Project:	**North Leamington School**	Job No:	**13239**
SUBJECT:	**Traffic Impact** **Assessment of Lillington Road/Sandy Lane roundabout and Lillington Road pelican crossing**		
Prepared by:	Peter Syddall Thad O'Higgins	Approved by: Ken Dudley	Date: 15/02/07

1. Summary

1.1 The impact of the proposed North Leamington School on the local highway network is similar overall to the existing Lower and Upper Schools and Sixth Form College. The travel patterns will generally remain similar. The total number of staff and pupils will be similar or less.

1.2 The school vehicular access is due to switch from Park Road to Sandy Lane. A new parking area is to be provided outside the new main school buildings. In accordance with advice from Warwickshire County Council Property Services, access to this car park will not be permitted for parent parking, drop off or pick up. This will be enforced through stringent school policy, the School Travel Plan, and school site management systems. Therefore parent parking behaviour is predicted to remain largely as per the current situation. Staff vehicle movements will shift to the proposed new access off Sandy Lane. Staff movements together with an estimated proportion of parents, who might contravene School policy with respect to car park access, has been considered in the assessment of the potential implications of the new school access on the Lillington Road/Sandy Lane roundabout and the pelican nearby on Lillington Road.

1.3 The impact of the estimated school traffic, to and from the proposed school, on the roundabout and pelican has been assessed for the AM peak. The AM peak is confirmed by the local Highway Authority as being the critical peak period.

1.4 The assessment of the roundabout indicates that, when the predicted performance of the roundabout in the opening and design years, is compared between the situation with existing land-use, and the situation with the proposed school, there is no reduction in the predicted performance of the roundabout. The proposed school does not impact on the performance of the roundabout/pelican, in either the opening year or design year. Therefore there is no requirement to consider mitigation measures at this junction or at the nearby Pelican Crossing.

2. Introduction

2.1 Gifford has been instructed by Warwickshire County Council Property Services to consider and assess the impact of the proposed re-location of North Leamington School, with a new access off Sandy Lane, on the Sandy Lane/Lillington Road roundabout.

2.2 The development proposal is to combine the two (Upper and Lower) schools, together with the Sixth Form College on one campus fronting onto Sandy Lane, with vehicular access from Sandy Lane and pedestrian and cycle access via routes from Lillington Road and Park Road. The Manor Hall building would be demolished. There will be no vehicular access from Park Road or Cloister Way. The vacated, existing school sites would be the subject of separate development proposals and an associated future planning application.

2.3 The development proposals can be summarised as:

- Around 1,500 pupils/students (lower and upper schools and sixth form) to be accommodated
- School Faculty Buildings
- Sports pitches and courts, open spaces/recreational areas
- Sports Hall
- A 'Hub' comprising:
    - Theatre (about 400 seats)
    - Music/Drama rooms
    - Lecture Theatre
    - Dining Hall
    - Learning Resource Centre
- Car parking for about 150 cars, including designated disabled spaces
- Overspill parking area (for out of school hours activities or unusual events)
- Internal access roads
- Vehicular access from Sandy Lane
- Coach and vehicle dropping off area, accessed off Sandy Lane
- Service areas and yard, accessed off Sandy Lane
- Primary pedestrian and cycle access via routes from Lillington Road and Park Road

2.4 The proposed number of pupils (including the sixth form) at the new site will be similar to the overall numbers for the existing, split site of 1500 pupils. Overall staff numbers are expected to fall slightly from 210 to 180 staff.

2.5 Many of the ancillary facilities – sports hall and pitches, the theatre and other rooms within the Hub, will be available for wider community use outside school hours.

3. Existing Site Trip Generation and Network Traffic on the Sandy Lane/Lillington Road Roundabout

Existing Traffic to and from the Existing Schools

3.1 Based on current travel plan data and postcode data, it is estimated that in the AM peak, the existing school generates the Origin Destination (O-D) flows on the Sandy Lane/Lillington Road roundabout as presented in Appendix A. These estimated existing flows will be removed as part of the assessment of the proposed school and roundabout/pelican, presented in this report.

Existing Traffic to and from Manor Hall Site

3.2 Based on recent survey data, it is estimated that in the AM peak, the existing Manor Hall site generates the O-D flows on the Sandy Lane/Lillington Road roundabout as presented in Appendix A. These estimated existing flows will be removed as part of the assessment of proposed school and the roundabout/pelican presented, in this report.

4. Proposed Site Trip Generation and Network Traffic on the Sandy Lane/Lillington Road Roundabout

4.1 With respect to the proposed relocation of the school building and access, in relation to traffic generation, the following factors have been defined by Warwickshire County Council Property Services:

- Parent parking behaviour will remain as is, in respect of school policy on no parent access to school car park off Sandy Lane
- A small proportion of parents who currently park on Park Road (assumed at 10%) will choose to contravene school policy
- All staff vehicle movements will transfer to the new access off Sandy Lane

4.2 The above factors combine to define the set of proposed school site O-D flows in the AM peak as presented in Appendix A. These predicted future flows will be added to the background network traffic, as part of the assessment of the proposed school and the roundabout/pelican presented in this report.

5. Background Network Traffic Growth Factors

5.1 In agreement with the local Highway Authority, the following growth factors have been defined for application in this assessment.

5.2 The same traffic growth factors will be applied to the base traffic (i.e. existing 2006 traffic flows) using factors derived from NRTF and TEMPRO4, as used in the Transport Statement.

5.3 The recommended current practice by the Department for Transport (DfT) is for NRTF values to be adjusted using TEMPRO4. The ratio of the Warwick/Leamington Spa urban area car driver trip ends for the modelled time periods to the national car driver trip ends for an average day should be calculated using TEMPRO4 and applied to NRTF growth factors.

