seconds)	Level of Service (LoS)	Degree of Saturation (DS)	Comment
Pelican Beach Resort – east approach	AM	395.9	F	1	Capacity exceeded in AM peak in existing configuration. Poor operation with unacceptable delays in AM peak due to highway traffic volumes.
	PM	147.6	F	0.474	
Campbell Close – west approach	AM	48.6	D	0.093	Long delays particularly in PM, but considered acceptable as low-use local road.
	PM	197.0	F	0.250	
Pacific Highway – south approach	AM	28.0	B	0.169	Delays relate to right turn movement. DS refers to through highway movement. Good operation with spare capacity.
	PM	17.8	B	0.421	
Pacific Highway – north approach	AM	15.9	B	0.389	Delays relate to right turn movement. DS refers to through highway movement. Good operation with spare capacity.
	PM	29.5	C	0.206	
Overall	**AM**	**395.9**	**F**	**Overall intersection performance governed by east approach. Unacceptable delays due to high through traffic volumes.**	
	PM	**197.0**	**F**		

Notes

(a) The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.

(b) The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.

(c) The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.

The results given in Table 2.4 show that the intersection operates poorly during AM and PM peak periods on the highway. The poor performance is due to insufficient gaps for traffic turning at the intersection caused by high through traffic volumes on the highway. The results of the modelling indicate that the capacity of the exit to Pelican Beach resort is being exceeded during the morning peak. Output from aaSIDRA is contained in Appendix C. It is likely that the results given in Table 2.4 underestimate the peak scenario due to the reasons given in Section 2.3.

2.5 Existing Crash History

The five-year crash history provided by the RTA has been analysed to identify any historical crash trends from the location and type of crashes 800 metres either side of the intersection.

The crash data is provided in Appendix D and summarised in Table 2.5.

Table 2.5 Accident Analysis Summary

Location	Pacific Highway: Intersection to Pelican Beach Resort (+/- 800m)		
Time Period	1/10/2000 to 30/9/2005 (5 years)		
Total Number of Accidents	13		
	No. of Accidents	**No. of Fatalities**	**No. of Injuries**
Fatal Accidents	1	1	0
Injury Accidents	4		5
Non Injury Accidents	8		

Source: RTA 2006

As shown in the plot of reported crashes (Appendix D), there is no pronounced cluster of crashes.

There was one crash at the intersection to Pelican Beach Resort. This crash occurred at 7.15am on 24 June 2004 and involved a motorcycle being hit by an oncoming car as the motorcycle was turning into the Pelican Beach Resort access road. The crash resulted in fatal injuries to the motorcyclist and occurred in fine and dry conditions.

Pedestrians were injured in two separate accidents at locations away from the intersection. This indicates pedestrian activity in the area.

The crash history does not indicate a problem with the design of the road or intersection. This conclusion is supported by the variability in crash location and type.

3. Proposed Development

3.1 General Description

The proposed development would involve the demolition of the existing Pelican Beach Resort. The existing paved access road within the western end of the site would remain as the primary site access.

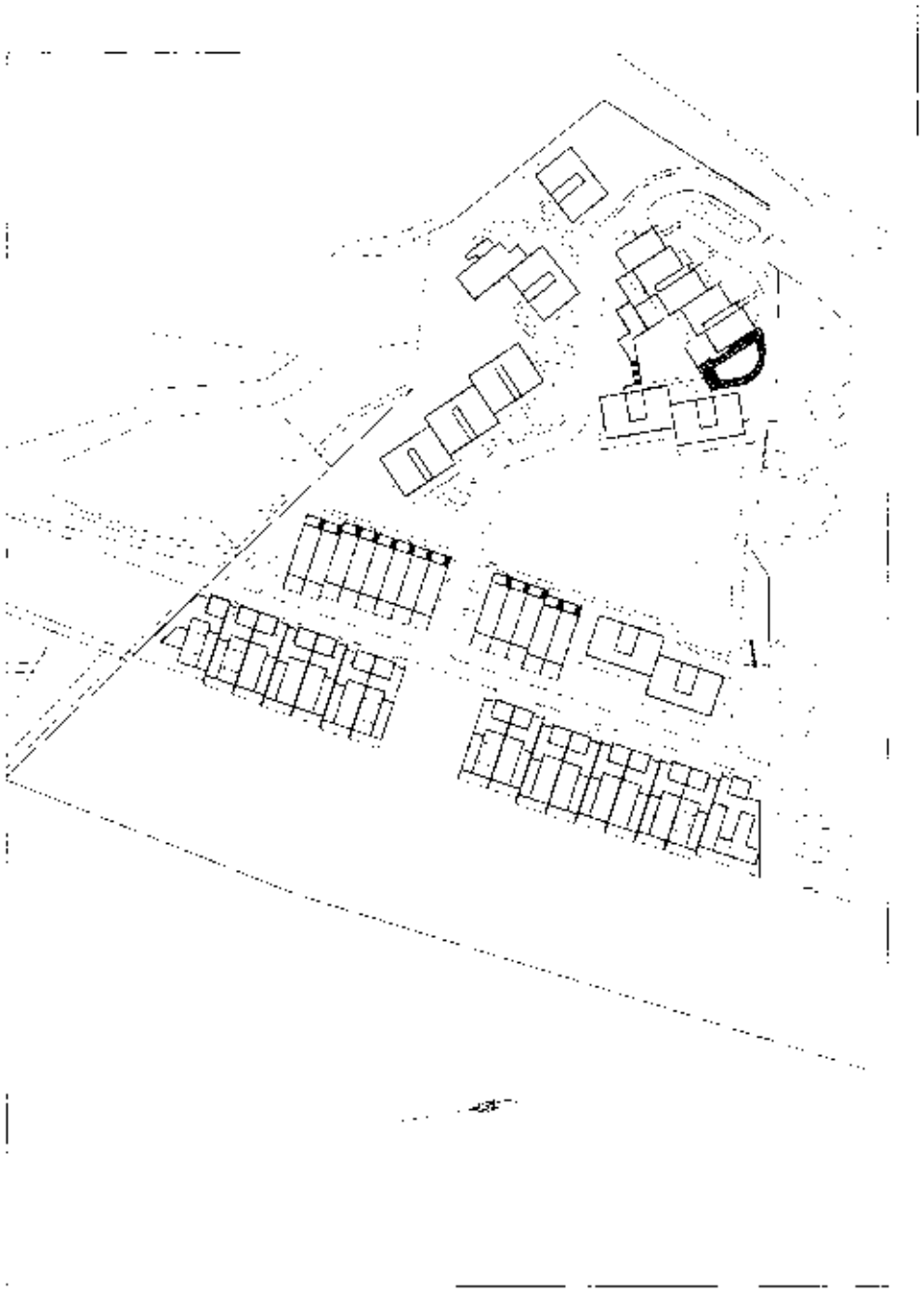
The proposed development is for the redevelopment of the Pelican Beach Resort to create an upmarket lifestyle resort catering for a mix of both permanent residents and tourists. The redevelopment of the site will be completed in stages with the early stages being built on the lower coastal section of the site. This will be followed by developing up the hill to the flat section adjacent to the Pacific Highway. Construction will be staged over four years (approximately 30 apartments, townhouses and/or houses per year).

At completion, it is expected that the development will comprises 117 dwellings, recreational/communal facilities and 234 car parks. The dwellings will consist of a mixture of apartments, town houses and houses. There will also be extensive areas of open space and retained vegetation on the site. The layout of the site is provided in Figure 3-1, below.

The houses will be located along the beachfront and consist of 2 storey, 3 bedroom structures. To the west of the houses a series of 2-3 bedroom town houses will be developed and up the hill to the flat section will be groups of 4 storey apartment complexes.

All apartments, townhouses and houses will have two car spaces and will be connected by a network of internal roads.

