

APPENDIX T: TECHNICAL NOTE 29 (2036 ASSESSMENTS)

WEST MIDLANDS INTERCHANGE

Transport Technical Note 29 – 2036 Junction Assessments

Job Title	West Midlands Interchange	Project Number	70001979
Client	Four Ashes Limited		
TTN No.	29	Date of Issue	October 2017
Subject	2036 Junction Assessments		
Author	Lewis Walton	Authorised	Neil Findlay / Ian Fielding
Distribution			

1 INTRODUCTION

1.1 In accordance with Circular 02/2013 The Strategic Road Network and the Delivery of Sustainable Development the highway mitigation required to support WMI has been determined on the basis of an assessment of the operation of the highway network serving the Site at the year of opening of the scheme, i.e. 2021. This assessment reflects the full provision of floor area proposed, together with background traffic growth and committed development traffic.

1.2 This assessment of the operation of the highway network serving WMI has been undertaken using the South Staffordshire VISSIM microsimulation model.

1.3 Highways England (HE) have also requested an assessment of the future operation of the proposed junctions that will be formed with the Strategic Road Network (SRN) at a year 15 years hence from the opening of the scheme. This assessment is a requirement of the Design Manual for Roads and Bridges (DMRB) TD 37/93. The junctions that would require an assessment at the 2036 future year are as follows: -

- The proposed three arm Roundabout Junction with the A5, and
- The proposed four arm roundabout junction of the A449/Crateford Lane/Gravelly Way

1.4 As the purpose of the assessment is only to determine the future operation of the changes to the SRN at 2036, it was agreed with Highways England and their consultants Systra that to undertake a full assessment of the operation of the network considered by the South Staffs VISSIM model would be an unduly onerous exercise. In particular, there is currently uncertainty as to the preferred route strategy of the M54 / M6 / M6 Toll link which prevents forecast changes in traffic flows arising from this HE scheme from being made available.

1.5 Therefore it was agreed with HE and Systra that the 2036 assessment would be undertaken on the basis of standalone junction capacity assessments using the Computer Program Junctions9. The basis of the assessment should be the traffic flows obtained from the 2021 South Staffordshire VISSIM model.

2 2036 JUNCTION ASSESSMENTS

2.1 In order to undertake this assessment, traffic growth using Tempro 7.2 has been applied to the 2021 Do Minimum 2021 traffic flows in order to produce the 2036 design year. An adjustment has been made to the Tempro growth rate to account for South Staffordshire District Council's (SSDC) forecast housing delivery by 2036 of 4,900 dwellings, which would see a greater level of housing numbers provided than identified within Tempro. SSDC housing delivery forecasts would see a further 577 households coming forward between 2021 and 2036 than identified by Tempro. The growth rate identified has been agreed with Systra on behalf of HE.

2.2 WMI development traffic has then been added to the background traffic flows at 2036.

2.3 Junctions9 models have then been prepared in order to undertake this assessment. Owing to the level of traffic, the 2036 flows have been assessed using the FLAT profile option. It is assumed that the number of vehicles will cause the peak period to spread by 2036.

2.4 The following details are appended to this TN:

- Annex 1 – Tempro growth rate calculations

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- Annex 2 – Confirmation from Systra as to acceptability of the growth rates
- Annex 3 – Measurements used to identify geometric parameters of roundabout arrangements for inclusion in Junctions9 assessments
- Annex 4 – Details of traffic flow diagrams for 2036 future year
- Annex 5 – Junction9 Output files.

2.5 Reviewing the output files of the Junctions9 assessments considers the following values: -

- Ratio to Flow Capacity (RFC)
- Vehicle Queues
- Vehicle Delay (presented as Delay per Vehicle in seconds).

2.6 The output obtained indicates the following: -

- All arms of the A449 and A5 junctions are shown to operate with RFC values within 0.850 during the AM peak hour. No material queues or delays are shown to occur; and
- All arms of the A449 and A5 junctions are shown to operate with RFC values within 0.850 during the PM peak hour. No material queues or delays are shown to occur;

2.7 **Tables 2-1 and 2-2** below show the results derived from the proposed three arm Roundabout Junction with the A5 and the proposed four arm roundabout junction of the A449/Crateford Lane/Gravelly Way respectively.

2036 Base +Dev	AM			PM		
	RFC	Queue	Delay	RFC	Queue	Delay
A5 East	0.663	2	6	0.729	3	7
Site Access	0.375	1	5	0.655	2	10
A5 West	0.652	2	7	0.643	2	8

Table 2-1 – Proposed A5 Site Access

2036 Base +Dev	AM			PM		
	RFC	Queue	Delay	RFC	Queue	Delay
Crateford Ln	0.080	1	10	0.018	1	8
A449 North	0.558	2	4	0.533	2	4
Gravelly Way	0.254	1	5	0.306	1	5
A449 South	0.663	2	5	0.693	3	5

Table 2-2 – Proposed A449 Site Access on Gravelly Way

2.8 It should be noted that no account of the RIS 2 M54 / M6 / M6 Toll link has been included within this assessment. Part of the purpose of this proposed infrastructure is to reduce traffic flows along the A449 corridor. The nature of this scheme is anticipated to consist of through the provision of an all moves connections between the M54 and the M6 at Junction 11.

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3 SUMMARY

3.1 This note has set out the results of the assessment of the future operation of the A5 and A449 site access junctions for the WMI scheme.

3.2 The assessment has been undertaken using the industry standard assessment tool Junctions9 as agreed with HE and their Consultants, Systra. It has utilised an agreed Temprow 7.2 growth rate that has been adjusted to reflect the level of planned growth identified within South Staffordshire between 2021 and 2036.

3.3 The results of the assessment indicate that both the A5 and A449 roundabouts would operate within capacity at 2036, even without the introduction of the proposed M54/M6/M6 Toll link road.

Annex 1

TEMPRO GROWTH RATE



CALCULATIONS

2021 - 2036 adjusted - South Staffordshire

AM Peak

PM Peak

Urban

Urban

Motorway						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.126145575		Authority	South Staffordshire	1.124399449

Trunk						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.084797569		Authority	South Staffordshire	1.083115554

Principal						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.088998575		Authority	South Staffordshire	1.087310047

Minor						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.098702305		Authority	South Staffordshire	1.096998731

All						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.099705685		Authority	South Staffordshire	1.098000555

Rural

Rural

Motorway						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.116978568		Authority	South Staffordshire	1.115246656

Trunk						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.086307286		Authority	South Staffordshire	1.08462293

Principal						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.077032259		Authority	South Staffordshire	1.075362285

Minor						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.082789683		Authority	South Staffordshire	1.081110781

All						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.092996649		Authority	South Staffordshire	1.091301921

General

General						
Level	Area	Local Growth Figure		Level	Area	Local Growth Figure
Authority	South Staffordshire	1.096651259		Authority	South Staffordshire	1.094950865

Annex 2

SYSTRA CORRESPONDENCE



Fielding, Ian

From: ORAM Nick <noram1@systra.com>
Sent: 07 September 2017 15:43
To: Fielding, Ian
Subject: RE: WMI

Ian

As discussed over the phone, Highways England agree that the Temprow growth rate that has been provided and would be used to factor flows to 2036 is acceptable.

Kind Regards
Nick Oram
Transport Planner
SYSTRA Ltd, Innovation Court, 121 Edmund Street, Birmingham, B3 2HJ

Main Office: 0121 230 6010
Website: www.systra.co.uk



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From: Fielding, Ian [mailto:ian.Fielding@wsp.com]
Sent: 07 September 2017 08:41
To: ORAM Nick <noram1@systra.com>
Cc: COX Chris <ccox@systra.com>; WHITE Lee <lwhite@systra.com>; Kristie Goffe <Kristie.Goffe@kier.co.uk>; Findlay, Neil <Neil.Findlay@wsp.com>; Bazley, Laura <Laura.Bazley@wsp.com>
Subject: RE: WMI

Nick

Thank you for your e-mail.

