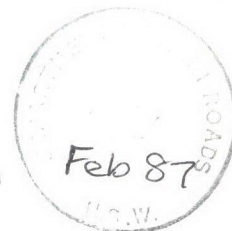


REVISED

**F4 FREEWAY
MAYS HILL - PROSPECT**



WORKING PAPER 2 - TRAFFIC MODEL

PREPARED FOR

THE DEPARTMENT OF MAIN ROADS

BY

**OVE ARUP TRANSPORTATION PLANNING
41 McLAREN STREET
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1 INTRODUCTION

This Working Paper describes and compares the seven alternative schemes investigated using the Department of Main Roads (DMR) 'TRANPLAN' traffic assignment model. A 2011 trip table (developed from the 1981 trip table) was assigned to these schemes and the resulting volumes generated by the model were compared. In addition, levels of service, delays and the general network configurations were also compared. A preferred scheme results from these comparisons.

2 DESCRIPTION OF NETWORKS

The alternative schemes developed were based on the following three networks:

- i) Network 1:
Existing 1986 network
- ii) Network 2:
Full duplication of the Great Western Highway (GWH)
- iii) Network 3:
Partial duplication/upgrading of the GWH.

Network 1 is based on the "STRAT PLAN '1981' NETWORK 4" which has been revised to the 1986 conditions. Network 2 is based on the "STRAT PLAN '2000' NETWORK 1", with the following alterations:

- Addition of GWH ramps at the Church Lane overpass (northern side only)
- Closure of Blacktown Road (eastern leg)

Both of these strategies and associated material were provided by the Strategic Planning Section of the DMR.

Network 3 is a modified version of Network 2, the details of which are described in Appendix A.

Of particular interest in all of the above networks is the section of the GWH between the existing F4 freeway connections at Mays Hill and Prospect.

The 1981 trip table was assigned to Network 1 to produce a base case scenario. Five future scenarios were produced from the assignment of the 2011 trip table to all of the above networks. These scenarios are described in Section 3.

2.1 Access Arrangements

The access arrangements adopted for Networks 2 and 3 are based on Western Suburbs Regional Organisation of Councils (WSROC) long term road hierarchy scheme. Major freeway interchange locations are proposed at the intersections with Church Lane and the Jersey Road extension. Apart from these access locations the following overpasses were included in both Networks 2 and 3:

- Greystanes Road
- Ettalong Road
- Centenary Road
- Coleman Street (existing)

These overpass locations are considered important north-south connectors and their primary function is to enable localised access and reduce the local traffic component using Jersey Road (especially during peak hours). These overpasses will also enable cyclist and pedestrian links, as well as the existing bus routes, to be maintained. The existing F4 on-ramp at Mays Hill has been retained in both Networks 2 and 3. The section of the F4 freeway (approximately between Dog Kennel Road and the GWH) was also retained and used as off- and on-ramps to the proposed F4 freeway extension.

3 DESCRIPTION OF SCENARIOS

A total of seven schemes were developed. These are:

- i) Base Case : 1981 Trip Table on Network 1
- ii) Scenario 1 : 2011 Trip Table on Network 1
- iii) Scenario 1A : 2011 Trip Table on Network 2
- iv) Scenario 2A : 2011 Trip Table on Network 2
- v) Scenario 2B : 2011 Trip Table on Network 2
- vi) Scenario 3A : 2011 Trip Table on Network 3
- vii) Scenario 3B : 2011 Trip Table on Network 3

Scenarios ii) to vii) above represent possible future alternative schemes. These schemes are compared on traffic engineering and economic grounds in Section 5.

3.1 Base Case Scenario

The base case scenario represents the 1981 condition and is used to illustrate how the model performs. Comparison of 1981 model volumes are made against 1983 - 1985 measured volumes, as shown in Working Paper 1, in order to ascertain whether the model tends to over- or underestimate. The model performance is discussed in Section 4.

3.2 Scenario 1

This scenario represents the 1986 'do nothing' option. The performance of this scheme is compared to the other future schemes in Section 5.

3.3 Scenario 1A

This scenario represents the 2000 road network without the F4 freeway link from Prospect to Mays Hill. The economic performance of this scheme is compared to other future schemes in Section 6.

3.4 Scenarios 2A and 2B

These scenarios are based on the full duplication of the GWH network. The access arrangements described in Section 2.1 were adopted for Scenario 2A. The only difference between Scenarios 2A and 2B is that freeway ramps are provided at Greystanes Road overpass in Scenario 2B.

3.5 Scenarios 3A and 3B

These scenarios are based on the partial duplication/upgrading of the GWH network. The access arrangements described in Section 2.1 incorporating the following adjustments were adopted for Scenario 3A:

- An additional interchange to the west of Reservoir Road
- An off ramp utilising the existing highway to the west of the Blacktown Road/GWH signalised intersection

The only difference between Scenarios 3A and 3B again being the inclusion of freeway ramps at the Greystanes Road overpass in Scenario 3B.

Scenarios 1, 2A and 3A are illustrated in Figure 1.

4 BASE CASE SCENARIO

4.1 Model Traffic Volumes

The model estimated AM peak traffic volumes (based on the 1981 trip table) are shown in Figure 2. These volumes are compared with the actual recorded 1983 - 1985 AM peak hour two-way traffic volumes (refer Figure 3A of Working Paper 1).

Comparison is complicated by the road network alterations and the spread of available traffic count information.

The following table shows a comparison between 1981 model traffic volumes and measured traffic volumes (in the 1983-85 period) for the GWH.

<u>Great Western Highway</u>	AM PEAK HOUR	
	1981 Model Volume	Measured Volume*
East of Centenary Rd	4540 (- 6%)	4850
Centenary Rd to Berith Rd	4290 (- 5%)	4500-4600
Berith Rd to Ettalong Rd	4290 (- 5%)	4500
Girraween Rd to Greystanes Rd	4480 (-0.4%)	4500
Greystanes Rd to Toongabbie Rd	5400 (- 6%)	5750
Toongabbie Rd to Blacktown Rd	5360 (- 3%)	5500
Flushcombe Rd to Reservoir Rd	3400 (-14%)	3970
Reservoir Rd to F4 Freeway	3080 (-28%)	4300

* Volumes measured in 1983-85 period.

Allowing for an average growth of 8% in GWH traffic between 1981 and 1984, the above table indicates a reasonable accuracy of traffic volume estimation with a range of -20% to +8% of measured volumes.

For north-south roads within the study area direct comparison is difficult because of the replacement of several roads by a single modelled link.

Examples are:

	AM PEAK HOUR 1981 Model Volume	Measured Volume*
Blacktown Rd and Toongabbie Rd	2080 (+12%)	1850
Centenary Rd	1490 (+10%)	1350

* Volumes measured in 1983-85 period.

There appears to be greater variation between modelled and measured traffic volumes on the north-south links, but this is dependent upon the judgement of link-road comparisons.

It is generally concluded that the model produced network flows which did not display particular bias and had reasonable accuracy especially for the Great Western Highway.

It is considered that the Tranplan model performs reasonably well within the study area and forms a suitable base for future modelling.

4.2 Future Trip Table

Following discussion with the Strategic Planning Section of the DMR a population/employment distribution prepared by the Department of Environment and Planning (DEP) was used to generate a future trip table which was then assigned to different network options. The population/employment distribution is that expected to occur by approximately the year 2011, and is the base distribution used by the DMR for future traffic modelling.

The population/employment distribution (appended) suggests major growth in local centres particularly in Baulkham Hills, Liverpool, Campbelltown and Blacktown. Parramatta is predicted to have a nett reduction in population but continued growth in employment.

It is considered that the population/employment distribution used is the best basis available for future traffic modelling.

5 COMPARISON OF FUTURE SCENARIOS

The future scenarios were compared with respect to the following:

- i) Modelled traffic performance characteristics
- ii) Weaving areas

A comparison of the alternatives then enabled a preferred layout to be determined.

5.1 Modelled Traffic Performance Characteristics

The TRANPLAN traffic assignment model used by the DMR's Strategic Planning Section produces the following estimates:

- i) Link and turn volumes
- ii) Area-wide performance characteristics
- iii) Travel times

The model generates 2 hour volumes over the entire network. Peak hour volumes were obtained by taking 55% of the 2 hour volume.

Both i) and ii) above are used in a comparison of the alternative scenarios. Travel times are not used as they are calculated on speed/flow relationships and do not take delays at signalised intersections into account.

The modelled volumes are discussed in Section 5.1.1, the estimated delays along the GWH are discussed in Section 5.1.2, whereas the area-wide performance characteristics are used in Section 6 to compare the anticipated accident rate of each option.

5.1.1 Model traffic volumes

The estimated AM peak traffic volumes for the future scenarios are shown in Figures 3A and 3B. It can be seen that traffic volumes along the GWH east of Blacktown Road generally decrease from Scenario 1 to Scenario 3. However, in the region

between Reservoir Road and the western leg of Blacktown Road in Scenario 3, the GWH forms part of the alternative F4 freeway alignment, and as such carries significantly higher volumes. Consequently the future scenarios can best be compared in two distinct regions. The pivoting point being the intersection of the GWH with the western leg of Blacktown Road.

Volumes to the West of Blacktown Road/GWH intersection:

The maximum expected eastbound AM peak traffic volumes on the GWH, and/or the F4 freeway link to the west of this intersection, are shown below in Table 1.

TABLE 1 EXPECTED MAXIMUM EASTBOUND VOLUMES TO THE WEST OF THE BLACKTOWN ROAD/GWH INTERSECTION

Future Scenario No.	GREAT WESTERN HIGHWAY		F4 FREEWAY	
	Section	AM Peak Volume	Section	AM Peak Volume
1	Reservoir Rd- Flushcombe Rd	3795(4)	N/A	N/A
2A	Reservoir Rd- Flushcombe Rd	2475(3)	East of Church Lane Interchange	3795(3)
3A	N/A		Adjacent to Flushcombe Rd	5115(4)
2B	Flushcombe Rd - Church Lane	2750(3)	East of Church Lane Interchange	3795(3)
3B	N/A		Adjacent to Flushcombe Road	5253(4)

NOTE: Values in brackets indicate the number of through traffic lanes (eastbound) required to provide a level of service of C or better. These calculations are based on the lane capacity values supplied by the DMR's Strategic Planning Section and shown in Figure 3A.

Based on the above table, Scenario 1 indicates that the existing GWH would need to be upgraded to 4 lanes in each direction in order to achieve a reasonable peak hour mid-block level of service. The level of service of this scheme, however, is controlled by the signalised intersections along the GWH. As indicated in Working Paper 1, some of these intersections have already reached near capacity based on 1986 flow conditions. Therefore, as the traffic flow increases, longer peak hour delays could be expected as these intersections approach oversaturation.

This indicates a very poor overall level of service for this scheme and raises doubts as to the practicality of further consideration of this option.

Scenarios 2A, 2B, 3A and 3B, however, indicate an improvement to the existing midblock level of service along the GWH, without the need to provide additional lanes.

The above table also indicates how the expected traffic volumes increase with improvement in the level of service. Scenarios 3A and 3B show how upgrading the existing highway to a freeway condition (between Reservoir and Blacktown Roads) increases the expected traffic volume, using this section of road, by approximately 40% (compared to Scenario 1). However, the provision of a freeway parallel to the existing highway (i.e. Scenarios 2A and 3B) increases the expected traffic volume along both the GWH and the F4 freeway corridor to the west of Church Lane, by approximately 50%.

The expected volume of traffic along the upgraded section of the GWH (in Scenarios 3A and 3B) is approaching level of service D for a 6-lane freeway. In order to achieve an AM-peak level of service C an additional lane is required in the eastbound direction.

