

The Welsh Dragon

Updated Transport Assessment

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1 Introduction

- 1.1 Crowd Dynamics International have been appointed by the Frank Wingett Cancel Appeal (FWCA) to prepare an updated Transport Assessment (TA) to accompany a planning submission to renew a now outdated planning permission for a proposed cultural and visitor centre at Black Park, Chirk.
- 1.2 In brief the project proposes to build a 36m high structure and sculpture of the Welsh Dragon, which will provide an iconic landmark gateway into Wales. The site will also feature a visitor building with an art gallery featuring a changing programme of national exhibits and supporting visitor facilities including a café/restaurant and gift shop.
- 1.3 The location of the site for a national landmark is highly appropriate. It lies at the confluence of the two primary highway routes connecting North Wales to Mid and South Wales via the Marches. Today over 6 million cars and 25,000 coaches pass the site each year.
- 1.4 A TA was submitted as part of the original planning application, reference P/2010/0568 submitted to Wrexham Council (WCBC) in July 2010.
- 1.5 Planning permission was granted in March 2011 subject to a number of conditions, several of which related to transportation matters. The permission has now lapsed and hence a new application is necessary. The project remains as previously proposed. However with the passage of time, the Welsh Government (WAG) who are responsible for the adjacent A483 trunk road have requested that an updated TA be submitted.
- 1.6 Discussions have been held with WAG highways officers concerning the scope of the updated TA.
- 1.7 The scope of this TA is to:
 - Update the base traffic figures for the A483;
 - Update accident records in the vicinity of the site;
 - Update the forecast traffic impacts of the proposed development;
 - Identify how the development will respond to the Active Travels Wales Act (2013) and encourage active and sustainable travel to and from the development.
- 1.8 The TA provides this information. It is structured as follows:
 - Section 2: Project details;
 - Section 3: Updated A483 traffic data;

- Section 4: Updated accident data;
- Section 5: Operational impact of development;
- Section 6: Sustainable travel options;
- Section 7: Recommended Planning Conditions;
- Section 8: Conclusions.

1.9 This report is an update and hence should be read in conjunction with the TA originally submitted by Gifford in June 2010, Report No 16735-TR002, and a subsequent addendum prepared in October 2010, Report No 16735-TR003.

2 Project Details

2.1 The development remains as previously submitted. It is illustrated in Figure 2.1 below.

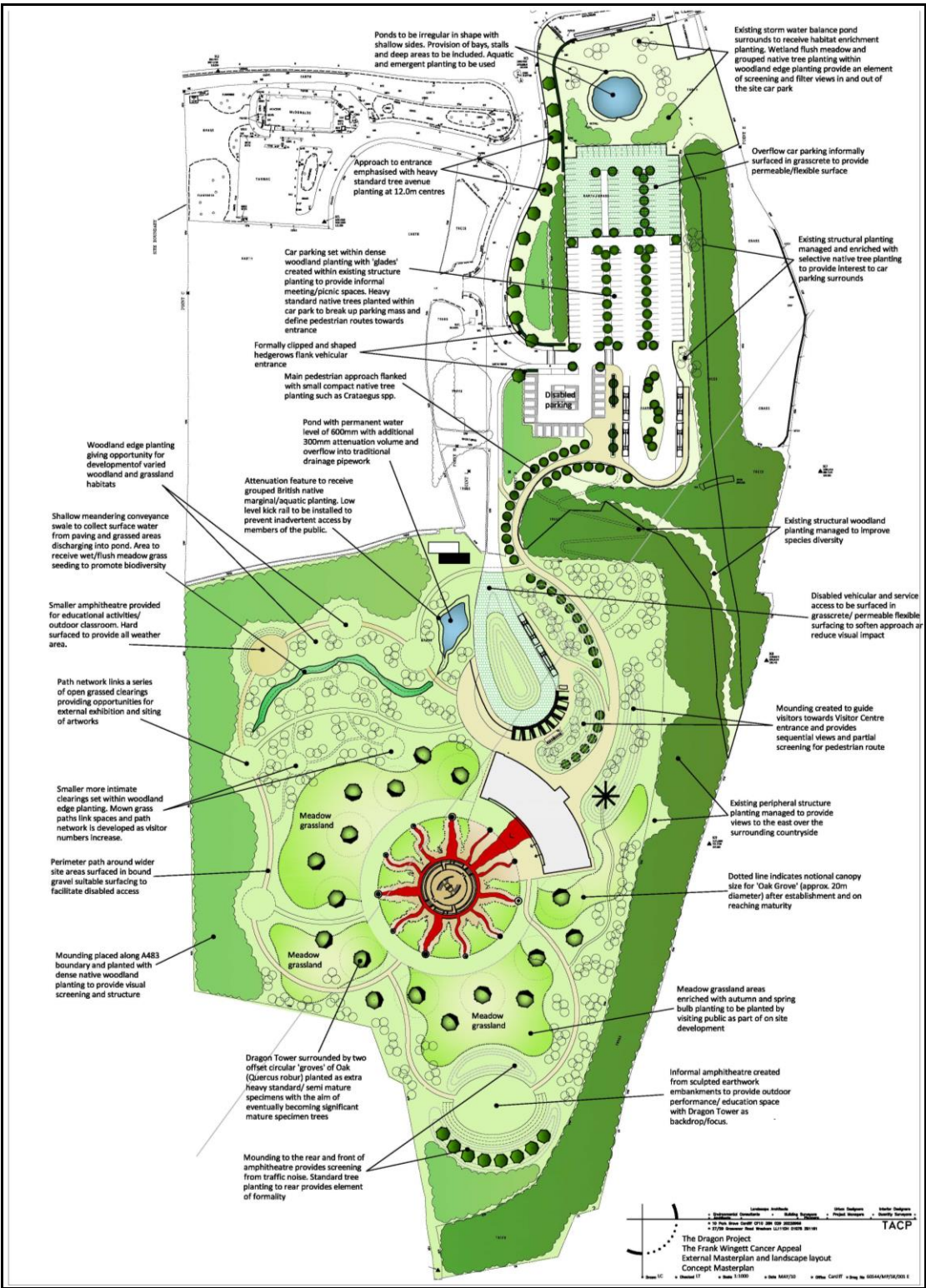


Figure 2.1 Dragon Project: Masterplan

- 2.2 The Transport assessment submitted with the original application utilised a maximum figure of 230,000 people per annum attracted to the Dragon by the third year of opening and that this figure would then remain constant into the future. It also utilised an exceptional visitor figure of 300,000 per annum.
- 2.3 Subsequent to the planning approval an economic impact assessment prepared by Independent consultants SQW on behalf of WCBC (Reference Waking the Dragon: October 2011 –WCBC) identified that the sustainable range of visitors per annum would lie between 125,000 and 200,000. Hence in this updated TA an updated maximum annual visitor figure of 200,000 has been used.

3 Updated A483 Traffic Data

- 3.1 For the original TA traffic data was collected on a 'typical' weekday and a 'peak of peak' day. The latter being a high season, bank holiday day. Good Friday and Easter Sunday counts were used in the 2010 TA.
- 3.2 Conditions on a 'peak of peak' day on the A483 were resurveyed. Data on traffic volumes and journey times were collected on August Bank Holiday Monday (2016) between the hours of 14.00 and 19.00 hours. The latest turning counts observed on this day at the Halton roundabout are shown in Figure 2. Full details are provided in Appendix A.

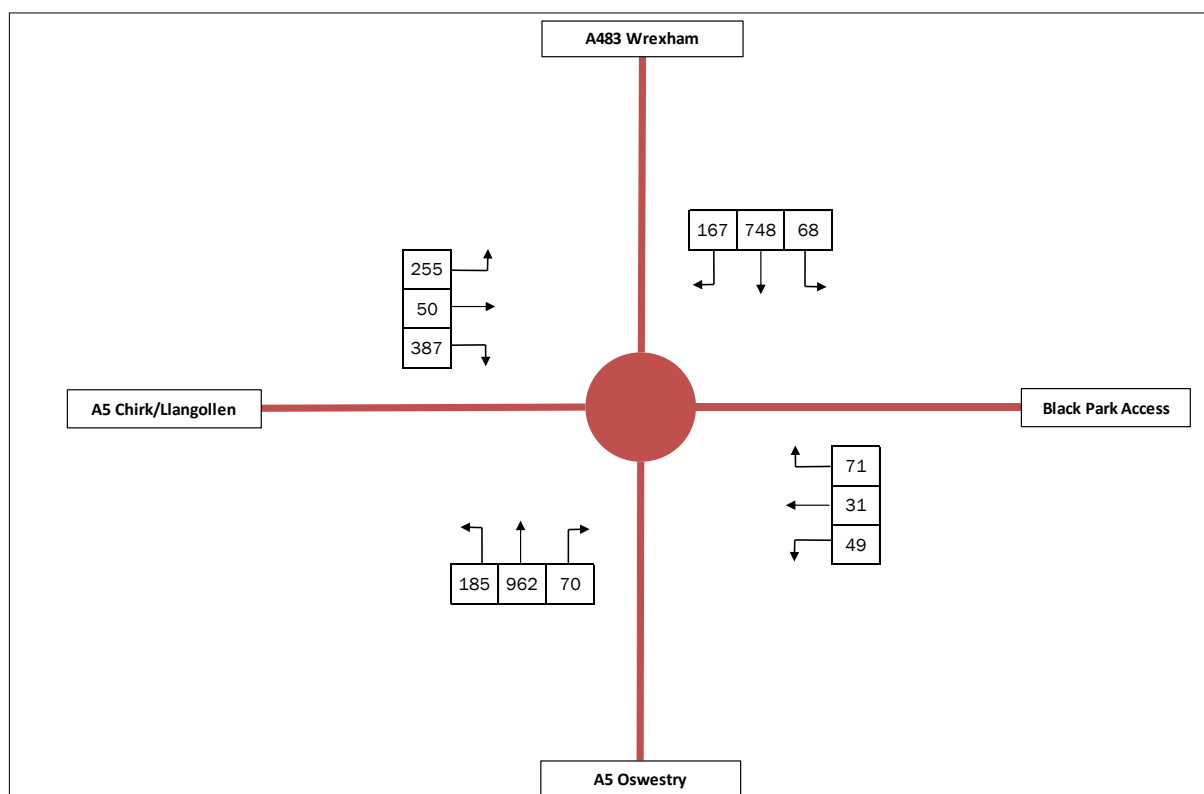


Figure 3.1 Halton Roundabout – Peak of Peak Hour Flows

- 3.3 Growth of traffic along the A483 in recent years has been obtained from a WAG traffic counter on the trunk road immediately adjacent to the site (site No 30510). This data is shown in Table 3.1 below.
- 3.4 From Table 3.1 it can be seen that there has been an 8.9% increase in daily traffic levels on the A483 between 2010 and 2015. This equates to an annual growth of approximately 1.3%.

AADF Year	CP	Pedal Cycles	Motorcycles	Cars/Taxis	Buses/Coaches	Light Goods Vehicles	V2 Axle Rigid/HGV	V3 Axle Rigid/HGV	V4 or 5Axle Rigid/HGV	V3 or 4 Axle Artic/HGV	V5 Axle Artic/HGV	V6 or More Axle Artic/HGV	All HGVs	All Motor Vehicles
2000	30510	0	95	15686	42	1566	672	119	109	289	922	430	2541	19930
2001	30510	0	97	16361	46	1585	678	141	113	254	791	483	2460	20549
2002	30510	0	99	16705	53	1661	706	159	127	238	710	547	2487	21005
2003	30510	0	108	16922	48	1864	716	170	141	227	629	602	2485	21427
2004	30510	1	88	16212	75	2238	650	138	112	286	666	621	2473	21086
2005	30510	1	77	16309	76	2316	641	133	117	254	584	658	2387	21165
2006	30510	1	76	16309	83	2488	628	127	121	243	551	751	2421	21377
2007	30510	1	78	16440	92	2818	671	135	142	222	555	818	2543	21971
2008	30510	1	193	16856	88	2595	521	123	140	176	579	594	2133	21865
2009	30510	1	195	16806	90	2589	479	123	134	163	498	575	1972	21652
2010	30510	4	166	16529	102	2776	482	116	106	125	530	621	1980	21553
2011	30510	3	181	16430	106	2851	466	121	115	93	501	627	1923	21491
2012	30510	6	104	18392	162	3039	464	104	113	139	602	717	2140	23837
2013	30510	6	108	18350	159	3145	449	109	123	107	593	756	2137	23899
2014	30510	0	45	17255	69	3540	441	108	87	222	599	786	2244	23153
2015	30510	0	45	17134	70	3854	460	121	91	280	609	801	2363	23467

Table 3.1 A483 adjacent to the Welsh dragon - Annual Average Daily Traffic Flows

- 3.5 The highest hourly volume through the junction on the August Bank Holiday Monday was between 14.00 and 15.00hrs with 3043 vehicles passing through. Subsequent hours had lower flows, see Table 3.2 below.

Time Period	Traffic Volume	% of peak hour flow
14.00-15.00hrs	3043	100%
15.00-16.00hrs	2806	92.2%
16.00-17.00hrs	2788	91.6%
17.00-18.00hrs	2745	90.2%
18.00-19.00hrs	2571	84.5%

Table 3.2 Halton Roundabout – Peak Day Volumes

- 3.6 These figures compare with a total flow of 2974 vehicles observed passing through the Halton Roundabout in the peak hour on a 'peak of peak' day in 2010.
- 3.7 There has therefore been little growth in the busiest hours at the Halton roundabout, with only 1.2% growth over 6 years, less than 0.2% per annum at the 'peak of peak' times. This is to be expected given the delays along the A483 on these 'peak of peak' days generated by the capacity constraints of the roundabouts along the length of the A483.
- 3.8 Journey times along the A483 were also surveyed in 2016 on the Bank Holiday Monday and are summarised in Table 3.3.

		14.00-15.00hrs		15.00-16.00hrs		16.00-17.00hrs		17.00-18.00hrs		18.00-19.00hrs	
Direction	Link Length	Time (min/sec)	Average Speed (kph)	Time (min/sec)	Average Speed (kph)	Time (min/sec)	Average Speed (kph)	Time (min/sec)	Average Speed (kph)	Time (min/sec)	Average Speed (kph)
Ruabon Junction to Halton Roundabout Southbound (A483)	3440m	3m 01	68.4	3m 00	68.8	2m 44	75.5	3m 06	66.6	2m 52	72.0
Oswestry (Park Hall) Roundabout Northbound (A5 South)	3460m	5m 30	37.7	2m 51	72.8	2m 43	76.4	2m 46	75.0	2m 30	83.0

Table 3.3 Average Speed and Journey Times on A483 at 'Peak of Peak'

- 3.9 From Table 3.3 it can be seen that in the surveyed 'peak of peak' hour there is delay and queuing at the Halton roundabout. During the period surveyed the delays were primarily northbound. At other times they are noted as being primarily southbound.
- 3.10 Even on a peak day the delays vary markedly hour by hour. At the busiest time surveyed the queues were noted as commencing some 1.5 kilometres from the Halton Roundabout. They take the form of a slow moving rolling queue. As a result there was on average 3 minute delays northbound and maximum delays of circa 5 minutes northbound during the busiest hour surveyed.
- 3.11 Observations were taken of queues on the A5 approach from the Halton roundabout. In the busiest

hour there was a slow moving queue for at least a few hundred metres. However for the other hours on the peak of peak day there was little queuing on this approach to the roundabout.

4 Accidents

- 4.1 Figure 4.1 presents the personal injury accident record for the Halton roundabout for the latest five year period, 2011-2015. Data was provided by WCBC. Details are provided in Appendix B.
- 4.2 There were 9 slight accidents during this 5 year period, 8 of which were 'tail end shunts' with vehicles running into the rear of queuing traffic. The other accident was a loss of control upon entry to the roundabout.
- 4.3 For the equivalent five year period 2005-2009 identified in the original TA, there were 9 slight accidents.
- 4.4 The accident record of the roundabout has therefore remained stable.

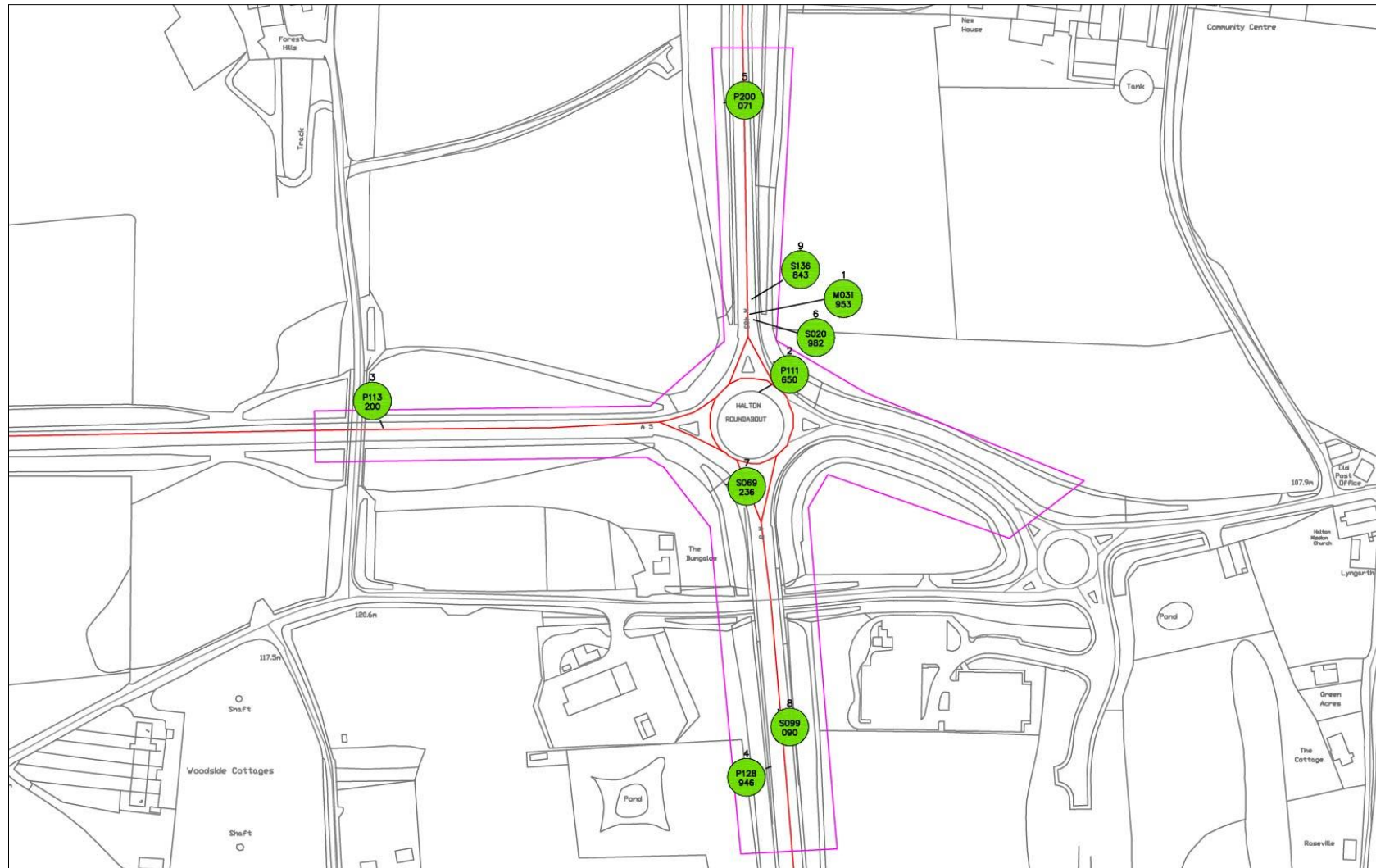


Figure 4.1 Personal Injury Accident Record 2011-15 at Halton Roundabout

5 Operational Impact

Trip Generation

5.1 The trip generation of the development has been reviewed and updated. The majority of key parameters and assumptions used in the previous TA and accepted by WAG/WCBC remain appropriate. These are:

- 13.3% of annual visitors in peak month;
- 8.3% of annual visitors in normal month;
- 7.0% of monthly total on a peak day;
- 3.3% of monthly total on a normal day;
- 71.5% of visitors arrive by car;
- 28.5% of visitors arrive by coach.

5.2 Certain assumptions have been refined. These are as follows:

- Maximum Annual Visitor Numbers – A maximum figure of 200,000 rather than 230,000 has now been used based upon WCBC report prepared subsequent to previous submission;
- Car Occupancy – Range between 2 and 3 previously used. A figure of 2.43 has now been adopted based upon the latest figures from the National Travel Survey and studies of leisure trips made by Scottish Government (See Appendix C);
- Percentage of Diverted/Linked Trips – As noted below a minimum figure of at least 37% rather than 24% is considered appropriate. Indeed on a peak day, given the nature and location of the development, it is considered a figure of 50% or above is likely;
- Coach Occupancy – Previously a figure of 65 persons per coach was used. This is considered to be an optimistic figure and a figure of 45 persons per coach has been adopted in this document;
- Hourly Profile – Although the site buildings are typically open for at least 9 hours per day. It is assumed 70% of arrivals will be evenly distributed across the central 5 hours. Hence a maximum hourly arrival or departure rate of 14% of daily total has been utilised.

- 5.3 In the addendum to the previous TA issued in October 2010 a figure of 24% was adopted for the percentage of trips to the Welsh Dragon that are 'diverted' or 'linked'. This was based upon a figure of 9% of leisure trips being linked trips. This figure was taken from the 2009 National Travel Survey (NTS) as being the percentage of leisure trips following on from a previous trip, but of any previous purpose. Using 2014 NTS data and more detailed consideration of the data a figure of 22% has been derived as the percentage of leisure trips following on from another leisure trip as compared to work or business being the previous trip. For these latter trip purposes the linkage rate with leisure trips is much lower. Given the location of the site and the key assessment periods being on weekends and bank holidays then the use of the 22% leisure to leisure linkage rate is considered appropriate. Indeed it is considered this figure may be conservative and on weekends and bank holidays it is considered that the majority of leisure trips are linked trips with people visiting more than one leisure destination. However for the purposes of this TA a figure of 22% has been used throughout.
- 5.4 Combining this figure with the 15% previously accepted for diverted local trips already on the network, a . Given the high volumes of traffic passing through the Halton roundabout and the nature of the total 'Passby' figure of 37% is derived. This figure is considered the minimum level of likely 'pass-by' traffic development, a large proportion of visitors will simply utilise the café/restaurant facilities in a similar manner to other large roadside café/restaurant facilities and then view the Dragon. Hence a pass-by figure at peak times of at least 50% is considered likely however a figure of 37% has been used for all the detailed assessments although in Table 5.1 below the impacts at the roundabout of using these higher 'Passby' rates is displayed.
- 5.5 The impact of the Welsh Dragon on the Halton roundabout as a result of using the updated annual visitor figures and different 'pass-by' rates is summarised in Table 5.1. These figures assume the development opens in 2018

	Pass-by Percentage			
	24%	37%	50%	75%
Peak Day in Peak Month	4.4	4.1	3.8	3.1
Normal Day in Peak Month	3.3	3.1	2.8	2.4
Peak Day in Off-peak Month	2.8	2.6	2.4	1.8
Normal Day in Off-peak Month	2.1	1.9	1.8	1.4

Table 5.1 Impact of Development on A483 Halton Roundabout (Year of opening 2018)

- 5.6 Using TEMPRO growth factor shown in Table 5.2 below, the impacts of the development in a future assessment year, 10 years after opening, are shown in Table 5.3.

From	To	Factor
2016	2018	3.3%
2016	2028	12.7%

Table 5.2 TEMPRO growth factors

	Pass-by Percentage			
	24%	37%	50%	75%
Peak Day in Peak Month	4.0	3.7	3.4	2.9
Normal Day in Peak Month	3.0	2.8	2.6	2.2
Peak Day in Off-peak Month	2.6	2.4	2.2	1.8
Normal Day in Off-peak Month	1.9	1.8	1.6	1.4

Table 5.3 Impact of Development on A483 Halton Roundabout in 2028

- 5.7 It is noted that the magnitude of the additional traffic generated by the development is less than the hourly fluctuations in traffic levels through the A483 Halton roundabout. As an example, on the 'peak of peak' day, August Bank Holiday Monday, the hourly fluctuations in traffic levels are 5-15% compared with additional traffic percentages of less than 4%.
- 5.8 On the majority of days during the year (normal days), Monday to Thursday in normal months the impact of the Welsh Dragon on the Halton Roundabout will be 2.0% or less. On normal days even in summer months the impact will be 3% or less. On a Friday evening or weekend in the non-summer months again the impact is forecast to be 3% or less.
- 5.9 Only on the limited number of days per year that constitute summer Fridays, weekends and Bank holidays is the impact forecast to be in excess of 3%, however even on these days it is forecast to be less than 4%.
- 5.10 Provided below are the results of detailed ARCADY assessments of the Halton Roundabout during evening peak hour on a Friday and also during peak hour on peak of peak day. The ARCADY model was validated against journey times observed on the Bank Holiday Monday on the A483 and following studies of lane usage. With the passage of time and the development of the ARCADY programme it has been possible to develop a more sophisticated ARCADY model compared with that used in 2010. Individual lane modelling has been used given the imbalance in lane usage on the immediate approaches to the roundabout. This creates a more conservative model of junction

performance and addresses the 2010 queries on the ARCADY modelling being too optimistic.

5.11 Results for the following scenarios are summarised below for:

- Peak of Peak Hour model;
- Friday Evening Peak Hour Low Season model;
- Friday Evening Peak Hour High Season model;

5.12 For each of these three time periods results are provided for the year of opening 2018 and a future assessment year of 2028, both with and without the Welsh Dragon Project. To generate 2018 and 2028 flows 2016 flows have been growthed by 3.2% and 12.4% respectively. Full ARCADY output is provided in Appendix D.

5.13 The highest traffic flows forecast are in the peak of peak hour, in 2018 some 3249 vehicles seeking to pass through the Halton Roundabout without the development and 3381 with the development. The respective figures for a Friday in low season are 3132 and 3190. with those in the High season being 2943 and 3032. In high season the flows on the A483 are higher than in the low season in both directions but the flows on the A5 flows are lower.