Figure 3-1 Site Layout



Source: Cox, 2006

3.2 Access

It is proposed that access to the site will be via the existing intersection of the Pacific Highway with Campbell Close and Pelican Beach access. It is likely that modifications would be required to the intersection to ensure an acceptable level of service (refer to Section 4).

Ongoing consultation will be required with the RTA to ensure that any interim modifications are acceptable and that long term access is considered in the RTA's Coffs Harbour Pacific Highway Planning Strategy (refer to Section 4).

3.3 Site Layout and Traffic Circulation

The existing access to Pelican Beach resort will be retained for access to the proposed development. Apartments will be serviced by a main internal road 7 metres wide with secondary roads 6 metres wide servicing groups of apartments/townhouses. The internal road network has been design to cater for service and emergency vehicles with a maximum grade of 16% (Road 1).

The existing road along the northern boundary (Road EX1) will be retained for a number of reasons, including:

- Secondary access in emergency situations;
- Easement in the favour of Council for access to sewer pumping station;
- Public access to beachfront and future Coffs Harbour Coastal Walk; and
- Bush fire access.

Requirements for bushfire access state a maximum 15 degree slope should be provided (Bushfire Safe, 2006). Road EX1 has a maximum slope over 23.5 m of 15.6 degrees, slightly over the requirements. Passing bays will be provided at each end. The road is bitumen sealed.

The detailed design phase will consider the following:

- Provision of a low speed environment on internal roads (<40 km/h and consideration to shared zones of 10 km/h);
- Provision of signage and linemarking at internal intersections (most likely give way control); and
- Internal routes for service and heavy vehicles (provision of adequate geometry, grades etc).

Site layout and long sections for internal roads are shown in Appendix E.

3.4 Parking

Standards for provision of car parking at new developments are set out in Coffs Harbour City Council's *Off Street Car Parking Development Control Plan*. The proposed car parking meets this document with two spaces provided per apartment (using Gross Floor Area greater than 100 m^2). The proposed development will have 234 car park spaces.

Consultation with the RTA has identified that motorists are parking along the Pacific Highway which raises safety concerns particularly in peak periods. The closure of the Pelican Beach Resort will remove its contribution to this observed issue, as adequate parking will be provided for residents, guests and staff within the proposed development.

Staff numbers are expected to change at the site due to the proposed development. Currently Pelican Beach Resort employs 26 full-time, 3 permanent part-time and between 50 and 70 casual staff depending on occupancy rates. This equates to between 45 and 50 full time equivalent staff. The proponent anticipates that the proposed development would lead to between 3 and 20 jobs being created, dependant on occupancy rates, following completion of the proposed development.

Currently there are a total of 110 car park spaces within Pelican Beach Resort, including three spaces for disabled persons, plus one space for a coach. There are also 24 car park spaces in front of the former restaurant at the front of the site which are also used by staff and guests of the resort.

4. Traffic Impact of the Proposed Development

This section will assess the traffic generation for the proposed redevelopment during both the construction and operation phases. The projected traffic generation of the proposed development has been estimated using the RTA (2002) *Guide to Traffic Generating Developments*.

4.1 Construction Stage Impacts

The construction of the development is proposed over an approximate four-year timeframe with the staged release of approximately 30 apartments/townhouses per year during this period.

4.1.1 General Description of Construction Activities

The first phase will be the demolition of the existing Pelican Beach Resort complex and the preparation of the site for construction activities. It is anticipated that the removal of materials during the demolition phase will correspond to the peak construction traffic generation.

The construction of Phase 1 of the four-stage development would then commence with the construction of drainage, roads and the provision of services. This would be followed by the first release of apartments, townhouses and houses.

It is likely that construction activities would occur from 7am to 6pm Monday to Friday and from 8am to 12pm Saturday with no work on Sunday or Public Holidays.

4.1.2 Access During Construction

Construction traffic would access the site through the intersection of the Pacific Highway with Pelican Beach Resort access. It is reiterated that traffic currently accessing the Pelican Beach Resort would no longer do so, hence whilst there will be an increase in heavy vehicle movements the impacts of this additional traffic would be minimised.

Following release of the first stage of the development, it is anticipated that internal light traffic would be separated from construction traffic for subsequent stages.

There is limited information available for the assignment of projected traffic generation during the construction period along the Pacific Highway. The disposal location for demolition materials is currently unknown. However it is assumed that the majority of deliveries and staff would travel to site from Coffs Harbour. Therefore it is anticipated that the majority of construction-generated traffic would access the site via a right turn into the Pelican Beach access road and exit the site via a left turn onto the highway.

4.1.3 Traffic Management During Construction

Traffic management controls will evolve throughout construction as staging of work progresses and shall be detailed in the construction stage Traffic Management Plan. The plan should particularly address the impacts of construction vehicles at the intersection with the Pacific Highway during morning and evening peak periods.

The control of site access will consist of appropriate traffic management equipment. Security fencing and gates would also be installed to prevent unauthorised access to the site outside of construction hours.

Parking for construction equipment and staff vehicles would be accommodated on site during construction in locations clearly separated from areas of work.

4.2 Post Development Traffic Impacts

4.2.1 Traffic Generation

Traffic volumes obtained for the existing situation were added to the development traffic volumes estimated using RTA (2002) *Guide to Traffic Generating Developments* based on the description of the development contained in PTW Planning (2006) *Sapphire Beach Development, Coffs Harbour - Preliminary Assessment for Concept Plan*.

The traffic volumes used in the aaSIDRA model are shown in Figure 4-1and Figure 4-2 for the AM and PM peak respectively. Details relating to the calculation of traffic generation and assignment and intersection survey results are shown in Appendix B. It has been assumed that traffic on the Pacific Highway increases at the rate of 3% per year.