Can I check that you agree with the Temprow growth rate that we have provided and would be used to factor flows to 2036? It was not clear from your response. We will of course provide ARCADY models of the A5 and A449 at these future year thresholds and will provide this information as soon as confirmation of the growth rate is provided to us.

Thank you for confirming that the assessment of M6 Junction 12 should use the VISSIM model output.

By copy to Kristie, are you now able to confirm that the merge / diverge assessment we have provided meets with your approval?

Kind regards

Ian Fielding

Tel: +44 (0)1256 318745
Mob: +44 (0)7747 648156

From: ORAM Nick [<mailto:noram1@systra.com>]
Sent: 06 September 2017 19:33
To: Fielding, Ian
Cc: COX Chris; WHITE Lee; Kristie Goffe; Findlay, Neil; Bazley, Laura
Subject: RE: WMI

Good Evening Ian,

In response to your points on the modelling of the roundabouts and M6 Junction 12:

1. I can confirm that the future year flows should be used to test the proposed A5 and A449 access roundabouts, using a junction assessment package like ARCADY.
2. I can also confirm that the traffic flows used within the merge/diverge assessment of M6 Junction 12 utilise the data from the South Staffs VISSIM model.

If you have any further questions or wish to query my response please contact me.

Regards
Nick Oram
Transport Planner
SYSTRA Ltd, Innovation Court, 121 Edmund Street, Birmingham, B3 2HJ

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Website: www.systra.co.uk

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From: Kristie Goffe [<mailto:Kristie.Goffe@kier.co.uk>]
Sent: 31 August 2017 09:57
To: COX Chris <ccox@systra.com>
Cc: Area9 DEVCONTROL <Area9.DEVCONTROL@kier.co.uk>
Subject: RE: WMI

Hi Chris

In relation to the second point Ian has raised.

According to previous discussions between ourselves, I believe the South Staffs Model validation report should confirm that the HE Web Tris flows in 2015 obtained at M6 Junction 12 were similar to the 2015 base Model flows. Confirming the Base model is truly representative of the current Network operation. Could you confirm this please?

Regards

Kristie Goffe

Development Management Engineer

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From: Fielding, Ian [<mailto:ian.Fielding@wsp.com>]

Sent: 31 August 2017 09:38

To: COX Chris <ccox@systra.com>

Cc: Derek Jones <Derek.Jones@jmp.co.uk>; WHITE Lee <lwhite@systra.com>; Hansen, Neil <Neil.Hansen@highwaysengland.co.uk>; James Carroll <James.Carroll@kier.emhighways.co.uk>; Kristie Goffe <Kristie.Goffe@kier.emhighways.co.uk>; Hawe, Simon (E,I&S) <simon.hawe@staffordshire.gov.uk>; Findlay, Neil <Neil.Findlay@wsp.com>; Bazley, Laura <Laura.Bazley@wsp.com>

Subject: WMI

Chris

We have not spoken before but I work with Neil Findlay and Laura Bazley on the WMI project. I understand that arising from the last meeting, there were a few actions with yourself and I wonder if I could seek progress if I may. It might be that you have directly responded to Neil and Laura on these points, but as they are both away at present I thought it best to get in touch with you directly.

Below are the points I was hoping you could respond

1. Laura's e-mail of 22 August 2017 in respect of the proposed Temprow growth rate to be used to factor traffic flows to a future year of 2036. For clarity, these future year flows would be used to test the proposed A5 and A449 access roundabouts.
2. Confirmation that the traffic flows used within the merge/diverge assessment of M6 Junction 12 should be utilise the data from the South Staffs VISSIM model.

If you could revert back on the above points, I would be very grateful. Of course by all means give me a call if you wish to discuss.

Regards

Ian Fielding BSc (Hons)

Technical Director



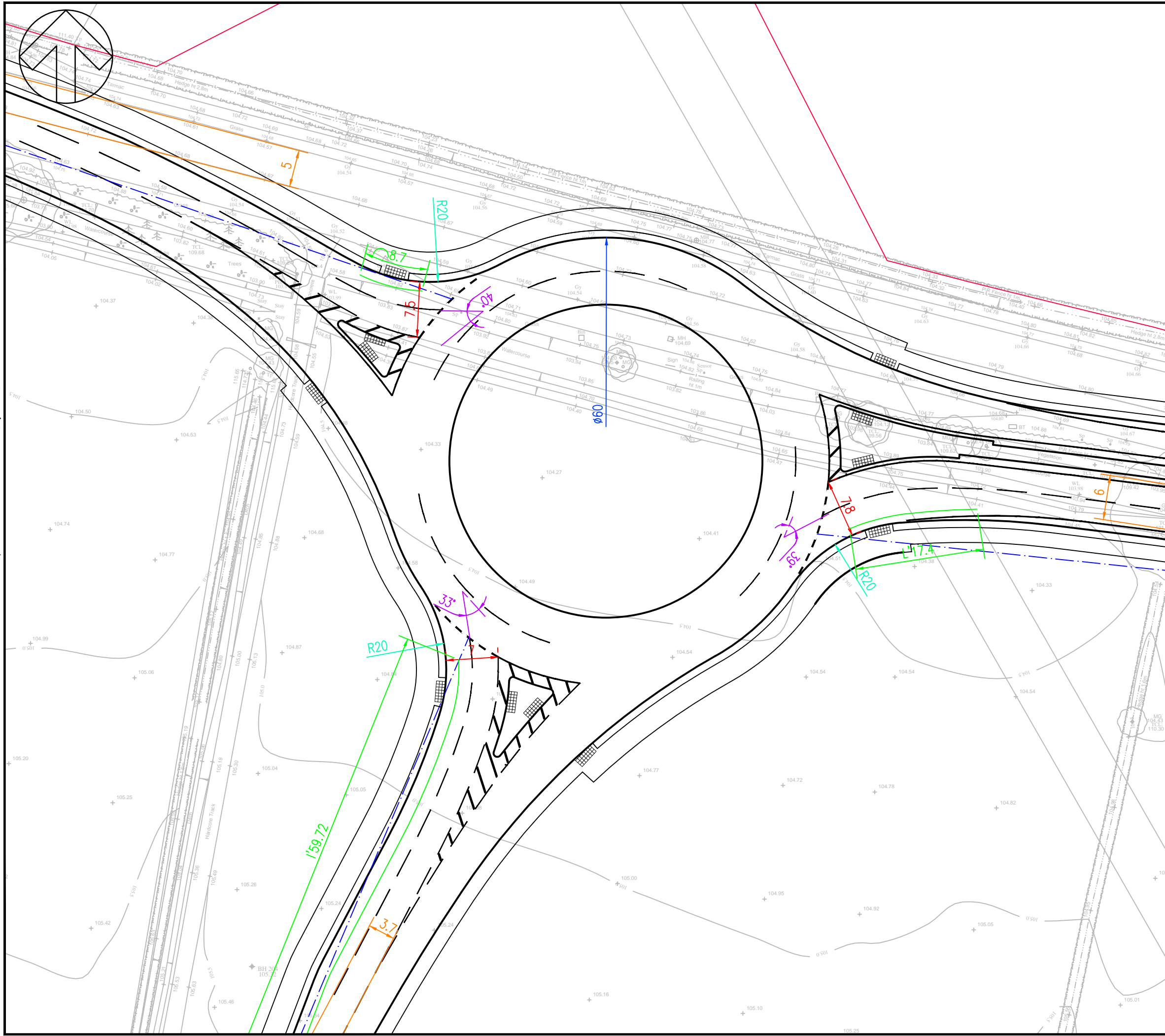
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Annex 3

