Traffic Impact Study

11801 Derry Road – Town of Milton

January 2024 | Project # 10509

Takol CMCC Derry Limited Partnership

TYLin

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1 INTRODUCTION

1.1 Scope and Objective

TYLin was retained by Takol CMCC Derry Limited Partnership to complete a Traffic Impact Study (TIS) in support of a Zoning By-Law Amendment and Site Plan Application for a proposed mixed-use industrial commercial development to be located at the southwest corner of Derry Road and Sixth Line in the Town of Milton ("the Town"), and within the Halton Region ("the Region").

The study consists of the following:

- The future traffic operations for the weekday AM and PM peak hour considering the background traffic growth and relevant background developments
- A summary of the expected impact on the operations for both the future background and total traffic conditions in the 5-year and 10-year post-buildout horizon years
- A review of the proposed parking supply to confirm conformance with relevant by-laws
- A review of the site plan's geometry to confirm conformance with relevant design standards
- Review of the proposed internal site circulation for the applicable design vehicles.

The purpose of this study is to determine the traffic volumes anticipated to be generated by the proposed development during the weekday AM and PM peak periods; to assess the impact of this traffic on the existing and future roadway network, recommend improvements to accommodate the projected traffic if any are needed, and confirm that the site plan network is consistent with Town and Regional standards.

A Terms of Reference was submitted by TYLin to the Town and Region for review and comment. Correspondence with the review agencies are included in **Appendix A**.

2 SITE CHARACTERISTICS

2.1 Study Environment

The subject site is located on the southwest corner of Sixth Line and Derry Road. The subject site is bounded by Sixth Line to the northeast, Derry Road to the southeast, and agricultural land to the west. The subject site is currently vacant of structures and used for agriculture.

The proposed site and surrounding road network are illustrated **Figure 2-1**.

Figure 2-1 Site Location

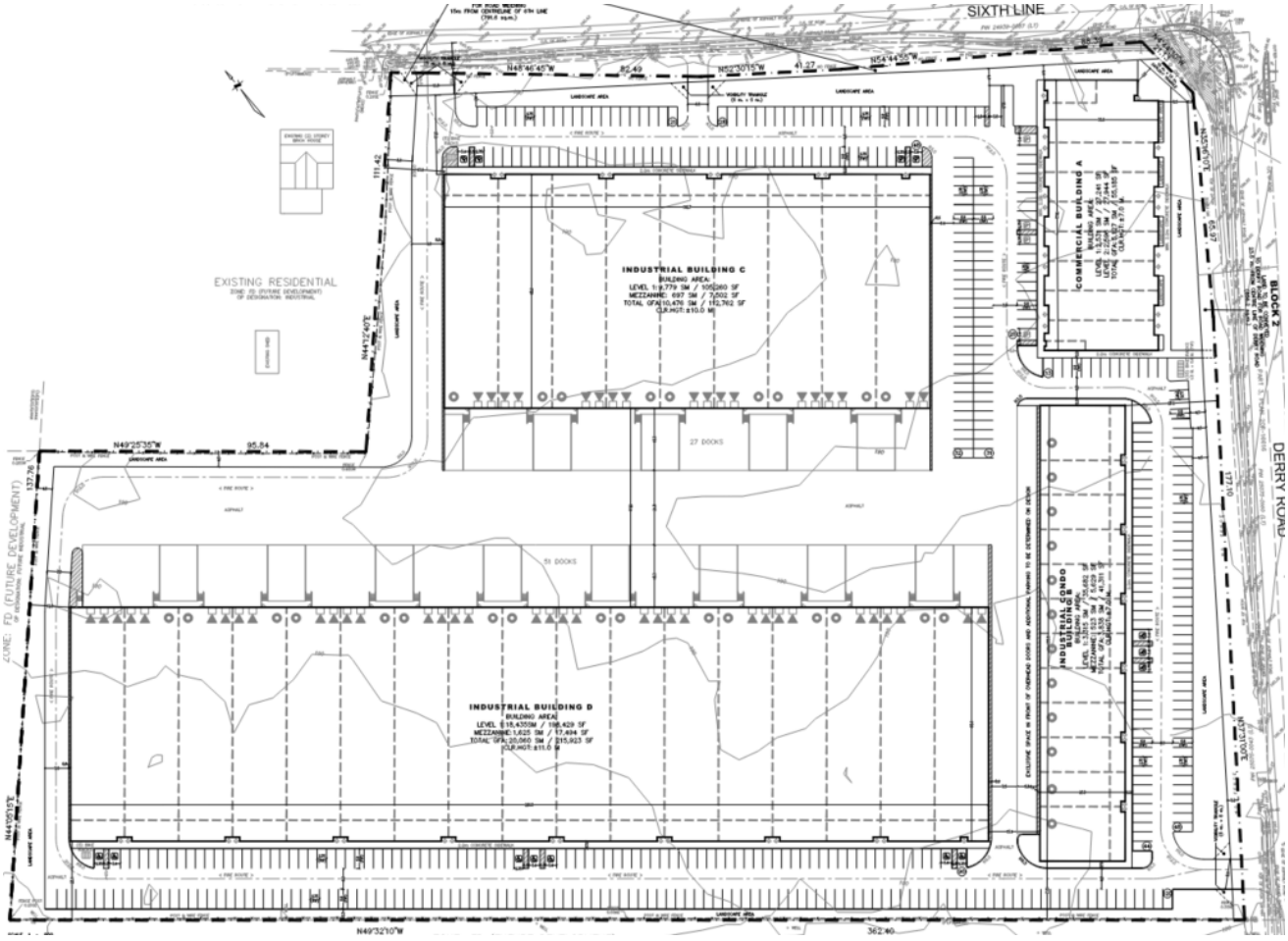
2.2 Development Context

As per the site plan dated December 8, 2023, the proposed development is the construction of an industrial commercial site comprised of the following four buildings:

- Building A – 2-storey commercial building with a GFA of 5,070 m^2
- Building B – 1-storey industrial condo building with a GFA of 3,838 m^2
- Building C – 1-storey industrial building with a GFA of 10,476 m^2
- Building D – 1-storey industrial building with a GFA of 20,060 m^2

Access is proposed via two full movement accesses on Sixth Line and a right-in right-out access on Derry Road. Trailer trucks will only access the site via the northmost access on Sixth Line. The proposed site plan showing the proposed development and site accesses is shown in **Figure 2-2** and in full in **Appendix B**.

Figure 2-2 Site Plan



2.3 Study Area Intersections

The following study area intersections have been included based on the Terms of Reference:

- Fifth Line at Derry Road
- Sixth Line at Derry Road
- Trafalgar Road at Derry Road
- Future N-S Collector Road at Derry Road
- Site Access 1 at Derry Road
- Site Access 2 at Sixth Line
- Site Access 3 at Sixth Line

3 SITE PLAN REVIEW

3.1 Vehicle Circulation

A review of the proposed site plan was conducted to ensure that the internal road configuration meet the municipal and regional requirements.

Furthermore, vehicle swept path analyses were performed to ensure that the proposed site configuration is sufficient for relevant design vehicles. Waste collection was assumed to be conducted in the loading spaces of building B, C, and D. It was noted that the loading spaces at the north corner of building D cannot accommodate WB-20 tractor trailer vehicles. The last space can accommodate an 11.5 m truck and the following six can accommodate a 15 m truck.

Detailed Swept path drawings and a pavement marking and signage plan can be found in **Appendix C**.

3.2 Site Access

The right-in right-out access on Derry Road was reviewed and found to provide 22 m of clear throat distance. Since the largest vehicle expected to the use the access is an HSU truck which 11.5 m long the clear throat distance will be able to store two trucks. This is expected to be sufficient storage for queuing of inbound and outbound traffic based on the predicted site trip volumes.

The right-in right-out access was also reviewed for the need to provide an auxiliary right turn lane. The Halton Region access guidelines state that a right turn taper is required at accesses with sufficient volume of decelerating vehicles, right turns at 10% of the through traffic, or constrained sightlines. The proposed access on Derry Road does not meet any of these criteria and therefore does not require a right turn taper.

There is 154 m of corner clearance between the southern most access on Sixth Line and the intersection of Sixth Line and Derry Road. Based on the TAC Figure 8.8.2, the suggested minimum corner clearance distance for an access on a collector road with an operating speed of 50 km/h is 55 m. TAC recommends a corner clearance of up to twice the suggested distance for roadways of higher speed. Since Sixth Line has a posted speed limit of 60 km/h and more than double the available corner clearance distance, the location of the southern access on Sixth Line is considered acceptable.

Although the site proposes to provide two accesses along Sixth Line, the Derry Road access is considered necessary for the optimal function of the site. The additional access provides improved access and circulation to the south portion of the site and ensures that traffic is not

entirely funneled into Sixth Line. In order to ensure minimal impact to traffic flows along Derry Road, the access has been designed as a right-in right-out. A centre island will be included to prevent outbound left turn movements and a centre median will be built on Derry Road to prevent inbound left turn movements. **Section 10** reviews the importance of the access in detail.

3.3 Site Access Sightline

The horizontal sight lines were also assessed based on the TAC 2017 guidelines. The assumed design speed of 100 km/h was used for Derry Road and 80 km/h was used for Sixth Line. The required intersection sight distance Derry Road would be 185 m with only the right-out movement allowed. The required intersection sight distance for the Sixth Line truck access for right turn and left turn is 235 m and 260 m respectively based on a tractor trailer design vehicle. The required intersection sight distance for the Sixth Line secondary access for right turn and left turn is 145 m and 170 m respectively based on a passenger design vehicle.

The sight line assessment indicates that the proposed accesses would have adequate sight lines for their intended maneuvers. The detailed sight line assessments can be found in **Appendix C**.

4 PARKING REVIEW UPDATE

4.1 Vehicle Parking Review

Under the previous June 2023 submission, the site proposed to adopt a site-specific parking rate, which would result in a minimum parking requirement of 439 parking spaces based on the commercial and industrial land uses. Further discussion of the proposed site-specific parking rate has been provided under the previous June 2023 submission. The site is currently proposing to provide 495 parking spaces.

Since the previous submission, Building A is to be partially utilized as a restaurant land use (371.6 m^2 / 4,000 ft^2) and Building C is to be partially utilized as a banquet hall (696.8 m^2 / 7,500 ft^2). These land uses typically experience peak parking demands in the evenings and weekends, which are expected to be complimentary with the other proposed industrial land uses which are typically not in use during those same times.

A shared parking analysis has been conducted based on the proposed land uses as shown in **Appendix D** using the U*rban Land Institute Shared Parking 3rd Edition* and have found that a maximum parking demand of 516 parking spaces would be observed at 11:00AM. This would be technically deficient from the current proposed parking supply of 495 spaces by 21 parking spaces.

It is noted that the proposed restaurant and banquet land uses are expected to experience their peak parking demands on weekends and would not have significant demand during weekday daytime hours. Whereas the other industrial and office components of the site would not be in operation during weekends and would therefore permit a greater usage of shared parking. Furthermore there is expected to be a portion of patrons for the restaurant may come from employees of the other commercial/industrial land uses on-site which would lead to multiple synergies through internal capture. This would further reduce parking demand on-site.

Therefore, it is our opinion that the proposed parking supply of 495 parking spaces is sufficient to service all land uses on the site.

4.2 Accessible Parking Review

The required accessible parking supply is based on the total required number of parking spaces as per the Town of Milton Comprehensive Zoning By-Law 016-2014 HUSP Urban Area Section 5.9 which states that for a parking supply between 201 and 1000, 2 parking spaces plus 2% of the total parking supply, must be accessible. The site is required to provide 11 accessible parking spaces and it proposes to provide 18 accessible parking spaces, thus meeting and exceeding the requirement.

4.3 Loading Space Review

According to Section 5.11 of the Town of Milton Urban Zoning By-Law 016-2014 HUSP Urban Area, any non-residential development with GFA greater than 7440 m^2 is required to provide 3 loading spaces and 1 loading space for every additional 9300 m^2 of GFA. Based on the proposed development statistics, the development is required to provide 13 loading space. The development proposes to provide 63 loading spaces which meets and exceeds the by-law requirements and is suitable for the intended nature of the development.

4.4 Bicycle Parking Review

According to Section 5.10 of the Town of Milton Urban Zoning By-Law 016-2014 HUSP Urban Area, commercial and employment developments are required to provide bicycle parking spaces equal to 3% of the required vehicle parking spaces. Based on the **Section 4.1** of the report, the proposed development is required to provide 15 bicycle parking spaces. The development proposes to provide 20 bicycle parking spaces and will therefore meet and exceed the requirement.

5 EXISTING CONDITIONS

5.1 Road Network

The following existing roads are included in the transportation study network:

Derry Road (Regional Road 7) is an east-west major arterial road under the jurisdiction of the Region of Halton. Within the Town of Milton, Derry Road runs from Highway 407 in the east to Milburough Town Line in the west. Within the vicinity of the study area, it operates with a four-lane undivided cross section (two lanes in each direction). Within the study area it has a posted speed limit of 80 km/h. No street parking is permitted on the roadway.

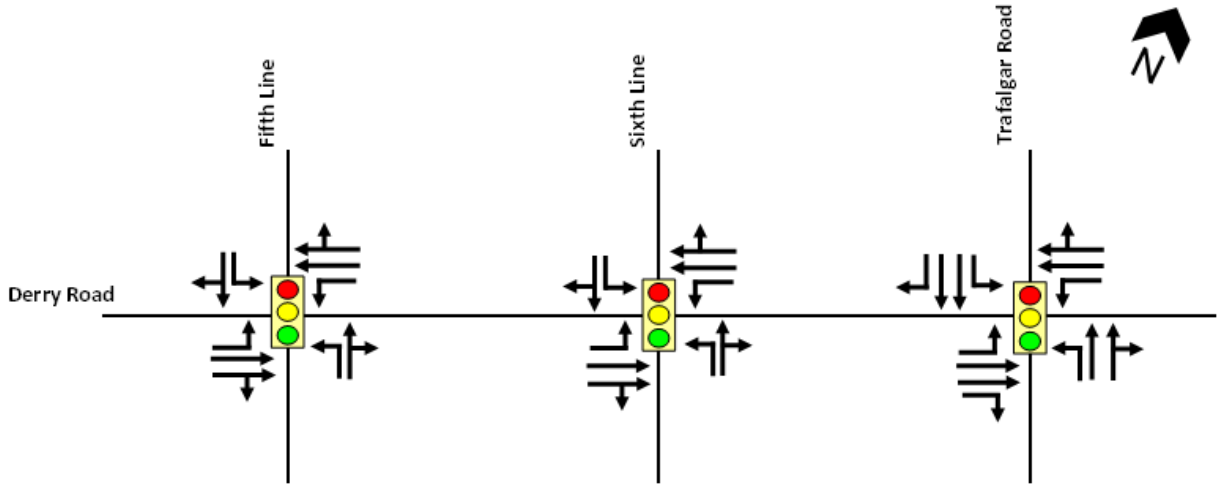
Fifth Line is a north-south minor arterial road under the jurisdiction of the Town of Milton. Within the Town of Milton, Fifth Line runs from Macdonald-Cartier Freeway in the north and Lower Base Line West in the south. Within the vicinity of the study area, it operates with a two-lane undivided cross section (one lane in each direction). Within the study area is has a posted speed limit of 70 km/h. Gravel shoulders are provided on both sides of the roadway. No street parking is permitted on the roadway.

Sixth Line is a north-south collector road under the jurisdiction of the Town of Milton. Within the Town of Milton, Sixth Line runs from Macdonald-Cartier Freeway in the north and Highway 407 in the south. Within the vicinity of the study area it operates with a two-lane undivided cross section (one lane in each direction). Within the study area it has a posted speed limit of 60 km/h. No shoulder is provided along the roadway and there is no street parking permitted.

Trafalgar Road (Regional Road 3) is a north-south major arterial road under the jurisdiction of the Region of Halton. Within the Town of Milton, Trafalgar Road runs from Macdonald-Cartier Freeway in the north and Highway 407 in the south. Within the vicinity of the study area, it operates with a five-lane undivided cross section (two lanes in each direction and a two-way left-turn turning lane). Within the study area it has a posted speed limit of 70 km/h north of Derry Road and a posted speed limit of 60 km/h south of Derry Road. Gravel shoulders are provided on both sides of the roadway and no street parking is permitted.

An existing lane configuration diagram for the intersections is provided in **Figure 5-1**.

Figure 5-1 Existing Lane Configuration



5.2 Transit Network

The following GO transit bus routes are within the vicinity of the study area:

GO Bus Route 21 – Milton is a generally east-west bus route that operates from Union Station in the City of Toronto to Milton Station in the Town of Milton. The route runs on weekdays with a frequency of 30-minutes between 5:00 a.m. and 5:00 p.m. The route reduces to a service frequency of 1-hour between buses from 5:00 p.m. to 2:00 a.m. on weekdays. On the weekend the route operates with 1-hour service frequency from 5:00 a.m. to 2:00 a.m. The nearest stop is at Derry Road and Trafalgar Road which is 1.5 km northeast of the site.

GO Bus Route 27 – Milton is a generally east-west bus route that operates from Finch Bus Terminal in the City of Toronto to Milton Station in the Town of Milton. The route runs on weekdays with 20-minute service frequency in the eastbound direction between 5:00 and 7:30 a.m. Westbound service is provided at a frequency of 30-minutes between 5:00 and 9:00 p.m. on weekdays. The nearest stop is at Derry Road and Trafalgar Road which is 1.5 km northeast of the site.

5.3 Active Transportation

Within the study area road network paved shoulders are provided along Derry Road which can facilitate cycling and pedestrian activity. All existing study intersections have pedestrian crossing signals, painted crossing lines, and curb cuts.

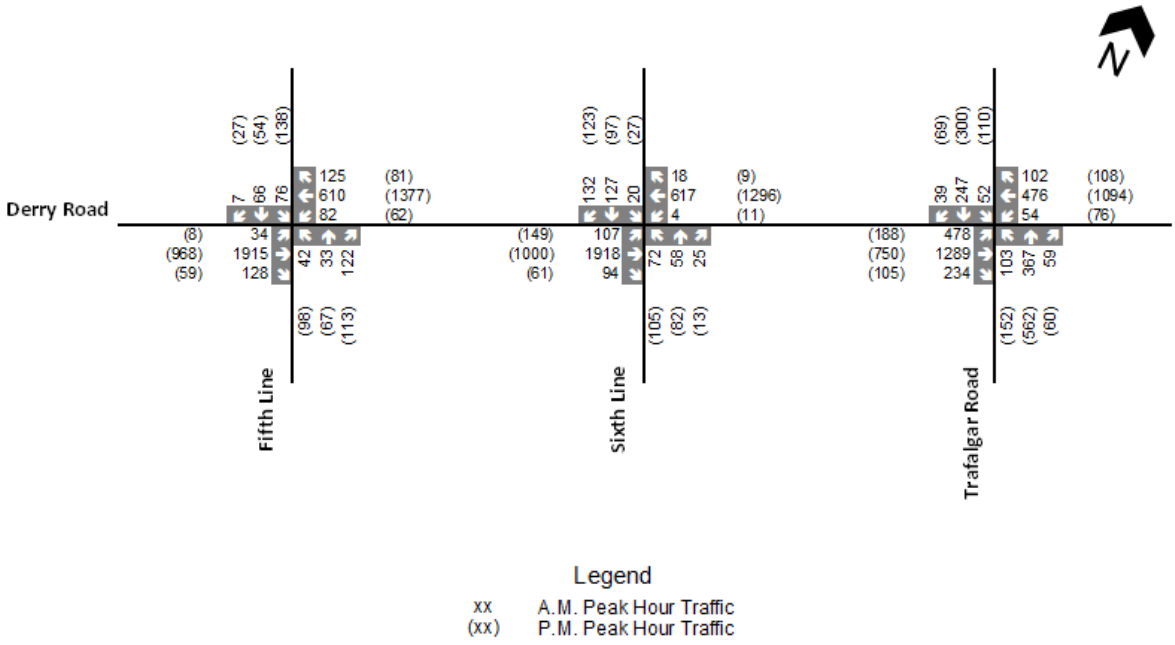
5.4 Site Visit Observation

A site visit was conducted on January 11, 2023, to observe the PM peak traffic conditions and signal timing plans. Based on the preliminary traffic assessment and the existing traffic volumes, the PM peak hour was found to be the more critical peak period. The study intersections appeared to be capable of servicing the high traffic volumes. All movements were observed to be able to fully to clear within a single cycle with the exception of the southbound left at Derry Road and Fifth Line which were conflicted with opposing northbound right movements. However, it was noted that due to construction in the area along Trafalgar Road and Britannia Road there were many aggregate trucks travelling through the area during peak hour which may be more than under typical conditions resulting in elevated heavy vehicle percentages. No pedestrian or cyclist activity was observed at the study intersections during the site visit.

5.5 Existing Traffic

Existing turning movement count data for the study intersections were collected on Wednesday December 7th, 2022. Communication with the Region has confirmed that the count data does not need any adjustments to account for pandemic effects or seasonal variations. These traffic counts are considered as the "existing traffic conditions" and are within 2 years of this study. Turning movement count data can be found in **Appendix E**. The existing traffic volumes are shown in **Figure 5-2**.

Figure 5-2 Existing Volumes



6 FUTURE HORIZON TRAFFIC

6.1 Study Horizon Year

Based on pre-consultation with reviewing agencies, the assumed buildout horizon is 2028 and a five-year post buildout horizon in 2033. The years have been maintained based on the previous June 2023 traffic study for consistency.

6.2 Background Corridor Growth

Growth rates were applied as per direction from the region. A 2.0% per annum growth rate (compounded annually) was applied to all eastbound and westbound movements along Derry Road as well as the northbound and southbound movements along Fifth Line and Sixth Line. 3.0% per annum growth rate (compounded annually) was applied to the northbound and southbound movements along Trafalgar Road. Five years of growth was applied to get the 2028 volumes and ten years of growth was applied to get the 2033 volumes.

6.3 Future Transportation Improvements

6.3.1 Transit Improvements

There are no transit improvements anticipated by the future horizon year within the study area.

6.3.2 Active Transportation Improvements

There are no active transportation improvements anticipated by the future horizon year within the study area.

6.3.3 Road Network Improvements

The following road network improvements are planned for the study network within the build out horizon:

- Road widening of Fifth Line from two lane cross section to four lane cross section which will include dedicated northbound and southbound right turn lanes. The construction is currently underway and scheduled to be completed in 2024.
- A north-south collector road is planned to be built between Fifth Line and Sixth Line that will connect to Steeles Avenue to the north and the extension of Clark Boulevard to the south as well as an interchange at Highway 401. The collector may ultimately be designed as a six-lane Regional Road but to be consistent with other traffic impact

studies in the area it is assumed to be a two-lane collector road that will be constructed by 2027.

Based on discussion with the Region, the aforementioned road improvements were included in both the 2028 and 2033 buildout horizons. Traffic volumes for the future north-south collector road were collected directly from the 2100 Labrador Avenue TIS prepared by LEA Consulting in October 2022. The specific pages referenced can be found in **Appendix F**.

Additionally, through the terms of reference process the following road network improvements were identified but not incorporated into the analysis:

- Widening of Derry Road to a six-lane cross section between Highway 407 and Tremaine Road. The Region's 2022 Budget and Business Plan indicates that construction is scheduled to start in 2031. The widening is not expected to be completed within the ultimate horizon year and was therefore excluded from the analysis.
- Widening of Trafalgar Road to a six-lane cross section between Highway 407 and 10 Side Road. The Region's 2022 Budget and Business Plan indicates that construction is scheduled to start in 203. The widening is not expected to be completed within the ultimate horizon years and therefore excluded from the analysis.

6.4 Background Developments

Based on discussions with the reviewing agencies the following background development listed in **Table 6-1** were included in the future background volumes.

Table 6-1 Background Developments

Number	Development	Description
1	Anatolia Industrial Site	Industrial site comprised of 3 industrial warehouse buildings on the southwest corner of Derry Road and Sixth Line. Access to the buildings are located on a future north-south collector road and Sixth Line.
2	Neamsby Industrial Site	Industrial site comprised of 3 industrial warehouse buildings and 7 industrial commercial buildings on the southeast corner Derry Road and Fifth Line. Access to the buildings are located on a future north-south collector, Derry Road, and Fifth Line.
3	Broccolini Industrial Site	Industrial Site comprised of 3 industrial warehouse buildings on the northeast corner of Derry Road and Fifth Avenue. Access to the buildings are located on a future north-south collector road and Derry Road.
4	Derry Green Corporate Business Park Secondary Plan	Area of industrial development bounded by James Snow Parkway, Sixth Line, Highway 401, and an NHS area below Louis St Laurent Avenue.
5	6712 Fifth Line	Industrial Park containing 4 multi-tenant buildings bounded by Derry Road, Fifth Line, and James Snow Parkway South. Located within the Derry Green Corporate Business Park Secondary Plan.

The traffic volumes for the Broccolini Industrial Site were obtained from the October 2022 TIS for 2100 Labrador Avenue, prepared by LEA Consulting. The traffic volumes for the Derry Green Corporate Business Park Secondary Plan were obtained by subtracting the existing 2017 traffic volumes from the Secondary Plan total trip volumes from the December 2014 TIS prepared by Read, Voorhees, & Associates. It was confirmed by the Region that traffic generated by the development at 6712 Fifth Line is accounted for within the volumes found in the Derry Green Corporate Business Park Secondary Plan and therefore were not obtained and incorporated separately.

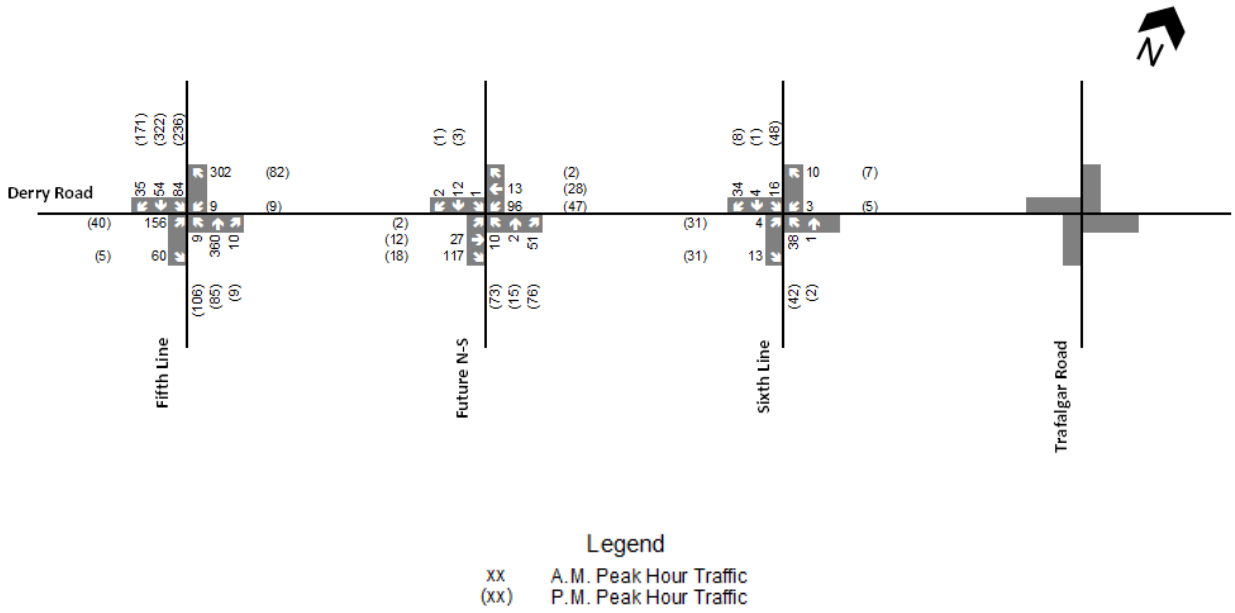
The traffic volumes for the Anatolia and Neamsby Industrial Sites were unavailable as they have not yet submitted TIS reports so traffic volumes were derived using statistics from their latest site plans and distributed according to the trip distribution outlined in **Section 7**.

As per direction from the Region, background development trips were only applied to "Regional Road-to-Town Road movements" where a movement begins on a regional road and finishes on a town road or vice versa such as a northbound left turn from Sixth Line onto Derry Road. The growth rates applied in **Section 6.2** were assumed to account for "Regional Road-to-Regional

Road" movements such as east-west through movements along Derry Road and all movements at the intersection of Derry Road and Trafalgar. The growth rates were not applied to the future north-south collector road since there are no existing trips to grow and therefore have not accounted for background development traffic that was not included in the 2100 Labrador Avenue TIS prepared by LEA Consulting. The background development trips for the Anatolia and Neamsby Industrial Sites are applied to the intersection of Derry Road and the future north-south collector for all movements.

The future background development volumes are presented in **Figure 6-1**.

Figure 6-1 Future Background Development Volumes

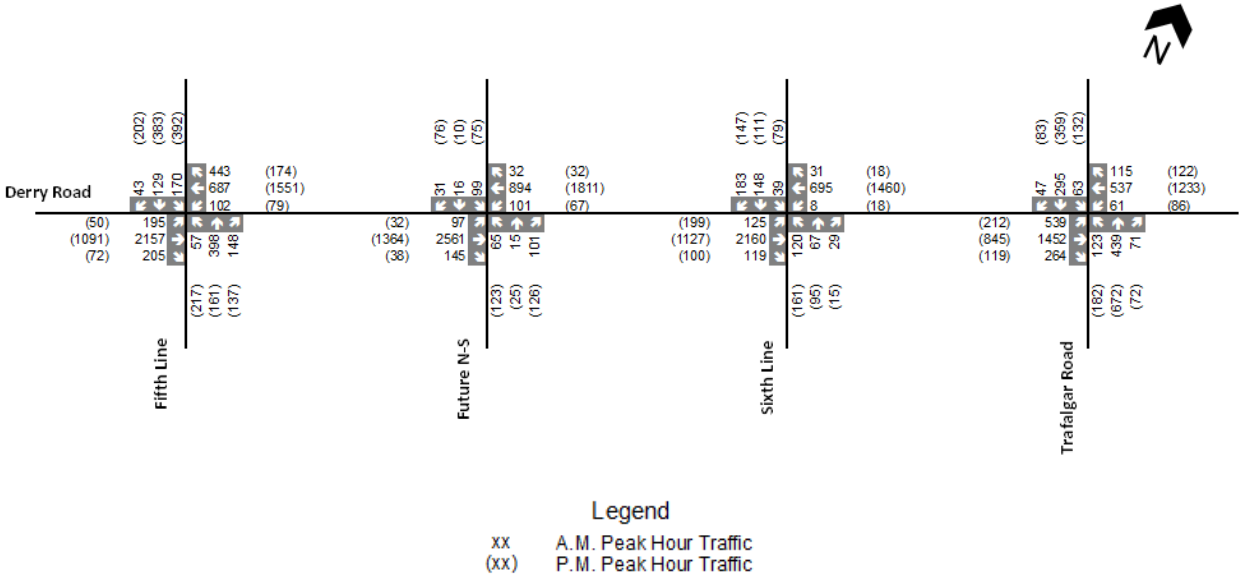


The site traffic volumes and site plans for the background developments are included in **Appendix F**.

6.5 Future Background Traffic Volumes

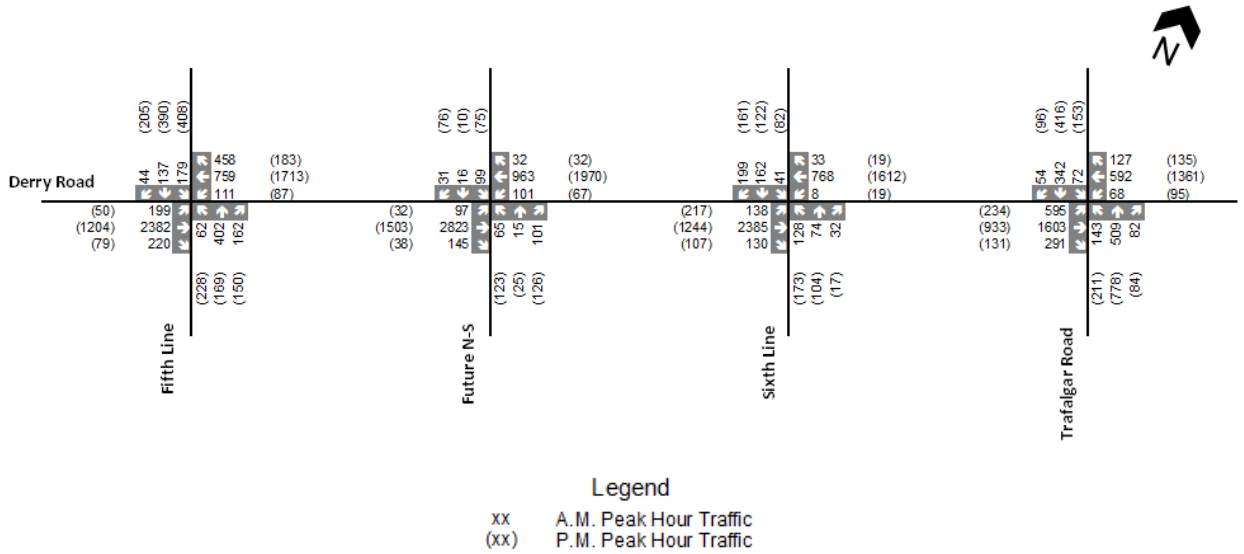
The 2028 future background weekday AM and PM peak hour traffic volumes include the existing volumes plus five years of growth and the background development traffic, and are presented in **Figure 6-2**.

Figure 6-2 Future Background 2028 Volumes



The 2033 future background weekday AM and PM peak hour volumes include the existing volumes plus ten years of growth and the background development traffic, and are presented in **Figure 6-3**.

Figure 6-3 Future Background 2033 Volumes



7 SITE GENERATED TRAFFIC

7.1 Site Trip Generation

Site trip generation was estimated according to the Institute of Transportation Engineers (ITE) 11th Edition Trip Generation manual. According to the latest site plan, the development will consist of 4 buildings comprised of: 1 commercial building, 1 industrial condo building, and 2 industrial buildings. Based on the development proposal, ITE Land Use Code (LUC) **710** for "General Office Building" for the commercial building, LUC **110** for "General Light Industrial" for the industrial condo building, and LUC **150** for "Warehousing" for the industrial warehouse buildings. Based on the expected uses and dedicated access, truck trip generation was applied to building C and D.

It is noted that the proposed development has included both restaurant and banquet land uses within Building A and Building C as per direction from the applicant and with support from the Town. Since the future tenants for these land uses have not been determined, the

For the purposes of trip generation, the restaurant has been assumed to function as a "High-Turnover Sit Down Restaurant" LUC **932**. The banquet hall has been assumed to function as a "Fine Dining Restaurant" LUC **931**. Due to the lack of information regarding directional distribution for LUC 931 in the AM peak hour, the directional distribution of LUC 932 has been adopted for this land use.

Based on the surrounding transportation environment, lack of nearby transit infrastructure, and the expected land use of the site no modal split was applied to the trips generated as a conservative estimate based on the nature of the proposed development.

Inbound/outbound trip distribution based on peak hour of adjacent street traffic was used for the selected LUC.

The supporting trip generation data can be found in **Appendix G**.

Table 7-1 summarizes the estimated total trip generation of the development.

