Appendix J

TECHNICAL NOTE

Job Name: Fort Halstead

Job No: 41290

Note No: 1

Date: 18/01/2019

Prepared By: MMNejad

Subject: **Trip Generation and Distribution**

Introduction

This technical note sets out the methodology undertaken to estimate the likely trip generation, mode of travel and distribution of trips associated with the proposed development during the peak hour periods (weekday morning peak from 08:00 to 09:00 and weekday evening peak between 17:00 and 18:00). It subsequently outlines the number of trips generated by each of the development uses, and the distribution of the vehicle trips over the local highway network.

The trip generation assessment focuses on the proposed new residential and commercial uses, which account for the majority of the trips. The development includes a number of other minor uses that will be located within the small village centre or adjacent to the fort. This comprises local facilities including village shop, community facilities which could include healthcare and a Historic Interpretation Centre of the Fort. However, these are likely to generate only a small number of trips, most of which would be internal within the site, or at weekends.

The trip generation estimates have been based on a combination of onsite surveys undertaken as part of the Transport Assessment (TA) for the consented Outline Planning Application (OPA) and data from the TRICS database. Mode share estimates have been informed by local surveys, TRICS data and Census data for journey to work.

Overall methodology

Residential Trip Generation

The TRICS database has been used to provide trip rates for the residential component of the proposed development. With regard to the previous trip generation assessment undertaken as part of the OPA, it has been agreed with KCC that the TRICS surveys used are likely to be outdated and should be updated to include surveys undertaken up to five years ago.

The assessment of trip generation figures uses the industry standard TRICS database with sites selected because of similar trip generating characteristics; situated in a predominately out of town location, more than 200 privately owned houses and with access to a bus stop. The following criteria was used in the selection of sites:

- Land Use – Residential, privately owned houses;

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
Job No/Brief/TN001	-	27.06.12				
Job No/Brief/TN001	A	07.08.12				

Peter Brett Associates LLP 33 Bowling Green Lane London EC1R 0BJ
T: +44 (0)20 3824 6600 E: london@peterbrett.com

- Categories - C3;
- Regions – England excluding Greater London;
- Survey type – Multi Modal;
- Range – 200 to 805;
- Survey Days – Monday to Friday.

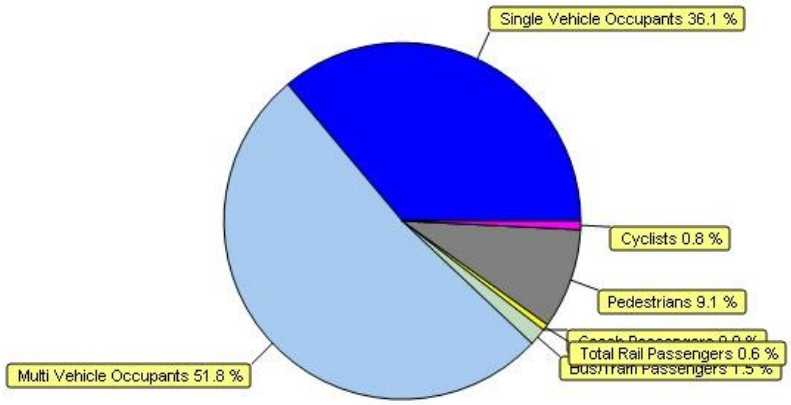
A summary of the TRICS sites selected based on the criteria set out above has been shown in Table 1.

Table 1: Selected Residential Sites from TRICS (including two-way 12-hour trips)

Site Reference	Borough	Units	Parking	Daily Person trips/ Unit	Similarities	Differences
ES-03-A-03	East Sussex	212	357	8.698	Bus stop within 400m	1/3 not privately owned
KC-03-A-06	Kent	363	789	7.419	Bus stop within 400m	All private
KC-03-A-07	Kent	288	891	11.292	Bus stop within 400m	All private
NE-03-A-02	North East	432	432	6.120	Bus stop within 400m	All private
ST-03-A-07	Staffordshire	148	881	6.804	Bus stop within 400m	All private
WS-03-A-06	West Horsham	805	1726	4.993	Bus stop within 400m	19% not privately owned

The modal split percentages from the multi-modal survey results are provided within Figure 1. As can be seen, motor vehicles are the dominant mode of transport making up 87.9% of journeys recorded. However, for a robust assessment of vehicle trip generation, the person trips rates from the TRICS sites have been used along with the assumed mode shares to be applied (Table 4) in order to estimate residential vehicle trip generation. This methodology is in line with the OPA TA and ensures that non-vehicle trips are not over estimated.

Figure 1: Modal Split from Multi-Modal



The person trips based on the TRICS surveys listed in Table 1, have been set out in Table 2.

Table 2: Peak Hour Trip Rates minus OGV Trip Rates

Time	Trip Rates (per unit)		
	Arrive	Depart	2-Way
08:00 – 09:00	0.191	0.827	1.018
17:00 – 18:00	0.637	0.297	0.934

Commercial Development

The commercial vehicle trip generation has been calculated based on traffic surveys undertaken on site as part of the OPA TA work. Trip rates were calculated from the survey results by comparing against the 1,000 employees that were known to be employed at the time of survey. Since the surveys included the traffic associated with the small residential community (72 homes), the traffic associated with that use has been removed in order to provide a more accurate estimate of trips generated by the commercial development only. This was done by reference to appropriate TRICS data for residential sites.

1.1.1 A summary of the vehicle trip rates per job for the commercial development is displayed in Table 3 below. These are the same trip rates as the consented OPA commercial trip rates.

Table 3: Trip Rates for Commercial Development

Commercial Trip Rates based on OPA 2014 Surveys (1,000 Employed on site)	AM peak (08:00 to 09:00)		PM peak (17:00 to 18:00)	
	In	Out	In	Out
Vehicle trip rate per job	0.295	0.030	0.019	0.230

Modal Split

For the residential element of the proposed development, the modal splits associated with the consented OPA have been adopted. The OPA TA modal splits are based on a combination of 'journey to work' 2011 Census data, TRICS survey modal splits and knowledge of the local transport network characteristics. Particular consideration was given to the fact that the site has poor public transport connectivity and that vehicles are likely to be the dominant mode choice in the absence of a transport strategy or travel plan measures. It should be noted that the general level of public transport provision has remained similar compared to 2015.

The proposed modal split to be applied to the TRICS person trip rates has been presented in Table 4 below, and, the detailed methodology and assumptions are available in Appendix H of the OPA TA (2015).

Table 4: Proposed Mode Splits to be Applied to Residential Person Trips

Mode	AM		PM	
	In	Out	In	Out
Public transport (bus, coach and all rail)	1%	12%	3%	3%
Private car and taxis	91%	83%	84%	85%
Drivers (% of total mode split)	*59%*	*51%*	*66%*	*64%*
Passengers (% of total mode split)	*32%*	*32%*	*18%*	*21%*
Powered two-wheeler	2%	1%	2%	2%
Bicycle	2%	1%	3%	2%
Pedestrians (including 'others')	4%	3%	8%	8%
Total	**100%**	**100%**	**100%**	**100%**

Summary Trip Generation

The peak hour total trip generation for the residential and commercial proposals of the proposed development have been provided within Table 5.

Table 5: Peak Hour Residential Trip Generation Summary

Land Use/ Trip Type	AM (08:00 – 09:00)		PM (17:00 – 18:00)	
	Arr	Dep	Arr	Dep
Residential Use (750 units)				
Person trip rate per unit	0.191	0.827	0.637	0.297
Person trip Generation	143	620	478	223
Car Driver Share	59%	51%	66%	64%
Total Vehicle Trips	85	315	316	143
Commercial Use (1,483 jobs)				
Vehicle trip rate per job	0.295	0.030	0.019	0.230
Vehicle (driver) trips	437	45	29	341
Total Vehicle Trips				
Total Vehicle Trips	522	360	345	485
Uplift From OPA	40	118	130	27

Trip Distribution

A detailed trip distribution and assignment analysis has been undertaken. The methodology and key outcomes are summarised below:

- The distribution of the vehicle trips generated by the development during the peak hours has been based on journey to work origin-destination data from the 2011 National Census.
- Only the car/van driver mode of travel to work has been used to account for the impact on the highway network. Most of the other modes have negligible numbers of trips according to the census with the notable exception of train, which is dominant for commuter trips to/from London. However, such trips will mainly occur outside the morning and evening peak hour periods.
- For the residential element, the proportions that apply are those referring to residents in Sevenoaks 008 who work elsewhere. The site boundary in relation to Sevenoaks 008 is presented in Figure A1 within Appendix A. Whilst the site straddles two supper output areas, it was considered that MSOA 008 best represents the more rural nature of the site whereas 011 includes most of the Sevenoaks urban area.
- For the commercial development, the relevant proportions are those of workers in the Sevenoaks 008 MSOA living elsewhere.

Seventeen feed points to the highway network were defined to represent the origin/ destination of all journeys to/from the site within the surrounding highway network under consideration. The number of trips feeding from each point from/ to each MSOA has been based on journey to work origin-destination data from the 2011 National Census.

The location of the feed points has been shown in Figure A2 within Appendix A.

Traffic Assignment

The assignment of vehicle trips to the local highway network, and hence each feed point, has been based on GIS journey time data for the for the AM and PM peak hours to and from the site access points.

GIS data is not available for the highway network within the site and so journey times for the internal element of trips has been estimated based on the proposed speed limit for the different links/ proposed traffic calming measures. Given the size of the site, the masterplan area has been disaggregated into 22 zones and journey times estimated from each zone's internal access point to each of the two site access points based on the current masterplan.

The final assignment of trips to/from each internal zone from/to each feed point is subsequently determined by considering both the journey time from each internal zone to the site access points and the journey time from the site access points to the 17 feed points.

It should be noted that this method is likely to under-estimate the number trips using the main Polhill access as it does not consider of deterrence factors associated with routing via narrow country lanes other than speed.

The expected number vehicle trips to/from each feed point and the site access used has been shown in Table 6 for the AM peak hour and Table 7 for the PM peak hour

The distributed vehicle trip generation has been shown on Figure B1 and Figure B2 within Appendix B for the AM and PM peak hours respectively.

Table 6: Total Vehicle Trip Generation to/from Each Feed Point (AM Peak Hour)

Feed Point	IN		OUT	
	North Access	South Access	North Access	South Access
1	4	4	3	3
2	11	12	9	12
3	0	14	0	9
4	0	5	0	4
5	0	9	0	7
6	5	0	4	0
7	39	42	24	31
8	2	3	2	3
9	15	16	13	16
10	22	17	26	6
11	25	20	24	6
12	15	0	5	0
13	37	0	20	1
14	56	0	34	0
15	6	0	3	0
16	0	0	0	0
17	144	0	96	0
Total	380	142	263	97

Table 7: Total Vehicle Trip Generation to/from Each Feed Point (PM Peak Hour)

Feed Point	IN		OUT	
	North Access	South Access	North Access	South Access
1	3	3	4	4
2	9	12	11	12
3	0	8	0	12
4	0	4	0	4
5	0	7	0	9
6	3	0	4	0
7	23	29	36	39
8	2	3	2	3
9	12	15	14	16
10	26	5	23	14
11	24	5	25	17
12	4	0	12	0
13	18	1	33	0
14	32	0	51	0
15	3	0	5	0
16	0	0	0	0
17	92	0	133	0
Total	252	93	353	132

TECHNICAL NOTE

Appendix A - Figures

Figure A1: Site Location in relation to MSOA Sevenoaks 008

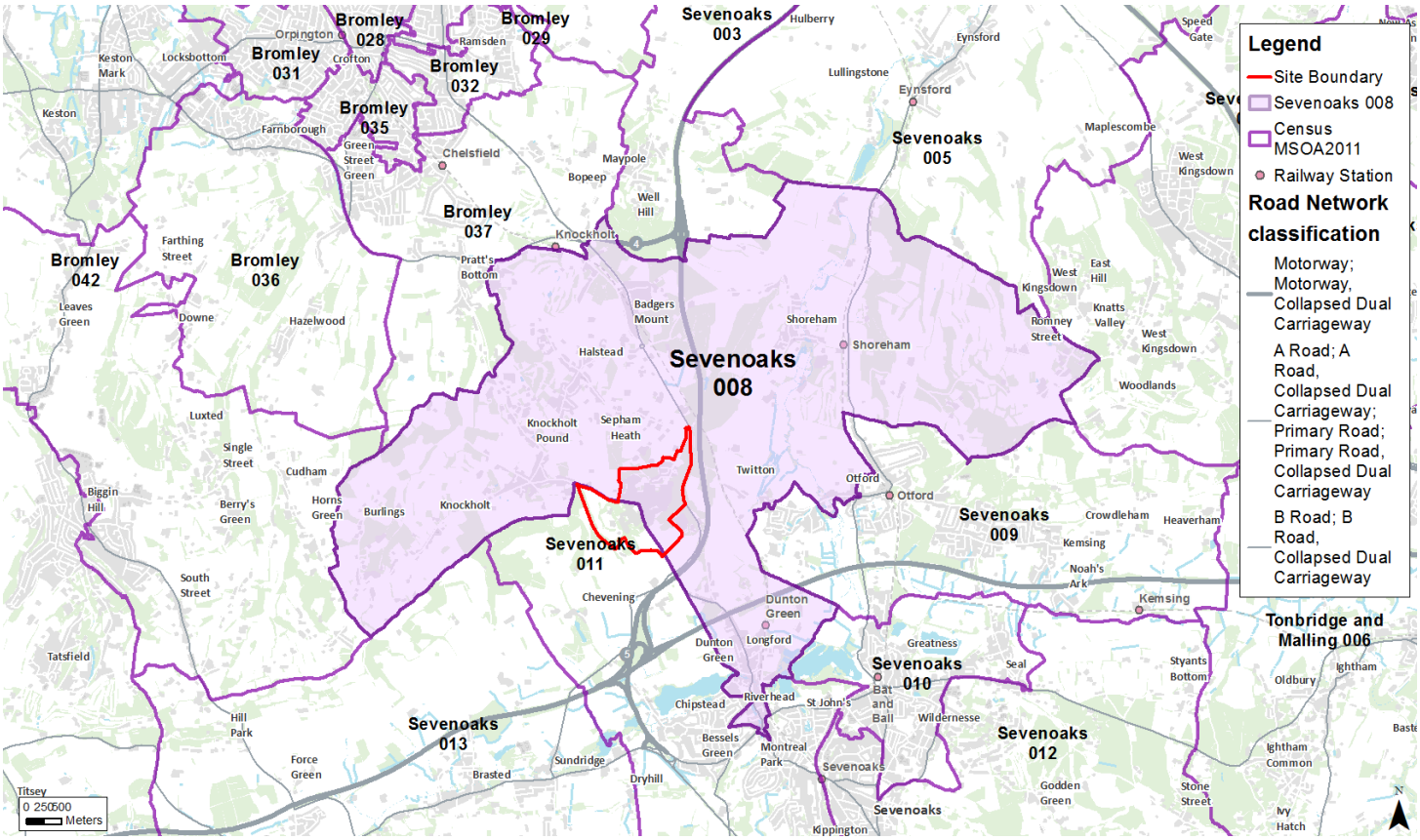
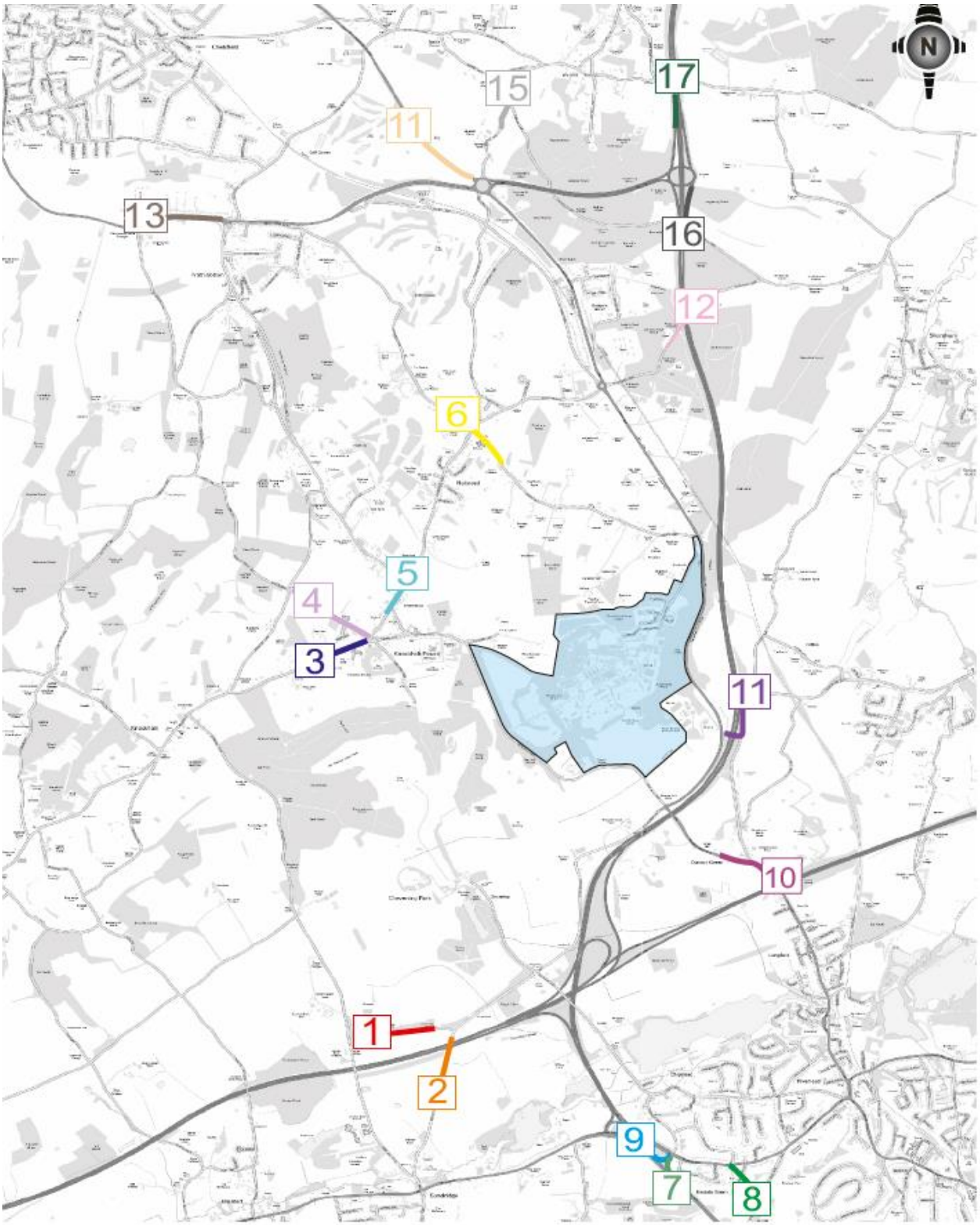


Figure A2: Location of Feed Points used for Traffic Assignment



Appendix B – Trip Generation Network Diagrams

Figure B1 Fort Halstead Development Vehicle Flows AM Peak (0800-0900)

Note: Numbers in the red box represent the different feed points, as defined within the report

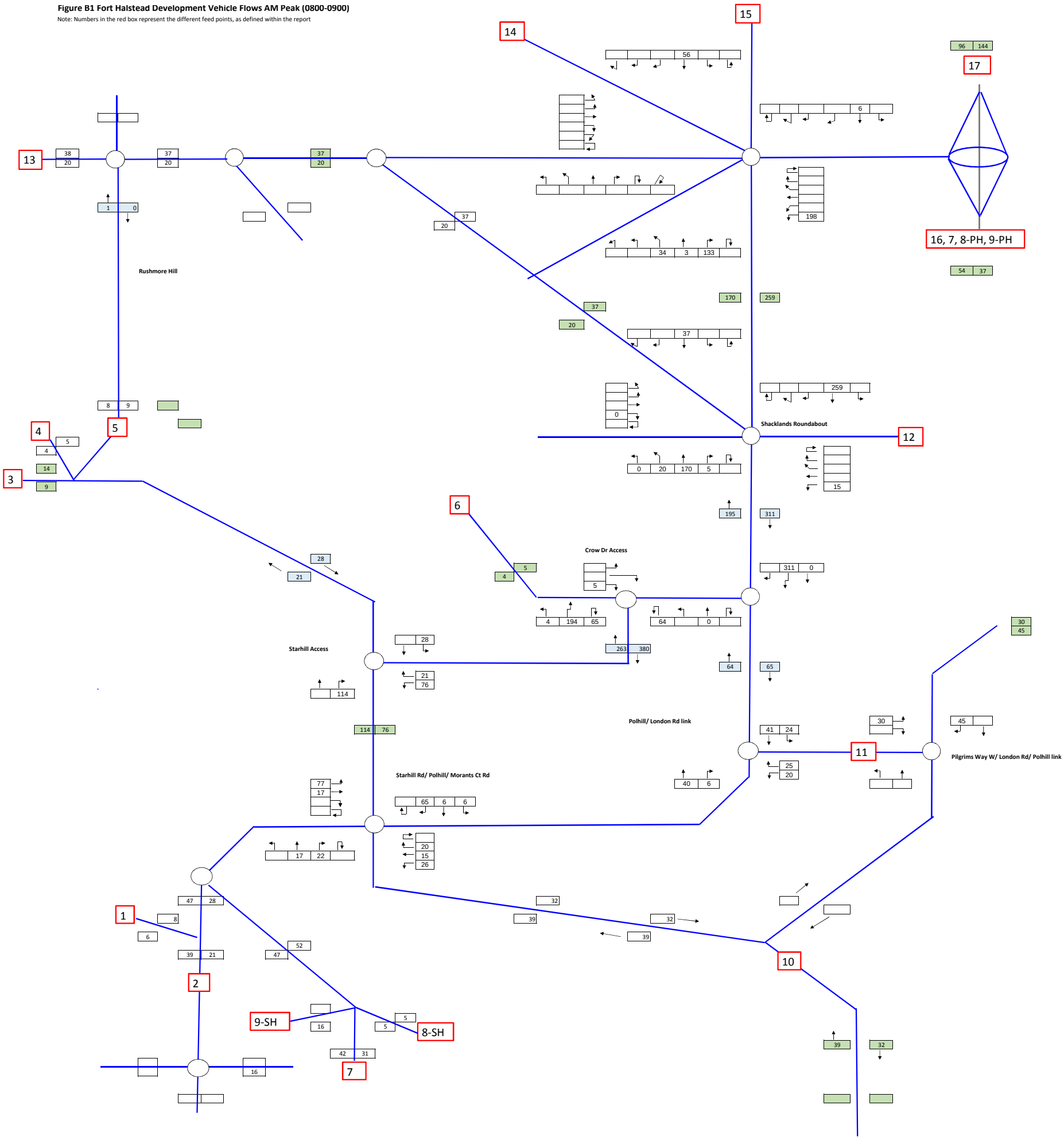
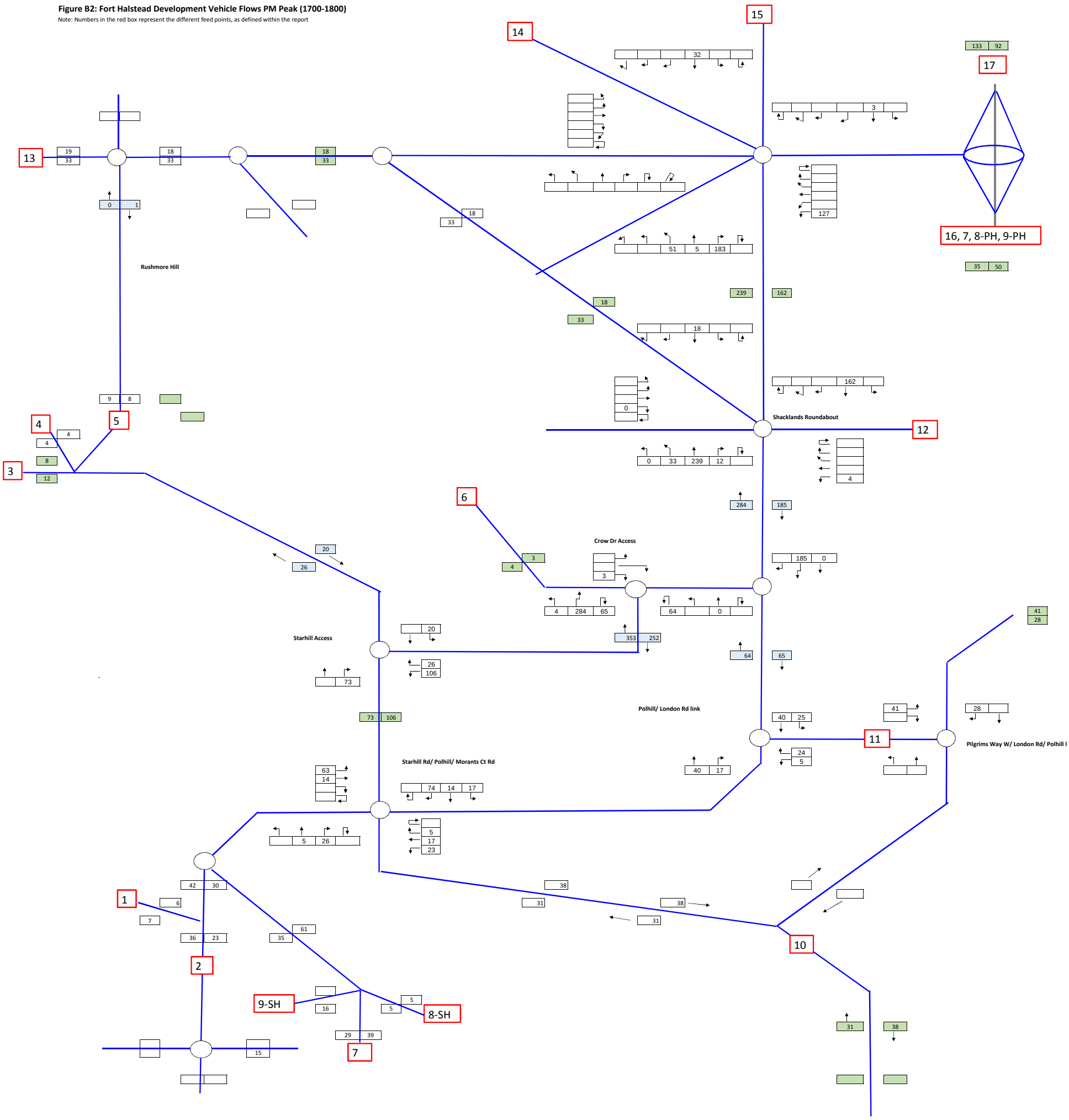


Figure B2: Fort Halstead Development Vehicle Flows PM Peak (1700-1800)

Note: Numbers in the red box represent the different feed points, as defined within the report



Appendix K

TECHNICAL NOTE

Job Name: Fort Halstead

Job No: 41290

Note No: 002

Date: 08/05/19

Prepared By: MMNejad **Checked: RRP**

Subject: **Primary School Highway Impact Review**

1. Introduction

1.1. Kent County Council (KCC) have requested for land to safeguarded within the Fort Halstead site for a potential primary school which is intended to primarily serve the future residents of Fort Halstead once developed.

1.2. This technical note provides a high-level review of impacts associated with the potential primary school proposals within Fort Halstead and sets out the proposed assessment approach for the Fort Halstead Transport Assessment with regard to the primary school.

2. School Proposals and Assumptions

2.1. Based on discussions with KCC and a review of requirements and constraints on site, a potential primary school on site would comprise the following:

- The primary school will be a 1 form entry comprehensive which would primarily cater for demand generated from Fort Halstead;
- The indicative location of the primary school is shown on Figure A1 in Appendix A;
- A drop-off facility would be provided on site which would help reduce short-term congestion on Crow Drive.

2.2. In terms of the demand generated by Fort Halstead for primary school spaces, it is assumed that the proposed development would generate a demand for 210 primary school spaces once fully developed. This is based on pupil product rate (PPR) calculations from KCC for 750 units.

2.3. Based on discussions with KCC, it is assumed that 81% of children from Fort Halstead would attend comprehensive school with the remaining 19% split across public schools, special educational needs and disability schools (SEN), hospital schools and home schooling. Fort Halstead would, therefore, generate demand for 170 comprehensive primary school spaces which would all be provided at the proposed school on site.

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
41290/TN002	-	16/05/19	MMN	RP	RP	RP

Peter Brett Associates LLP 33 Bowling Green Lane London EC1R 0BJ
T: +44 (0)20 3824 6600 E: london@peterbrett.com

2.4. It is assumed that the school would employ 38 full-time staff based on staff headcounts from 9 primary schools in Sevenoaks that are of comparable size.

3. Primary School Trip Generation

3.1. A high-level vehicle trip generation exercise has been undertaken for both the scenario of having a primary school provided on site (With School Scenario) and the scenario of no primary school provided on site (No School Scenario). The purpose of this assessment is to compare the external trip generation between the two scenarios and inform the approach regarding the highway impact assessments for the Transport Assessment. As such, various assumptions have been made for the two scenarios for simplicity:

- Whilst the school is expected to cater almost exclusively for the demand generated onsite, the trip generation assessments for the school assumes that 20% of the total school spaces in 2035 (highways impact assessment year) would be external and would originate from Halstead and Knockholt Pound. This would equate to a demand of approximately 40 spaces from outside of the site in addition to the demand of 170 spaces from Fort Halstead.
- It is assumed that the school would operate at 100% capacity in 2035 (the assessment year for the TA).
- A mode share of 100% by car has been assumed for all trips to and from school that involve travel beyond the Fort Halstead site.
- Each car trip represents one child, i.e. multiple children are not dropped off together.
- No linked trips have been assumed and parents would return home upon dropping/picking up children to school.
- Both the outgoing drop-off/pick-up and return home trips would occur within the school peak hours.
- All staff assumed to live outside of the site.

3.2. It should be noted that the assumptions set out above would not be adopted within the Transport Assessment and are only used to assess the relative difference in trip generation between the two scenarios.

3.3. The indicative vehicular trip generation for the With School Scenario and No School Scenario have been presented in Table 1 and 2.

Table 1: High-Level Vehicle Trip Generation for the With School Scenario

Primary School Provided On-Site	School AM Peak Hour		School PM Peak Hour	
	IN	Out	IN	Out
External trips to school on site	78	40	40	78
External trips from Fort Halstead to schools off site	40	40	40	40
Total	**118**	**80**	**80**	**118**

Table 2: High-Level Vehicle Trip Generation for the No School Scenario

No Primary School On-Site	School AM Peak Hour		School PM Peak Hour	
	IN	Out	IN	Out
External trips from Fort Halstead to schools off site	210	210	210	210

3.4. As can be seen from above, the No School Scenario would result in a substantially higher number of external school trips and would therefore represent the worst-case scenario on transport grounds. It should be noted that applying different assumptions to those set out in Paragraph 3.1 would affect both scenarios and would be unlikely to affect the relative difference between the two scenarios.

3.5. It is noted that, if no primary school is provided on site, then the Travel Plan strategy is likely to include measures to encourage children to use the community bus to travel to a nearby external primary school. Whilst this would reduce the number of car trips associated with the no on site school scenario, the TA will test as a worst case the impacts with no use of the community bus for school travel.

4. Next Steps and Proposed Approach for Transport Assessment

4.1. Details regarding the school proposals including the location, site layout and parking proposals would be agreed with KCC and presented in the Transport Assessment. This would include the arrangement of the drop off/shared space areas and delivery and servicing considerations.

4.2. Based on the information presented in this technical note, it is proposed that only the worst-case scenario with no primary school provided on site is tested in the Fort Halstead Transport Assessment with regard to trip generation, distribution and highway impact assessments.

TECHNICAL NOTE

Appendix A – Indicative Location of the Primary School Within the Site

Figure A1: Indicative Location of Primary School

Appendix L

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Hewitts Roundabout_Base (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\ARCADY\Hewitts Roundabout
Report generation date: 07/05/2020 11:40:56

»Existing layout - 2018 Baseline, AM Peak
»Existing layout - 2018 Baseline, PM Peak
»Existing layout - 2035 FB, AM Peak
»Existing layout - 2035 FB, PM Peak
»Existing layout - 2035 FB + Dev, AM Peak
»Existing layout - 2035 FB + Dev, PM Peak
»Existing layout - 2035 FB Sensitivity, AM Peak
»Existing layout - 2035 FB Sensitivity, PM Peak

Summary of junction performance

	AM Peak					PM Peak				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing layout - 2018 Baseline									
A - A224 Orpington BP	D1	0.7	6.18	0.40	A	D2	0.7	4.68	0.39	A
B - Wheatsheaf Hill		1.4	46.03	0.58	E		0.2	8.95	0.16	A
C - A21 Sevenoaks Rd		0.6	2.42	0.37	A		0.9	2.47	0.46	A
D - A224 Court Rd		1.2	4.69	0.53	A		3.0	10.29	0.75	B
E - Hewitts Rd		0.1	8.32	0.11	A		0.3	18.01	0.25	C
F - M25		3.0	4.28	0.74	A		1.2	2.27	0.53	A
	Existing layout - 2035 FB									
A - A224 Orpington BP	D3	3.0	17.89	0.75	C	D4	2.6	11.52	0.72	B
B - Wheatsheaf Hill		64.2	1667.58	9999999999.00	F		0.5	18.76	0.32	C
C - A21 Sevenoaks Rd		0.8	2.89	0.44	A		1.4	3.44	0.58	A
D - A224 Court Rd		2.0	6.92	0.66	A		57.9	145.43	1.08	F
E - Hewitts Rd		0.2	12.72	0.19	B		14.6	585.37	1.64	F
F - M25		11.8	14.31	0.93	B		1.9	3.08	0.65	A
	Existing layout - 2035 FB + Dev									
A - A224 Orpington BP	D5	3.8	21.62	0.79	C	D6	2.4	10.79	0.70	B
B - Wheatsheaf Hill		64.3	1689.04	9999999999.00	F		0.4	18.00	0.31	C
C - A21 Sevenoaks Rd		0.8	2.94	0.45	A		1.4	3.39	0.57	A
D - A224 Court Rd		2.1	7.14	0.67	A		55.1	138.07	1.07	F
E - Hewitts Rd		0.3	13.23	0.20	B		12.8	510.43	1.49	F
F - M25		10.8	13.15	0.92	B		1.9	3.16	0.66	A
	Existing layout - 2035 FB Sensitivity									
A - A224 Orpington BP	D7	1.7	11.65	0.62	B	D8	3.6	14.80	0.79	B
B - Wheatsheaf Hill		48.0	5239.30	5.06	F		0.5	21.73	0.35	C
C - A21 Sevenoaks Rd		0.8	2.70	0.43	A		1.4	3.59	0.59	A
D - A224 Court Rd		2.1	6.94	0.68	A		70.1	173.28	1.11	F
E - Hewitts Rd		0.3	12.41	0.20	B		13.8	658.29	1.75	F
F - M25		22.2	26.08	0.97	D		1.7	2.86	0.62	A

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

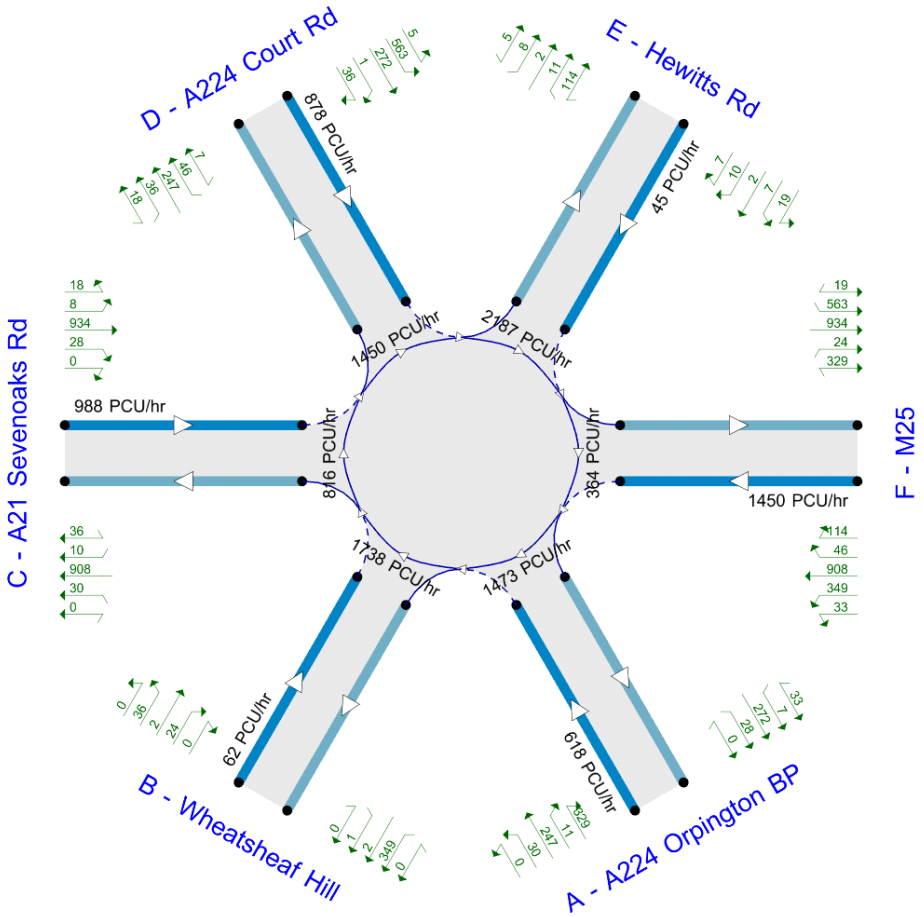
File summary

File Description

Title	Hewitts roundabout
Location	Sevenoaks
Site number	1
Date	29/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41290
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



Flows show modelled flow through junction (PCU/hr).
Time Segment: 16:45-17:00

The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing layout	100.000

Existing layout - 2018 Baseline, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	5.17	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	A224 Orpington BP	
B	Wheatsheaf Hill	
C	A21 Sevenoaks Rd	
D	A224 Court Rd	
E	Hewitts Rd	
F	M25	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - A224 Orpington BP	4.80	11.32	10.5	77.2	122.0	8.0	
B - Wheatsheaf Hill	2.71	6.53	6.0	21.3	122.0	16.0	
C - A21 Sevenoaks Rd	9.51	13.75	6.9	15.4	122.0	31.0	
D - A224 Court Rd	4.33	11.02	17.0	56.2	122.0	24.0	
E - Hewitts Rd	2.00	6.90	10.3	78.8	122.0	10.0	
F - M25	9.86	15.14	8.6	48.6	122.0	19.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - A224 Orpington BP	0.561	2354
B - Wheatsheaf Hill	0.396	1264
C - A21 Sevenoaks Rd	0.658	3255
D - A224 Court Rd	0.544	2325
E - Hewitts Rd	0.416	1321
F - M25	0.746	3763

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

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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	369	100.000
B - Wheatsheaf Hill		✓	103	100.000
C - A21 Sevenoaks Rd		✓	830	100.000
D - A224 Court Rd		✓	836	100.000
E - Hewitts Rd		✓	53	100.000
F - M25		✓	2318	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	3	39	214	7	106
	B - Wheatsheaf Hill	1	0	2	49	2	49
	C - A21 Sevenoaks Rd	35	1	0	29	9	756
	D - A224 Court Rd	265	7	47	0	9	508
	E - Hewitts Rd	13	1	11	9	9	10
	F - M25	237	72	1381	602	26	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	5	5	5	5	5
	B - Wheatsheaf Hill	5	0	5	5	5	5
	C - A21 Sevenoaks Rd	5	5	0	5	5	5
	D - A224 Court Rd	5	5	5	0	5	5
	E - Hewitts Rd	5	5	5	5	0	5
	F - M25	5	5	5	5	5	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.40	6.18	0.7	A
B - Wheatsheaf Hill	0.58	46.03	1.4	E
C - A21 Sevenoaks Rd	0.37	2.42	0.6	A
D - A224 Court Rd	0.53	4.69	1.2	A
E - Hewitts Rd	0.11	8.32	0.1	A
F - M25	0.74	4.28	3.0	A

Existing layout - 2018 Baseline, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	4.70	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)
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	459	100.000
B - Wheatsheaf Hill		✓	73	100.000
C - A21 Sevenoaks Rd		✓	1149	100.000
D - A224 Court Rd		✓	982	100.000
E - Hewitts Rd		✓	60	100.000
F - M25		✓	1661	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	0	38	238	7	176
	B - Wheatsheaf Hill	0	0	0	42	3	28
	C - A21 Sevenoaks Rd	30	0	0	21	9	1089
	D - A224 Court Rd	273	2	42	0	7	658
	E - Hewitts Rd	8	3	11	8	8	22
	F - M25	10	407	1057	54	133	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	2	2	2	2	2
	B - Wheatsheaf Hill	2	0	2	2	2	2
	C - A21 Sevenoaks Rd	2	2	0	2	2	2
	D - A224 Court Rd	2	2	2	0	2	2
	E - Hewitts Rd	2	2	2	2	0	2
	F - M25	2	2	2	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.39	4.68	0.7	A
B - Wheatsheaf Hill	0.16	8.95	0.2	A
C - A21 Sevenoaks Rd	0.46	2.47	0.9	A
D - A224 Court Rd	0.75	10.29	3.0	B
E - Hewitts Rd	0.25	18.01	0.3	C
F - M25	0.53	2.27	1.2	A

Existing layout - 2035 FB, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	46.02	E

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)
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	565	100.000
B - Wheatsheaf Hill		✓	115	100.000
C - A21 Sevenoaks Rd		✓	942	100.000
D - A224 Court Rd		✓	966	100.000
E - Hewitts Rd		✓	63	100.000
F - M25		✓	2842	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	3	44	272	10	236
	B - Wheatsheaf Hill	1	0	2	55	2	55
	C - A21 Sevenoaks Rd	35	1	0	33	10	863
	D - A224 Court Rd	315	8	53	0	10	580
	E - Hewitts Rd	18	1	13	10	10	11
	F - M25	467	82	1576	687	30	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	5	5	5	5	5
	B - Wheatsheaf Hill	5	0	5	5	5	5
	C - A21 Sevenoaks Rd	5	5	0	5	5	5
	D - A224 Court Rd	5	5	5	0	5	5
	E - Hewitts Rd	5	5	5	5	0	5
	F - M25	5	5	5	5	5	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.75	17.89	3.0	C
B - Wheatsheaf Hill	9999999999.00	1667.58	64.2	F
C - A21 Sevenoaks Rd	0.44	2.89	0.8	A
D - A224 Court Rd	0.66	6.92	2.0	A
E - Hewitts Rd	0.19	12.72	0.2	B
F - M25	0.93	14.31	11.8	B

Existing layout - 2035 FB, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	42.90	E

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)
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	755	100.000
B - Wheatsheaf Hill		✓	83	100.000
C - A21 Sevenoaks Rd		✓	1315	100.000
D - A224 Court Rd		✓	1166	100.000
E - Hewitts Rd		✓	70	100.000
F - M25		✓	2008	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	0	40	301	12	402
	B - Wheatsheaf Hill	0	0	0	48	3	32
	C - A21 Sevenoaks Rd	37	0	0	24	10	1244
	D - A224 Court Rd	357	2	48	0	7	752
	E - Hewitts Rd	11	3	13	9	9	25
	F - M25	122	465	1208	61	152	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	2	2	2	2	2
	B - Wheatsheaf Hill	2	0	2	2	2	2
	C - A21 Sevenoaks Rd	2	2	0	2	2	2
	D - A224 Court Rd	2	2	2	0	2	2
	E - Hewitts Rd	2	2	2	2	0	2
	F - M25	2	2	2	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.72	11.52	2.6	B
B - Wheatsheaf Hill	0.32	18.76	0.5	C
C - A21 Sevenoaks Rd	0.58	3.44	1.4	A
D - A224 Court Rd	1.08	145.43	57.9	F
E - Hewitts Rd	1.64	585.37	14.6	F
F - M25	0.65	3.08	1.9	A

Existing layout - 2035 FB + Dev, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	46.28	E

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)
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	599	100.000
B - Wheatsheaf Hill		✓	115	100.000
C - A21 Sevenoaks Rd		✓	942	100.000
D - A224 Court Rd		✓	970	100.000
E - Hewitts Rd		✓	63	100.000
F - M25		✓	2816	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	4	46	281	11	257
	B - Wheatsheaf Hill	1	0	2	55	2	55
	C - A21 Sevenoaks Rd	35	1	0	33	10	863
	D - A224 Court Rd	319	8	53	0	10	580
	E - Hewitts Rd	18	1	13	10	10	11
	F - M25	441	82	1576	687	30	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	5	5	5	5	5
	B - Wheatsheaf Hill	5	0	5	5	5	5
	C - A21 Sevenoaks Rd	5	5	0	5	5	5
	D - A224 Court Rd	5	5	5	0	5	5
	E - Hewitts Rd	5	5	5	5	0	5
	F - M25	5	5	5	5	5	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.79	21.62	3.8	C
B - Wheatsheaf Hill	9999999999.00	1689.04	64.3	F
C - A21 Sevenoaks Rd	0.45	2.94	0.8	A
D - A224 Court Rd	0.67	7.14	2.1	A
E - Hewitts Rd	0.20	13.23	0.3	B
F - M25	0.92	13.15	10.8	B

Existing layout - 2035 FB + Dev, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	40.45	E

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)
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	734	100.000
B - Wheatsheaf Hill		✓	83	100.000
C - A21 Sevenoaks Rd		✓	1315	100.000
D - A224 Court Rd		✓	1173	100.000
E - Hewitts Rd		✓	71	100.000
F - M25		✓	2025	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	0	41	304	12	377
	B - Wheatsheaf Hill	0	0	0	48	3	32
	C - A21 Sevenoaks Rd	37	0	0	24	10	1244
	D - A224 Court Rd	364	2	48	0	7	752
	E - Hewitts Rd	12	3	13	9	9	25
	F - M25	139	465	1208	61	152	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	2	2	2	2	2
	B - Wheatsheaf Hill	2	0	2	2	2	2
	C - A21 Sevenoaks Rd	2	2	0	2	2	2
	D - A224 Court Rd	2	2	2	0	2	2
	E - Hewitts Rd	2	2	2	2	0	2
	F - M25	2	2	2	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.70	10.79	2.4	B
B - Wheatsheaf Hill	0.31	18.00	0.4	C
C - A21 Sevenoaks Rd	0.57	3.39	1.4	A
D - A224 Court Rd	1.07	138.07	55.1	F
E - Hewitts Rd	1.49	510.43	12.8	F
F - M25	0.66	3.16	1.9	A

Existing layout - 2035 FB Sensitivity, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	125.21	F

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)
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	474	100.000
B - Wheatsheaf Hill		✓	115	100.000
C - A21 Sevenoaks Rd		✓	942	100.000
D - A224 Court Rd		✓	1016	100.000
E - Hewitts Rd		✓	68	100.000
F - M25		✓	2936	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	3	44	256	9	162
	B - Wheatsheaf Hill	1	0	2	55	2	55
	C - A21 Sevenoaks Rd	35	1	0	33	10	863
	D - A224 Court Rd	365	8	53	0	10	580
	E - Hewitts Rd	23	1	13	10	10	11
	F - M25	561	82	1576	687	30	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	2	2	2	2	2
	B - Wheatsheaf Hill	2	0	2	2	2	2
	C - A21 Sevenoaks Rd	2	2	0	2	2	2
	D - A224 Court Rd	2	2	2	0	2	2
	E - Hewitts Rd	2	2	2	2	0	2
	F - M25	2	2	2	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.62	11.65	1.7	B
B - Wheatsheaf Hill	5.06	5239.30	48.0	F
C - A21 Sevenoaks Rd	0.43	2.70	0.8	A
D - A224 Court Rd	0.68	6.94	2.1	A
E - Hewitts Rd	0.20	12.41	0.3	B
F - M25	0.97	26.08	22.2	D