Figure 4-1 Post Development (2010) AM Peak Traffic Volumes

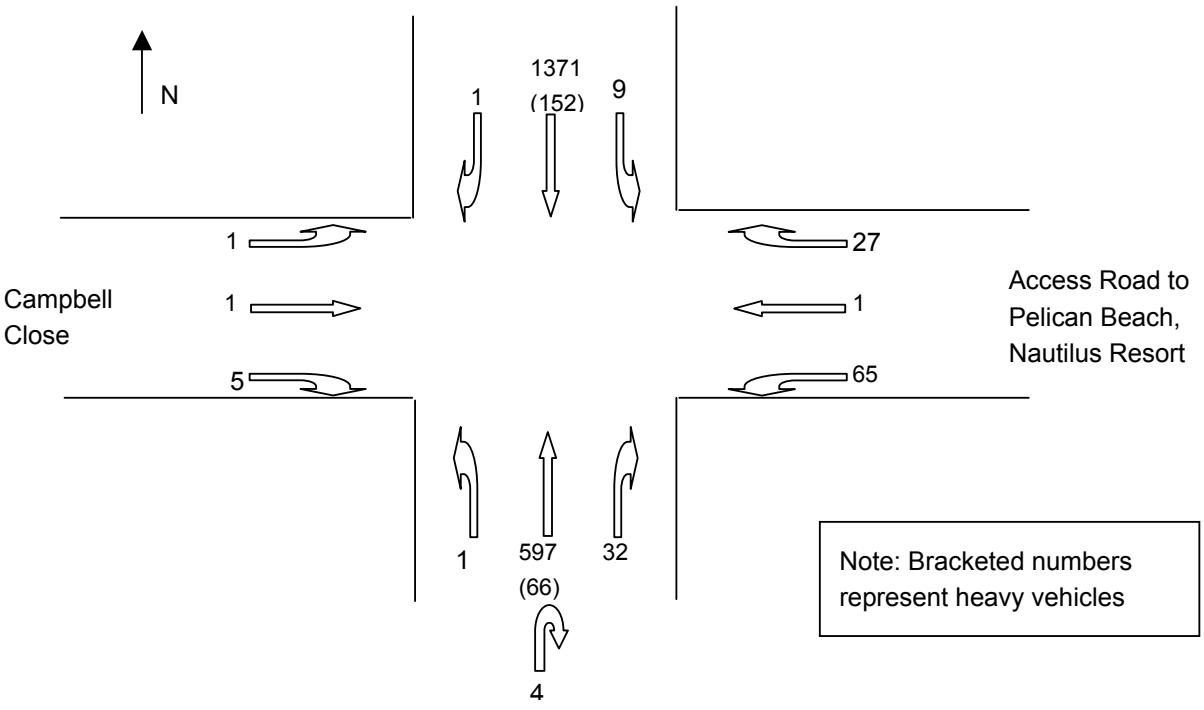
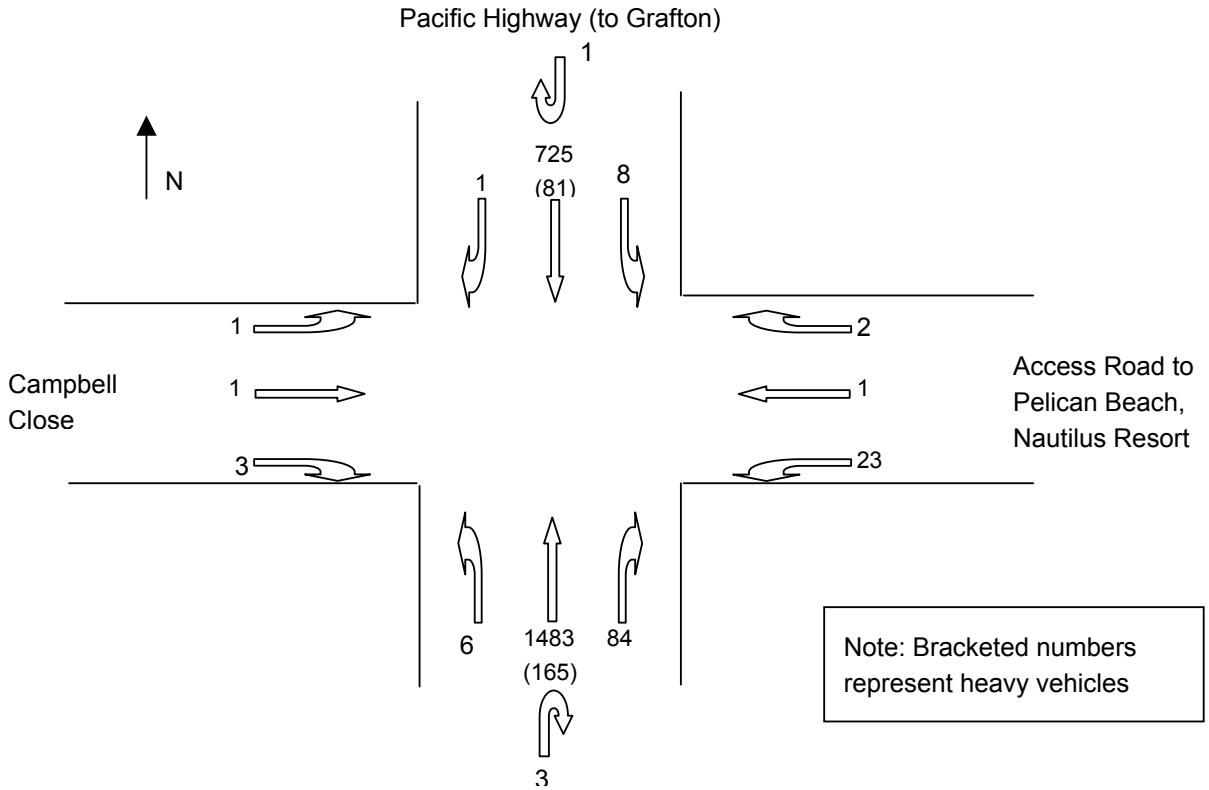


Figure 4-2 Post Development (2010) PM Peak Traffic Volumes



The calculation of traffic generation was based on a preliminary site layout of 151 dwellings comprising 120 one, two and three-bedroom apartments and 31 three-bedroom homes (refer to Appendix B). The development has since been refined to 117 dwellings including apartments, townhouses and houses.

The traffic volumes included in Figure 4-1 and Figure 4-2 do not include a reduction in the existing traffic volumes to take into account those vehicles that would no longer use the intersection following the closure of the Pelican Beach Resort. As discussed in Section 2.3, the contribution made by each existing development (Pelican Beach Resort, Quality resort Nautilus, residential apartments) could not be distinguished from the intersection survey.

Intuitively it was expected that traffic volumes following the completion of the proposed development would be similar to the existing volumes as the 114 room Pelican Beach Resort would be replaced by the proposed 117 dwelling development. However, the traffic volumes presented in Figures 4.1 and 4.2 are valid for the following reasons:

- **Calculation assumes 100% occupancy of proposed development:** The intersection survey was conducted when the existing Pelican Beach Resort had occupancy of approximately 32%. The calculation of traffic generation assumes 100% occupancy of all dwellings following completion of the final stage of the development;
- **Contribution from other developments:** It was likely that Quality Resort Nautilus had an occupancy rate similar to Pelican Beach Resort at the time of the intersection survey. The post-development traffic volumes include allowance for increased movements from other developments during peak season; and
- **Contribution from visitors and staff:** The calculation of post development traffic generation did not include staff or visitors.

The traffic volumes in Figures 4.1 and 4.2 are representative of peak season conditions that represent a 'worse-case' scenario.

4.2.2 Post Development Intersection Performance

Traffic volumes shown in Section 4.2 were assessed using the aaSIDRA traffic model to determine the post development peak hour operating performance for the intersection of the Pacific Highway and Pelican Beach Resort entrance. Results for the AM and PM peak period performance of this intersection are presented in Table 4.1.

Table 4.1 Post Development Intersection Performance

Intersection Approach	Peak Period	Average Delay (seconds)	Level of Service (LoS)	Degree of Saturation (DS)	Comment
Pelican Beach Resort – east approach	AM	623.8	F	1	Capacity of approach exceeded. Poor operation with unacceptable delays.
	PM	822.7	F	1	
Local Road – west approach	AM	102.6	F	0.2	Average delay in PM peak is unacceptable.
	PM	896.8	F	0.765	
Pacific Highway – south approach	AM	35.3	C	0.209	Delays relate to right turn movement. DS refers to through highway movement in PM peak. Acceptable operation with spare capacity.
	PM	20.4	B	0.474	
Pacific Highway – north approach	AM	16.4	B	0.438	Delays relate to right turn movement. DS refers to through highway movement. Acceptable operation with spare capacity.
	PM	36.4	C	0.232	
Overall	**AM**	**822.7**	**F**	**Overall intersection performance governed by east approach. Unacceptable delays due to high through traffic volumes. Intersection is not functioning in existing layout. Restrictions to movements or alternative control are required.**	
	PM	**896.8**	**F**		

Notes

(a) The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.

(b) The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.

(c) The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.

The results given in Table 4.1 show that the intersection operates extremely poorly during AM and PM peak periods on the highway. The poor performance is due to insufficient gaps for traffic turning at the intersection caused by high through traffic volumes on the highway. The results of the modelling indicate that the capacity of the access road to Pelican Beach Resort and Quality Resort Nautilus is being exceeded during the both the AM and PM peak periods. The restriction to movements at the intersection or an alternative form of control is required as modelling indicates that it would not function adequately following construction of the proposed development. Output from aaSIDRA is contained in Appendix C.

4.2.3 Consultation with RTA

GHD have undertaken preliminary consultation with the RTA in regard to access issues to the Pacific Highway. The RTA is currently formulating the Coffs Harbour Pacific Highway Planning Strategy and has prepared a number of options for improvements to the highway. These were presented to members of the project team on 25 May 2006 at Coffs Harbour City Council.

Since the meeting consultation has occurred primarily by telephone and email. The RTA has not selected a preferred option or construction staging methodology at the time of writing this report. It is understood that the upgrade program may also be staged over a number of years leading to the implementation of the ultimate strategy.

