Traffic & Economics

A228 Leybourne & West Malling Bypass
Environmental Statement
Volume 2 (part)

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HIGHWAYS &
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CONTENTS

1.0 INTRODUCTION

1.1 The A228 forms part of Kent's north-south strategic primary road network linking the M2 at the Medway towns with the M20, A20, A26 and the west Kent towns of Tonbridge and Tunbridge Wells.

1.2 A number of improvements (Figure 1) have already been carried out along the route and some villages and settlements have been bypassed. Further improvements are planned throughout its length to bring the route to a standard that will match its strategic traffic role and bring environmental benefits by removing traffic from unsuitable sections of road.

1.3 The current proposals provide a bypass to the village of Leybourne on the section between the A20 and M20 and a dualling of the West Malling Bypass to ensure continued benefits to West Malling by the removal of through traffic.

2.0 EXISTING AND HISTORICAL TRAFFIC COUNTS

2.1 A series of traffic counts have been undertaken along Castle Way and West Malling Bypass in recent years. These counts are compared with growth in traffic which has been observed nationally and with forecast growth as predicted by the Department of Transport.

Table 1 A228 Castle Way: Comparison of Local and National Traffic Growth.

Year	Annual Average Daily Traffic (AADT)	% Growth from Preview years	National Growth % Actual and Predicted
1984	14,100	–	–
1985	15,600	10.6	2.4
1986	17,700	13.5	5.3
1987	19,700	11.3	8.0
1988	–	4.3	7.5
1989	21,400	4.3	7.1
1990	22,000	2.8	0.6
1991	–	1.89	2.0 (Low) 3.6 (High)
1992	–	1.89	2.0 (Low) 3.0 (High)
1993	23,250	1.89	2.0 (Low) 3.1 (High)
1994	24,300	4.5	2.0 (Low) 3.1 (High)

Table 2   **West Malling Bypass: Comparison of Local and National Traffic Growth**

Year	Annual Average Daily Traffic (AADT)	% Growth from Preview years	National Growth % Actual and Predicted
1989	9,200	–	–
1990	10,100	9.8	0.6
1991	10,900	7.9	2.0 (Low) 3.6 (High)
1992	10,500	–3.7	2.0 (Low) 3.0 (High)
1993	–	11.9	2.0 (Low) 3.1 (High)
1994	13,000	11.9	2.0 (Low) 3.1 (High)

From these tables it can be seen that during the mid 1980s and early 1990s the growth in traffic along Castle Way and West Malling Bypass significantly exceeded the actual/predicted National increase in traffic. The National rates are obtained from the Department of Transports publication 'National Road Traffic Forecasts (Great Britain)' (NRTF).

3.0 PREDICTED TRAFFIC FLOWS

3.1   The County Council in assessing the carriageway widths for new schemes, applies the Department of Transport standards which are based on satisfactorily accommodating the forecast flows in the fifteenth year after opening. On the basis that 1998 would be the earliest year of opening for the proposed route a scheme design year of 2013 is appropriate.

3.2   Detailed forecasting traffic flows for the design year was carried out using 1990 link flows supplemented by a full survey of peak hour counts taken in 1991.

3.3   A spreadsheet model was developed taking into account committed development, identified in the Local Plan for this area, and growth in traffic based on the national average growth forecasts. In general terms, national forecasts take into account not only traffic growth due to increased car ownership and mobility but also the traffic growth of new development. This is valid across the County but very close to large development sites there will be additional local effects. The model developed accounts for this effect.

3.4   Forecast flows using the above method were examined by the Inspector and Objectors at the Medway Gap and Vicinity Local Plan Public Inquiry in 1993. Following much discussion and examination of base data an agreed Joint Statement was produced giving a range of traffic flows for both the Leybourne and West Malling Bypass. The range crossed the threshold between the capacity of a dual 2 and dual 3 lane carriageway and the scheme put forward and subsequently protected in the Local Plan was for a dual 3 lane carriageway.

3.5   The Joint Statement on traffic flows is reproduced as Appendix 1. The forecast flows for the A228 took account of two different sets of development proposals at Kings Hill and these were described as on the original mix and the revised mix. The agreed base traffic case used 1990 traffic flows on Castle Way and West Malling Bypass as these were the most up to date reliable figures.

3.6   Following the Public Inquiry the Highways and Public Transport Sub-Committee of Kent County Council decided that the standard for the A228 should be dual 2 lane carriageways. (H and P T Sub-Committee meeting dated October 1993).

3.7   In order to proceed with detailed design of the new road and its associated junctions, the 1990 link flows for the M20 and the A20 were supplemented by a full survey of peak hour turning counts in 1991. These have formed the basis for producing forecast flows for the projected design year of 2013, which is 2 years beyond the 2011 design year used at the Local Plan Inquiry.

3.8   The traffic forecasts have been produced by two methods. The first applies NRTF high growth to the 1991 base traffic figures. All the development proposals in the Local Plan are assumed to be included in the forecast with the exception of a proportion of the development planned at Kings Hill. The traffic generated by this proportion of Kings Hill (amounting to 1.86m sq.ft of business use and 1105 houses) is then added to the forecast flows. The results of this method are given in Appendix 2 and the principal flows illustrated in Figure 1.

3.9   The second method was put forward and agreed at the Public Inquiry. It applies NRTF low growth to the 1991 base traffic figures and assumes that the forecast includes development proposals in the Local Plan with the exception of the whole of the development planned at Kings Hill. The traffic generated by the Kings Hill proposals is then added to the NRTF low growth based forecast to produce the total 2013 forecasts flows. The results of this method are given in Appendix 3 and the principal flows are illustrated on Figure 2.

3.10   The two methods produce similar results and the range of 2 way link flows on the Leybourne Bypass is 38200 to 39700 with the range on West Malling Bypass being 35400 to 36100. The traffic flows on Castle Way assume that only traffic local to the area uses the road and the figures are based on turning counts at all the side roads along Castle Way. Traffic management measures are envisaged for when the bypass has been completed to encourage all through traffic to use the new road.

3.11   The link flows on Leybourne Bypass and West Malling Bypass are within the design flow for a dual 2 lane bypass as given in TD 20/85. Table 1 shows the relevant section on traffic flows and Width Assessment extracted from TD 20/85.

3.12   The proposed junction arrangements have been tested using the appropriate computer design programmes and will operate satisfactorily at the 2013 design year.

Table 1 Department of Transport Highways and Traffic Departmental Standard TD 20/85 –

Traffic Flows and Carriageway Width Assessment (Extract from Table 2)

Road Class	24 hour AADT Flow 15th Year after opening	Edge Treatment	Access Treatment	Junction Options	
				Minor Road Junctions	Major Road Junctions
Dual 2-Lane all purpose carriageway (D2AP)	11000 to 30000	1m hard-strips	Restriction of access. Turning movements concentrated. Clearways at top of the flow range.	Priority junction. No other gaps in central reserve.	Generally at-grade roundabouts.
	30000 to 46000**	1m hard strips	Restriction of access severely enforced and left turn only Clearway.	No gaps in the central reserve	Generally grade separation
Dual 3-Lane all purpose carriageway (D3AP)	40000 and above	1m hard strips	Restriction of access severely enforced and left turn only Clearway.	No gaps in the Central Reserve	Generally grade separation

** Upper limit of flow range assumes maximum diverting flow of about 10,000 vehicles per day during maintenance work.

4.0 SENSITIVITY TEST

4.1   A traffic survey was carried out in 1994 to provide up to date turning counts at junctions. These base traffic figures have been used to produce 2013 design flows using the two methods described above. The results are shown in Appendix 4 and Figure 3.

