Technical Note

Project:	**Magna Park Phase IV**	Job No:	**60470988**
Subject:	**Capacity Improvements at the A4303/A426 Whittle Roundabout**		
Prepared by:	**Jon Ashcroft**	Date:	**22/06/16**
Checked by:	**Paget Fulcher**	Date:	**22/06/16**
Approved by:	**Paget Fulcher**	Date:	**22/06/16**

Proposed Capacity Improvements at the A4303/A426 Roundabout

Introduction

This Technical Note has been prepared to consider the need for a further improvement scheme at the A426/A4303 Whittle roundabout to offset the impact of the additional traffic associated with the Hybrid planning application (15/01531/OUT). Before considering this need the note sets out the agreed position is relation to the DHL application.

The DHL Application

In support of the DHL application (15/00919/FUL), a mitigation scheme was proposed at the Whittle roundabout. This was presented on URS drawing number 47066811/A008/SK14 and in summary the proposal was to increase each roundabout entry to three lanes and to add spiral road markings to the circulatory carriageway to help guide vehicles through the roundabout. The proposed improvement scheme is appended to this note as **Appendix A**.

In its formal response to Harborough District Council, Leicestershire County Council (LCC) in its role as the local highway authority, concluded that the mitigation scheme in support of DHL '*will be acceptable in mitigating the development and will result in a better operation overall than the without the development and without mitigation*'.

To put the magnitude of the improvement into context, the ARCADY results that were presented in the Second Supplementary Transport Assessment for the existing roundabout in the 'without development' scenario are summarised in the table below.

Table 1: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 Without Development

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	1.217	116	1.133	68
A4303 East	0.982	24	0.800	4
A426 South	1.089	41	1.034	30
A4303 West	0.660	2	0.909	8

As can be seen the indications are that the existing junction would be operating well above capacity in 2026 without development. In the morning peak the critical arm is the A426 north where an RFC of 1.217 and a queue of 116 vehicles is predicted. The A426 south is also

predicted to be operating over capacity and the A4303 east very close to capacity. During the evening peak the A426 north and south are predicted to be over capacity with queues of 68 and 30 vehicles respectively.

To offset the impact of the DHL development, the improvement scheme presented in **Appendix A** was proposed. The consequence of the mitigation for DHL is the improvement in the performance of the Whittle roundabout over the predicted situation without development. For ease of reference and to demonstrate the benefits of the scheme, the ARCADY results that were presented in the third Supplementary Transport Assessment prepared for the DHL application, are summarised in the table below.

Table 2: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With DHL Development & URS Junction Improvements

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	0.866	6	0.790	4
A4303 East	0.986	26	0.798	4
A426 South	0.739	3	0.719	3
A4303 West	0.535	1	0.716	2

As can be seen the results of the ARCADY assessment indicated that the proposed improvement scheme would result in the Whittle roundabout working within capacity in 2026 with the development. It is apparent therefore that the proposed improvement would restore the capacity of the junction and provide significant relief to a capacity issue that would occur in the event of the development not proceeding.

The Hybrid Application

The Hybrid planning application was submitted in October 2015 and the additional traffic associated with the larger development resulted in some junctions coming under greater pressure. At the Whittle roundabout the main impact was on the A4303 eastern arm although there was also a small deterioration in the performance of some of the other arms.

For the Hybrid application two Transport Assessments were prepared, one based on a manual assessment of the traffic impacts and the other based on the Leicester and Leicestershire Integrated Transport Model (LLITM). For a development on the scale of that being promoted by the Hybrid application, LCC required the impact of the development to be tested using LLITM while Highways England was satisfied with the approach adopted in the manual assessment.

For ease of reference the ARCADY results at the Whittle roundabout that were presented in two supplementary transport assessments prepared for the Hybrid application are summarised in the tables below. These assessments were based on the original improvement scheme presented in URS drawing 47066811/A008/SK14.

The first table is extracted from the Supplementary Transport Assessment dated 1 February 2016 that was prepared in response to a request for further information from Highways England. This is based on the manual assessment. The second table is extracted from the

Second Supplementary Transport Assessment dated 4 March 2016 that was prepared to consider the impact of the development using LLITM.

Table 3: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With Hybrid Development & URS Junction Improvements – Manual Assessment

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	0.833	5	0.752	3
A4303 East	0.997	31	0.770	3
A426 South	0.719	2	0.659	2
A4303 West	0.546	1	0.758	3

Referring to Table 3 it can be seen that based on the manual assessment the Whittle roundabout would be operating close to capacity in 2026 with development with an RFC of 0.997 on the A4303 east during the morning peak.

Table 4: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With Hybrid Development & URS Junction Improvements – LLITM Assessment

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	0.850	5	0.863	6
A4303 East	1.010	41	0.813	4
A426 South	0.716	2	0.769	3
A4303 West	0.587	1	0.818	4

Referring to Table 4 it can be seen that based on the LLITM assessment the Whittle roundabout would be operating just above capacity in 2026 with the development in place with an RFC of 1.010 on the A4303 east arm during the morning peak.

LCC is concerned that the capacity benefits achieved for the improvement scheme proposed as part of the DHL application would be absorbed by the additional traffic associated with the Hybrid application and has stated that it would need to be satisfied that no further options exist which could readily provide better operation at the Whittle roundabout.

In response, a further improvement scheme has been proposed at the Whittle roundabout and this is shown on Hydrock drawing number C161222 – 207 Rev P4 presented in **Appendix B**. It should be noted that this drawing is currently in draft status. The main enhancement has been made to the A4303 eastern arm where the effective flare has been increased to approximately 80 metres allowing three lanes of traffic to form over a longer distance on the approach to the give way line.

The results of the ARCADY assessments for both the manual and LLITM assessments are presented in the tables below. The assessments are based on the traffic flows presented in the Supplementary Transport Assessment dated 1 February 2016 (manual assessment) and

the Second Supplementary Transport Assessment dated 4 March 2016 (LLITM assessment). The ARCADY output is presented in **Appendix C**.

Table 5: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With Hybrid Development & Hydrock Junction Improvements – Manual Assessment

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	0.881	7	0.798	4
A4303 East	0.869	6	0.672	2
A426 South	0.664	2	0.605	2
A4303 West	0.572	1	0.770	3

Referring to Table 5 it can be seen that based on the manual assessment, the enhanced mitigation scheme proposed by Hydrock would result in improvements to the performance of the Whittle roundabout. The most significant improvement is expected on the A4303 eastern arm during the morning peak where the RFC is predicted to fall from 0.997 in the DHL scheme to 0.869 in the Hydrock scheme. The corresponding reduction in the queue length is for it to fall from 31 to only six vehicles.

Table 6: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With Hybrid Development & Hydrock Junction Improvements – LLITM Assessment

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	0.898	8	0.917	3
A4303 East	0.881	7	0.709	3
A426 South	0.664	2	0.705	2
A4303 West	0.617	2	0.855	3

Referring to Table 6 it can be seen that based on the LLITM assessment, the enhanced mitigation scheme proposed by Hydrock would also result in improvements to the performance of the Whittle roundabout. The most significant improvement is expected on the A4303 eastern arm during the morning peak where the RFC is predicted to fall from 1.010 in the DHL scheme to 0.881 in the Hydrock scheme. The corresponding reduction in the queue length is for it to fall from 41 to only seven vehicles.