Table 7-1 Site Trip Generation

Building	Land Use	GFA ft^2	Parameters	Peak Hour Trip Generation (T)					
				Weekday AM			Weekday PM		
				In	Out	Total	In	Out	Total
Building A Commercial	General Office Building LUC 710	50,568	Total Trip Rate	T = 1.52 X			T = 1.44 X		
			Total Trip Distribution	88%	12%	100%	17%	83%	100%
			Total Trip Generation	68	9	77	13	66	79
Building A Restaurant	High Turnover Sit Down Restaurant LUC 932	4,000	Total Trip Rate	T = 9.57 X			T = 9.05 X		
			Total Trip Distribution	55%	45%	100%	55%	45%	100%
			Total Trip Generation	21	17	38	22	14	36
Building B Industrial Condo	General Light Industrial LUC 110	41,311	Total Trip Rate	T = 0.68 X +3.81			Ln(T) = 0.72 Ln(X) + 0.38		
			Total Trip Distribution	88%	12%	100%	14%	86%	100%
			Total Trip Generation	28	4	32	3	18	21
Building C Industrial	Warehousing LUC 150	105,262	Total Trip Rate	T = 0.12 X + 23.62			T = 0.12 X + 26.48		
			Total Trip Distribution	77%	23%	100%	28%	72%	100%
			Total Trip Generation	28	8	36	11	28	39
			Truck Trip Rate	T = 0.02 X			T = 0.03 X		
			Truck Trip Distribution	52%	48%	100%	52%	48%	100%
			Truck Trips	1	1	2	2	1	3
			Auto Trips (Total – Truck)	27	7	34	9	27	36
Building C Banquet	Fine Dining Restaurant LUC 931	7,500	Total Trip Rate	T = 0.73 X			T = 7.80 X		
			Total Trip Distribution	61%	39%	100%	61%	39%	100%
			Total Trip Generation	3	2	5	40	19	59
Building D Industrial	Warehousing LUC 150	215,923	Total Trip Rate	T = 0.12 X +23.62			T = 0.12 X + 26.48		
			Total Trip Distribution	77%	23%	100%	28%	72%	100%
			Total Trip Generation	39	11	50	15	37	52
			Truck Trip Rate	T = 0.02 X			T = 0.03 X		
			Truck Trip Distribution	52%	48%	100%	52%	48%	100%

			Truck Trips	2	2	4	3	3	6
			Auto Trips (Total – Truck)	37	9	46	12	34	46
Truck Trips				3	3	6	5	4	9
Passenger Trips				184	48	232	98	173	271
Overall Total Trips				187	51	238	103	177	280

A total of 238 net auto site trips, consisting of 187 inbound and 51 outbound trips, are predicted to be generated by the subject site during the AM peak hour. During the PM peak hour, 103 inbound and 177 outbound net auto site trips are predicted, totaling 192 trips. It was found that a total of 6 truck site trips, consisting of 3 inbound and 3 outbound trips, are predicted to be generated by the subject site during the AM peak hour. During the PM peak hour, 5 inbound and 4 outbound truck site trips are predicted, totaling 9 trips.

7.2 Trip Generation Comparison with Derry Green Secondary Plan

The analysis also compared the proposed development's trip generation with the trip generation proposed from the Derry Green Secondary Plan. It is estimated that the proposed development is located within approximately 35% of Zone 7b. The comparison of the two trip generation estimates are shown in **Table 7-2**.

Table 7-2 Site Trip Generation Comparison

Land Use	Parameters	Peak Hour Trip Generation (T)					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
11801 Derry Road Trip Generation	Total Trip Generation	187	51	238	103	177	280
Derry Green Secondary Plan Trip Generation	Total Trip Generation	512	79	591	112	294	406
	Proportion of 7b	35%			35%		
	Proportional Trip Generation	179	28	207	39	103	142
	Difference	+8	+23	+31	+64	+74	+138

In comparing the proposed development's trip generation with the Derry Green Secondary Plan

to about 35% of Zone 7b trip generation, the site is anticipated to generate 31 more two-way trips during the AM peak hour and 138 more two-way trips during the PM peak hour. While the proposed development is expected to generate more trips than originally planned in the Derry Green Secondary Plan, the subsequent Traffic Analysis demonstrates that the site generated traffic can be accommodated within the study area network.

7.3 Site Trip Distribution and Assignment

The distribution of site traffic was developed based on 2016 Transportation Tomorrow Survey (TTS) summary data for the Traffic Analysis Zones (TAZ) 4112, 4116, 4117, 4118 in Planning District 38 (Milton) and assigned to the network based on existing traffic patterns and engineering judgement. Site generated truck traffic was routed exclusively through the northmost access on Sixth Line. **Table 7-3** shows the directional distribution of trips in the study network.

Supporting trip distribution data is provided in **Appendix G**.

Table 7-3 Site Trip Distribution

To/From	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Northwest	18%	14%	16%	22%
North	4%	0%	0%	1%
Northeast	0%	6%	3%	3%
East	5%	30%	19%	2%
Southeast	6%	20%	27%	3%
South	4%	2%	2%	5%
Southwest	17%	12%	19%	17%
West	45%	16%	14%	46%
Total	100%	100%	100%	100%

Figure 7-1, **Figure 7-2**, **Figure 7-3**, and **Figure 7-4** show the trip distribution, passenger vehicle trips, truck vehicle trips, and overall site trips respectively.

Figure 7-1 Site Traffic Distribution

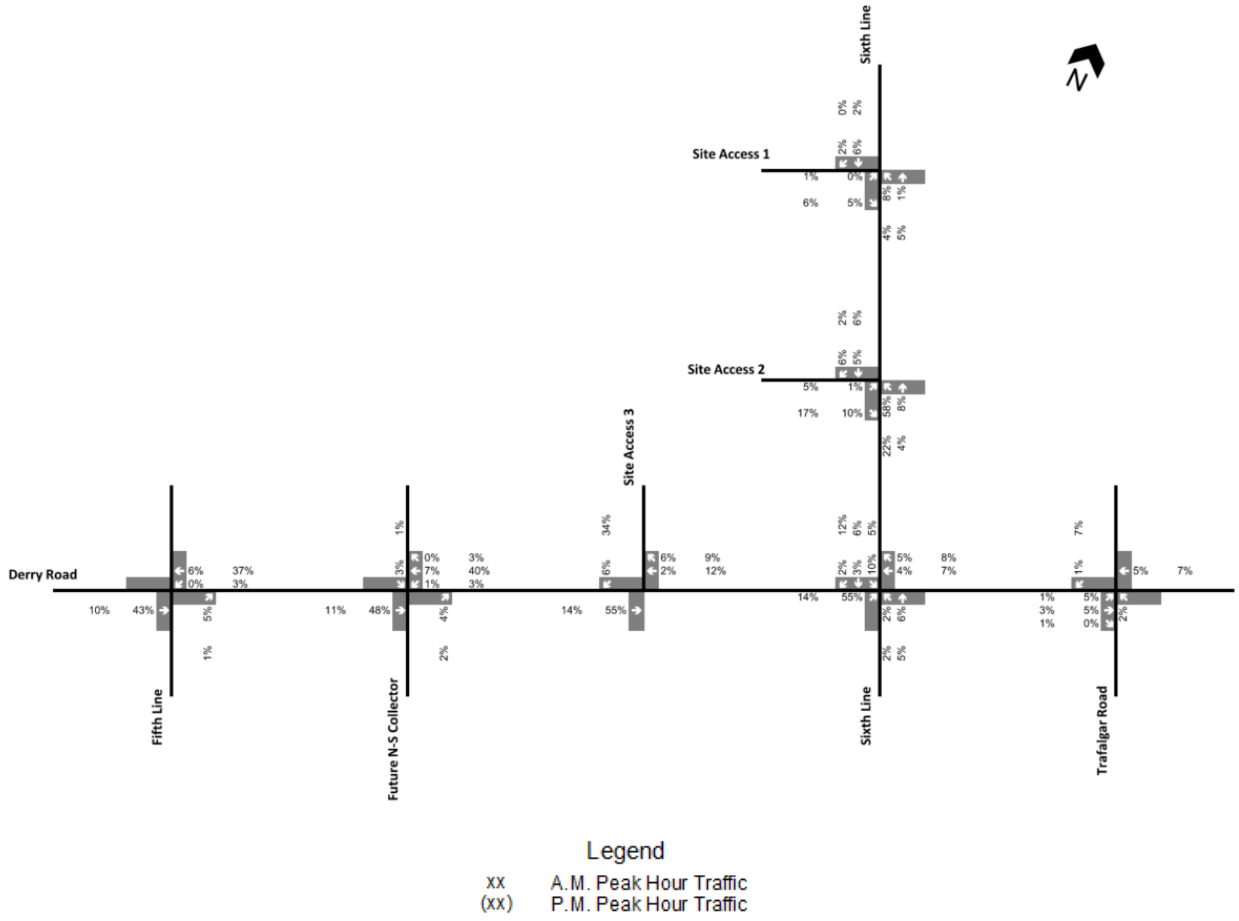


Figure 7-2 Site Passenger Traffic Volumes

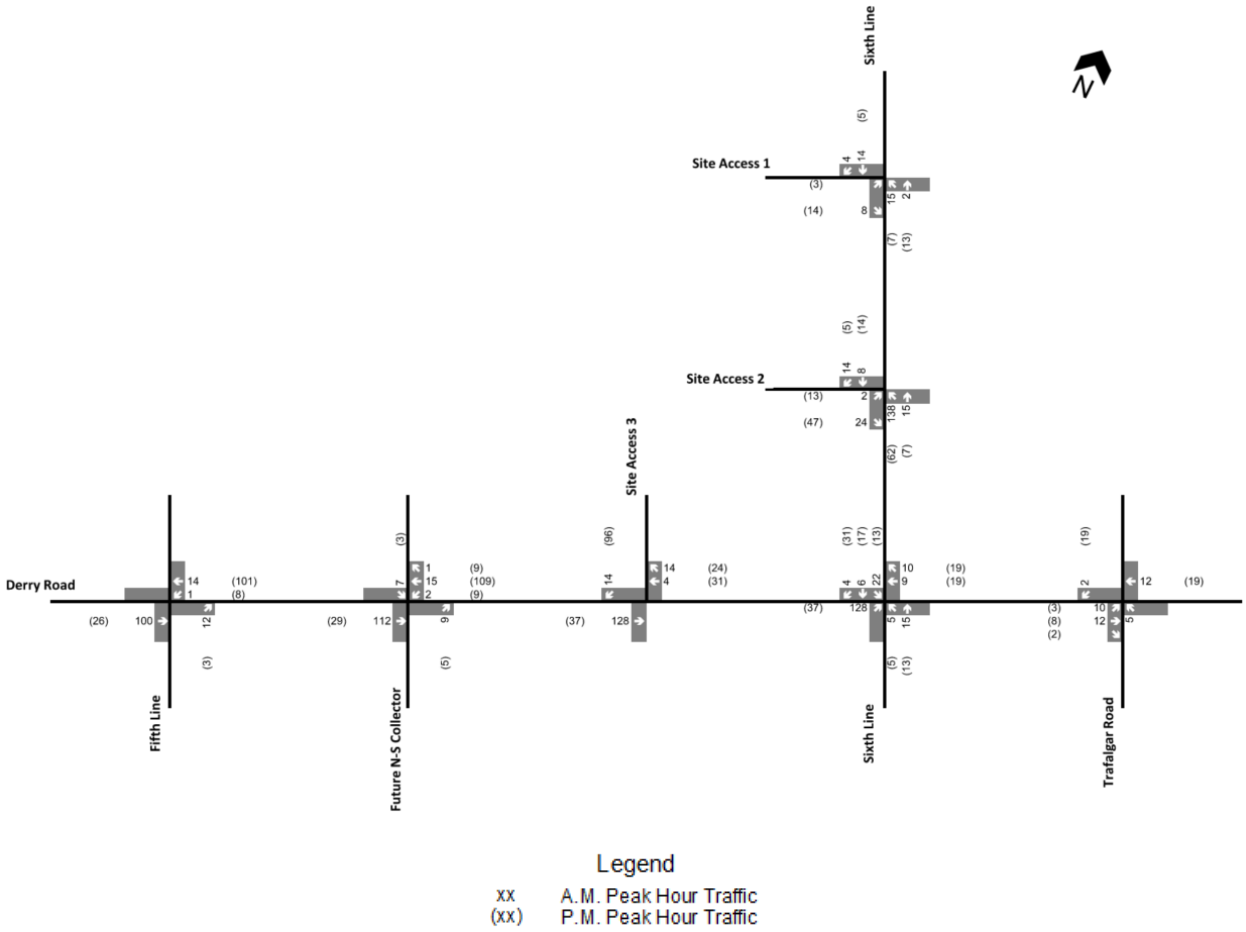


Figure 7-3 Site Truck Traffic Volumes

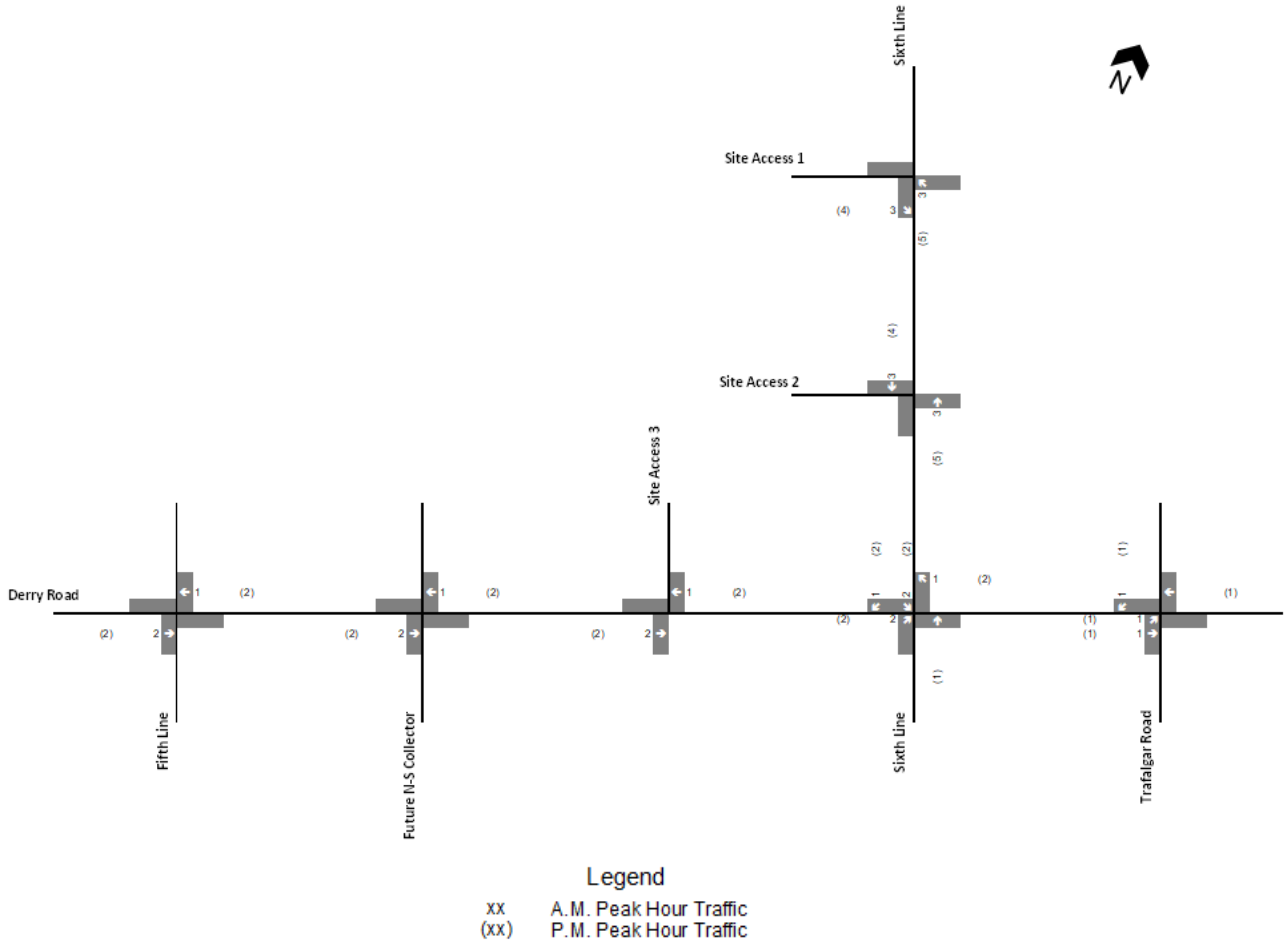
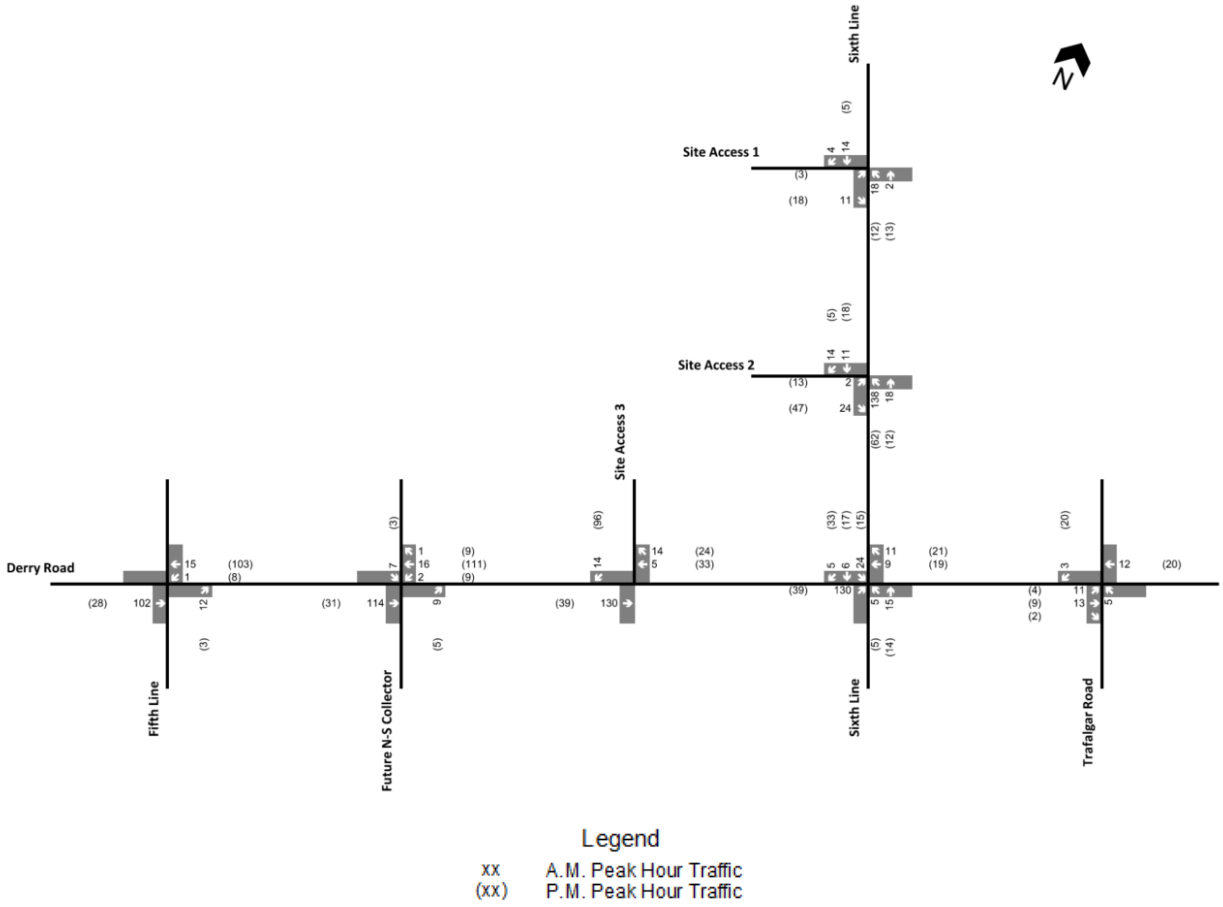


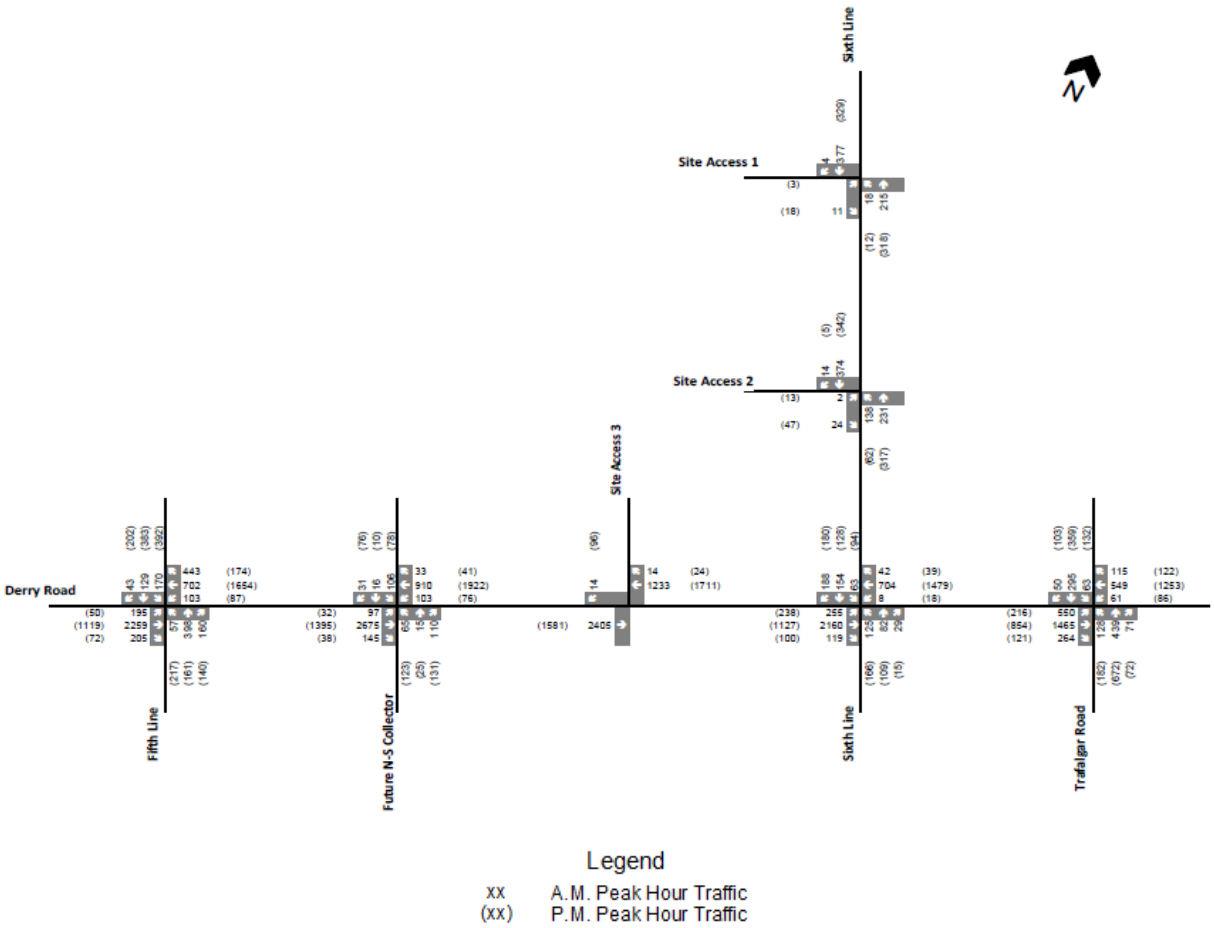
Figure 7-4 Site Traffic Volumes



8 FUTURE TOTAL TRAFFIC VOLUMES

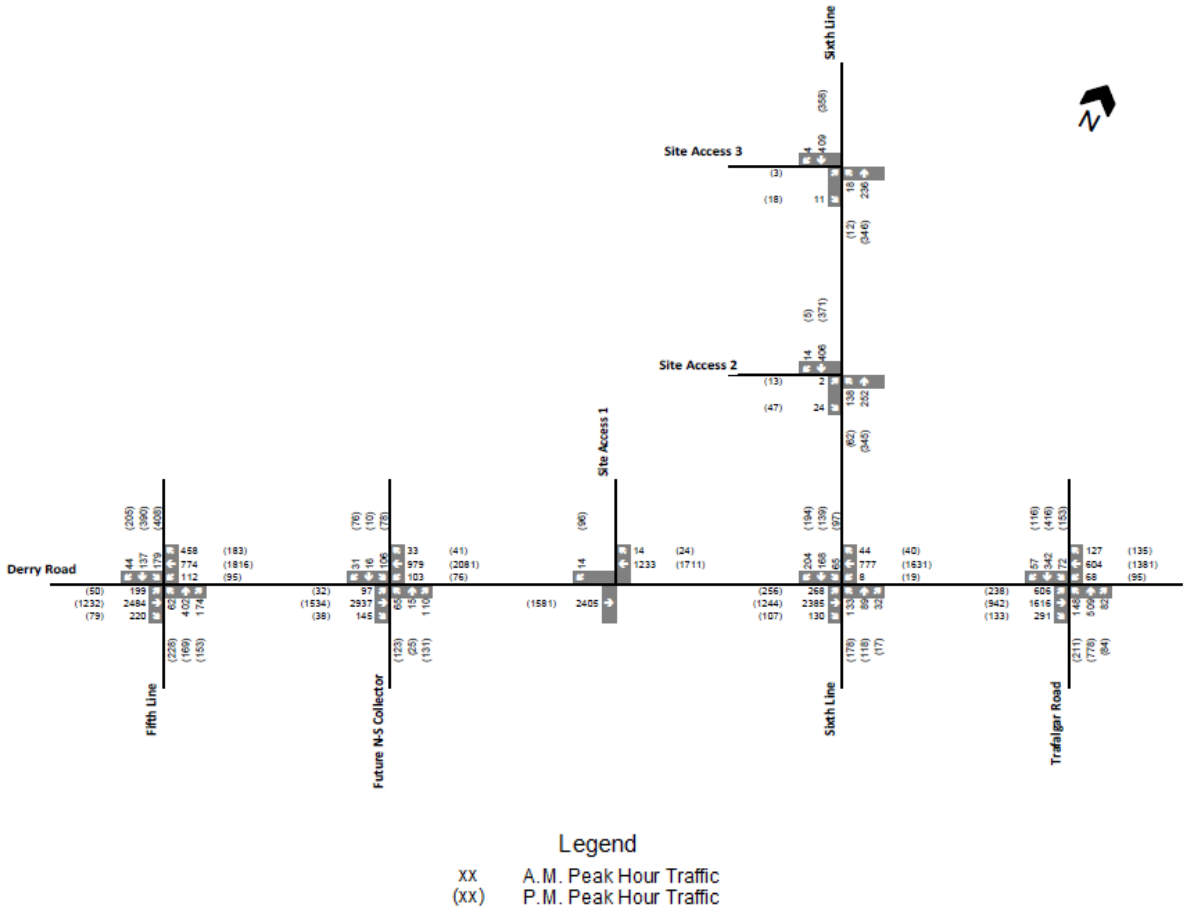
The future total traffic volumes during the weekday peak hours for the 2028 planning horizon were derived by combining the projected 2028 future background traffic with the estimate of site generated traffic. **Figure 8-1** shows the future total volumes for both weekday AM and PM peak hours.

Figure 8-1 Future Total 2028 Traffic Volumes



The future total traffic volumes during the weekday peak hours for the 2033 planning horizon were derived by combining the projected 2033 future background traffic with the corresponding estimate of site generated traffic. **Figure 8-2** shows the future total volumes for both weekday AM and PM peak hours.

Figure 8-2 Future Total 2033 Traffic Volumes



9 TRAFFIC CAPACITY ANALYSIS

The traffic capacity analysis identifies how well the intersections and access driveways are operating and how they are expected to operate in the future. The analysis contained in this report utilized the Highway Capacity Manual (HCM) methodology within the Synchro 11 Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the saturation volume for each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement. The definition of LOS can be found in **Appendix H**.

As part of the capacity analysis, TYLin detailed the traffic operation at all turning movements at the study intersections. Critical movements were **bolded** in the summary table, as identified per the Region of Halton's Transportation Impact Study (TIS) Guidelines:

For signalized intersections:

- Overall intersection operations, through movements, or shared through/turning movements with a v/c ratio of 0.85 or above;
- Exclusive turning movements with a v/c ratio of 0.95 or above;
- 95th percentile queue for individual movements which exceeds the available turning lane storage.

For unsignalized intersections:

- Level-of-service that exceeds LOS 'D'
- 95th percentile queue for individual movements which exceeds the available turning lane storage.

The following tables summarize the Synchro/HCM capacity for the study intersections during the weekday AM and PM peak hours under existing and future background and future total (2028 & 2033) traffic conditions. Detailed Synchro reports are attached in **Appendix I**.

9.1 Existing Conditions

The traffic capacity results for the signalized intersections in the study area are summarized in **Table 9-1** for both the weekday AM and PM peak hours under existing conditions.

Table 9-1 Existing Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Fifth Line at Derry Road	*Overall*	***0.89***	***24***	***C***	**-**	*0.70*	*20*	*B*	-
	EBL (90)	0.10	7	A	5	0.05	9	A	2
	EBTR	**0.91**	**23**	**C**	**309**	0.46	11	B	77
	WBL (95)	0.81	71	E	41	0.20	7	A	7
	WBTR	0.35	8	A	53	0.63	13	B	132
	NBL (95)	0.29	49	D	21	0.48	48	D	39
	NBTR	0.45	51	D	35	0.52	48	D	50
	SBL (55)	0.71	69	E	35	**0.89**	**89**	**F**	**69**
	SBTR	0.32	48	D	29	0.25	45	D	28
Sixth Line at Derry Road	*Overall*	***0.90***	***25***	***C***	**-**	*0.66*	*20*	*B*	-
	EBL (150)	0.21	6	A	14	0.53	11	B	18
	EBTR	**0.92**	**23**	**C**	**320**	0.47	10	A	96
	WBL (95)	0.04	21	C	1	0.03	8	A	3
	WBTR	0.35	12	B	55	0.61	15	B	130
	NBL (45)	0.81	84	F	39	**0.89**	**98**	**F**	**46**
	NBTR	0.23	40	D	26	0.30	43	D	31
	SBL (45)	0.10	39	D	10	0.13	41	D	13
	SBTR	0.78	57	E	76	0.65	50	D	58
Trafalgar Road at Derry Road	*Overall*	*0.80*	*37*	*D*	-	*0.81*	*67*	*E*	-
	EBL (140)	0.82	27	C	115	**0.68**	**82**	**F**	**146**
	EBT	0.63	25	C	204	0.43	34	C	164
	EBR (110)	0.18	17	B	15	0.08	27	C	15
	WBL (300)	0.25	25	C	14	0.22	36	D	29
	WBTR	0.37	32	C	95	**0.89**	**72**	**E**	**336**
	NBL (125)	0.49	56	E	46	0.49	62	E	73

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
	NBTR	0.72	74	E	96	0.83	96	F	181
	SBL (135)	0.29	58	E	25	0.58	72	E	54
	SBT	0.50	69	E	57	0.44	82	F	86
	SBR (80)	0.04	62	E	0	0.05	75	E	16

Under existing conditions, the study network operates well with all of the intersections and movements within capacity and few critical movements. In the AM peak hour, high volumes of traffic travelling east cause the eastbound through right movements to be critical at Sixth Line and Fifth Line. In the PM peak hour, queuing exceeds storage for the southbound left at Fifth Line, northbound left at Sixth Line and eastbound left at Trafalgar Road. Additionally high volumes of traffic travelling west cause the westbound through right movement at Trafalgar Road to reach critical.

Overall, the study network is functional during peak hour under existing conditions but high eastbound traffic volumes in the AM peak hour, westbound traffic volumes and left bound turns in the PM peak hour should be noted.

9.2 Future Background Conditions

As described in **Section 6.3.3**, under the 2028 future background conditions Fifth Line has been expanded to a four-lane cross section with dedicated right turn lanes and the future two-lane N-S collector road with dedicated left turn lanes has been added. The signal timing plan for the intersection of Derry Road and the future N-S collector was adopted directly from the 2100 Labrador TIS prepared by LEA Consulting.

The traffic capacity analysis results for the study area intersections under 2028 future background conditions are summarized in **Table 9-2** for both the weekday AM and PM peak hours.

Table 9-2 Future Background 2028 Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Fifth Line at Derry Road	*Overall*	***1.33***	***83***	***F***	-	***1.13***	***113***	***F***	-
	EBL (90)	0.92	50	D	40	0.44	18	B	9
	EBTR	**1.14**	**90**	**F**	**412**	0.56	13	B	104
	WBL (95)	**1.06**	**138**	**F**	**55**	0.36	11	B	8
	WBTR	0.64	20	B	140	0.84	28	C	248
	NBL (95)	0.34	45	D	27	**2.21**	**622**	**F**	**139**
	NBT	0.80	57	E	74	0.29	44	D	30
	NBR (55)	0.40	46	D	36	0.11	43	D	18
	SBL (55)	**2.06**	**561**	**F**	**114**	**2.35**	**676**	**F**	**226**
	SBT	0.24	44	D	25	0.71	52	D	67
	SBR (55)	0.04	42	D	4	0.51	48	D	50
Future N-S Collector/Clark Boulevard at Derry Road	*Overall*	***1.57***	***40***	***D***	-	*0.72*	*13.7*	*B*	-
	EBL (80)	0.27	2	A	3	0.37	8	A	7
	EBTR	**1.06**	**38**	**D**	**343**	0.55	7	A	95
	WBL (80)	**1.72**	**395**	**F**	**62**	0.36	10	A	17
	WBTR	0.36	5	A	55	0.72	9	A	173
	NBL (60)	0.40	49	D	28	0.73	64	E	49
	NBTR	0.57	53	D	45	0.50	50	D	43
	SBL (60)	0.68	62	E	42	0.65	60	E	34
	SBTR	0.10	46	D	14	0.34	48	D	30
Sixth Line at Derry Road	*Overall*	***1.25***	***75***	***E***	**-**	***1.19***	***37***	***D***	-
	EBL (150)	0.30	9	A	16	**1.18**	**157**	**F**	**90**
	EBTR	**1.14**	**89**	**F**	**403**	0.65	17	B	131
	WBL (95)	0.10	27	C	2	0.10	12	B	4
	WBTR	0.44	16	B	66	0.82	25	C	179

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
	NBL (45)	**1.51**	**325**	**F**	**78**	**1.11**	**147**	**F**	**87**
	NBTR	0.23	36	D	31	0.27	37	D	37
	SBL (45)	0.16	36	D	17	0.30	37	D	31
	SBTR	**0.85**	**59**	**E**	**118**	0.62	43	D	75
Trafalgar Road at Derry Road	*Overall*	***1.01***	***52***	***D***	**-**	***0.99***	***80***	***E***	-
	EBL (140)	**1.06**	**87**	**F**	**234**	**1.10**	**180**	**F**	**209**
	EBT	0.79	35	C	270	0.54	45	D	205
	EBR (110)	0.24	21	C	26	0.10	34	C	22
	WBL (300)	0.43	36	D	16	0.32	37	D	34
	WBTR	0.50	40	D	116	**1.00**	**93**	**F**	**424**
	NBL (125)	0.61	60	E	56	0.54	55	E	82
	NBTR	**0.86**	**82**	**F**	**123**	**0.86**	**92**	**F**	**220**
	SBL (135)	0.37	55	D	30	0.62	66	E	63
	SBT	0.56	68	E	71	0.44	74	E	100
	SBR (80)	0.05	59	E	0	0.06	66	E	16

Under the 2028 future background conditions, the only intersection that operates within capacity is Derry Road and the future N-S collector road under PM peak hour conditions. All other intersections are over capacity and experience several over capacity/critical movements. The movements of concern noted under existing conditions were observed to operate very poorly. In particular, the southbound left at Fifth Line and the westbound left at the N-S collector in the AM peak hour, and the northbound left and southbound left at Fifth Line in the PM peak hour have v/c ratios of over 1.70. This is due to the initially high volumes in the existing conditions which had five years of compounding growth applied.