4.2   Using the 1994 counts as the base situation, the forecast link flows on Leybourne Bypass and West Malling bypass are 41600 and 39200 respectively and confirm that a dual 2 lane carriageway is the appropriate provision. In the case of the Leybourne Bypass there may be some marginal lowering of service levels during maintenance work but this is considered to be acceptable.

4.3   Junction capacities for the proposed scheme have also been tested using the 1994 based forecasts flows in Appendix 4. This confirmed satisfactory operation at the 2013 design year under the sensitivity test assumptions.

5.0 Economic Performance of the Proposed Scheme

5.1 Method of Analysis

The following analysis has been undertaken using the Department of Transport programme COBA. The programme uses a standard set of criteria to determine the economic performance of a highway scheme. This includes travel time, junction delays and accidents. These criteria are assigned a monetary value. Changes that occur in these criteria as a result of construction give positive or negative travel benefits. These benefits are calculated for a 30 year period after opening for both high and low traffic growth and are reduced to a common base (1988). A comparison is made to the 'Do-Minimum' scenario to assess the levels of benefit.

Table 5.1   Travel Benefits (£m 1995 prices discounted to 1988.)

Benefit	Proposed Scheme	
	Low	*High*
Link Transit	9.275	16.915
Junction Delay	21.425	34.015
Accidents	2.137	2.843

5.2 Construction Costs

Construction costs are set against the benefits generated by the scheme. These costs are converted to the same base year as the travel benefits in order to enable a proper comparison to be made. The estimated construction cost of the proposed scheme are £19.16m at today's prices. The Do-Minimum improvements are estimated to cost £1.25m at today's prices.

5.3 Travel benefits

The travel benefits (travel time decreases, junction time delay reductions, accident reductions etc.) are compared with the scheme costs and the results are shown in Table 5.3.

Table 5.3   Net Present Values (NPV £m 1995 prices discounted to 1988.)

	Proposed Scheme	
	Low	*High*
Present Value of Benefits – PVB	32.837	53.773
Present Value of Costs – PVC	10.414	8.116
Net Present Value – NPV (PVB-PVC)	22.423	45.657

FIGURE 1

LEYBOURNE AND WEST MALLING BYPASS

2013 FLOWS - FULL DEVELOPMENT - (HIGH GROWTH - 1991 BASE)

| 1518 |
| 1538 |

J4 (W)

| 1952 |
| 3232 |

| 1372 |
| 1870 |

| 1777 |
| 1458 |

| 3628 |
| 1883 |

J4 (E)

M20

| 2123 |
| 1430 |

| 1999 |
| 3172 |
| 20005 |

| 3416 |
| 1903 |
| 19740 |

LEYBOURNE BYPASS

CASTLE WAY

| 198 |
| 204 |

| 253 |
| 110 |

| 73 |
| 265 |

O.S.L

| 452 |
| 148 |

| 1238 |
| 1972 |

| 922 |
| 1323 |

A20

| 703 |
| 865 |

| 1211 |
| 825 |

| 1965 |
| 1139 |

| 1083 |
| 776 |

| 1085 |
| 1647 |

| 1958 |
| 1149 |

KEY TO TRAFFIC FLOWS:
(ALL FLOWS IN VEHICLES
ASSUMING 8% HGV's)

AM	1-WAY PEAK HOUR
PM	1-WAY PEAK HOUR
AADT	1-WAY (IF SHOWN)

| 875 |
| 373 |

| 319 |
| 774 |

WEST MALLING BYPASS

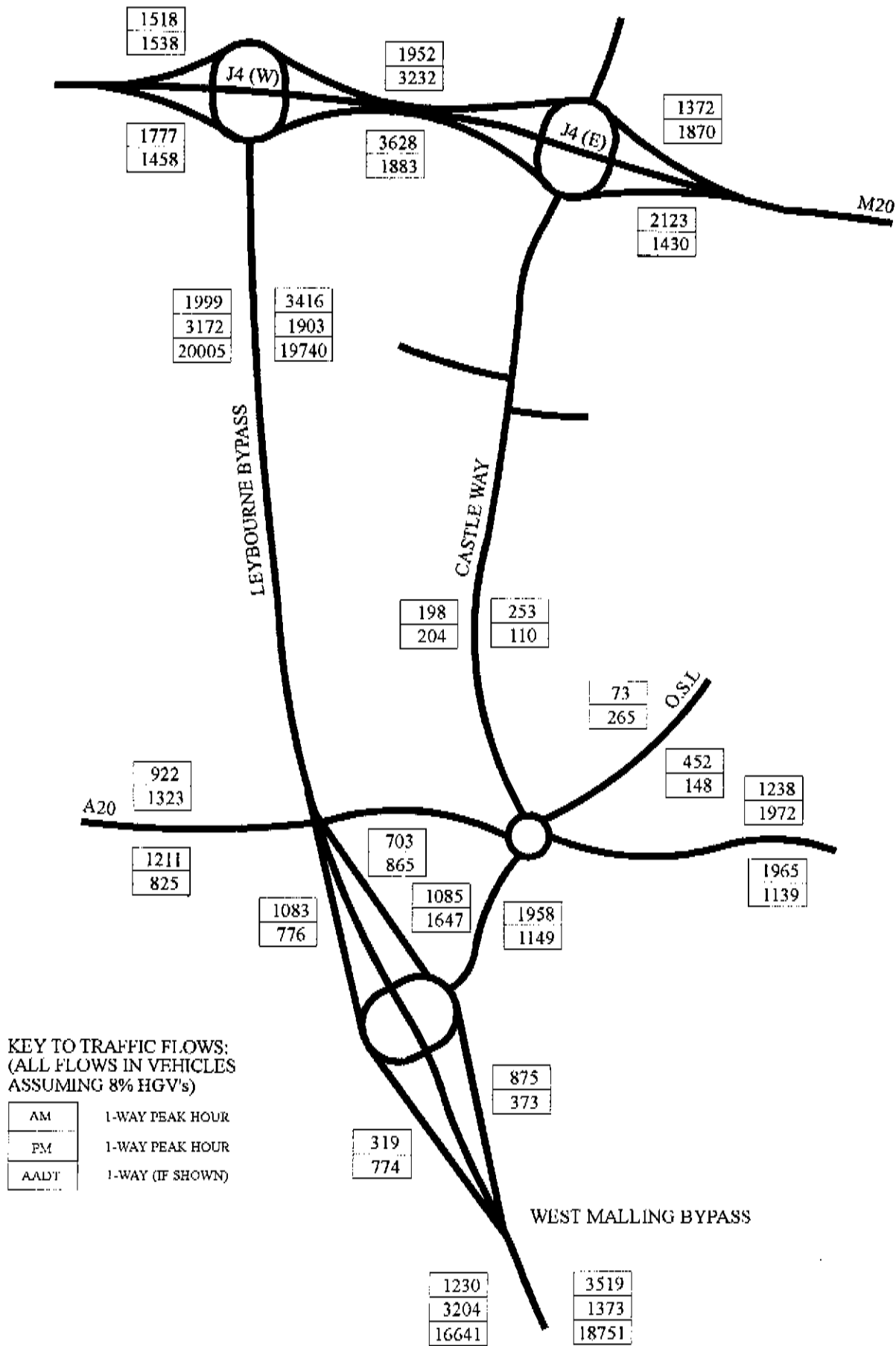| 1230 |
| 3204 |
| 16641 |

| 3519 |
| 1373 |
| 18751 |

FIGURE 2
LEYBOURNE AND WEST MALLING BYPASS
2013 FLOWS - FULL DEVELOPMENT - (LOW GROWTH - 1991 BASE)