ROUNDBOUT MEASUREMENTS



File name S:\70001979 - WMI SRFIE MODELS AND DRAWINGS\DEVELOPMENT\AUTOCAD\SKETCHES\70001979-SK-082.DWG, printed on 09 October 2017 12:22:16, by Walton, Lewis



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A	09/10/2017	LEW	FIRST ISSUE	F	NJF

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PROJECT: WMI SRFI

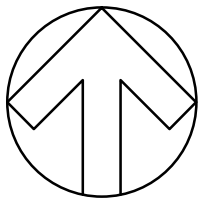
TITLE: PROPOSED A5 ACCESS ROUNDABOUT - DIMENSIONS FOR JUNCTION ASSESSMENT

SCALE @ A3: 1:500 CHECKED: IF APPROVED: NJF

PROJECT No: 70001979 DESIGNED: NW DRAWN: LEW DATE: October 17

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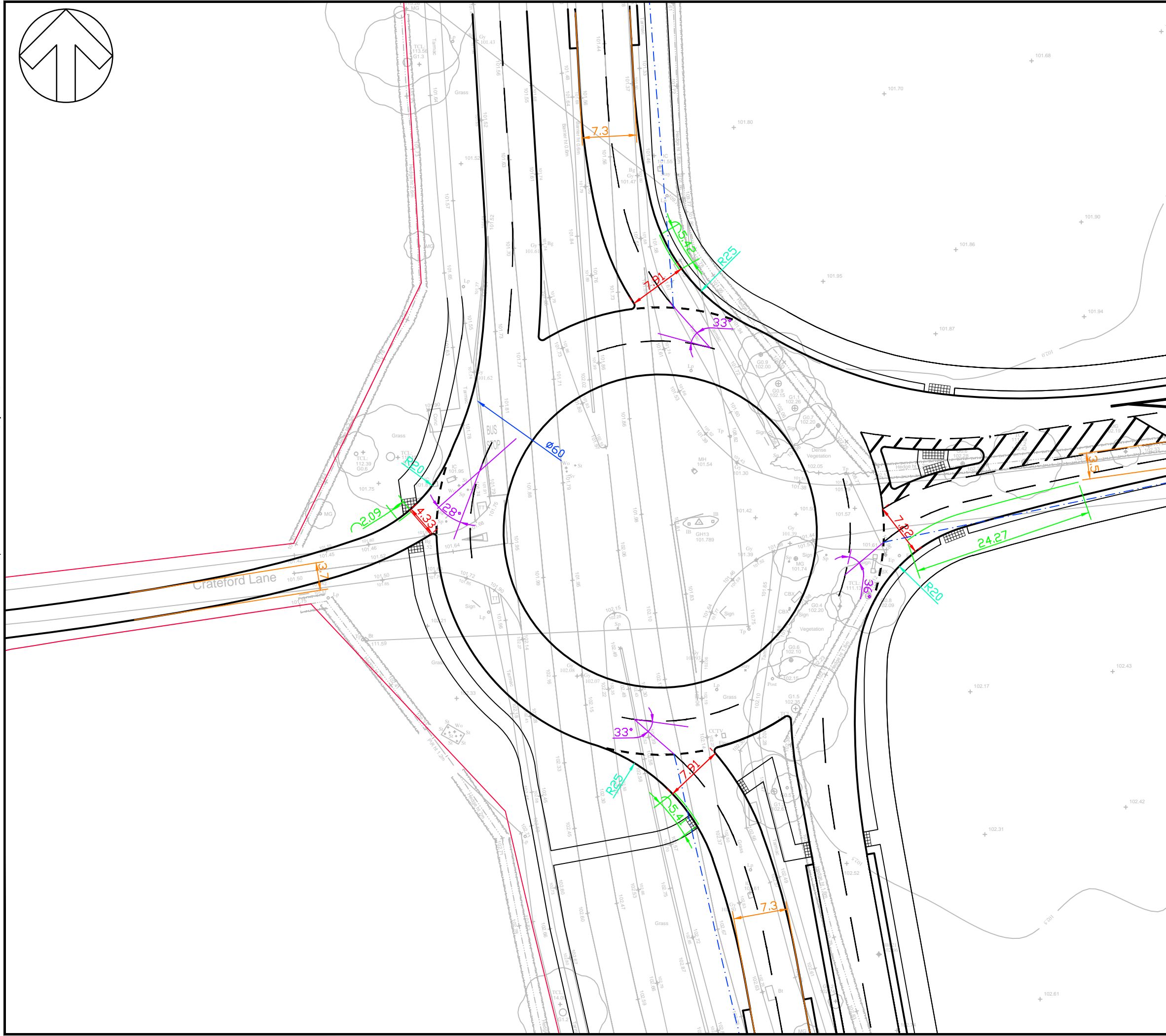


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CLIENT: West Midlands Interchange

ARCHITECT:

PROJECT: WMI SRFI

TITLE: PROPOSED A449/GRAVELLY WAY ACCESS ROUNDABOUT - DIMENSIONS FOR JUNCTION ASSESSMENT

SCALE @ A3: 1:500 CHECKED: IF APPROVED: NJF

PROJECT No: 70001979 DESIGNED: NW DRAWN: LEW DATE: October 17

DRAWING No: 70001979-SK-083 REV: A

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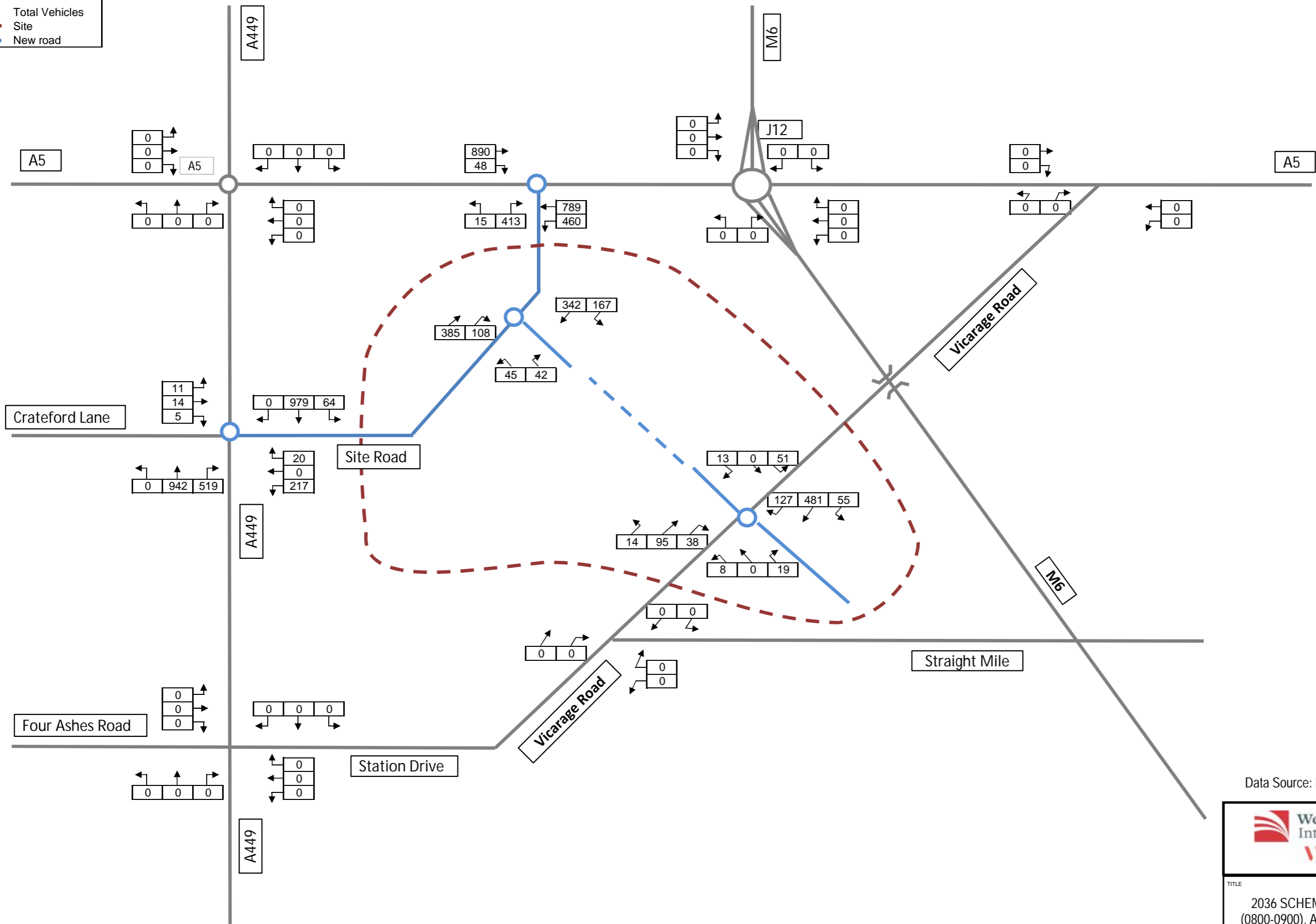
Annex 4