5.4 To avoid any double counting NRTF 'low traffic growth' has been taken, as the traffic growth factors in NRTF and TEMPRO include for growth associated with new developments, which is to be added separately to the factored base traffic.

5.5 The factors to be used for the two peak periods are shown in Table 5.1 below.

Years	Peak	NRTF Low Growth	TEMPRO 4 Adjustment	Growth Applied
2006-2008	AM	2.37%	1.0064	3.02%
	PM		1.0024	2.62%
2006-2018	AM	13.94%	1.0420	18.73%
	PM		1.0176	15.95%

Table 5.1: Base Traffic Growth Factors

6. Roundabout/Pelican Assessment Factors

6.1 The traffic impact is considered in the context of the operation of the roundabout and pelican crossing together. This interaction is simulated by adjusting the parameter of the ARCADY modelling used for the assessments, in order to create the present level of queuing, averaged over the modelled peak period. The simulated queuing was matched with that observed from survey data collected in December 2006 and January 2007. A maximum southbound queue (vehicles travelling under about 10 mph) of around 30 vehicles was observed on Lillington Road. The queuing varied from day to day. On one day, 30 January long southbound queues developed after the end of the school arrivals time. This appeared to be related to queuing further south on Lillington Road in the AM peak. The daily variation in southbound queues on Leicester Lane is illustrated in Figure 1.

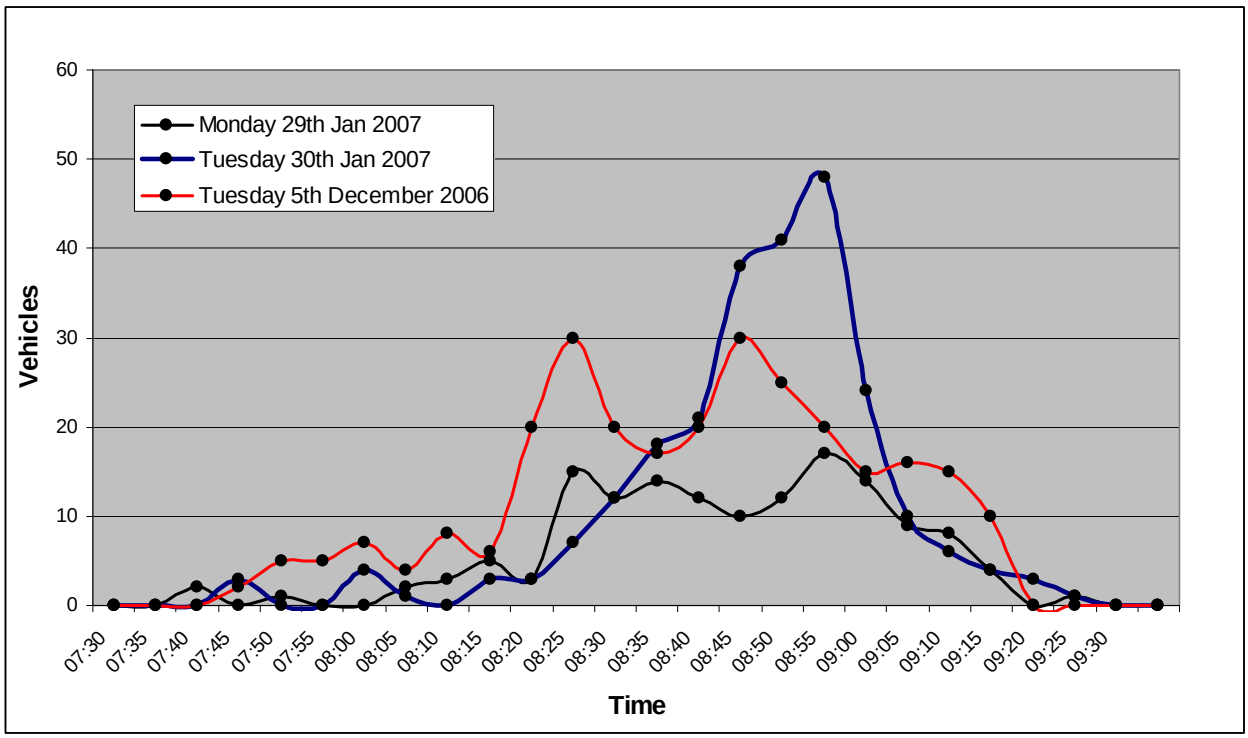

Figure 6.1: Daily Variations in Southbound Queuing on Leicester Lane

6.2 When the roundabout has been assessed the following benchmarks have been applied, in accordance with industry standards (TRL ARCADY Users Guide):

- If the Ratio of Flow to Capacity (RFC) exceeds 0.85, then the arm is considered to operate above standard capacity thresholds.
- If the RFC value for a specific arm exceeds RFC 0.99, then the predicted queue lengths cannot be considered accurate. This is due to being outside the theoretical model parameters within the roundabout assessment tool used in the report (ARCADY).

7. Roundabout/Pelican Assessment Scenarios

7.1 The following traffic impact assessment scenarios for the opening year 2008 and design year 2018 (AM peak period) for the Lillington Road/Sandy Lane roundabout and Pelican crossing were carried out:

Base Year 2006 assessment:

(1) Base Assessment – existing situation 2006
Manor Hall and existing schools retained

Opening Year 2008 assessment:

(2a) Existing Schools, 2008
Manor Hall

(2b) Proposed school, opening year 2008
no Manor Hall

Design Year 2018 assessment:

(3a) Existing Schools, 2018
Manor Hall

(3b) Proposed school, opening year 2018
no Manor Hall

8. Roundabout Capacity Assessment Results

8.1 The ARCADY model output results for the AM peak hour in 2006, 2008 and 2018 are summarised in the tables and comments below, with the full outputs contained in **Appendix B**.