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	9.90	0.6	1 left; ahead	0.513	A
				2 right	0.563	
2	A5 Oswestry	204.55	72.6	1 left; ahead	1.212	F
				2 ahead (10%); right	0.559	
3	A5 Chirk	28.25	6.2	1 left; ahead	0.798	D
				2 right	0.786	
4	A483 Wrexham	9.77	3.1	1 left; ahead; right	0.803	A

Table 5.4 Performance of A483 Halton Roundabout 2016 Base Peak of Peak Hour Bank Holiday

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	10.66	0.3	1 left; ahead 2 right	0.580 0.505	B
2	A5 Oswestry	298.56	100.8	1 left; ahead 2 ahead (10%); right	1.173 0.545	F
3	A5 Chirk	62.13	16.3	1 left; ahead 2 right	0.964 0.665	F
4	A483 Wrexham	10.13	3.3	1 left; ahead; right	0.809	B

Table 5.5 Performance of A483 Halton Roundabout 2018 Base Friday Low season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	12.37	0.8	1 left; ahead 2 right	0.590 0.543	B
2	A5 Oswestry	65.29	23.3	1 left; ahead 2 ahead (10%); right	1.003 0.573	F
3	A5 Chirk	16.19	2.5	1 left; ahead 2 right	0.764 0.566	E
4	A483 Wrexham	14.59	5.5	1 left; ahead; right	0.858	B

Table 5.6 Performance of A483 Halton Roundabout 2018 Base Friday High season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	10.74	0.5	1 left; ahead 2 right	0.537 0.569	B
2	A5 Oswestry	261.84	100.5	1 left; ahead 2 ahead (10%); right	1.246 0.589	F
3	A5 Chirk	35.39	7.8	1 left; ahead 2 right	0.811 0.805	E
4	A483 Wrexham	10.87	3.5	1 left; ahead; right	0.820	B

Table 5.7 Performance of A483 Halton Roundabout 2018 Base Peak of Peak Hour Bank Holiday

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	10.74	0.4	1 left; ahead 2 right	0.593 0.554	B
2	A5 Oswestry	302.87	102.2	1 left; ahead 2 ahead (10%); right	1.176 0.530	F
3	A5 Chirk	70.72	17.8	1 left; ahead 2 right	0.989 0.648	F
4	A483 Wrexham	10.82	3.6	1 left; ahead; right	0.819	B

Table 5.8 Performance of A483 Halton Roundabout 2018 + Development Friday Low season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	13.23	1.0	1 left; ahead 2 right	0.637 0.542	B
2	A5 Oswestry	70.51	25.4	1 left; ahead 2 ahead (10%); right	1.007 0.527	F
3	A5 Chirk	17.10	2.8	1 left; ahead 2 right	0.772 0.581	C
4	A483 Wrexham	17.08	7.1	1 left; ahead; right	0.886	C

Table 5.9 Performance of A483 Halton Roundabout 2018 + Development Friday High season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	11.87	1.0	1 left; ahead 2 right	0.580 0.566	B
2	A5 Oswestry	271.53	110.1	1 left; ahead 2 ahead (10%); right	1.253 0.531	F
3	A5 Chirk	38.26	9.3	1 left; ahead 2 right	0.860 0.795	E
4	A483 Wrexham	12.68	4.4	1 left; ahead; right	0.840	B

Table 5.10 Performance of A483 Halton Roundabout 2018 + Development Peak of Peak Hour Bank Holiday

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	11.89	0.4	1 left; ahead 2 right	0.630 0.601	B
2	A5 Oswestry	542.11	173.4	1 left; ahead 2 ahead (10%); right	1.271 0.588	F
3	A5 Chirk	104.79	28.6	1 left; ahead 2 right	1.050 0.664	F
4	A483 Wrexham	15.77	5.4	1 left; ahead; right	0.862	C

Table 5.11 Performance of A483 Halton Roundabout 2028 Base Friday Low season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	14.53	1.0	1 left; ahead 2 right	0.625 0.523	B
2	A5 Oswestry	143.33	55.0	1 left; ahead 2 ahead (10%); right	1.088 0.558	F
3	A5 Chirk	19.90	3.2	1 left; ahead 2 right	0.806 0.562	C
4	A483 Wrexham	26.56	11.0	1 left; ahead; right	0.930	D

Table 5.12 Performance of A483 Halton Roundabout 2028 Base Friday High season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	12.28	0.6	1 left; ahead 2 right	0.569 0.575	B
2	A5 Oswestry	471.14	210.3	1 left; ahead 2 ahead (10%); right	1.369 0.557	F
3	A5 Chirk	51.73	12.7	1 left; ahead 2 right	0.874 0.833	F
4	A483 Wrexham	17.15	5.9	1 left; ahead; right	0.874	C

Table 5.13 Performance of A483 Halton Roundabout 2028 Base Peak of Peak Hour Bank Holiday

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	12.08	0.6	1 left; ahead 2 right	0.569 0.521	B
2	A5 Oswestry	540.22	175.6	1 left; ahead 2 ahead (10%); right	1.304 0.589	F
3	A5 Chirk	130.78	36.6	1 left; ahead 2 right	1.088 0.682	F
4	A483 Wrexham	15.45	6.4	1 left; ahead; right	0.867	C

Table 5.14 Performance of A483 Halton Roundabout 2028 + Development Friday Low season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	16.21	1.4	1 left; ahead 2 right	0.671 0.537	C
2	A5 Oswestry	150.87	59.2	1 left; ahead 2 ahead (10%); right	1.099 0.567	F
3	A5 Chirk	150.87	59.2	1 left; ahead 2 right	0.815 0.571	C
4	A483 Wrexham	36.24	15.3	1 left; ahead; right	0.948	E

Table 5.15 Performance of A483 Halton Roundabout 2028 + Development Friday High season

	Arm	Max Delay (s)	Max Queue (PCU)	Lane	Max RFC	Max LOS
1	Black Park Access	14.03	1.1	1 left; ahead 2 right	0.573 0.590	B
2	A5 Oswestry	477.15	217.9	1 left; ahead 2 ahead (10%); right	1.380 0.561	F
3	A5 Chirk	56.58	15.7	1 left; ahead 2 right	0.922 0.852	F
4	A483 Wrexham	21.77	8.0	1 left; ahead; right	0.903	C

Table 5.16 Performance of A483 Halton Roundabout 2028 + Development Peak of Peak Hour Bank Holiday

5.14 Table 5.4 presents the existing performance of the roundabout in the peak of the peak hour. These forecast queues and delays were validated against those observed.

5.15 The impact of the development is identified for each of three time periods considered:

- Friday evening peak hour low season, Tables 5.5 v 5.8 and Tables 5.11 v 5.14;
- Friday evening peak hour high season Tables 5.6 v 5.9 and Tables 5.12 v 5.15 and;
- The peak of peak hour (Bank holiday) Tables 5.7 v 5.10 and Tables 5.13 v 5.16.

5.16 Table 5.17 below provides a summary of the impacts, comparing overall delay per vehicle through

the Halton Roundabout and Maximum RFC (Ratio of flow to Capacity) for each scenario with and without the development.

	Overall Junction Delay (s)		Max RFC	
	No Development	With Development	No Development	With Development
Friday Low Season 2018	133.43	136.11	1.172	1.176
Friday High Season 2018	32.51	35.14	1.003	1.007
Peak of Peak Hour 2018	117.42	120.16	1.246	1.253
Friday Low Season 2028	239.15	242.04	1.271	1.304
Friday High Season 2028	65.44	71.73	1.088	1.099
Peak of Peak Hour 2028	207.77	208.00	1.369	1.380

Table 5.17 Summary of Impacts

5.17 From the above tables it can be seen that:

- By 2018 in any event on any Friday evening or on a peak day the roundabout is operating at or above its capacity with significant delays on at least one arm;
- By 2028 at any of these times if growth in traffic continues the situation worsens with increased delays;
- However the impact of the Welsh Dragon on the roundabout at any of these times is modest. Tables 5.1 and 5.3 show that the percentage increase in traffic is small, between 2 and 4%. The ARCADY results show that the impact on junction performance is also small overall delays only increasing by circa 3 seconds per vehicle regardless of the time period studied. This is because traffic travelling to the Welsh Dragon from either the south or west use the lesser used lanes on the immediate approach to the roundabout and don't add to the critical lane at the roundabout itself. Upon exit from the Welsh Dragon the eastern approach into the roundabout is lightly trafficked and the additional flows create no issue.

5.18 From the tables it can be seen that the average delay per vehicle passing through the roundabout increases only by a small amount when the Welsh Dragon project is operational.

5.19 In summary the impact of the Welsh Dragon project on the operation of the Halton Roundabout is small/modest. Planning permission for a development should only be refused on highway grounds if the impact is severe. From the analysis above this is shown not to be the case. Hence in highway operational terms there is no reason not to approve the application.

6 Sustainable Travel Options

- 6.1 The Active Travel Wales Act (2013) seeks to encourage walking and cycling for journeys of all types.
- 6.2 The use of public transport (bus and rail) as an alternative to the car which also includes walking or cycling component of the trip is also promoted.
- 6.3 As part of the granting of planning permission for the 2010 Welsh Dragon application, a condition was applied (no 15) requiring the provision of the following sustainable travel initiatives:
- An extension to the existing No 5A Sunday bus service connecting Chirk, the Pontcysyllte Aqueduct and Canal World Heritage Site, and Llangollen to provide an hourly daytime service to the site for three years from the date of opening;
 - An extension of the No 64 daily core daily bus service to provide pickup/drop-off at the development site on Bank holidays and during school holidays for three years from the date of opening; and
 - The provision of a pre-bookable dedicated Welsh Dragon dial-a-ride shuttle bus service providing access to and from the development for the benefit of local community groups from the day of opening and until otherwise agreed in writing by the local planning authority.
- 6.4 There is a need to modify this condition firstly since the 'base situation' in regards to local bus services has changed since 2010 and secondly to provide a more effective solution to encouraging the use of public transport and cycling to the Welsh Dragon.
- 6.5 The 5A bus service was withdrawn in 2014 and the 64 service now only operates 5 times daily in Chirk. Hence the previous conditions can now no longer be implemented. The current timetable for the 64 is provided in Appendix C
- 6.6 The following is proposed, which is considered will provide a more effective and attractive solution:
- The Welsh Dragon development will provide a dial-a-ride minibus service, the 'Dragon Bus' with bicycle rack facilities that will connect the site to Chirk Railway station and the main bus stops in Chirk town centre. Any visitor can ring in advance on an advertised number to be picked up whether arriving by train or bus into Chirk, with or without a bike and be taken to the Welsh Dragon; and
 - To promote joint leisure trips in the Chirk area, the 'Dragon Bus' will also collect and drop off at Chirk Castle and the Pontcysyllte Aqueduct and Canal World Heritage Site.

6.7 The Welsh Dragon development will make these sites more accessible to public transport and cycle users (these being able to transport their cycle by this bus if they desire). The 'Dragon Bus' will make Chirk an integrated leisure destination, visitors being able to arrive in Chirk by rail or the primary bus services from Wrexham or Oswestry and then being able to visit any of the 3 attractions by a dedicated bus service which also carries cycles.. The route of the Dragon Bus is shown in Figure 6.1 below.

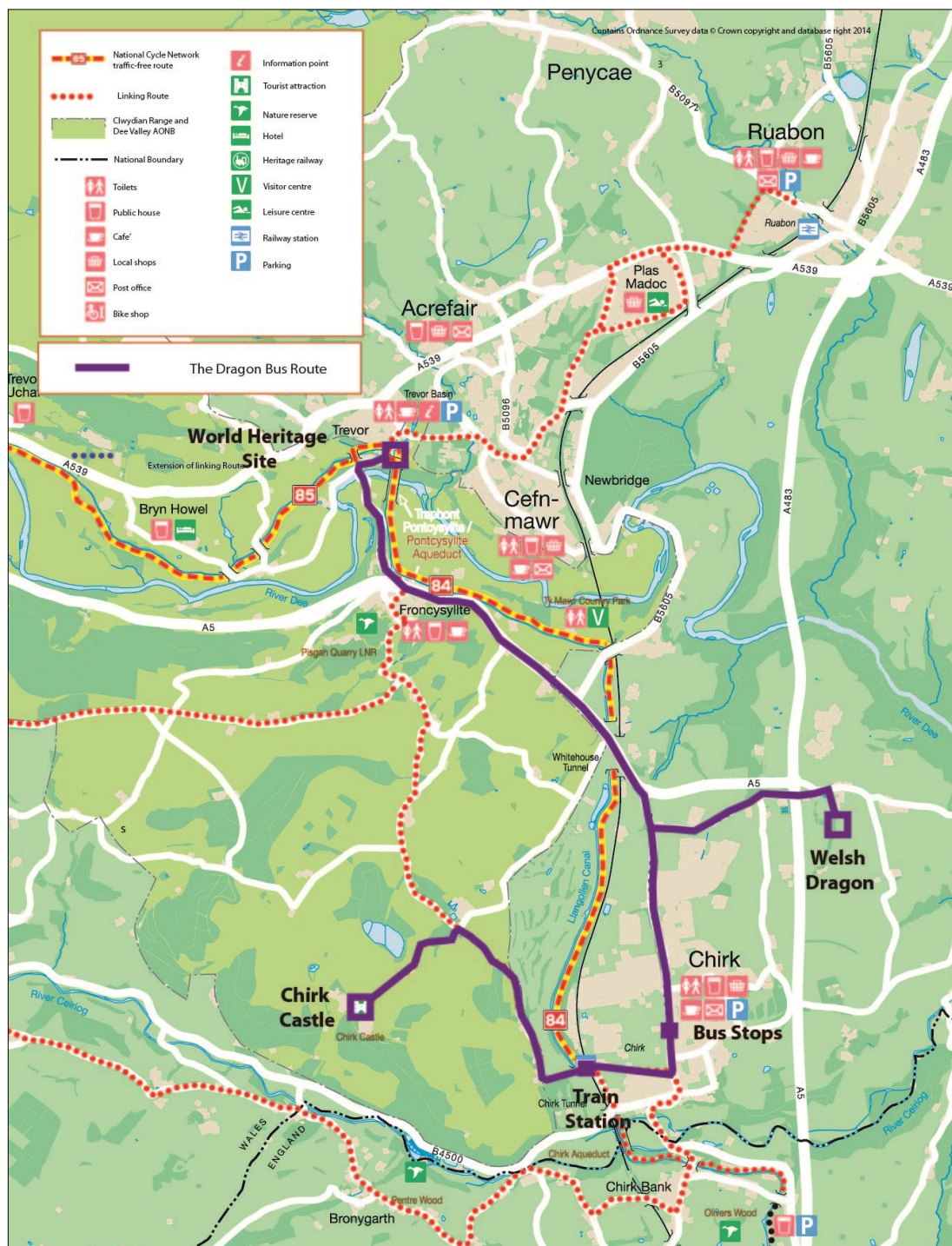


Figure 6.1 Route of the Dragon Bus

- 6.8 The 'Dragon Bus' shall be available to the general public:
- Monday to Friday during school holidays;
 - Weekends and Bank holidays throughout the year;
 - Between the hours of 09.00-18.00hrs on these days.
 - For a minimum of 3 years.
- 6.9 The Dragon Bus shall be available for use by local community groups, Monday to Friday during school term times.
- 6.10 National Cycle Route 84 passes through Chirk, as shown in the Sustrans plan in Figure 6.2. It is proposed that the Welsh Dragon site should also be included on this plan with a connecting route shown as marked. The cycle carrying facilities of the dedicated 'Dragon Bus' service should also be noted, enabling cyclists arriving by train to be transported to the Welsh Dragon, Chirk Castle or Pontcysyllte Aqueduct World Heritage Site if they so wish.
- 6.11 The 'Dragon Bus' will make it much easier for those arriving on foot from train or bus to reach the tourist sites and hence provide a realistic alternative to the car.
- 6.12 It is considered that such a service will provide a much more attractive offer than was previously being proposed.
- 6.13 In the event of that the 'Dragon Bus' becomes too popular, it will focus on providing the connectivity between Chirk Rail station and town centre and the Welsh Dragon site.

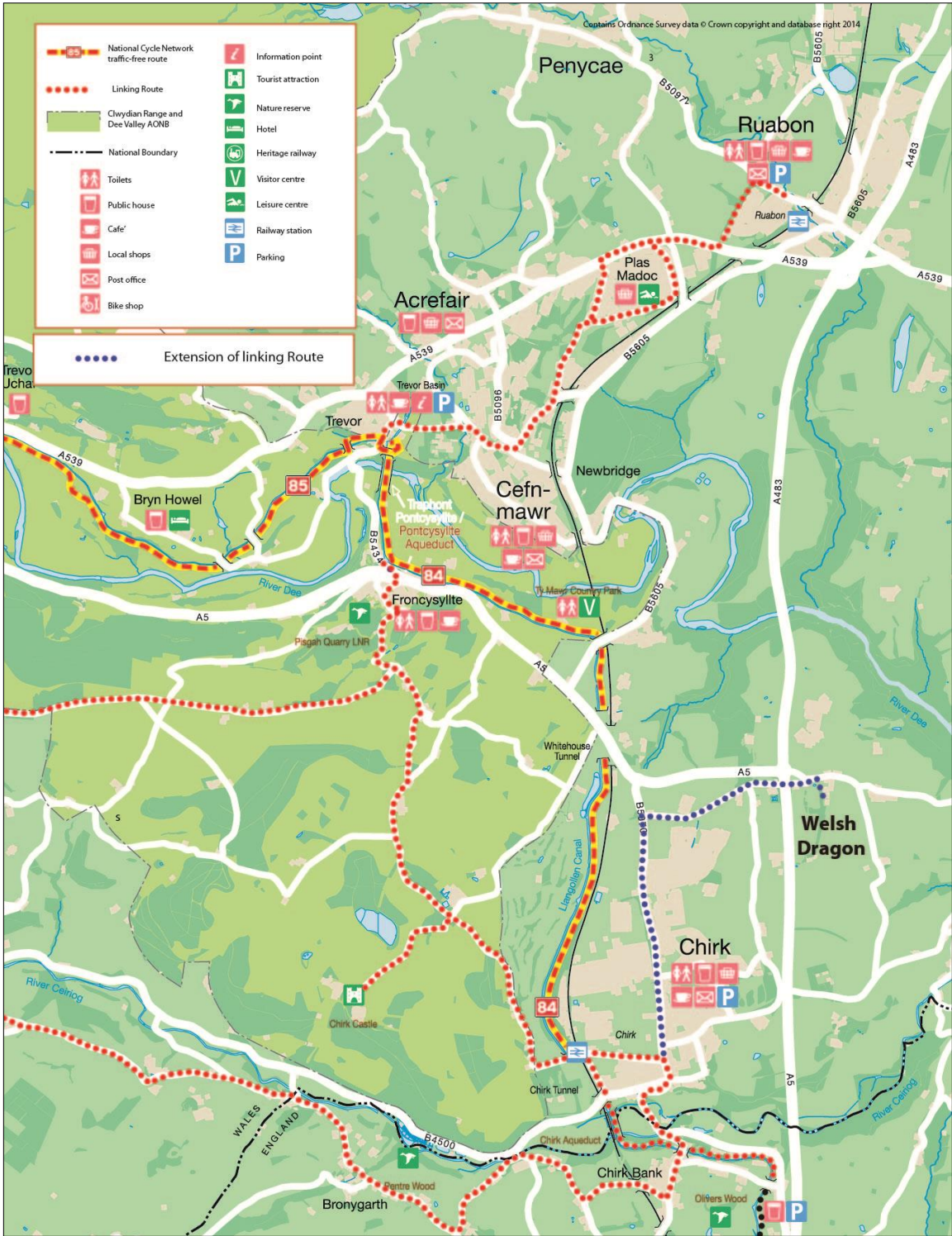


Figure 6.2 Promotion of cycling

7 Recommended Planning Conditions

7.1 This section of the report considers the planning conditions relating to movement that were previously placed on the planning approval in 2011. The can be subdivided into 3 categories:

- Highway Improvements;
- Measures to provide alternatives to the car;
- Monitoring of Impacts.

7.2 Each of these are discussed below with proposed revisions to the conditions or their deletion identified.

Highway Improvements- Condition 14

7.3 Condition 14 stated:

“No development shall take place until a final scheme for alterations to the Halton Roundabout (A5T/A483T) has been submitted to and agreed, in writing with the Local Planning Authority. The scheme as approved shall be fully implemented prior to first use of the development hereby permitted”.

7.4 The results of the updated appraisal of the impacts of the development on the Halton Roundabout detailed in section 5 which used revised visitor figures and more sophisticated modelling show that the impact of the development on this roundabout are much lower than were previously identified. The impacts are now considered modest at worst and indeed for the vast majority of the time are minor. The scale of impact is such that no improvements to the Halton Roundabout should be sought from the developer and this condition should be removed.

Measures to provide alternatives to the car – Condition 15;

7.5 Condition 15 states:

“No development shall take place until a scheme has been submitted and agreed in writing with the local planning authority for the provision of the following sustainable travel initiatives:

- *an extension to the existing No 5A Sunday bus service connecting Chirk, the World Heritage Site and Llangollen to provide an hourly day time service to the site for three years from the date of opening;*

- *an extension of the No 64 core daily bus service to provide pick up/drop off at the development and to provide an hourly service to the site on Bank Holidays and during school holidays for three years from the date of opening;*
- *the provision of a pre-bookable dedicated “Welsh Dragon” dial a ride shuttle bus service providing access to and from the development for the benefit of local community groups from the date of opening and until otherwise agreed in writing by the local planning authority”*

7.6 As noted in Section 6 of this report with the passage of time Service 5A no longer exists and service 64 is less frequent. Hence these conditions need to be revised. As noted in Section 6 a Dial a Ride service for the general public as well as local groups is proposed which is considered will provide a more effective and efficient provision not only for the Welsh Dragon development but other tourist attractions in or near to Chirk. It is recommended that the condition be revised to:

“No development shall take place until a scheme has been submitted and agreed in writing with the local planning authority for the provision of the following sustainable travel initiative;

- **The ‘Dragon Bus’- a dial-a-ride minibus service with bicycle rack facilities that will connect the site to Chirk Railway station and the main bus stops in Chirk town centre. It shall also connect to Chirk Castle and the World Heritage Site;**
- **The ‘Dragon Bus’ shall be available to the general public:**
 - **Monday to Friday during school holidays;**
 - **Weekends and Bank holidays throughout the year;**
 - **Between the hours of 09.00-18.00hrs on these days.**
 - **For a minimum of 3 years.**
- **The Dragon Bus shall be available for use by local community groups Monday to Friday during school term times.**

Monitoring of Impacts.

7.7 Although no formal planning condition relating to monitoring was included in the planning permission as part of the earlier application it was agreed with WCBC that there would be a comprehensive monitoring of travel movements to and from the site and their impact on the A483. A memorandum of understanding on these matters with WCBC was produced detailing an agreed schedule of monitoring. It is considered this agreed monitoring should remain unchanged.

7.8 The main points of the memorandum prepared in October 2010 by Gifford’s are summarised as follows:

- An annual travel survey will be undertaken at The Welsh Dragon Experience (TWDE) that will identify the mode of travel used by visitors to the site and whether the visitors are undertaking the trip as part of another reason for traveling e.g. visiting another local attraction. Ticket sales information at TWDE and Automatic Traffic Count (ATC) data from WAG/WCBC monitoring points on A5/A483 corridor will be used in conjunction with this survey to identify the volume of visitors to the attraction and whether they represent a new trip on the local highway network;
- Should the new trips across the year attributable to TWDE exceed the level assumed within the (earlier) Transport Assessment i.e. in excess of 83,233 annually, then TWDE will undertake to enter into discussions with WAG/WCBC to identify suitable trip reduction and highway capacity improvement measures. This trigger point will be based on visitor numbers, vehicle occupancy and trip diversion;
- It is accepted that the first year is unlikely to give representative data. The travel survey will be undertaken however, although mitigation discussions will not be required at the end of the first year of operation;
- It is suggested that the annual travel review take place initially for a duration of 8 years. This should allow sufficient time to allow for trip making behaviour and the visitor draw to the site to settle. If after the initial 8 year period the trigger points set out above have not been reached, future monitoring requirements should be removed. If the above trigger points have been reached, the monitoring process should continue until such time that newly generated traffic is brought to a level below the trigger point or highway infrastructure improvements works have been undertaken that mitigate against the impact of elevated trip generation levels.
- Monitoring should continue for a duration of 2 years after mitigation measures have been introduced to ensure they have been effective in mitigating the directly attributable impact of TWDE proposals;
- Should consensus on the method for undertaking the annual travel survey of the extent of reasonable mitigation measures fail to be reached between TWDE and WAG/WCBC, a mutually acceptable third party will be brought in to arbitrate in the dispute; and
- Should TWDE fail to undertake annual monitoring in accordance with the agreement or to implement agreed mitigation works, a penalty payment will be imposed, the level of which is to be agreed in advance as part of the memorandum, which will be used by WAG/WCBC to implement trip impact mitigation measures on behalf of TWDE.

8 Conclusions

- 8.1 An updated transport assessment of the impacts of the Welsh Dragon Development have been made, these have been based upon updated maximum annual visitor forecasts of 200,000 people and upon updated traffic and accident data for the A483.
- 8.2 Since 2010 traffic levels along the A483 past the Welsh Dragon site have grown on average by 8.9%. Now routinely on a Friday evening there is congestion at the Halton Roundabout.
- 8.3 On the very busiest days the growth is much lower, only 1.2% over this period. This is likely to because of the capacity restraints along this corridor.
- 8.4 An analysis of the impacts of the traffic to and from the Welsh Dragon development on the Halton Roundabout have been made using revised visitor numbers, updated base traffic flows and more sophisticated ARCADY modelling. This shows the impact on the Halton Roundabout to be much smaller than was initially envisaged. The impact is now considered to be modest/small with average delay per vehicle only increasing by approximately 3 seconds.
- 8.5 Analysis of accidents show that the safety record has remained stable. 9 accidents in period 2011-2015 compared with 9 in period 2005-2009.
- 8.6 A revised public transport service, the “Dragon Bus” is proposed to provide a realistic alternative to the car for travel to the Welsh Dragon. This will also be of benefit to cyclists. This is considered an improvement to the provision identified in 2010/11. Such a service will help more people walk or cycle for part of their journey to the Welsh Dragon and will accord with the requirements of the Active Wales legislation.
- 8.7 The impacts on the highway network of the development will NOT be severe in either operational or safety terms. A realistic alternative to the car for travel to the development is to be provided.
- 8.8 **Hence it is considered there is no transportation reason why this development should not be approved with the revised conditions proposed.**

Appendix A A483/A5 Roundabout Bank Holiday Traffic Volumes

A.1 Tables A1 to A4 show traffic counts for each arm of the A483/A5 roundabout for the survey undertaken on Monday 29th August 2016.

LOCATION: A483 / A5 / MCDONALDS ARM

ARM: A483 SOUTH

ARM: A483 SOUTH																									
TIME / CLASS	LEFT TO A5								STRAIGHT TO A483 NORTH								RIGHT TO MCDONALDS ARM								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	
14:00 - 14:15	0	6	42	1	0	2	0	51	0	7	214	21	3	2	2	249	0	2	16	1	0	0	0	19	319
14:15 - 14:30	0	11	35	5	1	0	0	52	0	4	212	18	2	3	1	240	0	1	14	2	0	0	0	17	309
14:30 - 14:45	0	6	25	6	0	0	0	37	0	8	192	29	3	4	2	238	0	3	17	1	1	0	0	22	297
14:45 - 15:00	0	5	37	3	0	0	0	45	0	8	201	20	1	5	0	235	0	1	11	0	0	0	0	12	292
HOURLY TOTAL	0	28	139	15	1	2	0	185	0	27	819	88	9	14	5	962	0	7	58	4	1	0	0	70	1217
15:00 - 15:15	0	2	37	1	1	0	0	41	0	3	176	11	2	2	1	195	0	0	13	2	0	0	0	15	251
15:15 - 15:30	0	1	20	5	0	0	0	26	0	6	164	23	1	3	1	198	0	2	10	1	1	0	0	14	238
15:30 - 15:45	0	6	29	1	0	0	0	36	0	9	197	17	3	5	0	231	0	0	19	0	0	0	0	19	286
15:45 - 16:00	0	1	30	6	1	1	0	39	0	4	162	19	4	7	3	199	0	0	8	1	0	0	0	9	247
HOURLY TOTAL	0	10	116	13	2	1	0	142	0	22	699	70	10	17	5	823	0	2	50	4	1	0	0	57	1022
16:00 - 16:15	0	1	28	4	0	0	0	33	0	1	198	17	1	4	1	222	0	0	6	0	0	0	0	6	261
16:15 - 16:30	0	0	23	4	0	1	0	28	0	4	167	18	2	6	1	198	0	0	14	2	0	0	0	16	242
16:30 - 16:45	0	0	26	8	0	1	0	35	0	5	187	29	4	7	0	232	0	0	11	0	1	0	0	12	279
16:45 - 17:00	0	0	30	4	1	0	0	35	0	7	189	13	1	1	0	211	0	4	13	0	0	0	0	17	263
HOURLY TOTAL	0	1	107	20	1	2	0	131	0	17	741	77	8	18	2	863	0	4	44	2	1	0	0	51	1045
17:00 - 17:15	0	0	28	5	0	0	0	33	0	12	163	17	1	0	0	193	0	0	7	0	0	0	0	7	233
17:15 - 17:30	0	1	24	5	0	0	0	30	0	2	155	14	4	1	1	177	0	0	9	0	0	0	0	9	216
17:30 - 17:45	0	0	14	1	1	1	0	17	0	4	179	9	0	3	1	196	0	2	6	1	0	0	0	9	222
17:45 - 18:00	0	0	23	8	1	1	0	33	0	4	199	18	2	5	1	229	0	1	6	0	0	0	0	7	269
HOURLY TOTAL	0	1	89	19	2	2	0	113	0	22	696	58	7	9	3	795	0	3	28	1	0	0	0	32	940
18:00 - 18:15	0	2	20	5	0	0	0	27	0	3	174	18	2	0	0	197	0	0	8	0	0	0	0	8	232
18:15 - 18:30	0	0	12	5	1	0	0	18	0	3	158	22	5	5	1	194	0	0	5	1	0	0	0	6	218
18:30 - 18:45	0	0	14	6	0	0	0	20	0	3	131	28	5	4	0	171	0	1	6	0	0	0	0	7	198
18:45 - 19:00	0	2	19	4	2	0	0	27	0	2	150	20	4	5	1	182	0	0	6	0	0	0	0	6	215
HOURLY TOTAL	0	4	65	20	3	0	0	92	0	11	613	88	16	14	2	744	0	1	25	1	0	0	0	27	863
PERIOD TOTAL	0	44	516	87	9	7	0	663	0	99	3568	381	50	72	17	4187	0	17	205	12	3	0	0	237	5087