KEY TO TRAFFIC FLOWS:
(ALL FLOWS IN VEHICLES
ASSUMING 8% HGV's)

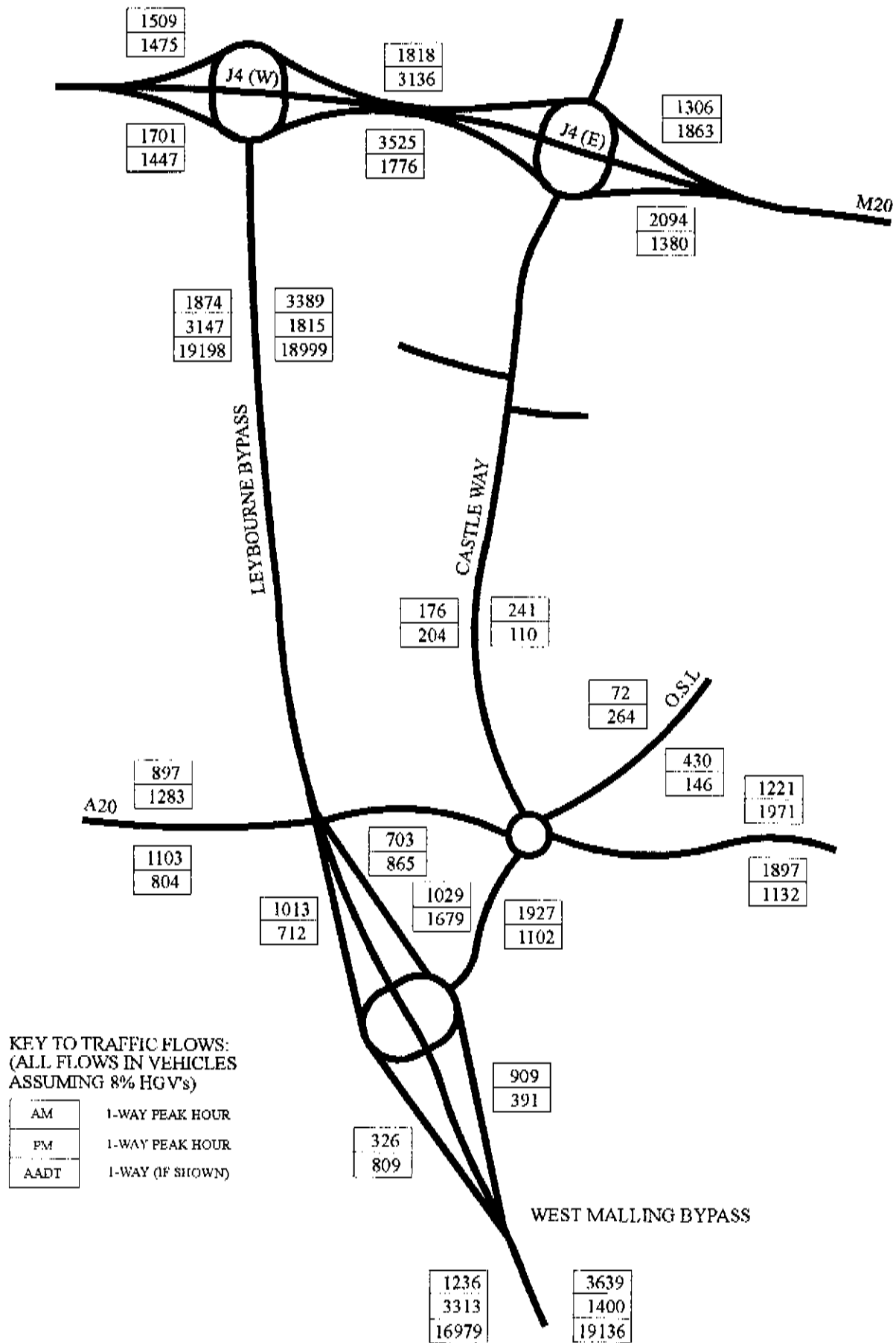|	
AM	1-WAY PEAK HOUR
PM	1-WAY PEAK HOUR
AADT	1-WAY (IF SHOWN)

WEST MALLING BYPASS

FIGURE 3
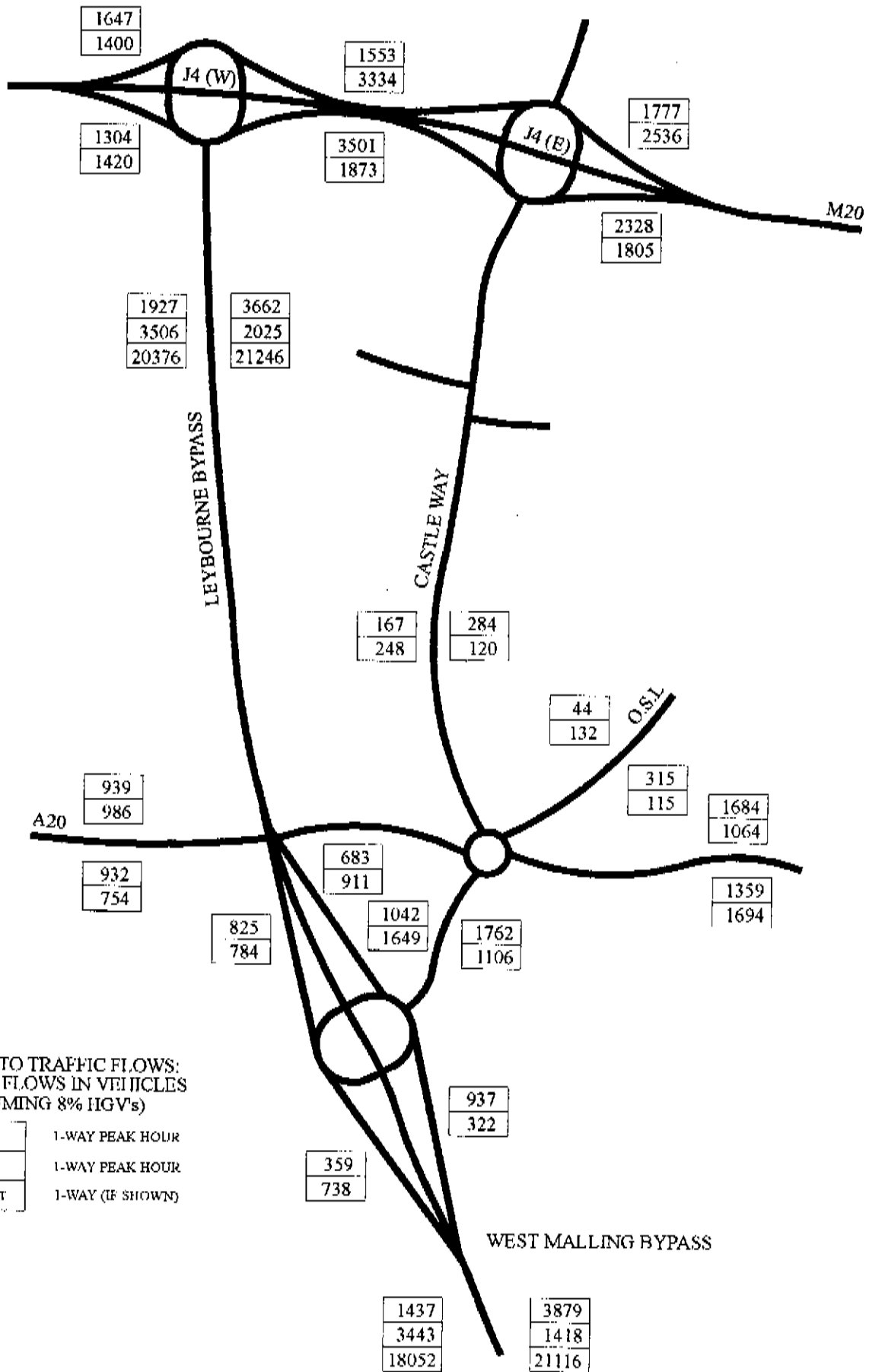## LEYBOURNE AND WEST MALLING BYPASS
2013 FLOWS - FULL DEVELOPMENT - (LOW GROWTH - 1994 BASE)

