TRAFFIC IMPACT STUDY, SITE PLAN REVIEW, & TRANSPORTATION DEMAND MANAGEMENT PLAN

Proposed Residential Development
1854 & 1858 Liverpool Road
City of Pickering, ON

August 2019

Prepared for
Liverpool Estates

c/o Grant Morris & Associates

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Transportation Engineering

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August 2, 2019

Liverpool Estates

c/o Grant Morris & Associates
Mr. Grant Morris Dip. Eng. Tech., B.A, M. Ed., LLD (honoris causa)
Planning Consultant
397 Sheppard Avenue
Pickering, ON, L1V 1E6

Re: **Proposed Residential Development, 1854 & 1858 Liverpool Road, Pickering, ON, Traffic Impact Study, Site Plan Review and Transportation Demand Management Plan**

Dear Mr. Morris,

TRANS-PLAN is pleased to submit this Traffic Impact Study, Site Plan Review and Transportation Demand Management (TDM) Plan in support of the proposed mixed-use development located at 1854 and 1858 Liverpool Road, in the City of Pickering. The proposed development consists of a 13-storey building with 461 sq. m. commercial/retail space on the ground floor and 98 dwelling units in floors 2 to 13 above.

Our traffic impact study findings indicate that the study area intersections are expected to operate acceptably in the future and no road improvements are required to accommodate the proposed development. The existing infrastructure and the capacity of the existing transit routes within the study area is expected to be sufficient for the site.

A Transportation Demand Management (TDM) plan has been prepared, outlining the measures promoting awareness for alternative travel choices to and from the site. A site plan review has been provided, demonstrating that the design of site access (i.e. connection at Liverpool Road) would be acceptable for traffic operations. A vehicle turning template review is also provided to show the on-site circulation.

Sincerely,

Anil Seegobin, P.Eng.
Partner, Engineer

Trans-Plan Transportation Inc.
Transportation Consultants

Joseph Doran
Transportation E.I.T.

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1. INTRODUCTION

Trans-Plan has been retained by Liverpool Estates to complete a Traffic Impact Study (TIS), Site Plan Review and Transportation Demand Management (TDM) Plan for the proposed mixed-use building to be located at 1854 and 1858 Liverpool Road in the City of Pickering.

The Traffic Impact Study includes the following:

- Review and assessment of the existing road network
- Assessment of future background conditions based on anticipated traffic growth, area developments and planned transportation improvements in the study area
- Assessment of the impact of site-generated traffic on the adjacent roadway network under future background and total traffic conditions at expected build-out and a five-year planning horizon after build-out
- Determination of roadway and intersection improvements and transit and pedestrian / cycling infrastructure improvements, as required, to accommodate the proposed development

The Site Plan Review includes the following:

- Review of the proposed site access according to the Regional Municipality of Durham Design Specifications for Road and Entranceways and the Transportation Association of Canada (TAC) Geometric Guidelines
- Review of the internal layout and the circulation for loading and waste collection vehicles on the site plan
- Review the existing available sight distance to confirm if it meets the requirements of the TAC Geometric Guidelines

The TDM plan includes the following study components:

- A review of existing and future TDM opportunities near the study area
- Recommendations of various TDM measures for the site to encourage a reduction in single-occupant auto vehicle trips and auto parking demands
- An implementation plan of the proposed TDM measures, with estimated costs

2. AGENCY CORRESPONDENCE

Prior to commencing this study, Transportation and Planning staff at the City of Pickering, Durham Region and the Ministry of Transportation were contacted for traffic data, such as turning movement counts (TMCs) and signal timing plans. Transportation planning staff at the City of Pickering were contacted for additional information on background developments in the study area to consider within our study. Staff were contacted and provided our study Terms of Reference to discuss the scope and methodology with their comments incorporated into the study. This report adheres to the Regional Municipality of Durham Traffic Impact Study Guidelines, dated October 2011.

3. SITE LOCATION

The site, shown in Figure 1, is located at 1854 and 1858 Liverpool Road. The land is currently occupied

with two single detached dwellings. The site is bounded by Liverpool Road to the east with low-rise residential and the Liverpool Plaza retail buildings beyond; low rise residential and commercial buildings to the south with Kingston Road beyond; low-rise residential buildings to the west with Glendale Drive beyond; and low-rise residential to the north with Glenanna Road beyond. The interchange of Liverpool Road and Highway 401 is located approximately 700 m to the south of the site with Pickering GO station beyond, approximately 850 m from the site.

4. PROPOSED DEVELOPMENT

The site plan was prepared by Emilio de Leon, Architect, and is shown in Figure 2. The proposed mixed-use building consists of 461 sq.m. of GFA of commercial space on the ground floor with 98 dwelling units on the 2nd to 13th floors (52 one-bedroom units, 42 two-bedroom units and 4 three-bedroom units). The building parking lot is proposed to have a full-moves access on Liverpool Road approximately 150 m from the intersection of Liverpool Road and Glenanna Road and approximately 180 m from the intersection of Liverpool Road and Kingston Road.

There are 126 parking spaces proposed with 31 spaces at the surface level and 2 levels of underground parking (46 spaces on P1, 49 spaces on P2) accessed from the southwest corner of the site.

5. EXISTING CONDITIONS

5.1 Road Network

The study area roadways in the immediate vicinity of the site can be described as follows:

Liverpool Road (Regional Road 29) is a major arterial road under the jurisdiction of the Region of Durham. It runs in a north-south direction consisting of five travel lanes, two in each direction and one centre two-way left turn lane. The posted speed limit is 50 km/h in the vicinity of the site.

Glenanna Road is a minor collector road under the jurisdiction of the City of Pickering. It runs in an east-west direction consisting of two travel lanes, one in each direction. The posted speed limit is 40 km/h in the vicinity of the site. There are signed bicycle lanes on both sides of the road.

Kingston Road (Regional Road 2) is a major arterial road under the jurisdiction of the Region of Durham. It runs in an east-west direction consisting of six travel lanes, three in each direction. The outer lane in each direction is designated as a “bus-only” lane. The posted speed limit is 60 km/h in the vicinity of the site. There are signed bicycle lanes on both sides of the road also.

The study area roadway characteristics are shown in Figure 3.

5.2 Traffic Counts

To determine existing operating conditions in the study area, Trans-Plan conducted a site visit and traffic observations along with Turning Movement Counts (TMCs) at the study area intersections. The traffic counts were all conducted on a typical weekday to capture peak hour roadway traffic volumes. Table 1 provides a summary of the traffic counts and peak hours obtained for each intersection (and driveway) counted. TMC diagrams are provided in Appendix A.

Table 1 – Intersection Turning Movement Count Details

Intersection	Count Date	Count Time	Weekday Peak Hour
Glenanna Road at Liverpool Road	Thursday June 20, 2019	AM: 7:00 – 9:30 PM: 4:00 – 6:30	AM: 8:00 – 9:00 PM: 5:15 – 6:15
1848 Liverpool Road Access at Liverpool Road	Thursday June 20, 2019	AM: 7:00 – 9:30 PM: 4:00 – 6:30	AM: 7:15 – 8:15 PM: 5:15 – 6:15
Liverpool Plaza Access at Liverpool Road	Thursday June 20, 2019	AM: 7:00 – 9:30 PM: 4:00 – 6:30	AM: 7:15 – 8:15 PM: 5:15 – 6:15
1294 Kingston Road Access at Liverpool Road	Thursday June 20, 2019	AM: 7:00 – 9:30 PM: 4:00 – 6:30	AM: 7:15 – 8:15 PM: 5:15 – 6:15
Kingston Road at Liverpool Road	Thursday June 20, 2019	AM: 7:00 – 9:30 PM: 4:00 – 6:30	AM: 8:00 – 9:00 PM: 5:15 – 6:15

The existing traffic volumes for the weekday AM and PM peak hour are shown in Figure 4. For the traffic analysis, roadway volumes were balanced (increased) to ensure consistency between the intersections.

5.3 Transit Service

The site is served by Durham Region Transit (DRT), connecting transit riders to major locations throughout Durham Region. DRT operates the following bus routes within the study area:

Route 103 Glenanna, operates between Rouge Hill GO Station and Pickering Parkway Terminal/Pickering GO Station running predominantly along Port Union Road, Kingston Road, Altona Road, Strouds Lane, Glenanna Road and Liverpool Road. The nearest bus stop for the northbound/westbound direction is at 1851 Liverpool Road. The nearest bus stop for the southbound direction is at the intersection of Liverpool Road and Kingston Road on the northwest corner.

Route 110, Finch West, operates between the Dunbarton neighbourhood and Pickering Parkway Terminal running predominantly along Liverpool Road, Fieldlight Boulevard, Valley Farm Road, Finch Avenue and Altona Road. The nearest bus stop for the northbound/westbound direction is at 1851 Liverpool Road.

Route 111, East Pickering, operates a loop predominantly along Dixie Road, Finch Avenue, Marshcourt Drive, Pickering Parkway and Kingston Road. The nearest bus stop for the westbound direction is at the intersection of Liverpool Road and Kingston Road on the northwest corner. The nearest bus stop for the eastbound direction is at the intersection of Liverpool Road and Kingston Road on the southeast corner.

Route 193A, Community Route - West Pickering, operates a counter-clockwise loop predominantly along Liverpool Road, Finch Avenue, Whites Road and Kingston Road. The nearest bus stop for the northbound/westbound direction is at the intersection of Liverpool Road and Glenanna Road on the Northeast corner.

Route 223, Bayly, operates between the Pickering Parkway Terminal and the Lakeside neighbourhood of Ajax, running predominantly along Bayly Street. The nearest bus stop for the southbound/eastbound direction is at the intersection of Liverpool Road and Kingston Road on the southeast corner.

Route 603, Pickering – Port Perry, operates between the Pickering Parkway Terminal and the town of Port Perry, running predominantly along Brock Road and Reach Street. The nearest bus stop for the northbound/eastbound direction is at the intersection of Liverpool Road and Kingston Road on the southeast corner.

Route 900, Pulse, operates an express service between the University of Toronto, Scarborough and Oshawa Town Centre running predominantly along Ellesmere Road, Kingston Road, Dundas Street and King Street. The nearest bus stop for the westbound direction is at the intersection of Liverpool Road and Kingston Road on the northwest corner. The nearest bus stop for the eastbound direction is at the intersection of Liverpool Road and Kingston Road on the southeast corner.

Route 916, Rossland, operates between the Pickering Parkway Terminal and Harmony Terminal, running predominantly along Rossland Road. The nearest bus stop for the northbound/eastbound direction is at the intersection of Liverpool Road and Kingston Road on the southeast corner.

Operating characteristics of the DRT are provided in Table 2 and a map of existing study area transit routes is provided in Figure 5.

Table 2 – Study Area Transit Service

Route	No.	Approximate Service Times			Approximate Peak Service Frequency (min)			
		Weekdays	Saturday	Sunday	AM	PM	SAT	SUN
Glenanna	103	5:32am – 7:43pm	7:55am – 7:24pm	-	30	30	60	-
Finch West	110	5:20am – 10:53pm	7:05am – 10:53pm	7:05am – 8:53pm	30	30	30	60
East Pickering	111	5:35am – 8:05pm	9:05am – 8:01pm	9:05am – 8:01pm	30	20	60	60
Community Route – West Pickering	193A	10:30am – 3:27pm	10:30am – 3:27pm	-	3 services per day			-
Bayly	223	5:00am – 1:34am	6:20am – 12:34am	7:18am – 10:34am	30	30	30	60
Pickering – Port Perry	603	6:08am – 7:17pm	-	-	5 services per day		-	-
Pulse	900	4:20am – 1:54am	5:50am – 1:52am	5:50am – 1:50am	10	10	15	30
Rossland	916	5:55am – 11:49pm	7:05am – 11:49pm	7:35am – 11:49pm	15	15	30	30

Source: Durham Region Transit website

6. FUTURE BACKGROUND CONDITIONS

Future background traffic volumes were determined based on a review of planned developments and future traffic volume growth in the study area. Planned roadway improvements were also reviewed in this section.

6.1 Horizon Years

As per the Durham Region Transportation Impact Study Guidelines, the horizon years used for our analysis are described as follows:

- 2-year horizon period, year 2021: estimated time-frame for full build-out
- 2+5-year horizon period, year 2026: five years after full build-out of the development

6.2 Background Growth Rate

The Region of Durham provided information on the background traffic growth stating that growth has been fairly stagnant for several years. A nominal 0.5 percent per year general background growth rate on the regional roads (Liverpool Road, Kingston Road) was recommended.

To be conservative the same annual growth rate of 0.5 percent was applied to the intersections of the local streets (Glenanna Road), in order to be consistent with the traffic growth of the nearby major arterial roads Liverpool Road and Kingston Road.

6.3 Planned Background Developments

Based on a review of the City of Pickering website for planning applications, one background development in the study area was found located to the adjacent south of the site and considered, as shown in Table 3.

Table 3 – Background Development in the Study Area

Location	Land Use	Development Size	Source
1294 Kingston Road, 1848 & 1852 Liverpool Road	Residential & Commercial Development	373 condominium units, 18 townhouse units 850 sq.m. of commercial GFA	Transportation Impact Study by LEA Consulting Ltd., May 24, 2019

Site auto traffic volumes for the noted area developments have been incorporated into our analysis of future background traffic conditions. Site trips were provided from the development's respective traffic study, 1294 Kingston Road, 1848 & 1852 Liverpool Road Transportation Impact Assessment by LEA Consulting Ltd., dated May 24th 2019. A signalised intersection was recommended for the Liverpool Plaza/1852 Liverpool Road Access. Detailed data for the background developments is provided in Appendix B.

6.4 Planned Roadway and Transit Improvements

Based on a review of the Durham Transportation Master Plan 2017, there are improvements expected to occur on Liverpool Road to the south of Kingston Road, widening from 5 lanes to 7 lanes between 2022 and 2026. The Region of Durham confirmed these plans but at present the EA study has not started so there are no drawings of the proposed changes.

As mentioned previously a signalised intersection was recommended at the northern access for the background development at 1294 Kingston Road, 1848 & 1852 Liverpool Road. This has been included in the traffic analysis for the background and future conditions of both the 2021 and 2026 horizon years.

Metrolinx is currently undertaking an EA study for the Transit Project Assessment Process (TPAP) for Bus Rapid Transit (BRT) along the Highway 2 (Kingston Road) corridor. Median BRT lanes are proposed on Kingston Road through the study area which will include replacing the existing curbside bus-only lanes with median lanes. There is currently no firm time line for implementation of the median BRT system.

The future roadway characteristics are shown in Figure 6. Future background development volumes for the horizon years 2021 and 2026 are provided in Figure 7 and Figure 8, respectively.

7. SITE TRAFFIC

7.1 Auto Trip Generation

Trips were generated based on the Institute of Transportation Engineers (ITE) Trip Generation manuals, 10th Edition, ITE Land Use Code (LUC) 222 for Multifamily Housing (High-Rise) and LUC 820 for Retail Shopping Center. Due to the small amount of retail space, it was assumed that the pass-by trips would be minimal. Therefore, to be conservative all trips for retail were considered as new trips. The site trip generation is provided in Table 4.

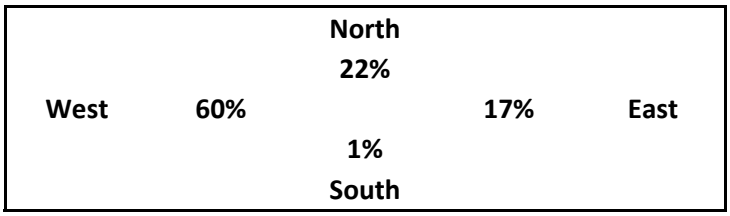
Table 4 – Site Trip Generation

Dwelling Type	Size		AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (High-Rise) ITE Code 222	98.00 units	Distribution	24%	76%	100%	61%	39%	100%
		Equation	T = 0.28(X) + 12.86			T = 0.34(X) + 8.56		
		Rate	0.10	0.31	0.41	0.27	0.16	0.43
		Trips	10	30	40	26	16	42
Retail Shopping Center ITE Code 820	4690 sq.ft. of GFA	Distribution	62%	38%	100%	48%	52%	100%
		Average Rate	AVG rate 0.94			AVG rate 3.81		
		Rate	0.58	0.36	0.94	1.83	1.98	3.81
		Trips	3	2	5	9	10	19
Total Site Trips			**13**	**32**	**45**	**35**	**26**	**61**

The subject site is expected to generate approximately 45 and 61 new two-way trips during the weekday AM and PM peak hours, respectively.

7.2 Auto Trip Distribution and Assignment

Auto site trips were distributed using 2016 Transportation Tomorrow Survey (TTS) data, all-purpose trips to and from Ward 2, for the residential uses. Details are provided in Appendix C. The resulting trip distribution for residential trips travelling from the study area to surrounding municipalities in the morning period, and returning to the study area in the afternoon period, is shown below.



According to the above noted distribution, the majority of traffic in Ward 2 travels mainly west or north to neighboring local wards and municipalities. The Highway 401 westbound interchange and the Pickering GO Station are located to the south of the site. The existing travel patterns along Liverpool Road and Kingston Road shows that the majority of traffic travels south towards the GO station and the interchange in the weekday AM peak hour and the opposite direction in the weekday PM peak hour. Therefore, the site auto traffic trips were assigned to major travel routes in and around the study area similar to the existing roadway travel patterns. The site auto traffic assignment for the weekday AM and PM peak hours are shown in Figure 9.

8. FUTURE TOTAL TRAFFIC CONDITIONS

Site auto traffic volumes were added to the background auto traffic volumes to obtain total traffic volumes for the peak hours. The future total traffic volumes for the weekday AM and PM peak hours for horizon years 2021 and 2026 are shown in Figure 10 and Figure 11, respectively.

9. CAPACITY AND VEHICLE QUEUING ANALYSIS

9.1 Auto Capacity Analysis

A capacity analysis was performed for the study area intersections using Synchro and SimTraffic analysis software. Capacity analysis results for the weekday AM and weekday PM peak hours for horizon year 2021 and 2026 are shown in Table 5 and Table 6, respectively. Capacity analysis sheets and Level-of-Service (LOS) Definitions are provided in Appendix D and Appendix E, respectively.

Capacity Analysis Thresholds:

According to the Durham Region Traffic Impact Study Guidelines, the road network in an urban setting should operate at an LOS of D or better.

The results of the capacity analysis are discussed in this section for each intersection.

Glenanna Road and Liverpool Road

Under existing conditions, the intersection overall operates well with an LOS of B and minimal delays for both the weekday AM and PM peak hours.

Horizon Year 2021 & 2026

Under future background and total conditions, the intersection is expected to continue to operate well with an overall LOS of B with minimal delays in the weekday AM and PM peak hour.

Kingston Road and Liverpool Road

Under existing conditions, the intersection overall operates acceptably with an LOS of C for both the weekday AM and PM peak hours. During the weekday AM peak hour, the northbound left movement operates at an LOS of E with a delay of 78 seconds. The northbound left movement operates at near capacity with a volume-to capacity (v/c) ratio of 0.99. All other individual movements operate acceptably at an LOS of D or better. In the weekday PM peak hour all movements operate acceptably with an LOS of D or better.

Horizon Year 2021

Signal timing adjustments were made while maintaining the cycle length to optimise the LOS and v/c for the northbound left movement. Under future background and total conditions, the intersection overall operates acceptably with an LOS of C for both the weekday AM and PM peak hours. The northbound left movement operates acceptably with an LOS of D for the weekday AM peak hour, with a maximum v/c of 0.90 and delay of 48 seconds.

Horizon Year 2026

With signal timing adjustments mentioned above, under future background and total conditions, the intersection overall operates acceptably with an LOS of C for both the weekday AM and PM peak hours. The northbound left movement operates acceptably with an LOS of D for the weekday AM peak hour, with a maximum v/c of 0.93 and delay of 55 seconds.

Liverpool Plaza North Access and Liverpool Road

Under existing conditions, the intersection operates acceptably with an LOS of C or better for both the weekday AM and PM peak hours.

Horizon Year 2021 & 2026

Under future background and total conditions, the intersection is expected to continue to operate well with an acceptable LOS of C or better in the weekday AM and PM peak hour.

1548 Liverpool Road Access and Liverpool Road

Under existing conditions the intersection operates well with an LOS of C or better for the weekday AM peak hour. The westbound left movement operates at an LOS of E with a delay of 40 seconds during the weekday PM peak hour.

Horizon Year 2021 & 2026

Under future background and total conditions, the intersection is proposed to be signalized in the future after the completion of the neighbouring development located at 1294 Kingston Road, 1848 and 1852 Liverpool Road. Signal timing plans were obtained from the developments Traffic Impact Study completed by LEA Consulting Ltd. The intersection is expected to operate well with an overall LOS of B in both the weekday AM and PM peak hours.

1294 Kingston Road Access and Liverpool Road

Under existing conditions, the intersection operates well with an LOS of C or better for both the weekday AM and PM peak hours.

Horizon Year 2021 & 2026

Under future background and total conditions, the intersection is expected to continue to operate well with a LOS of B or better in the weekday AM and PM peak hours. This intersection is expected to operate better than before due to the inclusion of the signalised intersection at the background development at the 1548 Liverpool Road Access and Liverpool Road.

Proposed Site Access and Liverpool Road

Under future total conditions for both the 2021 and 2026 horizon years, the proposed access is expected to operate well with an LOS of B or better in the weekday AM and PM peak hours. There is expected to be no required road improvements in order to support the subject site, except for the construction of the access to the roadway.

Table 5 - Capacity Analysis Results, Horizon Year 2021

Intersection / Movement	Existing Traffic Conditions						Background Traffic Conditions						Total Traffic Conditions					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Glenanna Road & Liverpool Road	**0.32**	**18**	**B**	**0.66**	**17**	**B**	**0.33**	**18**	**B**	**0.69**	**17**	**B**	**0.33**	**18**	**B**	**0.69**	**17**	**B**
Eastbound Left	0.22	39	D	0.50	41	D	0.23	39	D	0.51	41	D	0.23	39	D	0.51	41	D
Eastbound Through	0.60	45	D	0.59	41	D	0.61	45	D	0.60	41	D	0.61	45	D	0.60	41	D
Eastbound Right	0.17	38	D	0.26	36	D	0.18	38	D	0.27	36	D	0.18	38	D	0.27	36	D
Westbound Left	0.64	50	D	0.30	37	D	0.65	50	D	0.31	37	D	0.66	51	D	0.32	37	D
Westbound Through / Right	0.44	41	D	0.70	45	D	0.44	41	D	0.70	46	D	0.44	41	D	0.70	46	D
Northbound Left	0.22	3	A	0.65	12	B	0.23	5	A	0.69	13	B	0.24	5	A	0.69	13	B
Northbound Through / Right	0.13	2	A	0.32	4	A	0.14	4	A	0.34	4	A	0.15	4	A	0.34	4	A
Southbound Left	0.08	4	A	0.15	6	A	0.08	4	A	0.16	6	A	0.09	4	A	0.16	6	A
Southbound Through / Right	0.25	5	A	0.18	5	A	0.26	5	A	0.19	5	A	0.26	5	A	0.20	5	A
Kingston Road & Liverpool Road	**0.72**	**32**	**C**	**0.80**	**31**	**C**	**0.69**	**26**	**C**	**0.79**	**31**	**C**	**0.70**	**26**	**C**	**0.75**	**31**	**C**
Eastbound Left	0.26	21	C	0.65	30	C	0.33	24	C	0.67	30	C	0.33	24	C	0.66	29	C
Eastbound Through	0.41	30	C	0.71	33	C	0.41	28	C	0.81	38	D	0.41	28	C	0.81	38	D
Eastbound Right	0.15	0	A	0.17	0	A	0.16	0	A	0.17	0	A	0.16	0	A	0.17	0	A
Westbound Left	0.39	23	C	0.85	46	D	0.47	26	C	0.86	49	D	0.47	26	C	0.86	50	D
Westbound Through	0.56	32	C	0.44	26	C	0.55	30	C	0.51	29	C	0.55	30	C	0.53	30	C
Westbound Right	0.03	0	A	0.05	0	A	0.03	0	A	0.05	0	A	0.03	0	A	0.05	0	A
Northbound Left	0.99	78	E	0.73	37	D	0.88	46	D	0.78	39	D	0.90	48	D	0.79	41	D
Northbound Through	0.30	27	C	0.87	41	D												
Northbound Right	0.08	25	C	0.23	26	C												
Northbound Through/Right							0.23	21	C	0.78	33	C	0.24	21	C	0.79	33	C
Southbound Left	0.21	25	C	0.75	49	D	0.26	20	C	0.73	43	D	0.26	20	C	0.75	45	D
Southbound Through	0.69	38	D	0.46	26	C												
Southbound Right	0.09	35	C	0.06	16	B												
Southbound Through/Right							0.55	28	C	0.38	25	C	0.57	28	C	0.39	25	C
Liverpool Plaza North Access & Liverpool Road																		
Westbound Left / Right		11	B		15	C		11	B		17	C		11	B		17	C
Northbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Northbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Left		8	A		10	B		8	A		11	B		8	A		11	B
Southbound Through		0	A		0	A		0	A		0	A		0	A		0	A
1548 Liverpool Road Access & Liverpool Road							**0.37**	**11**	**B**	**0.55**	**11**	**B**	**0.38**	**11**	**B**	**0.56**	**11**	**B**
Eastbound Left / Through / Right		14	B		15	C	0.27	40	D	0.24	38	D	0.27	40	D	0.24	38	D
Westbound Left		19	C		40	E	0.57	45	D	0.64	47	D	0.57	45	D	0.64	47	D
Westbound Through / Right		10	A		10	B	0.06	39	D	0.13	37	D	0.06	39	D	0.15	37	D
Northbound Left		10	A		9	A	0.09	4	A	0.21	6	A	0.09	4	A	0.21	6	A
Northbound Through / Right		0	A		0	A	0.18	4	A	0.53	8	A	0.19	4	A	0.54	8	A
Southbound Left		8	A		11	B	0.14	5	A	0.35	9	A	0.14	5	A	0.36	9	A
Southbound Through / Right		0	A		0	A	0.33	6	A	0.27	4	A	0.34	6	A	0.27	5	A
1292 Kingston Road Access & Liverpool Road																		
Eastbound Left / Right		17	C		15	C		13	B		13	B		13	B		14	B
Northbound Left / Through		0	A		1	A		0	A		1	A		0	A		1	A
Northbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A
Proposed Site Access & Liverpool Road																		
Eastbound Left / Right		0	A		0	A		0	A		0	A		13	B		12	B
Northbound Left		0	A		0	A		0	A		0	A		10	B		9	A
Northbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A

Table 6 - Capacity Analysis Results, Horizon Year 2026

Intersection Movement	Existing Traffic Conditions						Background Traffic Conditions						Total Traffic Conditions					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Glenanna Road & Liverpool Road	**0.32**	**18**	**B**	**0.66**	**17**	**B**	**0.34**	**18**	**B**	**0.71**	**17**	**B**	**0.34**	**18**	**B**	**0.72**	**17**	**B**
Eastbound Left	0.22	39	D	0.50	41	D	0.24	39	D	0.53	41	D	0.24	39	D	0.53	41	D
Eastbound Through	0.60	45	D	0.59	41	D	0.62	45	D	0.59	41	D	0.62	45	D	0.59	41	D
Eastbound Right	0.17	38	D	0.26	36	D	0.21	38	D	0.28	36	D	0.22	39	D	0.29	36	D
Westbound Left	0.64	50	D	0.30	37	D	0.67	52	D	0.31	37	D	0.68	53	D	0.32	37	D
Westbound Through / Right	0.44	41	D	0.70	45	D	0.45	41	D	0.71	45	D	0.45	41	D	0.71	45	D
Northbound Left	0.22	3	A	0.65	12	B	0.24	5	A	0.72	14	B	0.25	5	A	0.72	15	B
Northbound Through / Right	0.13	2	A	0.32	4	A	0.15	4	A	0.35	4	A	0.15	4	A	0.35	4	A
Southbound Left	0.08	4	A	0.15	6	A	0.09	4	A	0.17	6	A	0.09	4	A	0.17	6	A
Southbound Through / Right	0.25	5	A	0.18	5	A	0.27	5	A	0.20	6	A	0.27	5	A	0.20	6	A
Kingston Road & Liverpool Road	**0.72**	**32**	**C**	**0.80**	**31**	**C**	**0.72**	**27**	**C**	**0.80**	**32**	**C**	**0.73**	**27**	**C**	**0.81**	**32**	**C**
Eastbound Left	0.26	21	C	0.65	30	C	0.35	24	C	0.72	33	C	0.35	24	C	0.72	34	C
Eastbound Through	0.41	30	C	0.71	33	C	0.42	28	C	0.80	37	D	0.42	28	C	0.80	37	D
Eastbound Right	0.15	0	A	0.17	0	A	0.16	0	A	0.17	0	A	0.16	0	A	0.17	0	A
Westbound Left	0.39	23	C	0.85	46	D	0.49	27	C	0.95	65	E	0.49	27	C	0.95	65	E
Westbound Through	0.56	32	C	0.44	26	C	0.57	31	C	0.50	28	C	0.57	31	C	0.50	28	C
Westbound Right	0.03	0	A	0.05	0	A	0.03	0	A	0.05	0	A	0.03	0	A	0.06	0	A
Northbound Left	0.99	78	E	0.73	37	D	0.92	52	D	0.81	42	D	0.93	55	E	0.82	44	D
Northbound Through	0.30	27	C	0.87	41	D												
Northbound Right	0.08	25	C	0.23	26	C												
Northbound Through/Right							0.24	21	C	0.80	33	C	0.24	21	C	0.81	34	C
Southbound Left	0.21	25	C	0.75	49	D	0.27	20	C	0.75	45	D	0.27	21	C	0.77	46	D
Southbound Through	0.69	38	D	0.46	26	C												
Southbound Right	0.09	35	C	0.06	16	B												
Southbound Through/Right							0.57	28	C	0.39	25	C	0.58	28	C	0.40	26	C
Liverpool Plaza North Access & Liverpool Road																		
Westbound Left / Right		11	B		15	C		11	B		17	C		12	B		18	C
Northbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Northbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Left		8	A		10	B		8	A		11	B		8	A		11	B
Southbound Through		0	A		0	A		0	A		0	A		0	A		0	A
1548 Liverpool Road Access & Liverpool Road							**0.38**	**11**	**B**	**0.57**	**12**	**B**	**0.38**	**11**	**B**	**0.58**	**12**	**B**
Eastbound Left / Through / Right		14	B		15	C	0.26	40	D	0.24	38	D	0.26	40	D	0.24	38	D
Westbound Left		19	C		40	E	0.58	45	D	0.65	47	D	0.58	45	D	0.65	47	D
Westbound Through / Right		10	A		10	B	0.06	39	D	0.16	37	D	0.06	39	D	0.19	37	D
Northbound Left		10	A		9	A	0.09	4	A	0.21	6	A	0.09	4	A	0.22	6	A
Northbound Through / Right		0	A		0	A	0.19	4	A	0.55	8	A	0.19	4	A	0.56	8	A
Southbound Left		8	A		11	B	0.14	5	A	0.37	9	A	0.15	5	A	0.39	10	A
Southbound Through / Right		0	A		0	A	0.34	6	A	0.27	5	A	0.35	6	A	0.28	5	A
1292 Kingston Road Access & Liverpool Road																		
Eastbound Left / Right		17	C		15	C		13	B		14	B		13	B		14	B
Northbound Left / Through		0	A		1	A		0	A		1	A		0	A		1	A
Northbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A
Proposed Site Access & Liverpool Road																		
Eastbound Left / Right		0	A		0	A		0	A		0	A		13	B		12	B
Northbound Left		0	A		0	A		0	A		0	A		10	B		9	A
Northbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through		0	A		0	A		0	A		0	A		0	A		0	A
Southbound Through / Right		0	A		0	A		0	A		0	A		0	A		0	A

10. SITE PLAN REVIEW

10.1 Site Access Review

A review of the proposed site access design was completed using Durham Region's Design Specifications for Roads and Entranceways in urban areas (see Appendix F – Site Plan Review Documents).