Scenarios 2A and 2B, however, provide a mechanism whereby the total traffic is separated into two streams:

1. Through traffic (via the freeway)
2. Local traffic (via the highway)

Consequently, traffic volumes on the highway are reduced and a peak hour level of service of C can be adequately attained on a 6-lane freeway facility.

Volumes to the East of Blacktown Road/GWH intersection:

The maximum expected eastbound AM peak traffic volumes on the GWH and/or the F4 freeway link, to the east of this intersection, are shown below on Table 2.

TABLE 2 EXPECTED MAXIMUM EASTBOUND VOLUMES TO THE EAST OF BLACKTOWN ROAD/GWH INTERSECTION

Future Scenario No.	GREAT WESTERN HIGHWAY		F4 FREEWAY	
	Section	AM Peak Volume	Section	AM Peak Volume
1	Toongabbie Rd -Greystanes Rd	5693 (35)	N/A	N/A
2A	Toongabbie Rd -Greystanes Rd	2585(3)	Church Lane -Jersey Rd	3795(3)
3A	Emert St-Station St	2255(3)	Greystanes Overpass to Jersey Rd interchange	4675(3)
2B	Emert St-Station St	2668(3)	Church Lane-Greystanes Overpass	3795(3)
3B	Emert St-Station St	2365(3)	Church Lane-Greystanes Overpass	5253(4)

NOTE: Values in brackets indicate the number of through traffic lanes required to provide a level of service of C or better.

The above table supports the rejection of Scenario 1 as it is considered impractical to provide in excess of 5 lanes in one direction for the section between Toongabbie Road and Greystanes Road.

It is considered that a better balance of traffic flows using the GWH and the proposed F4 freeway is achieved in Scenarios 2A and 2B (especially to the east of Greystanes Road). The proportion of traffic using the proposed F4 freeway as opposed to the GWH is approximately 2:1 in Scenarios 2A and 2B, whereas in Scenarios 3A and 3B it is approximately 3:1.

The number of lanes required to supply an AM peak hour level of service C along the proposed F4 freeway are shown in Figures 4A and 4B. The existing number of lanes along the GWH (parallel to the F4 Freeway link) is sufficient to supply an adequate peak hour mid-block level of service in Scenarios 2A, 2B, 3A and 3B.

5.1.2 Estimated delays

The traffic volumes determined by the 'TRANPLAN' traffic assignment model were used to estimate the average delay expected along the GWH. These estimates are shown below in Table 3.1:

TABLE 3.1 ESTIMATED SIGNALISED INTERSECTION DELAY
ALONG THE GREAT WESTERN HIGHWAY

Signalised Intersection with GWH	Estimated	Average Delay*(sec)/Scenario No.			
	1	2A	2B	3A	3B
Toongabbie Rd	**	30	10	20	10
Pendle Way	**	40	40	45	45
Jones Street	**	Becomes a T-intersection			
Station Street	**	25	25	25	25

* For delay calculations refer Appendix C

** Oversaturated intersection - delays incalculable

The estimated average delay expected for particular minor leg movements is shown in Table 3.2 below. The cycle time of 120 seconds was adopted for comparison with existing delays (refer Working Paper 1, Section 6.3).

TABLE 3.2 ESTIMATED SIGNALISED INTERSECTION DELAY
FOR MINOR LEG MOVEMENTS

Signalised Intersection with GWH	Movement	Average Delay*(sec)/Scenario No.				
		1	2A	2B	3A	3B
Toongabbie Rd	Left turn from T'gabbie	**	40	50	20	50
Pendle Way	North-south	**	40	40	30	30
	South-north		40	40	45	45
Jones Street	N/A	**	Becomes a T-intersection			
Station Street	North-south	**	50	50	50	50
	South-north		50	50	50	50
F4 (Mays Hill)	Right turn from GWH to F4		40	20	20	20

* For delay calculations refer appendix B

** Oversaturated - delays incalculable

The above tables indicate that a parallel freeway is preferred from Greystanes Road linking eastwards to the existing F4 freeway at Mays Hill, as this would reduce the existing oversaturated conditions at the following intersections with the GWH:

- Pendle Way/Ettalong Road
- Jones Street/Berith Road
- Station Street/Centenary Road

The above tables give no indication as to which freeway alignment is preferred to the west of Greystanes Road.

NOTES:

1. The above delay estimates were calculated using the linked signalised intersection delay formulae (from ARR 123)* based on the parameters derived from the SIDRA-2 micro-computer package.

This method of delay calculation was used as the TRANPLAN model does not take delays at signalised intersections into account.

2. The delay calculations were restricted to those intersections east of Blacktown Road which can be readily compared for Scenarios 2 and 3.
3. With the use of SCATS, various cycle times can be introduced. The delay calculations therefore have been based on a cycle time of 120 seconds to highlight their effect on anticipated delays for the various options.

5.2 Weaving Areas

Weaving is defined as the crossing of two or more traffic streams travelling in the same direction along a significant length of freeway, without the aid of traffic control devices. Weaving areas are formed when a merge area is closely followed by a diverge area, or when an on-ramp is closely followed by an off-ramp and the two are joined by an auxiliary lane.

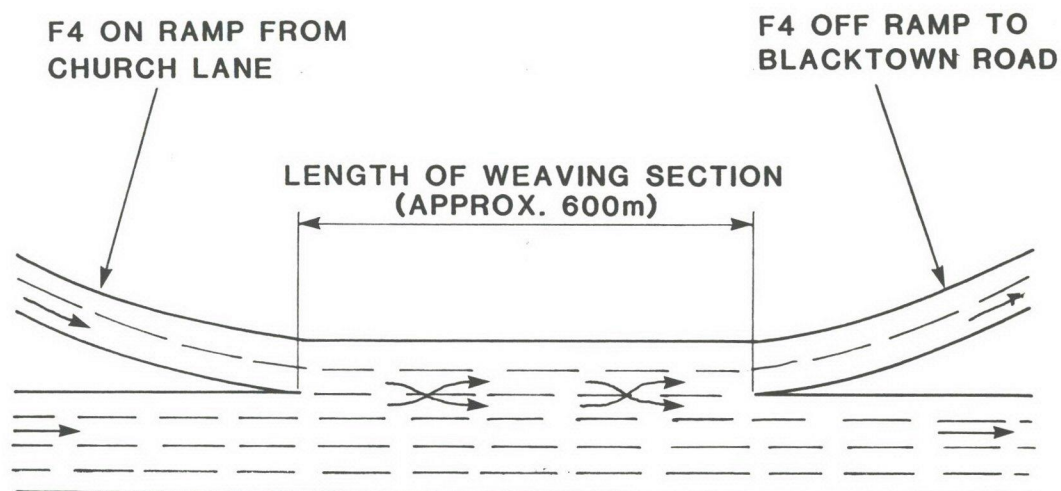
The most significant weaving area occurs in Scenarios 3A and 3B. This weaving area is that section of the freeway between the eastbound on-ramp at Church Lane and the eastbound off-ramp at Blacktown Road. The weaving length is approximately 600 metres.

NAASRA** suggests that an auxiliary lane is desirable when the weaving distance between an on-ramp and a following off-ramp is less than 600 metres. Therefore an auxiliary lane is required on the freeway between the on-ramp at Church Lane and the off-ramp at Blacktown Road in Scenarios 3A and 3B.

* Australian Road Research Report 123

** 'Grade Separated Interchanges - A Design Guide'
NAASRA, 1984, p50.

Figure 5 below illustrates how this section of freeway would look for Scenario 3B. Apart from providing an auxiliary lane, two on-ramp and two off-ramp lanes together with four through traffic lanes are required within this length of freeway. The expected merging and weaving manoeuvres, within this section of the freeway, will inevitably create some localised driver confusion and thus increase the probability of accidents.



**FIGURE 5 : PREDOMINANT WEAVING SECTION
FOR SCENARIO 3B.**

6 NETWORK MEASURES AND ACCIDENTS

6.1 Expansion Factors

The traffic flows produced by the Tranplan model are 2 hour AM peak flows and the following expansion factors are applied to produce 12 hour, 18 hour and annual flows.

The expansion is often carried out in two steps. The peak is expanded to daily traffic, and then the daily traffic is expanded to annual traffic. However, in this instance the DMR's Strategic Planning Section advised that 2 hour AM peak/year expansion factors of 1400 and 1600 should be used for cars and trucks respectively.

Reference* also reports on typical expansion factors used in the Warringah Expressway Study and on measurements taken by Colston & Budd Pty Ltd for the Traffic Authority of NSW, on roads of similar type in the Sydney area. For the day/AM peak factor, different values were used for each vehicle type, but Colston & Budd produced a single year/day expansion of 290 for all vehicle types.

Table 4 below summarises these factors:

TABLE 4 COMPARISON OF EXPANSION FACTORS

Expansion Factors	Car	Light Truck	Rigid Truck	Artic. Truck
Day/AM Peak (Glebe Is. EIS)	5.5	8.0	8.0	8.0
Year/Day " "	290	290	290	290
Year/AM Peak " "	1595	2320	2320	2320
Year/AM Peak (Warringah Study)	1633.5	2337.5	2125.0	
Year/AM Peak (From DMR)	1400	--	1600	--

The Year/AM peak factors used by the consultant are less than those used by others, but were adopted for the calculation of predicted accidents and network measures, at the recommendation of the DMR's Strategic Planning Section.

* DMR (1985). Glebe Island Arterial: Environmental Impact Statement

Expansion factors for AM peak to 12 hour and 18 hour calculations were derived from the actual traffic count for the GWH and other major roads in the area. This information was supplied by the DMR and also collected by the consultant.

Table 6 summarises these calculations:

TABLE 6 TRAFFIC COUNTS AND EXPANSION RATIOS

Location	2hr flows	12hr flows 7 am - 7 pm	18hr flows 6 am - 12 pm	Expansion Ratio 2hr - 12hr	Expansion Ratio 2hr - 18hr
F4-Pitt St	5286	28150	37020	5.33	7.06
F4-Nepean R	2964	13148	16360	4.44	5.52
P'matta Rd-Clyde	7962	47450	60940	5.96	7.65
GWH-Mays Hill	8876	50730	66300	5.72	7.45
GWH-East Church	5920	28892	37479	4.88	6.33
Average				5.27	6.80

GREAT WESTERN HIGHWAY

Location	2hr flows	12hr flows	18hr flows	2hr - 12hr	2hr - 18hr
Centenary Rd	8853	48339	62375	5.46	7.09
Greystanes Rd	9345	49873	64708	5.34	6.92
Flushcombe Rd	8889	46997	60976	5.29	6.86
Average				5.36	6.96

From the above tables the average expansion factors for the total traffic stream are:

2 hr - 12 hr	5.3
2 hr - 18 hr	6.9

These factors can then be applied to the performance indices (refer Appendix D) for each scenario to generate the vehicle parameters to be used in the environmental calculation for noise and pollution.

6.2 Accident Predictions and Network Measures

To assist in the comparison of the various options accident numbers were predicted for each. The accidents were split into the following kinds:

- fatality accidents
- injury accidents
- damage accidents

and they were compared for the 3 basic scenarios as shown in Appendix D.

As well as the accidents, the network measures of total vehicle kilometres and hours were calculated for each option and again shown in Appendix D.

The predicted accidents were calculated from the performance indices developed by the Tranplan model and various occurrence rates for each road type. Both of these variables are shown in Appendix D with the occurrence rates being taken from Reference*, which were based on traffic surveys in the Sydney area.

In order to check these generated accident numbers, the occurrence notes were applied to the Base Case scenario and then compared to the actual data received from the DMR. These calculations are contained in Appendix D and summarised below in Table 7. The actual accident data is contained in Appendix B of Working Paper 1.