KEY TO TRAFFIC FLOWS:
(ALL FLOWS IN VEHICLES
ASSUMING 8% HGV's)

AM	1-WAY PEAK HOUR
PM	1-WAY PEAK HOUR
AADT	1-WAY (IF SHOWN)

APPENDIX 1

JOINT STATEMENT – LOCAL PLAN INQUIRY

MEDWAY GAP & VICINITY LOCAL PLAN

Public Inquiry 1993

Joint Statement by Kent County Council & Mr G Holmes

Peak Hour Traffic Flows

1. Following the agreement reached on a range of future AADT flows for Leybourne Bypass, West Malling Bypass and Castle Way, agreement has now been reached on corresponding peak hour flows

2. The starting point was the peak hour flows given by KCC in Figures 7 & 8 of the Strategy and Traffic Evidence. These figures have been factored to reflect the revised agreed AADT flows. For the case of the revised Kings Hill Development, an allowance has been made for the anticipated greater reduction in the peak hour traffic demand, as a result of the change in development mix.

3. *It was agreed :-*

    The figures in Tables 1 and 2 give the ranges of peak hour flows on Leybourne Bypass and West Malling Bypass, corresponding to the agreed range of AADT flows.

    Peak hour traffic flows on Castle Way, north of Park Road, are some 200 vehicles/hour higher than the flows south of Oxley Shaw Lane.

Table 1 : Predicted Peak Hour Traffic Flows on Leybourne Bypass

	Base growth assumptions	AADT Flow in 2011	AM Peak		PM Peak	
			N ' bd	S ' bd	N ' bd	S ' bd
NRTF (low) plus Full Kings Hill (original)	Upper	47000	1658	3800	3510	1755
	Lower	40900	1290	3500	3220	1415
NRTF (low) plus Full Kings Hill (revised)	Upper	43900	1805	3255	3180	1690
	Lower	37800	1440	2955	2885	1350

NB Assumes a residual flow of 450 veh/hour each way on Castle Way (south of Oxley Shaw Lane)

Table 2 : Predicted Peak Hour Traffic Flows on West Malling Bypass

	Base growth assumptions	AADT Flow in 2011	AM Peak		PM Peak	
			N ' bd	S ' bd	N ' bd	S ' bd
NRTF (low) plus Full Kings Hill (original)	Upper	42800	1040	4380	3970	1360
	Lower	44000	923	4190	3800	1235
NRTF (low) plus Full Kings Hill (revised)	Upper	39200	1270	3660	3350	1585
	Lower	36300	1140	3470	3180	1460

v2
1 Mar 1993

MEDWAY GAP & VICINITY LOCAL PLAN

Public Inquiry 1993

Joint Statement by Kent County Council & Mr G Holmes

1.   A meeting took place on Friday 22nd January, between Mr Holmes (representing an alliance of objectors) and Mr Fairweather & Mr Barr (representing the KCC). The aim was to agree, where possible, traffic issues related to the A228 Leybourne & West Malling Bypass.

Base Traffic Flows

2.   Details of the locations of the 1989, 1990 & 1992 traffic counts, and the method of calculation of AADT flows were given to Mr Holmes by KCC. The 1989 and 1990 counts relate to traffic flows on the middle section of Castle Way, at the school. However, the 1992 count relates to flows on Castle Way between the Park Road junction and the M20. Traffic flows at this location are some 2000 vehicles/day higher than at the middle section of Castle Way used by the KCC for their base figures. Hence, it was not correct to use the comparison of the 1990 to 1992 flows for evidence of traffic growth over this period, as contained in the KCC Strategy and Traffic Evidence (Table 1, page 8).

3.   While it is possible to deduce comparable flows to estimate the growth on Castle Way between 1990 and 1992, there is no directly observed data. Mr Holmes, in his written evidence, deduced an annual growth rate of some 2.3% per annum. Using a different method of deducing the comparable flows, it is possible to conclude that growth might have been a maximum of 4% per annum over this period.

4.   *It was agreed :-*

   The AADT figures for 1989, 1990 & 1992, contained in Table 1 of the KCC Traffic evidence, have been correctly calculated.

   The annual growth in traffic for 1990 to 1992, calculated as 9.3% by KCC in Table 1, was incorrect. The estimated annual increase in traffic between 1990 & 1992 is likely to have been in the range 2.3% - 4%.

   Traffic flows on Castle Way, north of Park Road, are some 2000 vehicles/day higher than the 1990 base case flows used by KCC for the section of Castle Way south of Oxley Shaw Lane.

Journey Times

5.   Journey time information on the existing network was given to Mr Holmes by KCC. KCC also supplied an estimation of the journey times along Castle Way and the proposed Leybourne Bypass for the scheme design year. This enabled a comparison to be made on the relative attractiveness of the two routes.

6.   *It was agreed :-*

   The estimated journey times for Castle Way and Leybourne Bypass, taking account of differing traffic speeds and junction capacities, would be as indicated in Table A.

   It is KCC's intention that suitable traffic calming measures on Castle Way would be implemented to make the route via Leybourne Bypass more attractive than Castle Way.

Table A : Estimated journey times in Design Year

JOURNEY FROM A20(E) to A228 (Snodland) VIA :-		TIME
Leybourne Bypass		134 secs
Castle Way	(assuming 40 mph)	91 secs
	(assuming 30 mph)	114 secs
	(assuming 20 mph)	159 secs

Predicted Design Year Traffic Flows

7.   The prime difference between KCC and Mr Holmes centres around the methodology of reaching the Design year traffic flows. It was accepted by both sides that such a large development located so close to the road scheme requires special consideration, over and above a simple application of NRTF growth rates. Mr Holmes restated his view that, over a whole network, traffic growth should be constrained to NRTF rates, but KCC pointed out that growth in Kent over the last decade has consistently exceeded NRTF growth rates. Growth in future years, however, is always going to be a matter of judgement, based on past and recent trends.

8.   Discussion took place on the amount of development which should be allowed for at Kings Hill, and how much was assumed to be already included in the NRTF figures. The principle of adding a separate allowance, on top of NRTF growth, for an element of Kings Hill development was agreed. There was debate, but no agreement, about the total amount of Kings Hill development which should be used to plan for the road infrastructure. KCC believe that the full 3.8 million square feet, forming the original design brief proposals, is the most prudent case to consider. Mr Holmes considers that the recently revised development mix, put forward by the Developer, should form the basis of design.