Table A.1 A483 South arm counts

LOCATION: A483 / A5 / MCDONALDS ARM

ARM: A5

ARM: A5																									
TIME / CLASS	LEFT TO A483 NORTH								STRAIGHT TO MCDONALDS ARM								RIGHT TO A483 SOUTH								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	
14:00 - 14:15	0	0	58	3	0	0	0	61	0	0	10	1	0	0	0	11	0	12	58	8	2	0	0	80	152
14:15 - 14:30	0	1	57	5	3	0	0	66	0	0	13	2	1	0	0	16	0	7	79	10	0	2	0	98	180
14:30 - 14:45	0	3	62	2	0	0	0	67	0	2	12	0	0	0	0	14	0	10	82	6	1	0	0	99	180
14:45 - 15:00	0	1	55	2	2	0	1	61	0	0	9	0	0	0	0	9	0	5	90	9	1	1	4	110	180
HOURLY TOTAL	0	5	232	12	5	0	1	255	0	2	44	3	1	0	0	50	0	34	309	33	4	3	4	387	692
15:00 - 15:15	0	4	59	3	0	1	0	67	0	3	11	1	0	0	0	15	0	14	62	5	1	1	4	87	169
15:15 - 15:30	0	3	55	2	0	1	0	61	0	0	8	1	0	0	0	9	0	21	59	5	0	0	0	85	155
15:30 - 15:45	0	6	48	4	0	0	0	58	0	3	6	2	0	0	0	11	0	8	72	6	0	0	0	86	155
15:45 - 16:00	0	3	58	8	0	0	0	69	0	1	16	2	0	0	0	19	0	9	92	15	0	1	1	118	206
HOURLY TOTAL	0	16	220	17	0	2	0	255	0	7	41	6	0	0	0	54	0	52	285	31	1	2	5	376	685
16:00 - 16:15	0	1	60	4	0	0	0	65	0	0	7	0	0	0	0	7	0	5	73	5	0	2	0	85	157
16:15 - 16:30	0	0	67	4	0	1	2	74	0	0	9	2	0	0	0	11	0	4	72	9	0	4	0	89	174
16:30 - 16:45	0	0	53	6	1	1	0	61	0	0	6	0	0	0	0	6	0	3	68	8	0	1	0	80	147
16:45 - 17:00	0	1	82	6	0	0	0	89	0	2	5	0	0	0	0	7	0	8	81	11	0	4	0	104	200
HOURLY TOTAL	0	2	262	20	1	2	2	289	0	2	27	2	0	0	0	31	0	20	294	33	0	11	0	358	678
17:00 - 17:15	0	5	71	5	0	0	0	81	0	3	13	0	0	0	0	16	0	5	82	9	0	0	0	96	193
17:15 - 17:30	0	3	72	4	0	0	1	80	0	0	8	1	1	0	0	10	0	4	92	13	1	0	0	110	200
17:30 - 17:45	0	1	45	7	0	2	0	55	0	0	9	0	0	0	0	9	0	7	91	7	0	0	0	105	169
17:45 - 18:00	0	3	33	3	2	0	0	41	0	0	5	1	0	0	0	6	0	8	81	14	0	1	1	105	152
HOURLY TOTAL	0	12	221	19	2	2	1	257	0	3	35	2	1	0	0	41	0	24	346	43	1	1	1	416	714
18:00 - 18:15	0	5	93	0	0	0	0	98	0	4	14	0	0	0	0	18	0	5	102	6	1	0	0	114	230
18:15 - 18:30	0	3	43	0	2	2	0	50	0	0	6	0	0	0	0	6	0	5	94	14	0	0	0	113	169
18:30 - 18:45	0	0	40	0	0	1	0	41	0	0	4	0	0	0	0	4	0	4	115	14	0	1	1	135	180
18:45 - 19:00	0	0	38	0	0	1	0	39	0	0	5	0	0	0	0	5	0	5	100	14	1	1	1	122	166
HOURLY TOTAL	0	8	214	0	2	4	0	228	0	4	29	0	0	0	0	33	0	19	411	48	2	2	2	484	745
PERIOD TOTAL	0	43	1149	68	10	10	4	1284	0	18	176	13	2	0	0	209	0	149	1645	188	8	19	12	2021	3514

Table A.2 A5 arm counts

LOCATION: A483 / A5 / MCDONALDS ARM

ARM: A483 NORTH

TIME / CLASS	LEFT TO MCDONALDS ARM							STRAIGHT TO A483 SOUTH							RIGHT TO A5							TOTAL MOVEMENT FROM ARM			
	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV1		OGV2	BUS COACH	TOTAL
14:00 - 14:15	0	0	18	1	0	0	0	19	0	2	185	14	0	5	0	206	0	0	32	2	0	0	0	34	259
14:15 - 14:30	0	0	13	0	1	0	0	14	0	1	144	15	2	6	2	170	0	0	31	2	0	0	0	33	217
14:30 - 14:45	0	0	20	0	1	0	0	21	0	3	177	7	2	6	0	195	0	0	34	6	2	0	0	42	258
14:45 - 15:00	0	0	12	2	0	0	0	14	0	3	157	12	0	5	0	177	0	0	51	5	0	2	0	58	249
HOURLY TOTAL	0	0	63	3	2	0	0	68	0	9	663	48	4	22	2	748	0	0	148	15	2	2	0	167	983
15:00 - 15:15	0	0	15	1	0	0	0	16	0	1	161	8	3	4	0	177	0	0	32	3	1	0	0	36	229
15:15 - 15:30	0	0	16	1	0	0	0	17	0	2	168	13	1	1	0	185	0	2	50	2	0	0	0	54	256
15:30 - 15:45	0	0	13	2	0	0	0	15	0	1	164	9	2	7	0	183	0	1	29	4	1	0	0	35	233
15:45 - 16:00	0	0	23	3	0	0	0	26	0	1	160	17	1	3	1	183	0	0	32	4	0	3	0	39	248
HOURLY TOTAL	0	0	67	7	0	0	0	74	0	5	653	47	7	15	1	728	0	3	143	13	2	3	0	164	966
16:00 - 16:15	0	0	19	1	0	0	0	20	0	4	149	12	1	2	0	168	0	1	45	6	0	0	0	52	240
16:15 - 16:30	0	2	22	2	0	0	0	26	0	2	150	10	2	2	0	166	0	0	41	4	0	0	0	45	237
16:30 - 16:45	0	0	18	1	0	0	0	19	0	1	142	11	1	5	0	160	0	0	29	4	0	0	1	34	213
16:45 - 17:00	0	2	19	0	0	0	0	21	0	1	160	14	2	6	2	185	0	1	30	5	1	0	0	37	243
HOURLY TOTAL	0	4	78	4	0	0	0	86	0	8	601	47	6	15	2	679	0	2	145	19	1	0	1	168	933
17:00 - 17:15	0	0	22	0	0	0	0	22	0	2	172	12	1	2	0	189	0	0	42	3	0	0	0	45	256
17:15 - 17:30	0	0	20	0	0	0	0	20	0	2	168	11	2	2	0	185	0	1	37	3	0	1	0	42	247
17:30 - 17:45	0	1	9	1	0	0	0	11	0	0	169	13	0	5	0	187	0	0	43	2	0	0	0	45	243
17:45 - 18:00	0	0	16	1	0	0	0	17	0	2	139	14	3	3	0	161	0	0	24	0	0	1	0	25	203
HOURLY TOTAL	0	1	67	2	0	0	0	70	0	6	648	50	6	12	0	722	0	1	146	8	0	2	0	157	949
18:00 - 18:15	0	0	23	0	0	0	0	23	0	0	123	17	0	4	0	144	0	1	19	0	0	2	0	22	189
18:15 - 18:30	0	0	20	5	0	0	0	25	0	2	122	18	0	6	2	150	0	0	25	2	0	1	0	28	203
18:30 - 18:45	0	0	19	2	0	0	0	21	0	1	125	10	1	9	0	146	0	1	20	4	1	1	0	27	194
18:45 - 19:00	0	0	18	5	0	0	0	23	0	2	146	13	2	7	0	170	0	0	19	0	1	1	0	21	214
HOURLY TOTAL	0	0	80	12	0	0	0	92	0	5	516	58	3	26	2	610	0	2	83	6	2	5	0	98	800
PERIOD TOTAL	0	5	355	28	2	0	0	390	0	33	3081	250	26	90	7	3487	0	8	665	61	7	12	1	754	4631

Table A.3 A483 North arm counts

LOCATION: A483 / A5 / MCDONALDS ARM

ARM: MCDONALDS ARM

ARR. MOVEMENTS ARR.																									
TIME / CLASS	LEFT TO A483 SOUTH								STRAIGHT TO A5								RIGHT TO A483 NORTH								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	PEDAL CYCLE	MOTO R CYCLE	CAR TAXI	LGV	OGV1	OGV2	BUS COACH	TOTAL	
14:00 - 14:15	0	0	12	1	0	0	0	13	0	0	2	1	0	0	0	3	0	0	17	5	0	0	0	22	38
14:15 - 14:30	0	0	13	0	0	0	0	13	0	1	15	0	0	0	0	16	0	0	16	0	0	0	1	17	46
14:30 - 14:45	0	0	11	0	0	0	0	11	0	0	7	0	0	0	0	7	0	0	14	1	1	0	0	16	34
14:45 - 15:00	0	0	12	0	0	0	0	12	0	0	5	0	0	0	0	5	0	0	15	1	0	0	0	16	33
HOURLY TOTAL	0	0	48	1	0	0	0	49	0	1	29	1	0	0	0	31	0	0	62	7	1	0	1	71	151
15:00 - 15:15	0	0	12	0	0	0	0	12	0	0	6	0	1	0	0	7	0	0	13	1	0	0	0	14	33
15:15 - 15:30	0	1	11	0	0	0	0	12	0	0	2	0	0	0	0	2	0	0	14	0	0	0	0	14	28
15:30 - 15:45	0	0	17	0	0	0	0	17	0	0	3	0	0	0	0	3	0	0	17	1	0	0	0	18	38
15:45 - 16:00	0	0	12	4	0	0	0	16	0	0	3	1	0	0	0	4	0	0	13	1	0	0	0	14	34
HOURLY TOTAL	0	1	52	4	0	0	0	57	0	0	14	1	1	0	0	16	0	0	57	3	0	0	0	60	133
16:00 - 16:15	0	0	13	3	0	0	0	16	0	0	4	0	0	0	0	4	0	0	24	4	0	0	0	28	48
16:15 - 16:30	0	0	8	2	0	0	0	10	0	0	4	0	0	0	0	4	0	1	14	0	0	0	0	15	29
16:30 - 16:45	0	2	11	1	0	0	0	14	0	0	2	1	0	0	0	3	0	0	12	3	0	0	0	15	32
16:45 - 17:00	0	0	8	2	0	0	0	10	0	0	3	0	0	0	0	3	0	0	10	0	0	0	0	10	23
HOURLY TOTAL	0	2	40	8	0	0	0	50	0	0	13	1	0	0	0	14	0	1	60	7	0	0	0	68	132
17:00 - 17:15	0	0	12	2	0	0	0	14	0	0	6	1	0	0	0	7	0	0	16	0	0	0	0	16	37
17:15 - 17:30	0	3	11	3	0	0	0	17	0	0	5	0	0	0	0	5	0	0	12	1	0	0	0	13	35
17:30 - 17:45	0	0	20	0	0	0	0	20	0	1	3	0	0	0	0	4	0	0	7	0	0	0	0	7	31
17:45 - 18:00	0	0	14	1	0	0	0	15	0	0	7	0	1	0	0	8	0	0	16	0	0	0	0	16	39
HOURLY TOTAL	0	3	57	6	0	0	0	66	0	1	21	1	1	0	0	24	0	0	51	1	0	0	0	52	142
18:00 - 18:15	0	0	13	1	0	0	0	14	0	0	9	0	0	0	0	9	0	2	10	1	0	0	0	13	36
18:15 - 18:30	0	0	15	0	0	0	0	15	0	0	8	0	0	0	0	8	0	0	11	1	0	0	0	12	35
18:30 - 18:45	0	1	13	3	0	0	0	17	0	0	11	0	0	1	0	12	0	0	16	0	0	0	0	16	45
18:45 - 19:00	0	0	15	4	0	0	0	19	0	0	5	0	0	0	0	5	0	0	21	2	0	0	0	23	47
HOURLY TOTAL	0	1	56	8	0	0	0	65	0	0	33	0	0	1	0	34	0	2	58	4	0	0	0	64	163
PERIOD TOTAL	0	7	253	27	0	0	0	287	0	2	110	4	2	1	0	119	0	3	288	22	1	0	1	315	721

Table A.4 McDonalds access road arm counts

Appendix B A 483/A5 Roundabout Accidents 2011- 2015

A483 J/W A5 2011 - 2015

Accident Date BETWEEN '01-Jan-2011' AND '31-Dec-2015'

No.	Area	L/A	Reference	Severity	Day	Date	Time	Grid Coords	Link/Node	Street				
1		W06000006	M031953	Slight	Saturday	26/02/2011	15:00	329924/339893						
Location: A483 J/W A5 Halton Roundabout, Wrexham 1st Rd: A483 2nd Rd: A5														
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard					
30 MPH	Single c'way	R'dabt Give	Daylight	Fine	Dry	None	None	None	None					
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T	
1	Car	No	Going ahead	N S	On main	Junt appr	No	None		None	Untra.	-1	N/C	
2	Car	No	Stop	N S	On main	Junt appr	No	None		None	Female	22	N/C	
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil				
1	2	Drv/Rider	Female	22	Slight	No	Not ped	Not ped	Not ped	Other				
Description: V1 Collides with Rear of V2 at Roundabout.														
User Information:														
2		W06000006	P111650	Slight	Saturday	13/07/2013	02:44	329929/339852						
Location: A483 Southbound 56.44 Metres North of A5 Southbound, Chirk, Wrexham 1st Rd: A483 2nd Rd: A5														
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard					
60 MPH	Dual c'way	R'dabt Give	Dark/lights lit	Fine	Dry	None	None	None	None					
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T	
1	Car	No	Going ahead	N S	On main	Ent r'about	Yes	Cent island		Other	Male	48	-ve	
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil				
1	1	Drv/Rider	Male	48	Slight	No	Not ped	Not ped	Not ped	Other				
Description: Driver of V1 Has Been Driving Along A483 from General Direction of Wrexham Towards Chirk. Driver Has Missed Braking Point and Overshot Junction and Collided with Roundabout and Chevrons Present on Roundabout Causing Tyres to Blow out and Loss of Control														
User Information:														
3		W06000006	P113200	Slight	Monday	15/07/2013	08:36	329730/339833						
Location: A5, Chirk, Wrexham 1st Rd: A5 2nd Rd:														
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard					
60 MPH	Single c'way	NotJCT	Daylight	Fine	Dry	None	None	None	None					
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T	
1	Car	No	Going ahead	W E	On main	Not at	No	P'd veh u/l		None	Male	42	-ve	
2	Car	No	Waiting	W E	On main	Not at	No	None		None	Male	62	-ve	
3	Car	No	Waiting	W E	On main	Not at	No	None		None	Female	33	-ve	
4	Car	No	Waiting	W E	On main	Not at	No	None		None	Female	64	-ve	
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil				
1	1	Drv/Rider	Male	42	Slight	No	Not ped	Not ped	Not ped	Other				
2	2	Drv/Rider	Male	62	Slight	No	Not ped	Not ped	Not ped	Other				
3	3	Drv/Rider	Female	33	Slight	No	Not ped	Not ped	Not ped	Other				
Description: Veh1 Failed to Stop in Time and Collided with Rear of Veh2, Veh2 Has then Shunted into Rear of Veh3 and Veh3 into Rear of Veh4.														
User Information:														
4		W06000006	P128946	Slight	Wednesday	07/08/2013	13:03	329935/339654						
Location: A5 Toward A483 Northbound, Halton / Chirk, Wrexham 1st Rd: A5 2nd Rd:														
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard					
60 MPH	Single c'way	NotJCT	Daylight	Fine	Dry	None	None	None	None					
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T	
1	Car	No	Stop	S N	On main	Not at	No	None		None	Male	44	-ve	
2	Car	No	Stop	S N	On main	Not at	Yes	None		None	Male	24	-ve	
3	Car	No	Waiting	S N	On main	Not at	No	None		None	Female	31	-ve	
4	Car	No	Waiting	S N	On main	Not at	No	None		None	Male	54	-ve	
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil				
1	3	Drv/Rider	Female	31	Slight	No	Not ped	Not ped	Not ped	Other				
2	3	Passenger	Female	58	Slight	Front	Not ped	Not ped	Not ped	Other				
Description: V4 Has Been Approaching Roundabout and Has Slowed down for Approaching Hazard. Driver Has Slowed down with V3 Also Slowing Down. V2 Has Failed to Observe What was Occurring ahead and Collided with Rear of V3. V1 Has Collided with V2 Due to Heavy Braking by V2 Causing Impact. V2 to Blame Initially. V2 Write off														
User Information:														

A483 J/W A5 2011 - 2015

Accident Date BETWEEN '01-Jan-2011' AND '31-Dec-2015'

No.	Area	L/A	Reference	Severity	Day	Date	Time	Grid Coords	Link/Node	Street			
5		W06000006	P200071	Slight	Saturday	07/12/2013	17:20	329921/340006					
Location: A483 Halton 50 Metres North of A5, Chirk, Wrexham 1st Rd: A483 2nd Rd:													
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard				
60 MPH	Single c'way	NotJCT	Daylight	Fine	Dry	None	None	None	None				
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T
1	Car	No	Stop	N S	On main	Not at	Yes	None		None	Female	61	-ve
2	Car	No	Stop	N S	On main	Not at	No	None		None	Female	28	-ve
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	2	Drv/Rider	Female	28	Slight	No	Not ped	Not ped	Not ped	Other			
Description: on Slowing for Traffic ahead Veh Has Collided with Rear of Veh2.													
User Information:													
6		W06000006	S020982	Slight	Friday	13/02/2015	13:30	329926/339890					
Location: A483 HALTON, CHIRK, WREXHAM 1st Rd: A483 2nd Rd:													
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard				
60 MPH	Dual c'way	NotJCT	Daylight	Rain	Wet	None	None	None	None				
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T
1	Van/Goods < 3.5t	No	Stop	N S	On main	Not at	No	None		None	Female	54	-ve
2	Goods > 7.5t	Art	Going ahead	N S	On main	Not at	No	None		None	Male	61	-ve
3	Car	No	Going ahead	N S	On main	Not at	No	None		None	Female	28	-ve
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	1	Drv/Rider	Female	54	Slight	No	Not ped	Not ped	Not ped	Other			
2	3	Passenger	Male	34	Slight	Rear	Not ped	Not ped	Not ped	Other			
Description: VEHS 1, 2 AND 3 HAVE ALL BEEN TRAVELLING ALONG THE A483 SOUTHBOUND AT HALTON, CHIRK. ON THE APPROACH TO HALTON ROUNDABOUT VEH 1 HAS SUDDENLY STOPPED. VEH 2 HAS COLLIDED WITH REAR OF VEH 1. VEH 2 HAS STOPPED AND VEH 3 HAS COLLIDED WITH THE REAR OF VEH 2. 2 X MINOR INJURIES													
User Information:													
7		W06000006	S069236	Slight	Friday	15/05/2015	15:00	329922/339802					
Location: A5 HALTON ROUNDABOUT, at its Junction with A483, CHIRK, WREXHAM 1st Rd: A5 2nd Rd: A483													
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard				
60 MPH	Roundabout	R'dabt Give	Daylight	Fine	Dry	None	None	None	None				
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T
1	Car	No	Going ahead	S N	On main	Junt appr	No	None		None	Female	53	N/C
2	Car	No	Stop	S N	On main	Junt appr	No	None		None	Female	27	N/C
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	2	Drv/Rider	Female	27	Slight	No	Not ped	Not ped	Not ped	Other			
2	2	Passenger	Male	51	Slight	Front	Not ped	Not ped	Not ped	Other			
Description: VEH1 FAILED TO STOP INT IME AND COLLIDED WITH REAR OF VEH2 ON APPROACH TO ROUNDABOUT.													
User Information:													
8		W06000006	S099090	Slight	Sunday	05/07/2015	15:09	329945/339675					
Location: A5, HALTON, WREXHAM 1st Rd: A5 2nd Rd:													
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard				
60 MPH	Single c'way	NotJCT	Daylight	Rain	Wet	None	None	None	None				
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T
1	Car	No	Going ahead	N S	On main	Not at	No	None		None	Female	18	-ve
2	Car	No	Waiting	N S	On main	Not at	No	None		None	Female	50	-ve
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	1	Drv/Rider	Female	18	Slight	No	Not ped	Not ped	Not ped	Other			
2	2	Drv/Rider	Female	50	Slight	No	Not ped	Not ped	Not ped	Other			
Description: VEH1 FAILED TO STOP IN TIME AND COLLIDED WITH REAR OF VEH2 IN HEAVY TRAFFIC.													
User Information:													

A483 J/W A5 2011 - 2015

Accident Date BETWEEN '01-Jan-2011' AND '31-Dec-2015'

No.	Area	L/A	Reference	Severity	Day	Date	Time	Grid Coords	Link/Node	Street			
9		W06000006	S136843	Slight	Monday	07/09/2015	09:30	329925/339901					
Location: A483, 200 metres north of HALTON ROUNDABOUT, CHIRK, WREXHAM 1st Rd: A483 2nd Rd:													
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX - Human	- Phy Fac	Special	Hazard				
60 MPH	Single c'way	NotJCT	Daylight	Fine	Dry	None	None	None	None				
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age	B/T
1	Van/Goods < 3.	No	Going ahead	N S	On main	Not at	No	None		None	Male	50	-ve
2	Car	No	Stop	N S	On main	Not at	No	None		None	Male	20	-ve
Cas No	Veh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	2	Drv/Rider	Male	20	Slight	No	Not ped	Not ped	Not ped	Other			
Description: VEH 1 AND VEH 2 TRAVELLING IN SAME DIRECTION, SOUTHBOUND A483 APPROACHING HALTON ROUNDABOUT. VEH 2 HAS BRAKED DUE TO VEHICLES SLOWING FOR ROUNDABOUT. DRIVER VEH 1 HAS FAILED TO SEE VEH 2 SLOWING / STOPPING AND HAS COLLIDED INTO REAR OF VEH 2													
User Information:													

Appendix C Car Occupancy Data

C.1 Figure C.1 shows a car occupancy by trip purpose survey undertaken by the Scottish tourist board.

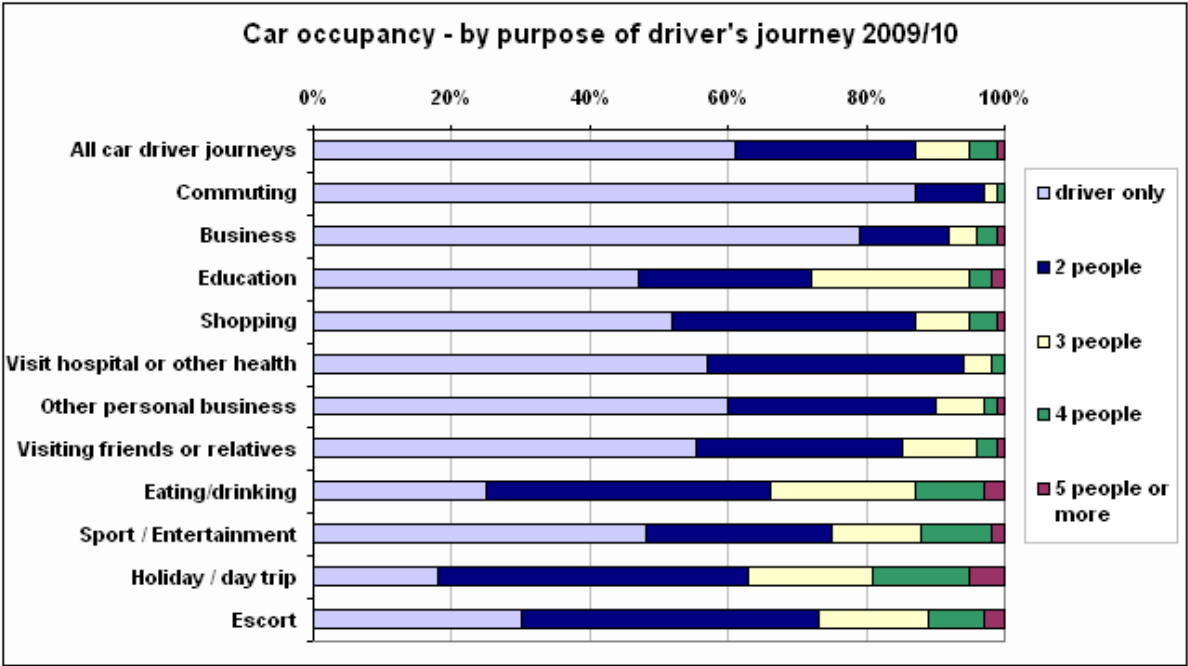


Table C.1 Car occupancy by trip purpose

Appendix D A483/A5 Roundabout Detailed ARCADY output

Junctions 9	
ARCADY 9 - Roundabout Module	
Version: 9.0.0.4211 [] © Copyright TRL Limited, 2016	
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk	
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution	

Filename: Welsh Dragon_Halton Roundabout_Bank Holiday_Rev1.j9

Path: C:\Welsh Dragon\Arcady\Halton Roundabout_Bank Holiday

Report generation date: 26-Sep-16 10:41:46 AM

-
- »Halton Roundabout, 2016 Bank Holiday
 - »Halton Roundabout, 2018 Bank Holiday
 - »Halton Roundabout, 2018 Bank Holiday + Dev
 - »Halton Roundabout, 2028 Bank Holiday
 - »Halton Roundabout, 2028 Bank Holiday + Dev

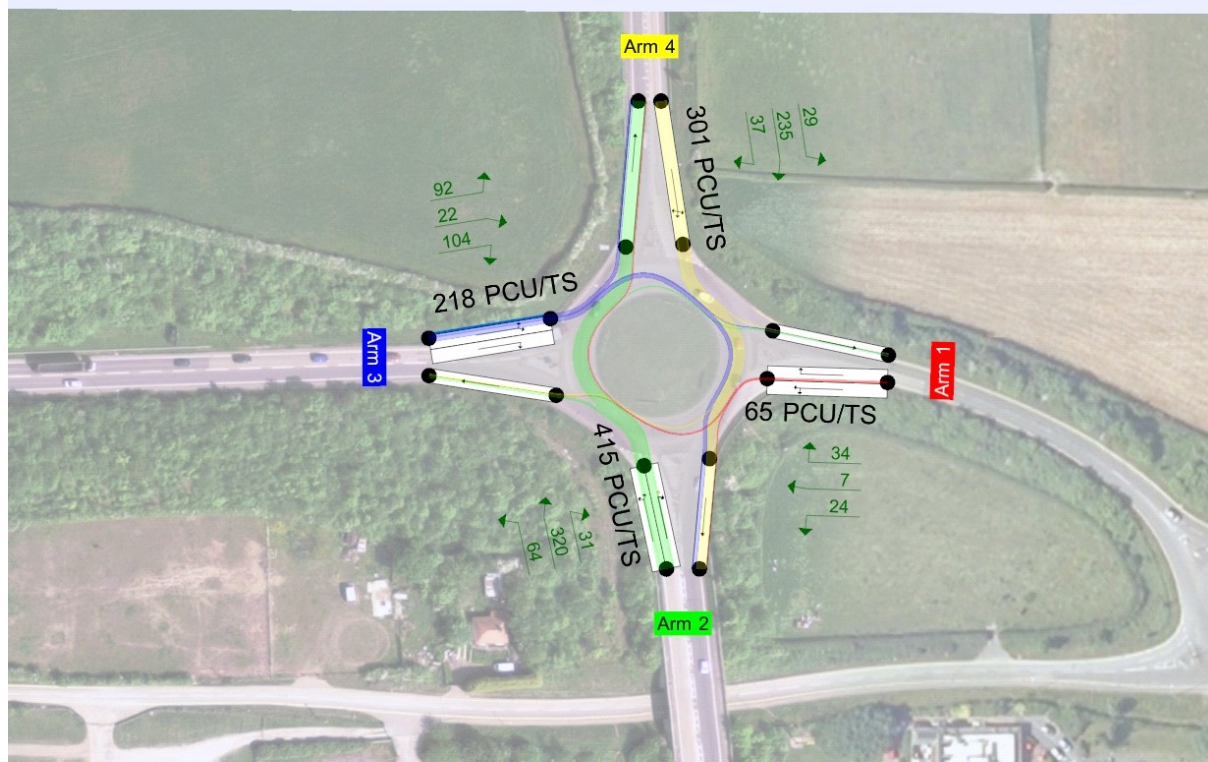
File summary

File Description

Title	Welsh Dragon - Halton Roundabout
Location	Chirk, Wales
Site number	
Date	14-Sep-16
Version	1207
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CDI_PC_1-PC*CDI_PC_1
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	perTimeSegment	s	-Min	perMin



Flow Overlay by Entry
Showing original traffic demand (PCU/TS).
Lane simulation visualisation time: 14:00:00

The junction diagram reflects the last run of Junctions.