Base Year 2006 Assessment:

(1) Base Assessment – existing situation 2006
Manor Hall and existing schools retained

Scenario	Arm	Max RFC	Max Queue
Base Assessment – existing situation 2006 Manor Hall and existing schools retained	ARM A – Sandy Lane	0.502	1
	ARM B – Leicester Lane	1.035	27.2
	ARM C – Lime Avenue	1.032	12.5
	ARM D – Lillington Road	0.631	1.7

Table 8.1: Base Year 2006 Assessment Existing Schools and Manor Hall

8.2 The assessment of the existing situation indicates that the Sandy Lane/Lillington Road roundabout is already at capacity in the AM peak with respect to flows on the Leicester Lane arm and the Lime Avenue arm. The other two arms of the roundabout operate within capacity thresholds.

Opening Year 2008 Assessment:

(2a) Existing Schools, 2008
Manor Hall

Scenario	Arm	Max RFC	Max Queue
Existing Schools, 2008 Manor Hall	ARM A – Sandy Lane	0.527	1.1
	ARM B – Leicester Lane	1.077	39.4
	ARM C – Lime Avenue	1.082	16.7
	ARM D – Lillington Road	0.650	1.8

Table 8.2: Opening Year Assessment 2008 Existing Schools and Manor Hall

8.3 For the opening year, based on existing land-uses, with background traffic growth applied, the queues on the critical Leicester Lane arm and Lime Avenue arm have increased in the AM peak, and these arms remain at/over capacity. The other two

arms remain within capacity thresholds. This worsening roundabout performance is as a result of growth in background traffic only. Traffic generated by the existing schools and Manor Hall will not increase from the Base Year of 2006, and have therefore not contributed to the further reduction in roundabout performance.

(2b) Proposed school, opening year 2008
no Manor Hall

Scenario	Arm	Max RFC	Max Queue
Proposed school, 2008 No Manor Hall	ARM A – Sandy Lane	0.547	1.2
	ARM B – Leicester Lane	1.065	35.5
	ARM C – Lime Avenue	1.077	16.1
	ARM D – Lillington Road	0.641	1.8

Table 8.3: Opening Year Assessment 2008 Proposed School, no Manor Hall

8.4 For the opening year of the proposed school, the situation on the Sandy Lane/Lillington Road roundabout is no worse than with the existing schools and Manor Hall. Both the Leicester Lane and Lime Avenue arms are still over capacity but to no greater degree. The Sandy Lane and Lillington Road arms continue to operate within capacity thresholds.

Design Year 2018 Assessment:

(3a) Existing Schools, 2018
Manor Hall

Scenario	Arm	Max RFC	Max Queue
Existing Schools, 2018 Manor Hall	ARM A – Sandy Lane	0.671	2
	ARM B – Leicester Lane	1.303	119.8
	ARM C – Lime Avenue	1.284	41.3
	ARM D – Lillington Road	0.742	2.8

Table 8.4: Design Year Assessment 2018 Existing School and Manor Hall

8.5 Moving forward to the Design Year of 2018, it is predicted that with the application of the agreed growth rates on background traffic, the situation as depicted for the base year and 2008 becomes more critical. The Leicester Lane and Lime Avenue arms continue to be over capacity, to a greater degree, but the Sandy Lane and Lillington Road arms remain within capacity thresholds. As before, traffic for the existing schools and Manor Hall is expected to remain constant as per the base

year of 2006, and have therefore not contributed to the further reduction in roundabout performance.

(3b) Proposed school, opening year 2018
no Manor Hall

Scenario	Arm	Max RFC	Max Queue
Proposed school, 2018 No Manor Hall	ARM A – Sandy Lane	0.690	2.2
	ARM B – Leicester Lane	1.291	114.3
	ARM C – Lime Avenue	1.283	40.6
	ARM D – Lillington Road	0.733	1.5

Table 8.5: Design Year Assessment 2018 Proposed School, no Manor Hall

8.6 When the proposed school with no Manor Hall is considered for the Design Year, it can be seen that the predicted performance of the roundabout is no worse than the situation with the existing schools and Manor Hall. The Leicester Lane and Lime Avenue arms are still over capacity, whilst the Sandy Lane and Lillington Road arm continue to operate within capacity thresholds.

9. Roundabout Assessment Summary

9.1 The above assessment of the Sandy Lane/Lillington Road roundabout indicates the following points:

- The roundabout in the base year operates over capacity on both the Leicester Road and Lime Avenue arms. Therefore, before any proposed school is considered, the roundabout/pelican already exceeds standard capacity thresholds of RFC> 0.85.

Opening Year 2008	With Existing School		With Proposed School	
Arm	Max RFC	Max Queues	Max RFC	Max Queues
Sandy Lane	0.527	1.1	0.547	1.2
Leicester Lane	1.077	39.4	1.065	35.5
Lime Avenue	1.082	16.7	1.077	16.1
Lillington Road	0.650	1.8	0.641	1.8

Table 9.1 – Roundabout Performance for Opening Year; Comparison between Existing School and Proposed School

Opening Year 2018	With Existing School		With Proposed School	
Arm	Max RFC	Max Queues	Max RFC	Max Queues
Sandy Lane	0.671	2	0.690	2.2
Leicester Lane	1.303	119.8	1.291	114.3
Lime Avenue	1.284	41.3	1.283	40.6
Lillington Road	0.742	2.8	0.733	1.5

Table 9.2 - Roundabout Performance for Design Year; Comparison between Existing School and Proposed School

As per tables 9.1 and 9.2:

- Once the proposed school is considered in the opening year (2008), when compared to the situation in the opening year with existing land-uses, there is no negative impact on the performance of the roundabout. The roundabout at opening year operates over capacity, to a greater degree than in the base year. This is due to background traffic growth, and not due to the proposed school.
- Similarly, for the design year (2018) the performance of the roundabout worsens on the critical arms. When the performance of the roundabout in 2018 is compared between the proposed school and the exiting land-uses, there is no negative impact on the performance of the roundabout. The roundabout at design year operates over capacity, to a greater degree than in the opening year. This is due to background traffic growth, and not due to the proposed school. Traffic to the proposed school is not expected to increase due to capped school capacity, and the potential benefits of the school travel plan.