Under 2033 future background conditions the operations would be expected to worsen after an additional five years of compounded growth. As such, this scenario has only been analyzed with the proposed mitigation measures in place.

9.3 Mitigation Measures

Efforts were made to optimize the signal timing plans in order to make the study network operate within capacity by extending cycle lengths, adjusting phase timing and adding protected turns phases. However, the extremely high volumes made this unfeasible and required the following roadway improvements:

- Widening Derry Road from a four-lane cross section to a six-lane cross section;
- Adding a dedicated eastbound right turn lane at the intersection of Derry Road and Fifth Line;
- Adding dual eastbound left turns at the intersection of Derry Road and Trafalgar Road.

The improvements are generally in line with the planned Derry Road widening which is indicated in the Region's 2022 Budget and Business Plan to begin in 2031. The results of the 2028 future background capacity analysis indicate that the acceleration of this planned project would be necessary. Ultimately the Region will monitor the need and timing of all corridor level improvements through future updates to the Transportation Master Plan (TMP).

It is noted that the implementation of the future north-south collector road which connects Britannia Road and Steeles Avenue to Highway 401 provides additional roadway capacity to the study network and alleviates traffic volumes on the existing Derry Road corridor. It is TYLin's understanding that the exact location and configuration will be confirmed through a Municipal Class Environmental Assessment (MCEA) study which has not been initiated yet.

The traffic capacity analysis results for the study area intersections under 2028 future background conditions after the roadway improvements and signal optimizations are summarized in **Table 9-3** for both weekday AM and PM peak hours.

Table 9-3 Future Background 2028 Improved Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Fifth Line at Derry Road	*Overall*	***0.95***	***45***	***D***	**-**	*0.83*	*39*	*D*	-
	EBL (90)	0.82	35	***C***	52	0.47	25	C	14
	EBT	0.82	36	D	268	0.40	18	B	88
	EBR (50)	0.20	21	**C**	36	0.05	14	B	9
	WBL (95)	**0.95**	**126**	**F**	**71**	0.45	30	C	37
	WBTR	0.50	27	**C**	118	0.73	30	C	188

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
	NBL (95)	0.28	63	E	30	0.88	87	F	81
	NBT	**0.93**	**102**	**F**	**115**	0.52	66	E	38
	NBR (50)	0.29	70	E	36	0.45	67	E	37
	SBL (55)	**0.94**	**104**	**F**	**94**	**0.90**	**64**	**E**	**150**
	SBT	0.20	61	E	33	0.72	64	E	77
	SBR (50)	0.04	59	E	0	**0.56**	**61**	**E**	**60**
Future N-S Collector/Clark Boulevard at Derry Road	*Overall*	*0.79*	*24*	*C*	-	*0.54*	*14.4*	*B*	-
	EBL (50)	0.31	14	B	25	0.40	22	C	14
	EBTR	**0.87**	**25**	**C**	**265**	0.44	10	A	65
	WBL (50)	0.78	68	E	49	0.42	17	B	20
	WBTR	0.26	7	A	39	0.57	12	B	97
	NBL (50)	0.27	55	D	34	0.43	44	D	46
	NBTR	0.19	53	D	30	0.31	40	D	41
	SBL (50)	0.48	62	E	50	0.32	41	D	31
	SBTR	0.07	51	D	16	0.20	38	D	29
Sixth Line at Derry Road	*Overall*	***0.86***	***41***	***D***	**-**	*0.83*	*33*	*C*	-
	EBL (150)	0.33	17	B	33	0.78	47	D	68
	EBTR	0.83	32	C	289	0.47	19	B	112
	WBL (95)	0.21	60	E	8	0.09	18	B	6
	WBTR	0.34	44	D	105	0.65	30	C	175
	NBL (45)	**0.66**	**56**	**E**	**50**	**0.84**	**70**	**E**	**62**
	NBTR	0.18	43	D	41	0.22	42	D	39
	SBL (45)	0.17	57	E	24	0.38	55	E	37
	SBTR	**0.92**	**96**	**F**	**175**	0.80	73	E	96
Trafalgar Road at Derry Road	*Overall*	*0.75*	*53*	*D*	-	*0.73*	*63*	*E*	-
	EBL (140)	0.80	70	E	135	0.72	113	F	72

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
	EBTR	0.69	45	D	200	0.42	38	D	134
	WBL (300)	0.39	33	C	17	0.32	34	C	32
	WBTR	0.36	40	D	80	0.65	53	D	239
	NBL (125)	0.60	57	E	54	0.57	58	E	87
	NBTR	0.79	73	E	114	**0.86**	**92**	**F**	**217**
	SBL (135)	0.40	59	E	29	0.70	75	E	68
	SBT	0.59	70	E	70	0.46	76	E	100
	SBR (80)	0.05	61	E	0	0.06	68	E	16

Under 2028 future background conditions after the necessary optimizations and improvements, all intersections operate within capacity. The Derry Road widening alleviated the most overcapacity east-west through movements. The exclusive left turn movements operate below critical v/c ratio but experience critical queuing due to their existing storage lengths.

The optimizations and improvements are carried forward into the 2033 horizon year. The traffic capacity analysis results for the study area intersections under 2033 future background conditions after the roadway improvements and signal optimizations are summarized **Table 9-4** for both weekday AM and PM peak hours.

Table 9-4 Future Background 2033 Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Fifth Line at Derry Road	*Overall*	***0.99***	***50***	***D***	**-**	***0.89***	***41***	***D***	**-**
	EBL (90)	0.85	46	D	63	0.50	29	C	15
	EBT	**0.91**	**43**	**D**	**322**	0.45	20	B	99
	EBR (50)	0.22	22	C	41	0.06	15	B	11
	WBL (95)	**0.98**	**139**	**F**	**81**	0.61	43	D	52
	WBTR	0.55	29	C	136	0.82	34	C	218
	NBL (95)	0.30	64	E	32	0.86	81	F	92
	NBT	**0.94**	**104**	**F**	**117**	0.50	65	E	38
	NBR (50)	0.35	71	E	42	0.52	68	E	42
	SBL (55)	**0.99**	**122**	**F**	**103**	**0.90**	**64**	**E**	**172**
	SBT	0.22	61	E	35	0.72	64	E	78
	SBR (50)	0.04	59	E	0.0	0.58	61	E	62
Future N-S Collector/Clark Boulevard at Derry Road	*Overall*	***0.85***	***29***	***C***	**-**	*0.57*	*15*	*B*	-
	EBL (50)	0.34	15	B	26	0.51	35	D	22
	EBTR	**0.96**	**33**	**C**	**331**	0.48	10	B	74
	WBL (50)	0.78	73	E	49	0.52	23	C	27
	WBTR	0.28	7	A	42	0.62	12	B	111
	NBL (50)	0.27	55	D	34	0.43	44	D	46
	NBTR	0.20	53	D	31	0.34	41	D	45
	SBL (50)	0.48	62	E	50	0.32	41	D	31
	SBTR	0.07	51	D	16	0.22	38	D	30
Sixth Line at Derry Road	*Overall*	***0.94***	***51***	***D***	**-**	***0.92***	***38***	***D***	**-**
	EBL (150)	0.40	19	B	36	0.87	72	E	89
	EBTR	**0.94**	**43**	**D**	**353**	0.53	21	C	127
	WBL (95)	0.21	66	E	7	0.11	20	B	6

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
	WBTR	0.39	61	E	117	0.75	35	D	202
	NBL (45)	**0.72**	**58**	**E**	**53**	**0.92**	**88**	**F**	**64**
	NBTR	0.19	41	D	45	0.23	40	D	43
	SBL (45)	0.17	55	E	26	0.37	54	D	38
	SBTR	**0.94**	**99**	**F**	**200**	0.83	75	E	107
Trafalgar Road at Derry Road	*Overall*	*0.83*	*58*	*E*	-	*0.83*	*69*	*E*	-
	EBL (140)	**0.88**	**72**	**E**	**156**	0.74	113	F	78
	EBTR	0.80	54	D	222	0.48	43	D	151
	WBL (300)	0.52	42	D	28	0.42	39	D	35
	WBTR	0.43	45	D	89	0.77	63	E	278
	NBL (125)	0.67	56	E	59	0.66	58	E	101
	NBTR	0.81	70	E	129	**0.94**	**100**	**F**	**269**
	SBL (135)	0.47	56	E	31	0.86	107	F	106
	SBT	0.59	66	E	77	0.49	74	E	117
	SBR (80)	0.06	56	E	0	0.07	65	E	18

Under 2033 future background conditions all intersections are critical with the exception of Trafalgar Road in both peak hours and the future N-S collector road in the PM peak hour. All movement operate with reserve capacity but several are critical and near capacity. In particular the eastbound through right at the future N-S collector and the southbound left and westbound left at Fifth Line near capacity in the AM peak hour. The initially high traffic volumes and growth rates compounded over ten years cause the east-west movements and the minor approach turning movements to reach critical v/c ratios as well as exceed their storage lengths.

TYLin recommends the Region monitor the intersections for critical operations and consider modifying the signal timing plans, extending storage lanes, and implementing additional roadway improvements to the minor road. It is noted that although Fifth Line and Sixth Line are municipal roads under the Town of Milton's jurisdiction, their intersections with Derry Road are under the jurisdiction of the Region. Corridor level improvements would be supported through updates to the Regional TMP.

9.4 Future Total Conditions

The traffic capacity analysis results for the study area intersections under 2028 future total conditions are summarized in **Table 9-5** for both weekday AM and PM peak hours.

Table 9-5 Future Total 2028 Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Fifth Line at Derry Road	*Overall*	*0.95*	*46*	*D*	-	***0.86***	***40***	***D***	**-**
	EBL (90)	0.82	36	D	53	0.50	27	C	15
	EBT	0.86	38	D	291	0.41	18	B	90
	EBR (50)	0.20	21	C	37	0.05	14	B	9
	WBL (95)	**0.95**	**127**	**F**	**72**	0.51	33	C	43
	WBTR	0.50	27	C	121	0.77	31	C	205
	NBL (95)	0.28	63	E	30	0.88	86	F	81
	NBT	0.93	102	F	115	0.51	66	E	38
	NBR (50)	0.33	70	E	40	0.47	67	E	38
	SBL (55)	**0.94**	**104**	**F**	**94**	0.90	64	E	151
	SBT	0.20	61	E	33	0.72	64	E	77
	SBR (50)	0.04	59	E	0	0.57	61	E	60
Future N-S Collector/Clark Boulevard at Derry Road	*Overall*	***0.89***	***35***	***C***	**-**	***0.56***	***15***	***B***	**-**
	EBL (50)	0.34	15	B	26	0.49	31	C	21
	EBTR	**0.99**	**40**	**D**	**395**	0.45	10	A	67
	WBL (50)	0.79	74	E	49	0.51	21	C	27
	WBTR	0.29	7	A	43	0.61	12	B	107
	NBL (50)	0.27	55	D	34	0.43	43	D	46
	NBTR	0.23	54	D	35	0.33	40	D	43
	SBL (50)	**0.54**	**65**	**E**	**53**	0.33	42	D	32
	SBTR	0.07	51	D	16	0.21	38	D	30

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Sixth Line at Derry Road	*Overall*	***0.87***	***43***	***D***	**-**	***0.93***	***40***	***D***	**-**
	EBL (150)	0.63	22	C	65	0.89	72	E	101
	EBTR	0.84	33	C	289	0.49	21	C	112
	WBL (95)	0.21	66	E	8	0.10	21	C	6
	WBTR	0.38	52	D	111	0.74	37	C	182
	NBL (45)	**0.69**	**57**	**E**	**52**	**0.90**	**82**	**F**	**65**
	NBTR	0.20	43	D	46	0.23	39	D	44
	SBL (45)	0.24	58	E	33	0.40	53	D	43
	SBTR	**0.93**	**97**	**F**	**184**	0.86	76	E	118
Trafalgar Road at Derry Road	*Overall*	*0.76*	*54*	*D*	-	*0.74*	*63*	*E*	-
	EBL (140)	0.80	69	E	140	0.72	113	F	73
	EBTR	0.69	45	D	202	0.42	38	D	135
	WBL (300)	0.39	33	C	17	0.33	34	C	32
	WBTR	0.37	41	D	81	0.66	54	D	244
	NBL (125)	0.62	57	E	55	0.57	58	E	87
	NBTR	0.79	73	E	113	**0.86**	**92**	**F**	**217**
	SBL (135)	0.40	59	E	29	0.71	75	E	68
	SBT	0.59	69	E	70	0.46	76	E	100
	SBR (80)	0.05	60	E	0	0.07	68	E	18
Site Access 3 at Derry Road	EBT	0.51	0	-	0	0.34	0	-	0
	WBTR	0.32	0	-	0	0.44	0	-	0
	SBR	0.02	9	A	0	0.13	10	B	3
Site Access 2 at Sixth Line	EBLR	0.05	12	B	1	0.12	13	B	2
	NBTT	0.13	4	A	3	0.06	2	A	1
	SBTR	0.25	0	-	0	0.22	0	-	0
Site Access 1	EBLR	0.02	11	B	0	0.04	11	B	1

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
at Sixth Line	NBLT	0.02	1	A	0	0.01	0	A	0
	SBTR	0.24	0	-	0.0	0.21	0	-	0

Under the 2028 future total conditions, the operations of the signalized intersections are only marginally impacted by the addition of the proposed site trips with the exception of the eastbound left at Sixth Line in the AM peak hour. The v/c ratio increases modestly due to the site access locations but still has ample reserve capacity. All proposed site accesses operate well with acceptable capacity and queueing. The critical movements noted in the 2028 future background conditions are still present but are not exasperated by the site traffic.

The traffic capacity analysis results for the study area intersections under 2033 future total conditions are summarized in **Table 9-6** for both weekday AM and PM peak hours.

Table 9-6 Future Total 2033 Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Fifth Line at Derry Road	*Overall*	***0.99***	***52***	***D***	***-***	***0.92***	***42***	***D***	***-***
	EBL (90)	0.85	48	D	64	0.50	31	C	15
	EBT	0.95	47	D	350	0.47	20	B	104
	EBR (50)	0.22	22	C	41	0.06	15	B	11
	WBL (95)	0.98	140	D	81	0.68	50	D	60
	WBTR	0.55	30	C	139	0.86	37	D	244
	NBL (95)	**0.30**	**64**	**E**	**32**	**0.86**	**81**	**F**	**82**
	NBT	**0.94**	**104**	**F**	**117**	0.50	65	E	38
	NBR (50)	0.37	71	E	43	0.54	68	E	43
	SBL (55)	**0.99**	**122**	**F**	**103**	0.90	64	E	162
	SBT	0.22	61	E	35	0.72	64	E	78
	SBR (50)	0.04	59	E	0	0.56	61	E	60

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Future N-S Collector/Clark Boulevard at Derry Road	*Overall*	***0.58***	***17***	***B***	***-***	*0.60*	*15*	*B*	-
	EBL (50)	0.40	26	C	17	0.55	40	D	23
	EBTR	0.46	13	B	90	0.49	10	B	76
	WBL (50)	0.53	9	A	11	0.62	31	C	40
	WBTR	0.56	10	B	107	0.66	13	B	122
	NBL (50)	0.54	63	E	59	0.43	43	D	46
	NBTR	0.22	53	D	34	0.36	41	D	47
	SBL (50)	0.46	62	E	41	0.33	42	D	32
	SBTR	0.24	54	D	36	0.22	38	D	31
Sixth Line at Derry Road	*Overall*	***0.96***	***54***	***D***	***-***	***0.98***	***45***	***D***	***-***
	EBL (150)	0.72	28	C	69	0.92	80	E	117
	EBTR	**0.96**	**46**	**D**	**353**	0.55	24	C	127
	WBL (95)	0.21	72	E	6	0.12	23	C	6
	WBTR	0.44	69	E	122	0.85	43	D	209
	NBL (45)	**0.74**	**59**	**E**	**57**	**1.00**	**110**	**F**	**83**
	NBTR	0.21	41	D	50	0.24	38	D	47
	SBL (45)	0.25	56	E	38	0.40	51	D	45
	SBTR	**0.95**	**99**	**F**	211	0.89	79	E	138
Trafalgar Road at Derry Road	*Overall*	***0.84***	***58***	***E***	***-***	***0.84***	***70***	***E***	***-***
	EBL (140)	**0.89**	**72**	**E**	**158**	**0.74**	**113**	**F**	**79**
	EBTR	0.80	54	D	225	0.49	43	D	153
	WBL (300)	0.52	42	D	28	0.43	40	D	35
	WBTR	0.44	45	D	91	0.79	64	E	284
	NBL (125)	0.68	58	E	61	0.66	58	E	101
	NBTR	0.81	70	E	129	0.94	100	F	270
	SBL (135)	0.47	56	E	31	**0.86**	**107**	**F**	**106**

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
	SBT	0.59	66	E	77	0.49	74	E	117
	SBR (80)	0.06	57	E	0	0.08	65	E	19
Site Access 3 at Derry Road	EBT	0.51	0	-	0	0.34	0.0	-	0
	WBTR	0.32	0	-	0	0.44	0.0	-	0
	SBR	0.02	9	A	0	0.14	10	B	4
Site Access 2 at Sixth Line	EBLR	0.05	12	B	1	0.13	13	B	3
	NBLT	0.13	4	A	4	0.06	2	A	1
	SBTR	0.27	0	-	0	0.24	0	-	0
Site Access 1 at Sixth Line	EBLR	0.02	12	B	1	0.04	12	B	1
	NBLT	0.03	1	A	0	0.01	0	A	0
	SBTR	0.26	0	-	0	0.23	0	-	0

Under 2033 future total conditions all intersections are at or approaching critical capacity with the exception of the intersection of the future N-S collector and Derry Road in the PM peak hour. However, all individual movements remain below capacity with the movements of concern noted under existing conditions at most critical. In particular the westbound left and southbound left at Fifth Line and the eastbound through/through right movements at Fifth Line, Sixth Line and the future N-S in the AM peak hour. All proposed site accesses operate well with acceptable capacity and queueing.

Similar to 2028 future total conditions, the proposed site traffic has a minor impact on the capacity of the study network compared to the future background with the exception of the eastbound left in the AM peak hour which has a modest increase. However, the movement does not become critical in either peak hour. The critical movements noted in the 2033 future background conditions are still present but are not exasperated by the site traffic.

Overall, it is expected that the introduction of subject site traffic to the study network will have a minor impact on the future operations of the network when compared to future background conditions. The future background scenario shows that without road improvements such as the widening of Derry Road and the addition of auxiliary turning lanes, the network will become over capacity.

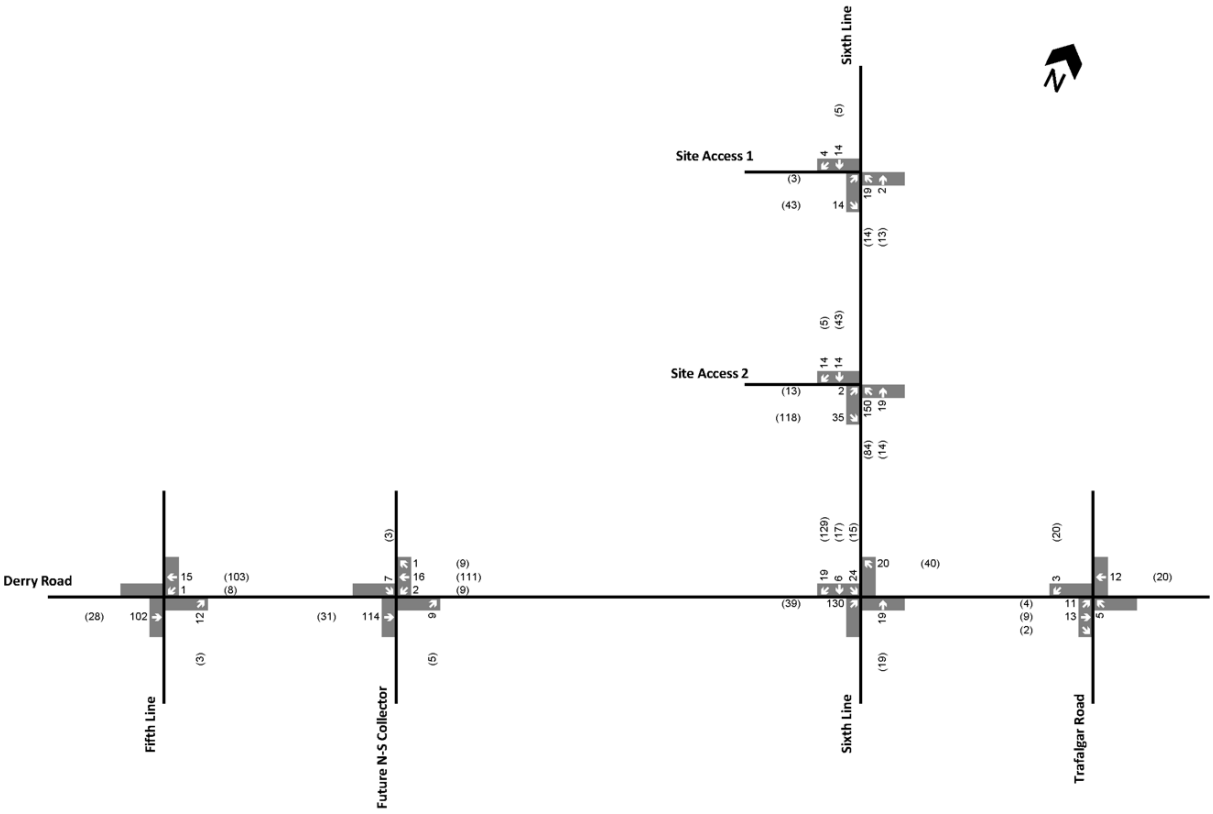
TYLin recommends the Region consider accelerating the timeline for the widening of Derry Road earlier than planned in the 2011-2031 TMP to accommodate for background growth in the area. The Region should also monitor the intersections for critical operations and consider modifying the signal timing plans, extending storage lanes, and implementing additional roadway improvements to the minor roads. It is noted that although Fifth Line and Sixth Line are municipal roads under the Town of Milton's jurisdiction, their intersections with Derry Road are under the jurisdiction of the Region. Larger corridor level improvements should be supported by updates to the Regional TMP.

10 RIGHT-IN RIGHT-OUT ACCESS SENSITIVITY ANALYSIS

10.1 Site Trip Rerouting

A sensitivity analysis on the intersection of Sixth Line and Derry Road was undertaken to review the impact of removing the right-in right-out access on Sixth Line. The removal of the right-in right-out access required the rerouting of all site traffic to the accesses on Sixth Line. **Figure 10-1** shows the rerouted site traffic without a right-in right-out access.

Figure 10-1 Rerouted Site Traffic without Right-In Right-Out Access



10.2 Traffic Capacity

Since the rerouting of site traffic does not change the volumes at the other intersections of the network, only the intersection of Sixth Line and Derry Road is analyzed for the sensitivity analysis.

The traffic capacity analysis results for the intersection of Sixth Line and Derry Road under 2028

and 2033 future total conditions without the right-in right-out access are summarized in **Table 10-1** for both weekday AM and PM peak hours. The detailed Synchro report can be found in **Appendix J**.

Table 10-1 Future Total Sixth Line and Derry Road Right-In Right-Out Access Capacity Analysis

Intersection	Movement (Storage m)	Weekday AM Peak Hour				Weekday PM Peak Hour			
		V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
Sixth Line at Derry Road (2028)	*Overall*	***0.88***	***44***	***D***	**-**	***0.96***	***46***	***D***	**-**
	EBL (150)	0.64	23	C	65	0.89	74	E	101
	EBTR	0.85	34	C	289	0.52	25	C	112
	WBL (95)	0.21	67	E	8	0.10	24	C	6
	WBTR	0.39	53	D	110	0.80	42	D	182
	NBL (45)	**0.68**	**55**	**E**	**50**	**0.99**	**105**	**F**	**85**
	NBTR	0.20	42	D	47	0.22	36	D	46
	SBL (45)	0.25	57	E	36	0.35	48	D	43
	SBTR	**0.93**	**97**	**F**	**196**	**0.97**	**92**	**F**	**180**
Sixth Line at Derry Road (2033)	*Overall*	***0.97***	***55***	***E***	**-**	***0.99***	***53***	***D***	**-**
	EBL (150)	0.72	28	C	69	0.96	91	F	122
	EBTR	**0.96**	**47**	**D**	**353**	0.61	29	C	134
	WBL (95)	0.21	72	E	6	0.14	27	C	7
	WBTR	0.45	70	E	122	**0.94**	**56**	**E**	**225**
	NBL (45)	0.74	61	E	56	0.94	85	F	86
	NBTR	0.21	40	D	52	0.22	33	C	47
	SBL (45)	0.25	55	E	38	0.34	47	D	44
	SBTR	**0.97**	**103**	**F**	**222**	0.97	92	F	191

The removal of the right-in right-out access has a minor impact on the traffic capacity of the intersection in AM peak hour during both horizon years with an increase of V/C of 0.01 and an increase of delay of up to 2 seconds at some of the movements. During the PM peak hour the

removal of the right-in right-out access has a more significant impact on the intersection with northbound left movement nearing capacity and several movements increasing V/C by up to 0.1 in the 2028 horizon year. In the 2033 horizon year the northbound left movement goes over capacity in the PM peak hour due to the volume of opposing traffic and necessitated minor signal timing optimization. The optimization allows the intersection to operate within capacity but notably worse than with the right-in right-out access. Similar to the 2028 AM peak hour, 2033 AM peak hour performs similarly to the scenario with the right-in right-out access. Overall from a traffic capacity perspective, the removal of the right-in right-out access would have a minor negative impact in AM peak hour and moderately negative impact in the PM peak hour for the intersection of Sixth Line and Derry Road. While both scenarios may be technically acceptable, providing the proposed right-in right-out access would provide an overall benefit to the transportation network.

10.3 Site Circulation

The circulation path within the site plan was also reviewed to analyze the impact of removing the right-in right-out access. It was found that the longest path to exit the site and travel westbound on Derry Road is 940 m compared to with the right-in right-out access which is 270 m. Based on an assumed speed of 10 km/h within the site as per the Highway Traffic Act, 60 km/h along Sixth Line, and 80 km/h along Derry Road, as well as the expected delay of each movement under the future total 2033 scenario, the time required to exit the site was estimated. **Table 10-2** outlines the breakdown of the exit path required in each scenario.

Table 10-2 Exit Path Breakdown

Leg/Movement	Distance (m)	Speed (km/h)	Time (s)
No Right-In Right-Out			
Site Circulation	510	10	184
Eastbound Right Turn	-	-	12
Sixth Line	160	60	10
Southbound Right Turn	-	-	98
Derry Road	270	80	12
Total	**940**	**-**	**316**
With Right-In Right-Out			
Site Circulation	270	10	97
Southbound Right Turn	-	-	9

Total	**270**	**-**	**106**
Difference	**670**	**-**	**210**

The path to exit requires approximately 316 seconds without the right-in right-out access and 106 seconds with the right-in right-out access.

Additionally, the removal of the right-in right-out access forces all traffic to be funneled to the two accesses on Sixth Line. This has the potential to create congestion within the site as traffic must drive long distances along drive aisles where other vehicles could be making parking maneuvers or between Building B, C, and D where truck loading is performed. This would add to the delay that is outlined in **Table 10-2**. Traveling a longer distance may also cause drivers to drive at increased speeds which would also result in other potential conflicts. Drawings showing the longest path analyzed as well as the congestion effect of the removal of the right-in right-out can be found in **Appendix J**.

It is TYLin's opinion that the right-in right-out access is necessary to ensure the optimal functionality of the subject site. The right-in right-out access would be beneficial to the operation of the intersection of Sixth Line and Derry Road, and eliminate significant delay to access and exit the site as well as congestion within the internal network.

11 TRAFFIC DEMAND MANAGEMENT

Transportation Demand Management (TDM) refers to various measures that are undertaken to encourage non-auto modes of travel and to reduce single-occupant vehicle (SOV) traffic. These have direct impacts to both parking and trip-related aspects of the site. TDM measures can be categorized into five categories and are listed as follows:

1. Introduction of Alternative Travel Modes
2. Core Commuter Information and Assistance
3. Financial Incentives
4. Supporting Infrastructure
5. TDM Program Support

11.1 Introduction of Alternative Travel Modes

The introduction of new modes of travel to current single-occupant vehicle drivers can be accomplished by utilizing various marketing and communication strategies. For industrial employment land uses, this can be accomplished through raising awareness of available alternative travel modes for employees. It is recommended that TDM marketing material be provided to all employees and that updates to transit / active transportation infrastructure be posted in locations with significant foot traffic.

Marketing material should be prepared and provided by Municipality, Region, and transit agency staff to ensure information is up to date. It is also important for the material to be visually appealing to be more approachable. This will help to target and encourage non-driver modes of transportation from the earliest point in the process.

Outreach events are another method to promoting TDM measures. It is recommended that an outreach event be hosted based on demand. Municipality, Region, and transit agency staff should be invited to attend events and answer any questions from employees on existing and planned infrastructure improvements. The event can be held in one of the buildings on site. Should the attendance of a TDM outreach event be insufficient to justify attendance of external staff, the TDM marketing material can provided to each employee.

11.2 Core Commuter Information and Assistance

In addition to marketing and communicating the availability of alternative travel modes, it is important to ensure that those seeking to change their travel behaviours have the tools and

information to facilitate this change. Information on the available transit routes, and active transportation network should be readily available for anyone looking to travel to or from the site. It is recommended that a carpool ride-matching tool such as www.ridesharing.com and carpool networking be promoted at the TDM outreach event for employees from similar areas to meet and find other looking to carpool together.

The information should be prepared by the Municipality, Region, and transit agency staff and distributed at the TDM outreach event.

11.3 Financial Incentives

It is understood that one of the primary factors in behavioural change is monetary compensation. The purpose of providing financial incentives is to promote this change in behaviour and incentivize commuters with trying out new alternate travel modes.

This financial support can come in the form of subsidizing travel such as transit passes or other future subsidies (such as rideshares). It is recommended that a pre-loaded transit passes, be provided for new employees to encourage the use of public transit and instill transit behaviour in new users. The exact amount and provision of the pre-loaded transit passes is subject to the discretion of the applicant. The transit passes can be distributed at the TDM outreach event or provided to each tenant individually at the Owner's discretion.

Additionally, a program can be organized to provide financial incentives for carpool drivers on a per passenger basis to encourage more employees to participate. The exact amount and provision of the incentive is subject to the discretion of the applicant.

11.4 Supporting Infrastructure

Physical infrastructure is necessary to support transit and active transportation modes. The infrastructure should be developed and improved for both the site as well as the Municipality and Region. For the proposed development, some examples of supportive infrastructure include:

- Sheltered transit stop within walking distance of the site;
- Pedestrian connections between on site buildings and external network;
- Cycling facilities such as bicycle parking, repair station, and connection to external network.

It is recommended that the Region, Municipality, and relevant transit agencies consider supporting infrastructure at the subject site when implementing improvements for the study network.

11.5 TDM Program Support

The TDM programs can be further supported through the involvement with a Transportation Management Associations (TMA). TMA's can provide support to TDM programs through the provision of promotional material, coordination of programs and events, and recommendations on the appropriate measures to be implemented.

Facilitating the implementation and management of these TDM programs can be accomplished through the effective employment or assignment of a TDM coordinator. The role of the TDM coordinator is to implement, manage and monitor the TDM measures in place for the development.

In addition to implementation of these programs, it is important to monitor both the success and the opportunities for improvement for the TDM measures. It is recommended that a baseline survey be conducted at the full build-out of the development to identify employee commuting behaviours. A follow-up monitoring survey should then be conducted every two years to measure the effectiveness of the TDM programs and provide recommendations for improvements. The provision of the monitoring survey, follow-up surveys and future TDM programs would be at the discretion of the TDM coordinator.

12 CONCLUSION

TYLin was retained by Takol CMCC Derry Limited Partnership to complete a Traffic Impact Study (TIS) in support of the proposed mixed-use development located at the 11801 Derry Road, in the Town of Milton. Access to the site is proposed via two full move accesses on Sixth Line and one right-in right-out access on Derry Road. Tractor trailer trucks will only access the site via the northmost access on Sixth Line. The proposed development will be comprised of one commercial building, one industrial condo building, and two warehouse buildings.

A review of the site configuration shows that the accesses and circulation routes are sufficient for the needs of the site. A sightline review along Derry Road was undertaken and also found to be sufficient. A sensitivity analysis was conducted to review the necessity for a

A review of the parking supply proposed for the site found that the site will meet and exceed the requirements for parking spaces, accessible spaces, loading spaces and bicycle parking. Site specific parking rate is proposed for the site which has been reviewed and is considered acceptable based on current parking rates and approved site specific parking rates.

Existing turning movement count data was collected on Wednesday December 7th, 2022. Background traffic volumes for 2028 and 2033 were derived by applying five and ten years of growth respectively to the baseline volumes and adding background development traffic. In the future background conditions Fifth Line is widened from a two-lane cross section to a four-lane cross section with dedicated north and south right turn lanes and a new two-lane north-south collector road is built between Fifth Line and Sixth Line.

The site is expected to generate 238 two-way trips (187 in, 51 out) in the AM peak hour and 280 two-way trips (103 in, 177 out) in the PM peak hour. Of these trips, 6 two-way truck trips (3 in, 3 out) are expected in the AM peak hour and 9 two-way truck trips (5 in, 5 out) are expected in the PM peak hour. Note that no multimodal trip reduction was applied due to the low presence of transit in the area and for a more conservative approach. Site trips were distributed according to TTS data obtained for the area. Site trips were combined with the future background volumes to derive 2028 and 2031 future total volumes. The proposed restaurant and banquet land uses can also be accommodated within the

Traffic capacity analysis shows that under existing conditions, the intersections are expected to operate within capacity although high eastbound and westbound volumes cause some movements to be at or approaching critical along Derry Road.

Under future background conditions, close to all intersections are over capacity with many turning movements exceeding capacity and queues exceeding the available storage. Signal optimization was attempted but did not result in sufficient improvements, and therefore several

roadway improvements were required. Derry Road was widened from a four-lane cross section to a six-lane cross section, a dedicated eastbound right turn lane was added at the intersection of Derry Road and Fifth Line, and dual eastbound left turns were added to the intersection of Derry Road and Trafalgar Road. These improvements are generally in line with the planned Derry Road widening which is indicated in the Region's 2022 Budget and Business Plan to begin in 2031. The roadway improvements greatly improve the performance of the road network in the 2028 future background conditions with all intersections operating within capacity. In the 2031 future background conditions several intersection approach capacity again due to the high volumes and additional growth.