The provision of interim and long-term access to the highway will be formulated through ongoing consultation with the RTA and representatives of other properties that utilise the intersection.

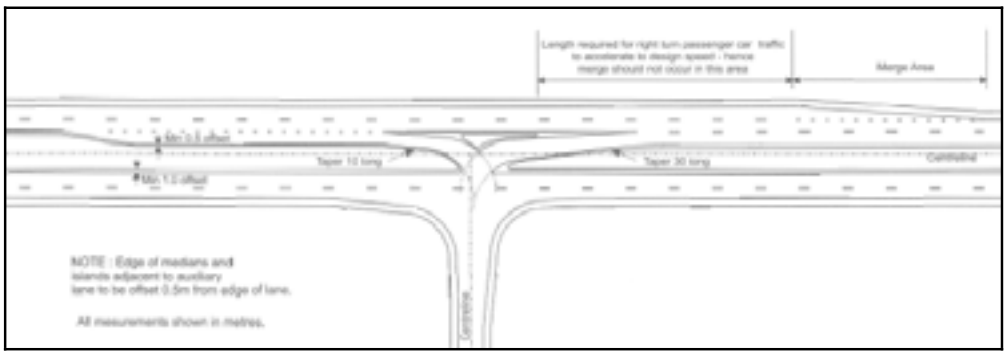
4.2.4 Potential Intersection Upgrade Options

Preliminary estimates indicate that commencement of the upgrade of the Pacific Highway at Sapphire Beach may commence in 2010. At this time it is envisaged that construction of the proposed development would commence in 2007 with the first release of 30 dwellings in 2008. This would therefore lead to finalisation of the proposed development in 2011. Hence it is likely that any upgrade of the intersection could be incorporated into the development of the RTA's Coffs Harbour Pacific Highway Planning Strategy.

Interim measures may be required, particularly if a delay occurs with the development and implementation of the RTA's planning strategy. Interim measures have not been formally discussed with the RTA at the time of writing, however options identified by GHD include:

- Construct a continuous median at the intersection to provide left-in, left-out movements for Campbell Close and Pelican Beach Resort access. Consideration is to be given for U-turn facilities either side of this location;
- Restrict movements from Campbell Close and Pelican Beach Resort access to left only. Again, consideration is to be given for U-turn facilities either side of this location; and
- Provide a "seagull" intersection layout as shown in Figure 4.3. This would eliminate the cross highway movement at the intersection in addition to limiting access to/from Campbell Close to left in, left out. The provision of this arrangement is included in one of the two upgrade options developed by the RTA as part of the Coffs Harbour Pacific Highway Planning Strategy.

Figure 4-3 Right Turn "Seagull" Intersection Treatment



4.3 Provision for Public Transport, Pedestrians and Cyclists

4.3.1 Bus Services

In the event that a review of the operation of the proposed development highlights a need for improved bus services, the following options would be pursued:

- The operator of the development would liaise with Coffs Harbour City Council and local bus operators for the provision of a formalised bus stop and shelter for use predominantly by permanent residents; and
- The operator of the development would liaise with other tourist accommodation providers in the area for the provision of a courtesy bus. It is envisaged that this service would provide links to the Coffs Harbour Central Business District and airport.

4.3.2 Pedestrian and Cyclist Facilities

The following measures will be undertaken to cater for pedestrians and cyclists:

- Provide cycle parking for residents and guests;
- Maintain public pedestrian access to the beachfront via the northern access road (Road EX1). This will inturn provide access to the planned Coffs Harbour Coastal Walk; and
- Provide off-road pedestrian access between the proposed development and Coachmans Close.

5. Conclusions

The Preliminary Traffic Study indicates that the intersection of the Pacific Highway and Pelican Beach Resort Entrance currently operates with a level of service F during peak periods. This is as a result of the inability of vehicles to exit the Pelican Beach resort entrance (east approach) primarily due to the volume of through traffic on the Pacific Highway. Traffic from other developments in the area also contributes to the existing situation, including traffic accessing the Quality Resort Nautilus and the existing residential apartment development.

Modelling of the existing intersection layout with projected post development traffic volumes and an assumption that traffic volumes on the highway will increase by 3 per cent per year indicates that the intersection would operate with an extremely poor level of service and would require modification. This would be required as delays have become excessive and the capacity of the east approach is being exceeded in the AM and PM peak periods.

Ongoing consultation with the RTA will aim to provide both interim and long-term access to the proposed development from the Pacific Highway. Access arrangements would consider the RTA's Coffs Harbour Pacific Highway Planning Strategy and involve other landowners that use the intersection. The preparation of a Construction Management Plan, incorporating a Traffic Management Plan, for the proposed development will assist in the consultation process.

The detailed design phase will consider the provision of a low speed environment within the development, the provision of signage and linemarking at internal intersections and provision of adequate geometry and grades for service and heavy vehicles.

Parking for the proposed development has been provided to satisfy the Coffs Harbour City Council *Off Street Car parking DCP*. A total of 234 car parks are proposed.

Pedestrian access would be maintained to the beachfront via the northern access road (Road EX1). This will provide ongoing access to Council to the sewer pumping station and public access to the future Coffs Harbour Coastal Walk. A pedestrian access path will also be provided from the proposed development to Coachmans Close.

6. References

- Bushfire Safe (2006) *Bushfire Risk Management Plan.* Access requirements
- Coffs Harbour City Council *Off Street Car Parking Development Control Plan*
- Connell Wagner (2002) *Coffs Harbour Highway Planning, Sapphire to Woolgoolga: Working Paper No. 8 – Traffic and Transport Assessment*. Heavy vehicle percentage of 10 per cent of total vehicles on the Pacific Highway
- GHD (2006) *Sapphire Beach Development - Traffic Survey*. Peak hour turning movements collected on 1 June 2006 and 6 June 2006
- PTW Planning (2006) *Sapphire Beach Development, Coffs Harbour. Preliminary Assessment for Concept Plan*. Development description
- RTA (2002) *Guide to Traffic Generating Developments*
- RTA (2006) *Coffs Harbour Pacific Highway Planning Strategy*. Concept plans
- Samsa Consulting (2004) *Pacific Bay Resort Development. Road Network and Traffic Assessment*. Pacific Highway traffic volumes counts undertaken from 29 May 2001 to 4 June 2001

Appendix A

Photographs

29 May 2006

PHOTOGRAPHS

PROJECT	Sapphire Beach Development – Intersection Assessment	**JOB N^{O}**	22/12787
CLIENT	Attentus	**DATE**	29 May 2006
TAKEN BY	Brett Algie		
FILE PATH FOR ORIGINALS		G:\22\12787\ Site Photos\2006 05 29	

Photograph 1 Facing north in front of Pelican Beach Resort

Photograph 2 Across to Campbell Close

Photograph 3 facing north from median

Photograph 4 Facing south - Pelican Beach Resort entrance

Appendix B

Calculations

Traffic Generation and Assignment

Intersection Survey

GHD

www.ghd.com.au
ntlmail@ghd.com.au
Tel. (02) 4979 9999 Fax. (02) 4979 9988
352 King Street Newcastle NSW 2300

Client: Attentus Projects and Properties Pty Ltd
Title: Sapphire Beach Development - Post Development Traffic Generation and Assignment
Job No: 22/12787

Traffic Generation

Development	Description	Number	Trips per peak hour	Total trips per peak hour
Apartment Accommodation	One Bedroom	60	0.4	24
	Three Bedroom	30	0.65	19.5
	Two Bedroom	30	0.5	15
Beachfront Housing	3 Bedroom Homes	18	0.85	15.3
Semi-Beachfront Housing	3 Bedroom Homes	13	0.85	11.05
			TOTAL	84.85

Traffic Assignment

No traffic generated would travel internally within the proposed development. This assumption was based on the relatively small footprint of the development and no proposed shops or schools being proposed on the site. It has been assumed that all internal travel would be done by walking or cycling.