- No capacity impact issues have been identified on the Sandy Lane/Lillington Road roundabout due to the proposed school. Capacity issues identified at the

roundabout existed in the base year, and have been exacerbated by background traffic growth.

9.2 The above assessment of the Sandy Lane/Lillington Road roundabout indicates that the proposed school does no negative impact on the performance of the roundabout, in either the opening year or design year. Therefore there is no requirement to consider mitigation measures at this junction or at the nearby Pelican Crossing.

10. Conclusions and Recommendations

10.1 The assessment of the Sandy Lane/Lillington Road roundabout/pelican is based upon a set of scenarios concerning:

- the base year (2006), opening year (2008) and design year (2018)
- existing traffic generated by the existing schools and Manor Hall
- estimated future traffic generation by the proposed school
- background network traffic with agreed future year growth rates

10.2 With respect to the proposed relocation of the school building and access, in relation to traffic generation, the following factors have been defined by Warwickshire County Council Property Services, to be considered in the assessment of the potential impact of the proposed school on the roundabout:

- Parent parking behaviour will remain as is, in respect of school policy on no parent access to school car park off Sandy Lane
- A small proportion of parents who currently park on Park Road (assumed at 10%) will choose to contravene school policy
- All staff vehicle movements will transfer to the new access off Sandy Lane

10.3 When the predicted performance of the roundabout is compared between the situation with the existing land-uses and the situation with the proposed school, there is no reduction in the predicted performance of the roundabout.

10.4 As a result of the assessment of the Sandy Lane/Lillington road roundabout, it has been demonstrated that the proposed school is not predicted to have any impact on the predicted performance of the roundabout in capacity terms for the opening year and design year.

10.5 **In light of the assessment of the roundabout with the proposed school, indicating no impact on the predicted performance of the roundabout, it is recommended that there are no requirements for mitigation measures to be implemented at the Sandy Lane/Lillington Road roundabout and pelican, in relation to the proposed school.**

Appendix A – Origin Destination Traffic Flows

Origin-Destination Traffic Flows

AM Peak

2006 Baseline

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	6	58	299
B: Leicester Lane	22	0	23	666
C: Lime Avenue	106	57	1	83
D : Lillington Rd	315	723	49	3

Manor Hall Traffic

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane		0	1	4
B: Leicester Lane	3			
C: Lime Avenue	11			
D : Lillington Rd	33			

Existing School

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane				
B: Leicester Lane				16
C: Lime Avenue				12
D : Lillington Rd		16	12	

2006 Net Traffic Flows

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	6	57	295
B: Leicester Lane	19	0	23	650
C: Lime Avenue	95	57	1	71
D : Lillington Rd	282	707	37	3

Proposed School

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane		5	11	12
B: Leicester Lane	7			
C: Lime Avenue	20			
D : Lillington Rd	40			

2008 Net Traffic Flows (3% growth factor)

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	6	59	304
B: Leicester Lane	20	0	24	670
C: Lime Avenue	98	59	1	73
D : Lillington Rd	291	728	38	3

2018 Net Traffic Flows (19% growth factor)

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	7	68	350
B: Leicester Lane	23	0	27	772
C: Lime Avenue	113	68	1	84
D : Lillington Rd	335	839	44	4

2008 Do Nothing Traffic flows

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	6	60	308
B: Leicester Lane	23	0	24	686
C: Lime Avenue	109	59	1	85
D : Lillington Rd	324	744	50	3

2018 Do Nothing Traffic flows

from \ to		B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	7	69	354
B: Leicester Lane	26	0	27	788
C: Lime Avenue	124	68	1	96
D : Lillington Rd	368	855	56	4

2008 Base plus development traffic flows

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	11	70	316
B: Leicester Lane	27	0	24	670
C: Lime Avenue	118	59	1	73
D : Lillington Rd	331	728	38	3

2018 Base plus development traffic flows

from \ to	A: Sandy Lane	B: Leicester Lane	C: Lime Avenue	D : Lillington Rd
A: Sandy Lane	0	12	79	362
B: Leicester Lane	30	0	27	772
C: Lime Avenue	133	68	1	84
D : Lillington Rd	375	839	44	4

Appendix B – ARCADY Output Files

TRL LIMITED

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

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Run with file:-
"C:\Gifford Work\13239 Leamington Sch\Revised Technical Work Feb 2007\Calibrated base models\
North Leamington School 2006 Base AM Peak.vai"
(drive-on-the-left) at 19:16:06 on Thursday, 15 February 2007

ROUNDABOUT CAPACITY AND DELAY

****

RUN TITLE

****

North Leamington School Rbt 2006 Base AM Peak - Calibrated

INPUT DATA

****

ARM A - Sandy Lane
ARM B - Leicester Lane
ARM C - Lime Avenue
ARM D - Lillington Road

GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.10	4.70	23.00	14.00	34.00	20.5	0.586	22.531
ARM B	3.00	4.80	9.50	17.00	34.00	22.5	0.571	17.271 *
ARM C	3.40	4.40	5.00	12.00	34.00	25.0	0.546	14.140 *
ARM D	3.65	8.00	30.00	15.00	34.00	15.0	0.741	34.633

V = approach half-width L = effective flare length D = inscribed circle diameter
E = entry width R = entry radius PHI = entry angle

WARNING One or more intercept values (flagged * in the table)
have been adjusted
according to local values input from a previous run and listed below -

