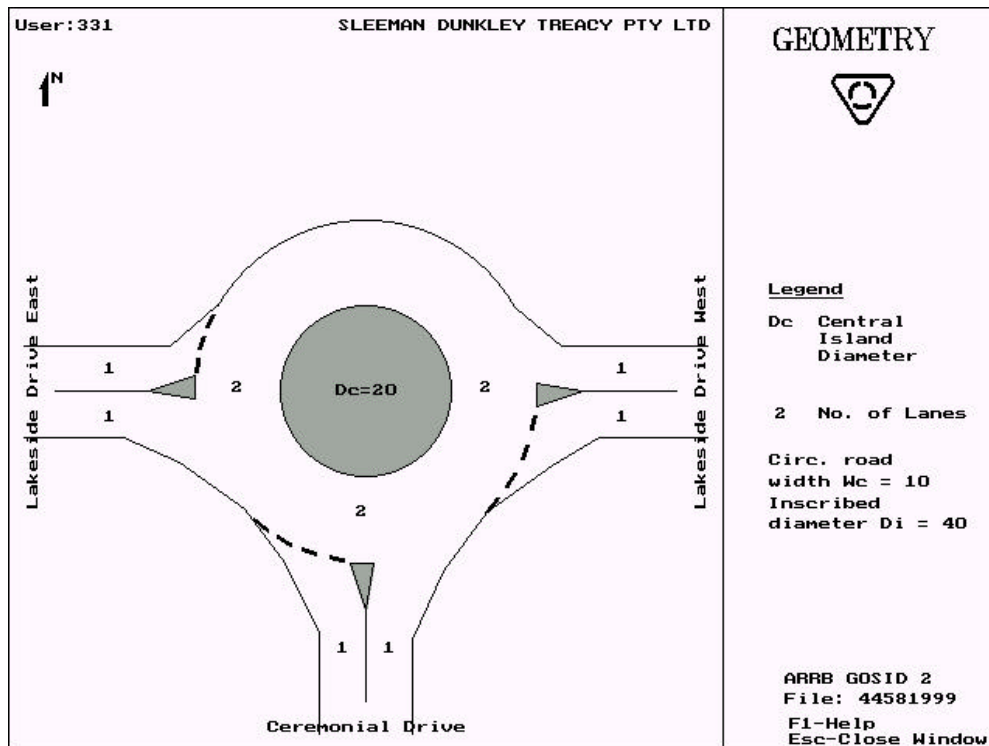


Appendix B Traffic Study

B.1 Introduction

A new access is proposed for the Northern Territory University intersecting Lakeside Drive adjacent to the existing Sports Oval, Lot 9260 - Town of Darwin. Sinclair Knight Merz was commissioned to assess the potential traffic impacts of the access arrangement on the existing Lakeside Drive Traffic.

The arrangement proposed is a 20m diameter roundabout with two circulating lanes. Refer to the diagram below.



B.2 Traffic Generation

The traffic generation is based on traffic counts undertaken at the NTU in August 1996. A distribution of traffic was derived from simultaneous movement records for each of the existing University entrances.

Peak traffic data was analysed for forecast growth based on increases in the equivalent full time student units (EFTSU'S) obtained from the NTU Master Plan Traffic Study by Pak Poy Lange Pty Ltd.

The traffic volume has been updated with vehicle counts for Lakeside Drive from April 1999 and the distribution from 1996 has been adopted for vehicles using the new entrance.

The new entrance would be the second entrance off Lakeside Drive. To simulate the worst case, the distribution to the existing entrance was applied to the new entrance as if the existing one was removed.

The present traffic generation distributed per the 1996 study is shown in Table 2.1 below.

TABLE 2.1 – PRESENT TRAFFIC GENERATION

MOVEMENT	am PEAK	pm PEAK
Left turn from Ceremonial Drive	13	68
Right turn from Ceremonial Drive	53	150
Left turn into Ceremonial Drive	530	215
Right turn into Ceremonial Drive	48	31
East bound on Lakeside Drive	596	567
West bound on Lakeside Drive	408	515

B3. Traffic Assignment - Proposed Development

B.3.1 Access Locations

Traffic access to the development is proposed at the location as shown on the attached Illustrative Plan.

The access to Ceremonial drive from Lakeside Drive will be a roundabout arrangement. The purpose of Ceremonial Drive is to provide an alternate entrance and landscaped feature to the University to link up with the South Ring-road in the vicinity of the proposed new Great Hall.