Based on the guidelines, the proposed access at Liverpool Road should have a maximum width of 7.5m and be spaced 7.5m from adjacent driveways. These requirements are met with the proposed width of 6.5m and is adequately spaced from adjacent driveways of the residential properties. Also, the required radius of the entranceway should be between 4.5 and 12m. This requirement is met with the proposed radius of 6m.

Liverpool Road is designated as a Type B arterial which, according to the Durham Region Official Plan, permits private access generally located a minimum of 80 metres apart in urban areas. However, according to Schedule E of the Durham Regional Official Plan, "Within Centres and Hamlets, speed and access spacing requirements shall not apply to arterial roads."

The throat length requirements of a Type B arterial road are 15 m from the radius curve. Currently the throat length shown in the site plan is 4.5m. Removing four surface level parking spaces from the northeast corner should allow for a throat length of 15m.

10.2 Sight Distance Review

A driver sight distance review was conducted to measure the available site distance, looking north and south from the future access at Liverpool Road.

Minimum sight distance requirements were obtained from the Transportation Association of Canada (TAC) Manual (Figure 2.3.3.4b) based on an assumed design speed of 70km. Details of the review are summarized in Table 7. Photographs taken from the proposed driveway location are provided in Appendix G – Sight Distance Photographs.

Table 7 - Sight Distance Summary

Location	Available Sight Distance (m)	Criteria	Sight Distance Design Domain (m)	Range Met? (Y / N)
Looking North along Liverpool Road	~400	AASHTO B2 and Cb	125 - 200	Yes
Looking South along Liverpool Road	~750	AASHTO B2 and Cb	125 - 200	Yes

The minimum available sight distance looking north and south along Liverpool Road is approximately 400m and 750m, respectively. The distance looking south meets the design domain between 120m to 200m for a passenger vehicle to turn right without being overtaken by a vehicle approaching from the left. Vehicles exiting the site can see past the intersection of Liverpool Road and Glenanna Road, for an approximate distance of 250m. Vehicles exiting the site can see past the intersection of Liverpool Road and Kingston Road, for an approximate distance of 500m.

10.3 Site Circulation Review

A site circulation review was completed using AutoTurn vehicle turning template software to determine if a loading vehicle, waste collection vehicle and passenger vehicle is able to manoeuvre within the site. The turning templates of the design vehicles are summarized as follows:

- Figure 12 demonstrates a loading vehicle, depicted by a Transportation Association of Canada (TAC) medium single-unit (MSU) vehicle, entering the site access, circulating the site and reversing into the loading area, then exiting the loading area and the site.
- Figure 13 demonstrates a 12m waste collection vehicle entering the site access and the first underground parking level through the ramp, and reversing in to the waste pick-up area. Figure 14 demonstrates a 12m waste collection vehicle exiting the waste pick-up area and the parking level through the ramp, then exiting the site. One additional manoeuvre is necessary to exit the waste pick-up area.

Our review demonstrates that all design vehicles can properly circulate the proposed site with minimal conflict. It is recommended that loading and waste collection operations should be scheduled separately, and during off-peak hours to ensure all manoeuvres can be made within the loading and parking area with minimal conflict.

11. TRANSPORTATION DEMAND MANAGEMENT PLAN

A TDM plan is provided as part of the proposed development in an effort to assist to minimize congestion, improve air quality, reduce greenhouse gas emissions, reduce parking demand, and improve public health in the long-term.

This TDM plan for the proposed development, along with the Durham Region transportation policies and initiatives for the surrounding road network, will help provide the public greater choice, incentives and opportunities to choose travel modes other than single-occupant vehicles. Our proposed TDM plan for the site is outlined as follows:

Transit

Increasing public transit use has many benefits such as protecting the environment, reducing traffic congestion on Regional roads, providing convenience, saving energy, strengthening communities and improving liveability.

The site is currently well served by transit with eight DRT routes in the vicinity, six of them operating along Kingston Road. Most services operate at frequencies of 30 minutes during peak hours. Bus Rapid Transit (BRT) is one of the services available on Kingston Road at service frequencies of approximately 10 minutes in the weekday AM and PM peak hours. Transit stops are located at the intersection of Kingston Road and Liverpool Road. The BRT stops at Liverpool Road and Kingston Road are approximately 3 minutes walk from the site using a walking speed of 1.0 m/s (~200m).

Pickering GO Station is approximately 1km from the site, south of Highway 401, with pedestrian access available through the Pickering Town Centre Shopping Centre. Pickering GO station is on the Lakeshore East train line with train service running between Toronto Union Station and Oshawa GO station approximately every 15 minutes. Bus services also extend the route as far as Newcastle.

To encourage residents and visitors of the site to travel by transit, they should be provided with DRT information packages containing route maps, schedules and other useful information. Staff of the retail units should also be provided the DRT packages by the tenants to encourage travel via transit as an alternative to driving.

Cycling & Walking

Encouraging more people to cycle would result in taking more cars off the road during peak hours, helping to reduce traffic congestion, and is more environmentally friendly.

Within the study area, there are cycle-only lanes along both sides of Kingston Road and Glenanna Road. The cycle lanes provide added safety for cyclists by reducing auto and cycle conflicts.

According to City of Pickering Zoning By-law 7553-17, 51 bicycle parking spaces should be provided with at least 13 (25%) of them within either a building, a secure area (e.g. supervised parking lot) or bicycle lockers.

Sidewalks are provided around the site and connect to the entrance of the commercial and residential area of the building. Sidewalks are provided on both sides of the residential streets within the study area, allowing residents of the neighbourhood to easily access the retail components of the subject site.

New residents should be introduced to Durham Region's Cycle Durham communication strategy which supports and encourages cycling. Active Switch is an online program where residents can set goals for their walking and cycling progress. Users of the program can enter monthly raffle prizes, which further incentivizes residents to log their active transportation activity.

Smart Commute Durham

Smart Commute Durham offers services and tools to help commuting easier for local commuters in the Durham and Greater Toronto and Hamilton Area. The programs of Smart Commute Durham includes carpooling, cycling and walking, Emergency Ride Home (ERH), PRESTO Card and alternative work arrangements. One of the services that are offered by Smart Commute Durham is connecting users to carpool through an online match making service. The program can provide residential users and visitors a network to arrange carpooling. In addition, Smart Commute Durham also provides trip planners and maps to users to help find other form of transportation options.

Communication Strategy

The aforementioned information packages (for transit, cycling and trails, and Smart Commute) are to be distributed when the residential units first become occupied and for new employees of the retail stores. Wayfinding brochures may also be beneficial, showing new residents where nearby amenities are located near the development or along Liverpool Road.

Table 8 – Transportation Demand Management Plan Summary

	TDM Program or Measure	Applicant's Responsibility	Implementation of TDM Measure	Units Costs	Total Costs
A	Transit	Information packages (DRT / Pulse maps, GO schedules, Smart Commute Durham)	Provide transit information packages to new residents upon closing of the unit and new employees upon employment	TBD	TBD
B	Pedestrian / Cycling	Pedestrian connections	Maintain the existing sidewalks on Liverpool Road	Concrete sidewalk: $46 / sq.m.*	TBD
		pedestrian / cycling circulation			
		Pedestrian / cycling connection to transit facilities			
		Cycling connections			
		Bicycle parking / shelter	Provide 51 spaces for bicycles with a minimum of 13 within the building / underground garage	TBD	TBD
		Illumination of pedestrian / cycling connections	Installation of lighting throughout property	TBD	TBD

Source: (*) York Region 2008 Quantity and Cost Summary

12. SUMMARY AND RECOMMENDATIONS

Our Traffic Impact Study (TIS) and Transportation Demand Management (TDM) Plan, prepared in support of a proposed multi-use building located at 1854 and 1858 Liverpool Road, City of Pickering, is summarized as follows:

12.1 Summary of Traffic Impacts

- The proposed mixed-use building consists of 461 sq.m. of GFA of commercial space on the ground floor with 98 dwelling units on the 2nd to 13th floors, with a proposed easement onto Liverpool Road.
- In correspondence with Durham Region, it was understood that the estimated traffic growth in the neighbourhood has stagnated recently. Therefore, a minimal traffic growth of 0.5 percent per annum was applied to all the study area intersections for both horizon year 2021 and 2026.
- One background development at 1294 Kingston Road, 1848 & 1852 Liverpool Road, directly south of the site, was included in the analysis. This development proposed to upgrade the 1852 Liverpool Road Access to a signalised intersection. This upgrade was applied to the analysis for horizon year 2021 and 2026.
- As part of the Region's road improvements in their Transportation Master Plan, Liverpool Road south of Kingston Road is to be widened from 5 to 7 lanes between 2022 and 2026. Also, Metrolinx is currently undertaking an EA study for the TPAP for BRT along Highway 2 (Kingston Road) with no current implementation timeline available.

- Site auto traffic for the residential development was generated based on rates provided in the ITE Trip Generation Manual, 10th Edition. The site is estimated to generate 45 and 61 two-way trips in the weekday AM and weekday PM peak hour.
- Under existing conditions, the northbound left turn lane at the intersection of Kingston Road and Liverpool Road operates at an LOS of E and near capacity with a volume-to capacity (v/c) ratio of 0.99. Signal timing changes were applied to the future background and total conditions to alleviate this issue.
- Under background and total conditions, for both the 2021 and 2026 horizon years, the study area intersections are expected to operate acceptably with no roadway improvements necessary to accommodate the subject site.

12.2 Summary of Site Plan Review

- The proposed site access is within the design requirements found in the Regional Municipality of Durham Design Specifications for Roads and Entranceways with a width of 6.5m and radius of 6m and is spaced adequately from adjacent driveways.
- The throat length requirement of a Type B arterial road is 15 m based on the Regional Municipality of Durham Design Specifications for Roads and Entranceways. Currently the throat length shown in the site plan is 4.5m. Removing four surface level parking spaces from the northeast corner would allow for a minimum throat length of 15m.
- The minimum available sight distance looking north and south from the proposed site access at Liverpool Road is approximately 400m and 750m, respectively. The distance looking south meets the TAC design domain between 120m to. Vehicles exiting the site can see past the intersection of Liverpool Road and Glenanna Road, for an approximate distance of 250m. Vehicles exiting the site can see past the intersection of Liverpool Road and Kingston Road, for an approximate distance of 500m.
- The site circulation review demonstrates that all design vehicles can properly circulate the proposed site without conflict. It is recommended that loading and waste collection operations should be scheduled separately, and during off-peak hours to ensure all manoeuvres can be made within the loading and parking area with minimal conflict.

12.3 Summary of Transportation Demand Management

- The site is currently well served by transit with eight DRT routes in the vicinity, most services operate at frequencies of 30 minutes during peak hours. Bus Rapid Transit (BRT) is one of the services available on Kingston Road at service frequencies of approximately 10 minutes. Transit stops are located at the intersection of Kingston Road and Liverpool Road approximately 3 minutes walk from the site (~200m).
- Sidewalks are provided around the site and connect to the entrance of the commercial and residential area of the building. Sidewalks are provided on both sides of the residential streets within the study area, allowing residents of the neighbourhood to easily access the retail components of the subject site.
- According to Zoning By-law 7553-17, 51 bicycle parking spaces should be provided with at least 13 (25%) of them within either a building, a secure area (e.g. supervised parking lot) or bicycle lockers.

- Information packages containing transit and cycling maps, and Durham Region Smart Commute and other TDM programs, should be provided to new residents and employees of the subject site.

12.4 Recommendations

Given the minimal impact of site traffic volumes on the study area road network, the proposed development could proceed without any further intersection improvements in the surrounding study area.

There are minimal changes to the site required to meet the the Regional Municipality of Durham Design Specifications for Roads and Entranceways and the City of Pickering Zoning By-law 7553-17. Removing four surface level parking spaces from the northeast corner would allow for a throat length of 15m. Also, provision of 51 bicycle parking spaces is required with at least 13 (25%) of them within either a building, a secure area (e.g. supervised parking lot) or bicycle lockers.

For Transportation Demand Management purposes, information packages containing transit and cycling maps, and Durham Region Smart Commute and other TDM programs, should be provided to new residents and employees of the subject site.

Respectfully submitted,

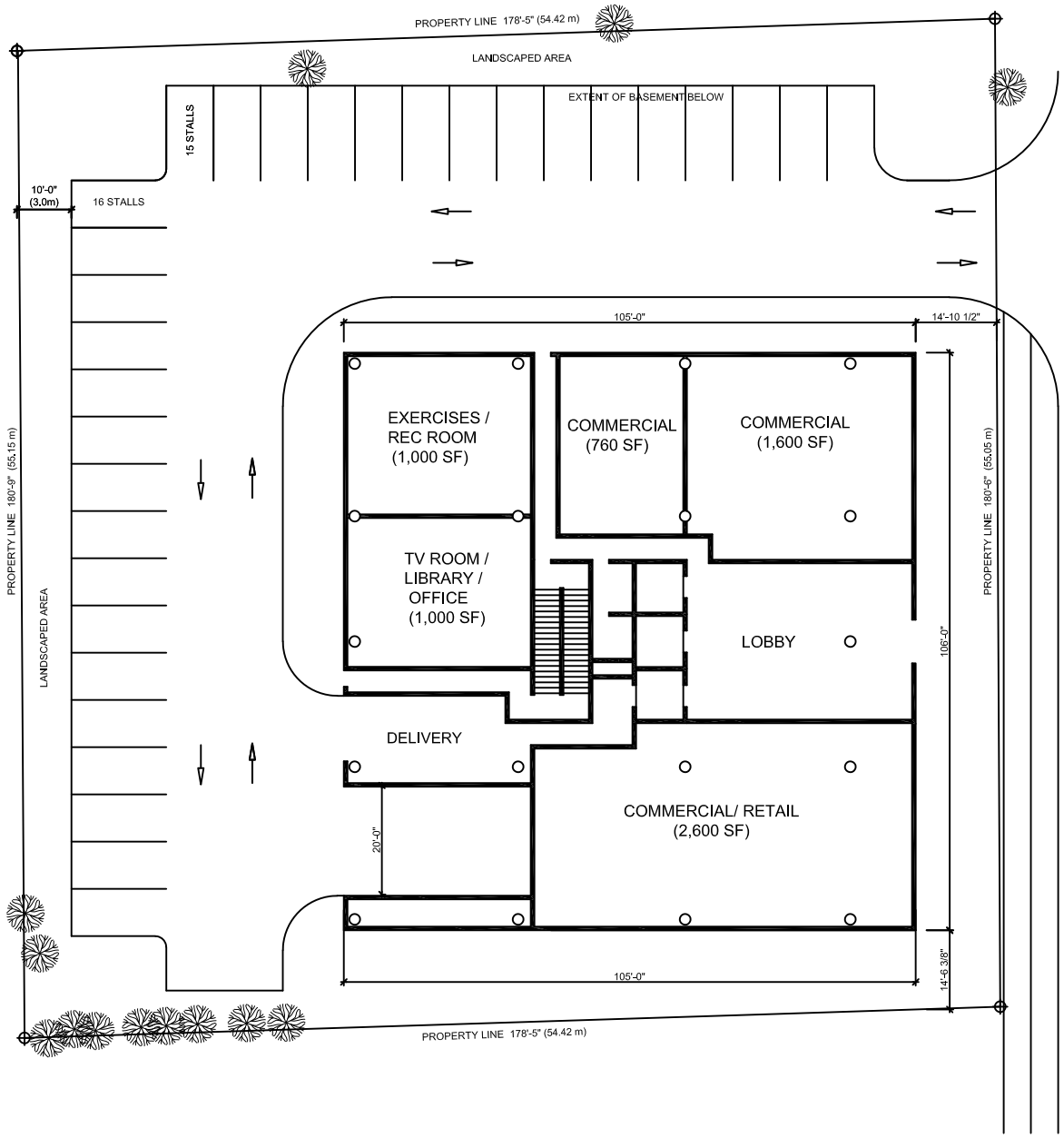
Anil Seegobin, P.Eng.
Partner, Engineer

Joseph Doran
Transportation E.I.T.

Trans-Plan Transportation Inc.
Transportation Consultants

Figure 1 – Site Location

Source: Google Maps



EMILIO DE LEON, ARCHITECT 25 BAYSIDE GATE, WHITBY 416 371 7588 edeleon@bimeb.ca www.bimeb.ca	PROPOSED 13-STOREY APARTMENT - LIVERPOOL ROAD, PICKERING	SHEET NO.
	GROUND FLOOR PLAN SCALE: 1/32" = 1'-0	A-1

Figure 3: Existing Study Area Roadway Characteristics

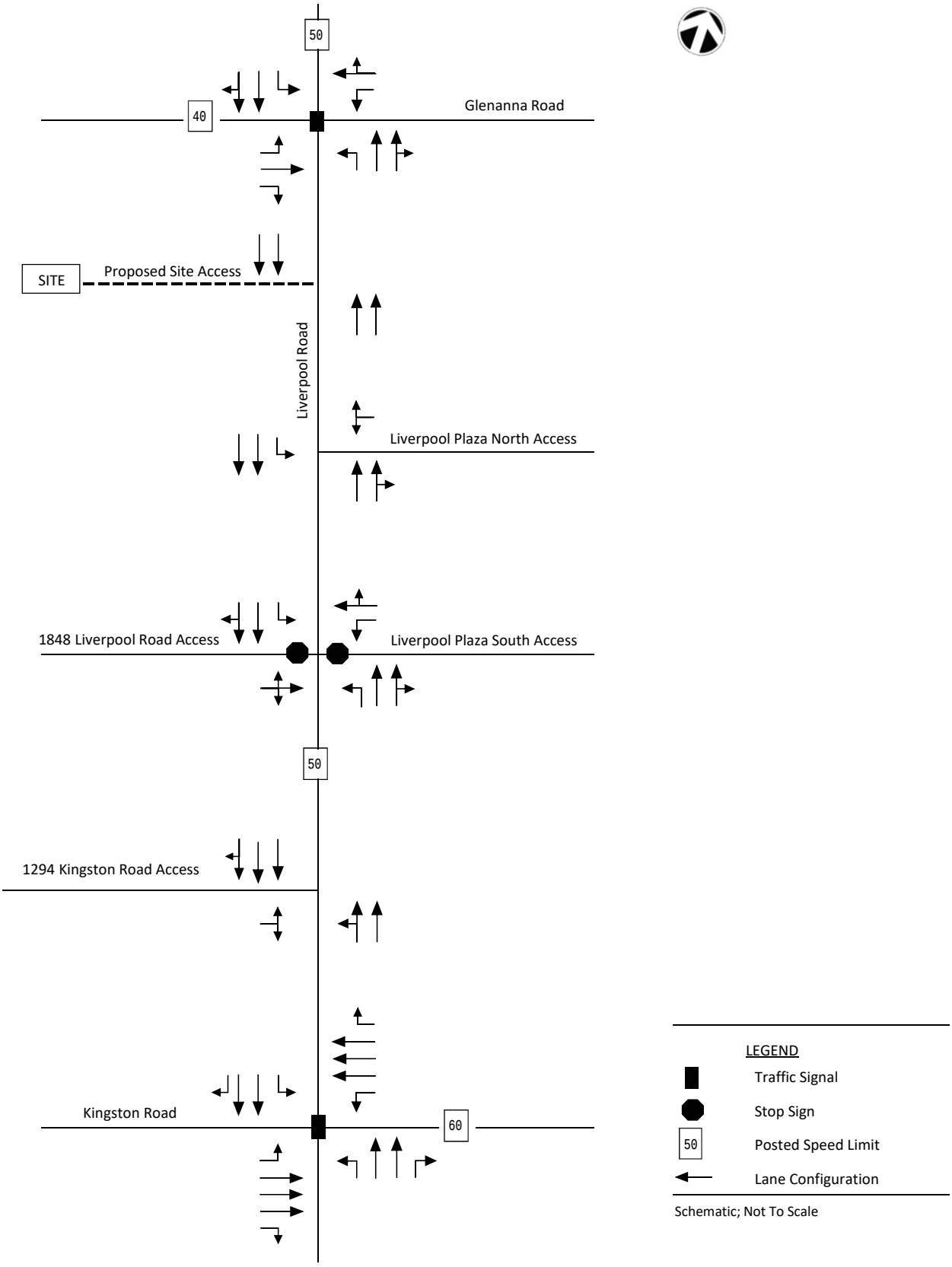


Figure 4 - Existing Traffic Volumes, Weekday AM and PM and SAT Peak Hours

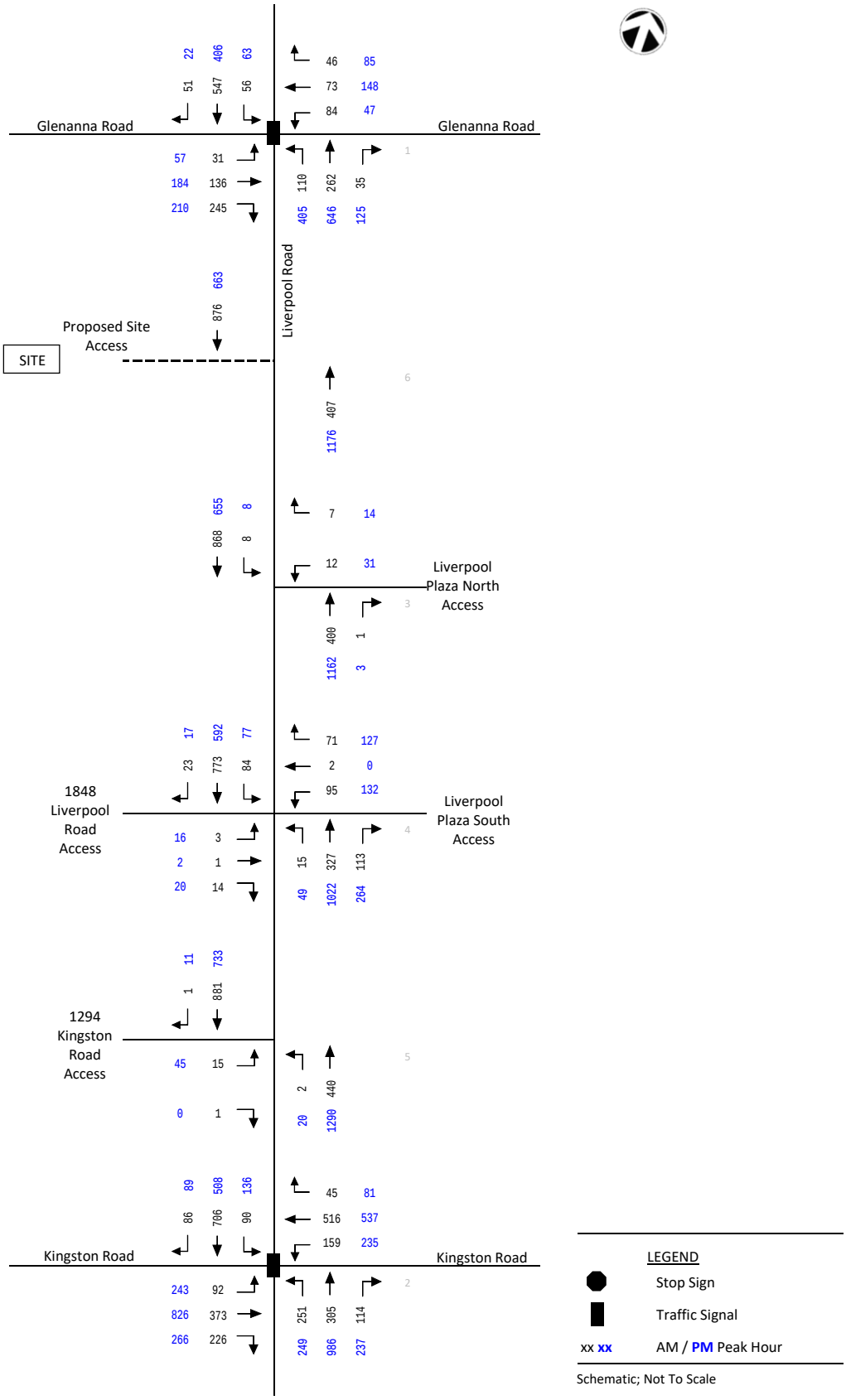
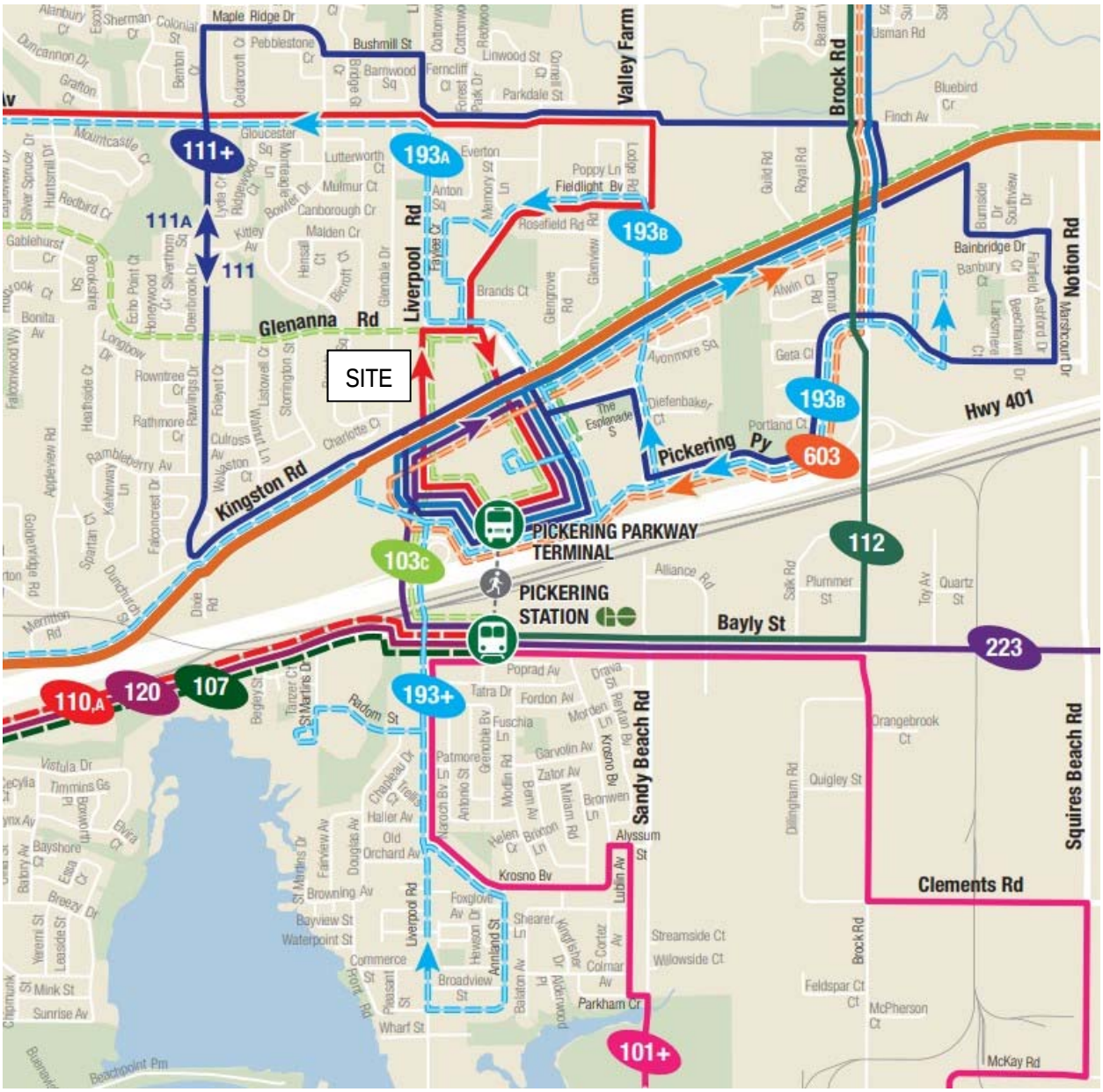