	ADJUSTMENT TO INTERCEPT (PCU/MIN)
ARM B	-3.900
ARM C	-5.800

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	4.54	6.81	4.54
ARM B	15.00	45.00	75.00	8.89	13.33	8.89
ARM C	15.00	45.00	75.00	3.09	4.63	3.09
ARM D	15.00	45.00	75.00	13.63	20.44	13.63

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.017	0.160	0.824
		0.0	6.0	58.0	299.0
		(0.0)	(0.0)	(5.2)	(1.0)
	ARM B	0.031	0.000	0.032	0.937
		22.0	0.0	23.0	666.0
		(4.5)	(0.0)	(0.0)	(2.9)
	ARM C	0.429	0.231	0.004	0.336
		106.0	57.0	1.0	83.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.289	0.663	0.045	0.003
		315.0	723.0	49.0	3.0
		(1.6)	(2.6)	(2.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
ARM A	4.54	16.05	0.283		0.0	0.4	5.7	
ARM B	8.89	13.91	0.639		0.0	1.7	23.6	
ARM C	3.09	7.30	0.423		0.0	0.7	10.0	
ARM D	13.63	32.19	0.423		0.0	0.7	10.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	5.42	14.84	0.365		0.4	0.6	8.3	
ARM B	10.61	13.34	0.795		1.7	3.5	46.8	
ARM C	3.69	5.95	0.619		0.7	1.5	20.6	
ARM D	16.27	31.87	0.510		0.7	1.0	15.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	6.64	13.25	0.501		0.6	1.0	14.1	
ARM B	13.00	12.58	1.034		3.5	17.6	173.7	
ARM C	4.52	4.55	0.992		1.5	7.7	79.2	
ARM D	19.93	31.60	0.630		1.0	1.7	24.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	6.64	13.22	0.502		1.0	1.0	14.9	
ARM B	13.00	12.56	1.035		17.6	27.2	338.7	
ARM C	4.52	4.37	1.032		7.7	12.5	153.8	
ARM D	19.93	31.56	0.631		1.7	1.7	25.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	5.42	14.73	0.368		1.0	0.6	9.1	
ARM B	10.61	13.32	0.797		27.2	4.7	186.0	
ARM C	3.69	5.05	0.730		12.5	3.3	94.1	
ARM D	16.27	31.51	0.516		1.7	1.1	16.6	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	4.54	15.99	0.284		0.6	0.4	6.1	
ARM B	8.89	13.89	0.640		4.7	1.8	30.7	
ARM C	3.09	7.11	0.434		3.3	0.8	13.9	
ARM D	13.63	32.08	0.425		1.1	0.7	11.4	

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.6	*
08.30	1.0	*
08.45	1.0	*
09.00	0.6	*
09.15	0.4	

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.7	**
08.15	3.5	****
08.30	17.6	******************
08.45	27.2	**************************
09.00	4.7	*****
09.15	1.8	**

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.7	*
08.15	1.5	**
08.30	7.7	********
08.45	12.5	*************
09.00	3.3	***
09.15	0.8	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.7	*
08.15	1.0	*
08.30	1.7	**
08.45	1.7	**
09.00	1.1	*
09.15	0.7	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	497.7	331.8	58.3	0.12	58.3	0.12
B	974.9	650.0	799.4	0.82	799.5	0.82
C	338.7	225.8	371.5	1.10	371.5	1.10
D	1494.6	996.4	103.5	0.07	103.5	0.07
ALL	3306.0	2204.0	1332.7	0.40	1332.9	0.40

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

****** ARCADY 5 run completed.

========== end of file ==========

[Printed at 19:16:25 on 15/02/2007]

TRL LIMITED

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

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TRL SOFTWARE BUREAU
TEL: CROWTHORNE (01344) 770758, FAX: 770864
EMAIL: SoftwareBureau@trl.co.uk

Run with file:-
"C:\Gifford Work\13239 Leamington Sch\Revised Technical Work Feb 2007\Calibrated base models\
North Leamington School Option 2a 2008 AM Peak No Dev.vai"
(drive-on-the-left) at 19:18:53 on Thursday, 15 February 2007

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

North Leamington School Rbt Option 2a - 2008 Opening Year AM Peak No Development

INPUT DATA

ARM A - Sandy Lane
ARM B - Leicester Lane
ARM C - Lime Avenue
ARM D - Lillington Road

GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)	
ARM A	3.10	4.70	23.00	14.00	34.00	20.5	0.586	22.531	
ARM B	3.00	4.80	9.50	17.00	34.00	22.5	0.571	17.271	*
ARM C	3.40	4.40	5.00	12.00	34.00	25.0	0.546	14.140	*
ARM D	3.65	8.00	30.00	15.00	34.00	15.0	0.741	34.633	

V = approach half-width L = effective flare length D = inscribed circle diameter
E = entry width R = entry radius PHI = entry angle

WARNING One or more intercept values (flagged * in the table)
have been adjusted
according to local values input from a previous run and listed below -

	ADJUSTMENT TO INTERCEPT (PCU/MIN)
ARM B	-3.900
ARM C	-5.800

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.68	7.01	4.68
ARM B	15.00	45.00	75.00	9.16	13.74	9.16
ARM C	15.00	45.00	75.00	3.17	4.76	3.17
ARM D	15.00	45.00	75.00	14.01	21.02	14.01