TABLE 7 COMPARISON OF ACCIDENT NUMBERS
Actual/Predicted (from Model)

Year	Accident Type		
	Fatality	Injury	Damage
1982	5	72	168
1983	2	87	192
1984	4	83	192
1985 (½ year)	3	41	110
Average	4	81	189
Predicted Accidents	4	101	428

* DMR (1981) Submissions to the Warringah Transport Corridor Inquiry, Volume 2.

This comparison indicates that the occurrence rates for the less severe accidents may be high but, because of the limited amount of data used in the comparison, no firm conclusions were drawn.

7 PREFERRED OPTION

Based on the comparisons detailed in Sections 5 and 6 and outlined below, Scenario 2A was considered to be the preferred action. This scenario is shown in Figure 1 and consists of the full duplication of the GWH as a 6-lane freeway, with interchanges at Church Street and Jersey Road, and overpasses at Greystanes Road, Pendle Way and Centenary Road.

Scenario 1 is the 'do nothing' option and was rejected (see Section 5.1.1) because it would require construction in excess of 5 lanes in one direction between Toongabbie Road and Greystanes Road, and generally 4 lanes in each direction - requiring considerable land acquisition and housing loss.

The comparison of Scenarios 2 and 3 pivoted around Greystanes Road with delays being the deciding factor to the east, while weaving, merging and the number of lanes were the criteria used west of this intersection.

7.1 Number of Lanes

Both Scenarios 2 and 3 generally require a 6-lane freeway to operate at a level of service C in the 2011 design year. Reference to Figures 3 and 4 show that Scenarios 2 and 3 would operate in levels of service B to C. The upgraded section of the freeway in Scenario 3 requires an additional lane for the eastbound direction as shown in Figure 4.

7.2 Weaving and Merging

Section 5.2 discusses weaving in detail and indicates that Scenario 3 would create some confusion and increase the probability of accidents in a section of the GWH between ramps for Church Lane and Blacktown Road.

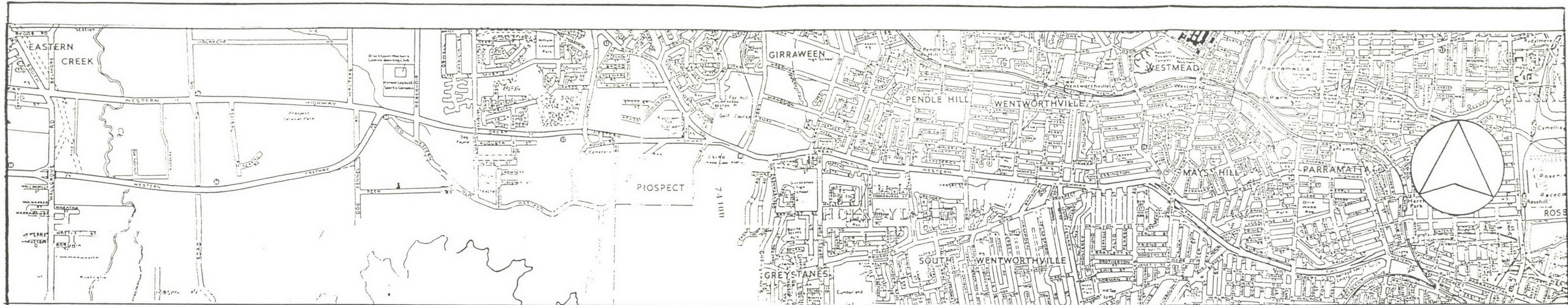
Scenario 3 would also require long acceleration lanes and a major interchange where the GWH merges with the F4 near Reservoir Road at Prospect.

7.3 Delays

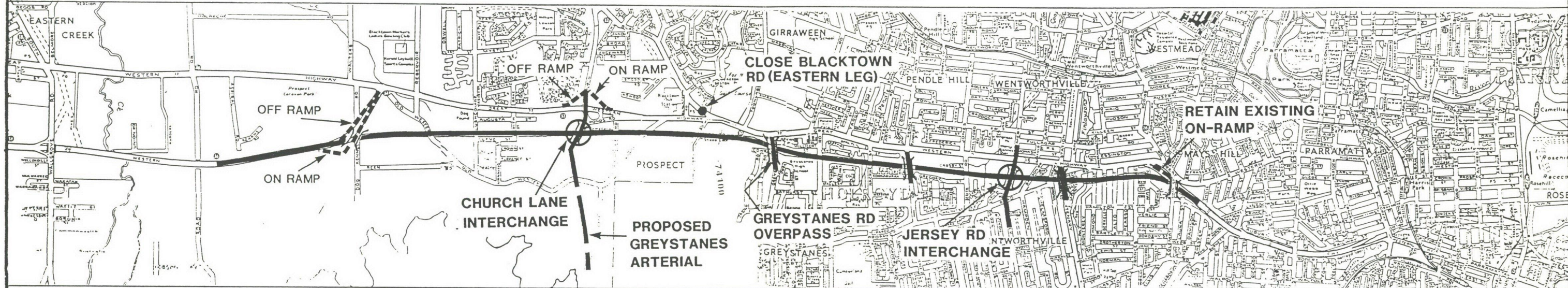
Delays are discussed in detail in Section 5.1.2 but concentrate in the main area of concern east of Greystanes Road. Table 3.2 shows that a parallel freeway is essential east of Greystanes Road to allow those intersections to function without being oversaturated. This section does not highlight any significant difference between Scenarios 2 and 3.

7.4 Accidents

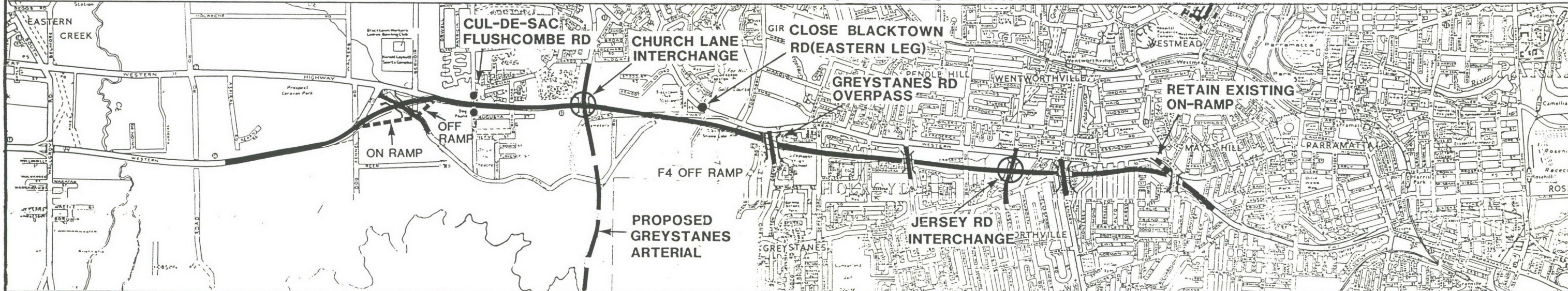
Appendix D in the Total Network Summary shows that Scenario 2A could be anticipated to have the least number of total accidents. This is to be expected, and is a result of the construction of the substantial length of new freeway.