The ARCADY assessments indicate that with the proposed Hydrock improvements the Whittle roundabout would operate within capacity in 2026 with the level of development associated with the Hybrid application. To satisfy the requirements of both Highways England and LCC, the junction has been tested using both the manual and LLITM traffic forecasts.

Impact of Symmetry Park – Sensitivity Test

In the event that the Hybrid application and symmetry park are both granted planning permission LCC needs to be satisfied that physical solutions exist that would cost effectively mitigate the cumulative impacts of both developments. There is a particular focus on the Whittle roundabout in this regard as this is where the combined impact of both developments is of greatest concern.

To respond to this concern a sensitivity test has been undertaken at the Whittle roundabout to assess the cumulative impact of the Hybrid application and symmetry park. The assessment is based on the improved layout prepared by Hydrock presented in **Appendix B**.

The results of the ARCADY assessments for both the manual and LLITM assessments are presented in the tables below. The ARCADY output is presented in **Appendix C.**

The assessments are based on the traffic flows presented in the Supplementary Transport Assessment dated 1 February 2016 (manual assessment) and the Second Supplementary Transport Assessment dated 4 March 2016 (LLITM assessment).

For the manual assessment the symmetry park development flows were extracted from a Transport Assessment produced by Peter Brett Associates (PBA). AM and PM peak development traffic flow diagrams were presented in Appendix 5.3 of the PBA document. For the LLITM assessment a separate model run was requested specifically to include the impact of symmetry park. These flows are presented in the Second Supplementary Transport Assessment.

Table 7: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With Hybrid Development & symmetry park - Hydrock Junction Improvements – Manual Assessment

	AM Peak		PM Peak	
Approach Arm	**RFC**	**Queue**	**RFC**	**Queue**
A426 North	0.917	9	0.860	6
A4303 East	0.944	14	0.695	2
A426 South	0.737	3	0.622	2
A4303 West	0.608	2	0.889	7

Referring to Table 7 it can be seen that based on the manual assessment, the Whittle roundabout would continue to operate within capacity in the ‘with development & symmetry park’ scenario.

Table 8: Summary of the Main Performance Indicators at the A4303/ A426 Roundabout – 2026 With Hybrid Development & symmetry park – Hydrock Junction Improvements – LLITM Assessment				
	AM Peak		PM Peak	
Approach Arm	RFC	Queue	RFC	Queue
A426 North	0.912	9	0.940	11
A4303 East	0.898	8	0.718	3
A426 South	0.692	2	0.720	3
A4303 West	0.631	2	0.892	8

Referring to Table 8 it can be seen that based on the LLITM assessment, the Whittle roundabout would continue to operate within capacity in the 'with development & symmetry park' scenario.

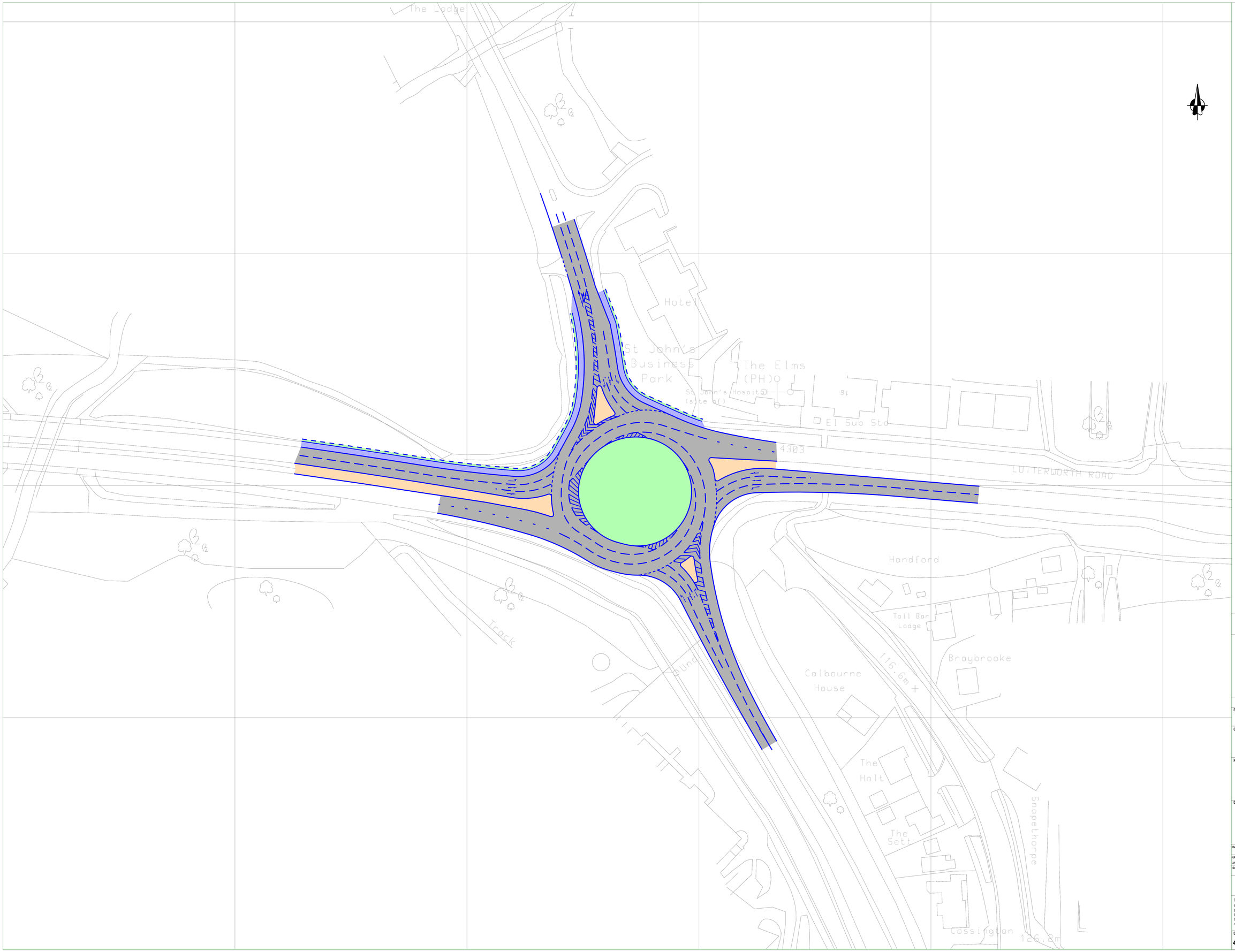
The ARCADY assessments indicate that with the proposed Hydrock improvements the Whittle roundabout would operate within capacity in 2026 in the 'with development & symmetry park' scenario. To satisfy the requirements of both Highways England and LCC, the junction has been tested using both the manual and LLITM traffic forecasts.

Summary

This Technical Note indicates that the performance of the Whittle roundabout would be improved in all the 'with development' scenarios when compared to the performance of the existing junction 'without development'. It is therefore reasonable to conclude that the additional traffic associated with the Hybrid application would not absorb the capacity benefits achieved by the improvement scheme for DHL. However to offset the impact of the Hybrid application and to accommodate the cumulative impacts of symmetry park, a further improvement is proposed at the Whittle roundabout and the indications are that the junction would operate within capacity even under this most severe of tests.