Figure 5 – Study Area Transit Service



Source: DRT System Map

Figure 6: Future Study Area Roadway Characteristics

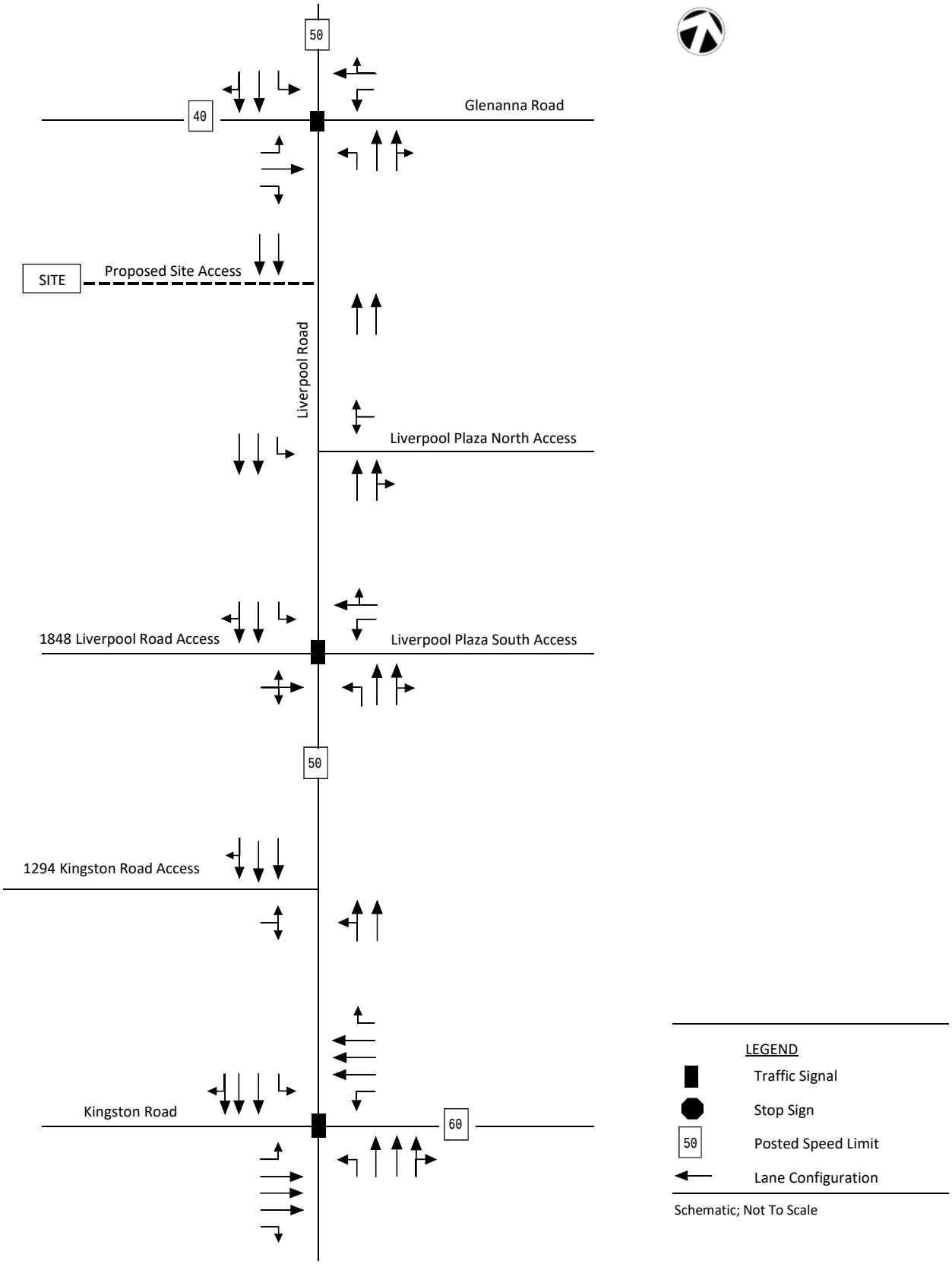


Figure 7: 2021 Background Traffic Volumes, Weekday AM and PM Peak Hours

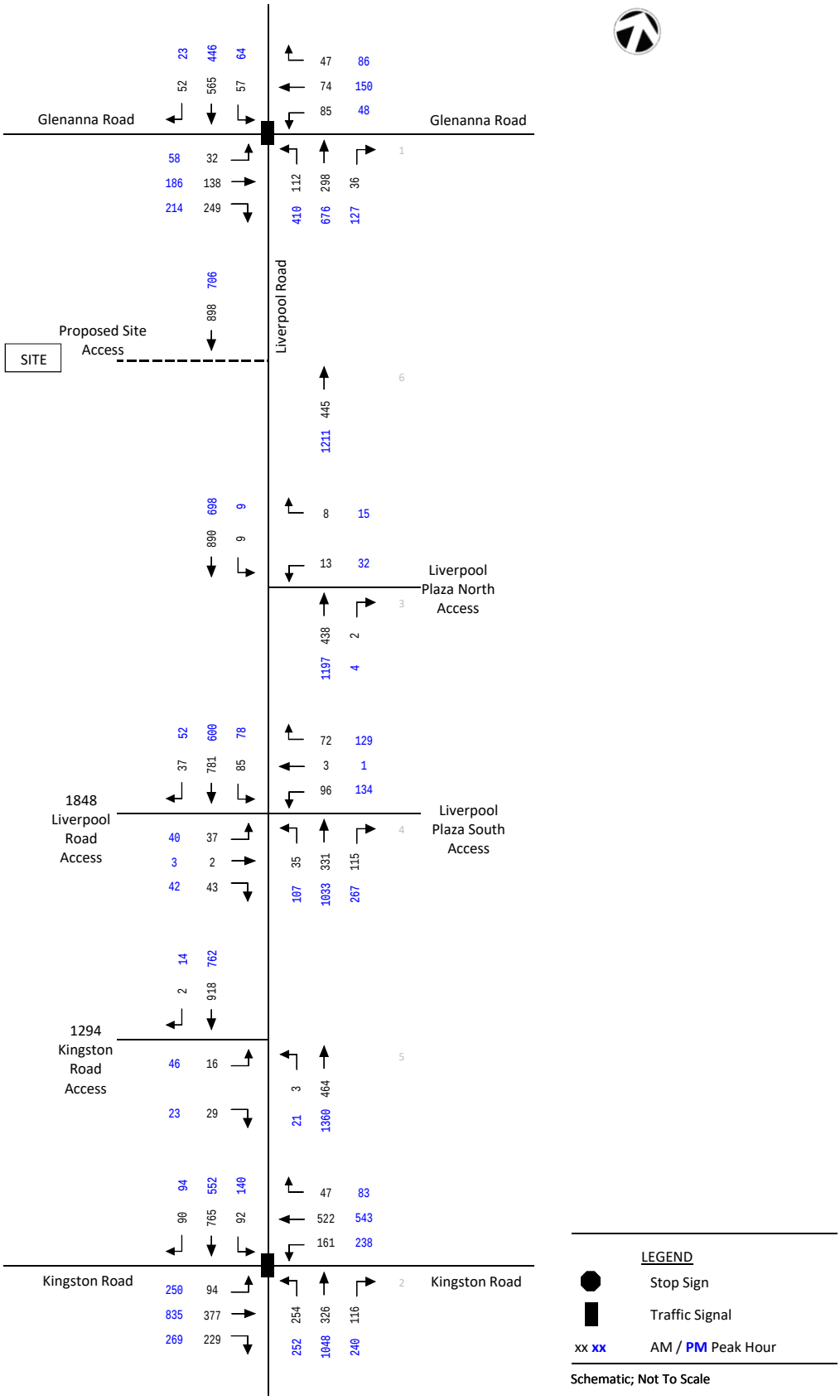


Figure 8: 2026 Background Traffic Volumes, Weekday AM and PM Peak Hours

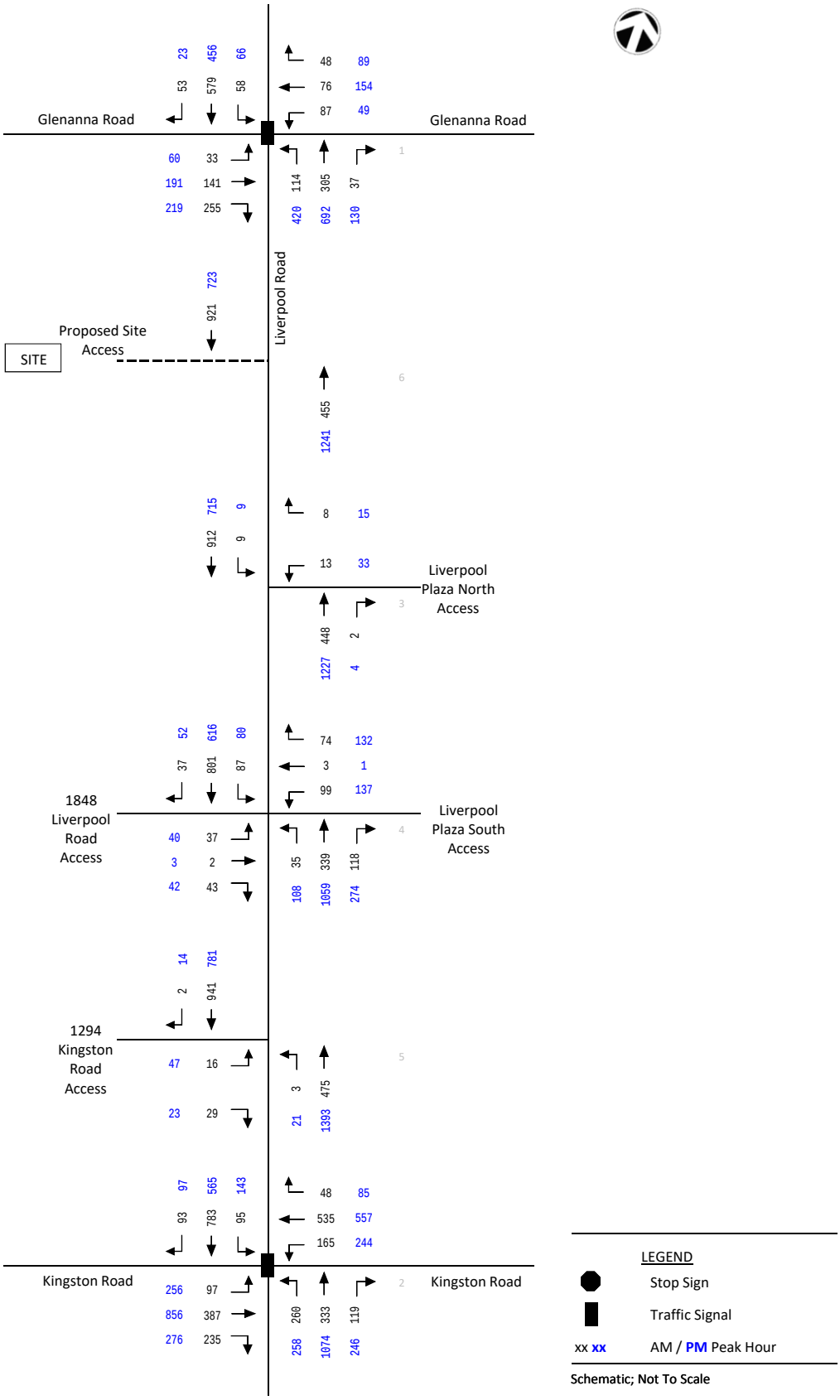


Figure 9: Site Traffic Volumes, Weekday AM and PM Peak Hours

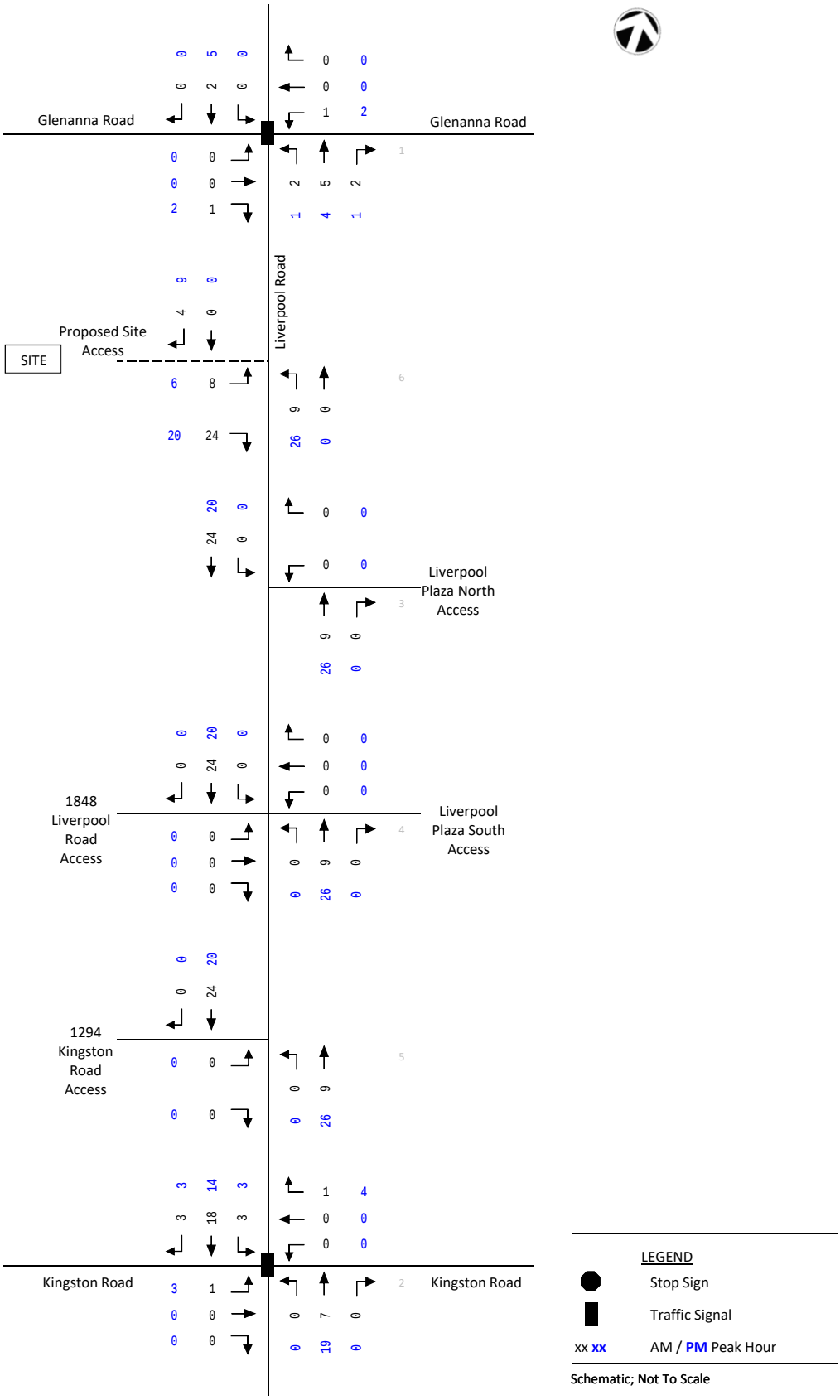


Figure 10: 2021 Total Traffic Volumes, Weekday AM and PM Peak Hours

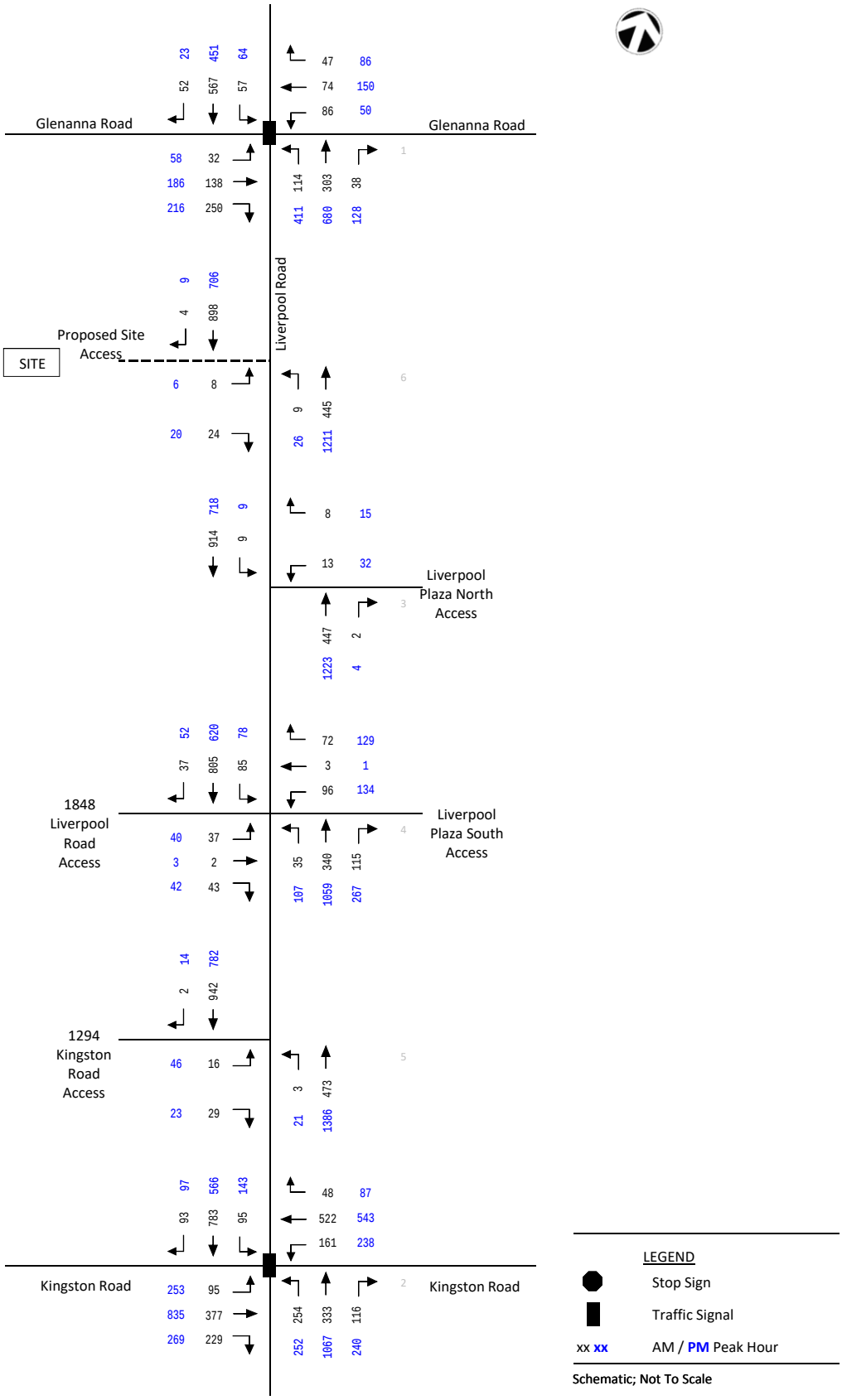
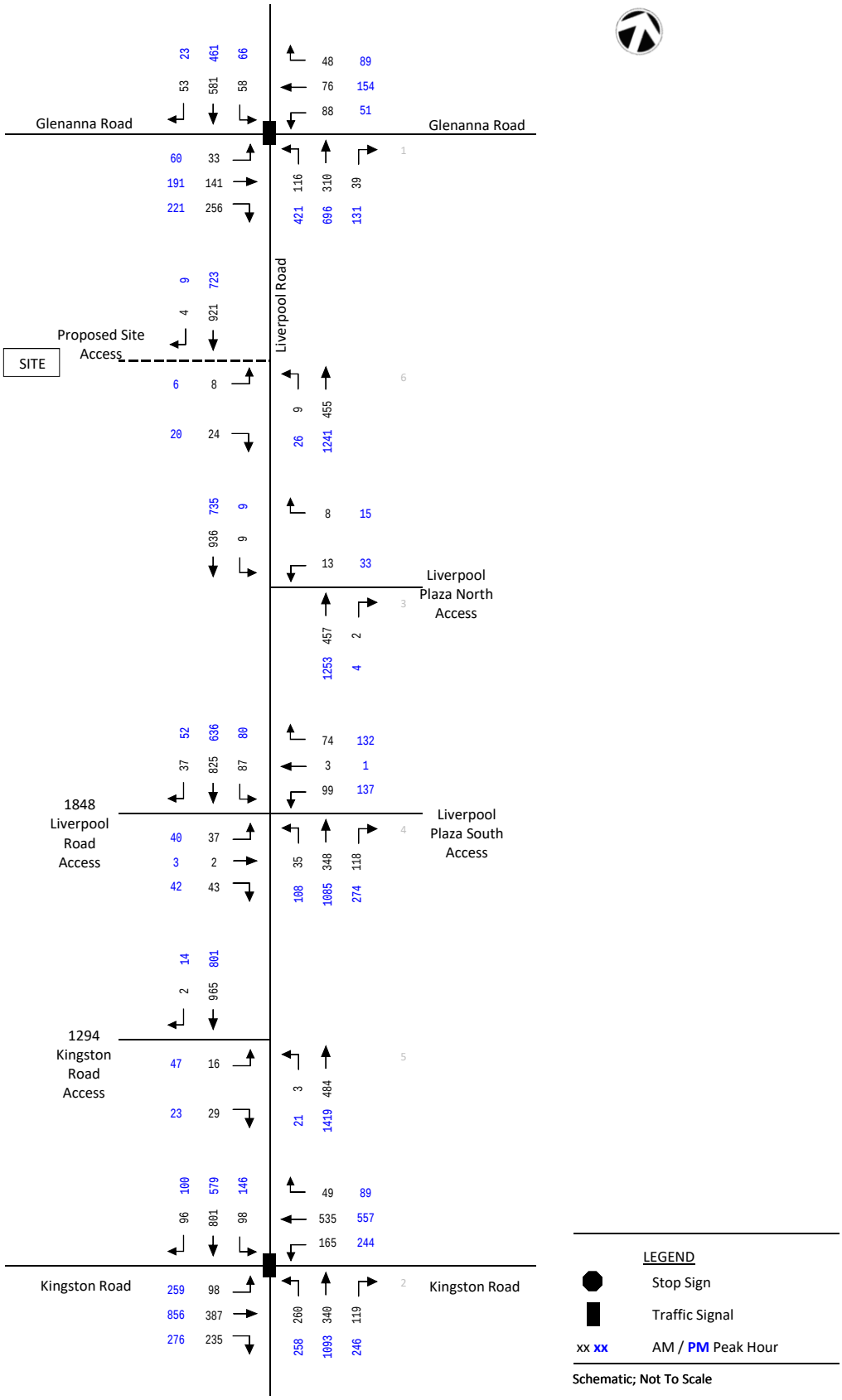


Figure 11: 2026 Total Traffic Volumes, Weekday AM and PM Peak Hours



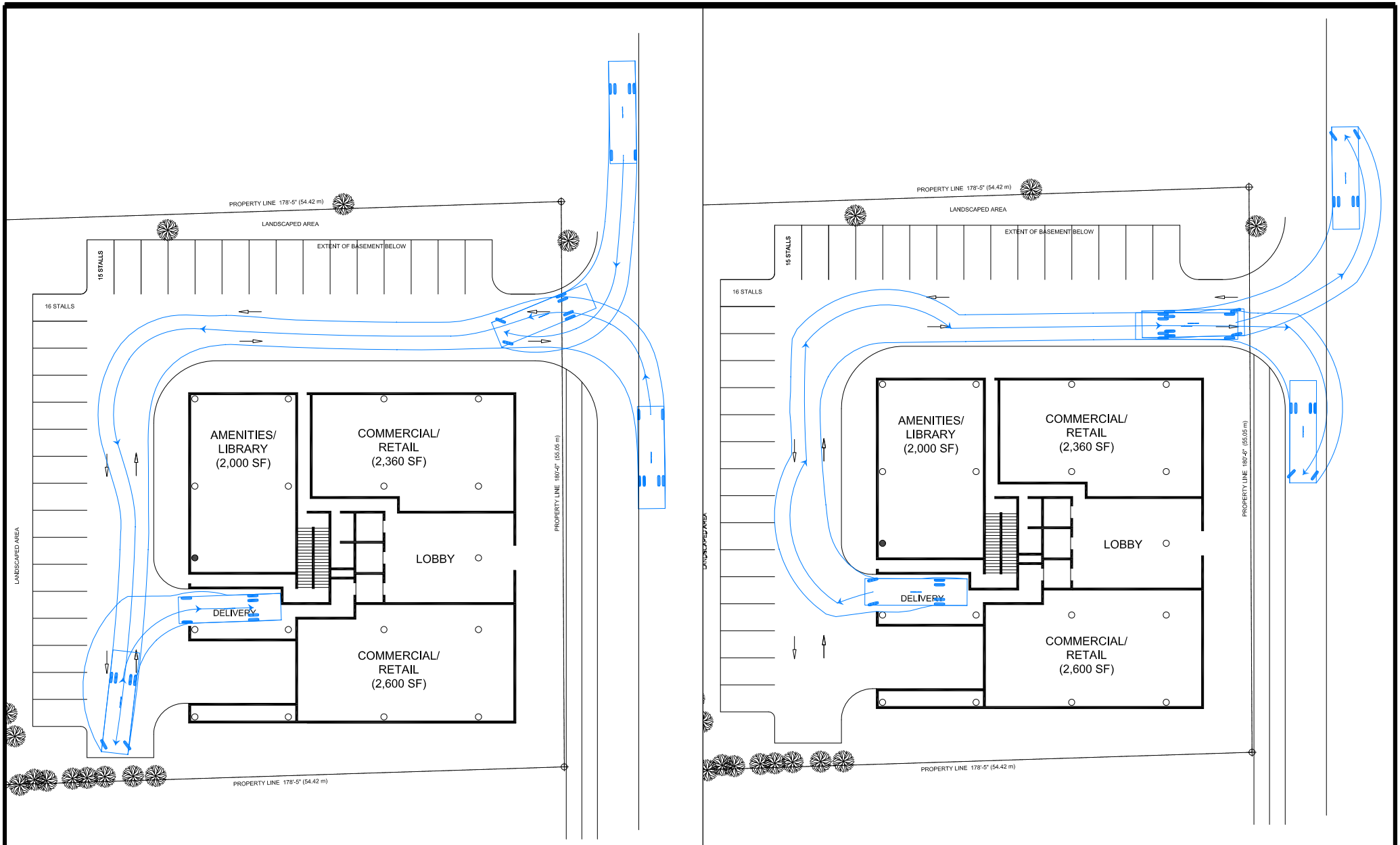
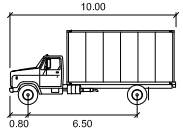


Figure 12 - Loading Vehicle Circulating the Site and the Loading Area

PROPOSED RESIDENTIAL DEVELOPMENT,
1854 & 1858 LIVERPOOL ROAD,
PICKERING, ON



MSU	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.1

CONSTRUCTION NORTH
TRUE NORTH

SCALE: 1:500 UNITS: mm

Source: Site Plan by Emilio De Leon Architect , dated July 8, 2019

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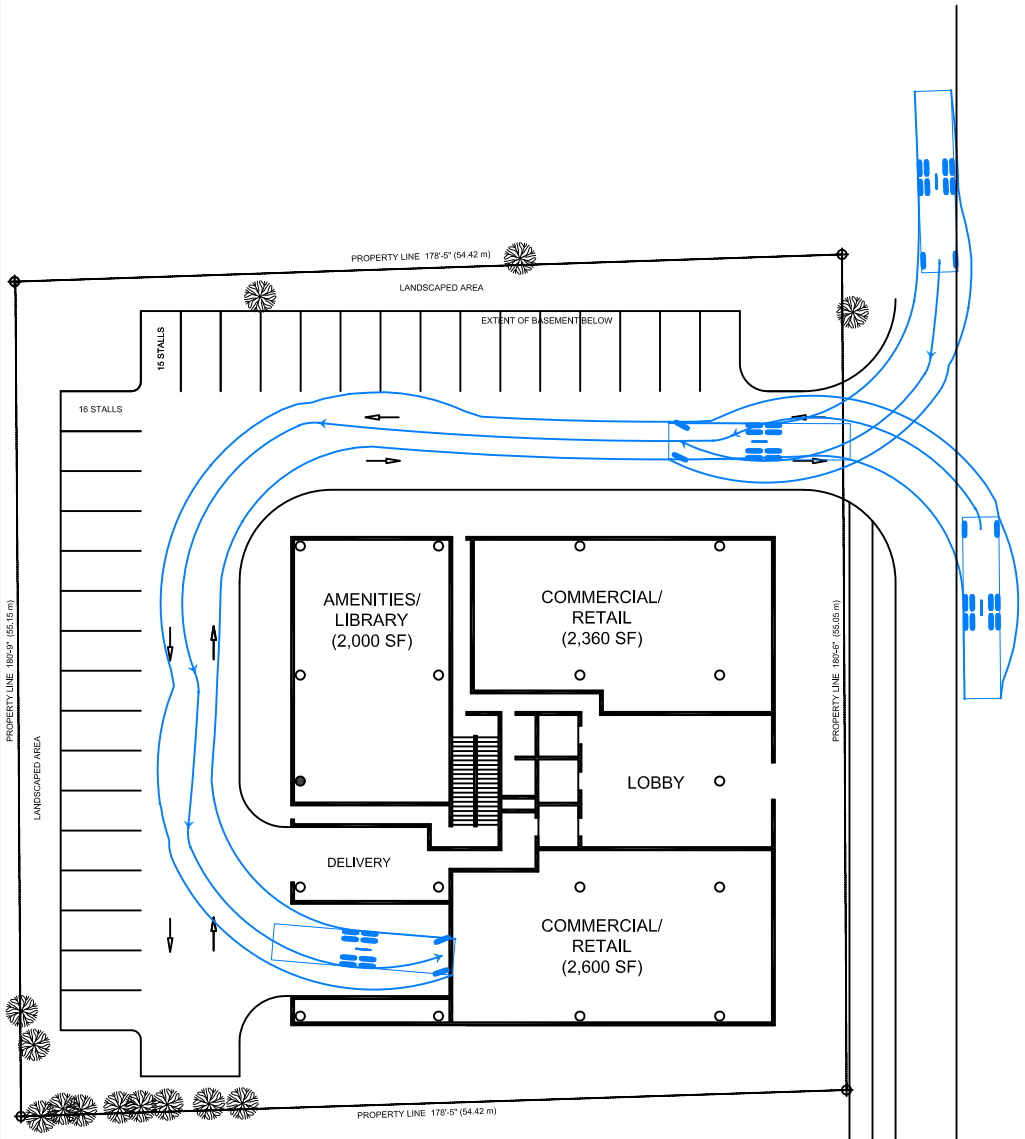


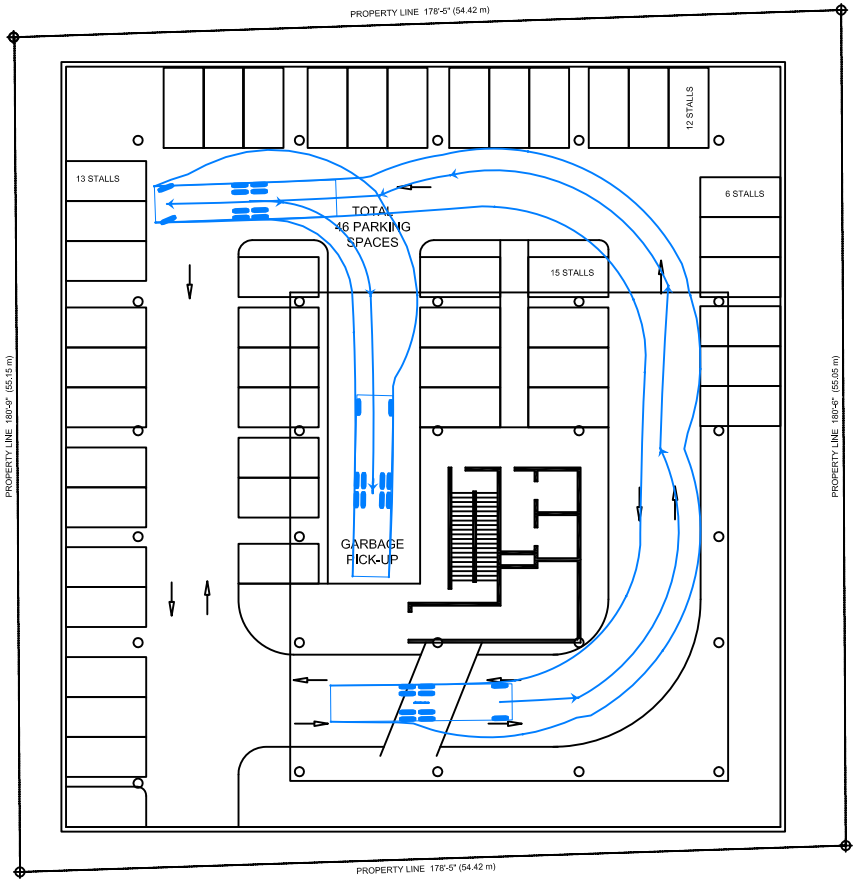
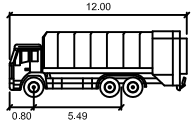