The addition of site traffic under future total conditions is expected to have minor impacts on operations at the study intersections when compared to future background conditions. All movements impacted by the site still operate with reserve capacity. TYLin recommends the Region monitor the network intersections for critical operations, consider accelerating the plan to widen Derry Road, and explore additional road improvements to Fifth Line and Sixth Line. It is noted that although Fifth Line and Sixth Line are municipal roads under the Town of Milton's jurisdiction, their intersections with Derry Road are under the jurisdiction of the Region. Larger corridor level improvements should be supported through updates to the Regional TMP.

Based on the findings of the Traffic Impact Study for 11801 Derry Road, TYLin is in support of the proposed development.

APPENDIX A

Terms of Reference

Angus Ho

From: Chris.Toews@milton.ca
Sent: Monday, December 5, 2022 9:07 AM
To: Angus Ho
Cc: 'Loro, Darren'; Jonathan Law; Michael Dowdall; Kavleen.Sachdeva@milton.ca; 'matt.krusto@halton.ca'
Subject: FW: 11801 Derry Road Mixed-Use Development

Hi Angus,

Sorry for the delay. Further to comments provided by the Region, see Transportation Planning's comments from the Town in red.

Feel free to reach out if you have any questions.

Kind regards,
Chris

Chris Toews
Transportation Planning Technologist
150 Mary Street., Milton ON, L9T 6Z5
905-878-7252 ext. 2502
www.milton.ca

From: Loro, Darren <Darren.Loro@halton.ca>
Sent: Thursday, December 1, 2022 10:55 AM
To: Angus Ho <angus.ho@tylin.com>
Cc: Jonathan Law <jonathan.law@tylin.com>; Michael Dowdall <michael.dowdall@tylin.com>; Kavleen Sachdeva <Kavleen.Sachdeva@milton.ca>; Chris Toews <Chris.Toews@milton.ca>; Krusto, Matt <Matt.Krusto@halton.ca>
Subject: RE: 11801 Derry Road Mixed-Use Development

Hi Angus,

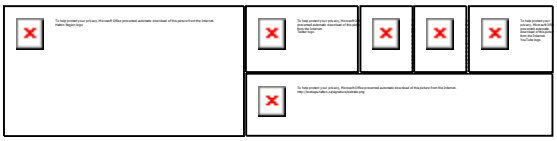
Thank you for providing the requested phasing and trip generation information.

Please see Transportation Planning's comments on the proposed TOR in blue.

Let me know if you want to discuss further!

Cheers,
Darren

Darren Loro, C.E.T.
Project Manager I – Transportation Planning Coordination
Infrastructure Planning & Policy
Public Works
Halton Region
905-825-6000, ext. 2694 | 1-866-442-5866



From: Angus Ho <angus.ho@tylin.com>
Sent: Wednesday, November 23, 2022 3:03 PM
To: Kavleen.Sachdeva@milton.ca; Loro, Darren <Darren.Loro@halton.ca>; Chris.Toews@milton.ca
Cc: Jonathan Law <jonathan.law@tylin.com>; Michael Dowdall <michael.dowdall@tylin.com>
Subject: 11801 Derry Road Mixed-Use Development

Hello,

This Terms of Reference (TOR) is an update to a TOR previously submitted on April 1st 2022. The previous TOR is attached for reference.

TYLIN has been retained by Takol CMCC Derry Limited Partnership to complete a Traffic Impact Study in support of their proposed mixed-use development located at 11801 Derry Road, in the Town of Milton. The site currently has no structures on it and is used for agricultural purposes. The study will be completed in support of the Zoning By-law Amendment and Site Plan Application for the development, which consists of 4 buildings as detailed below:

- Building A – 2-storeys proposed for commercial use with a GFA of 5,070 m^2.
- Building B – 1-storey proposed for industrial use with a GFA of 3,548 m^2.
- Building C – 1-storey proposed for industrial use with a GFA of 10,476 m^2.
- Building D – 1-storey proposed for industrial use with a GFA of 20,060 m^2.

Access to the subject lands is proposed via two full-moves accesses to Sixth Line and one right-in/right-out access to Derry Road (as per the Region's PAC comments). A total of 519 parking spaces are currently proposed within the lands. Please refer to the attached concept plan for reference. As discussed in Halton Region's pre-consultation comments for this development proposal, Halton Region's Access By-law (NO.32-17) Section 6.1 (a) states that "*access to a Regional Road from private property shall be permitted only where such access is necessary because access to a local road is not feasible.*" As access to Derry Road can be provided via Sixth Line, any proposed access directly to Derry Road will need to be justified via a TIS and will need to be approved by the Region. See comments below for further discussion.

Prior to initiating the study, TYLIN would like to confirm all study parameters with the Town and Region to confirm adequacy of the review. The proposed methodology has been detailed below for your review and input.

Traffic Operations Review

- TYLIN proposes to conduct up-to-date turning movement count surveys at the following intersections during the weekday AM (7-9) and PM (4-6) peak hours to use as our 2022 existing traffic volumes: Acceptable, as long as the counts are conducted on a typical Tuesday-Thursday.
    - Derry Road at Sixth Line (Signalized) Acceptable.
    - Derry Road at Fifth Line (Signalized) Acceptable.
    - Derry Road at Trafalgar Road (Signalized) Acceptable.
    - A future north-south roadway located between Fifth Line and Sixth Line has been identified as part of the Derry Green Secondary Plan. The future intersection of Derry Road and this north-south roadway will need to be analyzed under future conditions. For consistency with the Transportation Impact Studies (TIS's) prepared for the nearby Broccolini industrial developments, please assume that this north-south roadway is constructed by the 2027 horizon.

  The above intersections are proposed to be reviewed under existing conditions as well as future conditions, along with the planned accesses to Derry Road (1) and Sixth Line (2). **If you could, please provide us with the signal timing plans for the above noted intersections at your earliest convenience.** Signal timing plans can be requested at accesshalton@halton.ca.

- Study Horizon years – based on the scale of the development and associated trip generation during the weekday peak hours, the following study horizon years are proposed in accordance with the Halton Region TIS guidelines.
    - Existing
    - 5-year horizon Future Background & Future Total Given the scale of the proposed development, and for consistency with other TIS's prepared for development applications within the Derry Green Secondary Plan area, please analyze the anticipated year of full build-out plus the five-year horizon from full build-out.

  Based on the scale of the proposed development, it is TYLIN's opinion that a 5-year horizon would be acceptable for the subject lands. Please note that TYLIN is currently working on the Roads Needs Assessment Study for the Trafalgar Secondary Plan area. Based on the scale of the Trafalgar SP and current status of development application, it is TYLIN's opinion that it would not be developed by the 5-year horizon and would not need to be included as part of our review. Please confirm if that is accurate. See comments below regarding growth rates and background developments.

- Roadway Improvements – we have identified the below improvements within the study area
    - Widening of Derry Road to a six-lane cross-section between Highway 407 and Tremaine Road – scheduled to begin construction beyond 2030 The Region's 2022 Budget and Business Plan indicates a construction start date of 2031 for the Derry Road widening to six lanes. Therefore, it is not reasonable to assume that the road widening will be completed by the ultimate horizon and thus should not be quantitatively accounted for in the TIS.
    - Halton Region's Transportation Master Plan also identified the need to widen Trafalgar Road to six lanes from Highway 407 to 10 Side road, with construction for the segment between Britannia Road and Steeles Avenue currently scheduled to begin in 2030 per Halton Region's 2022 Budget and Business Plan). Therefore, it is not reasonable to assume that the road widening will be completed by the ultimate horizon and thus should not be quantitatively accounted for in the TIS.
        - Widening of Sixth Line – identified to begin construction in 2026 as per the Town's Capital Budget Town to confirm.
        - Widening of Sixth Line is scheduled to begin construction in 2028, anticipated completion for 2030, therefor it should not be accounted for in the TIS (assuming full-build out horizon analysis does not surpass 2030).

  Based on the timing for the above improvements, it is TYLIN's opinion that they would not be included in our review (which would lead to a more conservative analysis). Please confirm if that is accurate. If the widening of

Sixth Line is to be considered within our 5-year horizon, please confirm the planned roadway cross-section and intersection configuration at Derry Road. Finally, please confirm if any additional roadway improvements are to be considered as part of our study. The Town should confirm if any other improvements need to be accounted for.

- Widening of Fifth Line to a four-lane cross-section (2-lanes each direction between Derry Road and Main Street East) is currently underway, scheduled to be completed by 2024.
- Fifth Line and Derry Road intersection improvements will include dedicated RT lanes for Fifth Line (north and south legs).

Please ensure the above conditions are accounted for in the TIS.

1. Background Developments – please confirm any background developments that are to be considered within the study area for our study horizon year. See comments below regarding growth rates for information on background developments to account for.

2. Growth Rates – TYLIN will utilize historical traffic data to derive growth rates along the study roadways. These rates will be compared to the rates used for Derry Road and Trafalgar Road as part of the RNA study to confirm if the rates are acceptable. **If you could, please provide us with the historical traffic data for these roadways, allowing us to derive the rates as needed.**

   The following growth rate methodology for Derry Road has been applied to the TIS' prepared for other development applications within the Derry Green Secondary Plan area and should be applied to this study for consistency:

   - 2% compounded annually to through movements along Derry Road. This growth rate **accounts for background development traffic** within the Derry Green Secondary Plan area and Trafalgar / Agerton Secondary Plan areas (this growth rate has been derived from the Region's EMME model which includes these Secondary Plan areas).
   - 3% compounded annually to all movements on Trafalgar Road at the intersection of Derry Road (similar to the growth rate applied to Trafalgar Road in the "Transportation Master Plan for the Trafalgar and Agerton Secondary Plan Areas Traffic Addendum" prepared by WSP (dated March 2022). This growth rate **accounts for background development traffic** within the Derry Green Secondary Plan area and Trafalgar / Agerton Secondary Plan areas (this growth rate has been derived from the Region's EMME model which includes these Secondary Plan areas).
   - 2% compounded annually to turning movements along Derry Road (e.g. EBL, EBR, WBL, WBR) and the municipal road side-street approaches at Derry Road intersections (e.g. NBLTR, SBLTR). **This growth rate does not account for future background developments. Background development traffic must be accounted for at these movements.** For these movements, background site traffic from the following background developments must be accounted for:

     - Menkes Industrial Site (Fifth Line north of Derry Road)
     - Orlando Industrial Site (Fifth Line north of Derry Road)
     - Broccolini Derry Road subdivision (north-east corner of Derry Road and Fifth Line)
     - Broccolini 6712 Fifth Line site (south-west corner of Derry Road and Fifth Line)
     - Derry Green Corporate Business Park Secondary Plan
     - Anatolia Industrial Site (south side of Derry Road, between Fifth Line and Sixth Line) – a TIS has not yet been submitted to Halton Region for this application.
     - Neamsby Industrial Site (south of the Anatolia Industrial Site and east of Fifth Line) – a TIS has not yet been submitted to Halton Region for this application.

3. Trip Generation – proposed to be completed based on the ITE Trip Generation Manual, as well as any information provided by the project team. An internal trip capture estimate will be completed between the proposed commercial, office and industrial uses of the development. The TIS will also need to compare trip

generation forecasts between the proposed development and the subject property from the Derry Green Secondary Plan Transportation Study. All trip generation assumptions must be clearly documented in the TIS with supporting data appended.

4. Trip Distribution/Assignment – proposed to be derived based on existing traffic patterns and TTS data. Trip distribution for the proposed development should also consider the trip distribution assumptions from the TIS' prepared for other development applications within the Derry Green Secondary Plan area. All trip distribution assumptions must be clearly documented in the TIS with supporting data appended.

5. Future Traffic Conditions – following the completion of the traffic forecast, TYLIN will review the 5-year future background and total conditions to confirm the impacts of the site traffic onto the roadway network. See comments above on the required horizon years for analysis.

As part of this review, TYLIN will conduct warrants to investigate the need for additional turning lanes at the site accesses. Acceptable.

- Traffic operations analysis must be conducted per the Region's Transportation Impact Study (TIS) Guidelines. The Region's TIS Guidelines are available online at: https://www.halton.ca/Repository/Transportation-Impact-Study-Guidelines.
- Traffic operations results must be documented per the Region's Transportation Impact Study Guidelines, which includes bolding v/c ratios or 95th percentile queue lengths in the traffic operations results tables which exceed the critical thresholds as identified in the TIS Guidelines. The Region's TIS Guidelines are available online at: https://www.halton.ca/Repository/Transportation-Impact-Study-Guidelines.
- If traffic operations issues are identified under future background or total conditions, then the TIS will need to recommend mitigation measures to address these issues (even if not necessarily triggered by the proposed development) or at the very least, rationalize the traffic operations issues if there are no feasible mitigation measures. The TIS should identify who is responsible for each recommended mitigation measure, if required.
- The Region ultimately requires confirmation that the planned Regional Road Network can accommodate the planned growth in this area as well as the proposed development. As such, if there are intersections where capacity is an issue in the ultimate horizon, please demonstrate how accelerating the planned Derry Road widening to six lanes could mitigate these constraints under the ultimate horizon year.
- The TIS should acknowledge the benefit of the Region's long-term plans as identified in the 2011-2031 Transportation Master Plan. These plans include a new north south six-lane Regional corridor (known as 5 ½ Line) that would connect Britannia Road and Steeles Avenue to Highway 401 and provide additional roadway network capacity. The exact location and configuration will be confirmed through a future Municipal Class Environmental Assessment (MCEA) Study which has not yet been initiated. However, this future corridor (if implemented) would improve connectivity to and from the study area.
- If necessary, the report could also mention that the Region will monitor the need and timing of all corridor level improvement through updates to the Transportation Master Plan.

Parking Supply Review Town to comment on this section.

- TYLIN will complete a review of the proposed parking supply for the subject lands based on the Milton Urban Zoning By-law No. 016-2014 and confirm adequacy of the proposed parking supply. Should a deficiency be identified, TYLIN will provide a justification in coordination with the team.

- Any deficiency justification will be based on various factors, including shared parking methodology, study area characteristics and TTS data.

– If there is a deficiency in parking requirements based on the Town's zoning by-law, a parking justification study will be required as part of the TIS.

- As part of the parking supply review, TYLIN will complete a review of the accessible parking supply and loading supply to confirm if by-law requirements are met. – please note the Town will not support a deficiency in accessible parking/loading supplies.

Additional Components of the study

In addition to the above noted review for the subject lands, TYLIN will complete the following to be included as part of the study:

- Site Plan Review – to confirm that design standards are met internally to the site and at the accesses, and that site circulation can be accommodated without concern. Please confirm the design vehicles to be used for site circulation review. See comments below.

- Pavement Marking and Signage Plan – to identify all requirements for the lands. Acceptable.

- Completion of a Transportation Demand Management Plan for the site. Acceptable.

  - As discussed in Halton Region's pre-consultation comments for this development proposal, Halton Region's Access By-law (NO.32-17) Section 6.1 (a) states that "*access to a Regional Road from private property shall be permitted only where such access is necessary because access to a local road is not feasible.*" As access to Derry Road can be provided via Sixth Line, any proposed access directly to Derry Road will need to be justified via a TIS and will need to be approved by the Region. The justification should demonstrate that the proposed access conforms to Halton Region's Access Management Guideline (spacing, geometrics, sightlines, etc.), demonstrate the benefits of permitting access to Derry Road (e.g. traffic operations, safety, circulation, etc.) and highlight any negative impacts of not permitting access to Derry Road.
    - Given the available site frontage to Derry Road, the proposed access would have to operate as a right-in/right-out (RI/RO) access to conform to Halton Region's Access Management Guideline spacing requirements. The access would have to be RI/RO restricted by a raised centre median on Derry Road.
    - Halton Region must maintain priority and consideration for access requirements for adjacent properties on both the north and south side of Derry Road in the area, in co-ordination with the approved Derry Green Secondary Plan intersection locations.
  - The TIS must analyze traffic safety components associated with the proposed access to Derry Road including (but not limited to):
    - Sightlines along Derry Road;
    - the proposed clear throat length at the access; and
    - swept path analysis for the largest design vehicle anticipated to use the proposed access to Derry Road. The access should be designed as to allow a simultaneous inbound movement from the design vehicle and outbound movement from a passenger car, or vice versa.
  - The TIS must also review the proposed corner clearance on Sixth Line between Derry Road and the southerly proposed access to Sixth Line.

  – In the Site Circulation Review, please include vehicle turning templates for waste collection, emergency services, and loading vehicles. The figures should illustrate that access to relevant areas of the site (waste storage, fire routes, loading areas) are functional. Please also include vehicle turning diagrams for passenger vehicles, demonstrating that any critical parking spaces (at end of parking aisles, next to raised medians, etc.) are functional.

We hope that the above provides the necessary details for you to review our study methodology and provide us with the feedback required. If possible, we would appreciate a response from your respective teams by next Friday April 8, 2022, allowing us to get started on our review.

Should you have any questions about this email, please do not hesitate to contact me or Jonathan Law who is cc'd.

APPENDIX B

Site Plan

GENERAL NOTE:

DO NOT SCALE THESE DRAWINGS. ANY ERROR OR DISCREPANCY IS TO BE REPORTED IMMEDIATELY TO: MAINLINE PLANNING SERVICES INC.

LEGEND:

- CB — DENOTES DOUBLE CATCHBASIN
- CB — DENOTES SINGLE CATCHBASIN
- HW — DENOTES HANDWELL
- HMH — DENOTES HYDRO MANHOLE
- HP — DENOTES HYDRO POLE
- LS — DENOTES LIGHT STANDARD
- TSC — DENOTES TRAFFIC SIGNAL CONTROL
- TL — DENOTES TRAFFIC SIGNAL
- TJB — DENOTES TELEPHONE JUNCTION BOX
- PED — DENOTES TELEPHONE PEDESTAL
- WELL — DENOTES WELL
- BM — DENOTES BENCH MARK
- CSP — DENOTES CORRUGATED STEEL PIPE
- DENOTES DOCK HIGH TRUCK DOOR
- DENOTES GROUND LEVEL TRUCK DOOR
- —X—X— DENOTES FENCE
- —E— DENOTES OVERHEAD HYDRO CABLE
- —OC— DENOTES OVERHEAD CABLE

EXISTING RESIDENTIAL
ZONE: FD (FUTURE DEVELOPMENT) + NHS (NATURAL HERITAGE SYSTEM)
OP DESIGNATION: NATURAL HERITAGE SYSTEM

BLOCK 1
LAND TO BE CONVEYED FOR ROAD WIDENING
15m FROM CENTRELINE OF 6TH LINE
(791.6 sq.m.)

SIXTH LINE
PIN 24939-0057 (LT)

EXISTING (2) STOREY BRICK HOUSE

EXISTING RESIDENTIAL
ZONE: FD (FUTURE DEVELOPMENT)
OP DESIGNATION: INDUSTRIAL

EXISTING SHED

INDUSTRIAL BUILDING C
BUILDING AREA:
LEVEL 1: 9,779 SM / 105,260 SF
MEZZANINE: 697 SM / 7,502 SF
TOTAL GFA: 10,476 SM / 112,762 SF
CLR.HGT: ±10.0 M

COMMERCIAL BUILDING A
BUILDING AREA:
LEVEL 1: 2,531 SM / 27,241 SF
LEVEL 2: 2,596 SM / 27,944 SF
TOTAL GFA: 5,127 SM / 55,185 SF
CLR.HGT: ±7.0 M

INDUSTRIAL BUILDING D
BUILDING AREA:
LEVEL 1: 18,435SM / 198,429 SF
MEZZANINE: 1,625 SM / 17,494 SF
TOTAL GFA: 20,060 SM / 215,923 SF
CLR.HGT: ±11.0 M

INDUSTRIAL CONDO BUILDING B
BUILDING AREA:
LEVEL 1: 3,015 SM / 35,682 SF
MEZZANINE: 523 SM / 5,629 SF
TOTAL GFA: 3,838 SM / 41,311 SF
CLR.HGT: ±7.0 M

BLOCK 2
LAND TO BE CONVEYED FOR ROAD WIDENING
23.5 m FROM CENTRE LINE OF DERRY ROAD
(3642.7 sq.m.)

DERRY ROAD
PIN 25075-0160 (LT)

EXISTING GOLF COURSE
ZONE: OC (GOLF COURSE)
OP DESIGNATION: BUSINESS PARK

ZONE: FD (FUTURE DEVELOPMENT)
OP DESIGNATION: FUTURE INDUSTRIAL

ZONE: FD (FUTURE DEVELOPMENT)
OP DESIGNATION: INDUSTRIAL + BUSINESS PARK

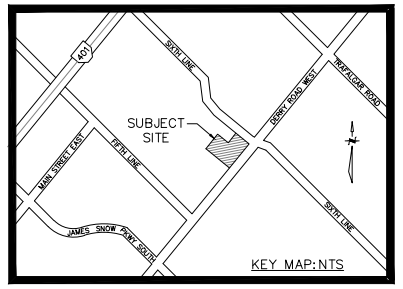
EXCLUSIVE SPACE IN FRONT OF OVERHEAD DOORS AND ADDITIONAL PARKING TO BE DETERMINED ON DESIGN

SCALE 1 : 500
10 0 10 20 30 METRES

LAND USE SCHEDULE

TOTAL SITE AREA:	=	76,134.0 sq.m.	(100.0%)
TOTAL BUILDING ENVELOPES	=	34,060.0 sq.m.	(44.7%)
BUILDING (A)	=	2,531.0 sq.m.	
BUILDING (B)	=	3,315.0 sq.m.	
BUILDING (C)	=	9,779.0 sq.m.	
BUILDING (D)	=	18,435.0 sq.m.	
BLOCK 1-2: LANDS TO BE CONVEYED FOR ROAD WIDENING	=	1,647.8 sq.m.	(2.2%)
TOTAL LANDSCAPED AREA	=	9,521.6 sq.m.	(12.5%)
TOTAL ASPHALT AREA	=	30,904.6 sq.m.	(40.6%)
TOTAL BUILDINGS G.F.A.	=	39,501.0 sq.m.	
BUILDING (A)	=	5,127.0 sq.m.	
BUILDING (B)	=	3,838.0 sq.m.	
BUILDING (C)	=	10,476.0 sq.m.	
BUILDING (D)	=	20,060.0 sq.m.	

BUILDING HEIGHT	= SEE PLAN
GARBAGE	= STORED INDOORS / PRIVATE COLLECTION
REQUIRED PARKING	= 446 TOTAL (INC. 11 ACCESSIBLE SPACES)
PROVIDED PARKING	= 495 TOTAL (INC. 18 ACCESSIBLE SPACES)
REQUIRED LOADING	= 13
PROVIDED LOADING	= 92
REQUIRED BICYCLE PARKING	= 17
PROVIDED BICYCLE PARKING	= 20
EXISTING ZONING	= FD (FUTURE DEVELOPMENT)
PROPOSED ZONING	= M1* (BUSINESS PARK – SITE SPECIFIC)
EXISTING USE OF LAND	= BUSINESS PARK AND INDUSTRIAL
PROPOSED USE OF LAND	= BUSINESS PARK AND INDUSTRIAL
ADJACENT USE OF LAND	= SEE PLAN



LEGAL DESCRIPTION

PLAN OF SURVEY ILLUSTRATING TOPOGRAPHY OF PART OF LOT 11 CONCESSION 6, NEW SURVEY (GEOGRAPHIC TOWNSHIP OF TRAFALGAR) TOWN OF MILTON REGIONAL MUNICIPALITY OF HALTON

NOTE:
ALL SURVEY INFORMATION PROVIDED BY J.D. BARNES LIMITED 401 WHEELABRATOR WAY, SUITE A, MILTON, ON L9T 3C1

NO.	DATE	DESCRIPTION	BY
1	JUN-23	SUBMITTED FOR ZBA APPLICATION	J.P.P.

REVISIONS

mainline planning services inc.
PH (905) 893-0046 FAX (888) 370-9474
P.O. BOX 319, KLEINBURG, ONTARIO, L0J 1C0

DRAWING TITLE
MILTON GATES
CONCEPT SITE PLAN

PROJECT
11801 DERRY ROAD
MILTON

DEVELOPER/OWNER
TAKOL CMCC DERRY LIMITED PARTNERSHIP

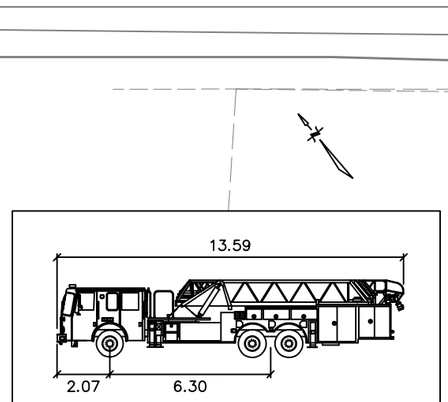
DRAWN	CHECKED	SCALE	DWG. NO.
K.A.R.	J.P.P.	1 = 500	CSP-1
DATE	ISSUED	CITY FILE No.	
AUG-22	J.P.P.		

APPENDIX C

Site Plan Functional Review

APPENDIX C1

Vehicle Movement Diagrams



SIXTH LINE

DERRY ROAD

INDUSTRIAL BUILDING C

INDUSTRIAL BUILDING D

COMMERCIAL BUILDING A

INDUSTRIAL CONDO BUILDING B

LANDSCAPE AREA

VISIBILITY TRIANGLE (9 m. x 9 m.)

2.2m CONCRETE SIDEWALK

< FIRE ROUTE >

ASPHALT

EXISTING (2) STOREY BRICK HOUSE

EXISTING SHED

POST & WIRE FENCE

PART 3, PLAN 20R-16616

PART 2, PLAN 20R-16616

SCALE 1 : 500

10 0 10 20 30 METRES

G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update

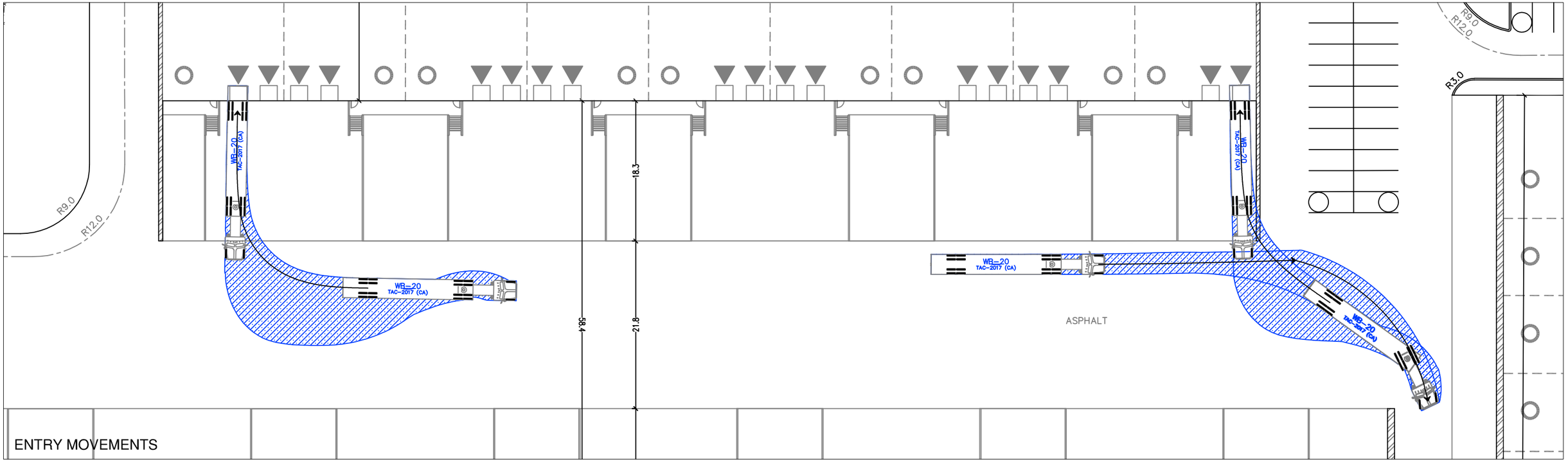
TYLin
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

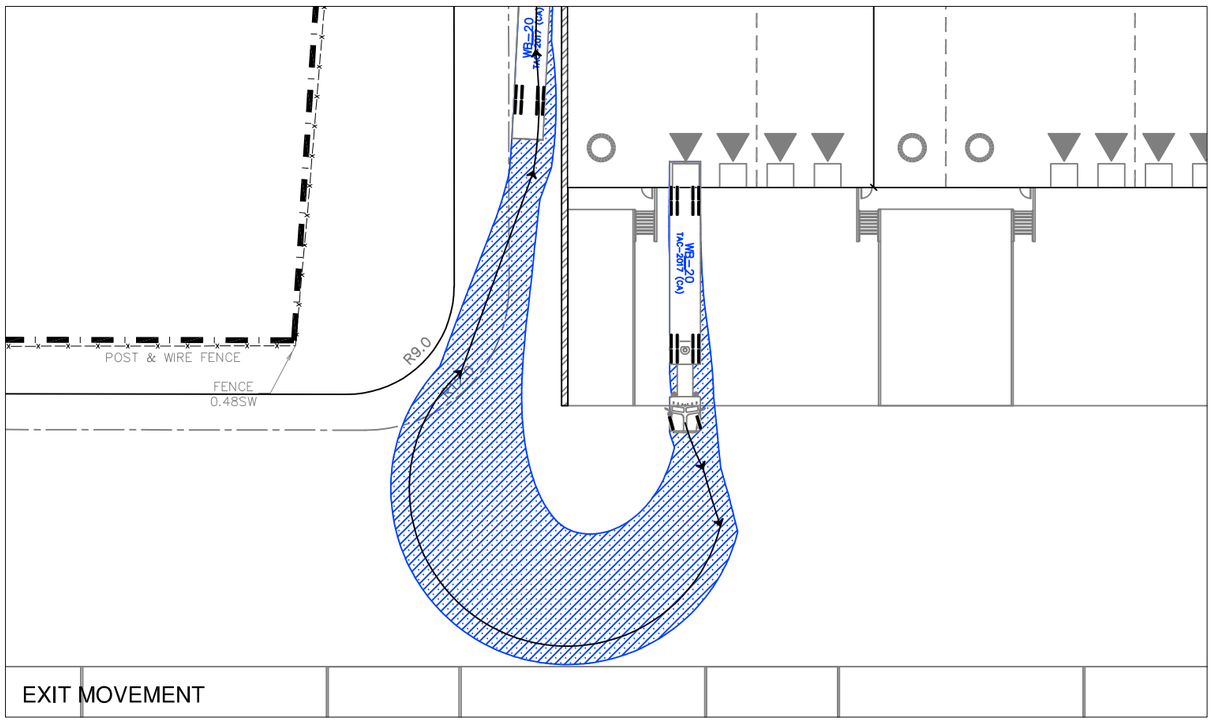
11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
FIRE ROUTE

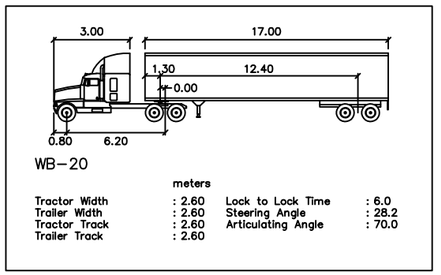
SCALE 1:1250

DRAWING No. 01

DATE DEC 2023







TYLin
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

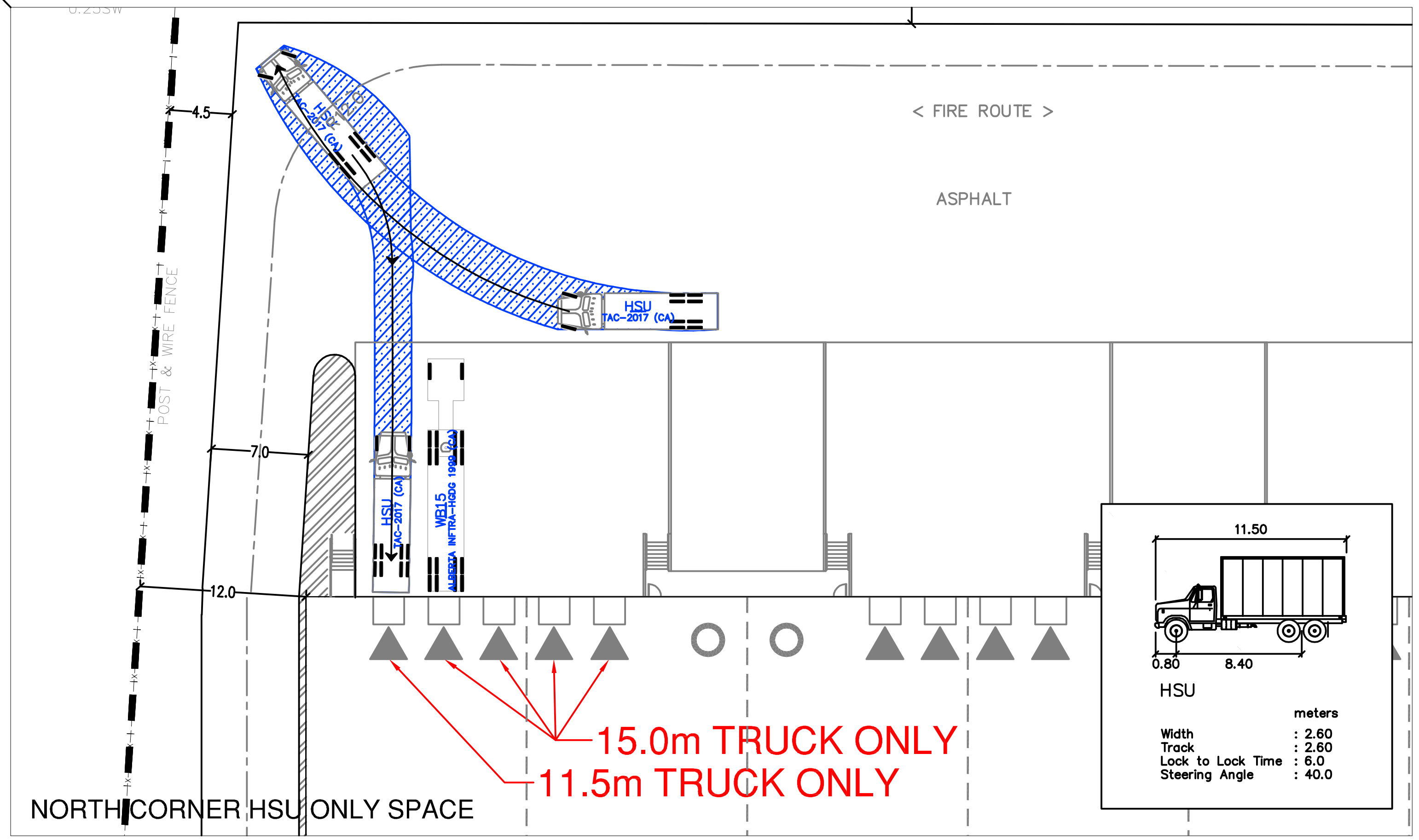
11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
BUILDING C - TRACTOR TRAILER CRITICAL LOADING SPACES