Appendix A:

A4303/A426 Whittle Roundabout – Proposed Junction Improvement for DHL (URS Drawing No. 47066811/A008/SK14)



NOTES

This drawing is for preliminary purposes only and is subject to amendment during design development. UNDER NO CIRCUMSTANCES MUST THIS DRAWING BE USED FOR CONSTRUCTION PURPOSES

Revision Details	By / Check	Date	Suffix

Purpose of issue

For Information

Client

IDI Gazeley
Brookfield Logistics Properties™

Project Title

MAGNA PARK EXTENSION HYBRID APPLICATION

Drawing Title

Proposed Roundabout Improvements

Designed	Drawn	Checked	Approved	Date
SDW	SDW	JRA	SCHY	April 15

URS Internal Project No.: 47066811

Suitability:

Scale @ A0: 1:500

Zone / Mileage:

URS Infrastructure & Environment UK Limited
URS House
Horne Lane
Bedford
MK40 1TS
www.ursglobal.com

Drawing Number	Rev
47066811/A008/SK14	

Appendix B:

A4303/A426 Whittle Roundabout – Proposed Junction Improvement for Hybrid Application (Hydrock Drawing No. C161222 – 207 Rev P4)

All LCC Roads

Proposed spiral markings to increase roundabout capacity.

Widened roundabout approaches.

Widened roundabout approaches.

0 10 20 30 40 50
SCALE IN METRES

Notes:

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING
CONSTRUCTION
MAINTENANCE / CLEANING
DECOMMISSIONING / DEMOLITION
IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

Rev	Date	Description	By	Ckd
P4	15-06-2016	Rugby Road rabout amended	MB	AJC
P3	05-05-2016	Drawing sheet number corrected.	JW	SEB
P2	14-04-2016	Highway Authority added.	PMA	SEB
P1	08-04-2016	First Issue	JW	PMA

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Client :
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Brookfield Logistics Properties

Project Title:
MAGNA PARK EXTENSION, LUTTERWORTH
PHASE 1 SECTION 278 WORKS

Drawing Title:
GENERAL ARRANGEMENT
SHEET 7 of 7
RUGBY ROAD ROUNDABOUT MODIFICATIONS

Drawing Status:
PRELIMINARY

Hydrock Job No:
C161222

Drawn	Checked	Scale @ A1	Date	Issue Date
JW	PMA	1 : 500	08-04-2016	08-04-2016

Drawing Number: C161222 - 207
Revision: P4

Appendix C:

ARCADY Output

_____ A R C A D Y 6 _____

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 7.0 (FEBRUARY 2010)

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Run with file:-
"j:\Gazeley UK Ltd\47071103 Magna Park Phase 4\Technical\11 Junction Assessments Outline\A4303_A426\
Dec 2015 Update Highways England\Hydrock Design\Title changes\S4 AM 2026 Base+CD+PD+Hydrock Imps.vai"
(drive-on-the-left) at 16:23:09 on Tuesday, 21 June 2016

FILE PROPERTIES
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RUN TITLE: S4 A4303/ A426 Rbt AM Pk 2026 + CD + PD + Hydrock Imps - Manual
LOCATION: A4303_Rugby Road
DATE: 31/07/14
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA
****
ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(07.15)AND ENDS(08.45)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

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	13.10	19.65	13.10
ARM B	15.00	45.00	75.00	24.60	36.90	24.60
ARM C	15.00	45.00	75.00	8.64	12.96	8.64
ARM D	15.00	45.00	75.00	9.65	14.47	9.65

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
07.15 - 08.45	ARM A	0.000	0.513	0.342	0.145
		0.0	538.0	358.0	152.0
		(0.0)	(8.4)	(4.5)	(8.6)
	ARM B	0.240	0.024	0.276	0.459
		473.0	48.0	543.0	904.0
		(8.9)	(0.0)	(9.0)	(17.0)
	ARM C	0.431	0.524	0.000	0.045
		298.0	362.0	0.0	31.0
		(4.7)	(11.9)	(0.0)	(9.7)
	ARM D	0.106	0.848	0.045	0.000
		82.0	655.0	35.0	0.0
		(22.0)	(21.1)	(17.1)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.15-07.30									
ARM A	13.15	25.75	0.511	- -	0.0	1.0	14.9	-	0.079
ARM B	24.69	43.73	0.565	- -	0.0	1.3	18.7	-	0.052
ARM C	8.67	24.68	0.351	- -	0.0	0.5	7.9	-	0.062
ARM D	9.69	28.63	0.338	- -	0.0	0.5	7.5	-	0.053
07.30-07.45									
ARM A	15.70	24.11	0.651	- -	1.0	1.8	26.1	-	0.117
ARM B	29.49	42.81	0.689	- -	1.3	2.2	31.5	-	0.074
ARM C	10.35	22.33	0.464	- -	0.5	0.9	12.5	-	0.083
ARM D	11.57	27.00	0.428	- -	0.5	0.7	10.9	-	0.065
07.45-08.00									
ARM A	19.23	21.88	0.879	- -	1.8	6.2	77.8	-	0.314
ARM B	36.11	41.62	0.868	- -	2.2	6.0	80.7	-	0.167
ARM C	12.68	19.22	0.660	- -	0.9	1.9	26.6	-	0.150
ARM D	14.17	24.83	0.571	- -	0.7	1.3	18.9	-	0.093
08.00-08.15									
ARM A	19.23	21.84	0.881	- -	6.2	6.7	97.2	-	0.369
ARM B	36.11	41.54	0.869	- -	6.0	6.4	93.5	-	0.181
ARM C	12.68	19.09	0.664	- -	1.9	1.9	28.8	-	0.156
ARM D	14.17	24.76	0.572	- -	1.3	1.3	19.8	-	0.094
08.15-08.30									
ARM A	15.70	24.04	0.653	- -	6.7	1.9	32.4	-	0.129
ARM B	29.49	42.68	0.691	- -	6.4	2.3	36.4	-	0.079
ARM C	10.35	22.15	0.467	- -	1.9	0.9	13.8	-	0.086
ARM D	11.57	26.90	0.430	- -	1.3	0.8	11.7	-	0.066

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
ARM A	13.15	25.70	0.512	- - -	1.9	1.1	16.4	-	0.080
ARM B	24.69	43.69	0.565	- - -	2.3	1.3	20.2	-	0.053
ARM C	8.67	24.60	0.352	- - -	0.9	0.5	8.4	-	0.063
ARM D	9.69	28.57	0.339	- - -	0.8	0.5	7.9	-	0.053

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.0	*
07.45	1.8	**
08.00	6.2	******
08.15	6.7	*******
08.30	1.9	**
08.45	1.1	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.3	*
07.45	2.2	**
08.00	6.0	******
08.15	6.4	******
08.30	2.3	**
08.45	1.3	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.5	*
07.45	0.9	*
08.00	1.9	**
08.15	1.9	**
08.30	0.9	*
08.45	0.5	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.5	*
07.45	0.7	*
08.00	1.3	*
08.15	1.3	*
08.30	0.8	*
08.45	0.5	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1442.5	961.7	264.8	0.18	264.8	0.18
B	2708.8	1805.9	281.0	0.10	281.0	0.10
C	951.1	634.1	98.0	0.10	98.0	0.10
D	1062.6	708.4	76.7	0.07	76.7	0.07
ALL	6165.0	4110.0	720.5	0.12	720.5	0.12