Figure 13 - Waste Collection Vehicle Entering the Site and the Loading Area

PROPOSED RESIDENTIAL DEVELOPMENT,
1854 & 1858 LIVERPOOL ROAD,
PICKERING, ON



Waste Collection meters

Width	: 2.40
Track	: 2.40
Lock to Lock Time	: 6.0
Steering Angle	: 25.9

Source: Site Plan by Emilio De Leon Architect , dated July 8, 2019

SCALE: 1:500 UNITS: mm

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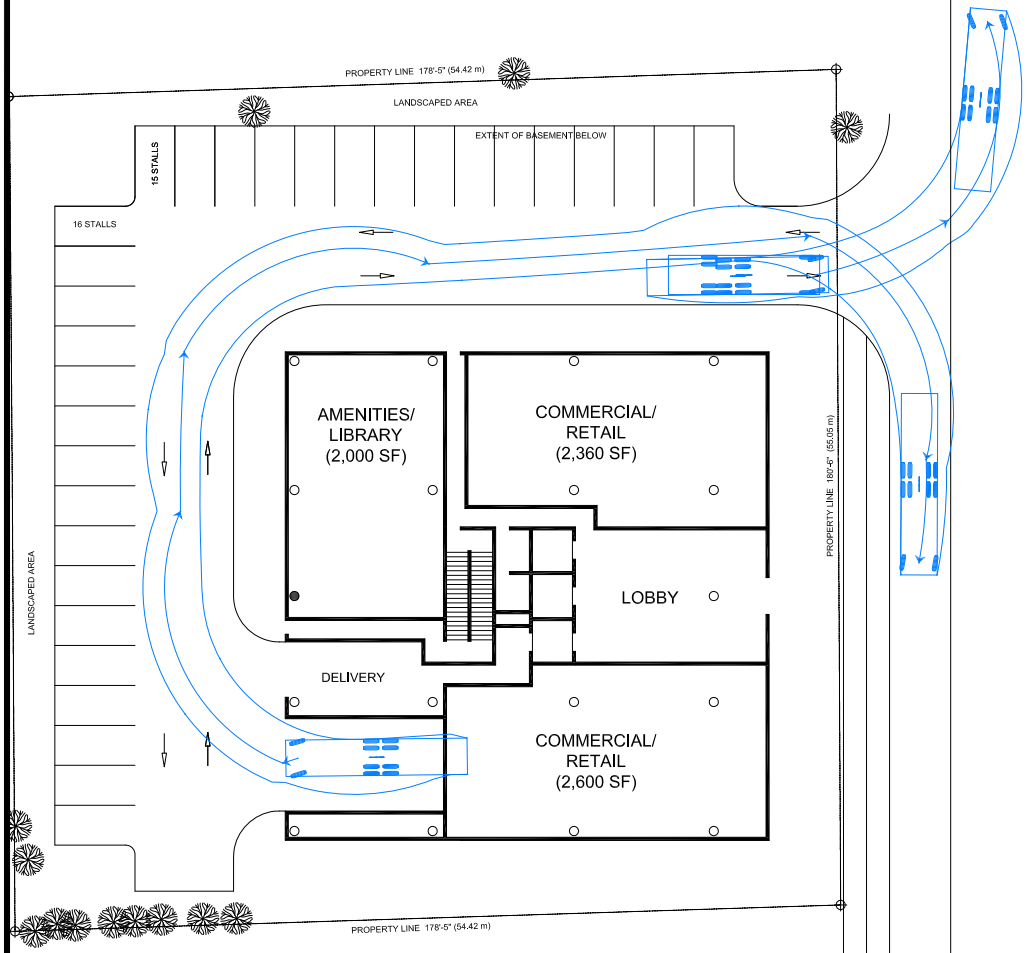
tel: (647) 931-7383
website: www.trans-plan.com



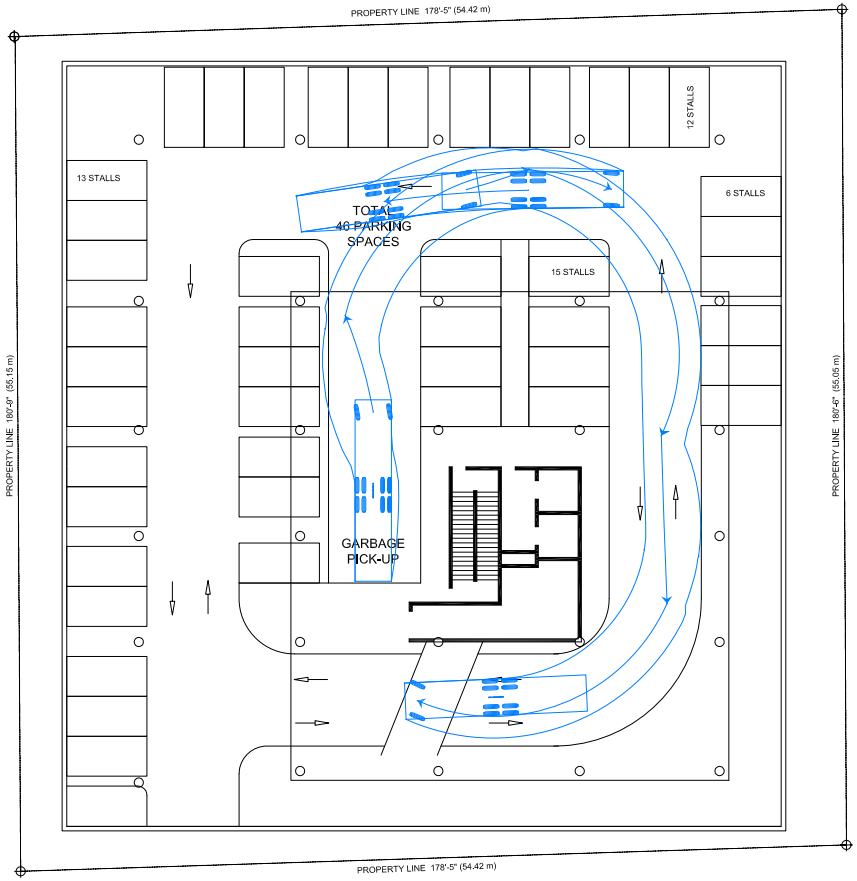
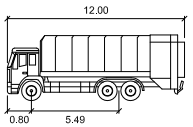


Figure 14 - Waste Collection Vehicle Exiting the Loading Area and the Site

PROPOSED RESIDENTIAL DEVELOPMENT,
1854 & 1858 LIVERPOOL ROAD,
PICKERING, ON



Waste Collection meters

Width	: 2.40
Track	: 2.40
Lock to Lock Time	: 6.0
Steering Angle	: 25.9

CONSTRUCTION NORTH

TRUE NORTH

SCALE: 1:500 UNITS: mm

Source: Site Plan by Emilio De Leon Architect , dated July 8, 2019

TRANS-PLAN™
transportation engineering consultants

785 Dundas Street West
Toronto, Ontario, M6J 1V2
tel: (647) 931-7383
website: www.trans-plan.com

APPENDICES

Appendix A – Traffic Count Data and Signal Timing Plans

Appendix B – Background Traffic Information

Appendix C – Transportation Tomorrow Survey Data

Appendix D – Capacity Analysis Sheets

Appendix E – Level of Service Definitions

Appendix F – Site Plan Review Documents

Appendix G – Sight Distance Photographs

APPENDIX A

Traffic Count Data and Signal Timing Plans

TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

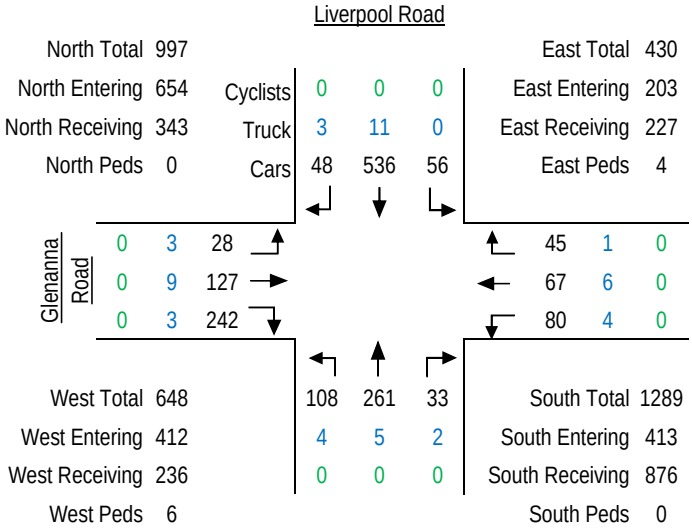
Intersection: Glenanna Road at Liverpool Road

Intersection ID:

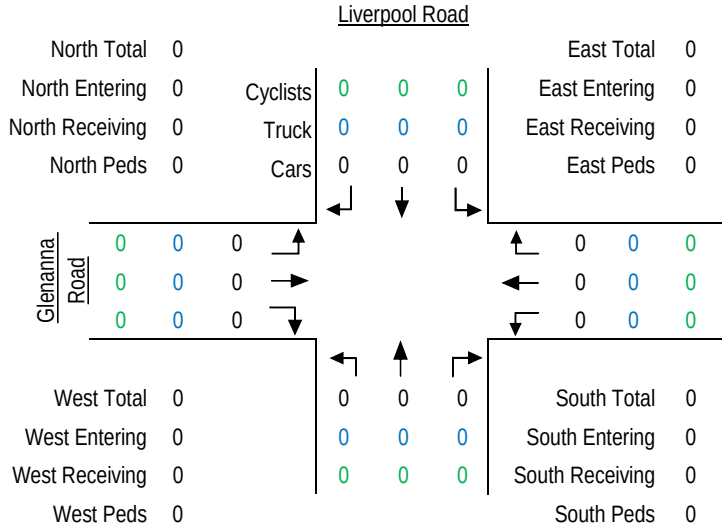
Municipality: Pickering, Ontario

Date: Thursday, June 20, 2019

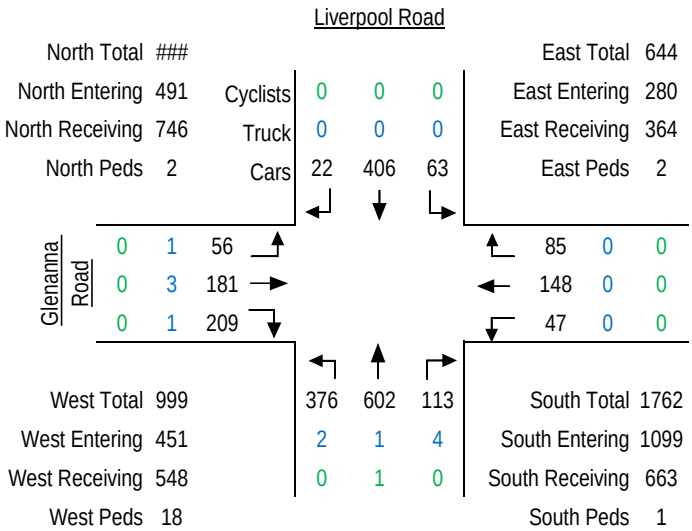
AM Peak Hour: 8:00 to 9:00



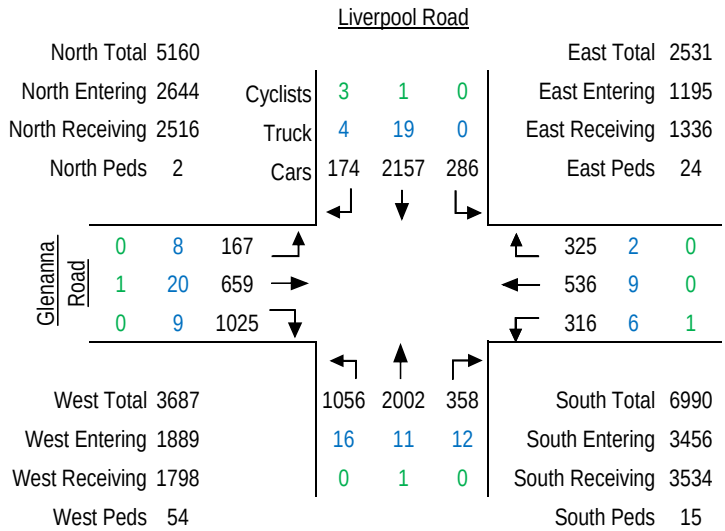
MD Peak Hour: - to -



PM Peak Hour: 17:15 to 18:15



Total 5-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

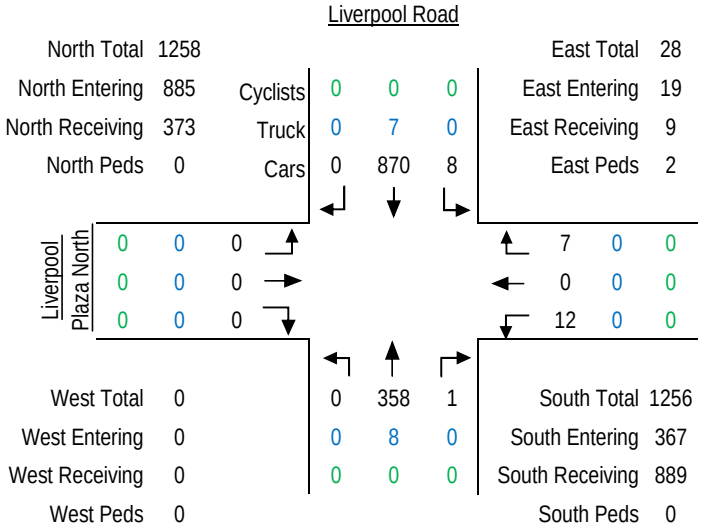
Intersection: Liverpool Plaza North Access at Liverpool Road

Intersection ID:

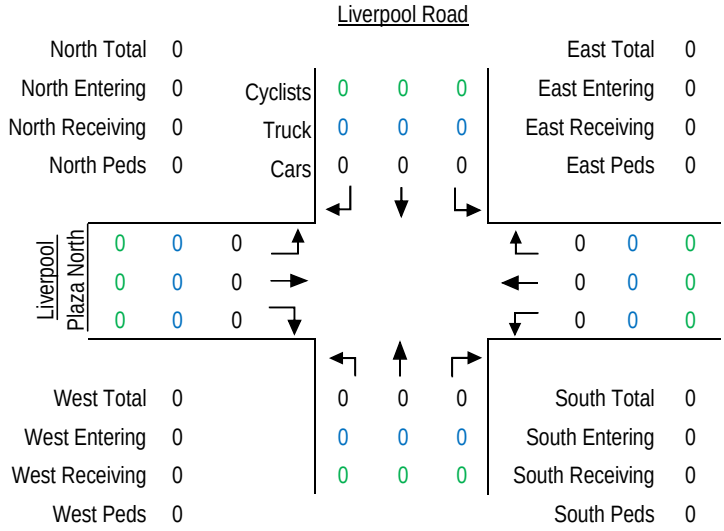
Municipality: Pickering, Ontario

Date: Thursday, June 20, 2019

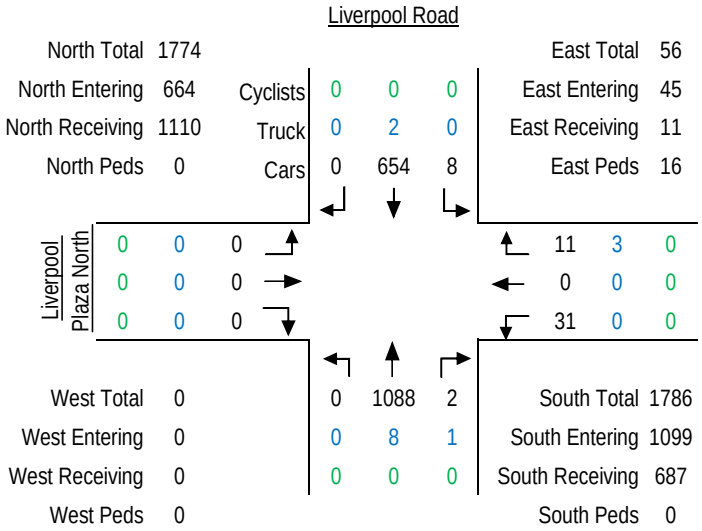
AM Peak Hour: 7:15 to 8:15



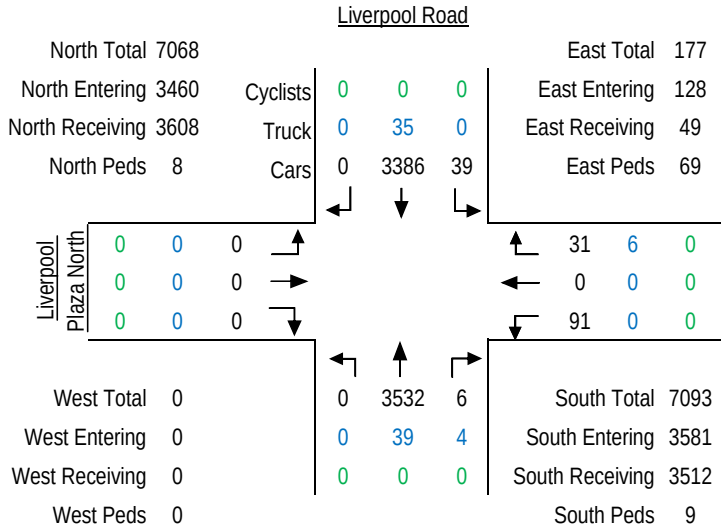
MD Peak Hour: - to -



PM Peak Hour: 17:15 to 18:15



Total 5-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

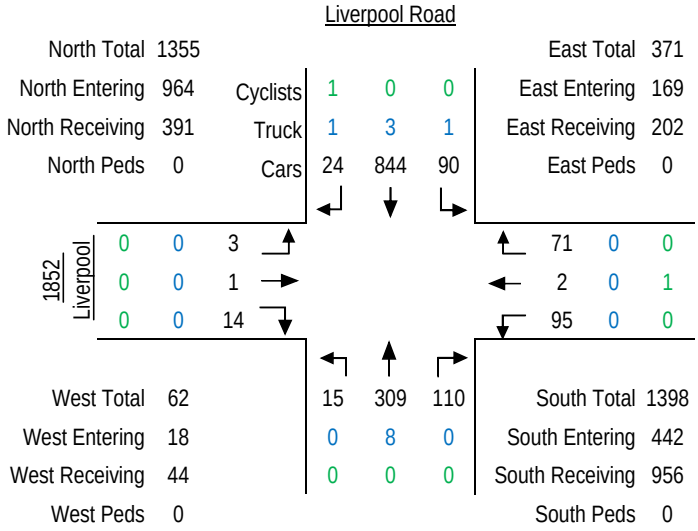
Intersection: 1852 Liverpool Road Access at Liverpool Road

Intersection ID:

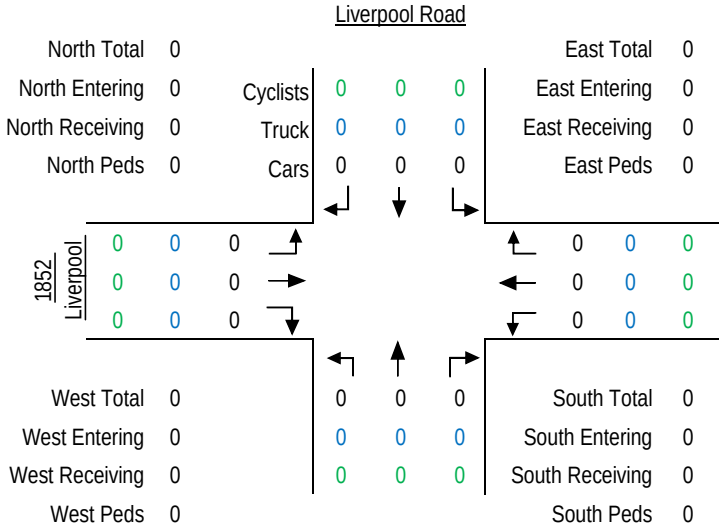
Municipality: Pickering, Ontario

Date: Thursday, June 20, 2019

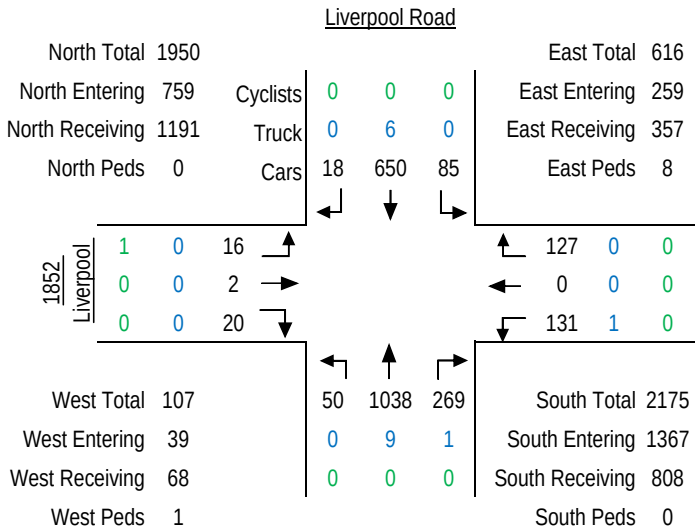
AM Peak Hour: 7:15 to 8:15



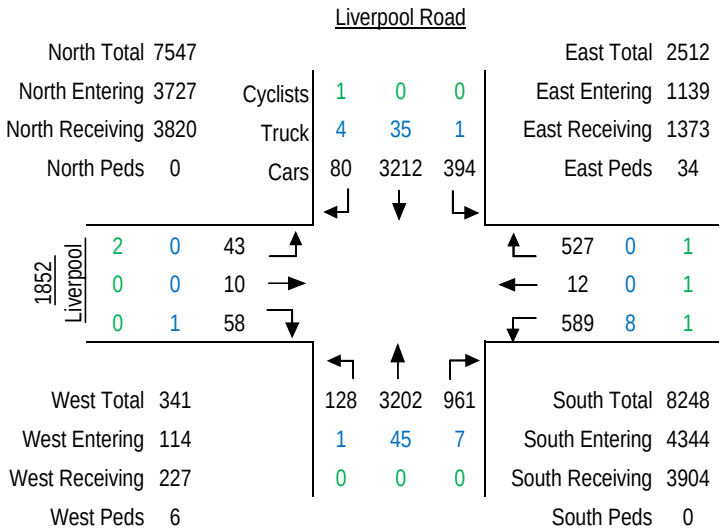
MD Peak Hour: - to -



PM Peak Hour: 17:15 to 18:15



Total 5-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

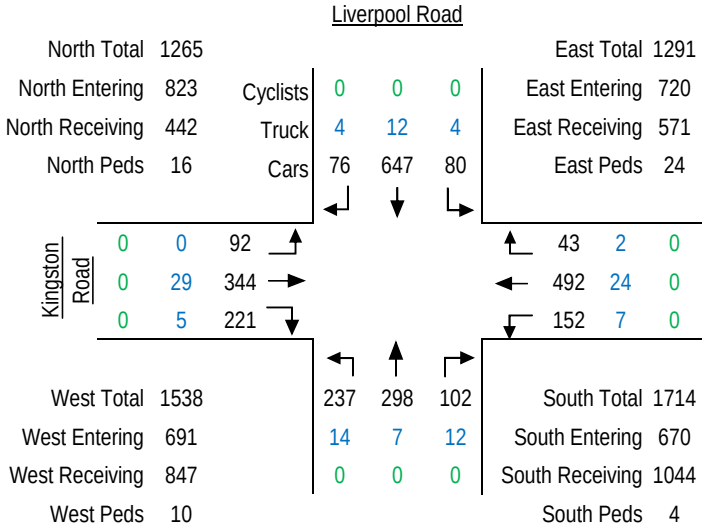
Intersection: Liverpool Road at Kingston Road

Intersection ID:

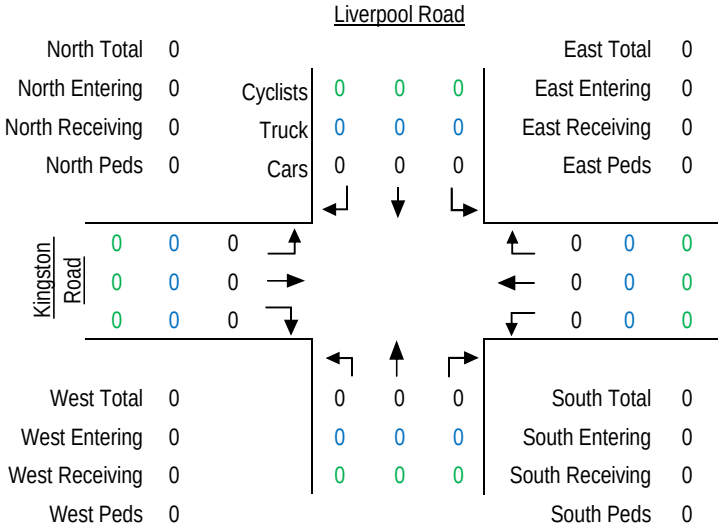
Municipality: Pickering, Ontario

Date: Thursday, June 20, 2019

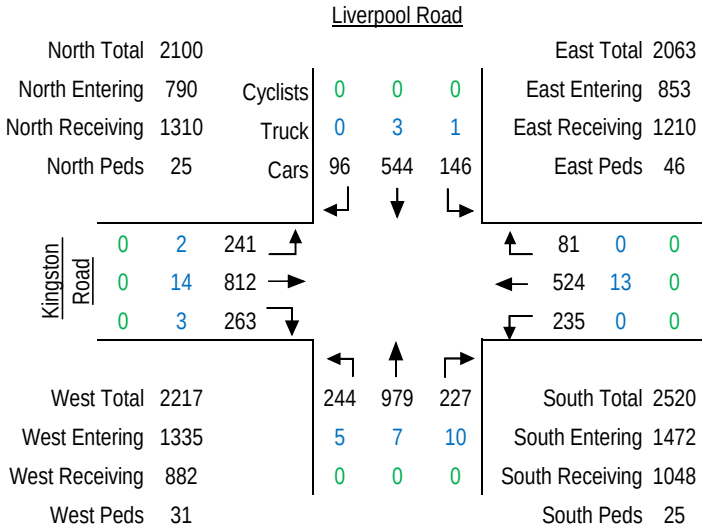
AM Peak Hour: 8:00 to 9:00



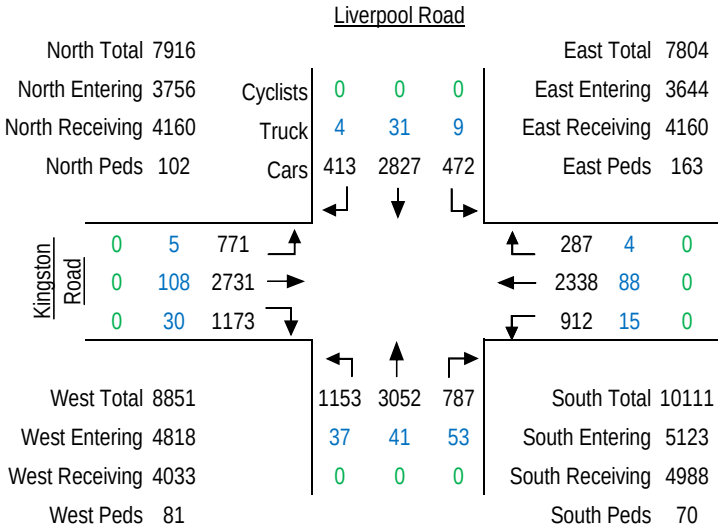
MD Peak Hour: - to -



PM Peak Hour: 17:15 to 18:15



Total 5-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

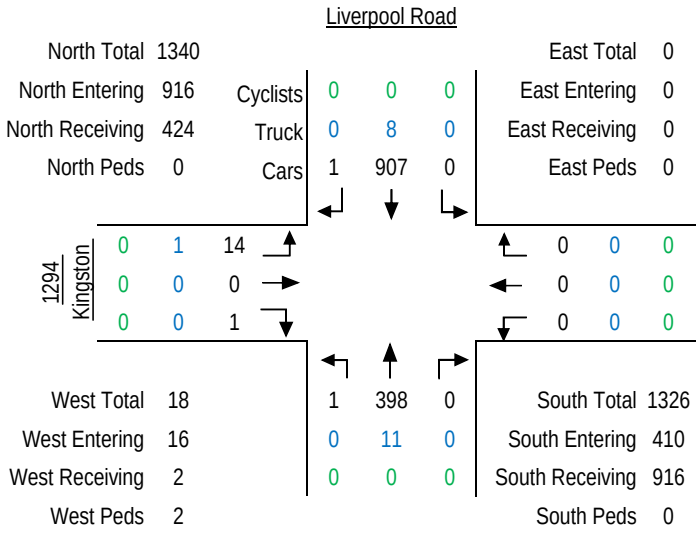
Intersection: 1294 Kingston Road at Liverpool Road

Intersection ID:

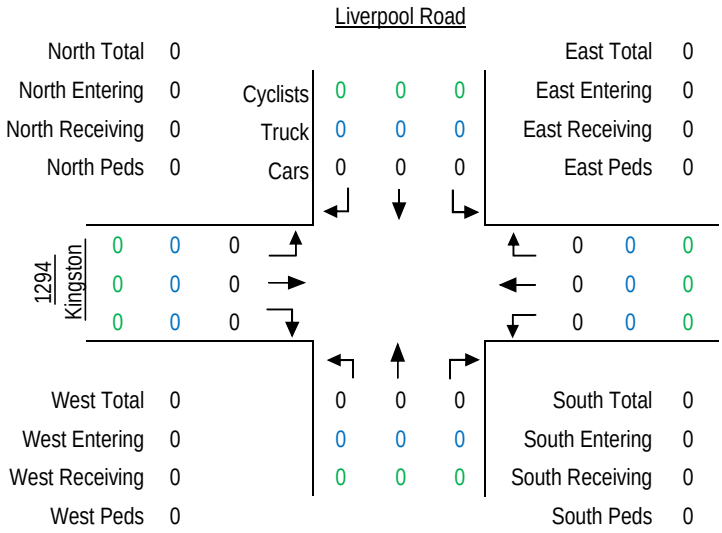
Municipality: Pickering, Ontario

Date: Thursday, June 20, 2019

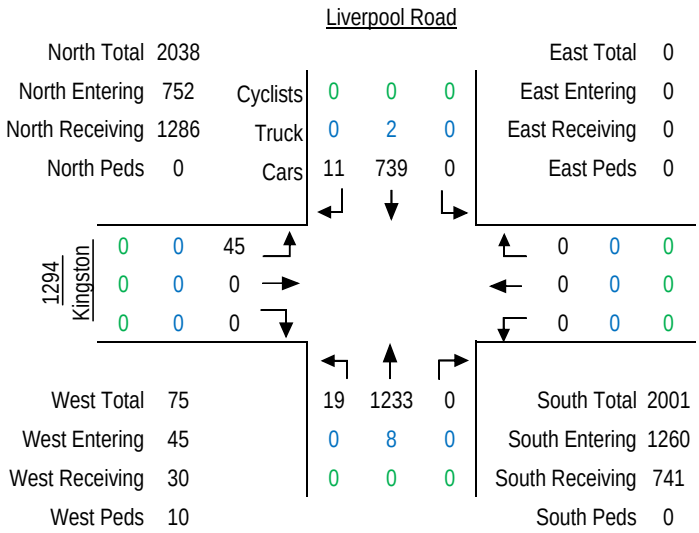
AM Peak Hour: 7:15 to 8:15



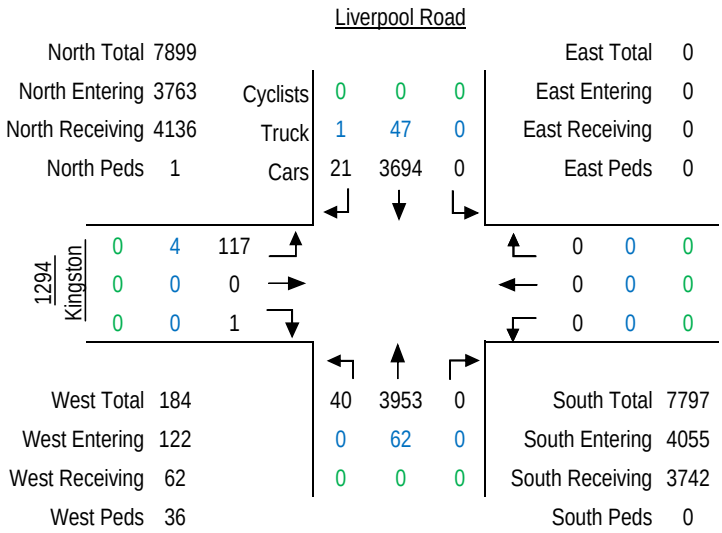
MD Peak Hour: - to -



PM Peak Hour: 17:15 to 18:15



Total 5-Hour Count



INTERSECTION SIGNAL TIMING REPORT

Location	Kingston Rd. (Hwy. 2) and Liverpool Rd. (RR 29)				
Date	June 28 2019	**C&E No.**	21753141	**Prepared by**	C. Maw
Prepared for	TRANS-PLAN				

