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July 2008

**TVBC DEVELOPMENT IMPACT
NORTH BADDESLEY CROSSROADS
TECHNICAL NOTE**

Test Valley Borough Council
Planning Service
Duttons Road
Romsey
SO51 8XG

**TVBC DEVELOPMENT IMPACT
NORTH BADDESLEY CROSSROADS**

TECHNICAL NOTE

C O N T E N T S

	Page
1. INTRODUCTION.....	1
2. BACKGROUND TRAFFIC FLOW INFORMATION	2
3. DEVELOPMENT OF MODEL.....	3
4. TRIP GENERATION	4
5. TRIP DISTRIBUTION AND ASSIGNMENT	5
6. JUNCTION ANALYSIS.....	7
7. CONCLUSIONS.....	10

APPENDICES

APPENDIX A - TRAFFIC SURVEY RESULTS

APPENDIX B - TRIP MATRICES AND TURNING MOVEMENT CALCULATIONS

APPENDIX C - LINSIG OUTPUTS

1. INTRODUCTION

- 1.0.1 This technical note has been prepared by Gifford for Test Valley Borough Council to assess the impact of development proposals in southern Test Valley on the Botley Road/Rownhams Road junction in North Baddesley (referred to as the 'North Baddesley crossroads' in this report). The development proposals are contained within the Core Strategy Preferred Development Options document, January 2008. Details of the development sites have been included below in section 1.1 of the report.
- 1.0.2 The North Baddesley junction is a four arm signalised junction, formed by the A27 Botley Road to the east and west, Nutburn Road to the north and Rownhams Road to the south, as shown in Figure 1. A LINSIG junction capacity model has been developed to enable assessment of the traffic impact of the development sites on North Baddesley crossroads. The existing turning moves at the junction have been obtained through a traffic survey. The likely distribution of trips from the proposed developments has been derived from Census 2001 journey to work information. The identification of the proportion of those trips likely to pass through the junction has been manually estimated on the basis of the probable routing of the trips across the local network, to and from the development sites.



Figure 1 North Baddesley Crossroads Location Plan

2. BACKGROUND TRAFFIC FLOW INFORMATION

- 2.0.1 To establish baseline (existing) traffic flows for the impact analysis under the base scenario, a survey was commissioned by Gifford. The survey was undertaken by Auto Surveys on 11th of April 2008 and the results are enclosed in Appendix A of this report. The AM peak was taken as the critical period to be assessed for the purposes of this study.
- 2.0.2 In addition to the turning flows, to allow calibration of the model, queue length observations were recorded per lane for each of the four arms, at the junction at five minute intervals. A summary of the observed queues can be found in Appendix A.
- 2.0.3 A summary of the surveyed 2008 flows for the AM peak between 8:00 and 9:00 is given in Figure 2. The peak hour flows were converted into PCUs (passenger car units) for the LINSIG calculation (this represents the number of axle pairs, which are used in the traffic signal assessment) rather than vehicle numbers.

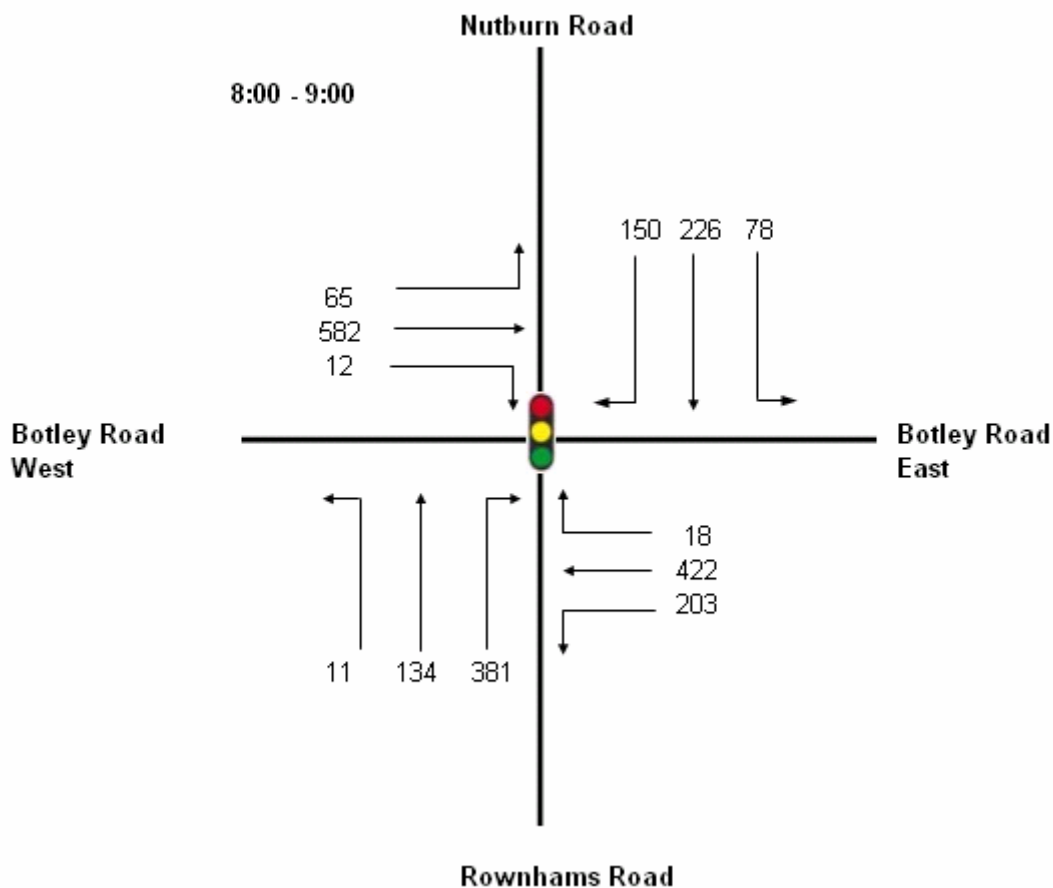


Figure 2 Surveyed Traffic Flows (Existing Situation)

3. DEVELOPMENT OF MODEL

- 3.0.1 A LINSIG model was developed for the base, existing (2008) North Baddesley crossroads in order to provide a benchmark to assess its performance following the addition of the proposed development traffic. The signal specification obtained from Hampshire County Council was used to determine the average green times and intergreen values for the various phases under the 'SCOOT' signal operating system.
- 3.0.2 In the absence of any information regarding the occurrence of pedestrian demand at the North Baddesley crossroads, it has been assumed that there is a pedestrian stage in every cycle for all the scenarios modelled.
- 3.0.3 In order to validate the LINSIG model with the observed queue length, the saturation flows were adjusted to reflect the existing traffic conditions at the crossroads. As the surveyed queue data is recorded separately for both lanes at the approach on Nutburn Road and Botley Road, queue values are summed up over the lanes across the survey period and averaged to get the mean queue for that arm. A comparison of the LINSIG modelled queuing results against the observed queues is given below in Table 1. It can be seen that the model queues are reasonably consistent with the observed values (An exact match is not possible as adjustment to one arm can then produce a disproportionate change elsewhere. Hence a 'best fit' is made).

Table 1 Comparison of Modelled Queues and Observed Queues

Scenario	Approach	Modelled Mean Maximum Queues	Observed queues
2008 Base	Nutburn Road	19	13
	Botley Road West	29	30
	Rownhams Road	25	26
	Botley Road East	22	19

- 3.0.4 As can be seen from the queue values and the Degree of Saturation (a measure of capacity), the junction is currently operating to close to capacity with the most stress on the A27 Botley Road West and Rownhams Road in the morning peak. Relatively high queuing on Rownhams Road is a direct consequence of the heavy right turning traffic on that arm and the absence of a dedicated lane for this traffic.
- 3.0.5 It should be noted that the crossroads junction has been assessed in isolation. The queuing on Botley Road east will be influenced by the rate of flow of traffic through the Botley Road/Castle Lane junction.

4. TRIP GENERATION

- 4.0.1 Test Valley Borough Council has identified the proposed scale of development in each of the settlements in Romsey, North Baddesley and Nursling. The proposed development for southern Test Valley includes residential allocations for each of these settlements plus an employment allocation at Nursling. The trips between the residential proposals and the employment allocation will be included in the trips generated by the residential element and assigned to the local road network. Hence there is no need for an additional assignment of trips to the employment proposal onto the network from the residential development proposals. The trips coming into and out of the employment site at Nursling from origins further away are highly unlikely to travel through North Baddesley and have therefore been discounted.
- 4.0.2 Trip rates for the proposed development in southern Test Valley are the same as those used in the Romsey Movement and Access Study Review Phase II. The scale of development, the associated trip rates and the resulting number of trips generated are shown in Table 2. It has been assumed that the development within North Baddesley will be on the west side of the settlement.

Table 2 Development Proposals and Trips Generation

Development Location	No of dwellings	Trip Rates		Total Trips	
		In	Out	In	Out
Residential					
Romsey	2300	0.15	0.465	345	1070
North Baddesley	500	0.15	0.465	75	233
Nursling	300	0.15	0.465	45	140

5. TRIP DISTRIBUTION AND ASSIGNMENT

- 5.0.1 The likely distribution of development trips between settlements where development is proposed and other destinations has been estimated on the basis of journey to work data from 2001 census data. The resulting Origin –Destination trip matrix has been included in Appendix B of this report. This has enabled the proportion of trips between the different origin and destination pairs to be identified. It should be noted that the census data provides a distribution of work trips only. This will tend to overestimate the number of trips leaving the identified settlements and underestimate the number of trips remaining within a settlement that have a trip purpose other than journey to work. Hence the number of trips passing through North Baddesley from Romsey (and Nursling) is likely to be a ‘worst case’ assessment.
- 5.0.2 Once the journey to work trip proportions matrix was established, those trips likely to go through North Baddesley crossroads were identified and the most probable routing of trips through the crossroads was also determined. Turning move matrices were arrived at on this basis by considering only those O-D pairs which are likely to impact on the crossroads. Detailed trip matrices are provided in Appendix B of this report.
- 5.0.3 For the purpose of this study three scenarios have been assessed:
- Base year (2008) flows, plus all proposed southern Test Valley (STV) development, to gauge the impact of the development relative to current conditions (Base + all STV development).
 - Base year (2008) flows, plus proposed development in North Baddesley only, to gauge the impact of this development relative to current conditions (Base + North Baddesley).
 - Future year (2026) flows, to gauge the possible impact of development in south Hampshire in line with the South East Plan, based on future traffic growth predictions (Future 2026 with allowance for all development in the area, based on national growth factors)
- 5.0.4 The resultant turning movement estimates for the different arms of the North Baddesley crossroads are shown in Tables 3, 4 and 5.

Table 3 Predicted Turning Moves at the North Baddesley Crossroads (Base + all STV development)

	Base Flows (2008)					Development Flows					Total Flows Base + Development				
	A	B	C	D	Total	A	B	C	D	Total	A	B	C	D	Total
A	0	152	231	81	464	0	0	3	0	3	0	152	234	81	467
B	68	0	13	624	705	0	0	0	144	144	68	0	13	768	849
C	139	11	0	393	543	8	0	0	70	78	147	11	0	463	621
D	21	459	219	0	699	0	47	23	0	70	21	506	242	0	769
Total	228	622	463	1098	2411	8	47	26	214	295	236	669	489	1312	2706

Notes: [A] – Nutburn Road, [B] – Botley Road West, [C] – Rowhams Road, [D] - Botley Road East

Table 4 Predicted Turning Moves at the North Baddesley Crossroads (Base + North Baddesley)

	Base Flows (2008)					North Baddesley Development Flows					Total Flows Base + North Baddesley Development				
	A	B	C	D	Total	A	B	C	D	Total	A	B	C	D	Total
A	0	152	231	81	464	0	0	3	0	3	0	152	234	81	467
B	68	0	13	624	705	0	0	0	0	144	68	0	13	624	705
C	139	11	0	393	543	8	0	0	70	78	147	11	0	463	621
D	21	459	219	0	699	0	0	23	0	70	21	459	242	0	722
Total	228	622	463	1098	2411	8	47	26	214	295	236	622	489	1168	2515

Table 5 Predicted Turning Moves at the North Baddesley Crossroads (Future 2026, all development)

	Base Flows (2008)					2026 Base Flows (Growth Factor = 1.159)				
	A	B	C	D	Total	A	B	C	D	Total
A	0	152	231	81	464	0	176	268	94	538
B	68	0	13	624	705	79	0	15	723	817
C	139	11	0	393	543	161	13	0	455	629
D	21	459	219	0	699	24	532	254	0	810
Total	228	622	463	1098	2411	264	721	537	1272	2794

6. JUNCTION ANALYSIS

6.1 Introduction

- 6.1.1 The effect of the development traffic on the crossroads was assessed by inputting the various scenario flows into the LINSIG model, using the flows shown in Tables 3, 4 and 5. The 'Practical Reserve Capacity' (PRC) is also quoted in the following summary tables as it gives a measure of the overall capacity for the junction.

6.2 Base Plus All STV Development

- 6.2.1 Table 6 provides a comparison of the performance of the junction with the base (2008) flows and the base plus all STV development traffic. The full model outputs are attached in Appendix C.

Table 6 LINSIG Modelling Output for Base and Base + Development

Approach	2008 Base			2008 Base + all STV Development Traffic		
	Mean Maximum Queues	Degree of saturation (%)	PRC %	Mean Maximum Queues	Degree of saturation (%)	PRC %
Nutburn Road	19	88.8	-7.1	26	99.9	-17.2
Botley Road West	29	94		59	105.5	
Rownhams Road	25	96		38	102.4	
Botley Road East	22	76.8		25	78.5	

- 6.2.2 The LINSIG analysis demonstrates that because the junction is operating close to or at capacity the additional development traffic increases the degree of saturation and queue lengths. The overall effect is therefore to increase the delays for traffic. The most noticeable increase in queueing occurs on Botley Road west. As mentioned in the previous section, the large number of right turners and the lack of a dedicated lane for right turners affects the capacity of the Rownhams Road arm.

6.3 Base Plus North Baddesley Development

- 6.3.1 The model was also run with traffic flows generated by the North Baddesley development proposals only. This allows the impact of North Baddesley development on the crossroads to be viewed in isolation. Table 7 demonstrates that following signal optimisation, the junction may perform slightly better than the base scenario with a reduced PRC of - 6.2%. In practice the opportunities for optimisation would require observation and adjustment on site based on the actual flows. The junction is still running close to capacity with similar queueing on all arms. This assessment does indicate however that the proposed development in North Baddesley, on its own, has only a margin affect on the predicted queues compared with the existing situation. Hence it is the effect of development in the other settlements that has the predominant impact.