EXISTING ROAD NETWORK



FULL DUPLICATION OF THE GREAT WESTERN HWY



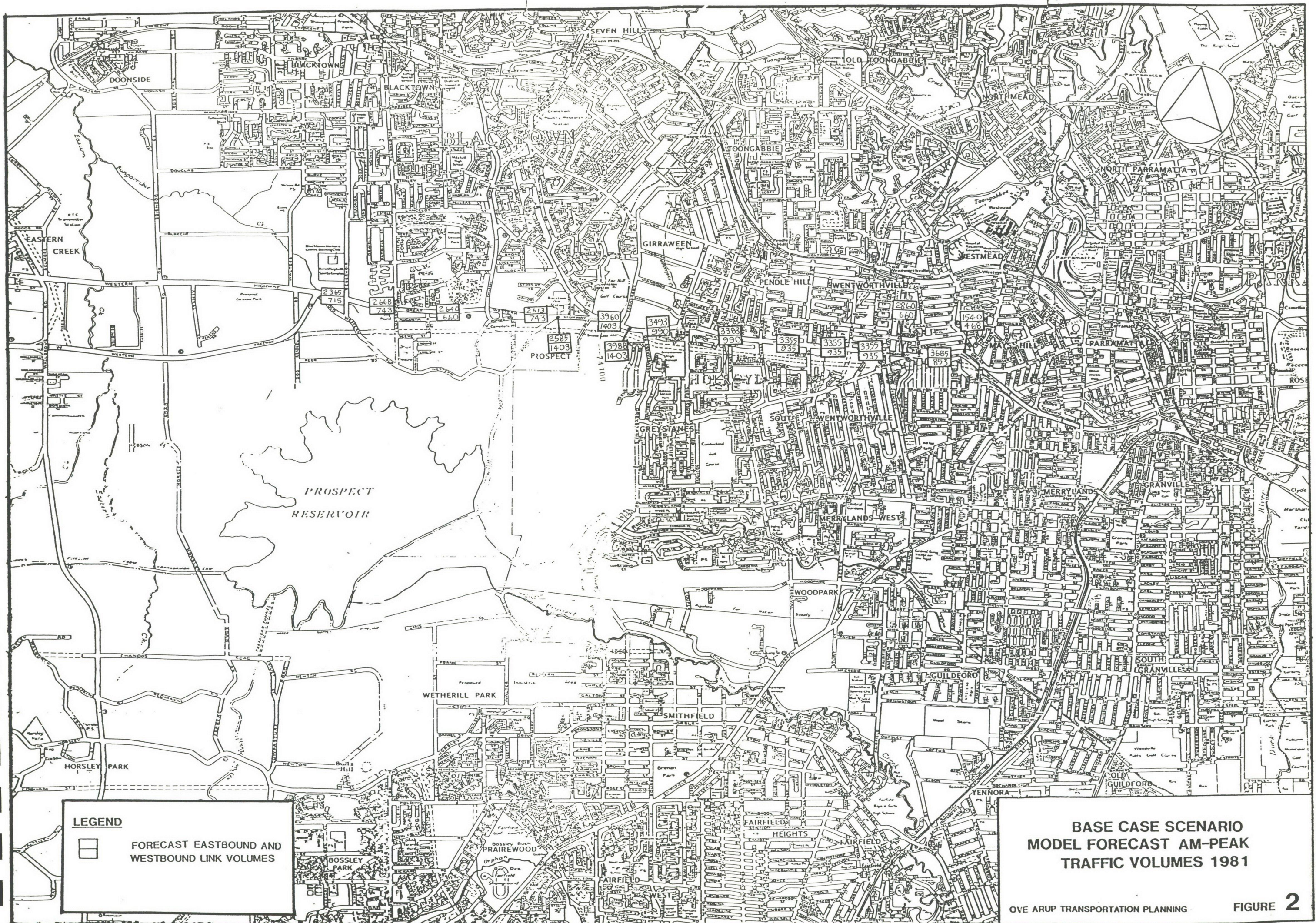
PARTIAL DUPLICATION/UPGRADING OF THE GREAT WESTERN HWY

LEGEND

— PROPOSED F4 FREEWAY

MODELLED F4 FREEWAY

ALTERNATIVES



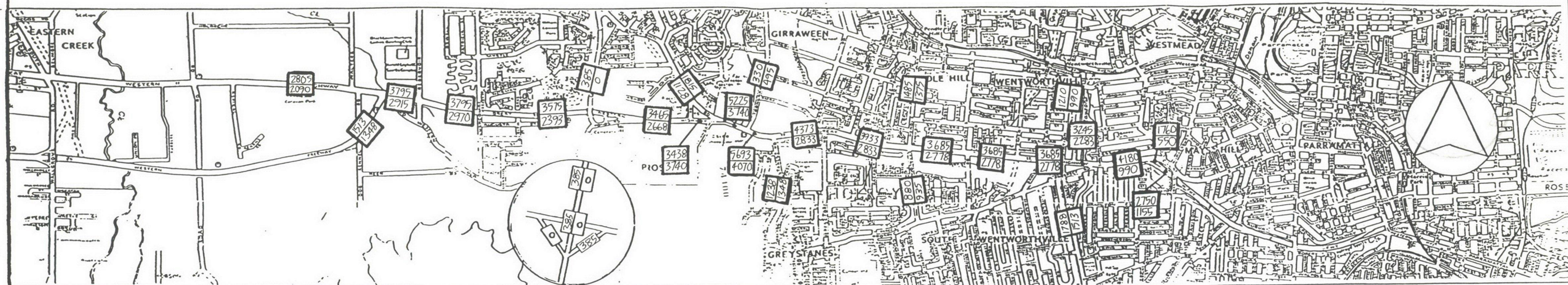
LEGEND

 FORECAST EASTBOUND AND WESTBOUND LINK VOLUMES

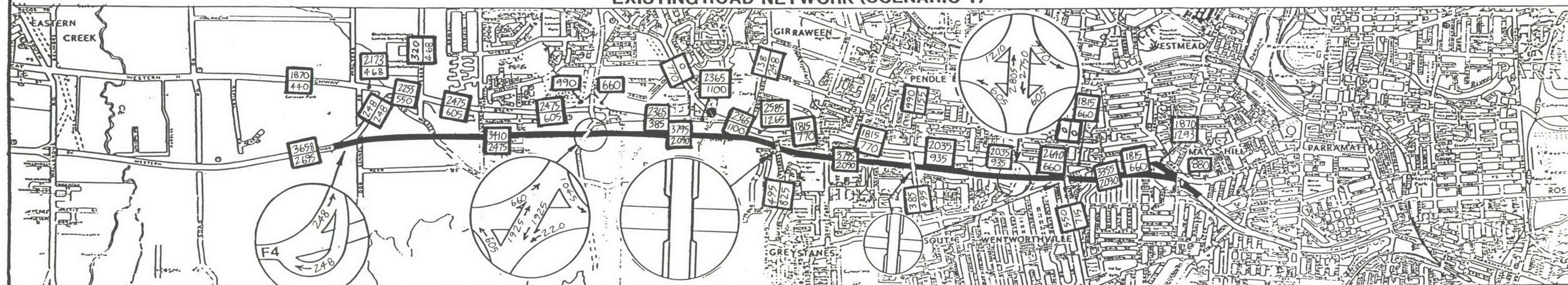
**BASE CASE SCENARIO
MODEL FORECAST AM-PEAK
TRAFFIC VOLUMES 1981**

OYE ARUP TRANSPORTATION PLANNING

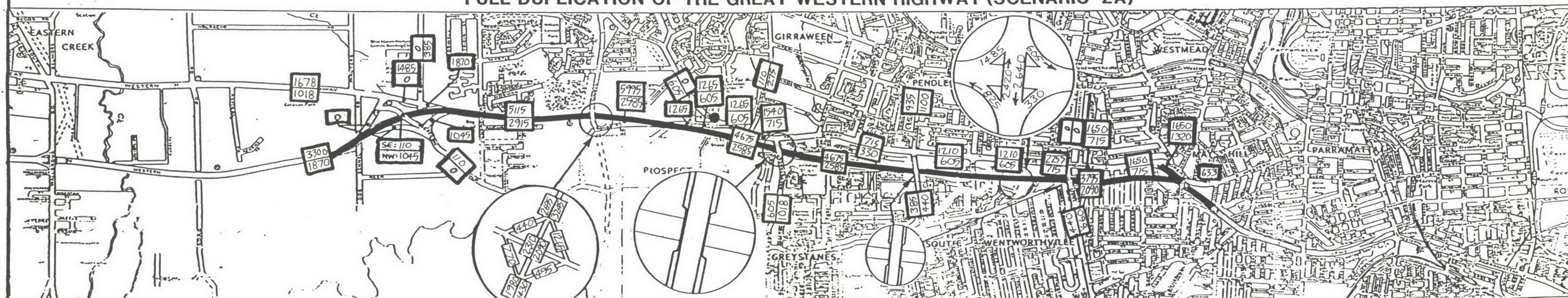
FIGURE 2



EXISTING ROAD NETWORK (SCENARIO 1)



FULL DUPLICATION OF THE GREAT WESTERN HIGHWAY (SCENARIO 2A)



PARTIAL DUPLICATION/UPGRADING OF THE GREAT WESTERN HWY (SCENARIO 3A)

LEGEND



FORECAST INTERCHANGE
LINK VOLUMES



FORECAST EASTBOUND AND
WESTBOUND LINK VOLUMES

PROPOSED CLOSURE
BLACKTOWN RD
(EASTERN LEG)
PROPOSED F4
FREEWAY

NOTE:
BASED ON THE TRANPLAN MODEL
A VOLUME / CAPACITY RATIO
OF 1.00 INDICATES THE LOWER
LIMIT OF LEVEL OF SERVICE D.

LINK CLASS (ONE DIRECTION ONLY)

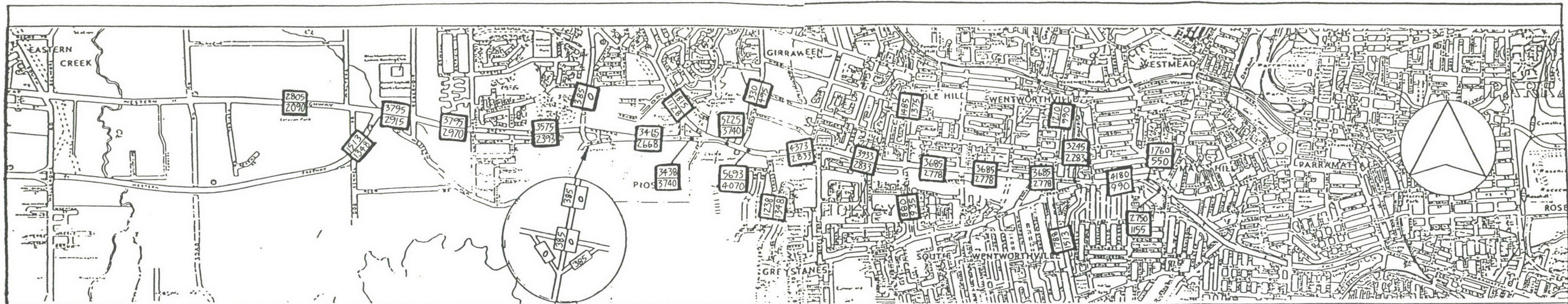
6 LANE FREEWAY	4800
4 LANE FREEWAY	3250
6 LANE ARTERIAL	2750
4 LANE ARTERIAL	1800
2 LANE ARTERIAL	1000
FREEWAY RAMP	900* * SINGLE LANE ONLY

NB: THE ABOVE VALUES WERE SUPPLIED BY THE
DMR'S STRATEGIC PLANNING SECTION.

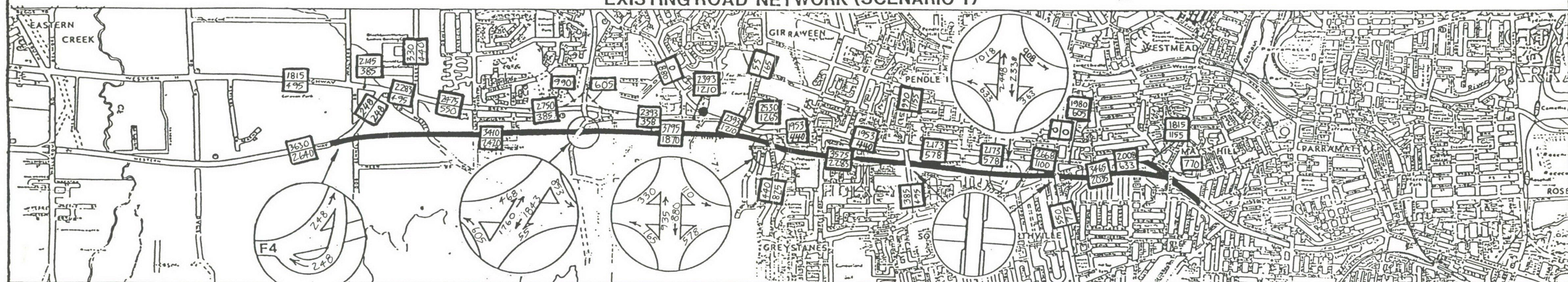
MODEL FORECAST AM-PEAK
TRAFFIC VOLUMES
(WITHOUT GREYSTANES ROAD INTERCHANGE)

OVE ARUP TRANSPORTATION PLANNING

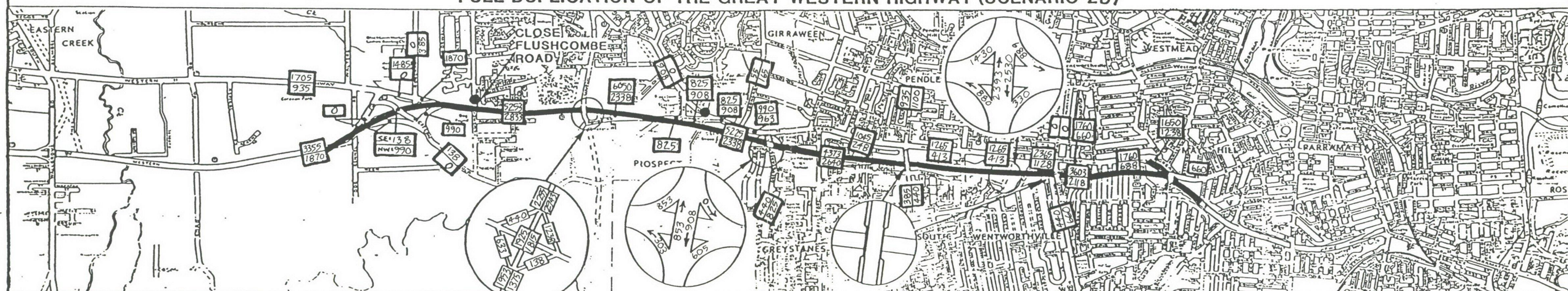
FIGURE 3A



EXISTING ROAD NETWORK (SCENARIO 1)



FULL DUPLICATION OF THE GREAT WESTERN HIGHWAY (SCENARIO 2B)



PARTIAL DUPLICATION/UPGRADING OF THE GREAT WESTERN HWY (SCENARIO 3B)

LEGEND



FORECAST INTERCHANGE
LINK VOLUMES



FORECAST EASTBOUND AND
WESTBOUND LINK VOLUMES

PROPOSED CLOSURE
BLACKTOWN RD
(EASTERN LEG)
PROPOSED F4
FREEWAY

NOTE:

BASED ON THE TRANPLAN MODEL
A VOLUME / CAPACITY RATIO
OF 1.00 INDICATES THE LOWER
LIMIT OF LEVEL OF SERVICE D.