* 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

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

Printed at 16:25:23 on 21/06/2016]

_____ A R C A D Y 6 _____

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

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Dec 2015 Update Highways England\Hydrock Design\Title changes\S4 PM 2026 Base+CD+PD+Hydrock Imps.vai"
(drive-on-the-left) at 16:23:22 on Tuesday, 21 June 2016

FILE PROPERTIES
****

RUN TITLE: S4 A4303/ A426 Rbt PM Pk 2026 + CD + PD + Hydrock Imps - Manual
LOCATION: A4303_Rugby Road
DATE: 31/07/14
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA
****
ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.60	11.60	12.60	22.00	74.00	47.0	0.636	45.760

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(16.45)AND ENDS(18.15)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

ARM	NUMBER OF MINUTES FROM START WHEN TO RISE	TO IS REACHED	TOP OF PEAK FALLING	FLOW STOPS BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	11.02	16.54	11.02
ARM B	15.00	45.00	75.00	19.39	29.08	19.39
ARM C	15.00	45.00	75.00	9.71	14.57	9.71
ARM D	15.00	45.00	75.00	14.05	21.08	14.05

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
16.45 - 18.15	ARM A	0.000	0.488	0.363	0.150
		0.0	430.0	320.0	132.0
		(0.0)	(1.6)	(1.6)	(9.9)
	ARM B	0.342	0.003	0.272	0.383
		530.0	5.0	422.0	594.0
		(2.8)	(0.0)	(10.7)	(22.7)
	ARM C	0.479	0.484	0.000	0.037
		372.0	376.0	0.0	29.0
		(1.6)	(7.7)	(0.0)	(0.0)
	ARM D	0.117	0.851	0.032	0.000
		131.0	957.0	36.0	0.0
		(8.4)	(13.6)	(5.6)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
ARM A	11.07	25.14	0.440	- -	0.0	0.8	11.3	-	0.071
ARM B	19.46	44.26	0.440	- -	0.0	0.8	11.5	-	0.040
ARM C	9.75	28.19	0.346	- -	0.0	0.5	7.7	-	0.054
ARM D	14.10	31.18	0.452	- -	0.0	0.8	12.0	-	0.058
17.00-17.15									
ARM A	13.21	23.10	0.572	- -	0.8	1.3	19.0	-	0.100
ARM B	23.24	43.45	0.535	- -	0.8	1.1	16.8	-	0.049
ARM C	11.64	26.24	0.444	- -	0.5	0.8	11.6	-	0.068
ARM D	16.84	29.33	0.574	- -	0.8	1.3	19.4	-	0.080
17.15-17.30									
ARM A	16.18	20.36	0.795	- -	1.3	3.6	48.6	-	0.224
ARM B	28.46	42.39	0.671	- -	1.1	2.0	29.1	-	0.071
ARM C	14.26	23.59	0.604	- -	0.8	1.5	21.6	-	0.106
ARM D	20.63	26.82	0.769	- -	1.3	3.2	44.1	-	0.155
17.30-17.45									
ARM A	16.18	20.28	0.798	- -	3.6	3.8	55.8	-	0.242
ARM B	28.46	42.34	0.672	- -	2.0	2.0	30.4	-	0.072
ARM C	14.26	23.55	0.605	- -	1.5	1.5	22.7	-	0.107
ARM D	20.63	26.79	0.770	- -	3.2	3.3	48.6	-	0.162
17.45-18.00									
ARM A	13.21	22.99	0.575	- -	3.8	1.4	21.9	-	0.106
ARM B	23.24	43.38	0.536	- -	2.0	1.2	17.9	-	0.050
ARM C	11.64	26.18	0.445	- -	1.5	0.8	12.5	-	0.069
ARM D	16.84	29.28	0.575	- -	3.3	1.4	21.5	-	0.082

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
18.00-18.15									
ARM A	11.07	25.07	0.441	- - -	1.4	0.8	12.3	-	0.072
ARM B	19.46	44.23	0.440	- - -	1.2	0.8	12.0	-	0.040
ARM C	9.75	28.14	0.346	- - -	0.8	0.5	8.1	-	0.054
ARM D	14.10	31.13	0.453	- - -	1.4	0.8	12.8	-	0.059

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.8	*
17.15	1.3	*
17.30	3.6	****
17.45	3.8	****
18.00	1.4	*
18.15	0.8	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.8	*
17.15	1.1	*
17.30	2.0	**
17.45	2.0	**
18.00	1.2	*
18.15	0.8	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	*
17.15	0.8	*
17.30	1.5	**
17.45	1.5	**
18.00	0.8	*
18.15	0.5	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.8	*
17.15	1.3	*
17.30	3.2	***
17.45	3.3	***
18.00	1.4	*
18.15	0.8	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1214.0	809.3	169.0	0.14	169.0	0.14
B	2134.8	1423.2	117.7	0.06	117.7	0.06
C	1069.5	713.0	84.2	0.08	84.2	0.08
D	1547.1	1031.4	158.3	0.10	158.3	0.10
ALL	5965.4	3977.0	529.2	0.09	529.2	0.09

* 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

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

Printed at 16:26:29 on 21/06/2016]

_____ A R C A D Y 6 _____

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 7.0 (FEBRUARY 2010)

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Run with file:-
"j:\Gazeley UK Ltd\47071103 Magna Park Phase 4\Technical\11 Junction Assessments Outline\A4303_A426\
LCC LLITM Flows Feb 2016\Hydrock Design\Title Changes\AM 2026+Dev+Hydrock Imps.vai"
(drive-on-the-left) at 16:21:53 on Tuesday, 21 June 2016

FILE PROPERTIES
****

RUN TITLE: A4303/ A426 Rbt AM Pk 2026 + Dev + Hydrock Imps - LLITM
LOCATION: A4303_Rugby Road
DATE: 31/07/14
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA
****
ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(07.15)AND ENDS(08.45)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

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	14.34	21.51	14.34
ARM B	15.00	45.00	75.00	28.45	42.68	28.45
ARM C	15.00	45.00	75.00	9.35	14.03	9.35
ARM D	15.00	45.00	75.00	12.43	18.64	12.43

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
07.15 - 08.45	ARM A	0.000	0.577	0.291	0.132
		0.0	662.0	334.0	151.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.270	0.000	0.278	0.452
		615.0	0.0	633.0	1028.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.424	0.512	0.000	0.064
		317.0	383.0	0.0	48.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.095	0.862	0.043	0.000
		94.0	857.0	43.0	0.0
		(0.0)	(0.0)	(0.0)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