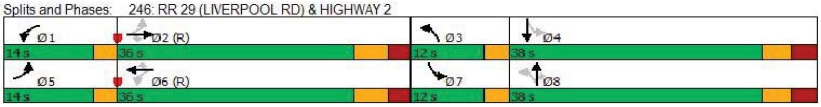
AM Peak 5:30 -9:00

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	14	36	12	38	14	36	12	38
Maximum Split (%)	14.0%	36.0%	12.0%	38.0%	14.0%	36.0%	12.0%	38.0%
Minimum Split (s)	9	35	9	38	9	35	9	38
Yellow Time (s)	3	4.2	3	3.7	3	4.2	3	3.7
All-Red Time (s)	0	2.8	0	3.2	0	2.8	0	3.2
Minimum Initial (s)	5	20	5	8	5	20	5	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		19		21		19		21
Flash Dont Walk (s)		7		9		7		9

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	95

Offset: 67 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Splits and Phases: 246: RR 29 (LIVERPOOL RD) & HIGHWAY 2



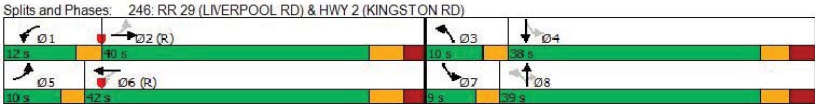
PM Peak 14:30-21:00

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	12	40	10	38	10	42	9	39
Maximum Split (%)	12.0%	40.0%	10.0%	38.0%	10.0%	42.0%	9.0%	39.0%
Minimum Split (s)	9	35	9	38	9	35	9	38
Yellow Time (s)	3	4.2	3	3.7	3	4.2	3	3.7
All-Red Time (s)	0	2.8	0	3.2	0	2.8	0	3.2
Minimum Initial (s)	5	20	5	8	5	20	5	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		19		21		19		21
Flash Dont Walk (s)		7		9		7		9

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	105

Offset: 82 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Splits and Phases: 246: RR 29 (LIVERPOOL RD) & HWY 2 (KINGSTON RD)



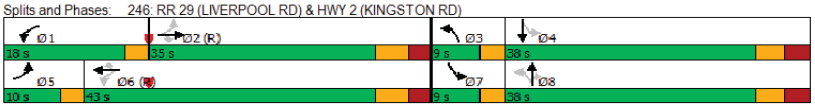
Weekend Peak 08:00-21:00

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	18	35	9	38	10	43	9	38
Maximum Split (%)	18.0%	35.0%	9.0%	38.0%	10.0%	43.0%	9.0%	38.0%
Minimum Split (s)	9	35	9	38	9	35	9	38
Yellow Time (s)	3	4.2	3	3.7	3	4.2	3	3.7
All-Red Time (s)	0	2.8	0	3.2	0	2.8	0	3.2
Minimum Initial (s)	5	20	5	8	5	20	5	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		19		21		19		21
Flash Dont Walk (s)		7		9		7		9

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	95

Offset: 26 (26%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Splits and Phases: 246: RR 29 (LIVERPOOL RD) & HWY 2 (KINGSTON RD)



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

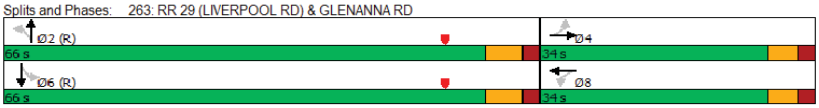
INTERSECTION SIGNAL TIMING REPORT

Location	Liverpool Rd. (RR 29) and Glenanna Dr.				
Date	June 28 2019	**C&E No.**	21753141	**Prepared by**	C. Maw
Prepared for	TRANS-PLAN				

AM Peak 05:30-09:00

Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	66	34	66	34
Maximum Split (%)	66.0%	34.0%	66.0%	34.0%
Minimum Split (s)	29	27	29	27
Yellow Time (s)	4.6	3.7	4.6	3.7
All-Red Time (s)	2.1	2.2	2.1	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	14	15	14	15
Flash Dont Walk (s)	5	5	5	5
Intersection Summary				
Cycle Length			100	
Control Type			Actuated-Coordinated	
Natural Cycle			60	
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow				

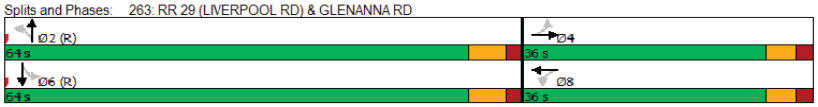
Splits and Phases: 263: RR 29 (LIVERPOOL RD) & GLENANNA RD



PM Peak 14:30-19:00

Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	64	36	64	36
Maximum Split (%)	64.0%	36.0%	64.0%	36.0%
Minimum Split (s)	29	27	29	27
Yellow Time (s)	4.6	3.7	4.6	3.7
All-Red Time (s)	2.1	2.2	2.1	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	14	15	14	15
Flash Dont Walk (s)	5	5	5	5
Intersection Summary				
Cycle Length			100	
Control Type			Actuated-Coordinated	
Natural Cycle			70	
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green				

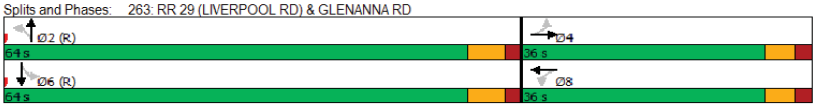
Splits and Phases: 263: RR 29 (LIVERPOOL RD) & GLENANNA RD



Weekend Peak 08:00-21:00

Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	64	36	64	36
Maximum Split (%)	64.0%	36.0%	64.0%	36.0%
Minimum Split (s)	29	27	29	27
Yellow Time (s)	4.6	3.7	4.6	3.7
All-Red Time (s)	2.1	2.2	2.1	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	14	15	14	15
Flash Dont Walk (s)	5	5	5	5
Intersection Summary				
Cycle Length			100	
Control Type			Actuated-Coordinated	
Natural Cycle			60	
Offset: 56 (56%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green				

Splits and Phases: 263: RR 29 (LIVERPOOL RD) & GLENANNA RD



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

APPENDIX B

Background Traffic Information

1854 & 1858 Liverpool Road, Pickering,On

Background Development Map

1 1294 Kingston Road, Pickering,On
Proposed Residential Development

2 1848 Liverpool Road,Pickering,On
Proposed Mixed-Use Development

3 1852 Liverpool Road,Pickering,On
Proposed Industrial Development

Background Developments Information
Proposed Residential Development
1854 & 1858 Liverpool Road,Pickering,On

Development 1, 2 & 3 - 1294 Kingston Road, 1848 & 1852 Liverpool Road Pickering, ON
Proposed Residential Development

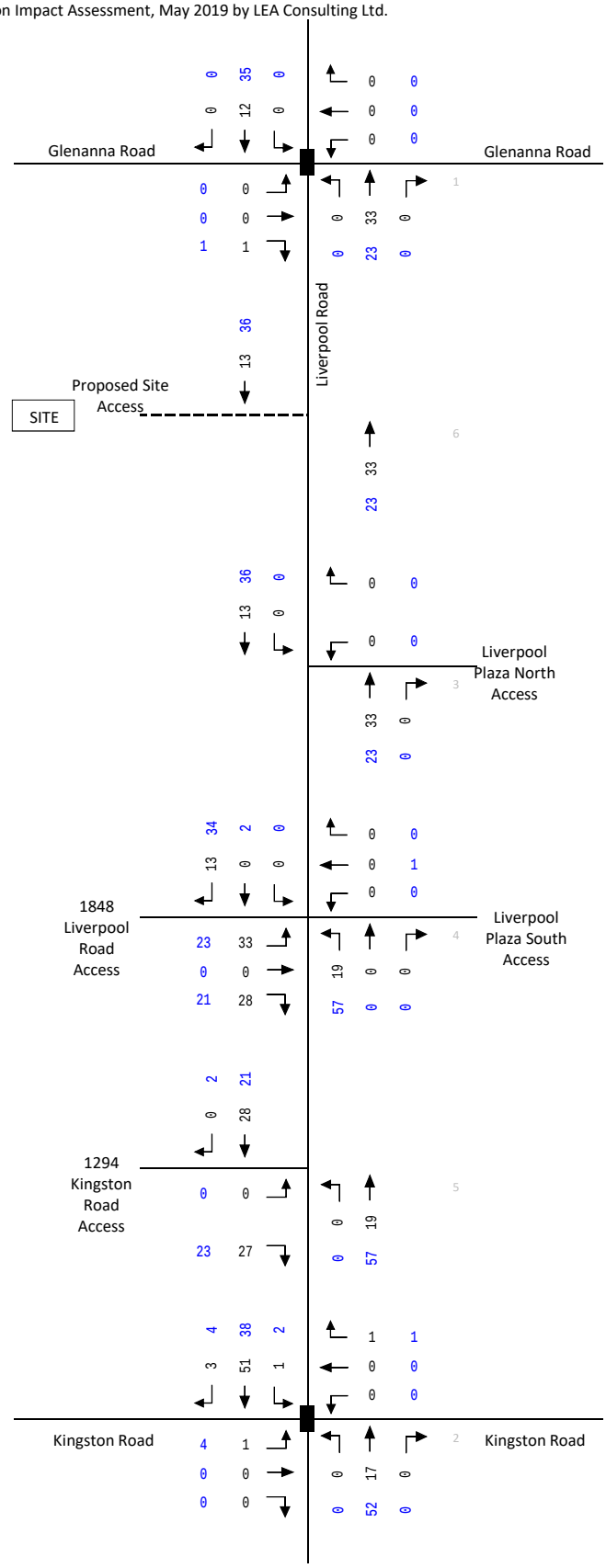
Table 4-2: Site Trip Generation

Land Use	Number of Units	Size (m^2)	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Block Townhouse	18		2	7	9	8	5	13
Apartment	373		28	89	117	82	53	135
Retail		850 m^2	6	3	9	17	19	36
Site Interaction	-		-1	-1	-2	-4	-4	-8
Transit Reduction (10%)	-		-3	-10	-13	-9	-6	-15
Total	*391*	*850*	*32*	*88*	*120*	*94*	*67*	*161*

Source: Transportation Impact Assessment, May 2019 by LEA Consulting Ltd.

DEV 1, 2 & 3 - 1294 Kingston Road, 1848 & 1852 Liverpool Road Pickering, ON

Source: Transportation Impact Assessment, May 2019 by LEA Consulting Ltd.



Schematic; Not To Scale

APPENDIX C

Transportation Tomorrow Survey Data

TTS Analysis

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd_dest

Column: Ward number of household - ward_hhld

Table: Trip purpose of origin - purp_orig

Filters:

Ward number of household - ward_hhld In 61

Trip purpose of origin - purp_orig In H,

Start time of trip - start_time In 600-900

		North		
		22%		
West	**60%**		**17%**	**East**
		1%		
		South		

Destination Zone	No. of Trips from City of Pickering Ward 2 (61 on TTS)	Percent of Trips from City of Pickering Ward 2 (61 on TTS)	Location respect to site
PD 1 of Toronto	1173	15%	W
PD 4 of Toronto	83	1%	W
PD 5 of Toronto	165	2%	W
PD 6 of Toronto	48	1%	W
PD 8 of Toronto	30	0%	W
PD 9 of Toronto	18	0%	W
PD 10 of Toronto	81	1%	W
PD 11 of Toronto	78	1%	W
PD 12 of Toronto	181	2%	W
PD 13 of Toronto	558	7%	W
PD 14 of Toronto	25	0%	W
PD 15 of Toronto	190	2%	W
PD 16 of Toronto	329	4%	W
Uxbridge	14	0%	N
Scugog	22	0%	N
Pickering		0%	
Ward 1	632	8%	W
Ward 2	1774	-	Internal
Ward 3	1462	19%	N
Ajax	843	11%	E
Whitby	123	2%	E
Oshawa	277	4%	E
Clarington	48	1%	E
Newmarket	17	0%	N
Aurora	138	2%	N
Richmond Hill	48	1%	W
Whitchurch-Stouffvil	65	1%	N
Markham	618	8%	W
Vaughan	189	2%	W
Brampton	14	0%	W
Mississauga	135	2%	W
Milton	30	0%	W
Flamborough	30	0%	W
Hamilton	70	1%	W
Niagara-on-the-Lake	40	1%	S
Hastings	17	0%	E
External	30	0%	S
Total	**7821**	**100%**	

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APPENDIX D

Capacity Analysis Sheets

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	31	136	245	84	73	110	262	56	547
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	34.0	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	13.9	13.9	13.9	13.9	13.9	73.5	73.5	73.5	73.5
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.74	0.74	0.74	0.74
v/c Ratio	0.22	0.60	0.59	0.64	0.50	0.22	0.13	0.08	0.26
Control Delay	39.9	50.1	10.4	59.7	35.5	3.3	1.8	4.9	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	50.1	10.4	59.7	35.5	3.3	1.8	4.9	4.9
LOS	D	D	B	E	D	A	A	A	A
Approach Delay		25.7			45.5		2.2		4.9
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 14.3		Intersection LOS: B	
Intersection Capacity Utilization 68.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	136	245	84	73	46	110	262	35	56	547	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1776	1599	1719	1693		1736	3462		1805	3482	
Flt Permitted	0.63	1.00	1.00	0.57	1.00		0.40	1.00		0.55	1.00	
Satd. Flow (perm)	1091	1776	1599	1037	1693		735	3462		1054	3482	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	34	149	269	92	80	51	121	288	38	62	601	56
RTOR Reduction (vph)	0	0	232	0	28	0	0	7	0	0	5	0
Lane Group Flow (vph)	34	149	37	92	103	0	121	319	0	62	652	0
Heavy Vehicles (%)	10%	7%	1%	5%	8%	2%	4%	2%	6%	0%	2%	6%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9		73.5	73.5		73.5	73.5	
Effective Green, g (s)	13.9	13.9	13.9	13.9	13.9		73.5	73.5		73.5	73.5	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.74	0.74		0.74	0.74	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	152	247	222	144	235		540	2545		775	2559	
v/s Ratio Prot		0.08			0.06			0.09			c0.19	
v/s Ratio Perm	0.03		0.02	c0.09			0.16			0.06		
v/c Ratio	0.22	0.60	0.17	0.64	0.44		0.22	0.13		0.08	0.25	
Uniform Delay, d1	38.3	40.5	38.0	40.7	39.5		4.2	3.9		3.7	4.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.45	0.42		1.00	1.00	
Incremental Delay, d2	0.7	4.1	0.4	9.0	1.3		1.0	0.1		0.2	0.2	
Delay (s)	39.0	44.6	38.3	49.6	40.8		2.9	1.7		3.9	4.6	
Level of Service	D	D	D	D	D		A	A		A	A	
Approach Delay (s)		40.4			44.5			2.0			4.5	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM Average Control Delay	17.6	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.32				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.6	
Intersection Capacity Utilization	68.2%	ICU Level of Service		C	
Analysis Period (min)	15				

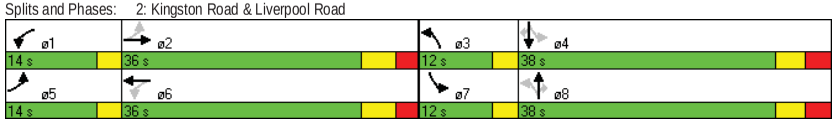
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	373	226	159	516	45	251	305	114	90	706	86
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		Perm	pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8		8	4		4
Detector Phase	5	2		1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	8.0	5.0	8.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	38.0	9.0	38.0	38.0
Total Split (s)	14.0	36.0	0.0	14.0	36.0	0.0	12.0	38.0	38.0	12.0	38.0	38.0
Total Split (%)	14.0%	36.0%	0.0%	14.0%	36.0%	0.0%	12.0%	38.0%	38.0%	12.0%	38.0%	38.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.7	3.0	3.7	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	3.2	0.0	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	6.9	3.0	6.9	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max	Max	Max
Act Effct Green (s)	44.0	29.0	100.0	44.0	29.0	100.0	44.0	31.1	31.1	44.0	31.1	31.1
Actuated g/C Ratio	0.44	0.29	1.00	0.44	0.29	1.00	0.44	0.31	0.31	0.44	0.31	0.31
v/c Ratio	0.24	0.41	0.15	0.36	0.56	0.03	0.94	0.30	0.23	0.19	0.69	0.17
Control Delay	16.5	30.2	0.2	18.0	32.6	0.0	61.5	27.1	5.9	19.9	38.2	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	30.2	0.2	18.0	32.6	0.0	61.5	27.1	5.9	19.9	38.2	13.2
LOS	B	C	A	B	C	A	E	C	A	B	D	B
Approach Delay		18.6			27.4			36.3			33.9	
Approach LOS		B			C			D			C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 67 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 29.3 — Intersection LOS: C
Intersection Capacity Utilization 77.1% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	373	226	159	516	45	251	305	114	90	706	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	6.9	3.0	6.9	6.9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3343	1583	1736	3438	1553	1703	3539	1455	1719	3539	1538
Flt Permitted	0.34	1.00	1.00	0.47	1.00	1.00	0.21	1.00	1.00	0.55	1.00	1.00
Satd. Flow (perm)	647	3343	1583	864	3438	1553	385	3539	1455	989	3539	1538
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	99	401	243	171	555	48	270	328	123	97	759	92
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	85	0	0	50
Lane Group Flow (vph)	99	401	243	171	555	48	270	328	38	97	759	42
Heavy Vehicles (%)	0%	8%	2%	4%	5%	4%	6%	2%	11%	5%	2%	5%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		Perm	pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8		8	4		4
Actuated Green, G (s)	40.0	29.0	100.0	40.0	29.0	100.0	40.1	31.1	31.1	40.1	31.1	31.1
Effective Green, g (s)	40.0	29.0	100.0	40.0	29.0	100.0	40.1	31.1	31.1	40.1	31.1	31.1
Actuated g/C Ratio	0.40	0.29	1.00	0.40	0.29	1.00	0.40	0.31	0.31	0.40	0.31	0.31
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9	6.9	3.0	6.9	6.9
Lane Grp Cap (vph)	386	969	1583	442	997	1553	273	1101	453	462	1101	478
v/s Ratio Prot	0.03	0.12		c0.04	c0.16		c0.09	0.09		0.02	0.21	
v/s Ratio Perm	0.07		0.15	0.11		0.03	c0.31		0.03	0.07		0.03
v/c Ratio	0.26	0.41	0.15	0.39	0.56	0.03	0.99	0.30	0.08	0.21	0.69	0.09
Uniform Delay, d1	19.3	28.6	0.0	20.0	30.1	0.0	25.7	26.2	24.4	19.0	30.2	24.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.25	1.13	1.41
Incremental Delay, d2	1.6	1.3	0.2	2.5	2.2	0.0	51.8	0.7	0.4	1.0	3.5	0.4
Delay (s)	20.9	29.9	0.2	22.5	32.3	0.0	77.5	26.9	24.7	24.9	37.8	34.7
Level of Service	C	C	A	C	C	A	E	C	C	C	D	C
Approach Delay (s)		19.0			28.1			45.5			36.1	
Approach LOS		B			C			D			D	

Intersection Summary

HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	12	7	400	1	8	868
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	13	8	440	1	9	954
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			188			170
pX, platoon unblocked	0.97	0.99			0.99	
vC, conflicting volume	935	220			441	
vC1, stage 1 conf vol	440					
vC2, stage 2 conf vol	495					
vCu, unblocked vol	829	198			420	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	506	809			1141	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	21	293	148	9	477	477
Volume Left	13	0	0	9	0	0
Volume Right	8	0	1	0	0	0
cSH	587	1700	1700	1141	1700	1700
Volume to Capacity	0.04	0.17	0.09	0.01	0.28	0.28
Queue Length 95th (m)	0.9	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.4	0.0	0.0	8.2	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	11.4	0.0		0.1		
Approach LOS	B					

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	34.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	14	95	2	71	15	327	113	84	773	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	3	1	15	102	2	76	16	352	122	90	831	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)								135			223	
pX, platoon unblocked	0.94	0.94	1.00	0.94	0.94	0.94	1.00			0.94		
vC, conflicting volume	1310	1530	428	1056	1481	237	856			473		
vC1, stage 1 conf vol	1024	1024		445	445							
vC2, stage 2 conf vol	285	505		612	1037							
vCu, unblocked vol	1195	1429	421	927	1377	66	850			317		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	97	72	99	92	98			92		
cM capacity (veh/h)	227	263	585	359	256	933	795			1174		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	19	102	78	16	234	239	90	554	302
Volume Left	3	102	0	16	0	0	90	0	0
Volume Right	15	0	76	0	0	122	0	0	25
cSH	439	359	870	795	1700	1700	1174	1700	1700
Volume to Capacity	0.04	0.28	0.09	0.02	0.14	0.14	0.08	0.33	0.18
Queue Length 95th (m)	1.1	9.2	2.4	0.5	0.0	0.0	2.0	0.0	0.0
Control Delay (s)	13.6	19.0	9.5	9.6	0.0	0.0	8.3	0.0	0.0
Lane LOS	B	C	A	A			A		
Approach Delay (s)	13.6	14.9		0.3			0.8		
Approach LOS	B	B							

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	47.4%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	1	2	440	881	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	1	2	468	937	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	278	
pX, platoon unblocked	0.93					
vC, conflicting volume	1176	469	938			
vC1, stage 1 conf vol	938					
vC2, stage 2 conf vol	238					
vCu, unblocked vol	1048	469	938			
tC, single (s)	6.9	6.9	4.1			
tC, 2 stage (s)	5.9					
tF (s)	3.6	3.3	2.2			
p0 queue free %	95	100	100			
cM capacity (veh/h)	318	546	739			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	17	158	312	625	313
Volume Left	16	2	0	0	0
Volume Right	1	0	0	0	1
cSH	327	739	1700	1700	1700
Volume to Capacity	0.05	0.00	0.18	0.37	0.18
Queue Length 95th (m)	1.3	0.1	0.0	0.0	0.0
Control Delay (s)	16.6	0.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	16.6	0.1		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		34.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	407	876	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	442	952	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				223	134	
pX, platoon unblocked	0.96	0.96	0.96			
vC, conflicting volume	1173	476	952			
vC1, stage 1 conf vol	952					
vC2, stage 2 conf vol	221					
vCu, unblocked vol	1089	359	857			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	343	609	745			

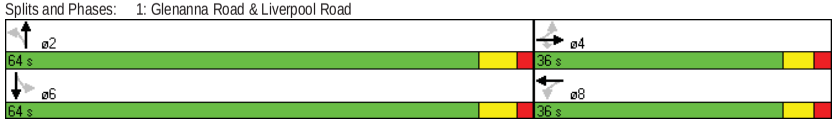
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	0	0	221	221	635	317
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.13	0.13	0.37	0.19
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0			0.0	
Approach LOS	A					

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		27.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	57	184	210	47	148	405	646	63	406
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	36.0	36.0	36.0	36.0	36.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%	64.0%	64.0%	64.0%	64.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	17.4	17.4	17.4	17.4	17.4	70.0	70.0	70.0	70.0
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.70	0.70	0.70	0.70
v/c Ratio	0.50	0.59	0.51	0.30	0.72	0.65	0.33	0.15	0.18
Control Delay	50.6	44.8	13.2	38.9	45.8	14.0	4.4	7.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	44.8	13.2	38.9	45.8	14.0	4.4	7.2	5.8
LOS	D	D	B	D	D	B	A	A	A
Approach Delay		30.8			44.6		7.7		6.0
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 16.0		Intersection LOS: B	
Intersection Capacity Utilization 79.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	184	210	47	148	85	405	646	125	63	406	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1615	1805	1796		1787	3505		1805	3582	
Flt Permitted	0.36	1.00	1.00	0.49	1.00		0.49	1.00		0.34	1.00	
Satd. Flow (perm)	677	1863	1615	934	1796		929	3505		638	3582	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	59	192	219	49	154	89	422	673	130	66	423	23
RTOR Reduction (vph)	0	0	145	0	25	0	0	11	0	0	3	0
Lane Group Flow (vph)	59	192	74	49	218	0	422	792	0	66	443	0
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	17.4	17.4	17.4	17.4	17.4		70.0	70.0		70.0	70.0	
Effective Green, g (s)	17.4	17.4	17.4	17.4	17.4		70.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17		0.70	0.70		0.70	0.70	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	324	281	163	313		650	2454		447	2507	
v/s Ratio Prot		0.10			c0.12			0.23			0.12	
v/s Ratio Perm	0.09		0.05	0.05			c0.45			0.10		
v/c Ratio	0.50	0.59	0.26	0.30	0.70		0.65	0.32		0.15	0.18	
Uniform Delay, d1	37.4	38.0	35.7	36.0	38.8		8.2	5.8		5.0	5.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.94	0.67		1.00	1.00	
Incremental Delay, d2	3.3	2.9	0.5	1.0	6.6		4.0	0.3		0.7	0.2	
Delay (s)	40.7	40.9	36.2	37.0	45.4		11.8	4.2		5.7	5.3	
Level of Service	D	D	D	D	D		B	A		A	A	
Approach Delay (s)		38.7			44.0			6.8			5.3	
Approach LOS		D			D			A			A	

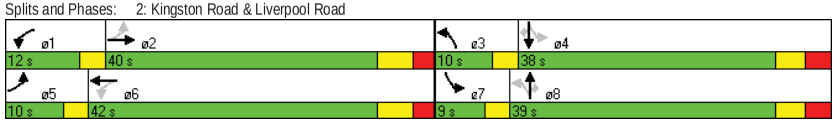
Intersection Summary					
HCM Average Control Delay	16.8	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.6	
Intersection Capacity Utilization	79.7%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	826	266	235	537	81	249	986	237	136	508	89
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		Perm	pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8		8	4		4
Detector Phase	5	2		1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	8.0	5.0	8.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	38.0	9.0	38.0	38.0
Total Split (s)	10.0	40.0	0.0	12.0	42.0	0.0	10.0	39.0	39.0	9.0	38.0	38.0
Total Split (%)	10.0%	40.0%	0.0%	12.0%	42.0%	0.0%	10.0%	39.0%	39.0%	9.0%	38.0%	38.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.7	3.0	3.7	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	3.2	0.0	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	6.9	3.0	6.9	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max	Max	Max
Act Effct Green (s)	44.0	33.0	100.0	48.0	35.0	100.0	43.0	32.1	32.1	41.0	31.1	31.1
Actuated g/C Ratio	0.44	0.33	1.00	0.48	0.35	1.00	0.43	0.32	0.32	0.41	0.31	0.31
v/c Ratio	0.60	0.71	0.17	0.81	0.44	0.05	0.67	0.87	0.38	0.71	0.46	0.16
Control Delay	23.7	33.5	0.2	38.4	26.3	0.1	29.5	41.6	9.3	40.2	26.1	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	33.5	0.2	38.4	26.3	0.1	29.5	41.6	9.3	40.2	26.1	4.3
LOS	C	C	A	D	C	A	C	D	A	D	C	A
Approach Delay		25.1			27.1			34.3			26.1	
Approach LOS		C			C			C			C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 82 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 28.7		Intersection LOS: C	
Intersection Capacity Utilization 88.9%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	826	266	235	537	81	249	986	237	136	508	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	6.9	3.0	6.9	6.9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3539	1599	1805	3539	1615	1770	3574	1553	1787	3574	1615
Flt Permitted	0.41	1.00	1.00	0.18	1.00	1.00	0.37	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	763	3539	1599	337	3539	1615	694	3574	1553	242	3574	1615
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	245	834	269	237	542	82	252	996	239	137	513	90
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	123	0	0	62
Lane Group Flow (vph)	245	834	269	237	542	82	252	996	116	137	513	28
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	1%	4%	1%	1%	0%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		Perm	pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8		8	4		4
Actuated Green, G (s)	40.0	33.0	100.0	44.0	35.0	100.0	39.1	32.1	32.1	37.1	31.1	31.1
Effective Green, g (s)	40.0	33.0	100.0	44.0	35.0	100.0	39.1	32.1	32.1	37.1	31.1	31.1
Actuated g/C Ratio	0.40	0.33	1.00	0.44	0.35	1.00	0.39	0.32	0.32	0.37	0.31	0.31
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9	6.9	3.0	6.9	6.9
Lane Grp Cap (vph)	377	1168	1599	280	1239	1615	347	1147	499	182	1112	502
v/s Ratio Prot	0.05	0.24		c0.08	0.15		c0.05	c0.28		0.05	0.14	
v/s Ratio Perm	0.21		0.17	c0.30		0.05	0.23		0.07	0.23		0.02
v/c Ratio	0.65	0.71	0.17	0.85	0.44	0.05	0.73	0.87	0.23	0.75	0.46	0.06
Uniform Delay, d1	22.0	29.4	0.0	20.2	24.9	0.0	24.0	32.0	24.9	23.9	27.7	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	0.88	0.66
Incremental Delay, d2	8.4	3.7	0.2	25.8	1.1	0.1	12.5	9.0	1.1	24.5	1.4	0.2
Delay (s)	30.4	33.1	0.2	46.0	26.1	0.1	36.5	40.9	26.0	49.4	25.9	16.1
Level of Service	C	C	A	D	C	A	D	D	C	D	C	B
Approach Delay (s)		26.0			29.1			37.8			29.0	
Approach LOS		C			C			D			C	

Intersection Summary					
HCM Average Control Delay		31.1	HCM Level of Service		C
HCM Volume to Capacity ratio		0.80			
Actuated Cycle Length (s)		100.0	Sum of lost time (s)		12.0
Intersection Capacity Utilization		88.9%	ICU Level of Service		E
Analysis Period (min)		15			
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	31	14	1162	3	8	655
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	32	15	1210	3	8	682
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			188			170
pX, platoon unblocked	0.78	0.77			0.77	
vC, conflicting volume	1570	607			1214	
vC1, stage 1 conf vol	1212					
vC2, stage 2 conf vol	358					
vCu, unblocked vol	1099	0			693	
tC, single (s)	6.8	7.3			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.5			2.2	
p0 queue free %	90	98			99	
cM capacity (veh/h)	333	794			706	

