TRANSPORT REPORT FOR PROPOSED REZONING OF ROYAL REHABILITATION CENTRE SITE, RYDE

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COLSTON BUDD HUNT & KAFES PTY LTD
ACN 002 334 296
Level 18 Tower A
Zenith Centre
821 Pacific Highway
CHATSWOOD NSW 2067

Telephone: (02) 9411 2411
Facsimile: (02) 9411 2422
Email: cbhk@cbhk.com.au

REF: 5717

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1. INTRODUCTION

1.1. Colston Budd Hunt and Kafes Pty Ltd has been retained to prepare a report on the transport implications of the proposed rezoning of the Royal Rehabilitation Centre site at Ryde to allow residential development. The site location is shown on Figure 1.

1.2. This report has been prepared in accordance with the principles set out in the RTA's Guide to Traffic Generating Developments (RTA, 2002). The development will require referral to the RTA Regional Development Committee (SRDAC) under SEPP 11.

1.3. The report examines the transport implications of the proposed rezoning through the following chapters:

- Chapter 2 - describes the existing situation; and
- Chapter 3 - assesses the transport effects of the proposed rezoning.

2. THE EXISTING SITUATION

Site Location and Road Network

2.1. The location of the Royal Rehabilitation Centre site is shown in Figure 1. The site has frontage to and access from Victoria Road, Morrison Road and Princes Street. The site also has access from Charles Street.

2.2. Surrounding land use is predominantly residential. There is commercial and retail development on the northern side of Victoria Road and in Putney south of the site. There are a number of retirement villages close to the site, including one adjacent to the site on its north-western side. The site is also in close proximity to churches, recreational areas and schools.

2.3. The road network in the vicinity of the site includes Victoria Road, Church Street, Morrison Road, Princes Street, Charles Street, Douglas Street and Henry Street.

2.4. Victoria Road is a major arterial road which provides the main east-west link through the area. It provides a four to six lane divided carriageway with traffic signals and additional turning lanes at major intersections. Access between the site and Victoria Road is left in/left out due to the median.

2.5. West of the site, Church Street provides the major north-south arterial road link through the area. It provides a four to six lane divided carriageway with traffic signals and additional turning lanes at major intersections. The intersection of Church Street with Devlin Street and Victoria Road is grade separated.

2.6. A texas turn at the intersection allows motorists travelling north along Concord Road/Church Street to U turn back along Church Street, then turn left into Morrison Road to reach the site. Alternatively they can make a G turn by using Well Street or Junction Street and Belmore Street to reach Morrison Road. They then cross Church Street via the Morrison Road signals to reach the site.

2.7. Morrison Road is a sub-arterial road that runs from Church Street through to the Gladesville area. It generally provides one traffic lane and one parking lane in each direction. Right turns at the Morrison Road/Church Street intersection are prohibited.

2.8. Charles Street is a collector road/sub-arterial road that runs between Morrison Road and Victoria Road. Both intersections are signalised.

2.9. Princes Street runs between Morrison Road and Victoria Road providing local access. Douglas Street runs south from Morrison Road and provides local access. Henry Street runs east of Charles Street and also provides local access.

Traffic Flows

2.10. In order to establish traffic conditions, traffic counts were undertaken during the morning and afternoon peak periods at the following intersections:

- Victoria Road/Charles Street;
- Church Street/Morrison Road;
- Morrison Road/Princes Street;

- Morrison Road/Douglas Street;
- Morrison Road/Charles Street;
- Charles Street/Henry Street; and
- site access points.

2.11. The results of the surveys are shown in Figure 2 and summarised in Table 2.1.

Table 2.1: Summary of existing two way (sum of both directions) peak hour traffic flows

Road	Location	Morning peak hour	Afternoon peak hour
Victoria Road	East of Charles Street	5,075	4,475
	West of Charles Street	5,325	4,650
Church Street	North of Morrison Road	6,070	6,625
	South of Morrison Road	6,175	6,650
Morrison Road	West of Church Street	510	500
	East of Church Street	935	975
	West of Princes Street	865	1,000
	East of Princes Street	875	1,000
	West of Douglas Street	925	995
	East of Douglas Street	930	995
	West of Charles Street	920	965
	East of Charles Street	980	960
Princes Street	North of Morrison Road	75	75
	South of Morrison Road	35	40
Douglas Street	South of Morrison Road	25	40
Charles Street	South of Victoria Road	570	445
	North of Henry Street	480	445
	South of Site Access	560	555
	North of Morrison Road	500	515
	South of Morrison Road	340	320
Henry Street	East of Charles Street	165	140

2.12. Table 2.1 shows that the highest traffic flows in the area occur on Church Street, west of the site. Church Street carries some 6,070 to 6,650 vehicles per hour, two way, during peak hours.