TIME	ARM	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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.15-07.30										
	ARM A	14.39	27.60	0.521	- -	0.0	1.1	15.6	-	0.075
	ARM B	28.56	49.64	0.575	- -	0.0	1.3	19.6	-	0.047
	ARM C	9.39	26.76	0.351	- -	0.0	0.5	7.9	-	0.057
	ARM D	12.47	34.37	0.363	- -	0.0	0.6	8.3	-	0.046
07.30-07.45										
	ARM A	17.19	25.85	0.665	- -	1.1	1.9	27.7	-	0.114
	ARM B	34.10	48.70	0.700	- -	1.3	2.3	33.3	-	0.068
	ARM C	11.21	24.20	0.463	- -	0.5	0.9	12.5	-	0.077
	ARM D	14.89	32.35	0.460	- -	0.6	0.8	12.4	-	0.057
07.45-08.00										
	ARM A	21.05	23.48	0.897	- -	1.9	7.1	88.2	-	0.327
	ARM B	41.77	47.49	0.879	- -	2.3	6.7	89.0	-	0.158
	ARM C	13.73	20.80	0.660	- -	0.9	1.9	26.7	-	0.139
	ARM D	18.24	29.65	0.615	- -	0.8	1.6	22.7	-	0.087
08.00-08.15										
	ARM A	21.05	23.43	0.898	- -	7.1	7.8	113.1	-	0.394
	ARM B	41.77	47.40	0.881	- -	6.7	7.1	103.7	-	0.175
	ARM C	13.73	20.66	0.664	- -	1.9	1.9	28.9	-	0.144
	ARM D	18.24	29.56	0.617	- -	1.6	1.6	23.8	-	0.088
08.15-08.30										
	ARM A	17.19	25.79	0.666	- -	7.8	2.0	35.0	-	0.127
	ARM B	34.10	48.56	0.702	- -	7.1	2.4	38.4	-	0.072
	ARM C	11.21	24.01	0.467	- -	1.9	0.9	13.7	-	0.079
	ARM D	14.89	32.23	0.462	- -	1.6	0.9	13.3	-	0.058

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
ARM A	14.39	27.56	0.522	- - -	2.0	1.1	17.1	-	0.077
ARM B	28.56	49.60	0.576	- - -	2.4	1.4	21.0	-	0.048
ARM C	9.39	26.68	0.352	- - -	0.9	0.5	8.4	-	0.058
ARM D	12.47	34.31	0.364	- - -	0.9	0.6	8.8	-	0.046

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.1	*
07.45	1.9	**
08.00	7.1	*******
08.15	7.8	********
08.30	2.0	**
08.45	1.1	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.3	*
07.45	2.3	**
08.00	6.7	*******
08.15	7.1	*******
08.30	2.4	**
08.45	1.4	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.5	*
07.45	0.9	*
08.00	1.9	**
08.15	1.9	**
08.30	0.9	*
08.45	0.5	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.6	*
07.45	0.8	*
08.00	1.6	**
08.15	1.6	**
08.30	0.9	*
08.45	0.6	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1578.8	1052.5	296.7	0.19	296.7	0.19
B	3132.7	2088.5	305.1	0.10	305.1	0.10
C	1029.6	686.4	98.1	0.10	98.1	0.10
D	1368.2	912.1	89.4	0.07	89.4	0.07
ALL	7109.2	4739.5	789.3	0.11	789.3	0.11

* 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

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

Printed at 16:28:10 on 21/06/2016]

_____ A R C A D Y 6 _____

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 7.0 (FEBRUARY 2010)

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Run with file:-
"j:\Gazeley UK Ltd\47071103 Magna Park Phase 4\Technical\11 Junction Assessments Outline\A4303_A426\
LCC LLITM Flows Feb 2016\Hydrock Design\Title Changes\PM 2026+Dev+Hydrock Imps.vai"
(drive-on-the-left) at 16:22:30 on Tuesday, 21 June 2016

FILE PROPERTIES
****

RUN TITLE: A4303/ A426 Rbt PM Pk 2026 + Dev + Hydrock Imps - LLITM
LOCATION: A4303_Rugby Road
DATE: 31/07/14
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA
****
ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(16.45)AND ENDS(18.15)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

ARM	NUMBER OF MINUTES FROM START WHEN 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	12.29	18.43	12.29
ARM B	15.00	45.00	75.00	22.54	33.81	22.54
ARM C	15.00	45.00	75.00	11.41	17.12	11.41
ARM D	15.00	45.00	75.00	16.74	25.11	16.74

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
16.45 - 18.15	ARM A	0.000	0.506	0.344	0.151
		0.0	497.0	338.0	148.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.285	0.000	0.248	0.467
		513.0	0.0	448.0	842.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.422	0.536	0.000	0.043
		385.0	489.0	0.0	39.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.131	0.798	0.072	0.000
		175.0	1068.0	96.0	0.0
		(0.0)	(0.0)	(0.0)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
ARM A	12.33	25.03	0.493	- -	0.0	1.0	13.9	-	0.078
ARM B	22.62	49.15	0.460	- -	0.0	0.8	12.5	-	0.038
ARM C	11.46	28.87	0.397	- -	0.0	0.7	9.6	-	0.057
ARM D	16.80	33.80	0.497	- -	0.0	1.0	14.3	-	0.058
17.00-17.15									
ARM A	14.73	22.78	0.647	- -	1.0	1.8	25.5	-	0.123
ARM B	27.01	48.11	0.561	- -	0.8	1.3	18.7	-	0.047
ARM C	13.68	26.73	0.512	- -	0.7	1.0	15.1	-	0.076
ARM D	20.06	31.67	0.633	- -	1.0	1.7	24.6	-	0.085
17.15-17.30									
ARM A	18.04	19.79	0.911	- -	1.8	7.8	92.8	-	0.406
ARM B	33.09	46.81	0.707	- -	1.3	2.4	34.2	-	0.072
ARM C	16.75	23.83	0.703	- -	1.0	2.3	32.3	-	0.138
ARM D	24.57	28.79	0.854	- -	1.7	5.3	69.9	-	0.214
17.30-17.45									
ARM A	18.04	19.66	0.917	- -	7.8	9.1	127.9	-	0.536
ARM B	33.09	46.69	0.709	- -	2.4	2.4	35.9	-	0.074
ARM C	16.75	23.77	0.705	- -	2.3	2.3	34.9	-	0.142
ARM D	24.57	28.73	0.855	- -	5.3	5.6	82.3	-	0.236
17.45-18.00									
ARM A	14.73	22.60	0.652	- -	9.1	1.9	34.6	-	0.144
ARM B	27.01	47.90	0.564	- -	2.4	1.3	20.0	-	0.048
ARM C	13.68	26.64	0.514	- -	2.3	1.1	16.6	-	0.078
ARM D	20.06	31.59	0.635	- -	5.6	1.8	28.6	-	0.091

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
18.00-18.15									
ARM A	12.33	24.96	0.494	- - -	1.9	1.0	15.3	-	0.080
ARM B	22.62	49.10	0.461	- - -	1.3	0.9	13.1	-	0.038
ARM C	11.46	28.83	0.397	- - -	1.1	0.7	10.2	-	0.058
ARM D	16.80	33.74	0.498	- - -	1.8	1.0	15.4	-	0.059

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	1.0	*
17.15	1.8	**
17.30	7.8	********
17.45	9.1	*********
18.00	1.9	**
18.15	1.0	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.8	*
17.15	1.3	*
17.30	2.4	**
17.45	2.4	**
18.00	1.3	*
18.15	0.9	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.7	*
17.15	1.0	*
17.30	2.3	**
17.45	2.3	**
18.00	1.1	*
18.15	0.7	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	1.0	*
17.15	1.7	**
17.30	5.3	*****
17.45	5.6	******
18.00	1.8	**
18.15	1.0	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1353.0	902.0	310.0	0.23	310.0	0.23
B	2481.7	1654.5	134.4	0.05	134.4	0.05
C	1256.7	837.8	118.8	0.09	118.8	0.09
D	1843.0	1228.7	235.0	0.13	235.0	0.13
ALL	6934.4	4623.0	798.2	0.12	798.2	0.12