The volume of traffic using this entrance is not anticipated to greatly affect the flow of traffic along Lakeside Drive with a 2 lane roundabout.

In view of the recent concerns regarding excessive speed and reduction of accidents along Lakeside Drive, the roundabout would be a positive traffic calming influence.

B.3.2. Traffic Distribution Scenarios

Distribution of traffic from the University access was assessed by considering the impact of the generated traffic on existing traffic at the peak activity time for the University. As the distribution and varying the contribution to am and pm peak directions to examine the sensitivity.

To demonstrate this, 2 runs were made, one at the 1996 split between left and right turns and the second at projected 10 year volumes to enhance the worst case of opposing turn movements.

Based on projected EFTSU growth an increase of 26% is expected.

The distribution is shown in Table 3.1 below.

TABLE 3.1 - DEVELOPMENT TRAFFIC DISTRIBUTION

	Generation	Left Turn (from Ceremonial Dr)		Right Turn (from Ceremonial Dr)	
		am Peak	pm Peak	am Peak	pm Peak
Run 1	1999	13	68	53	150
Run 2	2009	16	86	67	189

B.4 Perimeter Road Traffic

B.4.1. Lakeside Drive

Traffic on Lakeside Drive, was 11,613 vehicles per day (vpd.) in April 1999 (both directions) with an am peak flow of 408 v.p.h and pm peak flow of 515 v.p.h heading West and an am peak flow of 596 v.p.h and a pm peak flow of 567 v.p.h heading East.

The Lakeside Drive Street catchment is well developed under the current zoning and increases in the traffic are not expected to be great. The only source of traffic growth will be via increases in student enrolment at the University.

For this study we have adopted a nominal 2% increase in traffic for analysis purposes.

The projected traffic for the year 2009 based on this growth rate is shown in Figure E.4.1 below.

TABLE E.4.1 – YEAR 2009 TRAFFIC PROJECTION

East Bound		West Bound	
am Peak	pm Peak	am Peak	pm Peak
497	627	727	691

B.5 Intersection Analysis

The intersection was analysed using SIDRA to ascertain performance under the current and projected flows.

The heaviest traffic flows for the year 2009 were adopted for analysis.

A summary of traffic analysis definitions is presented at Appendix A and details of the SIDRA analysis are shown at Appendix B.

The critical results of the analysis predicted by SIDRA are acceptable for traffic exiting the proposed new access road onto Lakeside Drive at the year 2009. Adopting the worst case of the pm peak in the year 2009, they are:

Lakeside Drive

Maximum Average Delay – 12.1 seconds

Maximum Queue Length – 5 cars
 31m

Level of Service – A

The affect of the new roundabout on the nearby Gove St intersection is mentioned here due to its proximity to the new entrance road.

Due however to its location being some 70m away from the roundabout, (refer to the attached Sketch 4458-SK05), the worst case investigated here will not affect the flow of traffic from this street and conversely the flow of traffic from this street will not impact on the new roundabout.

Ceremonial Drive

Maximum Average Delay – 20.5 seconds

Maximum Queue Length – 4 cars
 25m

Level of Service – B

B.6 Conclusions

The traffic generated by the proposed new access road is in the order of 218 vehicles per hour in the afternoon peak.

The impact on the existing road network is minimal when traffic enters the existing road network at Lakeside Drive via a roundabout arrangement.

The Level of Service provided by the current intersection and for the proposed development, under projected traffic regimes, is high with negligible effect on external traffic flows to the year 2009.

B.7 Traffic Analysis Definitions

Degree of Saturation: The ratio usually expressed as a percentage of the number of vehicles entering a signalised intersection in a specified period, to the number which could enter if all approaches were fully saturated during that period. This definition may also be applied to other methods of control (Give-Way, Roundabout).

Acceptable Degree of Saturation ratios are:

- < 0.85 Give-Way, Stop, Roundabouts; and
- < 0.95 Signals

If the Degree of Saturation ratios are greater than the values indicated above, excessive delays result.

Average Delay/Delay: The time spent, on average by a vehicle waiting to enter a traffic stream.