2.13. Victoria Road also carries high traffic flows of some 4,475 to 5,325 vehicles per hour during peak hours.

2.14. Traffic flows on Morrison Road vary from some 500 to 1,000 vehicles per hour during peak hours. Traffic flows on Morrison Road are lower west of Church Street than east of Church Street.

2.15. Charles Street carries between 320 and 570 vehicles per hour, two way, during peak hours. Traffic flows on Charles Street are higher north of Morrison Road than south of Morrison Road.

2.16. Henry Street carries some 140 to 165 vehicles per hour during peak hours. Princes Street and Douglas Street carry less than 100 vehicles per hour during peak hours.

2.17. The site currently generates some 120 to 160 vehicles per hour (in plus out). As previously discussed, there are a number of access points to the site which are from Morrison Road, Victoria Road, Charles Street and Princes Street. The access points that carry the majority of traffic are the Charles Street (some 42 per cent), eastern Morrison Road (some 45 per cent) and Victoria Road (some 11 per cent) access points.

Road Network Performance

2.17 The capacity of the road network is generally determined by the ability of its intersections to cater for peak period flows. The operations of the surveyed intersections have been analysed using the INTANAL program. The INTANAL

program simulates the operation of intersections to produce a number of measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle.

2.18 Based on average delay per vehicle, INTANAL estimates the following levels of service (LOS):-

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:-

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode.
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:-

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required

57 to 70	=	"E"	At capacity and requires other control mode.
>70	=	"F"	Unsatisfactory and requires other control mode

2.19 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.20 The INTANAL analysis found that the signalised intersections of Charles Street with Victoria Road and Morrison Road are operating with average delays of less than 20 seconds per vehicle during morning and afternoon peak periods. This represents a level of service B, a good level of service.

2.21 The signalised intersection of Church Street and Morrison Road is operating with average delays of less than 35 seconds per vehicle during morning and afternoon peak periods. This represents a level of service C, a satisfactory level of service.

2.22 The unsignalised intersections of Morrison Road with Princes Street and Douglas Street, and Charles Street with Henry Street are operating with average delays of less than 15 seconds per vehicle during morning and afternoon peak periods. This represents a level of service A/B, a good level of service.

Residential Amenity

2.23 In addition to the physical capacity of the road network, traffic flow can also impact on the amenity of properties fronting the roads carrying the flows. The definition of the impacts on residential amenity by varying levels of traffic flow is extremely complex. Perceptions of impact vary greatly from person to person. Traffic flows that one person may find perfectly acceptable may be considered excessive by another.

2.24 The Roads and Traffic Authority has undertaken considerable research into appropriate environmental capacity performance standards on residential streets. Their "Guide to Traffic Generating Developments" defines the following environmental capacity performance standards for local residential streets and collector roads.

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

- Collector Roads
  - Environmental goal - 300 vehicles per hour in the peak hour;
  - Maximum flow - 500 vehicles per hour in the peak hour.

2.25 Comparing the traffic flows in Table 2.1 to the above goals shows that during peak periods, Princes Street, Douglas Street and Henry Street are all carrying traffic flows within the environmental goal for local streets.

2.26 The traffic volumes summarised in Table 2.1 and observations during peak times indicate that Morrison Road and Charles Street are functioning as sub-arterial roads.

Public Transport

2.27 The closest railway station to the site is Meadowbank, some two kilometres away. Suburban services through Meadowbank operate on the Northern Line (Berowra – North Sydney via Strathfield).

2.28 During peak periods, services on this line operate on a 15 minute frequency. Outside peaks, services operate on a 30 minute frequency.

2.29 Several bus services run along roads adjacent to the site. These are summarised in Table 2.2.

2.30 Hence, the site has good access to bus services running between Ryde and the city. The 507 service also provides a link to Meadowbank Station during peak periods.

Table 2.2: Bus services adjacent to the site

Route	Uses	Between	Frequency
500	Victoria Road	Circular Quay and Ryde	10 minutes (weekday peak periods)
501	Victoria Road	Town Hall and West Ryde	20 minutes Mon – Sat 30 minutes Sun
507	Morrison Road	Circular Quay and Macquarie University	30 minutes Mon – Sat 60 minutes Sun
515	Victoria Road	Circular Quay and Eastwood	30 minutes Mon – Sat 60 minutes Sun
518	Victoria Road	Circular Quay and Macquarie University	30 minutes Mon – Sat 60 minutes Sun
520	Victoria Road	Circular Quay and Parramatta	15 - 30 minutes Mon – Sat 60 minutes Sun
537	Morrison Road	Gladesville to East Ryde Terminus	30 minutes Mon – Sat 60 minutes Sun

2.31 A ferry wharf is located in the vicinity of the southern end of Charles Street. This provides access to ferry services along the Parramatta River.