All traffic generated by the proposed development would access the Pacific Highway: 85 trips during weekday peak hours.
The traffic split has been based on existing observations at the intersection:

For AM peak: 70% to/from the south (Pacific Highway): 60 trips
30% to/from the north (Pacific Highway): 25 trips

For PM peak: 90% to/from the south (Pacific Highway): 77 trips
10% to/from the north (Pacific Highway): 8 trips

It is assumed that the AM peak directional split would be 80% exiting and 20% entering.
The reverse would occur in the PM peak; 20% exiting and 80% entering.

Traffic Growth

For the purpose of this assessment, it has been assumed that the project will be fully developed in 2010. Traffic on the Pacific Highway has been assumed to increase at the rate of 3% per annum over this period.

Peak hour traffic on the Pacific Highway in the vicinity of the proposed development was obtained from Samsa Consulting (2004) "*Pacific Bay Resort Development. Road Network and Traffic Assessment*".

Pacific Highway Peak Hour Traffic Volumes 2004

Peak	Direction	
	Northbound	Southbound
AM	555	1,275
PM	1,380	675

Year 2004

Pacific Highway Peak Hour Traffic Volumes 2006

Peak	Direction	
	Northbound	Southbound
AM	589	1353
PM	1464	716

Year 2006
Growth 3 % p.a.

Pacific Highway Peak Hour Traffic Volumes 2010

Peak	Direction	
	Northbound	Southbound
AM	663	1523
PM	1648	806

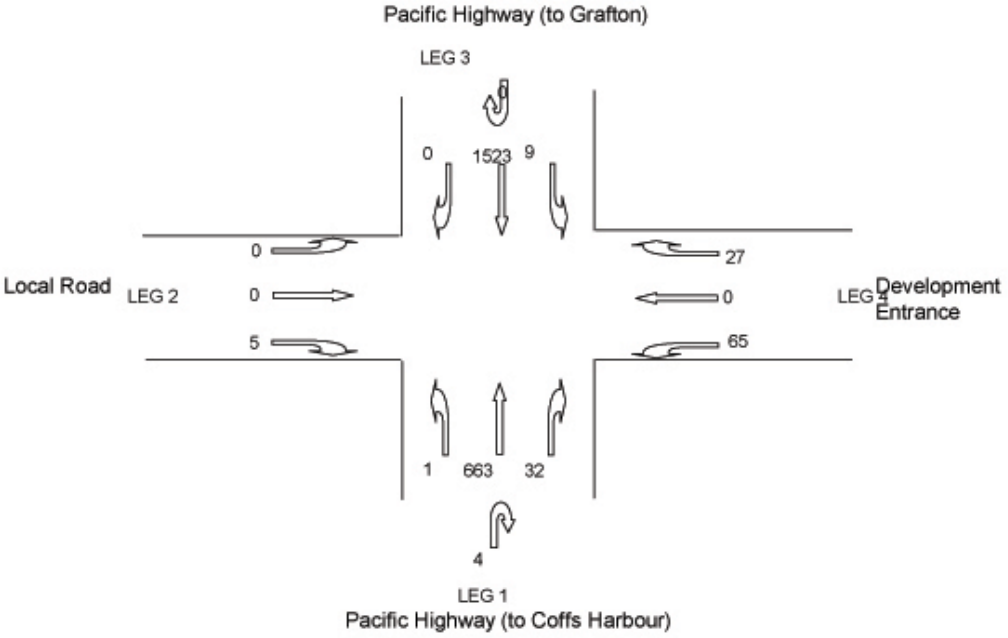
Year 2010
Growth 3 % p.a.

GHD

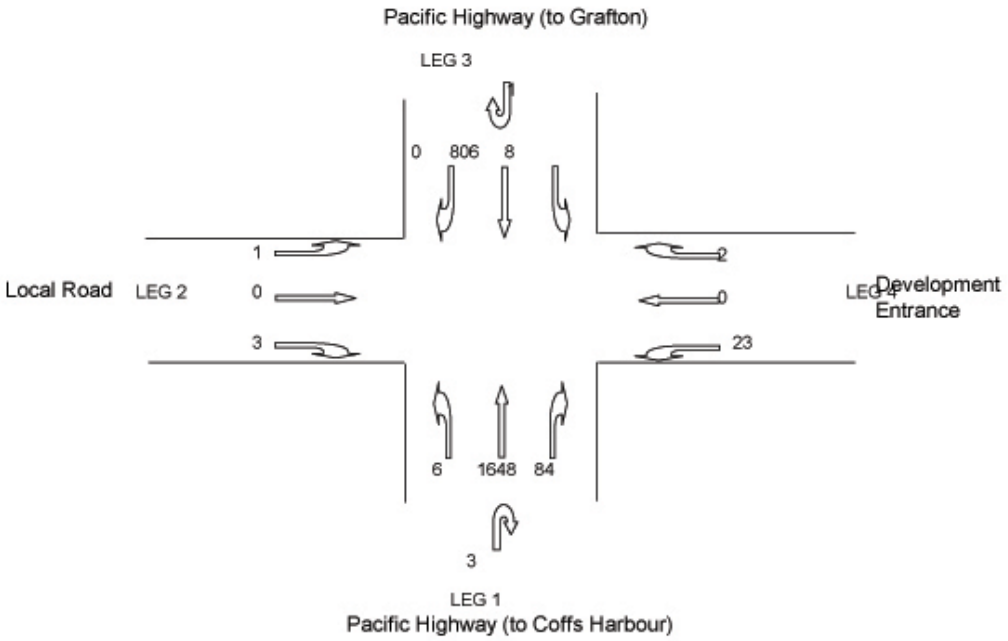
www.ghd.com.au
ntlmail@ghd.com.au
Tel. (02) 4979 9999 Fax. (02) 4979 9988
352 King Street Newcastle NSW 2300

Post Development Peak Hour Traffic Volumes in 2010

AM



PM



GHD

Tel: (02) 4979 9999 Fax: (02) 4979 9988
PO Box Street Newcastle NSW 2300

Client: Ishmitas Projects and Properties (Pty Ltd
Title: Traffic Survey – Pacific Highway and Pelican Beach Resort Entrance
Job No: 22/12707

Location: Pacific Highway / Pelican Beach Resort
Survey Type: Intersection Count

Weather: _____

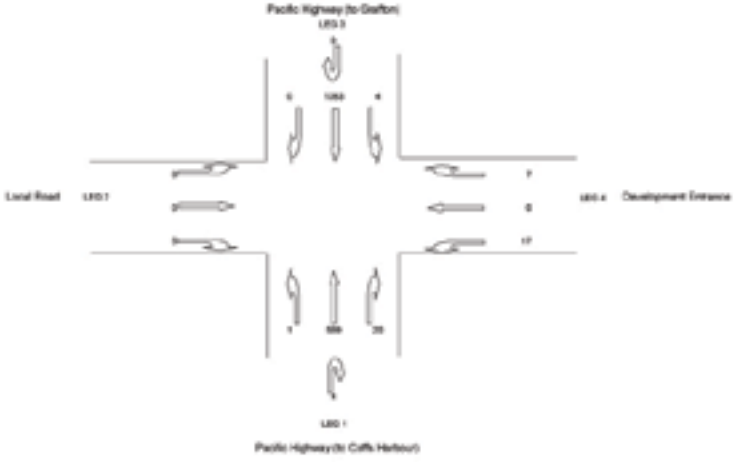
Surveyor: Scott Wyatt

Date: _____
am 6/6/06

A 'U' turns also north to south

Time Period	Vehicle Movement																								Totals
	1 to 2				2 to 4				2 to 3				3 to 4				3 to 1				4 to 1				4 to 3				
	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	
7:30 - 8:00					6				4								4				5				1				19
8:00 - 8:30					7				11								3				8				2				31
8:30 - 9:00	1				3				10								1				8				2				25
9:00 - 9:30					1				6								4				11				0				26
SUM	1	0	0	0	17	0	0	0	31	0	0	0	0	0	0	0	12	0	0	0	32	0	0	0	5	0	0	0	101
	1				17				31				0				12				32				5				