Queue: The number, or equivalent length, of vehicles waiting to enter a traffic stream

Level of Service: To correlate numerical traffic volume data to the traffic operating performance of a roadway, the concept of level of service (LOS) was developed. LOS is a qualitative measure describing operational conditions within a traffic stream. Generally, there are six service levels which are designated A to F, with level A representing the best operating condition and level F the worst. Levels C or D are considered to be the generally accepted standard for planning and the design of transportation facilities in urban areas.

Level of Service A: Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level of Service B: Is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. There is a slight decline in the freedom to manoeuvre within the traffic stream from LOS A.

Level of Service C: Is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and manoeuvring within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

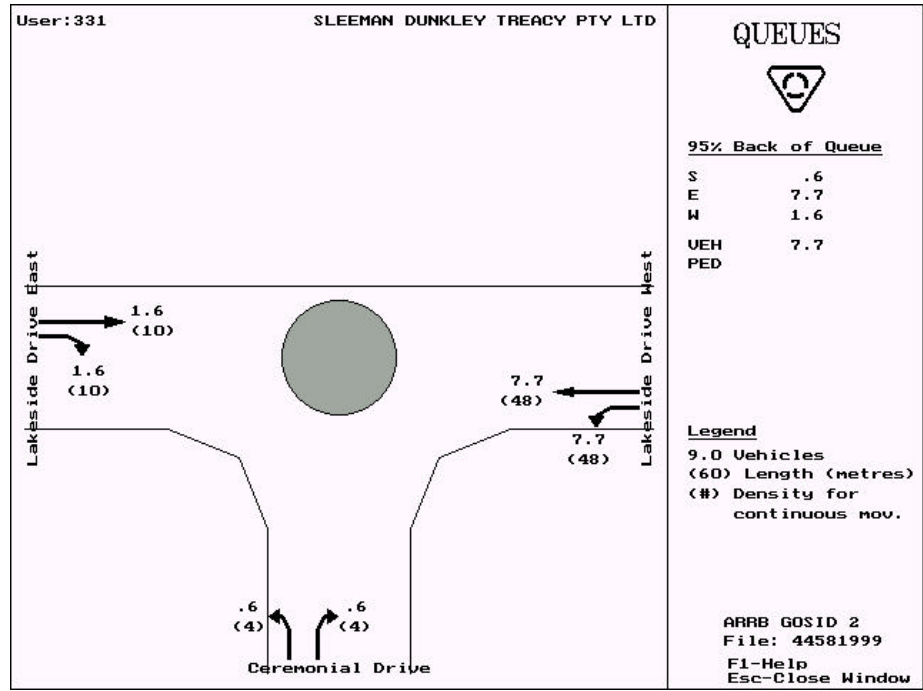
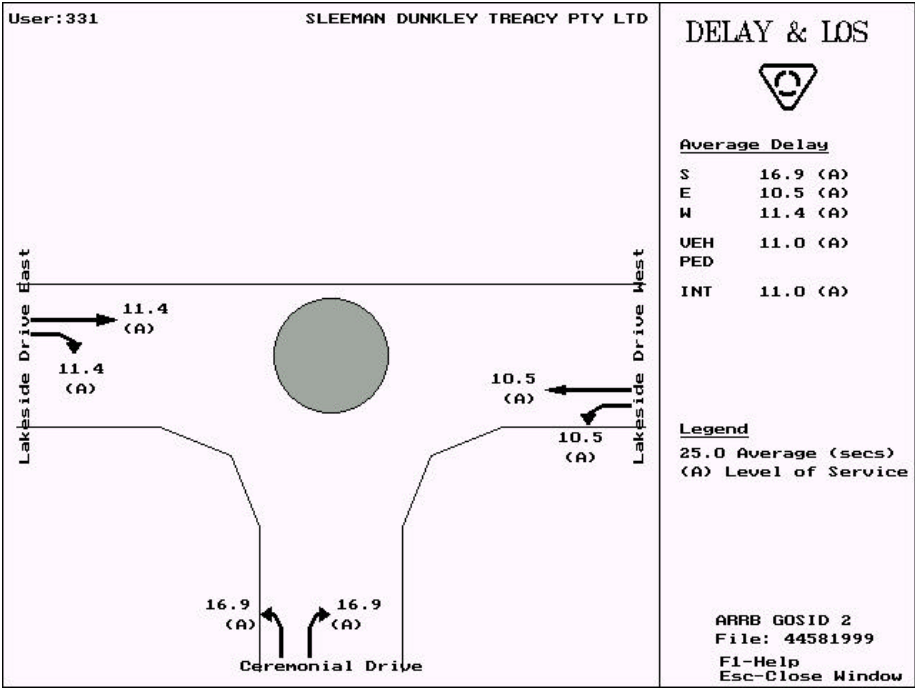
Level of Service D: Represents high density, but stable flow.