2.32 Overall, the site is readily accessible by public transport.

Local Traffic Study

2.33 In 2001 a local traffic study for the Tennyson/Putney area was undertaken for Ryde Council[1]. It recognised that a number of roads in the area, including Morrison Road, are functioning as sub-arterial roads. It also recognised that the road network is permeable and that other roads, including Charles Street, carry through traffic.

2.34 Our observations of the function of Charles Street and Morrison Road are consistent with these study findings. Consultation undertaken as part of the local traffic study indicated that local residents were not in favour of significant restrictive actions to reduce the functionality of these roads.

2.35 The local traffic study recommended that a number of roundabouts be provided to slow vehicles and improve local access. In particular, roundabouts were recommended on Morrison Road at Boulton Street and Douglas Street, and on Charles Street at Henry Street.

2.36 A number of these measures have been constructed including roundabouts at the intersections of Charles Street/Parry Street and Morrison Road/Boulton Street.

1 Tennyson/Putney Traffic Study Final Report, prepared for Ryde City Council by Geoplan Services Pty Ltd, March 2001.

3 IMPLICATIONS OF PROPOSED REZONING

3.1. It is proposed to rezone part of the site for residential development. The proposed scale of development is some 27 detached houses, 116 townhouses and some 757 residential units, based on the master plan prepared for the rezoning application. The units will comprise some 20 per cent three bedroom units and some 80 per cent one and two bedroom units. The site will be developed in a number of stages. The existing rehabilitation centre will be consolidated and located on southeastern corner of the site, with frontage to Morrison Road.

3.2. Parking will be provided in accordance with Council's parking code and/or RTA guidelines at the time development applications are prepared.

3.3. This chapter assesses the transport implications of the proposed development through the following sections:

- public transport;
- access and internal layout;
- traffic generation and effects; and
- summary.

Public Transport

3.4. As previously discussed, the site is located within 2 kilometres of Meadowbank Station. Services between Meadowbank and the city operate on a 15 minute frequency during peak periods. A number of regular bus services also provide a link between Ryde and the city. The ferry wharf at the end of Charles Street is

within two kilometres of the site. The site is therefore readily accessible by public transport.

3.5. Development of the site for residential use would increase residential densities within close proximity to existing public transport services. The proposed density exceeds 45 dwellings per hectare, which is in accordance with densities identified by DIPNR to support bus services in residential areas. The proposal would therefore strengthen the existing demand for bus and rail services.

3.6. The street network within the site is designed to facilitate walking and cycling. All parts of the site are within 400 metres walking distance of either Morrison or Victoria Roads, which is the typical catchment for local bus services. Hence, residents would be able to walk to bus stops.

3.7. There would be an opportunity to provide improved bus stops on Victoria Road and Morrison Road in front of the site. Appropriate infrastructure such as waiting areas and bus shelters should be provided at an early stage to encourage use of bus services. Any review of the location of existing bus stops should be done in consultation with Sydney Buses and Council.

3.8. Local trips to nearby shopping areas could be made by walking or cycling. The proposed development is therefore consistent with government policy and planning principles of:

(a) improving accessibility to employment and services by walking, cycling, and public transport;

(b) improving the choice of transport and reducing dependence solely on cars for travel purposes;

(c) moderating growth in the demand for travel and the distances travelled, especially by car; and

(d) supporting the efficient and viable operation of public transport services.

Access and Internal Layout

3.9. Access is proposed from Victoria Road, Morrison Road and Charles Street. Secondary access is proposed from Princes Street. This would allow traffic to disperse onto the surrounding road network.

3.10. Access from Victoria Road is proposed in the vicinity of the existing access location. Access would be left in/left out due to the median.

3.11. Access from Morrison Road is proposed via a new roundabout at Douglas Street. The roundabout would provide access to the site and slow through traffic on Morrison Road. Sight distance along Morrison Road at the proposed access point is in accordance with relevant standards.

3.12. Access from Charles Street is proposed at the existing access location. A new roundabout is proposed to facilitate entry and exit, and to slow traffic on Charles Street.

3.13. Secondary access is proposed from Princes Street near the southern end of the site. Sight distance in this location is in accordance with relevant standards.