Time Period	Vehicle Movement																								Totals		
	1 to 2				2 to 4				2 to 3				3 to 4				3 to 1				4 to 1				4 to 3						
	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	LV	HV	AV	BD	Total	Light	Heavy
7:30 - 8:30	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	0
8:00 - 9:00	1	0	0	0	8	0	0	0	31	0	0	0	0	0	0	0	7	0	0	0	19	0	0	0	2	0	0	0	69	67	2
8:30 - 9:30	1	0	0	0	4	0	0	0	31	0	0	0	0	0	0	0	8	0	0	0	27	0	0	0	4	0	0	0	76	74	2



GHD

www.ghd.com.au
nsw.mail@ghd.com.au
Tel: (02) 4979 0999 Fax: (02) 4979 9988
240 King Street Newcastle NSW 2300

Client: Mirvac Projects and Properties Pty Ltd
Title: Traffic Survey - Pacific Highway and Pelican Beach Resort Entrance
Job No: 33/21797

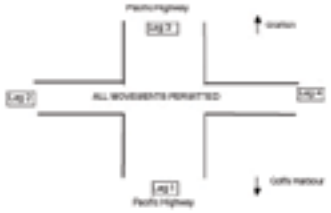
Location: Pacific Highway / Pelican Beach Resort
Survey Type: Intersection Count

Weather: _____

Surveyor: Scott Kipp

Date: pm 14/9/06

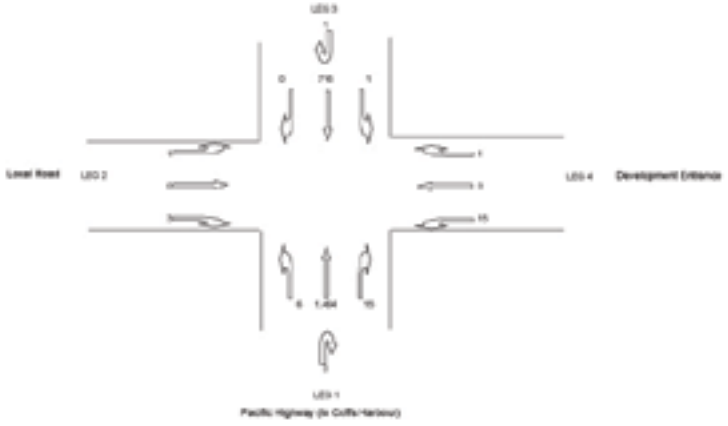
3 V Lane also north to south
1 V Lane also south to north



Time Period	Vehicle Movement																								Totals
	1 to 2				1 to 4				1 to 3				2 to 3				3 to 2				2 to 1				
	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	
16:30 - 16:00	1				1				3				3				1				2				25
16:00 - 16:30					1				4				1								2				14
16:30 - 17:00	1				1				3				1								1				24
17:00 - 17:30									4												2				16
SUM	2	0	0	0	3	0	0	0	14	0	0	0	5	0	0	0	1	0	0	0	7	0	0	0	
	2				3				14				5				1				7				79

Time Period	Vehicle Movement																								Totals		
	1 to 2				1 to 4				1 to 3				2 to 3				3 to 2				2 to 1						
	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	LV	HVs	AVs	BD	Total	Light	Heavy
16:30 - 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pacific Highway (to Grafton)



Pacific Highway (to Coffs Harbour)

Appendix C

aaSIDRA Output

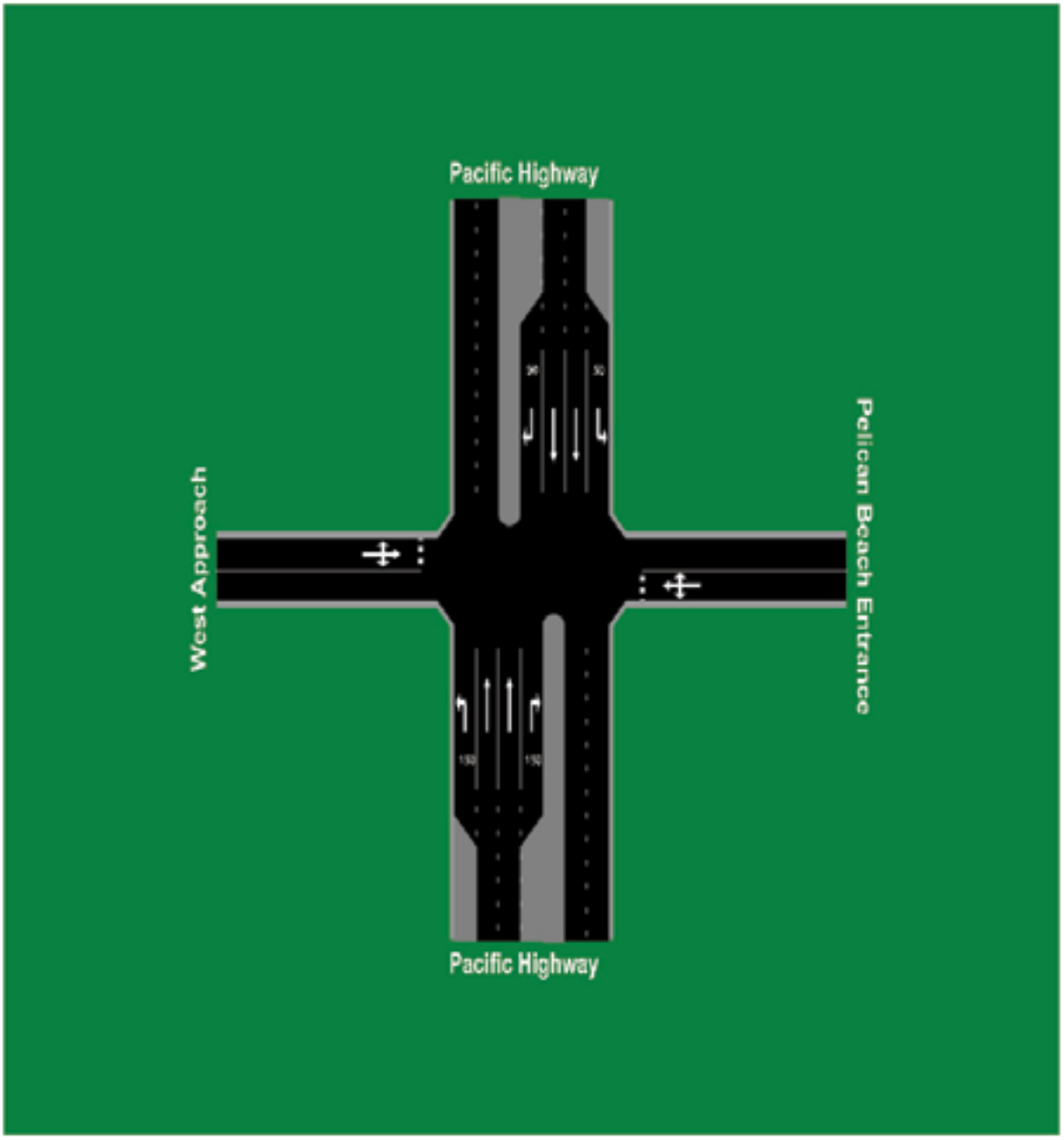
Existing traffic volumes (2006)

Post-development traffic volumes including traffic growth on highway (2010)