Analysis Options

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

Lane Simulation options

Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Individual vehicle animation number of trials	Use crossings quick response	Last run random seed	Last run number of trials	Last run time taken (s)
1.00	100000	100000	-1	3	1	✓	1080679564	278	50.08

Demand Set Summary

Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Model time period length (min)	Time segment length (min)	Run automatically
Halton Roundabout	2016 Bank Holiday	DIRECT	14:00	15:00	60	15	✓
Halton Roundabout	2018 Bank Holiday	DIRECT	14:00	15:00	60	15	✓
Halton Roundabout	2018 Bank Holiday + Dev	DIRECT	14:00	15:00	60	15	✓
Halton Roundabout	2028 Bank Holiday	DIRECT	14:00	15:00	60	15	✓
Halton Roundabout	2028 Bank Holiday + Dev	DIRECT	14:00	15:00	60	15	✓

Halton Roundabout, 2016 Bank Holiday

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	92.57	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Black Park Access	
2	A5 Oswestry	
3	A5 Chirk	
4	A483 Wrexham	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	3.50	7.03	10.3	30.6	55.1	16.4	
2	5.39	7.88	23.8	32.4	55.0	26.7	
3	4.24	6.99	6.2	26.4	55.5	12.8	
4	3.93	6.63	12.2	37.5	55.2	28.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/TS)
1	0.596	417.907
2	0.695	566.387
3	0.610	436.852
4	0.595	429.931

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

Lane Simulation: Arm options

Arm	Lane capacity source	Traffic Considering Secondary Lanes (%)
1	Evenly split	10.00
2	Evenly split	10.00
3	Evenly split	10.00
4	Evenly split	10.00

Lanes

Arm	Lane level	Lane	Destination arms	Has limited storage	Storage (PCU)	Minimum capacity (PCU/TS)	Maximum capacity (PCU/TS)
1	1 [Give-way line]	1	2,3	✓	200.00	0.00	24999.75
		2	4	✓	3.00	0.00	24999.75
	2	1	(1,2,3,4)		Infinity		
2	1 [Give-way line]	1	3,4	✓	200.00	0.00	24999.75
		2	1,(4)	✓	3.00	0.00	24999.75
	2	1	(1,2,3,4)		Infinity		
3	1 [Give-way line]	1	1,4	✓	200.00	0.00	24999.75
		2	2	✓	3.00	0.00	24999.75
	2	1	(1,2,3,4)		Infinity		
4	1 [Give-way line]	1	1,2,3		Infinity	0.00	24999.75

Entry Lane slope and intercept

Arm	Destination arms	Final slope	Final intercept (PCU/TS)
1	2,3	0.298	208.954
	4	0.298	208.954
2	3,4	0.348	283.193
	1,(4)	0.348	283.193
3	1,4	0.305	218.426
	2	0.305	218.426
4	1,2,3	0.595	429.931

Lane Movements

Junction	Arm	Lane Level	Lane	Arm			
				1	2	3	4
1	1	1 [Give-way line]	1		✓	✓	
			2				✓
	2	2	1	✓	✓	✓	✓
			2				
		1 [Give-way line]	1			✓	✓
			2	✓			
		2	1	✓	✓	✓	✓
			2				
	3	1 [Give-way line]	1	✓			✓
			2		✓		
	4	2	1	✓	✓	✓	✓
			2				
	4	1 [Give-way line]	1	✓	✓	✓	
			2				

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Model time period length (min)	Time segment length (min)	Run automatically
D1	Halton Roundabout	2016 Bank Holiday	DIRECT	14:00	15:00	60	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
1		DIRECT	✓	100.000
2		DIRECT	✓	100.000
3		DIRECT	✓	100.000
4		DIRECT	✓	100.000

Origin-Destination Data

Demand (PCU/TS)

(14:00-14:15)

		To			
		1	2	3	4
From	1	0.000	13.000	3.000	22.000
	2	20.000	0.000	58.000	287.000
	3	15.000	93.000	0.000	83.000
	4	19.000	211.000	34.000	0.000

Proportions

		To			
		1	2	3	4
From	1	0.00	0.34	0.08	0.58
	2	0.05	0.00	0.16	0.79
	3	0.08	0.49	0.00	0.43
	4	0.07	0.80	0.13	0.00

Demand (PCU/TS)

(14:15-14:30)

	To				
		1	2	3	4
From	1	0.000	13.000	15.000	18.000
	2	16.000	0.000	53.000	242.000
	3	17.000	94.000	0.000	67.000
	4	15.000	180.000	33.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.28	0.33	0.39
	2	0.05	0.00	0.17	0.78
	3	0.10	0.53	0.00	0.38
	4	0.07	0.79	0.14	0.00

Demand (PCU/TS)

(14:30-14:45)

	To				
		1	2	3	4
From	1	0.000	11.000	7.000	17.000
	2	20.000	0.000	40.000	239.000
	3	12.000	90.000	0.000	64.000
	4	22.000	201.000	43.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.31	0.20	0.49
	2	0.07	0.00	0.13	0.80
	3	0.07	0.54	0.00	0.39
	4	0.08	0.76	0.16	0.00

Demand (PCU/TS)

(14:45-15:00)

	To				
		1	2	3	4
From	1	0.000	12.000	5.000	16.000
	2	11.000	0.000	50.000	234.000
	3	9.000	111.000	0.000	62.000
	4	14.000	181.000	61.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.36	0.15	0.48
	2	0.04	0.00	0.17	0.79
	3	0.05	0.61	0.00	0.34
	4	0.05	0.71	0.24	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/TS)	Demand in PCU (PCU/TS)
14:00-14:15	1	38.00	38.00
	2	365.00	365.00
	3	191.00	191.00
	4	264.00	264.00
14:15-14:30	1	46.00	46.00
	2	311.00	311.00
	3	178.00	178.00
	4	228.00	228.00
14:30-14:45	1	35.00	35.00
	2	299.00	299.00
	3	166.00	166.00
	4	266.00	266.00
14:45-15:00	1	33.00	33.00
	2	295.00	295.00
	3	182.00	182.00
	4	256.00	256.00

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/TS)	Total Junction Arrivals (PCU)
1	9.90	0.6	A	37.80	151.21
2	204.55	72.6	F	317.71	1270.83
3	28.25	6.2	D	178.75	715.00
4	9.77	3.1	A	253.10	1012.41

Main Results for each time segment

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	37.63	37.63	340.40	37.51	54.85	0.0	0.5	9.116	A
2	368.18	368.18	59.23	310.97	318.68	0.0	60.6	97.163	F
3	189.83	189.83	284.88	189.15	85.33	0.0	6.2	23.030	C
4	265.41	265.41	129.21	266.05	344.83	0.0	3.0	9.149	A

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	45.50	45.50	307.05	45.19	47.92	0.5	0.6	9.903	A
2	309.39	309.39	66.40	298.41	285.84	60.6	69.9	198.247	F
3	177.42	177.42	265.90	177.82	98.91	6.2	4.7	25.040	D
4	227.77	227.77	126.57	228.40	317.15	3.0	1.8	7.403	A

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	35.99	35.99	333.97	35.91	54.54	0.6	0.4	9.734	A
2	299.50	299.50	66.03	304.18	303.85	69.9	66.8	204.553	F
3	166.44	166.44	280.08	166.37	90.13	4.7	4.3	22.053	C
4	267.51	267.51	121.61	266.90	324.84	1.8	3.1	9.765	A

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	32.09	32.09	348.36	32.02	32.99	0.4	0.4	9.854	A
2	293.76	293.76	80.37	286.91	300.00	66.8	72.6	195.583	F
3	181.32	181.32	253.18	178.42	114.11	4.3	6.2	28.250	D
4	251.72	251.72	127.71	253.64	303.90	3.1	2.4	9.405	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	16.12	31.41	0.513	15.97	0.0	0.2	8.809	A
			2	4	21.50	38.21	0.563	21.54	0.0	0.2	9.215	A
	Exit	2	1	(1,2,3,4)	37.63			37.62	0.0	0.0	0.070	A
			1		54.85			54.85	0.0	0.0	0.000	A
2	Entry	1	1	3,4	318.23	262.60	1.212	261.01	0.0	60.4	111.319	F
			2	1,(4)	49.95	89.41	0.559	49.96	0.0	0.2	4.052	A
	Exit	2	1	(1,2,3,4)	368.18			368.18	0.0	0.0	0.021	A
			1		318.68			318.68	0.0	0.0	0.000	A
3	Entry	1	1	1,4	97.83	122.67	0.798	96.72	0.0	3.2	22.440	C
			2	2	92.10	117.16	0.786	92.43	0.0	1.4	13.045	B
	Exit	2	1	(1,2,3,4)	189.83			189.94	0.0	1.6	5.112	A
			1		85.33			85.33	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	265.41	330.66	0.803	266.05	0.0	3.0	9.149	A
	Exit	1	1		344.83			344.83	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	27.29	52.14	0.523	26.99	0.2	0.4	10.453	B
			2	4	18.21	33.94	0.536	18.21	0.2	0.2	9.047	A
	Exit	2	1	(1,2,3,4)	45.50			45.50	0.0	0.0	0.008	A
			1		47.92			47.92	0.0	0.0	0.000	A
2	Entry	1	1	3,4	270.59	260.21	1.040	259.53	60.4	69.7	226.675	F
			2	1,(4)	38.83	73.87	0.526	38.88	0.2	0.2	4.088	A
	Exit	2	1	(1,2,3,4)	309.39			309.42	0.0	0.0	0.005	A
			1		285.84			285.84	0.0	0.0	0.000	A
3	Entry	1	1	1,4	83.33	115.48	0.722	83.46	3.2	1.8	20.809	C
			2	2	94.19	124.83	0.755	94.36	1.4	1.6	14.786	B
	Exit	2	1	(1,2,3,4)	177.42			177.52	1.6	1.3	7.475	A
			1		98.91			98.91	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	227.77	308.73	0.738	228.40	3.0	1.8	7.403	A
	Exit	1	1		317.15			317.15	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	19.03	33.57	0.567	19.03	0.4	0.2	9.646	A
			2	4	16.96	32.17	0.527	16.89	0.2	0.2	9.757	A
	Exit	2	1	(1,2,3,4)	35.99			35.99	0.0	0.0	0.034	A
			1		54.54			54.54	0.0	0.0	0.000	A
2	Entry	1	1	3,4	255.38	260.27	0.981	259.81	69.7	66.7	238.795	F
			2	1,(4)	44.13	69.41	0.636	44.36	0.2	0.1	4.065	A
	Exit	2	1	(1,2,3,4)	299.50			299.50	0.0	0.0	0.010	A
			1		303.85			303.85	0.0	0.0	0.000	A
3	Entry	1	1	1,4	76.92	110.57	0.696	76.63	1.8	1.5	16.957	C
			2	2	89.78	117.66	0.763	89.74	1.6	1.5	14.261	B
	Exit	2	1	(1,2,3,4)	166.44			166.71	1.3	1.3	6.572	A
			1		90.13			90.13	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	267.51	333.09	0.803	266.90	1.8	3.1	9.765	A
	Exit	1	1		324.84			324.84	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	16.47	29.87	0.551	16.52	0.2	0.2	9.832	A
			2	4	15.63	29.12	0.537	15.50	0.2	0.2	9.844	A
	Exit	2	1	(1,2,3,4)	32.09			32.09	0.0	0.0	0.017	A
			1		32.99			32.99	0.0	0.0	0.000	A
2	Entry	1	1	3,4	259.79	255.12	1.018	252.74	66.7	72.5	226.531	F
			2	1,(4)	33.97	57.41	0.592	34.17	0.1	0.1	4.014	A
	Exit	2	1	(1,2,3,4)	293.76			293.76	0.0	0.0	0.004	A
			1		300.00			300.00	0.0	0.0	0.000	A
3	Entry	1	1	1,4	69.76	103.07	0.677	70.26	1.5	1.1	15.182	C
			2	2	108.74	134.51	0.808	108.16	1.5	1.9	15.303	C
	Exit	2	1	(1,2,3,4)	181.32			178.50	1.3	3.2	13.075	B
			1		114.11			114.11	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	251.72	326.62	0.771	253.64	3.1	2.4	9.405	A
	Exit	1	1		303.90			303.90	0.0	0.0	0.000	A

Halton Roundabout, 2018 Bank Holiday

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	117.42	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Model time period length (min)	Time segment length (min)	Run automatically
D2	Halton Roundabout	2018 Bank Holiday	DIRECT	14:00	15:00	60	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
1		DIRECT	✓	100.000
2		DIRECT	✓	100.000
3		DIRECT	✓	100.000
4		DIRECT	✓	100.000

Origin-Destination Data

(14:00-14:15)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	13.000	3.000	23.000
	2	21.000	0.000	60.000	296.000
	3	15.000	96.000	0.000	86.000
	4	20.000	218.000	35.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.33	0.08	0.59
	2	0.06	0.00	0.16	0.79
	3	0.08	0.49	0.00	0.44
	4	0.07	0.80	0.13	0.00

(14:15-14:30)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	13.000	15.000	19.000
	2	17.000	0.000	55.000	250.000
	3	18.000	97.000	0.000	69.000
	4	15.000	186.000	34.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.28	0.32	0.40
	2	0.05	0.00	0.17	0.78
	3	0.10	0.53	0.00	0.38
	4	0.06	0.79	0.14	0.00

(14:30-14:45)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	11.000	7.000	18.000
	2	21.000	0.000	41.000	247.000
	3	12.000	93.000	0.000	66.000
	4	23.000	207.000	44.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.31	0.19	0.50
	2	0.07	0.00	0.13	0.80
	3	0.07	0.54	0.00	0.39
	4	0.08	0.76	0.16	0.00

(14:45-15:00)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	12.000	5.000	17.000
	2	11.000	0.000	52.000	241.000
	3	9.000	115.000	0.000	64.000
	4	14.000	187.000	63.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.35	0.15	0.50
	2	0.04	0.00	0.17	0.79
	3	0.05	0.61	0.00	0.34
	4	0.05	0.71	0.24	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/TS)	Demand in PCU (PCU/TS)
14:00-14:15	1	39.00	39.00
	2	377.00	377.00
	3	197.00	197.00
	4	273.00	273.00
14:15-14:30	1	47.00	47.00
	2	322.00	322.00
	3	184.00	184.00
	4	235.00	235.00
14:30-14:45	1	36.00	36.00
	2	309.00	309.00
	3	171.00	171.00
	4	274.00	274.00
14:45-15:00	1	34.00	34.00
	2	304.00	304.00
	3	188.00	188.00
	4	264.00	264.00

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/TS)	Total Junction Arrivals (PCU)
1	10.74	0.5	B	39.62	158.48
2	261.84	100.5	F	327.83	1311.31
3	35.39	7.8	E	185.56	742.22
4	10.87	3.5	B	261.81	1047.22

Main Results for each time segment

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	40.06	40.06	349.64	40.20	56.01	0.0	0.5	9.451	A
2	374.80	374.80	61.80	309.26	328.04	0.0	66.5	105.112	F
3	199.48	199.48	284.51	198.06	86.55	0.0	7.7	25.984	D
4	272.13	272.13	133.92	271.73	348.65	0.0	3.5	9.585	A

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	47.18	47.18	318.41	47.25	50.12	0.5	0.5	10.740	B
2	323.36	323.36	68.44	301.12	297.22	66.5	86.3	230.985	F
3	183.51	183.51	269.86	185.08	99.69	7.7	5.5	29.405	D
4	235.66	235.66	132.34	236.19	322.60	3.5	1.9	8.342	A

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	36.80	36.80	341.27	36.72	55.46	0.5	0.4	10.044	B
2	309.52	309.52	68.96	305.89	309.02	86.3	89.4	261.841	F
3	170.45	170.45	283.12	168.52	91.74	5.5	5.1	24.391	C
4	271.49	271.49	124.66	272.07	326.98	1.9	3.3	10.870	B

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	34.45	34.45	370.31	34.26	34.18	0.4	0.5	10.697	B
2	303.62	303.62	86.95	291.24	317.61	89.4	100.5	259.099	F
3	188.79	188.79	258.88	190.58	119.31	5.1	7.8	35.392	E
4	267.94	267.94	136.79	267.69	312.67	3.3	3.0	10.662	B

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	16.73	31.14	0.537	16.73	0.0	0.2	8.965	A
			2	4	23.34	41.04	0.569	23.47	0.0	0.3	9.707	A
	Exit	2	1	(1,2,3,4)	40.06			40.07	0.0	0.0	0.052	A
			1		56.01			56.01	0.0	0.0	0.000	A
2	Entry	1	1	3,4	326.02	261.72	1.246	260.40	0.0	66.3	120.309	F
			2	1,(4)	48.78	82.78	0.589	48.86	0.0	0.2	4.071	A
	Exit	2	1	(1,2,3,4)	374.80			374.80	0.0	0.0	0.014	A
			1		328.04			328.04	0.0	0.0	0.000	A
3	Entry	1	1	1,4	101.80	125.57	0.811	99.89	0.0	3.7	23.791	C
			2	2	97.85	121.49	0.805	98.16	0.0	1.7	13.956	B
	Exit	2	1	(1,2,3,4)	199.48			199.65	0.0	2.4	6.944	A
			1		86.55			86.55	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	272.13	331.78	0.820	271.73	0.0	3.5	9.585	A
	Exit	1	1		348.65			348.65	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	28.18	47.80	0.589	28.14	0.2	0.3	11.260	B
			2	4	19.00	35.24	0.539	19.11	0.3	0.2	9.922	A
	Exit	2	1	(1,2,3,4)	47.18			47.18	0.0	0.0	0.029	A
			1		50.12			50.12	0.0	0.0	0.000	A
2	Entry	1	1	3,4	280.87	259.41	1.083	258.56	66.3	86.1	264.996	F
			2	1,(4)	42.49	78.31	0.543	42.55	0.2	0.2	4.087	A
	Exit	2	1	(1,2,3,4)	323.36			323.36	0.0	0.0	0.008	A
			1		297.22			297.22	0.0	0.0	0.000	A
3	Entry	1	1	1,4	87.96	120.59	0.729	88.22	3.7	2.2	24.048	C
			2	2	96.79	124.97	0.775	96.86	1.7	1.6	15.065	C
	Exit	2	1	(1,2,3,4)	183.51			184.75	2.4	1.7	10.118	B
			1		99.69			99.69	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	235.66	308.52	0.764	236.19	3.5	1.9	8.342	A
	Exit	1	1		322.60			322.60	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	18.87	32.42	0.582	18.65	0.3	0.2	9.924	A
			2	4	17.93	29.59	0.606	18.07	0.2	0.2	10.132	B
	Exit	2	1	(1,2,3,4)	36.80			36.80	0.0	0.0	0.016	A
			1		55.46			55.46	0.0	0.0	0.000	A
2	Entry	1	1	3,4	263.75	259.24	1.017	260.05	86.1	89.2	306.532	F
			2	1,(4)	45.76	80.71	0.567	45.85	0.2	0.2	4.080	A
	Exit	2	1	(1,2,3,4)	309.52			309.52	0.0	0.0	0.006	A
			1		309.02			309.02	0.0	0.0	0.000	A
3	Entry	1	1	1,4	77.76	105.96	0.734	77.44	2.2	1.6	19.491	C
			2	2	91.46	118.28	0.773	91.08	1.6	1.6	14.668	B
	Exit	2	1	(1,2,3,4)	170.45			169.22	1.7	1.9	7.490	A
			1		91.74			91.74	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	271.49	333.57	0.814	272.07	1.9	3.3	10.870	B
	Exit	1	1		326.98			326.98	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	16.75	29.98	0.559	16.78	0.2	0.2	10.521	B
			2	4	17.69	32.95	0.537	17.48	0.2	0.3	10.785	B
	Exit	2	1	(1,2,3,4)	34.45			34.45	0.0	0.0	0.041	A
			1		34.18			34.18	0.0	0.0	0.000	A
2	Entry	1	1	3,4	268.29	252.96	1.061	255.75	89.2	100.3	304.437	F
			2	1,(4)	35.33	62.67	0.564	35.48	0.2	0.1	3.979	A
	Exit	2	1	(1,2,3,4)	303.62			303.62	0.0	0.0	0.000	A
			1		317.61			317.61	0.0	0.0	0.000	A
3	Entry	1	1	1,4	73.84	108.53	0.680	74.21	1.6	1.3	16.807	C
			2	2	115.98	135.78	0.854	116.36	1.6	2.0	16.132	C
	Exit	2	1	(1,2,3,4)	188.79			189.81	1.9	4.5	19.135	C
			1		119.31			119.31	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	267.94	330.86	0.810	267.69	3.3	3.0	10.662	B
	Exit	1	1		312.67			312.67	0.0	0.0	0.000	A

Halton Roundabout, 2018 Bank Holiday + Dev

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	120.16	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Model time period length (min)	Time segment length (min)	Run automatically
D3	Halton Roundabout	2018 Bank Holiday + Dev	DIRECT	14:00	15:00	60	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
1		DIRECT	✓	100.000
2		DIRECT	✓	100.000
3		DIRECT	✓	100.000
4		DIRECT	✓	100.000

Origin-Destination Data

Demand (PCU/TS)

(14:00-14:15)

	To				
		1	2	3	4
From	1	0.000	22.000	7.000	32.000
	2	30.000	0.000	59.000	293.000
	3	20.000	95.000	0.000	85.000
	4	28.000	216.000	34.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.36	0.11	0.52
	2	0.08	0.00	0.15	0.77
	3	0.10	0.48	0.00	0.43
	4	0.10	0.78	0.12	0.00

Demand (PCU/TS)

(14:15-14:30)

	To				
		1	2	3	4
From	1	0.000	21.000	19.000	26.000
	2	25.000	0.000	54.000	247.000
	3	23.000	96.000	0.000	68.000
	4	22.000	184.000	33.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.32	0.29	0.39
	2	0.08	0.00	0.17	0.76
	3	0.12	0.51	0.00	0.36
	4	0.09	0.77	0.14	0.00

Demand (PCU/TS)

(14:30-14:45)

	To				
		1	2	3	4
From	1	0.000	19.000	11.000	25.000
	2	29.000	0.000	41.000	245.000
	3	17.000	92.000	0.000	65.000
	4	30.000	205.000	44.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.35	0.20	0.45
	2	0.09	0.00	0.13	0.78
	3	0.10	0.53	0.00	0.37
	4	0.11	0.73	0.16	0.00

Demand (PCU/TS)

(14:45-15:00)

	To				
		1	2	3	4
From	1	0.000	20.000	9.000	24.000
	2	19.000	0.000	52.000	239.000
	3	13.000	114.000	0.000	64.000
	4	21.000	185.000	63.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.38	0.17	0.45
	2	0.06	0.00	0.17	0.77
	3	0.07	0.60	0.00	0.34
	4	0.08	0.69	0.23	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/TS)	Demand in PCU (PCU/TS)
14:00-14:15	1	61.00	61.00
	2	382.00	382.00
	3	200.00	200.00
	4	278.00	278.00
14:15-14:30	1	66.00	66.00
	2	326.00	326.00
	3	187.00	187.00
	4	239.00	239.00
14:30-14:45	1	55.00	55.00
	2	315.00	315.00
	3	174.00	174.00
	4	279.00	279.00
14:45-15:00	1	53.00	53.00
	2	310.00	310.00
	3	191.00	191.00
	4	269.00	269.00

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/TS)	Total Junction Arrivals (PCU)
1	11.87	1.0	B	58.84	235.35
2	271.53	110.1	F	332.22	1328.86
3	38.26	9.3	E	187.78	751.10
4	12.68	4.4	B	265.53	1062.14

Main Results for each time segment

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	60.09	60.09	342.32	59.93	77.28	0.0	0.8	10.108	B
2	381.02	381.02	72.41	316.31	329.84	0.0	66.4	103.832	F
3	199.99	199.99	300.69	196.68	88.02	0.0	9.3	28.431	D
4	278.02	278.02	142.47	277.13	354.90	0.0	4.4	11.298	B

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	66.69	66.69	313.88	66.12	70.01	0.8	1.0	11.485	B
2	324.88	324.88	77.54	304.03	302.45	66.4	87.2	232.718	F
3	186.26	186.26	279.55	187.76	102.03	9.3	6.3	33.988	D
4	239.25	239.25	144.10	239.80	323.21	4.4	2.3	9.060	A

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	55.60	55.60	338.48	55.72	75.48	1.0	0.7	11.158	B
2	314.35	314.35	79.64	306.35	314.57	87.2	95.0	269.807	F
3	172.38	172.38	292.92	172.35	93.07	6.3	5.3	26.420	D
4	277.57	277.57	136.95	277.01	328.32	2.3	4.2	12.676	B

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	52.98	52.98	364.00	52.92	52.91	0.7	0.7	11.865	B
2	308.62	308.62	95.92	295.16	321.00	95.0	110.1	271.530	F
3	192.47	192.47	269.48	193.26	121.60	5.3	8.7	38.259	E
4	267.30	267.30	148.28	268.64	314.46	4.2	3.6	12.200	B

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	28.10	48.43	0.580	27.92	0.0	0.4	9.831	A
			2	4	32.00	56.48	0.566	32.02	0.0	0.4	10.116	B
	Exit	2	1	(1,2,3,4)	60.09			60.10	0.0	0.0	0.126	A
			1		77.28			77.28	0.0	0.0	0.000	A
2	Entry	1	1	3,4	323.43	258.05	1.253	258.88	0.0	66.1	121.735	F
			2	1,(4)	57.64	108.59	0.531	57.43	0.0	0.3	4.262	A
	Exit	2	1	(1,2,3,4)	381.02			381.07	0.0	0.0	0.026	A
			1		329.84			329.84	0.0	0.0	0.000	A
3	Entry	1	1	1,4	105.33	122.49	0.860	102.74	0.0	5.0	27.589	D
			2	2	93.95	118.14	0.795	93.94	0.0	1.7	13.882	B
	Exit	2	1	(1,2,3,4)	199.99			199.29	0.0	2.6	7.206	A
			1		88.02			88.02	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	278.02	331.01	0.840	277.13	0.0	4.4	11.298	B
	Exit	1	1		354.90			354.90	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	40.86	68.58	0.596	40.40	0.4	0.6	12.139	B
			2	4	25.81	47.23	0.546	25.71	0.4	0.3	10.270	B
	Exit	2	1	(1,2,3,4)	66.69			66.67	0.0	0.0	0.086	A
			1		70.01			70.01	0.0	0.0	0.000	A
2	Entry	1	1	3,4	276.19	256.23	1.078	255.23	66.1	87.0	272.998	F
			2	1,(4)	48.68	91.17	0.534	48.80	0.3	0.2	4.330	A
	Exit	2	1	(1,2,3,4)	324.88			324.88	0.0	0.0	0.020	A
			1		302.45			302.45	0.0	0.0	0.000	A
3	Entry	1	1	1,4	91.16	118.71	0.768	91.34	5.0	2.7	30.125	D
			2	2	96.24	123.87	0.777	96.42	1.7	1.7	15.712	C
	Exit	2	1	(1,2,3,4)	186.26			187.40	2.6	1.9	11.258	B
			1		102.03			102.03	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	239.25	312.06	0.767	239.80	4.4	2.3	9.060	A
	Exit	1	1		323.21			323.21	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	30.18	51.34	0.588	30.34	0.6	0.4	11.441	B
			2	4	25.41	46.28	0.549	25.38	0.3	0.3	10.678	B
	Exit	2	1	(1,2,3,4)	55.60			55.59	0.0	0.0	0.063	A
			1		75.48			75.48	0.0	0.0	0.000	A
2	Entry	1	1	3,4	261.23	255.36	1.023	253.22	87.0	94.7	323.923	F
			2	1,(4)	53.10	95.18	0.558	53.13	0.2	0.3	4.418	A
	Exit	2	1	(1,2,3,4)	314.35			314.34	0.0	0.0	0.015	A
			1		314.57			314.57	0.0	0.0	0.000	A
3	Entry	1	1	1,4	80.22	110.51	0.726	80.61	2.7	1.8	20.625	C
			2	2	91.67	119.08	0.770	91.74	1.7	1.6	15.592	C
	Exit	2	1	(1,2,3,4)	172.38			171.89	1.9	1.8	8.503	A
			1		93.07			93.07	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	277.57	332.67	0.834	277.01	2.3	4.2	12.676	B
	Exit	1	1		328.32			328.32	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	29.22	51.69	0.565	29.19	0.4	0.4	12.005	B
			2	4	23.77	41.77	0.569	23.73	0.3	0.3	11.444	B
	Exit	2	1	(1,2,3,4)	52.98			52.99	0.0	0.0	0.117	A
			1		52.91			52.91	0.0	0.0	0.000	A
2	Entry	1	1	3,4	264.71	249.86	1.059	251.08	94.7	109.9	333.026	F
			2	1,(4)	43.91	72.74	0.604	44.07	0.3	0.2	4.246	A
	Exit	2	1	(1,2,3,4)	308.62			308.62	0.0	0.0	0.004	A
			1		321.00			321.00	0.0	0.0	0.000	A
3	Entry	1	1	1,4	78.40	110.75	0.708	77.44	1.8	1.8	18.248	C
			2	2	115.65	132.64	0.872	115.82	1.6	2.1	16.821	C
	Exit	2	1	(1,2,3,4)	192.47			194.05	1.8	4.9	20.969	C
			1		121.60			121.60	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	267.30	325.30	0.822	268.64	4.2	3.6	12.200	B
	Exit	1	1		314.46			314.46	0.0	0.0	0.000	A