3.14. The proposed roundabouts in Morrison Road and Charles Street are consistent with measures recommended in the local traffic study. They would provide appropriate access to the site, slow traffic and give priority to local movements.

3.15. The proposed residential subdivision has been designed taking into account principles in the AMCORD guidelines. These guidelines have been developed to provide a street network that is safe and efficient for all road users. AMCORD distinguishes between two levels of streets, access streets and collector streets.

3.16. On access streets the residential environment dominates. Traffic speeds and volumes are low and pedestrian and cycle movements encouraged. Vehicle speeds, should, as far as possible, be controlled by street length, parked cars, landscaping design and built form and activity along the street frontage. Bicycles are generally provided for on street. Collector streets collect traffic from access streets and generally carry higher flows. A good level of residential amenity and safety is maintained by restricting traffic volumes and vehicle speeds. Vehicle speeds on collector streets should be controlled by street alignment, parked cars, street length, intersection design, built form and by special measures at pedestrian/cycle crossings such as kerb extensions.

3.17. The adoption of the AMCORD guidelines provides a framework for the promotion of alternative travel modes to the private car (in particular improved pedestrian and cyclist facilities). Thus it is in line with state government policy for reducing trips by private car.

3.18. Roads within the proposed development will incorporate the following design principles:

- Collector Street (minor)
  - two traffic lanes and one kerbside parking lane or indented parking bays;
  - 7.0-7.5metre wide carriageway;
  - carriageway wide enough for two vehicles to pass each other while passing a parked car;

- generally provide pedestrian footpaths on both sides of the road;
- cyclists to be provided for on-street.

- Access Street
  - two traffic lanes;
  - 5.0-7.0 metre wide carriageway;
  - carriageway wide enough for two vehicles to pass;
  - parking on carriageway;
  - generally provide pedestrian footpath on one side of the road;
  - cyclists to be provided for on-street.

- Access Place
  - one traffic lane with passing opportunities;
  - 3.5 metre wide carriageway;
  - no separate footpath;
  - parking on verge;
  - cyclists to be provided for on-street.

3.19. The proposed layout also minimises the potential for through traffic movement between Victoria Road and Morrison Road.

Traffic Generation and Effects

3.20. The RTA sets out a generation rate of 0.85 vehicles per hour per dwelling for new residential development in areas where public transport accessibility is limited. Thus the maximum future traffic generation of the 27 detached dwellings of the proposed development would be up to some 25 vehicles per hour two way in peak hours (sum of in plus out).

3.21. In practice the actual traffic generation of these dwellings would be somewhat lower due to the good provision of public transport services in the area.

3.22. The apartments/units would generate some 0.4 to 0.5 vehicles per hour two way for one and two bedroom units and 0.5 to 0.65 vehicles for three bedroom units. The provision of good public transport services means that the traffic generation would be at the lower end of these ranges.

3.23. Based on the lower generation rates, the 873 apartments/town houses would generate some 435 vehicles per hour two way (in plus out). Hence the total generation would be up to some 460 vehicles per hour two way (in plus out).

3.24. The site currently generates some 120 to 160 vehicles per hour. Hence, the total traffic generation of the site would be some 580 to 620 vehicles per hour two way during peak hours.

3.25. During the morning, some 70 per cent of the residential traffic would be outbound. During the afternoon, some 70 per cent of traffic would be inbound.

3.26. The three main access points would carry most of the traffic to and from the site. The Princes Street access would carry smaller volumes of traffic.

3.27. The additional traffic has been assigned to the road network. Traffic volumes are shown in Figure 3, and summarised in Table 3.1.

3.28. Traffic increases would generally be modest, since the proposed access points would disperse traffic onto the surrounding road network. Table 3.2 shows that traffic increases on Victoria Road would be some 15 to 105 vehicles per hour, two way, during peak hours. Increases on Church Street would be up to 105

Modest

vehicles per hour, two way, during peak hours. These increases are small in relation to existing flows on these roads.