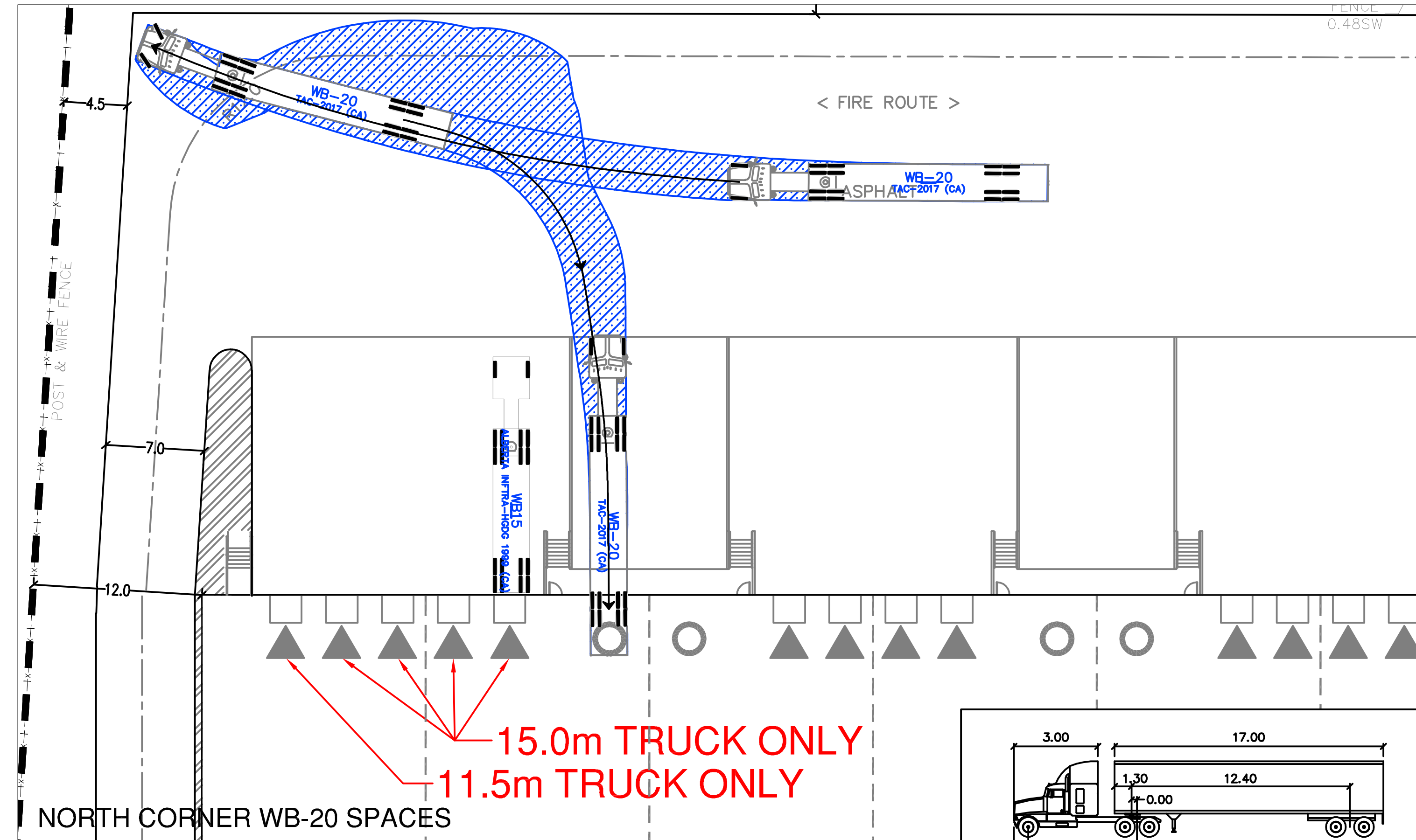
SCALE 1:500

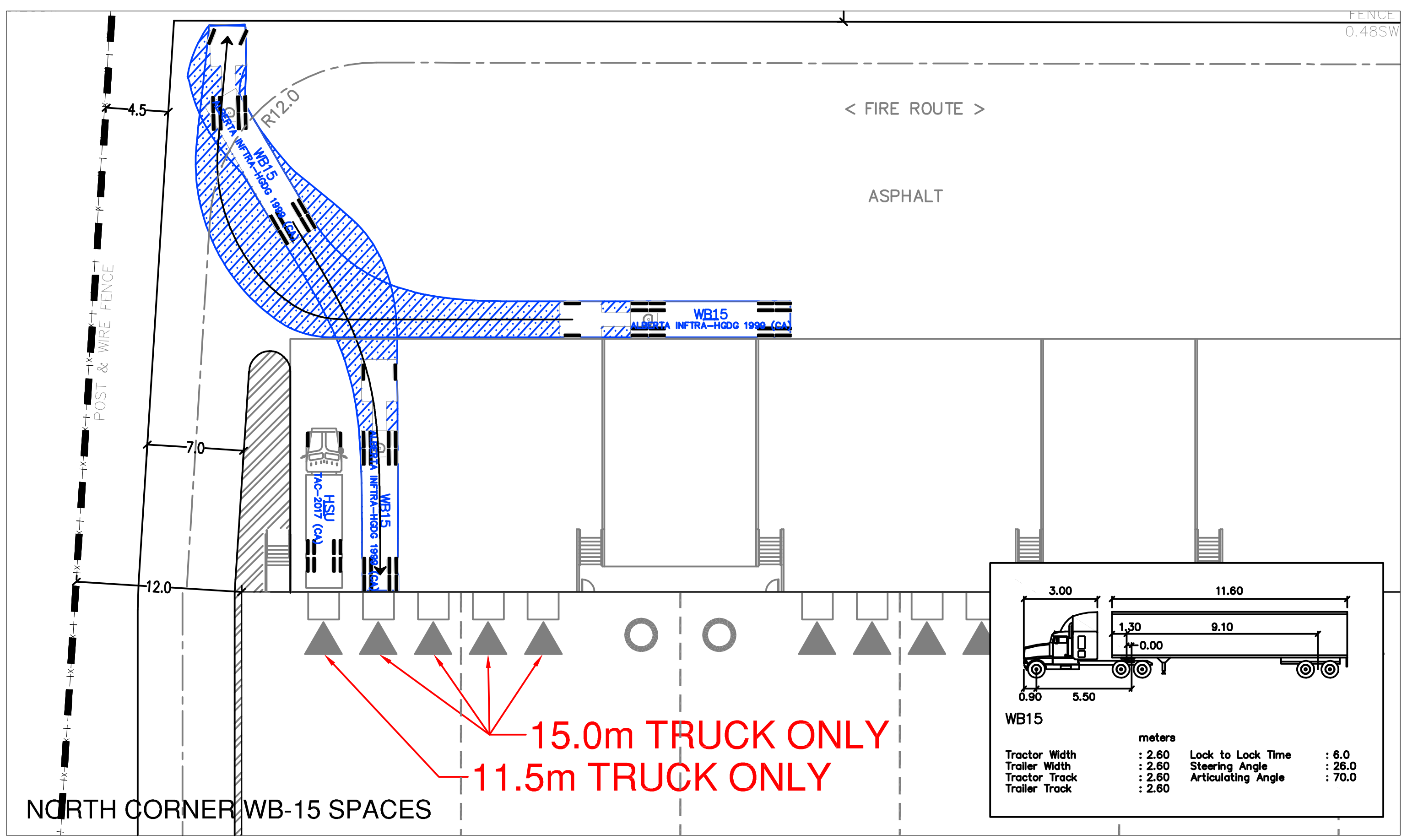
DRAWING No. 02

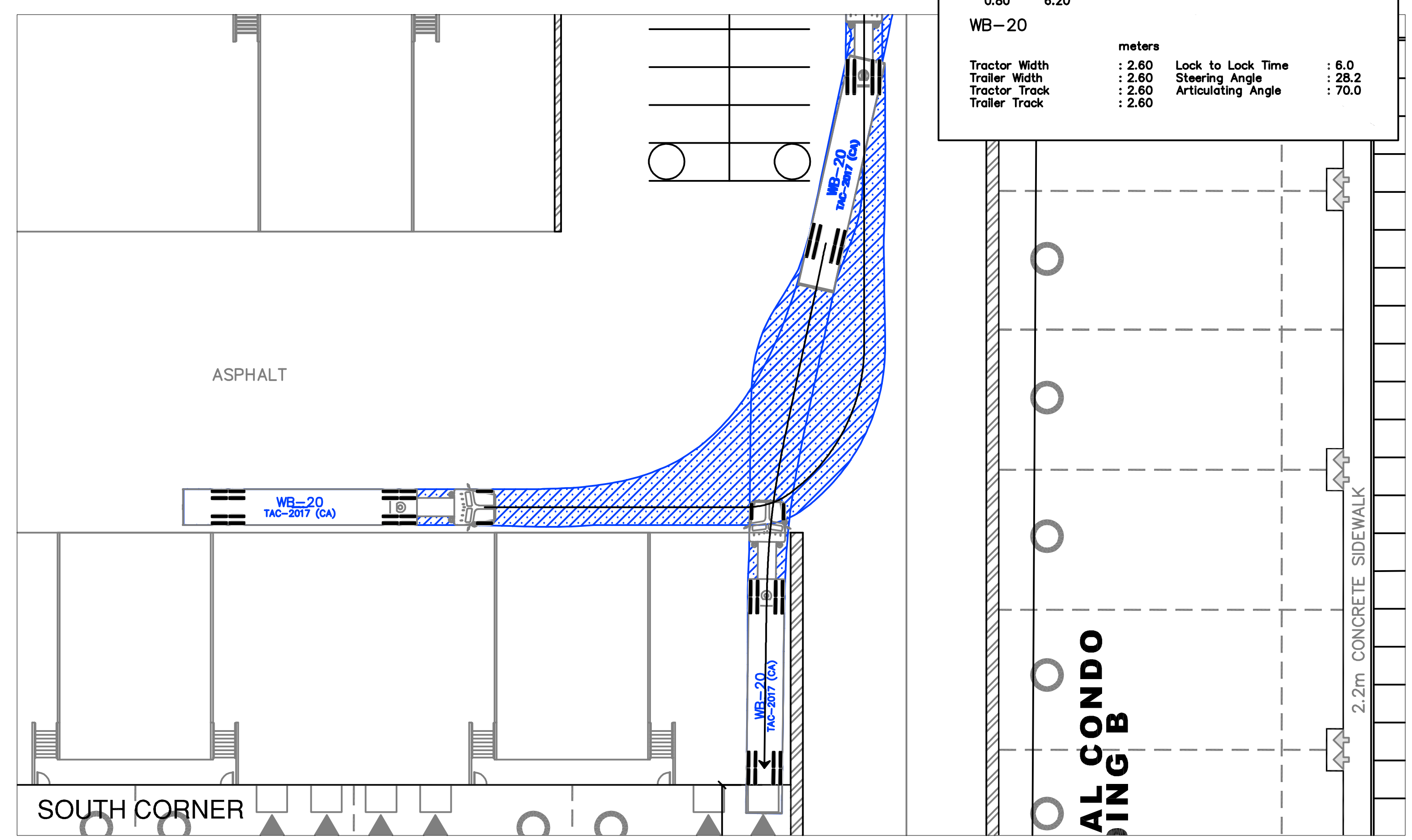
DATE DEC 2023

G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update









G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update

TYLin

8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

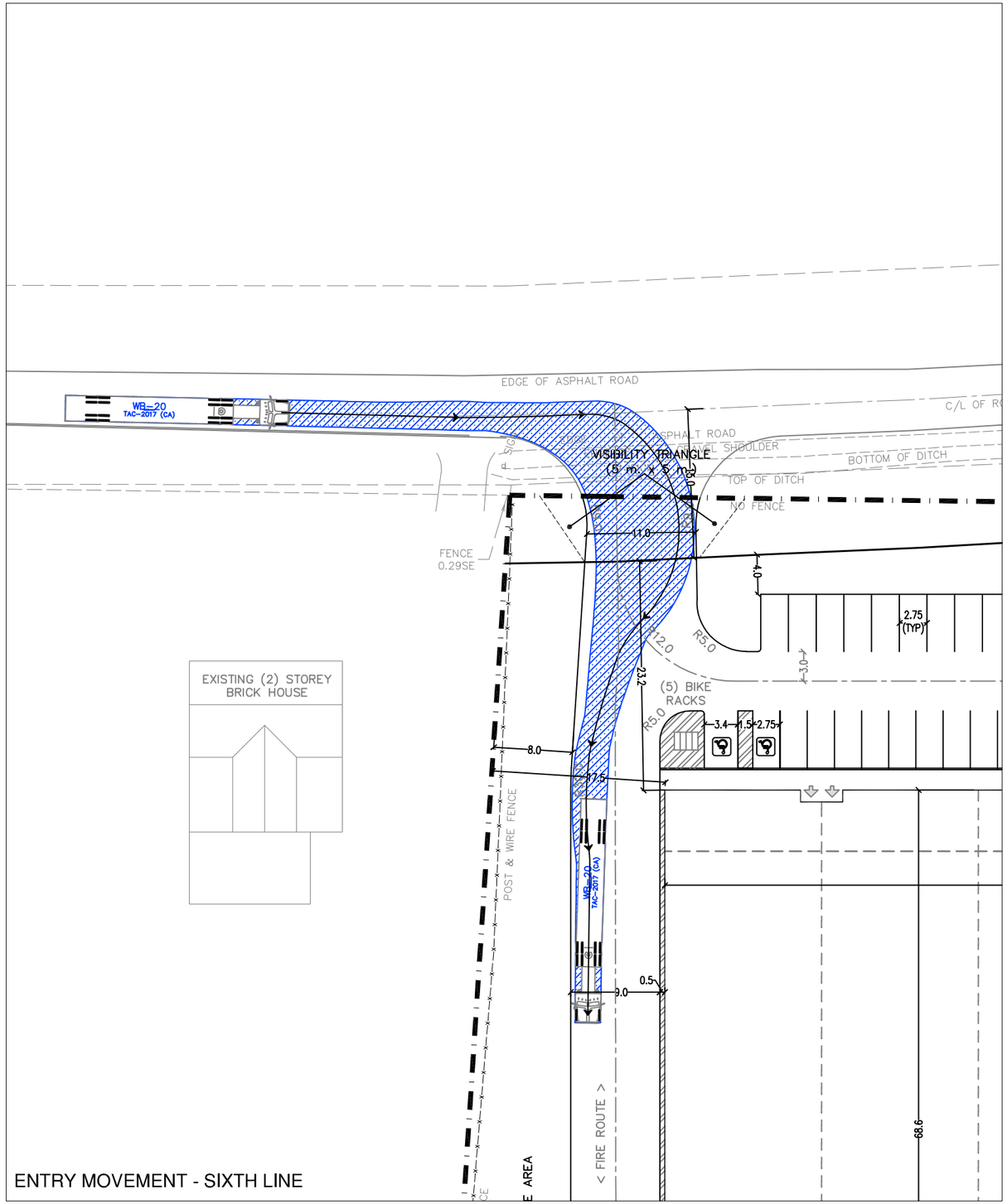
11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
BUILDING D - TRACTOR TRAILER CRITICAL LOADING SPACES

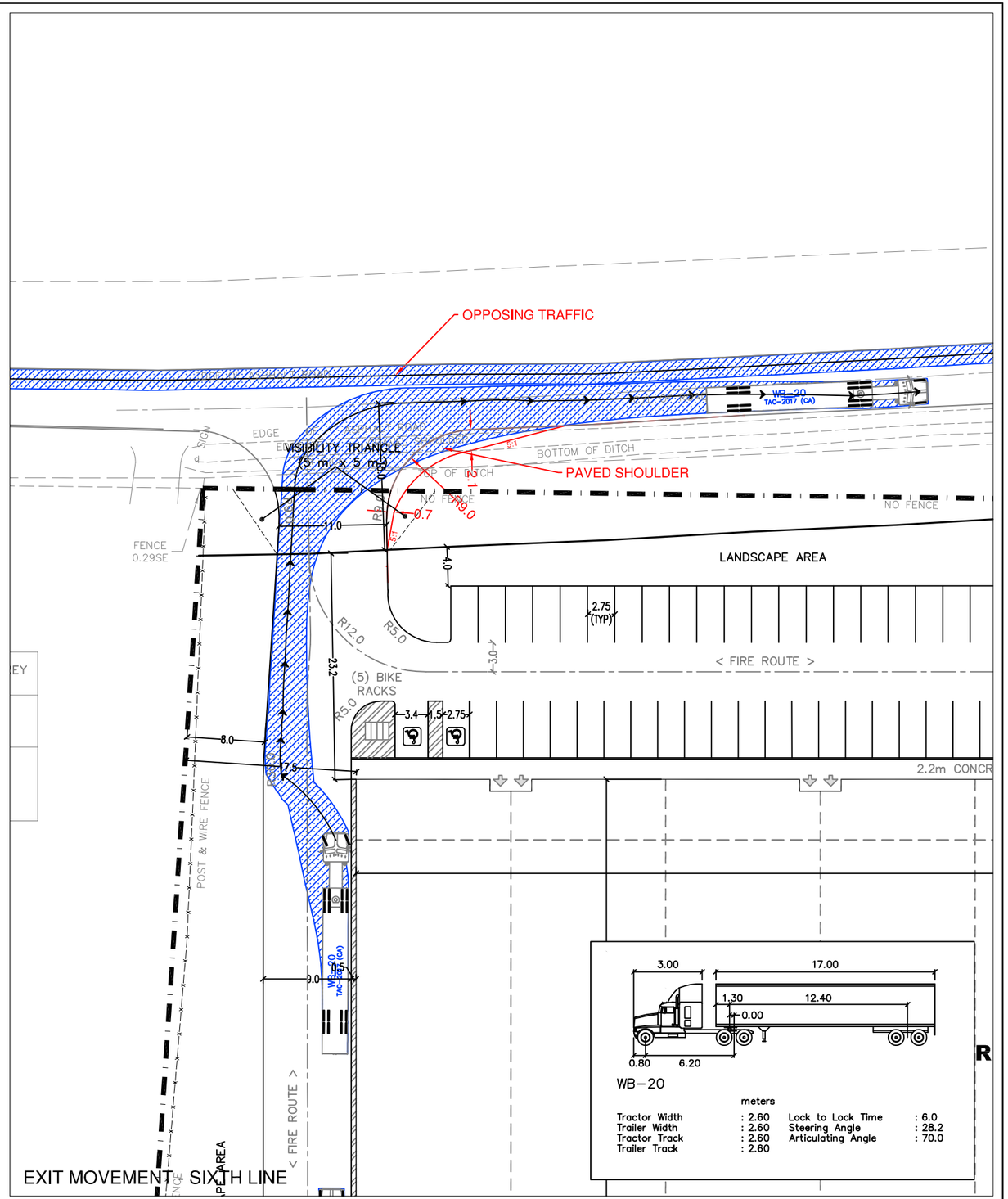
N

SCALE 1:500

DRAWING No. 03

DATE DEC 2023





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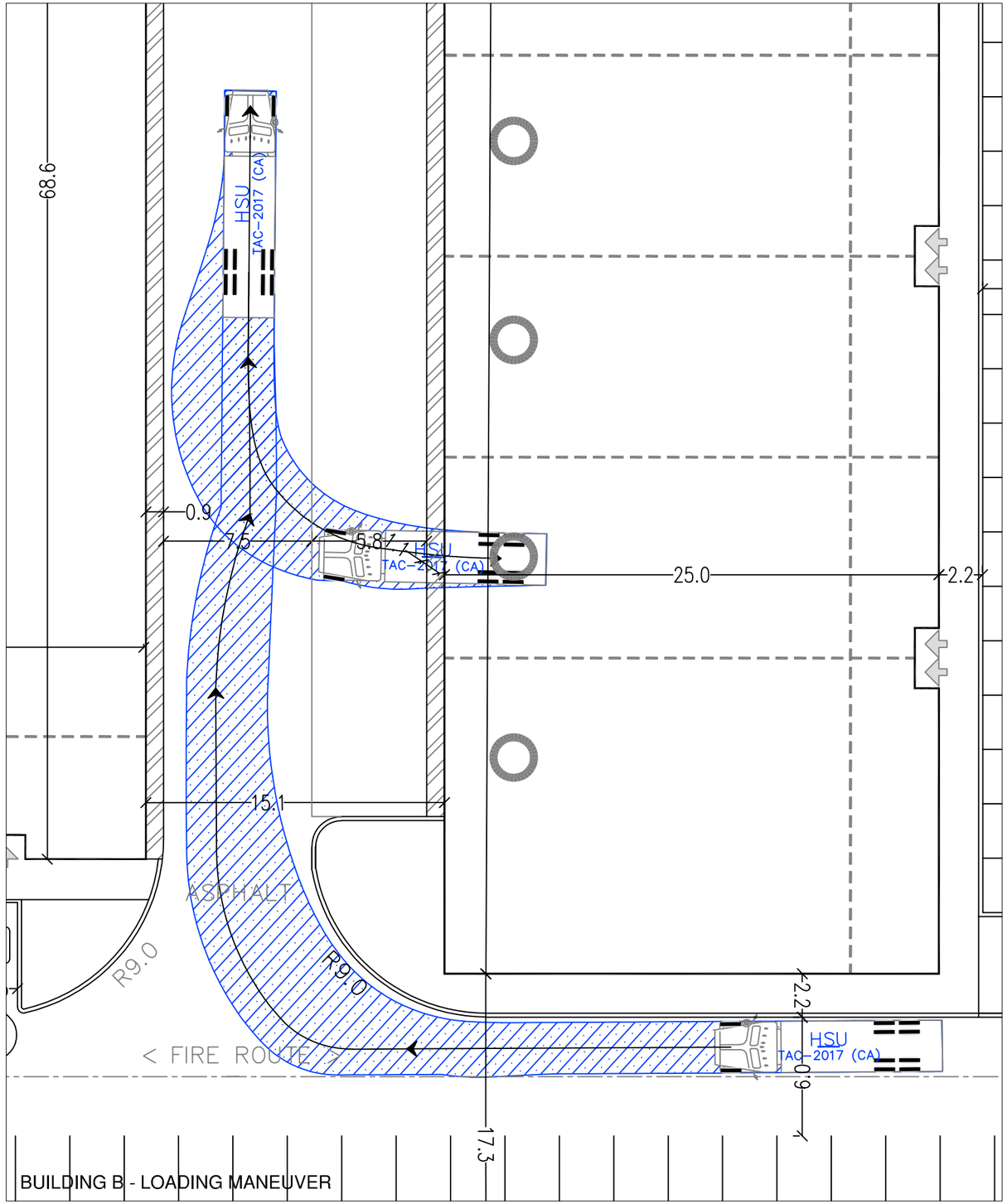
11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
WB-20 VEHICLE ACCESS

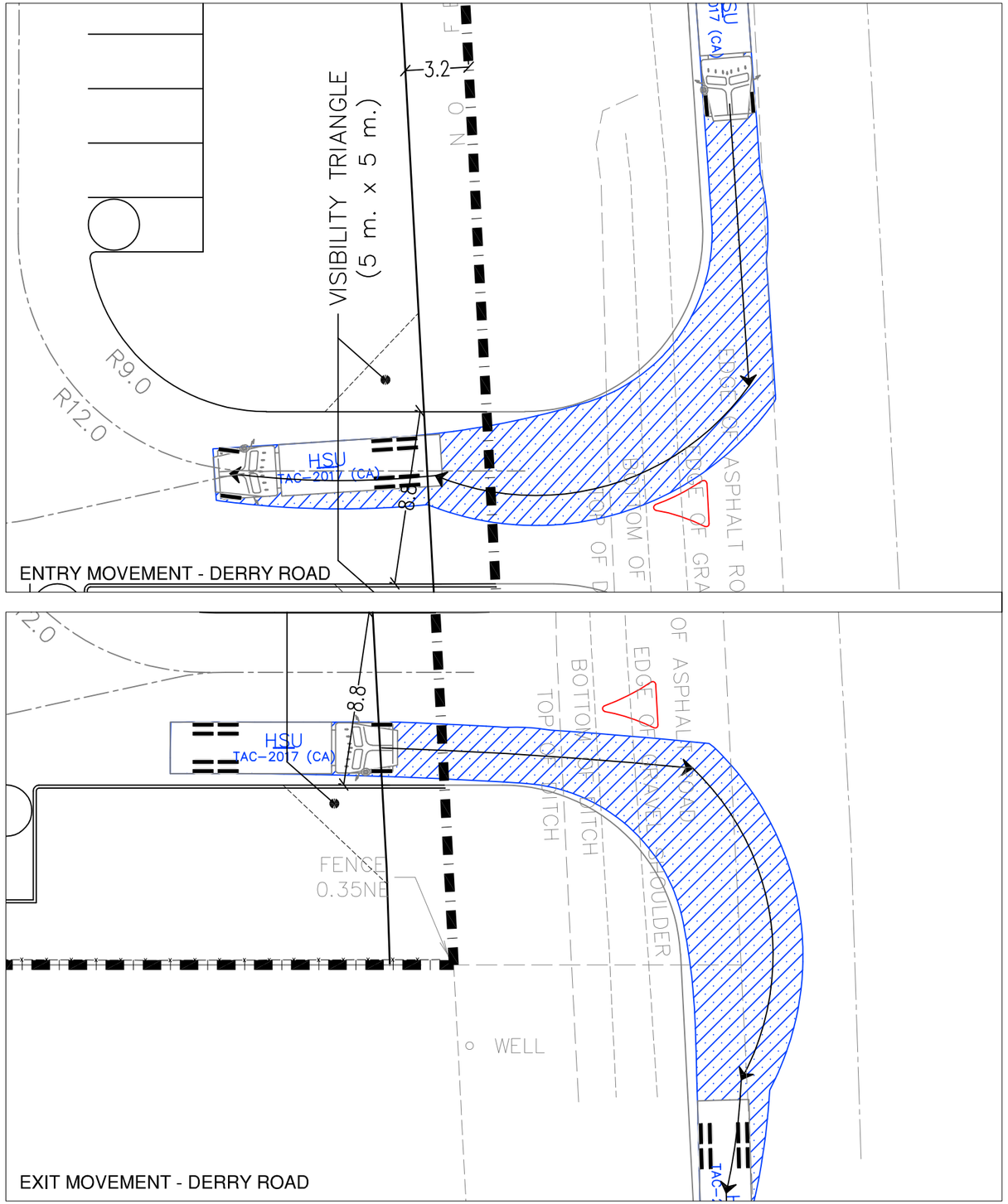
SCALE 1:500

DRAWING No.
04

DATE
DEC 2023



BUILDING B - LOADING MANEUVER



ENTRY MOVEMENT - DERRY ROAD

EXIT MOVEMENT - DERRY ROAD

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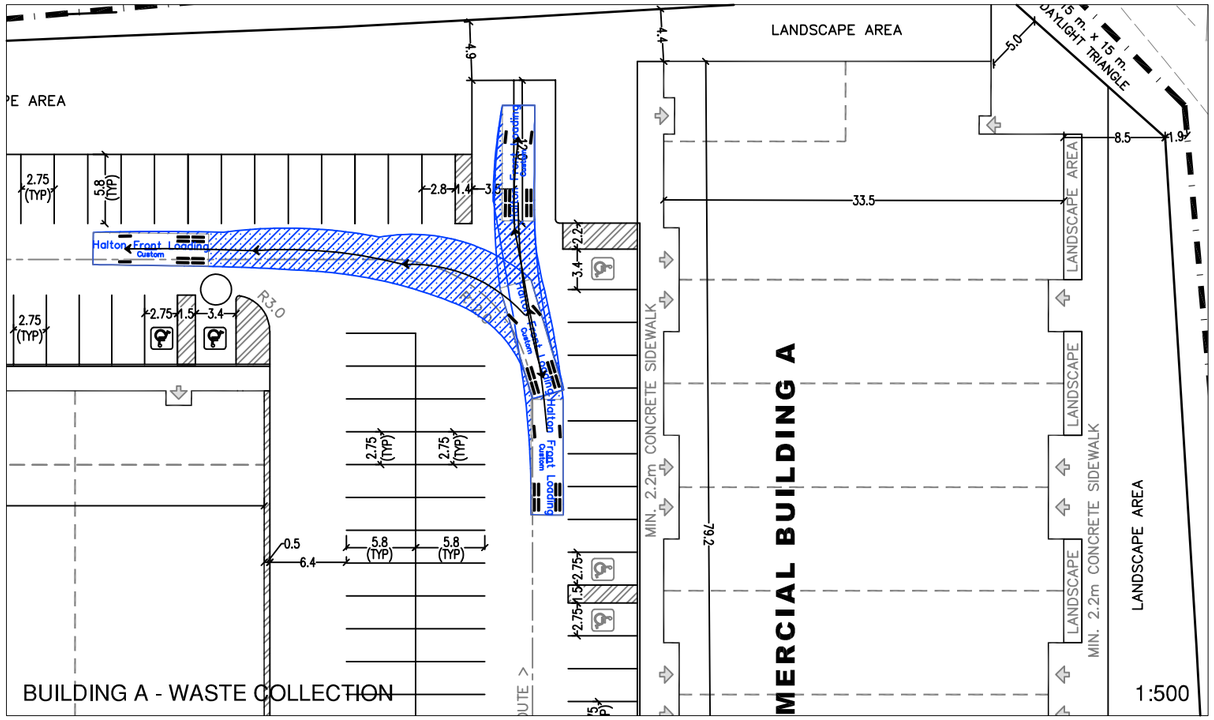
11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
HSU VEHICLE MOVEMENTS

SCALE 1:250

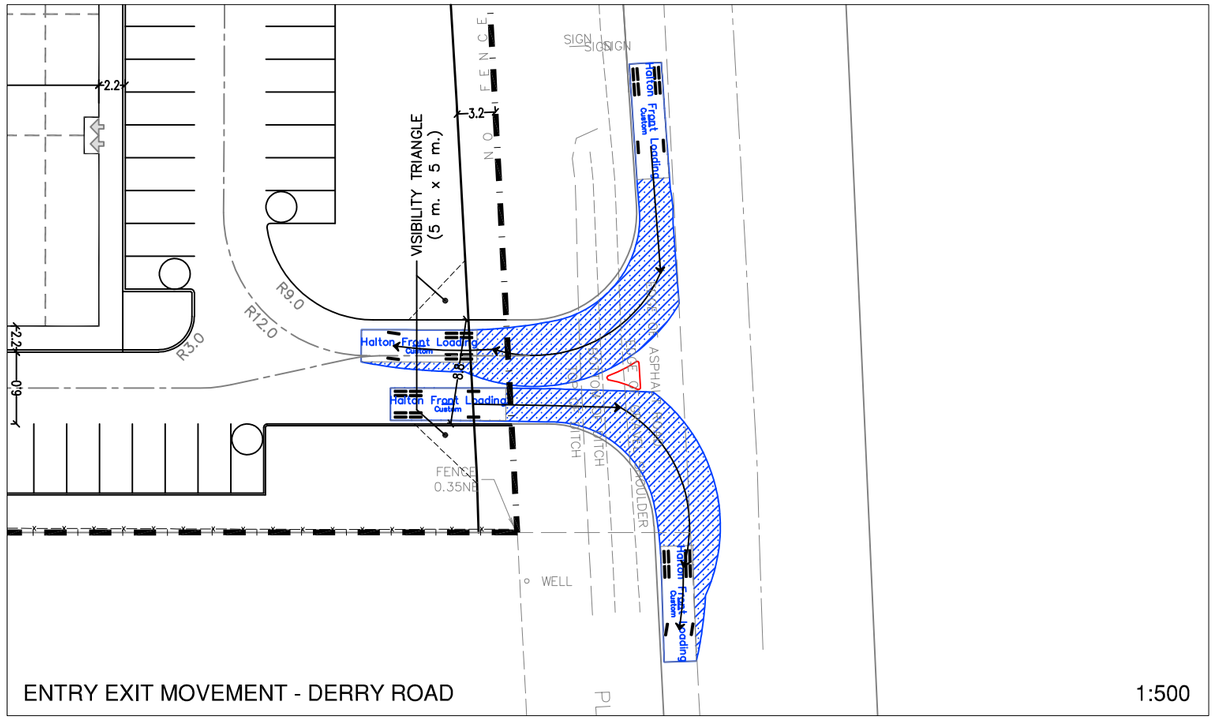
DRAWING No. 05

DATE DEC 2023

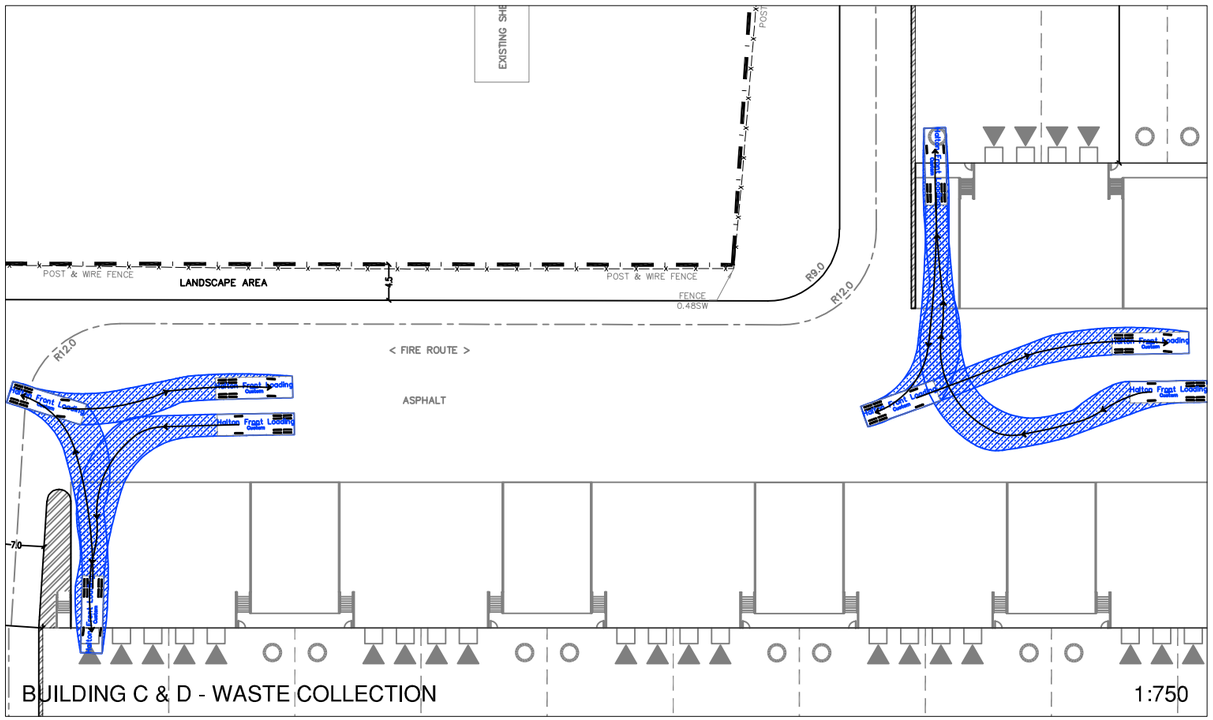
G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update