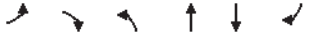
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	47	807	407	8	341	341
Volume Left	32	0	0	8	0	0
Volume Right	15	0	3	0	0	0
cSH	407	1700	1700	706	1700	1700
Volume to Capacity	0.12	0.47	0.24	0.01	0.20	0.20
Queue Length 95th (m)	3.1	0.0	0.0	0.3	0.0	0.0
Control Delay (s)	15.0	0.0	0.0	10.2	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	15.0	0.0		0.1		
Approach LOS	C					

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	42.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	2	20	132	0	127	49	1022	264	77	592	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	16	2	21	136	0	131	51	1054	272	79	610	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)								135			223	
pX, platoon unblocked	0.74	0.74		0.74	0.74	0.74				0.74		
vC, conflicting volume	1537	2205	314	1776	2077	663	628			1326		
vC1, stage 1 conf vol	778	778		1291	1291							
vC2, stage 2 conf vol	759	1427		486	787							
vCu, unblocked vol	1020	1924	314	1345	1752	0	628			735		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	99	97	42	100	84	95			88		
cM capacity (veh/h)	279	160	688	235	219	806	964			650		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	39	136	131	51	702	623	79	407	221
Volume Left	16	136	0	51	0	0	79	0	0
Volume Right	21	0	131	0	0	272	0	0	18
cSH	384	235	806	964	1700	1700	650	1700	1700
Volume to Capacity	0.10	0.58	0.16	0.05	0.41	0.37	0.12	0.24	0.13
Queue Length 95th (m)	2.7	26.2	4.6	1.3	0.0	0.0	3.3	0.0	0.0
Control Delay (s)	15.4	39.6	10.3	8.9	0.0	0.0	11.3	0.0	0.0
Lane LOS	C	E	B	A			B		
Approach Delay (s)	15.4	25.2		0.3			1.3		
Approach LOS	C	D							

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	65.5%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	45	0	20	1290	733	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	46	0	21	1330	756	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	278	
pX, platoon unblocked	0.74					
vC, conflicting volume	1468	384	767			
vC1, stage 1 conf vol	761					
vC2, stage 2 conf vol	706					
vCu, unblocked vol	916	384	767			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	100	98			
cM capacity (veh/h)	392	620	856			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	46	464	887	504	263
Volume Left	46	21	0	0	0
Volume Right	0	0	0	0	11
cSH	392	856	1700	1700	1700
Volume to Capacity	0.12	0.02	0.52	0.30	0.15
Queue Length 95th (m)	3.2	0.6	0.0	0.0	0.0
Control Delay (s)	15.4	0.7	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	15.4	0.2		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	59.8%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	1176	663	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1278	721	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				223	134	
pX, platoon unblocked	0.79	0.97	0.97			
vC, conflicting volume	1360	360	721			
vC1, stage 1 conf vol	721					
vC2, stage 2 conf vol	639					
vCu, unblocked vol	789	291	661			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	434	687	900			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	0	0	639	639	480	240
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.38	0.38	0.28	0.14
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0			0.0	
Approach LOS	A					

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	35.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	32	138	249	85	74	112	298	57	565
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	34.0	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.1	14.1	14.1	14.1	14.1	73.3	73.3	73.3	73.3
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.73	0.73	0.73	0.73
v/c Ratio	0.23	0.61	0.60	0.65	0.50	0.23	0.14	0.08	0.27
Control Delay	39.9	50.1	10.6	60.0	35.5	5.8	3.9	5.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	50.1	10.6	60.0	35.5	5.8	3.9	5.0	5.0
LOS	D	D	B	E	D	A	A	A	A
Approach Delay		25.8			45.6		4.3		5.0
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 14.6		Intersection LOS: B	
Intersection Capacity Utilization 68.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	138	249	85	74	47	112	298	36	57	565	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1776	1599	1719	1693		1736	3467		1805	3483	
Flt Permitted	0.63	1.00	1.00	0.57	1.00		0.39	1.00		0.53	1.00	
Satd. Flow (perm)	1082	1776	1599	1024	1693		720	3467		1013	3483	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	35	152	274	93	81	52	123	327	40	63	621	57
RTOR Reduction (vph)	0	0	233	0	27	0	0	6	0	0	5	0
Lane Group Flow (vph)	35	152	41	93	106	0	123	361	0	63	673	0
Heavy Vehicles (%)	10%	7%	1%	5%	8%	2%	4%	2%	6%	0%	2%	6%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	14.1	14.1	14.1	14.1	14.1		73.3	73.3		73.3	73.3	
Effective Green, g (s)	14.1	14.1	14.1	14.1	14.1		73.3	73.3		73.3	73.3	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.73	0.73		0.73	0.73	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	250	225	144	239		528	2541		743	2553	
v/s Ratio Prot		0.09			0.06			0.10			c0.19	
v/s Ratio Perm	0.03		0.03	c0.09			0.17			0.06		
v/c Ratio	0.23	0.61	0.18	0.65	0.44		0.23	0.14		0.08	0.26	
Uniform Delay, d1	38.1	40.4	37.9	40.6	39.3		4.3	4.0		3.8	4.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.89	0.90		1.00	1.00	
Incremental Delay, d2	0.8	4.1	0.4	9.5	1.3		1.0	0.1		0.2	0.3	
Delay (s)	38.9	44.5	38.3	50.1	40.6		4.8	3.7		4.0	4.7	
Level of Service	D	D	D	D	D		A	A		A	A	
Approach Delay (s)		40.4			44.6			4.0			4.6	
Approach LOS		D			D			A			A	

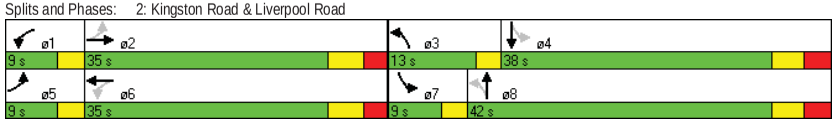
Intersection Summary					
HCM Average Control Delay	17.8	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.33				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.6	
Intersection Capacity Utilization	68.9%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	94	377	229	161	522	47	254	326	92	765
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	9.0	35.0	0.0	9.0	35.0	0.0	13.0	42.0	9.0	38.0
Total Split (%)	9.5%	36.8%	0.0%	9.5%	36.8%	0.0%	13.7%	44.2%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	38.0	28.0	95.0	38.0	28.0	95.0	48.0	35.1	41.0	31.1
Actuated g/C Ratio	0.40	0.29	1.00	0.40	0.29	1.00	0.51	0.37	0.43	0.33
v/c Ratio	0.30	0.41	0.16	0.43	0.55	0.03	0.84	0.26	0.23	0.56
Control Delay	18.9	28.4	0.2	21.5	30.7	0.0	38.8	16.4	14.2	27.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	28.4	0.2	21.5	30.7	0.0	38.8	16.4	14.2	27.2
LOS	B	C	A	C	C	A	D	B	B	C
Approach Delay		17.9			26.7			24.6		25.9
Approach LOS		B			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 24.0		Intersection LOS: C	
Intersection Capacity Utilization 74.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	94	377	229	161	522	47	254	326	116	92	765	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3343	1583	1736	3438	1553	1703	4774		1719	4989	
Flt Permitted	0.34	1.00	1.00	0.48	1.00	1.00	0.20	1.00		0.47	1.00	
Satd. Flow (perm)	655	3343	1583	872	3438	1553	365	4774		851	4989	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	101	405	246	173	561	51	273	351	125	99	823	97
RTOR Reduction (vph)	0	0	0	0	0	0	0	67	0	0	15	0
Lane Group Flow (vph)	101	405	246	173	561	51	273	409	0	99	905	0
Heavy Vehicles (%)	0%	8%	2%	4%	5%	4%	6%	2%	11%	5%	2%	5%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Effective Green, g (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Actuated g/C Ratio	0.36	0.29	1.00	0.36	0.29	1.00	0.46	0.37		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	307	985	1583	367	1013	1553	310	1764		387	1633	
v/s Ratio Prot	0.02	0.12		c0.03	c0.16		c0.09	0.09		0.02	0.18	
v/s Ratio Perm	0.10		0.16	0.14		0.03	c0.32			0.08		
v/c Ratio	0.33	0.41	0.16	0.47	0.55	0.03	0.88	0.23		0.26	0.55	
Uniform Delay, d1	21.0	26.9	0.0	22.0	28.2	0.0	17.5	20.7		18.7	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	1.3	0.2	4.3	2.2	0.0	28.1	0.3		1.6	1.4	
Delay (s)	23.8	28.2	0.2	26.3	30.4	0.0	45.6	21.0		20.3	27.6	
Level of Service	C	C	A	C	C	A	D	C		C	C	
Approach Delay (s)		18.4			27.5			29.9			26.9	
Approach LOS		B			C			C			C	

Intersection Summary					
HCM Average Control Delay	25.8	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.69				
Actuated Cycle Length (s)	95.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	74.7%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	8	438	2	9	890
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	9	481	2	10	978
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.97	0.98			0.98	
vC, conflicting volume	991	242			484	
vC1, stage 1 conf vol	482					
vC2, stage 2 conf vol	509					
vCu, unblocked vol	824	176			423	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	501	824			1120	

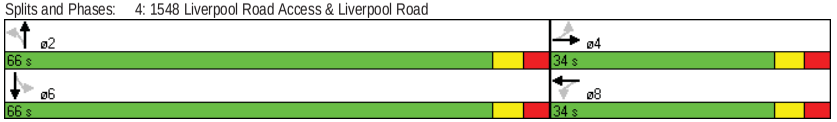
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	321	163	10	489	489
Volume Left	14	0	0	10	0	0
Volume Right	9	0	2	0	0	0
cSH	589	1700	1700	1120	1700	1700
Volume to Capacity	0.04	0.19	0.10	0.01	0.29	0.29
Queue Length 95th (m)	1.0	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.4	0.0	0.0	8.2	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	11.4	0.0		0.1		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		34.6%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	37	2	96	3	35	331	85	781
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9
Total Split (s)	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		12.5	12.5	12.5	73.7	73.7	73.7	73.7
Actuated g/C Ratio		0.12	0.12	0.12	0.74	0.74	0.74	0.74
v/c Ratio		0.40	0.57	0.30	0.09	0.19	0.14	0.33
Control Delay		26.0	52.5	12.3	5.2	3.8	5.6	6.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.0	52.5	12.3	5.2	3.8	5.6	6.0
LOS		C	D	B	A	A	A	A
Approach Delay		26.0		34.9		3.9		6.0
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 9.4		Intersection LOS: A	
Intersection Capacity Utilization 54.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	2	43	96	3	72	35	331	115	85	781	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.86		1.00	0.96		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1727		1805	1626		1805	3395		1787	3579	
Flt Permitted		0.82		0.76	1.00		0.31	1.00		0.48	1.00	
Satd. Flow (perm)		1440		1449	1626		595	3395		899	3579	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	2	46	103	3	77	38	356	124	91	840	40
RTOR Reduction (vph)	0	40	0	0	67	0	0	22	0	0	2	0
Lane Group Flow (vph)	0	48	0	103	13	0	38	458	0	91	878	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%	4%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.5		12.5	12.5		73.7	73.7		73.7	73.7	
Effective Green, g (s)		12.5		12.5	12.5		73.7	73.7		73.7	73.7	
Actuated g/C Ratio		0.12		0.12	0.12		0.74	0.74		0.74	0.74	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		180		181	203		439	2502		663	2638	
v/s Ratio Prot					0.01			0.13			c0.25	
v/s Ratio Perm		0.03		c0.07			0.06			0.10		
v/c Ratio		0.27		0.57	0.06		0.09	0.18		0.14	0.33	
Uniform Delay, d1		39.6		41.2	38.6		3.7	4.0		3.8	4.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.10	1.14	
Incremental Delay, d2		0.8		4.1	0.1		0.4	0.2		0.4	0.3	
Delay (s)		40.4		45.3	38.7		4.1	4.2		4.6	5.5	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		40.4			42.4			4.2			5.4	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM Average Control Delay	10.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.37			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	54.8%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	29	3	464	918	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	31	3	494	977	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.95	0.92	0.92			
vC, conflicting volume	1231	489	979			
vC1, stage 1 conf vol	978					
vC2, stage 2 conf vol	253					
vCu, unblocked vol	828	259	793			
tC, single (s)	6.9	6.9	4.1			
tC, 2 stage (s)	5.9					
tF (s)	3.6	3.3	2.2			
p0 queue free %	95	95	100			
cM capacity (veh/h)	351	683	766			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	48	168	329	651	328
Volume Left	17	3	0	0	0
Volume Right	31	0	0	0	2
cSH	511	766	1700	1700	1700
Volume to Capacity	0.09	0.00	0.19	0.38	0.19
Queue Length 95th (m)	2.5	0.1	0.0	0.0	0.0
Control Delay (s)	12.8	0.2	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.8	0.1		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	35.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	445	898	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	484	976	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.96	0.95	0.95			
vC, conflicting volume	1218	488	976			
vC1, stage 1 conf vol	976					
vC2, stage 2 conf vol	242					
vCu, unblocked vol	1090	362	874			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	335	605	731			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	0	0	242	242	651	325
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.14	0.14	0.38	0.19
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0			0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	58	186	214	48	150	410	676	64	446
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	36.0	36.0	36.0	36.0	36.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%	64.0%	64.0%	64.0%	64.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	17.5	17.5	17.5	17.5	17.5	69.9	69.9	69.9	69.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.70	0.70	0.70	0.70
v/c Ratio	0.51	0.59	0.52	0.31	0.72	0.69	0.34	0.16	0.20
Control Delay	51.4	44.7	13.2	39.0	45.9	15.4	3.7	7.4	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	44.7	13.2	39.0	45.9	15.4	3.7	7.4	5.9
LOS	D	D	B	D	D	B	A	A	A
Approach Delay		30.8			44.7		7.7		6.1
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 15.8		Intersection LOS: B	
Intersection Capacity Utilization 80.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	186	214	48	150	86	410	676	127	64	446	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1615	1805	1796		1787	3508		1805	3583	
Flt Permitted	0.36	1.00	1.00	0.49	1.00		0.47	1.00		0.32	1.00	
Satd. Flow (perm)	667	1863	1615	927	1796		891	3508		613	3583	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	60	194	223	50	156	90	427	704	132	67	465	24
RTOR Reduction (vph)	0	0	147	0	25	0	0	11	0	0	3	0
Lane Group Flow (vph)	60	194	76	50	221	0	427	825	0	67	486	0
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	17.5	17.5	17.5	17.5	17.5		69.9	69.9		69.9	69.9	
Effective Green, g (s)	17.5	17.5	17.5	17.5	17.5		69.9	69.9		69.9	69.9	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.70	0.70		0.70	0.70	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	117	326	283	162	314		623	2452		428	2505	
v/s Ratio Prot		0.10			c0.12			0.24			0.14	
v/s Ratio Perm	0.09		0.05	0.05			c0.48			0.11		
v/c Ratio	0.51	0.60	0.27	0.31	0.70		0.69	0.34		0.16	0.19	
Uniform Delay, d1	37.4	38.0	35.7	36.0	38.8		8.7	5.9		5.1	5.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.85	0.54		1.00	1.00	
Incremental Delay, d2	3.8	2.9	0.5	1.1	7.0		5.4	0.3		0.8	0.2	
Delay (s)	41.1	40.9	36.2	37.1	45.8		12.9	3.5		5.9	5.4	
Level of Service	D	D	D	D	D		B	A		A	A	
Approach Delay (s)		38.7			44.4			6.7			5.5	
Approach LOS		D			D			A			A	

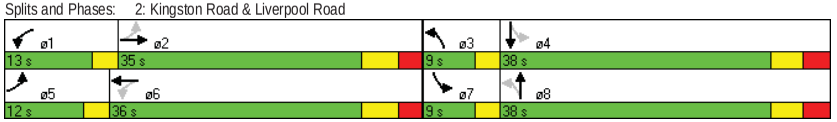
Intersection Summary				
HCM Average Control Delay	16.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6	
Intersection Capacity Utilization	80.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	250	835	269	238	543	83	252	1048	140	552
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	12.0	35.0	0.0	13.0	36.0	0.0	9.0	38.0	9.0	38.0
Total Split (%)	12.6%	36.8%	0.0%	13.7%	37.9%	0.0%	9.5%	40.0%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	41.0	28.0	95.0	43.0	29.0	95.0	41.0	31.1	41.0	31.1
Actuated g/C Ratio	0.43	0.29	1.00	0.45	0.31	1.00	0.43	0.33	0.43	0.33
v/c Ratio	0.62	0.81	0.17	0.83	0.51	0.05	0.72	0.78	0.70	0.39
Control Delay	23.8	38.3	0.2	42.0	29.1	0.1	31.4	31.5	35.8	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	38.3	0.2	42.0	29.1	0.1	31.4	31.5	35.8	24.0
LOS	C	D	A	D	C	A	C	C	D	C
Approach Delay		28.0			29.9			31.5		26.1
Approach LOS		C			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 29.2		Intersection LOS: C	
Intersection Capacity Utilization 87.9%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	250	835	269	238	543	83	252	1048	240	140	552	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3539	1599	1805	3539	1615	1770	4965		1787	5031	
Flt Permitted	0.37	1.00	1.00	0.15	1.00	1.00	0.36	1.00		0.13	1.00	
Satd. Flow (perm)	703	3539	1599	287	3539	1615	663	4965		242	5031	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	253	843	272	240	548	84	255	1059	242	141	558	95
RTOR Reduction (vph)	0	0	0	0	0	0	0	39	0	0	25	0
Lane Group Flow (vph)	253	843	272	240	548	84	255	1262	0	141	628	0
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	1%	4%	1%	1%	0%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	37.0	28.0	95.0	39.0	29.0	95.0	37.1	31.1		37.1	31.1	
Effective Green, g (s)	37.0	28.0	95.0	39.0	29.0	95.0	37.1	31.1		37.1	31.1	
Actuated g/C Ratio	0.39	0.29	1.00	0.41	0.31	1.00	0.39	0.33		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	376	1043	1599	278	1080	1615	329	1625		192	1647	
v/s Ratio Prot	0.06	0.24		c0.09	0.15		c0.05	c0.25		0.05	0.12	
v/s Ratio Perm	0.20		0.17	c0.26		0.05	0.25			0.24		
v/c Ratio	0.67	0.81	0.17	0.86	0.51	0.05	0.78	0.78		0.73	0.38	
Uniform Delay, d1	21.0	31.0	0.0	21.2	27.1	0.0	22.7	28.8		21.1	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.3	6.7	0.2	28.1	1.7	0.1	16.2	3.7		21.9	0.7	
Delay (s)	30.3	37.8	0.2	49.3	28.8	0.1	38.9	32.5		43.0	25.2	
Level of Service	C	D	A	D	C	A	D	C		D	C	
Approach Delay (s)		28.9			31.7			33.6			28.4	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	30.9	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	95.0	Sum of lost time (s)		15.9	
Intersection Capacity Utilization	87.9%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	32	15	1197	4	9	698
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	33	16	1247	4	9	727
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.84	0.83			0.83	
vC, conflicting volume	1631	626			1251	
vC1, stage 1 conf vol	1249					
vC2, stage 2 conf vol	382					
vCu, unblocked vol	1263	138			892	
tC, single (s)	6.8	7.3			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.5			2.2	
p0 queue free %	88	98			99	
cM capacity (veh/h)	286	687			638	

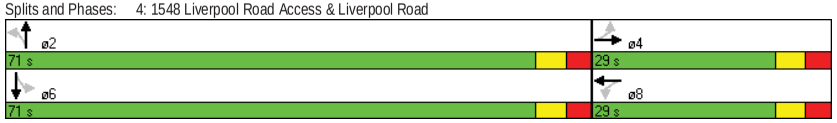
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	49	831	420	9	364	364
Volume Left	33	0	0	9	0	0
Volume Right	16	0	4	0	0	0
cSH	351	1700	1700	638	1700	1700
Volume to Capacity	0.14	0.49	0.25	0.01	0.21	0.21
Queue Length 95th (m)	3.8	0.0	0.0	0.4	0.0	0.0
Control Delay (s)	16.9	0.0	0.0	10.7	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	16.9	0.0		0.1		
Approach LOS	C					

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	43.2%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	3	134	1	107	1033	78	600
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Total Split (s)	29.0	29.0	29.0	29.0	71.0	71.0	71.0	71.0
Total Split (%)	29.0%	29.0%	29.0%	29.0%	71.0%	71.0%	71.0%	71.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		14.9	14.9	14.9	71.3	71.3	71.3	71.3
Actuated g/C Ratio		0.15	0.15	0.15	0.71	0.71	0.71	0.71
v/c Ratio		0.36	0.64	0.39	0.21	0.54	0.34	0.27
Control Delay		24.2	53.1	11.5	6.9	7.9	10.4	4.8
Queue Delay		0.0	0.0	0.0	0.0	1.3	0.0	0.0
Total Delay		24.2	53.1	11.5	6.9	9.1	10.4	4.8
LOS		C	D	B	A	A	B	A
Approach Delay		24.3		32.6		8.9		5.4
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	3	42	134	1	129	107	1033	267	78	600	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.85		1.00	0.97		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1732		1787	1617		1805	3471		1805	3534	
Flt Permitted		0.78		0.76	1.00		0.40	1.00		0.17	1.00	
Satd. Flow (perm)		1390		1433	1617		751	3471		324	3534	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	3	43	138	1	133	110	1065	275	80	619	54
RTOR Reduction (vph)	0	37	0	0	104	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	50	0	138	30	0	110	1322	0	80	668	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.9		14.9	14.9		71.3	71.3		71.3	71.3	
Effective Green, g (s)		14.9		14.9	14.9		71.3	71.3		71.3	71.3	
Actuated g/C Ratio		0.15		0.15	0.15		0.71	0.71		0.71	0.71	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		207		214	241		535	2475		231	2520	
v/s Ratio Prot					0.02			c0.38			0.19	
v/s Ratio Perm		0.04		c0.10			0.15			0.25		
v/c Ratio		0.24		0.64	0.13		0.21	0.53		0.35	0.27	
Uniform Delay, d1		37.6		40.1	36.9		4.8	6.7		5.5	5.1	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.82	0.82	
Incremental Delay, d2		0.6		6.5	0.2		0.9	0.8		4.0	0.3	
Delay (s)		38.2		46.6	37.1		5.7	7.5		8.5	4.4	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		38.2			41.9			7.3			4.9	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM Average Control Delay	11.3	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.55				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.8	
Intersection Capacity Utilization	77.4%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	46	23	21	1360	762	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	24	22	1402	786	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.78	0.94	0.94			
vC, conflicting volume	1537	400	800			
vC1, stage 1 conf vol	793					
vC2, stage 2 conf vol	744					
vCu, unblocked vol	771	226	653			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	97	98			
cM capacity (veh/h)	428	734	884			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	71	489	935	524	276
Volume Left	47	22	0	0	0
Volume Right	24	0	0	0	14
cSH	497	884	1700	1700	1700
Volume to Capacity	0.14	0.02	0.55	0.31	0.16
Queue Length 95th (m)	4.0	0.6	0.0	0.0	0.0
Control Delay (s)	13.4	0.7	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.4	0.2		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		63.1%	ICU Level of Service	B
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	1211	706	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1316	767	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.85	0.97	0.97			
vC, conflicting volume	1426	384	767			
vC1, stage 1 conf vol	767					
vC2, stage 2 conf vol	658					
vCu, unblocked vol	977	296	692			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	401	678	869			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	0	0	658	658	512	256
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.39	0.39	0.30	0.15
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0			0.0	
Approach LOS	A					

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		36.8%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	33	141	255	87	76	114	305	58	579
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	34.0	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.2	14.2	14.2	14.2	14.2	73.2	73.2	73.2	73.2
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.73	0.73	0.73	0.73
v/c Ratio	0.24	0.61	0.61	0.67	0.51	0.24	0.15	0.09	0.27
Control Delay	40.0	50.1	11.4	62.0	36.0	6.0	3.9	5.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	50.1	11.4	62.0	36.0	6.0	3.9	5.1	5.1
LOS	D	D	B	E	D	A	A	A	A
Approach Delay		26.3			46.7		4.4		5.1
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 15.0		Intersection LOS: B	
Intersection Capacity Utilization 69.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	141	255	87	76	48	114	305	37	58	579	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1776	1599	1719	1694		1736	3467		1805	3483	
Flt Permitted	0.61	1.00	1.00	0.56	1.00		0.39	1.00		0.53	1.00	
Satd. Flow (perm)	1061	1776	1599	1008	1694		707	3467		1004	3483	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	36	155	280	96	84	53	125	335	41	64	636	58
RTOR Reduction (vph)	0	0	232	0	27	0	0	6	0	0	5	0
Lane Group Flow (vph)	36	155	48	96	110	0	125	370	0	64	689	0
Heavy Vehicles (%)	10%	7%	1%	5%	8%	2%	4%	2%	6%	0%	2%	6%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	14.2	14.2	14.2	14.2	14.2		73.2	73.2		73.2	73.2	
Effective Green, g (s)	14.2	14.2	14.2	14.2	14.2		73.2	73.2		73.2	73.2	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.73	0.73		0.73	0.73	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	151	252	227	143	241		518	2538		735	2550	
v/s Ratio Prot		0.09			0.06			0.11			c0.20	
v/s Ratio Perm	0.03		0.03	c0.10			0.18			0.06		
v/c Ratio	0.24	0.62	0.21	0.67	0.45		0.24	0.15		0.09	0.27	
Uniform Delay, d1	38.1	40.3	38.0	40.7	39.3		4.4	4.0		3.8	4.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.89	0.90		1.00	1.00	
Incremental Delay, d2	0.8	4.4	0.5	11.7	1.4		1.1	0.1		0.2	0.3	
Delay (s)	38.9	44.7	38.4	52.4	40.7		5.0	3.8		4.1	4.7	
Level of Service	D	D	D	D	D		A	A		A	A	
Approach Delay (s)		40.5			45.5			4.1			4.7	
Approach LOS		D			D			A			A	

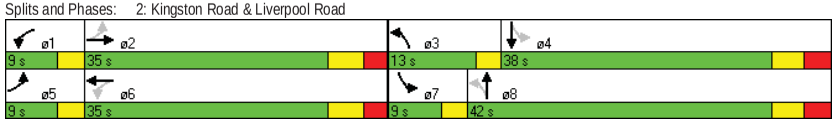
Intersection Summary					
HCM Average Control Delay	18.0	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.34				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.6	
Intersection Capacity Utilization	69.4%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	97	387	235	165	535	48	260	333	95	783
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	9.0	35.0	0.0	9.0	35.0	0.0	13.0	42.0	9.0	38.0
Total Split (%)	9.5%	36.8%	0.0%	9.5%	36.8%	0.0%	13.7%	44.2%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	38.0	28.0	95.0	38.0	28.0	95.0	48.0	35.1	41.0	31.1
Actuated g/C Ratio	0.40	0.29	1.00	0.40	0.29	1.00	0.51	0.37	0.43	0.33
v/c Ratio	0.32	0.42	0.16	0.45	0.57	0.03	0.88	0.27	0.24	0.57
Control Delay	19.2	28.6	0.2	21.9	31.0	0.0	44.9	16.5	14.3	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	28.6	0.2	21.9	31.0	0.0	44.9	16.5	14.3	27.4
LOS	B	C	A	C	C	A	D	B	B	C
Approach Delay		18.0			27.0			26.9		26.1
Approach LOS		B			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 24.6		Intersection LOS: C	
Intersection Capacity Utilization 75.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	387	235	165	535	48	260	333	119	95	783	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3343	1583	1736	3438	1553	1703	4773		1719	4989	
Flt Permitted	0.33	1.00	1.00	0.47	1.00	1.00	0.20	1.00		0.47	1.00	
Satd. Flow (perm)	634	3343	1583	853	3438	1553	350	4773		842	4989	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	104	416	253	177	575	52	280	358	128	102	842	100
RTOR Reduction (vph)	0	0	0	0	0	0	0	68	0	0	15	0
Lane Group Flow (vph)	104	416	253	177	575	52	280	418	0	102	927	0
Heavy Vehicles (%)	0%	8%	2%	4%	5%	4%	6%	2%	11%	5%	2%	5%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Effective Green, g (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Actuated g/C Ratio	0.36	0.29	1.00	0.36	0.29	1.00	0.46	0.37		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	301	985	1583	361	1013	1553	305	1763		384	1633	
v/s Ratio Prot	0.02	0.12		c0.03	c0.17		c0.10	0.09		0.02	0.19	
v/s Ratio Perm	0.10		0.16	0.14		0.03	c0.33			0.09		
v/c Ratio	0.35	0.42	0.16	0.49	0.57	0.03	0.92	0.24		0.27	0.57	
Uniform Delay, d1	21.0	27.0	0.0	22.1	28.4	0.0	17.8	20.7		18.8	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	1.3	0.2	4.7	2.3	0.0	34.3	0.3		1.7	1.4	
Delay (s)	24.2	28.3	0.2	26.8	30.7	0.0	52.0	21.0		20.4	27.8	
Level of Service	C	C	A	C	C	A	D	C		C	C	
Approach Delay (s)		18.6			27.8			32.4			27.1	
Approach LOS		B			C			C			C	

Intersection Summary					
HCM Average Control Delay	26.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	95.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	75.7%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	8	448	2	9	912
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	9	492	2	10	1002
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	1014	247			495	
vC1, stage 1 conf vol	493					
vC2, stage 2 conf vol	521					
vCu, unblocked vol	835	176			430	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	496	822			1112	