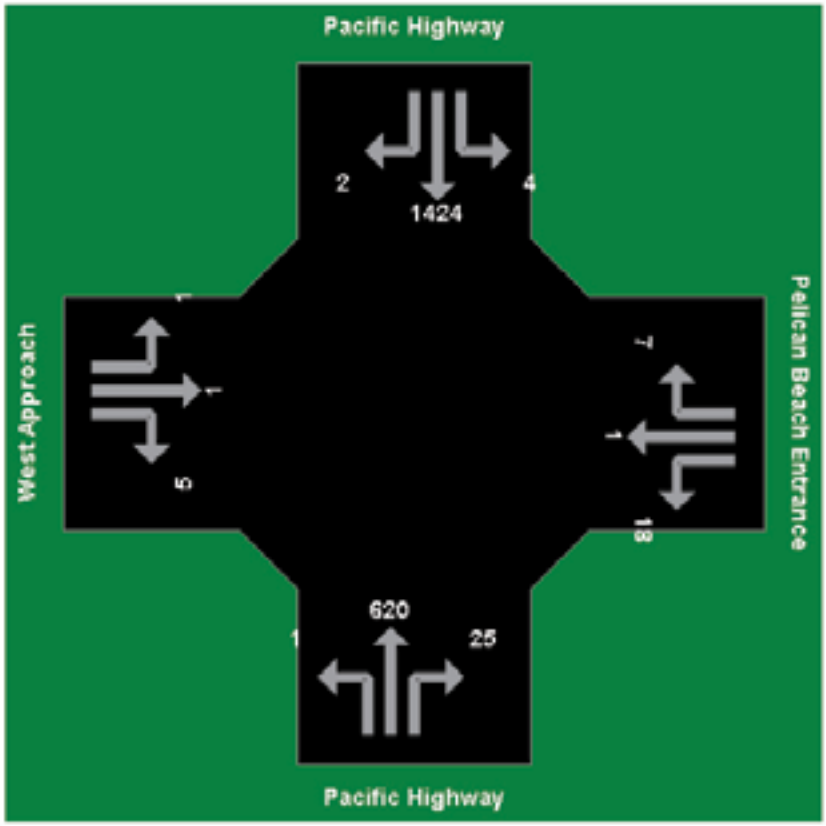
Pacific Highway and Pelican Beach Entrance, Sapphire