* 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

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

Printed at 16:28:52 on 21/06/2016]

ARCADY 6

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 7.0 (FEBRUARY 2010)

For sales and distribution information,
program advice and maintenance, contact:

TRL Limited Tel: +44 (0) 1344 770758
Crowthorne House Fax: +44 (0) 1344 770356
Nine Mile Ride Email: software@trl.co.uk
Wokingham, Berks. Web: www.trlsoftware.co.uk
RG40 3GA,UK

Run with file:-
"j:\Gazeley UK Ltd\47071103 Magna Park Phase 4\Technical\11 Junction Assessments Outline\A4303_A426\
Dec 2015 Update Highways England\Hydrock Design\Title changes\S5 AM 2026 Base+CD+PD+Symmetry+Hydrock Imps.vai"
(drive-on-the-left) at 16:23:32 on Tuesday, 21 June 2016

FILE PROPERTIES

RUN TITLE: S5 A4303/ A426 Rbt AM Pk 2026 + CD + PD + SP + Hydrock Imps - Manual
LOCATION: A4303_Rugby Road
DATE: 31/07/14
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA

ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(07.15)AND ENDS(08.45)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

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	13.30	19.95	13.30
ARM B	15.00	45.00	75.00	26.24	39.36	26.24
ARM C	15.00	45.00	75.00	8.64	12.96	8.64
ARM D	15.00	45.00	75.00	10.24	15.36	10.24

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
07.15 - 08.45	ARM A	0.000	0.506	0.336	0.158
		0.0	538.0	358.0	168.0
		(0.0)	(8.4)	(4.5)	(10.7)
	ARM B	0.225	0.023	0.259	0.493
		473.0	48.0	543.0	1035.0
		(8.9)	(0.0)	(9.0)	(19.2)
	ARM C	0.431	0.524	0.000	0.045
		298.0	362.0	0.0	31.0
		(4.7)	(11.9)	(0.0)	(9.7)
	ARM D	0.107	0.850	0.043	0.000
		88.0	696.0	35.0	0.0
		(22.7)	(21.3)	(17.1)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

TIME	ARM	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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.15-07.30										
	ARM A	13.35	25.34	0.527	- -	0.0	1.1	15.9	-	0.082
	ARM B	26.34	43.04	0.612	- -	0.0	1.6	22.6	-	0.059
	ARM C	8.67	23.36	0.371	- -	0.0	0.6	8.5	-	0.068
	ARM D	10.28	28.57	0.360	- -	0.0	0.6	8.2	-	0.054
07.30-07.45										
	ARM A	15.94	23.63	0.675	- -	1.1	2.0	28.7	-	0.128
	ARM B	31.45	42.10	0.747	- -	1.6	2.9	41.1	-	0.092
	ARM C	10.35	20.76	0.499	- -	0.6	1.0	14.3	-	0.096
	ARM D	12.27	26.95	0.455	- -	0.6	0.8	12.2	-	0.068
07.45-08.00										
	ARM A	19.52	21.34	0.915	- -	2.0	8.1	97.1	-	0.394
	ARM B	38.52	40.91	0.941	- -	2.9	11.9	142.0	-	0.288
	ARM C	12.68	17.45	0.727	- -	1.0	2.5	34.9	-	0.201
	ARM D	15.03	24.84	0.605	- -	0.8	1.5	21.7	-	0.101
08.00-08.15										
	ARM A	19.52	21.29	0.917	- -	8.1	9.2	131.5	-	0.504
	ARM B	38.52	40.80	0.944	- -	11.9	13.8	194.8	-	0.380
	ARM C	12.68	17.20	0.737	- -	2.5	2.7	39.7	-	0.219
	ARM D	15.03	24.72	0.608	- -	1.5	1.5	22.9	-	0.103
08.15-08.30										
	ARM A	15.94	23.55	0.677	- -	9.2	2.2	38.6	-	0.149
	ARM B	31.45	41.91	0.750	- -	13.8	3.1	55.8	-	0.110
	ARM C	10.35	20.35	0.509	- -	2.7	1.1	16.6	-	0.102
	ARM D	12.27	26.77	0.458	- -	1.5	0.9	13.2	-	0.069

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
ARM A	13.35	25.28	0.528	- - -	2.2	1.1	17.6	-	0.085
ARM B	26.34	42.99	0.613	- - -	3.1	1.6	24.8	-	0.061
ARM C	8.67	23.25	0.373	- - -	1.1	0.6	9.2	-	0.069
ARM D	10.28	28.51	0.361	- - -	0.9	0.6	8.7	-	0.055

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.1	*
07.45	2.0	**
08.00	8.1	********
08.15	9.2	*********
08.30	2.2	**
08.45	1.1	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.6	**
07.45	2.9	***
08.00	11.9	************
08.15	13.8	**************
08.30	3.1	***
08.45	1.6	**

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.6	*
07.45	1.0	*
08.00	2.5	***
08.15	2.7	***
08.30	1.1	*
08.45	0.6	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.6	*
07.45	0.8	*
08.00	1.5	**
08.15	1.5	**
08.30	0.9	*
08.45	0.6	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
A	1464.5	976.3	329.4	0.22	329.5	0.22
B	2889.1	1926.1	481.1	0.17	481.1	0.17
C	951.1	634.1	123.2	0.13	123.2	0.13
D	1127.3	751.5	86.7	0.08	86.8	0.08
ALL	6432.0	4288.0	1020.5	0.16	1020.6	0.16

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
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* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

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Printed at 16:26:58 on 21/06/2016]

_____ A R C A D Y 6 _____

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 7.0 (FEBRUARY 2010)

_____

For sales and distribution information,
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TRL Limited Tel: +44 (0) 1344 770758
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RG40 3GA,UK

Run with file:-
"j:\Gazeley UK Ltd\47071103 Magna Park Phase 4\Technical\11 Junction Assessments Outline\A4303_A426\
Dec 2015 Update Highways England\Hydrock Design\Title changes\S5 PM 2026 Base+CD+PD+Symmetry+Hydrock Imps.vai"
(drive-on-the-left) at 16:33:10 on Tuesday, 21 June 2016

FILE PROPERTIES
****

RUN TITLE: S5 A4303/ A426 Rbt PM Pk 2026 + CD + PD + SP + Hydrock Imps - Manual
LOCATION: A4303_Rugby Road
DATE: 14/07/31
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA
****
ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(16.45)AND ENDS(18.15)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

ARM	NUMBER OF MINUTES FROM START WHEN 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	11.10	16.65	11.10
ARM B	15.00	45.00	75.00	19.91	29.87	19.91
ARM C	15.00	45.00	75.00	9.71	14.57	9.71
ARM D	15.00	45.00	75.00	15.61	23.42	15.61

DEMAND SET TITLE: AM Peak 2006 Base Flows

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
16.45 - 18.15	ARM A	0.000	0.484	0.360	0.155
		0.0	430.0	320.0	138.0
		(0.0)	(1.6)	(1.6)	(10.1)
	ARM B	0.333	0.003	0.265	0.399
		530.0	5.0	422.0	636.0
		(2.8)	(0.0)	(10.7)	(23.4)
	ARM C	0.479	0.484	0.000	0.037
		372.0	376.0	0.0	29.0
		(1.6)	(7.7)	(0.0)	(0.0)
	ARM D	0.118	0.853	0.029	0.000
		148.0	1065.0	36.0	0.0
		(10.1)	(14.7)	(5.6)	(0.0)