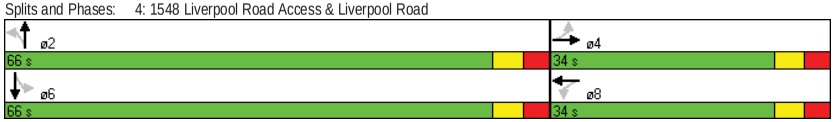
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	328	166	10	501	501
Volume Left	14	0	0	10	0	0
Volume Right	9	0	2	0	0	0
cSH	584	1700	1700	1112	1700	1700
Volume to Capacity	0.04	0.19	0.10	0.01	0.29	0.29
Queue Length 95th (m)	1.0	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.4	0.0	0.0	8.3	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	11.4	0.0		0.1		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		35.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	37	2	99	3	35	339	87	801
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9
Total Split (s)	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		12.7	12.7	12.7	73.5	73.5	73.5	73.5
Actuated g/C Ratio		0.13	0.13	0.13	0.74	0.74	0.74	0.74
v/c Ratio		0.39	0.58	0.30	0.09	0.20	0.14	0.34
Control Delay		25.7	52.5	12.1	5.3	3.9	5.9	6.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		25.7	52.5	12.1	5.3	3.9	5.9	6.3
LOS		C	D	B	A	A	A	A
Approach Delay		25.7		34.8		4.0		6.2
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 9.5		Intersection LOS: A	
Intersection Capacity Utilization 55.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	2	43	99	3	74	35	339	118	87	801	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.86		1.00	0.96		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1727		1805	1625		1805	3395		1787	3580	
Flt Permitted		0.81		0.76	1.00		0.31	1.00		0.47	1.00	
Satd. Flow (perm)		1438		1448	1625		580	3395		888	3580	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	2	46	106	3	80	38	365	127	94	861	40
RTOR Reduction (vph)	0	40	0	0	70	0	0	23	0	0	2	0
Lane Group Flow (vph)	0	48	0	106	13	0	38	469	0	94	899	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%	4%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.7		12.7	12.7		73.5	73.5		73.5	73.5	
Effective Green, g (s)		12.7		12.7	12.7		73.5	73.5		73.5	73.5	
Actuated g/C Ratio		0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		183		184	206		426	2495		653	2631	
v/s Ratio Prot					0.01			0.14			c0.25	
v/s Ratio Perm		0.03		c0.07			0.07			0.11		
v/c Ratio		0.26		0.58	0.06		0.09	0.19		0.14	0.34	
Uniform Delay, d1		39.4		41.1	38.4		3.8	4.1		3.9	4.7	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.11	1.16	
Incremental Delay, d2		0.8		4.3	0.1		0.4	0.2		0.4	0.3	
Delay (s)		40.2		45.4	38.5		4.2	4.2		4.8	5.8	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		40.2			42.4			4.2			5.7	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM Average Control Delay	10.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	55.4%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	29	3	475	941	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	31	3	505	1001	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.95	0.91	0.91			
vC, conflicting volume	1261	502	1003			
vC1, stage 1 conf vol	1002					
vC2, stage 2 conf vol	259					
vCu, unblocked vol	845	262	811			
tC, single (s)	6.9	6.9	4.1			
tC, 2 stage (s)	5.9					
tF (s)	3.6	3.3	2.2			
p0 queue free %	95	95	100			
cM capacity (veh/h)	342	678	752			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	48	172	337	667	336
Volume Left	17	3	0	0	0
Volume Right	31	0	0	0	2
cSH	503	752	1700	1700	1700
Volume to Capacity	0.10	0.00	0.20	0.39	0.20
Queue Length 95th (m)	2.5	0.1	0.0	0.0	0.0
Control Delay (s)	12.9	0.2	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.9	0.1		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	455	921	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	495	1001	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.96	0.95	0.95			
vC, conflicting volume	1248	501	1001			
vC1, stage 1 conf vol	1001					
vC2, stage 2 conf vol	247					
vCu, unblocked vol	1109	367	894			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	327	598	716			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	0	0	247	247	667	334
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.15	0.15	0.39	0.20
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0			0.0	
Approach LOS	A					

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		28.8%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	60	191	219	49	154	420	692	66	456
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	36.0	36.0	36.0	36.0	36.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%	64.0%	64.0%	64.0%	64.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	18.0	18.0	18.0	18.0	18.0	69.4	69.4	69.4	69.4
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.69	0.69	0.69	0.69
v/c Ratio	0.53	0.59	0.52	0.31	0.73	0.72	0.35	0.17	0.20
Control Delay	52.0	44.3	13.7	38.7	45.8	17.2	3.9	7.8	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	44.3	13.7	38.7	45.8	17.2	3.9	7.8	6.1
LOS	D	D	B	D	D	B	A	A	A
Approach Delay		31.0			44.6		8.4		6.3
Approach LOS		C			D		A		A

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 80		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.73		
Intersection Signal Delay: 16.3	Intersection LOS: B	
Intersection Capacity Utilization 81.1%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	191	219	49	154	89	420	692	130	66	456	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1615	1805	1795		1787	3508		1805	3584	
Flt Permitted	0.35	1.00	1.00	0.48	1.00		0.47	1.00		0.31	1.00	
Satd. Flow (perm)	654	1863	1615	916	1795		882	3508		596	3584	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	199	228	51	160	93	438	721	135	69	475	24
RTOR Reduction (vph)	0	0	145	0	25	0	0	11	0	0	2	0
Lane Group Flow (vph)	62	199	83	51	228	0	438	845	0	69	497	0
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0		69.4	69.4		69.4	69.4	
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0		69.4	69.4		69.4	69.4	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.69	0.69		0.69	0.69	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	335	291	165	323		612	2435		414	2487	
v/s Ratio Prot		0.11			c0.13			0.24			0.14	
v/s Ratio Perm	0.09		0.05	0.06			c0.50			0.12		
v/c Ratio	0.53	0.59	0.28	0.31	0.71		0.72	0.35		0.17	0.20	
Uniform Delay, d1	37.1	37.6	35.4	35.6	38.5		9.3	6.2		5.3	5.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.87	0.55		1.00	1.00	
Incremental Delay, d2	4.2	2.8	0.5	1.1	6.9		6.3	0.3		0.9	0.2	
Delay (s)	41.3	40.5	36.0	36.7	45.4		14.3	3.7		6.2	5.6	
Level of Service	D	D	D	D	D		B	A		A	A	
Approach Delay (s)		38.5			44.0			7.3			5.7	
Approach LOS		D			D			A			A	

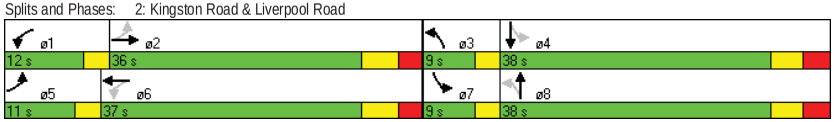
Intersection Summary				
HCM Average Control Delay	16.9	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6	
Intersection Capacity Utilization	81.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	256	856	276	244	557	85	258	1074	143	565
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	11.0	36.0	0.0	12.0	37.0	0.0	9.0	38.0	9.0	38.0
Total Split (%)	11.6%	37.9%	0.0%	12.6%	38.9%	0.0%	9.5%	40.0%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	41.0	29.0	95.0	43.0	30.0	95.0	41.0	31.1	41.0	31.1
Actuated g/C Ratio	0.43	0.31	1.00	0.45	0.32	1.00	0.43	0.33	0.43	0.33
v/c Ratio	0.66	0.80	0.17	0.90	0.50	0.05	0.75	0.80	0.71	0.40
Control Delay	26.1	37.1	0.2	54.7	28.4	0.1	33.7	32.2	37.1	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	37.1	0.2	54.7	28.4	0.1	33.7	32.2	37.1	24.1
LOS	C	D	A	D	C	A	C	C	D	C
Approach Delay		27.7			32.9			32.5		26.4
Approach LOS		C			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 30.1		Intersection LOS: C	
Intersection Capacity Utilization 89.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	256	856	276	244	557	85	258	1074	246	143	565	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3539	1599	1805	3539	1615	1770	4965		1787	5030	
Flt Permitted	0.37	1.00	1.00	0.15	1.00	1.00	0.35	1.00		0.13	1.00	
Satd. Flow (perm)	692	3539	1599	283	3539	1615	646	4965		242	5030	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	259	865	279	246	563	86	261	1085	248	144	571	98
RTOR Reduction (vph)	0	0	0	0	0	0	0	39	0	0	26	0
Lane Group Flow (vph)	259	865	279	246	563	86	261	1294	0	144	643	0
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	1%	4%	1%	1%	0%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	37.0	29.0	95.0	39.0	30.0	95.0	37.1	31.1		37.1	31.1	
Effective Green, g (s)	37.0	29.0	95.0	39.0	30.0	95.0	37.1	31.1		37.1	31.1	
Actuated g/C Ratio	0.39	0.31	1.00	0.41	0.32	1.00	0.39	0.33		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	362	1080	1599	260	1118	1615	323	1625		192	1647	
v/s Ratio Prot	0.06	0.24		c0.09	0.16		c0.05	0.26		0.05	0.13	
v/s Ratio Perm	0.22		0.17	c0.30		0.05	c0.26			0.25		
v/c Ratio	0.72	0.80	0.17	0.95	0.50	0.05	0.81	0.80		0.75	0.39	
Uniform Delay, d1	21.9	30.3	0.0	21.4	26.4	0.0	23.1	29.1		21.3	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.5	6.3	0.2	43.5	1.6	0.1	19.2	4.1		23.3	0.7	
Delay (s)	33.3	36.6	0.2	64.9	28.1	0.1	42.3	33.2		44.6	25.3	
Level of Service	C	D	A	E	C	A	D	C		D	C	
Approach Delay (s)		28.8			35.5			34.7			28.7	
Approach LOS		C			D			C			C	

Intersection Summary					
HCM Average Control Delay	32.1	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.80				
Actuated Cycle Length (s)	95.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	89.6%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	33	15	1227	4	9	715
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	34	16	1278	4	9	745
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.83	0.82			0.82	
vC, conflicting volume	1671	641			1282	
vC1, stage 1 conf vol	1280					
vC2, stage 2 conf vol	391					
vCu, unblocked vol	1280	125			907	
tC, single (s)	6.8	7.3			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.5			2.2	
p0 queue free %	88	98			98	
cM capacity (veh/h)	278	693			623	

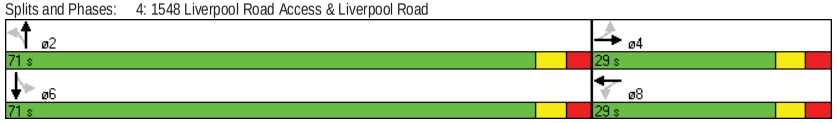
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	50	852	430	9	372	372
Volume Left	34	0	0	9	0	0
Volume Right	16	0	4	0	0	0
cSH	342	1700	1700	623	1700	1700
Volume to Capacity	0.15	0.50	0.25	0.02	0.22	0.22
Queue Length 95th (m)	4.1	0.0	0.0	0.4	0.0	0.0
Control Delay (s)	17.3	0.0	0.0	10.9	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	17.3	0.0		0.1		
Approach LOS	C					

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	44.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	3	137	1	108	1059	80	616
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Total Split (s)	29.0	29.0	29.0	29.0	71.0	71.0	71.0	71.0
Total Split (%)	29.0%	29.0%	29.0%	29.0%	71.0%	71.0%	71.0%	71.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		15.1	15.1	15.1	71.1	71.1	71.1	71.1
Actuated g/C Ratio		0.15	0.15	0.15	0.71	0.71	0.71	0.71
v/c Ratio		0.36	0.65	0.40	0.21	0.55	0.37	0.27
Control Delay		24.1	53.1	13.1	7.1	8.1	11.6	4.8
Queue Delay		0.0	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay		24.1	53.1	13.1	7.1	9.5	11.6	4.8
LOS		C	D	B	A	A	B	A
Approach Delay		24.1		33.4		9.3		5.5
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 11.3		Intersection LOS: B	
Intersection Capacity Utilization 78.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	3	42	137	1	132	108	1059	274	80	616	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.85		1.00	0.97		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1732		1787	1617		1805	3471		1805	3535	
Flt Permitted		0.78		0.76	1.00		0.39	1.00		0.16	1.00	
Satd. Flow (perm)		1379		1433	1617		736	3471		308	3535	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	3	43	141	1	136	111	1092	282	82	635	54
RTOR Reduction (vph)	0	37	0	0	98	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	50	0	141	39	0	111	1356	0	82	684	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.1		15.1	15.1		71.1	71.1		71.1	71.1	
Effective Green, g (s)		15.1		15.1	15.1		71.1	71.1		71.1	71.1	
Actuated g/C Ratio		0.15		0.15	0.15		0.71	0.71		0.71	0.71	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		208		216	244		523	2468		219	2513	
v/s Ratio Prot					0.02			c0.39			0.19	
v/s Ratio Perm		0.04		c0.10			0.15			0.27		
v/c Ratio		0.24		0.65	0.16		0.21	0.55		0.37	0.27	
Uniform Delay, d1		37.4		40.0	36.9		4.9	6.9		5.7	5.2	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.81	0.82	
Incremental Delay, d2		0.6		6.9	0.3		0.9	0.9		4.8	0.3	
Delay (s)		38.0		46.9	37.3		5.8	7.7		9.4	4.5	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		38.0			42.1			7.6			5.0	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM Average Control Delay	11.5	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.57				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.8	
Intersection Capacity Utilization	78.6%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	47	23	21	1393	781	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	48	24	22	1436	805	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.78	0.93	0.93			
vC, conflicting volume	1574	410	820			
vC1, stage 1 conf vol	812					
vC2, stage 2 conf vol	761					
vCu, unblocked vol	782	229	667			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	97	98			
cM capacity (veh/h)	420	729	871			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	72	500	957	537	283
Volume Left	48	22	0	0	0
Volume Right	24	0	0	0	14
cSH	488	871	1700	1700	1700
Volume to Capacity	0.15	0.02	0.56	0.32	0.17
Queue Length 95th (m)	4.1	0.6	0.0	0.0	0.0
Control Delay (s)	13.7	0.7	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.7	0.2		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		64.0%	ICU Level of Service	C
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	1241	723	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1349	786	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.84	0.96	0.96			
vC, conflicting volume	1460	393	786			
vC1, stage 1 conf vol	786					
vC2, stage 2 conf vol	674					
vCu, unblocked vol	986	298	705			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	395	674	858			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	0	0	674	674	524	262
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.40	0.40	0.31	0.15
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0			0.0	
Approach LOS	A					

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		37.6%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	32	138	250	86	74	114	303	57	567
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	34.0	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.1	14.1	14.1	14.1	14.1	73.3	73.3	73.3	73.3
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.73	0.73	0.73	0.73
v/c Ratio	0.23	0.61	0.60	0.66	0.50	0.24	0.15	0.09	0.27
Control Delay	39.9	50.1	10.6	61.2	35.5	5.8	3.9	5.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	50.1	10.6	61.2	35.5	5.8	3.9	5.0	5.0
LOS	D	D	B	E	D	A	A	A	A
Approach Delay		25.8			46.2		4.4		5.0
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 14.7		Intersection LOS: B	
Intersection Capacity Utilization 68.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	138	250	86	74	47	114	303	38	57	567	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1776	1599	1719	1693		1736	3465		1805	3483	
Flt Permitted	0.63	1.00	1.00	0.57	1.00		0.39	1.00		0.53	1.00	
Satd. Flow (perm)	1082	1776	1599	1024	1693		718	3465		1005	3483	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	35	152	275	95	81	52	125	333	42	63	623	57
RTOR Reduction (vph)	0	0	234	0	27	0	0	6	0	0	5	0
Lane Group Flow (vph)	35	152	41	95	106	0	125	369	0	63	675	0
Heavy Vehicles (%)	10%	7%	1%	5%	8%	2%	4%	2%	6%	0%	2%	6%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	14.1	14.1	14.1	14.1	14.1		73.3	73.3		73.3	73.3	
Effective Green, g (s)	14.1	14.1	14.1	14.1	14.1		73.3	73.3		73.3	73.3	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.73	0.73		0.73	0.73	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	250	225	144	239		526	2540		737	2553	
v/s Ratio Prot		0.09			0.06			0.11			c0.19	
v/s Ratio Perm	0.03		0.03	c0.09			0.17			0.06		
v/c Ratio	0.23	0.61	0.18	0.66	0.44		0.24	0.15		0.09	0.26	
Uniform Delay, d1	38.1	40.4	37.9	40.7	39.3		4.3	4.0		3.8	4.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.89	0.90		1.00	1.00	
Incremental Delay, d2	0.8	4.1	0.4	10.4	1.3		1.1	0.1		0.2	0.3	
Delay (s)	38.9	44.5	38.3	51.1	40.6		4.9	3.7		4.0	4.7	
Level of Service	D	D	D	D	D		A	A		A	A	
Approach Delay (s)		40.4			45.0			4.0			4.6	
Approach LOS		D			D			A			A	

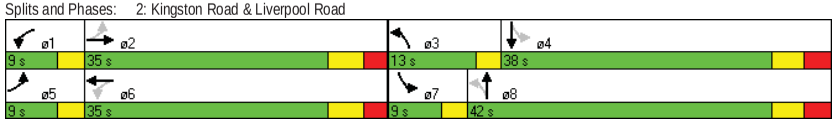
Intersection Summary					
HCM Average Control Delay	17.8	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.33				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.6	
Intersection Capacity Utilization	68.9%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	95	377	229	161	522	48	254	333	95	783
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	9.0	35.0	0.0	9.0	35.0	0.0	13.0	42.0	9.0	38.0
Total Split (%)	9.5%	36.8%	0.0%	9.5%	36.8%	0.0%	13.7%	44.2%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	38.0	28.0	95.0	38.0	28.0	95.0	48.0	35.1	41.0	31.1
Actuated g/C Ratio	0.40	0.29	1.00	0.40	0.29	1.00	0.51	0.37	0.43	0.33
v/c Ratio	0.30	0.41	0.16	0.43	0.55	0.03	0.86	0.26	0.24	0.57
Control Delay	19.0	28.4	0.2	21.5	30.7	0.0	41.6	16.5	14.3	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	28.4	0.2	21.5	30.7	0.0	41.6	16.5	14.3	27.4
LOS	B	C	A	C	C	A	D	B	B	C
Approach Delay		17.9			26.7			25.6		26.1
Approach LOS		B			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 24.3		Intersection LOS: C	
Intersection Capacity Utilization 75.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	377	229	161	522	48	254	333	116	95	783	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3343	1583	1736	3438	1553	1703	4779		1719	4989	
Flt Permitted	0.34	1.00	1.00	0.48	1.00	1.00	0.20	1.00		0.47	1.00	
Satd. Flow (perm)	655	3343	1583	872	3438	1553	350	4779		845	4989	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	102	405	246	173	561	52	273	358	125	102	842	100
RTOR Reduction (vph)	0	0	0	0	0	0	0	67	0	0	15	0
Lane Group Flow (vph)	102	405	246	173	561	52	273	416	0	102	927	0
Heavy Vehicles (%)	0%	8%	2%	4%	5%	4%	6%	2%	11%	5%	2%	5%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Effective Green, g (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Actuated g/C Ratio	0.36	0.29	1.00	0.36	0.29	1.00	0.46	0.37		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	307	985	1583	367	1013	1553	305	1766		385	1633	
v/s Ratio Prot	0.02	0.12		c0.03	c0.16		c0.09	0.09		0.02	0.19	
v/s Ratio Perm	0.10		0.16	0.14		0.03	c0.32			0.09		
v/c Ratio	0.33	0.41	0.16	0.47	0.55	0.03	0.90	0.24		0.26	0.57	
Uniform Delay, d1	21.0	26.9	0.0	22.0	28.2	0.0	17.6	20.7		18.8	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	1.3	0.2	4.3	2.2	0.0	30.6	0.3		1.7	1.4	
Delay (s)	23.9	28.2	0.2	26.3	30.4	0.0	48.2	21.0		20.4	27.8	
Level of Service	C	C	A	C	C	A	D	C		C	C	
Approach Delay (s)		18.4			27.5			30.8			27.1	
Approach LOS		B			C			C			C	

Intersection Summary					
HCM Average Control Delay	26.1	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.70				
Actuated Cycle Length (s)	95.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	75.1%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	8	447	2	9	914
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	9	491	2	10	1004
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	1014	247			493	
vC1, stage 1 conf vol	492					
vC2, stage 2 conf vol	522					
vCu, unblocked vol	843	176			429	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	494	822			1113	

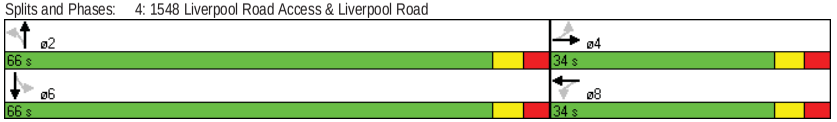
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	327	166	10	502	502
Volume Left	14	0	0	10	0	0
Volume Right	9	0	2	0	0	0
cSH	582	1700	1700	1113	1700	1700
Volume to Capacity	0.04	0.19	0.10	0.01	0.30	0.30
Queue Length 95th (m)	1.0	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.4	0.0	0.0	8.3	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	11.4	0.0		0.1		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		35.3%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	37	2	96	3	35	340	85	805
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9
Total Split (s)	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		12.5	12.5	12.5	73.7	73.7	73.7	73.7
Actuated g/C Ratio		0.12	0.12	0.12	0.74	0.74	0.74	0.74
v/c Ratio		0.40	0.57	0.30	0.09	0.19	0.14	0.34
Control Delay		26.0	52.5	12.3	5.2	3.9	5.7	6.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.0	52.5	12.3	5.2	3.9	5.7	6.1
LOS		C	D	B	A	A	A	A
Approach Delay		26.0		34.9		4.0		6.1
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 9.4		Intersection LOS: A	
Intersection Capacity Utilization 55.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	2	43	96	3	72	35	340	115	85	805	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.86		1.00	0.96		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1727		1805	1626		1805	3397		1787	3580	
Flt Permitted		0.82		0.76	1.00		0.30	1.00		0.47	1.00	
Satd. Flow (perm)		1440		1449	1626		577	3397		890	3580	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	2	46	103	3	77	38	366	124	91	866	40
RTOR Reduction (vph)	0	40	0	0	67	0	0	21	0	0	2	0
Lane Group Flow (vph)	0	48	0	103	13	0	38	469	0	91	904	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%	4%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.5		12.5	12.5		73.7	73.7		73.7	73.7	
Effective Green, g (s)		12.5		12.5	12.5		73.7	73.7		73.7	73.7	
Actuated g/C Ratio		0.12		0.12	0.12		0.74	0.74		0.74	0.74	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		180		181	203		425	2504		656	2638	
v/s Ratio Prot					0.01			0.14			c0.25	
v/s Ratio Perm		0.03		c0.07			0.07			0.10		
v/c Ratio		0.27		0.57	0.06		0.09	0.19		0.14	0.34	
Uniform Delay, d1		39.6		41.2	38.6		3.7	4.0		3.9	4.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.11	1.15	
Incremental Delay, d2		0.8		4.1	0.1		0.4	0.2		0.4	0.3	
Delay (s)		40.4		45.3	38.7		4.1	4.2		4.7	5.7	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		40.4			42.4			4.2			5.6	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM Average Control Delay	10.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	55.5%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	29	3	473	942	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	31	3	503	1002	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.95	0.91	0.91			
vC, conflicting volume	1261	502	1004			
vC1, stage 1 conf vol	1003					
vC2, stage 2 conf vol	258					
vCu, unblocked vol	846	262	813			
tC, single (s)	6.9	6.9	4.1			
tC, 2 stage (s)	5.9					
tF (s)	3.6	3.3	2.2			
p0 queue free %	95	95	100			
cM capacity (veh/h)	342	677	751			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	48	171	335	668	336
Volume Left	17	3	0	0	0
Volume Right	31	0	0	0	2
cSH	502	751	1700	1700	1700
Volume to Capacity	0.10	0.00	0.20	0.39	0.20
Queue Length 95th (m)	2.5	0.1	0.0	0.0	0.0
Control Delay (s)	12.9	0.2	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.9	0.1		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	36.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	8	24	9	445	898	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	26	10	484	976	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.96	0.95	0.95			
vC, conflicting volume	1240	490	980			
vC1, stage 1 conf vol	978					
vC2, stage 2 conf vol	261					
vCu, unblocked vol	1113	363	878			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	333	603	728			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	35	10	242	242	651	330
Volume Left	9	10	0	0	0	0
Volume Right	26	0	0	0	0	4
cSH	501	728	1700	1700	1700	1700
Volume to Capacity	0.07	0.01	0.14	0.14	0.38	0.19
Queue Length 95th (m)	1.8	0.3	0.0	0.0	0.0	0.0
Control Delay (s)	12.7	10.0	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	12.7	0.2			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization		35.0%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	58	186	216	50	150	411	680	64	451
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	36.0	36.0	36.0	36.0	36.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%	64.0%	64.0%	64.0%	64.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	17.5	17.5	17.5	17.5	17.5	69.9	69.9	69.9	69.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.70	0.70	0.70	0.70
v/c Ratio	0.51	0.59	0.52	0.32	0.72	0.69	0.34	0.16	0.20
Control Delay	51.4	44.7	13.3	39.4	45.9	15.8	3.7	7.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	44.7	13.3	39.4	45.9	15.8	3.7	7.5	5.9
LOS	D	D	B	D	D	B	A	A	A
Approach Delay		30.8			44.7		7.8		6.1
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 80.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	186	216	50	150	86	411	680	128	64	451	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1615	1805	1796		1787	3508		1805	3584	
Flt Permitted	0.36	1.00	1.00	0.49	1.00		0.47	1.00		0.32	1.00	
Satd. Flow (perm)	667	1863	1615	927	1796		887	3508		609	3584	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	60	194	225	52	156	90	428	708	133	67	470	24
RTOR Reduction (vph)	0	0	148	0	25	0	0	11	0	0	3	0
Lane Group Flow (vph)	60	194	77	52	221	0	428	830	0	67	491	0
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	17.5	17.5	17.5	17.5	17.5		69.9	69.9		69.9	69.9	
Effective Green, g (s)	17.5	17.5	17.5	17.5	17.5		69.9	69.9		69.9	69.9	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.70	0.70		0.70	0.70	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	117	326	283	162	314		620	2452		426	2505	
v/s Ratio Prot		0.10			c0.12			0.24			0.14	
v/s Ratio Perm	0.09		0.05	0.06			c0.48			0.11		
v/c Ratio	0.51	0.60	0.27	0.32	0.70		0.69	0.34		0.16	0.20	
Uniform Delay, d1	37.4	38.0	35.7	36.1	38.8		8.8	5.9		5.1	5.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.86	0.54		1.00	1.00	
Incremental Delay, d2	3.8	2.9	0.5	1.2	7.0		5.6	0.3		0.8	0.2	
Delay (s)	41.1	40.9	36.3	37.2	45.8		13.1	3.5		5.9	5.4	
Level of Service	D	D	D	D	D		B	A		A	A	
Approach Delay (s)		38.8			44.3			6.7			5.5	
Approach LOS		D			D			A			A	

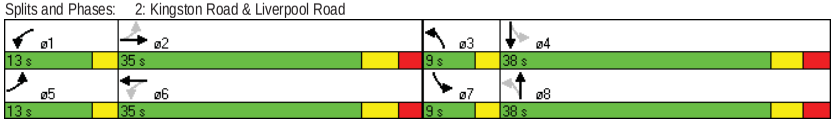
Intersection Summary				
HCM Average Control Delay	16.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6	
Intersection Capacity Utilization	80.4%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	253	835	269	238	543	87	252	1067	143	566
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	13.0	35.0	0.0	13.0	35.0	0.0	9.0	38.0	9.0	38.0
Total Split (%)	13.7%	36.8%	0.0%	13.7%	36.8%	0.0%	9.5%	40.0%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	42.0	28.0	95.0	42.0	28.0	95.0	41.0	31.1	41.0	31.1
Actuated g/C Ratio	0.44	0.29	1.00	0.44	0.29	1.00	0.43	0.33	0.43	0.33
v/c Ratio	0.62	0.81	0.17	0.83	0.53	0.05	0.73	0.79	0.71	0.40
Control Delay	23.2	38.3	0.2	42.1	30.2	0.1	32.6	32.0	37.1	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	38.3	0.2	42.1	30.2	0.1	32.6	32.0	37.1	24.1
LOS	C	D	A	D	C	A	C	C	D	C
Approach Delay		27.9			30.4			32.1		26.4
Approach LOS		C			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 88.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	835	269	238	543	87	252	1067	240	143	566	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3539	1599	1805	3539	1615	1770	4967		1787	5030	
Flt Permitted	0.35	1.00	1.00	0.16	1.00	1.00	0.35	1.00		0.13	1.00	
Satd. Flow (perm)	668	3539	1599	297	3539	1615	645	4967		242	5030	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	256	843	272	240	548	88	255	1078	242	144	572	98
RTOR Reduction (vph)	0	0	0	0	0	0	0	38	0	0	26	0
Lane Group Flow (vph)	256	843	272	240	548	88	255	1282	0	144	644	0
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	1%	4%	1%	1%	0%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	38.0	28.0	95.0	38.0	28.0	95.0	37.1	31.1		37.1	31.1	
Effective Green, g (s)	38.0	28.0	95.0	38.0	28.0	95.0	37.1	31.1		37.1	31.1	
Actuated g/C Ratio	0.40	0.29	1.00	0.40	0.29	1.00	0.39	0.33		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	385	1043	1599	278	1043	1615	323	1626		192	1647	
v/s Ratio Prot	0.07	0.24		c0.09	0.15		c0.05	0.26		0.05	0.13	
v/s Ratio Perm	0.20		0.17	c0.25		0.05	c0.26			0.25		
v/c Ratio	0.66	0.81	0.17	0.86	0.53	0.05	0.79	0.79		0.75	0.39	
Uniform Delay, d1	20.2	31.0	0.0	21.6	28.0	0.0	22.9	29.0		21.2	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.8	6.7	0.2	28.1	1.9	0.1	17.6	4.0		23.3	0.7	
Delay (s)	29.0	37.8	0.2	49.7	29.8	0.1	40.5	32.9		44.5	25.3	
Level of Service	C	D	A	D	C	A	D	C		D	C	
Approach Delay (s)		28.7			32.3			34.2			28.7	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	31.2	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.75				
Actuated Cycle Length (s)	95.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	88.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	32	15	1223	4	9	718
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	33	16	1274	4	9	748
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.83	0.82			0.82	
vC, conflicting volume	1669	639			1278	
vC1, stage 1 conf vol	1276					
vC2, stage 2 conf vol	393					
vCu, unblocked vol	1297	133			909	
tC, single (s)	6.8	7.3			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.5			2.2	
p0 queue free %	88	98			98	
cM capacity (veh/h)	278	688			624	

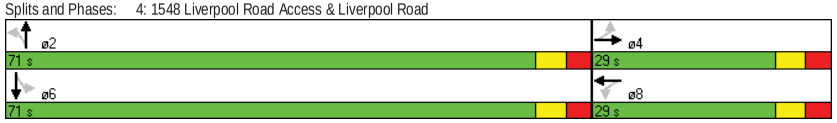
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	49	849	429	9	374	374
Volume Left	33	0	0	9	0	0
Volume Right	16	0	4	0	0	0
cSH	343	1700	1700	624	1700	1700
Volume to Capacity	0.14	0.50	0.25	0.02	0.22	0.22
Queue Length 95th (m)	3.9	0.0	0.0	0.4	0.0	0.0
Control Delay (s)	17.2	0.0	0.0	10.9	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	17.2	0.0		0.1		
Approach LOS	C					