Existing layout - 2035 FB Sensitivity, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Hewitts roundabout	Standard Roundabout		A, B, C, D, E, F	49.58	E

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)
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Orpington BP		✓	824	100.000
B - Wheatsheaf Hill		✓	83	100.000
C - A21 Sevenoaks Rd		✓	1315	100.000
D - A224 Court Rd		✓	1173	100.000
E - Hewitts Rd		✓	60	100.000
F - M25		✓	1930	100.000

Origin-Destination Data

Demand (PCU/hr)

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	0	40	330	15	439
	B - Wheatsheaf Hill	0	0	0	48	3	32
	C - A21 Sevenoaks Rd	37	0	0	24	10	1244
	D - A224 Court Rd	364	2	48	0	7	752
	E - Hewitts Rd	10	3	13	9	0	25
	F - M25	44	465	1208	61	152	0

Vehicle Mix

Heavy Vehicle Percentages

		To					
		A - A224 Orpington BP	B - Wheatsheaf Hill	C - A21 Sevenoaks Rd	D - A224 Court Rd	E - Hewitts Rd	F - M25
From	A - A224 Orpington BP	0	2	2	2	2	2
	B - Wheatsheaf Hill	2	0	2	2	2	2
	C - A21 Sevenoaks Rd	2	2	0	2	2	2
	D - A224 Court Rd	2	2	2	0	2	2
	E - Hewitts Rd	2	2	2	2	0	2
	F - M25	2	2	2	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Orpington BP	0.79	14.80	3.6	B
B - Wheatsheaf Hill	0.35	21.73	0.5	C
C - A21 Sevenoaks Rd	0.59	3.59	1.4	A
D - A224 Court Rd	1.11	173.28	70.1	F
E - Hewitts Rd	1.75	658.29	13.8	F
F - M25	0.62	2.86	1.7	A

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

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Filename: Shacklands Rbt_base (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\ARCADY\Shacklands roundabout
Report generation date: 07/05/2020 11:53:46

»Existing layout - 2018 Baseline, AM Peak
»Existing layout - 2018 Baseline, PM Peak
»Existing layout - 2035 FB, AM Peak
»Existing layout - 2035 FB, PM Peak
»Existing layout - 2035 FB + Dev, AM Peak
»Existing layout - 2035 FB + Dev, PM Peak
»Existing layout - 2035 FB Sensitivity, AM Peak
»Existing layout - 2035 FB Sensitivity, PM Peak

Summary of junction performance

	AM Peak					PM Peak				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing layout - 2018 Baseline									
A - A224 London Rd	D1	0.5	3.67	0.33	A	D2	0.5	3.51	0.33	A
B - Shoreham Ln		0.1	5.87	0.11	A		0.1	5.40	0.07	A
C - Old London Rd		0.4	3.92	0.29	A		0.2	3.18	0.16	A
D - A224 Orpington BP		1.0	4.50	0.49	A		0.3	2.83	0.25	A
E - Shacklands Rd		0.1	3.63	0.07	A		0.0	2.72	0.04	A
	Existing layout - 2035 FB									
A - A224 London Rd	D3	1.1	4.98	0.50	A	D4	1.3	5.32	0.56	A
B - Shoreham Ln		0.2	7.07	0.14	A		0.1	6.87	0.09	A
C - Old London Rd		0.6	4.68	0.35	A		0.3	3.88	0.23	A
D - A224 Orpington BP		2.5	8.11	0.71	A		0.7	3.61	0.40	A
E - Shacklands Rd		0.1	4.68	0.11	A		0.1	3.12	0.06	A
	Existing layout - 2035 FB + Dev									
A - A224 London Rd	D5	1.2	5.24	0.53	A	D6	1.2	5.17	0.55	A
B - Shoreham Ln		0.2	7.27	0.14	A		0.1	6.79	0.09	A
C - Old London Rd		0.6	4.78	0.36	A		0.3	3.86	0.23	A
D - A224 Orpington BP		2.4	7.72	0.70	A		0.7	3.72	0.42	A
E - Shacklands Rd		0.1	4.62	0.11	A		0.1	3.17	0.06	A
	Existing layout - 2035 FB Sensitivity									
A - A224 London Rd	D7	0.8	4.44	0.44	A	D8	1.7	6.38	0.63	A
B - Shoreham Ln		0.2	6.63	0.13	A		0.1	7.49	0.10	A
C - Old London Rd		0.6	4.63	0.37	A		0.3	4.04	0.23	A
D - A224 Orpington BP		4.7	13.24	0.82	B		0.5	3.29	0.34	A
E - Shacklands Rd		0.2	5.50	0.15	A		0.1	2.97	0.06	A

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

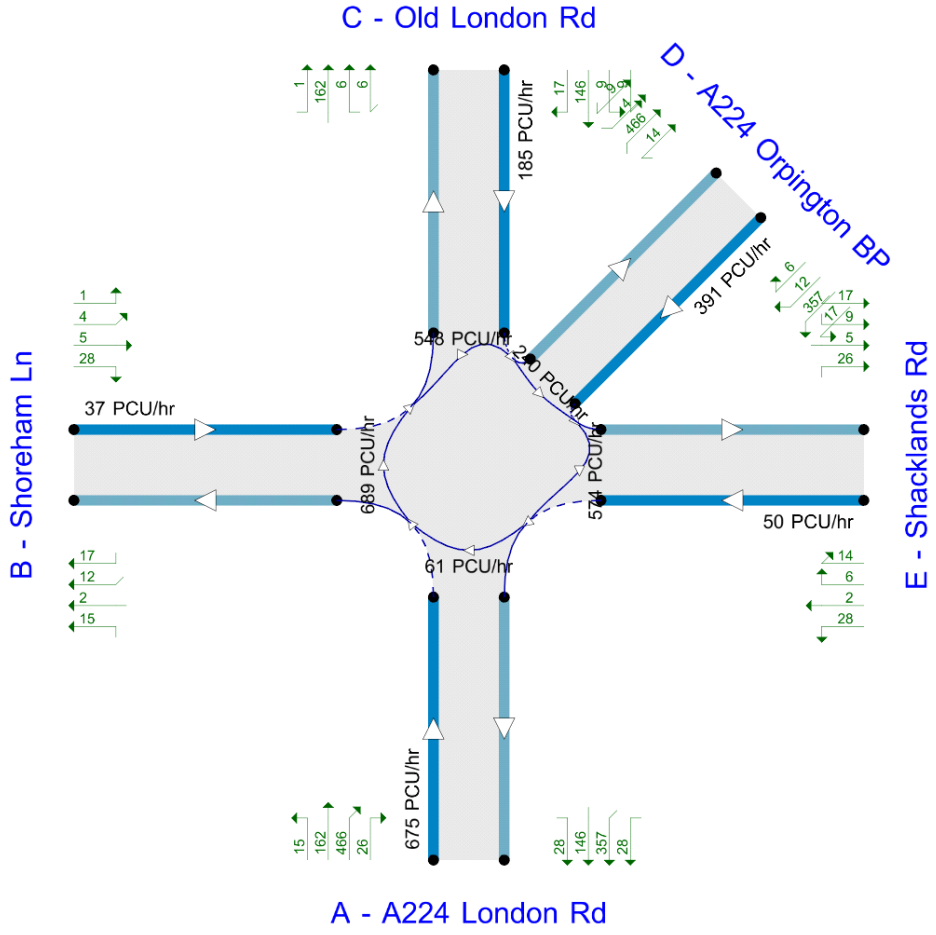
File summary

File Description

Title	Shacklands roundabout
Location	Sevenoaks
Site number	2
Date	29/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41290
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



Flows show modelled flow through junction (PCU/hr).
Time Segment: 16:45-17:00

The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing layout	100.000

Existing layout - 2018 Baseline, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	4.17	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	A224 London Rd	
B	Shoreham Ln	
C	Old London Rd	
D	A224 Orpington BP	
E	Shacklands Rd	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - A224 London Rd	4.00	5.50	20.8	18.4	64.0	23.0	
B - Shoreham Ln	2.50	3.73	8.9	10.9	64.0	40.0	
C - Old London Rd	5.10	7.90	6.1	6.0	64.0	48.0	
D - A224 Orpington BP	6.50	6.50	0.0	9.6	64.0	27.0	
E - Shacklands Rd	4.50	6.90	16.0	24.0	64.0	48.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - A224 London Rd	0.526	1613
B - Shoreham Ln	0.389	939
C - Old London Rd	0.466	1555
D - A224 Orpington BP	0.555	1885
E - Shacklands Rd	0.530	1754

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

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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	461	100.000
B - Shoreham Ln		✓	72	100.000
C - Old London Rd		✓	350	100.000
D - A224 Orpington BP		✓	726	100.000
E - Shacklands Rd		✓	72	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	1	14	142	299	5
	B - Shoreham Ln	46	0	6	16	4
	C - Old London Rd	299	32	2	9	8
	D - A224 Orpington BP	665	29	11	3	18
	E - Shacklands Rd	19	11	17	20	5

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	5	5	5	5	5
	B - Shoreham Ln	5	5	5	5	5
	C - Old London Rd	5	5	5	5	5
	D - A224 Orpington BP	5	5	5	5	5
	E - Shacklands Rd	5	5	5	5	5

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.33	3.67	0.5	A
B - Shoreham Ln	0.11	5.87	0.1	A
C - Old London Rd	0.29	3.92	0.4	A
D - A224 Orpington BP	0.49	4.50	1.0	A
E - Shacklands Rd	0.07	3.63	0.1	A

Existing layout - 2018 Baseline, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	3.25	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)
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	476	100.000
B - Shoreham Ln		✓	43	100.000
C - Old London Rd		✓	199	100.000
D - A224 Orpington BP		✓	396	100.000
E - Shacklands Rd		✓	54	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	7	19	161	276	13
	B - Shoreham Ln	31	0	1	5	6
	C - Old London Rd	153	21	4	11	10
	D - A224 Orpington BP	353	14	7	2	20
	E - Shacklands Rd	28	3	7	16	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	2	2	2	2	2
	B - Shoreham Ln	2	2	2	2	2
	C - Old London Rd	2	2	2	2	2
	D - A224 Orpington BP	2	2	2	2	2
	E - Shacklands Rd	2	2	2	2	2

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.33	3.51	0.5	A
B - Shoreham Ln	0.07	5.40	0.1	A
C - Old London Rd	0.16	3.18	0.2	A
D - A224 Orpington BP	0.25	2.83	0.3	A
E - Shacklands Rd	0.04	2.72	0.0	A

Existing layout - 2035 FB, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	6.39	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)
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	697	100.000
B - Shoreham Ln		✓	77	100.000
C - Old London Rd		✓	399	100.000
D - A224 Orpington BP		✓	1036	100.000
E - Shacklands Rd		✓	94	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	1	17	181	489	9
	B - Shoreham Ln	47	0	7	18	5
	C - Old London Rd	341	37	2	10	9
	D - A224 Orpington BP	967	33	13	3	20
	E - Shacklands Rd	33	13	20	23	5

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	5	5	5	5	5
	B - Shoreham Ln	5	5	5	5	5
	C - Old London Rd	5	5	5	5	5
	D - A224 Orpington BP	5	5	5	5	5
	E - Shacklands Rd	5	5	5	5	5

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.50	4.98	1.1	A
B - Shoreham Ln	0.14	7.07	0.2	A
C - Old London Rd	0.35	4.68	0.6	A
D - A224 Orpington BP	0.71	8.11	2.5	A
E - Shacklands Rd	0.11	4.68	0.1	A

Existing layout - 2035 FB, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	4.49	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)
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	795	100.000
B - Shoreham Ln		✓	50	100.000
C - Old London Rd		✓	252	100.000
D - A224 Orpington BP		✓	613	100.000
E - Shacklands Rd		✓	67	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	7	20	197	547	24
	B - Shoreham Ln	37	0	1	5	7
	C - Old London Rd	200	23	5	12	12
	D - A224 Orpington BP	565	16	8	2	22
	E - Shacklands Rd	38	3	8	18	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	2	2	2	2	2
	B - Shoreham Ln	2	2	2	2	2
	C - Old London Rd	2	2	2	2	2
	D - A224 Orpington BP	2	2	2	2	2
	E - Shacklands Rd	2	2	2	2	2

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.56	5.32	1.3	A
B - Shoreham Ln	0.09	6.87	0.1	A
C - Old London Rd	0.23	3.88	0.3	A
D - A224 Orpington BP	0.40	3.61	0.7	A
E - Shacklands Rd	0.06	3.12	0.1	A

Existing layout - 2035 FB + Dev, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	6.29	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)
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	732	100.000
B - Shoreham Ln		✓	77	100.000
C - Old London Rd		✓	401	100.000
D - A224 Orpington BP		✓	1013	100.000
E - Shacklands Rd		✓	95	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	1	17	185	519	10
	B - Shoreham Ln	47	0	7	18	5
	C - Old London Rd	343	37	2	10	9
	D - A224 Orpington BP	944	33	13	3	20
	E - Shacklands Rd	34	13	20	23	5

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	5	5	5	5	5
	B - Shoreham Ln	5	5	5	5	5
	C - Old London Rd	5	5	5	5	5
	D - A224 Orpington BP	5	5	5	5	5
	E - Shacklands Rd	5	5	5	5	5

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.53	5.24	1.2	A
B - Shoreham Ln	0.14	7.27	0.2	A
C - Old London Rd	0.36	4.78	0.6	A
D - A224 Orpington BP	0.70	7.72	2.4	A
E - Shacklands Rd	0.11	4.62	0.1	A

Existing layout - 2035 FB + Dev, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	4.44	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)
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	777	100.000
B - Shoreham Ln		✓	51	100.000
C - Old London Rd		✓	255	100.000
D - A224 Orpington BP		✓	638	100.000
E - Shacklands Rd		✓	67	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	7	20	199	526	25
	B - Shoreham Ln	38	0	1	5	7
	C - Old London Rd	203	23	5	12	12
	D - A224 Orpington BP	590	16	8	2	22
	E - Shacklands Rd	38	3	8	18	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	2	2	2	2	2
	B - Shoreham Ln	2	2	2	2	2
	C - Old London Rd	2	2	2	2	2
	D - A224 Orpington BP	2	2	2	2	2
	E - Shacklands Rd	2	2	2	2	2

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.55	5.17	1.2	A
B - Shoreham Ln	0.09	6.79	0.1	A
C - Old London Rd	0.23	3.86	0.3	A
D - A224 Orpington BP	0.42	3.72	0.7	A
E - Shacklands Rd	0.06	3.17	0.1	A

Existing layout - 2035 FB Sensitivity, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	8.92	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)
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	614	100.000
B - Shoreham Ln		✓	77	100.000
C - Old London Rd		✓	428	100.000
D - A224 Orpington BP		✓	1185	100.000
E - Shacklands Rd		✓	109	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	1	17	176	410	10
	B - Shoreham Ln	47	0	7	18	5
	C - Old London Rd	370	37	2	10	9
	D - A224 Orpington BP	1116	33	13	3	20
	E - Shacklands Rd	48	13	20	23	5

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	5	5	5	5	5
	B - Shoreham Ln	5	5	5	5	5
	C - Old London Rd	5	5	5	5	5
	D - A224 Orpington BP	5	5	5	5	5
	E - Shacklands Rd	5	5	5	5	5

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.44	4.44	0.8	A
B - Shoreham Ln	0.13	6.63	0.2	A
C - Old London Rd	0.37	4.63	0.6	A
D - A224 Orpington BP	0.82	13.24	4.7	B
E - Shacklands Rd	0.15	5.50	0.2	A

Existing layout - 2035 FB Sensitivity, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Shacklands	Standard Roundabout		A, B, C, D, E	5.06	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)
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 London Rd		✓	900	100.000
B - Shoreham Ln		✓	50	100.000
C - Old London Rd		✓	246	100.000
D - A224 Orpington BP		✓	521	100.000
E - Shacklands Rd		✓	66	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	7	20	216	622	35
	B - Shoreham Ln	37	0	1	5	7
	C - Old London Rd	194	23	5	12	12
	D - A224 Orpington BP	475	16	8	0	22
	E - Shacklands Rd	37	3	8	18	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		A - A224 London Rd	B - Shoreham Ln	C - Old London Rd	D - A224 Orpington BP	E - Shacklands Rd
From	A - A224 London Rd	2	2	2	2	2
	B - Shoreham Ln	2	2	2	2	2
	C - Old London Rd	2	2	2	2	2
	D - A224 Orpington BP	2	2	2	2	2
	E - Shacklands Rd	2	2	2	2	2

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 London Rd	0.63	6.38	1.7	A
B - Shoreham Ln	0.10	7.49	0.1	A
C - Old London Rd	0.23	4.04	0.3	A
D - A224 Orpington BP	0.34	3.29	0.5	A
E - Shacklands Rd	0.06	2.97	0.1	A

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Otford Lane (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\PICADY\Otford Lane
Report generation date: 07/05/2020 12:43:49

»Existing layout - 2018 Baseline, AM Peak
»Existing layout - 2018 Baseline, PM Peak
»Existing layout - 2035 FB, AM Peak
»Existing layout - 2035 FB, PM Peak
»Existing layout - 2035 FB + Dev, AM Peak
»Existing layout - 2035 FB + Dev, PM Peak
»Existing layout - 2035 FB Sensitivity, AM Peak
»Existing layout - 2035 FB Sensitivity, PM Peak

Summary of junction performance

	AM Peak					PM Peak				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing layout - 2018 Baseline									
Stream B-C	D1	0.1	6.79	0.07	A	D2	0.2	7.47	0.17	A
Stream B-A		0.2	12.40	0.14	B		0.2	12.01	0.17	B
Stream C-AB		0.3	8.07	0.25	A		0.1	6.55	0.06	A
	Existing layout - 2035 FB									
Stream B-C	D3	1.0	17.91	0.50	C	D4	13.2	129.56	1.01	F
Stream B-A		2.4	63.51	0.73	F		8.7	162.26	0.98	F
Stream C-AB		2.2	21.66	0.70	C		0.7	11.56	0.42	B
	Existing layout - 2035 FB + Dev									
Stream B-C	D5	1.0	14.68	0.49	B	D6	2.4	25.76	0.71	D
Stream B-A		1.4	42.38	0.59	E		1.5	42.47	0.61	E
Stream C-AB		1.8	18.16	0.64	C		0.9	12.86	0.48	B
	Existing layout - 2035 FB Sensitivity									
Stream B-C	D7	0.3	9.21	0.22	A	D8	7.9	63.49	0.92	F
Stream B-A		0.9	58.63	0.50	F		2.9	91.93	0.80	F
Stream C-AB		43.2	193.34	1.06	F		0.3	8.26	0.21	A

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

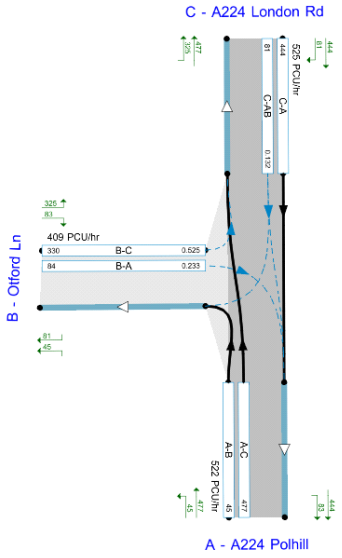
File summary

File Description

Title	Polhill access
Location	Sevenoaks
Site number	3
Date	30/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41209
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



Flows show modelled flow through junction (PCU/hr).
Streams (upstream end) show Total Demand (PCU/hr); Streams (downstream end) show RFC ()

Time Segment: 16:45-17:00

The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing layout	100.000

Existing layout - 2018 Baseline, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		1.36	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	A224 Polhill		Major
B	Otford Ln		Minor
C	A224 London Rd		Major

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)
C - A224 London Rd	10.20		✓	3.50	125.0	✓	18.00

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 - Otford Ln	One lane plus flare	10.00	9.70	6.40	4.76	3.80		3.00	116	82

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	615	0.092	0.231	0.146	0.330
B-C	721	0.090	0.228	-	-
C-B	738	0.234	0.234	-	-

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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	543	100.000
B - Otford Ln		✓	78	100.000
C - A224 London Rd		✓	742	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	67	476
	B - Otford Ln	43	0	35
	C - A224 London Rd	608	134	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.07	6.79	0.1	A
B-A	0.14	12.40	0.2	B
C-AB	0.25	8.07	0.3	A
C-A				
A-B				
A-C				

Existing layout - 2018 Baseline, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		1.26	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)
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	569	100.000
B - Otford Ln		✓	147	100.000
C - A224 London Rd		✓	530	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	34	535
	B - Otford Ln	56	0	91
	C - A224 London Rd	497	33	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.17	7.47	0.2	A
B-A	0.17	12.01	0.2	B
C-AB	0.06	6.55	0.1	A
C-A				
A-B				
A-C				

Existing layout - 2035 FB, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		9.07	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)
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	736	100.000
B - Otford Ln		✓	314	100.000
C - A224 London Rd		✓	1058	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	166	570
	B - Otford Ln	131	0	183
	C - A224 London Rd	711	347	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.50	17.91	1.0	C
B-A	0.73	63.51	2.4	F
C-AB	0.70	21.66	2.2	C
C-A				
A-B				
A-C				

Existing layout - 2035 FB, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		36.41	E

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)
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	747	100.000
B - Otford Ln		✓	515	100.000
C - A224 London Rd		✓	800	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	115	632
	B - Otford Ln	181	0	334
	C - A224 London Rd	590	210	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.01	129.56	13.2	F
B-A	0.98	162.26	8.7	F
C-AB	0.42	11.56	0.7	B
C-A				
A-B				
A-C				

Existing layout - 2035 FB + Dev, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		6.71	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)
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	689	100.000
B - Otford Ln		✓	328	100.000
C - A224 London Rd		✓	1039	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	119	570
	B - Otford Ln	109	0	219
	C - A224 London Rd	711	328	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.49	14.68	1.0	B
B-A	0.59	42.38	1.4	E
C-AB	0.64	18.16	1.8	C
C-A				
A-B				
A-C				

Existing layout - 2035 FB + Dev, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		8.10	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)
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	747	100.000
B - Otford Ln		✓	435	100.000
C - A224 London Rd		✓	829	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	114	633
	B - Otford Ln	120	0	315
	C - A224 London Rd	590	239	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.71	25.76	2.4	D
B-A	0.61	42.47	1.5	E
C-AB	0.48	12.86	0.9	B
C-A				
A-B				
A-C				

Existing layout - 2035 FB Sensitivity, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		78.11	F

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)
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	698	100.000
B - Otford Ln		✓	155	100.000
C - A224 London Rd		✓	1252	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	128	570
	B - Otford Ln	55	0	100
	C - A224 London Rd	714	538	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.22	9.21	0.3	A
B-A	0.50	58.63	0.9	F
C-AB	1.06	193.34	43.2	F
C-A				
A-B				
A-C				

Existing layout - 2035 FB Sensitivity, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Polhill access	T-Junction	Two-way		20.08	C

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)
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	694	100.000
B - Otford Ln		✓	550	100.000
C - A224 London Rd		✓	698	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	60	634
	B - Otford Ln	112	0	438
	C - A224 London Rd	590	108	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill	B - Otford Ln	C - A224 London Rd
From	A - A224 Polhill	0	1	1
	B - Otford Ln	1	0	1
	C - A224 London Rd	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.92	63.49	7.9	F
B-A	0.80	91.93	2.9	F
C-AB	0.21	8.26	0.3	A
C-A				
A-B				
A-C				

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

Filename: Polhill proposed rbt_new size (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\ARCADY\Polhill access proposed rbt
Report generation date: 07/05/2020 12:25:43

»Proposed layout - 2035 FB, AM
»Proposed layout - 2035 FB, PM
»Proposed layout - 2035 FB + Dev, AM
»Proposed layout - 2035 FB + Dev, PM
»Proposed layout - 2035 FB Sensitivity, AM
»Proposed layout - 2035 FB Sensitivity, PM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Proposed layout - 2035 FB									
A - A224 Polhill	D1	2.6	11.96	0.71	B	D2	2.2	9.68	0.67	A
B - Crow Drive		1.0	11.34	0.48	B		5.7	40.26	0.86	E
C - Otford Ln		0.1	7.18	0.07	A		0.1	9.68	0.06	A
D - A224 London Rd		3.6	11.40	0.77	B		1.6	6.61	0.60	A
	Proposed layout - 2035 FB + Dev									
A - A224 Polhill	D3	2.1	10.04	0.66	B	D4	2.3	10.16	0.68	B
B - Crow Drive		1.1	11.91	0.51	B		2.7	21.94	0.72	C
C - Otford Ln		0.1	7.29	0.07	A		0.1	8.75	0.06	A
D - A224 London Rd		3.2	10.34	0.75	B		1.6	6.51	0.60	A
	Proposed layout - 2035 FB Sensitivity									
A - A224 Polhill	D5	3.3	15.80	0.76	C	D6	1.6	7.43	0.59	A
B - Crow Drive		0.3	7.54	0.22	A		8.9	58.40	0.92	F
C - Otford Ln		0.1	6.18	0.06	A		0.1	10.13	0.06	B
D - A224 London Rd		7.6	20.94	0.88	C		1.1	5.21	0.50	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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

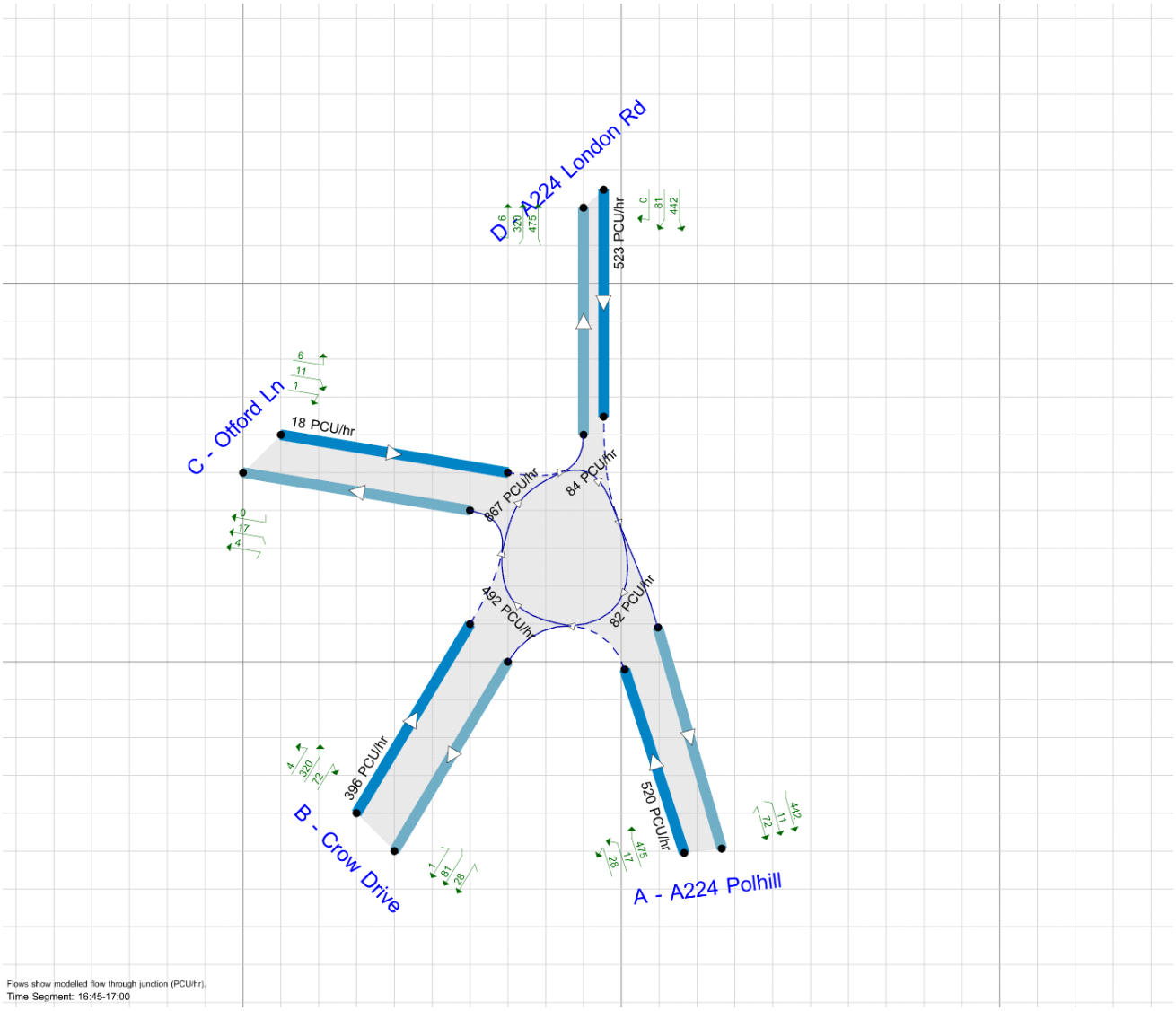
File summary

File Description

Title	Polhill access proposed roundabout
Location	Sevenoaks
Site number	3
Date	29/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41290
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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)
D1	2035 FB	AM	ONE HOUR	07:45	09:15	15
D2	2035 FB	PM	ONE HOUR	16:45	18:15	15
D3	2035 FB + Dev	AM	ONE HOUR	07:45	09:15	15
D4	2035 FB + Dev	PM	ONE HOUR	16:45	18:15	15
D5	2035 FB Sensitivity	AM	ONE HOUR	07:45	09:15	15
D6	2035 FB Sensitivity	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Proposed layout	100.000

Proposed layout - 2035 FB, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - A224 Polhill - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Proposed	Standard Roundabout		A, B, C, D	11.51	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	A224 Polhill	
B	Crow Drive	
C	Otford Ln	
D	A224 London Rd	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - A224 Polhill	3.80	4.50	33.0	60.0	40.0	36.0	
B - Crow Drive	3.20	3.70	6.0	11.0	40.0	48.0	
C - Otford Ln	2.50	4.30	7.6	20.0	40.0	26.0	
D - A224 London Rd	3.20	7.50	13.3	70.0	40.0	41.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - A224 Polhill	0.579	1366
B - Crow Drive	0.467	978
C - Otford Ln	0.523	1083
D - A224 London Rd	0.622	1605

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

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)
D1	2035 FB	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	737	100.000
B - Crow Drive		✓	293	100.000
C - Otford Ln		✓	36	100.000
D - A224 London Rd		✓	1058	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	1	150	16	570
	B - Crow Drive	112	0	10	171
	C - Otford Ln	19	5	0	12
	D - A224 London Rd	711	338	9	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	10	10	10	10
	B - Crow Drive	10	10	10	10
	C - Otford Ln	10	10	10	10
	D - A224 London Rd	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Polhill	0.71	11.96	2.6	B
B - Crow Drive	0.48	11.34	1.0	B
C - Otford Ln	0.07	7.18	0.1	A
D - A224 London Rd	0.77	11.40	3.6	B

Proposed layout - 2035 FB, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - A224 Polhill - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Proposed	Standard Roundabout		A, B, C, D	15.84	C

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)
D2	2035 FB	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	747	100.000
B - Crow Drive		✓	497	100.000
C - Otford Ln		✓	25	100.000
D - A224 London Rd		✓	800	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	0	92	23	632
	B - Crow Drive	166	0	5	326
	C - Otford Ln	15	2	0	8
	D - A224 London Rd	590	205	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	10	10	10	10
	B - Crow Drive	10	10	10	10
	C - Otford Ln	10	10	10	10
	D - A224 London Rd	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Polhill	0.67	9.68	2.2	A
B - Crow Drive	0.86	40.26	5.7	E
C - Otford Ln	0.06	9.68	0.1	A
D - A224 London Rd	0.60	6.61	1.6	A

Proposed layout - 2035 FB + Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - A224 Polhill - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Proposed	Standard Roundabout		A, B, C, D	10.42	B

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)
D3	2035 FB + Dev	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	690	100.000
B - Crow Drive		✓	308	100.000
C - Otford Ln		✓	36	100.000
D - A224 London Rd		✓	1039	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	1	103	16	570
	B - Crow Drive	90	0	11	207
	C - Otford Ln	19	5	0	12
	D - A224 London Rd	711	319	9	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	10	10	10	10
	B - Crow Drive	10	10	10	10
	C - Otford Ln	10	10	10	10
	D - A224 London Rd	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Polhill	0.66	10.04	2.1	B
B - Crow Drive	0.51	11.91	1.1	B
C - Otford Ln	0.07	7.29	0.1	A
D - A224 London Rd	0.75	10.34	3.2	B

Proposed layout - 2035 FB + Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - A224 Polhill - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Proposed	Standard Roundabout		A, B, C, D	11.08	B

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)
D4	2035 FB + Dev	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	747	100.000
B - Crow Drive		✓	417	100.000
C - Otford Ln		✓	26	100.000
D - A224 London Rd		✓	829	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	0	91	23	633
	B - Crow Drive	105	0	5	307
	C - Otford Ln	15	3	0	8
	D - A224 London Rd	590	234	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	10	10	10	10
	B - Crow Drive	10	10	10	10
	C - Otford Ln	10	10	10	10
	D - A224 London Rd	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Polhill	0.68	10.16	2.3	B
B - Crow Drive	0.72	21.94	2.7	C
C - Otford Ln	0.06	8.75	0.1	A
D - A224 London Rd	0.60	6.51	1.6	A

Proposed layout - 2035 FB Sensitivity, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - A224 Polhill - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Proposed	Standard Roundabout		A, B, C, D	18.14	C

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)
D5	2035 FB Sensitivity	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	699	100.000
B - Crow Drive		✓	133	100.000
C - Otford Ln		✓	38	100.000
D - A224 London Rd		✓	1253	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	1	112	16	570
	B - Crow Drive	36	0	9	88
	C - Otford Ln	19	7	0	12
	D - A224 London Rd	714	530	9	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	10	10	10	10
	B - Crow Drive	10	10	10	10
	C - Otford Ln	10	10	10	10
	D - A224 London Rd	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Polhill	0.76	15.80	3.3	C
B - Crow Drive	0.22	7.54	0.3	A
C - Otford Ln	0.06	6.18	0.1	A
D - A224 London Rd	0.88	20.94	7.6	C

Proposed layout - 2035 FB Sensitivity, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - A224 Polhill - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Proposed	Standard Roundabout		A, B, C, D	20.61	C

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)
D6	2035 FB Sensitivity	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill		✓	694	100.000
B - Crow Drive		✓	533	100.000
C - Otford Ln		✓	24	100.000
D - A224 London Rd		✓	698	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	0	37	23	634
	B - Crow Drive	97	0	6	430
	C - Otford Ln	15	1	0	8
	D - A224 London Rd	590	108	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - A224 Polhill	B - Crow Drive	C - Otford Ln	D - A224 London Rd
From	A - A224 Polhill	10	10	10	10
	B - Crow Drive	10	10	10	10
	C - Otford Ln	10	10	10	10
	D - A224 London Rd	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - A224 Polhill	0.59	7.43	1.6	A
B - Crow Drive	0.92	58.40	8.9	F
C - Otford Ln	0.06	10.13	0.1	B
D - A224 London Rd	0.50	5.21	1.1	A

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.1.7462

Filename: Pilgrims Way-A224 (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\PICADY\Pilgrims Way-A224
Report generation date: 07/05/2020 12:52:44

»Existing layout - 2018 Baseline, AM Peak
»Existing layout - 2018 Baseline, PM Peak
»Existing layout - 2035 FB, AM Peak
»Existing layout - 2035 FB, PM Peak
»Existing layout - 2035 FB with Dev, AM Peak
»Existing layout - 2035 FB with Dev, PM Peak
»Existing layout - 2035 FB Sensitivity, AM Peak
»Existing layout - 2035 FB Sensitivity, PM Peak

Summary of junction performance

	AM Peak					PM Peak				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing layout - 2018 Baseline									
Stream B-C	D1	0.9	17.45	0.46	C	D2	0.4	11.70	0.27	B
Stream B-A		2.0	32.95	0.67	D		1.5	25.11	0.61	D
Stream C-AB		0.2	8.31	0.19	A		0.3	8.41	0.25	A
	Existing layout - 2035 FB									
Stream B-C	D3	13.4	237.12	1.08	F	D4	5.2	142.87	0.96	F
Stream B-A		17.0	220.47	1.07	F		8.1	112.73	0.94	F
Stream C-AB		0.3	9.72	0.24	A		0.5	10.20	0.32	B
	Existing layout - 2035 FB with Dev									
Stream B-C	D5	11.5	203.51	1.05	F	D6	4.9	128.52	0.95	F
Stream B-A		14.5	188.53	1.04	F		7.3	98.79	0.93	F
Stream C-AB		0.3	9.63	0.24	A		0.5	9.83	0.31	A
	Existing layout - 2035 FB Sensitivity									
Stream B-C	D7	15.1	229.75	1.08	F	D8	1.5	42.40	0.62	E
Stream B-A		17.5	219.11	1.07	F		5.0	73.96	0.87	F
Stream C-AB		0.3	9.37	0.24	A		0.6	10.49	0.36	B

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

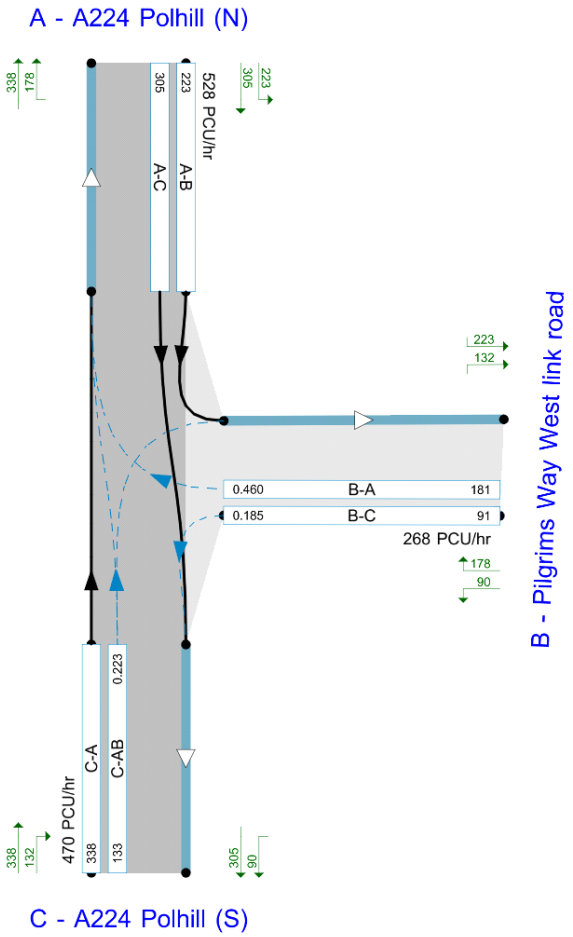
File summary

File Description

Title	Pilgrims Way West/Polhill junction
Location	Sevenoaks
Site number	4
Date	30/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41290
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



Flows show modelled flow through junction (PCU/hr).
Streams (upstream end) show Total Demand (PCU/hr); Streams (downstream end) show RFC ()

Time Segment: 16:45-17:00

The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15
D5	2035 FB with Dev	AM Peak	ONE HOUR	07:45	09:15	15
D6	2035 FB with Dev	PM Peak	ONE HOUR	16:45	18:15	15
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing layout	100.000

Existing layout - 2018 Baseline, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		6.93	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	A224 Polhill (N)		Major
B	Pilgrims Way West link road		Minor
C	A224 Polhill (S)		Major

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)
C - A224 Polhill (S)	9.83		✓	3.50	100.0	✓	12.00

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 - Pilgrims Way West link road	One lane plus flare	10.00	9.56	5.93	4.46	3.98		2.00	46	28

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	554	0.084	0.212	0.134	0.303
B-C	677	0.087	0.219	-	-
C-B	721	0.233	0.233	-	-

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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	661	100.000
B - Pilgrims Way West link road		✓	368	100.000
C - A224 Polhill (S)		✓	467	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	238	423
	B - Pilgrims Way West link road	203	0	165
	C - A224 Polhill (S)	371	96	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	3	3
	B - Pilgrims Way West link road	3	0	3
	C - A224 Polhill (S)	3	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.46	17.45	0.9	C
B-A	0.67	32.95	2.0	D
C-AB	0.19	8.31	0.2	A
C-A				
A-B				
A-C				

Existing layout - 2018 Baseline, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		5.49	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)
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	552	100.000
B - Pilgrims Way West link road		✓	306	100.000
C - A224 Polhill (S)		✓	495	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	241	311
	B - Pilgrims Way West link road	203	0	103
	C - A224 Polhill (S)	361	134	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	1	1
	B - Pilgrims Way West link road	1	0	1
	C - A224 Polhill (S)	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.27	11.70	0.4	B
B-A	0.61	25.11	1.5	D
C-AB	0.25	8.41	0.3	A
C-A				
A-B				
A-C				

Existing layout - 2035 FB, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		52.45	F

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)
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	853	100.000
B - Pilgrims Way West link road		✓	438	100.000
C - A224 Polhill (S)		✓	630	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	289	564
	B - Pilgrims Way West link road	251	0	187
	C - A224 Polhill (S)	520	110	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	3	3
	B - Pilgrims Way West link road	3	0	3
	C - A224 Polhill (S)	3	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.08	237.12	13.4	F
B-A	1.07	220.47	17.0	F
C-AB	0.24	9.72	0.3	A
C-A				
A-B				
A-C				

Existing layout - 2035 FB, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		26.13	D

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)
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	770	100.000
B - Pilgrims Way West link road		✓	368	100.000
C - A224 Polhill (S)		✓	645	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	297	473
	B - Pilgrims Way West link road	250	0	118
	C - A224 Polhill (S)	493	152	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	1	1
	B - Pilgrims Way West link road	1	0	1
	C - A224 Polhill (S)	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.96	142.87	5.2	F
B-A	0.94	112.73	8.1	F
C-AB	0.32	10.20	0.5	B
C-A				
A-B				
A-C				

Existing layout - 2035 FB with Dev, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		46.84	E

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)
D5	2035 FB with Dev	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	831	100.000
B - Pilgrims Way West link road		✓	440	100.000
C - A224 Polhill (S)		✓	583	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	292	539
	B - Pilgrims Way West link road	253	0	187
	C - A224 Polhill (S)	471	112	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	3	3
	B - Pilgrims Way West link road	3	0	3
	C - A224 Polhill (S)	3	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.05	203.51	11.5	F
B-A	1.04	188.53	14.5	F
C-AB	0.24	9.63	0.3	A
C-A				
A-B				
A-C				

Existing layout - 2035 FB with Dev, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		24.59	C

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)
D6	2035 FB with Dev	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	709	100.000
B - Pilgrims Way West link road		✓	378	100.000
C - A224 Polhill (S)		✓	638	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	297	412
	B - Pilgrims Way West link road	258	0	120
	C - A224 Polhill (S)	484	154	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	1	1
	B - Pilgrims Way West link road	1	0	1
	C - A224 Polhill (S)	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.95	128.52	4.9	F
B-A	0.93	98.79	7.3	F
C-AB	0.31	9.83	0.5	A
C-A				
A-B				
A-C				

Existing layout - 2035 FB Sensitivity, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		58.48	F

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)
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	780	100.000
B - Pilgrims Way West link road		✓	477	100.000
C - A224 Polhill (S)		✓	588	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	275	505
	B - Pilgrims Way West link road	259	0	218
	C - A224 Polhill (S)	474	114	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	3	3
	B - Pilgrims Way West link road	3	0	3
	C - A224 Polhill (S)	3	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	1.08	229.75	15.1	F
B-A	1.07	219.11	17.5	F
C-AB	0.24	9.37	0.3	A
C-A				
A-B				
A-C				

Existing layout - 2035 FB Sensitivity, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Pilgrims Way West/Polhill	T-Junction	Two-way		14.69	B

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)
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - A224 Polhill (N)		✓	701	100.000
B - Pilgrims Way West link road		✓	362	100.000
C - A224 Polhill (S)		✓	626	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	296	405
	B - Pilgrims Way West link road	241	0	121
	C - A224 Polhill (S)	449	177	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - A224 Polhill (N)	B - Pilgrims Way West link road	C - A224 Polhill (S)
From	A - A224 Polhill (N)	0	1	1
	B - Pilgrims Way West link road	1	0	1
	C - A224 Polhill (S)	1	1	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.62	42.40	1.5	E
B-A	0.87	73.96	5.0	F
C-AB	0.36	10.49	0.6	B
C-A				
A-B				
A-C				

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Morants Ct Rd Rb (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\ARCADY\Morants Ct Rd roundabout
Report generation date: 07/05/2020 12:04:01

»Existing layout - 2018 Baseline, AM Peak
»Existing layout - 2018 Baseline, PM Peak
»Existing layout - 2035 FB, AM Peak
»Existing layout - 2035 FB, PM Peak
»Existing layout - 2035 FB + Dev, AM Peak
»Existing layout - 2035 FB + Dev, PM Peak
»Existing layout - 2035 FB Sensitivity, AM Peak
»Existing layout - 2035 FB Sensitivity, PM Peak

Summary of junction performance

	AM Peak					PM Peak				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing layout - 2018 Baseline									
A - Star Hill Rd	D1	0.2	4.02	0.14	A	D2	0.2	4.24	0.19	A
B - A224 Polhill		1.2	6.44	0.53	A		0.6	4.82	0.38	A
C - A224 Morants Court Rd		0.7	5.27	0.39	A		0.4	3.95	0.27	A
D - Sundridge Rd		0.4	4.50	0.28	A		0.4	4.20	0.27	A
	Existing layout - 2035 FB									
A - Star Hill Rd	D3	0.3	4.78	0.21	A	D4	0.3	5.00	0.25	A
B - A224 Polhill		2.3	9.82	0.69	A		1.2	6.72	0.55	A
C - A224 Morants Court Rd		1.2	7.22	0.53	A		0.6	4.87	0.38	A
D - Sundridge Rd		0.6	5.40	0.37	A		0.6	5.11	0.36	A
	Existing layout - 2035 FB + Dev									
A - Star Hill Rd	D5	0.3	4.75	0.21	A	D6	0.4	5.33	0.30	A
B - A224 Polhill		2.2	9.70	0.68	A		1.0	6.32	0.51	A
C - A224 Morants Court Rd		1.2	7.25	0.53	A		0.6	4.92	0.39	A
D - Sundridge Rd		0.7	5.61	0.40	A		0.6	5.24	0.38	A
	Existing layout - 2035 FB Sensitivity									
A - Star Hill Rd	D7	0.3	4.71	0.20	A	D8	0.7	6.32	0.42	A
B - A224 Polhill		2.1	9.47	0.68	A		1.1	6.89	0.53	A
C - A224 Morants Court Rd		1.3	7.77	0.56	A		0.6	5.09	0.38	A
D - Sundridge Rd		1.1	7.30	0.52	A		0.5	4.91	0.34	A