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
ARM A	11.14	24.22	0.460	- -	0.0	0.8	12.2	-	0.076
ARM B	19.99	44.00	0.454	- -	0.0	0.8	12.2	-	0.041
ARM C	9.75	27.75	0.351	- -	0.0	0.5	7.9	-	0.055
ARM D	15.67	30.05	0.521	- -	0.0	1.1	15.7	-	0.069
17.00-17.15									
ARM A	13.30	22.01	0.605	- -	0.8	1.5	21.5	-	0.114
ARM B	23.87	43.18	0.553	- -	0.8	1.2	18.0	-	0.052
ARM C	11.64	25.72	0.453	- -	0.5	0.8	12.0	-	0.071
ARM D	18.71	28.25	0.662	- -	1.1	1.9	27.6	-	0.104
17.15-17.30									
ARM A	16.30	19.12	0.852	- -	1.5	5.1	64.8	-	0.305
ARM B	29.23	42.13	0.694	- -	1.2	2.2	32.1	-	0.077
ARM C	14.26	22.96	0.621	- -	0.8	1.6	23.0	-	0.114
ARM D	22.92	25.81	0.888	- -	1.9	6.7	85.1	-	0.287
17.30-17.45									
ARM A	16.30	18.95	0.860	- -	5.1	5.6	80.8	-	0.363
ARM B	29.23	42.06	0.695	- -	2.2	2.3	33.7	-	0.078
ARM C	14.26	22.91	0.622	- -	1.6	1.6	24.3	-	0.115
ARM D	22.92	25.77	0.889	- -	6.7	7.3	106.3	-	0.335
17.45-18.00									
ARM A	13.30	21.76	0.611	- -	5.6	1.6	26.6	-	0.126
ARM B	23.87	43.07	0.554	- -	2.3	1.3	19.3	-	0.052
ARM C	11.64	25.64	0.454	- -	1.6	0.8	13.0	-	0.072
ARM D	18.71	28.19	0.664	- -	7.3	2.0	33.8	-	0.114

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
18.00-18.15									
ARM A	11.14	24.13	0.462	- - -	1.6	0.9	13.4	-	0.078
ARM B	19.99	43.96	0.455	- - -	1.3	0.8	12.8	-	0.042
ARM C	9.75	27.70	0.352	- - -	0.8	0.5	8.4	-	0.056
ARM D	15.67	30.01	0.522	- - -	2.0	1.1	17.1	-	0.070

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.8	*
17.15	1.5	**
17.30	5.1	*****
17.45	5.6	******
18.00	1.6	**
18.15	0.9	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.8	*
17.15	1.2	*
17.30	2.2	**
17.45	2.3	**
18.00	1.3	*
18.15	0.8	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	*
17.15	0.8	*
17.30	1.6	**
17.45	1.6	**
18.00	0.8	*
18.15	0.5	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	1.1	*
17.15	1.9	**
17.30	6.7	*******
17.45	7.3	*******
18.00	2.0	**
18.15	1.1	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
A	1222.3	814.8	219.5	0.18	219.5	0.18
B	2192.6	1461.8	128.1	0.06	128.1	0.06
C	1069.5	713.0	88.5	0.08	88.6	0.08
D	1719.2	1146.1	285.5	0.17	285.5	0.17
ALL	6203.6	4135.7	721.7	0.12	721.7	0.12

* 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

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

Printed at 16:34:21 on 21/06/2016]

ARCADY 6

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 7.0 (FEBRUARY 2010)

For sales and distribution information,
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Run with file:-
"j:\Gazeley UK Ltd\47071103 Magna Park Phase 4\Technical\11 Junction Assessments Outline\A4303_A426\
LCC LLITM Flows Feb 2016\Hydrock Design\Title Changes\AM 2026+Dev+SP+Hydrock Imps.vai"
(drive-on-the-left) at 16:22:15 on Tuesday, 21 June 2016

FILE PROPERTIES

RUN TITLE: A4303/ A426 Rbt AM Pk 2026 + Dev + SP + Hydrock Imps - LLITM
LOCATION: A4303_Rugby Road
DATE: 14/07/31
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA

ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
Treat capacities with increasing caution.

TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(07.15)AND ENDS(08.45)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

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	14.41	21.62	14.41
ARM B	15.00	45.00	75.00	28.90	43.35	28.90
ARM C	15.00	45.00	75.00	9.51	14.27	9.51
ARM D	15.00	45.00	75.00	12.70	19.05	12.70

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.15 - 08.45	ARM A	0.000	0.572	0.291	0.137
		0.0	659.0	336.0	158.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.264	0.000	0.273	0.463
		611.0	0.0	631.0	1070.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.423	0.505	0.000	0.072
		322.0	384.0	0.0	55.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.094	0.860	0.046	0.000
		95.0	874.0	47.0	0.0
		(0.0)	(0.0)	(0.0)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

TIME	ARM	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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.15-07.30										
	ARM A	14.47	27.45	0.527	- -	0.0	1.1	15.9	-	0.076
	ARM B	29.01	49.53	0.586	- -	0.0	1.4	20.5	-	0.048
	ARM C	9.55	26.43	0.361	- -	0.0	0.6	8.2	-	0.059
	ARM D	12.75	34.35	0.371	- -	0.0	0.6	8.6	-	0.046
07.30-07.45										
	ARM A	17.28	25.67	0.673	- -	1.1	2.0	28.7	-	0.117
	ARM B	34.64	48.56	0.713	- -	1.4	2.4	35.3	-	0.071
	ARM C	11.40	23.81	0.479	- -	0.6	0.9	13.3	-	0.080
	ARM D	15.22	32.33	0.471	- -	0.6	0.9	13.0	-	0.058
07.45-08.00										
	ARM A	21.16	23.26	0.910	- -	2.0	7.9	96.0	-	0.357
	ARM B	42.43	47.34	0.896	- -	2.4	7.7	100.7	-	0.179
	ARM C	13.96	20.35	0.686	- -	0.9	2.1	29.7	-	0.153
	ARM D	18.64	29.64	0.629	- -	0.9	1.7	24.0	-	0.090
08.00-08.15										
	ARM A	21.16	23.21	0.912	- -	7.9	8.9	126.9	-	0.447
	ARM B	42.43	47.23	0.898	- -	7.7	8.3	120.8	-	0.203
	ARM C	13.96	20.19	0.692	- -	2.1	2.2	32.5	-	0.160
	ARM D	18.64	29.54	0.631	- -	1.7	1.7	25.3	-	0.092
08.15-08.30										
	ARM A	17.28	25.60	0.675	- -	8.9	2.1	37.3	-	0.134
	ARM B	34.64	48.40	0.716	- -	8.3	2.6	41.7	-	0.077
	ARM C	11.40	23.58	0.484	- -	2.2	0.9	14.8	-	0.083
	ARM D	15.22	32.20	0.473	- -	1.7	0.9	13.9	-	0.059

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
ARM A	14.47	27.40	0.528	- - -	2.1	1.1	17.5	-	0.078
ARM B	29.01	49.48	0.586	- - -	2.6	1.4	22.0	-	0.049
ARM C	9.55	26.35	0.362	- - -	0.9	0.6	8.8	-	0.060
ARM D	12.75	34.29	0.372	- - -	0.9	0.6	9.1	-	0.047

