

APPENDIX S: TECHNICAL NOTE 31 (SHIFT CHANGE ASSESSMENTS)

WEST MIDLANDS INTERCHANGE

Transport Technical Note 31 – Shift Change Assessments

Job Title	West Midlands Interchange	Project Number	70001979
Client	Four Ashes Limited		
TTN No.	31 Revision A	Date of Issue	8 December 2017
Subject	Shift Change Junction Assessments		
Author	Lewis Walton	Authorised	Neil Findlay / Ian Fielding
Distribution			

1 INTRODUCTION

1.1 This Technical Note (TN) provides a summary of the effects of the shift changes on the proposed A449/Crateford Lane/Gravelly Way site access and the staggered priority junctions serving the Intermodal Terminal to the south of the A449/A5 Link Road and the proposed development plot to the north.

1.2 Using the Junctions8 assessment package, assessments have been performed of the

- The proposed four arm roundabout junction of the A449/Crateford Lane/ A449/A5 Link Road; and
- The proposed Intermodal Terminal Access staggered junction on the A449/A5 Link Road (east of the A449/Crateford Lane/Gravelly Way roundabout).

1.3 These assessments have been run at the time of shift change during the main part of the day, this being the end of the 0600-1400 shift and the start of the 1400-2200 shift. In order to capture the incoming and outgoing traffic at the change, assessments deal with the hours of 1300-1400 and 1400-1500.

1.4 The Highways England South Staffordshire VISSIM model has considered the operation of the highway network, including the above junctions during the AM and PM peak periods. This analysis has shown that the infrastructure proposed to serve WMI and the associated traffic can be accommodated and there would not be any severe impacts on the Strategic Road Network. However this VISSIM model does not extend to the afternoon shift change periods of WMI. Comments received from Highways England retained Engineering Consultants have requested details of the operation of the junction of the A449/A5 Link Road and the Intermodal Terminal Access at these times in order to demonstrate that traffic will not queue back to the A449.

1.5 This revised TN 31 deals with specific comments raised by Systra, as Spatial Planning Consultants to Highways England to the initial submission, where minor amendments to the modelling methodology were requested. These concerned the removal of HGV movements shown at Crateford Lane (east bound), the use of PCU factors of 2.5 to account for the forecast levels of articulated HGV movements and finally providing clarification that the left turn movement out of the northern development had been included.

2 SHIFT CHANGE ASSESSMENTS

2.1 In order to undertake this assessment, the future year 2021 flows with the additional development traffic have been used for both the shift changes.

2.2 The methodology considered background and development flows separately. All flows were factored from the modelled AM Peak period to the respective shift periods. Those factors can be found in **Table 2-1** below.

Shift Change Flow Factors From AM Peak (0800 - 0900)		1300-1400	1400-1500
Light Vehicles	Background	0.59	0.60
	Development	1.27	1.65
HGVs	Background	1.00	1.06
	Development	1.27	1.42

Table 2-1: Shift Change Flow Factors

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2.3 Background flow factors were based on surveyed flows over an average week from Survey Site 22 on the A449 South of Gailey Roundabout. Separate factors for HGVs and light vehicles were generated. These factors were applied to the 2021 background flows only. Development flow factors were based on the WMI Development Trip generation profile for an average weekday. Separate factors for HGVs and Light Vehicles were generated. These factors were applied to the 2021 Development flows only.

2.4 Scheme flows for the 2pm shift change were calculated as the sum of the 2021 factored background flows and the 2021 factored development flows.

2.5 Junctions8 models have then been prepared in order to undertake this assessment. As the shift changes will naturally have a peak occurrence, the ONE HOUR/ODTAB traffic profile has been used to provide an indicative peak.

2.6 The following details are appended to this TN:

- Annex 1 – Measurements used to identify geometric parameters of roundabout arrangements for inclusion in Junctions8 assessments
- Annex 2 – Details of traffic flow diagrams for the inter-peak shift changes
- Annex 3 – Junction8 Output files.

2.7 Reviewing the output files of the Junctions8 assessments considers the following values: -

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

2.8 The output obtained indicates that all arms of the roundabout and staggered junction are shown to operate with RFC values within 0.850 during the inter-peak shift changes. No material queues are shown to occur;

2.9 **Tables 2-2 and 2-3** below show the results derived from the proposed roundabout and the staggered junctions respectively.

	Shift 1			Shift 2		
	RFC	Queue	Delay	RFC	Queue	Delay
A449/A5 Link Road	0.224	1	5	0.324	1	5
A449 South	0.500	1	4	0.490	1	3
Crateford Road	0.035	1	6	0.036	1	6
A449 North	0.377	1	3	0.399	1	3

Table 2-2 – Proposed A449 Roundabout Access

	Shift 1			Shift 2		
	RFC	Queue	Delay	RFC	Queue	Delay
A449/A5 Link Road (E)	0.187	1	11	0.093	1	11
Intermodal Terminal	0.258	1	27	0.361	1	29
A449/A5 Link Road (W)	0.074	1	8	0.171	1	13
Development Access	0.100	1	22	0.258	1	22

Table 2-3 – Proposed Internal Staggered Junction

2.10 It should be noted that the queue shown on the A449/A5 Link Road at the Intermodal Terminal staggered junction takes place in the ghost islands and therefore does not affect traffic on the mainline. With this accounted for, both junctions clearly operate well within capacity with limited queueing that does not extend back to the A449.

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2.11 There is a noticeable delay at the development plot access roads – this is likely due to the significantly higher level of traffic along the mainline rendering a gap harder to spot for any right-turners at the side roads. This is borne out by the delay incurred on the right-turning mainline traffic – the low vehicle number from the minor arm of the junctions, combined with a higher traffic movement on the mainline means that while a material queue does not build up, the vehicle that is waiting takes some time to make its manoeuvre. However it is considered that the level of delay shown is not material, particularly in the context of the RFC values obtained.

3 SUMMARY

3.1 This note has set out the results of the assessment of A449/Crateford Lane/ A449/A5 Link Road site access and the Intermodal Terminal Access staggered junction for the WMI scheme.

3.2 The assessment has been undertaken using the industry standard assessment tool Junctions8 as agreed with HE and their Consultants, Systra.

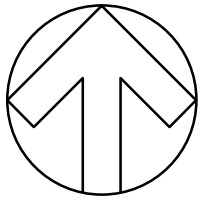
3.3 The assessment has dealt with comments raised by Systra in terms of the methodology adopted. Addressing these comments does not impact on the results of the assessments undertaken.

3.4 The results of the assessment indicate that during the shift change time periods, there will not be any issues with queueing back from the roundabout into the site that would interfere with the operation of the staggered Intermodal Terminal junctions. In addition, there would not be any issues with queues extending back from the staggered Intermodal Terminal access to the A449.

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ANNEX A – JUNCTION MEASUREMENTS