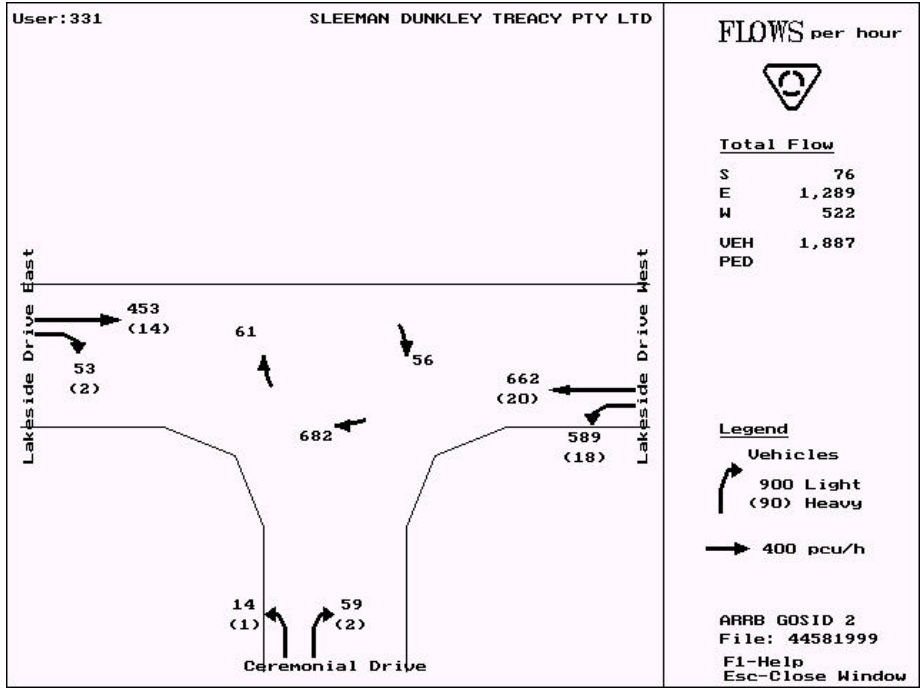
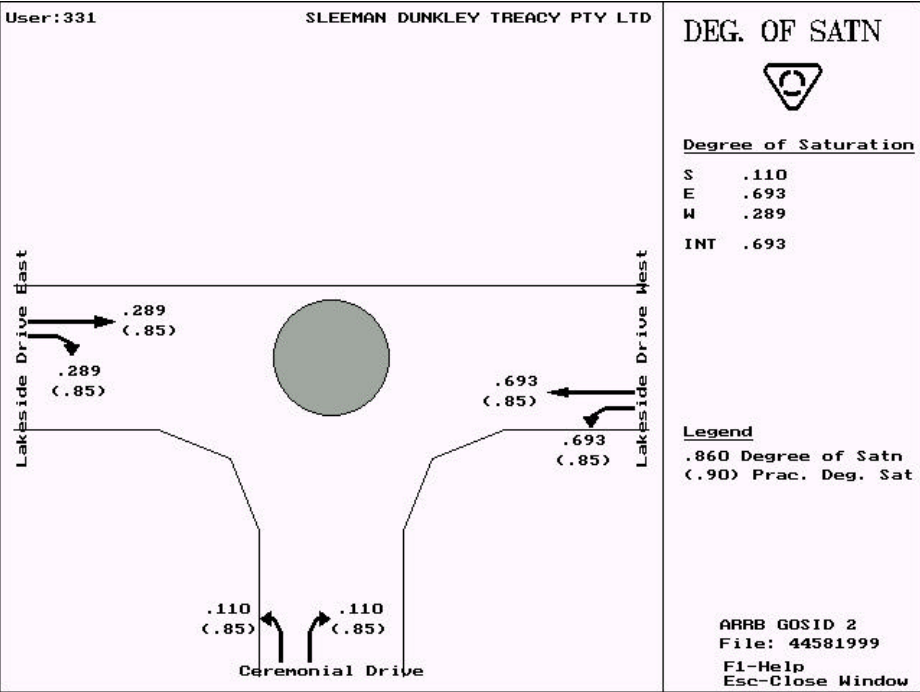
Level of Service E: Represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to manoeuvre with the traffic stream is extremely difficult. Comfort and convenience levels are extremely poor. Operations at this level are usually unstable, because small increases in flow or minor pedestrian movements within the traffic stream will cause breakdowns.