Table 7 Modelling Output for Base and Base + North Baddesley Development

Approach	2008 Base			2008 Base + North Baddesley Development Traffic		
	Mean Maximum Queues	Degree of saturation (%)	PRC %	Mean Maximum Queues	Degree of saturation (%)	PRC %
Nutburn Road	19	88.8	-7.1	21	94.3	-6.2
Botley Road West	29	94		29	94.3	
Rownhams Road	25	96		27.5	95.5	
Botley Road East	22	76.8		25.8	83.4	

6.4 Future (2026) Year Flows

6.4.1 As a sensitivity test, 2026 conditions were modelled by growing up the 2008 base flows based on the AM peak growth factor of 1.159, calculated using TEMPRO (v5.3). This growth factor takes into account proposed development in the south Hampshire area as it affects North Baddesley. Table 8 provides the model output for 2026 figures using the TEMPRO factor. The modelling results indicate that the junction is operating at or over capacity with significant queuing on all arms. The performance of the junction under this scenario is similar to the base + all STV development scenario. This probably reflects the fact that most of the traffic growth in the area will be related to the local levels of development.

Table 8 Modelling Output for 2026 Base

Approach	2026 Base		
	Mean Maximum Queues	Degree of saturation (%)	PRC %
Nutburn Road	34.5	102.9	-18.4
Botley Road West	60.6	106.6	
Rownhams Road	41.4	103.7	
Botley Road East	28.3	86.8	

6.5 Mitigation Measures at the Junction

6.5.1 The junction operates under a current signal plan with a maximum overall cycle time of 120 seconds. Increasing the cycle time beyond this maximum accepted cycle time is not a viable option. Additional dedicated right turning lanes on Rownhams Road and Nutburn Road would improve the operation of the junction. This strategy would reduce queuing on the two minor roads, thereby making it possible for the reassignment of additional green times to the main Botley Road approaches.

6.5.2 The effect of adding an extra lane on the minor roads was tested with the base + all STV development demand flows. Table 9 provides a summary of this scenario. It is evident that this scenario provides a reduction in the predicted delays, returning the queue lengths to a level

similar to the current observed queues. The full model outputs are attached in Appendix C of this report.

Table 9 LINSIG Modelling Output for Base + all STV Development, with Junction Improvement

Approach	2008 Base + Development Traffic		2008 Base + Development Traffic	
	(No improvement)		(With additional lane on minor arms)	
	Mean Maximum Queues	Degree of saturation (%)	Mean Maximum Queues	Degree of saturation (%)
Nutburn Road	26	99.9	18	84.5
Botley Road West	59	105.5	28	83.6
Rownhams Road	38	102.4	22	80.6
Botley Road East	25	78.5	21	62.2

6.5.3 However it is clear from site observations that a significant improvement involving road widening would be difficult to achieve within the existing highway boundary. There may be opportunities for adjustments to the existing carriageways to provide short stacking areas for right turning vehicles on the Nutburn Road or Rownhams Road approaches, but this would require more detailed investigation.

6.6 Other Mitigation Measures

6.6.1 The assessment of the future performance of the cross roads has been based on current levels of car use and travel patterns. The proposed development in Southern Test Valley, in line with the South East Plan, covers the period up to 2026. Test Valley Borough Council are actively promoting, and seeking to enable, more sustainable travel behaviour over this plan period.

6.6.2 The Borough Council is actively engaged in proposals to improve access to and facilities at Romsey rail station. The aim is to increase rail usage particularly between Romsey, Chandlers Ford, Eastleigh and Southampton. There is a cycle route between Romsey and Chandlers Ford. Bus quality partnerships are in place or being developed with the aim of improving bus services. Over time, these and other similar measures will contribute towards reductions in demands to travel by car.

6.6.3 Hence over the period of the South East Plan proposals, it is likely that many factors will influence traffic growth. Future car trip generation rates from new and existing development will reflect both national and local influences, including the measures being taken forward by the Borough Council.

7. CONCLUSIONS

- 7.0.1 The North Baddesley crossroads is currently operating close to or at capacity, with queuing of 20-30 vehicles on the various arms. The proposed development in southern Test Valley, assuming current car trip generation rates, is likely to increase queuing, particularly on Botley Road West in the morning peak. There is likely to be a corresponding increase in queuing on Botley Road east in the evening peak.
- 7.0.2 The absence of right turn lanes on the Rownhams Road and Nutburn Lane approaches affects the capacity of these arms and in turn affects the length of green signal time that can be allocated to the main west-east Botley Road route and the consequent levels of queuing. Provision of right turn lanes or short stacking areas for right turning vehicles would improve the performance of the junction, but there are land constraints for such modifications.
- 7.0.3 The junction assessment has been undertaken on the basis of current car trip generation and travel patterns. The proposed development covers the period up to 2026. There are many factors likely to influence travel behaviour and car trip generation over this period. The Borough Council is promoting a series of measures that will contribute towards less car use and more sustainable travel. Such measures will assist in reducing the traffic impacts of new development on locations such as North Baddesley.

APPENDIX A
TRAFFIC SURVEY RESULTS

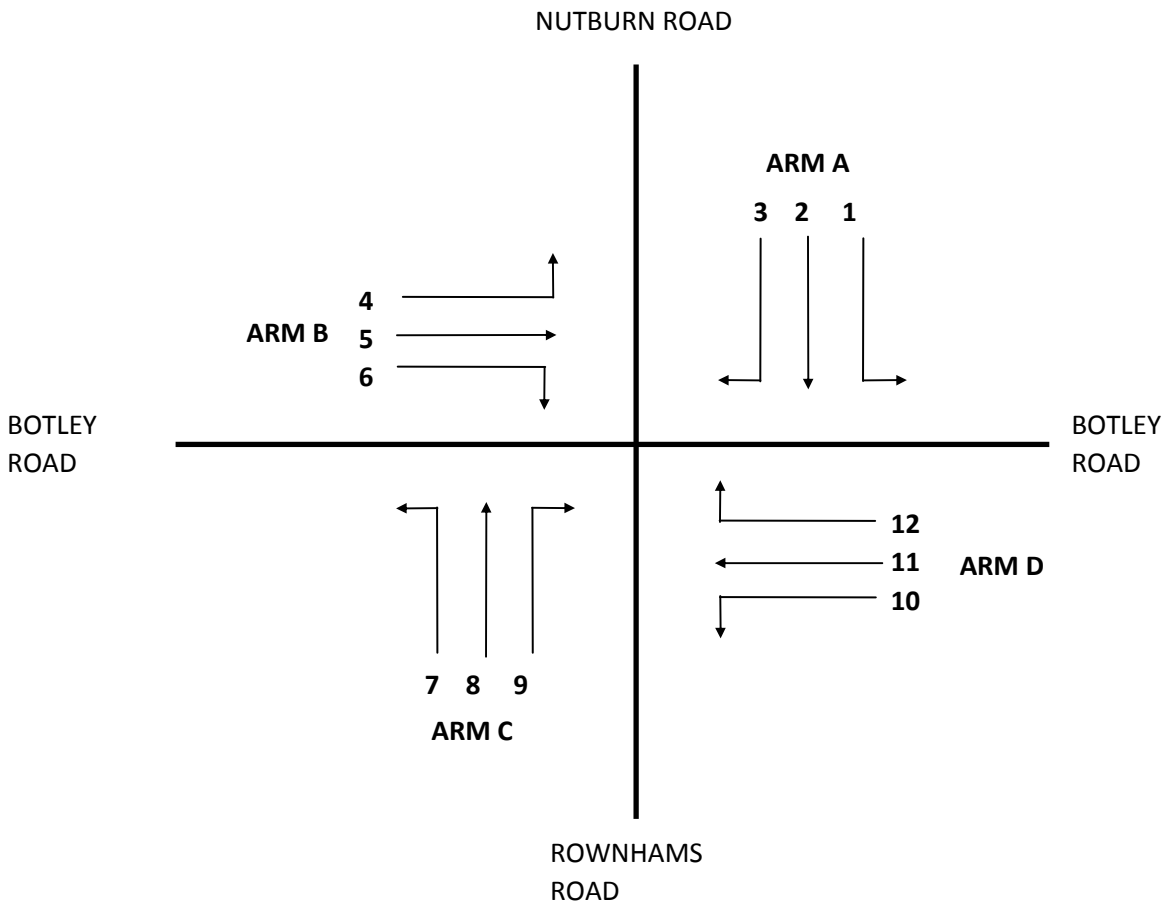
SITE: 1



DATE: 11TH MARCH 2008

LOCATION: BOTLEY ROAD /
ROWNHAMS ROAD

DAY: THURSDAY



JOB TITLE: NORTH BADDESLEY

JOB NUMBER: 11187

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	MOVEMENT 1 FROM NUTBURN ROAD TO BOTLEY ROAD						MOVEMENT 2 FROM NUTBURN ROAD TO ROWNHAMS ROAD						MOVEMENT 3 FROM NUTBURN ROAD TO BOTLEY ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	0	0	0	0	0	0	14	3	0	0	0	17	9	5	0	0	0	14
07:15	8	0	0	0	0	8	15	4	1	0	0	20	15	2	1	0	0	18
07:30	12	2	0	0	0	14	35	1	0	0	0	36	24	3	0	0	0	27
07:45	9	1	0	0	0	10	34	2	0	0	0	36	19	3	0	0	0	22
H/TOT	29	3	0	0	0	32	98	10	1	0	0	109	67	13	1	0	0	81
08:00	15	1	0	0	0	16	49	3	0	0	0	52	31	2	1	0	0	34
08:15	24	1	0	0	1	26	58	0	1	0	0	59	37	1	0	0	0	38
08:30	19	1	0	0	0	20	56	2	1	0	0	59	46	0	0	0	0	46
08:45	16	0	0	0	0	16	54	1	1	0	0	56	32	0	0	0	0	32
H/TOT	74	3	0	0	1	78	217	6	3	0	0	226	146	3	1	0	0	150
09:00	12	2	0	0	0	14	31	1	0	0	0	32	23	3	0	0	0	26
09:15	6	1	0	0	0	7	14	2	0	0	1	17	10	0	0	0	0	10
HH/TOT	18	3	0	0	0	21	45	3	0	0	1	49	33	3	0	0	0	36
P/TOT	121	9	0	0	1	131	360	19	4	0	1	384	246	19	2	0	0	267

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	MOVEMENT 4 FROM BOTLEY ROAD TO NUTBURN ROAD						MOVEMENT 5 FROM BOTLEY ROAD TO BOTLEY ROAD						MOVEMENT 6 FROM BOTLEY ROAD TO ROWNHAMS ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	2	1	0	0	0	3	84	10	1	1	0	96	1	0	0	0	0	1
07:15	9	2	0	0	0	11	116	13	1	1	0	131	3	0	2	0	0	5
07:30	11	3	0	0	0	14	158	20	0	1	0	179	0	1	0	0	0	1
07:45	17	0	0	0	0	17	133	11	0	2	4	150	1	0	0	0	0	1
H/TOT	39	6	0	0	0	45	491	54	2	5	4	556	5	1	2	0	0	8
08:00	13	3	0	0	0	16	124	21	3	4	4	156	2	0	0	0	0	2
08:15	11	1	0	0	0	12	127	6	2	1	0	136	1	0	1	0	0	2
08:30	20	2	0	0	0	22	150	12	0	1	0	163	3	0	0	0	0	3
08:45	15	0	0	0	0	15	105	11	3	4	4	127	4	0	1	0	0	5
H/TOT	59	6	0	0	0	65	506	50	8	10	8	582	10	0	2	0	0	12
09:00	15	1	0	0	0	16	105	16	0	4	2	127	3	1	0	0	0	4
09:15	28	3	2	0	1	34	95	11	3	7	1	117	4	1	2	0	0	7
HH/TOT	43	4	2	0	1	50	200	27	3	11	3	244	7	2	2	0	0	11
P/TOT	141	16	2	0	1	160	1197	131	13	26	15	1382	22	3	6	0	0	31

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	MOVEMENT 7 FROM ROWNHAMS ROAD TO BOTLEY ROAD						MOVEMENT 8 FROM ROWNHAMS ROAD TO NUTBURN ROAD						MOVEMENT 9 FROM ROWNHAMS ROAD TO BOTLEY ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	2	0	0	0	0	2	26	6	0	0	0	32	50	8	1	0	0	59
07:15	5	0	0	0	0	5	28	8	0	0	0	36	78	5	0	0	1	84
07:30	3	1	0	0	0	4	41	10	0	0	0	51	121	10	3	0	0	134
07:45	1	0	1	0	0	2	37	8	1	0	0	46	81	8	0	0	2	91
H/TOT	11	1	1	0	0	13	132	32	1	0	0	165	330	31	4	0	3	368
08:00	3	0	0	0	0	3	34	4	1	0	0	39	116	9	2	0	0	127
08:15	1	0	0	0	0	1	29	2	0	0	0	31	87	6	0	0	0	93
08:30	3	0	0	0	0	3	36	1	0	0	0	37	99	3	0	0	0	102
08:45	4	0	0	0	0	4	25	2	0	0	0	27	56	2	0	0	1	59
H/TOT	11	0	0	0	0	11	124	9	1	0	0	134	358	20	2	0	1	381
09:00	7	0	2	0	0	9	23	1	0	0	0	24	81	3	1	0	0	85
09:15	18	1	2	0	0	21	17	2	0	0	0	19	58	2	2	0	1	63
HH/TOT	25	1	4	0	0	30	40	3	0	0	0	43	139	5	3	0	1	148
P/TOT	47	2	5	0	0	54	296	44	2	0	0	342	827	56	9	0	5	897

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	MOVEMENT 10 FROM BOTLEY ROAD TO ROWNHAMS ROAD						MOVEMENT 11 FROM BOTLEY ROAD TO BOTLEY ROAD						MOVEMENT 12 FROM BOTLEY ROAD TO NUTBURN ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	15	2	0	0	0	17	56	7	1	2	0	66	6	1	0	0	0	7
07:15	27	5	0	0	1	33	77	16	4	0	1	98	5	5	0	0	0	10
07:30	40	0	2	0	1	43	110	13	3	1	0	127	6	0	0	0	0	6
07:45	27	4	1	0	1	33	88	16	3	0	0	107	6	4	0	0	0	10
H/TOT	109	11	3	0	3	126	331	52	11	3	1	398	23	10	0	0	0	33
08:00	48	5	1	0	0	54	85	13	4	1	1	104	3	2	0	0	0	5
08:15	36	7	2	0	0	45	87	13	1	1	1	103	2	0	0	0	0	2
08:30	45	4	0	0	2	51	106	12	5	2	1	126	4	1	1	0	0	6
08:45	44	6	3	0	0	53	73	9	7	0	0	89	4	1	0	0	0	5
H/TOT	173	22	6	0	2	203	351	47	17	4	3	422	13	4	1	0	0	18
09:00	24	3	2	0	0	29	67	10	7	0	0	84	5	1	1	0	0	7
09:15	30	4	0	0	1	35	65	17	9	3	0	94	11	1	0	0	0	12
HH/TOT	54	7	2	0	1	64	132	27	16	3	0	178	16	2	1	0	0	19
P/TOT	336	40	11	0	6	393	814	126	44	10	4	998	52	16	2	0	0	70