Halton Roundabout, 2028 Bank Holiday

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.
Last Run	Lane Simulation	Arm 3 - Lane Simulation	Arm 3: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	207.77	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Model time period length (min)	Time segment length (min)	Run automatically
D4	Halton Roundabout	2028 Bank Holiday	DIRECT	14:00	15:00	60	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
1		DIRECT	✓	100.000
2		DIRECT	✓	100.000
3		DIRECT	✓	100.000
4		DIRECT	✓	100.000

Origin-Destination Data

(14:00-14:15)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	15.000	3.000	25.000
	2	22.000	0.000	65.000	323.000
	3	17.000	106.000	0.000	93.000
	4	21.000	237.000	38.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.35	0.07	0.58
	2	0.05	0.00	0.16	0.79
	3	0.08	0.49	0.00	0.43
	4	0.07	0.80	0.13	0.00

(14:15-14:30)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	15.000	17.000	20.000
	2	18.000	0.000	60.000	272.000
	3	19.000	106.000	0.000	75.000
	4	17.000	202.000	37.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.29	0.33	0.38
	2	0.05	0.00	0.17	0.78
	3	0.10	0.53	0.00	0.38
	4	0.07	0.79	0.14	0.00

(14:30-14:45)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	12.000	8.000	19.000
	2	22.000	0.000	45.000	269.000
	3	13.000	101.000	0.000	72.000
	4	25.000	226.000	48.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.31	0.21	0.49
	2	0.07	0.00	0.13	0.80
	3	0.07	0.54	0.00	0.39
	4	0.08	0.76	0.16	0.00

(14:45-15:00)

Demand (PCU/TS)

	To				
		1	2	3	4
From	1	0.000	13.000	6.000	18.000
	2	12.000	0.000	56.000	263.000
	3	10.000	125.000	0.000	70.000
	4	16.000	203.000	69.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.35	0.16	0.49
	2	0.04	0.00	0.17	0.79
	3	0.05	0.61	0.00	0.34
	4	0.06	0.70	0.24	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/TS)	Demand in PCU (PCU/TS)
14:00-14:15	1	43.00	43.00
	2	410.00	410.00
	3	216.00	216.00
	4	296.00	296.00
14:15-14:30	1	52.00	52.00
	2	350.00	350.00
	3	200.00	200.00
	4	256.00	256.00
14:30-14:45	1	39.00	39.00
	2	336.00	336.00
	3	186.00	186.00
	4	299.00	299.00
14:45-15:00	1	37.00	37.00
	2	331.00	331.00
	3	205.00	205.00
	4	288.00	288.00

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/TS)	Total Junction Arrivals (PCU)
1	12.28	0.6	B	42.71	170.84
2	471.14	210.3	F	355.94	1423.75
3	51.73	12.7	F	200.70	802.78
4	17.15	5.9	C	283.67	1134.67

Main Results for each time segment

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	43.46	43.46	376.41	43.54	59.32	0.0	0.6	10.456	B
2	409.91	409.91	65.75	315.20	354.20	0.0	96.5	148.510	F
3	215.08	215.08	292.31	209.26	88.64	0.0	12.3	34.919	D
4	294.86	294.86	141.99	293.74	359.58	0.0	5.9	14.251	B

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	52.13	52.13	344.73	52.59	54.86	0.6	0.6	11.987	B
2	349.31	349.31	74.55	305.87	322.77	96.5	142.0	365.692	F
3	200.60	200.60	274.34	200.20	106.08	12.3	9.3	44.071	E
4	257.55	257.55	144.18	255.41	330.37	5.9	3.4	11.400	B

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	38.64	38.64	373.03	38.85	59.86	0.6	0.4	11.562	B
2	334.28	334.28	75.71	308.28	336.17	142.0	170.1	471.139	F
3	185.54	185.54	286.10	183.25	97.89	9.3	6.7	31.330	D
4	295.86	295.86	134.94	297.95	334.42	3.4	5.4	17.154	C

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	36.61	36.61	391.83	36.80	38.01	0.4	0.5	12.282	B
2	330.25	330.25	92.71	289.43	335.92	170.1	210.3	449.974	F
3	201.57	201.57	261.15	203.57	120.99	6.7	12.7	51.725	F
4	286.41	286.41	144.99	284.85	319.73	5.4	5.6	16.444	C

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	18.31	32.19	0.569	18.34	0.0	0.2	9.718	A
			2	4	25.14	43.70	0.575	25.21	0.0	0.3	10.783	B
	Exit	2	1	(1,2,3,4)	43.46			43.46	0.0	0.0	0.112	A
			1		59.32			59.32	0.0	0.0	0.000	A
2	Entry	1	1	3,4	356.55	260.36	1.369	261.72	0.0	96.2	169.973	F
			2	1,(4)	53.39	95.88	0.557	53.48	0.0	0.3	4.200	A
	Exit	2	1	(1,2,3,4)	409.91			409.94	0.0	0.0	0.082	A
			1		354.20			354.20	0.0	0.0	0.000	A
3	Entry	1	1	1,4	108.59	124.18	0.874	106.16	0.0	5.1	30.036	D
			2	2	103.31	124.07	0.833	103.09	0.0	2.0	14.457	B
	Exit	2	1	(1,2,3,4)	215.08			211.90	0.0	5.1	12.375	B
			1		88.64			88.64	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	294.86	337.26	0.874	293.74	0.0	5.9	14.251	B
	Exit	1	1		359.58			359.58	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	32.52	52.69	0.617	32.62	0.2	0.4	12.715	B
			2	4	19.62	33.70	0.582	19.97	0.3	0.2	10.690	B
	Exit	2	1	(1,2,3,4)	52.13			52.13	0.0	0.0	0.032	A
			1		54.86			54.86	0.0	0.0	0.000	A
2	Entry	1	1	3,4	303.97	257.27	1.181	260.42	96.2	141.8	419.165	F
			2	1,(4)	45.40	76.45	0.594	45.45	0.3	0.2	4.095	A
	Exit	2	1	(1,2,3,4)	349.31			349.36	0.0	0.0	0.010	A
			1		322.77			322.77	0.0	0.0	0.000	A
3	Entry	1	1	1,4	93.12	119.58	0.779	93.43	5.1	3.1	34.204	D
			2	2	106.97	129.45	0.826	106.77	2.0	2.0	16.572	C
	Exit	2	1	(1,2,3,4)	200.60			200.09	5.1	4.2	19.428	C
			1		106.08			106.08	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	257.55	324.12	0.795	255.41	5.9	3.4	11.400	B
	Exit	1	1		330.37			330.37	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	19.74	34.25	0.576	19.79	0.4	0.2	11.718	B
			2	4	18.90	31.34	0.603	19.06	0.2	0.2	11.298	B
	Exit	2	1	(1,2,3,4)	38.64			38.64	0.0	0.0	0.048	A
			1		59.86			59.86	0.0	0.0	0.000	A
2	Entry	1	1	3,4	284.05	256.90	1.106	258.30	141.8	169.8	551.564	F
			2	1,(4)	50.23	102.80	0.489	49.97	0.2	0.3	4.266	A
	Exit	2	1	(1,2,3,4)	334.28			334.28	0.0	0.0	0.012	A
			1		336.17			336.17	0.0	0.0	0.000	A
3	Entry	1	1	1,4	82.80	112.95	0.733	83.15	3.1	2.0	23.197	C
			2	2	100.31	122.96	0.816	100.10	2.0	1.8	15.592	C
	Exit	2	1	(1,2,3,4)	185.54			183.12	4.2	3.0	12.303	B
			1		97.89			97.89	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	295.86	339.42	0.872	297.95	3.4	5.4	17.154	C
	Exit	1	1		334.42			334.42	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	18.86	33.78	0.558	18.83	0.2	0.2	12.510	B
			2	4	17.77	31.57	0.563	17.97	0.2	0.2	11.869	B
	Exit	2	1	(1,2,3,4)	36.61			36.63	0.0	0.0	0.086	A
			1		38.01			38.01	0.0	0.0	0.000	A
2	Entry	1	1	3,4	292.40	250.98	1.165	251.64	169.8	210.1	580.052	F
			2	1,(4)	37.86	72.68	0.521	37.78	0.3	0.2	4.099	A
	Exit	2	1	(1,2,3,4)	330.25			330.25	0.0	0.0	0.004	A
			1		335.92			335.92	0.0	0.0	0.000	A
3	Entry	1	1	1,4	81.02	113.76	0.712	80.27	2.0	1.8	19.443	C
			2	2	123.31	137.08	0.900	123.30	1.8	2.4	17.468	C
	Exit	2	1	(1,2,3,4)	201.57			204.34	3.0	8.6	33.672	D
			1		120.99			120.99	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	286.41	335.47	0.854	284.85	5.4	5.6	16.444	C
	Exit	1	1		319.73			319.73	0.0	0.0	0.000	A

Halton Roundabout, 2028 Bank Holiday + Dev

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.
Last Run	Lane Simulation	Arm 3 - Lane Simulation	Arm 3: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	208.00	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Model time period length (min)	Time segment length (min)	Run automatically
D5	Halton Roundabout	2028 Bank Holiday + Dev	DIRECT	14:00	15:00	60	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
1		DIRECT	✓	100.000
2		DIRECT	✓	100.000
3		DIRECT	✓	100.000
4		DIRECT	✓	100.000

Origin-Destination Data

Demand (PCU/TS)

(14:00-14:15)

	To				
		1	2	3	4
From	1	0.000	24.000	7.000	34.000
	2	31.000	0.000	64.000	320.000
	3	22.000	104.000	0.000	92.000
	4	29.000	235.000	37.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.37	0.11	0.52
	2	0.07	0.00	0.15	0.77
	3	0.10	0.48	0.00	0.42
	4	0.10	0.78	0.12	0.00

Demand (PCU/TS)

(14:15-14:30)

	To				
		1	2	3	4
From	1	0.000	23.000	21.000	27.000
	2	26.000	0.000	59.000	269.000
	3	24.000	105.000	0.000	74.000
	4	29.000	200.000	36.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.32	0.30	0.38
	2	0.07	0.00	0.17	0.76
	3	0.12	0.52	0.00	0.36
	4	0.11	0.75	0.14	0.00

Demand (PCU/TS)

(14:30-14:45)

	To				
		1	2	3	4
From	1	0.000	20.000	12.000	26.000
	2	30.000	0.000	45.000	267.000
	3	18.000	100.000	0.000	71.000
	4	32.000	224.000	48.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.34	0.21	0.45
	2	0.09	0.00	0.13	0.78
	3	0.10	0.53	0.00	0.38
	4	0.11	0.74	0.16	0.00

Demand (PCU/TS)

(14:45-15:00)

	To				
		1	2	3	4
From	1	0.000	21.000	10.000	25.000
	2	20.000	0.000	56.000	261.000
	3	14.000	124.000	0.000	70.000
	4	29.000	201.000	69.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.38	0.18	0.45
	2	0.06	0.00	0.17	0.77
	3	0.07	0.60	0.00	0.34
	4	0.10	0.67	0.23	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/TS)	Demand in PCU (PCU/TS)
14:00-14:15	1	65.00	65.00
	2	415.00	415.00
	3	218.00	218.00
	4	301.00	301.00
14:15-14:30	1	71.00	71.00
	2	354.00	354.00
	3	203.00	203.00
	4	265.00	265.00
14:30-14:45	1	58.00	58.00
	2	342.00	342.00
	3	189.00	189.00
	4	304.00	304.00
14:45-15:00	1	56.00	56.00
	2	337.00	337.00
	3	208.00	208.00
	4	299.00	299.00

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/TS)	Total Junction Arrivals (PCU)
1	14.03	1.1	B	62.47	249.88
2	477.15	217.9	F	362.43	1449.72
3	56.58	15.7	F	205.37	821.48
4	21.77	8.0	C	291.76	1167.03

Main Results for each time segment

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	65.00	65.00	370.68	64.99	80.64	0.0	1.1	12.047	B
2	415.59	415.59	78.09	320.91	357.59	0.0	95.8	146.460	F
3	218.94	218.94	308.69	210.22	90.31	0.0	14.6	40.258	E
4	300.35	300.35	154.52	296.80	364.39	0.0	7.9	16.712	C

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	70.95	70.95	341.18	71.23	79.33	1.1	1.0	14.033	B
2	354.72	354.72	83.90	307.53	328.52	95.8	143.2	362.762	F
3	204.45	204.45	285.20	203.64	106.23	14.6	11.1	51.771	F
4	264.01	264.01	155.06	265.45	333.78	7.9	3.4	14.567	B

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	57.61	57.61	372.34	57.83	79.20	1.0	0.8	12.979	B
2	342.71	342.71	85.56	308.36	344.61	143.2	175.6	477.146	F
3	189.31	189.31	294.40	189.27	99.52	11.1	7.8	38.944	E
4	303.09	303.09	148.61	302.93	335.06	3.4	7.7	20.691	C

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

Arm	Total Demand (PCU/TS)	Junction Arrivals (PCU)	Circulating flow (PCU/TS)	Throughput (PCU/TS)	Throughput (exit side) (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	56.31	56.31	391.17	56.13	62.63	0.8	0.9	13.921	B
2	336.70	336.70	102.89	293.23	344.41	175.6	217.9	445.203	F
3	208.77	208.77	271.53	205.98	124.59	7.8	15.7	56.578	F
4	299.58	299.58	156.86	296.94	320.65	7.7	8.0	21.768	C

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	30.32	52.92	0.573	30.22	0.0	0.5	11.772	B
			2	4	34.67	58.78	0.590	34.78	0.0	0.5	11.552	B
	Exit	2	1	(1,2,3,4)	65.00			65.00	0.0	0.0	0.383	A
			1		80.64			80.64	0.0	0.0	0.000	A
2	Entry	1	1	3,4	353.36	256.07	1.380	258.63	0.0	95.5	171.375	F
			2	1,(4)	62.30	110.99	0.561	62.28	0.0	0.3	4.447	A
	Exit	2	1	(1,2,3,4)	415.59			415.66	0.0	0.0	0.070	A
			1		357.59			357.59	0.0	0.0	0.000	A
3	Entry	1	1	1,4	112.90	122.40	0.922	107.66	0.0	7.3	37.844	E
			2	2	102.62	120.41	0.852	102.55	0.0	2.0	15.243	C
	Exit	2	1	(1,2,3,4)	218.94			215.51	0.0	5.3	12.980	B
			1		90.31			90.31	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	300.35	332.60	0.903	296.80	0.0	7.9	16.712	C
	Exit	1	1		364.39			364.39	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	43.86	69.70	0.629	43.88	0.5	0.7	15.294	C
			2	4	27.09	43.70	0.620	27.35	0.5	0.3	11.603	B
	Exit	2	1	(1,2,3,4)	70.95			70.95	0.0	0.0	0.149	A
			1		79.33			79.33	0.0	0.0	0.000	A
2	Entry	1	1	3,4	301.76	254.06	1.188	254.79	95.5	142.9	426.034	F
			2	1,(4)	52.96	101.22	0.523	52.75	0.3	0.3	4.433	A
	Exit	2	1	(1,2,3,4)	354.72			354.71	0.0	0.0	0.025	A
			1		328.52			328.52	0.0	0.0	0.000	A
3	Entry	1	1	1,4	98.45	123.46	0.797	98.87	7.3	4.3	44.313	E
			2	2	105.04	126.15	0.833	104.77	2.0	2.0	17.215	C
	Exit	2	1	(1,2,3,4)	204.45			203.49	5.3	4.9	21.645	C
			1		106.23			106.23	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	264.01	320.21	0.825	265.45	7.9	3.4	14.567	B
	Exit	1	1		333.78			333.78	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	31.53	52.24	0.604	31.68	0.7	0.5	13.503	B
			2	4	26.09	46.29	0.564	26.15	0.3	0.4	12.054	B
	Exit	2	1	(1,2,3,4)	57.61			57.62	0.0	0.0	0.123	A
			1		79.20			79.20	0.0	0.0	0.000	A
2	Entry	1	1	3,4	286.18	253.47	1.129	251.96	142.9	175.3	570.810	F
			2	1,(4)	56.52	102.48	0.552	56.40	0.3	0.3	4.491	A
	Exit	2	1	(1,2,3,4)	342.71			342.70	0.0	0.0	0.033	A
			1		344.61			344.61	0.0	0.0	0.000	A
3	Entry	1	1	1,4	88.33	116.79	0.756	88.76	4.3	2.9	31.163	D
			2	2	100.51	121.95	0.824	100.51	2.0	1.9	16.596	C
	Exit	2	1	(1,2,3,4)	189.31			188.84	4.9	3.0	15.569	C
			1		99.52			99.52	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	303.09	336.15	0.902	302.93	3.4	7.7	20.691	C
	Exit	1	1		335.06			335.06	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/TS)	Capacity (PCU/TS)	RFC	Throughput (PCU/TS)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	31.89	54.07	0.590	31.83	0.5	0.6	14.482	B
			2	4	24.43	42.09	0.580	24.30	0.4	0.4	12.769	B
	Exit	2	1	(1,2,3,4)	56.31			56.31	0.0	0.0	0.200	A
			1		62.63			62.63	0.0	0.0	0.000	A
2	Entry	1	1	3,4	290.64	247.42	1.175	247.22	175.3	217.7	607.555	F
			2	1,(4)	46.04	83.12	0.554	46.01	0.3	0.2	4.402	A
	Exit	2	1	(1,2,3,4)	336.70			336.68	0.0	0.0	0.013	A
			1		344.41			344.41	0.0	0.0	0.000	A
3	Entry	1	1	1,4	83.18	116.46	0.714	82.63	2.9	2.4	23.265	C
			2	2	123.40	134.37	0.918	123.35	1.9	2.4	17.960	C
	Exit	2	1	(1,2,3,4)	208.77			206.57	3.0	10.9	36.787	E
			1		124.59			124.59	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	299.58	332.53	0.901	296.94	7.7	8.0	21.768	C
	Exit	1	1		320.65			320.65	0.0	0.0	0.000	A

Junctions 9	
ARCADY 9 - Roundabout Module	
Version: 9.0.0.4211 [] © Copyright TRL Limited, 2016	
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Filename: Welsh Dragon_Halton Roundabout_High_Low_Seasons_Rev1.j9

Path: C:\Welsh Dragon\Arcady\Halton Roundabout_Low_High Seasons

Report generation date: 23-Sep-16 6:38:23 PM

-
- »Halton Roundabout, 2018 Friday Low Season
 - »Halton Roundabout, 2018 Friday Low Season + Dev
 - »Halton Roundabout, 2028 Friday Low Season
 - »Halton Roundabout, 2028 Friday Low Season +Dev
 - »Halton Roundabout, 2018 Friday High Season
 - »Halton Roundabout, 2018 Friday High Season + Dev
 - »Halton Roundabout, 2028 Friday High Season
 - »Halton Roundabout, 2028 Friday High Season + Dev

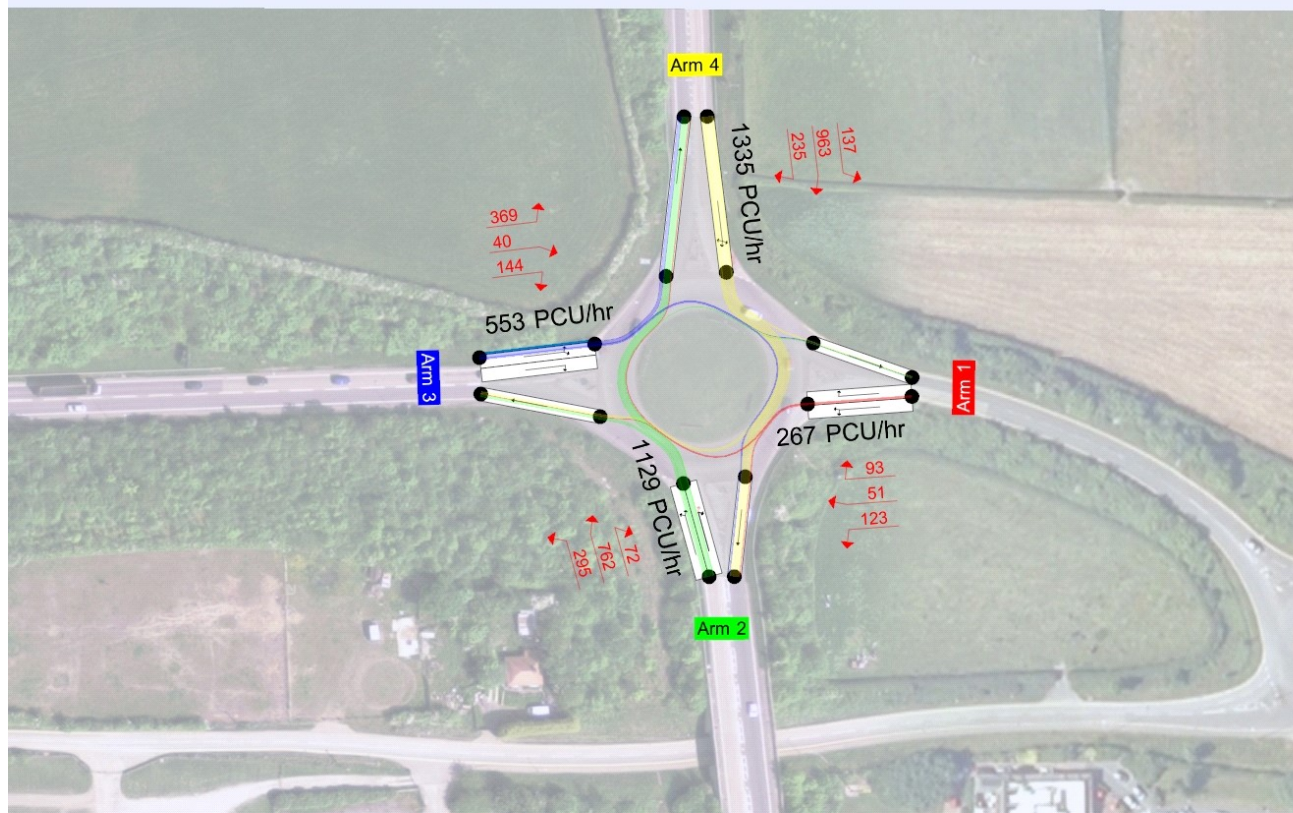
File summary

File Description

Title	Welsh Dragon - Halton Roundabout
Location	Chirk, Wales
Site number	
Date	14-Sep-16
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	1027
Enumerator	CDI_PC_1-PC*CDI_PC_1
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



Flow Overlay by Entry
Showing original traffic demand (PCU/hr).
Lane simulation visualisation time: 13:45:00

The junction diagram reflects the last run of Junctions.

Analysis Options

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

Lane Simulation options

Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Individual vehicle animation number of trials	Use crossings quick response	Last run random seed	Last run number of trials	Last run time taken (s)
1.00	100000	100000	-1	3	1	✓	1612566079	422	128.29

Demand Set Summary

Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
Halton Roundabout	2018 Friday Low Season	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2018 Friday Low Season + Dev	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2028 Friday Low Season	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2028 Friday Low Season +Dev	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2018 Friday High Season	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2018 Friday High Season + Dev	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2028 Friday High Season	ONE HOUR	13:45	15:15	15	✓
Halton Roundabout	2028 Friday High Season + Dev	ONE HOUR	13:45	15:15	15	✓

Halton Roundabout, 2018 Friday Low Season

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	133.43	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Black Park Access	
2	A5 Oswestry	
3	A5 Chirk	
4	A483 Wrexham	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	3.50	7.03	10.3	30.6	55.1	16.4	
2	5.39	7.88	23.8	32.4	55.0	26.7	
3	4.24	6.99	6.2	26.4	55.5	12.8	
4	3.93	6.63	12.2	37.5	55.2	28.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.596	1671.630
2	0.695	2265.546
3	0.610	1747.409
4	0.595	1719.724

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

Lane Simulation: Arm options

Arm	Lane capacity source	Traffic Considering Secondary Lanes (%)
1	Evenly split	10.00
2	Evenly split	10.00
3	Evenly split	10.00
4	Evenly split	10.00

Lanes

Arm	Lane level	Lane	Destination arms	Has limited storage	Storage (PCU)	Minimum capacity (PCU/hr)	Maximum capacity (PCU/hr)
1	1 [Give-way line]	1	2,3	✓	200.00	0.00	99999.00
		2	4	✓	3.00	0.00	99999.00
	2	1	(1,2,3,4)		Infinity		
2	1 [Give-way line]	1	3,4	✓	200.00	0.00	99999.00
		2	1,(4)	✓	3.00	0.00	99999.00
	2	1	(1,2,3,4)		Infinity		
3	1 [Give-way line]	1	1,4	✓	200.00	0.00	99999.00
		2	2	✓	3.00	0.00	99999.00
	2	1	(1,2,3,4)		Infinity		
4	1 [Give-way line]	1	1,2,3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Arm	Destination arms	Final slope	Final intercept (PCU/hr)
1	2,3	0.298	835.815
	4	0.298	835.815
2	3,4	0.348	1132.773
	1,(4)	0.348	1132.773
3	1,4	0.305	873.705
	2	0.305	873.705
4	1,2,3	0.595	1719.724

Lane Movements

Junction	Arm	Lane Level	Lane	Arm			
				1	2	3	4
1	1	1 [Give-way line]	1		✓	✓	
			2				✓
	2	2	1	✓	✓	✓	✓
			2				
		1 [Give-way line]	1			✓	✓
			2	✓			
		2	1	✓	✓	✓	✓
			2				
	3	1 [Give-way line]	1	✓			✓
			2		✓		
	4	2	1	✓	✓	✓	✓
			2				
	4	1 [Give-way line]	1	✓	✓	✓	
			2				

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D1	Halton Roundabout	2018 Friday Low Season	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	100.00	100.000
2		ONE HOUR	✓	1200.00	100.000
3		ONE HOUR	✓	769.00	100.000
4		ONE HOUR	✓	1066.00	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0.000	55.000	12.000	33.000
	2	23.000	0.000	259.000	918.000
	3	14.000	255.000	0.000	500.000
	4	45.000	771.000	250.000	0.000

Proportions

		To			
		1	2	3	4
From	1	0.00	0.55	0.12	0.33
	2	0.02	0.00	0.22	0.77
	3	0.02	0.33	0.00	0.65
	4	0.04	0.72	0.23	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	75.29	75.29
	2	903.42	903.42
	3	578.94	578.94
	4	802.54	802.54
14:00-14:15	1	89.90	89.90
	2	1078.78	1078.78
	3	691.32	691.32
	4	958.31	958.31
14:15-14:30	1	110.10	110.10
	2	1321.22	1321.22
	3	846.68	846.68
	4	1173.69	1173.69
14:30-14:45	1	110.10	110.10
	2	1321.22	1321.22
	3	846.68	846.68
	4	1173.69	1173.69
14:45-15:00	1	89.90	89.90
	2	1078.78	1078.78
	3	691.32	691.32
	4	958.31	958.31
15:00-15:15	1	75.29	75.29
	2	903.42	903.42
	3	578.94	578.94
	4	802.54	802.54

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	10.66	0.3	B	92.83	139.24
2	298.56	100.8	F	1103.42	1655.13
3	62.13	16.3	F	705.63	1058.44
4	10.13	3.3	B	977.33	1466.00