2036 TRAFFIC FLOW DIAGRAMS





Key
 00 Total Vehicles
 --- Site
 --- New road



Data Source: HE VISSIM Model



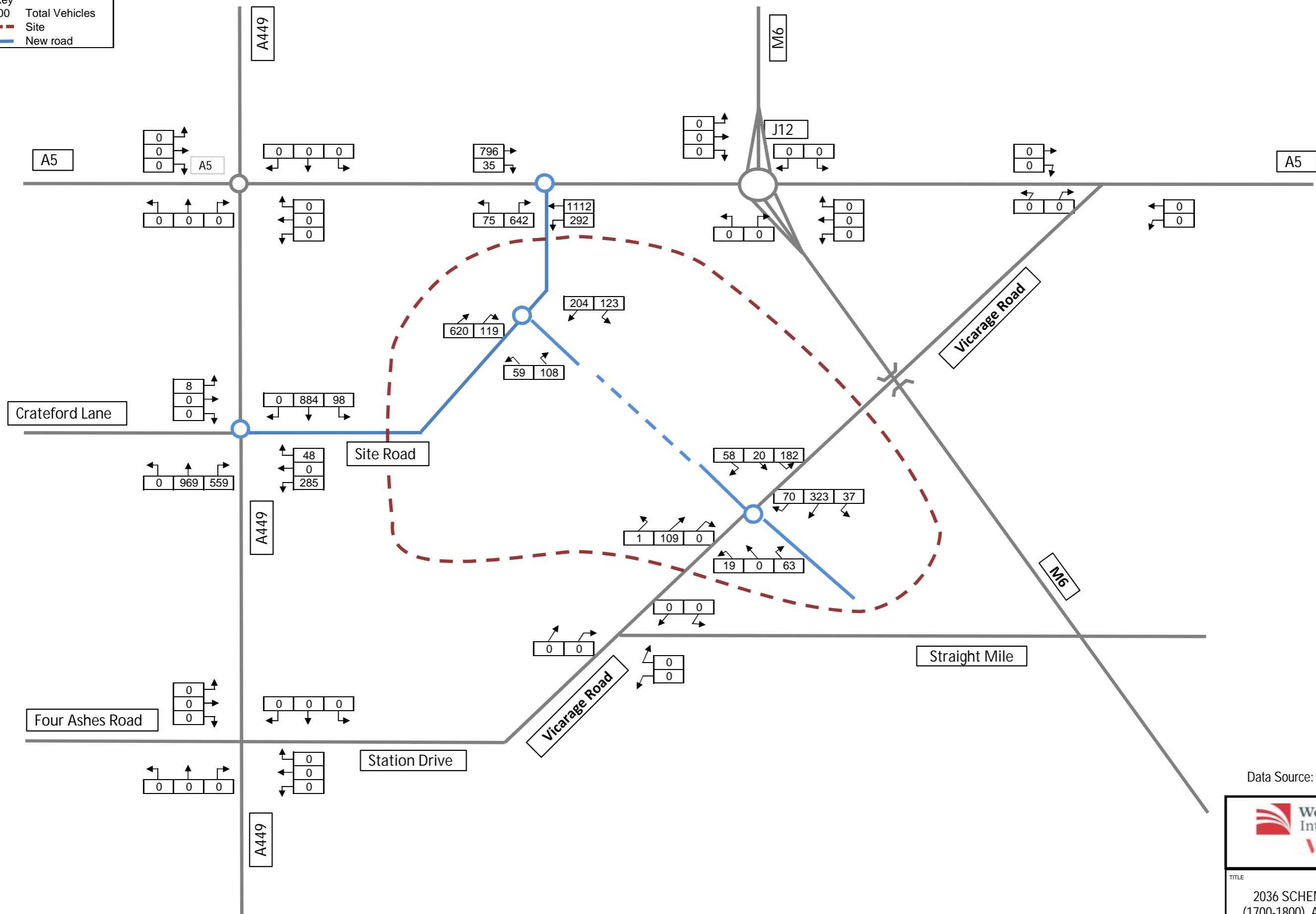
TITLE
 2036 SCHEME, AM PEAK HOUR
 (0800-0900), ALL VEHICLE TRAFFIC
 FLOWS Version 3, 26/09/2017

FIGURE No: **FIGURE T17**



Key

- 00 Total Vehicles
- - - Site
- New road



Data Source: HE VISSIM Model



TITLE
2036 SCHEME, PM PEAK HOUR
(1700-1800), ALL VEHICLE TRAFFIC
FLOWS Version 3,26/09/2017

FIGURE No:
FIGURE T18

Annex 5

JUNCTIONS 9 OUTPUT FILES



Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2017
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Filename: A5 Site Access Roundabout-2036 update.arc8
Path: S:\70001979 - WMI SRFID Design and Analysis\Development\ARCADY\2036 Update
Report generation date: 12/10/2017 15:54:15

- » **Default Run - 2036 Projected Flows + Dev, AM**
- » **Default Run - 2036 Projected Flows + Dev, PM**

Summary of junction performance

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
Default Run - 2036 Projected Flows + Dev								
A5 EAST	1.96	5.67	0.66	A	2.68	6.91	0.73	A
SITE ACCESS	0.60	5.04	0.37	A	1.88	9.51	0.65	A
A5 WEST	1.87	7.20	0.65	A	1.80	7.81	0.64	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

- "D1 - 2013 Observed Flows, AM" model duration: 07:45 - 09:15
- "D2 - 2013 Observed Flows, PM" model duration: 16:45 - 18:15
- "D3 - 2036 Projected Flows, AM" model duration: 07:45 - 09:15
- "D4 - 2036 Projected Flows, PM" model duration: 16:45 - 18:15
- "D5 - 2036 Projected Flows + Dev, AM " model duration: 07:45 - 09:15
- "D6 - 2036 Projected Flows + Dev, PM" model duration: 16:45 - 18:15
- "D7 - 2021 Projected Flows + Dev, AM" model duration: 07:45 - 09:15
- "D8 - 2021 Projected Flows + Dev, PM" model duration: 16:45 - 18:15