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	TO ARM A NUTBURN ROAD						FROM ARM A NUTBURN ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	34	8	0	0	0	42	23	8	0	0	0	31
07:15	42	15	0	0	0	57	38	6	2	0	0	46
07:30	58	13	0	0	0	71	71	6	0	0	0	77
07:45	60	12	1	0	0	73	62	6	0	0	0	68
H/TOT	194	48	1	0	0	243	194	26	2	0	0	222
08:00	50	9	1	0	0	60	95	6	1	0	0	102
08:15	42	3	0	0	0	45	119	2	1	0	1	123
08:30	60	4	1	0	0	65	121	3	1	0	0	125
08:45	44	3	0	0	0	47	102	1	1	0	0	104
H/TOT	196	19	2	0	0	217	437	12	4	0	1	454
09:00	43	3	1	0	0	47	66	6	0	0	0	72
09:15	56	6	2	0	1	65	30	3	0	0	1	34
HH/TOT	99	9	3	0	1	112	96	9	0	0	1	106
P/TOT	489	76	6	0	1	572	727	47	6	0	2	782

TO ARM A IS TOTAL OF MOVEMENTS 4, 8, 12
 FROM ARM A IS TOTAL OF MOVEMENTS 1, 2, 3

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	TO ARM B BOTLEY ROAD						FROM ARM B BOTLEY ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	67	12	1	2	0	82	87	11	1	1	0	100
07:15	97	18	5	0	1	121	128	15	3	1	0	147
07:30	137	17	3	1	0	158	169	24	0	1	0	194
07:45	108	19	4	0	0	131	151	11	0	2	4	168
H/TOT	409	66	13	3	1	492	535	61	4	5	4	609
08:00	119	15	5	1	1	141	139	24	3	4	4	174
08:15	125	14	1	1	1	142	139	7	3	1	0	150
08:30	155	12	5	2	1	175	173	14	0	1	0	188
08:45	109	9	7	0	0	125	124	11	4	4	4	147
H/TOT	508	50	18	4	3	583	575	56	10	10	8	659
09:00	97	13	9	0	0	119	123	18	0	4	2	147
09:15	93	18	11	3	0	125	127	15	7	7	2	158
HH/TOT	190	31	20	3	0	244	250	33	7	11	4	305
P/TOT	1107	147	51	10	4	1319	1360	150	21	26	16	1573

TO ARM B IS TOTAL OF MOVEMENTS 3, 7, 11
 FROM ARM B IS TOTAL OF MOVEMENTS 4, 5, 6

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	TO ARM C ROWNHAMS ROAD						FROM ARM C ROWNHAMS ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	30	5	0	0	0	35	78	14	1	0	0	93
07:15	45	9	3	0	1	58	111	13	0	0	1	125
07:30	75	2	2	0	1	80	165	21	3	0	0	189
07:45	62	6	1	0	1	70	119	16	2	0	2	139
H/TOT	212	22	6	0	3	243	473	64	6	0	3	546
08:00	99	8	1	0	0	108	153	13	3	0	0	169
08:15	95	7	4	0	0	106	117	8	0	0	0	125
08:30	104	6	1	0	2	113	138	4	0	0	0	142
08:45	102	7	5	0	0	114	85	4	0	0	1	90
H/TOT	400	28	11	0	2	441	493	29	3	0	1	526
09:00	58	5	2	0	0	65	111	4	3	0	0	118
09:15	48	7	2	0	2	59	93	5	4	0	1	103
HH/TOT	106	12	4	0	2	124	204	9	7	0	1	221
P/TOT	718	62	21	0	7	808	1170	102	16	0	5	1293

TO ARM C IS TOTAL OF MOVEMENTS 2, 6, 10
FROM ARM C IS TOTAL OF MOVEMENTS 7, 8, 9

CLASSIFIED TURNING COUNTS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	TO ARM D BOTLEY ROAD						FROM ARM D BOTLEY ROAD					
	CAR	LGV	OGV1	OGV2	PSV	TOT	CAR	LGV	OGV1	OGV2	PSV	TOT
07:00	134	18	2	1	0	155	77	10	1	2	0	90
07:15	202	18	1	1	1	223	109	26	4	0	2	141
07:30	291	32	3	1	0	327	156	13	5	1	1	176
07:45	223	20	0	2	6	251	121	24	4	0	1	150
H/TOT	850	88	6	5	7	956	463	73	14	3	4	557
08:00	255	31	5	4	4	299	136	20	5	1	1	163
08:15	238	13	2	1	1	255	125	20	3	1	1	150
08:30	268	16	0	1	0	285	155	17	6	2	3	183
08:45	177	13	3	4	5	202	121	16	10	0	0	147
H/TOT	938	73	10	10	10	1041	537	73	24	4	5	643
09:00	198	21	1	4	2	226	96	14	10	0	0	120
09:15	159	14	5	7	2	187	106	22	9	3	1	141
HH/TOT	357	35	6	11	4	413	202	36	19	3	1	261
P/TOT	2145	196	22	26	21	2410	1202	182	57	10	10	1461

TO ARM D IS TOTAL OF MOVEMENTS 1, 5, 9
 FROM ARM C IS TOTAL OF MOVEMENTS 10, 11, 12

QUEUE LENGTHS

SITE: 1

DATE: 11/03/2008



LOCATION: NUTBURN ROAD / BOTLEY ROAD / ROWNHAMS ROAD / BOTLEY ROAD

DAY: TUESDAY

TIME	ARM A - NUTBURN ROAD		ARM B - BOTLEY ROAD		ARM C - ROWNHAMS ROAD	ARM D - BOTLEY ROAD	
	LANE 1	LANE 2	LANE 1	LANE 2	LANE 1	LANE 1	LANE 2
07:00	3	0	2	1	5	2	2
07:05	2	0	8	1	5	7	2
07:10	2	0	4	1	10	4	2
07:15	1	0	8	4	10	12	1
07:20	5	0	14	3	11	16	4
07:25	3	0	18	3	12	18	3
07:30	4	2	9	2	24	6	1
07:35	7	2	25	3	25	14	3
07:40	6	2	25	3	23	24	3
07:45	9	2	19	3	18	15	2
07:50	8	2	16	1	28	10	2
07:55	10	2	24	2	31	18	3
08:00	10	2	29	4	24	19	3
08:05	12	1	40	2	25	16	2
08:10	15	3	38	2	28	19	3
08:15	16	3	44	4	30	22	3
08:20	12	2	36	1	32	18	1
08:25	9	1	25	2	40	16	2
08:30	8	2	31	1	38	16	2
08:35	8	0	26	3	30	19	2
08:40	16	2	24	1	15	15	1
08:45	9	1	21	2	14	16	1
08:50	4	2	30	1	13	15	2
08:55	6	2	30	2	20	10	1
09:00	9	2	28	2	18	8	1
09:05	4	2	27	2	19	7	2
09:10	5	0	26	2	14	5	1
09:15	4	0	11	1	17	8	2
09:20	3	1	13	3	12	8	4
09:25	2	0	12	2	10	14	3

APPENDIX B
TRIP MATRICES AND TURNING MOVEMENT CALCULATIONS

Table B1 2001 Census – Distribution of Trips

	Romsey	N B W	N B E	Nursling	West Soton	East Soton	Totton & W'side	North Soton	Eastleigh	Other	Total
Romsey	966	12	24	52	598	419	225	36	463	2358	4948
N Baddesley E (development location)	85	3	99	30	214	136	42	12	139	462	1177
Nursling	9	3	9	49	170	96	52	6	59	180	609

Notes: This table shows the number of journey to work trips between the origins and destinations shown, extracted from the census. The actual number of trips contained within a settlement for all trip purposes is likely to be higher than that shown for journey to work trips only. The RMAS phase II study predicted that about 37% of all trips would be internal to the town. Hence the number of external trips is likely to be an overestimate or a 'worst case'. To derive all purpose proportions would require more detailed 'gravity' modelling.

The figures shown in the **white background** boxes represent those trips considered likely to pass through North Baddesley Crossroads. It is considered unlikely that Nursling trips will travel through Baddesley.

The census area for North Baddesley east is taken as the 'model' zone location for the proposed development in North Baddesley.

Abbreviations:
 N Baddesley E and N B E – North Baddesley east (lower layer super output area from 2001 census data)
 N B W – North Baddesley west; Sootn – Southampton; W'side – the Waterside settlements
 Other – areas further afield outside the local/Southampton/Waterside areas
 West Southampton and East Southampton are west and east of The Avenue respectively; North Southampton is Bassett, Chilworth and Swaythling

Table B2 2001 Census – Proportional Distribution of Trips

	Romsey	N B W	N B E	Nursling	West Soton	East Soton	Totton & W'side	North Soton	Eastleigh	Other
Romsey	0.20	0.00	0.00	0.01	0.12	0.08	0.05	0.01	0.09	0.44
N Baddesley E	0.07	0.00	0.08	0.03	0.18	0.12	0.04	0.01	0.12	0.35
Nursling	0.01	0.00	0.01	0.08	0.28	0.16	0.09	0.01	0.10	0.26

Notes: This table shows the proportional split of census derived trips between the origins and destinations shown, to 2 decimal places. See table 1 for abbreviations

Table B3 – AM Peak Hour (0800-0900) Trips Generated by the proposed developments

	Total	
	OUT	IN
Housing		
Romsey	1070	345
North Baddesley	233	75
Nursling	140	45

Notes: This table shows the predicted total trip generation (internal and external) from each of the proposed developments. OUT means trips leaving the development; IN means trips arriving at the development

Table B4 Routing Through the Crossroads

	Romsey	N B W	N B E	Nursling	W Soton	E Soton	Totton & W	N Soton	Eastleigh	Other
Romsey						#[WE]		WE	WE	
N Baddesley W										
N Baddesley E						SE		SE	SE	**[SE,SN]
Nursling										
West Southampton										
East Southampton	#[EW]		ES							
Totton and Waterside										
North Southampton	EW		ES							
Eastleigh Fair Oak Bishopstoke	EW		ES							
Other			**[ES, NS]							
	[...] partial assignment									

Notes: This table shows the possible routing of trips through the crossroads

The figures shown in the **white background** boxes represent those trips considered likely to pass through North Baddesley Crossroads.

North Baddesley east as the model zone for the development in North Baddesley is assumed to be west of the settlement. Hence trips from for example Romsey West Southampton and Nursling will not pass through the crossroads

'WE' means west to east; SE, south to east; SN south to north; EW, ES and NS are the opposite movements

W stands for Botley Rd west; E for Botley Rd east; N for Nutburn Rd; S for Rownhams Rd

For Romsey - Southampton#[WE] and #[EW] for Romsey – Southampton, some traffic may travel through North Baddesley, but the majority are likely to use the M27. Hence for this assessment 40% are assumed to pass through North Baddesley. This may be an overestimate.

For 'other trips', to longer distance destinations traffic will tend to use major routes such as those through Romsey or reached via the M27 junction 3. Hence a minority of these trips will travel through the cross roads. For the purposes of this study, 25% of these trips are assumed to pass through the cross roads, 15% to/from Botley Road east, 10% to/from Nutburn Road.

Table B5 Development Trips through the cross roads – OUTBOUND

	Romsey	N B W	N B E	Nurs	W Soton	E Soton	Totton&W	N Soton	Eastleigh	Other	Other*	E Soton #	total
Romsey						91		8	100			36	1070
N Baddesley W													
N Baddesley E						27		2	28	83	21		233
Nursling													
West Southampton													
East Southampton													
Totton and Waterside													
North Southampton													
Eastleigh Fair Oak Bishopstoke													
Other													
* assumes 25% passes through junction, 15% SE, 10% SN (13 trips SE, 8 trips SN)						# assumes 40% passes through junction							

Notes: This table applies the proportions in table B2 to the number of outbound trips in table B3 to derive the estimated outbound (one way) trips from the developments likely to pass through the crossroads.
 The East Soton and Other trips likely to pass through the crossroads have been estimated as shown in table B4 and accompanying notes

Table B6 Morning Peak Hour Junction Trip Matrix for 'OUT' Trips by Turning Moves

	Romsey	N B W	N B E	Nurs	W Soton	E Soton	Totton &W	N Soton	Eastleigh	Other				
Romsey						36		8	100				Total	
N Baddesley W														
N Baddesley E						27		2	28	13	8	WE	144	
Nursling												SE	70	
West Southampton												SN	8	
East Southampton														
Totton and Waterside														
North Southampton														
Eastleigh Fair Oak Bishopstoke														
Other														

Notes: This table shows the total outbound turning moves between arms for all developments, e.g. WE is west to east, derived from tables B4 and B5

Table B7 Development Trips through the cross roads – INBOUND

	Romsey	N B W	N B E	Nurs	W Soton	E Soton	Totton&W	N Soton	Eastleigh	Other	Other*	E Soton	total
Romsey						29		3	32			12	345
N Baddesley W													
N Baddesley E						9		1	9	27	7		75
Nursling													
West Southampton													
East Southampton													
Totton and Waterside													
North Southampton													
Eastleigh Fair Oak Bishopstoke													
Other													
						* assumes 25% passes through junction, 15% SE, 10% SN (13/8)							
						# assumes 40% passes through junction							

Notes: This table applies the proportions in table B2 to the number of inbound trips in table B3 to derive the estimated inbound (one way) trips to the developments likely to pass through the crossroads.

In this table the origins are shown in the column headings not the row headings

The East Soton and Other trips likely to pass through the crossroads have been estimated as shown in table B4 and accompanying notes

Table B8 Morning Peak Hour Junction Trip Matrix for 'IN' Trips by Turning Moves

	Romsey	N B W	N B E	Nurs	W Soton	E Soton	Totton & W	N Soton	Eastleigh	Other			
Romsey						12		3	32				Total
N Baddesley W												NS	3
N Baddesley E						9		1	9	4	3	EW	47
Nursling												ES	23
West Southampton													
East Southampton													
Totton and Waterside													
North Southampton													
Eastleigh Fair Oak													
Bishopstoke													
Other													

Notes: This table shows the total inbound turning moves between arms for all developments, e.g. EW is east to west, derived from table B4 and B7