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

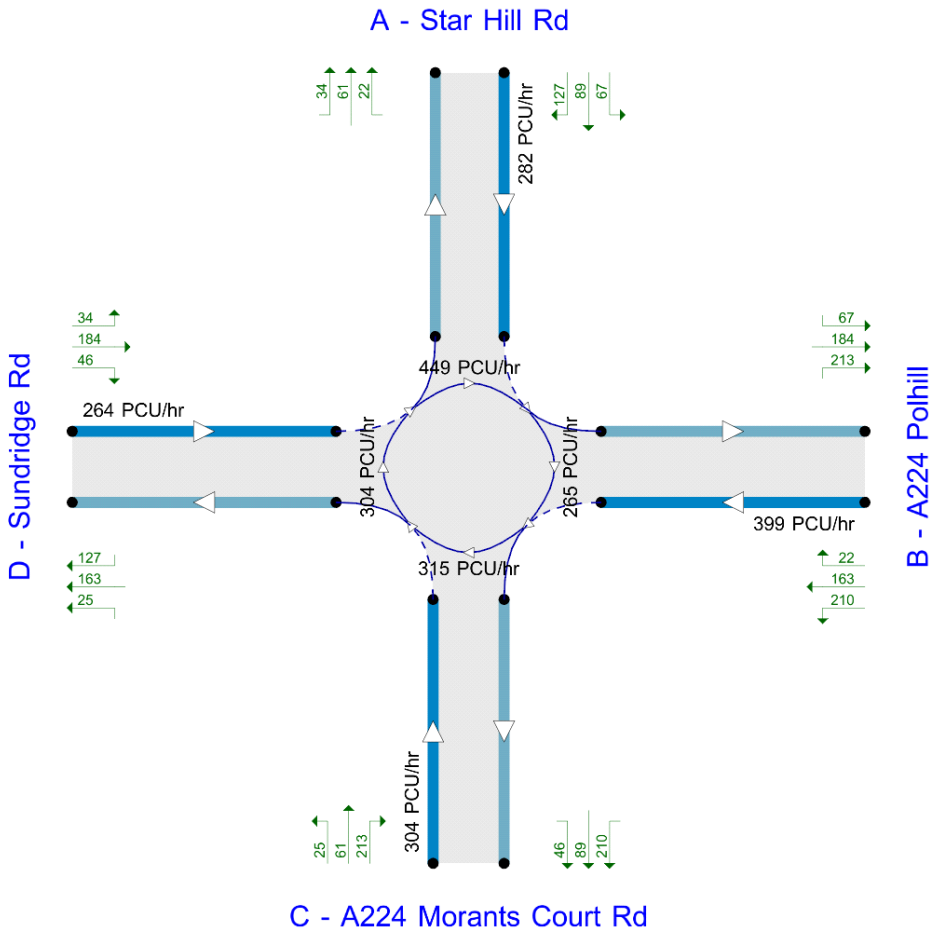
File summary

File Description

Title	Morants Court Road roundabout
Location	Sevenoaks
Site number	5
Date	29/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41290
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



Flows show modelled flow through junction (PCU/hr).
Time Segment: 16:45-17:00

The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing layout	100.000

Existing layout - 2018 Baseline, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	5.48	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	Star Hill Rd	
B	A224 Polhill	
C	A224 Morants Court Rd	
D	Sundridge Rd	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - Star Hill Rd	3.58	6.39	5.3	43.9	32.0	42.7	
B - A224 Polhill	4.74	4.91	1.5	17.0	32.0	56.0	
C - A224 Morants Court Rd	4.14	5.60	3.8	44.3	32.0	41.0	
D - Sundridge Rd	4.30	5.40	13.4	13.0	32.0	58.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - Star Hill Rd	0.584	1376
B - A224 Polhill	0.549	1328
C - A224 Morants Court Rd	0.599	1437
D - Sundridge Rd	0.551	1373

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

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)
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	133	100.000
B - A224 Polhill		✓	601	100.000
C - A224 Morants Court Rd		✓	412	100.000
D - Sundridge Rd		✓	295	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	34	72	27
	B - A224 Polhill	46	4	205	346
	C - A224 Morants Court Rd	89	233	0	90
	D - Sundridge Rd	56	188	49	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	3	3	3	3
	B - A224 Polhill	3	3	3	3
	C - A224 Morants Court Rd	3	3	3	3
	D - Sundridge Rd	3	3	3	3

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.14	4.02	0.2	A
B - A224 Polhill	0.53	6.44	1.2	A
C - A224 Morants Court Rd	0.39	5.27	0.7	A
D - Sundridge Rd	0.28	4.50	0.4	A

Existing layout - 2018 Baseline, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	4.36	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)
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	186	100.000
B - A224 Polhill		✓	422	100.000
C - A224 Morants Court Rd		✓	315	100.000
D - Sundridge Rd		✓	286	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	58	84	44
	B - A224 Polhill	25	4	209	184
	C - A224 Morants Court Rd	63	221	4	27
	D - Sundridge Rd	27	210	49	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	1	1	1	1
	B - A224 Polhill	1	1	1	1
	C - A224 Morants Court Rd	1	1	1	1
	D - Sundridge Rd	1	1	1	1

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.19	4.24	0.2	A
B - A224 Polhill	0.38	4.82	0.6	A
C - A224 Morants Court Rd	0.27	3.95	0.4	A
D - Sundridge Rd	0.27	4.20	0.4	A

Existing layout - 2035 FB, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	7.70	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)
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	182	100.000
B - A224 Polhill		✓	764	100.000
C - A224 Morants Court Rd		✓	526	100.000
D - Sundridge Rd		✓	361	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	62	89	31
	B - A224 Polhill	60	5	274	425
	C - A224 Morants Court Rd	101	312	0	113
	D - Sundridge Rd	57	242	60	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	3	3	3	3
	B - A224 Polhill	3	3	3	3
	C - A224 Morants Court Rd	3	3	3	3
	D - Sundridge Rd	3	3	3	3

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.21	4.78	0.3	A
B - A224 Polhill	0.69	9.82	2.3	A
C - A224 Morants Court Rd	0.53	7.22	1.2	A
D - Sundridge Rd	0.37	5.40	0.6	A

Existing layout - 2035 FB, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	5.64	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)
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	220	100.000
B - A224 Polhill		✓	599	100.000
C - A224 Morants Court Rd		✓	414	100.000
D - Sundridge Rd		✓	359	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	74	99	47
	B - A224 Polhill	56	4	289	250
	C - A224 Morants Court Rd	79	296	5	34
	D - Sundridge Rd	31	267	61	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	1	1	1	1
	B - A224 Polhill	1	1	1	1
	C - A224 Morants Court Rd	1	1	1	1
	D - Sundridge Rd	1	1	1	1

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.25	5.00	0.3	A
B - A224 Polhill	0.55	6.72	1.2	A
C - A224 Morants Court Rd	0.38	4.87	0.6	A
D - Sundridge Rd	0.36	5.11	0.6	A

Existing layout - 2035 FB + Dev, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	7.62	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)
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	192	100.000
B - A224 Polhill		✓	741	100.000
C - A224 Morants Court Rd		✓	525	100.000
D - Sundridge Rd		✓	392	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	38	92	62
	B - A224 Polhill	47	5	277	412
	C - A224 Morants Court Rd	102	310	0	113
	D - Sundridge Rd	110	220	60	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	3	3	3	3
	B - A224 Polhill	3	3	3	3
	C - A224 Morants Court Rd	3	3	3	3
	D - Sundridge Rd	3	3	3	3

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.21	4.75	0.3	A
B - A224 Polhill	0.68	9.70	2.2	A
C - A224 Morants Court Rd	0.53	7.25	1.2	A
D - Sundridge Rd	0.40	5.61	0.7	A

Existing layout - 2035 FB + Dev, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	5.54	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)
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	259	100.000
B - A224 Polhill		✓	541	100.000
C - A224 Morants Court Rd		✓	425	100.000
D - Sundridge Rd		✓	383	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	64	100	95
	B - A224 Polhill	30	4	285	222
	C - A224 Morants Court Rd	82	304	5	34
	D - Sundridge Rd	60	262	61	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	1	1	1	1
	B - A224 Polhill	1	1	1	1
	C - A224 Morants Court Rd	1	1	1	1
	D - Sundridge Rd	1	1	1	1

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.30	5.33	0.4	A
B - A224 Polhill	0.51	6.32	1.0	A
C - A224 Morants Court Rd	0.39	4.92	0.6	A
D - Sundridge Rd	0.38	5.24	0.6	A

Existing layout - 2035 FB Sensitivity, AM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	8.00	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)
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	184	100.000
B - A224 Polhill		✓	738	100.000
C - A224 Morants Court Rd		✓	553	100.000
D - Sundridge Rd		✓	497	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	40	92	52
	B - A224 Polhill	80	5	258	395
	C - A224 Morants Court Rd	127	313	0	113
	D - Sundridge Rd	214	221	60	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	3	3	3	3
	B - A224 Polhill	3	3	3	3
	C - A224 Morants Court Rd	3	3	3	3
	D - Sundridge Rd	3	3	3	3

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.20	4.71	0.3	A
B - A224 Polhill	0.68	9.47	2.1	A
C - A224 Morants Court Rd	0.56	7.77	1.3	A
D - Sundridge Rd	0.52	7.30	1.1	A

Existing layout - 2035 FB Sensitivity, PM Peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Morants Court Road	Standard Roundabout		A, B, C, D	5.91	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)
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd		✓	377	100.000
B - A224 Polhill		✓	533	100.000
C - A224 Morants Court Rd		✓	405	100.000
D - Sundridge Rd		✓	352	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	0	89	119	169
	B - A224 Polhill	30	4	281	218
	C - A224 Morants Court Rd	82	284	5	34
	D - Sundridge Rd	46	245	61	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Star Hill Rd	B - A224 Polhill	C - A224 Morants Court Rd	D - Sundridge Rd
From	A - Star Hill Rd	1	1	1	1
	B - A224 Polhill	1	1	1	1
	C - A224 Morants Court Rd	1	1	1	1
	D - Sundridge Rd	1	1	1	1

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - Star Hill Rd	0.42	6.32	0.7	A
B - A224 Polhill	0.53	6.89	1.1	A
C - A224 Morants Court Rd	0.38	5.09	0.6	A
D - Sundridge Rd	0.34	4.91	0.5	A

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Star Hill Access (200507).j9
Path: \\pba.int\BGL\Projects\41290 Fort Halstead Merseyside Pension Fund (RP)\5. Drawings & Models\Traffic Modelling\New TA\PICADY\Star Hill Access
Report generation date: 07/05/2020 12:55:57

»Existing layout - 2018 Baseline, AM Peak
»Existing layout - 2018 Baseline, PM Peak
»Existing layout - 2035 FB, AM Peak
»Existing layout - 2035 FB, PM Peak
»Existing layout - 2035 FB + Dev, AM Peak
»Existing layout - 2035 FB + Dev, PM Peak
»Existing layout - 2035 FB Sensitivity, AM Peak
»Existing layout - 2035 FB Sensitivity, PM Peak

Summary of junction performance

	AM Peak					PM Peak				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing layout - 2018 Baseline									
Stream B-C	D1	0.0	0.00	0.00	A	D2	0.0	5.33	0.02	A
Stream B-A		0.0	0.00	0.00	A		0.0	7.61	0.00	A
Stream C-AB		0.1	5.73	0.04	A		0.0	0.00	0.00	A
	Existing layout - 2035 FB									
Stream B-C	D3	0.0	0.00	0.00	A	D4	0.0	0.00	0.00	A
Stream B-A		0.0	0.00	0.00	A		0.0	0.00	0.00	A
Stream C-AB		0.0	0.00	0.00	A		0.0	0.00	0.00	A
	Existing layout - 2035 FB + Dev									
Stream B-C	D5	0.1	5.64	0.06	A	D6	0.1	5.85	0.08	A
Stream B-A		0.0	8.32	0.04	A		0.1	8.29	0.05	A
Stream C-AB		0.2	6.03	0.11	A		0.1	5.96	0.07	A
	Existing layout - 2035 FB Sensitivity									
Stream B-C	D7	0.0	5.58	0.04	A	D8	0.4	7.45	0.27	A
Stream B-A		0.0	9.73	0.02	A		0.1	8.72	0.10	A
Stream C-AB		1.0	9.97	0.46	A		0.1	5.84	0.04	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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

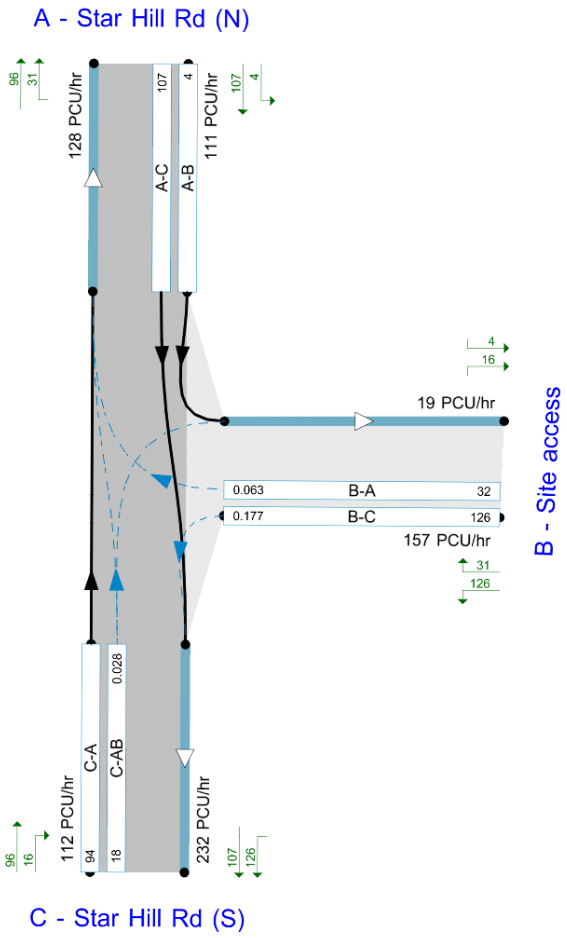
File summary

File Description

Title	Star Hill access junction
Location	Sevenoaks
Site number	6
Date	30/07/2019
Version	1
Status	
Identifier	
Client	
Jobnumber	41290
Enumerator	
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	PCU	PCU	perHour	s	-Min	perMin



Flows show modelled flow through junction (PCU/hr).
Streams (upstream end) show Total Demand (PCU/hr); Streams (downstream end) show RFC ()

Time Segment: 16:45-17:00

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	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15	✓
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15	✓
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15	✓
D4	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15	✓
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15	✓
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15	✓
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15	✓
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Existing layout	✓	100.000	100.000

Existing layout - 2018 Baseline, AM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		0.55	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Star Hill Rd (N)		Major
B	Site access		Minor
C	Star Hill Rd (S)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - Star Hill Rd (S)	5.83			96.0	✓	0.00

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 - Site access	One lane plus flare	10.00	10.00	8.48	5.05	3.73		2.00	61	49

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	584	0.107	0.271	0.170	0.387
B-C	733	0.113	0.286	-	-
C-B	630	0.246	0.246	-	-

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
D1	2018 Baseline	AM Peak	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	119	100.000
B - Site access		ONE HOUR	✓	1	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	149	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	3	116
	B - Site access	1	0	0
	C - Star Hill Rd (S)	128	21	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	4	4	4
	B - Site access	4	4	4
	C - Star Hill Rd (S)	4	4	4

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.00	0.00	0.0	A	0	0
B-A	0.00	0.00	0.0	A	0	0
C-AB	0.04	5.73	0.1	A	23	35
C-A					113	170
A-B					3	4
A-C					106	160

Existing layout - 2018 Baseline, PM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		0.33	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
D2	2018 Baseline	PM Peak	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	116	100.000
B - Site access		ONE HOUR	✓	14	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	107	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	0	116
	B - Site access	2	0	12
	C - Star Hill Rd (S)	107	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	5	5	5
	B - Site access	5	5	5
	C - Star Hill Rd (S)	5	5	5

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.02	5.33	0.0	A	11	17
B-A	0.00	7.61	0.0	A	2	3
C-AB	0.00	0.00	0.0	A	0	0
C-A					98	147
A-B					0	0
A-C					106	160

Existing layout - 2035 FB, AM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		0.00	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
D3	2035 FB	AM Peak	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	163	100.000
B - Site access		ONE HOUR	✓	0	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	170	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	0	163
	B - Site access	0	0	0
	C - Star Hill Rd (S)	170	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	4	4	4
	B - Site access	4	4	4
	C - Star Hill Rd (S)	4	4	4

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.00	0.00	0.0	A	0	0
B-A	0.00	0.00	0.0	A	0	0
C-AB	0.00	0.00	0.0	A	0	0
C-A					156	234
A-B					0	0
A-C					150	224

Existing layout - 2035 FB, PM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		0.00	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	2035 FB	PM Peak	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	154	100.000
B - Site access		ONE HOUR	✓	0	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	158	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	0	154
	B - Site access	0	0	0
	C - Star Hill Rd (S)	158	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	5	5	5
	B - Site access	5	5	5
	C - Star Hill Rd (S)	5	5	5

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.00	0.00	0.0	A	0	0
B-A	0.00	0.00	0.0	A	0	0
C-AB	0.00	0.00	0.0	A	0	0
C-A					145	217
A-B					0	0
A-C					141	212

Existing layout - 2035 FB + Dev, AM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		1.81	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
D5	2035 FB + Dev	AM Peak	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	163	100.000
B - Site access		ONE HOUR	✓	54	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	211	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	26	137
	B - Site access	18	0	36
	C - Star Hill Rd (S)	156	55	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	4	4	4
	B - Site access	4	4	4
	C - Star Hill Rd (S)	4	4	4

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.06	5.64	0.1	A	33	50
B-A	0.04	8.32	0.0	A	17	25
C-AB	0.11	6.03	0.2	A	64	96
C-A					129	194
A-B					24	36
A-C					126	189

Existing layout - 2035 FB + Dev, PM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		1.87	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
D6	2035 FB + Dev	PM Peak	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	159	100.000
B - Site access		ONE HOUR	✓	74	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	162	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	17	142
	B - Site access	24	0	50
	C - Star Hill Rd (S)	128	34	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	5	5	5
	B - Site access	5	5	5
	C - Star Hill Rd (S)	5	5	5

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.08	5.85	0.1	A	46	69
B-A	0.05	8.29	0.1	A	22	33
C-AB	0.07	5.96	0.1	A	38	57
C-A					111	166
A-B					16	23
A-C					130	195

Existing layout - 2035 FB Sensitivity, AM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		4.99	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
D7	2035 FB Sensitivity	AM Peak	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	191	100.000
B - Site access		ONE HOUR	✓	35	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	373	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	54	137
	B - Site access	7	0	28
	C - Star Hill Rd (S)	156	217	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	4	4	4
	B - Site access	4	4	4
	C - Star Hill Rd (S)	4	4	4

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.04	5.58	0.0	A	26	39
B-A	0.02	9.73	0.0	A	6	10
C-AB	0.46	9.97	1.0	A	254	381
C-A					88	132
A-B					50	74
A-C					126	189

Existing layout - 2035 FB Sensitivity, PM Peak

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	C - Star Hill Rd (S) - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Star Hill access	T-Junction	Two-way		3.49	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
D8	2035 FB Sensitivity	PM Peak	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Star Hill Rd (N)		ONE HOUR	✓	147	100.000
B - Site access		ONE HOUR	✓	210	100.000
C - Star Hill Rd (S)		ONE HOUR	✓	149	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	0	5	142
	B - Site access	42	0	168
	C - Star Hill Rd (S)	128	21	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Star Hill Rd (N)	B - Site access	C - Star Hill Rd (S)
From	A - Star Hill Rd (N)	5	5	5
	B - Site access	5	5	5
	C - Star Hill Rd (S)	5	5	5

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.27	7.45	0.4	A	154	231
B-A	0.10	8.72	0.1	A	39	58
C-AB	0.04	5.84	0.1	A	23	35
C-A					113	170
A-B					5	7
A-C					130	195

Junctions 9

ARCADY 9 - Roundabout Module

Filename: M25 J4 AM Validation (200512).j9
Path: J:\41290 - AM - Fort Halstead\BRIEF 5503 - Updated TA\MODELLING\TRANSPORT\JUNCTIONS 9
Report generation date: 12-May-20 11:40:46 AM

»2020 Observed, AM
»2035 Baseline, AM
»2035 Base + Dev (2 Access), AM
»2035 Base (CLEUD), AM

Summary of junction performance

	AM			
	Queue (PCU)	Delay (s)	RFC	LOS
	2020 Observed			
Arm 1	19.8	38.51	0.97	E
Arm 2	13.1	68.20	0.98	F
Arm 3	0.9	2.03	0.47	A
	2035 Baseline			
Arm 1	240.7	397.41	1.25	F
Arm 2	103.3	679.53	1.29	F
Arm 3	1.3	2.46	0.56	A
	2035 Base + Dev (2 Access)			
Arm 1	244.7	404.92	1.25	F
Arm 2	75.8	495.47	1.24	F
Arm 3	1.4	2.50	0.57	A
	2035 Base (CLEUD)			
Arm 1	283.3	473.10	1.28	F
Arm 2	140.9	1061.78	1.40	F
Arm 3	1.2	2.34	0.54	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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	
Location	
Site number	
Date	02-Mar-20
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\dansmith
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	PCU	PCU	perHour	s	-Min	perMin

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	2020 Observed	AM	ONE HOUR	07:00	08:30	15	✓
D3	2035 Baseline	AM	ONE HOUR	07:00	08:30	15	✓
D7	2035 Base + Dev (2 Access)	AM	ONE HOUR	07:00	08:30	15	✓
D9	2035 Base (CLEUD)	AM	ONE HOUR	07:00	08:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2020 Observed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	29.48	D

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	M25 North	
2	M25 South	
3	M25 West	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	7.12	7.79	16.1	69.1	151.2	11.4	
2	6.94	7.51	45.9	28.7	152.9	15.1	
3	7.79	7.88	0.5	94.6	151.9	11.8	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final slope	Final intercept (PCU/hr)
1	✓	1.256	2802	1.256	2802
2	✓	1.197	3012	1.197	3012
3	✓	1.272	3492	1.272	3492

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

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
D1	2020 Observed	AM	ONE HOUR	07:00	08:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	1770	100.000
2		ONE HOUR	✓	627	100.000
3		ONE HOUR	✓	1467	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	8	7	1755
	2	5	11	611
	3	906	561	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	33	0	6
	2	25	10	6
	3	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	0.97	38.51	19.8	E	1624	2436
2	0.98	68.20	13.1	F	575	863
3	0.47	2.03	0.9	A	1346	2019

Main Results for each time segment

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1333	333	430	2262	0.589	1327	691	0.0	1.5	4.056	A
2	472	118	1321	1430	0.330	470	435	0.0	0.5	3.973	A
3	1104	276	18	3469	0.318	1102	1773	0.0	0.5	1.577	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1591	398	514	2156	0.738	1586	826	1.5	2.9	6.624	A
2	564	141	1579	1122	0.503	562	520	0.5	1.1	6.800	A
3	1319	330	21	3465	0.381	1318	2119	0.5	0.6	1.741	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1949	487	629	2012	0.969	1897	1011	2.9	15.9	25.906	D
2	690	173	1889	751	0.920	664	636	1.1	7.7	36.604	E
3	1615	404	26	3460	0.467	1614	2527	0.6	0.9	2.024	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1949	487	629	2011	0.969	1933	1012	15.9	19.8	38.513	E
2	690	173	1926	707	0.976	669	637	7.7	13.1	68.201	F
3	1615	404	26	3459	0.467	1615	2569	0.9	0.9	2.026	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1591	398	515	2155	0.739	1658	828	19.8	3.1	8.719	A
2	564	141	1652	1035	0.545	611	522	13.1	1.3	10.034	B
3	1319	330	23	3463	0.381	1320	2239	0.9	0.6	1.744	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1333	333	431	2261	0.589	1339	692	3.1	1.5	4.168	A
2	472	118	1333	1416	0.333	475	436	1.3	0.5	4.076	A
3	1104	276	18	3469	0.318	1105	1790	0.6	0.5	1.583	A

2035 Baseline, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	296.29	F

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
D3	2035 Baseline	AM	ONE HOUR	07:00	08:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	2088	100.000
2		ONE HOUR	✓	800	100.000
3		ONE HOUR	✓	1762	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	9	8	2071
	2	6	12	782
	3	1078	684	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	33	0	5
	2	25	10	5
	3	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	1.25	397.41	240.7	F	1916	2874
2	1.29	679.53	103.3	F	734	1101
3	0.56	2.46	1.3	A	1617	2425

Main Results for each time segment

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1572	393	523	2145	0.733	1561	821	0.0	2.8	6.355	A
2	602	151	1555	1151	0.523	598	529	0.0	1.1	6.790	A
3	1327	332	20	3466	0.383	1324	2132	0.0	0.6	1.742	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1877	469	625	2017	0.931	1846	982	2.8	10.6	19.330	C
2	719	180	1839	811	0.887	699	632	1.1	6.3	29.627	D
3	1584	396	24	3462	0.458	1583	2514	0.6	0.9	1.988	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2299	575	764	1842	1.248	1837	1200	10.6	126.1	141.081	F
2	881	220	1830	822	1.072	802	771	6.3	26.0	88.084	F
3	1940	485	26	3459	0.561	1938	2606	0.9	1.3	2.454	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2299	575	765	1841	1.249	1841	1201	126.1	240.7	354.485	F
2	881	220	1833	817	1.078	812	772	26.0	43.3	173.546	F
3	1940	485	26	3459	0.561	1940	2619	1.3	1.3	2.460	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1877	469	625	2017	0.931	2008	983	240.7	207.9	397.407	F
2	719	180	2001	617	1.165	616	633	43.3	69.2	368.108	F
3	1584	396	23	3463	0.457	1586	2594	1.3	0.9	1.992	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1572	393	522	2146	0.733	2135	825	207.9	67.1	233.545	F
2	602	151	2127	466	1.293	466	530	69.2	103.3	679.534	F
3	1327	332	20	3467	0.383	1327	2573	0.9	0.6	1.749	A

2035 Base + Dev (2 Access), AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	265.29	F

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
D7	2035 Base + Dev (2 Access)	AM	ONE HOUR	07:00	08:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	2098	100.000
2		ONE HOUR	✓	763	100.000
3		ONE HOUR	✓	1783	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	9	8	2081
	2	6	12	745
	3	1102	681	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	33	0	5
	2	25	10	5
	3	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	1.25	404.92	244.7	F	1925	2888
2	1.24	495.47	75.8	F	700	1050
3	0.57	2.50	1.4	A	1636	2454

Main Results for each time segment

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1579	395	521	2148	0.735	1568	839	0.0	2.8	6.402	A
2	574	144	1562	1142	0.503	570	527	0.0	1.0	6.577	A
3	1342	336	20	3466	0.387	1340	2112	0.0	0.7	1.756	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1886	472	622	2020	0.934	1854	1003	2.8	11.0	19.732	C
2	686	171	1847	802	0.856	670	629	1.0	5.1	26.054	D
3	1603	401	24	3462	0.463	1602	2492	0.7	0.9	2.009	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2310	577	761	1846	1.252	1841	1226	11.0	128.2	143.085	F
2	840	210	1834	817	1.028	786	768	5.1	18.8	69.963	F
3	1963	491	26	3458	0.568	1961	2593	0.9	1.4	2.493	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2310	577	762	1844	1.252	1844	1228	128.2	244.7	359.415	F
2	840	210	1837	813	1.033	800	769	18.8	28.8	123.608	F
3	1963	491	27	3458	0.568	1963	2610	1.4	1.4	2.500	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1886	472	623	2020	0.934	2011	1005	244.7	213.3	404.918	F
2	686	171	2004	613	1.118	610	630	28.8	47.7	254.045	F
3	1603	401	23	3463	0.463	1605	2591	1.4	0.9	2.015	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1579	395	520	2148	0.735	2138	843	213.3	73.7	243.256	F
2	574	144	2130	463	1.242	462	528	47.7	75.8	495.468	F
3	1342	336	20	3466	0.387	1343	2572	0.9	0.7	1.760	A

2035 Base (CLEUD), AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	399.41	F

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
D9	2035 Base (CLEUD)	AM	ONE HOUR	07:00	08:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	2214	100.000
2		ONE HOUR	✓	768	100.000
3		ONE HOUR	✓	1692	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	9	8	2197
	2	6	12	750
	3	1052	640	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	33	0	5
	2	25	10	5
	3	5	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	1.28	473.10	283.3	F	2032	3047
2	1.40	1061.78	140.9	F	705	1057
3	0.54	2.34	1.2	A	1553	2329

Main Results for each time segment

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1667	417	490	2187	0.762	1654	802	0.0	3.3	6.939	A
2	578	145	1648	1040	0.556	573	496	0.0	1.3	8.031	A
3	1274	318	20	3466	0.367	1271	2201	0.0	0.6	1.701	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1990	498	585	2067	0.963	1943	958	3.3	15.0	24.462	C
2	690	173	1936	694	0.994	645	592	1.3	12.6	54.414	F
3	1521	380	23	3463	0.439	1520	2558	0.6	0.8	1.923	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2438	609	716	1903	1.281	1900	1171	15.0	149.4	162.305	F
2	846	211	1893	746	1.134	739	722	12.6	39.3	142.238	F
3	1863	466	25	3460	0.538	1861	2607	0.8	1.2	2.336	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2438	609	716	1902	1.281	1902	1172	149.4	283.3	403.423	F
2	846	211	1895	743	1.138	741	723	39.3	65.4	284.033	F
3	1863	466	25	3460	0.538	1863	2612	1.2	1.2	2.340	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1990	498	585	2068	0.963	2060	959	283.3	265.9	473.103	F
2	690	173	2053	555	1.244	555	592	65.4	99.4	612.784	F
3	1521	380	21	3465	0.439	1523	2586	1.2	0.8	1.927	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1667	417	489	2188	0.762	2180	805	265.9	137.6	334.167	F
2	578	145	2172	412	1.402	412	496	99.4	140.9	1061.781	F
3	1274	318	19	3468	0.367	1275	2566	0.8	0.6	1.703	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: M25 J4 PM Validation (200512).j9
Path: J:\41290 - AM - Fort Halstead\BRIEF 5503 - Updated TA\MODELLING\TRANSPORT\JUNCTIONS 9
Report generation date: 12-May-20 11:42:17 AM

»2020 Observed, PM
»2035 Baseline, PM
»2035 Base + Dev (2 Access), PM
»2035 Base (CLEUD), PM

Summary of junction performance

	PM			
	Queue (PCU)	Delay (s)	RFC	LOS
	2020 Observed			
Arm 1	10.7	36.00	0.93	E
Arm 2	8.5	48.73	0.92	E
Arm 3	1.5	2.66	0.60	A
	2035 Baseline			
Arm 1	186.1	519.21	1.35	F
Arm 2	28.1	171.28	1.10	F
Arm 3	2.9	4.08	0.74	A
	2035 Base + Dev (2 Access)			
Arm 1	174.1	465.54	1.32	F
Arm 2	46.1	292.18	1.18	F
Arm 3	2.8	3.97	0.73	A
	2035 Base (CLEUD)			
Arm 1	137.4	349.53	1.25	F
Arm 2	15.9	113.83	1.00	F
Arm 3	3.1	4.29	0.75	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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	
Location	
Site number	
Date	02-Mar-20
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\dansmith
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	PCU	PCU	perHour	s	-Min	perMin

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
D2	2020 Observed	PM	ONE HOUR	16:45	18:15	15	✓
D4	2035 Baseline	PM	ONE HOUR	16:45	18:15	15	✓
D8	2035 Base + Dev (2 Access)	PM	ONE HOUR	16:45	18:15	15	✓
D10	2035 Base (CLEUD)	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2020 Observed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	20.34	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	M25 North	
2	M25 South	
3	M25 West	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	7.12	7.79	16.1	69.1	151.2	11.4	
2	6.94	7.51	45.9	28.7	152.9	15.1	
3	7.79	7.88	0.5	94.6	151.9	11.8	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final slope	Final intercept (PCU/hr)
1	✓	1.256	2054	1.256	2054
2	✓	1.197	2074	1.197	2074
3	✓	1.272	3500	1.272	3500

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

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
D2	2020 Observed	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	1042	100.000
2		ONE HOUR	✓	605	100.000
3		ONE HOUR	✓	1895	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	11	11	1020
	2	3	8	594
	3	1309	585	1

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	2
	2	0	0	2
	3	3	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	0.93	36.00	10.7	E	956	1434
2	0.92	48.73	8.5	E	555	833
3	0.60	2.66	1.5	A	1739	2608

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	784	196	446	1493	0.525	780	994	0.0	1.1	5.113	A
2	455	114	773	1149	0.396	453	454	0.0	0.7	5.250	A
3	1427	357	16	3479	0.410	1424	1209	0.0	0.7	1.791	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	937	234	534	1384	0.677	933	1189	1.1	2.1	8.070	A
2	544	136	924	968	0.562	541	543	0.7	1.3	8.555	A
3	1704	426	20	3475	0.490	1702	1446	0.7	1.0	2.078	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1147	287	653	1234	0.930	1119	1455	2.1	9.2	27.029	D
2	666	167	1108	748	0.891	647	664	1.3	6.2	31.658	D
3	2086	522	24	3470	0.601	2084	1731	1.0	1.5	2.654	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1147	287	654	1233	0.931	1141	1457	9.2	10.7	35.999	E
2	666	167	1130	721	0.924	657	665	6.2	8.5	48.728	E
3	2086	522	24	3469	0.601	2086	1763	1.5	1.5	2.664	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	937	234	535	1382	0.678	971	1191	10.7	2.2	9.637	A
2	544	136	961	923	0.589	572	544	8.5	1.5	11.257	B
3	1704	426	21	3474	0.490	1706	1513	1.5	1.0	2.086	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	784	196	448	1492	0.526	789	997	2.2	1.1	5.250	A
2	455	114	781	1139	0.400	459	455	1.5	0.7	5.421	A
3	1427	357	17	3479	0.410	1428	1223	1.0	0.7	1.799	A

2035 Baseline, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	180.10	F

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	2035 Baseline	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	1230	100.000
2		ONE HOUR	✓	733	100.000
3		ONE HOUR	✓	2333	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	12	12	1206
	2	3	9	721
	3	1580	752	1

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	2
	2	0	0	2
	3	3	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	1.35	519.21	186.1	F	1129	1693
2	1.10	171.28	28.1	F	673	1009
3	0.74	4.08	2.9	A	2141	3211

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	926	232	572	1335	0.694	917	1198	0.0	2.2	8.604	A
2	552	138	909	986	0.560	547	580	0.0	1.3	8.264	A
3	1756	439	18	3477	0.505	1752	1438	0.0	1.0	2.130	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1106	276	684	1195	0.926	1079	1432	2.2	8.9	27.187	D
2	659	165	1070	794	0.830	647	694	1.3	4.3	23.304	C
3	2097	524	21	3473	0.604	2095	1695	1.0	1.5	2.671	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1354	339	837	1003	1.351	999	1749	8.9	97.6	201.628	F
2	807	202	991	888	0.909	794	846	4.3	7.5	34.511	D
3	2569	642	23	3471	0.740	2563	1762	1.5	2.9	4.036	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1354	339	839	1000	1.354	1000	1753	97.6	186.1	487.058	F
2	807	202	991	887	0.910	803	848	7.5	8.4	40.239	E
3	2569	642	23	3471	0.740	2569	1772	2.9	2.9	4.082	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1106	276	686	1192	0.928	1185	1438	186.1	166.2	519.206	F
2	659	165	1175	668	0.987	637	697	8.4	14.0	78.278	F
3	2097	524	22	3472	0.604	2103	1789	2.9	1.6	2.702	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	926	232	574	1333	0.694	1325	1206	166.2	66.4	317.822	F
2	552	138	1313	502	1.099	496	586	14.0	28.1	171.281	F
3	1756	439	21	3473	0.506	1758	1788	1.6	1.1	2.150	A

2035 Base + Dev (2 Access), PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	187.59	F

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
D8	2035 Base + Dev (2 Access)	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	1251	100.000
2		ONE HOUR	✓	729	100.000
3		ONE HOUR	✓	2309	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	12	12	1227
	2	3	9	717
	3	1589	719	1

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	1
	2	0	0	2
	3	3	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	1.32	465.54	174.1	F	1148	1722
2	1.18	292.18	46.1	F	669	1003
3	0.73	3.97	2.8	A	2119	3178

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	942	235	547	1366	0.689	933	1205	0.0	2.2	8.235	A
2	549	137	925	967	0.568	544	556	0.0	1.3	8.571	A
3	1738	435	18	3477	0.500	1734	1451	0.0	1.0	2.110	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1125	281	655	1232	0.913	1101	1440	2.2	8.0	24.449	C
2	655	164	1092	767	0.854	641	664	1.3	4.9	26.514	D
3	2076	519	21	3473	0.598	2074	1711	1.0	1.5	2.630	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1377	344	801	1048	1.314	1044	1759	8.0	91.2	180.929	F
2	803	201	1035	835	0.962	778	810	4.9	11.2	48.937	E
3	2542	636	23	3471	0.732	2537	1790	1.5	2.8	3.925	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1377	344	802	1046	1.317	1046	1763	91.2	174.1	440.296	F
2	803	201	1037	833	0.964	791	811	11.2	14.0	67.065	F
3	2542	636	23	3471	0.733	2542	1805	2.8	2.8	3.969	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1125	281	656	1230	0.915	1222	1446	174.1	149.7	465.544	F
2	655	164	1212	624	1.051	612	667	14.0	24.8	134.458	F
3	2076	519	22	3472	0.598	2081	1802	2.8	1.5	2.657	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	942	235	548	1365	0.690	1356	1213	149.7	46.1	262.337	F
2	549	137	1344	465	1.179	464	561	24.8	46.1	292.181	F
3	1738	435	21	3474	0.500	1740	1787	1.5	1.0	2.129	A

2035 Base (CLEUD), PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm 2 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout
Warning	Geometry	Arm 3 - Roundabout Geometry	Roundabout diameter is over 130m; roundabout should be treated as a Grade Separated and/or Large Roundabout

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	119.07	F

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
D10	2035 Base (CLEUD)	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	1197	100.000
2		ONE HOUR	✓	688	100.000
3		ONE HOUR	✓	2372	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	12	12	1173
	2	3	9	676
	3	1660	711	1

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	2
	2	0	0	2
	3	3	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	1.25	349.53	137.4	F	1098	1648
2	1.00	113.83	15.9	F	631	947
3	0.75	4.29	3.1	A	2177	3265

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	901	225	541	1374	0.656	894	1258	0.0	1.9	7.528	A
2	518	129	885	1014	0.511	514	550	0.0	1.0	7.277	A
3	1786	446	18	3477	0.514	1781	1381	0.0	1.1	2.168	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1076	269	647	1241	0.867	1061	1504	1.9	5.7	18.950	C
2	618	155	1051	816	0.758	611	657	1.0	3.0	17.289	C
3	2132	533	21	3473	0.614	2130	1641	1.1	1.6	2.740	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1318	329	792	1059	1.244	1053	1837	5.7	72.1	143.693	F
2	758	189	1043	825	0.918	738	801	3.0	7.7	35.986	E
3	2612	653	23	3470	0.753	2606	1758	1.6	3.1	4.237	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1318	329	794	1057	1.247	1057	1841	72.1	137.4	349.531	F
2	758	189	1047	821	0.923	752	803	7.7	9.2	46.750	E
3	2612	653	24	3470	0.753	2612	1775	3.1	3.1	4.292	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1076	269	650	1238	0.869	1229	1511	137.4	99.2	342.212	F
2	618	155	1218	617	1.003	593	661	9.2	15.7	91.342	F
3	2132	533	23	3471	0.614	2138	1788	3.1	1.6	2.778	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	901	225	543	1371	0.657	1289	1266	99.2	2.2	118.825	F
2	518	129	1277	546	0.949	517	556	15.7	15.9	113.834	F
3	1786	446	22	3472	0.514	1788	1772	1.6	1.1	2.192	A

TRANSYT 15

Filename: A25 A21 Junctions (Observed).t15
Path: J:\41290 - AM - Fort Halstead\BRIEF 5503 - Updated TA\MODELLING\TRANSPORT\TRANSYT
Report generation date: 26/03/2020 14:17:19

»A1 - 2020 Observed AM : D1 - 2020 Observed AM* :
»A2 - 2020 Observed PM : D2 - 2020 Observed PM* :

A1 - 2020 Observed AM
D1 - 2020 Observed AM*

Signal Timings

Network Default: 94s cycle time; 94 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

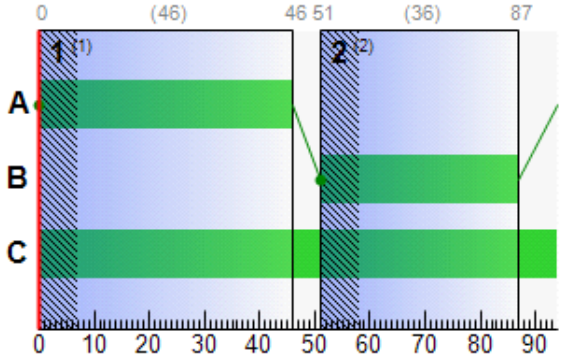
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	0	46	46	1	7
	2	✓	2	B,C	51	87	36	1	7

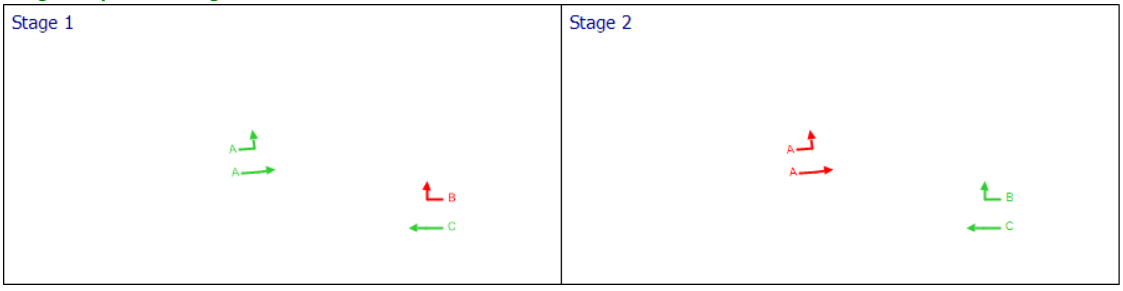
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	0	46	46
3	1	2	1	A	0	46	46
28	1	18	1	C	0	0	94
29	1	18	1	B	51	87	36

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	D wei mu
1	1		1			226	1937	94	0.00	12	671	8.01	0.12	0.00	0.01	
	2		1			565	2047	94	4.00	28	226	8.20	0.34	0.00	0.05	
2	1		2	1	A	226	1975	46	0.00	23	293	20.98	13.81	54.96	3.36	
3	1		2	1	A	565 <	1937	46	0.00	58	54	26.27	19.18	70.89	10.76 +	
4	1					757	Unrestricted	94	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			411	591	94	0.00	70	29	18.70	7.85	31.95	4.44	
6	1		4			976	2004	94	0.00	49	85	26.01	0.86	1.24	3.59	
7	1		5			610	1982	94	0.00	31	192	8.42	0.40	0.00	0.07	
	2		5			375	2076	94	0.00	18	398	8.24	0.19	0.00	0.02	
8	1		6			610	2018	94	0.00	30	198	7.11	0.39	0.00	0.07	
9	1		9			375	497	94	0.00	76	19	36.94	13.67	68.14	8.24	
10	1		6			630	1947	94	0.00	32	178	30.68	0.44	0.00	0.08	
11	1		7			1240	4024	94	0.00	31	192	10.50	0.20	0.00	0.07	
12	1		8			358	709	94	0.00	50	78	8.89	2.58	0.00	0.26	
13	1		9			882	1891	94	0.00	47	93	6.88	0.83	0.00	0.20	
14	1					385	Unrestricted	94	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			111	1752	94	0.00	6	1321	9.60	0.07	0.00	0.00	
16	1		11			23	521	94	94.00	4	1939	2.30	0.16	0.00	0.00	
17	1		11			88	126	94	0.00	70	29	38.30	36.66	88.99	2.23	
18	1					905	Unrestricted	94	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			1037	1975	94	0.00	53	71	13.72	1.01	0.00	0.29	
20	1					654	Unrestricted	94	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			229	1815	94	0.00	13	613	4.88	0.14	0.00	0.01	
22	1		14			781	2011	94	0.00	39	132	6.78	0.57	0.00	0.12	
23	1		14			27	541	94	94.00	5	1704	5.64	0.17	0.00	0.00	
24	1		15			344	1893	94	0.00	18	395	13.73	0.21	0.00	0.02	
25	1		15			819	1970	94	0.00	42	116	5.28	0.65	0.00	0.15	
26	1		16			1163	4114	94	0.00	28	218	27.35	0.17	0.00	0.06	
27	1		17			768	2126	94	0.00	36	149	11.99	0.48	0.00	0.10	
	2		17			531	2120	94	0.00	25	259	11.85	0.28	0.00	0.04	
28	1		18	1	C	768	2017	94	0.00	38	136	12.81	0.55	0.00	0.12	
29	1		18	1	B	531	1849	36	0.00	73	23	43.09	30.72	88.94	12.58	
30	1					768	2011	94	0.00	38	136	16.78	0.55	0.00	0.12	
31	1		19			0	546	94	94.00	0	Unrestricted	0.00	0.00	0.00	0.00	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2036.10	81.58	24.96	13.71	194.63	18.49	0.00	213.12
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	2036.10	81.58	24.96	13.71	194.63	18.49	0.00	213.12

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

A2 - 2020 Observed PM
D2 - 2020 Observed PM*

Signal Timings

Network Default: 82s cycle time; 82 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

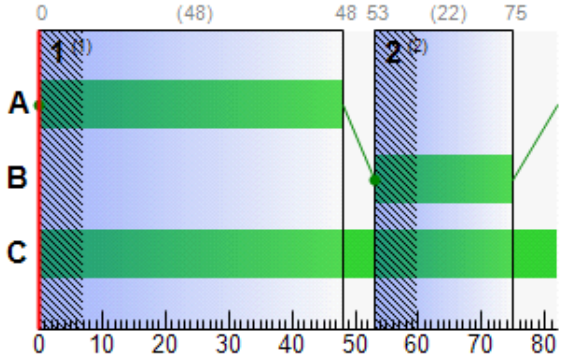
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	0	48	48	1	7
	2	✓	2	B,C	53	75	22	1	7