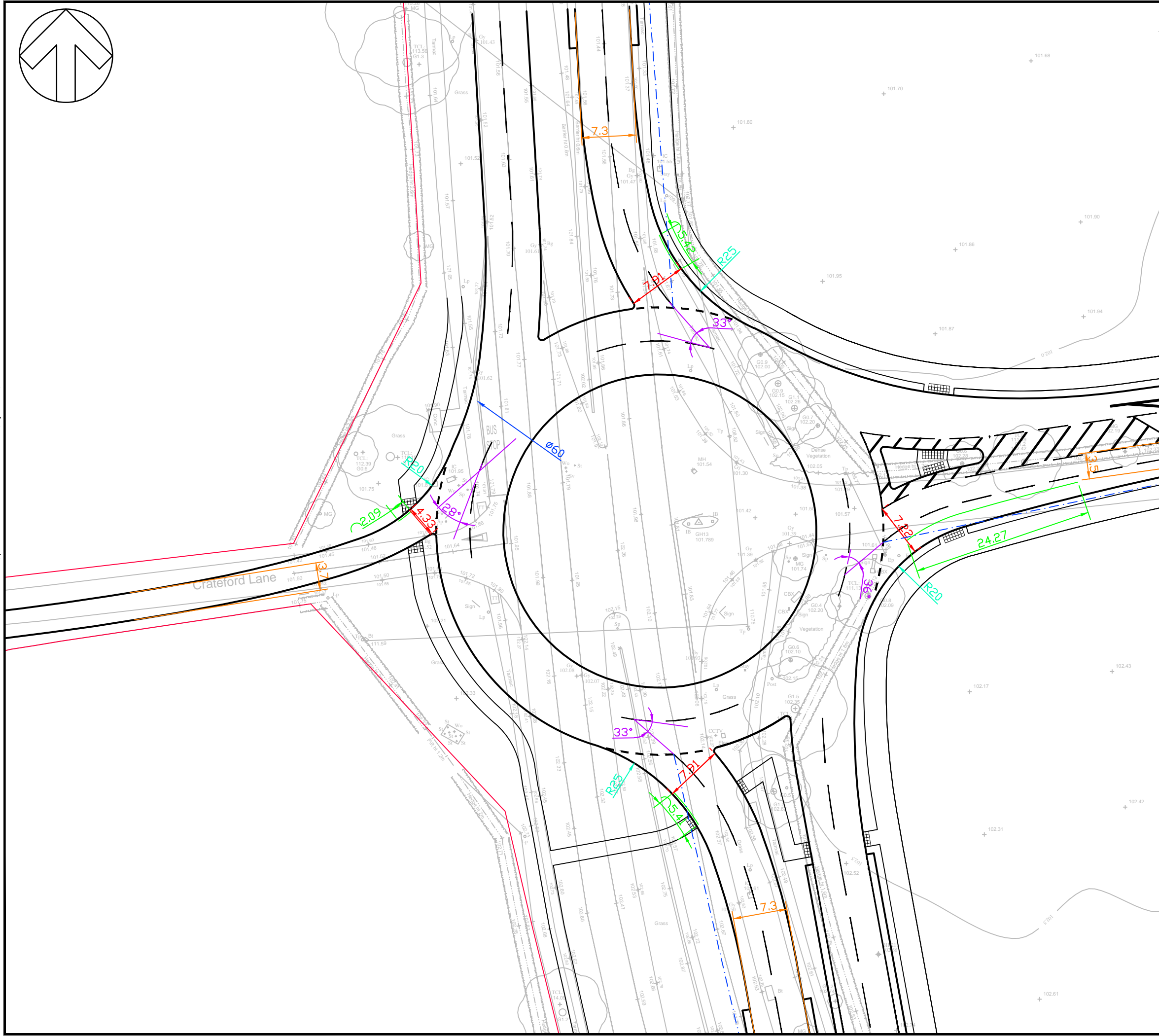


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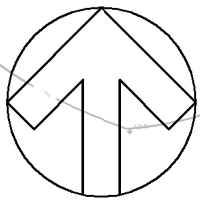
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SCALE @ A3: 1:500 CHECKED: IF APPROVED: NJF

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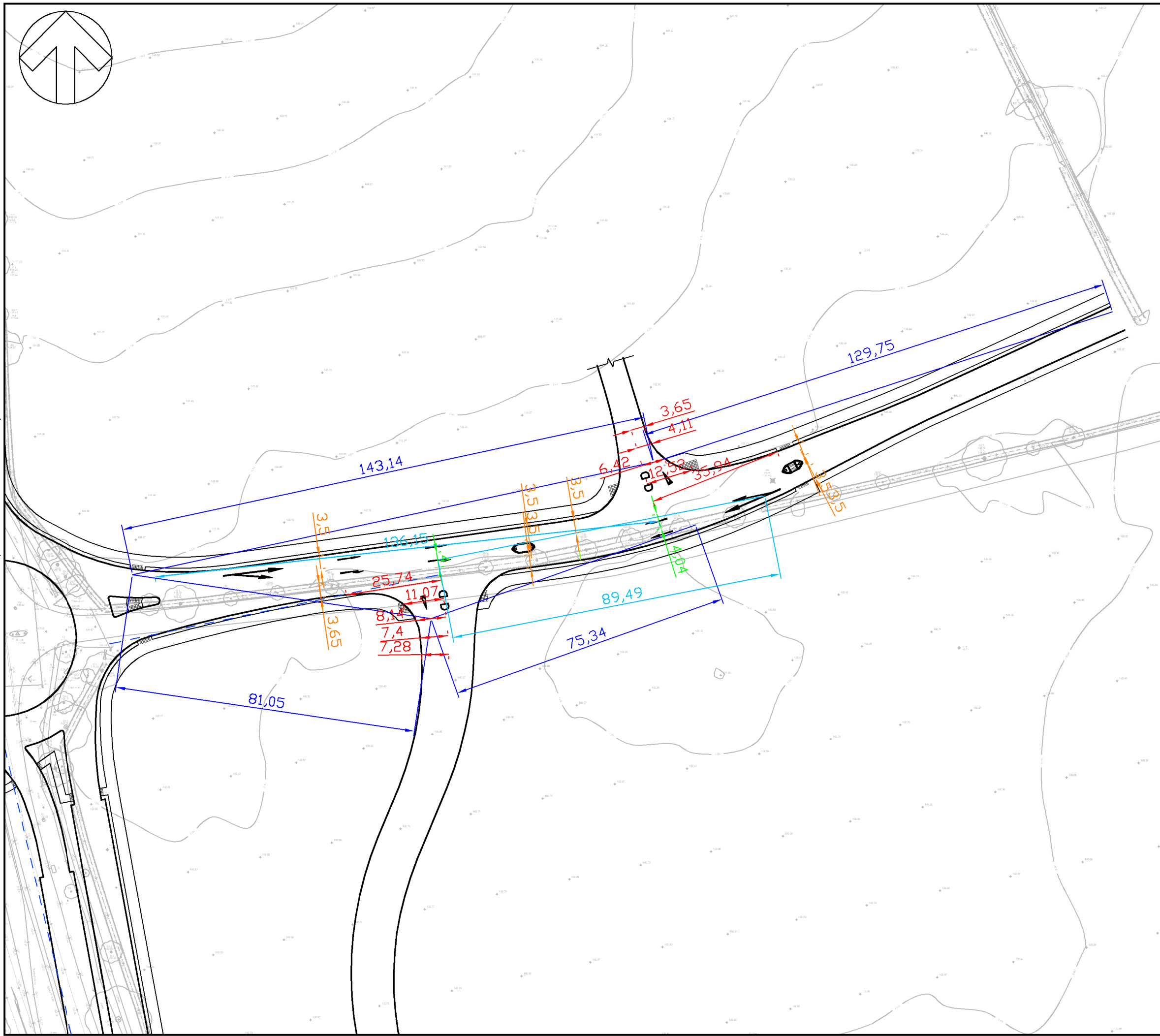


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TITLE: PROPOSED ZONE 1 AND ZONE 2 ACCESS JUNCTIONS - DIMENSIONS FOR JUNCTION ASSESSMENT

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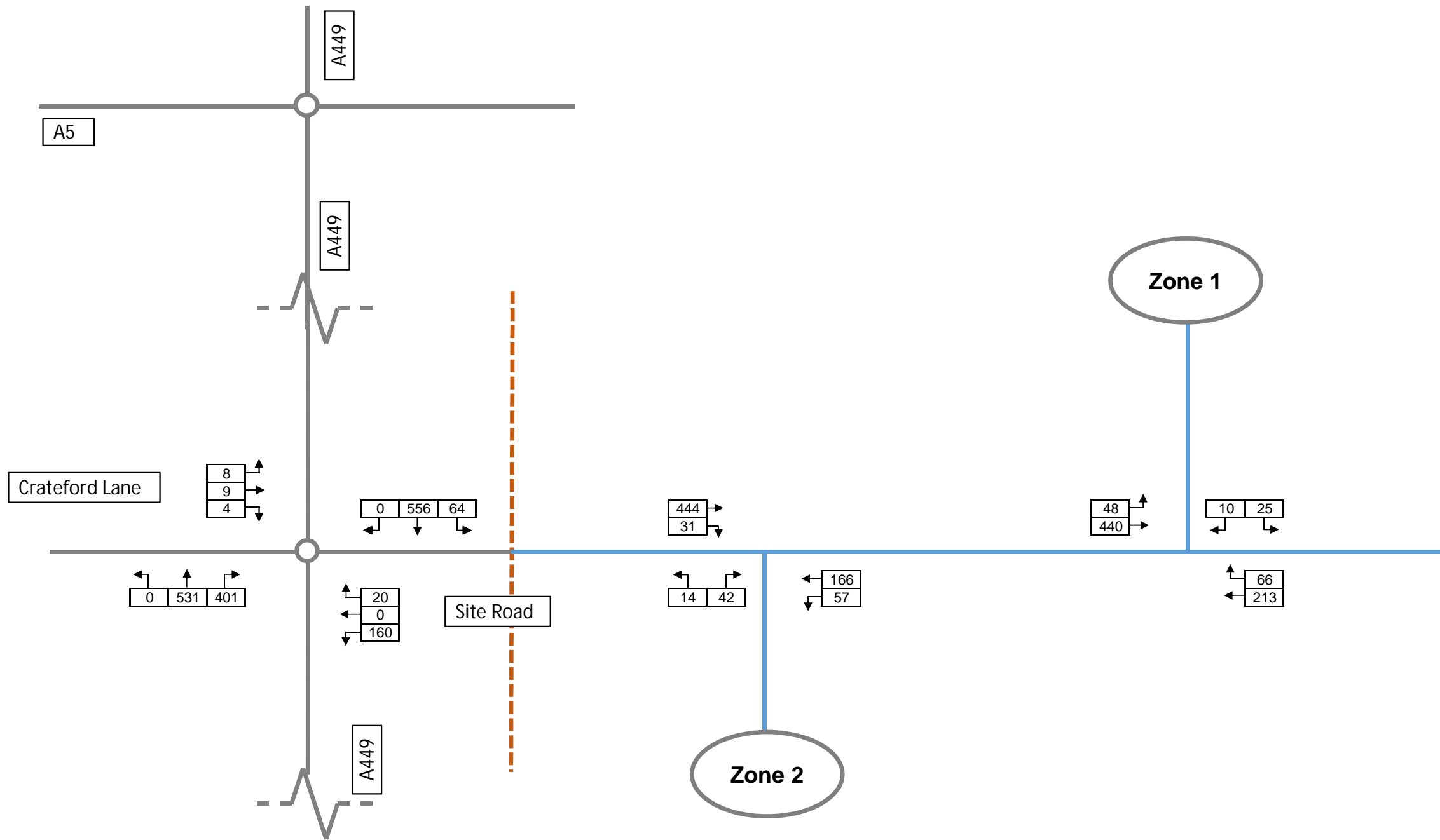
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ANNEX B – JUNCTION ASSESSMENTS