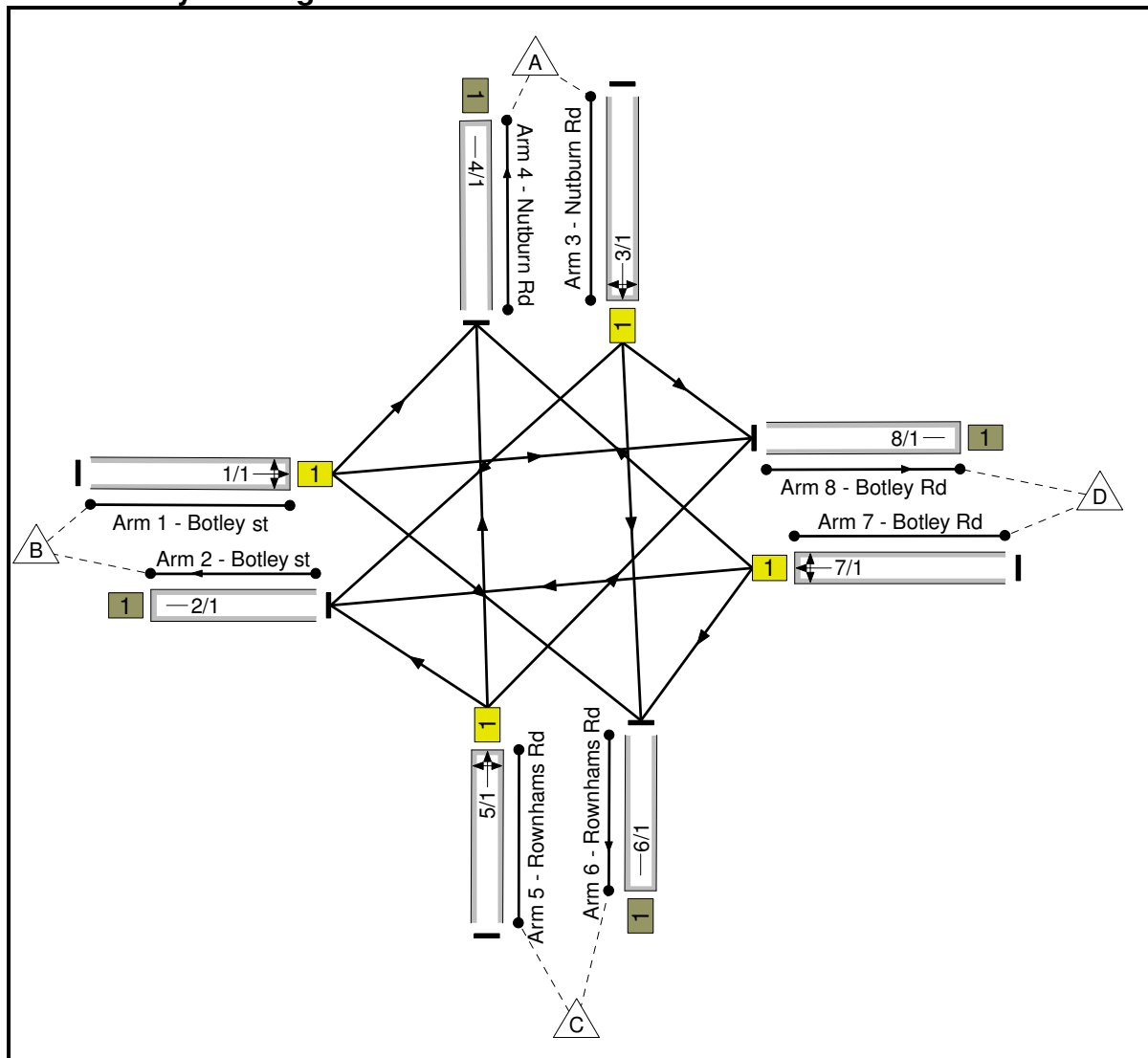
APPENDIX C
LINSIG OUTPUTS

Full Input Data And Results

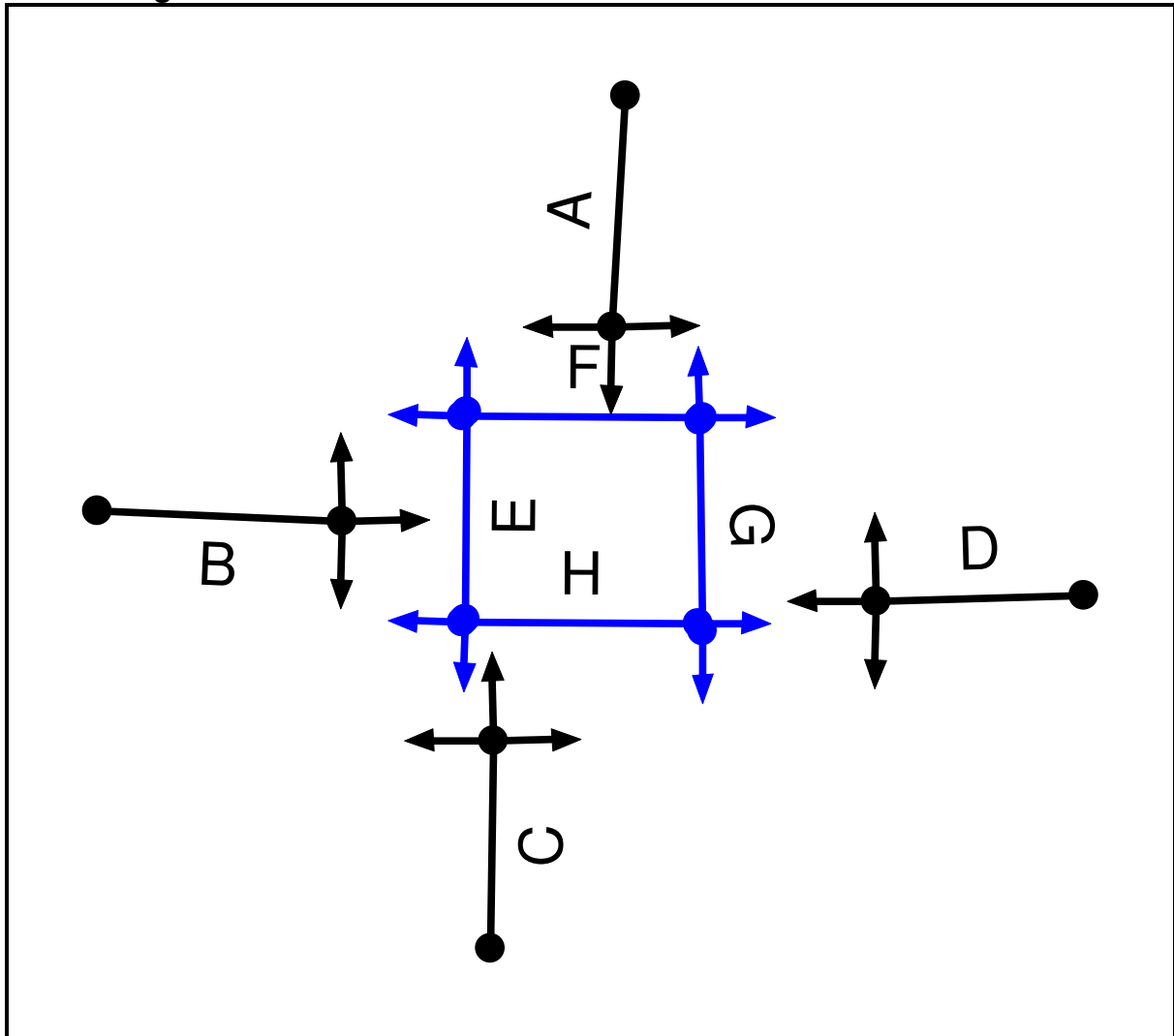
User and Project Details

Project:	14780 – TVBC Impact on strategic road network
Title:	North Baddesley cross roads analysis
Location:	North Baddesley
File name:	NB Xrds Rev1_ all scenarios.lsgx
Author:	N.J George
Company:	Gifford
Address:	
Controller:	Generic
SCN:	
Notes:	

Junction Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase type	Assoc Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		6	6
F	Pedestrian		6	6
G	Pedestrian		6	6
H	Pedestrian		6	6

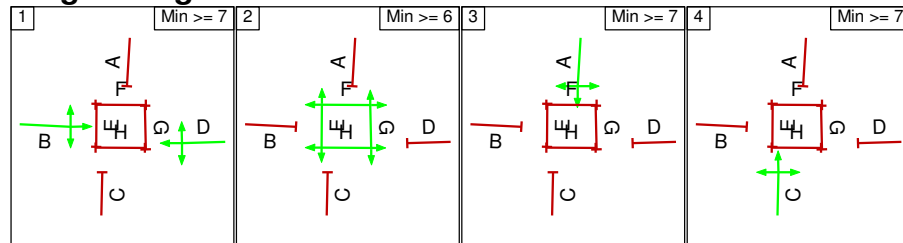
Phase Intergrens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A		7	7	7	7	7	7	7
	B	7		7	-	7	7	7	7
	C	7	7		7	7	7	7	7
	D	7	-	7		7	7	7	7
	E	9	9	9	9		-	-	-
	F	9	9	9	9	-		-	-
	G	9	9	9	9	-	-		-
	H	9	9	9	9	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	B D
2	E F G H
3	A
4	C

Stages Diagram



Phase Delays

There are no phase delays defined in this stage stream

Prohibited Stage Changes

		To Stage			
		1	2	3	4
From Stage	1		7	7	7
	2	9		9	9
	3	7	7		7
	4	7	7	7	

Link Input Data

Arm/ Link	Link Name	Link Type	Num Lanes	Phases	Start Disp.	End Disp.
1/1	Botley st Left Right Ahead	U	1	B	2	3
2/1	Botley st	U	1		2	3
3/1	Nutburn Rd Right Ahead Left	U	1	A	2	3
4/1	Nutburn Rd	U	1		2	3
5/1	Rownhams Rd Left Ahead Right	U	1	C	2	3
6/1	Rownhams Rd	U	1		2	3
7/1	Botley Rd Ahead Right Left	U	1	D	2	3
8/1	Botley Rd	U	1		2	3

Full Input Data And Results

Lane Input Data

Arm/ Lane	Link Num	Physical Length (PCU)	Expected Usage (PCU)	Sat Flow Type	User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)
1/1 (Botley st Lane 1)	Link 1 (Botley st Left Right Ahead)	Inf	Inf	User	2300	4.00	0.00	N	Arm 4 Left (Nutburn Rd)	15.00
									Arm 6 Right (Rownhams Rd)	25.00
									Arm 8 Ahead (Botley Rd)	Inf
2/1 (Botley st Lane 1)	Link 1 (Botley st)	Inf	Inf	Inf (Exit)	1800	5.00	0.00	N		
3/1 (Nutburn Rd Lane 1)	Link 1 (Nutburn Rd Right Ahead Left)	Inf	Inf	User	3300	2.75	0.00	Y	Arm 2 Right (Botley st)	Inf
									Arm 6 Ahead (Rownhams Rd)	Inf
									Arm 8 Left (Botley Rd)	15.00
4/1 (Nutburn Rd Lane 1)	Link 1 (Nutburn Rd)	Inf	Inf	Inf (Exit)	1800	4.00	0.00	N		
5/1 (Rownhams Rd Lane 1)	Link 1 (Rownhams Rd Left Ahead Right)	Inf	Inf	User	2600	5.00	0.00	Y	Arm 2 Left (Botley st)	14.00
									Arm 4 Ahead (Nutburn Rd)	Inf
									Arm 8 Right (Botley Rd)	25.00
6/1 (Rownhams Rd Lane 1)	Link 1 (Rownhams Rd)	Inf	Inf	Inf (Exit)	1800	3.66	0.00	N		

Full Input Data And Results

7/1 (Botley Rd Lane 1)	Link 1 (Botley Rd Ahead Right Left)	Inf	Inf	User	2800	4.00	0.00	N	Arm 2 Ahead (Botley st)	Inf
									Arm 4 Right (Nutburn Rd)	25.00
									Arm 6 Left (Rownhams Rd)	15.00
8/1 (Botley Rd Lane 1)	Link 1 (Botley Rd)	Inf	Inf	Inf (Exit)	1800	3.25	0.00	Y		

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM peak'	08:00	09:00	01:00	
2: 'AM Peak - With all dev'	08:00	09:00	01:00	
3: 'AM Peak - With NB Dev only'	08:00	09:00	01:00	
4: '2026 Base'	08:00	09:00	01:00	F1*1.159

Flow Group 1: 'AM peak'
Traffic Flow Matrix
Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	152	231	81	464
	B	68	0	13	624	705
	C	139	11	0	393	543
	D	21	459	219	0	699
	Tot.	228	622	463	1098	2411

Link Traffic Flows

Arm/Link	Flow Group 1: AM peak
1/1	705
2/1	622
3/1	464
4/1	228
5/1	543
6/1	463
7/1	699
8/1	1098

Lane Saturation Flows

Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Botley st Lane 1)	This lane uses a directly entered Saturation Flow						2300
2/1 (Botley st Lane 1)	5.00	0.00	N				2255
3/1 (Nutburn Rd Lane 1)	This lane uses a directly entered Saturation Flow						3300
4/1 (Nutburn Rd Lane 1)	4.00	0.00	N				2155
5/1 (Rownhams Rd Lane 1)	This lane uses a directly entered Saturation Flow						2600
6/1 (Rownhams Rd Lane 1)	3.66	0.00	N				2121
7/1 (Botley Rd Lane 1)	This lane uses a directly entered Saturation Flow						2800
8/1 (Botley Rd Lane 1)	Infinite Saturation Flow (on Exit Link)						Inf

Flow Group 2: 'AM Peak - With all dev'

Traffic Flow Matrix

Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	152	234	81	467
	B	68	0	13	768	849
	C	147	11	0	463	621
	D	21	506	242	0	769
	Tot.	236	669	489	1312	2706

Link Traffic Flows

Arm/Link	Flow Group 2: AM Peak - With all dev
1/1	849
2/1	669
3/1	467
4/1	236
5/1	621
6/1	489
7/1	769
8/1	1312

Lane Saturation Flows

Arm/ Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Botley st Lane 1)	This lane uses a directly entered Saturation Flow						2300
2/1 (Botley st Lane 1)	5.00	0.00	N				2255
3/1 (Nutburn Rd Lane 1)	This lane uses a directly entered Saturation Flow						3300
4/1 (Nutburn Rd Lane 1)	4.00	0.00	N				2155
5/1 (Rownhams Rd Lane 1)	This lane uses a directly entered Saturation Flow						2600
6/1 (Rownhams Rd Lane 1)	3.66	0.00	N				2121
7/1 (Botley Rd Lane 1)	This lane uses a directly entered Saturation Flow						2800
8/1 (Botley Rd Lane 1)	Infinite Saturation Flow (on Exit Link)						Inf

Flow Group 3: 'AM Peak - With NB Dev only'

Traffic Flow Matrix

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	152	234	81	467
	B	68	0	13	624	705
	C	147	11	0	463	621
	D	21	496	242	0	759
	Tot.	236	659	489	1168	2552

Link Traffic Flows

Arm/Link	Flow Group 3: AM Peak - With NB Dev only
1/1	705
2/1	659
3/1	467
4/1	236
5/1	621
6/1	489
7/1	759
8/1	1168

Lane Saturation Flows

Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Botley st Lane 1)	This lane uses a directly entered Saturation Flow						2300
2/1 (Botley st Lane 1)	5.00	0.00	N				2255
3/1 (Nutburn Rd Lane 1)	This lane uses a directly entered Saturation Flow						3300
4/1 (Nutburn Rd Lane 1)	4.00	0.00	N				2155
5/1 (Rownhams Rd Lane 1)	This lane uses a directly entered Saturation Flow						2600
6/1 (Rownhams Rd Lane 1)	3.66	0.00	N				2121
7/1 (Botley Rd Lane 1)	This lane uses a directly entered Saturation Flow						2800
8/1 (Botley Rd Lane 1)	Infinite Saturation Flow (on Exit Link)						Inf

Flow Group 4: '2026 Base'

Traffic Flow Matrix

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	176	268	94	538
	B	79	0	15	723	817
	C	161	13	0	455	629
	D	24	532	254	0	810
	Tot.	264	721	537	1273	2794

Link Traffic Flows

Arm/Link	Flow Group 4: 2026 Base
1/1	817
2/1	721
3/1	538
4/1	264
5/1	629
6/1	537
7/1	810
8/1	1273