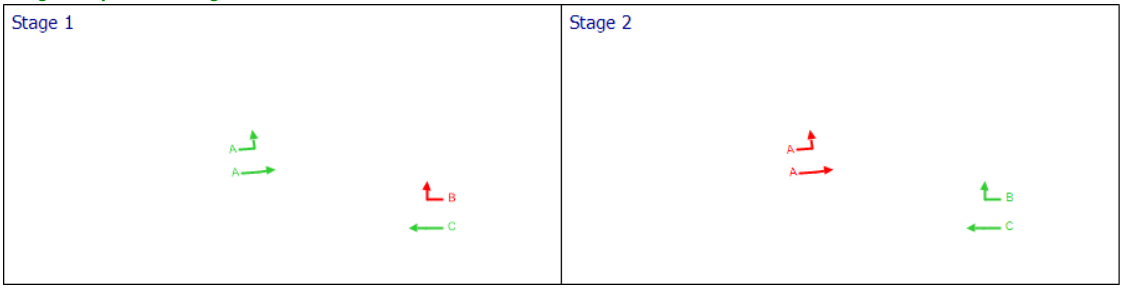
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	0	48	48
3	1	2	1	A	0	48	48
28	1	18	1	C	0	0	82
29	1	18	1	B	53	75	22

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	we m
1	1		1			321	1937	82	0.00	17	443	8.08	0.18	0.00	0.02	
	2		1			704	2047	82	0.00	34	162	8.33	0.46	0.00	0.09	
2	1		2	1	A	321	1975	48	0.00	27	231	15.67	8.51	46.45	3.53	
3	1		2	1	A	704	2029	48	0.00	58	55	19.31	12.22	61.09	10.18	
4	1					777	Unrestricted	82	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			163	560	82	0.00	29	209	12.17	1.32	0.00	0.06	
6	1		4			867	2004	82	0.00	43	108	25.83	0.68	0.00	0.16	
7	1		5			570	1982	82	0.00	29	213	8.38	0.37	0.00	0.06	
	2		5			302	2076	82	0.00	15	519	8.20	0.15	0.00	0.01	
8	1		6			570	2018	82	0.00	28	219	7.08	0.35	0.00	0.06	
9	1		9			302	537	82	0.00	56	60	27.57	4.30	6.33	1.86	
10	1		6			451	1947	82	0.00	23	289	30.52	0.28	0.00	0.03	
11	1		7			1021	4024	82	0.00	25	255	10.46	0.15	0.00	0.04	
12	1		8			127	711	82	0.00	18	404	6.86	0.55	0.00	0.02	
13	1		9			894	1891	82	0.00	47	90	6.90	0.85	0.00	0.21	
14	1					146	Unrestricted	82	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			88	1752	82	0.00	5	1692	9.58	0.05	0.00	0.00	
16	1		11			25	518	82	82.00	5	1766	2.32	0.18	0.00	0.00	
17	1		11			63	163	82	0.00	39	133	10.61	8.96	38.54	0.63	
18	1					919	Unrestricted	82	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			914	1975	82	0.00	46	94	13.50	0.78	0.00	0.20	
20	1					514	Unrestricted	82	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			167	1815	82	0.00	9	878	4.84	0.10	0.00	0.00	
22	1		14			728	2011	82	0.00	36	149	6.72	0.51	0.00	0.10	
23	1		14			19	537	82	82.00	4	2444	5.59	0.12	0.00	0.00	
24	1		15			213	1893	82	0.00	11	700	13.64	0.12	0.00	0.01	
25	1		15			746	1970	82	0.00	38	138	5.18	0.56	0.00	0.12	
26	1		16			959	4114	82	0.00	23	286	27.31	0.13	0.00	0.04	
27	1		17			504	2126	82	0.00	24	280	11.78	0.26	0.00	0.04	
	2		17			456	2120	82	0.00	22	318	11.80	0.23	0.00	0.03	
28	1		18	1	C	504	2017	82	0.00	25	260	12.56	0.30	0.00	0.04	
29	1		18	1	B	456	1810	22	0.00	90	0	67.56	55.19	123.48	13.28	
30	1					682	2011	82	0.00	34	165	16.68	0.46	0.00	0.09	
31	1		19			178	604	82	0.00	29	205	28.68	1.24	0.00	0.06	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	1766.00	71.01	24.87	12.15	172.48	14.87	0.00	187.34
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	1766.00	71.01	24.87	12.15	172.48	14.87	0.00	187.34

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

TRANSYT 15

Version: 15.5.3.4

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Filename: A25 A21 Junctions (Baseline FR).t15
Path: J:\41290 - AM - Fort Halstead\BRIEF 5503 - Updated TA\MODELLING\TRANSPORT\TRANSYT
Report generation date: 26/03/2020 14:18:33

»A1 - 2035 Baseline AM : D1 - 2035 Baseline AM* :
»A2 - 2035 Baseline PM : D2 - 2035 Baseline PM* :

A1 - 2035 Baseline AM
D1 - 2035 Baseline AM*

Signal Timings

Network Default: 51s cycle time; 51 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

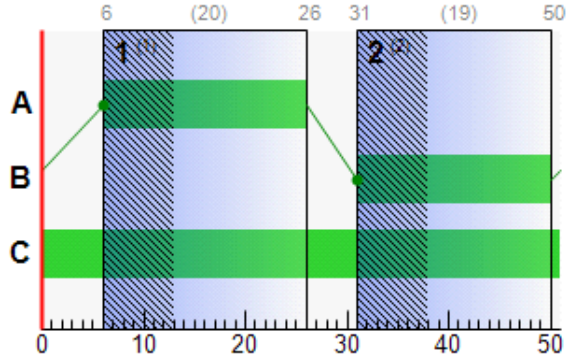
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	6	26	20	1	7
	2	✓	2	B,C	31	50	19	1	7

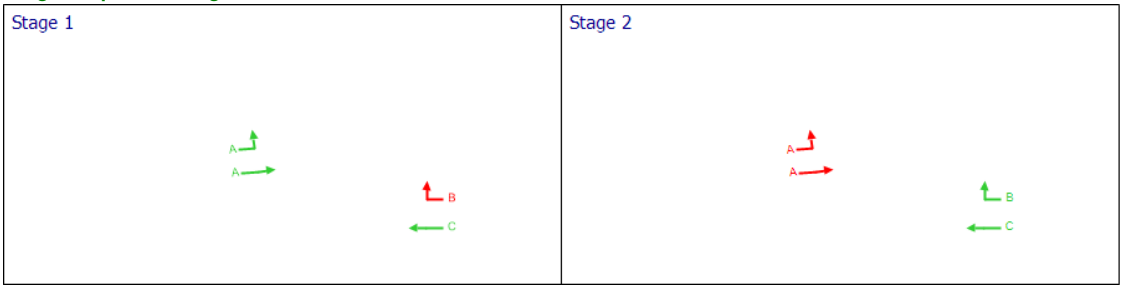
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	6	26	20
3	1	2	1	A	6	26	20
28	1	18	1	C	0	0	51
29	1	18	1	B	31	50	19

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	w m
1	1		1			245	1937	51	0.00	13	612	8.03	0.13	0.00	0.01	
	2		1			613	2047	51	0.00	30	201	8.25	0.38	0.00	0.06	
2	1		2	1	A	245	1975	20	0.00	30	199	18.20	11.04	65.56	2.38	
3	1		2	1	A	613	1937	20	0.00	77	17	27.33	20.25	94.98	8.57	
4	1					822	Unrestricted	51	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			446	580	51	0.00	77	17	22.19	11.34	54.02	4.34	
6	1		4			1059	2004	51	0.00	53	70	26.16	1.00	0.00	0.30	
7	1		5			663	1982	51	0.00	33	169	8.47	0.46	0.00	0.08	
	2		5			407	2076	51	0.00	20	359	8.26	0.21	0.00	0.02	
8	1		6			663	2018	51	0.00	33	174	7.16	0.44	0.00	0.08	
9	1		9			407	466	51	0.00	87	3	48.68	25.41	89.99	7.01	
10	1		6			684	1947	51	0.00	35	156	30.74	0.50	0.00	0.10	
11	1		7			1347	4024	51	0.00	33	169	10.53	0.23	0.00	0.08	
12	1		8			389	709	51	0.00	55	64	9.38	3.07	0.00	0.33	
13	1		9			958	1891	51	0.00	51	78	7.02	0.98	0.00	0.26	
14	1					418	Unrestricted	51	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			120	1752	51	51.00	7	1214	9.60	0.08	0.00	0.00	
16	1		11			25	504	51	51.00	5	1715	2.33	0.19	0.00	0.00	
17	1		11			95 <	86	51	0.00	111	-19	282.35	280.70	300.60	8.42 +	
18	1					983	Unrestricted	51	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			1126	1975	51	0.00	57	58	13.92	1.21	0.00	0.38	
20	1					705	Unrestricted	51	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			249	1815	51	0.00	14	556	4.89	0.16	0.00	0.01	
22	1		14			848	2011	51	0.00	42	113	6.87	0.65	0.00	0.15	
23	1		14			29	515	51	51.00	6	1497	5.68	0.21	0.00	0.00	
24	1		15			374	1893	51	0.00	20	356	13.76	0.23	0.00	0.02	
25	1		15			889	1970	51	0.00	45	99	5.38	0.75	0.00	0.19	
26	1		16			1263	4114	51	0.00	31	193	27.37	0.19	0.00	0.07	
27	1		17			834	2126	51	0.00	39	129	12.06	0.55	0.00	0.13	
	2		17			577	2120	51	0.00	27	231	11.88	0.32	0.00	0.05	
28	1		18	1	C	834	2017	51	0.00	41	118	12.89	0.63	0.00	0.15	
29	1		18	1	B	577	1849	19	0.00	80	13	35.44	23.08	100.95	8.72	
30	1					834	2011	51	0.00	41	117	16.86	0.63	0.00	0.15	
31	1		19			0	532	51	51.00	0	Unrestricted	0.00	0.00	0.00	0.00	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2210.32	95.88	23.05	22.21	315.32	27.46	0.00	342.78
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	2210.32	95.88	23.05	22.21	315.32	27.46	0.00	342.78

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

A2 - 2035 Baseline PM
D2 - 2035 Baseline PM*

Signal Timings

Network Default: 56s cycle time; 56 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

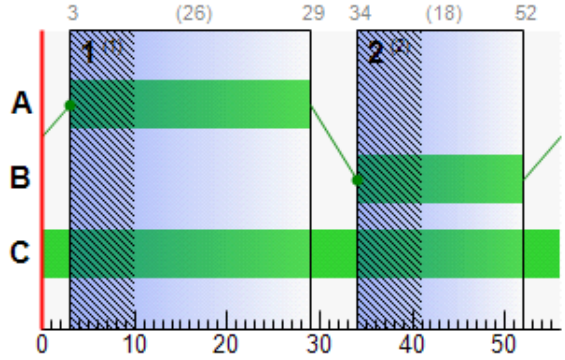
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	3	29	26	1	7
	2	✓	2	B,C	34	52	18	1	7

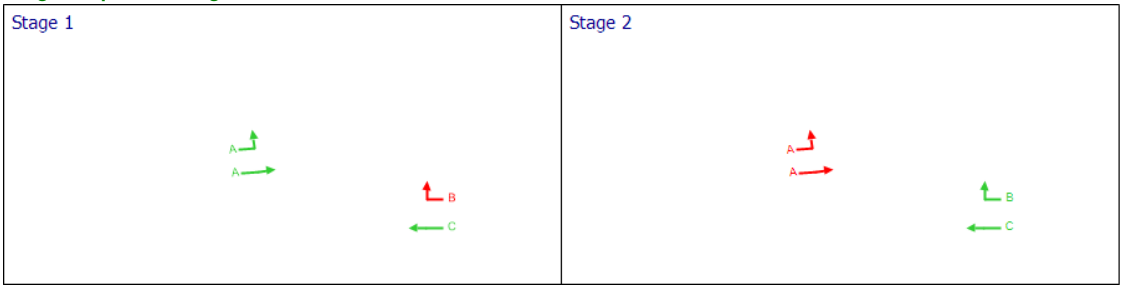
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	3	29	26
3	1	2	1	A	3	29	26
28	1	18	1	C	0	0	56
29	1	18	1	B	34	52	18

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	we m
1	1		1			353	1937	56	0.00	18	394	8.10	0.21	0.00	0.02	
	2		1			770	2047	56	5.00	38	139	8.40	0.53	0.00	0.11	
2	1		2	1	A	353	1975	26	0.00	37	143	17.43	10.26	61.61	3.54	
3	1		2	1	A	770 <	2029	26	0.00	79	14	25.85	18.77	90.21	11.26 +	
4	1					850	Unrestricted	56	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			177	546	56	0.00	32	177	12.43	1.58	0.00	0.08	
6	1		4			947	2004	56	0.00	47	90	25.95	0.80	0.00	0.21	
7	1		5			621	1982	56	0.00	31	187	8.43	0.41	0.00	0.07	
	2		5			329	2076	56	0.00	16	468	8.21	0.16	0.00	0.01	
8	1		6			621	2018	56	0.00	31	192	7.12	0.40	0.00	0.07	
9	1		9			329	509	56	0.00	65	39	29.93	6.66	26.10	3.16	
10	1		6			491	1947	56	0.00	25	257	30.55	0.31	0.00	0.04	
11	1		7			1112	4024	56	0.00	28	226	10.47	0.17	0.00	0.05	
12	1		8			138	710	56	0.00	19	363	6.92	0.61	0.00	0.02	
13	1		9			974	1891	56	0.00	52	75	7.05	1.01	0.00	0.27	
14	1					159	Unrestricted	56	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			96	1752	56	0.00	5	1543	9.59	0.06	0.00	0.00	
16	1		11			27	501	56	56.00	5	1569	2.35	0.20	0.00	0.00	
17	1		11			69	126	56	0.00	55	64	23.93	22.28	79.97	0.94	
18	1					1001	Unrestricted	56	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			996	1975	56	0.00	50	78	13.64	0.93	0.00	0.26	
20	1					560	Unrestricted	56	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			182	1815	56	0.00	10	798	4.85	0.11	0.00	0.01	
22	1		14			793	2011	56	0.00	39	128	6.80	0.58	0.00	0.13	
23	1		14			21	509	56	56.00	4	2082	5.62	0.15	0.00	0.00	
24	1		15			232	1893	56	0.00	12	634	13.65	0.13	0.00	0.01	
25	1		15			813	1970	56	0.00	41	118	5.27	0.64	0.00	0.14	
26	1		16			1045	4114	56	0.00	25	254	27.32	0.15	0.00	0.04	
27	1		17			549	2126	56	0.00	26	249	11.81	0.29	0.00	0.04	
	2		17			497	2120	56	0.00	23	284	11.82	0.26	0.00	0.04	
28	1		18	1	C	549	2017	56	0.00	27	231	12.59	0.33	0.00	0.05	
29	1		18	1	B	497	1810	18	0.00	81	11	41.16	28.79	106.89	8.55	
30	1					743	2011	56	0.00	37	144	16.75	0.52	0.00	0.11	
31	1		19			194	594	56	0.00	33	176	28.90	1.47	0.00	0.08	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	1925.60	76.10	25.30	11.91	169.11	19.87	0.00	188.98
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	1925.60	76.10	25.30	11.91	169.11	19.87	0.00	188.98

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

TRANSYT 15

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Filename: A25 A21 Junctions (Baseline + Dev FR).t15
Path: J:\41290 - AM - Fort Halstead\BRIEF 5503 - Updated TA\MODELLING\TRANSPORT\TRANSYT
Report generation date: 31/03/2020 10:01:35

»A3 - 2035 Baseline + Dev (2 Access) AM : D3 - 2035 Baseline + Dev (2 Access) AM* :
»A4 - 2035 Baseline + Dev (2 Access) PM : D4 - 2035 Baseline + Dev (2 Access) PM* :
»A5 - 2035 Baseline (CLEUD) AM : D5 - 2035 Baseline (CLEUD) AM* :
»A6 - 2035 Baseline (CLEUD) PM : D6 - 2035 Baseline (CLEUD) PM* :

A3 - 2035 Baseline + Dev (2 Access) AM
D3 - 2035 Baseline + Dev (2 Access) AM*

Signal Timings

Network Default: 51s cycle time; 51 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

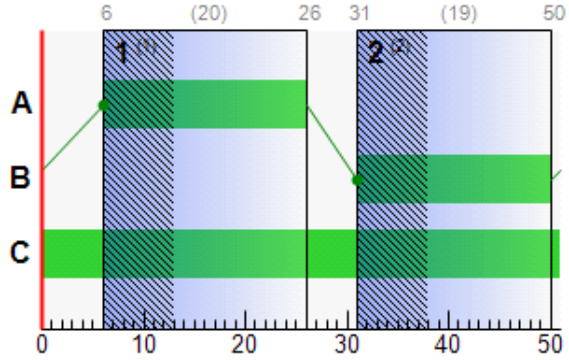
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	6	26	20	1	7
	2	✓	2	B,C	31	50	19	1	7

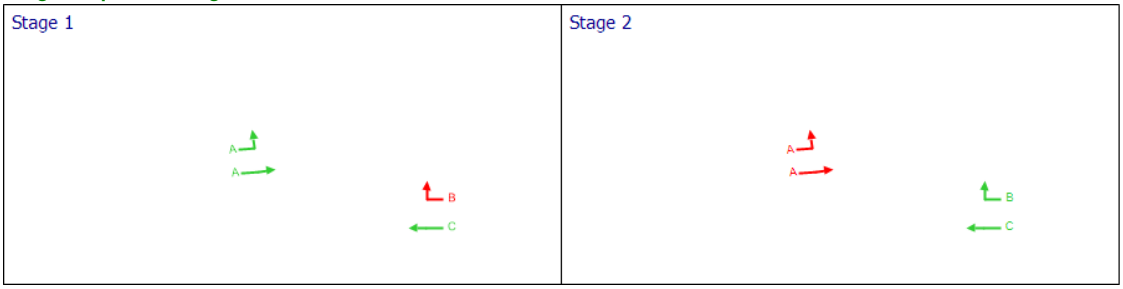
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	6	26	20
3	1	2	1	A	6	26	20
28	1	18	1	C	0	0	51
29	1	18	1	B	31	50	19

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	w m
1	1		1			245	1937	51	0.00	13	612	8.03	0.13	0.00	0.01	
	2		1			613	2047	51	0.00	30	201	8.25	0.38	0.00	0.06	
2	1		2	1	A	245	1975	20	0.00	30	199	18.20	11.04	65.56	2.38	
3	1		2	1	A	613	1937	20	0.00	77	17	27.33	20.25	94.98	8.57	
4	1					823	Unrestricted	51	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			476	580	51	0.00	82	10	26.05	15.20	66.15	5.49	
6	1		4			1089	2004	51	0.00	54	66	26.22	1.07	0.00	0.32	
7	1		5			692	1982	51	0.00	35	158	8.50	0.49	0.00	0.09	
	2		5			407	2076	51	0.00	20	359	8.26	0.21	0.00	0.02	
8	1		6			692	2018	51	0.00	34	162	7.19	0.47	0.00	0.09	
9	1		9			407	466	51	0.00	87	3	48.48	25.21	87.25	6.98	
10	1		6			684	1947	51	0.00	35	156	30.74	0.50	0.00	0.10	
11	1		7			1376	4024	51	0.00	34	163	10.54	0.23	0.00	0.09	
12	1		8			418	708	51	0.00	59	52	9.96	3.65	0.00	0.42	
13	1		9			958	1891	51	0.00	51	78	7.02	0.98	0.00	0.26	
14	1					452	Unrestricted	51	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			148	1752	51	51.00	8	965	9.62	0.09	0.00	0.00	
16	1		11			30	504	51	51.00	6	1413	2.37	0.23	0.00	0.00	
17	1		11			118 <	85	51	0.00	139	-35	547.56	545.91	372.54	18.91 +	
18	1					988	Unrestricted	51	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			1131	1975	51	0.00	57	57	13.93	1.22	0.00	0.38	
20	1					706	Unrestricted	51	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			249	1815	51	0.00	14	556	4.89	0.16	0.00	0.01	
22	1		14			848	2011	51	0.00	42	113	6.87	0.65	0.00	0.15	
23	1		14			34	515	51	51.00	7	1262	5.72	0.25	0.00	0.00	
24	1		15			384	1893	51	0.00	20	344	13.76	0.24	0.00	0.03	
25	1		15			883	1970	51	0.00	45	101	5.37	0.74	0.00	0.18	
26	1		16			1267	4114	51	0.00	31	192	27.37	0.19	0.00	0.07	
27	1		17			836	2126	51	0.00	39	129	12.06	0.55	0.00	0.13	
	2		17			578	2120	51	0.00	27	230	11.88	0.32	0.00	0.05	
28	1		18	1	C	836	2017	51	0.00	41	117	12.89	0.63	0.00	0.15	
29	1		18	1	B	578	1849	19	0.00	80	13	35.59	23.23	101.14	8.73	
30	1					836	2011	51	0.00	42	117	16.86	0.64	0.00	0.15	
31	1		19			0	531	51	51.00	0	Unrestricted	0.00	0.00	0.00	0.00	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2237.12	108.02	20.71	33.45	475.05	29.00	0.00	504.05
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	2237.12	108.02	20.71	33.45	475.05	29.00	0.00	504.05

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

A4 - 2035 Baseline + Dev (2 Access) PM
D4 - 2035 Baseline + Dev (2 Access) PM*

Signal Timings

Network Default: 57s cycle time; 57 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

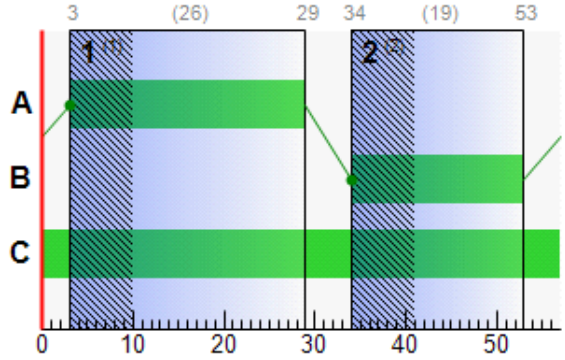
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	3	29	26	1	7
	2	✓	2	B,C	34	53	19	1	7

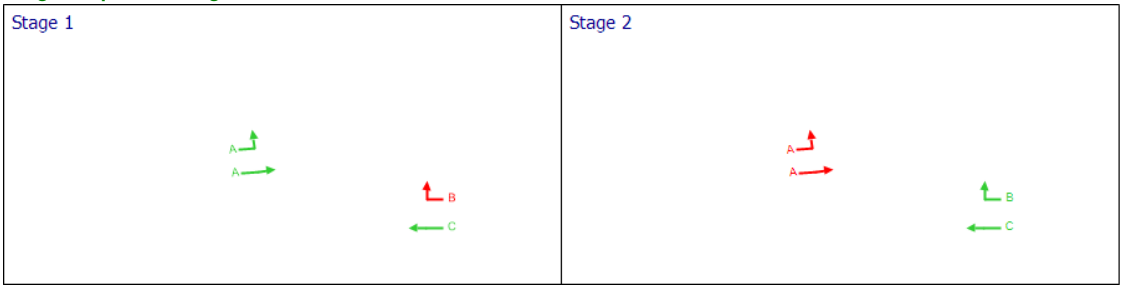
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	3	29	26
3	1	2	1	A	3	29	26
28	1	18	1	C	0	0	57
29	1	18	1	B	34	53	19

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	we m
1	1		1			353	1937	57	0.00	18	394	8.10	0.21	0.00	0.02	
	2		1			770	2047	57	8.00	38	139	8.40	0.53	0.00	0.11	
2	1		2	1	A	353	1975	26	0.00	38	139	17.95	10.79	62.65	3.64	
3	1		2	1	A	770 <	2029	26	0.00	80	12	27.18	20.09	92.61	11.84 +	
4	1					860	Unrestricted	57	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			191	546	57	0.00	35	157	12.62	1.77	0.00	0.09	
6	1		4			961	2004	57	0.00	48	88	25.98	0.83	1.49	1.34	
7	1		5			635	1982	57	0.00	32	181	8.44	0.43	0.00	0.08	
	2		5			329	2076	57	0.00	16	468	8.21	0.16	0.00	0.01	
8	1		6			635	2018	57	0.00	31	186	7.14	0.41	0.00	0.07	
9	1		9			329	509	57	0.00	65	39	29.97	6.70	27.99	3.16	
10	1		6			491	1947	57	0.00	25	257	30.55	0.31	0.00	0.04	
11	1		7			1126	4024	57	0.00	28	222	10.48	0.17	0.00	0.05	
12	1		8			152	710	57	0.00	21	320	7.00	0.69	0.00	0.03	
13	1		9			974	1891	57	0.00	52	75	7.05	1.01	0.00	0.27	
14	1					177	Unrestricted	57	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			137	1752	57	22.00	8	1051	9.61	0.09	0.00	0.00	
16	1		11			32	501	57	57.00	6	1308	2.39	0.25	0.00	0.00	
17	1		11			105 <	125	57	0.00	84	7	69.16	67.52	151.28	3.01 +	
18	1					1006	Unrestricted	57	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			1000	1975	57	0.00	51	78	13.65	0.93	0.00	0.26	
20	1					586	Unrestricted	57	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			182	1815	57	0.00	10	798	4.85	0.11	0.00	0.01	
22	1		14			793	2011	57	0.00	39	128	6.80	0.58	0.00	0.13	
23	1		14			25	509	57	57.00	5	1733	5.65	0.18	0.00	0.00	
24	1		15			239	1893	57	0.00	13	613	13.66	0.14	0.00	0.01	
25	1		15			823	1970	57	0.00	42	115	5.28	0.65	0.00	0.15	
26	1		16			1062	4114	57	0.00	26	249	27.33	0.15	0.00	0.04	
27	1		17			556	2126	57	0.00	26	244	11.81	0.30	0.00	0.05	
	2		17			507	2120	57	0.00	24	276	11.83	0.27	0.00	0.04	
28	1		18	1	C	556	2017	57	0.00	28	226	12.60	0.34	0.00	0.05	
29	1		18	1	B	507	1810	19	0.00	80	13	39.88	27.51	104.41	8.71	
30	1					750	2011	57	0.00	37	141	16.76	0.53	0.00	0.11	
31	1		19			194	593	57	0.00	33	175	28.91	1.47	0.00	0.08	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	1953.42	78.87	24.77	13.75	195.27	21.68	0.00	216.95
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	1953.42	78.87	24.77	13.75	195.27	21.68	0.00	216.95

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

A5 - 2035 Baseline (CLEUD) AM
D5 - 2035 Baseline (CLEUD) AM*

Signal Timings

Network Default: 53s cycle time; 53 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

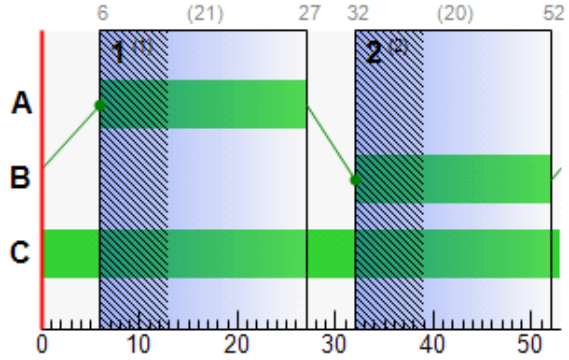
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	6	27	21	1	7
	2	✓	2	B,C	32	52	20	1	7

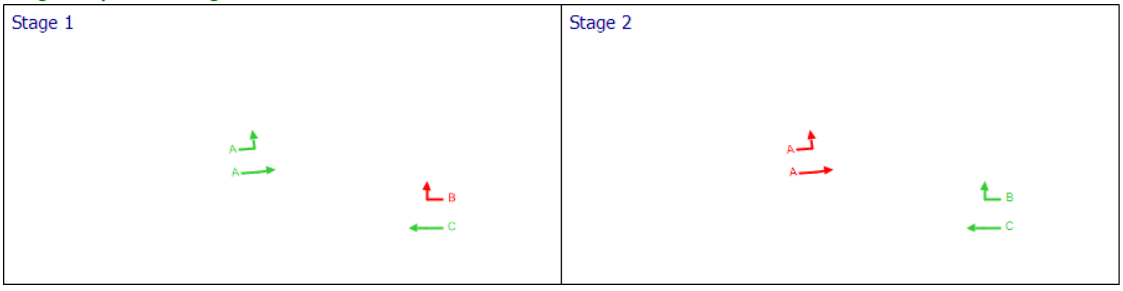
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	6	27	21
3	1	2	1	A	6	27	21
28	1	18	1	C	0	0	53
29	1	18	1	B	32	52	20

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	w m
1	1		1			245	1937	53	0.00	13	612	8.03	0.13	0.00	0.01	
	2		1			613	2047	53	0.00	30	201	8.25	0.38	0.00	0.06	
2	1		2	1	A	245	1975	21	0.00	30	201	18.47	11.30	65.16	2.45	
3	1		2	1	A	613	1937	21	0.00	76	18	27.40	20.31	93.90	8.86	
4	1					821	Unrestricted	53	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			536	580	53	0.00	92	-3	43.92	33.07	108.43	10.31	
6	1		4			1149	2004	53	0.00	57	57	26.35	1.20	0.00	0.38	
7	1		5			752	1982	53	0.00	38	137	8.57	0.55	0.00	0.12	
	2		5			407	2076	53	0.00	20	359	8.26	0.21	0.00	0.02	
8	1		6			752	2018	53	0.00	37	142	7.26	0.53	0.00	0.11	
9	1		9			407	466	53	0.00	87	3	48.20	24.93	80.87	6.98	
10	1		6			684	1947	53	0.00	35	156	30.74	0.50	0.00	0.10	
11	1		7			1436	4024	53	0.00	36	152	10.55	0.25	0.00	0.10	
12	1		8			478	707	53	0.00	68	33	11.56	5.26	0.00	0.70	
13	1		9			958	1891	53	0.00	51	78	7.02	0.98	0.00	0.26	
14	1					515	Unrestricted	53	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			137	1752	53	53.00	8	1051	9.61	0.09	0.00	0.00	
16	1		11			26	504	53	53.00	5	1645	2.34	0.19	0.00	0.00	
17	1		11			111 <	84	53	0.00	132	-32	484.19	482.55	355.99	15.94 +	
18	1					984	Unrestricted	53	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			1134	1975	53	0.00	57	57	13.94	1.23	0.00	0.39	
20	1					706	Unrestricted	53	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			249	1815	53	0.00	14	556	4.89	0.16	0.00	0.01	
22	1		14			848	2011	53	0.00	42	113	6.87	0.65	0.00	0.15	
23	1		14			37	515	53	53.00	7	1152	5.74	0.27	0.00	0.00	
24	1		15			405	1893	53	0.00	21	321	13.78	0.26	0.00	0.03	
25	1		15			882	1970	53	0.00	45	101	5.37	0.74	0.00	0.18	
26	1		16			1287	4114	53	0.00	31	188	27.37	0.20	0.00	0.07	
27	1		17			858	2126	53	0.00	40	123	12.09	0.57	0.00	0.14	
	2		17			576	2120	53	0.00	27	231	11.88	0.32	0.00	0.05	
28	1		18	1	C	858	2017	53	0.00	43	112	12.92	0.66	0.00	0.16	
29	1		18	1	B	576	1849	20	0.00	79	14	35.25	22.88	99.12	8.76	
30	1					858	2011	53	0.00	43	111	16.89	0.67	0.00	0.16	
31	1		19			0	526	53	53.00	0	Unrestricted	0.00	0.00	0.00	0.00	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2289.30	110.02	20.81	33.71	478.71	31.55	0.00	510.26
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	2289.30	110.02	20.81	33.71	478.71	31.55	0.00	510.26

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

A6 - 2035 Baseline (CLEUD) PM
D6 - 2035 Baseline (CLEUD) PM*

Signal Timings

Network Default: 73s cycle time; 73 steps

Intergreen Matrix for Controller Stream 1

		To		
		A	B	C
From	A		5	
	B	7		
	C			

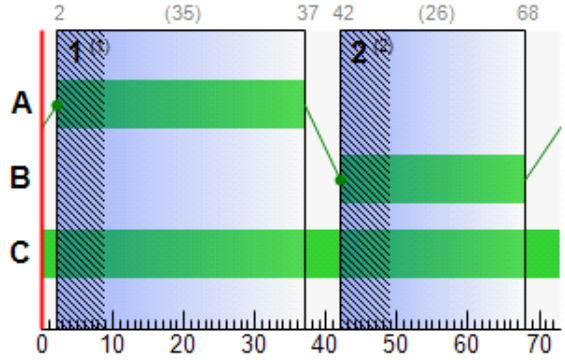
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C	2	37	35	1	7
	2	✓	2	B,C	42	68	26	1	7

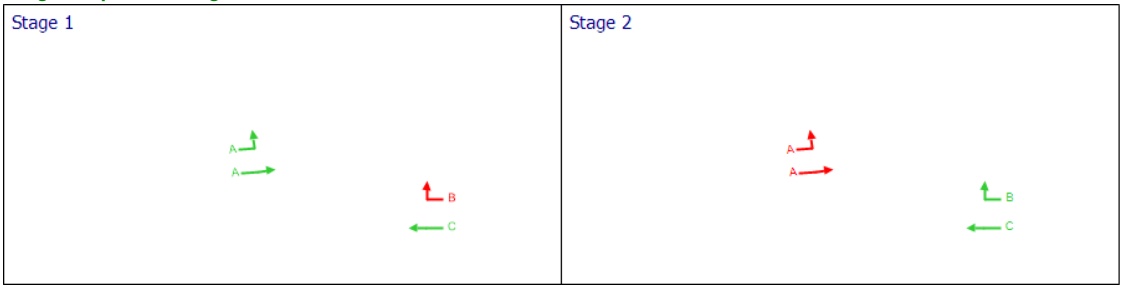
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
2	1	2	1	A	2	37	35
3	1	2	1	A	2	37	35
28	1	18	1	C	0	0	73
29	1	18	1	B	42	68	26

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	w m
1	1		1			353	1937	73	0.00	18	394	8.10	0.21	0.00	0.02	
	2		1			770	2047	73	17.00	38	139	8.40	0.53	0.00	0.11	
2	1		2	1	A	353	1975	35	0.00	36	148	19.63	12.47	60.16	4.52	
3	1		2	1	A	770 <	2029	35	0.00	77	17	28.11	21.02	85.99	13.88 +	
4	1					870	Unrestricted	73	0.00	0	Unrestricted	13.74	0.00	0.00	0.00	
5	1		3			186	546	73	0.00	34	164	12.55	1.70	0.00	0.09	
6	1		4			956	2004	73	0.00	48	89	25.99	0.84	2.39	4.70	
7	1		5			621	1982	73	0.00	31	187	8.43	0.41	0.00	0.07	
	2		5			329	2076	73	0.00	16	468	8.21	0.16	0.00	0.01	
8	1		6			621	2018	73	0.00	31	192	7.12	0.40	0.00	0.07	
9	1		9			329	509	73	0.00	65	39	30.70	7.43	45.14	4.86	
10	1		6			491	1947	73	0.00	25	257	30.55	0.31	0.00	0.04	
11	1		7			1112	4024	73	0.00	28	226	10.47	0.17	0.00	0.05	
12	1		8			138	710	73	0.00	19	363	6.92	0.61	0.00	0.02	
13	1		9			974	1891	73	0.00	52	75	7.05	1.01	0.00	0.27	
14	1					159	Unrestricted	73	0.00	0	Unrestricted	11.48	0.00	0.00	0.00	
15	1		10			195	1752	73	73.00	11	709	9.66	0.13	0.00	0.01	
16	1		11			33	501	73	73.00	7	1266	2.40	0.25	0.00	0.00	
17	1		11			162 <	129	73	0.00	126	-28	417.95	416.31	332.97	20.75 +	
18	1					1007	Unrestricted	73	0.00	0	Unrestricted	18.67	0.00	0.00	0.00	
19	1		12			996	1975	73	0.00	50	78	13.64	0.93	0.00	0.26	
20	1					605	Unrestricted	73	0.00	0	Unrestricted	11.64	0.00	0.00	0.00	
21	1		13			182	1815	73	0.00	10	798	4.85	0.11	0.00	0.01	
22	1		14			793	2011	73	0.00	39	128	6.80	0.58	0.00	0.13	
23	1		14			21	509	73	73.00	4	2082	5.62	0.15	0.00	0.00	
24	1		15			235	1893	73	0.00	12	625	13.66	0.13	0.00	0.01	
25	1		15			828	1970	73	0.00	42	114	5.29	0.66	0.00	0.15	
26	1		16			1063	4114	73	0.00	26	248	27.33	0.15	0.00	0.05	
27	1		17			547	2126	73	0.00	26	250	11.81	0.29	0.00	0.04	
	2		17			517	2120	73	0.00	24	269	11.84	0.27	0.00	0.04	
28	1		18	1	C	547	2017	73	0.00	27	232	12.59	0.33	0.00	0.05	
29	1		18	1	B	517	1810	26	0.00	77	17	41.61	29.24	97.39	10.49	
30	1					741	2011	73	0.00	37	144	16.75	0.52	0.00	0.11	
31	1		19			194	595	73	0.00	33	176	28.90	1.46	0.00	0.08	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	1953.45	96.36	20.27	31.25	443.69	24.81	0.00	468.50
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	1953.45	96.36	20.27	31.25	443.69	24.81	0.00	468.50

- *< = adjusted flow warning (upstream links/traffic streams are over-saturated)*
- ** = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%*
- *^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%*
- *+ = average link/traffic stream excess queue is greater than 0*
- ***P.I. = PERFORMANCE INDEX***

Appendix M

Stantec

Technical Note

Updated Public Transport Strategy

Fort Halstead

41290 Technical Note PT1

30 March 2020

1. Introduction

1.1. PBA previously prepared the public transport strategy for the Fort Halstead development, reported in a technical note dated 26 October 2018. The strategy consisted of diversion of the existing Sevenoaks to Orpington bus service (then numbered 431) into the site and operation of a two-vehicle community minibus service designed specifically to meet the needs of people living or working in the development.

1.2. The viability of the strategy was subsequently analysed to establish the level of funding support that would be required, and this was reported in a technical note dated 8 August 2019.

1.3. Subsequently, the development proposals for the site have been amended, with a reduction in the number of new residential dwellings from 750 to 635 and a slight reduction in employment numbers from 1,483 to 1,438. With a change in development proposals and major changes to the local rail timetable since the public transport strategy was prepared, it is now considered appropriate to review and update the strategy.

1.4. The revised strategy also takes account of primary school provision on site: previous it was envisaged that buses would initially run to Halstead and St Katherine's primary schools and to the extent that these are no longer required, alternative uses of the buses at school times have been investigated.

1.5. The Note is structured to provide an update on proposals to divert the existing Sevenoaks to Orpington service into the site in section 2 and to develop new schedules for the community minibus service in section 3. As previously, we have engaged with local bus operator Go-Coach Hire in the development of the strategy and this is reported in section 4. A viability analysis has been undertaken to establish the likely funding support requirements and this is set out in section 5. Finally, conclusions are presented in section 6.

2. Diversion of Service 3

2.1. The principal existing bus service is the Go Coach service 3 operating between Sevenoaks and Orpington via Dunton Green, Knockholt Pound, Halstead and Pratts Bottom. This service was renumbered from 431 in 2019. The service operates via Starhill Road, to the west of the development site, with bus stops at the junction with Crow Drive. The timetable provides journeys for three off-peak journeys on a two-hourly frequency, Monday to Friday. There is no evening or weekend service. The current timetable is shown in Table 1.

Table 1: Go Coach Service 3 Timetable

Sevenoaks to Orpington			Go Coach service 3		
SEVENOAKS, Bus Station	09:30	11:30	13:30		
SEVENOAKS, Rail Station	09:35	11:35	13:35		
RIVERHEAD, Tesco	09:39	11:39	13:39		
KNOCKHOLT POUND	09:49	11:49	13:49		
HALSTEAD	09:53	11:53	13:53		
KNOCKHOLT, Rail Station	10:00	12:00	14:00		
ORPINGTON, High Street	10:15	12:15	14:15		
Orpington to Sevenoaks			**Go Coach service 3**		
ORPINGTON, High Street	10:30	12:30	14:30		
KNOCKHOLT, Rail Station	10:47	12:47	14:47		
HALSTEAD	10:54	12:54	14:54		
KNOCKHOLT POUND	10:58	12:58	14:58		
RIVERHEAD, Tesco	11:08	13:08	15:08		
SEVENOAKS, Rail Station	11:12	13:12	15:12		
SEVENOAKS, Bus Station	11:18	13:18	15:18		

2.2. Diversion of service 3 into the site is a low-cost measure that would provide links to Sevenoaks and Orpington for shopping etc. Go Coach have confirmed that this diversion could be accommodated within the existing schedule at no extra cost, on the basis that buses operate via the current route to Morants Court Rd then via Polhill, through the site and out onto Starhill Rd where the current route would be picked up.

2.3. Go Coach have also suggested that the daytime frequency of service 3 could be enhanced, if desired.

2.4. There are no other services operating in the area that could be amended to serve Fort Halstead.

3. Community Minibus Service

3.1. The public transport strategy envisages the use of two high quality minibuses operating on Monday to Friday as a mix of fixed timetable journeys for commuters at peak periods and flexible demand responsive services at other times. The timetabled journeys are designed to facilitate commuting both from the development to London, Orpington and Sevenoaks and also to employment within the development from Orpington and Sevenoaks.

3.2. Commuting to and from London would involve interchange onto the rail network and he choice of which railway stations to serve has been determined following review of rail service options at the six stations in the wider Fort Halstead area. The analysis has considered travel time between Fort Halstead and the station via the community minibus, typical rail travel time between the station and central London, frequency of rail service and the weekly travel cost, based on a 7-day Travelcard. The results are shown in Table 2.

Table 2: Analysis of Rail Interchange Options

Station	Travel Time to/from Central London			Trains / hour	Weekly Cost
	Ft Halstead – Station (bus)	Station – London (rail)	Ft Halstead – London (total)		
Orpington	21 mins	26 – 36 mins	47 – 57 mins	5♦	£66.00
Chelsfield	14 mins	30 – 32 mins	44 – 46 mins	3♦	£66.00
Knockholt	9 mins	35 – 37 mins ♥	44 – 46 mins ♥	3	£66.00
Dunton Green	11 mins	40 – 42 mins ♥	51 – 53 mins ♥	3	£95.40
Otford	13 mins	38 – 42 mins	51 – 55 mins	4♦	£111.20
Sevenoaks	18 mins	37 – 41 mins	55 – 59 mins	6♦	£111.20

Notes:

♦ Trains per hour figures include those with journey times in the range shown; slower services are omitted

♥ Times based on changing trains at Chelsfield; through trains are 5-10 mins slower

3.3. Table 2 shows that travel via Orpington, Chelsfield and Knockholt is considerably cheaper than the other stations; this is a result of these stations being within the TfL Travelcard fare zone system. Fastest possible peak travel times between central London and the three stations are similar at 44 minutes for Chelsfield and Knockholt, and 47 minutes for Orpington. There is more variation in travel times at Orpington, extending up to 57 minutes, but also a wider choice of trains and destinations.

3.4. For Knockholt and Chelsfield, the combined bus and rail travel times are identical. It therefore makes sense to serve Knockholt rather than Chelsfield as the shorter travel time to and from Fort Halstead means the minibuses can be used more intensively to provide a greater number of journeys. All peak trains stopping at Knockholt connect with fast London trains at Chelsfield, giving a wider choice of services and destinations.

3.5. It is therefore proposed to serve Knockholt as the primary rail interchange station as it offers the shortest journey times and (equal) lowest cost of travel.

3.6. It is also proposed to serve Orpington as a secondary rail interchange as this will offer connections with Thameslink services to St Pancras and North London as well as supplementing links to Charing Cross services at peak shoulder times.

3.7. The community minibus service will also provide local commuting links, with journeys timetabled to serve Orpington and Sevenoaks. This will enable residents of the development to access employment in the two towns and also provide opportunities for in-commuting to jobs in Fort Halstead itself from the surrounding area.

3.8. Outside commuting times, the community minibus operation will be available for trips in the local area on a fully flexible demand responsive basis.

3.9. Table 3 summarises the proposed deployment of the minibus operation.

Table 3: Proposed Community Minibus Service Pattern

Time Period	Operations
0555 – 0855	Timetabled shuttles for Knockholt, Orpington and Sevenoaks
0855 – 1600	On demand as required
1600 – 2030	Timetabled shuttles for Knockholt, Orpington and Sevenoaks

3.10. Indicative timetables for each of the fixed services are shown below, in Tables 4 to 6.

Table 4: Indicative Timetable for Commuter Shuttles to and from Knockholt Station

Fort Halstead to Knockholt Station							
Bus Number	*1*	*1*	*1*	*1*	*1*	*1*	*1*
FORT HALSTEAD	05:55	06:26	06:51	07:11	07:31	07:51	08:11
KNOCKHOLT Station, London Rd	06:04	06:35	07:00	07:20	07:40	08:00	08:20
	↓	↓	↓	↓	↓	↓	↓
KNOCKHOLT , Rail Station	*06:09*	*06:42*	*07:05*	*07:25*	*07:45*	*08:05*	*08:25*
Train destination	*Charing X*	*Cannon St*	*Cannon St*	*Cannon St*	*Cannon St*	*Cannon St*	*Cannon St*
Arrival time	*07:03*	*07:25*	*07:48*	*08:09*	*08:25*	*08:50*	*09:12*
Knockholt Station to Fort Halstead							
Train origin	*Cannon St*	*Cannon St*	*Charing X*	*Cannon St*	*Cannon St*	*Charing X*	*Charing X*
Departure time	*16:52*	*17:16*	*17:26*	*17:58*	*18:20*	*19:04*	*19:34*
KNOCKHOLT , Rail Station	*17:34*	*17:57*	*18:19*	*18:41*	*19:06*	*19:49*	*20:19*
	↓	↓	↓	↓	↓	↓	↓
Bus Number	*1*	*1*	*1*	*1*	*1*	*2*	*2*
KNOCKHOLT Station, London Rd	17:39	18:02	18:24	18:46	19:11	19:54	20:24
FORT HALSTEAD	17:48	18:11	18:33	18:55	19:20	20:03	20:33

3.11. Table 4 shows that connections would be provided into all trains stopping at Knockholt that arrive in London between 7.00 and 9.30am, and also out of all trains stopping at Knockholt that depart from London between 5.00pm and 8.00pm.

Table 5: Indicative Timetable for Commuter Shuttles to and from Orpington Station and Town Centre

Fort Halstead to Orpington Station								
Bus Number	*2*	*2*	*2*		*2*	*1*	*2*	*2*
FORT HALSTEAD	06:03	07:03	08:30		16:05	16:35	17:55	18:45
ORPINGTON, War Memorial	06:22	07:22	08:49		16:24	16:54	18:14	19:04
ORPINGTON Station, Crofton Rd	06:24	07:24	08:51		16:26	16:56	18:16	19:06
	↓	↓	↓					
ORPINGTON , Rail Station	*06:30*	*07:30*	*09:04*					
Train destination	*St Pancras*	*St Pancras*	*Charing X*					
Arrival time	*07:28*	*08:28*	*09:33*					
Orpington Station to Fort Halstead								
Train origin			*Charing X*	*Charing X*	*St Pancras*	*St Pancras*		
Departure time			*16:00*	*16:28*	*17:17*	*18:17*		
ORPINGTON , Rail Station			*16:26*	*16:53*	*18:16*	*19:14*		
			↓	↓	↓	↓		
Bus Number	*2*		*2*	*1*	*2*	*2*		
ORPINGTON Station, Crofton Rd	07:34		16:32	16:59	18:22	19:20		
ORPINGTON, War Memorial	07:36		16:34	17:01	18:24	19:22		
FORT HALSTEAD	07:55		16:53	17:20	18:43	19:41		

3.12. Table 5 shows how the links to and from trains stopping at Orpington augment the Knockholt service by providing connections into Thameslink services for St Pancras as well as additional Charing Cross journeys. The service also provides peak commuting links with employment in Orpington town centre and, in the reverse direction, from Orpington to employment at Fort Halstead.