9.   After lengthy discussions, a compromise approach was agreed. The current KCC method has been to assume that the equivalent of 1 million square feet of Kings Hill Development was already included in the NRTF (high) assumptions, and then to add the effect of the traffic from the balance of 2.8m sq. feet. However, an alternative approach is to use NRTF (low) to growth the base background traffic flows up to the Design year (this will allow for car ownership growth, and other development in the area) and then to add the traffic from the whole of the Kings Hill development. This could be argued to be the likely "high" scenario. An equivalent "low" scenario could be,be the application of only one third of NRTF (low) growth to the base traffic, and then adding the traffic from the whole Kings Hill development.

10.   It is still not agreed whether the allowance for the Kings Hill Development should be for the original 3.8m sq. feet, or the revised 2.8m sq. feet plus extra housing & University campus. Hence, design year flows have been produced for both cases in Tables 4c and 5c below.

11.   *It was agreed :-*

> *Average traffic growth in Kent has exceeded NRTF predictions over the last decade, but has slowed down since 1990.*

> *The method of adding additional traffic, to allow for elements of local development not included in NRTF, is accepted in principle.*

> *The difference in generated traffic flow form the original development mix (3.8m sq ft) and the revised deveolopment mix (2.8m sq ft) at Kings Hill would be some 3100 AADT on Leybourne Bypass and some 3700 AADT on West Malling Bypass*

The Design Year (2011) Flows, shown on Tables 4c & 5c, represent the agreed range for the two alternative scenarios which the developers have put forward to-date. The "upper" base growth assumptions assume NRTF (low) applied to base traffic levels, and the "lower" level assumes only one third of NRTF (low) applied to base traffic.

Design year flows for any residual flows on Castle Way should be estimated by applying NRTF low growth to existing "local" traffic movements, plus an allowance for the Leybourne Grange development.

Table 4c : Predicted Traffic Flows (AADT) on Leybourne Bypass
(1990 base)

	Base growth assumptions	Flow in 2011
NRTF (low) plus Full Kings Hill (original)	Upper	47000
	Lower	40900
NRTF (low) plus Full Kings Hill (revised)	Upper	43900
	Lower	37800

NB Assumes a residual flow of 8200 AADT on Castle Way

Table 5c : Predicted Traffic Flows (AADT) on West Malling Bypass
(1990 base)

	Base growth assumptions	Flow in 2011
NRTF (low) plus Full Kings Hill (original)	Upper	42800
	Lower	40000
NRTF (low) plus Full Kings Hill (revised)	Upper	39200
	Lower	36300

v4
1 Feb 1993

APPENDIX 2

2013 DESIGN YEAR

(1991 BASE NRTF HIGH AND PROPORTION OF KINGS HILL TRAFFIC)

TRAFFIC USING A228 BYPASS   2013
FULL DEVELOPMENT (LOW) 1991 BASE FLOWS (VEH'S)

A228 CASTLE WAY BYPASS

		NORTHBOUND	SOUTHBOUND	TWO-WAY
AM	TOTAL TRAFFIC	1873	3388	5262
	KINGS HILL TRAFFIC	422	2073	2495
PM	TOTAL TRAFFIC	3148	1815	4962
	KINGS HILL TRAFFIC	1911	552	2463
AADT	TOTAL TRAFFIC	19198	18999	38197
	KINGS HILL TRAFFIC	7289	8204	15493

A228 WEST MALLING BYPASS

		NORTHBOUND	SOUTHBOUND	TWO-WAY
AM	TOTAL TRAFFIC	1235	3638	4873
	KINGS HILL TRAFFIC	534	2533	3067
PM	TOTAL TRAFFIC	3312	1400	4712
	KINGS HILL TRAFFIC	2336	689	3025
AADT	TOTAL TRAFFIC	16979	19136	36115
	KINGS HILL TRAFFIC	8971	10068	19039

TRAFFIC USING A228 BYPASS   2013
FULL DEVELOPMENT (HIGH) 1991 BASE FLOWS (VEH'S)

A228 CASTLE WAY BYPASS

		NORTHBOUND	SOUTHBOUND	TWO-WAY
AM	TOTAL TRAFFIC	1999	3416	5415
	KINGS HILL TRAFFIC	397	1952	2349
PM	TOTAL TRAFFIC	3172	1903	5075
	KINGS HILL TRAFFIC	1799	521	2320
AADT	TOTAL TRAFFIC	20005	19740	39746
	KINGS HILL TRAFFIC	6864	7726	14590

A228 WEST MALLING BYPASS

		NORTHBOUND	SOUTHBOUND	TWO-WAY
AM	TOTAL TRAFFIC	1230	3519	4750
	KINGS HILL TRAFFIC	506	2394	2900
PM	TOTAL TRAFFIC	3204	1373	4577
	KINGS HILL TRAFFIC	2210	652	2862
AADT	TOTAL TRAFFIC	16641	18751	35392
	KINGS HILL TRAFFIC	8485	9519	18005

M20/A228

AM PEAK TOTALS

FROM/TO	M20(E)	A228(S)	M20(W)	A228(N)	BYPASS	TOTAL
M20(E)	0	120	0	519	1485	2123
A228(S)	208	0	184	145	0	537
M20(W)	0	51	0	482	984	1518
A228(N)	462	108	1012	0	947	2529
BYPASS	701	0	581	717	0	1999
TOTAL	1372	279	1777	1863	3416	8706

PM PEAK TOTALS

FROM/TO	M20(E)	A228(S)	M20(W)	A228(N)	BYPASS	TOTAL
M20(E)	0	209	0	566	656	1430
A228(S)	95	0	55	113	0	264
M20(W)	0	186	0	793	558	1538
A228(N)	513	181	483	0	689	1867
BYPASS	1261	0	920	992	0	3172
TOTAL	1870	576	1458	2464	1903	8272

A20/A228

AM PEAK TOTALS

FROM/TO	A20(W)	A228(N)	OSL	A20(E)	BYPASS(S)	BYPASS(N)	TOTAL
A20(W)	0	30	37	439	107	308	922
A228(N)	28	0	0	70	155	0	253
OSL	132	10	0	169	43	99	452
A20(E)	624	71	24	0	571	676	1965
BYPASS(S)	14	87	7	211	0	911	1230
BYPASS(N)	413	0	5	349	2644	0	3410
TOTAL	1211	198	73	1238	3519	1994	8232

PM PEAK TOTALS

FROM/TO	A20(W)	A228(N)	OSL	A20(E)	BYPASS(S)	BYPASS(N)	TOTAL
A20(W)	0	23	103	712	30	455	1323
A228(N)	10	0	1	35	64	0	110
OSL	28	1	0	93	9	17	148
A20(E)	387	54	122	0	271	304	1139
BYPASS(S)	92	126	24	532	0	2430	3204
BYPASS(N)	308	0	15	600	1000	0	1923
TOTAL	825	204	265	1972	1373	3206	7845

BYPASS/SITE ACCESS

AM PEAK TOTALS

FROM/TO	BYPASS(N)	SITE	BYPASS(S)	TOTAL
BYPASS(N)	0	2418	1333	3751
SITE	308	0	54	362
BYPASS(S)	974	105	0	1079
TOTAL	1283	2523	1386	5192

PM PEAK TOTALS

FROM/TO	BYPASS(N)	SITE	BYPASS(S)	TOTAL
BYPASS(N)	0	2214	1246	3460
SITE	508	0	52	560
BYPASS(S)	877	99	0	976
TOTAL	1385	2313	1297	4995

A228/BYPASS

AM PEAK TOTALS

FROM/TO	BYPASS	A228(S)	A228(N)	TOTAL
BYPASS	0	1427	19	1446
A228(S)	1024	0	225	1249
A228(N)	92	357	0	449
TOTAL	1116	1785	244	3145