Key	
00	Total Vehicles
	Site
	New road



Data Source: HE VISSIM Model

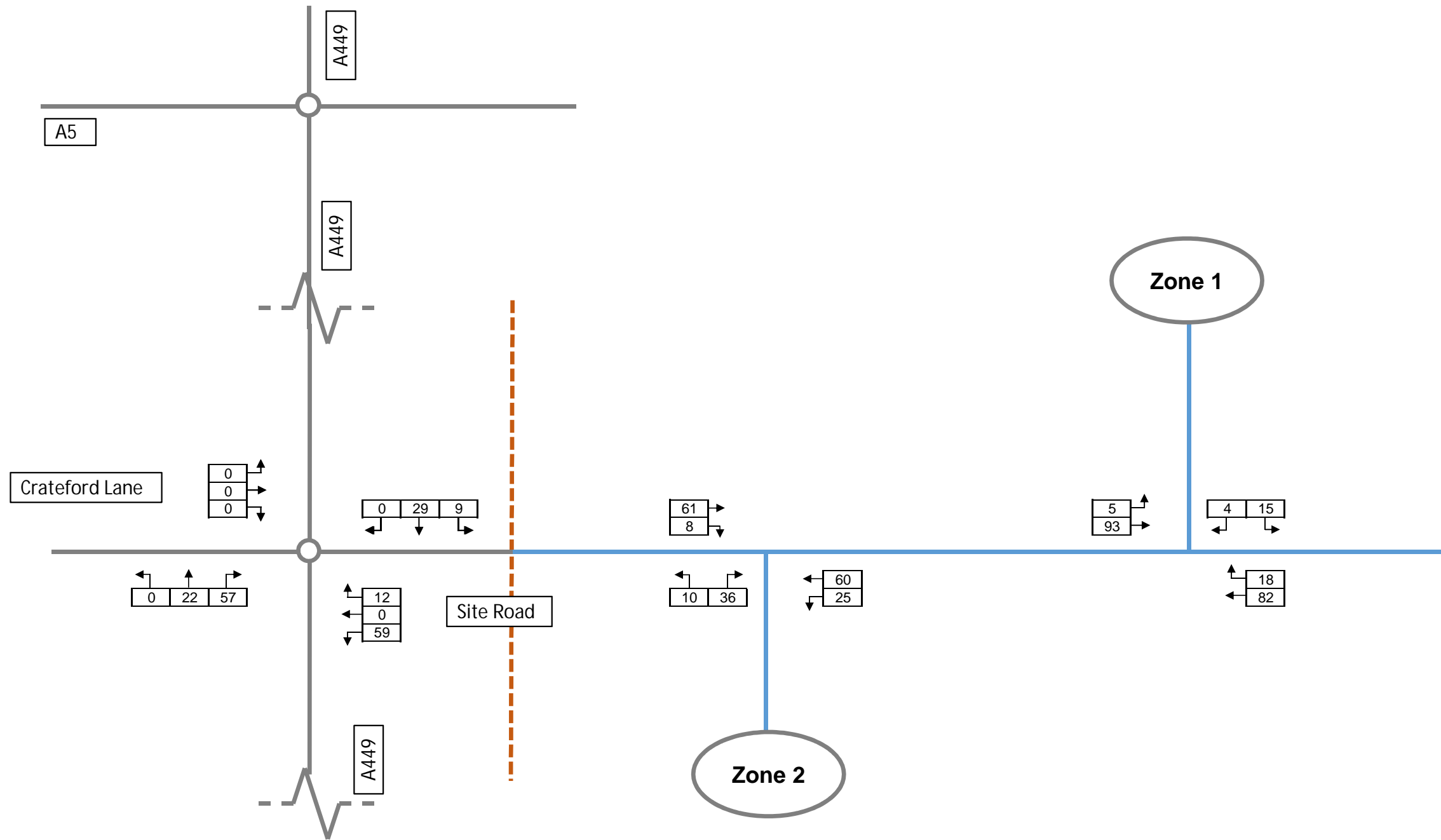


TITLE
2021 DS, SHIFT CHANGE (1300-1400),
ALL VEHICLE TRAFFIC FLOWS Version
1, 10/10/2017

FIGURE No: FIGURE T41



Key	
00	HGVs
	Site
	New road



Data Source: HE VISSIM Model

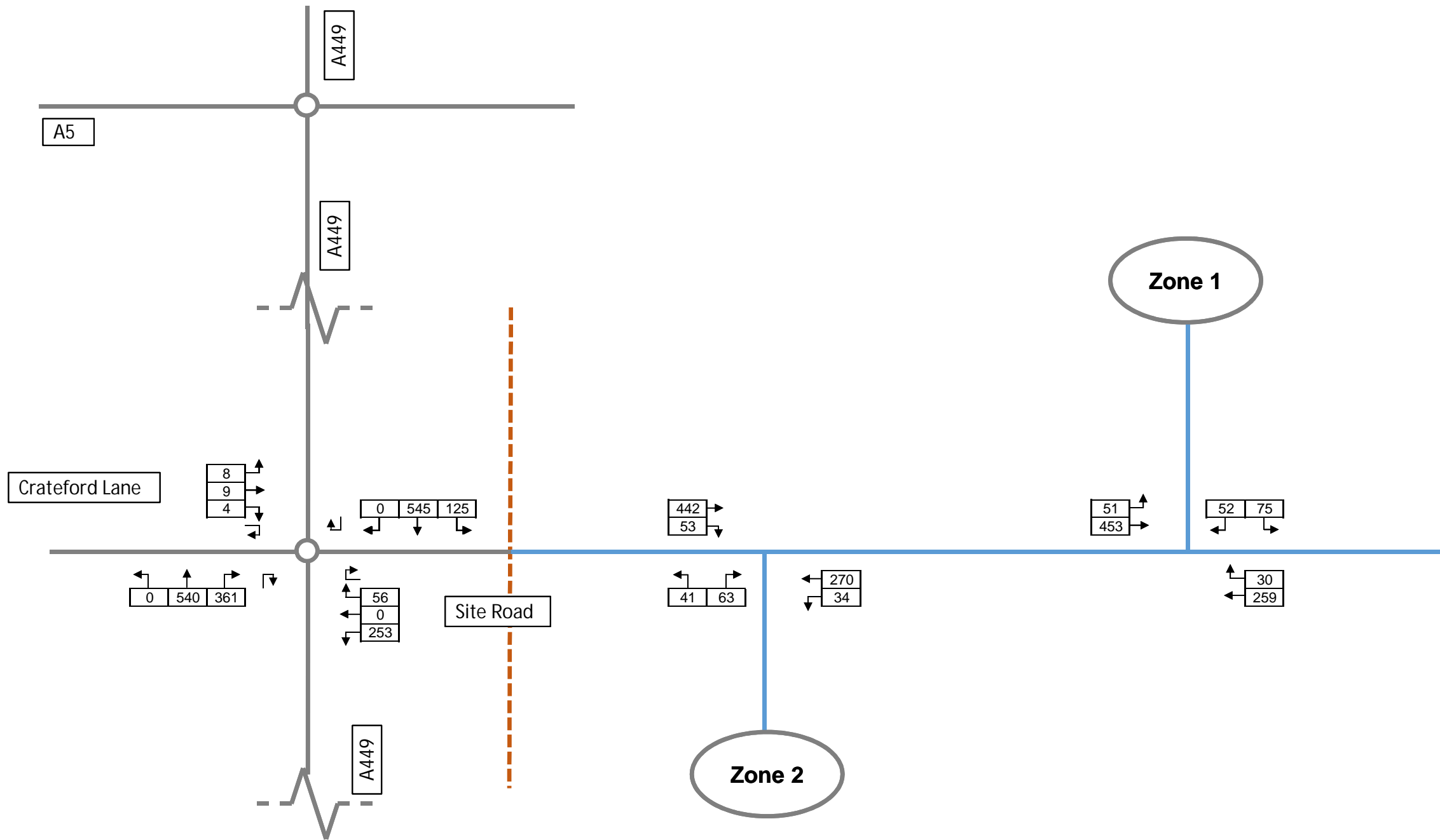


TITLE
2021 DS, SHIFT CHANGE (1300-1400),
HGV TRAFFIC FLOWS
Version 1, 10/10/2017

FIGURE No: **FIGURE T42**



Key	
00	Total Vehicles
	Site
	New road



Data Source: HE VISSIM Model

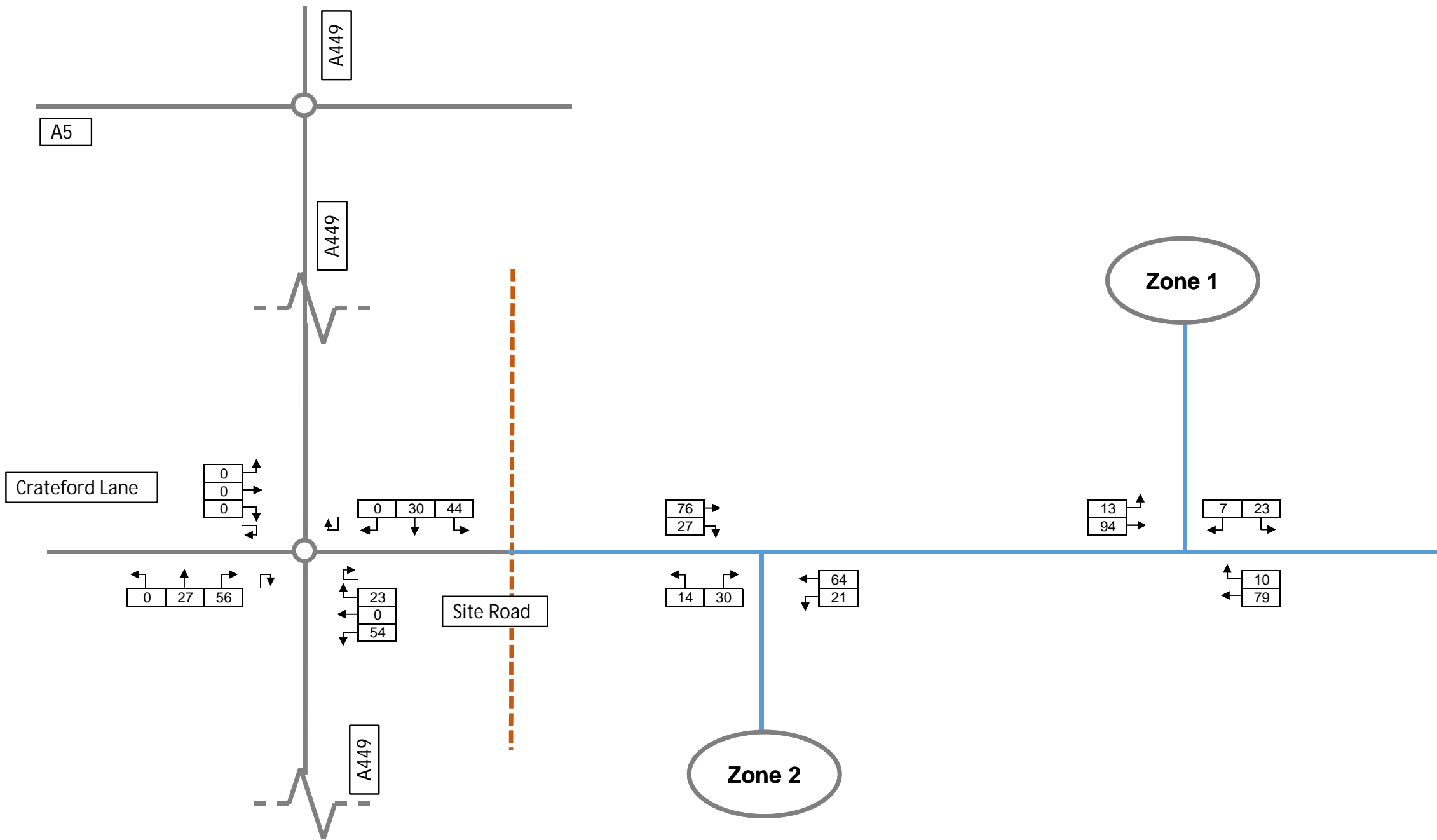


TITLE
2021 DS, SHIFT CHANGE (1400-1500),
ALL VEHICLE TRAFFIC FLOWS Version
1, 10/10/2017

FIGURE No: **FIGURE T43**



Key	
00	HGVs
	Site
	New road



Data Source: HE VISSIM Model



TITLE
2021 DS, SHIFT CHANGE (1400-1500),
HGV TRAFFIC FLOWS
Version 1, 10/10/2017

FIGURE No: **FIGURE T44**

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2017
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk
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Filename: Crateford Lane Roundabout_v2.arc8
Path: S:\70001979 - WMI SRFID Design and Analysis\Development\ARCADY