Table 6: Indicative Timetable for Commuter Services to and from Sevenoaks Town Centre

Fort Halstead to Sevenoaks		
Bus Number	*2*	*2*
FORT HALSTEAD	07:55	16:55
SEVENOAKS Rail Station	08:25	17:13
SEVENOAKS Bus Station	08:30	17:18
Sevenoaks to Fort Halstead		
Bus Number	*2*	*2*
SEVENOAKS Bus Station	08:32	17:20
SEVENOAKS Rail Station	08:37	17:25
FORT HALSTEAD	08:55	17:55

3.13. Table 6 shows the proposed peak commuting timetable for Sevenoaks; this consists of one journey in each direction in each peak period, enabling development residents to access employment in Sevenoaks and people living in Sevenoaks to access jobs at Fort Halstead.

4. Bus Operator Engagement

4.1. During the development of the public transport strategy, there has been periodic engagement with local bus operator, Go Coach who are based in Otford, to confirm the feasibility of proposals and to understand operational practicalities. Further discussions are planned to refine the detail of the proposals and to work towards a finalised proposition.

4.2. Go Coach have also previously provided their calculation of the annual operating costs to deliver the community minibus operation, and this has been used in the viability analysis described below.

5. Viability Analysis

5.1. The methodology used in the previous viability analysis has been applied to the latest development proposals and to the revised public transport strategy. The analysis uses costs of operation obtained from Go Coach in January 2019 adjusted to reflect the new proposals. The revised costings have then been uplifted for inflation by applying the annual bus industry cost index prepared by the bus and coach industry trade body, the Confederation of Passenger Transport (CPT).

5.2. Revenue is calculated using bus trip numbers extrapolated from demand data in the TA and local bus fares information.

5.3. Where local data is unavailable, assumptions have been made and these are set out in the narrative below. In general, assumptions are based on National Travel Survey data.

Costs

5.4. In January 2019, Go Coach provided an estimate of £252k per year to deliver the minibus operation, as previously proposed. This has been amended to take account of a slight reduction of 4 hours 10 minutes per week in operating hours, calculated using Stantec's bus industry costing model. This identifies all the costs involved in bus operation and allocates them either to buses or operating hours, according to which resource factor is more appropriate. For example, costs associated with bus ownership such as insurance, depreciation and maintenance are allocated to buses, whereas variable costs such as driver wages and fuel are allocated to operating hours. The model is then calibrated for the specific local area, in this case using the base data supplied by Go Coach.

5.5. Our estimate of the cost of the operation, including adjustment for inflation since January 2019 based on the CPT cost index for 2019 for south east England is £255k. This figure has been used for the viability analysis at 2020 prices.

Demand

5.6. Demand data has been based on forecasts for peak hour trips presented in the TA. These have then been factored up to give daily and annual trip numbers. Separate calculations have been made for residential and commercial based trips. Taking residential demand first, the key factors and calculations are set out in Table 7.

Table 7: Residential Demand Factors

DESCRIPTION	FACTOR	SOURCE
Total Development (units)	635	TA
Build Out Rate (units)	80	TA
0800-0900 Trips (All Modes)	646	TA
0600-2000 Trips (All Modes)	5,092	NTS
Peak trips (0600-0900/1600-2000)	2,573	NTS
Off Peak Trips	2,520	
Mon-Fri Annualisation	253	
Peak PT Mode Share	6.6%	TA
Peak Trips (Bus)	170	TA
Off Peak Bus Mode Share	6.6%	
Off Peak Trips (Bus)	167	
Annual Resi Bus Trips		
Peak period	43,068	
Off Peak	42,182	
Total	85,250	

5.7. The residential demand identified in Table 7 is likely to be split between the community minibus operation and service 3 during the times of day when the latter operates. No data is available to determine how the demand will divide between the two services, so it has been assumed that off-peak residential trips are assigned to each service pro rata on the hours of operation. Table 7 shows the operating hours per week for each service.

Table 8: Level of Operation on Proposed Services

	Operating Hours	
Ser 3	22.5	14.8%
Minibus	130	85.2%
Total	152.5	100.0%

5.8. Table 8 suggests circa 85% of off-peak demand will fall to the minibus service and just under 15% to service 3. Annual Fort Halstead trips on service 3, therefore, would be 6,224 and this should be deducted from the total annual off-peak trips shown in Table 6, giving 35,958 trips on the minibus operation.

5.9. Commercial demand factors are shown in Table 9.

Table 9: Commercial Demand Factors

DESCRIPTION	FACTOR	SOURCE
Total jobs	1,438	TA
Qinetiq jobs	250	TA
Average days worked per year	216	ONS
Commercial Bus Mode Share	3%	Assumed
Annual Commercial Bus Trips	18,636	

5.10. It has been assumed that all commercial-based trips are made on the minibus service due to the restricted operating hours of service 3 which are not suitable for commuting purposes.

5.11. As shown in Tables 7 and 8 total bus demand on completion of build out is forecast to be 79k residential-based trips per year and 19k commercial-based.

Revenue

5.12. To convert demand to revenue, average fare factors have been applied, reflecting the prevailing ticket prices in the local area. Three fare values have been calculated, to capture the different trip lengths and fares likely to be paid for different trip purposes and destinations, as follows:

- Knockholt rail shuttle: £2.00 per single trip. This matches the £20.00 rate for the Go Coach local zone 10-journey ticket and would also be competitive with the £4.20 daily parking rate at the station.
- Commuter fare: £3.00 per single trip. This matches the £30.00 rate for the Go Coach area-wide 10-journey ticket for trips further afield, such as Sevenoaks and Orpington. It is also considerably lower than the £7.20 daily parking charge at Orpington station.
- Off-peak fare: based on current fares between Fort Halstead and Orpington / Sevenoaks. Table 10 shows current fares and uses NTS data to show the breakdown of sales by ticket type based on national data.

Table 10: Local Fares from Fort Halstead to Sevenoaks and Orpington

	Fare	Price/trip	NTS Sales
Adult			
Single	£4.50	£4.50	23%
Return	£6.00	£3.00	16%
Child			
Single	£2.25	£2.25	9%
Return	£3.00	£1.50	9%
Concession			
Operator reimbursement	£0.98	£0.98	43%
Off Peak Average Fare		£2.26	

5.13. Table 10 shows that the average fare for off-peak trips is £2.26.

5.14. The fares calculated above have been applied to the forecast demand as follows:

- Knockholt fare: £2.00 x 28,425 trips (assumed as 66% of peak out-commuting trips) = £56,850 per year
- Commuter fare: out-commuting at £3.00 x 14,643 trips (assumed as 34% of peak out-commuting trips) plus in-commuting at £3.00 x 18,636 trips = £99,839 per year
- Off peak fare: £2.26 x annual off-peak trips of 42,182 = £81,223 per year.

5.15. Total revenue for the service would therefore be £238k on completion of build out. This compares with costs of operation of £255k, meaning that the service would require ongoing support of £17k per year.

Financial Support

5.16. Based on the foregoing calculations, Table 11 shows the financial support required for the service year by year during build out. This assumes the service is introduced at first household occupation with one bus and built up to two buses in year 3. Built out is assumed to follow the profile described in the TA.

Table 11: Forecast Funding Requirements

Year	1	2	3	4	5	6	7	8	9	10	Total	Annual Ongoing
REVENUE (£'000)												
Knockholt commuting trips	4	11	18	25	32	39	47	53	57	57	343	57
Other out-commuting trips	3	8	14	19	25	30	36	41	44	44	265	44
In-commuting trips	12	20	28	36	44	52	56	56	56	56	416	56
Off-peak trips	5	15	26	36	46	56	67	76	81	81	490	81
TOTAL REVENUE	24	55	85	116	147	178	205	227	238	238	1,513	238
COSTS (£'000)												
TOTAL COSTS	175	175	255	255	255	255	255	255	255	255	2,388	255
SURPLUS (£'000)												
SURPLUS / LOSS	-151	-120	-169	-138	-108	-77	-50	-28	-17	-17		-17
CUMULATIVE SURPLUS / LOSS	-151	-271	-441	-579	-687	-763	-813	-841	-858	-875	-875	

5.17. Table 11 shows that the operation would require funding support of circa £875k during development build out and an ongoing £17k per year thereafter. This could potentially be financed as part of a residents' service charge.

6. Conclusions

6.1. This Note shows how a two-vehicle community minibus operation could be provided to serve the Fort Halstead development. It would enable connections into all peak period commuter trains to and from London, as well as services for residents working in Sevenoaks and Orpington town centres and for in-commuting from Orpington and Sevenoaks to Fort Halstead.

6.2. At other times of day, the operation would be able to provide a demand responsive, flexible service to and from local destinations.

6.3. The cost of the operation is estimated to be £255k per year. Compared to the forecast revenue of £238k, this means the service would require annual funding support of £17k on completion of development. During development build-out, financial support of £875k would be required.

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Appendix N

Fort Halstead

Framework Travel Plan

On behalf of **Merseyside Pension Fund**

Project Ref: 41290/5501 | Rev: 04 | Date: May 2020

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address:
T: E:

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	Name	Position	Signature	Date
Prepared by:	Felicity Mott Hannah Wenman	Graduate Transport Planner	FM HW	Sept 19
Reviewed by:	Jason Lewis	Director	JL	Sept 19
Approved by:	Greg Callaghan	Director	GC	Sept 19
For and on behalf of Stantec UK Limited				

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4	28/05/20	Addressing CBRE comments	FM	JL	JL

Contents

1 Introduction 1
1.1 Background 1
1.2 Site Location 1
1.3 Existing Land Use 1
1.4 Development Proposals 2
1.5 Requirement of a Travel Plan 2
1.6 Context and Scope 2
1.7 Structure 3
2 Policy Review 4
2.1 Introduction 4
2.2 National Planning Policy Framework (NPPF) (2019) 4
2.3 Kent County Council Guidance on Transport Assessments and Travel Plans (2008) . 5
2.4 Sevenoaks District Council – Allocations and Development Management Plan (2015)6
2.5 Sevenoaks District Council – Submission Draft Local Plan (2018) 7
2.6 Summary 7
3 Site 8
3.1 Introduction 8
3.2 Existing Site Use 9
3.3 Highway Access 10
3.4 Public Transport Access 10
3.5 Pedestrian and Cycle Access 13
3.6 Mode Share 14
3.7 Summary 15
4 Development Proposals and Travel Needs 16
4.1 Introduction 16
4.2 Development Schedule 16
4.3 Highways Access 16
4.4 Parking 17
4.5 Public Transport Access 18
4.6 Pedestrian and Cycle Access 18
4.7 Travel Demand 19
5 Objectives and Targets 21
5.1 Introduction 21
5.2 Objectives 21
5.3 Targets 21
5.4 Summary 22
6 Delivering Travel Plan Objectives 23
6.1 Introduction 23

6.2 Management 23
6.3 Securing and Funding 23
6.4 Awareness 24
6.5 Encouraging Sustainable Travel 25
6.6 Summary 25
7 Measures and Action Plan 26
7.2 Timescales for Monitoring and Review 1

Figures

Figure 3-1: Strategic site location 9
Figure 3-2: Railway stations in vicinity of Fort Halstead 11
Figure 3-3: Bus routes in the vicinity of Fort Halstead 12
Figure 3-4: Pedestrian and cycle routes in the vicinity of Fort Halstead 14
Figure 6-1: Travel Plans structure 23

Tables

Table 3-1: Existing commuting mode share 14
Table 3-2: 2011 Census mode share for MSOA Sevenoaks 008 15
Table 4-1: Indicative business floorspace 16
Table 4-2: Development peak hour trip generation 20
Table 5-1: Proposed mode share targets for employees at the Fort Halstead site 22
Table 7-1: Fort Halstead Development Action Plan 4
Table 7-2: Plans and timescales for Travel Plan Monitoring and Review 1

Appendices

Appendix A Indicative Masterplan
Appendix B Proposed DRT bus timetable

1 Introduction

1.1 Background

1.1.1 Stantec has been commissioned by Merseyside Pension Fund (MPF) to provide transport planning and highways advice in support of a Hybrid Planning Application (HPA) for the redevelopment of Fort Halstead, with a total site area of circa 130 hectares (ha), in the District of Sevenoaks.

1.1.2 This report presents the Framework Travel Plan for the proposed mixed use development, including retained employment, new employment, residential and community supporting uses. This provides an outline Travel Plan for the overall site which will be used to guide individual land use specific Travel Plans as the development comes forward.

1.1.3 A full Transport Assessment has been prepared for this proposed development, which includes a Sustainable Transport Strategy that has been agreed with Kent County Council (KCC). This transport strategy is intended to improve linkages to Fort Halstead by non-car modes, to encourage sustainable patterns of travel and to minimise impacts on Star Hill Road.

1.1.4 This Framework Travel Plan forms the first element of this transport strategy and aims to guide the form and nature of development at the site. As the development is built out, individual workplaces (and other uses where appropriate) will need to develop separate, detailed Travel Plans which accord with this overall Framework. In accordance with guidance, this Framework will be subject to regular review in order to ensure that it is current in terms of policy and local transport and land use conditions

1.1.5 This Framework Travel Plan is consistent with KCC Guidance for the preparation of Travel Plans as set out in Kent County Council Guidance on Transport Assessments and Travel Plans (2008).

1.2 Site Location

1.2.1 Fort Halstead is located to the north-west of Sevenoaks town centre, west of the M25 and overlooking the North Downs.

1.2.2 There are two access points to the site. The main one (Polhill access) is through Crow Drive onto the A224 London Road / Polhill (via Otford Lane) at the north eastern corner of the site. There is a secondary access (Star Hill access) at the western end of the site onto Star Hill Road.

1.2.3 The site is currently well connected to the local and strategic highway network and located within five kilometres of two mainline railway stations: Knockholt and Dunton Green. Further details on the accessibility to the site are provided in Chapter 3 of this document.

1.3 Existing Land Use

1.3.1 Fort Halstead currently accommodates around 750 employees associated with Dstl, the Government's Defence, Science and Technology Laboratory and 'QinetiQ', a private sector defence research organisation.

1.3.2 In 2011, Dstl announced it would be vacating Fort Halstead and since then, has been undergoing phased relocation to Portsdown West and Porton Down. QinetiQ has remained on site and the development proposals within this application have allowed for retention and potential future expansion of the QinetiQ research facility.

1.3.3 Next to the site, but outside the application boundary, there is also a small residential development of 72 homes, which is not in the ownership of MPF.

1.4 Development Proposals

1.4.1 Further to Dstl's planned relocation, proposals for the site's future were secured as part of an outline planning permission ('OPP') granted in December 2015, for employment space, 450 residential units, a hotel and community uses. Since then, MPF has acquired the site and alongside the emerging Sevenoaks District Local Plan as well as changes to the National Planning Policy Framework, is seeking to optimise the site's future development and provide a deliverable and viable development.

1.4.2 Following extensive consultations with the local community and with Sevenoaks District Council (SDC), an initial development plan for the site has been established and an indicative masterplan has been drawn up (Appendix A).

1.4.3 This plan allows for QinetiQ to remain on site in a secure enclave. It also provides sufficient serviced land and accommodation to allow a substantial level of employment to be maintained (and enhanced) on site (around 1,400 jobs) and also allows for a residential development of 635 homes, a primary school and other community uses including a village centre with shops / cafés, early years facilities and some B1a, b and c space, and a historic interpretation centre within the existing scheduled monument. There will be an element of D1, D2, A1 and A3 use classes associated with the Village Centre.

1.4.4 Further details of the redevelopment proposals can be found in chapter 4 of this document and in chapter 4 of the Transport Assessment (TA).

1.5 Requirement of a Travel Plan

1.5.1 The proposed residential and commercial developments exceed KCC's thresholds over which a Travel Plan is required. Furthermore, it has been agreed with KCC in scoping discussions that an overall travel plan is needed to guide the development in order to encourage sustainable travel patterns.

1.5.2 Since the planning application is in Outline based upon Parameters, final development details are not yet available. Therefore, this document constitutes a Framework Travel Plan (FTP) which covers all proposed land uses. Full travel plans will also be prepared for individual workplaces and other developments as plots come forward, and they will use this FTP as a guide.

1.6 Context and Scope

1.6.1 This FTP has been written in accordance with scoping discussions and KCC's Guidance on Transport Assessments and Travel Plans (2008).

1.6.2 This FTP and the later Full Travel Plan(s) to be developed aim to address the travel behaviour of employees, residents and other visitors to, from and within the site.

1.6.3 Travel Plans are considered to be 'living documents'. As such, not only will the Travel Plan(s) be actively promoted with residents and the visitors, but they will be reviewed and revised over time.

1.6.4 As development proposals are finalised, full Travel Plans will be developed in line with KCC's Guidance on Transport Assessments and Travel Plans for any part of the development which exceeds KCC's thresholds. Further detail on KCC guidance and the thresholds for Travel Plans is given in Chapter 2 of this report.

1.6.5 Deliveries and servicing for the proposed development will be addressed in the Delivery and Servicing Plan (DSP), which will be submitted for approval prior to occupation of the first construction phase of the new development.

1.7 Structure

1.7.1 The remainder of this document is structured as follows:

- Chapter 2 briefly summarises the existing national, regional and local planning policy that informs the writing of this FTP;
- Chapter 3 outlines site accessibility and the existing travel conditions at Fort Halstead;
- Chapter 4 presents the development proposals;
- Chapter 5 outlines objectives and targets;
- Chapter 6 discusses the delivery of the FTP objectives;
- Chapter 7 provides the Travel Plan measures and action plan; and
- Chapter 8 summarises plans and timescales for Travel Plan monitoring and review.

2 Policy Review

2.1 Introduction

2.1.1 This section presents a brief outline of the relevant Travel Planning policy in relation to the proposed Fort Halstead development, which is embodied within the following documents:

- National Planning Policy Framework (2019)
- Kent County Council Guidance on Transport Assessments and Travel Plans (2008)
- Sevenoaks District Council – Local Development Framework: Core Strategy (2011)
- Sevenoaks District Council – Allocations and Development Management Plan (2015)
- Sevenoaks District Council – Submission Draft Local Plan (2018)

2.2 National Planning Policy Framework (NPPF) (2019)

2.2.1 The NPPF aims to enable local people and their councils to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.

2.2.2 Section 9: Promoting Sustainable Transport, of the NPPF, paragraph 102 states that;

2.2.3 "transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

- *the potential impacts of development on transport networks can be addressed;*
- *opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;*
- *opportunities to promote walking, cycling and public transport use are identified and pursued;*
- *the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for mitigation and for net gains in environmental quality; and*
- *patterns of movement, streets, parking and other transport considerations are integral to the design of schemes and contribute to making high quality places."*

2.2.4 With regards to sites that may be allocated for development in plans, or specific applications for development, paragraph 108 states that;

- *"…it should be ensured that:*
- *appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
- *safe and suitable access to the site can be achieved for all users; and*

- *any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree."*

2.2.5 Paragraph 111 states that:

"All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed."

2.3 Kent County Council Guidance on Transport Assessments and Travel Plans (2008)

2.3.1 KCC's Guidance on Transport Assessments and Travel Plans defines the latter as 'a strategy for managing multi-modal access to a site or development focusing on promoting access by sustainable modes'. It further stresses the importance of Travel Plans stating that 'the presentation of a high quality Travel Plan may be an important factor in determining the acceptability of planning applications, for any development with significant transport implications'.

2.3.2 This guidance establishes that the decision of whether a Travel Plan is required or not will rest with the relevant Planning Authority.

2.3.3 For developers submitting a planning application for a site, the guidance states that it will be required to include a Travel Plan alongside the application:

- 'where the acceptability of the proposed development on highway grounds depends on the assumption that a significant proportion of the trips to be generated by the proposal will be made by non-car means;
- where there are particular transport, accessibility or environmental issues in connection with the proposed site'; or
- in any case where the development exceeds the thresholds set out in the document, which include:
- A1 Food Retail – 1000 m2 GFA
- A1 Non-food Retail – 1000 m2 GFA
- B1 (a) Offices – 25,000 m2 GFA
- B1 (b&c) Research and Development/Light Industry – 5,000 m2 GFA
- C3 Housing – Individually assessed for any proposal over 100 units
- D1 Primary and Secondary Schools – Individually assessed
- D1 All other non-residential institutions – 2,500m2 GFA
- D2 Assembly and leisure – 1,000m2 GFA

2.3.4 According to the guidance, a Travel Plan document should include:

- *'a clear statement of targets and objectives – these should be discussed with KCC's Travel Plan Officer and agreed with the Planning Authority at an early stage in the production of the Travel Plan';*

- *'an assessment of existing transport infrastructure and facilities serving the site';*
- *'an assessment of the travel needs which will be generated by the site' and, 'in the case of an extension to an existing site, a travel survey of existing employees/customers will also be needed';*
- *'a programme of measures which will improve accessibility, promote sustainable travel options and reduce traffic impact. These should include the appointment of an individual to act as Travel Plan Coordinator, who must have the full support of the site management and who will be responsible for the implementation of the Travel Plan'; and*
- *'a programme for implementation of the Travel Plan, giving details of; the dates by which the various measures will be put in place; of who will be responsible for the various actions and; of how funding will be provided'.*

2.3.5 Furthermore, the guidance states that Travel Plans must have regular monitoring surveys, review progress against targets, and have the targets and measures updated to reflect and/or build upon progress achieved.

2.3.6 For developments where a travel plan is required, a financial contribution will be sought to cover monitoring and support of each development related Travel Plan by the Planning Authority. This will be reduced by 50% if the application is in respect of an extension to an existing site for which an effective Travel Plan is already in place.

2.3.7 An initial monitoring survey will be required after occupation of the site. The frequency of monitoring surveys thereafter will depend on whether initial monitoring shows that targets are being achieved. Once targets are achieved, monitoring surveys will be required only every three years.

2.3.8 Sevenoaks District Council – Local Development Framework: Core Strategy (2011) The relevant policy for transport in SDC's adopted Core Strategy is included within SP 2: Transport, which stipulates:

'The Council will support and promote measures to reduce reliance on travel by car both in providing for new development and in supporting measures promoted through the Transport Strategy. Specifically it will:

- *support improvements to enhance the safety and convenience of public and community transport;*
- *seek improved facilities for cyclists and pedestrians; and*
- *require the inclusion of Travel Plans and other appropriate measures in new developments that generate significant traffic volumes'.*

2.4 Sevenoaks District Council – Allocations and Development Management Plan (2015)

2.4.1 In relation to Travel Plans, the Allocations and Development Management Plan (ADMP), within policy EMP3 concerning the redevelopment of Fort Halstead, sets out what would be expected of redevelopment proposals for the site, which includes 'Be sustainable in respect of the location, uses and quantum of development and be accompanied by a Travel Plan incorporating binding measures to reduce dependency of future occupants on car use'.

2.5 Sevenoaks District Council – Submission Draft Local Plan (2018)

2.5.1 Appendix 2 of the Draft Local Plan sets out Design Guidance for large sites coming forward and requires that larger developments are accompanied by a Travel Plan.

2.5.2 Following hearing sessions in September and October 2019, the Planning Inspector issued the final report in March 2020 in relation to the examination of the Sevenoaks District Local Plan, stating several significant concerns about several aspects of the plan. Sevenoaks Council has not withdrawn its Local Plan and the decision is being challenged in the High Court.

2.6 Summary

2.6.1 By providing a Travel Plan, the proposed Fort Halstead development will be aligned with local and national policy. This will promote sustainable travel opportunities and encourage a mode shift away from single occupancy car journeys.

2.6.2 In line with KCC's policy, this FTP gives the Local Authority the opportunity to agree the targets and objectives before development proposals are finalised and full Travel Plans are developed.

2.6.3 This FTP is provided in accordance with the SDC's ADMP, which states that redevelopment proposals for Fort Halstead should be accompanied by a Travel Plan which incorporates measures to reduce dependency on car use of future occupants. Based upon the Guidance Full Travel Plans will be required for the residential and commercial elements of the development. Although the A1, A3, D1 and D2 uses fall below the relevant threshold it is intended that these uses will also provide a Travel Plan for its employees.

3 Site

3.1 Introduction

3.1.1 This section presents the Fort Halstead site in its Baseline Condition, including a review of existing transport networks.

3.1.2 Fort Halstead is located to the north west of Sevenoaks town centre, at the top of a chalk escarpment. The nearest towns offering a comprehensive range of facilities and services are Sevenoaks, approximately 8 km to the south west, and Orpington, about 9 km to the north. There are also a number of established villages close to the site which provide various facilities:

- Knockholt Pound: shops, a convenience store, a pub, community facilities, and a place of worship. There is also a primary school nearby Knockholt.
- Halstead: primary school, local shop/post office, pub, places of worship;
- Otford: local shops, public houses/restaurants, primary school, medical facilities, and a Sainsbury's superstore plus small retail park; and
- Dunton Green/Riverhead: local shops, including a Tesco superstore, nursery and primary schools.
- In addition, Polhill Garden centre, which is located just 2 km to the north of the site, offers a wide range of retail facilities.

3.1.3 The site is well connected by road, including easy access to the National Motorway Network via the M25, junction 4. Existing access by public transport is relatively poor.

3.1.4 The site location is presented in Figure 3-1.

Figure 3-1: Strategic site location

3.2 Existing Site Use

3.2.1 The existing site uses comprised some 97,600 m2 of defence-related research space (for which there is a Certificate of Lawfulness of Existing Use and Development), which currently provides around 750 jobs on site, across Dstl and QinetiQ. These uses already generate a substantial transport demand on the local transport network. Historically, there were as many as 4,000 employees on site, and in more recent years, c.2,000. This number has been diminishing as Dslt completes its phased relocation.

3.2.2 Next to the site, but outside the application boundary, there are 72 homes, which also add some traffic onto the main site access via Crow Drive.

3.3 Highway Access

3.3.1 The site has two established points of highway access. The main access is from the A224 London Road / Polhill via Otford Lane and Crow Drive, but there is also a secondary access from Star Hill Road, currently used solely during weekday peak periods. Since the defence uses are still present on site, site accesses remains strictly controlled and there is no unrestricted movement between these two access points. Although employees of QinetiQ are able to use either access point to enter/leave the site, visitors are restricted to use the Polhill access. A visitor car park is provided outside of the security barrier of the access point via the A224.

3.3.2 The highway network has the following characteristics:

- The A224 is a single carriageway road which, to the north, provides access to the M25 (junction 4), Orpington (via Badgers Mount), Bromley (via Old London Road), and the A21. To the south, it provides the main access route into Sevenoaks. Within the vicinity of the site, the A224 is subject to a 50 mph speed limit. Although the road is provided with lighting columns, the street lighting along the A224 corridor has recently been switched off as part of an energy saving experiment. Nonetheless, the lighting remains switched on at the main junctions, including the site access junction. The road has limited footway provision: to the north of the site there is a footway on the east side of the carriageway only; and to the south along Polhill there are no footways.

- Star Hill Road provides a convenient means of access to the local villages of Knockholt Pound and Pratt's Bottom and an alternative route towards Dunton Green and Sevenoaks. It is a relatively narrow rural lane with no footway or street lighting and subject to the national speed limit of 60 mph. It is part of the route of the 402 bus.

- Otford lane is a narrow rural lane with no lighting or footways and also subject to the national speed limit. It links the site and the village of Halstead.

- Crow Drive is a private road which provides access into the site from the A224. It has a speed limit of 30 mph. Whilst it generally has one single lane in each direction, at the junction with Otford Lane, for approximately 100 m, the northbound carriageway has two lanes, one for each turning movement onto the A224. The road has a footway on its south side. On the north side there is also a footway and also a short length of cycleway. The last section of the road as it approaches Otford Lane has no footway provision.

3.3.3 The submitted Transport Assessment did not identify any highway capacity issues that are likely to arise as a result of the proposed development during either the morning or evening weekday peak periods.

3.4 Public Transport Access

3.4.1 The site is currently poorly connected by public transport.

3.4.2 The nearest railway stations are Dunton Green to the south (approximately a 5 km drive from the site) and Knockholt to the north (approximately a 4 km drive from the site). Both stations are on the Sevenoaks to London Charing Cross/Cannon Street line and are served by slow stopping services providing direct connections to London Bridge, Lewisham, Bromley and Orpington to the north as well as to Sevenoaks. The line also provides easy access to Tonbridge, Tunbridge Wells, Hastings, Paddock Wood, Ashford and the Kent Coast through interchange at Sevenoaks.

3.4.3 There are a number of other stations within a 10 km driving distance of the site which will potentially be attractive to people living or working on the site. These are:

- Otford (6 km)
- Shoreham (7 km)
- Sevenoaks (7 km)
- Chelsfield (7 km)
- Bat and Ball (8 km)
- Orpington (9 km)

3.4.4 Within the existing villages surrounding Fort Halstead, the majority of those commuting by rail to central London by train drive to one of the local stations. The choice of station varies depending on personal preferences reflecting a variety of factors, including the ultimate destination within central London, ticket price, parking availability and price, and speed/frequency of service. Figure 3-2 shows the main railway stations around the site.

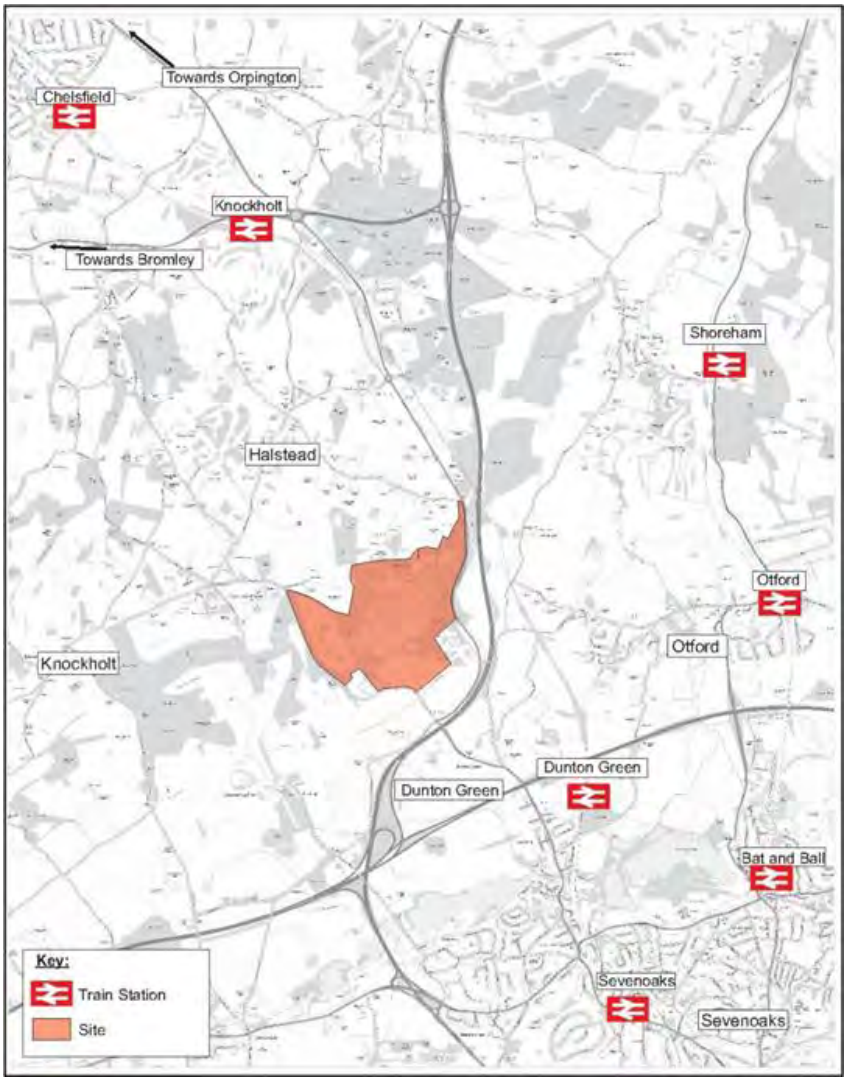

Figure 3-2: Railway stations in vicinity of Fort Halstead

3.4.5 The existing site occupiers currently run a private peak period shuttle bus between the site and Knockholt and Orpington Stations, which is operated by Go Coach. There are three buses during the morning peak and three during the evening peak.

3.4.6 The 402 bus service operates between Bromley and Tunbridge Wells via Sevenoaks. Since the OPA was approved, the 402 bus service has been withdrawn and the 431 bus service introduced which operates between Orpington to Sevenoaks via Star Hill Road and Knockholt Rail Station. It provides 3 - 4 services daily, Monday to Friday. In January 2020 the 431 changed number to become the number 3 service, however the routing and the frequency has remained unchanged. KCC have expressed that they do not believe that 3-4 services a day is enough to cater for the site.

3.4.7 The R5/R10 service is a circular bus service providing access to Orpington Station, with the nearest stop to site being at Knockholt Pound. Additionally, there are various school services (S31, S32, S33, T3and TW6) operating one return trip on schooldays only. All of these services go past the Star Hill Road entrance to the site and can stop at the bus stop at the entrance. These services serve schools in Sevenoaks, Tonbridge and Tunbridge Wells.

3.4.8 A map of the services in the vicinity of the site is provided in Figure 3-3.

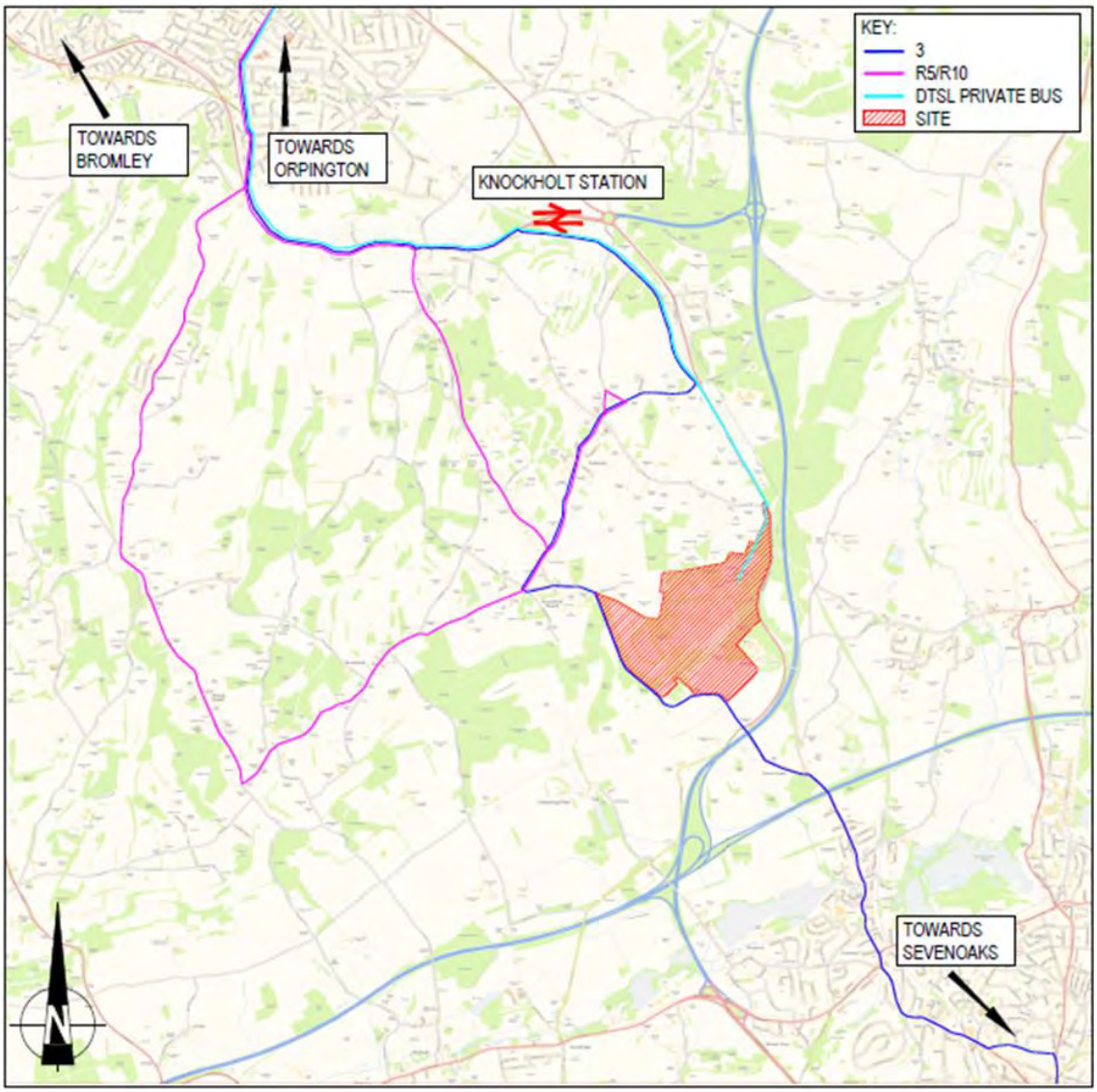

Figure 3-3: Bus routes in the vicinity of Fort Halstead

3.4.9 KCC have commented that the existing bus services are not sufficient to provide a sustainable choice in transport and that improvements should be sought to improve the facilities and services. This has been explored within Chapter 4 detailing the development proposal.

3.5 Pedestrian and Cycle Access

3.5.1 Existing pedestrian and cycle links to the site are relatively poor. There are a number of footpath links and rights of way in the vicinity of the site, providing a good network of leisure routes, but they are generally unsurfaced and unlit and hence not suitable as commuter/school access routes. Figure 3-4 identifies the existing pedestrian routes by type.

3.5.2 The pedestrian site access routes are as follows:

- Access to Knockholt Pound is via Star Hill Road. This is a relatively narrow country lane with no dedicated footways or lighting. There are however, existing footpath links on the east side of Star Hill Road, between the road and the site boundary. There is also a footpath along the northern boundary of the site linking this to Star Hill Road at its junction with Birchwood Avenue. Both footpaths are unlit and unsurfaced and therefore as currently laid out suitable as leisure routes only;

- Access to Halstead is via Otford Lane. This is also a narrow and unlit country lane. Otford Lane is either accessed from Crow Drive or there is also a public footpath that runs alongside the ancient woodland and which connects to Otford Lane to the west of Crow Lane. This is not a particularly direct footpath link and is again only considered suitable as a leisure route;

- The A224 London Road, to the north of Otford Lane, provides a footway on its east side and this provides a safe pedestrian access to the existing restaurant facilities that are located along that road and to the Polhill Garden Centre further north.

- There are various other footpath and bridleway links to the site as shown on the plan in Figure 3 4: Pedestrian and cycle routes in the vicinity of Fort Halstead all of which can be considered as providing a good range of leisure opportunities rather than connections for day to day use to local facilities. These include existing bridleways accessed from the junction of A224 Polhill / Otford Lane.

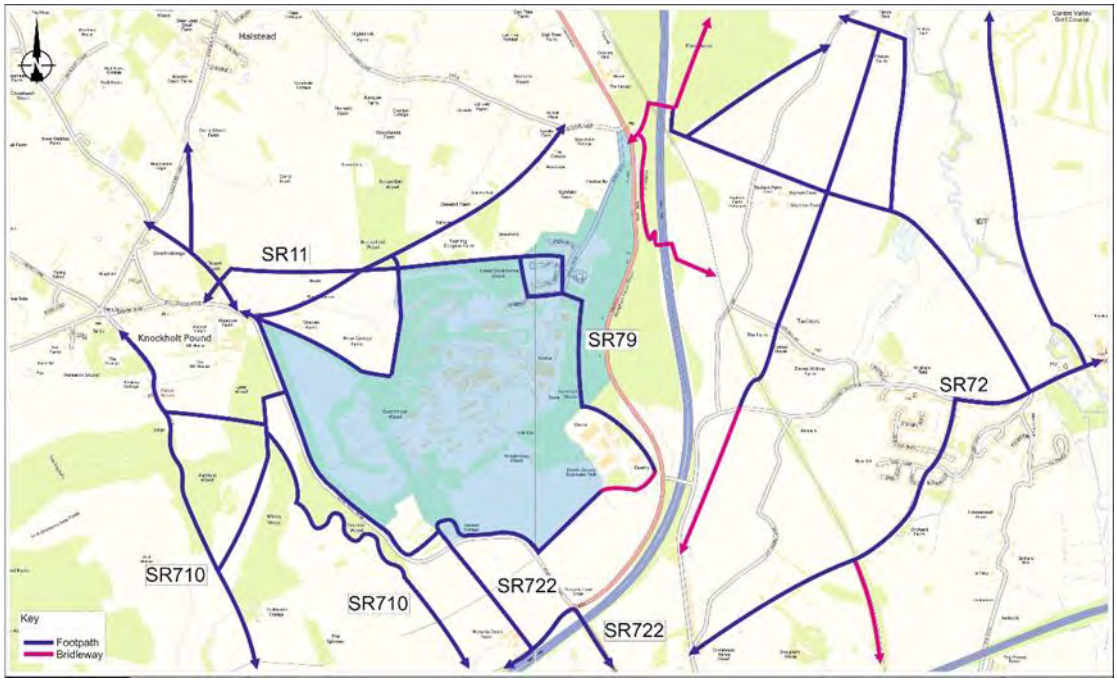

Figure 3-4: Pedestrian and cycle routes in the vicinity of Fort Halstead

3.5.3 There are also relatively limited cycle facilities. Since the site is located on top of a chalk escarpment, there is a steep hill to negotiate in order to access the site from Sevenoaks. However, the cycle route to Knockholt station is relatively flat and there are advisory cycle lanes on Old London Road, one of the few existing cycle facilities within the district.

3.5.4 Within the site, Crow Drive has a footway on either side and there is a short cycle lane on alongside the visitor car park. Currently, there is also a zebra crossing on Crow Drive, close to the junction with Fort Road, which provides access between the two existing small residential communities on either side of Crow Drive.

3.5.5 Kent Count Council have requested that improvements are made to the pedestrian and cycle facilities and infrastructure within the locality of the site.

3.6 Mode Share

3.6.1 Most people travel to and from the site by car due to poor public transport connectivity and also the nature of operations at Dstl and QinetiQ. It is understood that most staff do not live in the local area due to the specialist secure nature of the work and require travel between the Dstl sites across the south. Based upon traffic surveys and review of bus patronage data, the following mode share has been identified from the 2011 Census for people travelling to and from the Fort Halstead site and working at either DSTL or QinetiQ at the time:

Mode	Existing share
Car (driver)	80%
Car (passenger)	13%
Public transport	7%
Walking and cycling	0%

Table 3-1: Existing commuting mode share

3.6.2 Mode shares for journey to work have also been derived from the 2011 National Census, which provide complementary information about the travel patterns in the area. This analysis has been performed at the middle layer super output area (MSOA) level, which is the smallest survey area provided by the 2011 Census.

3.6.3 Although Fort Halstead lies across two MSOAs (Sevenoaks 008 and Sevenoaks 011). However, Sevenoaks 008 has been chosen as it appears to be more representative of the site, including the villages of Halstead and Knockholt. It also presents the worst-case scenario as it presents higher levels of car reliance.

3.6.4 The 2011 Census results for residents and workers in Sevenoaks 008 are shown in Table 3-2.

Mode	Living in Sevenoaks 008	Working in Sevenoaks 008
Train	27%	3%
Bus, minibus or coach	1%	3%
Motorcycle, scooter or moped	1%	1%
Driving a car or van	59%	78%
Passenger in a car or van	4%	6%
Bicycle	1%	2%
On foot	6%	7%
Total	100%	100%

Table 3-2: 2011 Census mode share for MSOA Sevenoaks 008

3.6.5 These results reflect the rural nature of the area and the high reliance on car for commuter journeys. Although there is a high train share for residents in the area, no train stations are accessible on foot from Fort Halstead, so these journeys would need a connecting trip by some other mode.

3.7 Summary

3.7.1 The existing site is currently fairly reliant on car trips. Access by public transport relies on mainly driving to the nearest train station, with bus services nearby mostly serving school trips,

3.7.2 Pedestrian access is minimal for commuter trips to the site and cycle access is restricted to very local trips or connections with railway services at the stations.

4 Development Proposals and Travel Needs

4.1 Introduction

4.1.1 This section presents a summary of the proposed development for the Fort Halstead site and of the travel needs that are likely to be generated once complete and operational. Further details can be found in the TA. An indicative masterplan of the proposed development is provided in Appendix A.

4.2 Development Schedule

4.2.1 The currently proposed mix of uses, floorspace and employment is summarised in Table 4-1. The application allows for the following elements:

- Retention of the existing QinetiQ facilities and jobs within the existing buildings in the 'X' enclave.
- Provision of 635 new residential dwellings across a range of unit types and sizes. The development will include affordable housing;
- New employment area for the provision of a business park with a mix of B1a, b, c uses;
- Land safeguarded for a one form entry primary school; and Provision of a heritage centre within the Fort, community space, and a village centre with small-scale offices uses, a shop, café, health centre and early years provision, under planning use classes D1, D2, A1 and A3.

4.2.2 The commercial floorspace set out above is expected to support approximately 1,438 total jobs onsite.

Land use	Gross external area (GEA) (m2)
Total Employment Uses Including Village Centre (excl. QinetiQ)	20,409
Retained QinetiQ	6,016
Total	26,425

Table 4-1: Indicative business floorspace

4.2.3 The development is expected to be delivered in phases until 2031, when it is expected that it will be complete and fully operational.

4.3 Highways Access

4.3.1 The layout of the development as shown in the Access and Movement Parameter Plan and the indicative masterplan is in accordance with current best practice including Manual for Streets and Kent Design Guide. It seeks to promote pedestrian and cycle movement over motorised vehicles and ensure safe and secure movement for all.

4.3.2 The Polhill access will continue to form the main access to the site but the Star Hill Road access will be retained as a secondary vehicular access, to help integrate the development with the surrounding villages, and also in the interest of good masterplanning and in response to the requirement by KCC that the development be served by two accesses. It will also be important for use by buses, pedestrians and cyclists.

4.3.3 The masterplan further responds to concerns raised by residents in the area about potential negative impacts on safety and the environment around the villages of Knockholt Pound and Pratt's Bottom due to the retention of the Star Hill access. This is reflected in a number of ways:

- Locating the new commercial development away from the Star Hill access point and orientated more towards the Polhill access point;
- Designing the internal highway network such that the route to the Star Hill access point is more convoluted and hence journey times to the Star Hill access point would be slower and less desirable;
- Whilst retaining much of the Crow Drive/ Crow Road alignment, part of the route will be pedestrianised removing the direct vehicular through route;
- The stretch of road from the Star Hill access to the centre of the site would be re-designed to include multiple deviations from the current geometry which would result in traffic calming and longer journey times to the Star Hill access.

4.3.4 Furthermore, the design of the roads within the residential area will be compatible with the requirements for designation as a 20 mph zone.

4.3.5 The development will include at its heart a small village centre which includes a convenience store, heritage centre relating to the historic uses of the site situated at the Fort, community facility and early years provision, and potentially health care facilities.