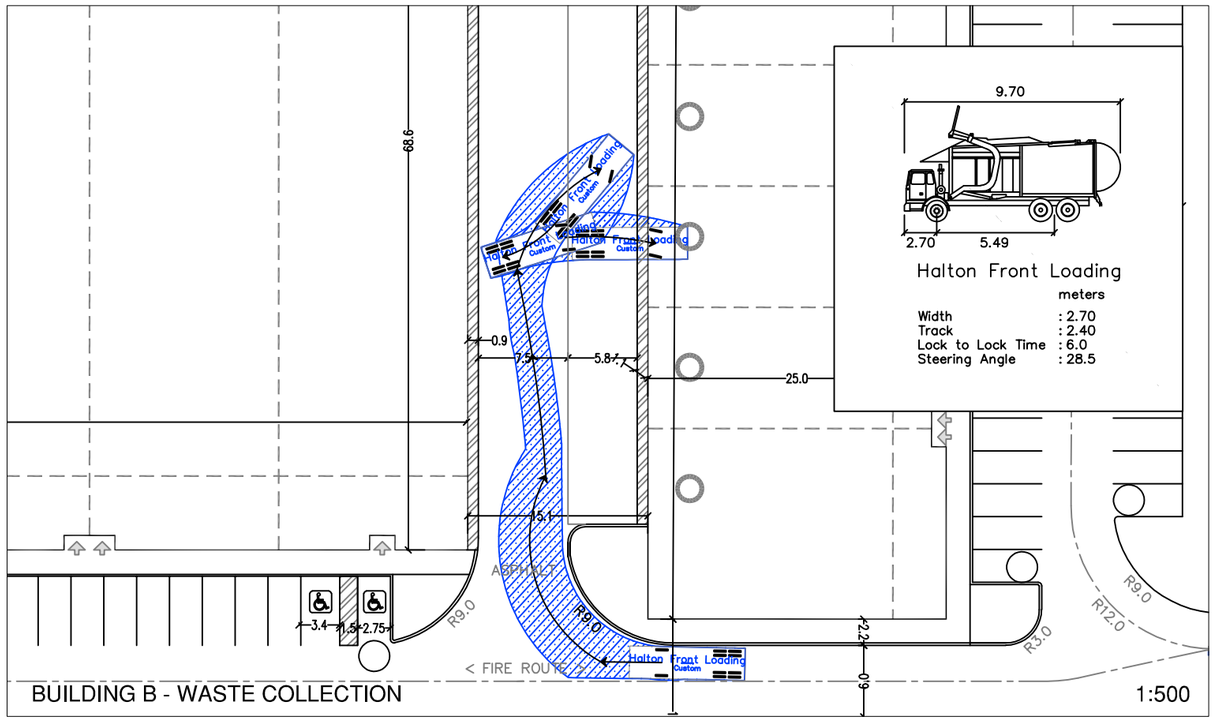
BUILDING A - WASTE COLLECTION 1:500



ENTRY EXIT MOVEMENT - DERRY ROAD 1:500



BUILDING C & D - WASTE COLLECTION 1:750



BUILDING B - WASTE COLLECTION 1:500

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11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
WASTE VEHICLE MOVEMENTS

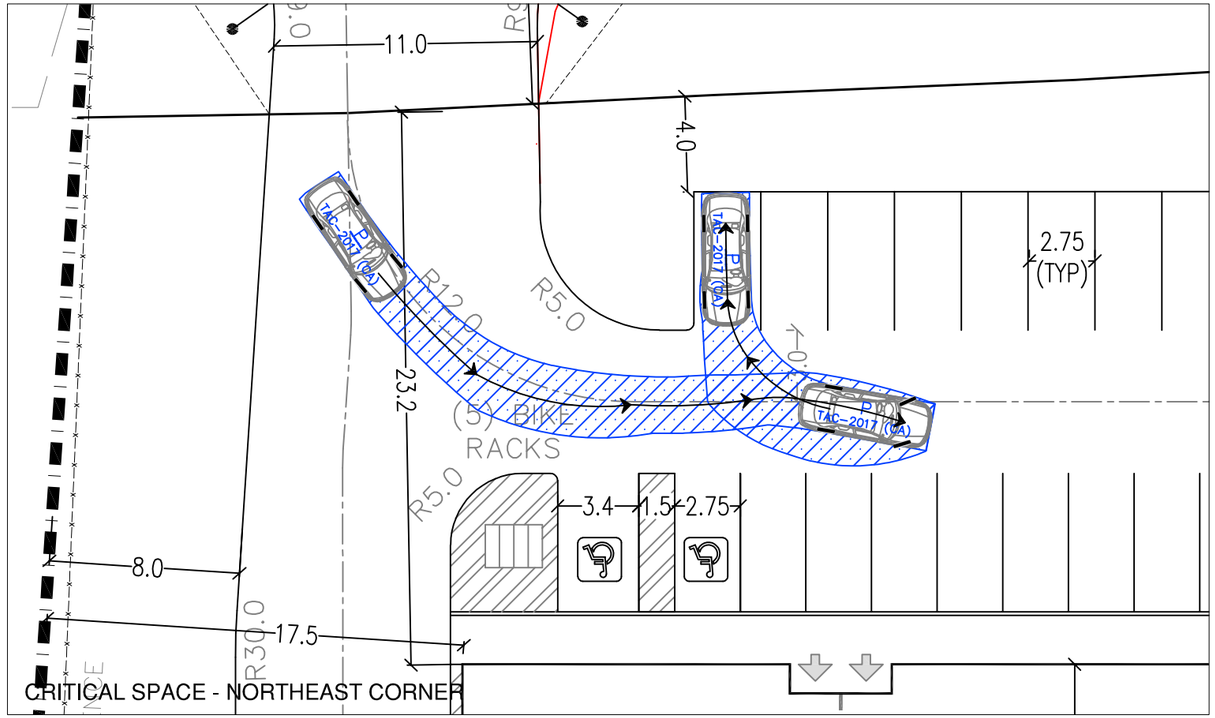
N

SCALE AS SHOWN

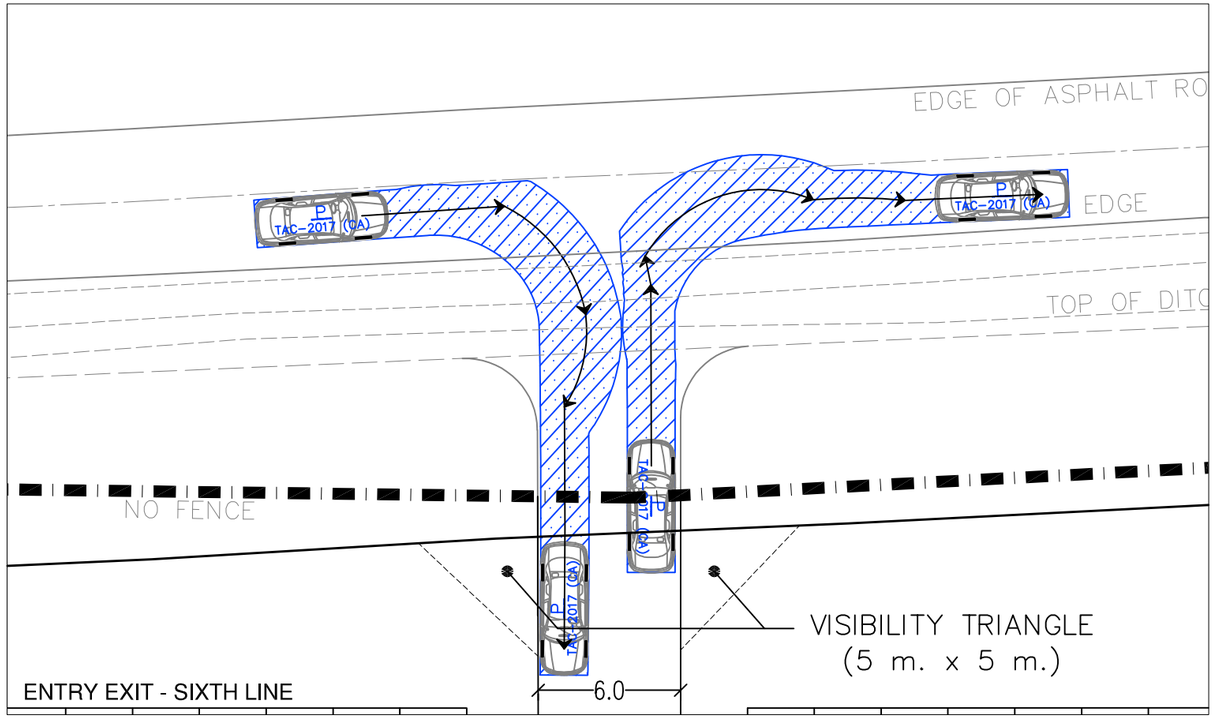
DRAWING No. 06

DATE DEC 2023

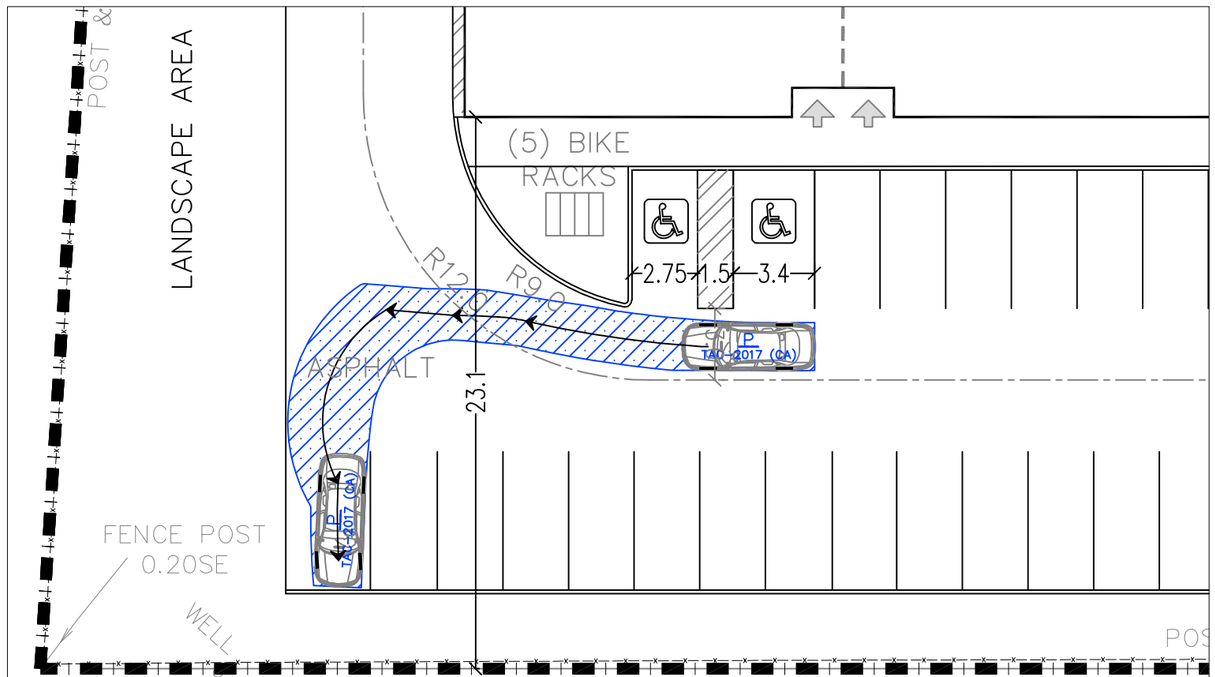
G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update



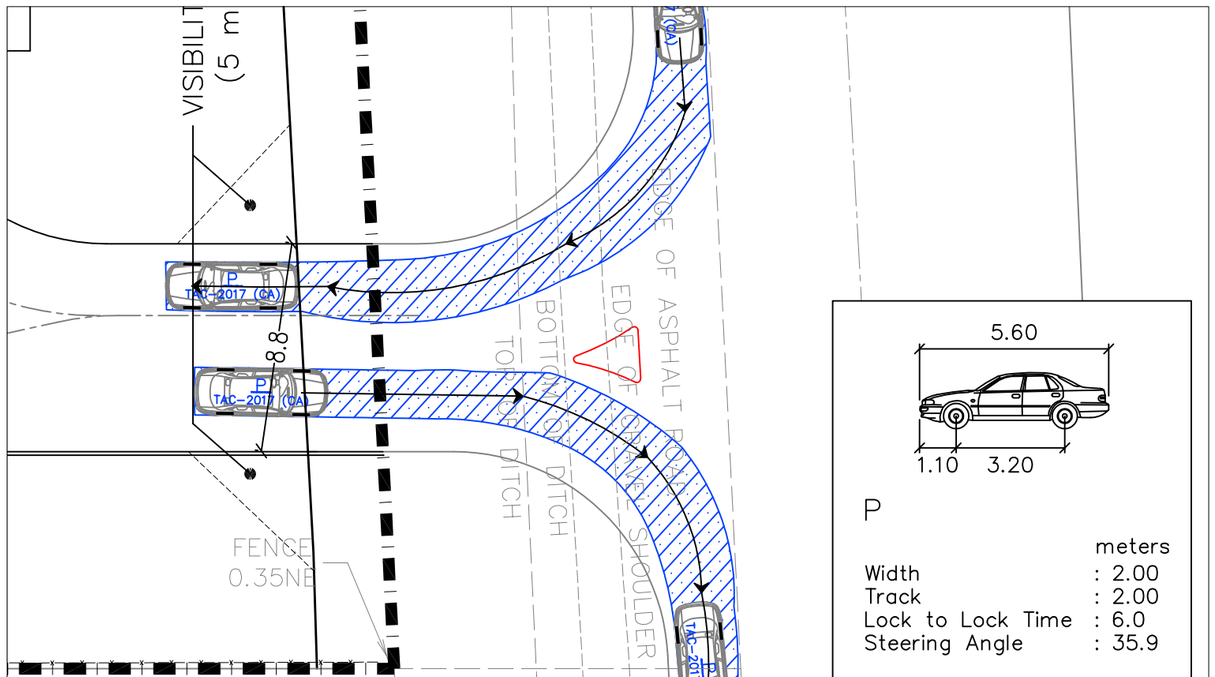
CRITICAL SPACE - NORTHEAST CORNER



ENTRY EXIT - SIXTH LINE



CRITICAL SPACE - NORTHWEST CORNER



ENTRY EXIT - DERRY ROAD

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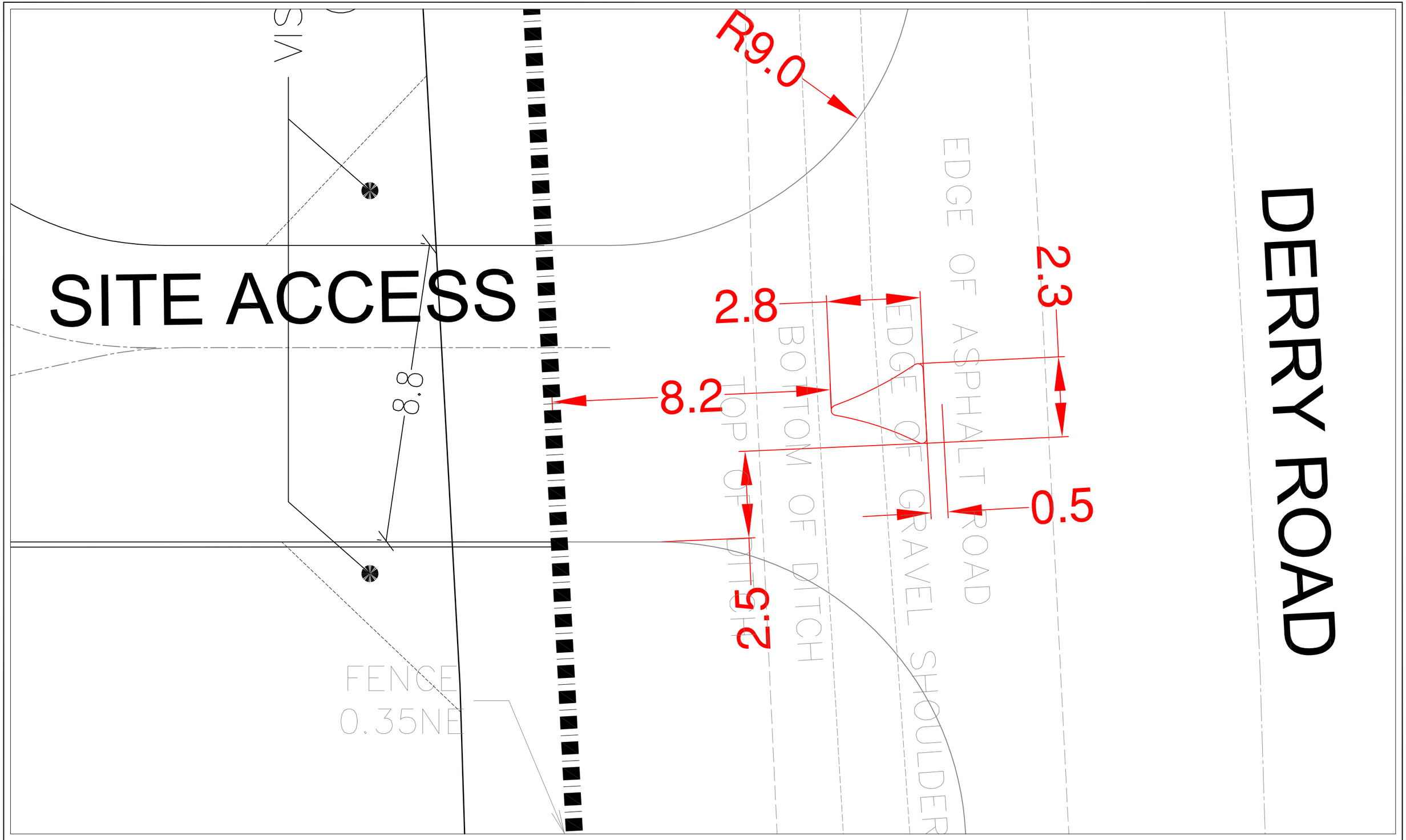
11801 DERRY ROAD
VEHICLE SWEPT PATH ANALYSIS
PASSENGER VEHICLE MOVEMENTS

SCALE 1:250

DRAWING No. 07

DATE DEC 2023



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11801 DERRY ROAD
DERRY ROAD RIGHT-IN RIGHT-OUT ISLAND

SCALE 1:100

DRAWING No. 08

DATE DEC 2023

APPENDIX C2

Access Sightline Review

G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211

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11801 DERRY ROAD
SIGHTLINE REVIEW
DERRY ROAD - RIGHT TURN

N

SCALE 1:500

DRAWING No.
01

DATE
DEC 2023

SIGHTLINE
SIGHT DISTANCE

SIXTH LINE

235 m

VISIBILITY TRIANGLE
(5 m. x 5 m.)

EXISTING (2) STOREY BRICK HOUSE

(5) BIKE RACKS

8.0

17.5

68.6

FIRE ROUTE

AREA

G:\Projects\2022\110509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update

TYLin

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Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

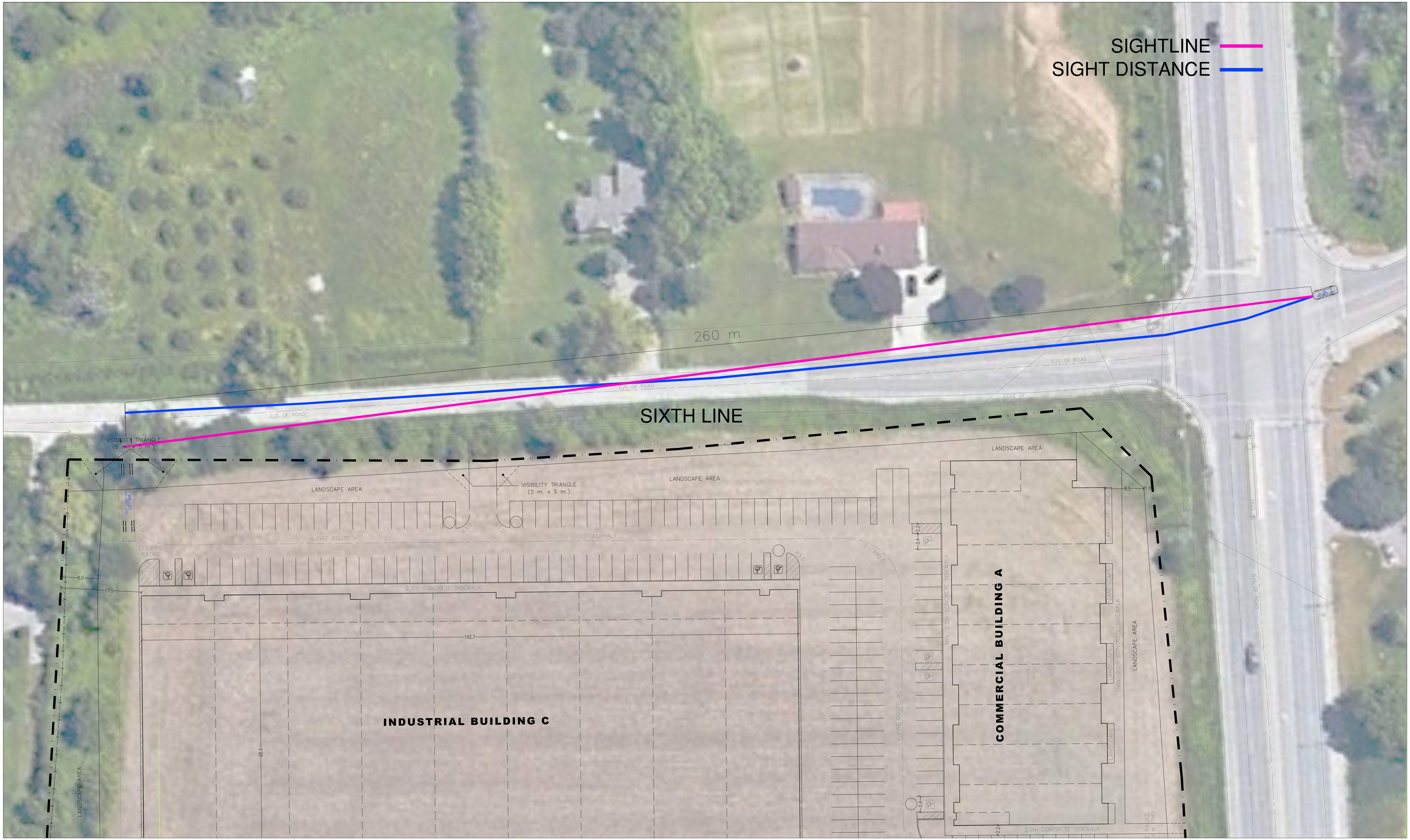
11801 DERRY ROAD
SIGHTLINE REVIEW
SIXTH LINE TRUCK ACCESS - RIGHT TURN

N

SCALE 1:750

DRAWING No.
02

DATE
DEC 2023



TYLin
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

11801 DERRY ROAD
SIGHTLINE REVIEW
SIXTH LINE TRUCK ACCESS - LEFT TURN

SCALE 1:750

DRAWING No. 03

DATE DEC 2023

SIGHTLINE
SIGHT DISTANCE

SIXTH LINE

145 m

C/L OF ROAD

EDGE OF ROAD

TOP OF DITCH

BOTTOM OF DITCH

SHOULDER

VISIBILITY TRIANGLE
(5 m. x 5 m.)

R9.0

FENCE

NO FENCE

LANDSCAPE AREA

VISIBILITY TRIANGLE
(5 m. x 5 m.)

R12.0

R3.0

R3.0

< FIRE ROUTE >

ASPHAL

EXISTING (2) STOREY
BRICK HOUSE

(5) BIKE
RACKS

R5.0

8.0

17.5

POST WIRE FENCE

2.2m CONCRETE SIDEWALK

142.7

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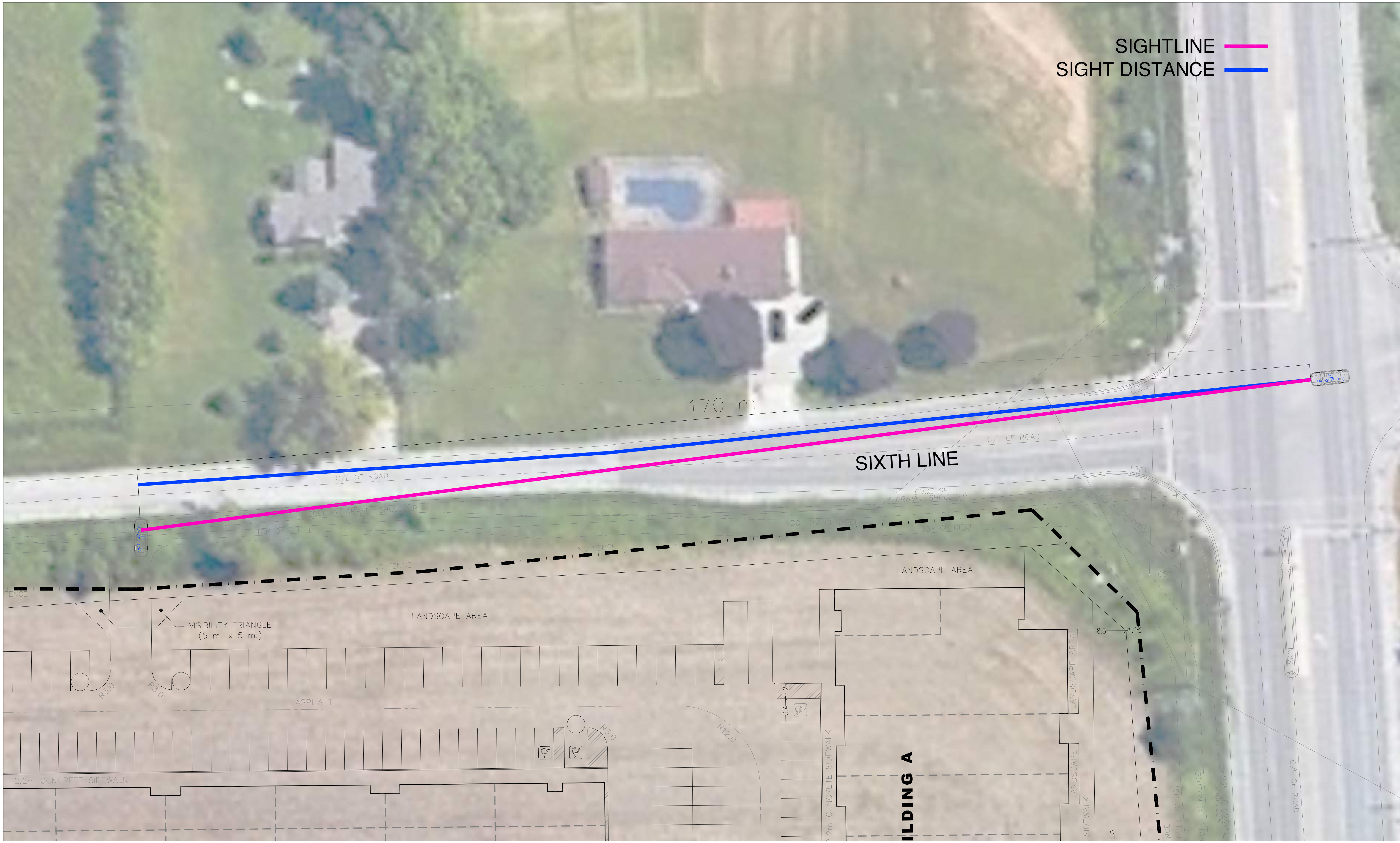
11801 DERRY ROAD
SIGHTLINE REVIEW
SIXTH LINE SECONDARY ACCESS - RIGHT TURN

N

SCALE 1:500

DRAWING No.
04

DATE
DEC 2023



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Suite 200
Vaughan, ON
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11801 DERRY ROAD
SIGHTLINE REVIEW
SIXTH LINE SECONDARY ACCESS - LEFT TURN

SCALE 1:500

DRAWING No. 05

DATE DEC 2023

APPENDIX C3

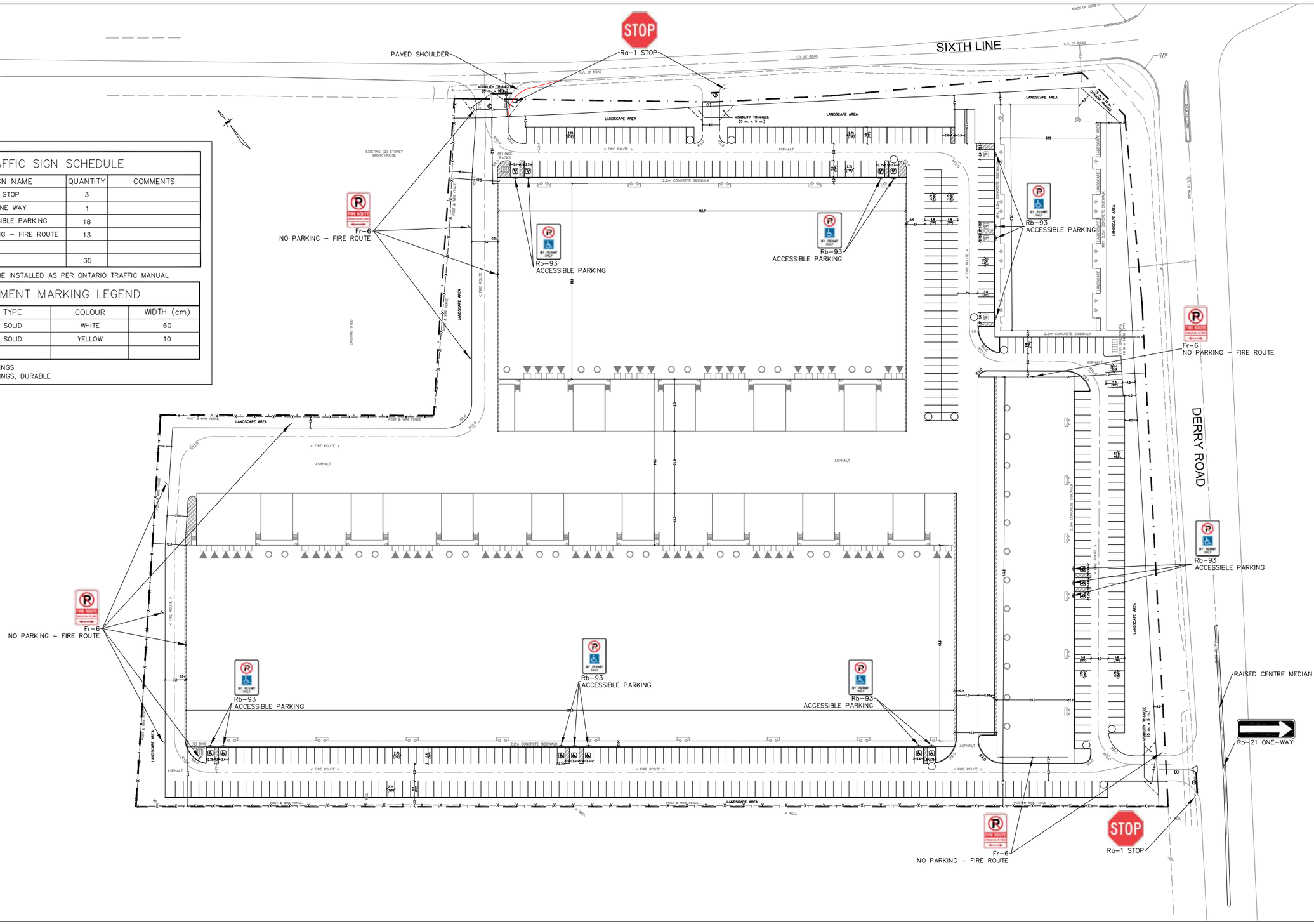
Pavement Marking and Signage Plan

TRAFFIC SIGN SCHEDULE			
SIGN NUMBER	SIGN NAME	QUANTITY	COMMENTS
Ra-1	STOP	3	
Rb-21	ONE WAY	1	
Rb-93	ACCESSIBLE PARKING	18	
Fr-6	NO PARKING – FIRE ROUTE	13	
TOTAL		35	

ALL REGULATORY SIGNS TO BE INSTALLED AS PER ONTARIO TRAFFIC MANUAL

PAVEMENT MARKING LEGEND			
IDENTIFICATION	TYPE	COLOUR	WIDTH (cm)
1	SOLID	WHITE	60
2	SOLID	YELLOW	10

◯ DENOTES PAVEMENT MARKINGS
⬡ DENOTES PAVEMENT MARKINGS, DURABLE



TYLin
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

11801 DERRY ROAD
PAVEMENT MARKING AND SIGNAGE PLAN

SCALE 1:1250

DRAWING No. 01

DATE DEC 2023

APPENDIX D

Shared Parking Analysis

11801 Derry Rd Shared Parking Analysis

Proposed Landuse	GFA (m2)	GFA-10%	Parking rate	Parking Required	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM
Building A Commercial	4755.4	4279.849		143	3%	15%	50%	90%	100%	100%	85%	85%	95%	95%	85%	60%	25%	15%	5%	3%	1%	0%	0%
Building B Industrial Condo	3838.0	3454.2	1 space/30 m2 of GFA	116	3%	15%	50%	90%	100%	100%	85%	85%	95%	95%	85%	60%	25%	15%	5%	3%	1%	0%	0%
Building C Industrial	9779.2	8801.305	For GFA up to 5000 m2, 1 space/125 m2 of GFA +	60	3%	15%	50%	90%	100%	100%	85%	85%	95%	95%	85%	60%	25%	15%	5%	3%	1%	0%	0%
Building D Industrial	20060.0	18054	For GFA over 5000 m2, 1 space/200 m2 of GFA	106	3%	15%	50%	90%	100%	100%	85%	85%	95%	95%	85%	60%	25%	15%	5%	3%	1%	0%	0%
			Total Demand	425	13	64	213	383	425	425	362	362	404	404	362	255	107	64	22	13	5	0	0
Restaurant	371.6	334.5	1 space/9 m2 of GFA	38	0%	0%	0%	0%	15%	40%	75%	75%	65%	40%	50%	75%	95%	100%	100%	100%	95%	75%	25%
Banquet Hall	696.8	627.1	1 space/5m2 of GFA	126	0%	0%	30%	60%	60%	60%	65%	65%	65%	65%	65%	100%	100%	100%	100%	100%	50%	0%	0%
			Total Demand	164	0	0	38	76	82	91	111	111	107	98	101	155	163	164	164	164	100	29	10
				Hourly Parking Demand	13	64	251	459	507	**516**	473	473	511	502	463	410	270	228	186	177	105	29	10

Max Demand **516**

APPENDIX E

Turning Movement Counts

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

Municipality: Milton
Site #: 2223200003
Intersection: Derry Rd & Fifth Line
TFR File #: 1
Count date: 7-Dec-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