Table 3.1: Summary of future two way peak hour traffic flows with development

Road	Location	Morning peak hour		Afternoon peak hour	
		Existing	Future	Existing	Future
Victoria Road	East of Charles Street	5,075	+85	4,475	+105
	West of Charles Street	5,325	+15	4,650	+90
Church Street	North of Morrison Road	6,070	+30	6,625	+105
	South of Morrison Road	6,175	+60	6,650	+40
Morrison Road	West of Church Street	510	+40	500	+35
	East of Church Street	935	+95	975	+140
	West of Princes Street	865	+95	1,000	+140
	East of Princes Street	875	+75	1,000	+85
	West of Douglas Street	925	+75	995	+85
	East of Douglas Street	930	+65	995	+70
	West of Charles Street	920	+65	965	+70
	East of Charles Street	980	+65	960	+70
Princes Street	North of Morrison Road	75	+35	75	+55
	South of Morrison Road	35	-	40	-
Douglas Street	South of Morrison Road	25	-	40	-
Charles Street	South of Victoria Road	570	+75	445	+85
	North of Henry Street	480	+75	445	+85
	South of Site Access	560	+65	555	+65
	North of Morrison Road	500	-	515	-
	South of Morrison Road	340	-	320	-
Henry Street	East of Charles Street	165	-	140	-

+2%

3.29. Traffic flows on Morrison Road would increase by some 35 to 140 vehicles per hour, two way, during peak hours. The greatest increase in traffic on Morrision Road would occur between Princes Street and Church Street. West of Church Street and east of Princes Street, the increase in traffic would be lower at some 35 to 85 vehicles per hour, two way, during peak hours.

3.30. Increases on other roads would be lower. Traffic increases on Princes Street and Charles Street would be some 55 to 85 vehicles per hour, two way.

3.31. The intersections previously analysed in Chapter 2 have been re-analysed with INTANAL using the traffic flows in Figures 2 and 3. The analysis found that all intersections would continue to operate at their existing levels of service, with similar average delays per vehicle.

3.32. As noted in Chapter 2, Morrison Road and Charles Street function as sub-arterial roads. The proposed development would result in modest increases in traffic flows, which should not significantly affect the amenity of the area.

3.33. Princes Street, Douglas Street and Henry Street would continue to carry traffic flows within the environmental goal for local streets.

Summary

3.34. The main points relating to the transport implications for future residential development of the site are as follows:

- the site is currently readily accessible by public transport and its development would strengthen the demand for public transport services in the area. The opportunity exists to provide improved public transport facilities on Victoria and Morrison Roads;

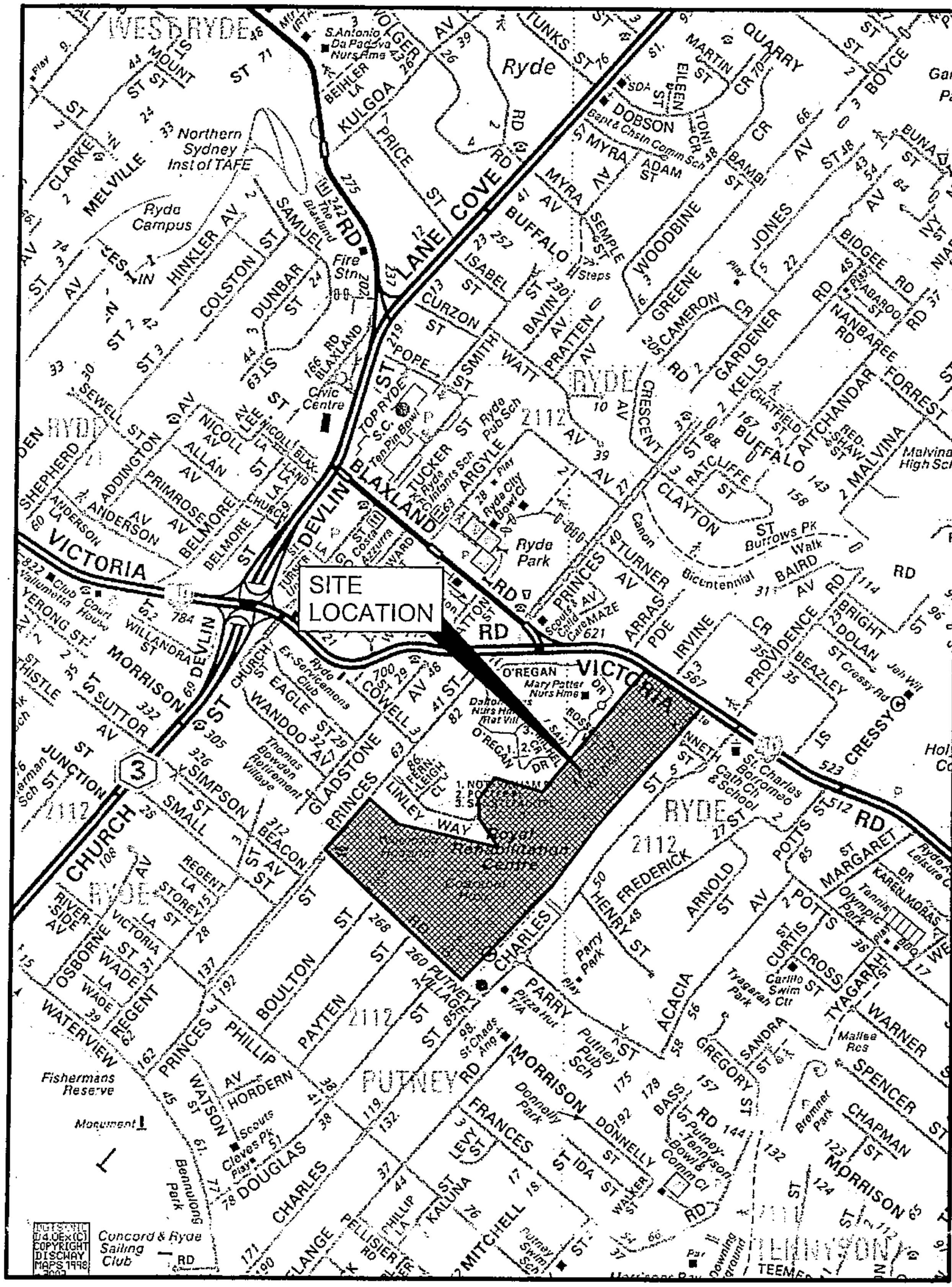
- the street network has been designed taking into account principles in AMCORD to facilitate walking and cycling;