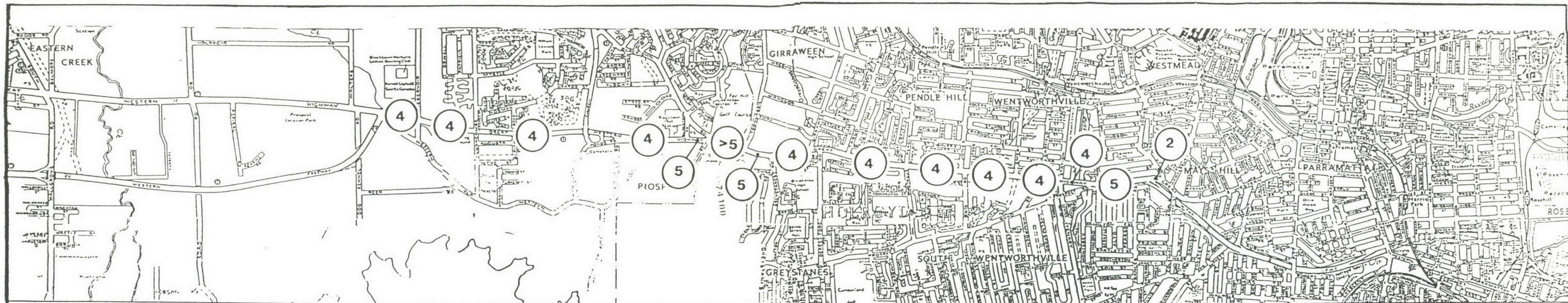
LINK CLASS	1HR CAPACITY (ONE DIRECTION ONLY)
6 LANE FREEWAY	4800
4 LANE FREEWAY	3250
6 LANE ARTERIAL	2750
4 LANE ARTERIAL	1800
2 LANE ARTERIAL	1000
FREEWAY RAMP	900 * SINGLE LANE ONLY

NB: THE ABOVE VALUES WERE SUPPLIED BY THE
DMR'S STRATEGIC PLANNING SECTION.

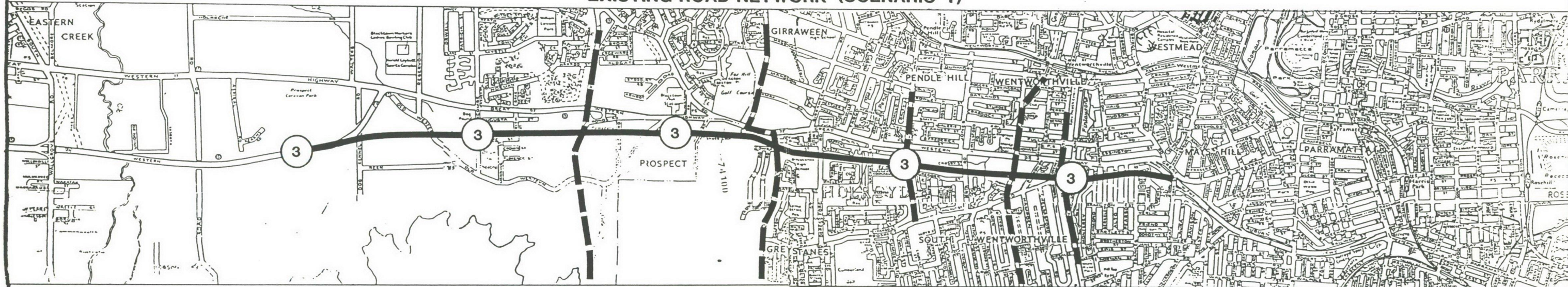
MODEL FORECAST AM-PEAK
TRAFFIC VOLUMES
(WITH GREYSTANES ROAD INTERCHANGE)

OVE ARUP TRANSPORTATION PLANNING

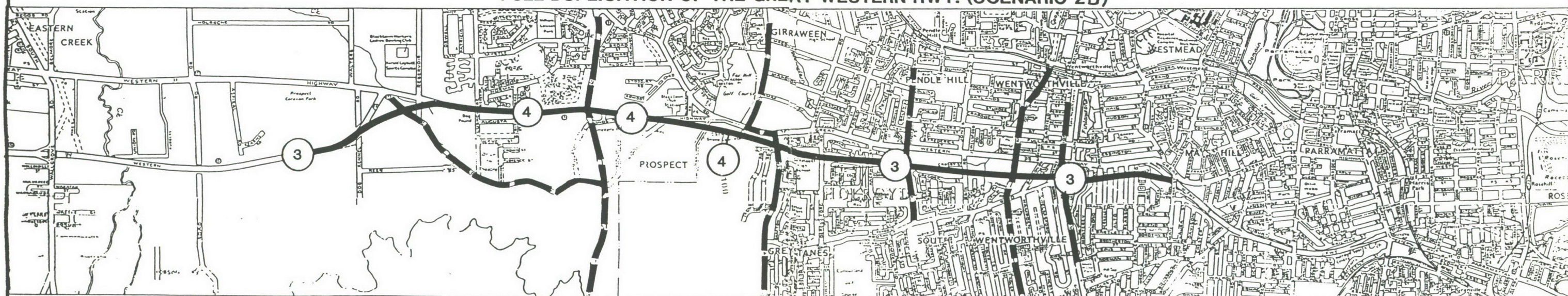
FIGURE 3B



EXISTING ROAD NETWORK (SCENARIO 1)



FULL DUPLICATION OF THE GREAT WESTERN HWY. (SCENARIO 2B)



PARTIAL DUPLICATION / UPGRADING OF THE GREAT WESTERN HWY. (SCENARIO 3B)

LEGEND

-  PROPOSED F4 FREEWAY
-  NORTH - SOUTH CONNECTORS

NUMBER OF THROUGH TRAFFIC LANES
REQUIRED FOR A LEVEL OF SERVICE C.
- EASTBOUND DIRECTION ONLY

(WITH GREYSTANES ROAD
INTERCHANGE)

OVE ARUP TRANSPORTATION PLANNING

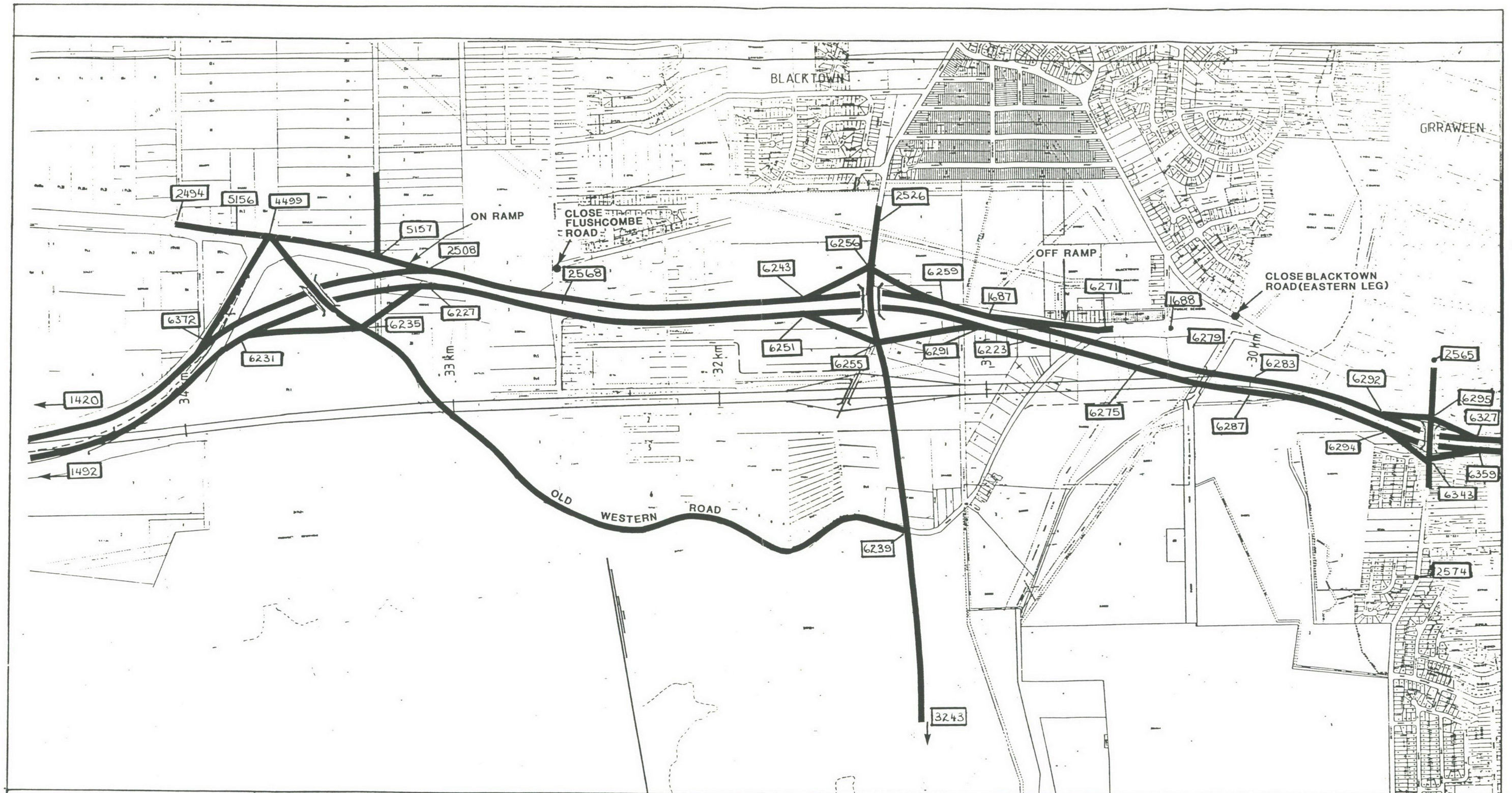
FIGURE 4B

APPENDIX A

MODEL DEVELOPMENT

As discussed in Section 2 of this Working Paper, both Networks 2 and 3 were modified. Details of these modifications are shown on the following coding forms. These coding forms were used by the DMR's Strategic Planning Section to alter their "STRAT PLAN '2000' NETWORK 1".

Figure A1 illustrates the upgraded section of Scenario 3B incorporating the revised node numbers detailed on the coding sheets.



NOTE : NODE NUMBERS FOR SCENARIO 3B
INDICATED FOR THE G.W.H. UPGRADED
SECTION OF THE PROPOSED FREEWAY

ALTERATIONS TO NETWORK 2
TO PRODUCE THE UPGRADED
SECTION OF NETWORK 3

OVE ARUP TRANSPORTATION PLANNING

FIGURE A1

CODING SHEETS : SCENARIO 2A

ON BLANK - 10/11/11 SUPERFICIAL COLLIMMS

B = DELETE BOTH A-B AND B-A

[illegible]

CODING SHEETS : SCENARIO 2B

APPLYING TO
NETWORKS 2A, 2B, 3A & 3B

1 1/2 TIME.
O = DELETE A-B
B = DELETE BOTH A-B AND B-A

0-1110
 1-1111
 1 ON BLANK PICHIDE SUFFICIENT COLLARS

[illegible]

B = DELETE BOTH A-B AND B-A

1.00 BLANK - 1.000000 SUSCEPTIBLE COLUMNS

[illegible]

CODING SHEETS : SCENARIO 3A

SCENARIO 3A

U. S. 11110
U. S. 11111
1 ON BLANK PICHIDE SUCCESSION COLLARMS

[illegible]

CODING SHEETS : SCENARIO 3B

GENERAL ALTERATIONS

APPLYING TO NETWORKS 2A, 2B, 3A & 3B

SCENARIO 3B

U- SPEED
T- TIME
ON BLANK- ICHINE SURFEDH COLLANS

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B = DELETE BOTH A-B AND B-A

100 BLANK + 1000000 SUPPLEMENTARY COLUMNS

DELETE LINKS

(ADDITIONAL LINK INFORMATION)

[illegible]

A..B

SCENARIO 50

8. TOTAL

100 BLANK HIGH-DEGREE SUPERFICIAL COLUMNS

(ADDITIONAL LINK INFORMATION)

[illegible]

4-8

B = DELETE BOTH A-B AND B-A

J. T. HAN

100 BLANK SIGCODE SHEET(200) COLUMNS

100 BLANK SIGCODE SHEET(200) COLUMNS

[illegible]