Run using Junctions 8.0.6.541 at 12/10/2017 15:54:14

File summary

Title	(untitled)
Location	
Site Number	
Date	05/04/2016
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	UKRJM015
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Default Run - 2036 Projected Flows + Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	SITE ACCESS - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Default Run	ARCADY		✓	✓	D5,D6		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relation
2036 Projected Flows + Dev, AM	2036 Projected Flows + Dev	AM		FLAT	07:45	09:15	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				6.07	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A5 EAST	1	A5 EAST	
SITE ACCESS	2	SITE ACCESS	
A5 WEST	3	A5 WEST	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A5 EAST	0.00	99999.00		0.00
SITE ACCESS	0.00	99999.00		0.00
A5 WEST	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A5 EAST	6.00	7.80	17.40	20.00	60.00	39.00	
SITE ACCESS	3.65	7.00	60.00	20.00	60.00	33.00	
A5 WEST	5.00	7.50	6.70	20.00	60.00	40.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
A5 EAST		(calculated)	(calculated)	0.628	2158.184
SITE ACCESS		(calculated)	(calculated)	0.597	1946.657
A5 WEST		(calculated)	(calculated)	0.565	1795.704

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
A5 EAST	FLAT	✓	1249.00	100.000
SITE ACCESS	FLAT	✓	428.00	100.000
A5 WEST	FLAT	✓	938.00	100.000

Turning Proportions

Turning Counts / Proportions (Veh/hr) - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	0.000	460.000	789.000
	SITE ACCESS	413.000	0.000	15.000
	A5 WEST	890.000	48.000	0.000

Turning Proportions (Veh) - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	0.00	0.37	0.63
	SITE ACCESS	0.96	0.00	0.04
	A5 WEST	0.95	0.05	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	1.000	1.255	1.055
	SITE ACCESS	1.264	1.000	1.429
	A5 WEST	1.043	1.064	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	0.0	25.5	5.5
	SITE ACCESS	26.4	0.0	42.9
	A5 WEST	4.3	6.4	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
A5 EAST	0.66	5.67	1.96	A	1249.00	1873.50	174.07	5.57	1.93	174.13	5.58
SITE ACCESS	0.37	5.04	0.60	A	428.00	642.00	53.41	4.99	0.59	53.42	4.99
A5 WEST	0.65	7.20	1.87	A	938.00	1407.01	165.42	7.05	1.84	165.49	7.06

Main Results for each time segment

Main results: (07:45-08:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1249.00	312.25	1241.27	1293.76	47.63	0.00	1883.96	1878.91	0.663	0.00	1.93	5.538	A
SITE ACCESS	428.00	107.00	425.63	504.78	784.12	0.00	1144.09	944.27	0.374	0.00	0.59	4.995	A
A5 WEST	938.00	234.50	930.68	799.04	410.71	0.00	1439.21	1097.17	0.652	0.00	1.83	6.982	A

Main results: (08:00-08:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1249.00	312.25	1248.93	1302.89	47.99	0.00	1883.74	1878.91	0.663	1.93	1.95	5.668	A
SITE ACCESS	428.00	107.00	427.98	507.97	788.95	0.00	1141.69	944.27	0.375	0.59	0.60	5.043	A
A5 WEST	938.00	234.50	937.91	803.95	412.98	0.00	1437.66	1097.17	0.652	1.83	1.85	7.201	A

Main results: (08:15-08:30)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1249.00	312.25	1248.97	1302.97	48.00	0.00	1883.74	1878.91	0.663	1.95	1.96	5.671	A
SITE ACCESS	428.00	107.00	428.00	507.99	788.98	0.00	1141.68	944.27	0.375	0.60	0.60	5.043	A
A5 WEST	938.00	234.50	937.97	803.98	413.00	0.00	1437.65	1097.17	0.652	1.85	1.86	7.204	A

Main results: (08:30-08:45)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1249.00	312.25	1248.99	1302.98	48.00	0.00	1883.74	1878.91	0.663	1.96	1.96	5.671	A
SITE ACCESS	428.00	107.00	428.00	508.00	788.99	0.00	1141.67	944.27	0.375	0.60	0.60	5.043	A
A5 WEST	938.00	234.50	937.99	803.99	413.00	0.00	1437.65	1097.17	0.652	1.86	1.87	7.204	A

Main results: (08:45-09:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1249.00	312.25	1248.99	1302.99	48.00	0.00	1883.74	1878.91	0.663	1.96	1.96	5.671	A
SITE ACCESS	428.00	107.00	428.00	508.00	789.00	0.00	1141.67	944.27	0.375	0.60	0.60	5.043	A
A5 WEST	938.00	234.50	938.00	803.99	413.00	0.00	1437.65	1097.17	0.652	1.87	1.87	7.204	A

Main results: (09:00-09:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1249.00	312.25	1248.99	1302.99	48.00	0.00	1883.74	1878.91	0.663	1.96	1.96	5.671	A
SITE ACCESS	428.00	107.00	428.00	508.00	789.00	0.00	1141.67	944.27	0.375	0.60	0.60	5.043	A
A5 WEST	938.00	234.50	938.00	804.00	413.00	0.00	1437.65	1097.17	0.652	1.87	1.87	7.204	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	27.48	1.83	5.538	A	A
SITE ACCESS	8.60	0.57	4.995	A	A
A5 WEST	25.83	1.72	6.982	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	29.14	1.94	5.668	A	A
SITE ACCESS	8.93	0.60	5.043	A	A
A5 WEST	27.68	1.85	7.201	A	A

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	29.29	1.95	5.671	A	A
SITE ACCESS	8.96	0.60	5.043	A	A
A5 WEST	27.89	1.86	7.204	A	A

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	29.36	1.96	5.671	A	A
SITE ACCESS	8.97	0.60	5.043	A	A
A5 WEST	27.97	1.86	7.204	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	29.39	1.96	5.671	A	A
SITE ACCESS	8.98	0.60	5.043	A	A
A5 WEST	28.01	1.87	7.204	A	A

Queueing Delay results: (09:00-09:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	29.42	1.96	5.671	A	A
SITE ACCESS	8.98	0.60	5.043	A	A
A5 WEST	28.04	1.87	7.204	A	A

Default Run - 2036 Projected Flows + Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	SITE ACCESS - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Default Run	ARCADY		✓	✓	D5,D6		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relation
2036 Projected Flows + Dev, PM	2036 Projected Flows + Dev	PM		FLAT	16:45	18:15	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				7.81	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A5 EAST	1	A5 EAST	
SITE ACCESS	2	SITE ACCESS	
A5 WEST	3	A5 WEST	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A5 EAST	0.00	99999.00		0.00
SITE ACCESS	0.00	99999.00		0.00
A5 WEST	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A5 EAST	6.00	7.80	17.40	20.00	60.00	39.00	
SITE ACCESS	3.65	7.00	60.00	20.00	60.00	33.00	
A5 WEST	5.00	7.50	6.70	20.00	60.00	40.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
A5 EAST		(calculated)	(calculated)	0.628	2158.184
SITE ACCESS		(calculated)	(calculated)	0.597	1946.657
A5 WEST		(calculated)	(calculated)	0.565	1795.704

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
A5 EAST	FLAT	✓	1404.00	100.000
SITE ACCESS	FLAT	✓	717.00	100.000
A5 WEST	FLAT	✓	831.00	100.000

Turning Proportions

Turning Counts / Proportions (Veh/hr) - (untitled) (for whole period)

		To		
		A5 EAST	SITE ACCESS	A5 WEST
From	A5 EAST	0.000	292.000	1112.000
	SITE ACCESS	642.000	0.000	75.000
	A5 WEST	796.000	35.000	0.000

Turning Proportions (Veh) - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	0.00	0.21	0.79
	SITE ACCESS	0.90	0.00	0.10
	A5 WEST	0.96	0.04	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	1.000	1.344	1.046
	SITE ACCESS	1.147	1.000	1.110
	A5 WEST	1.065	1.141	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To		
From		A5 EAST	SITE ACCESS	A5 WEST
	A5 EAST	0.0	34.4	4.6
	SITE ACCESS	14.7	0.0	11.0
	A5 WEST	6.5	14.1	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
A5 EAST	0.73	6.91	2.68	A	1404.00	2105.99	236.68	6.74	2.63	236.80	6.75
SITE ACCESS	0.65	9.51	1.88	A	717.00	1075.50	165.71	9.24	1.84	165.81	9.25
A5 WEST	0.64	7.81	1.80	A	831.00	1246.50	158.49	7.63	1.76	158.57	7.63