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.016	0.160	0.824
		0.0	6.0	60.0	308.0
		(0.0)	(0.0)	(5.2)	(1.0)
	ARM B	0.031	0.000	0.033	0.936
		23.0	0.0	24.0	686.0
		(4.5)	(0.0)	(0.0)	(2.9)
	ARM C	0.429	0.232	0.004	0.335
		109.0	59.0	1.0	85.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.289	0.664	0.045	0.003
		324.0	744.0	50.0	3.0
		(1.6)	(2.6)	(2.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
ARM A	4.68	15.87	0.295		0.0	0.4	6.0	
ARM B	9.16	13.83	0.663		0.0	1.9	25.8	
ARM C	3.17	7.10	0.447		0.0	0.8	10.9	
ARM D	14.01	32.14	0.436		0.0	0.8	11.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	5.58	14.63	0.381		0.4	0.6	8.9	
ARM B	10.94	13.24	0.826		1.9	4.2	54.2	
ARM C	3.79	5.72	0.663		0.8	1.8	23.9	
ARM D	16.73	31.82	0.526		0.8	1.1	16.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	6.84	13.01	0.525		0.6	1.1	15.5	
ARM B	13.40	12.45	1.076		4.2	23.6	220.8	
ARM C	4.64	4.44	1.047		1.8	9.9	96.6	
ARM D	20.49	31.59	0.649		1.1	1.8	26.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	6.84	12.98	0.527		1.1	1.1	16.4	
ARM B	13.40	12.44	1.077		23.6	39.4	474.1	
ARM C	4.64	4.29	1.082		9.9	16.7	200.7	
ARM D	20.49	31.55	0.650		1.8	1.8	27.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	5.58	14.52	0.384		1.1	0.6	9.8	
ARM B	10.94	13.21	0.828		39.4	10.2	372.7	
ARM C	3.79	4.56	0.832		16.7	8.3	192.5	
ARM D	16.73	31.46	0.532		1.8	1.1	17.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	4.68	15.76	0.297		0.6	0.4	6.5	
ARM B	9.16	13.80	0.664		10.2	2.1	42.6	
ARM C	3.17	6.71	0.473		8.3	0.9	24.5	
ARM D	14.01	31.87	0.440		1.1	0.8	12.1	

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.6	*
08.30	1.1	*
08.45	1.1	*
09.00	0.6	*
09.15	0.4	

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.9	**
08.15	4.2	****
08.30	23.6	**********
08.45	39.4	**********
09.00	10.2	**********
09.15	2.1	**

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.8	*
08.15	1.8	**
08.30	9.9	**********
08.45	16.7	*****************
09.00	8.3	********
09.15	0.9	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.8	*
08.15	1.1	*
08.30	1.8	**
08.45	1.8	**
09.00	1.1	*
09.15	0.8	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	512.8	341.9	63.2	0.12	63.2	0.12
B	1005.1	670.1	1190.2	1.18	1190.4	1.18
C	348.3	232.2	549.1	1.58	549.1	1.58
D	1537.1	1024.8	110.8	0.07	110.8	0.07
ALL	3403.3	2268.9	1913.2	0.56	1913.4	0.56

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

****** ARCADY 5 run completed.

========== end of file ==========

[Printed at 19:19:46 on 15/02/2007]

TRL LIMITED

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

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EMAIL: SoftwareBureau@trl.co.uk

Run with file:-
"C:\Gifford Work\13239 Leamington Sch\Revised Technical Work Feb 2007\Calibrated base models\
North Leamington School Option 2b 2008 AM Peak + Dev.vai"
(drive-on-the-left) at 19:20:52 on Thursday, 15 February 2007

ROUNDABOUT CAPACITY AND DELAY

****

RUN TITLE

****

North Leamington School Rbt Option 2b - 2008 Opening Year AM Peak + Development

INPUT DATA

****

ARM A - Sandy Lane
ARM B - Leicester Lane
ARM C - Lime Avenue
ARM D - Lillington Road

GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.10	4.70	23.00	14.00	34.00	20.5	0.586	22.531
ARM B	3.00	4.80	9.50	17.00	34.00	22.5	0.571	17.271 *
ARM C	3.40	4.40	5.00	12.00	34.00	25.0	0.546	14.140 *
ARM D	3.65	8.00	30.00	15.00	34.00	15.0	0.741	34.633

V = approach half-width L = effective flare length D = inscribed circle diameter
E = entry width R = entry radius PHI = entry angle

WARNING One or more intercept values (flagged * in the table)
have been adjusted
according to local values input from a previous run and listed below -

	ADJUSTMENT TO INTERCEPT (PCU/MIN)
ARM B	-3.900
ARM C	-5.800

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.96	7.44	4.96
ARM B	15.00	45.00	75.00	9.01	13.52	9.01
ARM C	15.00	45.00	75.00	3.14	4.71	3.14
ARM D	15.00	45.00	75.00	13.75	20.63	13.75

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.028	0.176	0.796
		0.0	11.0	70.0	316.0
		(0.0)	(0.0)	(5.2)	(1.0)
	ARM B	0.037	0.000	0.033	0.929
		27.0	0.0	24.0	670.0
		(4.5)	(0.0)	(0.0)	(2.9)
	ARM C	0.470	0.235	0.004	0.291
		118.0	59.0	1.0	73.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.301	0.662	0.035	0.003
		331.0	728.0	38.0	3.0
		(1.6)	(2.6)	(2.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
ARM A	4.96	16.07	0.309		0.0	0.4	6.4	
ARM B	9.01	13.78	0.654		0.0	1.8	25.0	
ARM C	3.14	7.12	0.441		0.0	0.8	10.6	
ARM D	13.75	32.03	0.429		0.0	0.7	10.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	5.93	14.87	0.398		0.4	0.7	9.5	
ARM B	10.76	13.19	0.816		1.8	3.9	51.5	
ARM C	3.75	5.75	0.652		0.8	1.7	23.0	
ARM D	16.42	31.68	0.518		0.7	1.1	15.6	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	7.26	13.30	0.546		0.7	1.2	16.7	
ARM B	13.18	12.39	1.064		3.9	21.6	205.3	
ARM C	4.59	4.42	1.039		1.7	9.5	93.2	
ARM D	20.11	31.43	0.640		1.1	1.7	25.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	7.26	13.27	0.547		1.2	1.2	17.8	
ARM B	13.18	12.37	1.065		21.6	35.5	430.5	
ARM C	4.59	4.26	1.077		9.5	16.1	192.9	
ARM D	20.11	31.38	0.641		1.7	1.8	26.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	5.93	14.75	0.402		1.2	0.7	10.6	
ARM B	10.76	13.16	0.818		35.5	6.4	304.3	
ARM C	3.75	4.59	0.815		16.1	7.0	174.6	
ARM D	16.42	31.27	0.525		1.8	1.1	17.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	4.96	15.97	0.311		0.7	0.5	7.0	
ARM B	9.01	13.76	0.655		6.4	2.0	34.7	
ARM C	3.14	6.88	0.456		7.0	0.9	20.3	
ARM D	13.75	31.78	0.433		1.1	0.8	11.8	