PM PEAK TOTALS

FROM/TO	BYPASS	A228(S)	A228(N)	TOTAL
BYPASS	0	906	101	1006
A228(S)	1315	0	310	1625
A228(N)	32	196	0	227
TOTAL	1347	1101	411	2859

A228/OLD SITE ACCESS

AM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	637	1166	1804
SITE	411	0	139	549
A228(S)	851	720	0	1570
TOTAL	1261	1357	1305	3923

PM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	223	886	1109
SITE	689	0	674	1362
A228(S)	950	153	0	1103
TOTAL	1638	376	1560	3574

HOUSING ACCESS

AM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	0	1245	1245
SITE	0	0	0	0
A228(S)	1518	0	0	1518
TOTAL	1518	0	1245	2762

PM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	0	1509	1509
SITE	0	0	0	0
A228(S)	1058	0	0	1058
TOTAL	1058	0	1509	2567

A228/A26

AM PEAK TOTALS

FROM/TO	A228(N)	A26(E)	A26(S)	THE STR.	TOTAL
A228(N)	0	237	863	102	1203
A26(E)	566	0	241	245	1052
A26(S)	771	202	0	10	983
THE STR.	120	190	7	0	318
TOTAL	1457	630	1112	357	3556

PM PEAK TOTALS

FROM/TO	A228(N)	A26(E)	A26(S)	THE STR.	TOTAL
A228(N)	0	470	848	130	1449
A26(E)	220	0	218	91	528
A26(S)	730	259	0	12	1001
THE STR.	71	215	1	0	288
TOTAL	1022	945	1068	233	3267

A26/B2016

AM PEAK TOTALS

FROM/TO	A26(N)	B2016(E)	A26(S)	B2016(W)	TOTAL
A26(N)	0	163	1005	47	1215
B2016(E)	146	0	9	357	513
A26(S)	901	85	0	175	1160
B2016(W)	15	263	147	0	425
TOTAL	1062	511	1161	579	3314

PM PEAK TOTALS

FROM/TO	A26(N)	B2016(E)	A26(S)	B2016(W)	TOTAL
A26(N)	0	169	978	28	1175
B2016(E)	130	0	6	288	425
A26(S)	914	8	0	157	1079
B2016(W)	70	294	92	0	456
TOTAL	1114	471	1076	474	3134

A26/B2015

AM PEAK TOTALS

FROM/TO	RED HILL	A26(E)	B2015(S)	A26(W)	TOTAL
RED HILL	0	16	258	84	358
A26(E)	13	0	354	893	1260
B2015(S)	119	460	0	100	678
A26(W)	29	620	88	0	736
TOTAL	160	1095	701	1076	3033

PM PEAK TOTALS

FROM/TO	RED HILL	A26(E)	B2015(S)	A26(W)	TOTAL
RED HILL	0	62	183	50	295
A26(E)	9	0	346	477	832
B2015(S)	195	498	0	66	760
A26(W)	21	972	67	0	1060
TOTAL	225	1532	596	593	2946

B2016/THE STREET

AM PEAK TOTALS

FROM/TO	B2016(N)	THE STRT	B2016(S)	M'RTH RD	TOTAL
B2016(N)	0	158	297	33	488
THE STRT	133	0	109	188	430
B2016(S)	491	39	0	122	653
M'RTH RD	33	180	73	0	286
TOTAL	657	377	480	343	1857

PM PEAK TOTALS

FROM/TO	B2016(N)	THE STRT	B2016(S)	M'RTH RD	TOTAL
B2016(N)	0	209	374	33	616
THE STRT	128	0	45	117	291
B2016(S)	387	47	0	96	531
M'RTH RD	33	107	93	0	232
TOTAL	548	363	513	247	1670

A20/TOWN HILL

AM PEAK TOTALS

FROM/TO	A20(E)	TOWN HI	WFIELD L	A20(W)	TOTAL
A20(E)	0	481	124	1099	1580
TOWN HIL	360	0	84	130	490
A20(W)	880	161	120	0	1041
TOTAL	1241	642	328	1229	3112

PM PEAK TOTALS

FROM/TO	A20(E)	TOWN HI	A20(W)	TOTAL
A20(E)	0	403	779	1182
TOWN HIL	482	0	218	699
A20(W)	1225	178	0	1403
TOTAL	1707	581	996	3284

A20/LUNSFORD LANE

AM PEAK TOTALS

FROM/TO	L'FRD LN	A20(E)	WFIELD L	A20(W)	TOTAL
L'FRD LN	0	390	124	199	714
A20(E)	97	0	84	1777	1958
WFIELD L	142	182	0	282	606
A20(W)	103	1032	120	0	1254
TOTAL	341	1604	328	2259	4532

PM PEAK TOTALS

FROM/TO	L'FRD LN	A20(E)	WFIELD L	A20(W)	TOTAL
L'FRD LN	0	218	72	108	398
A20(E)	280	0	89	1359	1728
WFIELD L	133	126	0	379	638
A20(W)	335	1791	157	0	2283
TOTAL	748	2135	318	1846	5048

APPENDIX 3

2013 DESIGN YEAR

1991 BASE NRTF LOW AND WHOLE OF KINGS HILL TRAFFIC

FLOW SUMMARY   FULL DEVELOPMENT   2013   (LOW) - 1991 BASE FLOWS (VEH'S)

M20/A228

AM PEAK TOTALS

FROM/TO	M20(E)	A228(S)	M20(W)	A228(N)	BYPASS	TOTAL
M20(E)	0	105	0	513	1476	2094
A228(S)	187	0	166	124	0	478
M20(W)	0	48	0	440	1021	1509
A228(N)	462	91	991	0	892	2435
BYPASS	657	0	544	673	0	1873
TOTAL	1306	244	1701	1750	3388	8389

PM PEAK TOTALS

FROM/TO	M20(E)	A228(S)	M20(W)	A228(N)	BYPASS	TOTAL
M20(E)	0	185	0	566	629	1380
A228(S)	85	0	52	96	0	233
M20(W)	0	166	0	775	534	1476
A228(N)	511	154	443	0	652	1760
BYPASS	1267	0	952	928	0	3148
TOTAL	1864	505	1447	2365	1815	7996

A20/A228

AM PEAK TOTALS

FROM/TO	A20(W)	A228(N)	OSL	A20(E)	BYPASS(S)	BYPASS(N)	TOTAL
A20(W)	0	25	37	439	114	282	898
A228(N)	24	0	0	67	150	0	240
OSL	120	8	0	169	43	90	430
A20(E)	568	62	24	0	602	641	1897
BYPASS(S)	15	81	7	223	0	910	1235
BYPASS(N)	376	0	4	323	2730	0	3434
TOTAL	1103	176	72	1221	3638	1923	8133

PM PEAK TOTALS

FROM/TO	A20(W)	A228(N)	OSL	A20(E)	BYPASS(S)	BYPASS(N)	TOTAL
A20(W)	0	23	103	712	32	413	1283
A228(N)	10	0	1	35	64	0	110
OSL	28	1	0	93	9	15	146
A20(E)	387	54	122	0	286	283	1134
BYPASS(S)	98	126	24	561	0	2504	3312
BYPASS(N)	281	0	14	570	1009	0	1874
TOTAL	804	204	264	1971	1400	3215	7858

BYPASS/SITE ACCESS

AM PEAK TOTALS

FROM/TO	BYPASS(N)	SITE	BYPASS(S)	TOTAL
BYPASS(N)	0	2442	1104	3547
SITE	356	0	71	427
BYPASS(S)	801	113	0	914
TOTAL	1157	2556	1175	4888