Main Results for each time segment

Main results: (16:45-17:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1404.00	351.00	1393.52	1424.80	34.71	0.00	1925.40	1914.98	0.729	0.00	2.62	6.644	A
SITE ACCESS	717.00	179.25	709.72	324.53	1103.70	0.00	1099.94	874.30	0.652	0.00	1.82	9.066	A
A5 WEST	831.00	207.75	824.01	1177.94	635.49	0.00	1295.84	1206.52	0.641	0.00	1.75	7.523	A

Main results: (17:00-17:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1404.00	351.00	1403.85	1437.72	34.99	0.00	1925.21	1914.98	0.729	2.62	2.66	6.900	A
SITE ACCESS	717.00	179.25	716.83	326.97	1111.89	0.00	1095.46	874.30	0.655	1.82	1.86	9.498	A
A5 WEST	831.00	207.75	830.87	1186.87	641.85	0.00	1291.99	1206.52	0.643	1.75	1.78	7.803	A

Main results: (17:15-17:30)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1404.00	351.00	1403.95	1437.92	35.00	0.00	1925.21	1914.98	0.729	2.66	2.67	6.903	A
SITE ACCESS	717.00	179.25	716.95	326.99	1111.96	0.00	1095.42	874.30	0.655	1.86	1.87	9.507	A
A5 WEST	831.00	207.75	830.96	1186.96	641.96	0.00	1291.92	1206.52	0.643	1.78	1.79	7.807	A

Main results: (17:30-17:45)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1404.00	351.00	1403.97	1437.96	35.00	0.00	1925.21	1914.98	0.729	2.67	2.67	6.906	A
SITE ACCESS	717.00	179.25	716.98	326.99	1111.98	0.00	1095.41	874.30	0.655	1.87	1.88	9.509	A
A5 WEST	831.00	207.75	830.98	1186.98	641.98	0.00	1291.90	1206.52	0.643	1.79	1.79	7.808	A

Main results: (17:45-18:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1404.00	351.00	1403.98	1437.98	35.00	0.00	1925.21	1914.98	0.729	2.67	2.68	6.906	A
SITE ACCESS	717.00	179.25	716.99	327.00	1111.99	0.00	1095.41	874.30	0.655	1.88	1.88	9.511	A
A5 WEST	831.00	207.75	830.99	1186.99	641.99	0.00	1291.90	1206.52	0.643	1.79	1.79	7.810	A

Main results: (18:00-18:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
A5 EAST	1404.00	351.00	1403.99	1437.99	35.00	0.00	1925.21	1914.98	0.729	2.68	2.68	6.906	A
SITE ACCESS	717.00	179.25	716.99	327.00	1111.99	0.00	1095.41	874.30	0.655	1.88	1.88	9.511	A
A5 WEST	831.00	207.75	830.99	1187.00	641.99	0.00	1291.90	1206.52	0.643	1.79	1.80	7.810	A

Queueing Delay Results for each exit time segment
Queueing Delay results: (16:45-17:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	36.68	2.45	6.644	A	A
SITE ACCESS	25.36	1.69	9.066	A	A
A5 WEST	24.60	1.64	7.523	A	A

Queueing Delay results: (17:00-17:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	39.63	2.64	6.900	A	A
SITE ACCESS	27.69	1.85	9.498	A	A
A5 WEST	26.50	1.77	7.803	A	A

Queueing Delay results: (17:15-17:30)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	39.95	2.66	6.903	A	A
SITE ACCESS	28.03	1.87	9.507	A	A
A5 WEST	26.75	1.78	7.807	A	A

Queueing Delay results: (17:30-17:45)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	40.08	2.67	6.906	A	A
SITE ACCESS	28.15	1.88	9.509	A	A
A5 WEST	26.84	1.79	7.808	A	A

Queueing Delay results: (17:45-18:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	40.15	2.68	6.906	A	A
SITE ACCESS	28.22	1.88	9.511	A	A
A5 WEST	26.89	1.79	7.810	A	A

Queueing Delay results: (18:00-18:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
A5 EAST	40.20	2.68	6.906	A	A
SITE ACCESS	28.26	1.88	9.511	A	A
A5 WEST	26.92	1.79	7.810	A	A

<h1>Junctions 8</h1>
<h2>ARCADY 8 - Roundabout Module</h2>
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2017
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Filename: A449, Gravelly Way - Site Access Roundabout-2036 update.arc8
Path: S:\70001979 - WMI SRFID Design and Analysis\Development\ARCADY\2036 Update
Report generation date: 12/10/2017 15:52:39

- » (Default Analysis Set) - 2036 Projected Flows + Dev, AM
- » (Default Analysis Set) - 2036 Projected Flows + Dev, PM

Summary of junction performance

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
A1 - 2036 Projected Flows + Dev								
CRATEFORD LANE	0.09	10.41	0.08	B	0.02	8.44	0.02	A
A449 North	1.26	4.37	0.56	A	1.14	4.18	0.53	A
GRAVELLY WAY	0.34	5.16	0.25	A	0.44	4.76	0.31	A
A449 South	1.96	4.84	0.66	A	2.25	5.31	0.69	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

- "D1 - 2013 Observed Flows, AM" model duration: 07:45 - 09:15
- "D2 - 2013 Observed Flows, PM" model duration: 16:45 - 18:15
- "D3 - 2036 Projected Flows, AM" model duration: 07:45 - 09:15
- "D4 - 2036 Projected Flows, PM" model duration: 16:45 - 18:15
- "D5 - 2036 Projected Flows + Dev, AM" model duration: 07:45 - 09:15
- "D6 - 2036 Projected Flows + Dev, PM" model duration: 16:45 - 18:15
- "D7 - 2021 Projected Flows + Dev, AM" model duration: 07:45 - 09:15
- "D8 - 2021 Projected Flows + Dev, PM" model duration: 16:45 - 18:15

Run using Junctions 8.0.6.541 at 12/10/2017 15:52:38

File summary

Title	(untitled)
Location	
Site Number	
Date	05/04/2016
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	UKRJM015
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	s	-Min	perMin

(Default Analysis Set) - 2036 Projected Flows + Dev, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓	✓	D5,D6		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relation
2036 Projected Flows + Dev, AM	2036 Projected Flows + Dev	AM		FLAT	07:45	09:15	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				4.77	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
CRATEFORD LANE	1	CRATEFORD LANE	
A449 North	2	A449 North	
GRAVELLY WAY	3	GRAVELLY WAY	
A449 South	4	A449 South	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
CRATEFORD LANE	0.00	99999.00		0.00
A449 North	0.00	99999.00		0.00
GRAVELLY WAY	0.00	99999.00		0.00
A449 South	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
CRATEFORD LANE	3.70	4.30	2.10	20.00	60.00	28.00	
A449 North	7.30	7.90	5.40	25.00	60.00	34.00	
GRAVELLY WAY	3.50	7.20	24.40	20.00	60.00	36.00	
A449 South	7.30	7.90	5.40	25.00	60.00	33.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
CRATEFORD LANE		(calculated)	(calculated)	0.476	1224.510
A449 North		(calculated)	(calculated)	0.666	2336.396
GRAVELLY WAY		(calculated)	(calculated)	0.565	1777.529
A449 South		(calculated)	(calculated)	0.669	2344.537

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
CRATEFORD LANE	FLAT	✓	30.00	100.000
A449 North	FLAT	✓	1043.00	100.000
GRAVELLY WAY	FLAT	✓	237.00	100.000
A449 South	FLAT	✓	1461.00	100.000

Turning Proportions

Turning Counts / Proportions (Veh/hr) - (untitled) (for whole period)