Lane Saturation Flows

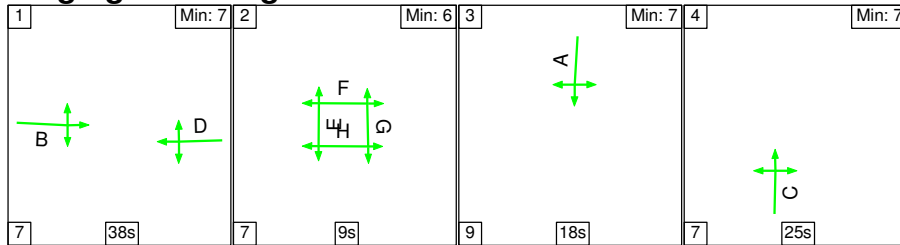
Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Botley st Lane 1)	This lane uses a directly entered Saturation Flow						2300
2/1 (Botley st Lane 1)	5.00	0.00	N				2255
3/1 (Nutburn Rd Lane 1)	This lane uses a directly entered Saturation Flow						3300
4/1 (Nutburn Rd Lane 1)	4.00	0.00	N				2155
5/1 (Rownhams Rd Lane 1)	This lane uses a directly entered Saturation Flow						2600
6/1 (Rownhams Rd Lane 1)	3.66	0.00	N				2121
7/1 (Botley Rd Lane 1)	This lane uses a directly entered Saturation Flow						2800
8/1 (Botley Rd Lane 1)	Infinite Saturation Flow (on Exit Link)						Inf

Scenario 1: 'NB AM Peak - Base'

Staging Plan 1: 'AM Peak - Base'

Flow Group 1: 'AM peak'

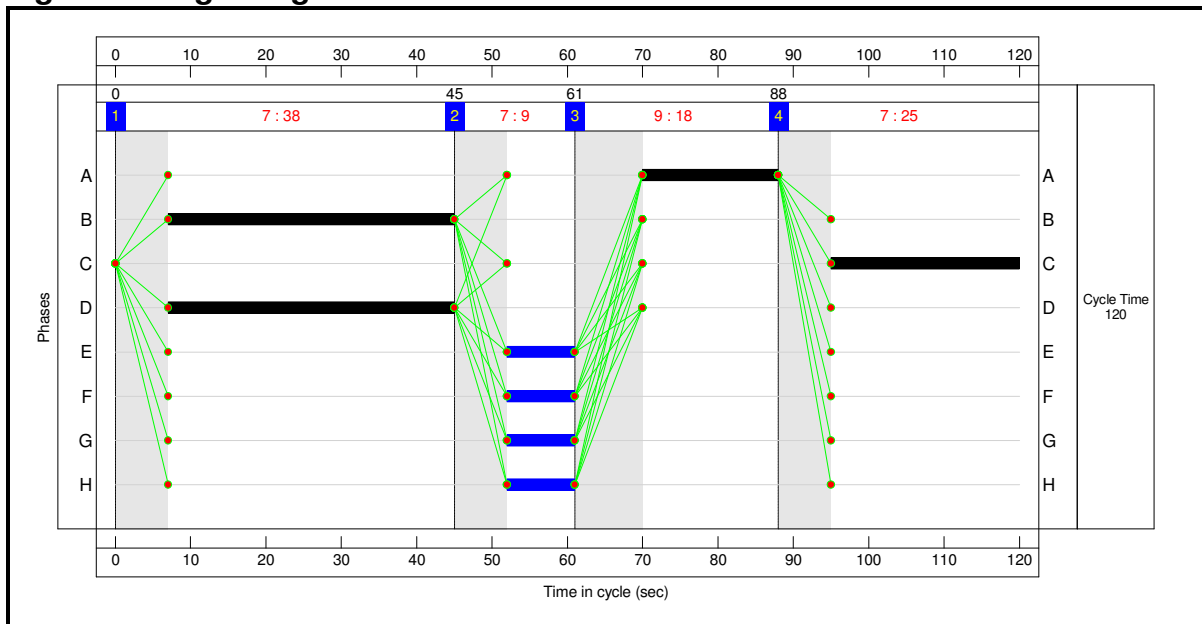
Staging Plan Diagram



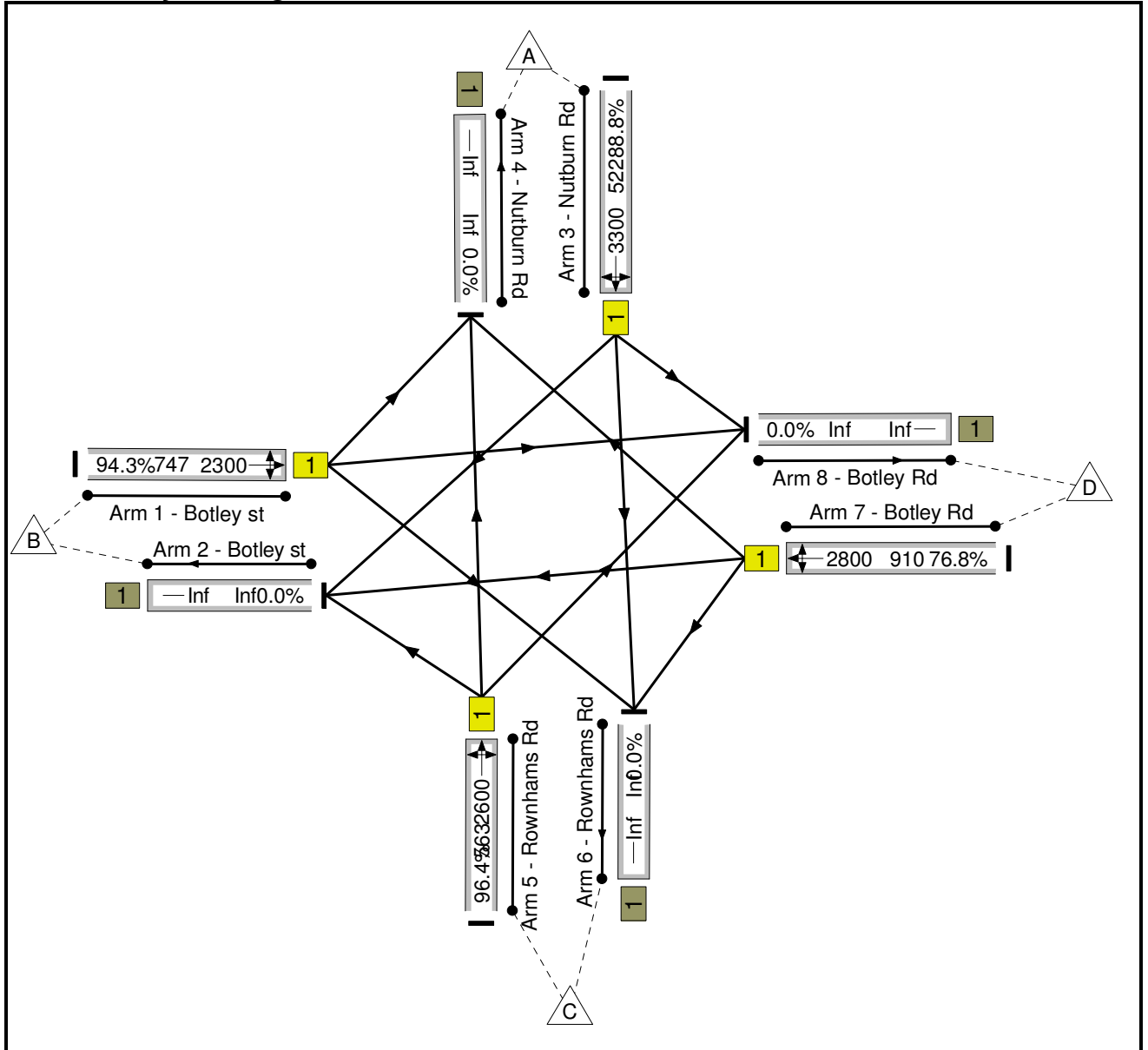
Stage Timings

Stage	1	2	3	4
Duration	38	9	18	25
Change Point	0	45	61	88

Signal Timings Diagram



Junction Layout Diagram



Link Results

Full Input Data And Results

Link Num	Link Desc	Link Type	Stage Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Ave Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
1/1	Botley st Left Right Ahead	U	N/A	N/A	B		1	38	-	705	2300	2300	747	94.3
2/1	Botley st	U	N/A	N/A	-		-	-	-	622	Inf	Inf	Inf	0.0
3/1	Nutburn Rd Right Ahead Left	U	N/A	N/A	A		1	18	-	464	3300	3300	522	88.8
4/1	Nutburn Rd	U	N/A	N/A	-		-	-	-	228	Inf	Inf	Inf	0.0
5/1	Rownhams Rd Left Ahead Right	U	N/A	N/A	C		1	25	-	543	2600	2600	563	96.4
6/1	Rownhams Rd	U	N/A	N/A	-		-	-	-	463	Inf	Inf	Inf	0.0
7/1	Botley Rd Ahead Right Left	U	N/A	N/A	D		1	38	-	699	2800	2800	910	76.8
8/1	Botley Rd	U	N/A	N/A	-		-	-	-	1098	Inf	Inf	Inf	0.0

Full Input Data And Results

Link Num	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)		
1/1	705	705	-	-	-	7.7	6.4	-	14.1	72.0	22.7	6.4	29.1		
2/1	622	622	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
3/1	464	464	-	-	-	6.4	3.5	-	9.9	76.9	15.1	3.5	18.6		
4/1	228	228	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
5/1	543	543	-	-	-	7.0	7.6	-	14.6	97.1	17.8	7.6	25.4		
6/1	463	463	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
7/1	699	699	-	-	-	7.1	1.6	-	8.7	44.8	20.8	1.6	22.4		
8/1	1098	1098	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
PRC for Signalled Links (%):				-7.1	Total Delay for Signalled Links (pcuHr):				47.37						
PRC Over All Links (%):				-7.1	Total Delay Over All Links (pcuHr):				47.37	Cycle Time (s): 120					

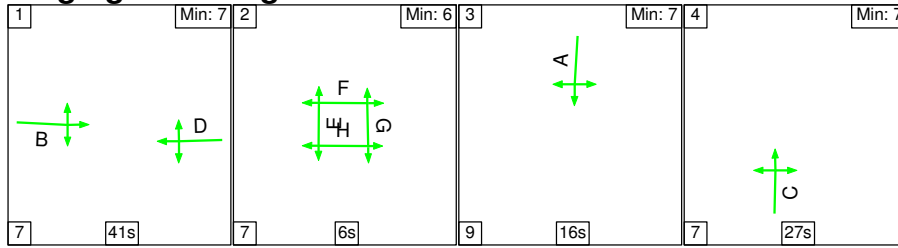
Full Input Data And Results

Scenario 2: 'NB AM Peak - Base + All Dev'

Staging Plan 1: 'AM Peak - Base'

Flow Group 2: 'AM Peak - With all dev'