- future access to the site will be provided from Victoria Road, Morrison Road (via the existing roundabout at Douglas Street), Charles Street and Princes Street;

- future peak hour traffic generation of the site would be up to some additional 465 vehicles per hour;

- the road network will be able to cater for traffic generated by the proposed development of the site; and

- the modest increases in traffic flows on surrounding streets as a result of future development of the site would not significantly affect the amenity of the area.



LOCATION PLAN 1

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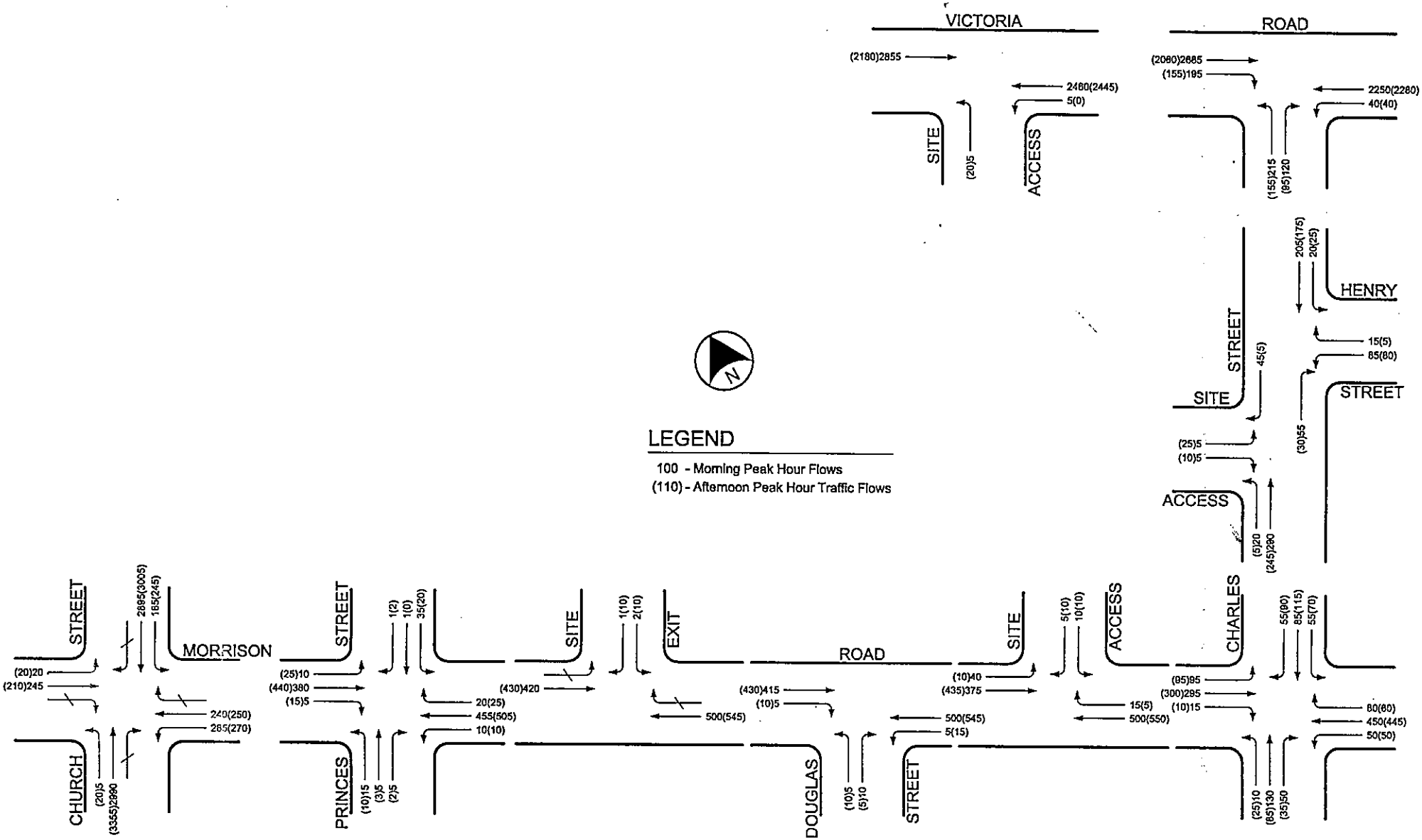