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.1	*
07.45	2.0	**
08.00	7.9	********
08.15	8.9	*********
08.30	2.1	**
08.45	1.1	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.4	*
07.45	2.4	**
08.00	7.7	********
08.15	8.3	********
08.30	2.6	***
08.45	1.4	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.6	*
07.45	0.9	*
08.00	2.1	**
08.15	2.2	**
08.30	0.9	*
08.45	0.6	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.6	*
07.45	0.9	*
08.00	1.7	**
08.15	1.7	**
08.30	0.9	*
08.45	0.6	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
A	1587.0	1058.0	322.3	0.20	322.4	0.20
B	3182.3	2121.5	341.0	0.11	341.0	0.11
C	1047.5	698.3	107.3	0.10	107.3	0.10
D	1398.4	932.3	93.9	0.07	93.9	0.07
ALL	7215.2	4810.2	864.6	0.12	864.6	0.12

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* 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

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Printed at 16:29:16 on 21/06/2016]

ARCADY 6

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LCC LLITM Flows Feb 2016\Hydrock Design\Title Changes\PM 2026+Dev+SP+Hydrock Imps.vai"
(drive-on-the-left) at 16:22:41 on Tuesday, 21 June 2016

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RUN TITLE: A4303/ A426 Rbt PM Pk 2026 + Dev + SP + Hydrock Imps - LLITM
LOCATION: A4303_Rugby Road
DATE: 14/07/31
CLIENT: IDI Gazeley
ENUMERATOR: jon_ashcroft [UKBEDFLT06027]
JOB NUMBER: 47071103
STATUS:
DESCRIPTION:

INPUT DATA

ARM A - Rugby Road
ARM B - A4303 East
ARM C - A426 South
ARM D - A4303 West

GEOMETRIC DATA

T5

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	3.00	11.40	31.00	25.00	74.00	43.0	0.556	36.532
ARM B	7.30	11.20	80.00	20.00	74.00	27.0	0.731	54.463
ARM C	4.20	11.30	31.30	22.00	74.00	46.0	0.583	39.841
ARM D	7.30	11.60	12.60	22.00	74.00	47.0	0.626	44.668

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

WARNING ARM A Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM B Effective flare length is outside normal range.
Treat capacities with increasing caution.

WARNING ARM C Effective flare length is outside normal range.
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TRAFFIC DEMAND DATA

Only sets included in the current run are shown

SCALING FACTORS

T13

IARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

TIME PERIOD BEGINS(16.45)AND ENDS(18.15)

LENGTH OF TIME PERIOD -(90) MINUTES

LENGTH OF TIME SEGMENT - (15) MINUTES

DEMAND FLOW PROFILES ARE SYNTHESISED FROM THE TURNING COUNT DATA

DEMAND SET TITLE: AM Peak 2006 Base Flows

T15

ARM	NUMBER OF MINUTES FROM START WHEN TO RISE	NUMBER OF MINUTES FROM START WHEN IS REACHED	NUMBER OF MINUTES FROM START WHEN 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	12.25	18.38	12.25
ARM B	15.00	45.00	75.00	22.85	34.28	22.85
ARM C	15.00	45.00	75.00	11.57	17.36	11.57
ARM D	15.00	45.00	75.00	17.41	26.12	17.41

DEMAND SET TITLE: AM Peak 2006 Base Flows

T33

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/T	ARM A	ARM B	ARM C	ARM D
16.45 - 18.15	ARM A	0.000	0.505	0.350	0.145
		0.0	495.0	343.0	142.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.280	0.000	0.246	0.474
		512.0	0.0	450.0	866.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.423	0.529	0.000	0.048
		392.0	490.0	0.0	44.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.128	0.803	0.069	0.000
		178.0	1119.0	96.0	0.0
		(0.0)	(0.0)	(0.0)	(0.0)

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

T70

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
ARM A	12.30	24.67	0.498	- - -	0.0	1.0	14.2	-	0.080
ARM B	22.94	49.16	0.467	- - -	0.0	0.9	12.8	-	0.038
ARM C	11.62	28.75	0.404	- - -	0.0	0.7	9.9	-	0.058
ARM D	17.48	33.75	0.518	- - -	0.0	1.1	15.5	-	0.061
17.00-17.15									
ARM A	14.68	22.35	0.657	- - -	1.0	1.9	26.6	-	0.128
ARM B	27.39	48.13	0.569	- - -	0.9	1.3	19.2	-	0.048
ARM C	13.87	26.58	0.522	- - -	0.7	1.1	15.7	-	0.078
ARM D	20.87	31.61	0.660	- - -	1.1	1.9	27.5	-	0.092
17.15-17.30									
ARM A	17.98	19.31	0.931	- - -	1.9	9.1	104.8	-	0.466
ARM B	33.54	46.86	0.716	- - -	1.3	2.5	35.6	-	0.074
ARM C	16.99	23.65	0.718	- - -	1.1	2.5	34.6	-	0.146
ARM D	25.56	28.71	0.890	- - -	1.9	7.0	88.1	-	0.264
17.30-17.45									
ARM A	17.98	19.14	0.940	- - -	9.1	11.2	154.4	-	0.666
ARM B	33.54	46.72	0.718	- - -	2.5	2.5	37.6	-	0.076
ARM C	16.99	23.59	0.720	- - -	2.5	2.5	37.6	-	0.151
ARM D	25.56	28.65	0.892	- - -	7.0	7.6	109.8	-	0.311
17.45-18.00									
ARM A	14.68	22.11	0.664	- - -	11.2	2.0	39.5	-	0.159
ARM B	27.39	47.86	0.572	- - -	2.5	1.3	20.8	-	0.049
ARM C	13.87	26.48	0.524	- - -	2.5	1.1	17.4	-	0.081
ARM D	20.87	31.51	0.662	- - -	7.6	2.0	33.4	-	0.101

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
18.00-18.15									
ARM A	12.30	24.59	0.500	- - -	2.0	1.0	15.7	-	0.082
ARM B	22.94	49.11	0.467	- - -	1.3	0.9	13.4	-	0.038
ARM C	11.62	28.70	0.405	- - -	1.1	0.7	10.5	-	0.059
ARM D	17.48	33.69	0.519	- - -	2.0	1.1	16.8	-	0.062

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	1.0	*
17.15	1.9	**
17.30	9.1	*********
17.45	11.2	**********
18.00	2.0	**
18.15	1.0	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.9	*
17.15	1.3	*
17.30	2.5	**
17.45	2.5	***
18.00	1.3	*
18.15	0.9	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.7	*
17.15	1.1	*
17.30	2.5	**
17.45	2.5	***
18.00	1.1	*
18.15	0.7	*

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	1.1	*
17.15	1.9	**
17.30	7.0	*******
17.45	7.6	********
18.00	2.0	**
18.15	1.1	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

T75

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1348.9	899.3	355.1	0.26	355.1	0.26
B	2516.1	1677.4	139.4	0.06	139.4	0.06
C	1274.6	849.7	125.6	0.10	125.6	0.10
D	1917.4	1278.2	291.0	0.15	291.0	0.15
ALL	7056.9	4704.6	911.1	0.13	911.1	0.13

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END OF JOB

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

Printed at 16:29:41 on 21/06/2016]