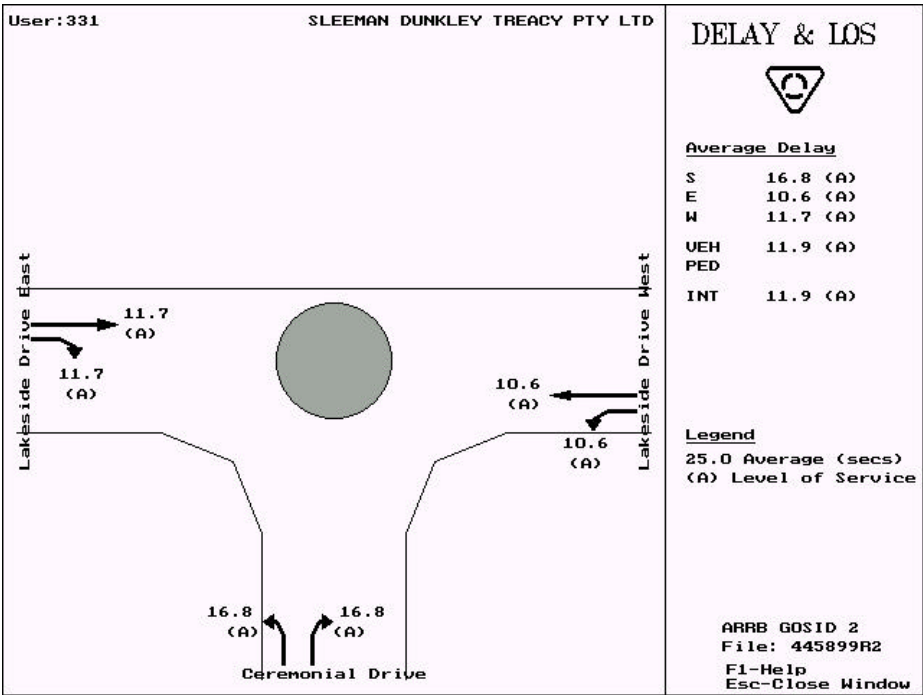
Level of Service F: Is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. It is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level of service F is an appropriate designation for such points.

SIDRA Analysis Summaries

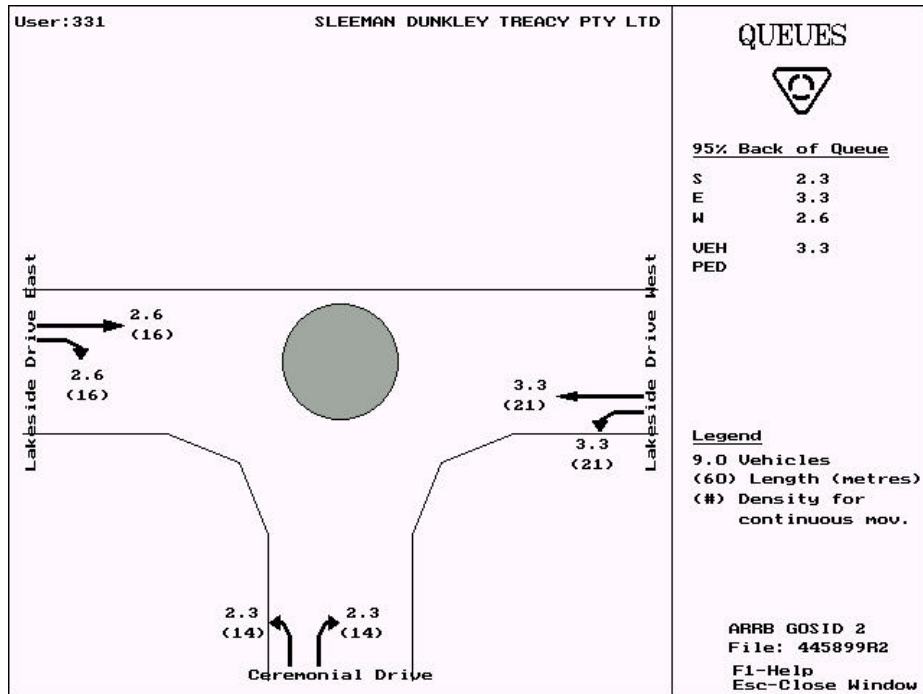
Roundabout with 1999 traffic distribution Run 1 am peak