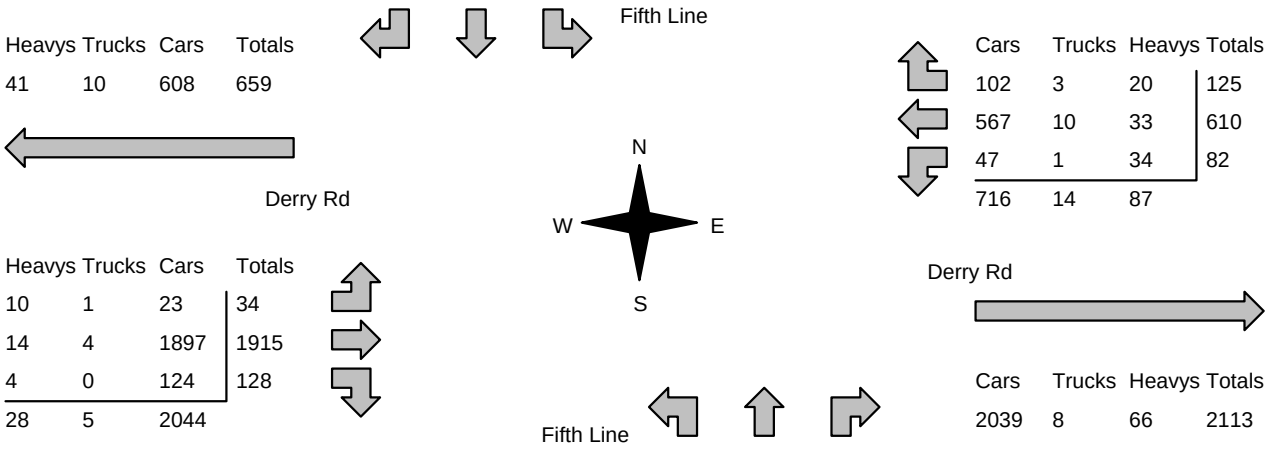
Major Road: Derry Rd runs W/E

North Leg Total:	341
North Entering:	149
North Peds:	0
Peds Cross:	⋈

Heavys	2	2	10	14
Trucks	0	1	2	3
Cars	5	63	64	132
Totals	7	66	76	

Heavys	34			
Trucks	4			
Cars	154			
Totals	192			

East Leg Total:	2930
East Entering:	817
East Peds:	0
Peds Cross:	⧖



Heavys	Trucks	Cars	Totals
41	10	608	659

Cars	Trucks	Heavys	Totals
102	3	20	125
567	10	33	610
47	1	34	82
716	14	87	

Heavys	Trucks	Cars	Totals
10	1	23	34
14	4	1897	1915
4	0	124	128
28	5	2044	

Cars	Trucks	Heavys	Totals
2039	8	66	2113

Peds Cross:	⧖
West Peds:	0
West Entering:	2077
West Leg Total:	2736

Cars	234			
Trucks	2			
Heavys	40			
Totals	276			

Cars	36	29	78	143
Trucks	0	0	2	2
Heavys	6	4	42	52
Totals	42	33	122	

Peds Cross:	⋈
South Peds:	0
South Entering:	197
South Leg Total:	473

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

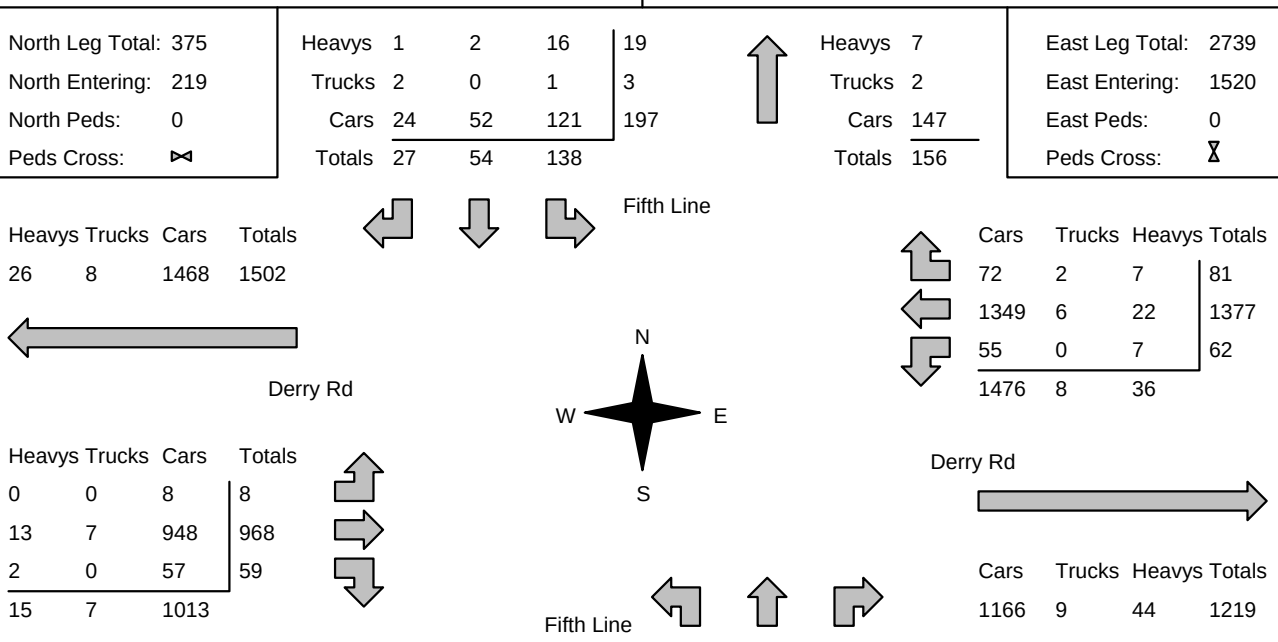
Municipality: Milton
Site #: 2223200003
Intersection: Derry Rd & Fifth Line
TFR File #: 1
Count date: 7-Dec-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Derry Rd runs W/E



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

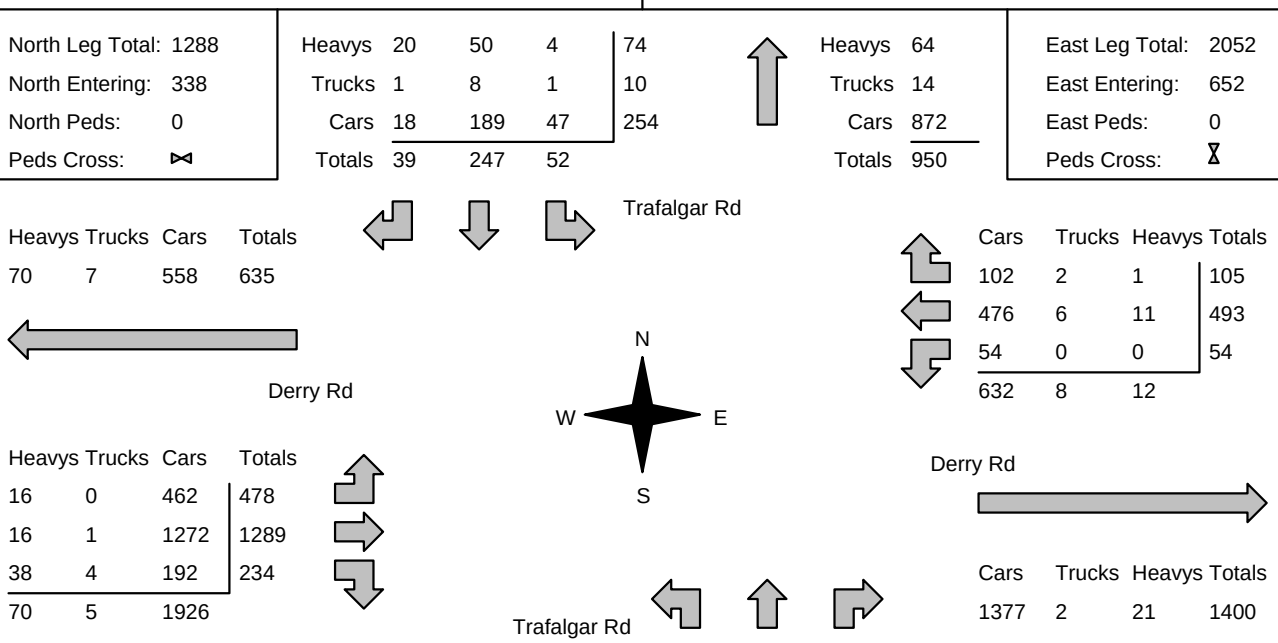
Municipality: Milton
Site #: 2223200001
Intersection: Derry Rd & Trafalgar Rd
TFR File #: 1
Count date: 7-Dec-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Derry Rd runs W/E



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Milton
Site #: 2223200001
Intersection: Derry Rd & Trafalgar Rd
TFR File #: 1
Count date: 7-Dec-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Derry Rd runs W/E

North Leg Total: 1337
North Entering: 479
North Peds: 0
Peds Cross: ⋈

Heavys	3	17	0	20
Trucks	0	5	1	6
Cars	66	278	109	453
Totals	69	300	110	

Heavys	49
Trucks	9
Cars	800
Totals	858

East Leg Total: 2198
East Entering: 1278
East Peds: 0
Peds Cross: ⧖

Trafalgar Rd

Heavys	Trucks	Cars	Totals
28	7	1280	1315

Derry Rd

Cars	Trucks	Heavys	Totals
105	1	2	108
1072	6	16	1094
76	0	0	76
1253	7	18	

N
W E
S

Heavys	Trucks	Cars	Totals
27	2	159	188
22	4	724	750
1	3	101	105
50	9	984	

Derry Rd

Cars	Trucks	Heavys	Totals
892	6	22	920

Trafalgar Rd

Peds Cross: ⧖
West Peds: 1
West Entering: 1043
West Leg Total: 2358

Cars	455
Trucks	8
Heavys	18
Totals	481

Cars	142	536	59	737
Trucks	1	6	1	8
Heavys	9	20	0	29
Totals	152	562	60	

Peds Cross: ⋈
South Peds: 0
South Entering: 774
South Leg Total: 1255

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

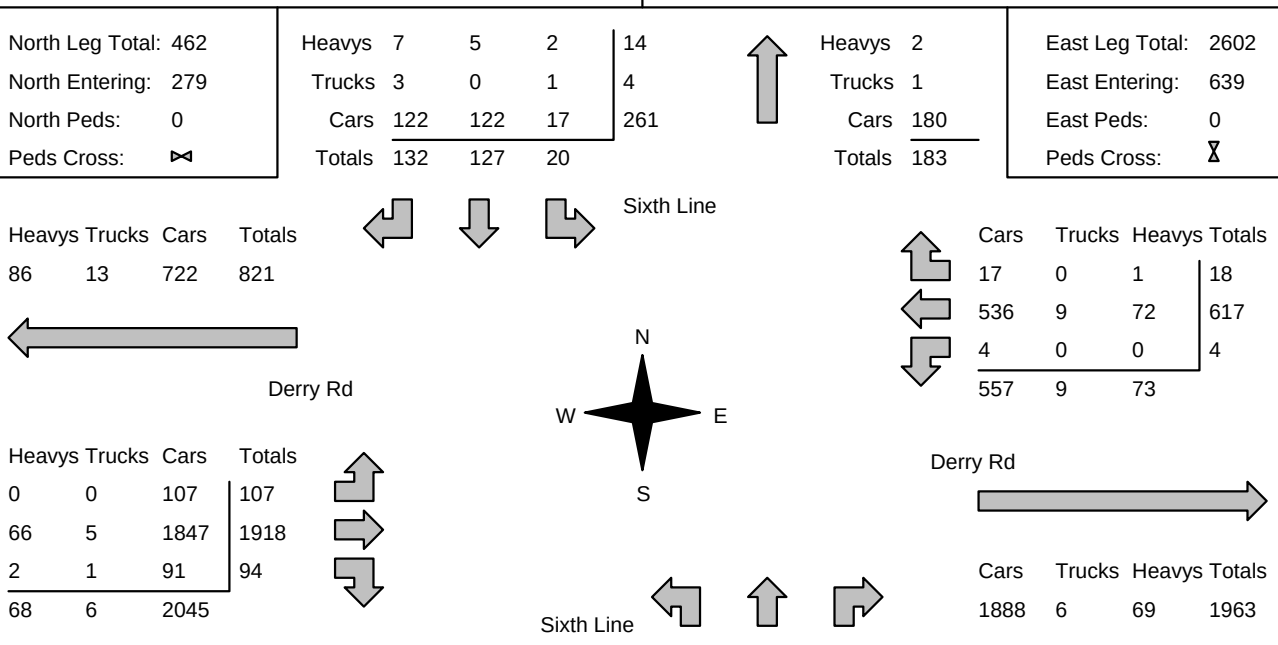
Municipality: Milton
Site #: 2223200002
Intersection: Derry Rd & Sixth Line
TFR File #: 1
Count date: 7-Dec-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Derry Rd runs W/E



Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Milton
Site #: 2223200002
Intersection: Derry Rd & Sixth Line
TFR File #: 1
Count date: 7-Dec-22

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Derry Rd runs W/E

North Leg Total: 487
North Entering: 247
North Peds: 0
Peds Cross: ⋈

Heavys	5	1	0	6
Trucks	0	0	1	1
Cars	118	96	26	240
Totals	123	97	27	

Heavys	4
Trucks	3
Cars	233
Totals	240

East Leg Total: 2356
East Entering: 1316
East Peds: 0
Peds Cross: ⧗

Sixth Line

Heavys	Trucks	Cars	Totals
34	6	1484	1524

Derry Rd

Cars	Trucks	Heavys	Totals
7	1	1	9
1262	6	28	1296
11	0	0	11
1280	7	29	

N
W E
S

Heavys	Trucks	Cars	Totals
2	1	146	149
46	9	945	1000
0	0	61	61
48	10	1152	

Derry Rd

Cars	Trucks	Heavys	Totals
984	10	46	1040

Sixth Line

Peds Cross: ⧗
West Peds: 0
West Entering: 1210
West Leg Total: 2734

Cars	168
Trucks	0
Heavys	1
Totals	169

Cars	104	80	13	197
Trucks	0	1	0	1
Heavys	1	1	0	2
Totals	105	82	13	

Peds Cross: ⋈
South Peds: 0
South Entering: 200
South Leg Total: 369

Comments

APPENDIX F

Background Developments

PROJECT DATA:

SITE AREA:		
GROSS:		61.98 HA
	6,671,424 SF	619,796 m²
DETENTION:	@ 7%	44,095 m²
R.O.W. EASEMENTS:	174,918 SF	16,250 m²
NET:		55.94 HA
	6,021,867 SF	559,450 m²
BUILDING AREA:		
BUILDING 1	729,120 SF	67,738 m²
BUILDING 2	624,960 SF	58,061 m²
BUILDING 3	188,720 SF	17,533 m²
TOTAL:	1,542,800 SF	143,332 m²
COVERAGE:		
GROSS:		23%
NET:		26%

BUILDING 1

▲ DOCK-HIGH DOORS			134
O GRADE-LEVEL DOORS			4
PARKING REQUIRED:			
WAREHOUSE			
< 1000 m²		1,000 m²	33 STALLS
1000 m²-5000 m²		4,000 m²	40 STALLS
>5000 m²		59,351 m²	297 STALLS
OFFICE	@ 5%	3,387 m²	113 STALLS
TOTAL			483 STALLS
PARKING PROVIDED:			780 STALLS
			@1.15/100 m²
TRAILER STALLS			178 STALLS

BUILDING 2

▲ DOCK-HIGH DOORS			112
O GRADE-LEVEL DOORS			4
PARKING REQUIRED:			
WAREHOUSE			
< 1000 m²		1,000 m²	33 STALLS
1000 m²-5000 m²		4,000 m²	40 STALLS
>5000 m²		50,158 m²	251 STALLS
OFFICE	@ 5%	2,903 m²	97 STALLS
TOTAL			421 STALLS
PARKING PROVIDED:			620 STALLS
			@1.07/100 m²
TRAILER STALLS			150 STALLS

BUILDING 3

▲ DOCK-HIGH DOORS			38
O GRADE-LEVEL DOORS			2
PARKING REQUIRED:			
WAREHOUSE			
< 1000 m²		1,000 m²	33 STALLS
1000 m²-5000 m²		4,000 m²	40 STALLS
>5000 m²		11,656 m²	58 STALLS
OFFICE	@ 5%	877 m²	29 STALLS
TOTAL			161 STALLS
PARKING PROVIDED:			190 STALLS
			@1.08/100 m²

DEVELOPMENT STANDARDS:

ZONING:	M2
MAX. COVERAGE:	n/a [1]
MAX. HEIGHT:	15.0m
BUILDING SETBACKS:	
FRONT:	9.0m
SIDE:	3.0m
REAR:	12.0m
LANDSCAPE SETBACKS:	
FRONT:	4.5m
SIDE:	6.0m
REAR:	4.5m
LANDSCAPE REQ.:	5%
OFF-STREET PARKING:	
STANDARD:	2.75X5.8
DRIVE AISLE:	6.0m
REQ. PARKING RATIO BY USE:	
WAREHOUSE:	1/30m2 [2]
OFFICE:	1/30m2

NOTES:

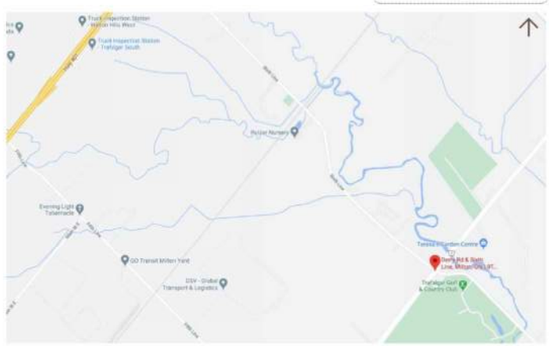
1 Minimum coverage of 40%; max limited to 35% without Municipal servicing, no maximum with Municipal servicing.

2 For the first 1000m2, 1 parking space per 30m2 of gross floor area. For gross floor areas between 1001m2 to 5000m2 shall provide 1 space per 100m2 of gross floor area; greater than 5000m2 shall provide 1 parking space per 200m2 of gross floor area.

This conceptual design is based upon a preliminary review of entitlement requirements and on unverified and possibly incomplete site and/or building information, and is intended merely to assist in exploring how the project might be developed.

Stormwater Management Design:
SURFACE DETENTION

Boundary Source:
CIVIL CAD FILE



1:2000
0 20m 50m 100m 200m

NORTH

anatolia TILE + STONE

scheme: 1

Conceptual Site Plan

Derry Road & Sixth Line
Milton, ON CAN

WARE MALCOMB

TOR21-0016-00
02.03.2021

SHEET
1

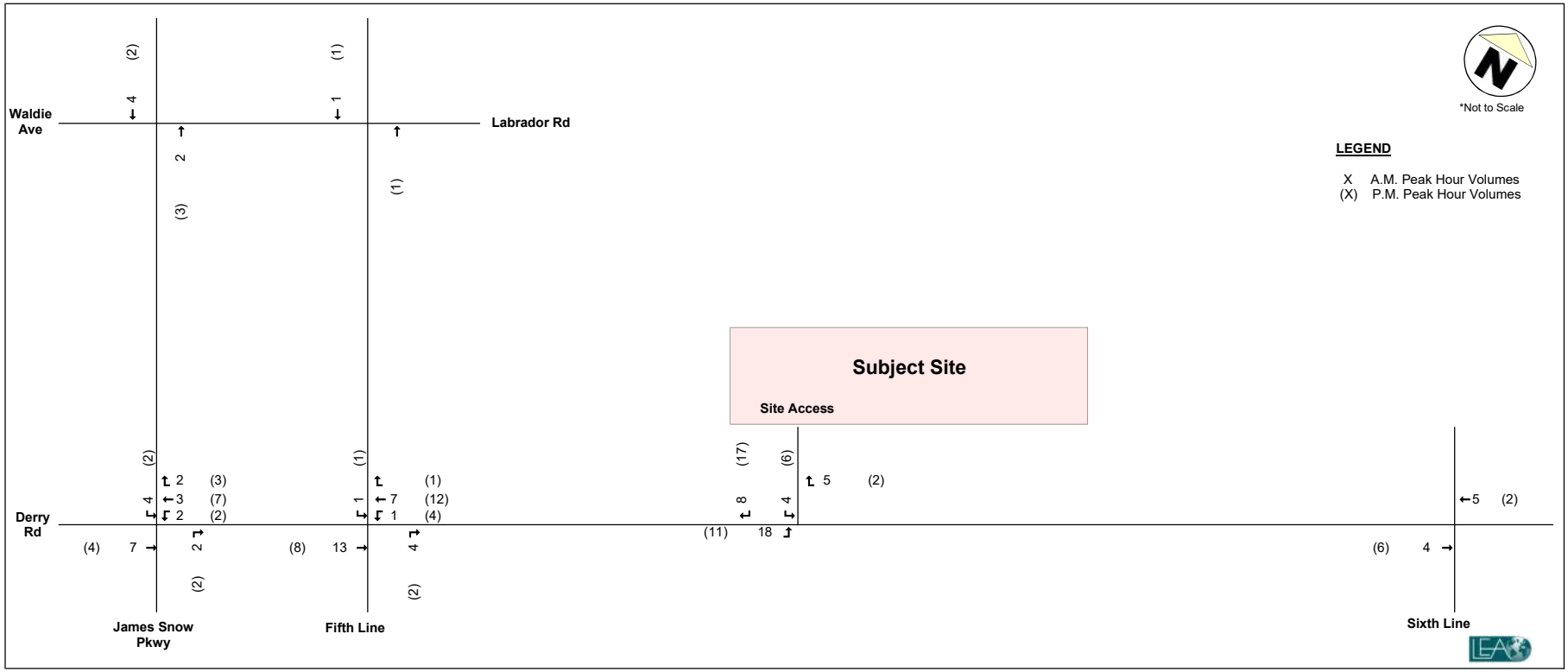

*Not to Scale
LEGEND
X A.M. Peak Hour Volumes
(X) P.M. Peak Hour Volumes
Waldie Ave
Labrador Rd
Derry Rd
Subject Site
Site Access
James Snow Pkwy
Fifth Line
Sixth Line

Figure 4.9: 2029/2034 Net Site Generated Traffic Volumes

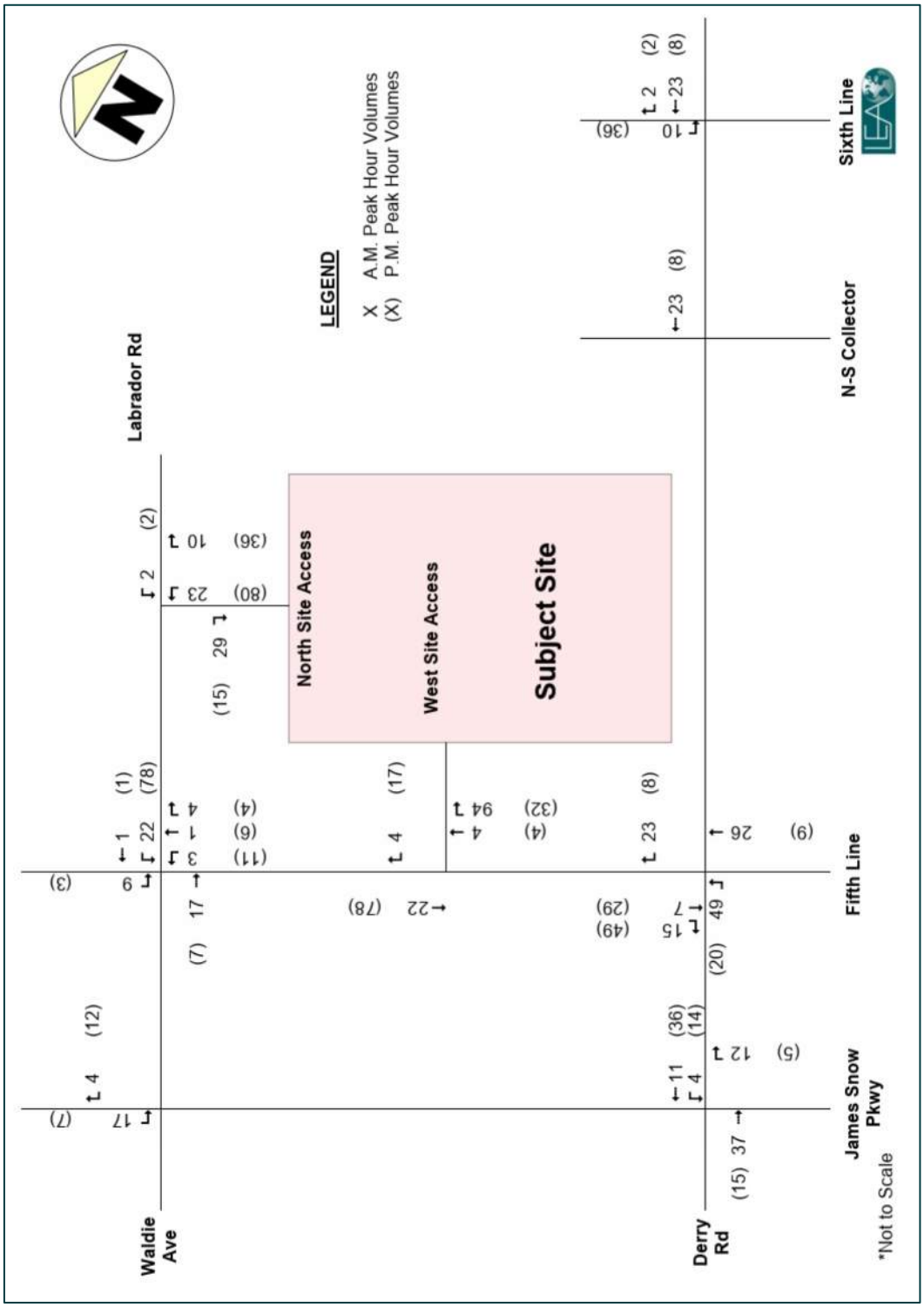
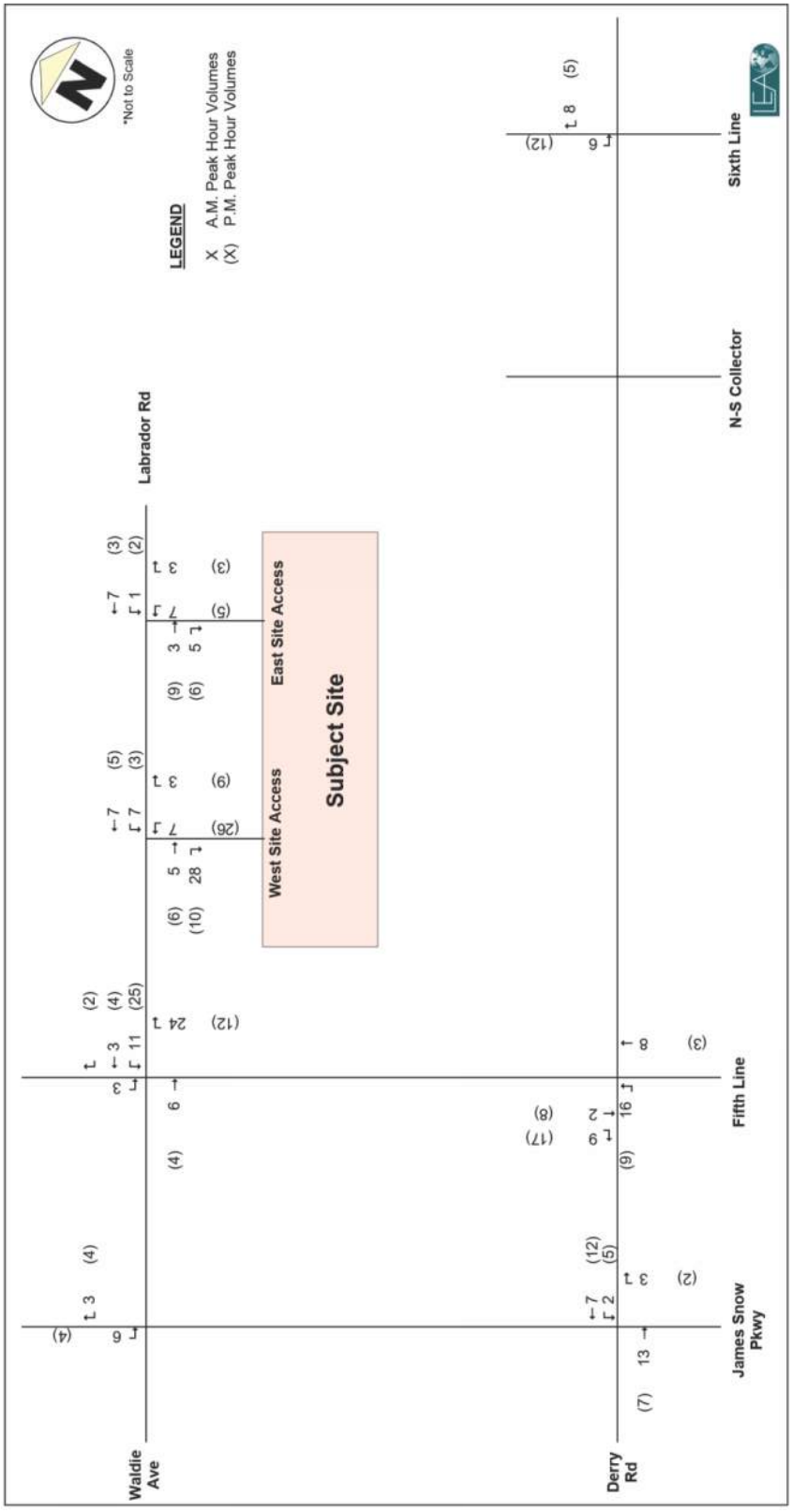
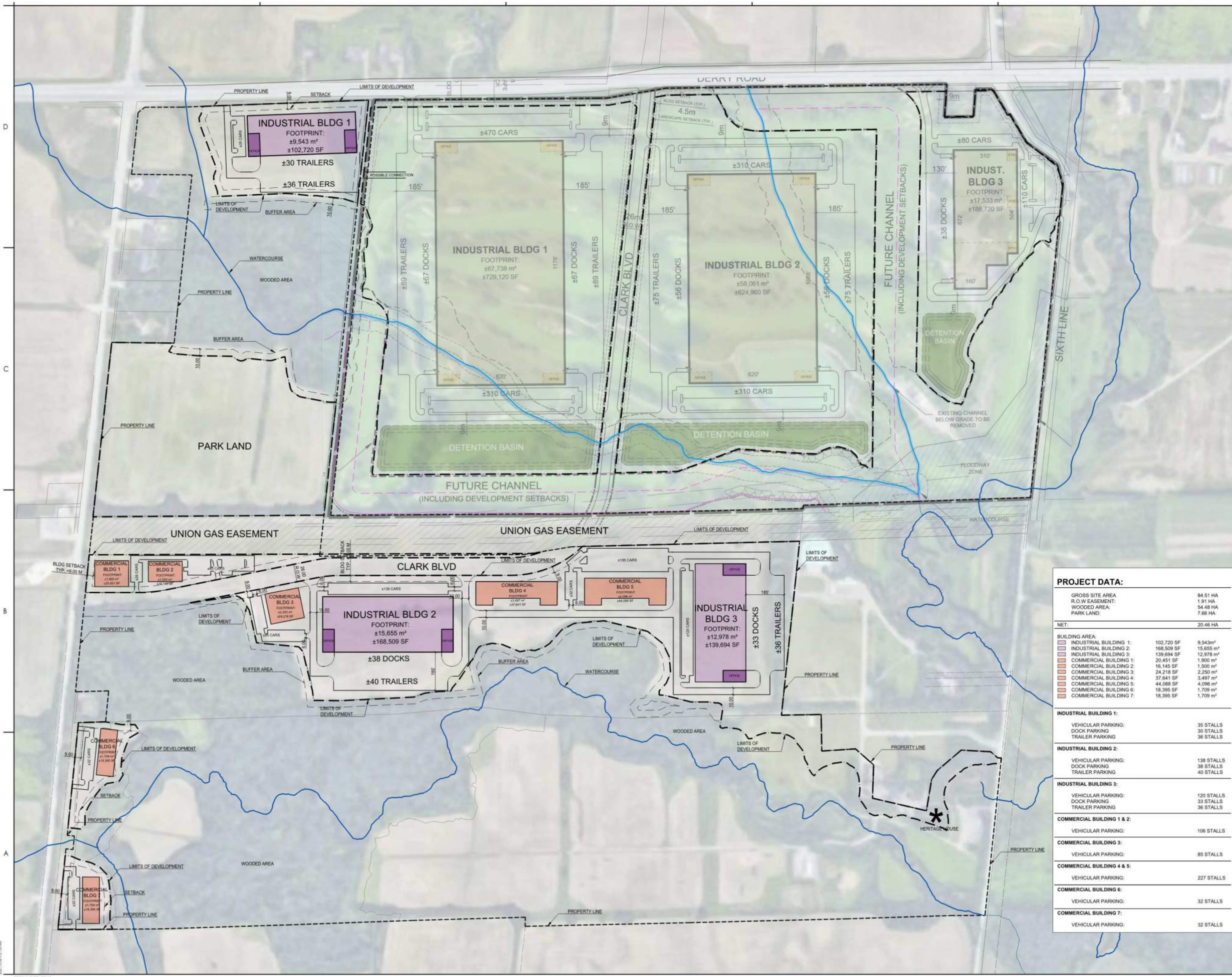


Figure 4-6: Total Site Traffic, Horizon 2 – 2029 and Horizon 3 – 2034





PROJECT DATA:

GROSS SITE AREA		84.51 HA
R.O.W EASEMENT:		1.91 HA
WOODED AREA:		54.48 HA
PARK LAND:		7.66 HA
NET:		20.46 HA
BUILDING AREA:		
INDUSTRIAL BUILDING 1:	102,720 SF	9,543m²
INDUSTRIAL BUILDING 2:	168,509 SF	15,655 m²
INDUSTRIAL BUILDING 3:	139,694 SF	12,978 m²
COMMERCIAL BUILDING 1:	20,451 SF	1,900 m²
COMMERCIAL BUILDING 2:	16,145 SF	1,500 m²
COMMERCIAL BUILDING 3:	24,218 SF	2,250 m²
COMMERCIAL BUILDING 4:	37,641 SF	3,497 m²
COMMERCIAL BUILDING 5:	44,088 SF	4,096 m²
COMMERCIAL BUILDING 6:	18,395 SF	1,709 m²
COMMERCIAL BUILDING 7:	18,395 SF	1,709 m²
INDUSTRIAL BUILDING 1:		
VEHICULAR PARKING:		35 STALLS
DOCK PARKING		30 STALLS
TRAILER PARKING		36 STALLS
INDUSTRIAL BUILDING 2:		
VEHICULAR PARKING:		138 STALLS
DOCK PARKING		38 STALLS
TRAILER PARKING		40 STALLS
INDUSTRIAL BUILDING 3:		
VEHICULAR PARKING:		120 STALLS
DOCK PARKING		33 STALLS
TRAILER PARKING		36 STALLS
COMMERCIAL BUILDING 1 & 2:		
VEHICULAR PARKING:		106 STALLS
COMMERCIAL BUILDING 3:		
VEHICULAR PARKING:		85 STALLS
COMMERCIAL BUILDING 4 & 5:		
VEHICULAR PARKING:		227 STALLS
COMMERCIAL BUILDING 6:		
VEHICULAR PARKING:		32 STALLS
COMMERCIAL BUILDING 7:		
VEHICULAR PARKING:		32 STALLS

Stantec

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www.stantec.com

Consultant

Revision | By | Appd | YYYY.MM.DD

Issued | By | Appd | YYYY.MM.DD

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
THE REMINGTON GROUP INC
REMINGTON PRE-CONCEPT PLAN
Milton, Ontario

Project No.: 160622773
File Name: 2021-10-05_SITE PLAN_160622773
Scale: 1:2500

FM	FM	NJ	2021.10.05
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
Concept Plan