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	75.95	18.99	959.63	75.64	63.67	0.0	0.2	6.578	A
2	910.41	227.60	220.12	909.44	815.15	0.0	3.7	13.291	B
3	576.68	144.17	733.39	577.93	396.17	0.0	1.7	10.716	B
4	805.62	201.41	219.67	803.63	1091.66	0.0	1.2	4.400	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	92.30	23.08	1147.19	92.33	75.44	0.2	0.2	7.985	A
2	1086.88	271.72	266.33	1063.34	973.19	3.7	11.8	29.943	D
3	694.49	173.62	862.35	693.24	467.32	1.7	3.8	18.029	C
4	961.34	240.33	262.27	960.37	1293.33	1.2	1.6	6.053	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	112.09	28.02	1408.18	112.24	91.14	0.2	0.3	10.026	B
2	1323.95	330.99	328.27	1148.82	1192.15	11.8	56.7	113.156	F
3	841.65	210.41	944.53	822.74	532.55	3.8	12.2	42.404	E
4	1174.46	293.62	323.06	1176.26	1444.21	1.6	3.2	9.594	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	110.99	27.75	1404.57	111.47	87.30	0.3	0.3	10.664	B
2	1331.23	332.81	323.57	1153.79	1192.46	56.7	100.8	254.228	F
3	852.91	213.23	947.29	831.36	530.08	12.2	16.3	62.126	F
4	1167.64	291.91	323.60	1168.27	1455.04	3.2	3.3	10.133	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	91.34	22.83	1141.76	90.94	74.16	0.3	0.2	8.476	A
2	1068.00	267.00	263.89	1139.09	968.82	100.8	86.3	298.562	F
3	693.78	173.45	922.81	712.32	480.17	16.3	6.8	46.469	E
4	953.55	238.39	260.76	955.17	1374.37	3.3	1.5	6.298	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	74.30	18.58	957.61	74.39	63.13	0.2	0.1	7.109	A
2	900.06	225.01	217.14	1088.33	814.86	86.3	34.7	178.118	F
3	574.24	143.56	873.50	578.87	431.97	6.8	2.3	18.626	C
4	801.38	200.35	219.01	801.73	1233.36	1.5	1.0	4.671	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	51.67	105.36	0.490	51.73	0.0	0.1	6.811	A
			2	4	24.28	59.16	0.410	23.91	0.0	0.1	6.091	A
	Exit	1	1	(1,2,3,4)	75.95			75.95	0.0	0.0	0.000	A
			1		63.67			63.67	0.0	0.0	0.000	A
2	Entry	1	1	3,4	832.07	1007.31	0.826	830.82	0.0	3.6	14.182	B
			2	1,(4)	78.34	142.15	0.551	78.63	0.0	0.1	3.602	A
	Exit	2	1	(1,2,3,4)	910.41			910.41	0.0	0.0	0.000	A
			1		815.15			815.15	0.0	0.0	0.000	A
3	Entry	1	1	1,4	384.48	530.19	0.725	386.36	0.0	1.3	12.229	B
			2	2	192.06	325.11	0.591	191.57	0.0	0.4	7.277	A
	Exit	2	1	(1,2,3,4)	576.68			576.54	0.0	0.0	0.138	A
			1		396.17			396.17	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	805.62	1262.90	0.638	803.63	0.0	1.2	4.400	A
	Exit	1	1		1091.66			1091.66	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	61.99	116.98	0.530	62.16	0.1	0.1	8.013	A
			2	4	30.31	63.28	0.479	30.17	0.1	0.1	7.928	A
	Exit	2	1	(1,2,3,4)	92.30			92.30	0.0	0.0	0.000	A
			1		75.44			75.44	0.0	0.0	0.000	A
2	Entry	1	1	3,4	987.67	1036.77	0.953	964.46	3.6	11.7	32.571	D
			2	1,(4)	99.21	178.19	0.557	98.87	0.1	0.1	3.768	A
	Exit	2	1	(1,2,3,4)	1086.88			1086.88	0.0	0.0	0.000	A
			1		973.19			973.19	0.0	0.0	0.000	A
3	Entry	1	1	1,4	464.84	575.07	0.808	465.04	1.3	3.1	22.194	C
			2	2	229.31	375.62	0.610	228.20	0.4	0.6	8.731	A
	Exit	2	1	(1,2,3,4)	694.49			694.15	0.0	0.1	0.303	A
			1		467.32			467.32	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	961.34	1319.09	0.729	960.37	1.2	1.6	6.053	A
	Exit	1	1		1293.33			1293.33	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	74.19	128.02	0.580	74.67	0.1	0.2	10.404	B
			2	4	37.91	75.09	0.505	37.56	0.1	0.1	9.271	A
	Exit	2	1	(1,2,3,4)	112.09			112.09	0.0	0.0	0.001	A
			1		91.14			91.14	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1194.65	1018.75	1.173	1019.52	11.7	56.6	124.544	F
			2	1,(4)	129.30	237.07	0.545	129.30	0.1	0.1	3.977	A
	Exit	2	1	(1,2,3,4)	1323.95			1323.95	0.0	0.0	0.000	A
			1		1192.15			1192.15	0.0	0.0	0.000	A
3	Entry	1	1	1,4	562.24	583.35	0.964	541.82	3.1	11.3	56.686	F
			2	2	280.29	421.46	0.665	280.92	0.6	0.8	10.481	B
	Exit	2	1	(1,2,3,4)	841.65			842.53	0.1	0.2	1.005	A
			1		532.55			532.55	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1174.46	1452.63	0.809	1176.26	1.6	3.2	9.594	A
	Exit	1	1		1444.21			1444.21	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	73.25	138.16	0.530	73.56	0.2	0.2	11.066	B
			2	4	37.73	68.42	0.552	37.91	0.1	0.1	9.880	A
	Exit	2	1	(1,2,3,4)	110.99			110.99	0.0	0.0	0.004	A
			1		87.30			87.30	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1204.27	1020.33	1.180	1026.34	56.6	100.7	280.906	F
			2	1,(4)	126.97	226.63	0.560	127.45	0.1	0.1	3.988	A
	Exit	2	1	(1,2,3,4)	1331.23			1331.23	0.0	0.0	0.001	A
			1		1192.46			1192.46	0.0	0.0	0.000	A
3	Entry	1	1	1,4	571.36	582.09	0.982	547.36	11.3	15.3	86.100	F
			2	2	283.00	424.99	0.666	283.99	0.8	0.9	10.629	B
	Exit	2	1	(1,2,3,4)	852.91			854.36	0.2	0.2	1.057	A
			1		530.08			530.08	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1167.64	1442.18	0.810	1168.27	3.2	3.3	10.133	B
	Exit	1	1		1455.04			1455.04	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	60.94	116.93	0.521	60.31	0.2	0.2	8.668	A
			2	4	30.40	62.39	0.487	30.63	0.1	0.1	8.102	A
	Exit	2	1	(1,2,3,4)	91.34			91.34	0.0	0.0	0.001	A
			1		74.16			74.16	0.0	0.0	0.000	A
2	Entry	1	1	3,4	967.65	1041.08	0.929	1039.08	100.7	86.1	328.803	F
			2	1,(4)	100.15	202.39	0.495	100.01	0.1	0.1	3.868	A
	Exit	2	1	(1,2,3,4)	1068.00			1067.80	0.0	0.1	0.175	A
			1		968.82			968.82	0.0	0.0	0.000	A
3	Entry	1	1	1,4	466.07	569.72	0.818	484.32	15.3	6.1	64.237	F
			2	2	227.69	358.59	0.635	228.00	0.9	0.6	9.371	A
	Exit	2	1	(1,2,3,4)	693.78			693.75	0.2	0.1	0.413	A
			1		480.17			480.17	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	953.55	1330.79	0.717	955.17	3.3	1.5	6.298	A
	Exit	1	1		1374.37			1374.37	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	49.51	83.72	0.591	49.65	0.2	0.1	7.205	A
			2	4	24.80	46.73	0.531	24.74	0.1	0.0	6.911	A
	Exit	2	1	(1,2,3,4)	74.30			74.30	0.0	0.0	0.001	A
			1		63.13			63.13	0.0	0.0	0.000	A
2	Entry	1	1	3,4	814.89	1045.25	0.780	1003.05	86.1	34.6	198.972	F
			2	1,(4)	85.17	161.00	0.529	85.28	0.1	0.1	3.721	A
	Exit	2	1	(1,2,3,4)	900.06			900.06	0.1	0.0	0.020	A
			1		814.86			814.86	0.0	0.0	0.000	A
3	Entry	1	1	1,4	382.83	516.19	0.742	387.95	6.1	1.8	23.333	C
			2	2	191.23	325.13	0.588	190.92	0.6	0.5	8.616	A
	Exit	2	1	(1,2,3,4)	574.24			574.07	0.1	0.0	0.219	A
			1		431.97			431.97	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	801.38	1197.72	0.669	801.73	1.5	1.0	4.671	A
	Exit	1	1		1233.36			1233.36	0.0	0.0	0.000	A

Halton Roundabout, 2018 Friday Low Season + Dev

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	136.11	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D2	Halton Roundabout	2018 Friday Low Season + Dev	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	136.00	100.000
2		ONE HOUR	✓	1209.00	100.000
3		ONE HOUR	✓	775.00	100.000
4		ONE HOUR	✓	1074.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1	2	3	4
	1	0.000	69.000	20.000	47.000
	2	37.000	0.000	258.000	914.000
	3	23.000	254.000	0.000	498.000
	4	58.000	767.000	249.000	0.000

Proportions

	To				
From		1	2	3	4
	1	0.00	0.51	0.15	0.35
	2	0.03	0.00	0.21	0.76
	3	0.03	0.33	0.00	0.64
	4	0.05	0.71	0.23	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
From		1	2	3	4
	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
From		1	2	3	4
	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	102.39	102.39
	2	910.20	910.20
	3	583.46	583.46
	4	808.56	808.56
14:00-14:15	1	122.26	122.26
	2	1086.87	1086.87
	3	696.71	696.71
	4	965.50	965.50
14:15-14:30	1	149.74	149.74
	2	1331.13	1331.13
	3	853.29	853.29
	4	1182.50	1182.50
14:30-14:45	1	149.74	149.74
	2	1331.13	1331.13
	3	853.29	853.29
	4	1182.50	1182.50
14:45-15:00	1	122.26	122.26
	2	1086.87	1086.87
	3	696.71	696.71
	4	965.50	965.50
15:00-15:15	1	102.39	102.39
	2	910.20	910.20
	3	583.46	583.46
	4	808.56	808.56

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	10.74	0.4	B	124.44	186.66
2	302.87	102.2	F	1111.23	1666.84
3	70.72	17.8	F	708.92	1063.38
4	10.82	3.6	B	984.48	1476.73

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	105.32	26.33	958.31	105.65	88.81	0.0	0.2	6.657	A
2	916.70	229.17	238.39	915.39	825.57	0.0	3.7	12.989	B
3	579.00	144.75	758.19	579.97	395.59	0.0	1.8	10.944	B
4	808.01	202.00	238.09	809.03	1100.07	0.0	1.0	4.492	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	120.66	30.17	1139.26	120.13	105.32	0.2	0.3	8.327	A
2	1083.58	270.89	283.27	1072.79	976.12	3.7	11.1	29.996	D
3	696.90	174.22	883.63	695.78	472.43	1.8	4.1	18.946	C
4	965.79	241.45	281.83	962.74	1297.58	1.0	1.8	5.988	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	149.20	37.30	1392.49	149.55	129.49	0.3	0.4	10.467	B
2	1331.31	332.83	345.79	1147.33	1196.25	11.1	57.7	113.258	F
3	851.67	212.92	959.83	824.34	533.30	4.1	13.3	44.447	E
4	1179.44	294.86	341.71	1180.27	1442.46	1.8	3.6	10.416	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	148.01	37.00	1394.16	147.80	129.00	0.4	0.4	10.739	B
2	1329.97	332.49	346.12	1151.35	1195.84	57.7	102.2	257.452	F
3	851.37	212.84	963.53	836.55	533.94	13.3	17.8	70.721	F
4	1181.60	295.40	342.31	1180.86	1457.77	3.6	3.5	10.822	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	120.43	30.11	1137.19	120.73	107.65	0.4	0.3	8.776	A
2	1089.13	272.28	282.23	1145.83	975.69	102.2	88.8	302.866	F
3	693.65	173.41	942.80	715.00	485.27	17.8	7.8	52.936	F
4	963.60	240.90	279.37	965.47	1378.42	3.5	1.6	6.504	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	103.02	25.75	956.70	102.59	90.61	0.3	0.2	7.455	A
2	916.70	229.17	240.87	1089.43	818.43	88.8	39.6	186.735	F
3	580.94	145.23	887.91	588.77	442.39	7.8	2.4	20.411	C
4	808.48	202.12	238.06	809.25	1238.62	1.6	1.1	4.765	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	68.25	123.46	0.553	68.48	0.0	0.1	6.785	A
			2	4	37.07	69.26	0.535	37.17	0.0	0.1	6.415	A
	Exit	1	1	(1,2,3,4)	105.32			105.32	0.0	0.0	0.000	A
			1		88.81			88.81	0.0	0.0	0.000	A
2	Entry	1	1	3,4	826.85	1000.37	0.827	825.46	0.0	3.6	13.989	B
			2	1,(4)	89.85	171.96	0.523	89.93	0.0	0.1	3.652	A
	Exit	1	1	(1,2,3,4)	916.70			916.70	0.0	0.0	0.000	A
			1		825.57			825.57	0.0	0.0	0.000	A
3	Entry	1	1	1,4	386.79	544.65	0.710	386.85	0.0	1.4	12.511	B
			2	2	192.63	315.32	0.611	193.12	0.0	0.4	7.366	A
	Exit	1	1	(1,2,3,4)	579.00			579.42	0.0	0.0	0.121	A
			1		395.59			395.59	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	808.01	1183.15	0.683	809.03	0.0	1.0	4.492	A
	Exit	1	1		1100.07			1100.07	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	78.67	152.28	0.517	78.23	0.1	0.2	8.551	A
			2	4	41.99	81.56	0.515	41.90	0.1	0.1	7.898	A
	Exit	1	1	(1,2,3,4)	120.66			120.66	0.0	0.0	0.001	A
			1		105.32			105.32	0.0	0.0	0.000	A
2	Entry	1	1	3,4	972.66	1028.90	0.945	962.11	3.6	11.0	32.966	D
			2	1,(4)	110.92	220.84	0.502	110.68	0.1	0.1	3.875	A
	Exit	1	1	(1,2,3,4)	1083.58			1083.58	0.0	0.0	0.000	A
			1		976.12			976.12	0.0	0.0	0.000	A
3	Entry	1	1	1,4	466.94	568.72	0.821	466.72	1.4	3.4	23.313	C
			2	2	229.48	372.06	0.617	229.06	0.4	0.6	8.889	A
	Exit	1	1	(1,2,3,4)	696.90			696.43	0.0	0.1	0.376	A
			1		472.43			472.43	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	965.79	1331.66	0.725	962.74	1.0	1.8	5.988	A
	Exit	1	1		1297.58			1297.58	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	97.20	163.80	0.593	97.51	0.2	0.3	10.956	B
			2	4	52.01	93.82	0.554	52.04	0.1	0.1	9.536	A
	Exit	2	1	(1,2,3,4)	149.20			149.20	0.0	0.0	0.002	A
			1		129.49			129.49	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1190.98	1012.56	1.176	1007.20	11.0	57.6	126.080	F
			2	1,(4)	140.33	264.79	0.530	140.14	0.1	0.2	4.109	A
	Exit	2	1	(1,2,3,4)	1331.31			1331.31	0.0	0.0	0.002	A
			1		1196.25			1196.25	0.0	0.0	0.000	A
3	Entry	1	1	1,4	573.98	580.51	0.989	547.30	3.4	12.2	59.414	F
			2	2	278.22	429.64	0.648	277.04	0.6	0.9	10.412	B
	Exit	2	1	(1,2,3,4)	851.67			852.20	0.1	0.3	1.055	A
			1		533.30			533.30	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1179.44	1440.74	0.819	1180.27	1.8	3.6	10.416	B
	Exit	1	1		1442.46			1442.46	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	96.63	174.78	0.553	96.49	0.3	0.3	11.256	B
			2	4	51.31	96.40	0.532	51.31	0.1	0.1	9.742	A
	Exit	2	1	(1,2,3,4)	148.01			147.94	0.0	0.0	0.008	A
			1		129.00			129.00	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1187.09	1012.50	1.172	1009.07	57.6	102.0	287.457	F
			2	1,(4)	142.64	281.44	0.507	142.28	0.2	0.2	4.117	A
	Exit	2	1	(1,2,3,4)	1329.97			1329.73	0.0	0.0	0.014	A
			1		1195.84			1195.84	0.0	0.0	0.000	A
3	Entry	1	1	1,4	573.02	578.40	0.991	559.92	12.2	16.7	98.073	F
			2	2	277.42	424.23	0.654	276.63	0.9	0.9	10.689	B
	Exit	2	1	(1,2,3,4)	851.37			850.44	0.3	0.3	1.110	A
			1		533.94			533.94	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1181.60	1438.98	0.821	1180.86	3.6	3.5	10.822	B
	Exit	1	1		1457.77			1457.77	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	78.56	138.93	0.565	78.61	0.3	0.2	8.962	A
			2	4	41.87	79.96	0.524	42.12	0.1	0.1	8.407	A
	Exit	2	1	(1,2,3,4)	120.43			120.43	0.0	0.0	0.005	A
			1		107.65			107.65	0.0	0.0	0.000	A
2	Entry	1	1	3,4	974.19	1034.55	0.942	1031.20	102.0	88.6	337.548	F
			2	1,(4)	114.42	200.98	0.569	114.64	0.2	0.1	3.895	A
	Exit	2	1	(1,2,3,4)	1089.13			1088.61	0.0	0.1	0.274	A
			1		975.69			975.69	0.0	0.0	0.000	A
3	Entry	1	1	1,4	469.58	567.57	0.827	490.19	16.7	7.2	73.338	F
			2	2	224.56	364.05	0.617	224.81	0.9	0.6	9.566	A
	Exit	2	1	(1,2,3,4)	693.65			694.14	0.3	0.0	0.473	A
			1		485.27			485.27	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	963.60	1316.85	0.732	965.47	3.5	1.6	6.504	A
	Exit	1	1		1378.42			1378.42	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	67.14	132.43	0.507	66.67	0.2	0.2	7.657	A
			2	4	35.87	66.04	0.543	35.92	0.1	0.1	7.067	A
	Exit	2	1	(1,2,3,4)	103.02			103.02	0.0	0.0	0.001	A
			1		90.61			90.61	0.0	0.0	0.000	A
2	Entry	1	1	3,4	822.70	1038.18	0.792	995.16	88.6	39.5	211.486	F
			2	1,(4)	94.08	182.90	0.514	94.27	0.1	0.1	3.764	A
	Exit	2	1	(1,2,3,4)	916.70			916.78	0.1	0.0	0.168	A
			1		818.43			818.43	0.0	0.0	0.000	A
3	Entry	1	1	1,4	391.27	528.97	0.740	397.43	7.2	2.0	25.884	D
			2	2	189.84	308.38	0.616	191.34	0.6	0.4	8.563	A
	Exit	2	1	(1,2,3,4)	580.94			581.11	0.0	0.0	0.208	A
			1		442.39			442.39	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	808.48	1195.16	0.676	809.25	1.6	1.1	4.765	A
	Exit	1	1		1238.62			1238.62	0.0	0.0	0.000	A

Halton Roundabout, 2028 Friday Low Season

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	239.15	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D3	Halton Roundabout	2028 Friday Low Season	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	109.00	100.000
2		ONE HOUR	✓	1301.00	100.000
3		ONE HOUR	✓	833.00	100.000
4		ONE HOUR	✓	1154.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1	2	3	4
	1	0.000	60.000	13.000	36.000
	2	25.000	0.000	281.000	995.000
	3	15.000	276.000	0.000	542.000
	4	49.000	835.000	270.000	0.000

Proportions

	To				
From		1	2	3	4
	1	0.00	0.55	0.12	0.33
	2	0.02	0.00	0.22	0.76
	3	0.02	0.33	0.00	0.65
	4	0.04	0.72	0.23	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
From		1	2	3	4
	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
From		1	2	3	4
	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	82.06	82.06
	2	979.46	979.46
	3	627.13	627.13
	4	868.79	868.79
14:00-14:15	1	97.99	97.99
	2	1169.57	1169.57
	3	748.85	748.85
	4	1037.42	1037.42
14:15-14:30	1	120.01	120.01
	2	1432.43	1432.43
	3	917.15	917.15
	4	1270.58	1270.58
14:30-14:45	1	120.01	120.01
	2	1432.43	1432.43
	3	917.15	917.15
	4	1270.58	1270.58
14:45-15:00	1	97.99	97.99
	2	1169.57	1169.57
	3	748.85	748.85
	4	1037.42	1037.42
15:00-15:15	1	82.06	82.06
	2	979.46	979.46
	3	627.13	627.13
	4	868.79	868.79

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	11.89	0.4	B	100.51	150.76
2	542.11	173.4	F	1195.89	1793.84
3	104.79	28.6	F	763.09	1144.63
4	15.77	5.4	C	1060.70	1591.05

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	85.48	21.37	1038.80	85.07	69.81	0.0	0.2	6.911	A
2	984.21	246.05	240.95	981.65	882.93	0.0	5.8	17.825	C
3	622.72	155.68	798.93	619.13	423.67	0.0	2.7	12.719	B
4	879.46	219.87	230.80	877.81	1187.26	0.0	1.4	5.088	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	100.66	25.16	1240.58	100.66	81.32	0.2	0.2	8.626	A
2	1173.44	293.36	291.30	1120.49	1049.94	5.8	23.1	51.955	F
3	745.77	186.44	911.26	739.55	500.54	2.7	6.1	24.493	C
4	1039.09	259.77	283.46	1038.43	1367.34	1.4	2.1	6.813	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	118.47	29.62	1528.95	119.96	95.63	0.2	0.3	11.289	B
2	1420.78	355.20	346.64	1139.63	1302.27	23.1	93.8	193.032	F
3	926.76	231.69	938.43	876.95	547.84	6.1	20.6	63.190	F
4	1273.28	318.32	351.05	1273.53	1464.33	2.1	5.3	14.139	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	121.65	30.41	1520.78	121.69	96.41	0.3	0.4	11.890	B
2	1441.69	360.42	353.69	1133.65	1288.78	93.8	167.1	420.238	F
3	916.25	229.06	938.97	890.56	548.37	20.6	28.6	104.786	F
4	1266.80	316.70	347.84	1269.36	1481.69	5.3	5.4	15.768	C

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	95.30	23.82	1242.68	94.56	81.53	0.4	0.3	9.445	A
2	1167.42	291.86	283.71	1152.87	1053.53	167.1	173.4	542.112	F
3	744.78	186.20	937.03	780.54	499.55	28.6	15.8	93.057	F
4	1039.46	259.87	284.37	1039.84	1433.20	5.4	2.0	7.731	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	81.48	20.37	1032.45	81.28	68.41	0.3	0.2	7.808	A
2	987.79	246.95	237.81	1158.31	875.92	173.4	133.7	427.608	F
3	622.23	155.56	932.91	644.04	463.22	15.8	4.8	39.710	E
4	866.10	216.53	237.40	863.46	1339.55	2.0	1.2	5.204	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	56.82	104.33	0.545	56.70	0.0	0.1	6.942	A
			2	4	28.66	60.97	0.470	28.37	0.0	0.1	6.827	A
	Exit	1	1	(1,2,3,4)	85.48			85.48	0.0	0.0	0.007	A
			1		69.81			69.81	0.0	0.0	0.000	A
2	Entry	1	1	3,4	896.49	1024.55	0.875	893.65	0.0	5.7	19.202	C
			2	1,(4)	87.71	176.59	0.497	88.00	0.0	0.1	3.673	A
	Exit	1	1	(1,2,3,4)	984.21			984.21	0.0	0.0	0.000	A
			1		882.93			882.93	0.0	0.0	0.000	A
3	Entry	1	1	1,4	421.36	559.58	0.753	418.56	0.0	2.2	15.086	C
			2	2	201.20	349.49	0.576	200.58	0.0	0.5	7.529	A
	Exit	1	1	(1,2,3,4)	622.72			622.56	0.0	0.0	0.117	A
			1		423.67			423.67	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	879.46	1321.96	0.665	877.81	0.0	1.4	5.088	A
	Exit	1	1		1187.26			1187.26	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	66.93	117.03	0.572	67.18	0.1	0.1	8.834	A
			2	4	33.73	73.16	0.461	33.48	0.1	0.1	8.211	A
	Exit	1	1	(1,2,3,4)	100.66			100.66	0.0	0.0	0.000	A
			1		81.32			81.32	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1060.91	1030.88	1.029	1007.59	5.7	23.0	56.990	F
			2	1,(4)	112.54	192.20	0.586	112.91	0.1	0.1	3.819	A
	Exit	1	1	(1,2,3,4)	1173.44			1173.44	0.0	0.0	0.001	A
			1		1049.94			1049.94	0.0	0.0	0.000	A
3	Entry	1	1	1,4	497.61	577.04	0.862	493.07	2.2	5.1	31.126	D
			2	2	246.43	393.78	0.626	246.47	0.5	0.7	9.351	A
	Exit	1	1	(1,2,3,4)	745.77			744.04	0.0	0.3	0.546	A
			1		500.54			500.54	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1039.09	1381.79	0.752	1038.43	1.4	2.1	6.813	A
	Exit	1	1		1367.34			1367.34	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	81.28	129.04	0.630	82.23	0.1	0.2	12.015	B
			2	4	37.20	61.85	0.601	37.73	0.1	0.1	9.821	A
	Exit	2	1	(1,2,3,4)	118.47			118.47	0.0	0.0	0.000	A
			1		95.63			95.63	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1286.39	1012.20	1.271	1004.91	23.0	93.7	212.520	F
			2	1,(4)	134.43	228.60	0.588	134.72	0.1	0.1	4.048	A
	Exit	2	1	(1,2,3,4)	1420.78			1420.82	0.0	0.0	0.001	A
			1		1302.27			1302.27	0.0	0.0	0.000	A
3	Entry	1	1	1,4	617.24	587.73	1.050	568.95	5.1	19.3	86.471	F
			2	2	310.06	467.13	0.664	308.00	0.7	1.0	10.838	B
	Exit	2	1	(1,2,3,4)	926.76			927.30	0.3	0.3	1.675	A
			1		547.84			547.84	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1273.28	1477.40	0.862	1273.53	2.1	5.3	14.139	B
	Exit	1	1		1464.33			1464.33	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	81.20	141.47	0.574	81.57	0.2	0.3	12.261	B
			2	4	40.45	82.58	0.490	40.12	0.1	0.1	11.099	B
	Exit	2	1	(1,2,3,4)	121.65			121.65	0.0	0.0	0.014	A
			1		96.41			96.41	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1272.37	1009.97	1.260	999.63	93.7	163.6	459.738	F
			2	1,(4)	133.69	234.52	0.570	134.02	0.1	0.1	4.124	A
	Exit	2	1	(1,2,3,4)	1441.69			1406.06	0.0	3.3	1.830	A
			1		1288.78			1288.78	0.0	0.0	0.000	A
3	Entry	1	1	1,4	610.31	587.17	1.039	585.53	19.3	27.3	148.963	F
			2	2	306.19	457.21	0.670	305.03	1.0	1.0	11.077	B
	Exit	2	1	(1,2,3,4)	916.25			916.49	0.3	0.4	1.803	A
			1		548.37			548.37	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1266.80	1478.73	0.857	1269.36	5.3	5.4	15.768	C
	Exit	1	1		1481.69			1481.69	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	62.68	128.33	0.488	62.10	0.3	0.2	9.642	A
			2	4	32.62	59.07	0.552	32.45	0.1	0.1	9.056	A
	Exit	2	1	(1,2,3,4)	95.30			95.30	0.0	0.0	0.001	A
			1		81.53			81.53	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1039.96	1034.11	1.006	1040.29	163.6	165.5	575.964	F
			2	1,(4)	112.12	194.91	0.575	112.58	0.1	0.1	3.907	A
	Exit	2	1	(1,2,3,4)	1167.42			1152.08	3.3	7.8	19.220	C
			1		1053.53			1053.53	0.0	0.0	0.000	A
3	Entry	1	1	1,4	501.28	579.47	0.865	535.84	27.3	15.0	132.881	F
			2	2	244.70	387.15	0.632	244.70	1.0	0.7	9.837	A
	Exit	2	1	(1,2,3,4)	744.78			745.98	0.4	0.1	0.702	A
			1		499.55			499.55	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1039.46	1389.36	0.748	1039.84	5.4	2.0	7.731	A
	Exit	1	1		1433.20			1433.20	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	53.73	111.17	0.483	53.48	0.2	0.1	8.045	A
			2	4	27.75	53.06	0.523	27.79	0.1	0.1	7.328	A
	Exit	2	1	(1,2,3,4)	81.48			81.48	0.0	0.0	0.000	A
			1		68.41			68.41	0.0	0.0	0.000	A
2	Entry	1	1	3,4	903.63	1049.99	0.861	1060.49	165.5	131.1	505.284	F
			2	1,(4)	97.73	175.77	0.556	97.81	0.1	0.1	3.776	A
	Exit	2	1	(1,2,3,4)	987.79			1001.36	7.8	2.5	14.511	B
			1		875.92			875.92	0.0	0.0	0.000	A
3	Entry	1	1	1,4	417.69	553.14	0.755	438.80	15.0	4.2	54.615	F
			2	2	204.74	339.63	0.603	205.24	0.7	0.5	8.853	A
	Exit	2	1	(1,2,3,4)	622.23			622.43	0.1	0.0	0.269	A
			1		463.22			463.22	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	866.10	1247.07	0.695	863.46	2.0	1.2	5.204	A
	Exit	1	1		1339.55			1339.55	0.0	0.0	0.000	A

Halton Roundabout, 2028 Friday Low Season +Dev

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.
Last Run	Lane Simulation	Arm 2 - Lane Simulation	Arm 2: Queue at end of modelled period is greater than 10 PCU. Delay is likely to have been underestimated.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	242.04	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D4	Halton Roundabout	2028 Friday Low Season +Dev	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	145.00	100.000
2		ONE HOUR	✓	1310.00	100.000
3		ONE HOUR	✓	839.00	100.000
4		ONE HOUR	✓	1162.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1	2	3	4
	1	0.000	74.000	21.000	50.000
	2	39.000	0.000	280.000	991.000
	3	24.000	275.000	0.000	540.000
	4	62.000	831.000	269.000	0.000