Existing AM Peak

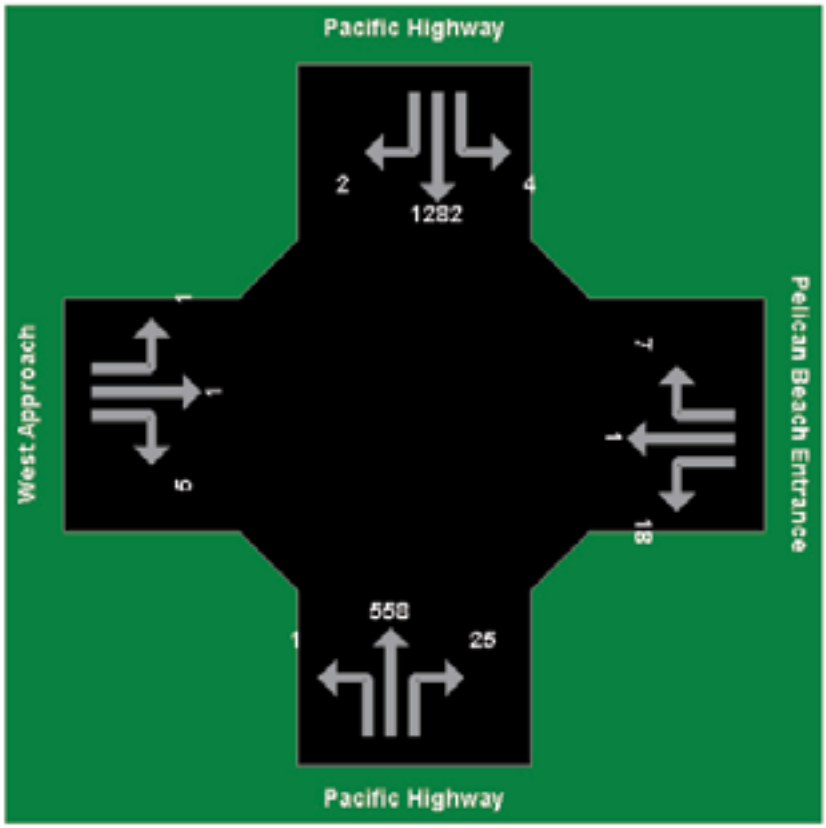
Geometry



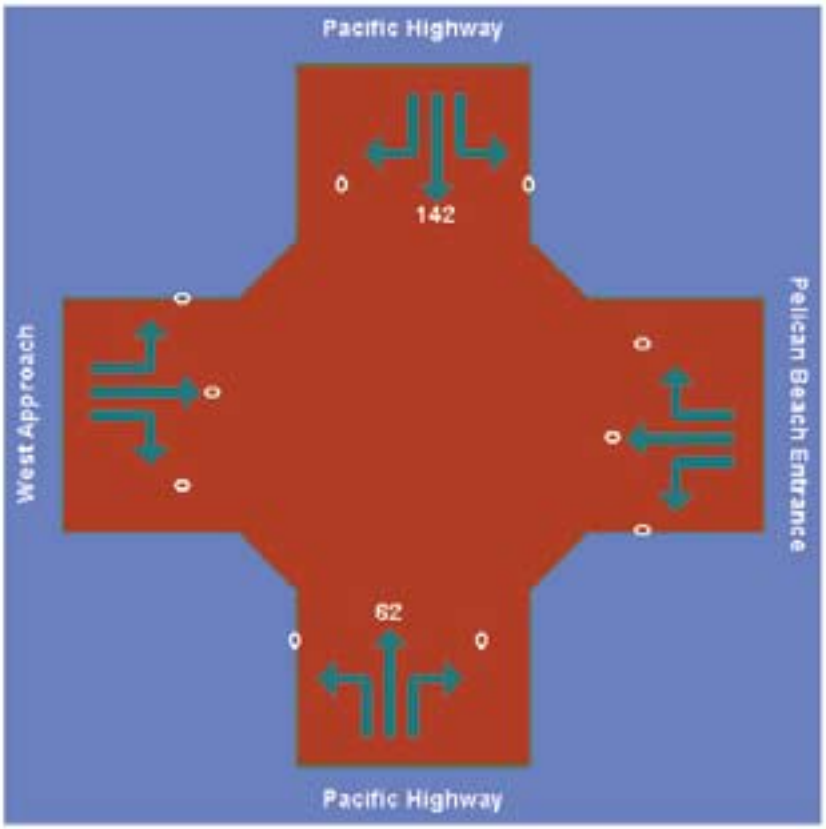
Demand Flows - Total



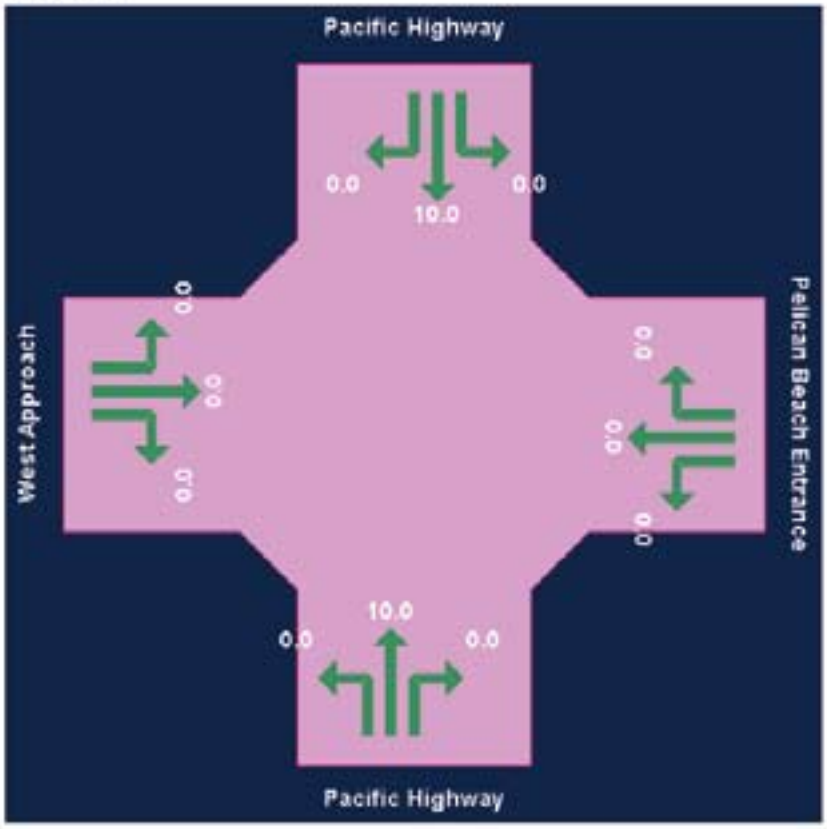
Demand Flows - Light Vehicles



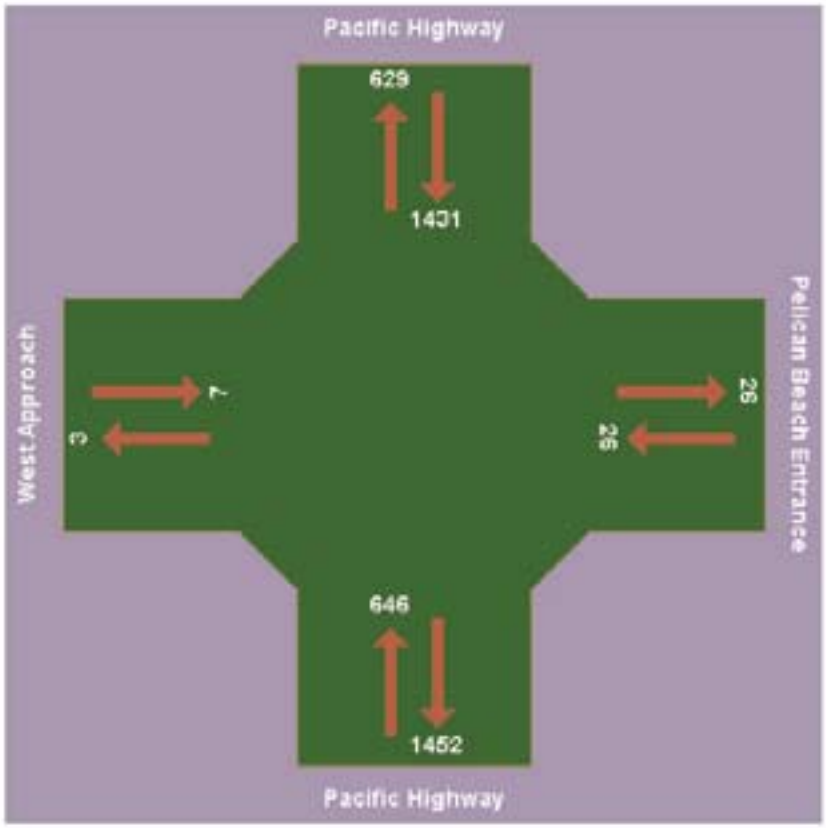
Demand Flows - Heavy Vehicles



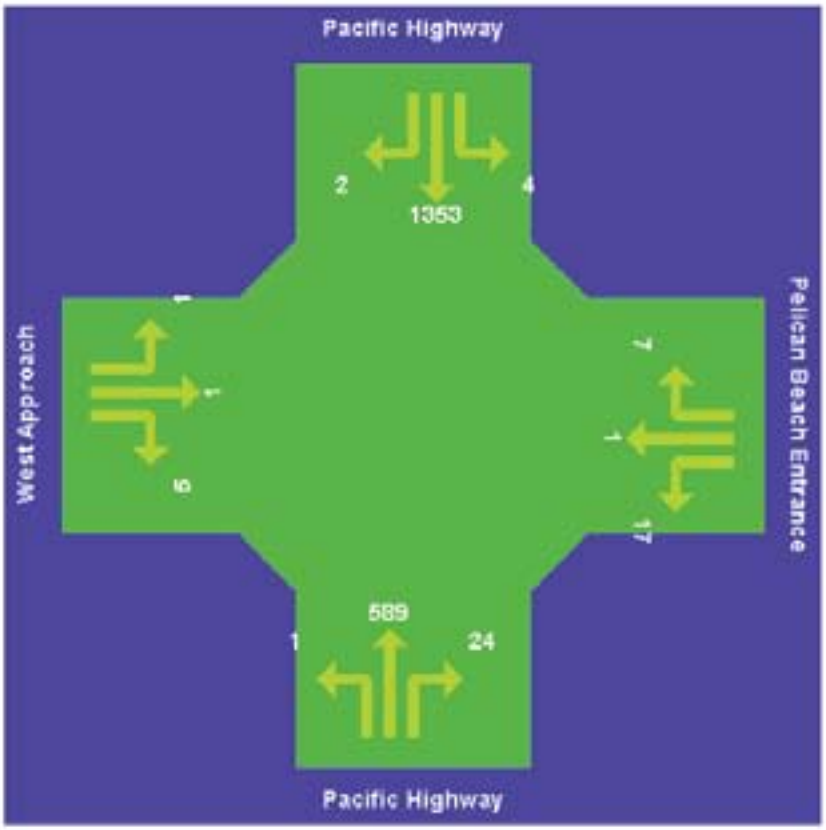
Percent Heavy Vehicles



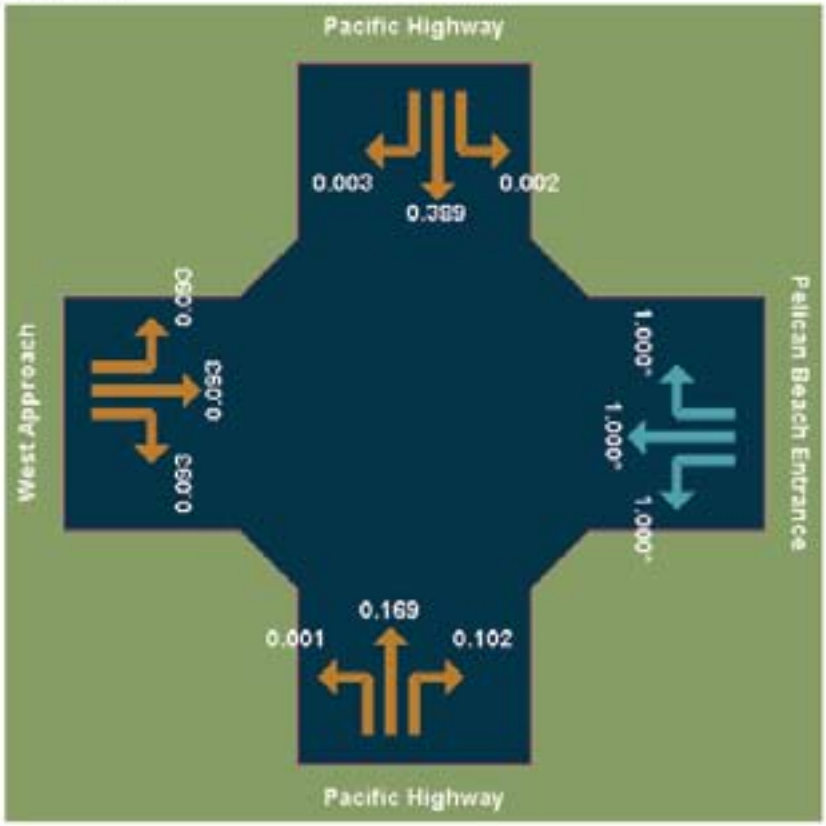
Approach, Circulating and Exiting Flows



Input Volumes



Degree of Saturation



Control Delay (Average)