A P P E N D I X B

Population and Employment Distribution

LOCAL GOVERNMENT AREA	POPULATION				EMPLOYMENT			
	1981	2011	CHANGE	%	1981	2011	CHANGE	%
1 SYDNEY	51875	53686	1811	3.4	256259	256825	566	0.2
2 NORTH SYDNEY	48500	48392	-108	-0.2	44725	49489	4764	9.6
3 SOUTH SYDNEY	30776	31902	1126	3.5	48591	30343	-18248	-60.1
4 WOOLAHRA	51659	48730	-2929	-6.0	14720	14259	-461	-3.2
5 WAVERLEY	61575	54682	-6893	-12.6	8304	17270	8966	51.9
6 RANDWICK	116202	104211	-11991	-11.5	24691	33613	8922	26.5
7 BOTANY	35565	29652	-5913	-19.9	31326	32320	994	3.1
8 MARRICKVILLE	83448	71145	-12303	-17.3	26367	20787	-5580	-26.8
9 LEICHDART	57293	51784	-5509	-10.6	22611	11480	-11131	-97.0
10 DRUMMOYNE	30961	29640	-1321	-4.5	6851	6637	-214	-3.2
11 ASHFIELD	41253	37012	-4241	-11.5	7365	8207	842	10.3
12 BURWOOD	28896	32508	3612	11.1	9631	15183	5552	36.6
13 CONCORD	23926	25654	1728	6.7	13545	12928	-617	-4.8
14 STRATHFIELD	25882	30462	4580	15.0	16893	14028	-2865	-20.4
15 CANTERBURY	126741	107836	-18905	-17.5	24994	24609	-385	-1.6
16 ROCKDALE	82857	76503	-6354	-8.3	18145	16961	-1184	-7.0
17 KOGARAH	46322	51545	5223	10.1	10893	13023	2130	16.4
18 HURSTVILLE	64910	64633	-277	-0.4	14466	22768	8302	36.5
19 SUTHERLAND	165336	205062	39726	19.4	34881	65331	30450	46.6
20 BANKSTOWN	152636	144674	-7962	-5.5	60841	59461	-1380	-2.3
21 AUBURN	46622	50229	3607	7.2	34280	33779	-501	-1.5
22 HOLROYD	80116	81495	1379	1.7	24715	33740	9025	26.7
23 FAIRFIELD	129557	161921	32364	20.0	25909	42781	16872	39.4
24 LIVERPOOL	92715	268663	175948	65.5	26941	92931	65990	71.0
25 CAMDEN	17096	149973	132877	88.6	5435	36012	30577	84.9
26 CAMPBELLTOWN	91525	176136	84611	48.0	14192	79797	65605	82.2
27 PENRITH	108720	216360	107640	49.8	26300	81487	55187	67.7
28 WINDSOR	20870	50525	29655	58.7	9323	15165	5842	38.5
29 BLACKTOWN	181139	374193	193054	51.6	35124	120118	84994	70.8
30 PARRAMATTA	130943	129387	-1556	-1.2	62266	103033	40767	39.6
31 Baulkham Hills	93084	212815	119731	56.3	16884	59212	42328	71.5
32 HORNSBY	111081	127480	16399	12.9	24612	47330	22718	48.0
33 RYDE	88948	85126	-3822	-4.5	32074	34928	2854	8.2
34 HUNTERS HILL	12537	11465	-1072	-9.4	3253	2541	-712	-28.0
35 LANE COVE	29113	28467	-646	-2.3	9335	10240	905	8.8
36 WILLOUGHBY	52120	52570	450	0.9	34211	51348	17137	33.4
37 KU-RING-GAI	101051	102637	1586	1.5	16922	27957	11035	39.5
38 WARRINGAH	172653	209823	37170	17.7	38827	67015	28188	42.1
39 MANLY	37080	33289	-3791	-11.4	8118	13123	5005	38.1
40 MOSMAN	26200	27549	1349	4.9	5210	5995	785	13.1
41 WOLLONDILLY	5029	178984	173955	97.2	1224	43555	42331	97.2
TOTAL	2954812	4028800	1073988	26.7	1151254	1727609	576355	33.4

A P P E N D I X C

Delay Calculations

INTERSECTION	SCENARIO NO	MOVEMENT	VOLUME (vph)	MOVEMENT PARAMETERS*				AVERAGE DELAY (sec)
				G (sec)	Y	X	S (vph)	
TOONGABBIE	2A	EASTBOUND	2150	79	.321	.488	6694	30
		ALONG GWH. LEFT TURN FROM TOONGABBIE	220	33	.170	.618	1294	40
	2B	EASTBOUND ALONG GWH.	2150	94	.321	.410	6694	10
		LEFT TURN FROM TOONGABBIE	140	18	.108	.721	1294	50
	3A	EASTBOUND ALONG GWH.	1160	54	.173	.385	6694	20
		LEFT TURN FROM TOONGABBIE	240	58	.185	.384	1294	20
	3B	EASTBOUND ALONG GWH.	750	94	.112	.143	6694	10
		LEFT TURN FROM TOONGABBIE	130	18	.100	.670	1294	50

ESTIMATED AVERAGE DELAY PER VEHICLE

* MOVEMENT PARAMETERS : DERIVED FROM SIDRA-2 ANALYSIS

G - GREEN TIME (sec)

Y - FLOW RATIO

X - DEGREE OF SATURATION

S - SATURATION FLOW

CYCLE TIME OF 120 SECONDS ADOPTED

Job No

Page No

4161

Made by

Date

INTERSECTION	SCENARIO Nº	MOVEMENT	VOLUME (vph)	MOVEMENT PARAMETERS*				AVERAGE DELAY (sec)
				G (sec)	Y	X	S (vph)	
PENDLE WAY	2A	EASTBOUND	1680	39	.337	1.038	4980	40
		ALONG GWH.						
		SOUTH - NORTH	290	27	.172	1.034	1682	40
		MINOR MOVEMENT						
		NORTH - SOUTH	465	40	.345	1.036	1680	40
		MINOR MOVEMENT						
	2B	SAME AS ABOVE						
	3A	EASTBOUND	860	25	.177	.849	4860	45
		ALONG GWH.						
		SOUTH - NORTH	300	25	.178	.856	1682	45
		MINOR MOVEMENT						
		NORTH - SOUTH	490	51	.365	.858	1680	30
		MINOR MOVEMENT						
	3B	SAME AS ABOVE						

ESTIMATED AVERAGE DELAY PER VEHICLE

* MOVEMENT PARAMETERS : DERIVED FROM SIDRA-2 ANALYSIS

G - GREEN TIME (sec)

Y - FLOW RATIO

X - DEGREE OF SATURATION

S - SATURATION FLOW

CYCLE TIME OF 120 SECONDS ADOPTED

INTERSECTION	SCENARIO Nº	MOVEMENT	VOLUME (vph)	MOVEMENT PARAMETERS*				AVERAGE DELAY (sec)
				G (sec)	Y	X	S (vph)	
STATION ST.	2A	EASTBOUND	1801	59	.368	.748	4894	25
		ALONG GWH.						
		SOUTH - NORTH	2	14	.001	.012	1850	50
		MINOR MOVEMENT						
		NORTH - SOUTH	1	7	.001	.009	1841	50
		MINOR MOVEMENT						
	2B	SAME	AS ABOVE					
	3A	EASTBOUND	1581	58	.323	.668	4894	25
		ALONG GWH.						
		SOUTH - NORTH	2	14	.001	.012	1850	50
		MINOR MOVEMENT						
		NORTH - SOUTH	1	7	.001	.009	1841	50
		MINOR MOVEMENT						
	3B	SAME	AS ABOVE					

ESTIMATED AVERAGE DELAY PER VEHICLE

* MOVEMENT PARAMETERS : DERIVED FROM SIDRA-2 ANALYSIS

G - GREEN TIME (sec)

Y - FLOW RATIO

X - DEGREE OF SATURATION

S - SATURATION FLOW

CYCLE TIME OF 120 SECONDS ADOPTED

Job No

Page No

4161

Made by

Date

A P P E N D I X D

Accident Predictions and Network Measures

PREDICTED ACCIDENTS - BASE CASE

SITUATION: Base Case

ROAD : Great Western Highway

VEHICLE TYPE : Cars (90% - Expansion Factor = 1400)

SECTION (As per App.B) w/k paper. 1	LENGTH	2-HR 2WAY AM PEAK FLOW	ANNUAL FLOW $\times 10^6$	ANNUAL VEH FLOW $\times 10^6$	FORECAST ACCIDENTS		
					Fatalities (0.030)	Injuries (1.118)	Tow away (4.897)
19	2.6	5350	7.49	19.47	0.58	21.77	95.34
18	1.7	7350	10.29	17.49	0.52	19.55	85.65
17	1.6	7250	10.15	16.24	0.49	18.16	79.32
16	1.6	7050	9.87	15.79	0.47	17.65	77.32
15	1.0	7400	10.36	10.36	0.31	11.58	50.73
Totals	8.5				3	89	389
From Trucks Total					1	12	39
					4	101	428

Made by

Page No

D1

Date

PREDICTED ACCIDENTS - BASE CASE

SITUATION: Base Case

ROAD : Great Western Highway

VEHICLE TYPE Trucks (10% - Expansion Factor 1600)

SECTION (As per App.B) w/k paper 1	LENGTH	2-HR 2-WAY AM PEAK FLOW	ANNUAL FLOW $\times 10^6$	ANNUAL VEH. FLOW $\times 10^6$	FORECAST ACCIDENTS		
					Fatalities (0.030)	Injuries (1.118)	Tow away (4.897)
19	2.6	600	0.96	2.50	0.08	2.80	5.47
18	1.7	820	1.31	2.23	0.07	2.49	10.92
17	1.6	805	1.29	2.06	0.06	2.30	10.09
16	1.6	780	1.25	2.00	0.06	2.24	9.79
15	1.0	825	1.32	1.32	0.04	1.48	2.64
Totals					1	12	39

TABLE AREA WIDE PERFORMANCE INDICES FOR BLACKTOWN LGA.

AREA WIDE PERFORMANCE INDEX	SCENARIO No.	LINK CLASS						
		LOCAL STREET	SUB- ARTERIAL	ARTERIAL		STATE HWY (Divided)	FREEWAY RAMP	FREEWAY
				(Undivided)	(Divided)			
VEHICLE -kms	1 A	35 498	220 363	490 345	45 344	86 845	16 14	49 131
	2 A	32 191	214 716	470 474	47 968	56 510	2483	89 388
	3 A	31 605	213 688	506 693	50 060	38 417	7135	130 597
VEHICLE -hrs	1 A	1198	7028	15 223	1306	3129	57	721
	2 A	966	6852	14 291	1244	1317	117	1599
	3 A	929	6825	15 341	1337	826	497	2373

TABLE AREA WIDE PERFORMANCE INDICES FOR HOLROYD LGA.

AREA WIDE PERFORMANCE INDEX	SCENARIO No.	LINK CLASS						
		LOCAL STREET	SUB- ARTERIAL	ARTERIAL		STATE HWY (Divided)	FREEWAY RAMP	FREEWAY
				(Undivided)	(Divided)			
VEHICLE - kms	1 A	2017	56295	73774	5281	67328	153	24511
	2 A	2061	52169	64495	5688	43087	1178	102500
	3 A	2061	49939	65515	5682	31644	1124	81758
VEHICLE - hrs	1 A	44	1600	1882	130	2031	5	518
	2 A	45	1460	1700	230	1065	57	2386
	3 A	45	1384	1685	218	769	72	2112

TABLE AREA WIDE PERFORMANCE INDICES FOR BLACKTOWN LGA.