EXISTING MORNING AND AFTERNOON PEAK HOUR TRAFFIC FLOWS

2

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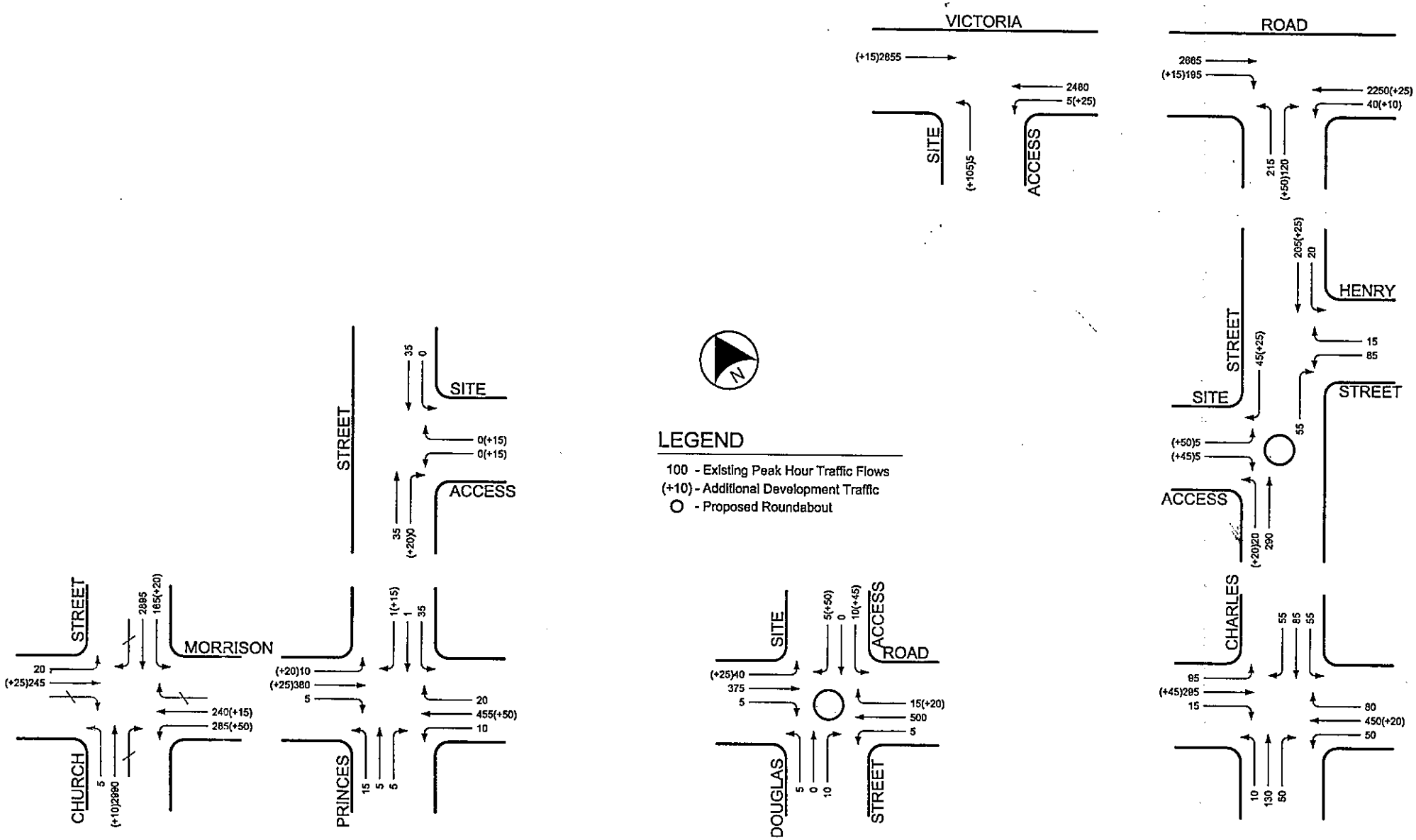