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	43.9%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	3	134	1	107	1059	78	620
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Total Split (s)	29.0	29.0	29.0	29.0	71.0	71.0	71.0	71.0
Total Split (%)	29.0%	29.0%	29.0%	29.0%	71.0%	71.0%	71.0%	71.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		14.9	14.9	14.9	71.3	71.3	71.3	71.3
Actuated g/C Ratio		0.15	0.15	0.15	0.71	0.71	0.71	0.71
v/c Ratio		0.36	0.64	0.40	0.21	0.55	0.36	0.27
Control Delay		24.2	53.1	12.8	7.0	8.0	11.0	4.8
Queue Delay		0.0	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay		24.2	53.1	12.8	7.0	9.4	11.0	4.8
LOS		C	D	B	A	A	B	A
Approach Delay		24.3		33.2		9.2		5.5
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 11.1		Intersection LOS: B	
Intersection Capacity Utilization 78.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	3	42	134	1	129	107	1059	267	78	620	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.85		1.00	0.97		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1732		1787	1617		1805	3473		1805	3535	
Flt Permitted		0.78		0.76	1.00		0.39	1.00		0.16	1.00	
Satd. Flow (perm)		1390		1433	1617		733	3473		312	3535	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	3	43	138	1	133	110	1092	275	80	639	54
RTOR Reduction (vph)	0	37	0	0	98	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	50	0	138	36	0	110	1349	0	80	688	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.9		14.9	14.9		71.3	71.3		71.3	71.3	
Effective Green, g (s)		14.9		14.9	14.9		71.3	71.3		71.3	71.3	
Actuated g/C Ratio		0.15		0.15	0.15		0.71	0.71		0.71	0.71	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		207		214	241		523	2476		222	2520	
v/s Ratio Prot					0.02			c0.39			0.19	
v/s Ratio Perm		0.04		c0.10			0.15			0.26		
v/c Ratio		0.24		0.64	0.15		0.21	0.54		0.36	0.27	
Uniform Delay, d1		37.6		40.1	37.0		4.8	6.7		5.5	5.1	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.81	0.82	
Incremental Delay, d2		0.6		6.5	0.3		0.9	0.9		4.4	0.3	
Delay (s)		38.2		46.6	37.3		5.8	7.6		9.0	4.5	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		38.2			42.0			7.5			4.9	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM Average Control Delay	11.3	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.8	
Intersection Capacity Utilization	78.1%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	46	23	21	1386	782	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	24	22	1429	806	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.78	0.93	0.93			
vC, conflicting volume	1571	410	821			
vC1, stage 1 conf vol	813					
vC2, stage 2 conf vol	758					
vCu, unblocked vol	789	229	668			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	97	98			
cM capacity (veh/h)	419	729	870			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	71	498	953	537	283
Volume Left	47	22	0	0	0
Volume Right	24	0	0	0	14
cSH	488	870	1700	1700	1700
Volume to Capacity	0.15	0.02	0.56	0.32	0.17
Queue Length 95th (m)	4.1	0.6	0.0	0.0	0.0
Control Delay (s)	13.6	0.7	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.6	0.2		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		63.8%	ICU Level of Service	B
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	20	26	1211	706	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	22	28	1316	767	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.85	0.97	0.97			
vC, conflicting volume	1487	389	777			
vC1, stage 1 conf vol	772					
vC2, stage 2 conf vol	715					
vCu, unblocked vol	1036	298	700			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	97			
cM capacity (veh/h)	386	674	863			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	28	28	658	658	512	266
Volume Left	7	28	0	0	0	0
Volume Right	22	0	0	0	0	10
cSH	575	863	1700	1700	1700	1700
Volume to Capacity	0.05	0.03	0.39	0.39	0.30	0.16
Queue Length 95th (m)	1.2	0.8	0.0	0.0	0.0	0.0
Control Delay (s)	11.6	9.3	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.6	0.2			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		43.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	33	141	256	88	76	116	310	58	581
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	34.0	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.2	14.2	14.2	14.2	14.2	73.2	73.2	73.2	73.2
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.73	0.73	0.73	0.73
v/c Ratio	0.24	0.61	0.61	0.67	0.51	0.25	0.15	0.09	0.27
Control Delay	40.0	50.0	11.6	62.5	35.9	6.0	4.0	5.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	50.0	11.6	62.5	35.9	6.0	4.0	5.1	5.1
LOS	D	D	B	E	D	A	A	A	A
Approach Delay		26.4			46.9		4.5		5.1
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 99 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 15.0		Intersection LOS: B	
Intersection Capacity Utilization 69.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	141	256	88	76	48	116	310	39	58	581	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1776	1599	1719	1694		1736	3465		1805	3484	
Flt Permitted	0.61	1.00	1.00	0.56	1.00		0.39	1.00		0.52	1.00	
Satd. Flow (perm)	1061	1776	1599	1008	1694		706	3465		996	3484	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	36	155	281	97	84	53	127	341	43	64	638	58
RTOR Reduction (vph)	0	0	231	0	27	0	0	6	0	0	5	0
Lane Group Flow (vph)	36	155	50	97	110	0	127	378	0	64	691	0
Heavy Vehicles (%)	10%	7%	1%	5%	8%	2%	4%	2%	6%	0%	2%	6%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	14.2	14.2	14.2	14.2	14.2		73.2	73.2		73.2	73.2	
Effective Green, g (s)	14.2	14.2	14.2	14.2	14.2		73.2	73.2		73.2	73.2	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.73	0.73		0.73	0.73	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	151	252	227	143	241		517	2536		729	2550	
v/s Ratio Prot		0.09			0.06			0.11			c0.20	
v/s Ratio Perm	0.03		0.03	c0.10			0.18			0.06		
v/c Ratio	0.24	0.62	0.22	0.68	0.45		0.25	0.15		0.09	0.27	
Uniform Delay, d1	38.1	40.3	38.0	40.7	39.3		4.4	4.0		3.8	4.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.89	0.91		1.00	1.00	
Incremental Delay, d2	0.8	4.4	0.5	12.1	1.4		1.1	0.1		0.2	0.3	
Delay (s)	38.9	44.7	38.5	52.8	40.7		5.0	3.8		4.1	4.7	
Level of Service	D	D	D	D	D		A	A		A	A	
Approach Delay (s)		40.6			45.7			4.1			4.7	
Approach LOS		D			D			A			A	

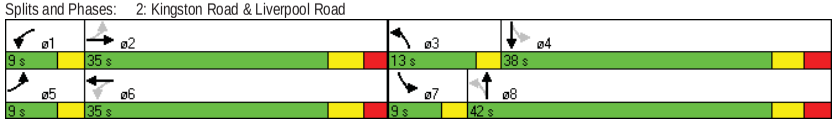
Intersection Summary					
HCM Average Control Delay	18.0	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.34				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.6	
Intersection Capacity Utilization	69.5%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	98	387	235	165	535	49	260	340	98	801
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	9.0	35.0	0.0	9.0	35.0	0.0	13.0	42.0	9.0	38.0
Total Split (%)	9.5%	36.8%	0.0%	9.5%	36.8%	0.0%	13.7%	44.2%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	38.0	28.0	95.0	38.0	28.0	95.0	48.0	35.1	41.0	31.1
Actuated g/C Ratio	0.40	0.29	1.00	0.40	0.29	1.00	0.51	0.37	0.43	0.33
v/c Ratio	0.32	0.42	0.16	0.45	0.57	0.03	0.89	0.27	0.25	0.58
Control Delay	19.2	28.6	0.2	21.9	31.0	0.0	47.9	16.7	14.4	27.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	28.6	0.2	21.9	31.0	0.0	47.9	16.7	14.4	27.6
LOS	B	C	A	C	C	A	D	B	B	C
Approach Delay		18.1			27.0			28.0		26.3
Approach LOS		B			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 25.0		Intersection LOS: C	
Intersection Capacity Utilization 76.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	387	235	165	535	49	260	340	119	98	801	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3343	1583	1736	3438	1553	1703	4778		1719	4988	
Flt Permitted	0.33	1.00	1.00	0.47	1.00	1.00	0.19	1.00		0.46	1.00	
Satd. Flow (perm)	634	3343	1583	853	3438	1553	335	4778		835	4988	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	105	416	253	177	575	53	280	366	128	105	861	103
RTOR Reduction (vph)	0	0	0	0	0	0	0	66	0	0	15	0
Lane Group Flow (vph)	105	416	253	177	575	53	280	428	0	105	949	0
Heavy Vehicles (%)	0%	8%	2%	4%	5%	4%	6%	2%	11%	5%	2%	5%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Effective Green, g (s)	34.0	28.0	95.0	34.0	28.0	95.0	44.1	35.1		37.1	31.1	
Actuated g/C Ratio	0.36	0.29	1.00	0.36	0.29	1.00	0.46	0.37		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	301	985	1583	361	1013	1553	300	1765		382	1633	
v/s Ratio Prot	0.02	0.12		c0.03	c0.17		c0.10	0.09		0.02	0.19	
v/s Ratio Perm	0.10		0.16	0.14		0.03	c0.34			0.09		
v/c Ratio	0.35	0.42	0.16	0.49	0.57	0.03	0.93	0.24		0.27	0.58	
Uniform Delay, d1	21.1	27.0	0.0	22.1	28.4	0.0	17.9	20.7		18.8	26.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	1.3	0.2	4.7	2.3	0.0	37.4	0.3		1.8	1.5	
Delay (s)	24.2	28.3	0.2	26.8	30.7	0.0	55.3	21.1		20.6	28.1	
Level of Service	C	C	A	C	C	A	E	C		C	C	
Approach Delay (s)		18.6			27.8			33.5			27.3	
Approach LOS		B			C			C			C	

Intersection Summary					
HCM Average Control Delay		26.8	HCM Level of Service		C
HCM Volume to Capacity ratio		0.73			
Actuated Cycle Length (s)		95.0	Sum of lost time (s)		13.0
Intersection Capacity Utilization		76.1%	ICU Level of Service		D
Analysis Period (min)		15			
c Critical Lane Group					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	8	457	2	9	936
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	9	502	2	10	1029
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	1037	252			504	
vC1, stage 1 conf vol	503					
vC2, stage 2 conf vol	534					
vCu, unblocked vol	854	177			436	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	488	819			1104	

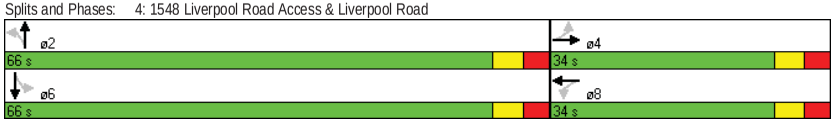
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	335	170	10	514	514
Volume Left	14	0	0	10	0	0
Volume Right	9	0	2	0	0	0
cSH	577	1700	1700	1104	1700	1700
Volume to Capacity	0.04	0.20	0.10	0.01	0.30	0.30
Queue Length 95th (m)	1.0	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.5	0.0	0.0	8.3	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	11.5	0.0		0.1		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		35.9%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	37	2	99	3	35	348	87	825
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9
Total Split (s)	34.0	34.0	34.0	34.0	66.0	66.0	66.0	66.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	66.0%	66.0%	66.0%	66.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		12.7	12.7	12.7	73.5	73.5	73.5	73.5
Actuated g/C Ratio		0.13	0.13	0.13	0.74	0.74	0.74	0.74
v/c Ratio		0.39	0.58	0.30	0.09	0.20	0.15	0.35
Control Delay		25.7	52.5	12.1	5.3	4.0	6.0	6.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		25.7	52.5	12.1	5.3	4.0	6.0	6.4
LOS		C	D	B	A	A	A	A
Approach Delay		25.7		34.8		4.1		6.4
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 9.6		Intersection LOS: A	
Intersection Capacity Utilization 56.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	2	43	99	3	74	35	348	118	87	825	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.86		1.00	0.96		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1727		1805	1625		1805	3397		1787	3580	
Flt Permitted		0.81		0.76	1.00		0.30	1.00		0.47	1.00	
Satd. Flow (perm)		1438		1448	1625		562	3397		881	3580	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	2	46	106	3	80	38	374	127	94	887	40
RTOR Reduction (vph)	0	40	0	0	70	0	0	22	0	0	2	0
Lane Group Flow (vph)	0	48	0	106	13	0	38	479	0	94	925	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%	4%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.7		12.7	12.7		73.5	73.5		73.5	73.5	
Effective Green, g (s)		12.7		12.7	12.7		73.5	73.5		73.5	73.5	
Actuated g/C Ratio		0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		183		184	206		413	2497		648	2631	
v/s Ratio Prot					0.01			0.14			c0.26	
v/s Ratio Perm		0.03		c0.07			0.07			0.11		
v/c Ratio		0.26		0.58	0.06		0.09	0.19		0.15	0.35	
Uniform Delay, d1		39.4		41.1	38.4		3.8	4.1		3.9	4.7	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.14	1.18	
Incremental Delay, d2		0.8		4.3	0.1		0.4	0.2		0.5	0.4	
Delay (s)		40.2		45.4	38.5		4.2	4.3		4.9	5.9	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		40.2			42.4			4.3			5.9	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM Average Control Delay	10.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	56.0%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	29	3	484	965	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	31	3	515	1027	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.94	0.91	0.91			
vC, conflicting volume	1291	514	1029			
vC1, stage 1 conf vol	1028					
vC2, stage 2 conf vol	264					
vCu, unblocked vol	863	265	831			
tC, single (s)	6.9	6.9	4.1			
tC, 2 stage (s)	5.9					
tF (s)	3.6	3.3	2.2			
p0 queue free %	95	95	100			
cM capacity (veh/h)	333	672	736			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	48	175	343	684	344
Volume Left	17	3	0	0	0
Volume Right	31	0	0	0	2
cSH	493	736	1700	1700	1700
Volume to Capacity	0.10	0.00	0.20	0.40	0.20
Queue Length 95th (m)	2.6	0.1	0.0	0.0	0.0
Control Delay (s)	13.1	0.2	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.1	0.1		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	8	24	9	455	921	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	26	10	495	1001	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	1270	503	1005			
vC1, stage 1 conf vol	1003					
vC2, stage 2 conf vol	267					
vCu, unblocked vol	1133	368	898			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	324	597	713			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	35	10	247	247	667	338
Volume Left	9	10	0	0	0	0
Volume Right	26	0	0	0	0	4
cSH	493	713	1700	1700	1700	1700
Volume to Capacity	0.07	0.01	0.15	0.15	0.39	0.20
Queue Length 95th (m)	1.8	0.3	0.0	0.0	0.0	0.0
Control Delay (s)	12.9	10.1	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	12.9	0.2			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization		35.6%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	60	191	221	51	154	421	696	66	461
Turn Type	Perm		Perm	Perm		Perm		Perm	
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	29.0	29.0	29.0	29.0
Total Split (s)	36.0	36.0	36.0	36.0	36.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%	36.0%	36.0%	36.0%	64.0%	64.0%	64.0%	64.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	6.7	6.7	6.7	6.7
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	18.0	18.0	18.0	18.0	18.0	69.4	69.4	69.4	69.4
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.69	0.69	0.69	0.69
v/c Ratio	0.53	0.59	0.53	0.32	0.73	0.72	0.35	0.17	0.20
Control Delay	52.0	44.3	13.7	39.1	45.8	17.5	3.9	7.8	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	44.3	13.7	39.1	45.8	17.5	3.9	7.8	6.2
LOS	D	D	B	D	D	B	A	A	A
Approach Delay		30.9			44.6		8.5		6.3
Approach LOS		C			D		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 16.3		Intersection LOS: B	
Intersection Capacity Utilization 81.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Glenanna Road & Liverpool Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	191	221	51	154	89	421	696	131	66	461	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1615	1805	1795		1787	3508		1805	3584	
Flt Permitted	0.35	1.00	1.00	0.48	1.00		0.47	1.00		0.31	1.00	
Satd. Flow (perm)	654	1863	1615	916	1795		878	3508		593	3584	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	199	230	53	160	93	439	725	136	69	480	24
RTOR Reduction (vph)	0	0	147	0	25	0	0	11	0	0	2	0
Lane Group Flow (vph)	62	199	83	53	228	0	439	850	0	69	502	0
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0		69.4	69.4		69.4	69.4	
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0		69.4	69.4		69.4	69.4	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.69	0.69		0.69	0.69	
Clearance Time (s)	5.9	5.9	5.9	5.9	5.9		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	335	291	165	323		609	2435		412	2487	
v/s Ratio Prot		0.11			c0.13			0.24			0.14	
v/s Ratio Perm	0.09		0.05	0.06			c0.50			0.12		
v/c Ratio	0.53	0.59	0.29	0.32	0.71		0.72	0.35		0.17	0.20	
Uniform Delay, d1	37.1	37.6	35.4	35.7	38.5		9.4	6.2		5.3	5.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.87	0.55		1.00	1.00	
Incremental Delay, d2	4.2	2.8	0.5	1.1	6.9		6.4	0.4		0.9	0.2	
Delay (s)	41.3	40.5	36.0	36.8	45.4		14.6	3.7		6.2	5.6	
Level of Service	D	D	D	D	D		B	A		A	A	
Approach Delay (s)		38.5			43.9			7.4			5.7	
Approach LOS		D			D			A			A	

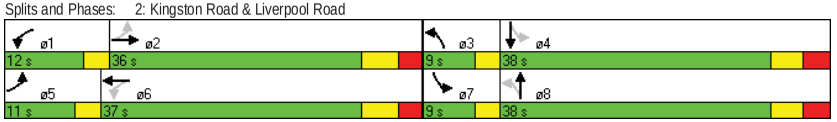
Intersection Summary				
HCM Average Control Delay	16.9	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.6	
Intersection Capacity Utilization	81.3%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Volume (vph)	259	856	276	244	557	89	258	1093	146	579
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt		pm+pt	
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		Free	6		Free	8		4	
Detector Phase	5	2		1	6		3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0	5.0	8.0
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	38.0	9.0	38.0
Total Split (s)	11.0	36.0	0.0	12.0	37.0	0.0	9.0	38.0	9.0	38.0
Total Split (%)	11.6%	37.9%	0.0%	12.6%	38.9%	0.0%	9.5%	40.0%	9.5%	40.0%
Yellow Time (s)	3.0	4.2		3.0	4.2		3.0	3.7	3.0	3.7
All-Red Time (s)	0.0	2.8		0.0	2.8		0.0	3.2	0.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9	3.0	6.9
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		Max	Max		Max	Max	Max	Max
Act Effct Green (s)	41.0	29.0	95.0	43.0	30.0	95.0	41.0	31.1	41.0	31.1
Actuated g/C Ratio	0.43	0.31	1.00	0.45	0.32	1.00	0.43	0.33	0.43	0.33
v/c Ratio	0.67	0.80	0.17	0.90	0.50	0.06	0.76	0.81	0.73	0.41
Control Delay	26.5	37.1	0.2	54.7	28.4	0.1	35.2	32.7	38.4	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	37.1	0.2	54.7	28.4	0.1	35.2	32.7	38.4	24.3
LOS	C	D	A	D	C	A	D	C	D	C
Approach Delay		27.8			32.7			33.1		26.8
Approach LOS		C			C			C		C

Intersection Summary			
Cycle Length: 95			
Actuated Cycle Length: 95			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 30.4		Intersection LOS: C	
Intersection Capacity Utilization 90.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Kingston Road & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	259	856	276	244	557	89	258	1093	246	146	579	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	4.0	3.0	7.0	4.0	3.0	6.9		3.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3539	1599	1805	3539	1615	1770	4967		1787	5030	
Flt Permitted	0.37	1.00	1.00	0.15	1.00	1.00	0.34	1.00		0.13	1.00	
Satd. Flow (perm)	692	3539	1599	283	3539	1615	628	4967		242	5030	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	262	865	279	246	563	90	261	1104	248	147	585	101
RTOR Reduction (vph)	0	0	0	0	0	0	0	38	0	0	26	0
Lane Group Flow (vph)	262	865	279	246	563	90	261	1314	0	147	660	0
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	1%	4%	1%	1%	0%
Turn Type	pm+pt		Free	pm+pt		Free	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		Free	6		Free	8			4		
Actuated Green, G (s)	37.0	29.0	95.0	39.0	30.0	95.0	37.1	31.1		37.1	31.1	
Effective Green, g (s)	37.0	29.0	95.0	39.0	30.0	95.0	37.1	31.1		37.1	31.1	
Actuated g/C Ratio	0.39	0.31	1.00	0.41	0.32	1.00	0.39	0.33		0.39	0.33	
Clearance Time (s)	3.0	7.0		3.0	7.0		3.0	6.9		3.0	6.9	
Lane Grp Cap (vph)	362	1080	1599	260	1118	1615	317	1626		192	1647	
v/s Ratio Prot	0.06	0.24		c0.09	0.16		c0.05	0.26		0.05	0.13	
v/s Ratio Perm	0.22		0.17	c0.30		0.06	c0.27			0.25		
v/c Ratio	0.72	0.80	0.17	0.95	0.50	0.06	0.82	0.81		0.77	0.40	
Uniform Delay, d1	22.0	30.3	0.0	21.4	26.4	0.0	23.3	29.2		21.4	24.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.9	6.3	0.2	43.5	1.6	0.1	20.9	4.4		24.8	0.7	
Delay (s)	33.9	36.6	0.2	64.9	28.1	0.1	44.3	33.6		46.2	25.5	
Level of Service	C	D	A	E	C	A	D	C		D	C	
Approach Delay (s)		28.9			35.4			35.4			29.1	
Approach LOS		C			D			D			C	

Intersection Summary				
HCM Average Control Delay	32.3	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	90.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	33	15	1253	4	9	735
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	34	16	1305	4	9	766
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			54			170
pX, platoon unblocked	0.83	0.81			0.81	
vC, conflicting volume	1709	655			1309	
vC1, stage 1 conf vol	1307					
vC2, stage 2 conf vol	402					
vCu, unblocked vol	1313	119			923	
tC, single (s)	6.8	7.3			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.5			2.2	
p0 queue free %	87	98			98	
cM capacity (veh/h)	270	694			609	

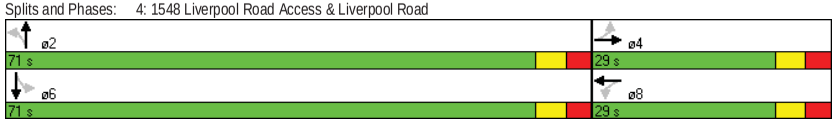
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	50	870	439	9	383	383
Volume Left	34	0	0	9	0	0
Volume Right	16	0	4	0	0	0
cSH	334	1700	1700	609	1700	1700
Volume to Capacity	0.15	0.51	0.26	0.02	0.23	0.23
Queue Length 95th (m)	4.2	0.0	0.0	0.4	0.0	0.0
Control Delay (s)	17.7	0.0	0.0	11.0	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	17.7	0.0		0.1		
Approach LOS	C					

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	44.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	3	137	1	108	1085	80	636
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Total Split (s)	29.0	29.0	29.0	29.0	71.0	71.0	71.0	71.0
Total Split (%)	29.0%	29.0%	29.0%	29.0%	71.0%	71.0%	71.0%	71.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		15.1	15.1	15.1	71.1	71.1	71.1	71.1
Actuated g/C Ratio		0.15	0.15	0.15	0.71	0.71	0.71	0.71
v/c Ratio		0.36	0.65	0.41	0.22	0.56	0.39	0.28
Control Delay		24.1	53.1	14.4	7.2	8.3	12.3	4.9
Queue Delay		0.0	0.0	0.0	0.0	1.5	0.0	0.0
Total Delay		24.1	53.1	14.4	7.2	9.8	12.3	4.9
LOS		C	D	B	A	A	B	A
Approach Delay		24.1		34.0		9.6		5.7
Approach LOS		C		C		A		A

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 11.4		Intersection LOS: B	
Intersection Capacity Utilization 79.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: 1548 Liverpool Road Access & Liverpool Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	3	42	137	1	132	108	1085	274	80	636	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.93		1.00	0.85		1.00	0.97		1.00	0.99	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1732		1787	1617		1805	3473		1805	3536	
Flt Permitted		0.78		0.76	1.00		0.38	1.00		0.16	1.00	
Satd. Flow (perm)		1379		1433	1617		718	3473		297	3536	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	41	3	43	141	1	136	111	1119	282	82	656	54
RTOR Reduction (vph)	0	37	0	0	92	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	50	0	141	45	0	111	1383	0	82	705	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.1		15.1	15.1		71.1	71.1		71.1	71.1	
Effective Green, g (s)		15.1		15.1	15.1		71.1	71.1		71.1	71.1	
Actuated g/C Ratio		0.15		0.15	0.15		0.71	0.71		0.71	0.71	
Clearance Time (s)		6.9		6.9	6.9		6.9	6.9		6.9	6.9	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		208		216	244		510	2469		211	2514	
v/s Ratio Prot					0.03			c0.40			0.20	
v/s Ratio Perm		0.04		c0.10			0.15			0.28		
v/c Ratio		0.24		0.65	0.19		0.22	0.56		0.39	0.28	
Uniform Delay, d1		37.4		40.0	37.1		4.9	6.9		5.8	5.2	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.81	0.82	
Incremental Delay, d2		0.6		6.9	0.4		1.0	0.9		5.2	0.3	
Delay (s)		38.0		46.9	37.4		5.9	7.9		9.9	4.5	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		38.0			42.2			7.7			5.1	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM Average Control Delay	11.5	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.58				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.8	
Intersection Capacity Utilization	79.3%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	47	23	21	1419	801	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	48	24	22	1463	826	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				79	55	
pX, platoon unblocked	0.77	0.93	0.93			
vC, conflicting volume	1608	420	840			
vC1, stage 1 conf vol	833					
vC2, stage 2 conf vol	775					
vCu, unblocked vol	799	231	682			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	97	97			
cM capacity (veh/h)	411	724	857			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	72	509	975	551	290
Volume Left	48	22	0	0	0
Volume Right	24	0	0	0	14
cSH	479	857	1700	1700	1700
Volume to Capacity	0.15	0.03	0.57	0.32	0.17
Queue Length 95th (m)	4.2	0.6	0.0	0.0	0.0
Control Delay (s)	13.8	0.7	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.8	0.2		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		64.8%	ICU Level of Service	C
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	20	26	1241	723	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	22	28	1349	786	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				88	134	
pX, platoon unblocked	0.84	0.96	0.96			
vC, conflicting volume	1522	398	796			
vC1, stage 1 conf vol	791					
vC2, stage 2 conf vol	731					
vCu, unblocked vol	1044	301	713			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	97			
cM capacity (veh/h)	380	671	851			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	28	28	674	674	524	272
Volume Left	7	28	0	0	0	0
Volume Right	22	0	0	0	0	10
cSH	570	851	1700	1700	1700	1700
Volume to Capacity	0.05	0.03	0.40	0.40	0.31	0.16
Queue Length 95th (m)	1.2	0.8	0.0	0.0	0.0	0.0
Control Delay (s)	11.6	9.4	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.6	0.2			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		44.3%	ICU Level of Service	A
Analysis Period (min)		15		

APPENDIX E

Level of Service Definitions

LEVEL OF SERVICE ANALYSIS AT SIGNALIZED INTERSECTIONS

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". The term Level of Service implies a qualitative measure of traffic flow at an intersection. It is dependent upon vehicle delay and vehicle queue lengths at the approaches. Specifically, Level of Service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The following table describes the characteristics of each level:

Level of Service	Features	Stopped Delay per Vehicle (sec)
A	At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation.	≤ 5.0
B	At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection.	> 5.0 and ≤ 15.0
C	At this level, the operation is stable though with more frequent fully utilized signal phases. Drivers feel more restricted and occasionally may have to wait more than one red signal indication, and queues may develop behind turning vehicles. This level is normally employed in urban intersection design.	> 15.0 and ≤ 25.0
D	At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive backups.	> 25.0 and ≤ 40.0
E	At this level, capacity is reached. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles.	> 40.0 and ≤ 60.0
F	At this level, saturation occurs, with vehicle demand exceeding the available capacity.	> 60.0

LEVEL OF SERVICE ANALYSIS AT UNSIGNALIZED INTERSECTIONS[1]

The term "level of service" implies a qualitative measure of traffic flow at an intersection. It is dependent upon the vehicle delay and vehicle queue lengths at approaches. The level of service at unsignalized intersections is often related to the delay accumulated by flows on the minor streets, caused by all other conflicting movements. The following table describes the characteristics of each level.

Level of Service	Features
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.
E	Very long traffic delays occur. Operations approach the capacity of the intersection.
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.

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(1) Highway Capacity Manual - Special Report No. 209, Transportation Research Board, 1985.

APPENDIX F

Site Plan Review Documents

ENTRANCEWAY GEOMETRICS	**DIMENSION REFERENCE (see TAC Figure 8.9.2)**	**URBAN**			**RURAL**			
		Res.	Com.	Ind.	Res.	Com	Ind.	Farm
Maximum (2 Lane)		7.5	8.0	12.0	9.0	9.0	12.0	15.0
Maximum (3 Lane)		7.5	11.0	12.0	9.0	11.0	12.0	15.0
Right Turn Radius (m)	R							
Minimum		(1)	4.5	6.0	3.0	4.5	7.5	7.5 (3)
Maximum		(1)	12.0	15.0	7.5	24.0	24.0	24.0
Minimum Spacing (m)								
From property line	P	R	R	R	R	R	R	
Between driveways	E	7.5	25.0	25.0	7.5	25.0	25.0	

Notes:

1) In Urban areas, all residential entrances shall have a minimum 1.5 m approaching and 1.0 m departing flare in addition to the entrance width shown in the table above.

2) Recommended minimum width of 8.0m to accommodate larger farm equipment is used. Access width to be reviewed with the farm owner/operator.

3) Minimum radius for farm entrances should consider the farm equipment used (in consultation with the farm owner/operator) and consider the Regional Road AADT.

OPSD 351.010 (latest revision) shall be used as a guide for urban residential design with the exception of approaching / departing flare dimensions. For commercial entrances use OPSD 350.010, with the exception of the dimensions specified above.

3.8 Parking Structures

a) *Parking structures* located adjacent to any *street line* shall comply with the provisions for the *main building* in accordance with this By-law.

b) *Parking structures* constructed completely below *established grade* are permitted to encroach below public and private right-of-ways and public parkland.

c) Stairs and air vents associated with a *parking structure* are not permitted in a *front yard* or *exterior side yard*.

d) Air vents constructed in association with an underground *parking structure* are permitted to project to a maximum of 1.2 metres above *established grade* no closer than 4.0 metres to a *street line*.

e) The parking of *motor vehicles* is prohibited in the *first storey* of an above *grade parking structure* for the first 9.0 metres of the depth of the *parking structure* measured in from the *lot line* along a *street line* with required *active at grade frontages*, as shown on Schedule 6 to this by-law.

f) Above ground *parking structures* that front onto a *street line* shall have a minimum *ground floor height* of 4.5 metres.

3.9 Bicycle Parking Space Requirements

a) *Bicycle parking spaces* must be located on the same *lot* as the use or *building* for which it is required.

b) A maximum of 50 percent of the required *bicycle parking spaces* may be vertical spaces; the rest of the required spaces must be horizontal spaces.

c) Where the number of *bicycle parking spaces* exceeds 50 spaces, a minimum of 25 percent of the total required must be located within:

   i) a *building* or *structure*;

   ii) a secure area such as a supervised *parking lot* or enclosure; or

   iii) bicycle lockers.

d) Where four or more *bicycle parking spaces* are provided in a common *parking area*, each space must contain a parking rack that is securely anchored to the ground and attached to a heavy base such as concrete.

e) Dimensions:

   i) if located in a horizontal position (on the ground): a minimum length of 1.8 metres and a minimum width of 0.6 metres;

   ii) if located in a vertical position (on the wall): a minimum length of 1.5 metres and a minimum width of 0.5 metres.

APPENDIX G

Sight Distance Photographs

1854 & 1858 Liverpool Road, Pickering
Sight Distance Photos

3m from curb, looking North

At curb, looking North

3m from curb, looking South

At curb, looking South