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.4	
08.15	0.7	*
08.30	1.2	*
08.45	1.2	*
09.00	0.7	*
09.15	0.5	

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.8	**
08.15	3.9	****
08.30	21.6	**********
08.45	35.5	**********
09.00	6.4	******
09.15	2.0	**

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.8	*
08.15	1.7	**
08.30	9.5	*********
08.45	16.1	**********
09.00	7.0	*******
09.15	0.9	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.7	*
08.15	1.1	*
08.30	1.7	**
08.45	1.8	**
09.00	1.1	*
09.15	0.8	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	544.4	362.9	68.0	0.12	68.0	0.12
B	988.6	659.1	1051.3	1.06	1051.5	1.06
C	344.2	229.4	514.6	1.50	514.7	1.50
D	1508.3	1005.6	107.2	0.07	107.2	0.07
ALL	3385.5	2257.0	1741.2	0.51	1741.4	0.51

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

****** ARCADY 5 run completed.

========== end of file ==========

[Printed at 19:21:33 on 15/02/2007]

TRL LIMITED

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

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EMAIL: SoftwareBureau@trl.co.uk

Run with file:-
"C:\Gifford Work\13239 Leamington Sch\Revised Technical Work Feb 2007\Calibrated base models\
North Leamington School Option 3a 2018 AM Peak No Dev.vai"
(drive-on-the-left) at 19:22:10 on Thursday, 15 February 2007

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

North Leamington School Rbt Option 3a - 2018 Opening Year AM Peak No Development

INPUT DATA

ARM A - Sandy Lane
ARM B - Leicester Lane
ARM C - Lime Avenue
ARM D - Lillington Road

GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)	
ARM A	3.10	4.70	23.00	14.00	34.00	20.5	0.586	22.531	
ARM B	3.00	4.80	9.50	17.00	34.00	22.5	0.571	17.271	*
ARM C	3.40	4.40	5.00	12.00	34.00	25.0	0.546	14.140	*
ARM D	3.65	8.00	30.00	15.00	34.00	15.0	0.741	34.633	

V = approach half-width L = effective flare length D = inscribed circle diameter
E = entry width R = entry radius PHI = entry angle

WARNING One or more intercept values (flagged * in the table)
have been adjusted
according to local values input from a previous run and listed below -

	ADJUSTMENT TO INTERCEPT (PCU/MIN)
ARM B	-3.900
ARM C	-5.800

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	5.38	8.06	5.38
ARM B	15.00	45.00	75.00	10.51	15.77	10.51
ARM C	15.00	45.00	75.00	3.61	5.42	3.61
ARM D	15.00	45.00	75.00	16.04	24.06	16.04

TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TURNING PROPORTIONS

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.016	0.160	0.823
		0.0	7.0	69.0	354.0
		(0.0)	(0.0)	(5.2)	(1.0)
	ARM B	0.031	0.000	0.032	0.937
		26.0	0.0	27.0	788.0
		(4.5)	(0.0)	(0.0)	(2.9)
	ARM C	0.429	0.235	0.003	0.332
		124.0	68.0	1.0	96.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.287	0.666	0.044	0.003
		368.0	855.0	56.0	4.0
		(1.6)	(2.6)	(2.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
ARM A	5.38	14.95	0.360		0.0	0.6	8.0	
ARM B	10.51	13.40	0.785		0.0	3.3	42.9	
ARM C	3.61	6.09	0.593		0.0	1.4	18.2	
ARM D	16.04	31.92	0.502		0.0	1.0	14.6	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	6.42	13.55	0.474		0.6	0.9	12.8	
ARM B	12.55	12.73	0.986		3.3	12.5	133.3	
ARM C	4.31	4.71	0.917		1.4	5.4	60.1	
ARM D	19.15	31.63	0.606		1.0	1.5	22.0	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	7.86	11.75	0.669		0.9	1.9	26.6	
ARM B	15.37	11.84	1.299		12.5	66.2	592.2	
ARM C	5.28	4.14	1.275		5.4	23.6	220.2	
ARM D	23.45	31.61	0.742		1.5	2.8	39.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	7.86	11.71	0.671		1.9	2.0	29.5	
ARM B	15.37	11.80	1.303		66.2	119.9	1395.4	
ARM C	5.28	4.12	1.284		23.6	41.3	486.8	
ARM D	23.45	31.60	0.742		2.8	2.8	42.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	6.42	13.47	0.477		2.0	0.9	14.7	
ARM B	12.55	12.67	0.991		119.9	119.8	1797.8	
ARM C	4.31	4.33	0.996		41.3	41.9	623.9	
ARM D	19.15	31.50	0.608		2.8	1.6	24.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	5.38	14.79	0.363		0.9	0.6	8.9	
ARM B	10.51	13.36	0.787		119.8	78.8	1489.7	
ARM C	3.61	4.45	0.811		41.9	30.8	545.5	
ARM D	16.04	31.45	0.510		1.6	1.0	16.2	