Proportions

	To				
From		1	2	3	4
	1	0.00	0.51	0.14	0.34
	2	0.03	0.00	0.21	0.76
	3	0.03	0.33	0.00	0.64
	4	0.05	0.72	0.23	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
From		1	2	3	4
	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
From		1	2	3	4
	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	109.16	109.16
	2	986.24	986.24
	3	631.64	631.64
	4	874.81	874.81
14:00-14:15	1	130.35	130.35
	2	1177.66	1177.66
	3	754.24	754.24
	4	1044.61	1044.61
14:15-14:30	1	159.65	159.65
	2	1442.34	1442.34
	3	923.76	923.76
	4	1279.39	1279.39
14:30-14:45	1	159.65	159.65
	2	1442.34	1442.34
	3	923.76	923.76
	4	1279.39	1279.39
14:45-15:00	1	130.35	130.35
	2	1177.66	1177.66
	3	754.24	754.24
	4	1044.61	1044.61
15:00-15:15	1	109.16	109.16
	2	986.24	986.24
	3	631.64	631.64
	4	874.81	874.81

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	12.08	0.6	B	134.70	202.04
2	540.22	175.6	F	1199.67	1799.51
3	130.78	36.6	F	766.99	1150.48
4	15.45	6.4	C	1065.35	1598.02

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	112.24	28.06	1041.00	111.33	90.33	0.0	0.3	7.114	A
2	992.02	248.01	260.28	984.91	892.04	0.0	5.7	16.538	C
3	624.78	156.20	812.02	621.72	433.17	0.0	2.6	12.613	B
4	878.22	219.55	253.24	878.09	1180.50	0.0	1.1	5.089	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	136.17	34.04	1230.98	135.07	108.39	0.3	0.4	8.780	A
2	1166.80	291.70	308.35	1103.61	1057.70	5.7	22.5	50.146	F
3	741.46	185.36	918.78	730.30	493.17	2.6	6.3	25.524	D
4	1037.15	259.29	296.41	1042.96	1352.67	1.1	2.0	7.117	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	161.48	40.37	1507.76	161.93	135.13	0.4	0.6	11.539	B
2	1456.83	364.21	375.85	1147.04	1293.85	22.5	96.7	194.027	F
3	926.35	231.59	969.65	864.98	553.24	6.3	23.3	68.682	F
4	1284.39	321.10	366.00	1276.89	1468.63	2.0	6.4	14.996	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	156.59	39.15	1503.33	157.04	141.59	0.6	0.6	12.079	B
2	1429.50	357.38	370.57	1154.93	1289.80	96.7	166.4	422.746	F
3	918.65	229.66	965.93	868.63	559.57	23.3	36.6	130.741	F
4	1275.65	318.91	366.91	1278.00	1467.65	6.4	5.5	15.448	C

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	130.43	32.61	1236.91	131.28	115.11	0.6	0.3	9.862	A
2	1167.20	291.80	306.78	1147.63	1061.41	166.4	175.6	540.222	F
3	758.74	189.68	953.87	808.70	500.54	36.6	24.4	130.782	F
4	1045.50	261.38	305.09	1046.93	1457.48	5.5	1.8	8.332	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	111.26	27.82	1026.39	111.07	99.52	0.3	0.3	7.970	A
2	985.70	246.42	254.09	1155.52	883.37	175.6	136.1	433.457	F
3	631.96	157.99	945.72	668.93	463.89	24.4	7.3	59.186	F
4	871.17	217.79	253.89	872.02	1360.76	1.8	1.1	5.316	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	73.11	144.03	0.508	72.72	0.0	0.2	7.286	A
			2	4	39.13	91.29	0.429	38.61	0.0	0.1	6.786	A
	Exit	1	1	(1,2,3,4)	112.24			112.24	0.0	0.0	0.000	A
			1		90.33			90.33	0.0	0.0	0.000	A
2	Entry	1	1	3,4	895.17	1023.63	0.875	888.00	0.0	5.6	17.936	C
			2	1,(4)	96.85	193.94	0.499	96.91	0.0	0.1	3.668	A
	Exit	1	1	(1,2,3,4)	992.02			992.02	0.0	0.0	0.000	A
			1		892.04			892.04	0.0	0.0	0.000	A
3	Entry	1	1	1,4	417.78	566.66	0.737	414.07	0.0	2.2	14.890	B
			2	2	206.87	329.47	0.628	207.65	0.0	0.4	7.550	A
	Exit	1	1	(1,2,3,4)	624.78			624.65	0.0	0.0	0.142	A
			1		433.17			433.17	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	878.22	1216.27	0.722	878.09	0.0	1.1	5.089	A
	Exit	1	1		1180.50			1180.50	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	89.67	152.91	0.586	88.83	0.2	0.3	9.109	A
			2	4	46.50	96.61	0.481	46.24	0.1	0.1	8.176	A
	Exit	1	1	(1,2,3,4)	136.17			136.17	0.0	0.0	0.001	A
			1		108.39			108.39	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1048.30	1024.81	1.023	985.50	5.6	22.3	55.445	F
			2	1,(4)	118.50	267.31	0.443	118.11	0.1	0.2	3.914	A
	Exit	1	1	(1,2,3,4)	1166.80			1166.80	0.0	0.0	0.000	A
			1		1057.70			1057.70	0.0	0.0	0.000	A
3	Entry	1	1	1,4	499.89	577.82	0.865	488.41	2.2	5.5	32.675	D
			2	2	240.52	380.99	0.631	241.89	0.4	0.7	9.338	A
	Exit	1	1	(1,2,3,4)	741.46			740.41	0.0	0.2	0.491	A
			1		493.17			493.17	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1037.15	1386.76	0.748	1042.96	1.1	2.0	7.117	A
	Exit	1	1		1352.67			1352.67	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	107.22	188.56	0.569	107.41	0.3	0.4	12.276	B
			2	4	54.26	104.12	0.521	54.52	0.1	0.2	10.102	B
	Exit	2	1	(1,2,3,4)	161.48			161.48	0.0	0.0	0.001	A
			1		135.13			135.13	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1306.43	1002.13	1.304	997.11	22.3	96.5	215.984	F
			2	1,(4)	150.39	255.14	0.589	149.93	0.2	0.2	4.160	A
	Exit	2	1	(1,2,3,4)	1456.83			1456.83	0.0	0.0	0.001	A
			1		1293.85			1293.85	0.0	0.0	0.000	A
3	Entry	1	1	1,4	630.39	579.25	1.088	565.96	5.5	22.1	94.014	F
			2	2	296.61	434.85	0.682	299.02	0.7	0.8	10.819	B
	Exit	2	1	(1,2,3,4)	926.35			927.00	0.2	0.4	1.406	A
			1		553.24			553.24	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1284.39	1482.00	0.867	1276.89	2.0	6.4	14.996	B
	Exit	1	1		1468.63			1468.63	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	101.61	175.68	0.578	101.09	0.4	0.5	12.835	B
			2	4	54.98	90.92	0.605	55.96	0.2	0.1	10.610	B
	Exit	2	1	(1,2,3,4)	156.59			156.59	0.0	0.0	0.007	A
			1		141.59			141.59	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1251.59	1003.94	1.247	1003.57	96.5	163.6	469.017	F
			2	1,(4)	151.76	305.26	0.497	151.37	0.2	0.2	4.327	A
	Exit	2	1	(1,2,3,4)	1429.50			1403.35	0.0	2.6	1.593	A
			1		1289.80			1289.80	0.0	0.0	0.000	A
3	Entry	1	1	1,4	625.04	579.22	1.079	571.83	22.1	35.3	185.758	F
			2	2	296.28	445.27	0.665	296.80	0.8	1.0	11.178	B
	Exit	2	1	(1,2,3,4)	918.65			921.33	0.4	0.4	1.561	A
			1		559.57			559.57	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1275.65	1465.68	0.870	1278.00	6.4	5.5	15.448	C
	Exit	1	1		1467.65			1467.65	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	85.17	144.17	0.591	85.83	0.5	0.2	10.197	B
			2	4	45.26	91.06	0.497	45.46	0.1	0.1	9.227	A
	Exit	2	1	(1,2,3,4)	130.43			130.43	0.0	0.0	0.003	A
			1		115.11			115.11	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1041.72	1026.18	1.015	1024.50	163.6	168.1	582.111	F
			2	1,(4)	123.33	209.59	0.588	123.13	0.2	0.1	4.064	A
	Exit	2	1	(1,2,3,4)	1167.20			1165.04	2.6	7.3	18.274	C
			1		1061.41			1061.41	0.0	0.0	0.000	A
3	Entry	1	1	1,4	511.17	580.48	0.881	562.04	35.3	23.4	188.106	F
			2	2	246.65	391.13	0.631	246.65	1.0	0.8	10.109	B
	Exit	2	1	(1,2,3,4)	758.74			757.83	0.4	0.2	0.736	A
			1		500.54			500.54	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1045.50	1361.57	0.768	1046.93	5.5	1.8	8.332	A
	Exit	1	1		1457.48			1457.48	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	71.87	144.51	0.497	72.00	0.2	0.2	8.234	A
			2	4	39.39	89.47	0.440	39.07	0.1	0.1	7.479	A
	Exit	2	1	(1,2,3,4)	111.26			111.26	0.0	0.0	0.002	A
			1		99.52			99.52	0.0	0.0	0.000	A
2	Entry	1	1	3,4	892.37	1044.54	0.854	1049.54	168.1	134.3	522.129	F
			2	1,(4)	105.98	173.44	0.611	105.98	0.1	0.1	3.881	A
	Exit	2	1	(1,2,3,4)	985.70			998.35	7.3	1.7	12.131	B
			1		883.37			883.37	0.0	0.0	0.000	A
3	Entry	1	1	1,4	427.17	558.11	0.765	463.57	23.4	6.7	84.104	F
			2	2	205.76	349.19	0.589	205.37	0.8	0.5	8.796	A
	Exit	2	1	(1,2,3,4)	631.96			632.93	0.2	0.0	0.342	A
			1		463.89			463.89	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	871.17	1251.68	0.696	872.02	1.8	1.1	5.316	A
	Exit	1	1		1360.76			1360.76	0.0	0.0	0.000	A

Halton Roundabout, 2018 Friday High Season

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	32.51	D

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D5	Halton Roundabout	2018 Friday High Season	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	195.00	100.000
2		ONE HOUR	✓	1030.00	100.000
3		ONE HOUR	✓	504.00	100.000
4		ONE HOUR	✓	1217.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1	2	3	4
From	1	0.000	95.000	37.000	63.000
	2	47.000	0.000	274.000	709.000
	3	27.000	134.000	0.000	343.000
	4	103.000	895.000	219.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.49	0.19	0.32
	2	0.05	0.00	0.27	0.69
	3	0.05	0.27	0.00	0.68
	4	0.08	0.74	0.18	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	146.81	146.81
	2	775.44	775.44
	3	379.44	379.44
	4	916.22	916.22
14:00-14:15	1	175.30	175.30
	2	925.95	925.95
	3	453.09	453.09
	4	1094.06	1094.06
14:15-14:30	1	214.70	214.70
	2	1134.05	1134.05
	3	554.91	554.91
	4	1339.94	1339.94
14:30-14:45	1	214.70	214.70
	2	1134.05	1134.05
	3	554.91	554.91
	4	1339.94	1339.94
14:45-15:00	1	175.30	175.30
	2	925.95	925.95
	3	453.09	453.09
	4	1094.06	1094.06
15:00-15:15	1	146.81	146.81
	2	775.44	775.44
	3	379.44	379.44
	4	916.22	916.22

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	12.37	0.8	B	178.16	267.24
2	65.29	23.3	F	949.43	1424.14
3	16.19	2.5	C	461.71	692.57
4	14.59	5.5	B	1116.16	1674.24

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	148.54	37.13	943.23	149.18	133.31	0.0	0.3	6.961	A
2	781.71	195.43	246.15	778.96	846.25	0.0	2.2	9.051	A
3	382.92	95.73	625.82	382.82	399.29	0.0	0.9	7.577	A
4	918.45	229.61	159.33	917.21	849.31	0.0	1.4	5.008	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	174.59	43.65	1124.71	174.29	160.84	0.3	0.4	8.740	A
2	935.53	233.88	288.64	926.76	1010.35	2.2	4.4	14.422	B
3	455.60	113.90	735.66	453.28	479.73	0.9	1.3	9.826	A
4	1095.73	273.93	191.26	1094.29	997.68	1.4	2.1	6.816	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	216.03	54.01	1364.94	215.80	196.61	0.4	0.8	11.719	B
2	1130.02	282.50	349.68	1105.14	1231.06	4.4	16.4	40.366	E
3	556.07	139.02	883.73	555.26	571.09	1.3	2.5	15.095	C
4	1332.57	333.14	230.12	1331.43	1208.87	2.1	5.2	13.287	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	215.53	53.88	1359.70	215.66	196.44	0.8	0.7	12.369	B
2	1143.53	285.88	352.00	1113.95	1223.36	16.4	23.3	65.290	F
3	557.55	139.39	883.46	558.66	582.49	2.5	2.5	16.189	C
4	1328.77	332.19	229.78	1326.35	1212.34	5.2	5.5	14.594	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	172.81	43.20	1124.67	172.30	154.86	0.7	0.4	9.195	A
2	936.03	234.01	287.60	954.39	1009.38	23.3	5.7	37.955	E
3	444.57	111.14	755.60	444.84	486.39	2.5	1.3	11.100	B
4	1100.44	275.11	183.46	1096.07	1016.97	5.5	2.4	7.649	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	141.48	35.37	944.71	141.65	131.09	0.4	0.3	7.712	A
2	769.75	192.44	241.28	772.37	845.08	5.7	1.9	10.443	B
3	373.58	93.39	612.44	374.05	401.21	1.3	0.8	8.271	A
4	920.97	230.24	154.79	921.01	831.70	2.4	1.3	5.181	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	98.86	161.63	0.612	99.43	0.0	0.2	7.229	A
			2	4	49.68	92.92	0.535	49.75	0.0	0.1	6.419	A
	Exit	1	1	(1,2,3,4)	148.54			148.54	0.0	0.0	0.000	A
			1		133.31			133.31	0.0	0.0	0.000	A
2	Entry	1	1	3,4	703.63	937.62	0.750	701.08	0.0	2.1	9.641	A
			2	1,(4)	78.08	162.18	0.481	77.88	0.0	0.1	3.731	A
	Exit	1	1	(1,2,3,4)	781.71			781.71	0.0	0.0	0.000	A
			1		846.25			846.25	0.0	0.0	0.000	A
3	Entry	1	1	1,4	280.07	439.16	0.638	279.87	0.0	0.8	8.252	A
			2	2	102.82	173.99	0.591	102.96	0.0	0.2	5.690	A
	Exit	1	1	(1,2,3,4)	382.92			382.89	0.0	0.0	0.004	A
			1		399.29			399.29	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	918.45	1325.19	0.693	917.21	0.0	1.4	5.008	A
	Exit	1	1		849.31			849.31	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	118.02	199.04	0.593	117.95	0.2	0.3	9.166	A
			2	4	56.57	104.43	0.542	56.34	0.1	0.1	7.829	A
	Exit	1	1	(1,2,3,4)	174.59			174.59	0.0	0.0	0.001	A
			1		160.84			160.84	0.0	0.0	0.000	A
2	Entry	1	1	3,4	835.90	996.49	0.839	827.36	2.1	4.3	15.696	C
			2	1,(4)	99.63	198.93	0.501	99.39	0.1	0.1	3.763	A
	Exit	1	1	(1,2,3,4)	935.53			935.53	0.0	0.0	0.000	A
			1		1010.35			1010.35	0.0	0.0	0.000	A
3	Entry	1	1	1,4	333.18	481.10	0.693	331.36	0.8	1.0	10.953	B
			2	2	122.39	226.75	0.540	121.92	0.2	0.2	6.652	A
	Exit	1	1	(1,2,3,4)	455.60			455.56	0.0	0.0	0.020	A
			1		479.73			479.73	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1095.73	1432.84	0.765	1094.29	1.4	2.1	6.816	A
	Exit	1	1		997.68			997.68	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	146.18	241.99	0.604	146.08	0.3	0.6	12.562	B
			2	4	70.02	129.66	0.540	69.71	0.1	0.2	9.860	A
	Exit	2	1	(1,2,3,4)	216.03			216.20	0.0	0.0	0.030	A
			1		196.61			196.61	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1002.35	1011.62	0.991	977.95	4.3	16.3	44.977	E
			2	1,(4)	127.66	249.61	0.511	127.19	0.1	0.2	4.045	A
	Exit	2	1	(1,2,3,4)	1130.02			1130.02	0.0	0.0	0.001	A
			1		1231.06			1231.06	0.0	0.0	0.000	A
3	Entry	1	1	1,4	408.91	538.45	0.759	408.03	1.0	2.2	17.714	C
			2	2	147.19	251.08	0.586	147.23	0.2	0.3	7.493	A
	Exit	2	1	(1,2,3,4)	556.07			556.10	0.0	0.0	0.068	A
			1		571.09			571.09	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1332.57	1535.65	0.868	1331.43	2.1	5.2	13.287	B
	Exit	1	1		1208.87			1208.87	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	145.61	246.97	0.590	145.92	0.6	0.5	13.441	B
			2	4	69.95	128.78	0.543	69.75	0.2	0.2	10.045	B
	Exit	2	1	(1,2,3,4)	215.53			215.56	0.0	0.0	0.019	A
			1		196.44			196.44	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1014.25	1010.95	1.003	984.50	16.3	23.2	73.136	F
			2	1,(4)	129.28	225.52	0.573	129.45	0.2	0.1	4.055	A
	Exit	2	1	(1,2,3,4)	1143.53			1143.53	0.0	0.0	0.002	A
			1		1223.36			1223.36	0.0	0.0	0.000	A
3	Entry	1	1	1,4	411.90	538.94	0.764	412.64	2.2	2.1	19.115	C
			2	2	145.68	257.16	0.566	146.02	0.3	0.3	7.729	A
	Exit	2	1	(1,2,3,4)	557.55			557.58	0.0	0.0	0.062	A
			1		582.49			582.49	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1328.77	1548.75	0.858	1326.35	5.2	5.5	14.594	B
	Exit	1	1		1212.34			1212.34	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	117.75	207.19	0.568	117.31	0.5	0.3	9.680	A
			2	4	55.06	107.27	0.513	54.99	0.2	0.1	8.161	A
	Exit	2	1	(1,2,3,4)	172.81			172.81	0.0	0.0	0.004	A
			1		154.86			154.86	0.0	0.0	0.000	A
2	Entry	1	1	3,4	836.10	1000.06	0.836	854.66	23.2	5.6	42.191	E
			2	1,(4)	99.93	185.54	0.539	99.73	0.1	0.1	3.849	A
	Exit	2	1	(1,2,3,4)	936.03			936.03	0.0	0.0	0.000	A
			1		1009.38			1009.38	0.0	0.0	0.000	A
3	Entry	1	1	1,4	326.69	480.30	0.680	326.15	2.1	1.1	12.481	B
			2	2	118.05	219.34	0.538	118.69	0.3	0.2	7.180	A
	Exit	2	1	(1,2,3,4)	444.57			444.74	0.0	0.0	0.033	A
			1		486.39			486.39	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1100.44	1463.22	0.752	1096.07	5.5	2.4	7.649	A
	Exit	1	1		1016.97			1016.97	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	94.35	189.88	0.497	94.08	0.3	0.2	7.912	A
			2	4	47.13	88.20	0.534	47.56	0.1	0.1	7.296	A
	Exit	2	1	(1,2,3,4)	141.48			141.48	0.0	0.0	0.001	A
			1		131.09			131.09	0.0	0.0	0.000	A
2	Entry	1	1	3,4	693.82	935.00	0.742	696.34	5.6	1.8	11.207	B
			2	1,(4)	75.93	160.00	0.475	76.03	0.1	0.1	3.712	A
	Exit	2	1	(1,2,3,4)	769.75			769.75	0.0	0.0	0.000	A
			1		845.08			845.08	0.0	0.0	0.000	A
3	Entry	1	1	1,4	272.57	434.08	0.628	273.14	1.1	0.6	9.016	A
			2	2	101.01	188.27	0.537	100.91	0.2	0.2	6.198	A
	Exit	2	1	(1,2,3,4)	373.58			373.58	0.0	0.0	0.012	A
			1		401.21			401.21	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	920.97	1326.12	0.694	921.01	2.4	1.3	5.181	A
	Exit	1	1		831.70			831.70	0.0	0.0	0.000	A

Halton Roundabout, 2018 Friday High Season + Dev

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	35.14	E

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D6	Halton Roundabout	2018 Friday High Season + Dev	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	251.00	100.000
2		ONE HOUR	✓	1043.00	100.000
3		ONE HOUR	✓	510.00	100.000
4		ONE HOUR	✓	1233.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1	2	3	4
From	1	0.000	116.000	47.000	88.000
	2	68.000	0.000	272.000	703.000
	3	37.000	133.000	0.000	340.000
	4	128.000	888.000	217.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.46	0.19	0.35
	2	0.07	0.00	0.26	0.67
	3	0.07	0.26	0.00	0.67
	4	0.10	0.72	0.18	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	188.97	188.97
	2	785.23	785.23
	3	383.95	383.95
	4	928.27	928.27
14:00-14:15	1	225.64	225.64
	2	937.64	937.64
	3	458.48	458.48
	4	1108.44	1108.44
14:15-14:30	1	276.36	276.36
	2	1148.36	1148.36
	3	561.52	561.52
	4	1357.56	1357.56
14:30-14:45	1	276.36	276.36
	2	1148.36	1148.36
	3	561.52	561.52
	4	1357.56	1357.56
14:45-15:00	1	225.64	225.64
	2	937.64	937.64
	3	458.48	458.48
	4	1108.44	1108.44
15:00-15:15	1	188.97	188.97
	2	785.23	785.23
	3	383.95	383.95
	4	928.27	928.27

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	13.23	1.0	B	228.76	343.14
2	70.51	25.4	F	957.76	1436.64
3	17.10	2.8	C	466.23	699.35
4	17.08	7.1	C	1132.78	1699.16

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	189.69	47.42	933.38	190.18	176.27	0.0	0.4	7.297	A
2	777.99	194.50	266.19	781.94	857.37	0.0	1.8	8.721	A
3	379.16	94.79	647.75	378.57	400.38	0.0	0.9	7.967	A
4	928.13	232.03	180.99	928.66	845.34	0.0	1.4	5.057	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	221.80	55.45	1117.63	221.80	209.65	0.4	0.6	9.375	A
2	945.47	236.37	311.88	944.48	1027.56	1.8	4.0	14.329	B
3	459.46	114.86	776.27	458.56	480.09	0.9	1.6	10.398	B
4	1113.81	278.45	211.06	1116.22	1023.76	1.4	2.2	7.367	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	270.26	67.57	1360.57	270.20	255.86	0.6	0.9	12.322	B
2	1141.51	285.38	377.89	1105.97	1252.87	4.0	18.3	42.861	E
3	558.20	139.55	914.81	556.84	569.06	1.6	2.7	16.031	C
4	1350.39	337.60	260.21	1356.22	1211.44	2.2	6.0	15.199	C

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	270.48	67.62	1355.51	270.79	254.50	0.9	1.0	13.226	B
2	1156.29	289.07	381.96	1119.36	1244.33	18.3	25.4	70.513	F
3	557.80	139.45	922.70	556.41	578.62	2.7	2.8	17.099	C
4	1361.55	340.39	258.26	1351.74	1220.85	6.0	7.1	17.083	C

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	226.46	56.61	1111.74	226.80	211.00	1.0	0.6	10.216	B
2	938.75	234.69	313.54	977.15	1025.00	25.4	6.8	45.469	E
3	456.80	114.20	799.03	456.03	491.66	2.8	1.4	12.148	B
4	1110.51	277.63	211.62	1111.13	1043.44	7.1	2.3	8.635	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	193.88	48.47	932.98	195.58	177.96	0.6	0.3	8.036	A
2	786.54	196.63	268.50	790.61	860.05	6.8	1.9	11.771	B
3	385.97	96.49	652.90	385.60	406.21	1.4	0.9	8.830	A
4	932.27	233.07	181.36	929.58	857.15	2.3	1.5	5.429	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	123.49	212.10	0.582	123.98	0.0	0.3	7.551	A
			2	4	66.20	126.44	0.524	66.20	0.0	0.1	6.823	A
	Exit	1	1	(1,2,3,4)	189.69			189.69	0.0	0.0	0.003	A
			1		176.27			176.27	0.0	0.0	0.000	A
2	Entry	1	1	3,4	682.49	914.56	0.746	686.28	0.0	1.7	9.405	A
			2	1,(4)	95.51	178.71	0.534	95.66	0.0	0.1	3.672	A
	Exit	1	1	(1,2,3,4)	777.99			777.99	0.0	0.0	0.001	A
			1		857.37			857.37	0.0	0.0	0.000	A
3	Entry	1	1	1,4	279.08	459.75	0.607	278.38	0.0	0.8	8.676	A
			2	2	100.07	176.27	0.568	100.20	0.0	0.1	5.937	A
	Exit	1	1	(1,2,3,4)	379.16			379.16	0.0	0.0	0.005	A
			1		400.38			400.38	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	928.13	1345.50	0.690	928.66	0.0	1.4	5.057	A
	Exit	1	1		845.34			845.34	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	144.65	261.11	0.554	144.28	0.3	0.4	9.972	A
			2	4	77.15	136.97	0.563	77.52	0.1	0.2	8.248	A
	Exit	1	1	(1,2,3,4)	221.80			221.80	0.0	0.0	0.007	A
			1		209.65			209.65	0.0	0.0	0.000	A
2	Entry	1	1	3,4	827.72	988.21	0.838	826.98	1.7	3.9	15.808	C
			2	1,(4)	117.75	229.79	0.512	117.50	0.1	0.1	3.917	A
	Exit	1	1	(1,2,3,4)	945.47			945.47	0.0	0.0	0.002	A
			1		1027.56			1027.56	0.0	0.0	0.000	A
3	Entry	1	1	1,4	342.54	507.16	0.675	341.49	0.8	1.3	11.636	B
			2	2	116.92	218.82	0.534	117.07	0.1	0.2	6.823	A
	Exit	1	1	(1,2,3,4)	459.46			459.46	0.0	0.0	0.012	A
			1		480.09			480.09	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1113.81	1436.34	0.775	1116.22	1.4	2.2	7.367	A
	Exit	1	1		1023.76			1023.76	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	175.90	271.14	0.649	175.65	0.4	0.6	13.545	B
			2	4	94.33	167.10	0.565	94.55	0.2	0.3	9.963	A
	Exit	2	1	(1,2,3,4)	270.26			270.23	0.0	0.0	0.030	A
			1		255.86			255.86	0.0	0.0	0.000	A
2	Entry	1	1	3,4	992.95	1001.28	0.992	958.15	3.9	18.1	48.538	E
			2	1,(4)	148.53	306.09	0.485	147.83	0.1	0.2	4.238	A
	Exit	2	1	(1,2,3,4)	1141.51			1141.48	0.0	0.0	0.004	A
			1		1252.87			1252.87	0.0	0.0	0.000	A
3	Entry	1	1	1,4	411.98	538.40	0.765	410.41	1.3	2.4	18.790	C
			2	2	146.28	255.87	0.572	146.44	0.2	0.3	7.913	A
	Exit	2	1	(1,2,3,4)	558.20			558.26	0.0	0.0	0.044	A
			1		569.06			569.06	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1350.39	1533.90	0.880	1356.22	2.2	6.0	15.199	C
	Exit	1	1		1211.44			1211.44	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	175.68	275.86	0.637	176.79	0.6	0.7	14.396	B
			2	4	94.70	174.74	0.542	93.99	0.3	0.3	10.768	B
	Exit	2	1	(1,2,3,4)	270.48			270.39	0.0	0.0	0.098	A
			1		254.50			254.50	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1006.37	999.03	1.007	969.84	18.1	25.2	80.590	F
			2	1,(4)	149.92	284.51	0.527	149.52	0.2	0.2	4.263	A
	Exit	2	1	(1,2,3,4)	1156.29			1156.29	0.0	0.0	0.006	A
			1		1244.33			1244.33	0.0	0.0	0.000	A
3	Entry	1	1	1,4	412.44	534.37	0.772	411.21	2.4	2.5	20.262	C
			2	2	145.33	250.23	0.581	145.20	0.3	0.3	7.851	A
	Exit	2	1	(1,2,3,4)	557.80			557.77	0.0	0.0	0.063	A
			1		578.62			578.62	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1361.55	1536.92	0.886	1351.74	6.0	7.1	17.083	C
	Exit	1	1		1220.85			1220.85	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	147.64	233.83	0.631	148.57	0.7	0.3	10.907	B
			2	4	78.82	154.77	0.509	78.23	0.3	0.2	8.867	A
	Exit	2	1	(1,2,3,4)	226.46			226.46	0.0	0.0	0.035	A
			1		211.00			211.00	0.0	0.0	0.000	A
2	Entry	1	1	3,4	822.42	993.50	0.828	860.30	25.2	6.7	51.554	F
			2	1,(4)	116.33	201.23	0.578	116.85	0.2	0.1	4.015	A
	Exit	2	1	(1,2,3,4)	938.75			938.75	0.0	0.0	0.001	A
			1		1025.00			1025.00	0.0	0.0	0.000	A
3	Entry	1	1	1,4	340.20	500.00	0.680	339.24	2.5	1.2	13.862	B
			2	2	116.61	208.99	0.558	116.79	0.3	0.2	7.155	A
	Exit	2	1	(1,2,3,4)	456.80			456.80	0.0	0.0	0.037	A
			1		491.66			491.66	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1110.51	1444.64	0.769	1111.13	7.1	2.3	8.635	A
	Exit	1	1		1043.44			1043.44	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	125.80	208.05	0.605	127.00	0.3	0.2	8.371	A
			2	4	68.08	120.39	0.565	68.58	0.2	0.1	7.390	A
	Exit	2	1	(1,2,3,4)	193.88			193.88	0.0	0.0	0.007	A
			1		177.96			177.96	0.0	0.0	0.000	A
2	Entry	1	1	3,4	692.95	921.40	0.752	696.86	6.7	1.8	12.858	B
			2	1,(4)	93.59	186.80	0.501	93.75	0.1	0.1	3.643	A
	Exit	2	1	(1,2,3,4)	786.54			786.54	0.0	0.0	0.000	A
			1		860.05			860.05	0.0	0.0	0.000	A
3	Entry	1	1	1,4	285.69	453.72	0.630	285.69	1.2	0.8	9.704	A
			2	2	100.29	182.52	0.549	99.92	0.2	0.2	6.349	A
	Exit	2	1	(1,2,3,4)	385.97			385.97	0.0	0.0	0.012	A
			1		406.21			406.21	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	932.27	1334.53	0.699	929.58	2.3	1.5	5.429	A
	Exit	1	1		857.15			857.15	0.0	0.0	0.000	A