		To			
		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
From	CRATEFORD LANE	0.000	11.000	14.000	5.000
	A449 North	0.000	0.000	64.000	979.000
	GRAVELLY WAY	0.000	20.000	0.000	217.000
	A449 South	0.000	942.000	519.000	0.000

Turning Proportions (Veh) - (untitled) (for whole period)

		To			
		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
From	CRATEFORD LANE	0.00	0.37	0.47	0.17
	A449 North	0.00	0.00	0.06	0.94
	GRAVELLY WAY	0.00	0.08	0.00	0.92
	A449 South	0.00	0.64	0.36	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To			
		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
From	CRATEFORD LANE	1.000	1.364	1.143	1.400
	A449 North	1.000	1.000	1.125	1.032
	GRAVELLY WAY	1.000	1.500	1.000	1.267
	A449 South	1.000	1.025	1.108	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To			
		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
From	CRATEFORD LANE	0.0	36.4	14.3	40.0
	A449 North	0.0	0.0	12.5	3.2
	GRAVELLY WAY	0.0	50.0	0.0	26.7
	A449 South	0.0	2.5	10.8	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
CRATEFORD LANE	0.08	10.41	0.09	B	30.00	45.00	7.69	10.25	0.09	7.69	10.25
A449 North	0.56	4.37	1.26	A	1043.00	1564.49	112.51	4.31	1.25	112.53	4.32
GRAVELLY WAY	0.25	5.16	0.34	A	237.00	355.50	30.29	5.11	0.34	30.29	5.11
A449 South	0.66	4.84	1.96	A	1461.01	2191.51	174.24	4.77	1.94	174.29	4.77

Main Results for each time segment

Main results: (07:45-08:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	30.00	7.50	29.66	0.00	1473.15	0.00	379.01	74.26	0.079	0.00	0.08	10.296	B
A449 North	1043.00	260.75	1038.00	967.77	535.04	0.00	1869.65	1666.56	0.558	0.00	1.25	4.303	A
GRAVELLY WAY	237.00	59.25	235.66	593.79	979.26	0.00	936.92	664.97	0.253	0.00	0.34	5.124	A
A449 South	1461.01	365.25	1453.27	1195.03	19.89	0.00	2204.49	2170.04	0.663	0.00	1.93	4.745	A

Main results: (08:00-08:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	30.00	7.50	30.00	0.00	1480.94	0.00	375.90	74.26	0.080	0.08	0.09	10.407	B
A449 North	1043.00	260.75	1042.96	972.96	537.98	0.00	1867.54	1666.56	0.558	1.25	1.26	4.365	A
GRAVELLY WAY	237.00	59.25	236.99	596.98	983.96	0.00	934.78	664.97	0.254	0.34	0.34	5.158	A
A449 South	1461.01	365.25	1460.95	1200.96	20.00	0.00	2204.39	2170.04	0.663	1.93	1.95	4.842	A

Main results: (08:15-08:30)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	30.00	7.50	30.00	0.00	1480.98	0.00	375.88	74.26	0.080	0.09	0.09	10.407	B
A449 North	1043.00	260.75	1042.99	972.99	537.99	0.00	1867.53	1666.56	0.558	1.26	1.26	4.365	A
GRAVELLY WAY	237.00	59.25	237.00	596.99	983.99	0.00	934.77	664.97	0.254	0.34	0.34	5.158	A
A449 South	1461.01	365.25	1460.99	1200.99	20.00	0.00	2204.38	2170.04	0.663	1.95	1.95	4.842	A

Main results: (08:30-08:45)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	30.00	7.50	30.00	0.00	1480.99	0.00	375.88	74.26	0.080	0.09	0.09	10.407	B
A449 North	1043.00	260.75	1042.99	972.99	538.00	0.00	1867.53	1666.56	0.558	1.26	1.26	4.365	A
GRAVELLY WAY	237.00	59.25	237.00	597.00	983.99	0.00	934.76	664.97	0.254	0.34	0.34	5.158	A
A449 South	1461.01	365.25	1461.00	1201.00	20.00	0.00	2204.38	2170.04	0.663	1.95	1.96	4.842	A

Main results: (08:45-09:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	30.00	7.50	30.00	0.00	1481.00	0.00	375.88	74.26	0.080	0.09	0.09	10.407	B
A449 North	1043.00	260.75	1042.99	973.00	538.00	0.00	1867.53	1666.56	0.558	1.26	1.26	4.365	A
GRAVELLY WAY	237.00	59.25	237.00	597.00	984.00	0.00	934.76	664.97	0.254	0.34	0.34	5.158	A
A449 South	1461.01	365.25	1461.00	1201.00	20.00	0.00	2204.38	2170.04	0.663	1.96	1.96	4.842	A

Main results: (09:00-09:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	30.00	7.50	30.00	0.00	1481.00	0.00	375.88	74.26	0.080	0.09	0.09	10.407	B
A449 North	1043.00	260.75	1042.99	973.00	538.00	0.00	1867.53	1666.56	0.558	1.26	1.26	4.365	A
GRAVELLY WAY	237.00	59.25	237.00	597.00	984.00	0.00	934.76	664.97	0.254	0.34	0.34	5.158	A
A449 South	1461.01	365.25	1461.00	1201.00	20.00	0.00	2204.38	2170.04	0.663	1.96	1.96	4.842	A

Queueing Delay Results for each time segment
Queueing Delay results: (07:45-08:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	1.22	0.08	10.296	B	B
A449 North	18.04	1.20	4.303	A	A
GRAVELLY WAY	4.89	0.33	5.124	A	A
A449 South	27.67	1.84	4.745	A	A

Queueing Delay results: (08:00-08:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	1.28	0.09	10.407	B	B
A449 North	18.81	1.25	4.365	A	A
GRAVELLY WAY	5.06	0.34	5.158	A	A
A449 South	29.16	1.94	4.842	A	A

Queueing Delay results: (08:15-08:30)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	1.29	0.09	10.407	B	B
A449 North	18.88	1.26	4.365	A	A
GRAVELLY WAY	5.08	0.34	5.158	A	A
A449 South	29.29	1.95	4.842	A	A

Queueing Delay results: (08:30-08:45)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	1.30	0.09	10.407	B	B
A449 North	18.91	1.26	4.365	A	A
GRAVELLY WAY	5.08	0.34	5.158	A	A
A449 South	29.35	1.96	4.842	A	A

Queueing Delay results: (08:45-09:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	1.30	0.09	10.407	B	B
A449 North	18.93	1.26	4.365	A	A
GRAVELLY WAY	5.09	0.34	5.158	A	A
A449 South	29.38	1.96	4.842	A	A

Queueing Delay results: (09:00-09:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	1.30	0.09	10.407	B	B
A449 North	18.94	1.26	4.365	A	A
GRAVELLY WAY	5.09	0.34	5.158	A	A
A449 South	29.40	1.96	4.842	A	A

(Default Analysis Set) - 2036 Projected Flows + Dev, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓	✓	D5,D6		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relation
2036 Projected Flows + Dev, PM	2036 Projected Flows + Dev	PM		FLAT	16:45	18:15	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				4.86	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
CRATEFORD LANE	1	CRATEFORD LANE	
A449 North	2	A449 North	
GRAVELLY WAY	3	GRAVELLY WAY	
A449 South	4	A449 South	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
CRATEFORD LANE	0.00	99999.00		0.00
A449 North	0.00	99999.00		0.00
GRAVELLY WAY	0.00	99999.00		0.00
A449 South	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
CRATEFORD LANE	3.70	4.30	2.10	20.00	60.00	28.00	
A449 North	7.30	7.90	5.40	25.00	60.00	34.00	
GRAVELLY WAY	3.50	7.20	24.40	20.00	60.00	36.00	
A449 South	7.30	7.90	5.40	25.00	60.00	33.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
CRATEFORD LANE		(calculated)	(calculated)	0.476	1224.510
A449 North		(calculated)	(calculated)	0.666	2336.396
GRAVELLY WAY		(calculated)	(calculated)	0.565	1777.529
A449 South		(calculated)	(calculated)	0.669	2344.537