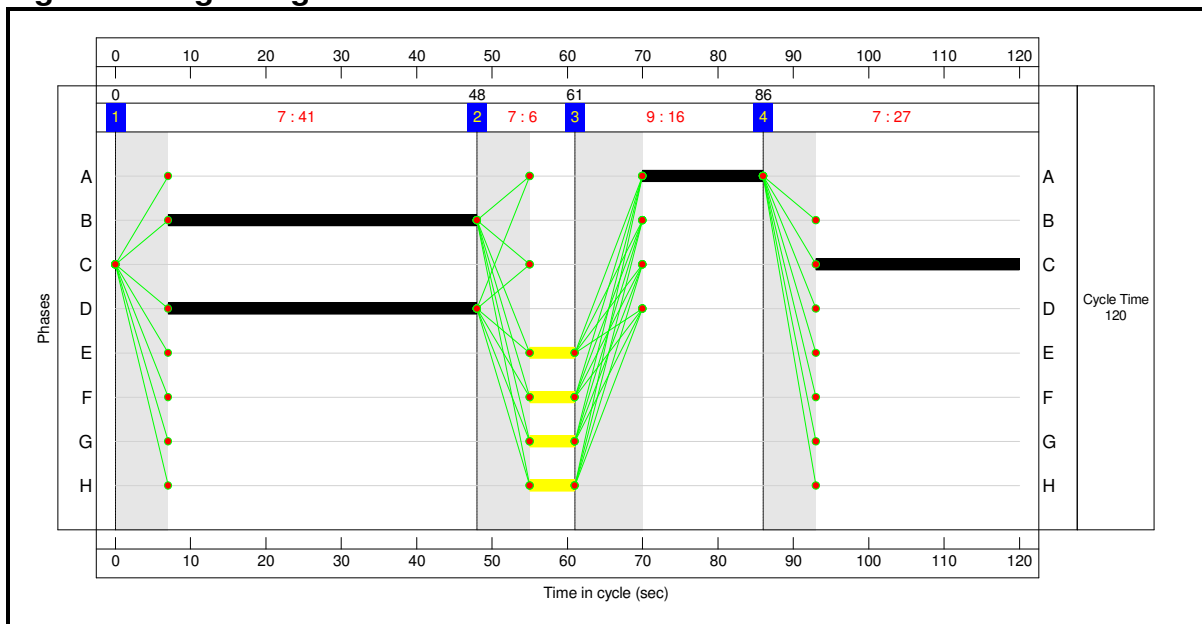
Staging Plan Diagram



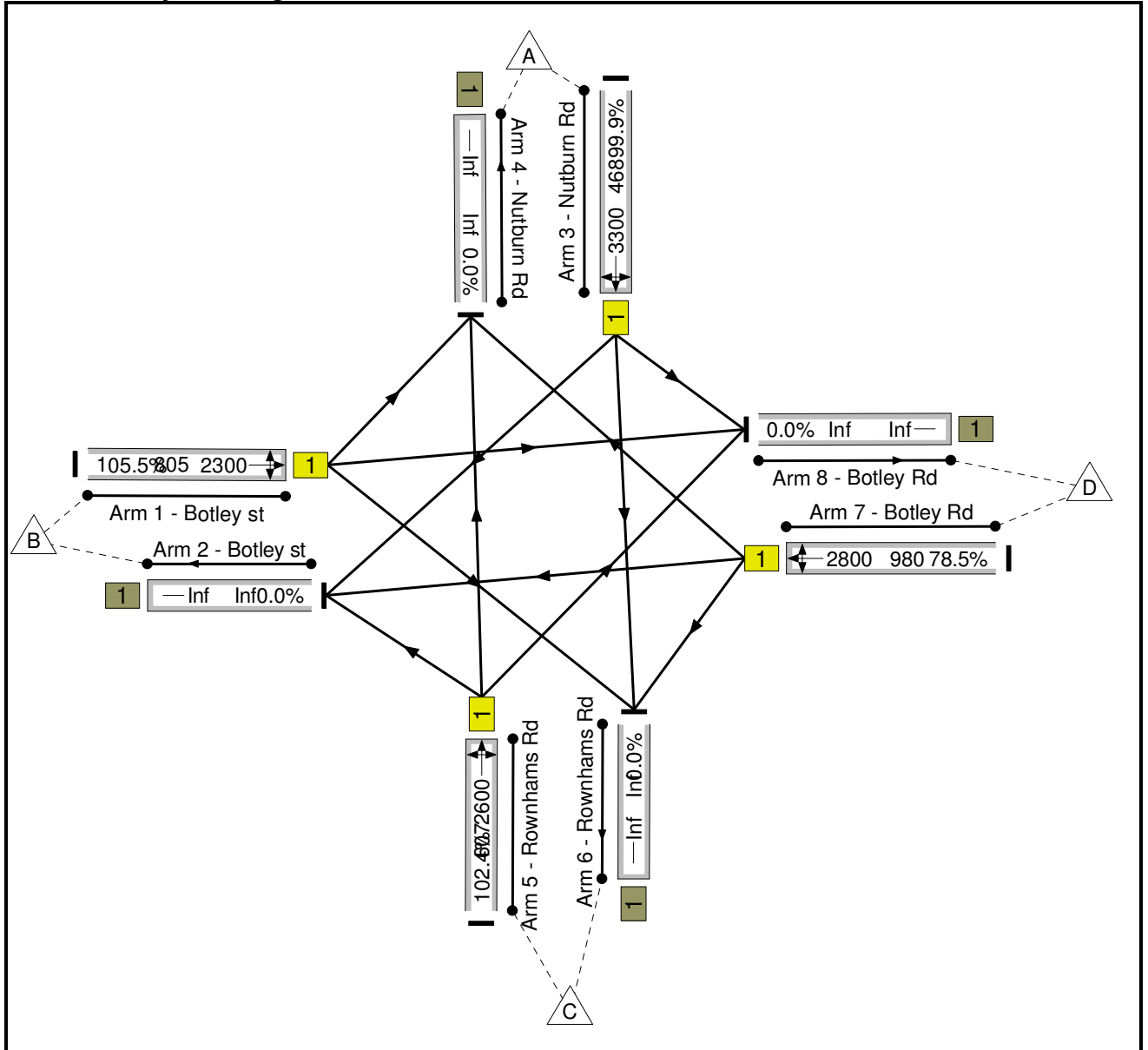
Stage Timings

Stage	1	2	3	4
Duration	41	6	16	27
Change Point	0	48	61	86

Signal Timings Diagram



Junction Layout Diagram



Full Input Data And Results

Link Results

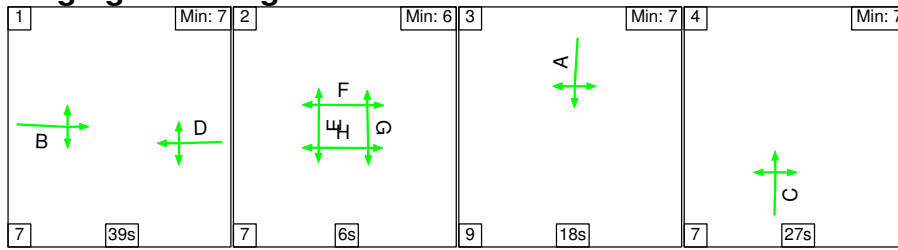
Link Num	Link Desc	Link Type	Stage Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Ave Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
1/1	Botley st Left Right Ahead	U	N/A	N/A	B		1	41	-	849	2300	2300	805	105.5
2/1	Botley st	U	N/A	N/A	-		-	-	-	669	Inf	Inf	Inf	0.0
3/1	Nutburn Rd Right Ahead Left	U	N/A	N/A	A		1	16	-	467	3300	3300	468	99.9
4/1	Nutburn Rd	U	N/A	N/A	-		-	-	-	236	Inf	Inf	Inf	0.0
5/1	Rownhams Rd Left Ahead Right	U	N/A	N/A	C		1	27	-	621	2600	2600	607	102.4
6/1	Rownhams Rd	U	N/A	N/A	-		-	-	-	489	Inf	Inf	Inf	0.0
7/1	Botley Rd Ahead Right Left	U	N/A	N/A	D		1	41	-	769	2800	2800	980	78.5
8/1	Botley Rd	U	N/A	N/A	-		-	-	-	1312	Inf	Inf	Inf	0.0

Full Input Data And Results

Link Num	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	
1/1	849	805	-	-	-	11.8	29.3	-	41.0	174.0	29.8	29.3	59.0	
2/1	669	669	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
3/1	467	467	-	-	-	6.7	10.7	-	17.4	133.8	15.4	10.7	26.1	
4/1	229	229	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
5/1	621	607	-	-	-	8.9	16.5	-	25.5	147.7	21.2	16.5	37.7	
6/1	488	488	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
7/1	769	769	-	-	-	7.5	1.8	-	9.3	43.3	22.9	1.8	24.6	
8/1	1262	1262	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
PRC for Signalled Links (%):			-17.2		Total Delay for Signalled Links (pcuHr):			93.13						
PRC Over All Links (%):			-17.2		Total Delay Over All Links (pcuHr):			93.13		Cycle Time (s): 120				

Full Input Data And Results

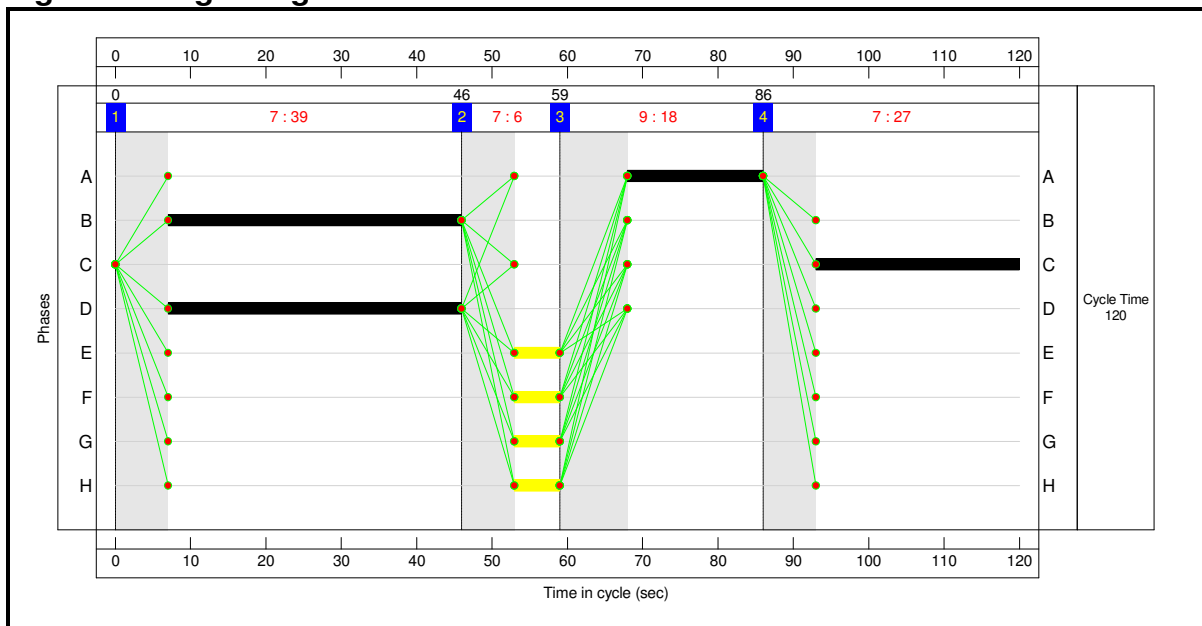
Scenario 3: 'NB 2026 Base'
 Staging Plan 1: 'AM Peak - Base'
 Flow Group 4: '2026 Base'
Staging Plan Diagram



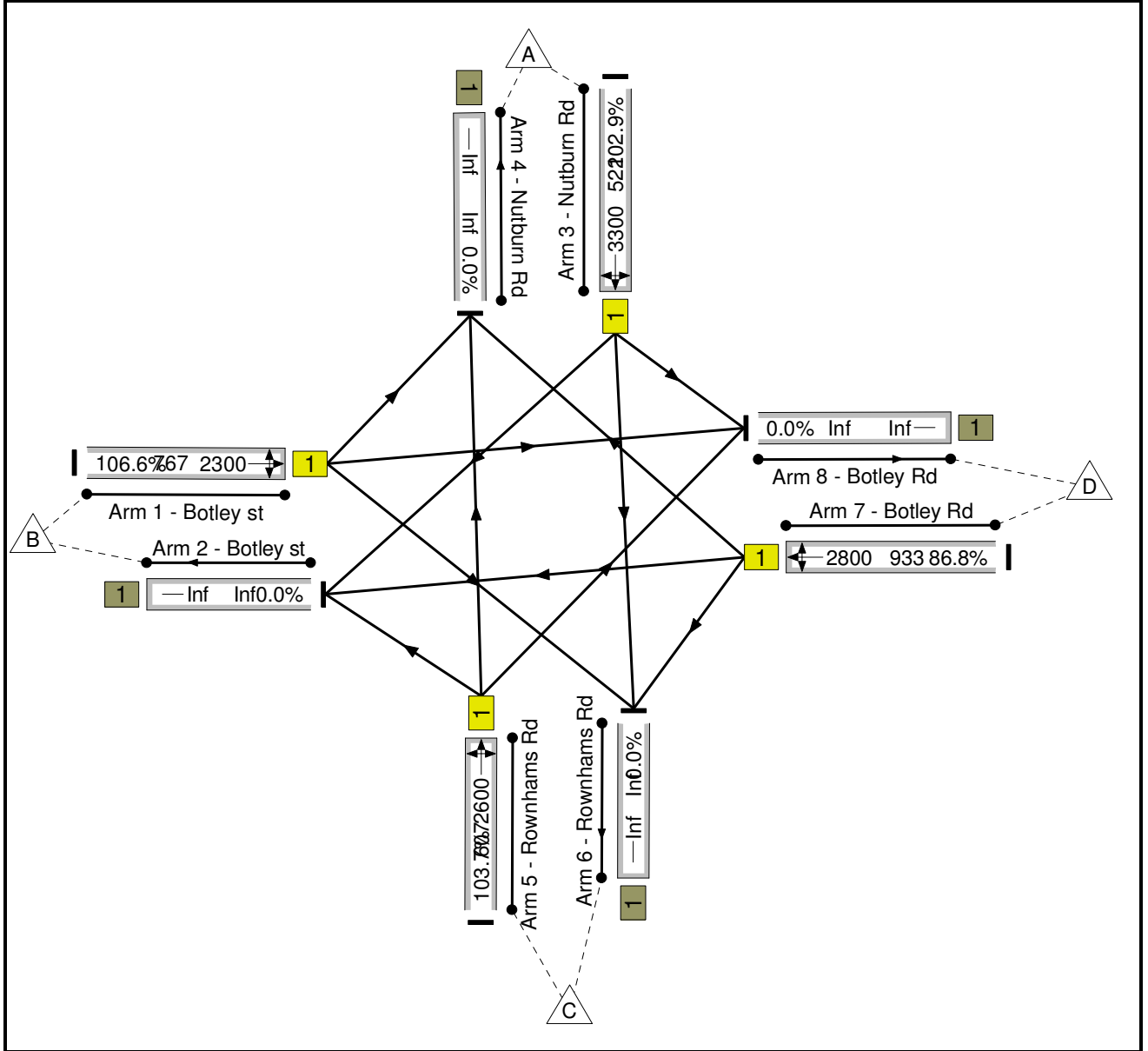
Stage Timings

Stage	1	2	3	4
Duration	39	6	18	27
Change Point	0	46	59	86

Signal Timings Diagram



Junction Layout Diagram



Full Input Data And Results

Link Results

Link Num	Link Desc	Link Type	Stage Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Ave Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
1/1	Botley st Left Right Ahead	U	N/A	N/A	B		1	39	-	817	2300	2300	767	106.6
2/1	Botley st	U	N/A	N/A	-		-	-	-	721	Inf	Inf	Inf	0.0
3/1	Nutburn Rd Right Ahead Left	U	N/A	N/A	A		1	18	-	538	3300	3300	522	102.9
4/1	Nutburn Rd	U	N/A	N/A	-		-	-	-	264	Inf	Inf	Inf	0.0
5/1	Rownhams Rd Left Ahead Right	U	N/A	N/A	C		1	27	-	629	2600	2600	607	103.7
6/1	Rownhams Rd	U	N/A	N/A	-		-	-	-	537	Inf	Inf	Inf	0.0
7/1	Botley Rd Ahead Right Left	U	N/A	N/A	D		1	39	-	810	2800	2800	933	86.8
8/1	Botley Rd	U	N/A	N/A	-		-	-	-	1273	Inf	Inf	Inf	0.0

Full Input Data And Results

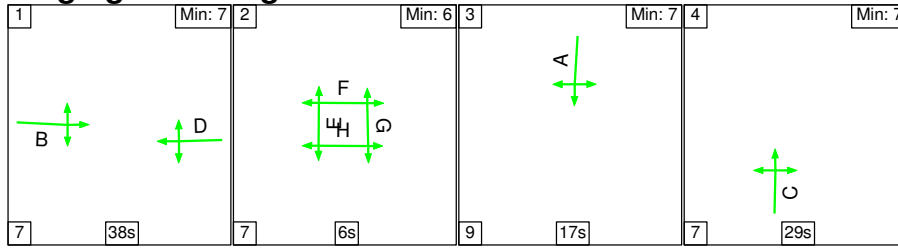
Link Num	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	
1/1	817	767	-	-	-	12.0	31.7	-	43.7	192.6	28.9	31.7	60.6	
2/1	715	715	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
3/1	538	522	-	-	-	8.2	16.0	-	24.3	162.4	18.4	16.0	34.5	
4/1	254	254	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
5/1	629	607	-	-	-	9.6	19.4	-	29.1	166.2	22.0	19.4	41.4	
6/1	528	528	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
7/1	810	810	-	-	-	8.4	3.1	-	11.6	51.4	25.2	3.1	28.3	
8/1	1209	1209	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	
PRC for Signalled Links (%):			-18.4		Total Delay for Signalled Links (pcuHr):			108.59						
PRC Over All Links (%):			-18.4		Total Delay Over All Links (pcuHr):			108.59		Cycle Time (s): 120				

Scenario 4: 'NB AM peak - Base + NB Dev'

Staging Plan 1: 'AM Peak - Base'

Flow Group 3: 'AM Peak - With NB Dev only'