Report generation date: 07/12/2017 14:15:39

- » **A449 Roundabout Access - 2021 DS, Shift Change 1**
- » **A449 Roundabout Access - 2021 DS, Shift Change 2**

Summary of junction performance

	Shift Change 1				Shift Change 2			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
A449 Roundabout Access - 2021 DS								
A449/A5 Link Road	0.29	5.26	0.22	A	0.48	5.08	0.32	A
A449 South	0.99	3.50	0.50	A	0.96	3.49	0.49	A
Crateford Lane	0.04	5.71	0.04	A	0.04	5.73	0.04	A
A449 North	0.60	3.19	0.38	A	0.66	3.24	0.40	A

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

"D1 - 2021 DS, AM" model duration: 07:45 - 09:15
 "D2 - 2021 DS, PM" model duration: 16:45 - 18:15
 "D3 - 2021 DS, Shift Change 1 " model duration: 12:45 - 14:15
 "D4 - 2021 DS, Shift Change 2" model duration: 13:45 - 15:15

Run using Junctions 8.0.6.541 at 07/12/2017 14:15:37

File summary

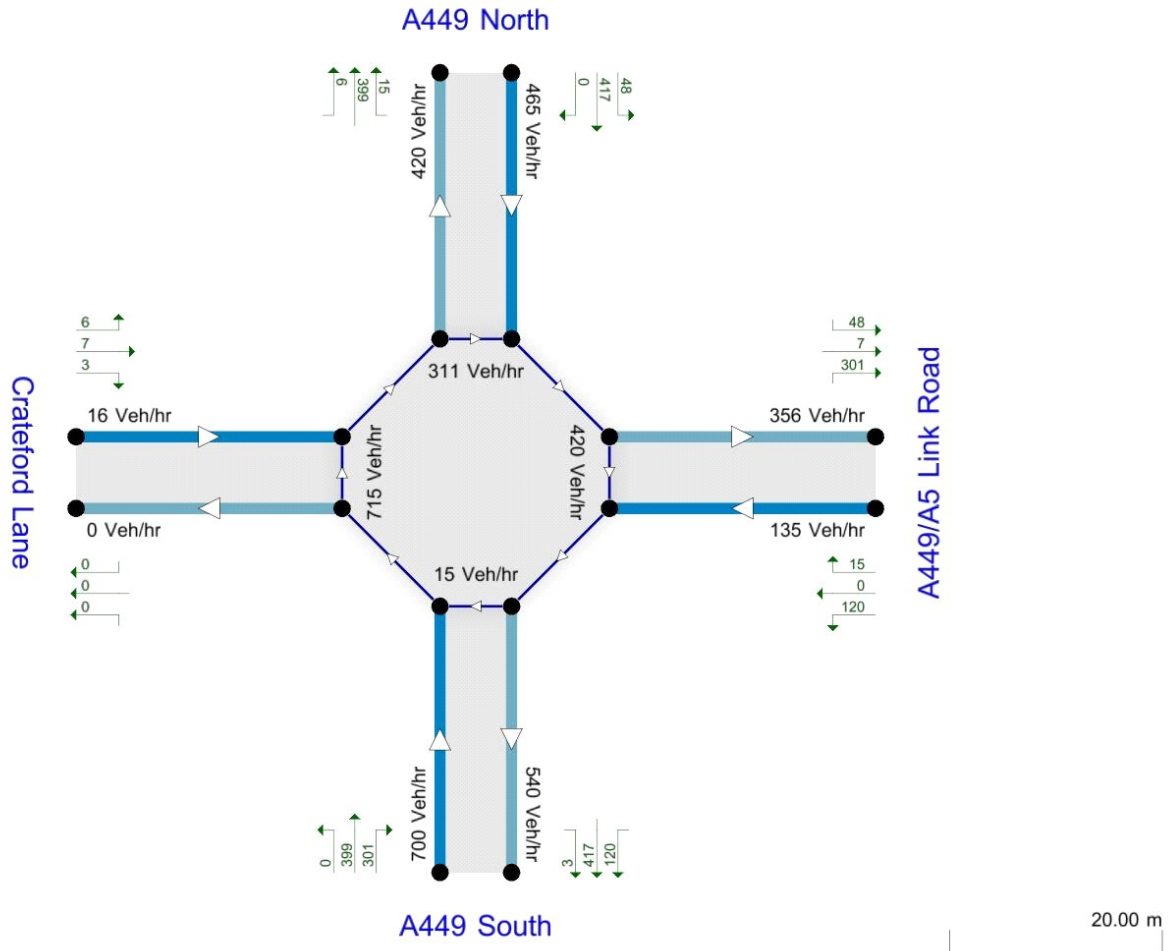
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Location	
Site Number	
Date	18/10/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	UKSJF002
Description	