4.3.6 The indicative masterplan seeks to prioritise the movement of pedestrians and cycles both by controlling traffic speeds and providing more direct routes for these modes for internal movements within the site. In addition, the masterplan seeks to create an attractive environment that will encourage people to walk and cycle.

4.3.7 The Access and Movement Parameter Plan identifies a number of important pedestrian/cycle routes. These include a new east – west cycle route across the site linking the A224 Polhill and Star Hill Road, as well as a route from the centre of the site to the north west corner which will provide a convenient access route between the site and Knockholt Pound.

4.3.8 It also identifies access roads that would be designed to allow for bus movement through the site and two bus nodes, one at the village centre and one close to the Star Hill entrance which is specifically included to allow the existing 3 bus service to enter the site based upon discussions with the main bus provider, Go-Coach.

4.4 Parking

4.4.1 Car, cycle, motorcycle, disabled and heavy goods vehicle parking, along with facilities for the parking and charging of electric vehicles, will be provided based on current KCC standards and in agreement with KCC officers.

4.4.2 The relevant parking standards are set out in the following documents:

- Kent Design Guide Review: Interim Guidance Note 3 on Residential Parking, 2008
- Kent and Medway Structure Plan 2006: Mapping out the future – Supplementary Planning Guidance SPG4: Kent Vehicle Parking Standards, 2006

4.4.3 At this stage the masterplan is indicative only and so the detailed layout of the various phases of the development including the layout of parking will be agreed at the appropriate time.

4.4.4 Prior to first occupation of the development, a car park management strategy will be developed setting out how the car parking will be managed to achieve these objectives. This could accompany the future reserved matters submissions.

4.5 Public Transport Access

4.5.1 It is recognised that a key element of this Travel Plan will be the enhanced public transport connections to the site. A number of alternative options have been investigated and discussions held with KCC's public transport team and Go Coach who are the operators of the existing No. 3 bus service and the existing shuttle bus link to Fort Halstead. A full review of the options considered is presented in the TA.

4.5.2 The TA proposes the following provision:

- A minor diversion of the No. 3 bus service into the site via Star Hill Road
- The provision of a dedicated Demand Responsive Transport (DRT) bus service

4.5.3 The diversion of the No. 3 service into the site has been agreed with both KCC's public transport team and Go Coach. The bus service would route through the internal site via the primary road.

4.5.4 In relation to the DRT bus service, the proposed service consists of two minibuses operating on Monday to Friday, providing timetabled links to local railway stations for commuters and a demand responsive flexible service in the inter-peak period. At this stage it would not be appropriate to fix exactly what the demand responsive flexible service would provide as this is considered to be unnecessarily restrictive. It is important that the service is able to be amended to service popular routes as demand changes, providing flexibility in the service to meet the needs of the community. It has been left deliberately flexible to be able to meet the demands that come at a later stage, to fix this service now, could lead to provision of a service that is not required and therefore become unviable. This approach would provide a key and attractive alternative to the car and deliver a quality and responsive service for the development which would be beneficial as offers flexibility to be decided later in the planning process. It is accepted that a condition may be sought to ensure this service is provided.

4.5.5 The frequency of the service and timetabling for commuters has been designed so that the service can interact with the times of the commuter trains to ensure that the bus service can provide a realistic and attractive alternative to driving to the train station. These minibuses would provide a reliable, comfortable service offering Wi-Fi on board which would allow commuters to continue to work should they wish, which they would not be able to do if they were driving between the station and the site.

4.5.6 Prior to the delivery of a primary school on the site (which will be led by KCC), the service would provide a dedicated service to the local primary schools. Once the school is open, these journeys would no longer be required and the hours of operation of the flexible demand responsive service could be extended.

4.5.7 Initially, during the early stages of build-out, when demand is low the service could be provided by a single minibus. It is considered critical that the service is provided at the outset to ensure early occupants of the site have use the service and build in usage.

4.5.8 The proposed indicative timetables are included in Appendix B.

4.6 Pedestrian and Cycle Access

4.6.1 For trips within the site walking and cycling will be the main modes. The Masterplan therefore places a high priority on ensuring that pedestrians and cycles can move easily and safely

between the various development plots. All routes will be designed to ensure that they are safe from both a practical point of view and that they will also be perceived as such.

4.6.2 The Access and Movement Parameter Plan included within Appendix F of the TA highlights the key pedestrian and cycle routes through the site. This includes a cycle route through the site to link the two site access points as well as a further cycle route towards Knockholt linking the centre of the site to Birchwood.

4.6.3 It will also be important for the developer to work closely with KCC in order to improve external connections, where possible.

4.6.4 Following discussions with KCC as part of the OPP, it was agreed that the proposed development would upgrade the existing bridleway between Polhill and Twitton, taking the form of improvements to lighting under the M25 bridge. It was also agreed with KCC that cycle access to the north would be improved through the provision of on-street cycle lanes on London Road to link Otford Lane with the existing advisory cycle lanes on Old London Road which provide access towards the Knockholt Station. The improvement scheme has been shown in Appendix I of the TA.

4.6.5 Following discussions in 2020 with the KCC PRoW team proposals have been devised to provide a foot/cycleway link upgrade between the site and Birchwood Lane. This new facility will sit alongside the existing PRoW.

4.6.6 KCC also requested that an off road cycle route be explored between the site and Knockholt train station to encourage less experienced cyclist who may cycle to the station rather than take the DRT bus or drive. This request has been fully explored and it is not deemed feasible for an off route cycleway to be provided due to physical and land ownership constraints. These constraints can be found in the Technical Note appended to the TA. It is therefore concluded that the additional advisory cycle lane on the A224 should provide suitable provision to allow commuter cyclists access to the nearest rail station.

4.6.7 KCC subsequently requested that consideration be made that the cycle route be formed from verge and some of the existing carriageway. This has been explored, however, it is deemed unfeasible to use existing highway due to right turn bays along London Road which constrain the land available. As such it is considered that the proposed advisory cycle lanes along London Road and Old London Road are sufficient to meet the requirements of the development.

4.7 Travel Demand

4.7.1 The new uses of the proposed development will generate a wide range of trips both internal and external to the site. Their number, time of the day, mode, and purpose will vary depending on the use. The TA has identified a worst case trip generation during the weekday morning and evening weekday peak hours, which is summarised in Table 4-2. Consideration has also been given to the wider range of residential trips including shopping and leisure trips which will mainly occur outside of the main peak hours.

4.7.2 The measures outlined later in this Travel Plan will address all types of trips although formal monitoring will focus on the journey to work of people working at Fort Halstead.

Use	AM peak (08:00 to 09:00)		PM peak (17:00 to 18:00)	
	In	Out	In	Out
Residential Use (635 units)				
Person trip rate per unit	0.191	0.827	0.637	0.297
Person trip Generation	121	525	404	189
Car Driver Share	59%	51%	66%	64%
Total Vehicle Trips	71	268	267	121
Commercial development (1,438 jobs)				
Vehicle trip rate per job	0.295	0.030	0.019	0.230
Vehicle (driver) trips	424	43	28	331
Total Vehicle Trips				
Total Vehicle Trips	495	311	295	452
Uplift From OPP	15	168	125	18

Table 4-2: Development peak hour trip generation

5 Objectives and Targets

5.1 Introduction

5.1.1 This section sets out the overarching Objectives and Targets of the FTP for Fort Halstead redevelopment.

5.1.2 The objectives are supported by a set of quantified SMART (Specific, Measurable, Achievable, Realistic and Timed) targets so that progress towards achieving them can be measured.

5.2 Objectives

5.2.1 The objective of this FTP is:

- "To encourage residents, employees and visitors to travel to and from the Fort Halstead site using sustainable modes"
- To support the realisation of this overarching objective, several sub-objectives have been set out:
- Ensure the site is accessible to all and responds to the needs of vulnerable groups (e.g. those with mobility problems);
- Increase awareness of the Travel Plan and its constituent measures;
- Encourage greater use of sustainable transport modes, particularly car-sharing and use of public transport where possible;
- Encourage the most efficient use of cars and other vehicles;
- Reduce the need to travel overall and / or in peak times;
- Promote smarter living practices that reduce the need to travel overall or in the peak periods;
- Influence the travel behaviour of visitors; and
- Improve the health of residents and employees and minimise the development impacts on the environment.

5.2.2 Details on how the Travel Plan will deliver these objectives are provided in chapter 6.

5.3 Targets

5.3.1 The KCC document Guidance for Transport Assessments and Travel Plans states that Travel Plans must have regular monitoring surveys. Progress should be reviewed against targets, and the targets and measures be updated to reflect and build upon progress achieved.

5.3.2 The guidance suggests that an initial monitoring survey will be required after occupation of the site, frequency of monitoring surveys thereafter will depend on whether initial monitoring shows that targets are being achieved. Once targets are achieved, monitoring surveys will be required only every three years. This allows the targets to be regularly reviewed and the progress monitored regularly if the targets are not being met avoids unnecessary work if targets are being met.

5.3.3 Employment will be focussed on two main areas:

- The new QinetiQ enclave that will accommodate their existing workforce and allows for their future expansion requirements; and
- The proposed business park which will comprise a mix of B1a, B1b and B1c uses.

5.3.4 There will also be some additional employment within the various A1/A3 and D1/D2 community uses that are proposed within the village centre and retained buildings within the Fort. The level of this employment will fall outside of the thresholds for providing a Travel Plan and therefore it is not proposed to undertake the monitoring surveys for these uses.

5.3.5 For the commercial development, mode share targets have been developed based upon the existing mode share identified in the TA, which was presented in Table 3-1. However, a new baseline will be developed after the occupation of the first part of the new commercial development, which corresponds to the new QinetiQ facilities. Baseline surveys will be undertaken and these will provide new information to revise the indicative targets presented in Table 5-1, if necessary.

Mode	Existing	Baseline (after 25% occupation of new commercial development)	5 year target
Car (driver)	80%	76%	70%
Car (passenger)	13%	14%	15%
Public transport	7%	7%	10%
Walking and cycling	0%	3%	5%

Table 5-1: Proposed mode share targets for employees at the Fort Halstead site

5.3.6 It is proposed that separate baseline surveys will be undertaken for QinetiQ and the business park. It is further proposed that the baseline surveys for the Business Park are undertaken when that element is 30% occupied.

5.4 Summary

5.4.1 This section has presented the objectives for the Fort Halstead Travel Plan and the proposed mode share targets for the commercial development which reflect the predicted mode share as set out in the Transport Assessment Report. It is considered that these targets are ambitious but realistic bearing in mind the accessibility of the site.

6 Delivering Travel Plan Objectives

6.1 Introduction

6.1.1 This section explains how this Travel Plan will be taken forward to successfully achieve its Objectives and Targets.

6.2 Management

6.2.1 The success of the Travel Plan is dependent upon effective management combined with clearly defined roles. The site management company will manage this FTP and will have responsibility for implementation and further development of this Travel Plan. As land uses become occupied, the further Travel Plans which are developed will be handed over with the site. It is likely that the Residential Travel Plan will be managed by the site management company, with the Travel Plans for the other land uses being taken over by the individual management companies when identified. Figure 6-1 presents a schematic diagram of the family of Travel Plans for the proposed development.

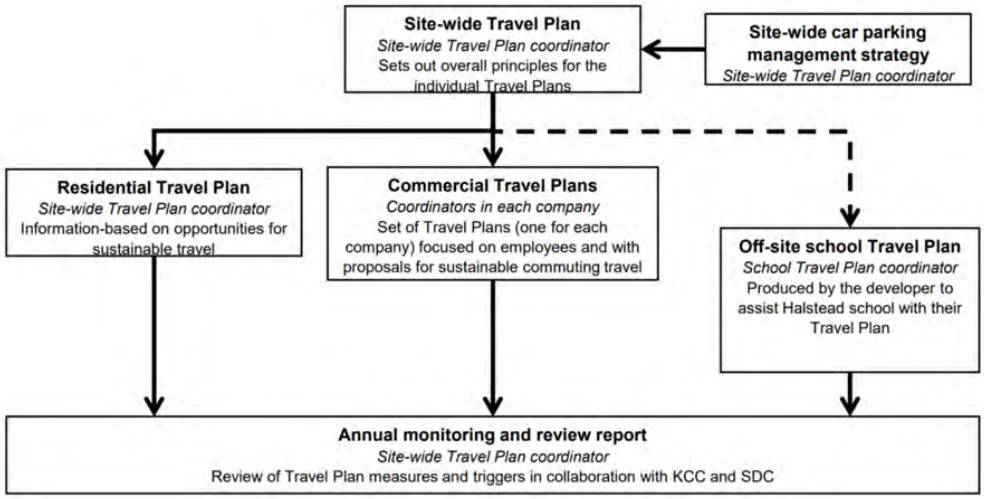

Figure 6-1: Travel Plans structure

6.2.2 The Travel Plan Coordinator at this stage is proposed to be the site management company until a permanent Travel Plan Coordinator (TPC) is appointed. The appointed TPC will then be responsible for the management and further development of this Travel Plan.

6.2.3 A Steering Group will be established with quarterly meetings with users of the site and other relevant parties. This is to ensure that the Travel Plan is taken forward and to provide an effective communication/discussion channel for the residents and occupiers.

6.3 Securing and Funding

6.3.1 It is envisaged that this FTP will be secured through a Section 106 agreement. This will secure funding for the future monitoring and development of this Travel Plan.

6.3.2 A set of sustainable transport measures will be implemented as part of the development proposals, demonstrating the commitment from the developer to encourage sustainable travel. It is anticipated that these measures are likely to include the following:

- Provision of a new DRT bus service providing access between the site and local stations and destinations. This will be secured through the S106;
- New infrastructure on the site to facilitate the diversion of the No.3 bus service into the site;
- A network of secure pedestrian and cycle routes within the site to encourage walking and cycling as the main modes for movement around the site;
- Improved cycle route between the site and Knockholt Station;
- Enhanced pedestrian crossing facilities over London Road; and
- Provision of secure cycle parking within the site, including visitor parking, for all site uses.
- Provide EV charging points throughout the site.
- Promote a Car Club/Care Share/Electric Cycle scheme on the site.

6.3.3 These measures will encourage sustainable transport modes and improved accessibility for users of the site.

6.4 Awareness

6.4.1 The success of this Plan is dependent on the development and implementation of an effective marketing strategy which will be produced by the developer. Once the TPC has been appointed, they will take over the development and implementation of the marketing strategy.

6.4.2 To increase awareness of the Travel Plan Objectives, residents will be given a Travel Welcome Pack on arrival in their new property. This will give information on the sustainable ways to travel around the area and the local services and facilities. It is anticipated that a Fort Halstead community Website will be developed and that this will include a Travel Plan page with details of all Travel Plan initiatives, travel information and links to other websites. A key element of the Travel Plan will be to encourage residents to take up local jobs and so the website should also include details of local job opportunities.

6.4.3 Employees will also be given information on the travel options available to them; this will include information on any shuttle buses. It is essential that employees working at the site are involved in the implementation and evolution of the travel plan. The travel surveys and pre-survey marketing will contribute to raising awareness at the outset. The Steering Group will also provide a communication channel for employees to discuss site-wide issues. It will also allow them to have an input into the ongoing development of the travel plan. The developer and the TPC will work together to develop a marketing strategy. This will include:

- The provision of local transport information on organisations' websites / intranets;
- The provision of travel plan information on organisations' websites / intranets with links to Real Time travel information; and
- An annual review of all marketing information will be undertaken and material updated as appropriate.

6.4.4 The Action Plan in chapter 7 details the specific measures that are to be pursued in relation to encouraging more sustainable travel patterns such as greater use of cycling, walking, and public transport. The emphasis is placed on providing a good level of accessibility to the employment uses on the site by all modes and, in doing so, ensuring that those using the site have a range of travel options available to them.

6.5 Encouraging Sustainable Travel

6.5.1 Public transport proposals will allow residents and employees to travel sustainably. This would ensure that there is reduced reliance on the private car for travelling to and from work.

6.5.2 Cycle facilities will be provided on site, including showers in the offices. There is also potential to provide enhanced secure cycle storage at Knockholt station.

6.5.3 Employment opportunities on site will be advertised to residents before they move onto site. This would mean that they could walk or cycle to work and would not need to leave the site. The internal pedestrian and cycle networks are of high quality to encourage those making internal trips to do so sustainably.

6.5.4 Home working could be promoted to employees of the site to reduce the need for people to travel into the site for the day.

6.5.5 The potential for establishing a car club on the site will be explored with operators. This could potentially be used by both residents and by employers on the site and would be used as a means for reducing car ownership and thereby reduce reliance on the private car. A dedicated car sharing website will also be promoted to allow both employees and residents.

6.6 Summary

6.6.1 This section has summarised the proposed methods for delivering the FTP. These measures will be further detailed in the site specific Travel Plans when more information is available.

7 Measures and Action Plan

7.1.1 This section details the measures that the developer intends to implement at Fort Halstead and the likely measures that they will encourage to implement in order to promote sustainable transport modes and reduce car use.

7.1.2 An Action Plan is provided in Table 7-1. The main aim of the Action Plan is to identify individual initiatives that can assist the residents and employees to reduce private vehicle journeys. Table 7-1 sets out the benefits the various measures and the timescales for their implementation. They are grouped by measures that will meet the Travel Plan sub-objectives. Measures relating to servicing and deliveries are included within the separate Delivery and Servicing Plan.

Initiative	Description	Measures	Benefits	Timescale for Implementation	Responsibility
Managing the on-going development and delivery of the Travel Plan with future residents					
Adoption of the Travel Plan	Sign in from the developer will be vital to ensure that the FTP is an active, living document	Encourage local residents and employees to adopt the FTP	The involvement of the developer will ensure future commitment to the development of the FTP	On occupation	The Site Management Company / Developer
Travel Plan Coordinator	A Travel Plan Coordinator will be responsible for managing the on-going development, delivery and promotion of the Travel Plan	Appoint a site-wide TPC, individual TPC's will come forward with each Travel Plan	This will ensure that the Travel Plan is taken forward and results are delivered	Prior to occupation	The Site Management Company / Developer
Establish Steering Group	The Steering Group should include residents and employer representatives and allow them to discuss issues with KCC, SDC and the developer	Establish and work alongside the Steering Group	This will ensure that the Travel Plan is taken forward and results are delivered	On occupation	The Site Management Company / Developer
TPC to attend Steering Group	Meetings with the Steering Group will enable the discussion of site-wide issues and the exchange of TP progress and information between all site occupiers	Work with the TPC and Steering Group to meet on a quarterly basis	This will ensure that key site-wide issues are addressed and TP progress and information is exchanged	On occupation	The Site Management Company / Developer
Increasing awareness of the Travel Plan and is constituent measures					
Travel Information Packs	Provide Travel Plan Information Packs to each residential unit and provide travel information to employees	Provide information on sustainable ways to travel around the area and the local services and facilities available on the site	Residents and employees will be provided with a high level of information to inform their travel choices	On occupation	The Site Management Company / Developer
Feedback to site users	Promote the Travel Plan and achievements made	Feedback to site users on progress against Travel Plan targets	This feedback will keep the site's users involved and aware of the Travel Plan.	Annually after the development is occupied	TPC

Initiative	Description	Measures	Benefits	Timescale for Implementation	Responsibility
Provision of travel information to prospective residents and employees	Provide travel information in the marketing suite and / or show homes and also to potential employees	Provide information on all modes in the marketing suite and / or show homes and have trained sales / marketing staff to give information on the options available. Information on sustainable travel options could be provided in public spaces.	Residents and employees will be provided with a high level of information to inform their travel choices before agreeing to occupy the units	Prior to occupation and ongoing	The Site Management Company / Developer
Encouraging greater use of sustainable transport modes, rather than the single occupancy car journeys					
Cycle facilities	The development will provide secure cycle parking and information on cycle facilities. There is also the opportunity to explore bike hire schemes, which could include electric bikes.	Provide secure cycle parking, an information leaflet on cycle facilities available should be given to site users.	Provision of cycle facilities will encourage residents and employees to use bicycles as a mode of travel	Prior to occupation and ongoing	The Site Management Company / Developer
Pedestrian facilities	Creating pedestrian links and spaces in the development and linking these to the wider area.	Develop good pedestrian networks within the site and create links with the wider local area and public transport facilities	Improved pedestrian links will encourage visitors and employees to walk within the site	Prior to occupation and ongoing	The Site Management Company / Developer
Car club	Develop a car sharing scheme for both employees and residents	Encourage a more sustainable use of cars for users that need them	Reduce number of vehicles going into and out of the site; reduce number of car parking spaces on site	Investigate feasibility prior to occupation and implement if practical	Developer to discuss with car club providers
Public transport	Improving the availability of public transport to site users	Provision of new bus stop for the 3 service and a new DRT bus.	This will give residents and employees a viable alternative to the car	New bus stop to be provided prior to first occupation. For the new DRT bus, an appropriate trigger in relation to the level of occupation will be agreed with KCC to ensure that funds are used effectively.	The Site Management Company / Developer

Initiative	Description	Measures	Benefits	Timescale for Implementation	Responsibility
Car sharing database	A car sharing database will allow for a reduction in single occupancy car journeys.	A database will be set up for employees and residents to allow them to find options for car sharing.	This is an attractive alternative to single occupancy car journeys and will allow people to reduce their travel costs without too much work	Prior to occupation and ongoing	The Site Management Company / Developer
Discounts on local services and facilities	Provide discounts on the use of sustainable transport modes	Promote discounts on the use of public transport, bicycles, cycle equipment and car clubs	Encourage travel by sustainable modes and reduce travel by car	The developer will research and put these options forward to the TPC as the site becomes operational. If signed up to then these will then become the responsibility of the TPC	
Encouraging the best use of cars and other vehicles					
Site access	Regulate vehicle access to the site	Promote Polhill access as the main access into and out of the site for all land uses	A direct vehicular access route is provided to link the development with the A224 Polhill as part of a strategy to discourage the use of Star Hill Road except for local trips. This aims to minimise the impacts of the development on the tranquillity of the Kent Downs AONB	During construction and on occupation	The Site Management Company / Developer
Parking	Manage car parking spaces efficiently to encourage sustainable travel patterns	Prioritisation of non-residential car parking availability for those who travel more sustainably (car sharers, electric vehicle drivers).	This will provide advantages for the most sustainable uses of cars and encourage people to use other modes	To be implemented as the redevelopment comes forward	The Site Management Company / Developer
Effective Management of commercial Parking	Ensure that the other parts of the development are not impacted by discriminate parking associated with the commercial uses	Monitor parking behaviour and introduce parking management measures, potentially including yellow lines, should that be required	Reduce indiscriminate parking, assist achievement of mode share targets and maintain a high quality of urban realm	To be implemented as the redevelopment comes forward	The Site Management Company / Developer
Disabled Parking	Provide designated parking spaces	Ensure disabled parking spaces are reserved for disabled users	Enable disabled users can access the development	On completion	The Site Management Company / Developer
Reducing the need to travel					

Initiative	Description	Measures	Benefits	Timescale for Implementation	Responsibility
Tele-working	Occasional working from home will be promoted to residents and employees	Employees and residents will be made aware of the benefits of working from home to reduce vehicle trips to and from the site.	This could reduce vehicle trips to and from the site	On occupation	TPC
Living and working on site	Opportunities for living and working on site will be promoted	Employment opportunities on site will be advertised to new residents and current employees will also be made aware of the proposed housing on site.	This could reduce vehicle trips to and from the site through internalisation of trips that would be primarily on foot or by bicycle	On occupation	TPC
Internet connectivity	All leading supermarkets offer delivery service for groceries. This can reduce the need to travel by car to local supermarkets.	Allow for internet connections to be made available in each residential unit and promote the merits of online grocery shopping.	Residents can order shopping online and reduce the need to travel by car to their local supermarket.	On occupation	TPC

Table 7-1: Fort Halstead Development Action Plan

7.2 Timescales for Monitoring and Review

Outline

7.2.1 The FTP will be the responsibility of the developer who will identify a TPC. This TPC and the developer will discuss funding to manage the future development of the Travel Plans, including the on-going monitoring and review.

7.2.2 The Travel Plans will be regularly monitored and reviewed to ensure that they reflect the changing requirements of the site, is up-to-date with travel planning options available and remains challenging.

7.2.3 below gives the plans and timescales for the monitoring and review of the Travel Plan.

Action	Timescale
Baseline travel survey of QinetiQ employees	To be undertaken within six months of consolidation of QinetiQ in the X enclave, following commencement of the development.
Update of Travel Plans following baseline surveys	Following baseline travel surveys
Future travel surveys	3rd and 5th year
Steering Group Meetings	Quarterly following occupation
Feedback to the management company, users of the Fort Halstead site	Quarterly (following Steering Group meetings)
Undertake a comprehensive strategic review of all aspects of the Travel Plan (including the Objectives, Targets, the Action Plan and the monitoring programme)	Following baseline surveys (6 months), 3rd and 5th year

Table 7-2: Plans and timescales for Travel Plan Monitoring and Review

7.2.4 It is recognised that the site will be developed and occupied over quite a long period. It is envisaged that both the residential and commercial elements will be built out and occupied by 2031. However, these timescales could be extended depending upon market conditions. It is therefore likely that the period for undertaking travel surveys will need to be reviewed. Separate surveys are likely to be required to reflect the build out of the business park. At this stage the following programme is suggested:

- Initial survey of business park once 30% occupied;
- Second survey after three years or when 75% occupied (whichever sooner)
- Third survey after five years or when 100% occupied (whichever sooner)

Appendix A Indicative Masterplan

Notes:
Do not scale from this drawing.
All contractors must visit the site and be responsible for taking and checking Dimensions.
All construction information should be taken from figured dimensions only.
Any discrepancies between drawings, specifications and site conditions must be brought to the attention of the supervising officer.
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KEY

Application boundary

Applicant's land ownership boundary

NOTE

Aerial photograph is not geo-referenced. Refer to the Site Location Plan (Drawing No. 00556I_S01) for the precise location of the red and blue line boundaries.

Rev	Date	Description	Drawn	Chkd
P2	18.05.20	Resubmission for Planning	DZL	ECC
P1	20.09.19	Submitted for Planning	DZL	ECC

Drawing Status
FOR PLANNING

Client
Merseyside Pension Fund

JTP Studios
Unit 5, The Rum Warehouse
Pennington Street
London, E1W 2AP

+44 (0)20 7017 1780
www.jtp.co.uk

Project
Fort Halstead Masterplan

Drawing Title
Illustrative Masterplan

Scale @ A0	1:2500	Job Ref.	00556I
Drawing No.	00556I_ MP01	Revision	P2

Scale Bar 0 20 40 60 80 100m

Appendix B Proposed DRT bus timetable

Indicative Timetable for Commuter Shuttles to and from Knockholt Station

Fort Halstead to Knockholt Station							
Bus Number	*1*	*1*	*1*	*1*	*1*	*1*	*1*
FORT HALSTEAD	05:55	06:26	06:51	07:11	07:31	07:51	08:11
KNOCKHOLT Station, London Rd	06:04	06:35	07:00	07:20	07:40	08:00	08:20
	↓	↓	↓	↓	↓	↓	↓
KNOCKHOLT , Rail Station	*06:09*	*06:42*	*07:05*	*07:25*	*07:45*	*08:05*	*08:25*
Train destination	*Charing X*	*Cannon St*	*Cannon St*	*Cannon St*	*Cannon St*	*Cannon St*	*Cannon St*
Arrival time	*07:03*	*07:25*	*07:48*	*08:09*	*08:25*	*08:50*	*09:12*
Knockholt Station to Fort Halstead							
Train origin	*Cannon St*	*Cannon St*	*Charing X*	*Cannon St*	*Cannon St*	*Charing X*	*Charing X*
Departure time	*16:52*	*17:16*	*17:26*	*17:58*	*18:20*	*19:04*	*19:34*
KNOCKHOLT , Rail Station	*17:34*	*17:57*	*18:19*	*18:41*	*19:06*	*19:49*	*20:19*
	↓	↓	↓	↓	↓	↓	↓
Bus Number	*1*	*1*	*1*	*1*	*1*	*2*	*2*
KNOCKHOLT Station, London Rd	17:39	18:02	18:24	18:46	19:11	19:54	20:24
FORT HALSTEAD	17:48	18:11	18:33	18:55	19:20	20:03	20:33

Indicative Timetable for Commuter Shuttles to and from Orpington Station and Town Centre

Fort Halstead to Orpington Station								
Bus Number	*2*	*2*	*2*		*2*	*1*	*2*	*2*
FORT HALSTEAD	06:03	07:03	08:30		16:05	16:35	17:55	18:45
ORPINGTON, War Memorial	06:22	07:22	08:49		16:24	16:54	18:14	19:04
ORPINGTON Station, Crofton Rd	06:24	07:24	08:51		16:26	16:56	18:16	19:06
	↓	↓	↓					
ORPINGTON , Rail Station	*06:30*	*07:30*	*09:04*					
Train destination	*St Pancras*	*St Pancras*	*Charing X*					
Arrival time	*07:28*	*08:28*	*09:33*					
Orpington Station to Fort Halstead								
Train origin			*Charing X*	*Charing X*	*St Pancras*	*St Pancras*		
Departure time			*16:00*	*16:28*	*17:17*	*18:17*		
ORPINGTON , Rail Station			*16:26*	*16:53*	*18:16*	*19:14*		
			↓	↓	↓	↓		
Bus Number	*2*		*2*	*1*	*2*	*2*		
ORPINGTON Station, Crofton Rd	07:34		16:32	16:59	18:22	19:20		
ORPINGTON, War Memorial	07:36		16:34	17:01	18:24	19:22		
FORT HALSTEAD	07:55		16:53	17:20	18:43	19:41		

Indicative Timetable for Commuter Services to and from Sevenoaks Town Centre

Fort Halstead to Sevenoaks		
Bus Number	*2*	*2*
FORT HALSTEAD	07:55	16:55
SEVENOAKS Rail Station	08:25	17:13
SEVENOAKS Bus Station	08:30	17:18

Sevenoaks to Fort Halstead		
Bus Number	*2*	*2*
SEVENOAKS Bus Station	08:32	17:20
SEVENOAKS Rail Station	08:37	17:25
FORT HALSTEAD	08:55	17:55

Appendix O

TECHNICAL NOTE

Job Name: Fort Halstead

Job No: 41290

Note No: 002

Date: 19/03/2019

Prepared By: MMNejad / Jason Lewis / Robert Parker

Subject: **Star Hill Road Transport Review**

1. Introduction and Context

1.1. In 2015 Sevenoaks Planning Committee approved proposals for the regeneration of the Fort Halstead site with a mixed-use scheme. However, this was on the basis of a Condition that restricted vehicle access to the site to the main access onto A224 Polhill with the use of the existing secondary access onto Star Hill Road to be restricted to emergency use, buses and cycles. This Condition responded to concerns raised by residents and local politicians regarding the potential impact of development traffic on Star Hill Road including concerns regarding road safety.

1.2. At the time of the previous application, KCC supported the retention of the access onto Star Hill Road for all traffic but also agreed in principal proposals to introduce a 40 mph speed limit along a section of Star Hill Road between Knockholt Village and a location to the south of the sharp bend south of the Site access. These proposals, which also suggested the possible use of a Vehicle Actuated Sign (VAS) to warn drivers regarding speeds approaching the sharp bend, were set out in a Technical Note appended to the 2014 Transport Assessment report (TA). This is appended as Appendix A.

1.3. During current preapplication discussions, KCC have repeated their strong support for the retention of the access onto Star Hill Road to be available for the use of all development traffic (potentially excluding HGV's). However, they have referred the proposals for the new speed limit to their Local Schemes Team. Geoff Bineham of the Local Schemes Team has undertaken a preliminary review and the outcome is set out in his email of 25th February 2019 (Appendix B). In this email he queries the benefit for introducing the proposed 40 mph speed limit and also states that the use of a VAS on Star Hill Road would not meet Department for Transport Guidance.

1.4. This note provides an update on the information provided in previous TA Appendix re Star Hill Road and responds to the points raised by Geoff Bineham.

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
41290 / TN02	-	12/03/19	MMN	JSL	GC	GC

Peter Brett Associates LLP 33 Bowling Green Lane London EC1R 0BJ
T: +44 (0)20 3824 6600 E: london@peterbrett.com

2. Review Undertaken by KCC Local Schemes Team

2.1. Geoff Bineham suggests caution regarding the proposals to implement a 40 mph speed limit on Star Hill Road and also suggest that the DfT criteria for the use of VAS is not met.

2.2. His main points are as follows:

- The current National Speed Limit (60mph) is consistent with most rural roads in Kent;
- Provision of a 40 mph speed limit may be counterproductive, potentially encouraging drivers to drive up to the new speed limit;
- There may be a compliance issue at the northern end of Star Hill Road where he estimates that cars are travelling at 50 mph;
- Current accident data suggests that there are no accidents and therefore no accident problem along Star Hill Road;
- The proposed improvements at the site access junction will involve visibility at that location; and
- Based on a recent site visit there was no evidence of any use of this section of road by vulnerable road users i.e. pedestrians or cycles.

3. Accident Data

3.1. At the time of the 2015 TA there appeared to be small clusters of accidents at the two bends, 5 accidents at the southern bend by the cottages and two at the northern bend at the junction of Birchwood Lane. Speed appeared to be a factor in a number of these accidents.

3.2. Whilst there has been only 1 recoded accident within the last three years, the five-year data still shows a number of accidents at the two bends, 2 at the southern junction and 3, including a fatality, at the northern bend. Details of these accidents are provided within Figure 1 and Table 1 below. It is noted that KCC have asked for the inclusion of five-year data within the TA and it is considered that five-year data provides a better basis for considering accident issues than three-year data.

3.3. Speed does appear to have been a factor contributing to accidents on this section of Star Hill Road

Figure 1: Locations for PICs Between October 2012 to September 2017

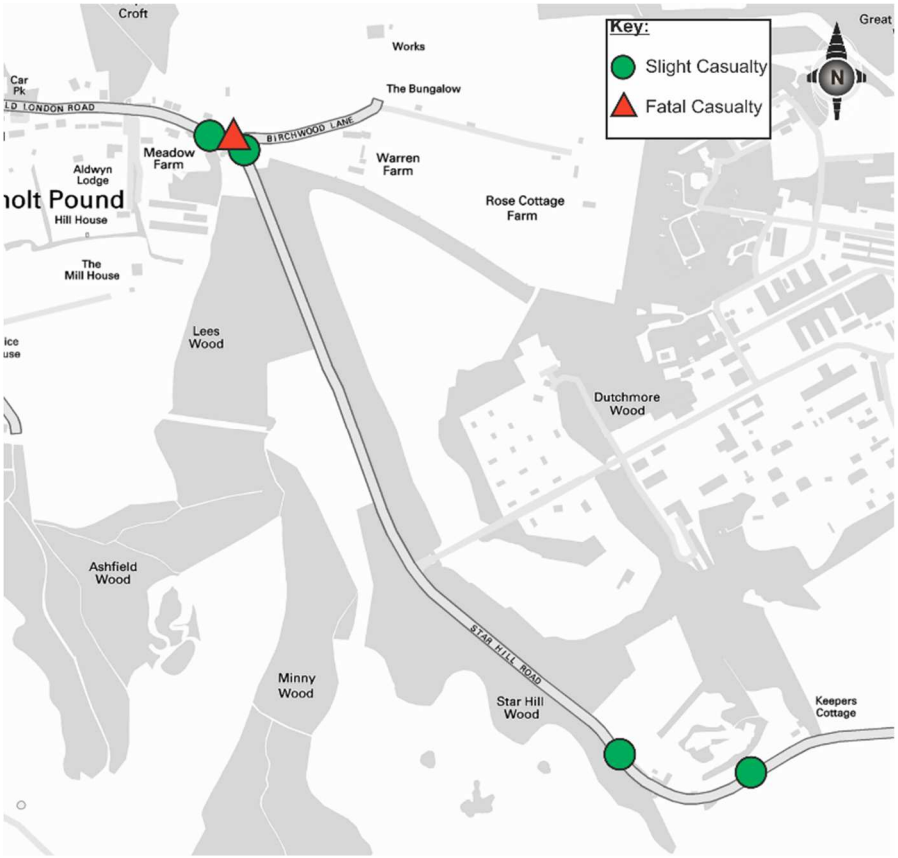

Table 1: Personal Injury Collisions Along Star Hill Road Between October 2012 to September 2017

Date of Accident	Severity of Injury and Description of Accident
07/11/2012	Slight injury. Vehicle 1 has been travelling down Star Hill Road in the direction of Dunton Green following two other unknown vehicles. On a left-hand bend, a car has come around the bend towards vehicle 1 with bright lights and caused driver to pull to the left. This has caused the front end to lose control and hit the nearside bank and the vehicle to roll.
19/01/2014	Slight Injury. Vehicle 2 was travelling north on Star Hill Road. A vehicle in front of Vehicle 2, travelling in the same direction came to a halt. Vehicle 2 then came to a halt. Vehicle 2 was then struck by Vehicle 1 from behind resulting in injury and damage.
08/06/2014	Slight Injury. Cyclist travelling along Star Hill Road direction of Birchwood Lane, as the cyclist was cycling down the hill, hit a man hole cover, lost control and fell off bike. Bike continued down the road and hit oncoming vehicle.
06/08/2015	Fatal injury. Vehicle 1 was travelling downhill and negotiating a left-hand bend. It failed to negotiate the bend crossing into the opposite carriageway and collided with a tree. The driver was removed by the fire brigade and taken to hospital with life threatening injuries and later died of the Injuries.
23/06/2017	Slight Injury. V1 travelling in a north/northwest direction along Old London Rd. Rounded a left and corner, clipped the bank on the outside corner, nearside to vehicle 1. Vehicle 1 then lost control, travelled up the bank and came to rest in the bushes.

4. Current Traffic Speeds

4.1. The TA (Appendix) reported traffic speeds at a number of locations along Star Hill Road and showed that generally the existing average speeds were consistent with the proposed 40 mph speed limit. More recently (between 25th September – 2nd October 2018) a further speed check was undertaken through an automatic traffic counter located approximately 450 metres to the north of the site access. This location is where traffic speeds would likely be at their highest since the location is on the long straight section of road but sufficiently far from the northern bend and 30 mph village speed limit not to be constrained by those factors.

4.2. Table 2 provides a summary of the average and 85th percentile speed recordings from these various surveys. As can be seen, the more recent surveys are consistent with the earlier surveys and do not suggest that there would be a compliance problem should a 40 mph speed limit be provided.

Table 2: Recorded Speeds Along Star Hill Road

Location and Description	Direction	Mean Speed (mph)	85th Percentile Speed (mph)
2018 Traffic Surveys			
Star Hill - 450m North of Site Access	Northbound	41.1	47.5
	Southbound	38.0	43.6
2014 Traffic Surveys (As Part of 2015 OPA)			
Star Hill - 100m North of Site Access	Northbound	39.7	45.9
	Southbound	40.8	47.2
Star Hill - Between Site Access and the Cottages	Northbound	33.9	39.6
	Southbound	36	41.2
Star Hill - South of the Cottages	Northbound	38.6	43.6
	Southbound	36.1	41.8

5. Summary and Conclusions

5.1. The accident data suggests that there is a continuing pattern of accidents at the two bends along Star Hill Road and that speed is a contributing factor.

5.2. The proposed speed limit is consistent with the recoded speeds along the entire section of Star Hill Road and do not suggests that there would be a compliance problem. It is also noted that the 40 mph speed area would abut an existing 30 mph area and would not involve an isolated 40 mph within a rural area. It would therefore provide a logical progression.

5.3. It is not clear what evidence there is to support the contention that the provision of 40 mph repeater signs would encourage drivers to drive up to the new speed limit. However, it is considered that the provision of VAS signs at the bend, would help to counter any such a tendency.

5.4. The fact that there are accidents at these bends suggests that the provision of such signs would not conflict with DfT guidance. Alternatively, static warning signs and/or chevrons could be incorporated as an alternative.

5.5. Geoff Binham's report notes that there is no evidence of Star Hill Road being used by vulnerable road users. However, it has been noted, based on comments made by residents and others and through site visits, that there is considerable use of Star Hill Road by cyclists, particularly at weekends.

Appendix A – Star Hill Road Improvement Measures (Appendix From 2015 OPA)

Appendix F Technical Note 003 (Star Hill Road)

TECHNICAL NOTE

Job Name: Fort Halstead

Job No: 26582

Note number: 003

Date: 26 November 2014

Prepared By: Robert Parker and Charlie Rudd

Subject: **Star Hill Road Impact Review**

This technical note provides a review of traffic conditions along Star Hill Road including traffic flows, speeds and the safety record of the road. It also looks at the potential impact of the proposed Fort Halstead development on the road. It has been undertaken in part in response to concerns raised about safety by residents at the recent Fort Halstead public consultation event.

Currently daily traffic flows on Star Hill Road are in the order of 3,000 vehicles per day (average weekday) with peak flows of around 315 vehicles during the morning peak and 272 during the evening peak. The review of the impact of the existing Fort Halstead development upon Star Hill Road has concluded that this is limited to the morning and evening peak periods and is very largely restricted to the section of Star Hill Road between the A224 and the site access. The impact to the north of the site access is negligible. The most recent survey undertaken by DSTL indicates that approximately 45 vehicles used the Star Hill access during the morning peak hour and 75 during the evening peak hour with almost all traffic travelling to or from the A224.

Star Hill Road is subject to the national speed limit (60 mph). It is a narrow road, unlit rural lane with a width of approximately 5.0 metres and has a steep gradient of up to 10% rising up from the A224 towards the site access. There are sharp bends to the south of the site and also to the north at the junction with Birchwood Avenue just before the road enters the village of Knockholt Pound.

There is very limited frontage activity along the road. A small number of cottages front the road to the south of the site at the sharp bend (Photo 1). Whilst some of the cottages have off-street parking others share a small plot of land just to the north of the cottages where there is parking available to accommodate up to 4 cars. There is also a bus stop for the 402 bus service at this location. There is a narrow footway (which is likely to be private) along the frontage of these cottages.

Photo 1: Informal parking and bus stop located to the north of the cottages

Photo 2: Cottages located on bend to the south of the site access

The existing site access (Photo 3) is located approximately 515 metres to the north of the cottages. The road is still rising slightly at the location and the access is on the inside of the gentle bend. Whilst the access is excessively wide, visibility for traffic exiting the site is minimal, approximately 35 metres to the south and 75 metres to the north. This compares with the DMRB requirements for a road subject to the 60 mph National speed limit of 240 metres. Concealed entrance signs are displayed on Star Hill Road to warn approaching drivers regarding the junction and a mirror has been installed opposite the junction to allow drivers exiting the junction to view approaching vehicles.

Photo 3: Existing Site Access Junction

Traffic speed surveys were undertaken in October 2014 at three locations along the Star Hill Road corridor, south of the cottages between the two bends (ATC 3), between the site access and the cottages (ATC 2), and approximately 100 metres to the north of the site access (ATC 1). The results of these surveys are summarised within Table 1 below and the full speed data provided within Appendix A. These show that the mean speeds recorded are all around or below 40 mph and that, with the exception of the ATC 3 site all 85th percentile values are around 40

mph. The ATC 3 site reflects the highest speeds on Star hill Road since it was located mid-way along the straight road between Birchwood Terrace and the site access. Therefore, the recorded 85th percentile speeds are slightly highly higher, 46 mph northbound and 47 mph southbound.

Based upon the observed 85th percentile speeds and the manual for Streets methodology the minimum visibility splay requirements at the Fort Halstead access onto Star Hill Road would be 85 metres to the north and 65 metres to the south.

Table 1: Recorded mean and 85th percentile speeds along Star Hill Road

Location	Direction	Mean speed (mph)	85th percentile speed (mph)
ATC 1	Northbound	38.6	43.6
	Southbound	36.1	41.8
ATC 2	Northbound	33.9	39.6
	Southbound	36.0	41.2
ATC 3	Northbound	39.7	45.9
	Southbound	40.8	47.2

Photo 4: Faded entry treatment on entry to Knockholt Pound (south of Birchwood Lane)

Accident data for a period of almost 7 years has been analysed for the Star Hill Road corridor. During that time there have been 7 recorded injury accidents, all slight in severity between Knockholt Pound Village and the A224 (excluding accidents at the A224 junction itself).

The locations of the accidents are shown on Figure 1 and descriptions provided within Table 2. This shows that whilst the overall accident rate is not particularly high that the accidents have been located at two points, the bend close to the cottages, where 5 accidents have occurred and the bend close to Birchwood Avenue where 2 accidents have occurred. Two of the accidents involved a cyclist and for at least two of the accidents excessive speed appears to have been a factor.

There have been no recorded accidents within the vicinity of the Fort Halstead access.

Figure 1: Accident location

Table 2: Description of recorded injury accidents on Star Hill Road

Date of accident	Description of accident
27/02/2009	D1 was travelling towards Halstead on the Star Hill Road and hit a cyclist travelling in the same direction on the same side of the road. D1 hit the cyclist with the nearside wing mirror. Bright sunlight obscured driver's vision. The effect of the sunlight was made worse due to the steep uphill gradient on Star Hill Road. D1 did not even see the cyclist.
23/04/2012	Veh 1 heading down Star Hill Road towards Dunton Green. As came round the bend D1 lost control and went across the road and entered the field. This has damaged the fence in the field. Veh 1 has stopped a short distance into the field.
14/03/2012	V1 was travelling along Star Hill Road toward Knockholt came out of national speed limit, road enters near side bend after changing to 30 speed limit. D1 lost control of V1 causing V1 to hit telegraph pole (marker DP 353).
28/02/2012	Vehicle 1 was travelling downhill (south east direction) along Star Hill Road, approaching a L/hand bend driver lost control, clipped nearside grass bank, span and rolled onto its side. Road surface was greasy at location.
11/07/2012	Veh 1 has been travelling down Star Hill Road in the direction of Dunton Green following 2 other unknown vehicles. On a left hand bend, a car has come round the bend towards Veh 1 with bright lights and caused driver to pull steering to the left. This has caused the front end to lose control and hit the N/S bank and the vehicle to roll.
19/01/2014	Vehicle 2 was travelling north on Star Hill Road. A vehicle in front of Vehicle 2, travelling in the same direction came to a halt. Vehicle 2 then came to a halt. Vehicle 2 was then struck by Vehicle 1 from behind resulting in injury and damage.
06/08/2014	Cyclist travelling along Star Hill Road direction of Birchwood Lane, as the cyclist was cycling down the hill hit a man hole cover, lost control and fell off bike. Bike continued down the road and hit oncoming vehicle.

An analysis of the likely traffic impact of the Fort Halstead development (see separate Technical Note on journey times) suggests that on a worst case basis the development (450 residential units, an 80 bedroom hotel and extra jobs to reach a total of 1,483 workers on site) could add

around 63 additional trips onto Star Hill Road (as compared with traffic levels observed in June 2014) during the morning peak hour and 92 during the evening peak hour.

In terms of average weekday traffic (AAWT), for both future locations (north and south of the site access along Star Hill Road) the proportion of peaks to weekday average from the ATC north of the site (which accounts mostly for residential traffic) has been used, because in the future all traffic using the Star Hill access to Fort Halstead would be from the residential development, since trips to/from the commercial and hotel developments will use the other access.

Table 3 summarises the likely net impacts.