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.6	*
08.15	0.9	*
08.30	1.9	**
08.45	2.0	**
09.00	0.9	*
09.15	0.6	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	3.3	***
08.15	12.5	************
08.30	66.2	**********
08.45	119.9	**********
09.00	119.8	**********
09.15	78.8	**********

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.4	*
08.15	5.4	*****
08.30	23.6	**********
08.45	41.3	**********
09.00	41.9	**********
09.15	30.8	**********

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.0	*
08.15	1.5	**
08.30	2.8	***
08.45	2.8	***
09.00	1.6	**
09.15	1.0	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	589.6	393.1	100.4	0.17	100.4	0.17
B	1153.2	768.8	5451.2	4.73	5683.6	4.93
C	396.3	264.2	1954.7	4.93	2061.6	5.20
D	1759.3	1172.8	158.9	0.09	159.0	0.09
ALL	3898.4	2598.9	7665.3	1.97	8004.5	2.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

****** ARCADY 5 run completed.

========== end of file ==========

[Printed at 19:22:42 on 15/02/2007]

TRL LIMITED

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

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Run with file:-
"C:\Gifford Work\13239 Leamington Sch\Revised Technical Work Feb 2007\Calibrated base models\
North Leamington School Option 3b 2018 AM Peak + Dev.vai"
(drive-on-the-left) at 19:23:30 on Thursday, 15 February 2007

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

North Leamington School Rbt Option 3b - 2018 Opening Year AM Peak +Development

INPUT DATA

ARM A - Sandy Lane
ARM B - Leicester Lane
ARM C - Lime Avenue
ARM D - Lillington Road

GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)	
ARM A	3.10	4.70	23.00	14.00	34.00	20.5	0.586	22.531	
ARM B	3.00	4.80	9.50	17.00	34.00	22.5	0.571	17.271	*
ARM C	3.40	4.40	5.00	12.00	34.00	25.0	0.546	14.140	*
ARM D	3.65	8.00	30.00	15.00	34.00	15.0	0.741	34.633	

V = approach half-width L = effective flare length D = inscribed circle diameter
E = entry width R = entry radius PHI = entry angle

WARNING One or more intercept values (flagged * in the table)
have been adjusted
according to local values input from a previous run and listed below -

	ADJUSTMENT TO INTERCEPT (PCU/MIN)
ARM B	-3.900
ARM C	-5.800

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	5.66	8.49	5.66
ARM B	15.00	45.00	75.00	10.36	15.54	10.36
ARM C	15.00	45.00	75.00	3.58	5.36	3.58
ARM D	15.00	45.00	75.00	15.77	23.66	15.77

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.026	0.174	0.799
		0.0	12.0	79.0	362.0
		(0.0)	(0.0)	(5.2)	(1.0)
	ARM B	0.036	0.000	0.033	0.931
		30.0	0.0	27.0	772.0
		(4.5)	(0.0)	(0.0)	(2.9)
	ARM C	0.465	0.238	0.003	0.294
		133.0	68.0	1.0	84.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.297	0.665	0.035	0.003
		375.0	839.0	44.0	4.0
		(1.6)	(2.6)	(2.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
07.45-08.00								
ARM A	5.66	15.14	0.374		0.0	0.6	8.5	
ARM B	10.36	13.35	0.776		0.0	3.2	41.2	
ARM C	3.58	6.11	0.585		0.0	1.3	17.7	
ARM D	15.77	31.80	0.496		0.0	1.0	14.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	6.76	13.78	0.491		0.6	0.9	13.6	
ARM B	12.37	12.67	0.976		3.2	11.5	124.9	
ARM C	4.27	4.71	0.906		1.3	5.1	57.6	
ARM D	18.84	31.48	0.598		1.0	1.5	21.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	8.28	12.04	0.688		0.9	2.1	28.7	
ARM B	15.15	11.78	1.287		11.5	62.9	561.0	
ARM C	5.23	4.11	1.273		5.1	23.1	214.9	
ARM D	23.07	31.48	0.733		1.5	2.7	37.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	8.28	12.01	0.690		2.1	2.2	32.0	
ARM B	15.15	11.74	1.291		62.9	114.3	1329.7	
ARM C	5.23	4.07	1.283		23.1	40.6	478.5	
ARM D	23.07	31.46	0.733		2.7	2.7	40.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	6.76	13.71	0.493		2.2	1.0	15.7	
ARM B	12.37	12.61	0.981		114.3	112.4	1700.3	
ARM C	4.27	4.29	0.995		40.6	41.2	613.7	
ARM D	18.84	31.35	0.601		2.7	1.5	23.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	5.66	14.99	0.378		1.0	0.6	9.5	
ARM B	10.36	13.31	0.778		112.4	69.9	1366.8	
ARM C	3.58	4.43	0.807		41.2	29.9	533.4	
ARM D	15.77	31.29	0.504		1.5	1.0	15.8	

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.6	*
08.15	0.9	*
08.30	2.1	**
08.45	2.2	**
09.00	1.0	*
09.15	0.6	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	3.2	***
08.15	11.5	**********
08.30	62.9	**********
08.45	114.3	**********
09.00	112.4	**********
09.15	69.9	**********

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.3	*
08.15	5.1	*****
08.30	23.1	**********
08.45	40.6	**********
09.00	41.2	**********
09.15	29.9	**********

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	1.0	*
08.15	1.5	*
08.30	2.7	***
08.45	2.7	***
09.00	1.5	**
09.15	1.0	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	621.2	414.1	108.1	0.17	108.1	0.17
B	1136.7	757.8	5124.0	4.51	5307.3	4.67
C	392.2	261.4	1915.8	4.89	2017.1	5.14
D	1730.5	1153.6	153.3	0.09	153.3	0.09
ALL	3880.5	2587.0	7301.2	1.88	7585.8	1.95

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

****** ARCADY 5 run completed.

========== end of file ==========

[Printed at 19:24:01 on 15/02/2007]