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



Showing modelled flow through junction (Veh/hr).
 Time Segment: (12:45-13:00)
 Showing Analysis Set "A1 - A449 Roundabout Access"; Demand Set "D3 - 2021 DS, Shift Change 1"

The junction diagram reflects the last run of ARCADY.

A449 Roundabout Access - 2021 DS, Shift Change 1

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
A449 Roundabout Access	ARCADY		✓	✓	D3,D4		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	Relations
2021 DS, Shift Change 1	2021 DS	Shift Change 1		ONE HOUR	12:45	14:15	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				3.67	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A449/A5 Link Road	1	A449/A5 Link Road	
A449 South	2	A449 South	
Crateford Lane	3	Crateford Lane	
A449 North	4	A449 North	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A449/A5 Link Road	0.00	99999.00		0.00
A449 South	0.00	99999.00		0.00
Crateford Lane	0.00	99999.00		0.00
A449 North	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
A449/A5 Link Road	3.50	7.20	24.30	20.00	60.00	36.00	
A449 South	7.30	7.90	5.40	25.00	60.00	33.00	
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	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)
A449/A5 Link Road		(calculated)	(calculated)	0.565	1776.537
A449 South		(calculated)	(calculated)	0.669	2344.537
Crateford Lane		(calculated)	(calculated)	0.476	1224.510
A449 North		(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	2.50				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
A449/A5 Link Road	ONE HOUR	✓	180.00	100.000
A449 South	ONE HOUR	✓	932.00	100.000
Crateford Lane	ONE HOUR	✓	21.00	100.000
A449 North	ONE HOUR	✓	620.00	100.000

Turning Proportions

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

		To			
		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
From	A449/A5 Link Road	0.000	160.000	0.000	20.000
	A449 South	401.000	0.000	0.000	531.000
	Crateford Lane	9.000	4.000	0.000	8.000
	A449 North	64.000	556.000	0.000	0.000

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

		To			
From		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
	A449/A5 Link Road	0.00	0.89	0.00	0.11
	A449 South	0.43	0.00	0.00	0.57
	Crateford Lane	0.43	0.19	0.00	0.38
	A449 North	0.10	0.90	0.00	0.00

Vehicle Mix

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

		To			
From		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
	A449/A5 Link Road	1.000	1.554	1.000	1.856
	A449 South	1.215	1.000	1.000	1.063
	Crateford Lane	1.000	1.000	1.000	1.000
	A449 North	1.212	1.078	1.000	1.000

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

		To			
From		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
	A449/A5 Link Road	0.0	36.9	0.0	57.1
	A449 South	14.3	0.0	0.0	4.2
	Crateford Lane	0.0	0.0	0.0	0.0
	A449 North	14.1	5.2	0.0	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)
A449/A5 Link Road	0.22	5.26	0.29	A	165.17	247.76	19.83	4.80	0.22	19.83	4.80
A449 South	0.50	3.50	0.99	A	855.22	1282.83	65.51	3.06	0.73	65.52	3.06
Crateford Lane	0.04	5.71	0.04	A	19.27	28.90	2.43	5.04	0.03	2.43	5.04
A449 North	0.38	3.19	0.60	A	568.92	853.39	40.29	2.83	0.45	40.29	2.83

Main Results for each time segment

Main results: (12:45-13:00)

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
A449/A5 Link Road	135.51	33.88	134.86	355.80	420.43	0.00	958.14	606.65	0.141	0.00	0.16	4.369	A
A449 South	701.66	175.42	699.61	540.31	14.98	0.00	2061.68	2004.02	0.340	0.00	0.51	2.640	A
Crateford Lane	15.81	3.95	15.73	0.00	714.59	0.00	835.17	87.61	0.019	0.00	0.02	4.393	A
A449 North	466.77	116.69	465.49	419.57	310.75	0.00	1917.56	1472.93	0.243	0.00	0.32	2.477	A

Main results: (13:00-13:15)

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
A449/A5 Link Road	161.82	40.45	161.63	425.77	503.06	0.00	926.46	606.65	0.175	0.16	0.21	4.705	A
A449 South	837.85	209.46	837.18	646.73	17.96	0.00	2058.41	2004.02	0.407	0.51	0.68	2.946	A
Crateford Lane	18.88	4.72	18.85	0.00	855.13	0.00	758.59	87.61	0.025	0.02	0.03	4.866	A
A449 North	557.37	139.34	556.96	502.11	371.87	0.00	1872.36	1472.93	0.298	0.32	0.42	2.737	A

Main results: (13:15-13:30)

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
A449/A5 Link Road	198.18	49.55	197.88	521.26	615.92	0.00	883.18	606.65	0.224	0.21	0.29	5.250	A
A449 South	1026.15	256.54	1024.92	791.81	21.99	0.00	2053.98	2004.02	0.500	0.68	0.99	3.493	A
Crateford Lane	23.12	5.78	23.08	0.00	1046.90	0.00	654.10	87.61	0.035	0.03	0.04	5.704	A
A449 North	682.63	170.66	681.91	614.72	455.26	0.00	1810.68	1472.93	0.377	0.42	0.60	3.188	A

Main results: (13:30-13:45)

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
A449/A5 Link Road	198.18	49.55	198.18	521.88	616.57	0.00	882.93	606.65	0.224	0.29	0.29	5.256	A
A449 South	1026.15	256.54	1026.14	792.73	22.02	0.00	2053.94	2004.02	0.500	0.99	0.99	3.501	A
Crateford Lane	23.12	5.78	23.12	0.00	1048.16	0.00	653.42	87.61	0.035	0.04	0.04	5.710	A
A449 North	682.63	170.66	682.63	615.46	455.82	0.00	1810.28	1472.93	0.377	0.60	0.60	3.191	A

Main results: (13:45-14:00)

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
A449/A5 Link Road	161.82	40.45	162.12	426.73	504.08	0.00	926.07	606.65	0.175	0.29	0.21	4.713	A
A449 South	837.85	209.46	839.07	648.18	18.01	0.00	2058.35	2004.02	0.407	0.99	0.69	2.954	A
Crateford Lane	18.88	4.72	18.92	0.00	857.08	0.00	757.52	87.61	0.025	0.04	0.03	4.875	A
A449 North	557.37	139.34	558.08	503.27	372.73	0.00	1871.73	1472.93	0.298	0.60	0.43	2.743	A

Main results: (14:00-14:15)

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
A449/A5 Link Road	135.51	33.88	135.70	357.20	421.97	0.00	957.55	606.65	0.142	0.21	0.17	4.381	A
A449 South	701.66	175.42	702.35	542.60	15.08	0.00	2061.58	2004.02	0.340	0.69	0.52	2.649	A
Crateford Lane	15.81	3.95	15.83	0.00	717.42	0.00	833.62	87.61	0.019	0.03	0.02	4.403	A
A449 North	466.77	116.69	467.18	421.27	311.99	0.00	1916.64	1472.93	0.244	0.43	0.32	2.485	A

Queueing Delay Results for each time segment
Queueing Delay results: (12:45-13:00)

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
A449/A5 Link Road	2.40	0.16	4.369	A	A
A449 South	7.56	0.50	2.640	A	A
Crateford Lane	0.28	0.02	4.393	A	A
A449 North	4.73	0.32	2.477	A	A

Queueing Delay results: (13:00-13:15)