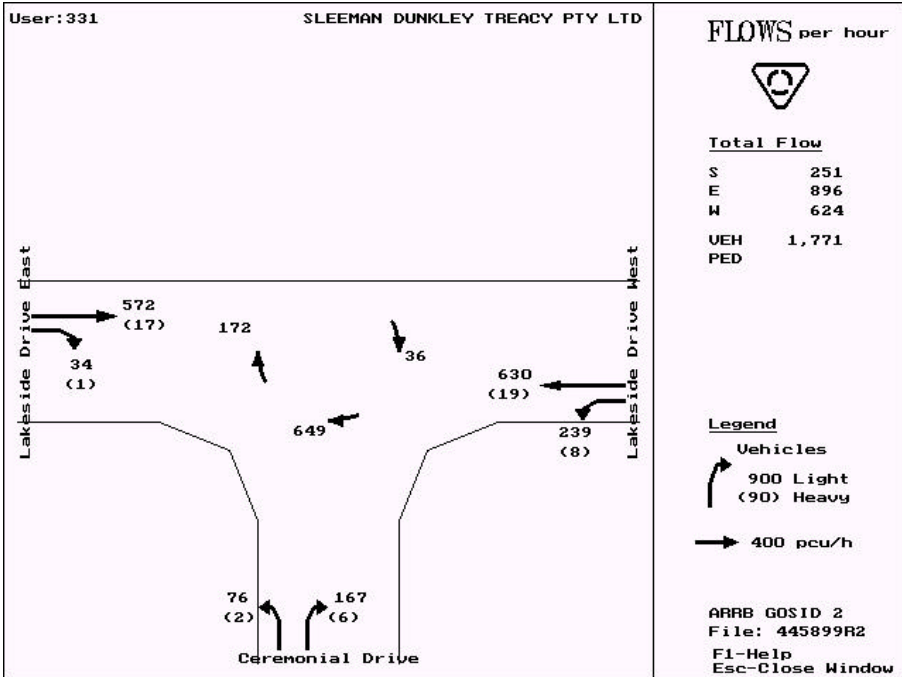
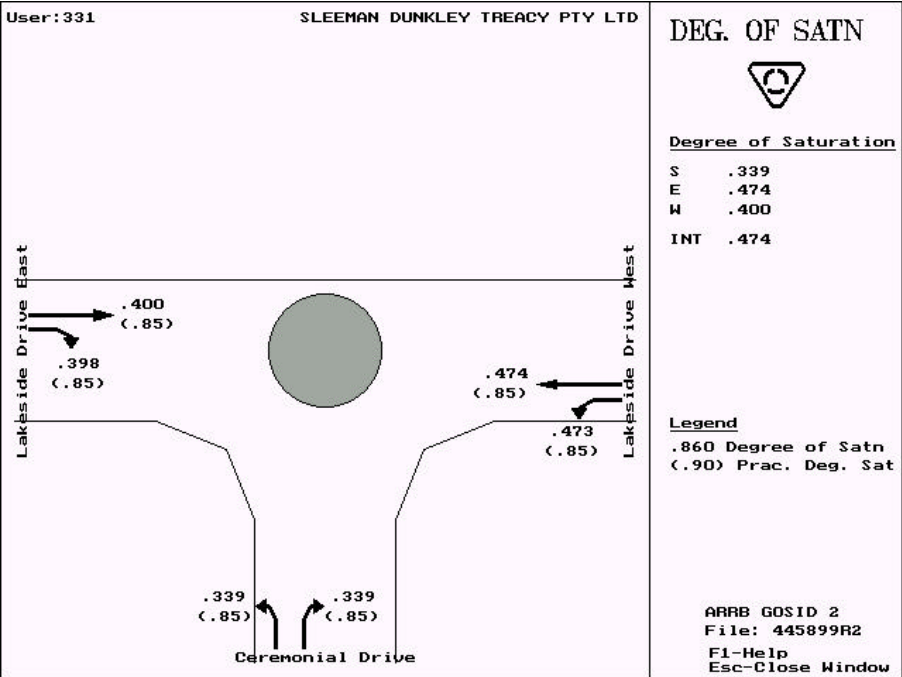