AREA WIDE PERFORMANCE INDEX	SCENARIO No.	LINK CLASS						
		LOCAL STREET	SUB- ARTERIAL	ARTERIAL		STATE HWY (Divided)	FREEWAY RAMP	FREEWAY
				(Undivided)	(Divided)			
VEHICLE - kms	1 A	35498	220363	490345	45344	86845	1614	49131
	2 B	32042	213986	470734	46880	55555	2123	110078
	3 B	32770	212836	505193	49177	38045	6506	130685
VEHICLE - hrs	1 A	1198	7028	15223	1306	3129	57	721
	2 B	955	6816	14203	1209	1304	91	1997
	3 B	984	6825	15308	1295	814	458	2971

TABLE AREA WIDE PERFORMANCE INDICES FOR HOLROYD LGA.

AREA WIDE PERFORMANCE INDEX	SCENARIO No.	LINK CLASS						
		LOCAL STREET	SUB- ARTERIAL	ARTERIAL		STATE HWY (Divided)	FREEWAY RAMP	FREEWAY
				(Undivided)	(Divided)			
VEHICLE - kms	1 A	2017	56295	73774	5281	67328	153	24511
	2 B	2079	51684	64960	5690	42184	1466	83521
	3 B	2067	51420	64405	5762	33644	1801	79760
VEHICLE - hrs	1 A	44	1600	1882	130	2031	5	518
	2 B	46	1432	1690	196	1057	59	1846
	3 B	46	1432	1688	212	824	94	1956

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 1A

VEHICLE TYPE : CAR (90%)

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	35498	31948	44.73	0.037	1.66	1.221	54.62	3.759	168.14
SUB ARTERIAL	220363	198327	277.66	0.037	10.27	1.221	339.02	3.759	1043.72
ARTERIAL	490345	441311	617.83	0.039	24.10	1.295	800.09	4.722	2917.39
HIGHWAY	132189	118970	166.56	0.030	5.00	1.118	186.21	4.897	815.64
FREEWAY	50745	45671	63.94	0.013	0.83	0.315	20.14	0.957	61.19
TOTALS			1171	N/A	42	N/A	1400	N/A	5006

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L.G.A. : Blacktown

SCENARIO : 1A

VEHICLE TYPE : Trucks (10%)

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	35498	3550	5.68	0.037	0.21	1.221	6.94	3.759	21.35
SUB ARTERIAL	220363	22036	35.26	0.037	1.30	1.221	43.05	3.759	132.54
ARTERIAL	490345	49035	78.46	0.039	3.06	1.295	101.61	4.722	370.49
HIGHWAY	132189	13219	21.15	0.030	0.63	1.118	23.65	4.897	103.57
FREEWAY	50745	5075	8.12	0.013	0.11	0.315	2.56	0.957	7.77
TOTALS			149	N/A	6	N/A	178	N/A	636

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROYD

SCENARIO : 1A

VEHICLE TYPE : CAR

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2017	1815	2.54	0.037	0.09	1.221	3.10	3.759	9.55
SUB ARTERIAL	56295	50666	70.93	0.037	2.62	1.221	86.61	3.759	266.63
ARTERIAL	73774	66397	92.96	0.039	3.63	1.295	120.38	4.722	438.96
HIGHWAY	72609	65348	91.49	0.030	2.74	1.118	102.29	4.897	448.03
FREEWAY	24664	22198	31.08	0.013	0.40	0.315	9.79	0.957	29.74
TOTALS			289	N/A	10	N/A	323	N/A	1193

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROID

SCENARIO : 1A

VEHICLE TYPE : Truck

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2017	202	0.32	0.037	0.01	1.221	0.39	3.759	1.20
SUB ARTERIAL	56295	5630	9.01	0.037	0.33	1.221	11.00	3.759	33.87
ARTERIAL	73774	7377	11.80	0.039	0.46	1.295	15.28	4.722	55.72
HIGHWAY	72609	7261	11.62	0.030	0.35	1.118	12.99	4.897	56.90
FREEWAY	24664	2466	3.95	0.013	0.05	0.315	1.24	0.957	3.78
TOTALS			37	N/A	2	N/A	41	N/A	152

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 2A

VEHICLE TYPE : CARS

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM x 10 ⁶	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	32 191	28 972	40.56	0.037	1.50	1.221	49.52	3.759	152.47
SUB ARTERIAL	214 716	193 244	270.54	0.037	10.01	1.221	330.33	3.759	1016.97
ARTERIAL	470 474	423 427	592.80	0.039	23.12	1.295	767.67	4.722	2799.19
HIGHWAY	104 478	94 030	131.64	0.030	3.95	1.118	147.18	4.897	644.65
FREEWAY	91 871	82 684	115.76	0.013	1.50	0.315	36.46	0.957	110.78
TOTALS			1151		40		1331		4724

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 2A

VEHICLE TYPE : TRUCK

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	32 191	32 19	5.15	0.037	0.19	1.221	6.29	3.759	19.36
SUB ARTERIAL	214 716	21 472	34.36	0.037	1.27	1.221	41.95	3.759	129.16
ARTERIAL	470474	4 7047	75.28	0.039	2.936	1.295	97.48	4.722	355.45
HIGHWAY	104478	10 448	16.72	0.030	0.50	1.118	18.69	4.897	81.86
FREEWAY	91 871	9 187	14.70	0.013	0.19	0.315	4.63	0.957	14.07
TOTALS			146		5		169		600

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROYD
 SCENARIO : 2A
 VEHICLE TYPE : CAR

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ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2061	1855	2.60	0.037	0.10	1.221	3.17	3.759	9.76
SUB ARTERIAL	57169	51452	72.03	0.037	2.67	1.221	87.95	3.759	270.77
ARTERIAL	64495	58046	81.26	0.039	3.17	1.295	105.24	4.722	383.73
HIGHWAY	48775	43895	61.46	0.030	1.84	1.118	68.71	4.897	300.95
FREEWAY	103678	93310	130.63	0.013	1.70	0.315	41.15	0.957	125.02
TOTALS			348		9		306		1090

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROYD
 SCENARIO : 2A
 VEHICLE TYPE : TRUCK

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ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES		DAMAGE	
						RATE	NO.	RATE	NO.
LOCAL	2061	206	0.33	0.037	0.01	1.221	0.40	3.759	1.24
SUB ARTERIAL	57169	5717	9.15	0.037	0.34	1.221	11.17	3.759	34.38
ARTERIAL	64495	6500	10.32	0.039	0.40	1.295	13.36	4.722	48.73
HIGHWAY	48775	4878	7.80	0.030	0.23	1.118	8.72	4.897	38.22
FREEWAY	103678	10368	16.59	0.013	0.22	0.315	5.23	0.957	15.88
TOTALS			44		1		39		139

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 3A

VEHICLE TYPE : CAR

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	31 605	28 445	39.82	0.037	1.47	1.221	48.62	3.759	149.69
SUB ARTERIAL	213 688	192 319	269.25	0.037	9.96	1.221	328.75	3.759	1012.10
ARTERIAL	506 693	456 024	638.43	0.039	24.90	1.295	826.77	4.722	3014.68
HIGHWAY	88 477	79 629	111.48	0.030	3.34	1.118	124.64	4.897	545.92
FREEWAY	137 732	123 959	173.54	0.013	2.26	0.315	54.67	0.957	166.08
TOTALS			1233		42		1383		4 888

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 3A

VEHICLE TYPE : TRUCK

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	31 605	3161	5.06	0.037	0.19	1.221	6.17	3.759	19.01
SUB ARTERIAL	213 688	21 369	34.19	0.037	1.27	1.221	41.75	3.759	128.52
ARTERIAL	506 693	50 669	81.07	0.039	3.16	1.295	104.99	4.722	382.82
HIGHWAY	88 477	8848	14.16	0.030	0.42	1.118	15.83	4.897	69.32
FREEWAY	137732	13 773	22.64	0.013	0.29	0.315	6.94	0.957	21.09
TOTALS			157		5		176		621

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROYD
 SCENARIO : 3A
 VEHICLE TYPE : CAR

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2061	1855	2.60	0.037	0.10	1.221	3.17	3.759	9.76
SUB ARTERIAL	49939	44945	62.92	0.037	2.33	1.221	76.83	3.759	236.53
ARTERIAL	65515	58964	82.55	0.039	3.22	1.295	106.90	4.722	389.80
HIGHWAY	37326	33593	47.03	0.030	1.41	1.118	52.58	4.897	230.31
FREEWAY	82882	74594	104.43	0.013	1.36	0.315	32.90	0.957	99.94
TOTALS			300		8		272		966

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROYD

SCENARIO : 3A

VEHICLE TYPE : TRUCK

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2061	206	0.33	0.037	0.01	1.221	0.40	3.759	1.24
SUB ARTERIAL	49939	4994	7.99	0.037	0.30	1.221	9.76	3.759	30.04
ARTERIAL	65515	6552	10.48	0.039	0.41	1.295	13.59	4.722	49.50
HIGHWAY	37326	3733	5.97	0.030	0.18	1.118	6.68	4.897	29.25
FREEWAY	82882	8288	13.26	0.013	0.17	0.315	4.18	0.957	12.69
TOTALS			38		1		35		123

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 2B

VEHICLE TYPE : CARS

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES		DAMAGE	
						RATE	NO.	RATE	NO.
LOCAL	32042	28838	40.37	0.037	1.49	1.221	49.29	3.759	151.75
SUB ARTERIAL	213986	192587	269.62	0.037	9.98	1.221	329.21	3.759	1013.50
ARTERIAL	470734	423661	593.13	0.039	23.13	1.295	768.10	4.722	2800.76
HIGHWAY	102435	92191	129.07	0.030	3.87	1.118	144.30	4.897	632.06
FREEWAY	112201	100980	141.37	0.013	1.84	0.315	44.53	0.957	135.29
TOTALS			1174	N/A	41	N/A	1336	N/A	4734

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : BLACKTOWN

SCENARIO : 2B

VEHICLE TYPE : Truck

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM x 10 ⁶	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES		DAMAGE	
						RATE	NO.	RATE	NO.
LOCAL	32042	3204	5.12	0.037	0.189	1.221	6.25	3.759	19.24
SUB ARTERIAL	213986	21398	34.24	0.037	1.267	1.221	41.81	3.759	128.71
ARTERIAL	470734	47073	75.32	0.039	2.937	1.295	97.54	4.722	355.66
HIGHWAY	102435	10243	16.38	0.030	0.49	1.118	18.31	4.897	80.21
FREEWAY	112201	11220	17.95	0.013	0.23	0.315	5.65	0.957	17.18
TOTALS			149	N/A	6	N/A	170	N/A	601

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L G A : HOLROYD

SCENARIO : 2 B

VEHICLE TYPE : CAR

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2079	1871	2.62	0.037	0.10	1.221	320	3.759	9.85
SUB ARTERIAL	51684	46516	65.12	0.037	2.41	1.221	79.51	3.759	244.79
ARTERIAL	64960	58464	81.85	0.039	3.19	1.295	106.00	4.722	386.50
HIGHWAY	47874	43087	60.32	0.030	1.81	1.118	67.44	4.897	295.39
FREEWAY	84993	76494	107.09	0.013	1.39	0.315	33.73	0.957	102.49
TOTALS			317	N/A	9	N/A	290	N/A	1040

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L.G.A. : HOLROYD
 SCENARIO : 2B
 VEHICLE TYPE : Truck

ROAD TYPE	TOTAL	2 HR. AM PEAK VEH. KM	ANNUAL VEH. KM	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2079	208	0.33	0.027	0.012	1.221	0.40	3.759	1.24
SUB ARTERIAL	51684	5168	8.3	0.037	0.3059	1.221	10.09	3.759	31.08
ARTERIAL	64960	6496	10.4	0.039	0.41	1.295	13.5	4.722	49.1
HIGHWAY	47874	4787	7.7	0.030	0.23	1.118	8.6	4.897	37.7
FREEWAY	84993	8499	13.6	0.013	0.177	0.315	4.28	0.957	13.01
TOTALS			40.3	N/A	2	N/A	37	N/A	132