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
A449/A5 Link Road	3.10	0.21	4.705	A	A
A449 South	10.08	0.67	2.946	A	A
Crateford Lane	0.37	0.02	4.866	A	A
A449 North	6.25	0.42	2.737	A	A

Queueing Delay results: (13:15-13:30)

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
A449/A5 Link Road	4.22	0.28	5.250	A	A
A449 South	14.54	0.97	3.493	A	A
Crateford Lane	0.54	0.04	5.704	A	A
A449 North	8.87	0.59	3.188	A	A

Queueing Delay results: (13:30-13:45)

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
A449/A5 Link Road	4.32	0.29	5.256	A	A
A449 South	14.90	0.99	3.501	A	A
Crateford Lane	0.55	0.04	5.710	A	A
A449 North	9.04	0.60	3.191	A	A

Queueing Delay results: (13:45-14:00)

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
A449/A5 Link Road	3.26	0.22	4.713	A	A
A449 South	10.55	0.70	2.954	A	A
Crateford Lane	0.39	0.03	4.875	A	A
A449 North	6.49	0.43	2.743	A	A

Queueing Delay results: (14:00-14:15)

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
A449/A5 Link Road	2.53	0.17	4.381	A	A
A449 South	7.89	0.53	2.649	A	A
Crateford Lane	0.30	0.02	4.403	A	A
A449 North	4.91	0.33	2.485	A	A

A449 Roundabout Access - 2021 DS, Shift Change 2

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
A449 Roundabout Access	ARCADY		✓	✓	D3,D4		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	Relations
2021 DS, Shift Change 2	2021 DS	Shift Change 2		ONE HOUR	13:45	15:15	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				3.73	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Name	Arm	Name	Description
A449/A5 Link Road	1	A449/A5 Link Road	
A449 South	2	A449 South	
Crateford Lane	3	Crateford Lane	
A449 North	4	A449 North	

Capacity Options

Name	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A449/A5 Link Road	0.00	99999.00		0.00
A449 South	0.00	99999.00		0.00
Crateford Lane	0.00	99999.00		0.00
A449 North	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
A449/A5 Link Road	3.50	7.20	24.30	20.00	60.00	36.00	
A449 South	7.30	7.90	5.40	25.00	60.00	33.00	
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	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)
A449/A5 Link Road		(calculated)	(calculated)	0.565	1776.537
A449 South		(calculated)	(calculated)	0.669	2344.537
Crateford Lane		(calculated)	(calculated)	0.476	1224.510
A449 North		(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	2.50				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
A449/A5 Link Road	ONE HOUR	✓	309.00	100.000
A449 South	ONE HOUR	✓	901.00	100.000
Crateford Lane	ONE HOUR	✓	21.00	100.000
A449 North	ONE HOUR	✓	670.00	100.000

Turning Proportions

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

		To			
		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
From	A449/A5 Link Road	0.000	253.000	0.000	56.000
	A449 South	361.000	0.000	0.000	540.000
	Crateford Lane	9.000	4.000	0.000	8.000
	A449 North	125.000	545.000	0.000	0.000

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

		To			
		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
From	A449/A5 Link Road	0.00	0.82	0.00	0.18
	A449 South	0.40	0.00	0.00	0.60
	Crateford Lane	0.43	0.19	0.00	0.38
	A449 North	0.19	0.81	0.00	0.00

Vehicle Mix

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

		To			
		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
From	A449/A5 Link Road	1.000	1.349	1.000	1.309
	A449 South	1.237	1.000	1.000	1.062
	Crateford Lane	1.000	1.000	1.000	1.000
	A449 North	1.109	1.080	1.000	1.000

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

		To			
From		A449/A5 Link Road	A449 South	Crateford Lane	A449 North
	A449/A5 Link Road	0.0	23.3	0.0	20.6
	A449 South	15.8	0.0	0.0	4.1
	Crateford Lane	0.0	0.0	0.0	0.0
	A449 North	7.2	5.4	0.0	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)
A449/A5 Link Road	0.32	5.08	0.48	A	283.54	425.32	32.00	4.51	0.36	32.00	4.51
A449 South	0.49	3.49	0.96	A	826.77	1240.16	63.20	3.06	0.70	63.20	3.06
Crateford Lane	0.04	5.73	0.04	A	19.27	28.90	2.44	5.06	0.03	2.44	5.06
A449 North	0.40	3.24	0.66	A	614.80	922.20	44.01	2.86	0.49	44.01	2.86

Main Results for each time segment

Main results: (13:45-14:00)

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
A449/A5 Link Road	232.63	58.16	231.61	371.57	412.17	0.00	1136.51	751.83	0.205	0.00	0.26	3.974	A
A449 South	678.32	169.58	676.33	601.80	41.97	0.00	2038.81	1965.94	0.333	0.00	0.50	2.639	A
Crateford Lane	15.81	3.95	15.73	0.00	718.31	0.00	833.55	79.20	0.019	0.00	0.02	4.402	A
A449 North	504.41	126.10	503.02	453.32	280.72	0.00	1947.29	1529.35	0.259	0.00	0.35	2.490	A

Main results: (14:00-14:15)

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
A449/A5 Link Road	277.79	69.45	277.47	444.64	493.17	0.00	1099.70	751.83	0.253	0.26	0.34	4.375	A
A449 South	809.98	202.49	809.33	720.35	50.28	0.00	2032.39	1965.94	0.399	0.50	0.66	2.942	A
Crateford Lane	18.88	4.72	18.85	0.00	859.61	0.00	756.64	79.20	0.025	0.02	0.03	4.879	A
A449 North	602.32	150.58	601.87	542.53	335.94	0.00	1905.49	1529.35	0.316	0.35	0.46	2.761	A

Main results: (14:15-14:30)

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
A449/A5 Link Road	340.22	85.05	339.66	544.36	603.80	0.00	1049.43	751.83	0.324	0.34	0.48	5.067	A
A449 South	992.02	248.00	990.84	881.90	61.56	0.00	2023.67	1965.94	0.490	0.66	0.95	3.483	A
Crateford Lane	23.12	5.78	23.08	0.00	1052.39	0.00	651.71	79.20	0.035	0.03	0.04	5.726	A
A449 North	737.68	184.42	736.88	664.19	411.28	0.00	1848.47	1529.35	0.399	0.46	0.66	3.237	A

Main results: (14:30-14:45)

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
A449/A5 Link Road	340.22	85.05	340.21	545.00	604.45	0.00	1049.13	751.83	0.324	0.48	0.48	5.077	A
A449 South	992.02	248.00	992.00	883.00	61.66	0.00	2023.60	1965.94	0.490	0.95	0.96	3.488	A
Crateford Lane	23.12	5.78	23.12	0.00	1053.66	0.00	651.02	79.20	0.036	0.04	0.04	5.732	A
A449 North	737.68	184.42	737.67	665.01	411.78	0.00	1848.09	1529.35	0.399	0.66	0.66	3.241	A

Main results: (14:45-15:00)

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
A449/A5 Link Road	277.79	69.45	278.34	445.63	494.19	0.00	1099.24	751.83	0.253	0.48	0.34	4.389	A
A449 South	809.98	202.49	811.15	722.08	50.44	0.00	2032.26	1965.94	0.399	0.96	0.67	2.952	A
Crateford Lane	18.88	4.72	18.92	0.00	861.59	0.00	755.56	79.20	0.025	0.04	0.03	4.888	A
A449 North	602.32	150.58	603.11	543.80	336.71	0.00	1904.91	1529.35	0.316	0.66	0.46	2.768	A

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

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
A449/A5 Link Road	232.63	58.16	232.96	373.02	413.69	0.00	1135.82	751.83	0.205	0.34	0.26	3.988	A
A449 South	678.32	169.58	678.98	604.43	42.22	0.00	2038.62	1965.94	0.333	0.67	0.50	2.648	A
Crateford Lane	15.81	3.95	15.84	0.00	721.20	0.00	831.97	79.20	0.019	0.03	0.02	4.412	A
A449 North	504.41	126.10	504.86	455.19	281.85	0.00	1946.44	1529.35	0.259	0.46	0.35	2.497	A

Queueing Delay Results for each time segment
Queueing Delay results: (13:45-14:00)

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
A449/A5 Link Road	3.75	0.25	3.974	A	A
A449 South	7.31	0.49	2.639	A	A
Crateford Lane	0.28	0.02	4.402	A	A
A449 North	5.14	0.34	2.490	A	A

Queueing Delay results: (14:00-14:15)

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
A449/A5 Link Road	4.95	0.33	4.375	A	A
A449 South	9.73	0.65	2.942	A	A
Crateford Lane	0.38	0.03	4.879	A	A
A449 North	6.81	0.45	2.761	A	A

Queueing Delay results: (14:15-14:30)