Table 3: Development impacts on Star Hill Road

Period	North of site access		South of site access	
	Existing	Future	Existing	Future
AM peak	305	327	315	339
PM peak	268	294	272	292
Average weekday	3256	3529	3336	3586

Whilst the impacts are quite modest, particularly to the north of the site access, the impacts on conditions at the cottages could be considered to be material and require some mitigation. Possible improvements have been identified within Figure 2 and include the following:

- Provision of a 40 mph speed limit between Knockholt village (existing 30 mph zone) and south of the cottages. The outcome of the speed measurements together with the evidence of some speed related accidents at the corner by the cottages indicates that this could be justified.
- Improvements to the operation of the site access junction, to include improved visibility splays, shell grip on the approaches and low level lighting. These improvements have been requested by KCC;
- Potential improvement of the footway width outside the cottages. Whilst there is limited scope to narrow the road on the corner there maybe scope to widen slightly within existing highway limits on the west side in order to ease a short section of road across. This could allow a modest widening of the existing narrow footway. The feasibility of such an option would need to be checked through more detailed feasibility studies. It could also be compromised by ownerships.
- Remove the central carriageway lane markings and replace with carriageway edge markings. This would be consistent with the approach adopted elsewhere by KCC on roads of similar status and traffic flow and is considered to help reduce traffic speeds.
- In order to justify a revision to the existing speed limit some further measures would need to be considered. In the absence of street lighting options are quite limited but could include provision on a new gateway entry treatment on entry to the 40 mph zone form the south. This could include the provision of flashing warning lights to detect speeding cars.

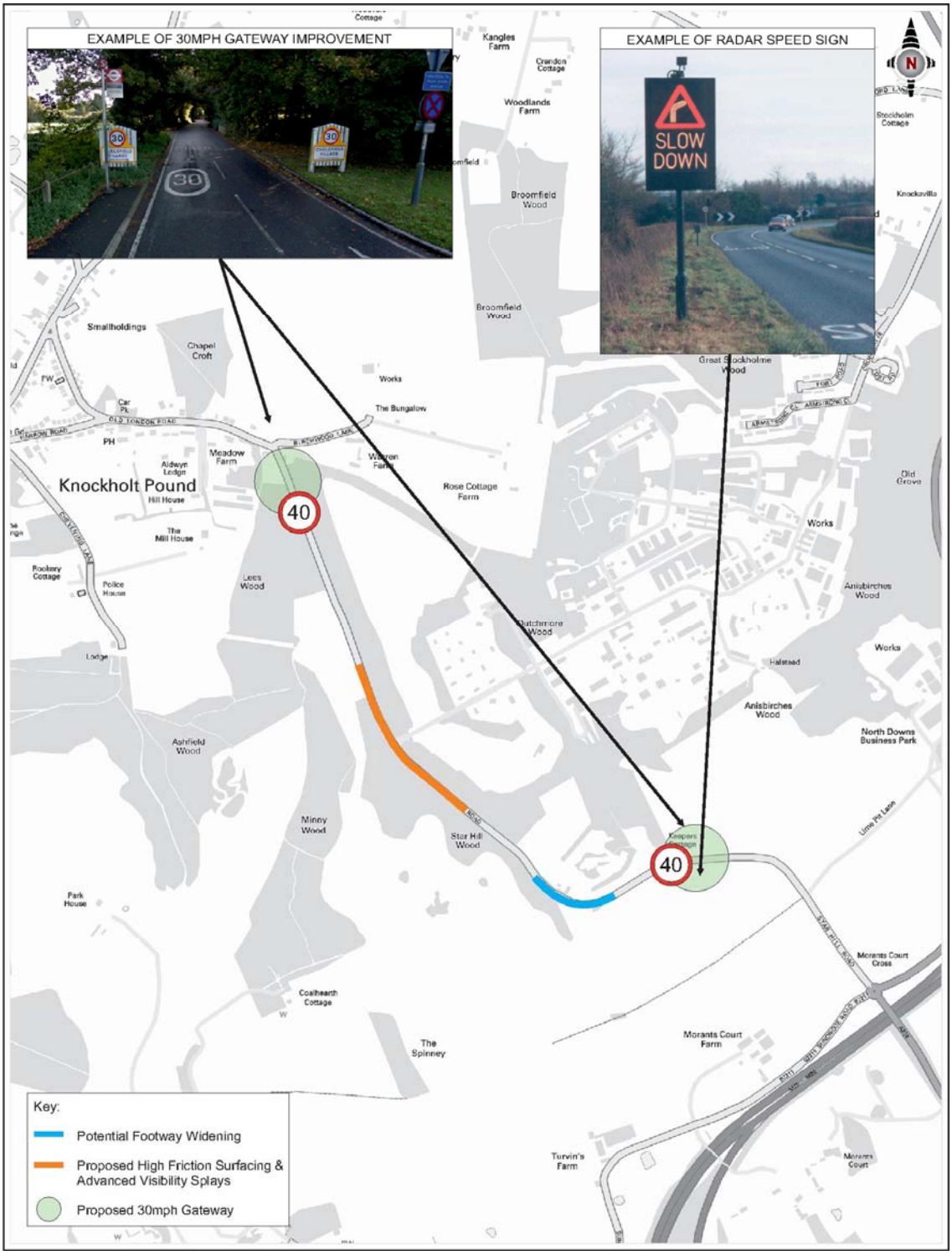

Figure 2: Proposed scheme

Appendix B – Email from Geoff Bineham of KCC Local Schemes Team

Robert Parker

Subject: RE: Fort Halstead - Star Hill Road Traffic Calming and speed limit

From: Bineham, Geoffrey - GT HTW <Geoffrey.Bineham@kent.gov.uk>
Sent: 25 February 2019 14:17
To: Rowlands, Louise - GT HTW <Louise.Rowlands@kent.gov.uk>
Subject: Re: Fort Halstead - Star Hill Road Traffic Calming and speed limit

Hello Louise,

Please see my comments below:

Road geometry and environment

Star Hill Road is a two lane single carriageway road in a rural area, properties on this road are sparse and mainly concentrated close to the bend south of Star Hill Wood. The cottages are set back slightly from the road with a short section of footway serving the cottages, there are no other footways on this road and no street lighting is present. The road has predominantly a through traffic function, with bends but it is in the main straight with few junctions or accesses, during site visits to this area there was no evidence of vulnerable road users.

Traffic Speeds

The vast majority of the rural road network is subject to the national speed limit of 60 mph on single carriageway roads. On many of these roads, the majority of drivers are travelling below, sometimes significantly below, the speed limit because of the characteristics of the roads. This is especially evident where the geometric characteristics include narrow sections, some bends, junctions and accesses. The traffic count data provided shows mean speeds of between 33.9mph and 40.8mph.

3-year Collision History

Star Hill Road has a good safety record as there has been no injury collisions along this section of national speed limit within the last three years.

Proposed VAS

There are no collisions on Star Hill Road, therefore the site does not meet the application criteria set out by the DfT for vehicle activated signs.

Secondary access

I appreciate that the current access to Fort Halstead may have more turning movements on to Star Hill Road as a result of the new development, however, the removal of vegetation as shown in the drawings provided should improve visibility splays and safety may be improved further by the addition of junction warning signs on Star Hill Road.

Additional comments

Taking these facts into consideration, the current 60mph speed limit is appropriate for this section of road and complies with the current Department for Transport guidance for setting local speed limits.

My main concern is, currently the speed limit is national and therefore is only signed at the terminal points with no repeaters. This means that the majority of drivers drive appropriately to the road conditions, in other words, they drive to what they can see ahead of them. If the speed limit were to be reduced to 40mph, repeater signs would need to be installed as a reminder to drivers of the posted speed limit, we have previous experience where this has occurred and has resulted in a collision problem at bends, with drivers perception being that 40mph is a safe speed to travel along the road despite there being hazards. Reducing the speed limit to 40mph does not necessarily mean that there will be a reduction in traffic speeds. During a recent site visit observed driven speeds in the northern section between Fort Halstead and Knockholt were around 50mph, therefore reducing the speed limit may lead to a compliance issue in some areas.

From the above analysis, I do not feel that we would be looking to reduce the speed limit along this section of road to 40mph and any application received for a related TRO from a third party for this section of road may be unsuccessful.

If you have any queries with my comments please contact me.

Kind regards

Geoff

Geoff Bineham | Schemes Project Manager | Highways, Transportation and Waste
Kent County Council | Ashford Highway Depot | Javelin Way | Ashford | TN24 8AD

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Appendix P

K&M TRAFFIC SURVEYS

DATE: TUESDAY 25TH FEBRUARY 2020 LOCATION: KNOCKHOLT, KENT

ROAD NAME	ZONE	RESTRICTION	METRES	5 METRES= 1 BAY	TUESDAY 25TH FEB 2020 11:00-11:30 PARKED	OBSERVED SPACES	%RESTRICTION STRESS
OLD LONDON ROAD	1	DOUBLE YELLOW LINE	33.2				
		ACCESS	13.6				
		BUS STOP	12.9				
		DROPPED KERB	212.1				
		UNRESTRICTED	380.6	63	4	59	6.35%
		WOULD NOT PARK UNRESTRICTED	17.3				
	2	UNRESTRICTED	39.6	7	0	7	0.00%
		DROPPED KERB	7				
		WOULD NOT PARK UNRESTRICTED	84.7				
	3	WOULD NOT PARK UNRESTRICTED	118.1				
		ACCESS	14.1				
	4	WOULD NOT PARK UNRESTRICTED	619.4				
		DROPPED KERB	10.8				
		DOUBLE YELLOW LINE	417				
		BUS STOP	12.5				
		ACCESS	19.7				
	5	DOUBLE YELLOW LINE	26.6				
		SINGLE YELLOW LINE MON-FRI 1100-1200	102.9	18	0	18	0.00%
		DROPPED KERB	78.7				
		BUS STOP	19				
	6	DOUBLE YELLOW LINE	491.6				
		BUS STOP	41.6				
	7	DOUBLE YELLOW LINE	270.8				
	8	DOUBLE YELLOW LINE	14.5				
	9	DOUBLE YELLOW LINE	157.8				
		PERMIT HOLDER OR PAY & DISPLAY MON-FRI 0830-1830	270.7	52	35	10	77.78%
		ACCESS	13.1				
	10	DOUBLE YELLOW LINE	78.5				
		BUS STOP	30.3				
		PERMIT HOLDER OR PAY & DISPLAY MON-FRI 0830-1830	273.5	54	48	0	100.00%
		DROPPED KERB	10.6				
	11	DOUBLE YELLOW LINE	205.8				
		SINGLE YELLOW LINE MON-FRI 1100-1200	157	31	0	31	0.00%
		BUS STOP	19.4				
		UNRESTRICTED	158.6	31	26	1	96.30%
		DROPPED KERB	5.7				
STATION CAR PARK	12	REGULAR PAY & DISPLAY BAYS	BAYS	35	35	1	97.22%
		DISBALED BAYS	BAYS	3	0	3	0.00%

K&M TRAFFIC SURVEYS

DATE: TUESDAY 25TH FEBRUARY 2020 LOCATION: KNOCKHOLT, KENT

ROAD NAME	ZONE	RESTRICTION	METRES	5 METRES= 1 BAY	TUESDAY 25TH FEB 2020 14:30-15:00 PARKED	OBSERVED SPACES	%RESTRICTION STRESS
OLD LONDON ROAD	1	DOUBLE YELLOW LINE	33.2				
		ACCESS	13.6				
		BUS STOP	12.9				
		DROPPED KERB	212.1				
		UNRESTRICTED	380.6	63	2	61	3.17%
		WOULD NOT PARK UNRESTRICTED	17.3				
	2	UNRESTRICTED	39.6	7	0	7	0.00%
		DROPPED KERB	7				
		WOULD NOT PARK UNRESTRICTED	84.7				
	3	WOULD NOT PARK UNRESTRICTED	118.1				
		ACCESS	14.1				
	4	WOULD NOT PARK UNRESTRICTED	619.4				
		DROPPED KERB	10.8				
		DOUBLE YELLOW LINE	417				
		BUS STOP	12.5				
		ACCESS	19.7				
	5	DOUBLE YELLOW LINE	26.6				
		SINGLE YELLOW LINE MON-FRI 1100-1200	102.9	18	2	16	11.11%
		DROPPED KERB	78.7				
		BUS STOP	19				
	6	DOUBLE YELLOW LINE	491.6				
		BUS STOP	41.6				
	7	DOUBLE YELLOW LINE	270.8				
	8	DOUBLE YELLOW LINE	14.5				
	9	DOUBLE YELLOW LINE	157.8				
		PERMIT HOLDER OR PAY & DISPLAY MON-FRI 0830-1830	270.7	52	35	10	77.78%
		ACCESS	13.1				
	10	DOUBLE YELLOW LINE	78.5				
		BUS STOP	30.3				
		PERMIT HOLDER OR PAY & DISPLAY MON-FRI 0830-1830	273.5	54	45	3	93.75%
		DROPPED KERB	10.6				
	11	DOUBLE YELLOW LINE	205.8		1		
		SINGLE YELLOW LINE MON-FRI 1100-1200	157	31	1	30	3.23%
		BUS STOP	19.4				
		UNRESTRICTED	158.6	31	24	3	88.89%
		DROPPED KERB	5.7				
STATION CAR PARK	12	REGULAR PAY & DISPLAY BAYS	BAYS	35	36	0	100.00%
		DISBALED BAYS	BAYS	3	0	3	0.00%

Appendix Q

Queue Validation - 2018

	Hewitts Roundabout					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
Hewitts Road	1	2	0	0	-1	-2
M25	6	4	3	1	-3	-3
Wheatsheaf Hill	6	5	1	0	-5	-5
A21	2	8	1	1	-1	-7
A224 EB	6	6	1	1	-5	-5

	Shacklands Roundabout					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
Shacklands Road	1	1	0	0	-1	-1
A224 NB	1	1	1	1	0	0
Shoreham Lane	1	1	0	0	-1	-1
Old London Road	2	3	0	0	-2	-3
A224 SB	3	4	1	0	-2	-4

	A224 Polhill/ Crow Drive/ Otford Lane					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
A224 Polhill	2	1	0	0	-2	-1
Crow Drive	1	1	0	0	-1	-1
Otford Lane	2	2	0	0	-2	-2

	A224 Polhill/ Access/ Pilgrims Way W					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
Pilgrims Way	6	4	2	2	-4	-2
A224 Polhill (RT)	1	2	0	0	-1	-2

	Morants Ct Roundabout					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
A224 Polhill	5	3	1	1	-4	-2
A224 Morants Court Rd	6	4	1	0	-5	-4
B2211	5	4	0	0	-5	-4
Starhill Road	3	3	0	0	-3	-3

	Crow Drive/Star Hill					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
Crow Drive	0	0	0	0	0	0
Star Hill	0	0	0	0	0	0

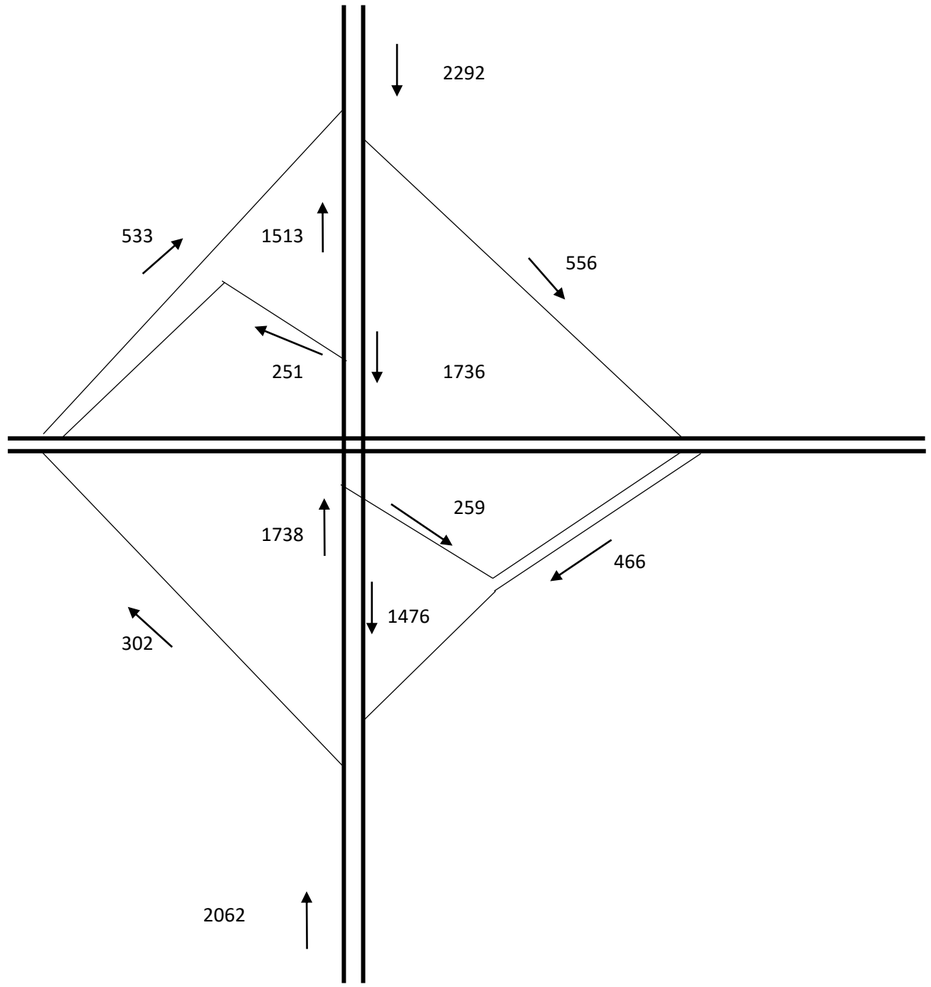
	M25 J4					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
M25 North Arm	9	5	20	11	11	6
M25 South Arm	8	4	13	9	5	5
M25 West Arm	0	0	0	2	0	2

	M25/A25/A21 - A25 / Westerham Rd Crossroad					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
Westerham Road (LT)	1	0	0	0	-1	0
Westerham Rd (SO and RT)	3	1	2	1	-1	0
A25 WB (LT and SO)	0	0	0	0	0	0
A25 WB (RT)	1	1	0	0	-1	-1
A21	0	0	0	0	0	0
A25 EB (LT)	1	0	0	0	-1	0
A25 EB (SO)	4	4	0	0	-4	-4
A25 EB (RT)	7	6	8	2	1	-4

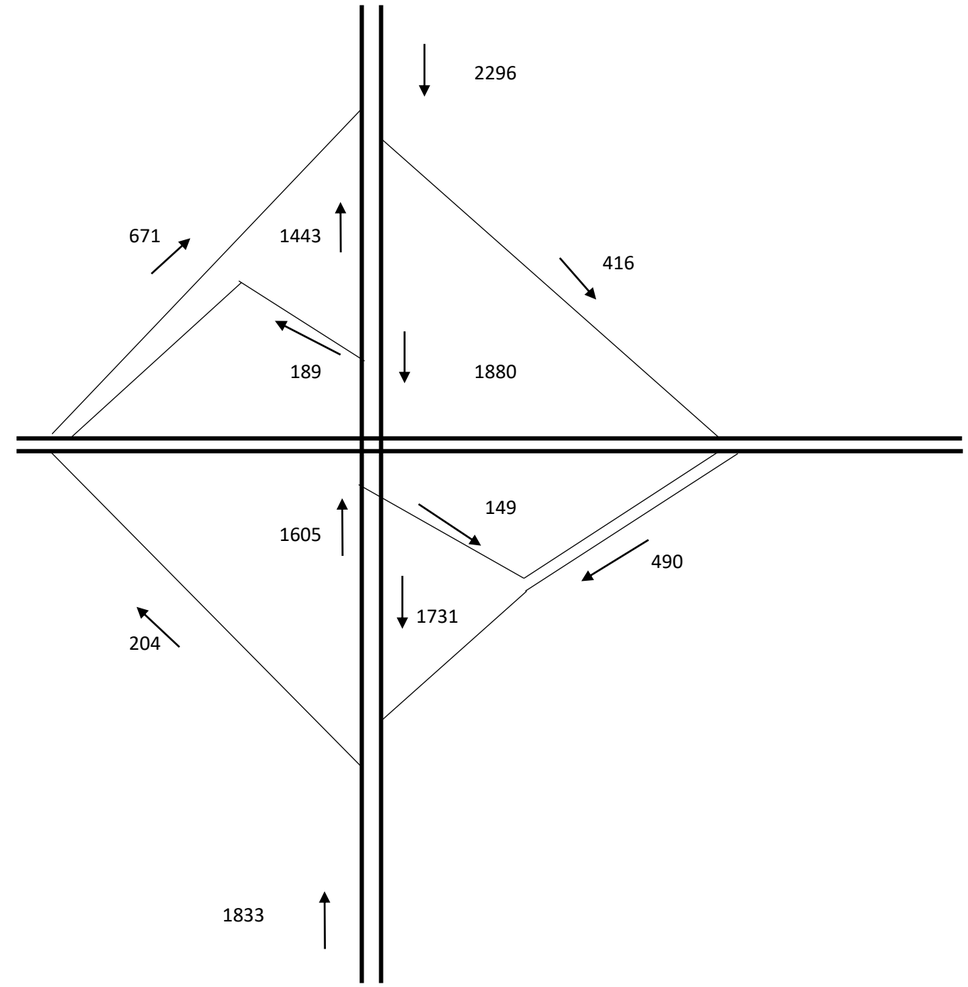
	M25/A25/A21 - A25 / A2 Traffic lights					
	Observed		Modelled		difference	
Arm	AM	PM	AM	PM	AM	PM
A21 SB	0	0	4	0	4	0
A25 WB (SO)	0	0	0	0	0	0
A25 WB (RT)	13	14	13	13	0	-1
A21 NB	0	1	0	0	0	-1
A25 EB (LT)	4	4	3	4	-1	0
A25 EB (SO)	9	11	11	10	2	-1

Appendix R

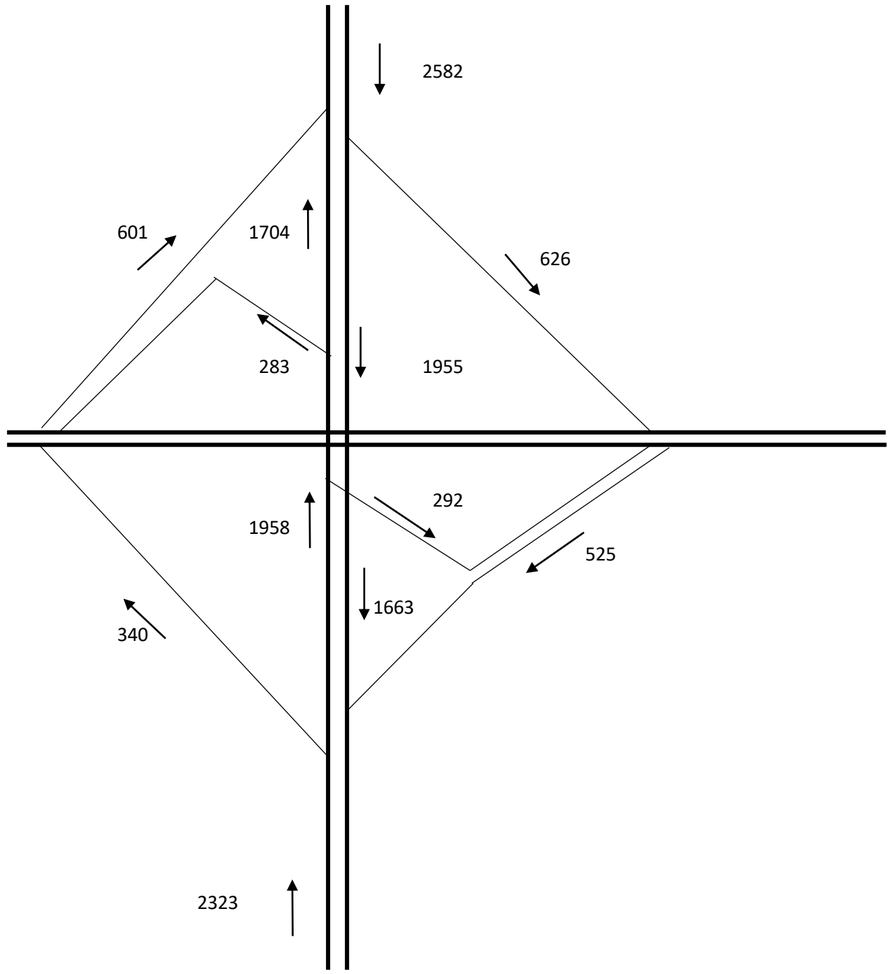
2019 Merge/Diverge Assessment
2019 WebTRIS flows
AM Peak



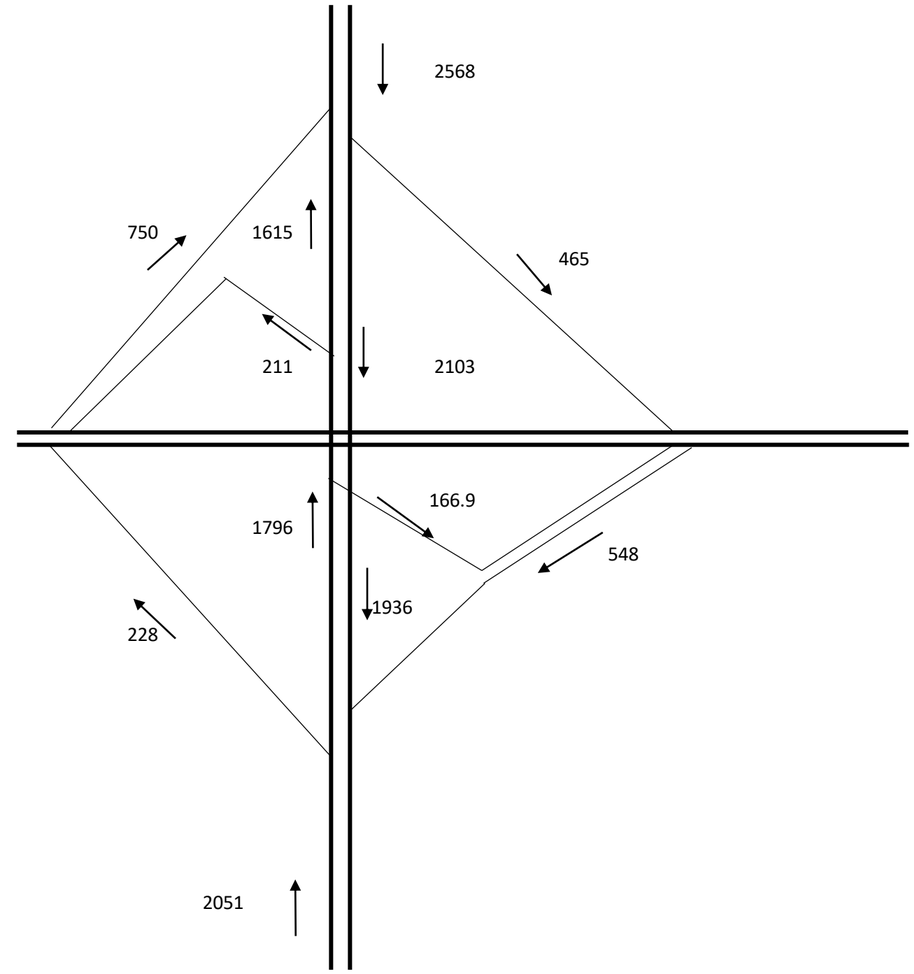
2019 Merge/Diverge Assessment
2019 WebTRIS flows
PM Peak



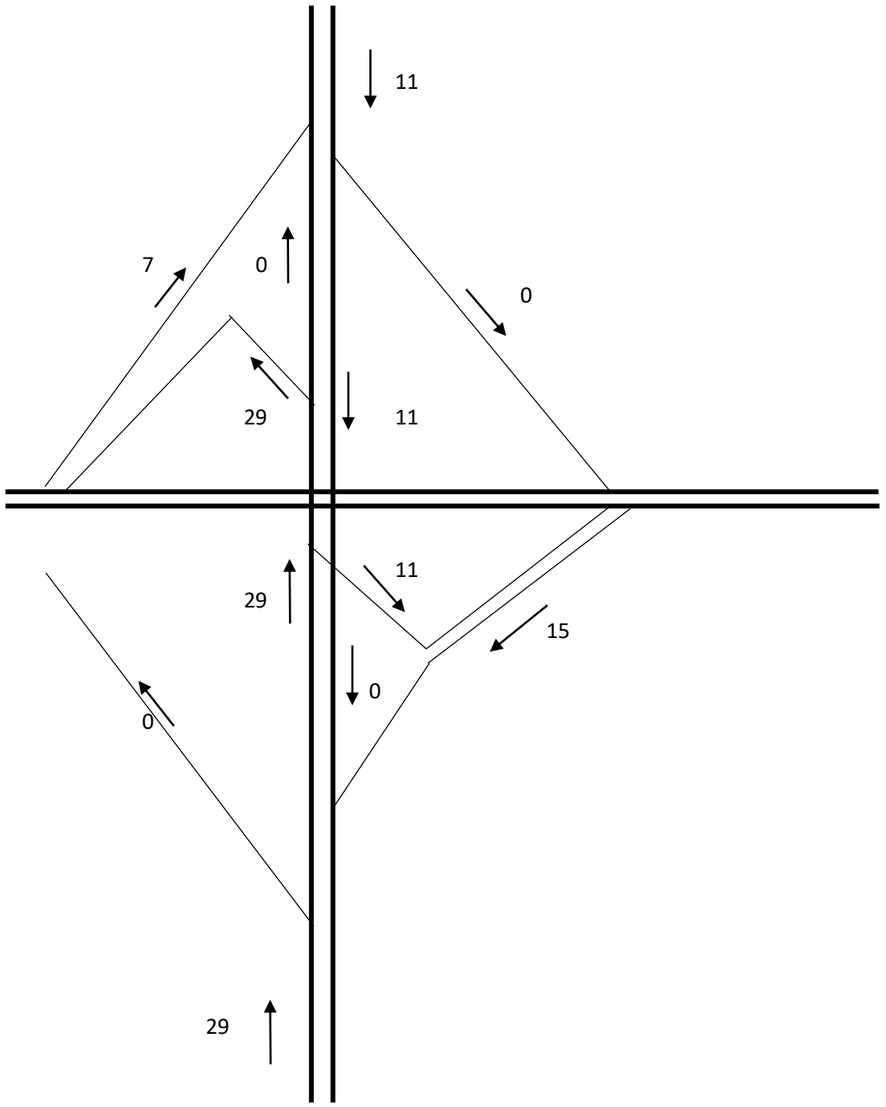
2019 Merge/Diverge Assessment
2035 Baseline
AM Peak



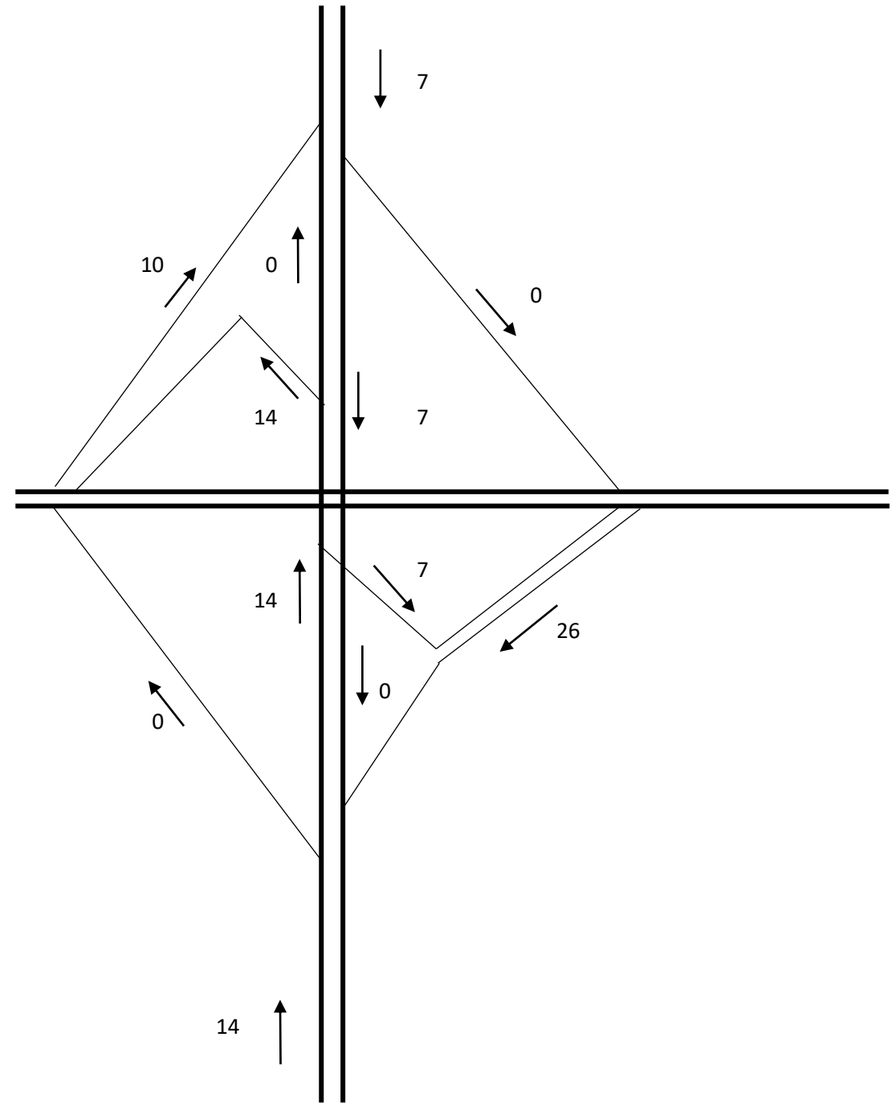
2019 Merge/Diverge Assessment
2035 Baseline
PM Peak



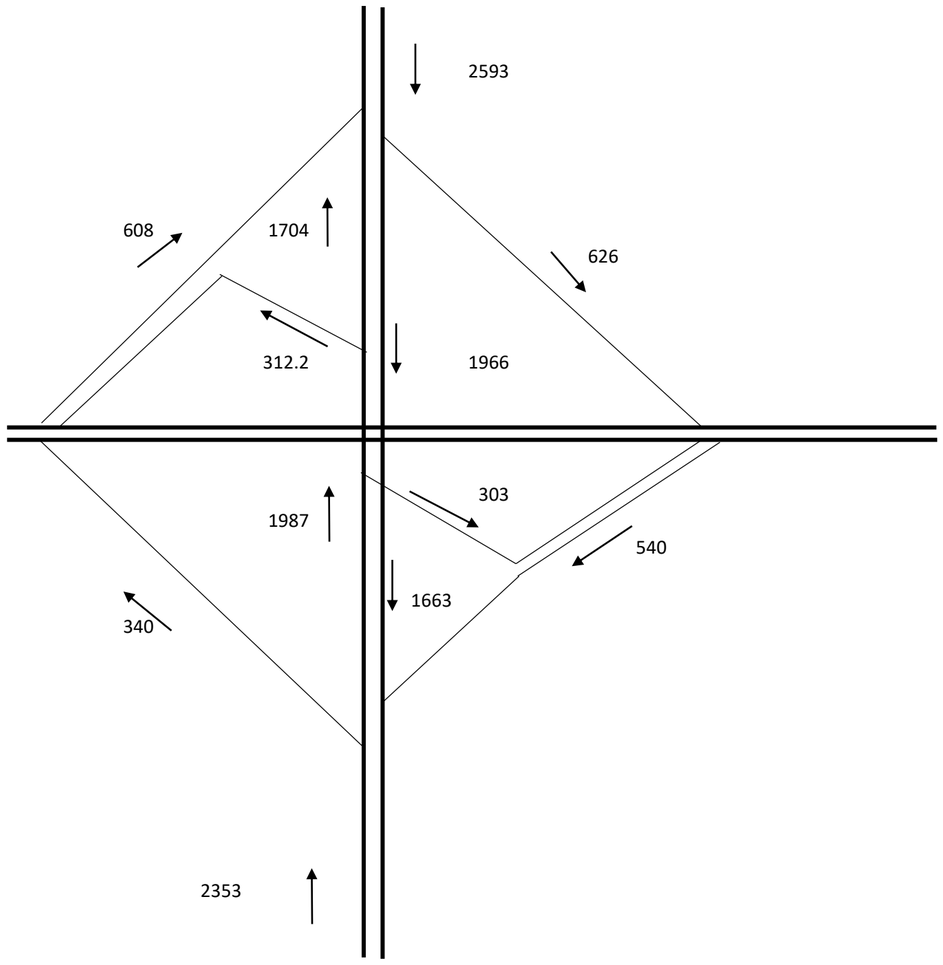
2019 Merge/Diverge Assessment
Development flows
AM Peak



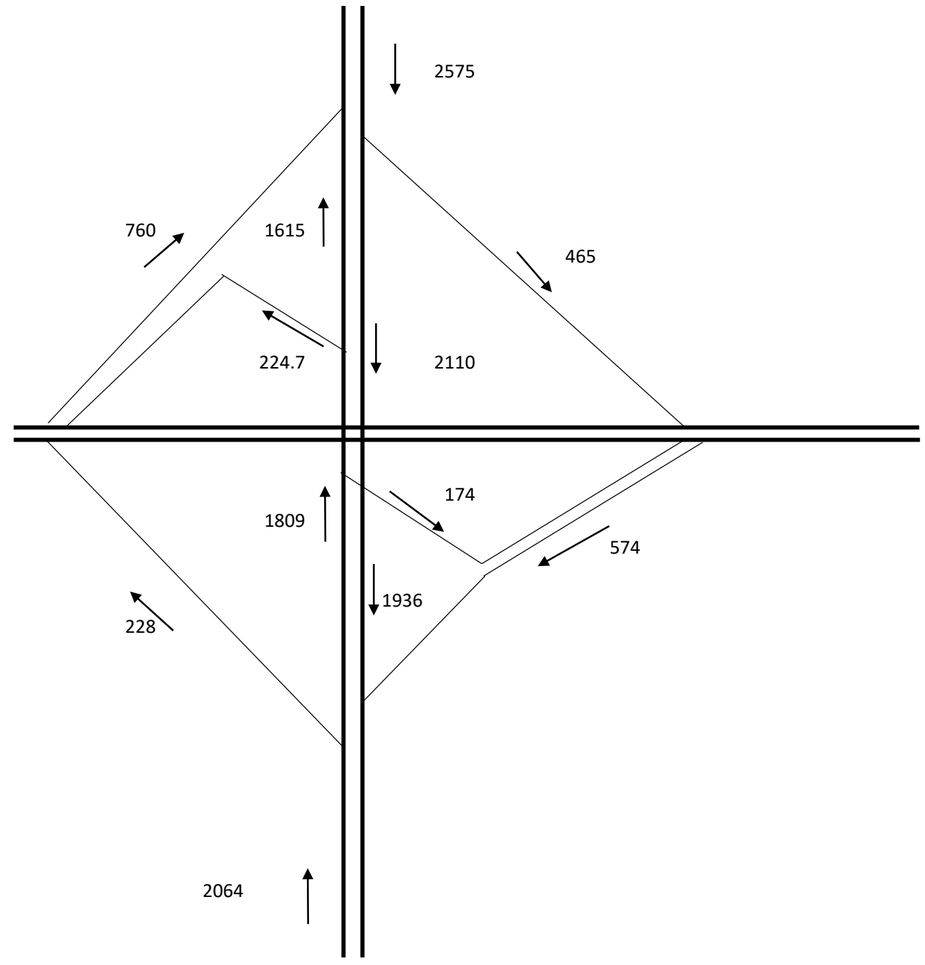
2019 Merge/Diverge Assessment
Development flows
PM Peak



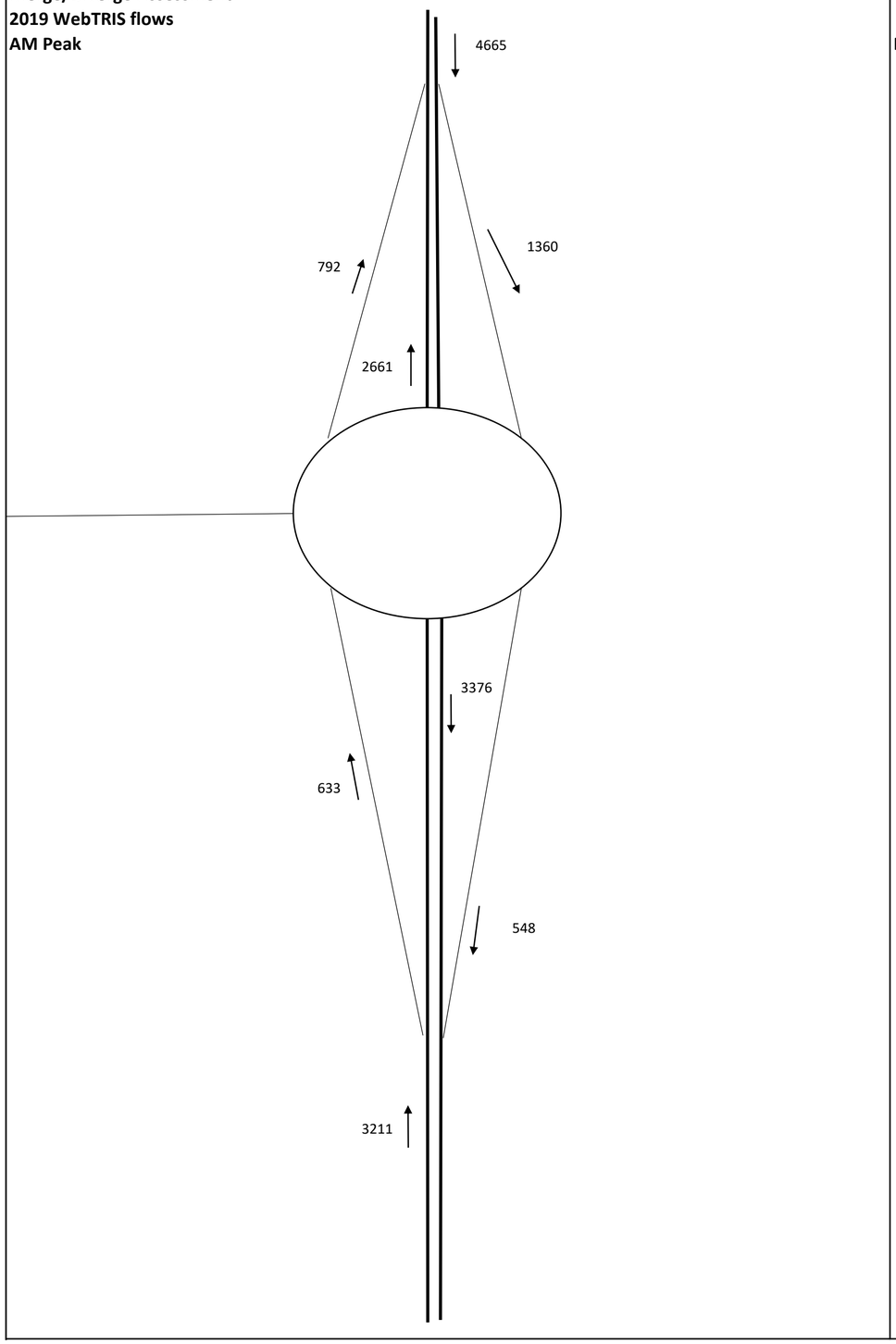
2019 Merge/Diverge Assessment
2035 Baseline + development flows
AM Peak



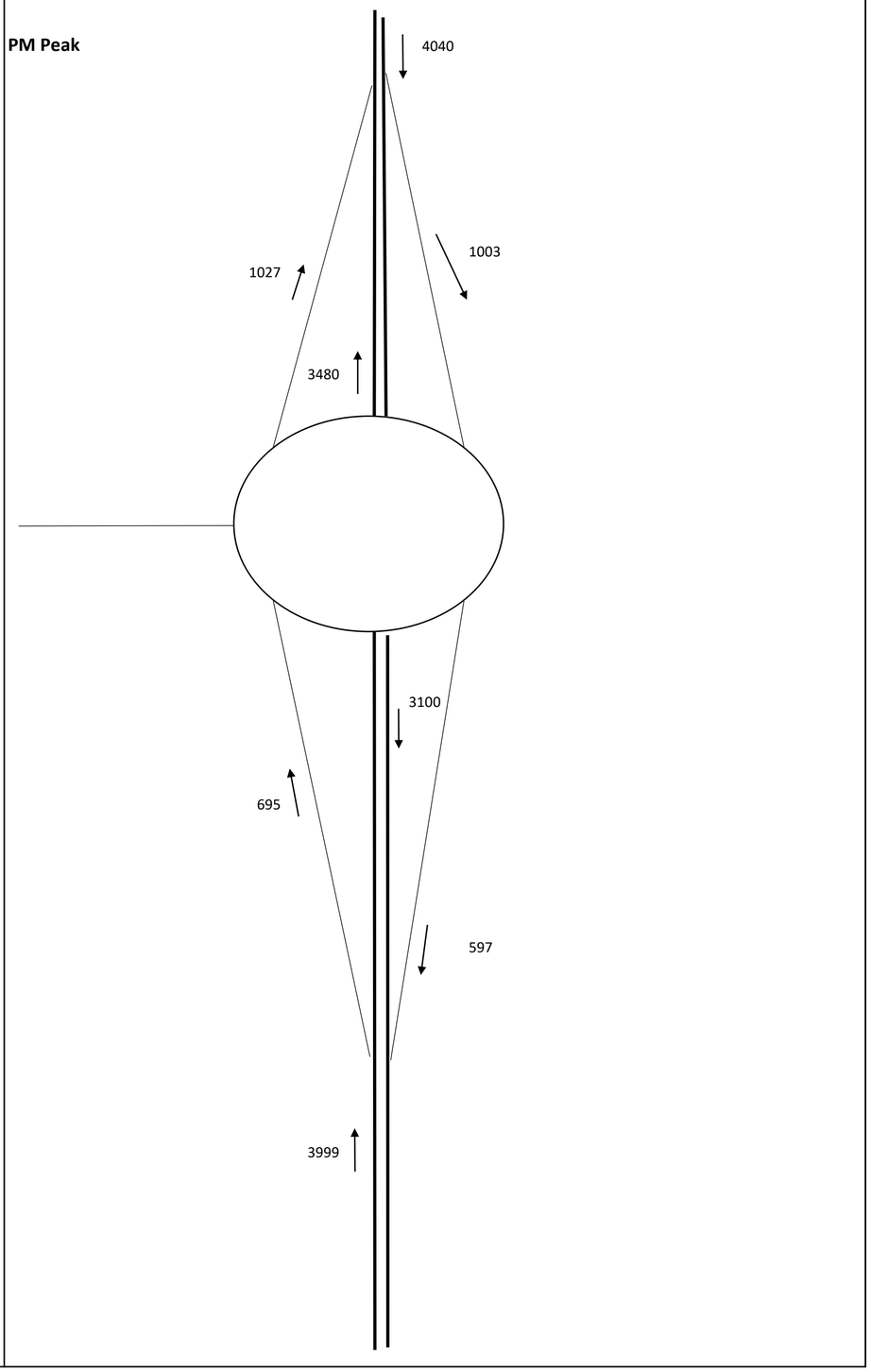
2019 Merge/Diverge Assessment
2035 Baseline + development flows
PM Peak