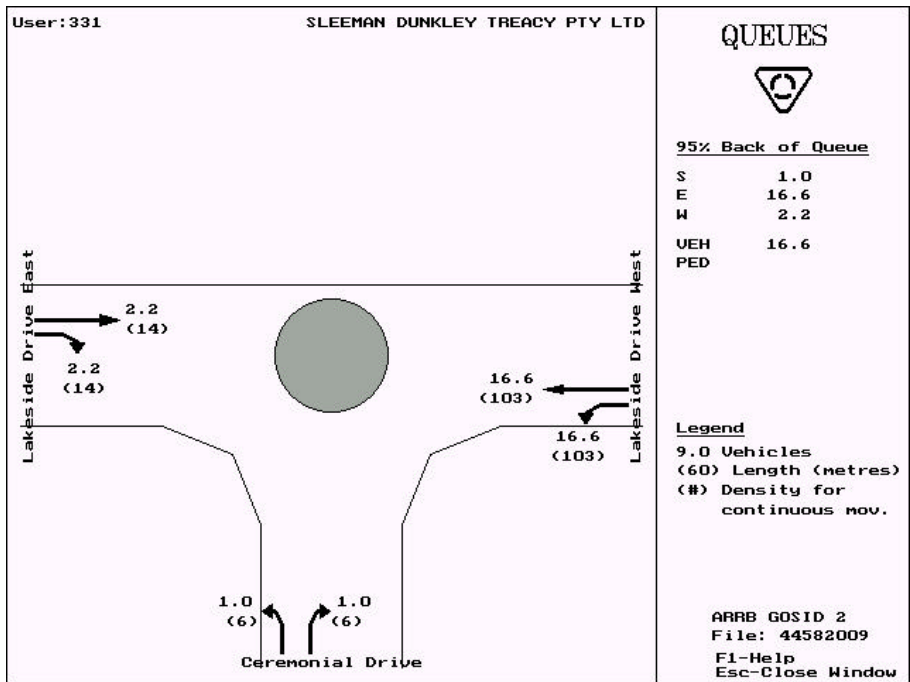
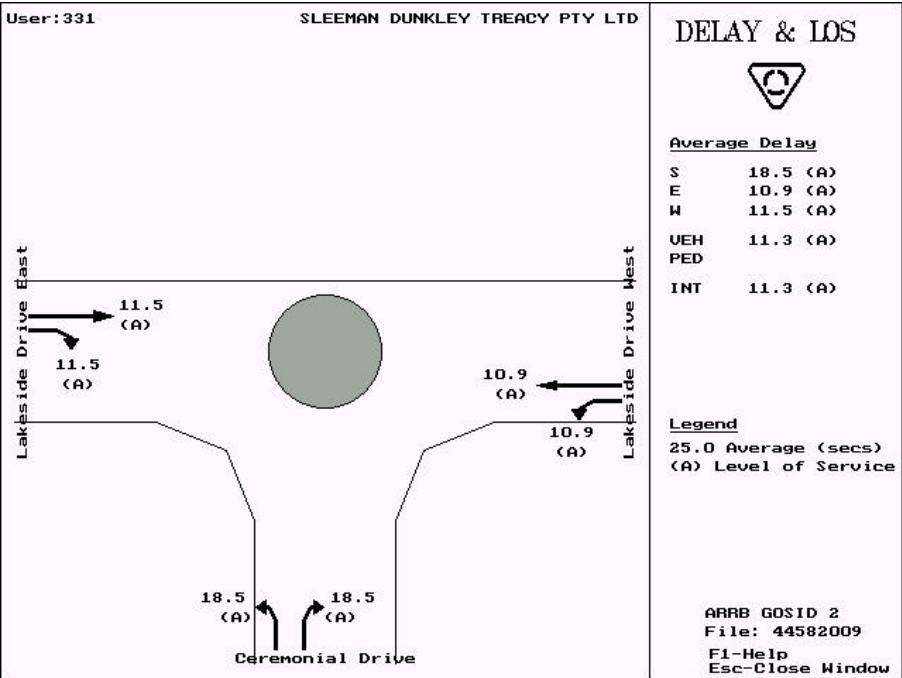