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
A449/A5 Link Road	6.98	0.47	5.067	A	A
A449 South	14.02	0.93	3.483	A	A
Crateford Lane	0.54	0.04	5.726	A	A
A449 North	9.73	0.65	3.237	A	A

Queueing Delay results: (14:30-14:45)

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
A449/A5 Link Road	7.16	0.48	5.077	A	A
A449 South	14.35	0.96	3.488	A	A
Crateford Lane	0.55	0.04	5.732	A	A
A449 North	9.92	0.66	3.241	A	A

Queueing Delay results: (14:45-15:00)

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
A449/A5 Link Road	5.21	0.35	4.389	A	A
A449 South	10.18	0.68	2.952	A	A
Crateford Lane	0.39	0.03	4.888	A	A
A449 North	7.08	0.47	2.768	A	A

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

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
A449/A5 Link Road	3.95	0.26	3.988	A	A
A449 South	7.62	0.51	2.648	A	A
Crateford Lane	0.30	0.02	4.412	A	A
A449 North	5.33	0.36	2.497	A	A

Junctions 9
PICADY 9 - Priority Intersection Module
Version: 9.0.1.4646 [] © Copyright TRL Limited, 2017
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Filename: Import of Staggered Internal Rd Site Access Junction.j9
Path: S:\70001979 - WMI SRFID Design and Analysis\Development\ARCADY
Report generation date: 07/12/2017 12:01:25

- » Intermodal Terminal Staggered Junction - 2021 DS, Shift1
- » Intermodal Terminal Staggered Junction - 2021 DS, Shift2

Summary of junction performance

	Shift1				Shift2			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
Intermodal Terminal Staggered Junction - 2021 DS								
Stream B-C	0.1	13.94	0.06	B	0.2	12.12	0.13	B
Stream B-AD	0.3	27.08	0.26	D	0.6	29.26	0.36	D
Stream A-BCD	0.2	11.36	0.19	B	0.1	11.12	0.09	B
Stream D-A	0.1	14.61	0.10	B	0.3	14.22	0.25	B
Stream D-BC	0.1	22.21	0.06	C	0.3	21.86	0.26	C
Stream C-ABD	0.1	8.39	0.07	A	0.2	12.74	0.17	B

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

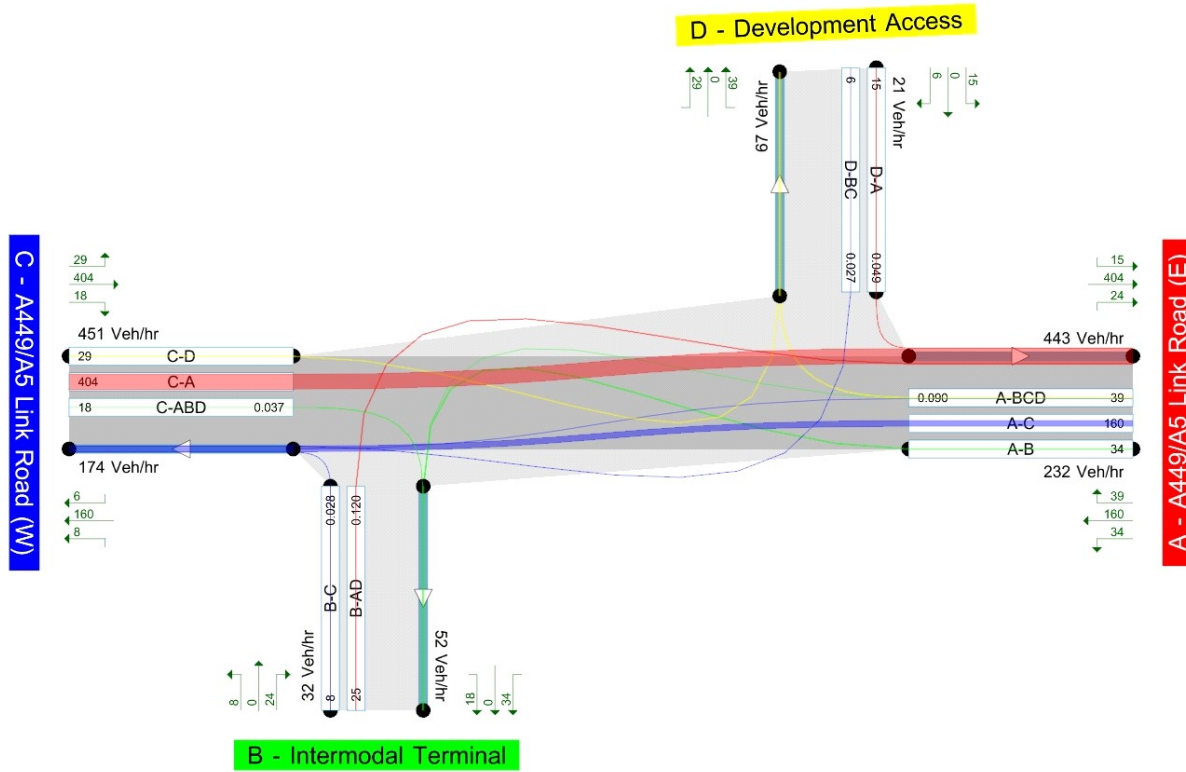
File summary

File Description

Title	(untitled)
Location	
Site number	
Date	20/10/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	UKSJF002
Description	

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



Flow by Exit overlay enabled
 Flows show modelled flow through junction (Veh/hr).
 Streams (upstream end) show Total Demand (Veh/hr); Streams (downstream end) show RFC ()
 Time Segment: 07:45-08:00
 The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2021 DS	AM	ONE HOUR	07:45	09:15	15	✓
D2	2021 DS	PM	ONE HOUR	16:45	18:15	15	✓
D3	2021 DS	Shift1	ONE HOUR	12:45	14:15	15	✓
D4	2021 DS	Shift2	ONE HOUR	13:45	15:15	15	✓

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Intermodal Terminal Staggered Junction	✓	✓	D3,D4	100.000	100.000

Intermodal Terminal Staggered Junction - 2021 DS, Shift1

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Staggered Site Junction	Right-Left Stagger	Two-way	4.16	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	A449/A5 Link Road (E)		Major
B	Intermodal Terminal		Minor
C	A449/A5 Link Road (W)		Major
D	Development Access		Minor

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
A - A449/A5 Link Road (E)	7.00		✓	4.00	136.1	✓	8.00
C - A449/A5 Link Road (W)	7.00		✓	4.00	89.5	✓	10.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - Intermodal Terminal	One lane plus flare	10.00	10.00	8.10	7.40	7.30	✓	3.00	81	75
D - Development Access	One lane plus flare	10.00	10.00	6.40	4.10	3.65	✓	2.00	44	30

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/hr)	Slope for AB	Slope for AC	Slope for AD	Slope for B-A	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-B	Slope for D-C
1	A-D	781	-	-	-	0.289	0.289	0.289	-	0.289	-	-
1	B-AD	650	0.113	0.286	-	-	-	0.180	0.409	0.180	0.113	0.286
1	B-C	709	0.104	0.263	-	-	-	-	-	-	0.104	0.263
1	C-B	748	0.277	0.277	-	-	-	-	-	-	0.277	0.277
1	D-A	741	-	-	-	0.274	0.109	0.274	-	0.109	-	-
1	D-BC	550	0.152	0.152	0.346	0.242	0.096	0.242	-	0.096	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2021 DS	Shift1	ONE HOUR	12:45	14:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.50

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A449/A5 Link Road (E)		ONE HOUR	✓	289	100.000
B - Intermodal Terminal		ONE HOUR	✓	56	100.000
C - A449/A5 Link Road (W)		ONE HOUR	✓	519	100.000
D - Development Access		ONE HOUR	✓	35	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		A - A449/A5 Link Road (E)	B - Intermodal Terminal	C - A449/A5 Link Road (W)	D - Development Access
From	A - A449/A5 Link Road (E)	0	57	166	66
	B - Intermodal Terminal	42	0	14	0
	C - A449/A5 Link Road (W)	440	31	0	48
	D - Development Access	25	0	10	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A449/A5 Link Road (E)	B - Intermodal Terminal	C - A449/A5 Link Road (W)	D - Development Access
From	A - A449/A5 Link Road (E)	0	44	36	27
	B - Intermodal Terminal	85	0	73	0
	C - A449/A5 Link Road (W)	21	25	0	11
	D - Development Access	60	0	37	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-C	0.06	13.94	0.1	B	13	19
B-AD	0.26	27.08	0.3	D	39	58
ABCD	0.19	11.36	0.2	B	61	91
A-B					52	78
A-C					152	228
D-A	0.10	14.61	0.1	B	23	34
D-BC	0.06	22.21	0.1	C	9	14
C-ABD	0.07	8.39	0.1	A	28	43
C-D					44	66
C-A					404	606