Halton Roundabout, 2028 Friday High Season

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	65.44	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D7	Halton Roundabout	2028 Friday High Season	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	211.00	100.000
2		ONE HOUR	✓	1116.00	100.000
3		ONE HOUR	✓	547.00	100.000
4		ONE HOUR	✓	1319.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1	2	3	4
From	1	0.000	102.000	41.000	68.000
	2	51.000	0.000	297.000	768.000
	3	30.000	145.000	0.000	372.000
	4	112.000	970.000	237.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.48	0.19	0.32
	2	0.05	0.00	0.27	0.69
	3	0.05	0.27	0.00	0.68
	4	0.08	0.74	0.18	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	158.85	158.85
	2	840.18	840.18
	3	411.81	411.81
	4	993.01	993.01
14:00-14:15	1	189.68	189.68
	2	1003.26	1003.26
	3	491.74	491.74
	4	1185.75	1185.75
14:15-14:30	1	232.32	232.32
	2	1228.74	1228.74
	3	602.26	602.26
	4	1452.25	1452.25
14:30-14:45	1	232.32	232.32
	2	1228.74	1228.74
	3	602.26	602.26
	4	1452.25	1452.25
14:45-15:00	1	189.68	189.68
	2	1003.26	1003.26
	3	491.74	491.74
	4	1185.75	1185.75
15:00-15:15	1	158.85	158.85
	2	840.18	840.18
	3	411.81	411.81
	4	993.01	993.01

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	14.53	1.0	B	194.41	291.61
2	143.33	55.0	F	1024.97	1537.46
3	19.90	3.2	C	501.80	752.69
4	26.56	11.0	D	1210.90	1816.34

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	155.89	38.97	1012.24	156.31	145.59	0.0	0.4	7.550	A
2	840.60	210.15	257.57	843.13	910.98	0.0	2.6	10.321	B
3	412.29	103.07	668.36	410.64	432.34	0.0	1.1	8.231	A
4	993.13	248.28	167.26	990.57	911.74	0.0	1.7	5.666	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	191.66	47.91	1219.99	190.78	174.34	0.4	0.5	9.590	A
2	1011.84	252.96	314.62	1011.16	1096.15	2.6	6.5	19.726	C
3	482.08	120.52	804.88	484.41	520.89	1.1	1.6	11.435	B
4	1183.85	295.96	201.78	1192.55	1087.51	1.7	2.5	8.366	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	237.50	59.37	1476.43	237.01	213.30	0.5	1.0	13.242	B
2	1229.46	307.36	377.26	1126.12	1336.18	6.5	33.0	67.612	F
3	604.78	151.19	906.68	605.32	596.70	1.6	3.2	18.193	C
4	1457.83	364.46	248.84	1440.88	1263.16	2.5	10.7	21.007	C

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	230.73	57.68	1481.12	230.39	214.69	1.0	1.0	14.532	B
2	1227.78	306.95	381.07	1136.70	1330.44	33.0	55.0	143.326	F
3	605.29	151.32	908.16	611.69	609.61	3.2	3.0	19.899	C
4	1449.21	362.30	248.76	1447.05	1271.09	10.7	11.0	26.559	D

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	191.26	47.82	1225.96	191.06	172.41	1.0	0.6	10.915	B
2	1001.66	250.41	312.00	1091.18	1105.02	55.0	30.2	134.799	F
3	491.66	122.91	856.72	492.40	546.45	3.0	1.9	13.608	B
4	1190.13	297.53	203.09	1195.28	1146.03	11.0	2.6	11.616	B

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	159.41	39.85	1011.41	158.02	148.52	0.6	0.4	8.193	A
2	838.49	209.62	257.37	883.68	912.06	30.2	5.3	46.666	E
3	414.68	103.67	700.18	415.00	440.87	1.9	1.1	9.857	A
4	991.22	247.81	169.62	990.31	945.55	2.6	1.6	5.837	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	104.47	190.49	0.548	104.93	0.0	0.3	7.943	A
			2	4	51.41	94.72	0.543	51.38	0.0	0.1	6.720	A
	Exit	1	1	(1,2,3,4)	155.89			155.89	0.0	0.0	0.001	A
			1		145.59			145.59	0.0	0.0	0.000	A
2	Entry	1	1	3,4	754.89	960.65	0.786	757.76	0.0	2.5	11.085	B
			2	1,(4)	85.71	168.73	0.508	85.36	0.0	0.1	3.638	A
	Exit	1	1	(1,2,3,4)	840.60			840.60	0.0	0.0	0.000	A
			1		910.98			910.98	0.0	0.0	0.000	A
3	Entry	1	1	1,4	304.81	487.14	0.626	303.58	0.0	0.9	8.957	A
			2	2	107.46	198.35	0.542	107.06	0.0	0.2	6.184	A
	Exit	1	1	(1,2,3,4)	412.29			412.27	0.0	0.0	0.007	A
			1		432.34			432.34	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	993.13	1395.56	0.712	990.57	0.0	1.7	5.666	A
	Exit	1	1		911.74			911.74	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	130.04	229.49	0.567	129.47	0.3	0.4	10.119	B
			2	4	61.62	120.79	0.510	61.31	0.1	0.2	8.456	A
	Exit	1	1	(1,2,3,4)	191.66			191.66	0.0	0.0	0.002	A
			1		174.34			174.34	0.0	0.0	0.000	A
2	Entry	1	1	3,4	903.13	1010.72	0.894	902.50	2.5	6.4	21.664	C
			2	1,(4)	108.71	208.83	0.521	108.65	0.1	0.1	3.843	A
	Exit	1	1	(1,2,3,4)	1011.84			1011.84	0.0	0.0	0.000	A
			1		1096.15			1096.15	0.0	0.0	0.000	A
3	Entry	1	1	1,4	354.17	502.22	0.705	356.08	0.9	1.3	13.008	B
			2	2	128.05	223.27	0.574	128.33	0.2	0.2	6.993	A
	Exit	1	1	(1,2,3,4)	482.08			482.22	0.0	0.0	0.026	A
			1		520.89			520.89	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1183.85	1479.44	0.800	1192.55	1.7	2.5	8.366	A
	Exit	1	1		1087.51			1087.51	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	160.78	254.41	0.632	159.98	0.4	0.7	14.503	B
			2	4	76.72	136.80	0.561	77.03	0.2	0.2	10.498	B
	Exit	2	1	(1,2,3,4)	237.50			237.50	0.0	0.0	0.043	A
			1		213.30			213.30	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1088.42	1001.66	1.087	984.54	6.4	32.9	75.781	F
			2	1,(4)	141.04	242.63	0.581	141.58	0.1	0.1	4.143	A
	Exit	2	1	(1,2,3,4)	1229.46			1229.46	0.0	0.0	0.003	A
			1		1336.18			1336.18	0.0	0.0	0.000	A
3	Entry	1	1	1,4	448.55	560.68	0.800	449.03	1.3	2.9	21.714	C
			2	2	156.31	272.06	0.575	156.28	0.2	0.3	7.921	A
	Exit	2	1	(1,2,3,4)	604.78			604.86	0.0	0.0	0.078	A
			1		596.70			596.70	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1457.83	1563.15	0.933	1440.88	2.5	10.7	21.007	C
	Exit	1	1		1263.16			1263.16	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	155.03	247.96	0.625	155.37	0.7	0.7	15.908	C
			2	4	75.55	144.44	0.523	75.01	0.2	0.3	11.552	B
	Exit	2	1	(1,2,3,4)	230.73			230.59	0.0	0.0	0.033	A
			1		214.69			214.69	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1087.79	1000.20	1.088	996.88	32.9	54.8	161.187	F
			2	1,(4)	139.99	251.06	0.558	139.82	0.1	0.2	4.232	A
	Exit	2	1	(1,2,3,4)	1227.78			1227.78	0.0	0.0	0.002	A
			1		1330.44			1330.44	0.0	0.0	0.000	A
3	Entry	1	1	1,4	447.21	554.60	0.806	453.67	2.9	2.7	24.030	C
			2	2	157.85	280.70	0.562	158.02	0.3	0.4	8.060	A
	Exit	2	1	(1,2,3,4)	605.29			605.06	0.0	0.0	0.074	A
			1		609.61			609.61	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1449.21	1557.86	0.930	1447.05	10.7	11.0	26.559	D
	Exit	1	1		1271.09			1271.09	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	130.61	228.37	0.572	130.15	0.7	0.4	11.629	B
			2	4	60.65	112.01	0.542	60.91	0.3	0.1	9.397	A
	Exit	2	1	(1,2,3,4)	191.26			191.26	0.0	0.0	0.006	A
			1		172.41			172.41	0.0	0.0	0.000	A
2	Entry	1	1	3,4	890.10	1021.14	0.872	979.73	54.8	30.0	151.333	F
			2	1,(4)	111.55	210.41	0.530	111.44	0.2	0.1	3.923	A
	Exit	2	1	(1,2,3,4)	1001.66			1001.66	0.0	0.0	0.000	A
			1		1105.02			1105.02	0.0	0.0	0.000	A
3	Entry	1	1	1,4	360.17	512.50	0.703	360.80	2.7	1.6	15.722	C
			2	2	131.52	248.81	0.529	131.60	0.4	0.3	7.564	A
	Exit	2	1	(1,2,3,4)	491.66			491.69	0.0	0.0	0.038	A
			1		546.45			546.45	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1190.13	1483.15	0.802	1195.28	11.0	2.6	11.616	B
	Exit	1	1		1146.03			1146.03	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	106.86	208.76	0.512	106.07	0.4	0.3	8.472	A
			2	4	52.55	107.43	0.489	51.95	0.1	0.1	7.622	A
	Exit	2	1	(1,2,3,4)	159.41			159.41	0.0	0.0	0.000	A
			1		148.52			148.52	0.0	0.0	0.000	A
2	Entry	1	1	3,4	751.48	978.16	0.768	796.86	30.0	5.2	51.877	F
			2	1,(4)	87.01	176.11	0.494	86.82	0.1	0.1	3.745	A
	Exit	2	1	(1,2,3,4)	838.49			838.49	0.0	0.0	0.000	A
			1		912.06			912.06	0.0	0.0	0.000	A
3	Entry	1	1	1,4	305.97	483.88	0.632	306.43	1.6	0.9	10.966	B
			2	2	108.71	210.71	0.516	108.57	0.3	0.2	6.721	A
	Exit	2	1	(1,2,3,4)	414.68			414.68	0.0	0.0	0.016	A
			1		440.87			440.87	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	991.22	1373.88	0.721	990.31	2.6	1.6	5.837	A
	Exit	1	1		945.55			945.55	0.0	0.0	0.000	A

Halton Roundabout, 2028 Friday High Season + Dev

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Lane Simulation	A1 - [Lane Simulation]	This analysis set uses Lane Simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

Analysis Set Details

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

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Halton Roundabout	Standard Roundabout	1,2,3,4	71.73	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Lane Simulation: Arm options

[same as above]

Lanes

[same as above]

Entry Lane slope and intercept

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)	Run automatically
D8	Halton Roundabout	2028 Friday High Season + Dev	ONE HOUR	13:45	15:15	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		ONE HOUR	✓	267.00	100.000
2		ONE HOUR	✓	1129.00	100.000
3		ONE HOUR	✓	553.00	100.000
4		ONE HOUR	✓	1335.00	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1	2	3	4
From	1	0.000	123.000	51.000	93.000
	2	72.000	0.000	295.000	762.000
	3	40.000	144.000	0.000	369.000
	4	137.000	963.000	235.000	0.000

Proportions

	To				
		1	2	3	4
From	1	0.00	0.46	0.19	0.35
	2	0.06	0.00	0.26	0.67
	3	0.07	0.26	0.00	0.67
	4	0.10	0.72	0.18	0.00

Vehicle Mix

Heavy Vehicle proportion

	To				
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0

Average PCU Per Veh

	To				
		1	2	3	4
From	1	1.000	1.000	1.000	1.000
	2	1.000	1.000	1.000	1.000
	3	1.000	1.000	1.000	1.000
	4	1.000	1.000	1.000	1.000

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
13:45-14:00	1	201.01	201.01
	2	849.97	849.97
	3	416.33	416.33
	4	1005.06	1005.06
14:00-14:15	1	240.03	240.03
	2	1014.95	1014.95
	3	497.14	497.14
	4	1200.14	1200.14
14:15-14:30	1	293.97	293.97
	2	1243.05	1243.05
	3	608.86	608.86
	4	1469.86	1469.86
14:30-14:45	1	293.97	293.97
	2	1243.05	1243.05
	3	608.86	608.86
	4	1469.86	1469.86
14:45-15:00	1	240.03	240.03
	2	1014.95	1014.95
	3	497.14	497.14
	4	1200.14	1200.14
15:00-15:15	1	201.01	201.01
	2	849.97	849.97
	3	416.33	416.33
	4	1005.06	1005.06

Results

Results Summary for whole modelled period

Arm	Max delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1	16.21	1.4	C	244.06	366.10
2	150.87	59.2	F	1035.81	1553.72
3	22.58	3.8	C	508.40	762.60
4	36.24	15.3	E	1223.89	1835.84

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	199.65	49.91	988.65	200.32	190.65	0.0	0.4	7.863	A
2	851.32	212.83	277.03	847.81	911.94	0.0	2.8	10.501	B
3	414.10	103.52	695.13	415.10	429.71	0.0	1.1	8.634	A
4	987.42	246.85	192.29	987.00	917.94	0.0	1.5	5.599	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	241.55	60.39	1205.48	242.65	224.26	0.4	0.7	10.162	B
2	1014.03	253.51	344.16	1003.94	1103.97	2.8	6.9	20.209	C
3	502.32	125.58	830.35	504.42	517.74	1.1	1.8	12.536	B
4	1199.55	299.89	228.74	1201.00	1106.03	1.5	3.0	9.201	A

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	290.35	72.59	1466.10	292.90	277.35	0.7	1.2	14.547	B
2	1236.42	309.10	410.10	1138.94	1348.90	6.9	34.9	72.069	F
3	609.26	152.31	944.90	606.90	604.13	1.8	3.8	19.450	C
4	1475.42	368.85	282.97	1460.48	1268.84	3.0	13.8	25.962	D

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	294.52	73.63	1472.13	293.84	279.10	1.2	1.4	16.206	C
2	1250.68	312.67	411.06	1146.71	1354.90	34.9	59.2	150.870	F
3	604.81	151.20	951.39	606.19	606.39	3.8	3.6	22.581	C
4	1470.23	367.56	280.48	1470.74	1277.10	13.8	15.3	36.238	E

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	238.55	59.64	1216.13	239.61	224.06	1.4	0.6	11.630	B
2	1009.35	252.34	342.19	1106.97	1113.55	59.2	33.6	147.639	F
3	501.87	125.47	893.74	502.81	555.42	3.6	1.9	14.480	B
4	1206.06	301.52	228.94	1211.26	1167.61	15.3	3.3	15.356	C

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

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	199.77	49.94	1013.06	200.81	186.74	0.6	0.5	8.770	A
2	853.06	213.27	284.26	907.06	929.61	33.6	5.2	50.131	F
3	418.03	104.51	739.65	417.06	451.68	1.9	1.1	10.416	B
4	1004.68	251.17	192.71	1007.10	964.00	3.3	1.6	6.076	A

Lane Results

Lane Level notation: Lane Level 1 is always closest to the junction.

Lanes: Main Results for each time segment

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	130.61	221.74	0.589	131.45	0.0	0.3	8.230	A
			2	4	69.03	134.90	0.512	68.87	0.0	0.2	7.164	A
	Exit	2	1	(1,2,3,4)	199.65			199.65	0.0	0.0	0.007	A
			1		190.65			190.65	0.0	0.0	0.000	A
2	Entry	1	1	3,4	748.00	954.61	0.784	744.45	0.0	2.7	11.421	B
			2	1,(4)	103.32	198.56	0.520	103.35	0.0	0.1	3.773	A
	Exit	2	1	(1,2,3,4)	851.32			851.32	0.0	0.0	0.000	A
			1		911.94			911.94	0.0	0.0	0.000	A
3	Entry	1	1	1,4	307.84	482.27	0.638	309.03	0.0	0.9	9.502	A
			2	2	106.26	207.17	0.513	106.06	0.0	0.2	6.140	A
	Exit	2	1	(1,2,3,4)	414.10			414.10	0.0	0.0	0.003	A
			1		429.71			429.71	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	987.42	1376.08	0.718	987.00	0.0	1.5	5.599	A
	Exit	1	1		917.94			917.94	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	157.45	263.59	0.597	158.10	0.3	0.5	10.857	B
			2	4	84.10	143.36	0.587	84.55	0.2	0.2	8.798	A
	Exit	2	1	(1,2,3,4)	241.55			241.55	0.0	0.0	0.024	A
			1		224.26			224.26	0.0	0.0	0.000	A
2	Entry	1	1	3,4	886.61	995.01	0.891	876.23	2.7	6.8	22.538	C
			2	1,(4)	127.42	231.55	0.550	127.71	0.1	0.1	3.987	A
	Exit	2	1	(1,2,3,4)	1014.03			1014.03	0.0	0.0	0.002	A
			1		1103.97			1103.97	0.0	0.0	0.000	A
3	Entry	1	1	1,4	374.94	525.93	0.713	376.10	0.9	1.6	14.320	B
			2	2	127.42	220.34	0.578	128.32	0.2	0.2	7.207	A
	Exit	2	1	(1,2,3,4)	502.32			502.35	0.0	0.0	0.042	A
			1		517.74			517.74	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1199.55	1490.96	0.805	1201.00	1.5	3.0	9.201	A
	Exit	1	1		1106.03			1106.03	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	187.10	282.31	0.663	190.48	0.5	0.8	15.971	C
			2	4	103.19	188.92	0.546	102.42	0.2	0.4	11.565	B
	Exit	2	1	(1,2,3,4)	290.35			290.29	0.0	0.0	0.116	A
			1		277.35			277.35	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1075.61	990.16	1.086	976.84	6.8	34.7	82.120	F
			2	1,(4)	161.00	294.38	0.547	162.10	0.1	0.2	4.308	A
	Exit	2	1	(1,2,3,4)	1236.42			1236.61	0.0	0.0	0.003	A
			1		1348.90			1348.90	0.0	0.0	0.000	A
3	Entry	1	1	1,4	451.16	558.56	0.808	448.84	1.6	3.4	23.266	C
			2	2	158.13	273.84	0.577	158.06	0.2	0.4	8.185	A
	Exit	2	1	(1,2,3,4)	609.26			609.29	0.0	0.0	0.124	A
			1		604.13			604.13	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1475.42	1548.11	0.953	1460.48	3.0	13.8	25.962	D
	Exit	1	1		1268.84			1268.84	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	194.03	289.03	0.671	194.13	0.8	1.0	18.200	C
			2	4	100.35	186.95	0.537	99.71	0.4	0.4	12.190	B
	Exit	2	1	(1,2,3,4)	294.52			294.39	0.0	0.0	0.094	A
			1		279.10			279.10	0.0	0.0	0.000	A
2	Entry	1	1	3,4	1087.55	989.85	1.099	983.19	34.7	59.0	172.824	F
			2	1,(4)	163.10	287.72	0.567	163.52	0.2	0.2	4.315	A
	Exit	2	1	(1,2,3,4)	1250.68			1250.65	0.0	0.0	0.010	A
			1		1354.90			1354.90	0.0	0.0	0.000	A
3	Entry	1	1	1,4	449.87	552.20	0.815	451.87	3.4	3.3	27.347	D
			2	2	155.00	271.25	0.571	154.32	0.4	0.3	8.279	A
	Exit	2	1	(1,2,3,4)	604.81			604.87	0.0	0.0	0.119	A
			1		606.39			606.39	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1470.23	1551.29	0.948	1470.74	13.8	15.3	36.238	E
	Exit	1	1		1277.10			1277.10	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	154.87	255.84	0.605	155.97	1.0	0.4	12.607	B
			2	4	83.71	146.48	0.571	83.65	0.4	0.2	9.673	A
	Exit	2	1	(1,2,3,4)	238.55			238.58	0.0	0.0	0.033	A
			1		224.06			224.06	0.0	0.0	0.000	A
2	Entry	1	1	3,4	882.35	1009.12	0.874	980.16	59.0	33.5	169.084	F
			2	1,(4)	127.00	244.64	0.519	126.81	0.2	0.1	4.026	A
	Exit	2	1	(1,2,3,4)	1009.35			1009.35	0.0	0.0	0.002	A
			1		1113.55			1113.55	0.0	0.0	0.000	A
3	Entry	1	1	1,4	369.97	508.53	0.728	370.81	3.3	1.6	16.772	C
			2	2	131.94	236.08	0.559	132.00	0.3	0.3	7.774	A
	Exit	2	1	(1,2,3,4)	501.87			501.90	0.0	0.0	0.064	A
			1		555.42			555.42	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1206.06	1501.09	0.803	1211.26	15.3	3.3	15.356	C
	Exit	1	1		1167.61			1167.61	0.0	0.0	0.000	A

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

Arm	Side	Lane level	Lane	Destination arms	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	LOS
1	Entry	1	1	2,3	129.00	229.15	0.563	129.84	0.4	0.3	9.196	A
			2	4	70.77	133.77	0.529	70.97	0.2	0.2	7.970	A
	Exit	2	1	(1,2,3,4)	199.77			199.77	0.0	0.0	0.005	A
			1		186.74			186.74	0.0	0.0	0.000	A
2	Entry	1	1	3,4	750.00	980.74	0.765	804.29	33.5	5.1	56.834	F
			2	1,(4)	103.06	205.53	0.501	102.77	0.1	0.1	3.798	A
	Exit	2	1	(1,2,3,4)	853.06			853.06	0.0	0.0	0.001	A
			1		929.61			929.61	0.0	0.0	0.000	A
3	Entry	1	1	1,4	308.42	470.66	0.655	307.03	1.6	0.9	11.629	B
			2	2	109.61	204.37	0.536	110.03	0.3	0.2	6.966	A
	Exit	2	1	(1,2,3,4)	418.03			418.03	0.0	0.0	0.018	A
			1		451.68			451.68	0.0	0.0	0.000	A
4	Entry	1	1	1,2,3	1004.68	1384.96	0.725	1007.10	3.3	1.6	6.076	A
	Exit	1	1		964.00			964.00	0.0	0.0	0.000	A

Appendix E Bus Timetable Service 64

64 LLANGOLLEN -GLYN CEIRIOG - LLANARMON DC via Froncysyllte & Chirk/ Y Waun

Monday to Friday except Bank Holidays : Llun i Gwener heblaw Gwyliau Cyhoeddus

RJ's Of Wem Ltd

Days / Dyddiau:	SDO					
Llangollen, Health Centre			1015	1325	....	....
Llangollen, Parade Street	0835	0850	1020	1330	1540	1737
Pengwern Estate	0840	....	1025	1335	1545	....
Froncysyllte		0857	1033	1343	1553	1744
Froncysyllte Community Centre			1035	1345	1555	....
Whitehurst		0901	1038	1348	1558	1748
Black Park			1042	1352	1602	....
Chirk, Lodgevale Park Entrance		0902	1047	1357	1607	1749
Chirk Hand Hotel		0905	1050	1400	1610	1752
Chirk Station		0906	1051	1401	1611	1753
Pontfadog		0913	1058	1408	1618	1800
Dolywern		0915	1100	1410	1620	1802
Glyn Ceiriog		0920	1105	1415	1625	1807
Tregeiriog			1113	1423	1633	....
Llanarmon Dyffryn Ceiriog			1120	1430	1640	....

SDO: Schooldays Only / Dyddiau Ysgol yn Unig

From 6 September 2016 / O 6 Medi 2016

64 LLANARMON DC - GLYN CEIRIOG - LLANGOLLEN via Chirk/ Y Waun & Froncysyllte

Monday to Friday except Bank Holidays : Llun i Gwener heblaw Gwylian Cyhoeddus

RJ's Of Wem Ltd

Days / Dyddiau:	DB	SDO		DB		
Llanarmon Dyffryn Ceiriog	0740	....	....	1130	1435	1645
Tregeiriog	0744	....	....	1134	1439	1649
Glyn Ceiriog	0750	....	0923	1140	1445	1655
Dolywern, Village	0752	....	0925	1142	1447	1657
Pontfadog	0754	....	0927	1144	1449	1659
Chirk Station	0804	....	0937	1154	1459	1709
Chirk Hand Hotel	0805	....	0938	1155	1500	1710
Lodgevale Park Entrance	0808	....	0941	1158	1503	1713
Black Park	....	....	0944	1201	1506	....
Whitehurst	0812	....	0948	1205	1510	1722
Froncysyllte, Community Centre	0815	....	0951	1208	1513	....
Froncysyllte	....	....	0952	1209	1514	1725
Pengwern Estate	....	0840	1000	1217	1522	....
Llangollen, Parade Street	0822	0845	1005	1222	1527	1732
Llangollen, Health Centre	....	....	1008	1225	....	....

SDO: Schooldays Only / Dyddiau Ysgol yn Unig

DB: This journey extends to Llangollen Pavilion on School Days / Mae'r daith hon yn ymestyn i ym Mhafiliwn Llangollen ar dyddiau ysgol

From 6 September 2016 / O 6 Medi 2016

64 LLANARMON DC - GLYN CEIRIOG - LLANGOLLEN via Chirk/ Y Waun & Froncysyllte

Saturday : Dydd Sadwrn

RJ's Of Wem Ltd

Llanarmon Dyffryn Ceiriog	0740	....	1130	1435	1645
Tregeiriog	0744	....	1134	1439	1649
Glyn Ceiriog	0750	0923	1140	1445	1655
Dolywern, Village	0752	0925	1142	1447	1657
Pontfadog	0754	0927	1144	1449	1659
Chirk Station	0804	0937	1154	1459	1709
Chirk Hand Hotel	0805	0938	1155	1500	1710
Lodgevale Park Entrance	0808	0941	1158	1503	1713
Black Park	....	0944	1201	1506	....
Whitehurst	0812	0948	1205	1510	1722
Froncysyllte, Community Centre	0815	0951	1208	1513	....
Froncysyllte	....	0952	1209	1514	1725
Pengwern Estate	....	1000	1217	1522	....
Llangollen, Parade Street	0822	1005	1222	1527	1732

64 LLANGOLLEN -GLYN CEIRIOG - LLANARMON DC via Froncysyllte & Chirk/ Y Waun

Saturday : Dydd Sadwrn

Llangollen, Parade Street	0850	1020	1330	1540	1737
Pengwern Estate	....	1025	1335	1545	....
Froncysyllte	0857	1033	1343	1553	1744
Froncysyllte Community Centre	....	1035	1345	1555	....
Whitehurst	0901	1038	1348	1558	1748
Black Park	....	1042	1352	1602	....
Chirk, Lodgevale Park Entrance	0902	1047	1357	1607	1749
Chirk Hand Hotel	0905	1050	1400	1610	1752
Chirk Station	0906	1051	1401	1611	1753
Pontfadog	0913	1058	1408	1618	1800
Dolywern	0915	1100	1410	1620	1802
Glyn Ceiriog	0920	1105	1415	1625	1807
Tregeiriog	....	1113	1423	1633	....
Llanarmon Dyffryn Ceiriog	....	1120	1430	1640	....

From 6 September 2016 / O 6 Medi 2016