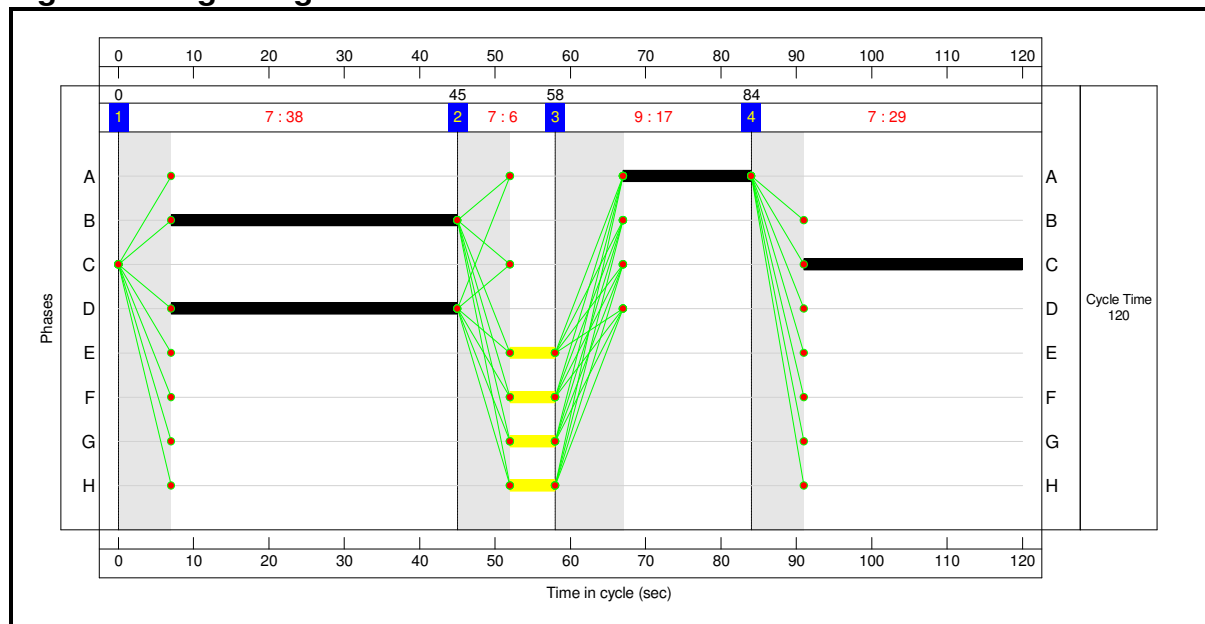
Staging Plan Diagram



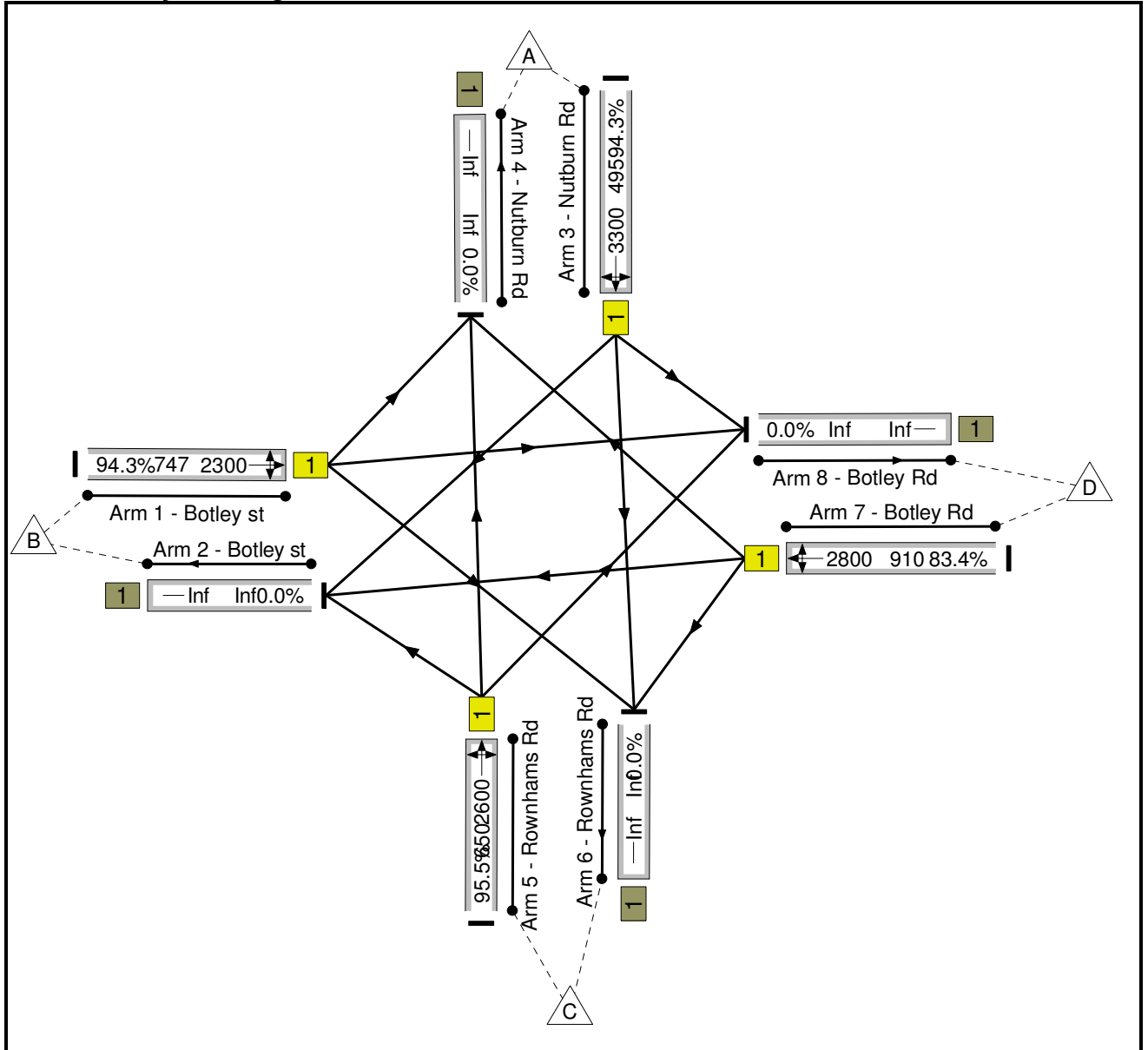
Stage Timings

Stage	1	2	3	4
Duration	38	6	17	29
Change Point	0	45	58	84

Signal Timings Diagram



Junction Layout Diagram



Full Input Data And Results

Link Results

Link Num	Link Desc	Link Type	Stage Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Ave Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
1/1	Botley st Left Right Ahead	U	N/A	N/A	B		1	38	-	705	2300	2300	747	94.3
2/1	Botley st	U	N/A	N/A	-		-	-	-	659	Inf	Inf	Inf	0.0
3/1	Nutburn Rd Right Ahead Left	U	N/A	N/A	A		1	17	-	467	3300	3300	495	94.3
4/1	Nutburn Rd	U	N/A	N/A	-		-	-	-	236	Inf	Inf	Inf	0.0
5/1	Rownhams Rd Left Ahead Right	U	N/A	N/A	C		1	29	-	621	2600	2600	650	95.5
6/1	Rownhams Rd	U	N/A	N/A	-		-	-	-	489	Inf	Inf	Inf	0.0
7/1	Botley Rd Ahead Right Left	U	N/A	N/A	D		1	38	-	759	2800	2800	910	83.4
8/1	Botley Rd	U	N/A	N/A	-		-	-	-	1168	Inf	Inf	Inf	0.0

Full Input Data And Results

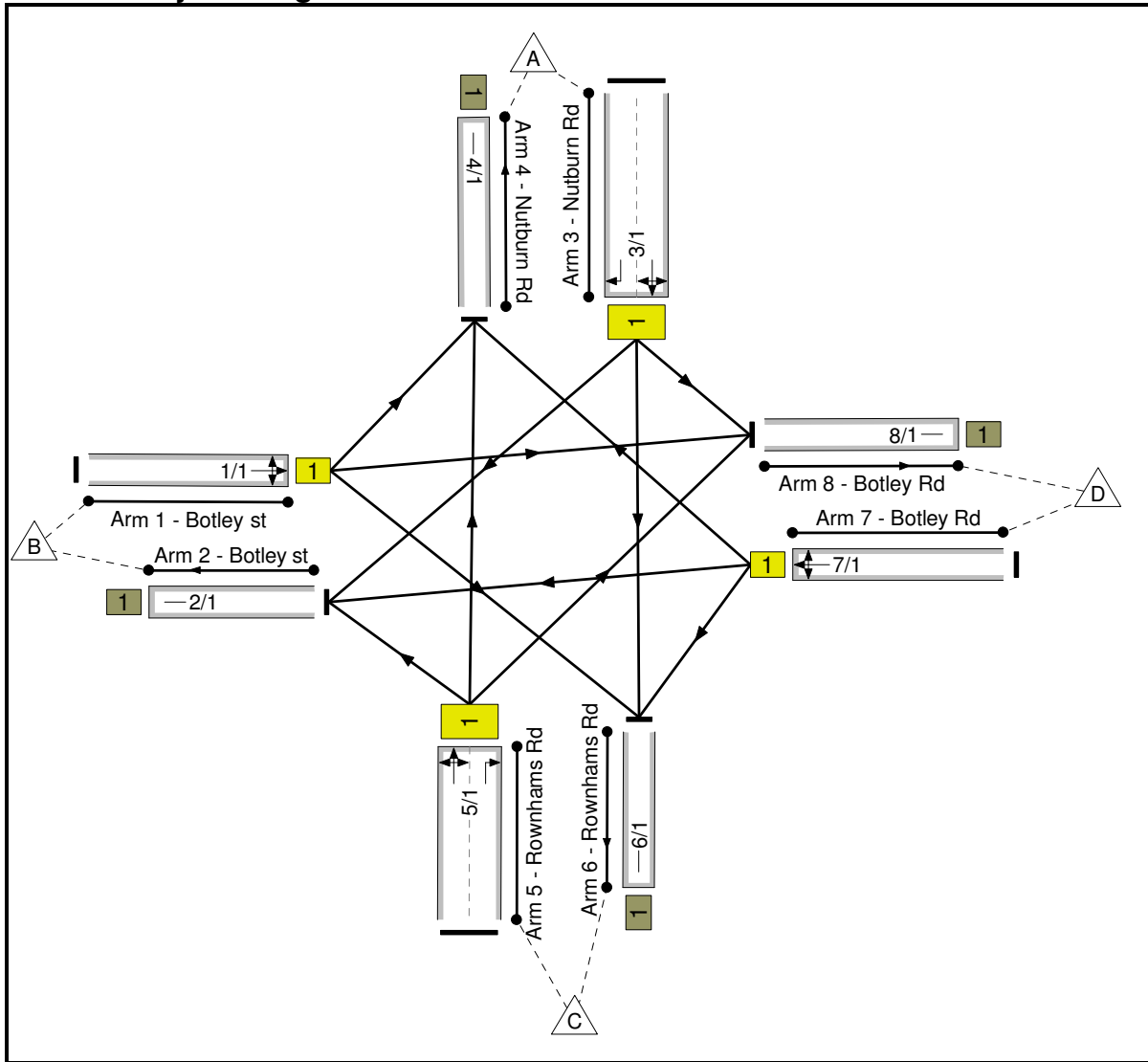
Link Num	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)		
1/1	705	705	-	-	-	7.7	6.4	-	14.1	72.0	22.7	6.4	29.1		
2/1	659	659	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
3/1	467	467	-	-	-	6.6	5.9	-	12.4	95.8	15.3	5.9	21.2		
4/1	236	236	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
5/1	621	621	-	-	-	7.6	7.2	-	14.8	85.9	20.4	7.2	27.5		
6/1	489	489	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
7/1	759	759	-	-	-	7.9	2.4	-	10.3	49.1	23.4	2.4	25.8		
8/1	1168	1168	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
PRC for Signalled Links (%):				-6.2	Total Delay for Signalled Links (pcuHr):				51.68						
PRC Over All Links (%):				-6.2	Total Delay Over All Links (pcuHr):				51.68	Cycle Time (s): 120					

Full Input Data And Results

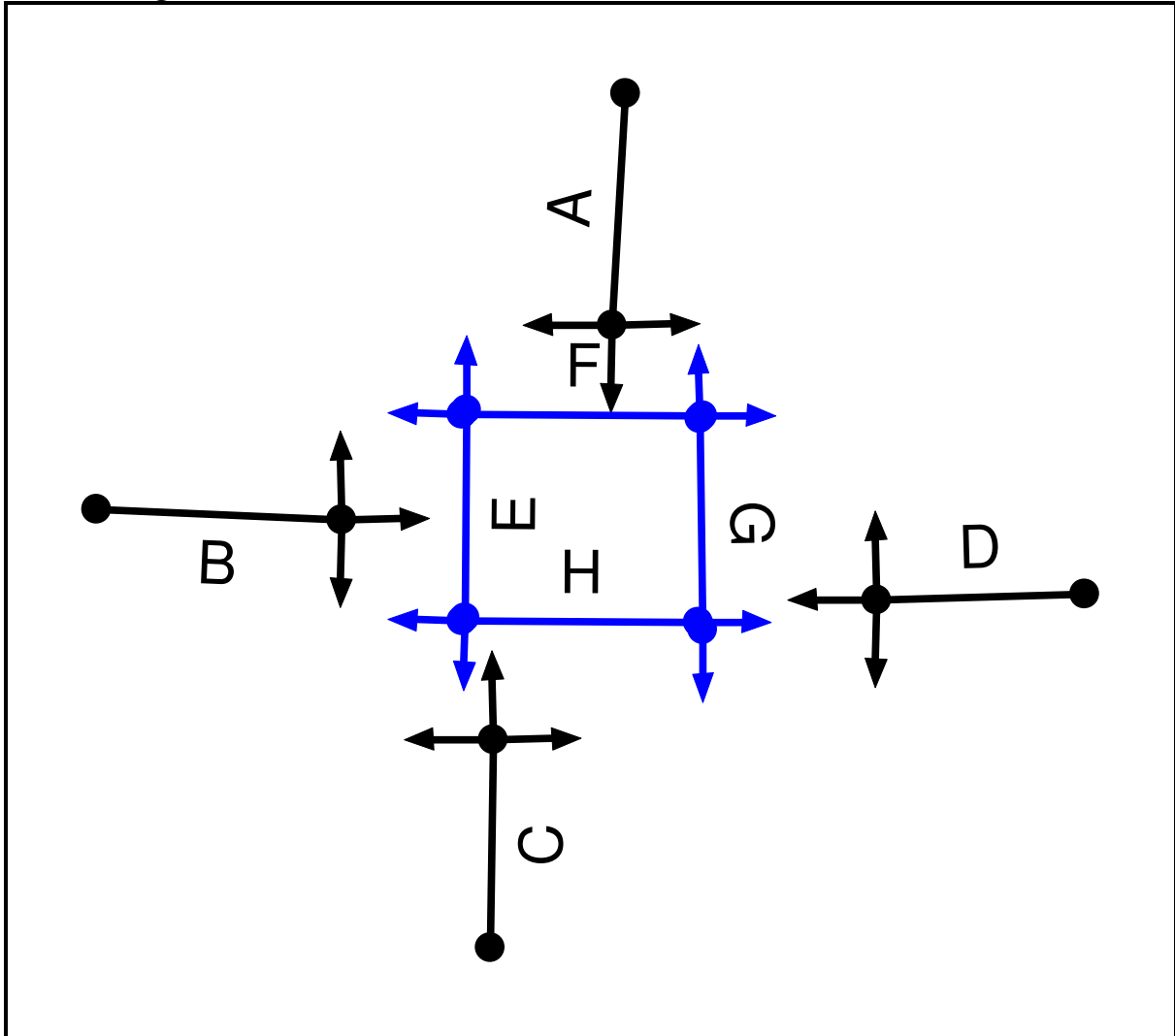
User and Project Details

Project:	14780 – TVBC Impact of development on strategic road network
Title:	North Baddesley Cross Roads – Performance testing of junction with an additional lane on the minor roads
Location:	North Baddesley
File name:	2 lane test_rev flows.lsgx
Author:	N.J.George
Company:	Gifford
Address:	
Controller:	Generic
SCN:	
Notes:	

Junction Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase type	Assoc Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		6	6
F	Pedestrian		6	6
G	Pedestrian		6	6
H	Pedestrian		6	6