Main Results for each time segment

12:45 - 13:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	11	3	297	0.035	10	0.0	0.0	12.535	B
B-AD	32	8	213	0.149	31	0.0	0.2	19.712	C
ABCD	50	12	442	0.112	49	0.0	0.1	9.143	A
A-B	43	11			43				
A-C	125	31			125				
D-A	19	5	312	0.060	19	0.0	0.1	12.280	B
D-BC	8	2	231	0.033	7	0.0	0.0	16.106	C
C-ABD	23	6	489	0.048	23	0.0	0.0	7.729	A
C-D	36	9			36				
C-A	331	83			331				

13:00 - 13:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	13	3	288	0.044	13	0.0	0.0	13.065	B
B-AD	38	9	199	0.190	38	0.2	0.2	22.301	C
ABCD	59	15	420	0.141	59	0.1	0.2	9.968	A
A-B	51	13			51				
A-C	149	37			149				
D-A	22	6	296	0.076	22	0.1	0.1	13.165	B
D-BC	9	2	207	0.044	9	0.0	0.0	18.216	C
C-ABD	28	7	478	0.058	28	0.0	0.1	7.997	A
C-D	43	11			43				
C-A	396	99			396				

13:15 - 13:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	15	4	274	0.056	15	0.0	0.1	13.920	B
B-AD	46	12	179	0.258	46	0.2	0.3	26.918	D
A-BCD	73	18	390	0.186	72	0.2	0.2	11.337	B
A-B	63	16			63				
A-C	183	46			183				
D-A	28	7	274	0.100	27	0.1	0.1	14.585	B
D-BC	11	3	173	0.064	11	0.0	0.1	22.159	C
C-ABD	34	9	463	0.074	34	0.1	0.1	8.392	A
C-D	53	13			53				
C-A	484	121			484				

13:30 - 13:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	15	4	274	0.056	15	0.1	0.1	13.940	B
B-AD	46	12	179	0.258	46	0.3	0.3	27.080	D
A-BCD	73	18	389	0.187	73	0.2	0.2	11.361	B
A-B	63	16			63				
A-C	183	46			183				
D-A	28	7	274	0.100	28	0.1	0.1	14.608	B
D-BC	11	3	173	0.064	11	0.1	0.1	22.212	C
C-ABD	34	9	463	0.074	34	0.1	0.1	8.394	A
C-D	53	13			53				
C-A	484	121			484				

13:45 - 14:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	13	3	288	0.044	13	0.1	0.0	13.091	B
B-AD	38	9	199	0.190	38	0.3	0.2	22.489	C
A-BCD	59	15	420	0.141	60	0.2	0.2	10.000	B
A-B	51	13			51				
A-C	149	37			149				
D-A	22	6	295	0.076	23	0.1	0.1	13.198	B
D-BC	9	2	206	0.044	9	0.1	0.0	18.270	C
C-ABD	28	7	478	0.058	28	0.1	0.1	8.003	A
C-D	43	11			43				
C-A	396	99			396				

14:00 - 14:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	11	3	297	0.035	11	0.0	0.0	12.569	B
B-AD	32	8	213	0.149	32	0.2	0.2	19.923	C
A-BCD	50	12	442	0.112	50	0.2	0.1	9.183	A
A-B	43	11			43				
A-C	125	31			125				
D-A	19	5	311	0.061	19	0.1	0.1	12.326	B
D-BC	8	2	230	0.033	8	0.0	0.0	16.165	C
C-ABD	23	6	489	0.048	23	0.1	0.1	7.737	A
C-D	36	9			36				
C-A	331	83			331				

Intermodal Terminal Staggered Junction - 2021 DS, Shift2

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Staggered Site Junction	Right-Left Stagger	Two-way	5.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2021 DS	Shift2	ONE HOUR	13:45	15:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.50

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A - A449/A5 Link Road (E)		ONE HOUR	✓	334	100.000
B - Intermodal Terminal		ONE HOUR	✓	104	100.000
C - A449/A5 Link Road (W)		ONE HOUR	✓	557	100.000
D - Development Access		ONE HOUR	✓	127	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		A - A449/A5 Link Road (E)	B - Intermodal Terminal	C - A449/A5 Link Road (W)	D - Development Access
From	A - A449/A5 Link Road (E)	0	34	270	30
	B - Intermodal Terminal	63	0	41	0
	C - A449/A5 Link Road (W)	453	53	0	51
	D - Development Access	75	0	52	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A449/A5 Link Road (E)	B - Intermodal Terminal	C - A449/A5 Link Road (W)	D - Development Access
From	A - A449/A5 Link Road (E)	0	62	24	33
	B - Intermodal Terminal	47	0	35	0
	C - A449/A5 Link Road (W)	21	50	0	25
	D - Development Access	30	0	14	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-C	0.13	12.12	0.2	B	38	56
B-AD	0.36	29.26	0.6	D	58	87
A-BCD	0.09	11.12	0.1	B	28	41
A-B					31	47
A-C					248	372
D-A	0.25	14.22	0.3	B	69	103
D-BC	0.26	21.86	0.3	C	48	72
C-ABD	0.17	12.74	0.2	B	49	73
C-D					47	70
C-A					416	624

Main Results for each time segment

13:45 - 14:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	31	8	391	0.079	31	0.0	0.1	9.967	A
B-AD	47	12	251	0.189	47	0.0	0.2	17.539	C
A-BCD	23	6	410	0.055	22	0.0	0.1	9.291	A
A-B	26	6			26				
A-C	203	51			203				
D-A	56	14	399	0.142	56	0.0	0.2	10.475	B
D-BC	39	10	301	0.130	39	0.0	0.1	13.713	B
C-ABD	40	10	369	0.108	39	0.0	0.1	10.925	B
C-D	38	10			38				
C-A	341	85			341				

14:00 - 14:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	37	9	373	0.099	37	0.1	0.1	10.715	B
B-AD	57	14	226	0.250	56	0.2	0.3	21.111	C
A-BCD	27	7	387	0.070	27	0.1	0.1	9.987	A
A-B	31	8			31				
A-C	243	61			243				
D-A	67	17	373	0.181	67	0.2	0.2	11.745	B
D-BC	47	12	268	0.175	47	0.1	0.2	16.255	C
C-ABD	48	12	357	0.134	48	0.1	0.2	11.630	B
C-D	46	11			46				
C-A	407	102			407				

14:15 - 14:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	45	11	343	0.132	45	0.1	0.1	12.071	B
B-AD	69	17	192	0.361	69	0.3	0.5	28.875	D
A-BCD	33	8	357	0.093	33	0.1	0.1	11.104	B
A-B	37	9			37				
A-C	297	74			297				
D-A	83	21	336	0.245	82	0.2	0.3	14.137	B
D-BC	57	14	222	0.258	57	0.2	0.3	21.684	C
C-ABD	58	15	341	0.171	58	0.2	0.2	12.718	B
C-D	56	14			56				
C-A	499	125			499				

14:30 - 14:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	45	11	342	0.132	45	0.1	0.2	12.122	B
B-AD	69	17	192	0.361	69	0.5	0.6	29.265	D
A-BCD	33	8	357	0.093	33	0.1	0.1	11.121	B
A-B	37	9			37				
A-C	297	74			297				
D-A	83	21	336	0.246	83	0.3	0.3	14.216	B
D-BC	57	14	222	0.258	57	0.3	0.3	21.856	C
C-ABD	58	15	341	0.171	58	0.2	0.2	12.740	B
C-D	56	14			56				
C-A	499	125			499				

14:45 - 15:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	37	9	371	0.099	37	0.2	0.1	10.768	B
B-AD	57	14	226	0.250	57	0.6	0.3	21.447	C
A-BCD	27	7	387	0.070	27	0.1	0.1	10.008	B
A-B	31	8			31				
A-C	243	61			243				
D-A	67	17	373	0.181	68	0.3	0.2	11.826	B
D-BC	47	12	267	0.175	47	0.3	0.2	16.399	C
C-ABD	48	12	357	0.134	48	0.2	0.2	11.660	B
C-D	46	11			46				
C-A	407	102			407				

15:00 - 15:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
B-C	31	8	390	0.079	31	0.1	0.1	10.024	B
B-AD	47	12	251	0.189	48	0.3	0.2	17.785	C
ABCD	23	6	409	0.055	23	0.1	0.1	9.317	A
A-B	26	6			26				
A-C	203	51			203				
D-A	56	14	398	0.142	57	0.2	0.2	10.556	B
D-BC	39	10	300	0.131	39	0.2	0.2	13.829	B
C-ABD	40	10	368	0.108	40	0.2	0.1	10.969	B
C-D	38	10			38				
C-A	341	85			341				