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L.G.A. : BLACKTOWN

SCENARIO : 3B

VEHICLE TYPE : CAR

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	32770	29493	41.29	0.037	1.53	1.221	50.42	3.759	155.21
SUB ARTERIAL	212836	191552	268.17	0.037	9.92	1.221	327.44	3.759	1008.05
ARTERIAL	505193	454673	636.54	0.039	24.83	1.295	824.46	4.722	3006.26
HIGHWAY	87222	78500	109.90	0.030	3.30	1.118	122.87	4.897	538.18
FREEWAY	137191	123472	172.86	0.013	2.25	0.315	54.45	0.957	165.4
TOTALS			1229	N/A	42	N/A	1380	N/A	4873

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L.G.A : BLACKTOWN

SCENARIO : 3B

VEHICLE TYPE : TRUCK

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM x10 ⁶	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES		DAMAGE	
						RATE	NO.	RATE	NO.
LOCAL	32770	3277	5.24	0.637	0.194	1.221	639	3.759	19.697
SUB ARTERIAL	212836	21283	34.05	0.037	1.259	1.221	4157	3.759	127.99
ARTERIAL	505193	50519	80.83	0.039	3.152	1.295	10467	4.722	381.67
HIGHWAY	87222	8722	13.95	0.030	0.418	1.118	1559	4.897	68.31
FREEWAY	137191	13712	21.95	0.013	0.285	0.315	691	0.957	21.00
TOTALS			156	N/A	6	N/A	176	N/A	619

ACCIDENT PREDICTIONS AND NETWORK MEASURES

L. G. A. : HOLROYD
SCENARIO : 3B
VEHICLE TYPE : CAR

ROAD TYPE	TOTAL	2 HR. AM PEAK VEH. KM	ANNUAL VEH. KM $\times 10^6$	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2067	1861	2.61	0.037	0.10	1.221	3.19	3.759	9.81
SUB ARTERIAL	51420	46278	64.79	0.037	2.40	1.721	79.11	3.759	243.55
ARTERIAL	64405	57965	81.15	0.039	3.16	1.295	105.09	4.722	383.19
HIGHWAY	39346	35411	49.58	0.030	1.49	1.118	55.43	4.897	242.79
FREEWAY	81561	73405	102.77	0.013	1.34	0.315	32.37	0.957	98.35
TOTALS			301	N/A	9	N/A	276	N/A	978

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ACCIDENT PREDICTIONS AND NETWORK MEASURES

L.G.A. : HOLROYD

SCENARIO : 3B

VEHICLE TYPE : Truck

ROAD TYPE	TOTAL	2 HR AM PEAK VEH. KM	ANNUAL VEH. KM	FORECAST FATALITIES		ACCIDENTS			
				RATE	NO.	INJURIES RATE	NO.	DAMAGE RATE	NO.
LOCAL	2067	207	0.33	0.037	0.012	1.221	0.40	3.759	1.24
SUB ARTERIAL	51420	5142	8.22	0.037	0.30	1.221	10.04	3.759	30.90
ARTERIAL	64405	6440	10.30	0.039	0.40	1.295	13.33	4.722	48.63
HIGHWAY	39346	3935	6.29	0.030	0.19	1.118	7.03	4.897	30.80
FREEWAY	81561	8156	13.05	0.013	0.17	0.315	4.11	0.957	12.48
TOTALS			39	N/A	2	N/A		N/A	125

BLACKTOWN - ACCIDENT PREDICTIONS & NETWORK MEASURES

ROAD TYPE	ANNUAL VEHICLE Km. x 10 ⁶			ANNUAL VEHICLE HOURS x 10 ⁶			ACCIDENT TYPE FATALITY			INJURY			DAMAGE		
	1A	2A	3A	1A	2A	3A	1A	2A	3A	1A	2A	3A	1A	2A	3A
LOCAL	50.41	45.71	44.88	1.70	1.37	1.32	1.87	1.69	1.66	61.56	55.81	54.79	189.49	171.83	168.70
SUB-ARTERIAL	312.92	304.90	303.44	9.98	1.73	9.69	11.57	11.28	11.23	382.07	372.28	370.50	1176.26	1146.13	1140.62
ARTERIAL	696.29	668.08	719.50	21.62	20.29	21.78	27.16	26.06	28.06	901.7	865.15	931.76	3287.88	3154.64	3397.5
HIGHWAY	187.71	148.36	125.64	6.30	3.65	3.07	5.63	4.45	3.76	209.86	165.87	140.47	919.21	726.51	615.24
FREEWAY	72.06	130.46	195.58	1.10	2.44	4.07	0.94	1.69	2.55	22.7	41.09	61.61	68.96	124.85	187.17
TOTALS	1319.4	1297.51	1389.04	40.7	37.46	39.93	47	45	47	1578	1500	1559	5642	5324	5509

HOLROYD - ACCIDENT PREDICTIONS & NETWORK MEASURES

ROAD TYPE	ANNUAL VEHICLE Km. x 10 ⁶			ANNUAL VEHICLE HOURS x 10 ⁶			ACCIDENT TYPE FATALITY			INJURY			DAMAGE		
	1A	2A	3A	1A	2A	3A	1A	2A	3A	1A	2A	3A	1A	2A	3A
LOCAL	2.86	2.93	2.93	0.06	0.64	0.64	0.10	0.11	0.11	3.49	3.57	3.57	10.75	11.00	11.00
SUB-ARTERIAL	79.94	81.18	70.91	2.27	2.07	1.96	2.95	3.01	2.63	97.61	99.12	86.59	300.5	305.15	266.57
ARTERIAL	104.76	91.58	93.03	2.67	2.41	2.39	4.09	3.57	3.63	135.66	118.60	120.49	494.68	432.97	439.30
HIGHWAY	103.11	69.26	53.00	3.07	1.83	1.40	3.09	2.07	1.59	115.28	77.43	59.26	504.93	339.17	259.56
FREEWAY	35.03	147.22	117.69	0.74	3.47	3.10	0.45	1.92	1.53	11.03	46.38	37.08	33.52	140.90	112.63
TOTALS	325.7	392.17	337.56	8.81	10.42	9.49	11	11	9	363	345	307	1344	1229	1099

BLACKTOWN — ACCIDENT PREDICTIONS & NETWORK MEASURES

ROAD TYPE	ANNUAL VEHICLE Km. $\times 10^6$ SCENARIO			ANNUAL VEHICLE HOURS $\times 10^6$ SCENARIO			FATALITY			ACCIDENT TYPE INJURY			DAMAGE		
	1A	2B	3B	1A	2B	3B	1A	2B	3B	1A	2B	3B	1A	2B	3B
LOCAL	50.41	45.52	46.5	1.70	1.35	1.40	1.87	2	2	61.56	55	58	189.49	172	176
SUBARTERIAL	312.92	303.80	302.3	9.98	9.67	9.68	11.57	12	12	382.07	370	370	1176.26	1142	1136
ARTERIAL (Undivided)	696.29	668.40	717.3	21.62	20.2	21.74	27.16	26	27	901.7	865	930	3287.88	3157	3389
HIGHWAY + (Divided Arterial)	187.71	145.50	124	6.30	3.57	2.98	5.63	4	5	209.86	162	139	919.21	712	607
FREEWAY	72.06	159.40	194.9	1.10	2.96	4.16	0.94	2	3	22.7	49	62	68.96	160	127
TOTALS	1319.4	1322.7	1385.0	40.7	37.8	39.9	47	46	49	1578	1501	1559	5642	5343	5435

HOLROYD

ROAD TYPE	ANNUAL VEHICLE Km. $\times 10^6$ SCENARIO			ANNUAL VEHICLE HOURS SCENARIO			FATALITY			ACCIDENT TYPE INJURY			DAMAGE		
	1A	2B	3B	1A	2B	3B	1A	2B	3B	1A	2B	3B	1A	2B	3B
LOCAL	2.86	2.95	2.93	0.06	0.06	0.06	0.10	1	1	3.49	4	4	10.75	11	11
SUBARTERIAL	79.94	73.4	72.9	2.27	2.03	2.03	2.95	3	3	97.61	90	90	300.5	275	274
ARTERIAL (Undivided)	104.76	92.2	91.45	2.67	2.40	2.40	4.09	3	4	135.66	120	118	494.68	436	432
HIGHWAY + (Divided Arterial)	103.11	68.0	55.8	3.07	1.78	1.47	3.09	2	2	115.28	76	63	504.93	333	274
FREEWAY	35.03	120.7	115.8	0.74	2.70	2.91	0.45	2	2	11.03	38	37	33.52	115	111
TOTALS	325.7	357.3	338.8	8.81	9.0	8.9	11	11	12	363	328	312	1344	1171	1102

TOTAL NETWORK - ACCIDENT PREDICTIONS & NETWORK MEASURES

ROAD TYPE	ANNUAL VEHICLE Km. $\times 10^6$			ANNUAL VEHICLE HOURS $\times 10^6$			ACCIDENT TYPE								
	1A	2A	3A	1A	2A	3A	FATALITY			INJURY			DAMAGE		
	1A	2A	3A	1A	2A	3A	1A	2A	3A	1A	2A	3A	1A	2A	3A
LOCAL	53.27	48.64	47.81	1.76	2.01	1.96	1.97	1.80	1.77	65.05	59.38	58.36	200.24	182.83	179.70
SUB-ARTERIAL	392.86	386.08	374.35	12.25	11.8	11.65	14.52	14.29	13.86	479.68	471.4	457.09	1476.76	1451.28	1407.13
ARTERIAL	801.05	759.66	812.53	24.29	22.7	24.17	31.25	29.63	31.69	1037.36	983.75	1052.25	3782.56	3587.61	3836.8
HIGHWAY	290.82	217.62	178.64	9.37	5.48	4.47	8.72	6.52	5.35	325.14	243.3	199.73	1424.14	1065.68	874.8
FREEWAY	107.09	277.68	313.27	1.84	5.91	7.17	1.39	3.61	4.08	33.73	87.47	98.69	102.48	265.75	299.8
TOTALS	1645.1	1689.68	1726.60	49.5	47.9	49.4	58	56	57	1941	1845	1866	6986	6553	6598

TOTAL NETWORK - ACCIDENT PREDICTIONS & NETWORK MEASURES

ROAD TYPE	ANNUAL VEHICLE KM. x 10 ⁶ SCENARIO			ANNUAL VEHICLE HOURS x 10 ⁶ SCENARIO			FATALITY			ACCIDENT TYPE INJURY			DAMAGE		
	1A	2B	3B	1A	2B	3B	1A	2B	3B	1A	2B	3B	1A	2B	3B
LOCAL	53.27	48.52	49.43	1.76	1.41	1.46	1.97	3	3	65.05	59	62	200.24	183	187
SUB ARTERIAL	392.86	377.2	375.2	12.25	11.7	11.72	14.52	15	15	479.68	460	460	1476.76	1418	1410
ARTERIAL (Undivided)	801.05	760.6	808.75	24.29	22.6	24.41	31.25	29	31	1037.36	985	1048	3782.56	3593	3821
HIGHWAY + DIVIDED ARTERIAL	290.82	213.5	179.72	9.37	5.35	4.45	8.72	6	7	325.14	238	202	1424.14	1045	881
FREEWAY	107.09	280.1	310.7	1.84	5.66	7.07	1.39	4	5	33.73	87	99	102.48	275	238
TOTALS	1645.1	1679.9	1724	49.5	46.7	49.1	58	57	61.	1941	1829	1871	6986	6514	6537