EXISTING MORNING PEAK HOUR TRAFFIC FLOWS PLUS DEVELOPMENT TRAFFIC

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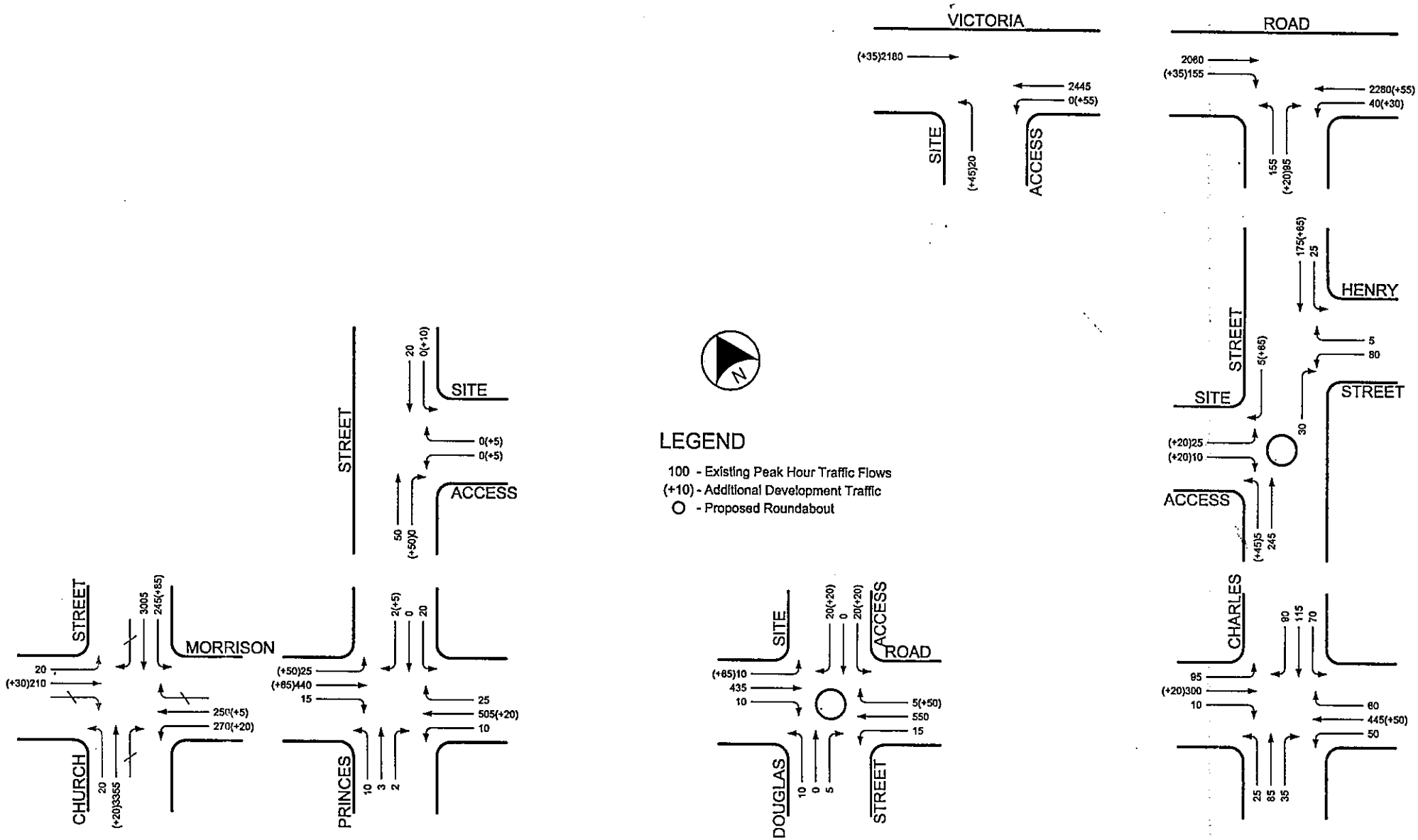

EXISTING AFTERNOON PEAK HOUR TRAFFIC FLOWS PLUS DEVELOPMENT TRAFFIC

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