PM PEAK TOTALS

FROM/TO	BYPASS(N)	SITE	BYPASS(S)	TOTAL
BYPASS(N)	0	546	725	1271
SITE	2240	0	108	2348
BYPASS(S)	1028	66	0	1094
TOTAL	3268	612	833	4713

A228/BYPASS

AM PEAK TOTALS

FROM/TO	BYPASS	A228(S)	A228(N)	TOTAL
BYPASS	0	1214	21	1235
A228(S)	859	0	223	1083
A228(N)	93	356	0	449
TOTAL	952	1571	244	2767

PM PEAK TOTALS

FROM/TO	BYPASS	A228(S)	A228(N)	TOTAL
BYPASS	0	766	102	868
A228(S)	1112	0	308	1420
A228(N)	33	194	0	227
TOTAL	1145	960	410	2514

A228/OLD SITE ACCESS

AM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	606	1009	1615
SITE	359	0	122	482
A228(S)	725	709	0	1434
TOTAL	1084	1316	1131	3531

PM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	185	755	940
SITE	656	0	663	1319
A228(S)	821	140	0	961
TOTAL	1477	325	1418	3220

HOUSING ACCESS

AM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	0	1068	1068
SITE	0	0	0	0
A228(S)	1396	0	0	1396
TOTAL	1396	0	1068	2464

PM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	0	1380	1380
SITE	0	0	0	0
A228(S)	916	0	0	916
TOTAL	916	0	1380	2296

A228/A26

AM PEAK TOTALS

FROM/TO	A228(N)	A26(E)	A26(S)	THE STR.	TOTAL
A228(N)	0	224	783	92	1098
A26(E)	581	0	241	245	1067
A26(S)	722	202	0	10	935
THE STR.	118	190	7	0	316
TOTAL	1421	616	1031	347	3415

PM PEAK TOTALS

FROM/TO	A228(N)	A26(E)	A26(S)	THE STR.	TOTAL
A228(N)	0	463	787	118	1368
A26(E)	211	0	186	78	474
A26(S)	666	221	0	10	898
THE STR.	65	184	1	0	250
TOTAL	942	868	975	206	2991

A26/B2016

AM PEAK TOTALS

FROM/TO	A26(N)	B2016(E)	A26(S)	B2016(W)	TOTAL
A26(N)	0	142	879	45	1067
B2016(E)	127	0	9	344	480
A26(S)	811	81	0	168	1060
B2016(W)	15	253	141	0	409
TOTAL	953	477	1029	557	3015

PM PEAK TOTALS

FROM/TO	A26(N)	B2016(E)	A26(S)	B2016(W)	TOTAL
A26(N)	0	147	873	27	1046
B2016(E)	114	0	6	276	396
A26(S)	801	7	0	150	958
B2016(W)	67	281	88	0	435
TOTAL	982	435	967	453	2836

A26/B2015

AM PEAK TOTALS

FROM/TO	RED HILL	A26(E)	B2015(S)	A26(W)	TOTAL
RED HILL	0	14	228	75	316
A26(E)	11	0	314	821	1146
B2015(S)	105	407	0	88	600
A26(W)	25	547	80	0	652
TOTAL	141	969	621	983	2714

PM PEAK TOTALS

FROM/TO	RED HILL	A26(E)	B2015(S)	A26(W)	TOTAL
RED HILL	0	55	161	44	260
A26(E)	8	0	306	427	740
B2015(S)	172	441	0	60	672
A26(W)	19	886	60	0	965
TOTAL	198	1381	527	530	2637

B2016/THE STREET

AM PEAK TOTALS

FROM/TO	B2016(N)	THE STRT	B2016(S)	M'RTH RD	TOTAL
B2016(N)	0	134	253	28	416
THE STRT	113	0	93	162	368
B2016(S)	419	33	0	104	556
M'RTH RD	28	157	63	0	247
TOTAL	560	325	409	294	1587

PM PEAK TOTALS

FROM/TO	B2016(N)	THE STRT	B2016(S)	M'RTH RD	TOTAL
B2016(N)	0	178	319	28	525
THE STRT	109	0	39	105	252
B2016(S)	330	40	0	82	452
M'RTH RD	28	93	79	0	201
TOTAL	467	312	437	215	1430

A20/TOWN HILL

AM PEAK TOTALS

FROM/TO	A20(E)	TOWN HI	A20(W)	TOTAL
A20(E)	0	409	931	1340
TOWN HIL	306	0	111	417
A20(W)	759	137	0	896
TOTAL	1065	545	1042	2653

PM PEAK TOTALS

FROM/TO	A20(E)	TOWN HI	A20(W)	TOTAL
A20(E)	0	342	672	1014
TOWN HIL	409	0	185	593
A20(W)	1038	151	0	1189
TOTAL	1447	493	857	2797

A20/LUNSFORD LANE

AM PEAK TOTALS

FROM/TO	L'FRD LN	A20(E)	WFIELD L	A20(W)	TOTAL
L'FRD LN	0	360	115	184	658
A20(E)	89	0	77	1594	1760
WFIELD L	130	168	0	260	558
A20(W)	95	901	104	0	1099
TOTAL	314	1428	295	2037	4075

PM PEAK TOTALS

FROM/TO	L'FRD LN	A20(E)	WFIELD L	A20(W)	TOTAL
L'FRD LN	0	198	65	99	362
A20(E)	254	0	81	1179	1514
WFIELD L	121	115	0	319	555
A20(W)	305	1598	142	0	2045
TOTAL	680	1911	289	1597	4477

APPENDIX 4

2013 DESIGN YEAR

(1994 BASE NRTF LOW AND WHOLE OF KINGS HILL TRAFFIC)

TRAFFIC USING A228 BYPASS   2013
FULL DEVELOPMENT (LOW) 1994 BASE FLOWS (VEH'S)

A228 CASTLE WAY BYPASS

		NORTHBOUND	SOUTHBOUND	TWO-WAY
AM	TOTAL TRAFFIC	1927	3662	5589
	KINGS HILL TRAFFIC	422	2073	2495
PM	TOTAL TRAFFIC	3506	2025	5530
	KINGS HILL TRAFFIC	1911	552	2463
AADT	TOTAL TRAFFIC	20376	21246	41622
	KINGS HILL TRAFFIC	7289	8204	15493

A228 WEST MALLING BYPASS

		NORTHBOUND	SOUTHBOUND	TWO-WAY
AM	TOTAL TRAFFIC	1437	3879	5316
	KINGS HILL TRAFFIC	534	2533	3067
PM	TOTAL TRAFFIC	3443	1418	4861
	KINGS HILL TRAFFIC	2336	689	3025
AADT	TOTAL TRAFFIC	18052	21116	39168
	KINGS HILL TRAFFIC	8971	10068	19039

FLOW SUMMARY   FULL DEVELOPMENT   2013   (LOW) - 1994 BASE FLOWS (VEH'S)

M20/A228

AM PEAK TOTALS

FROM/TO	M20(E)	A228(S)	M20(W)	A228(N)	BYPASS	TOTAL
M20(E)	0	128	0	425	1775	2328
A228(S)	209	0	120	131	0	460
M20(W)	0	53	0	503	1091	1647
A228(N)	767	62	810	0	796	2435
BYPASS	801	0	374	751	0	1927
TOTAL	1777	244	1304	1810	3662	8797