Merge/Diverge Assessment
2019 WebTRIS flows
AM Peak

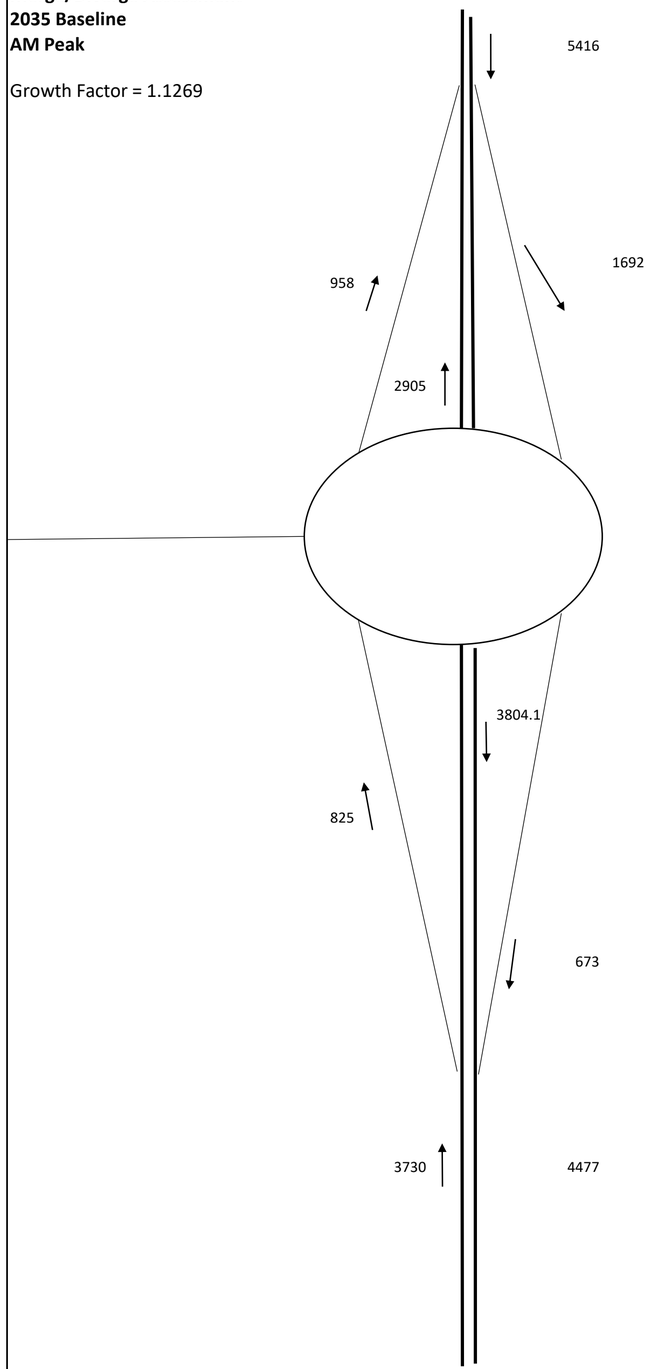


PM Peak



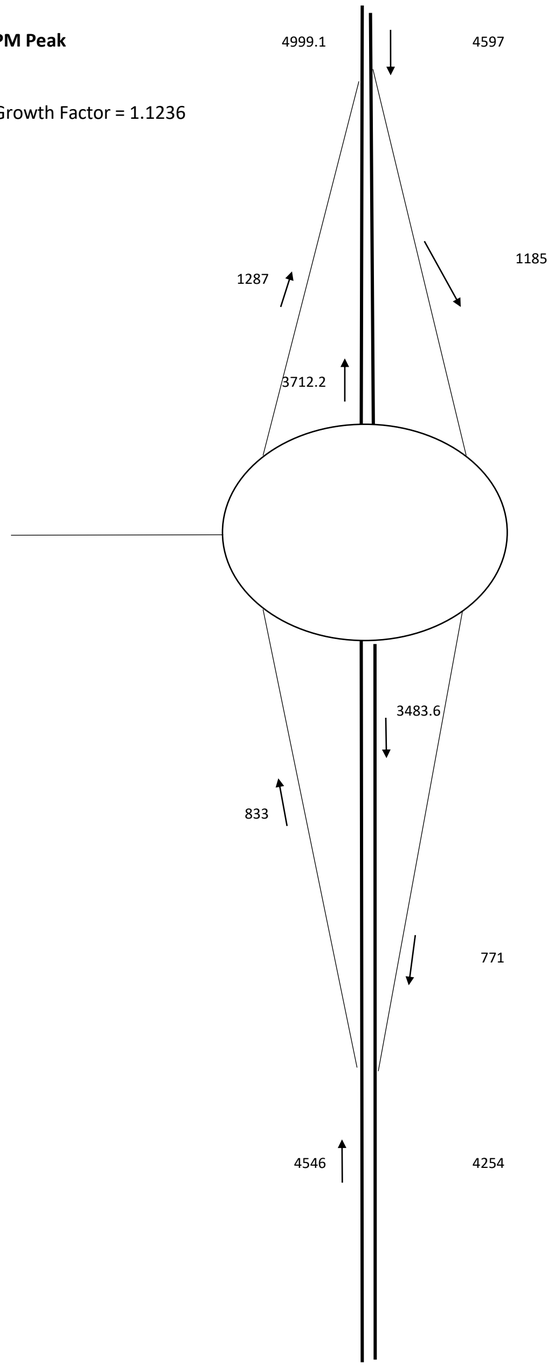
Merge/Diverge Assessment
2035 Baseline
AM Peak

Growth Factor = 1.1269

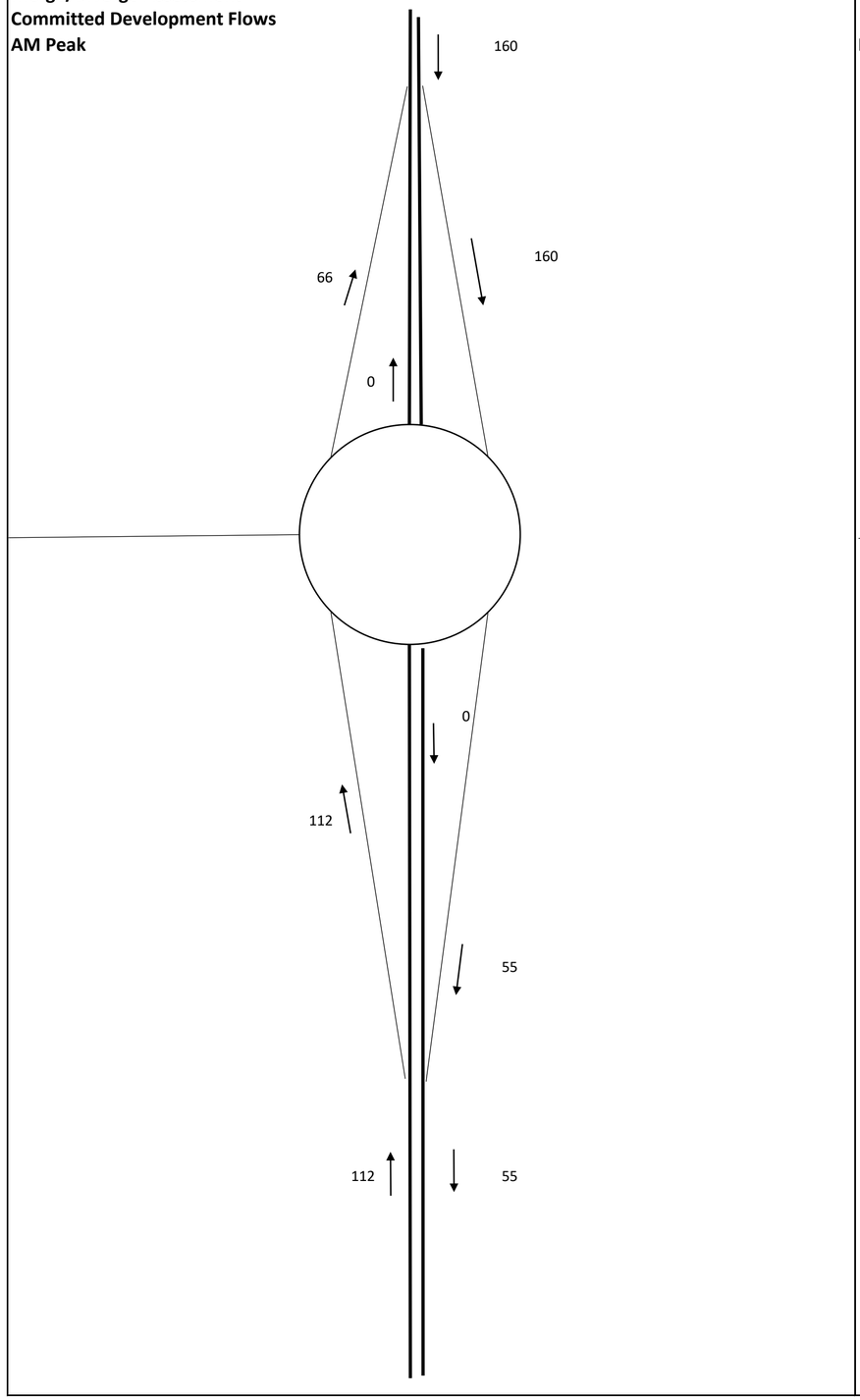


PM Peak

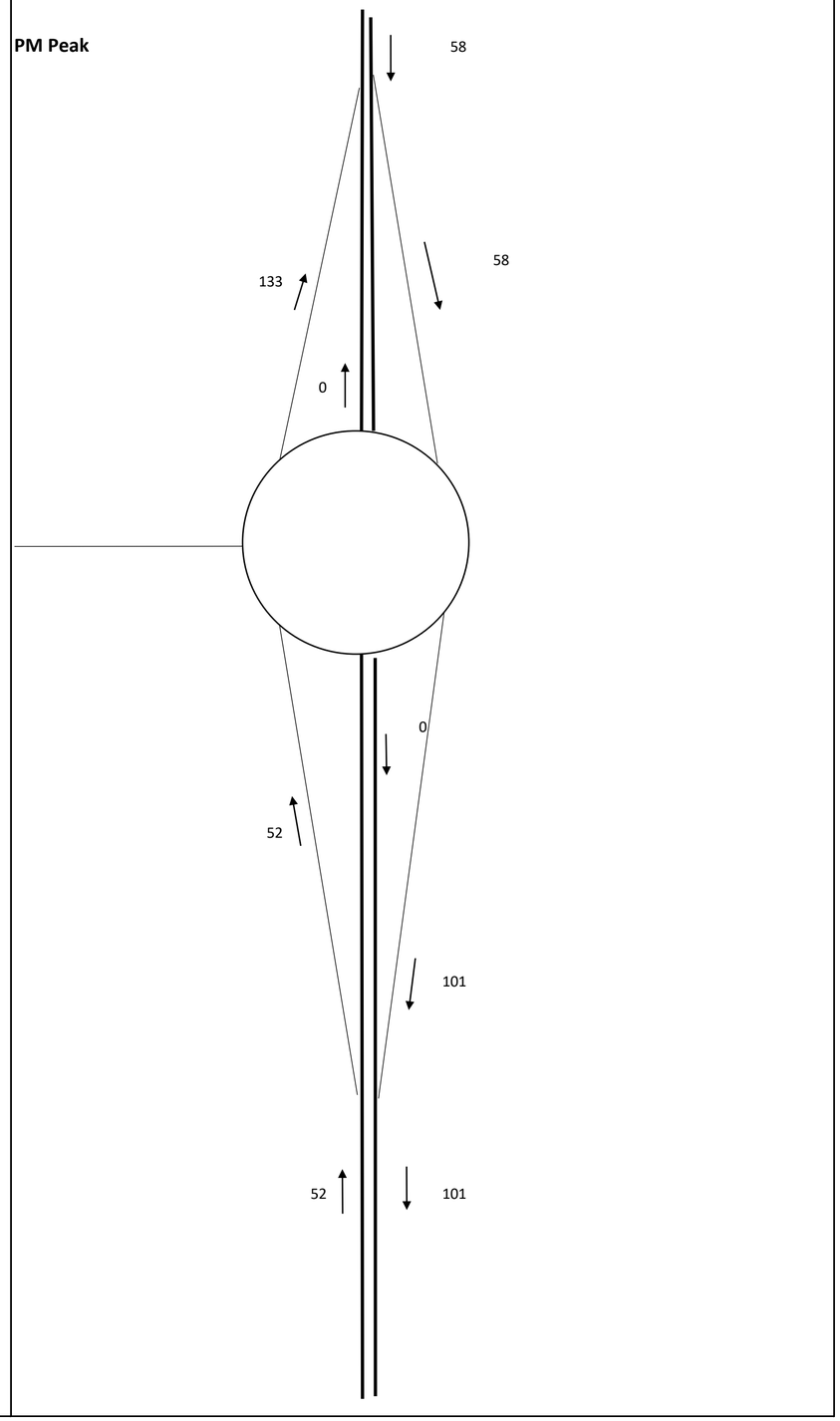
Growth Factor = 1.1236



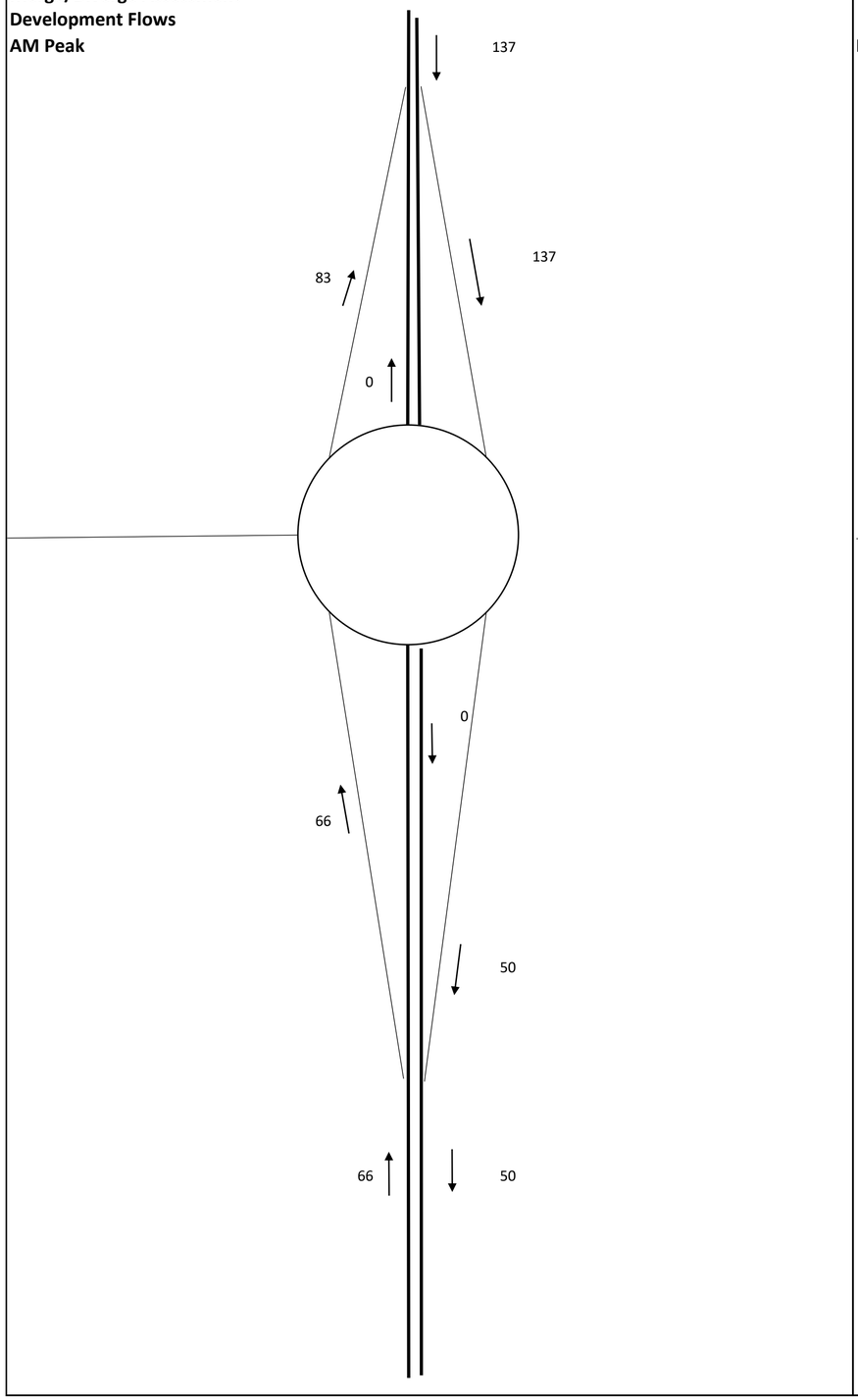
Merge/Diverge Assessment
Committed Development Flows
AM Peak



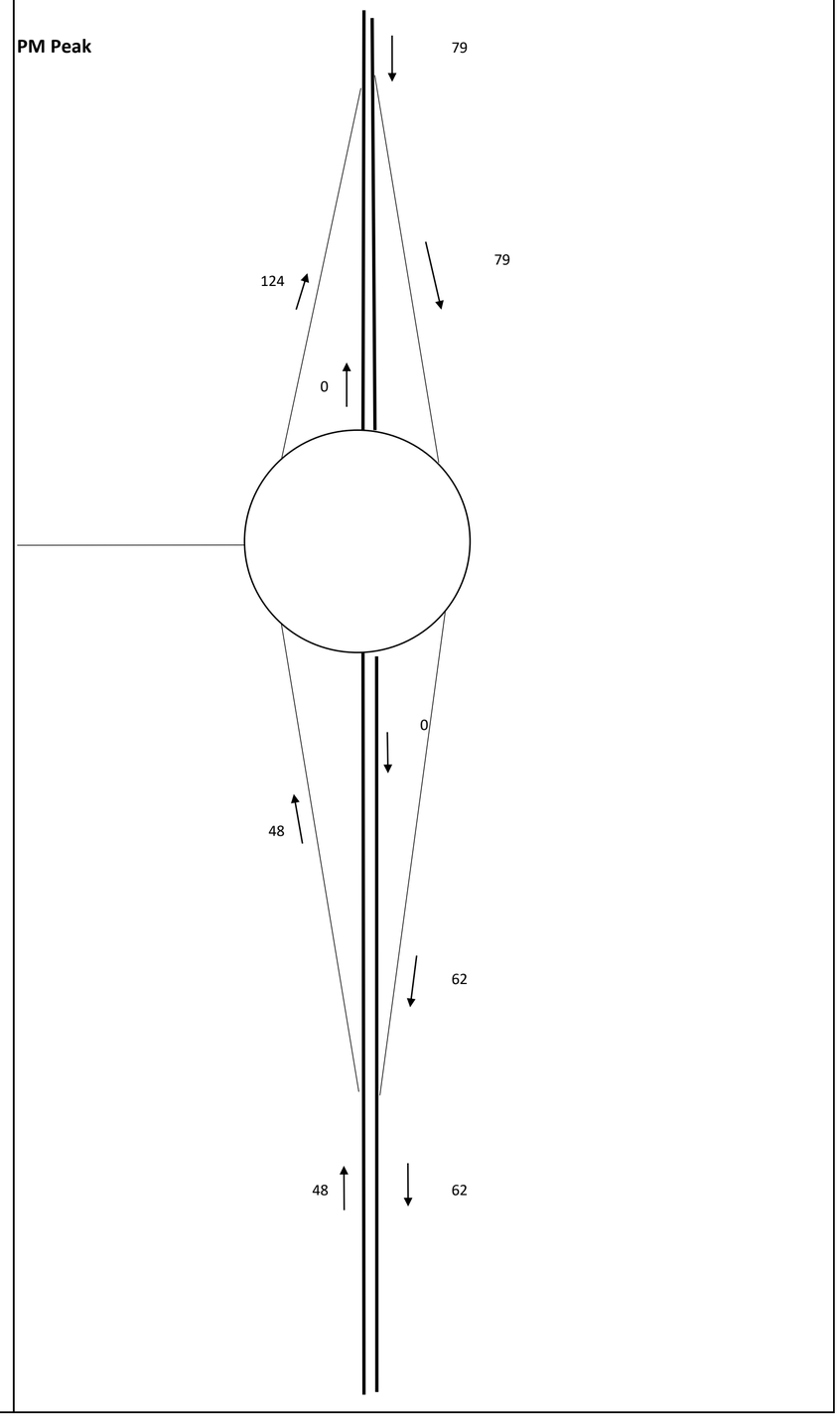
PM Peak



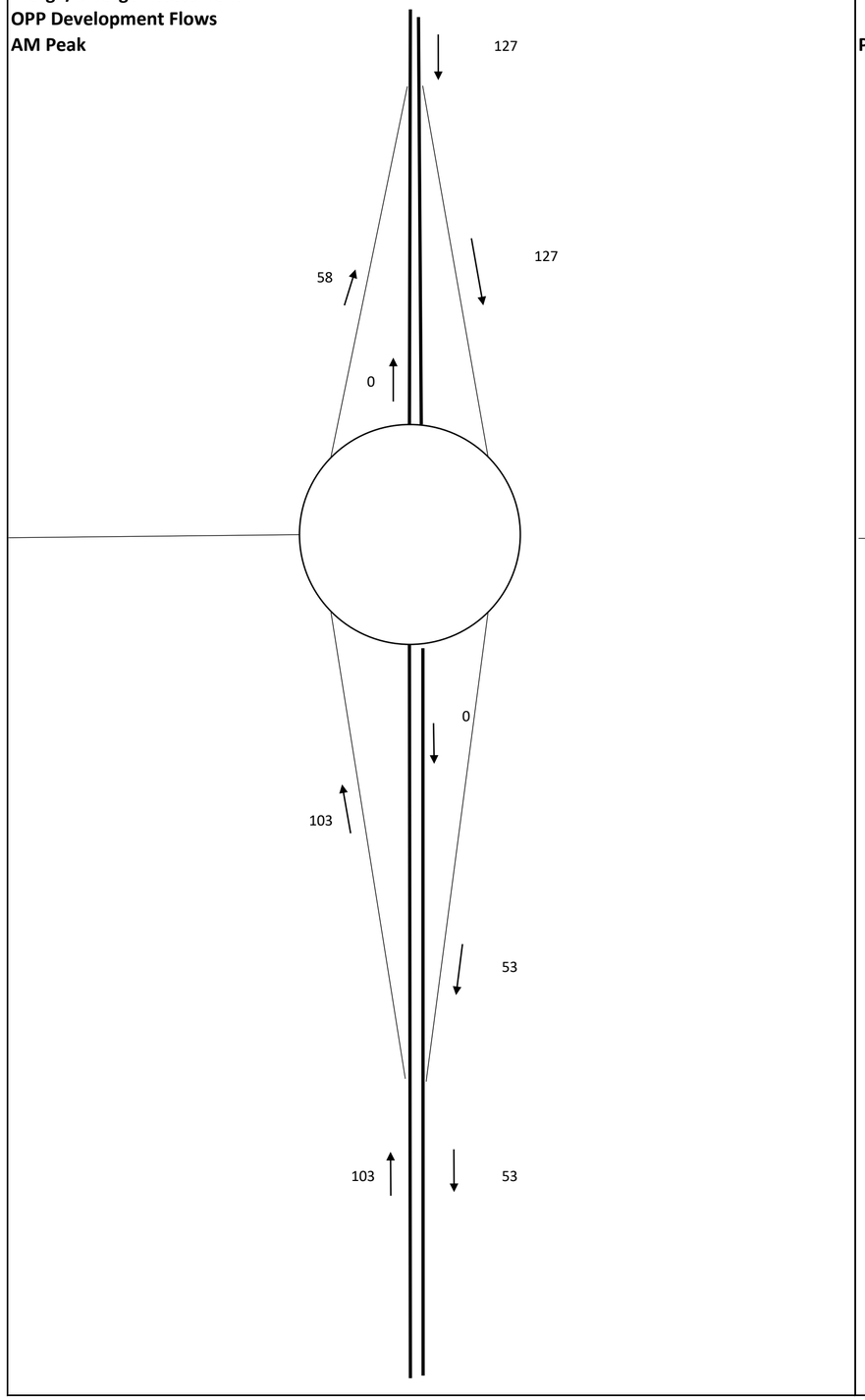
Merge/Diverge Assessment
Development Flows
AM Peak



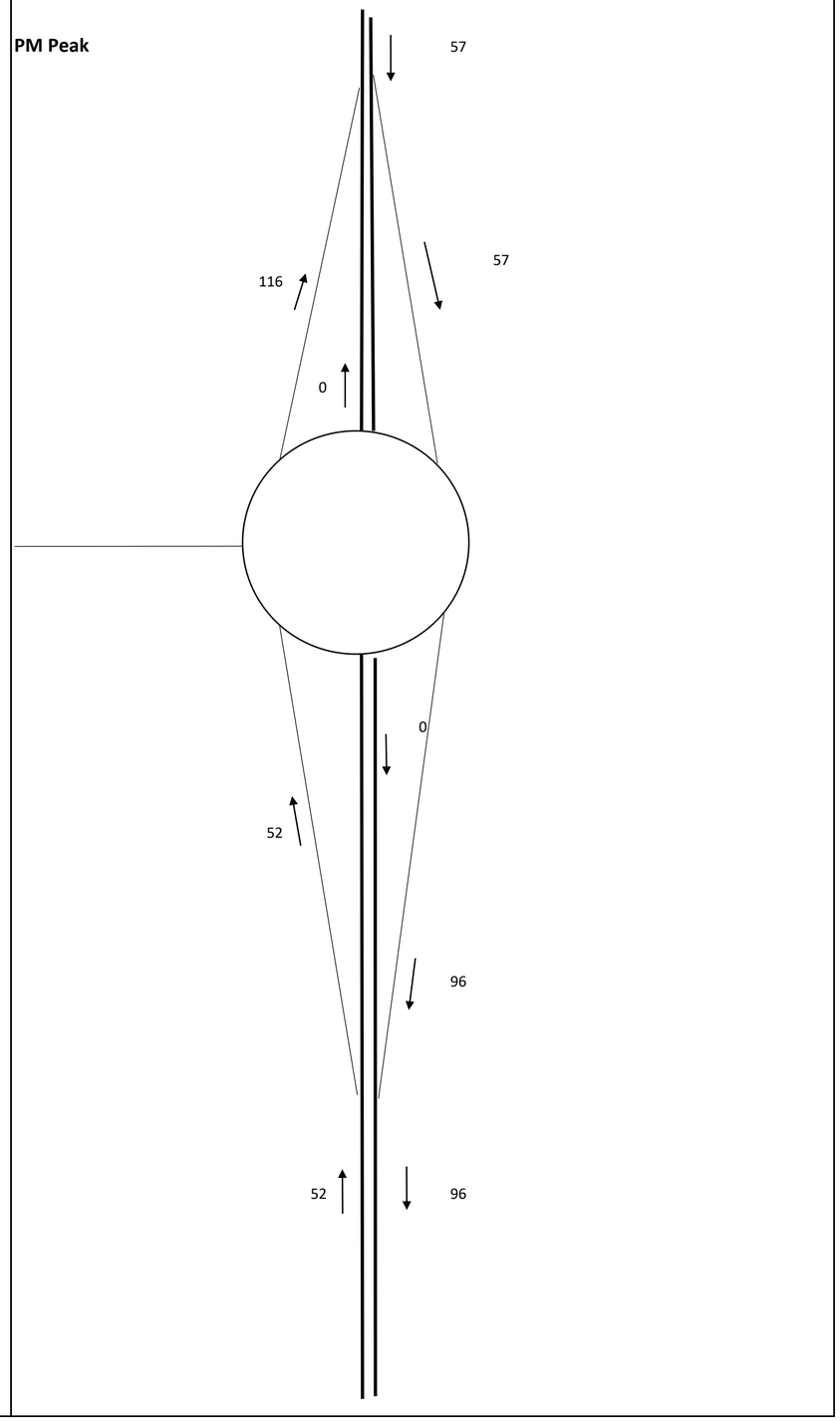
PM Peak



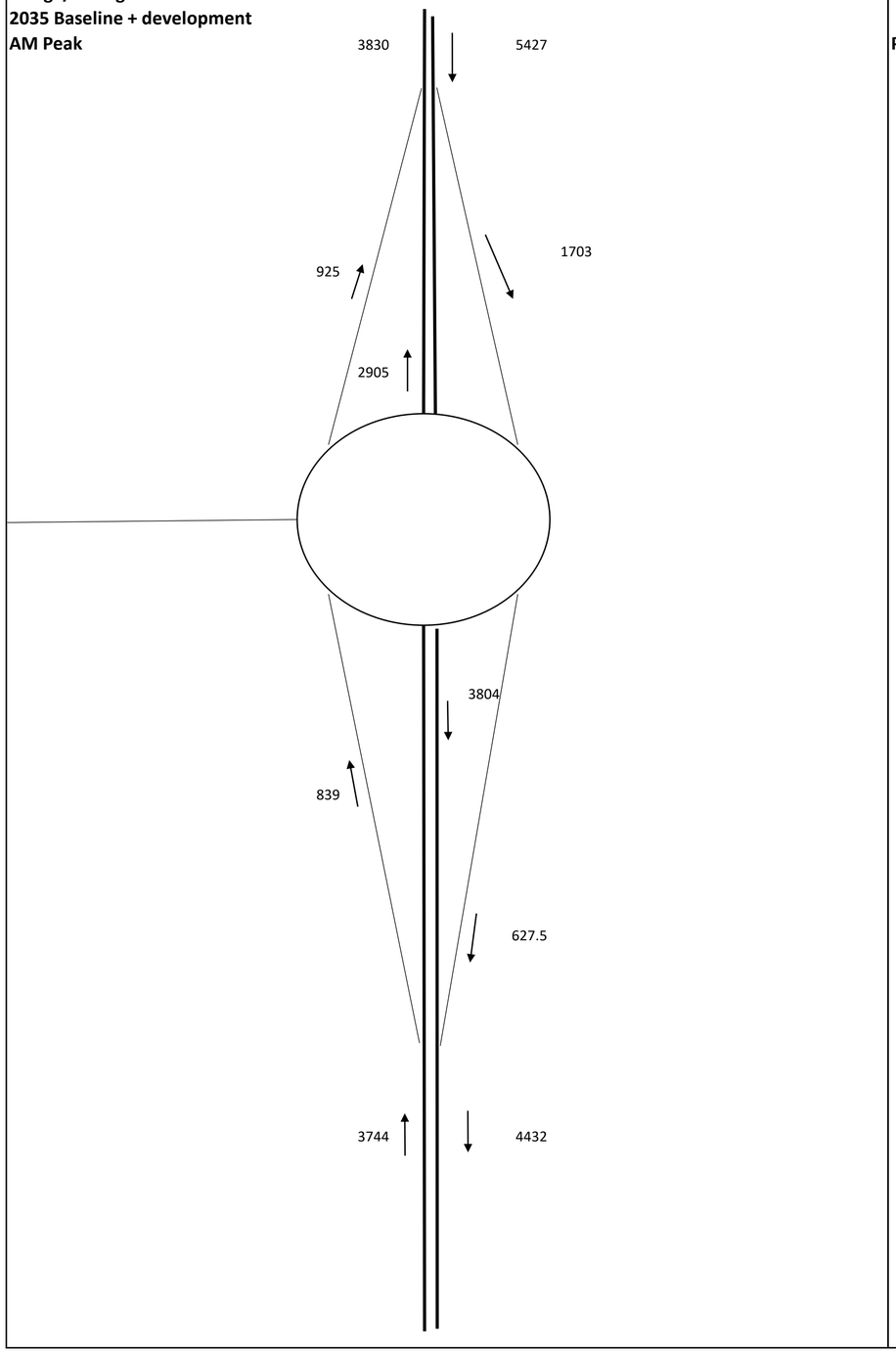
Merge/Diverge Assessment
OPP Development Flows
AM Peak



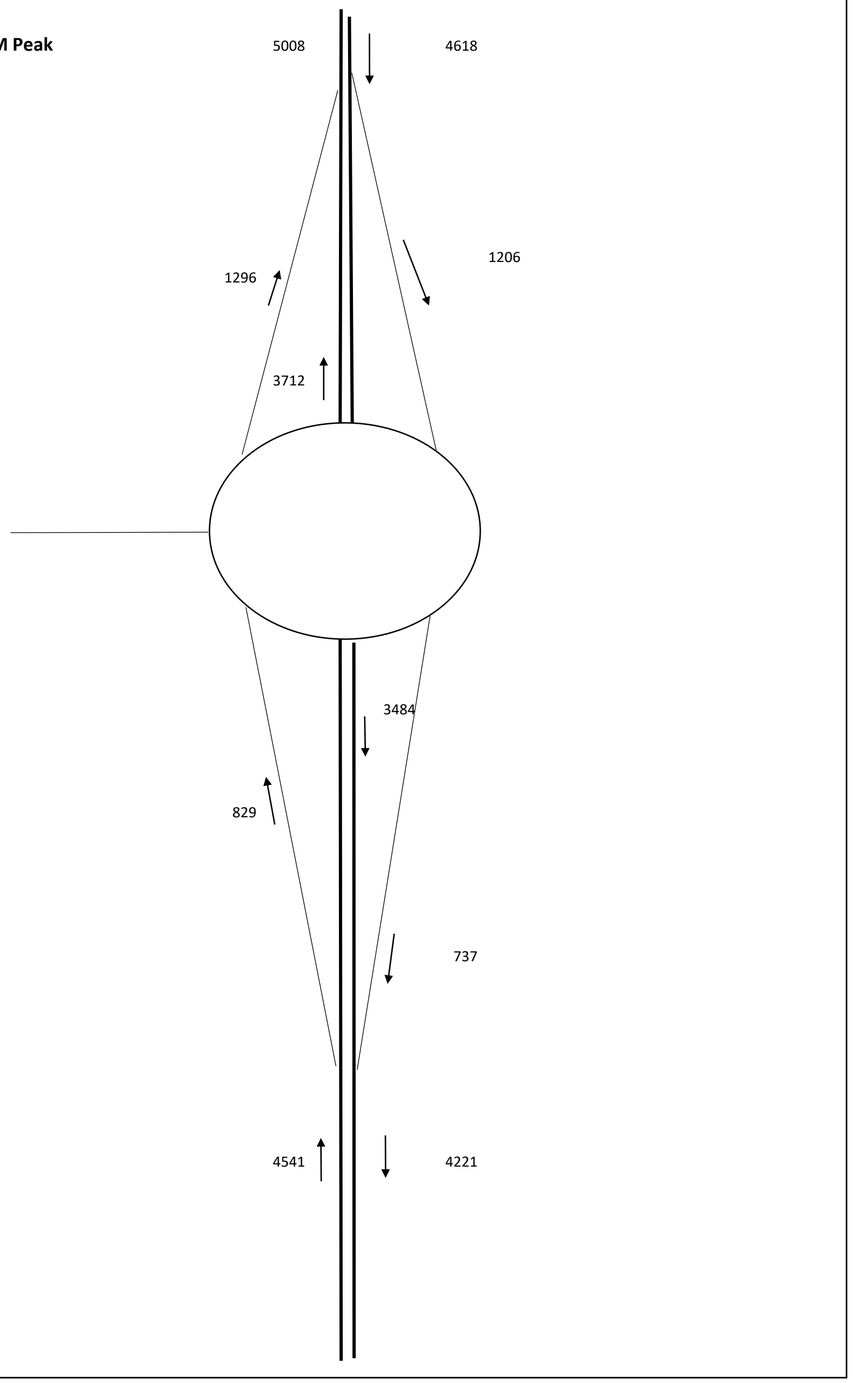
PM Peak



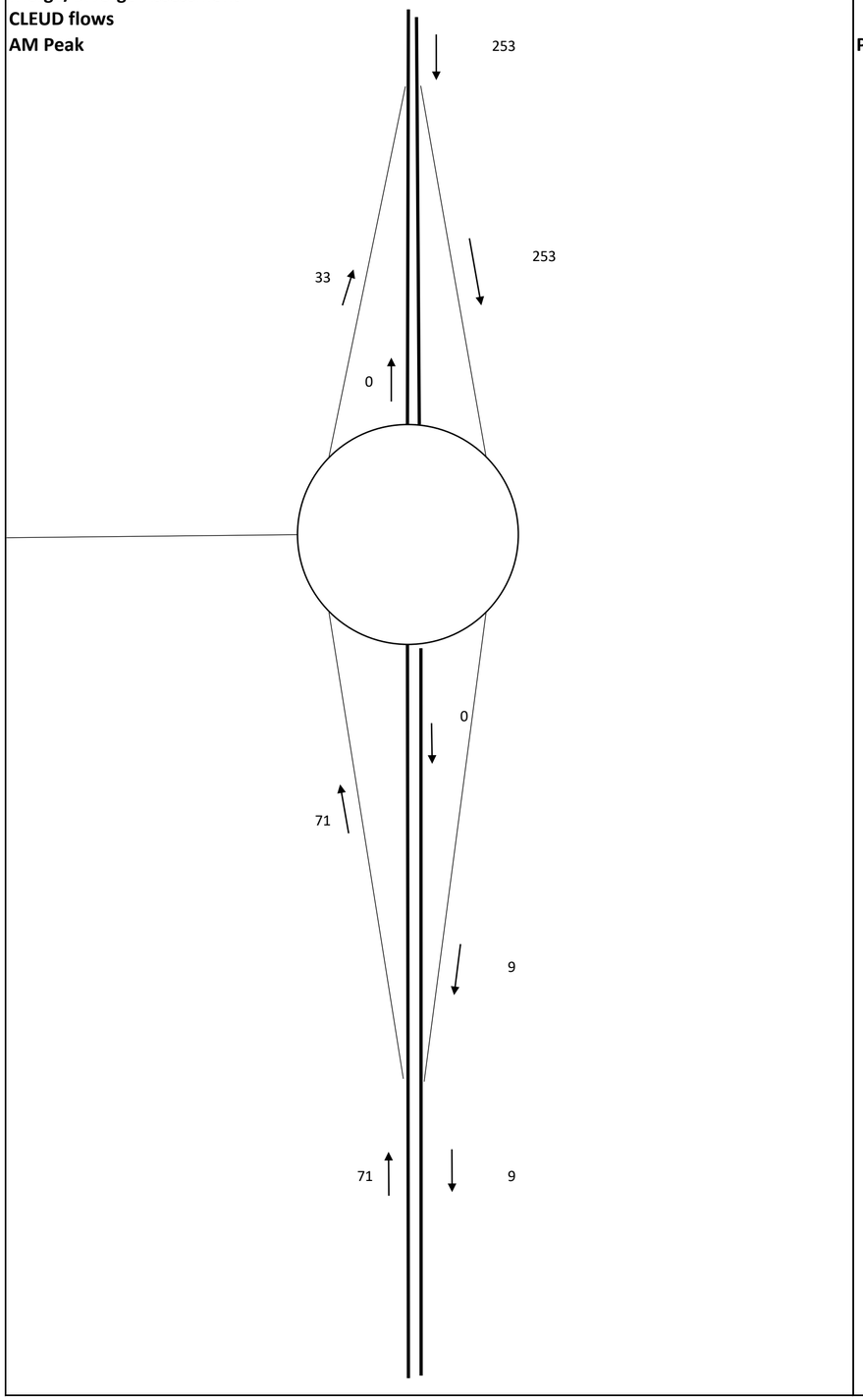
Merge/Diverge Assessment
2035 Baseline + development
AM Peak



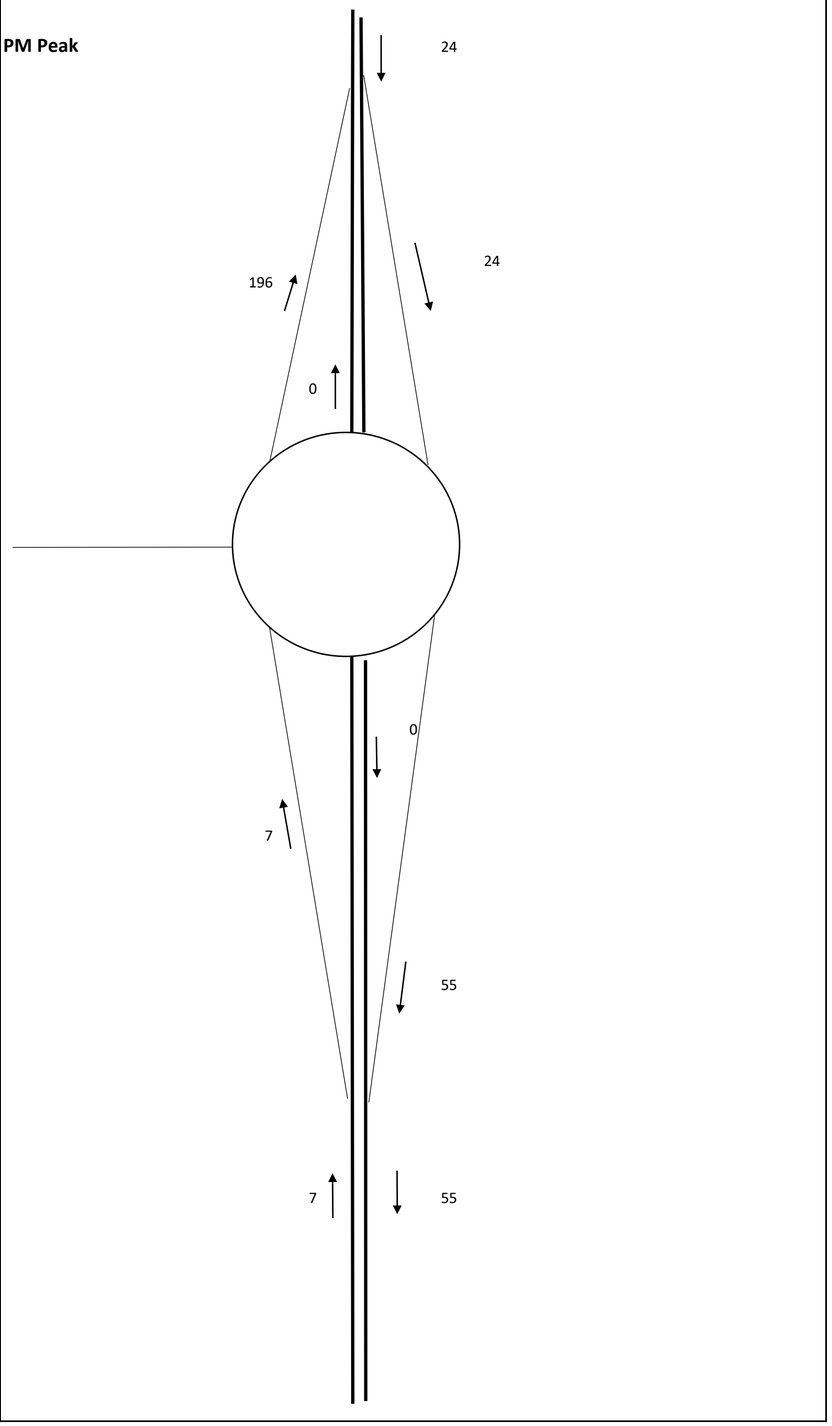
PM Peak



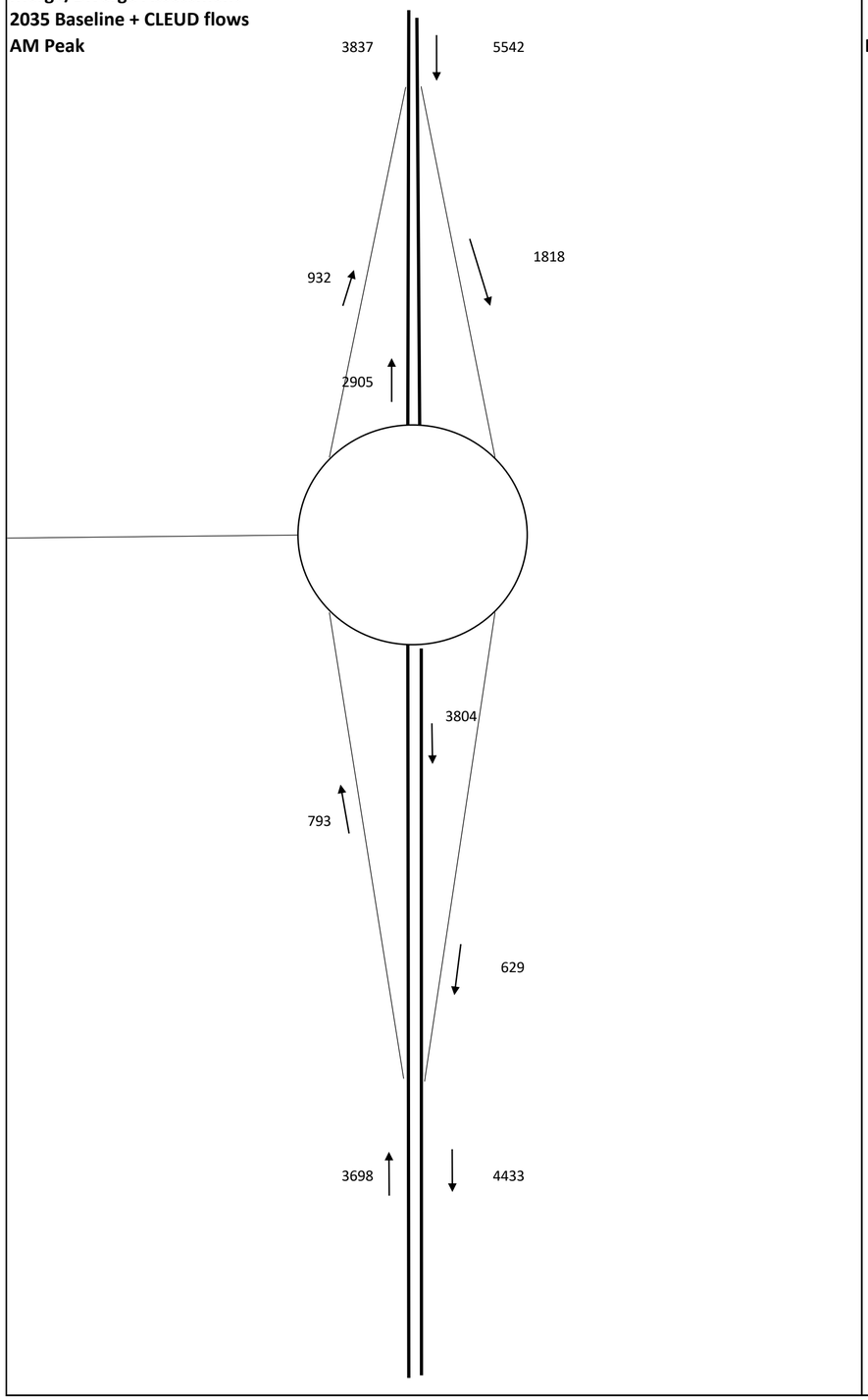
Merge/Diverge Assessment
CLEUD flows
AM Peak



PM Peak



Merge/Diverge Assessment
2035 Baseline + CLEUD flows
AM Peak



PM Peak