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
CRATEFORD LANE	FLAT	✓	8.00	100.000
A449 North	FLAT	✓	982.00	100.000
GRAVELLY WAY	FLAT	✓	333.00	100.000
A449 South	FLAT	✓	1528.00	100.000

Turning Proportions

Turning Counts / Proportions (Veh/hr) - (untitled) (for whole period)

		To			
		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
From	CRATEFORD LANE	0.000	8.000	0.000	0.000
	A449 North	0.000	0.000	98.000	884.000
	GRAVELLY WAY	0.000	48.000	0.000	285.000
	A449 South	0.000	969.000	559.000	0.000

Turning Proportions (Veh) - (untitled) (for whole period)

		To			
		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
From	CRATEFORD LANE	0.00	1.00	0.00	0.00
	A449 North	0.00	0.00	0.10	0.90
	GRAVELLY WAY	0.00	0.14	0.00	0.86
	A449 South	0.00	0.63	0.37	0.00

Vehicle Mix

Average PCU Per Vehicle - (untitled) (for whole period)

		To			
From		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
	CRATEFORD LANE	1.000	1.000	1.000	1.000
	A449 North	1.000	1.000	1.329	1.018
	GRAVELLY WAY	1.000	1.333	1.000	1.137
	A449 South	1.000	1.022	1.080	1.000

Heavy Vehicle Percentages - (untitled) (for whole period)

		To			
From		CRATEFORD LANE	A449 North	GRAVELLY WAY	A449 South
	CRATEFORD LANE	0.0	0.0	0.0	0.0
	A449 North	0.0	0.0	32.9	1.8
	GRAVELLY WAY	0.0	33.3	0.0	13.7
	A449 South	0.0	2.2	8.0	0.0

Results

Results Summary for whole modelled period

Name	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
CRATEFORD LANE	0.02	8.44	0.02	A	8.00	12.00	1.67	8.34	0.02	1.67	8.34
A449 North	0.53	4.18	1.14	A	982.00	1473.00	101.44	4.13	1.13	101.46	4.13
GRAVELLY WAY	0.31	4.76	0.44	A	333.00	499.50	39.28	4.72	0.44	39.29	4.72
A449 South	0.69	5.31	2.25	A	1528.00	2292.00	199.19	5.21	2.21	199.26	5.22

Main Results for each time segment

Main results: (16:45-17:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	8.00	2.00	7.93	0.00	1566.91	0.00	439.03	83.82	0.018	0.00	0.02	8.350	A
A449 North	982.00	245.50	977.49	1019.07	555.77	0.00	1845.97	1687.21	0.532	0.00	1.13	4.124	A
GRAVELLY WAY	333.00	83.25	331.26	653.32	879.95	0.00	1091.09	775.72	0.305	0.00	0.44	4.727	A
A449 South	1528.00	382.00	1519.16	1163.45	47.75	0.00	2206.61	2151.88	0.692	0.00	2.21	5.173	A

Main results: (17:00-17:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	8.00	2.00	8.00	0.00	1575.92	0.00	434.52	83.82	0.018	0.02	0.02	8.440	A
A449 North	982.00	245.50	981.97	1024.95	558.97	0.00	1843.78	1687.21	0.533	1.13	1.13	4.177	A
GRAVELLY WAY	333.00	83.25	332.99	656.97	883.97	0.00	1089.10	775.72	0.306	0.44	0.44	4.760	A
A449 South	1528.00	382.00	1527.91	1168.97	48.00	0.00	2206.40	2151.88	0.693	2.21	2.23	5.303	A

Main results: (17:15-17:30)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	8.00	2.00	8.00	0.00	1575.98	0.00	434.49	83.82	0.018	0.02	0.02	8.440	A
A449 North	982.00	245.50	981.99	1024.98	558.99	0.00	1843.76	1687.21	0.533	1.13	1.14	4.177	A
GRAVELLY WAY	333.00	83.25	333.00	656.99	883.99	0.00	1089.09	775.72	0.306	0.44	0.44	4.760	A
A449 South	1528.00	382.00	1527.97	1168.99	48.00	0.00	2206.40	2151.88	0.693	2.23	2.24	5.306	A

Main results: (17:30-17:45)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	8.00	2.00	8.00	0.00	1575.99	0.00	434.49	83.82	0.018	0.02	0.02	8.440	A
A449 North	982.00	245.50	981.99	1024.99	558.99	0.00	1843.76	1687.21	0.533	1.14	1.14	4.177	A
GRAVELLY WAY	333.00	83.25	333.00	657.00	884.00	0.00	1089.09	775.72	0.306	0.44	0.44	4.760	A
A449 South	1528.00	382.00	1527.98	1169.00	48.00	0.00	2206.40	2151.88	0.693	2.24	2.24	5.306	A

Main results: (17:45-18:00)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	8.00	2.00	8.00	0.00	1576.00	0.00	434.48	83.82	0.018	0.02	0.02	8.440	A
A449 North	982.00	245.50	981.99	1025.00	559.00	0.00	1843.76	1687.21	0.533	1.14	1.14	4.177	A
GRAVELLY WAY	333.00	83.25	333.00	657.00	884.00	0.00	1089.09	775.72	0.306	0.44	0.44	4.760	A
A449 South	1528.00	382.00	1527.99	1169.00	48.00	0.00	2206.40	2151.88	0.693	2.24	2.24	5.306	A

Main results: (18:00-18:15)

Name	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
CRATEFORD LANE	8.00	2.00	8.00	0.00	1576.00	0.00	434.48	83.82	0.018	0.02	0.02	8.440	A
A449 North	982.00	245.50	982.00	1025.00	559.00	0.00	1843.76	1687.21	0.533	1.14	1.14	4.177	A
GRAVELLY WAY	333.00	83.25	333.00	657.00	884.00	0.00	1089.09	775.72	0.306	0.44	0.44	4.760	A
A449 South	1528.00	382.00	1527.99	1169.00	48.00	0.00	2206.40	2151.88	0.693	2.24	2.25	5.306	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:45-17:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	0.27	0.02	8.350	A	A
A449 North	16.31	1.09	4.124	A	A
GRAVELLY WAY	6.35	0.42	4.727	A	A
A449 South	31.42	2.09	5.173	A	A

Queueing Delay results: (17:00-17:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	0.28	0.02	8.440	A	A
A449 North	16.96	1.13	4.177	A	A
GRAVELLY WAY	6.56	0.44	4.760	A	A
A449 South	33.34	2.22	5.303	A	A

Queueing Delay results: (17:15-17:30)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	0.28	0.02	8.440	A	A
A449 North	17.02	1.13	4.177	A	A
GRAVELLY WAY	6.58	0.44	4.760	A	A
A449 South	33.52	2.23	5.306	A	A

Queueing Delay results: (17:30-17:45)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	0.28	0.02	8.440	A	A
A449 North	17.04	1.14	4.177	A	A
GRAVELLY WAY	6.59	0.44	4.760	A	A
A449 South	33.60	2.24	5.306	A	A

Queueing Delay results: (17:45-18:00)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	0.28	0.02	8.440	A	A
A449 North	17.05	1.14	4.177	A	A
GRAVELLY WAY	6.59	0.44	4.760	A	A
A449 South	33.64	2.24	5.306	A	A

Queueing Delay results: (18:00-18:15)

Name	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
CRATEFORD LANE	0.28	0.02	8.440	A	A
A449 North	17.06	1.14	4.177	A	A
GRAVELLY WAY	6.60	0.44	4.760	A	A
A449 South	33.67	2.24	5.306	A	A