PM PEAK TOTALS

FROM/TO	M20(E)	A228(S)	M20(W)	A228(N)	BYPASS	TOTAL
M20(E)	0	190	0	938	678	1805
A228(S)	91	0	51	48	0	191
M20(W)	0	154	0	720	526	1400
A228(N)	812	194	323	0	820	2149
BYPASS	1633	0	1046	827	0	3506
TOTAL	2536	538	1420	2533	2025	9052

A20/A228

AM PEAK TOTALS

FROM/TO	A20(W)	A228(N)	OSL	A20(E)	BYPASS(S)	BYPASS(N)	TOTAL
A20(W)	0	21	4	542	116	256	939
A228(N)	27	0	0	77	180	0	284
OSL	50	5	0	143	49	68	315
A20(E)	517	48	26	0	592	501	1684
BYPASS(S)	36	92	8	223	0	1078	1437
BYPASS(N)	302	0	6	374	2942	0	3625
TOTAL	932	167	44	1359	3879	1903	8284

PM PEAK TOTALS

FROM/TO	A20(W)	A228(N)	OSL	A20(E)	BYPASS(S)	BYPASS(N)	TOTAL
A20(W)	0	26	43	543	38	336	986
A228(N)	12	0	1	39	68	0	120
OSL	39	2	0	39	8	28	115
A20(E)	313	69	54	0	207	420	1064
BYPASS(S)	96	151	16	475	0	2705	3443
BYPASS(N)	294	0	18	599	1096	0	2007
TOTAL	754	248	132	1694	1418	3489	7735

BYPASS/SITE ACCESS

AM PEAK TOTALS

FROM/TO	BYPASS(N)	SITE	BYPASS(S)	TOTAL
BYPASS(N)	0	2695	1054	3749
SITE	425	0	77	502
BYPASS(S)	936	133	0	1069
TOTAL	1361	2827	1131	5320

PM PEAK TOTALS

FROM/TO	BYPASS(N)	SITE	BYPASS(S)	TOTAL
BYPASS(N)	0	578	768	1346
SITE	2425	0	113	2539
BYPASS(S)	906	85	0	991
TOTAL	3331	663	881	4876

A228/BYPASS

AM PEAK TOTALS

FROM/TO	BYPASS	A228(S)	A228(N)	TOTAL
BYPASS	0	1110	27	1136
A228(S)	951	0	192	1143
A228(N)	128	325	0	454
TOTAL	1079	1435	219	2733

PM PEAK TOTALS

FROM/TO	BYPASS	A228(S)	A228(N)	TOTAL
BYPASS	0	775	120	895
A228(S)	963	0	242	1205
A228(N)	38	189	0	227
TOTAL	1002	963	362	2327

A228/OLD SITE ACCESS

AM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	293	1134	1427
SITE	225	0	139	364
A228(S)	905	732	0	1638
TOTAL	1130	1025	1272	3428

PM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	177	765	943
SITE	255	0	664	919
A228(S)	946	176	0	1123
TOTAL	1202	353	1429	2984

HOUSING ACCESS

AM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	0	1250	1250
SITE	0	0	0	0
A228(S)	1638	0	0	1638
TOTAL	1638	0	1250	2888

PM PEAK TOTALS

FROM/TO	A228(N)	SITE	A228(S)	TOTAL
A228(N)	0	0	1408	1408
SITE	0	0	0	0
A228(S)	1105	0	0	1105
TOTAL	1105	0	1408	2513

A228/A26

AM PEAK TOTALS

FROM/TO	A228(N)	A26(E)	A26(S)	THE STR.	TOTAL
A228(N)	0	197	935	129	1261
A26(E)	485	0	311	119	915
A26(S)	1023	283	0	9	1315
THE STR.	129	87	9	0	224
TOTAL	1638	566	1255	257	3716

PM PEAK TOTALS

FROM/TO	A228(N)	A26(E)	A26(S)	THE STR.	TOTAL
A228(N)	0	462	854	89	1405
A26(E)	199	0	264	90	553
A26(S)	855	260	0	4	1118
THE STR.	69	110	2	0	181
TOTAL	1123	831	1120	183	3257

A26/B2016

AM PEAK TOTALS

FROM/TO	A26(N)	B2016(E)	A26(S)	B2016(W)	TOTAL
A26(N)	0	327	910	68	1305
B2016(E)	449	0	13	305	766
A26(S)	842	10	0	78	929
B2016(W)	70	293	84	0	448
TOTAL	1361	630	1006	450	3448

PM PEAK TOTALS

FROM/TO	A26(N)	B2016(E)	A26(S)	B2016(W)	TOTAL
A26(N)	0	307	871	43	1221
B2016(E)	378	0	9	297	684
A26(S)	789	11	0	65	865
B2016(W)	70	411	38	0	519
TOTAL	1236	729	918	405	3288

A26/B2015

AM PEAK TOTALS

FROM/TO	RED HILL	A26(E)	B2015(S)	A26(W)	TOTAL
RED HILL	0	24	214	45	284
A26(E)	23	0	430	805	1258
B2015(S)	95	460	0	76	631
A26(W)	11	477	90	0	578
TOTAL	129	962	734	926	2751

PM PEAK TOTALS

FROM/TO	RED HILL	A26(E)	B2015(S)	A26(W)	TOTAL
RED HILL	0	21	122	24	167
A26(E)	23	0	311	554	888
B2015(S)	144	478	0	65	687
A26(W)	25	799	115	0	938
TOTAL	192	1298	547	643	2680

B2016/THE STREET

AM PEAK TOTALS

FROM/TO	B2016(N)	THE STRT	B2016(S)	M'RTH RD	TOTAL
B2016(N)	0	71	356	18	445
THE STRT	93	0	89	95	276
B2016(S)	372	50	0	28	450
M'RTH RD	3	113	3	0	118
TOTAL	468	235	448	140	1289

PM PEAK TOTALS

FROM/TO	B2016(N)	THE STRT	B2016(S)	M'RTH RD	TOTAL
B2016(N)	0	118	463	6	587
THE STRT	75	0	40	102	217
B2016(S)	374	19	0	13	405
M'RTH RD	1	82	16	0	100
TOTAL	450	219	519	121	1308

A20/TOWN HILL

AM PEAK TOTALS

FROM/TO	A20(E)	TOWN HI	A20(W)	TOTAL
A20(E)	0	395	693	1088
TOWN HIL	312	0	110	422
A20(W)	682	168	0	850
TOTAL	994	563	804	2361

PM PEAK TOTALS

FROM/TO	A20(E)	TOWN HI	A20(W)	TOTAL
A20(E)	0	272	546	819
TOWN HIL	381	0	159	540
A20(W)	662	124	0	786
TOTAL	1043	396	706	2145

A20/LUNSFORD LANE

AM PEAK TOTALS

FROM/TO	L'FRD LN	A20(E)	WFIELD L	A20(W)	TOTAL
L'FRD LN	0	133	204	135	473
A20(E)	100	0	43	1384	1527
WFIELD L	129	118	0	258	505
A20(W)	162	1038	140	0	1340
TOTAL	391	1289	387	1778	3845

PM PEAK TOTALS

FROM/TO	L'FRD LN	A20(E)	WFIELD L	A20(W)	TOTAL
L'FRD LN	0	108	44	83	234
A20(E)	168	0	60	881	1110
WFIELD L	108	79	0	259	446
A20(W)	237	1343	127	0	1706
TOTAL	513	1530	231	1224	3497

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ENVIRONMENT & LANDSCAPE
Environmental Statement

11/03/2001 16:00:03

A228 LEYBOURNE & WEST MALLING BYPASS – ENV. STATEMENT VOLUME 2 – TRAFFIC & ECONOMICS 07/95

HA 44/27/140# 1