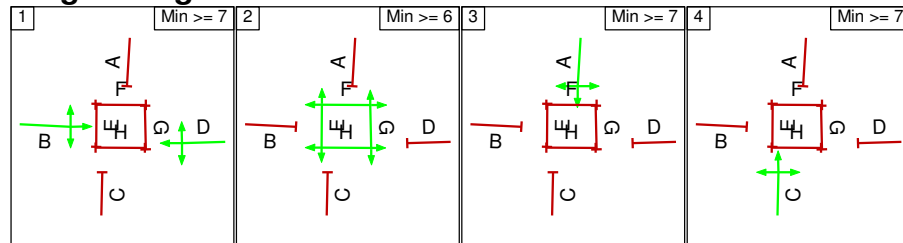
Phase Intergrens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A		7	7	7	7	7	7	7
	B	7		7	-	7	7	7	7
	C	7	7		7	7	7	7	7
	D	7	-	7		7	7	7	7
	E	9	9	9	9		-	-	-
	F	9	9	9	9	-		-	-
	G	9	9	9	9	-	-		-
	H	9	9	9	9	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	B D
2	E F G H
3	A
4	C

Stages Diagram



Phase Delays

There are no phase delays defined in this stage stream

Prohibited Stage Changes

		To Stage			
		1	2	3	4
From Stage	1		7	7	7
	2	9		9	9
	3	7	7		7
	4	7	7	7	

Link Input Data

Arm/ Link	Link Name	Link Type	Num Lanes	Phases	Start Disp.	End Disp.
1/1	Botley st Left Right Ahead	U	1	B	2	3
2/1	Botley st	U	1		2	3
3/1	Nutburn Rd Right Ahead Left	U	2	A	2	3
4/1	Nutburn Rd	U	1		2	3
5/1	Rownhams Rd Left Ahead Right	U	2	C	2	3
6/1	Rownhams Rd	U	1		2	3
7/1	Botley Rd Ahead Right Left	U	1	D	2	3
8/1	Botley Rd	U	1		2	3

Full Input Data And Results

Lane Input Data

Arm/ Lane	Link Num	Physical Length (PCU)	Expected Usage (PCU)	Sat Flow Type	User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)
1/1 (Botley st Lane 1)	Link 1 (Botley st Left Right Ahead)	Inf	Inf	User	2300	4.00	0.00	N	Arm 4 Left (Nutburn Rd)	15.00
									Arm 6 Right (Rownhams Rd)	25.00
									Arm 8 Ahead (Botley Rd)	Inf
2/1 (Botley st Lane 1)	Link 1 (Botley st)	Inf	Inf	Inf (Exit)	1800	5.00	0.00	N		
3/1 (Nutburn Rd Lane 1)	Link 1 (Nutburn Rd Right Ahead Left)	Inf	Inf	User	3300	2.75	0.00	Y	Arm 2 Right (Botley st)	Inf
									Arm 6 Ahead (Rownhams Rd)	Inf
									Arm 8 Left (Botley Rd)	15.00
3/2 (Nutburn Rd Lane 2)	Link 1 (Nutburn Rd Right Ahead Left)	Inf	Inf	User	1800	3.25	0.00	Y	Arm 2 Right (Botley st)	Inf
4/1 (Nutburn Rd Lane 1)	Link 1 (Nutburn Rd)	Inf	Inf	Inf (Exit)	1800	4.00	0.00	N		
5/1 (Rownhams Rd Lane 1)	Link 1 (Rownhams Rd Left Ahead Right)	Inf	Inf	User	2600	5.00	0.00	Y	Arm 2 Left (Botley st)	14.00
									Arm 4 Ahead (Nutburn Rd)	Inf
									Arm 8 Right (Botley Rd)	25.00

Full Input Data And Results

5/2 (Rownhams Rd Lane 2)	Link 1 (Rownhams Rd Left Ahead Right)	Inf	Inf	User	1800	3.25	0.00	Y	Arm 8 Right (Botley Rd)	Inf
6/1 (Rownhams Rd Lane 1)	Link 1 (Rownhams Rd)	Inf	Inf	Inf (Exit)	1800	3.66	0.00	N		
7/1 (Botley Rd Lane 1)	Link 1 (Botley Rd Ahead Right Left)	Inf	Inf	User	2800	4.00	0.00	N	Arm 2 Ahead (Botley st)	Inf
									Arm 4 Right (Nutburn Rd)	25.00
									Arm 6 Left (Rownhams Rd)	15.00
8/1 (Botley Rd Lane 1)	Link 1 (Botley Rd)	Inf	Inf	Inf (Exit)	1800	3.25	0.00	Y		

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM Peak - With dev'	08:00	09:00	01:00	

Flow Group 1: 'AM Peak - With dev'

Traffic Flow Matrix

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	152	234	81	467
	B	68	0	13	768	849
	C	147	11	0	463	621
	D	21	506	242	0	769
	Tot.	236	669	489	1312	2706

Link Traffic Flows

Arm/Link	Flow Group 1: AM Peak - With dev
1/1	849
2/1	669
3/1	467
4/1	236
5/1	621
6/1	489
7/1	769
8/1	1312

Lane Saturation Flows

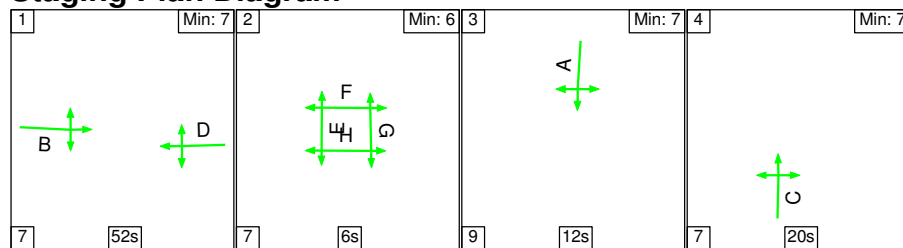
Arm/ Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Botley st Lane 1)	This lane uses a directly entered Saturation Flow						2300
2/1 (Botley st Lane 1)	5.00	0.00	N				2255
3/1 (Nutburn Rd Lane 1)	This lane uses a directly entered Saturation Flow						3300
3/2 (Nutburn Rd Lane 2)	This lane uses a directly entered Saturation Flow						1800
4/1 (Nutburn Rd Lane 1)	4.00	0.00	N				2155
5/1 (Rownhams Rd Lane 1)	This lane uses a directly entered Saturation Flow						2600
5/2 (Rownhams Rd Lane 2)	This lane uses a directly entered Saturation Flow						1800
6/1 (Rownhams Rd Lane 1)	3.66	0.00	N				2121
7/1 (Botley Rd Lane 1)	This lane uses a directly entered Saturation Flow						2800
8/1 (Botley Rd Lane 1)	Infinite Saturation Flow (on Exit Link)						Inf

Scenario 1: 'NB AM Peak - With Dev'

Staging Plan 2: 'AM Peak - With Dev'

Flow Group 1: 'AM Peak - With dev'

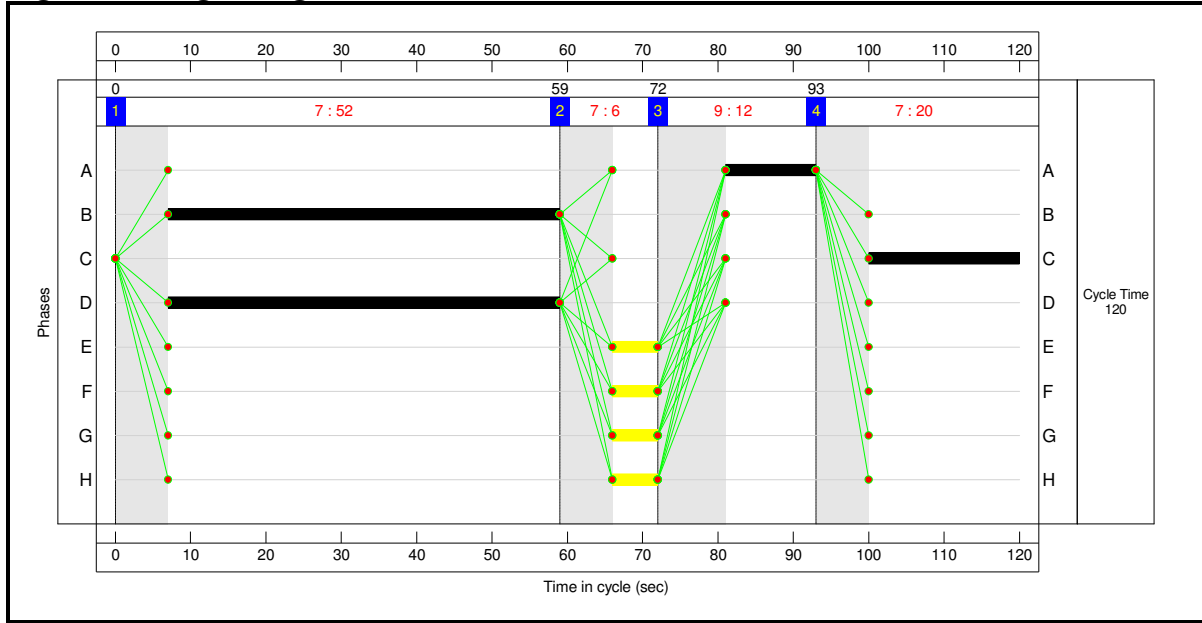
Staging Plan Diagram



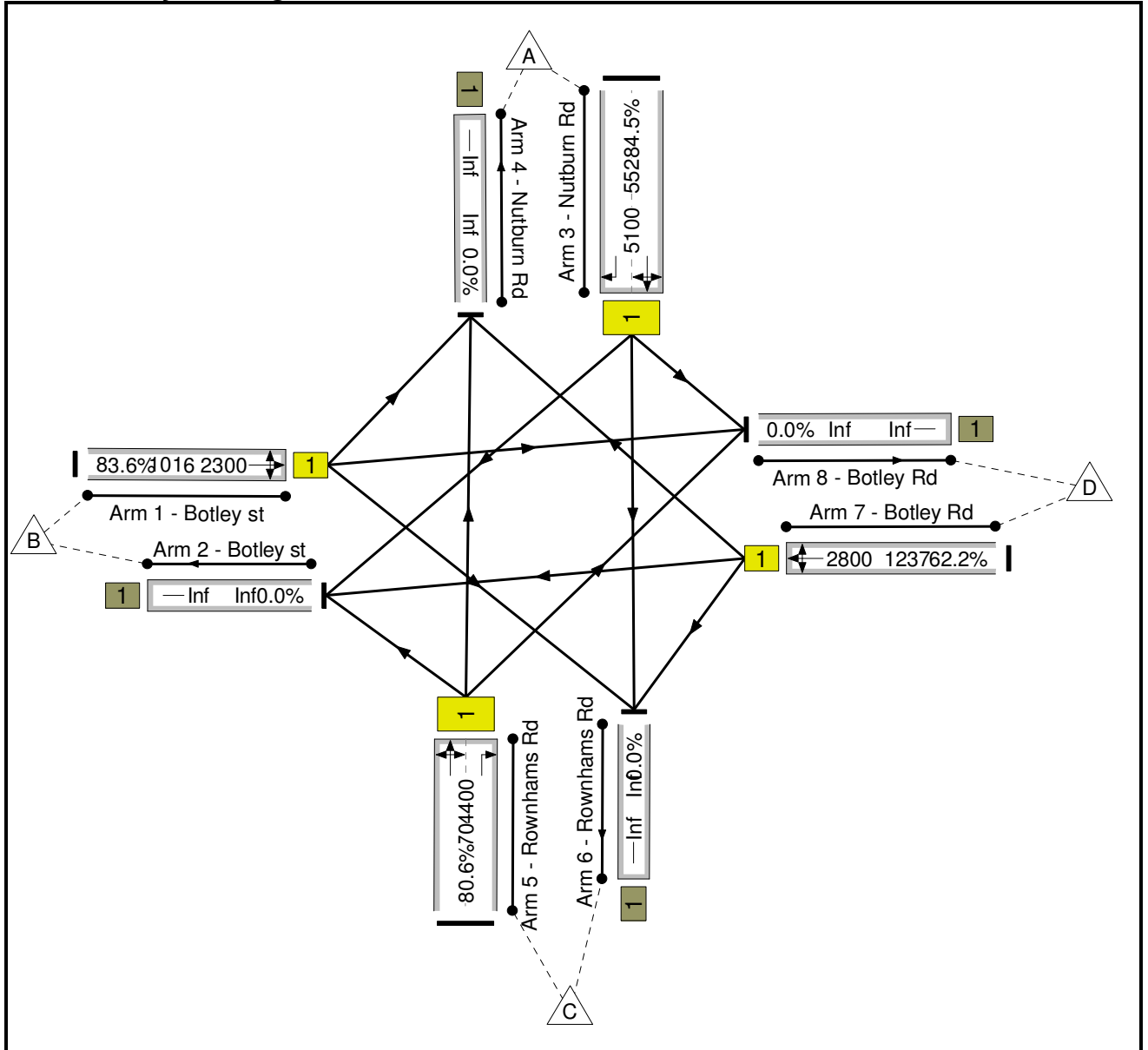
Stage Timings

Stage	1	2	3	4
Duration	52	6	12	20
Change Point	0	59	72	93

Signal Timings Diagram



Junction Layout Diagram



Full Input Data And Results

Link Results

Link Num	Link Desc	Link Type	Stage Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Ave Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
1/1	Botley st Left Right Ahead	U	N/A	N/A	B		1	52	-	849	2300	2300	1016	83.6
2/1	Botley st	U	N/A	N/A	-		-	-	-	669	Inf	Inf	Inf	0.0
3/1	Nutburn Rd Right Ahead Left	U	N/A	N/A	A		1	12	-	467	5100	5100	552	84.5
4/1	Nutburn Rd	U	N/A	N/A	-		-	-	-	236	Inf	Inf	Inf	0.0
5/1	Rownhams Rd Left Ahead Right	U	N/A	N/A	C		1	20	-	621	4400	4400	770	80.6
6/1	Rownhams Rd	U	N/A	N/A	-		-	-	-	489	Inf	Inf	Inf	0.0
7/1	Botley Rd Ahead Right Left	U	N/A	N/A	D		1	52	-	769	2800	2800	1237	62.2
8/1	Botley Rd	U	N/A	N/A	-		-	-	-	1312	Inf	Inf	Inf	0.0

Full Input Data And Results

Link Num	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)		
1/1	849	849	-	-	-	7.0	2.5	-	9.5	40.1	25.0	2.5	27.5		
2/1	669	669	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
3/1	467	467	-	-	-	6.8	2.6	-	9.4	72.4	15.2	2.6	17.8		
4/1	236	236	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
5/1	621	621	-	-	-	8.2	2.0	-	10.2	59.3	19.8	2.0	21.9		
6/1	489	489	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
7/1	769	769	-	-	-	5.5	0.8	-	6.3	29.6	19.7	0.8	20.5		
8/1	1312	1312	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
PRC for Signalled Links (%):				6.5	Total Delay for Signalled Links (pcuHr):				35.41						
PRC Over All Links (%):				6.5	Total Delay Over All Links (pcuHr):				35.41	Cycle Time (s): 120					