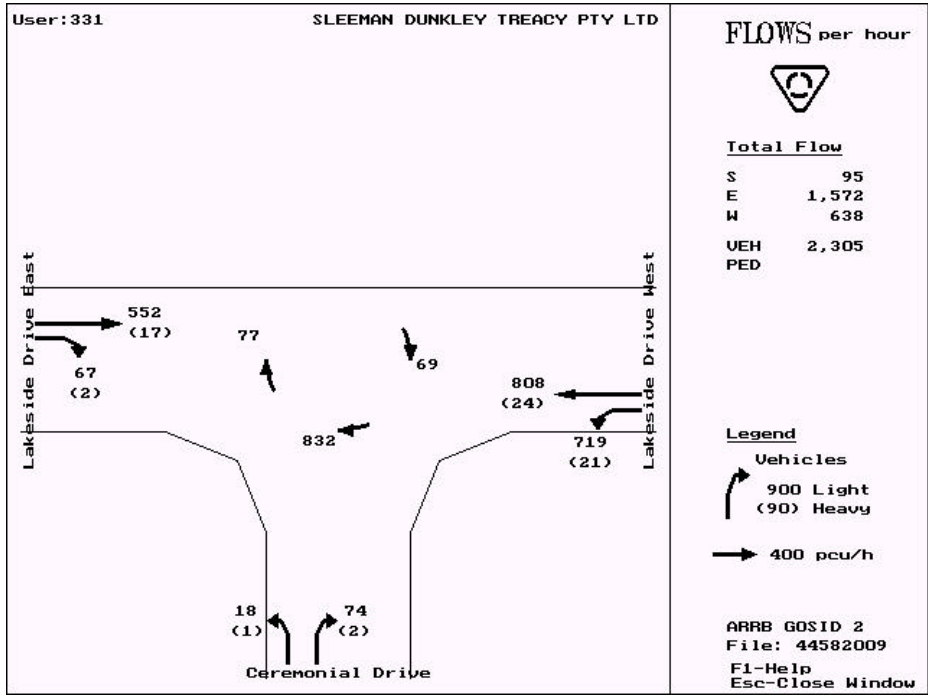
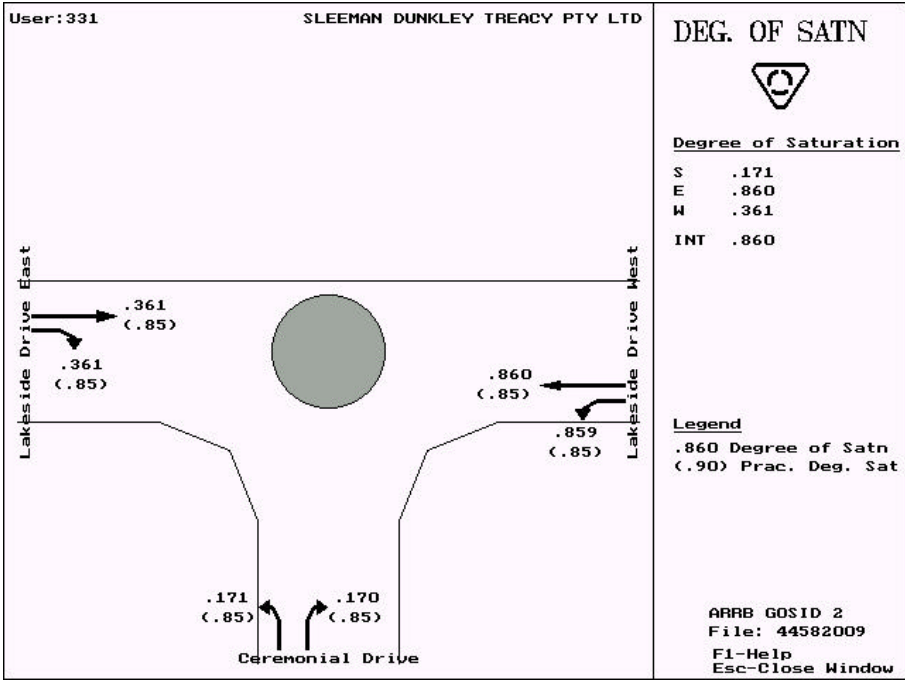
Roundabout with 1999 traffic distribution Run 1 pm peak





Roundabout with 2009 traffic distribution Run 2 am peak





Roundabout with 2009 traffic distribution Run 2 pm peak