Revision: 0 Sheet: of XX

Drawing No.
C-101

Figure 3-6: 2029 Future Background Peak Hour Traffic Volumes

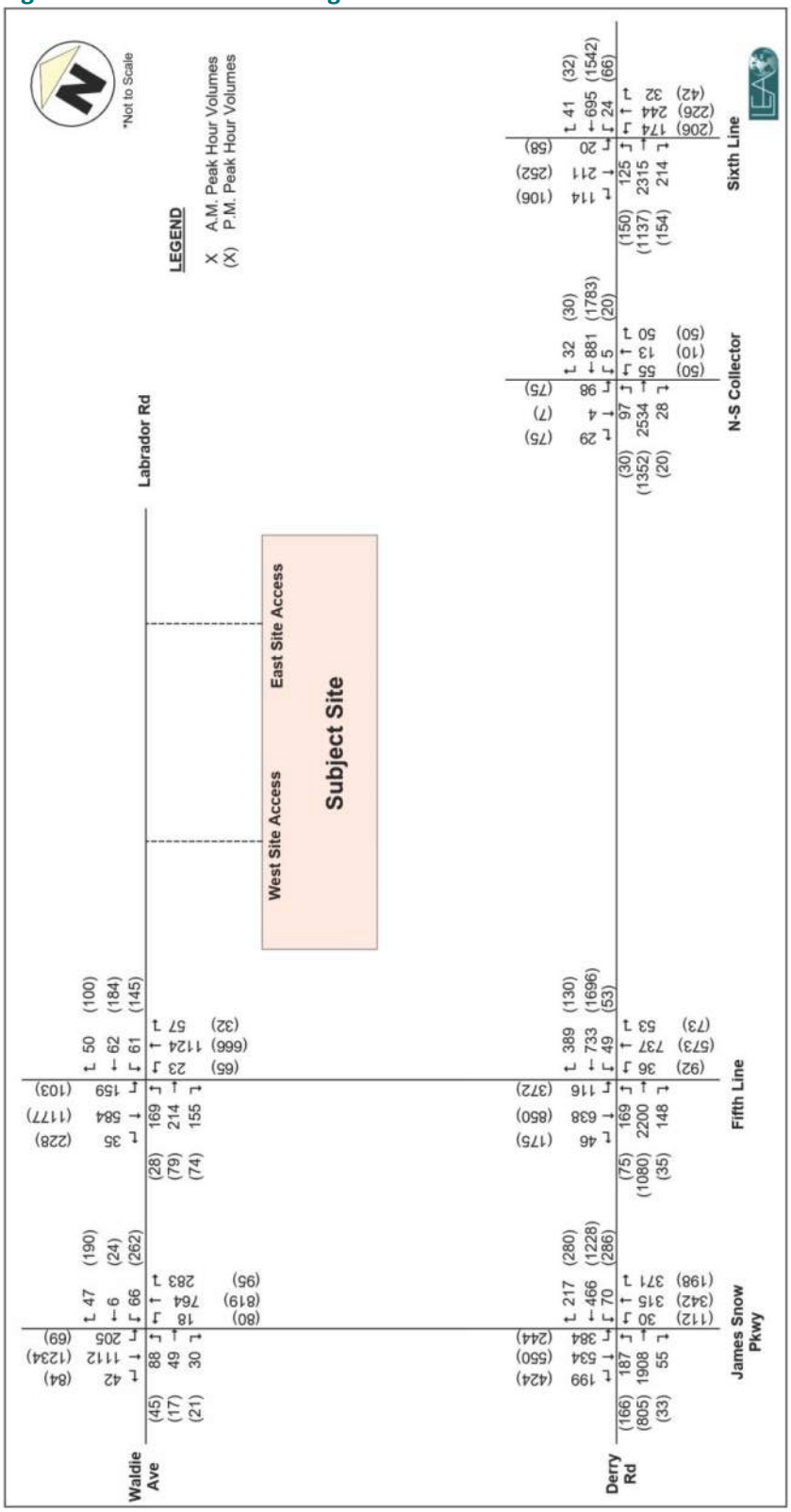
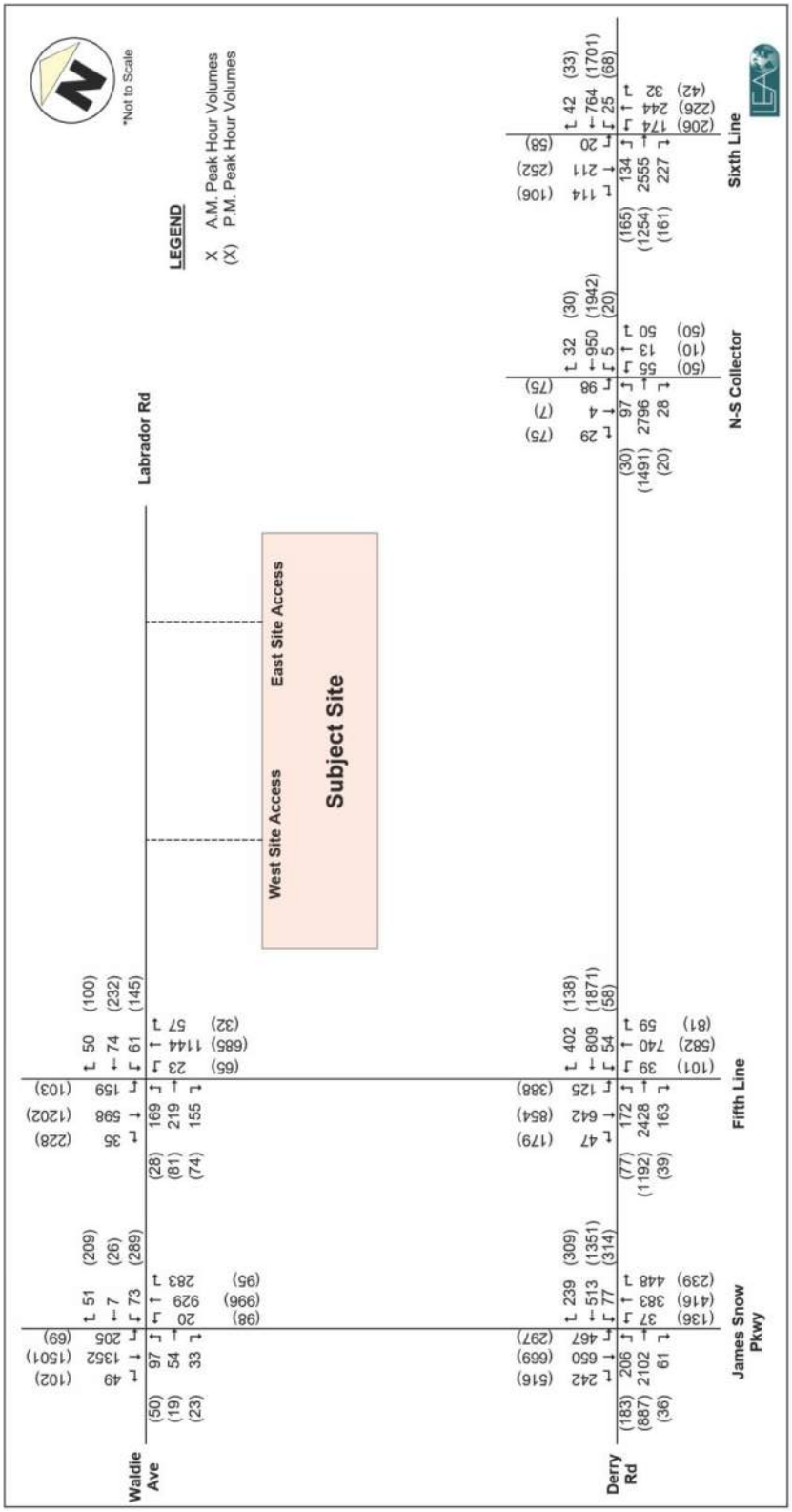


Figure 3-7: 2034 Future Background Peak Hour Traffic Volumes



APPENDIX G

Trip Generation and Distribution

AM IN

Mon Oct 30 2023 10:24:33 GMT-0400 (Eastern Daylight Time) - Run Time: 2670ms
Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(2006 GTA zone of destination - gta06_dest In 4112,4118,4117,4116
and
Start time of trip - start_time In 0630-0930
and
Age of person - age In 18-98)

Trip 2016
Table:

,4112,4116,4117,4118

3613,0,0,0,16

3719,6,0,0,0

3721,0,0,0,12

3809,0,0,0,20

3832,0,13,0,0

4013,0,0,0,21

4045,0,0,28,0

4080,0,13,0,0

4105,0,0,7,18

4119,0,0,105,0

4120,0,0,191,0

4124,0,0,0,22

4125,0,0,0,22

4158,0,15,0,0

4196,0,0,9,0

5179,0,0,24,0

5195,0,0,34,0

AM OUT

Mon Oct 30 2023 10:26:51 GMT-0400 (Eastern Daylight Time) - Run Time: 2449ms
Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
(2006 GTA zone of origin - gta06_orig In 4112,4118,4117,4116
and
Start time of trip - start_time In 0630-0930
and
Age of person - age In 18-98)

Trip 2016

Table:

,4112,4117,4118	3703,0,0,26
21,0,0,39	3721,0,0,23
57,0,0,35	3816,0,0,10
228,0,0,24	3819,0,12,0
473,0,0,16	3847,0,0,26
2109,0,0,16	4003,0,0,16
3343,0,24,0	4060,0,0,16
3372,0,0,20	4105,0,0,18
3484,0,18,0	4110,0,0,74
3492,0,0,16	4119,0,53,0
3605,0,31,0	4120,0,91,0
3606,0,0,34	4126,0,26,0
3612,0,0,10	4147,0,0,17
3618,0,0,10	4187,0,0,16
3631,0,0,71	4192,20,0,0
3693,0,0,16	7173,0,0,10
3702,0,7,0	8057,20,0,0

PM IN

Mon Oct 30 2023 10:28:34 GMT-0400 (Eastern Daylight Time) - Run Time: 2551ms
Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(2006 GTA zone of destination - gta06_dest In 4112,4118,4117,4116
and
Start time of trip - start_time In 1530-1830
and
Age of person - age In 18-98)

Trip 2016
Table:

,4112,4117,4118

21,0,0,39

57,0,0,35

228,0,0,24

309,0,0,38

331,0,0,12

473,0,0,16

2109,0,0,16

3372,0,0,20

3612,0,0,10

3618,0,0,10

3620,0,12,0

3631,0,0,71

3693,0,0,16

3703,0,0,26

3812,0,0,17

4003,0,0,16

4068,0,0,16

4103,0,9,0

4104,0,0,38

4110,0,32,39

4119,0,26,37

4122,20,0,0

4123,0,95,0

4147,0,0,17

4187,0,0,16

8057,20,0,0

PM OUT

Mon Oct 30 2023 10:29:28 GMT-0400 (Eastern Daylight Time) - Run Time: 3226ms
Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
(2006 GTA zone of origin - gta06_orig In 4112,4118,4117,4116
and
Start time of trip - start_time In 1530-1830
and
Age of person - age In 18-98)

Trip 2016
Table:

,4112,4116,4117,4118

2655,0,0,18,0

3719,0,0,13,0

3809,0,0,0,20

4011,7,0,0,0

4035,24,0,0,0

4045,0,0,28,0

4104,0,0,0,38

4110,0,0,43,0

4119,0,0,51,0

4120,0,0,155,0

4122,20,0,0,0

4124,0,0,12,33

4125,20,0,36,22

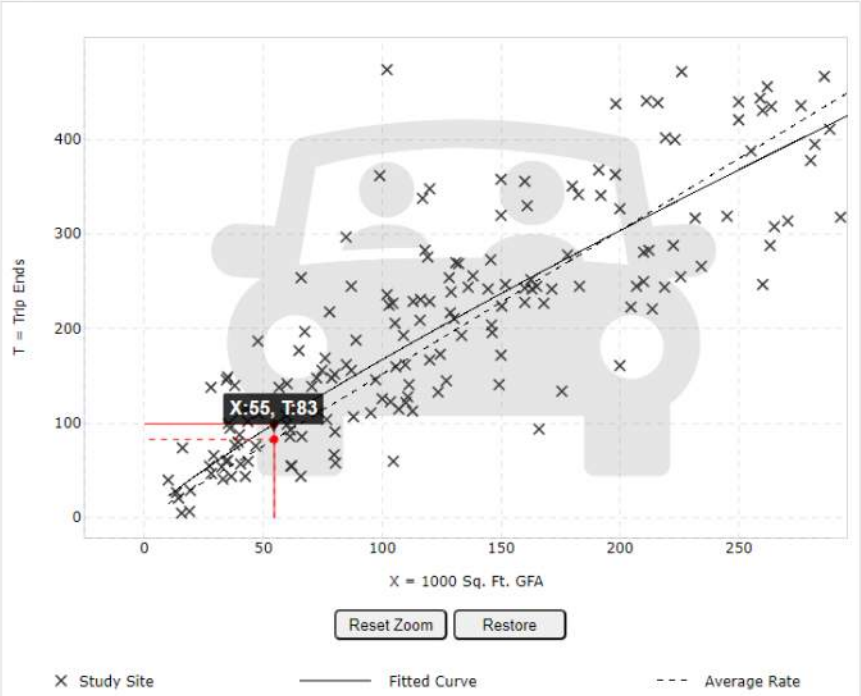
4148,0,0,34,0

4196,0,0,9,0

5223,0,12,0,0

7335,0,0,31,0

Data Plot and Equation



DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
221

Avg. 1000 Sq. Ft. GFA:
201

Average Rate:
1.52

Range of Rates:
0.32 - 4.93

Standard Deviation:
0.58

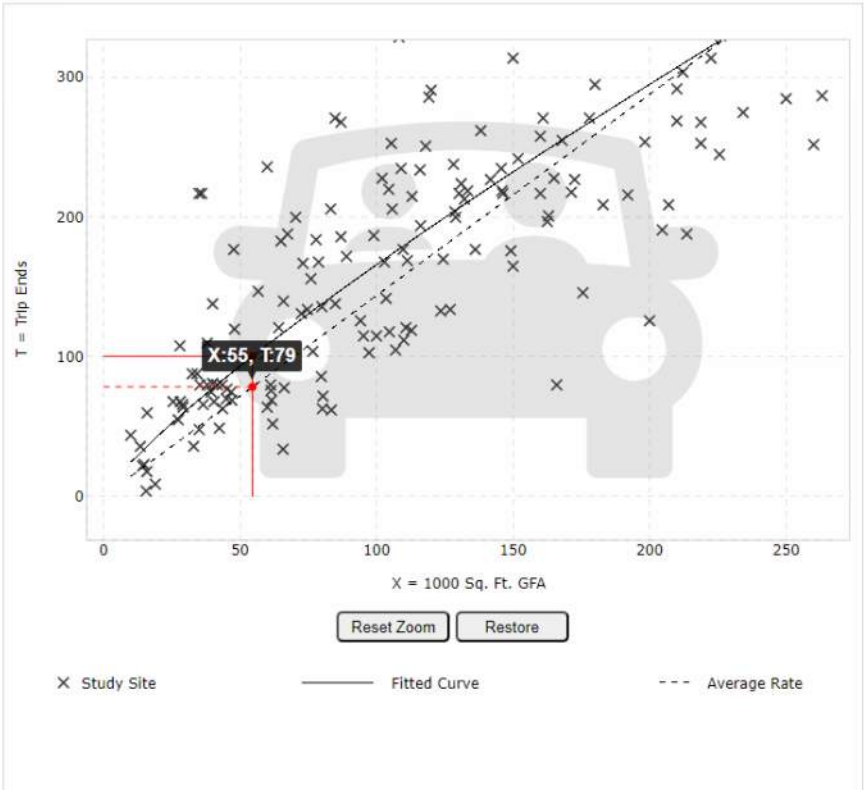
Fitted Curve Equation:
Ln(T) = 0.86 Ln(X) + 1.16

R^2:
0.78

Directional Distribution:
88% entering, 12% exiting

Calculated Trip Ends:
Average Rate: 83 (Total), 73 (Entry), 10 (Exit)
Fitted Curve: 99 (Total), 88 (Entry), 11 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
232

Avg. 1000 Sq. Ft. GFA:
199

Average Rate:
1.44

Range of Rates:
0.26 - 6.20

Standard Deviation:
0.60

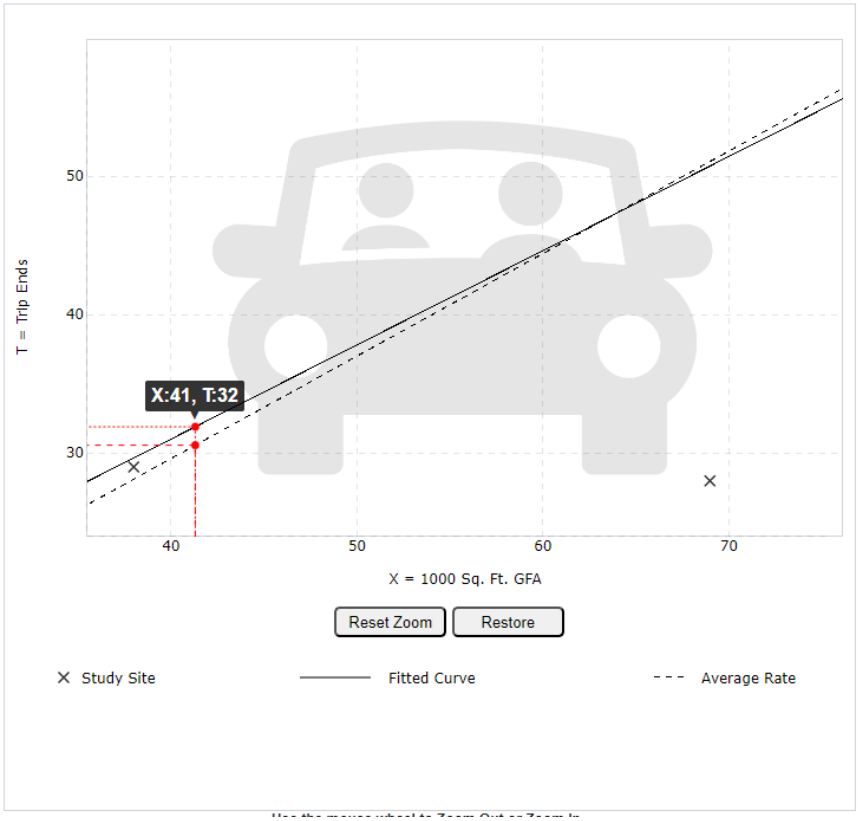
Fitted Curve Equation:
Ln(T) = 0.83 Ln(X) + 1.29

R^2:
0.77

Directional Distribution:
17% entering, 83% exiting

Calculated Trip Ends:
Average Rate: 79 (Total), 13 (Entry), 66 (Exit)
Fitted Curve: 100 (Total), 17 (Entry), 83 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
General Light Industrial (110) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
41

Avg. 1000 Sq. Ft. GFA:
65

Average Rate:
0.74

Range of Rates:
0.02 - 4.46

Standard Deviation:
0.61

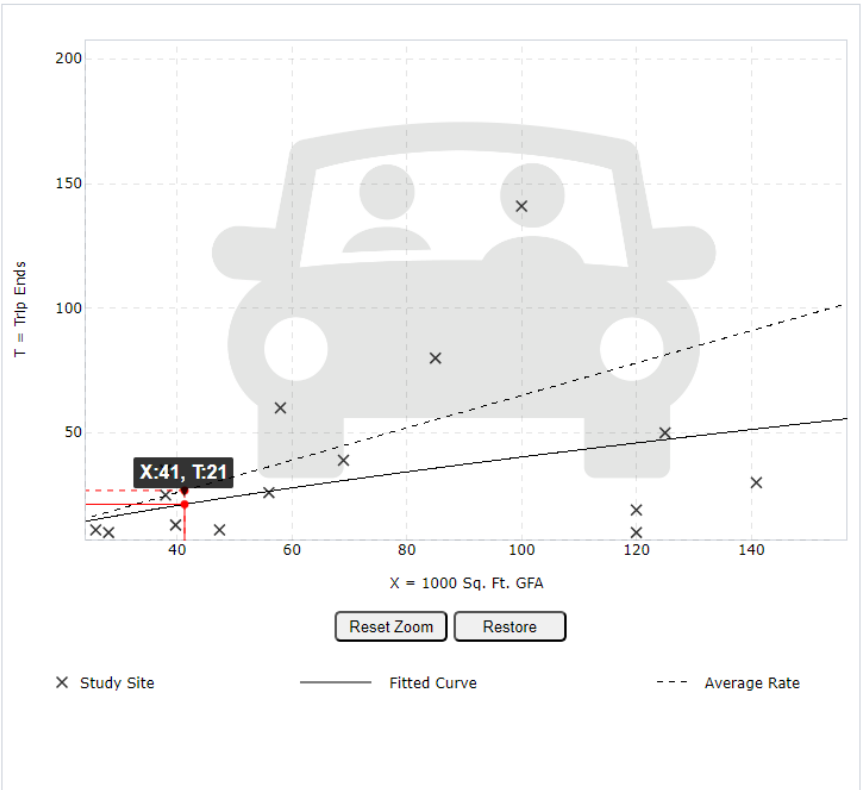
Fitted Curve Equation:
T = 0.68(X) + 3.81

R^2:
0.66

Directional Distribution:
88% entering, 12% exiting

Calculated Trip Ends:
Average Rate: 31 (Total), 27 (Entry), 4 (Exit)
Fitted Curve: 32 (Total), 28 (Entry), 4 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
General Light Industrial (110) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
40

Avg. 1000 Sq. Ft. GFA:
58

Average Rate:
0.65

Range of Rates:
0.07 - 7.02

Standard Deviation:
0.56

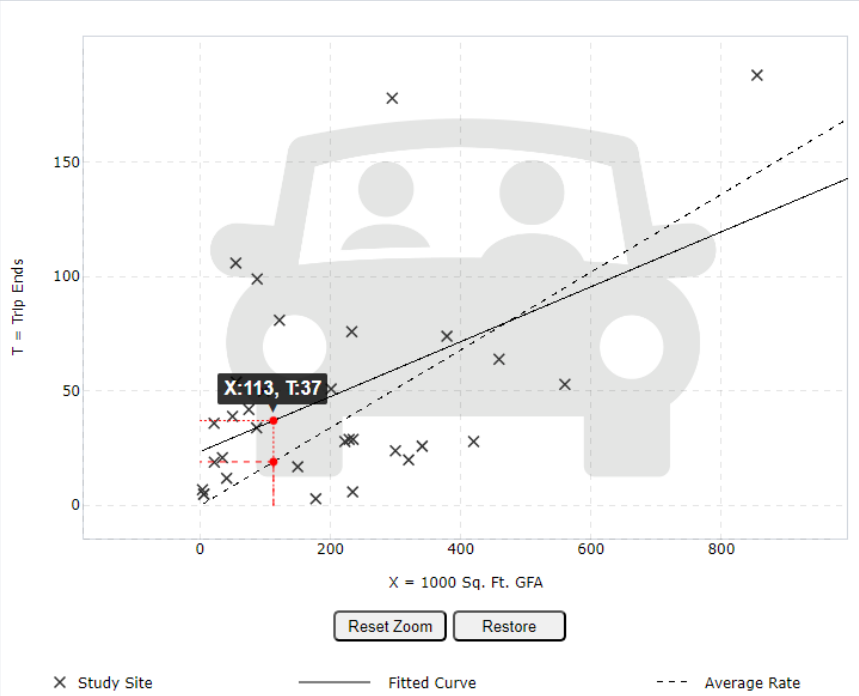
Fitted Curve Equation:
Ln(T) = 0.72 Ln(X) + 0.38

R^2:
0.55

Directional Distribution:
14% entering, 86% exiting

Calculated Trip Ends:
Average Rate: 27 (Total), 4 (Entry), 23 (Exit)
Fitted Curve: 21 (Total), 3 (Entry), 18 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
Warehousing (150) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
36

Avg. 1000 Sq. Ft. GFA:
448

Average Rate:
0.17

Range of Rates:
0.02 - 1.93

Standard Deviation:
0.19

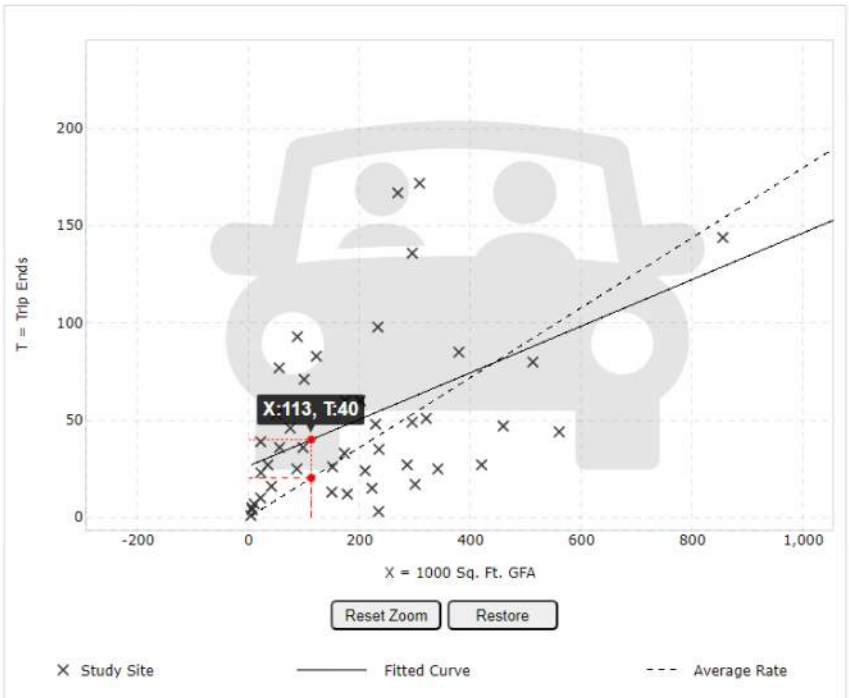
Fitted Curve Equation:
T = 0.12(X) + 23.62

R^2:
0.69

Directional Distribution:
77% entering, 23% exiting

Calculated Trip Ends:
Average Rate: 19 (Total), 15 (Entry), 4 (Exit)
Fitted Curve: 37 (Total), 29 (Entry), 8 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
Warehousing (150) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
49

Avg. 1000 Sq. Ft. GFA:
400

Average Rate:
0.18

Range of Rates:
0.01 - 1.80

Standard Deviation:
0.18

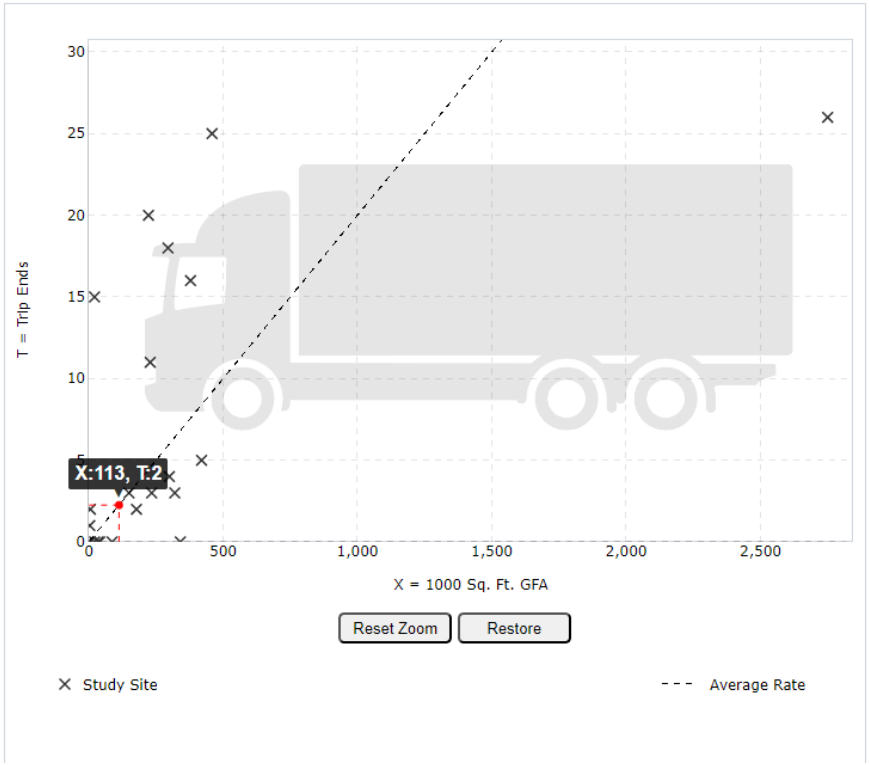
Fitted Curve Equation:
T = 0.12(X) + 26.48

R^2:
0.65

Directional Distribution:
28% entering, 72% exiting

Calculated Trip Ends:
Average Rate: 20 (Total), 6 (Entry), 14 (Exit)
Fitted Curve: 40 (Total), 11 (Entry), 29 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
Warehousing (150) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Truck

Number of Studies:
21

Avg. 1000 Sq. Ft. GFA:
309

Average Rate:
0.02

Range of Rates:
0.00 - 0.69

Standard Deviation:
0.05

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
52% entering, 48% exiting

Calculated Trip Ends:
Average Rate: 2 (Total), 1 (Entry), 1 (Exit)

Data Plot and Equation

DATA STATISTICS

Land Use:
Warehousing (150) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Truck

Number of Studies:
23

Avg. 1000 Sq. Ft. GFA:
308

Average Rate:
0.03

Range of Rates:
0.00 - 0.42

Standard Deviation:
0.03

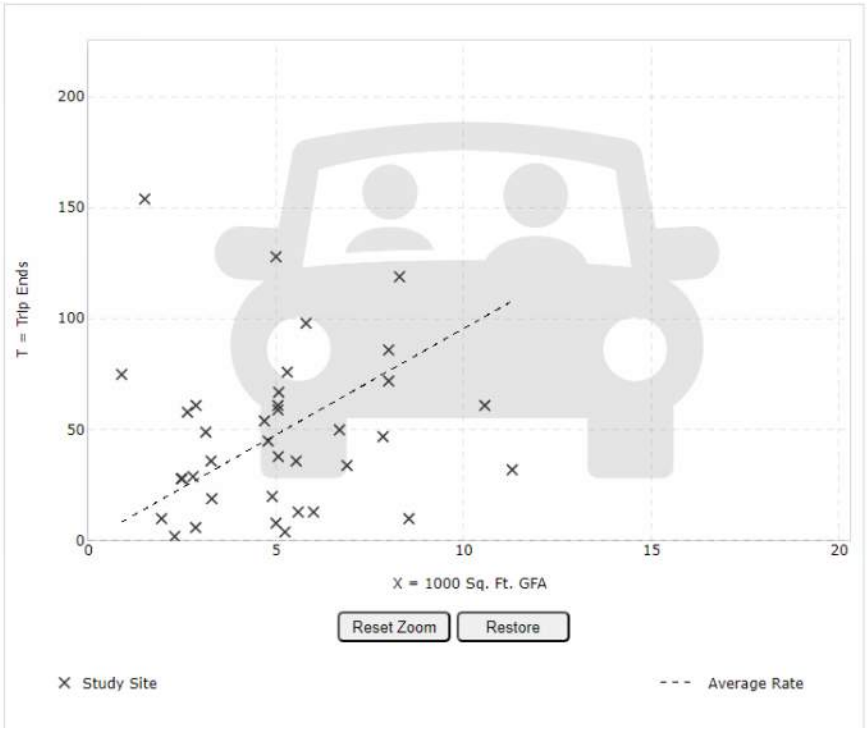
Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
52% entering, 48% exiting

Calculated Trip Ends:
Average Rate: 3 (Total), 2 (Entry), 1 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:
High-Turnover (Sit-Down) Restaurant (932) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
37

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
9.57

Range of Rates:
0.76 - 102.39

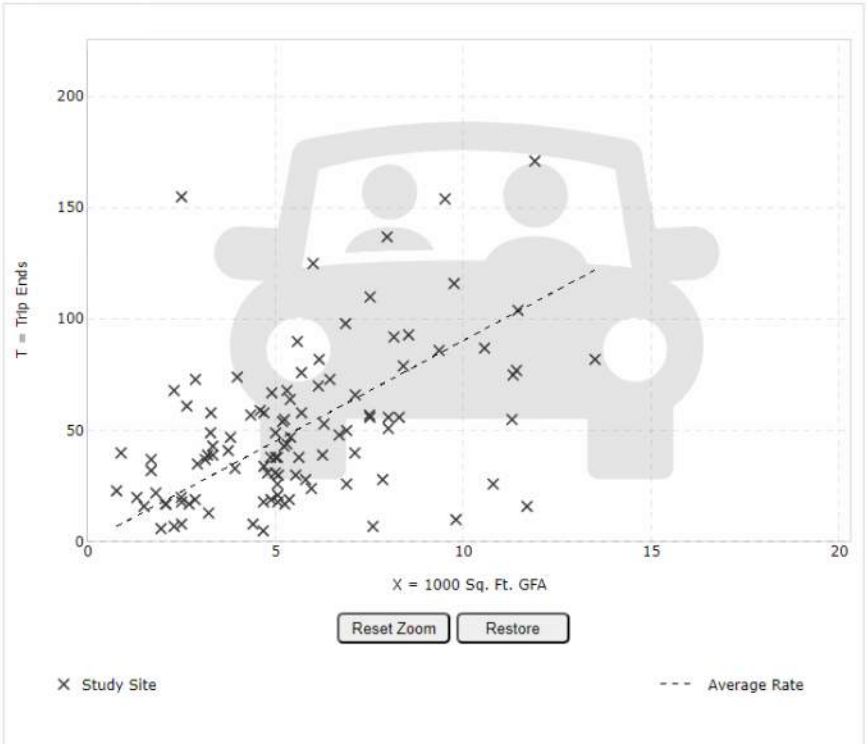
Standard Deviation:
11.61

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
55% entering, 45% exiting

Data Plot and Equation



DATA STATISTICS

Land Use:
High-Turnover (Sit-Down) Restaurant (932) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
104

Avg. 1000 Sq. Ft. GFA:
6

Average Rate:
9.05

Range of Rates:
0.92 - 62.00

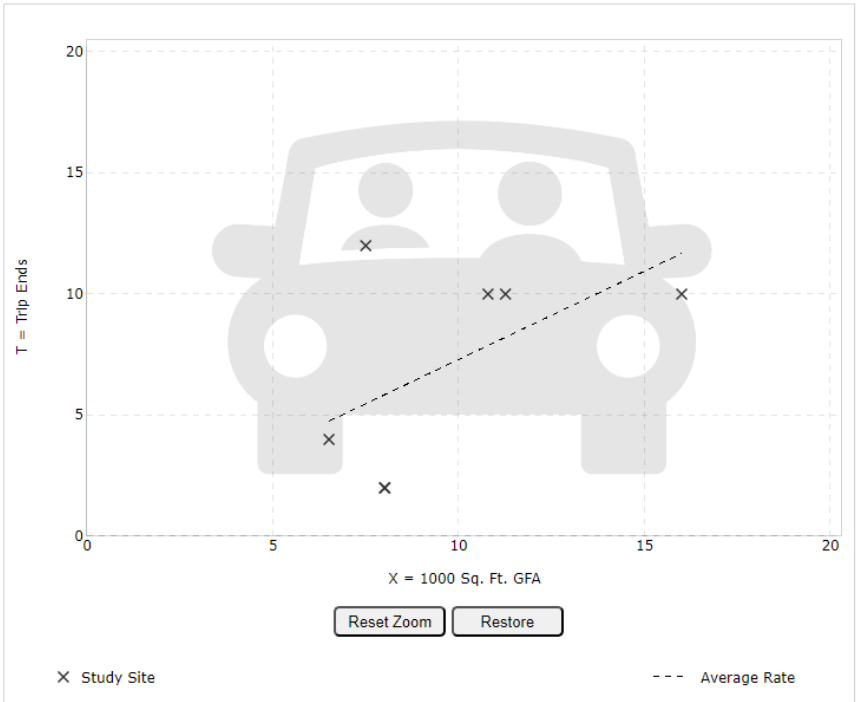
Standard Deviation:
6.18

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
61% entering, 39% exiting

Data Plot and Equation



DATA STATISTICS

Land Use:
Fine Dining Restaurant (931) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
7

Avg. 1000 Sq. Ft. GFA:
10

Average Rate:
0.73

Range of Rates:
0.25 - 1.60

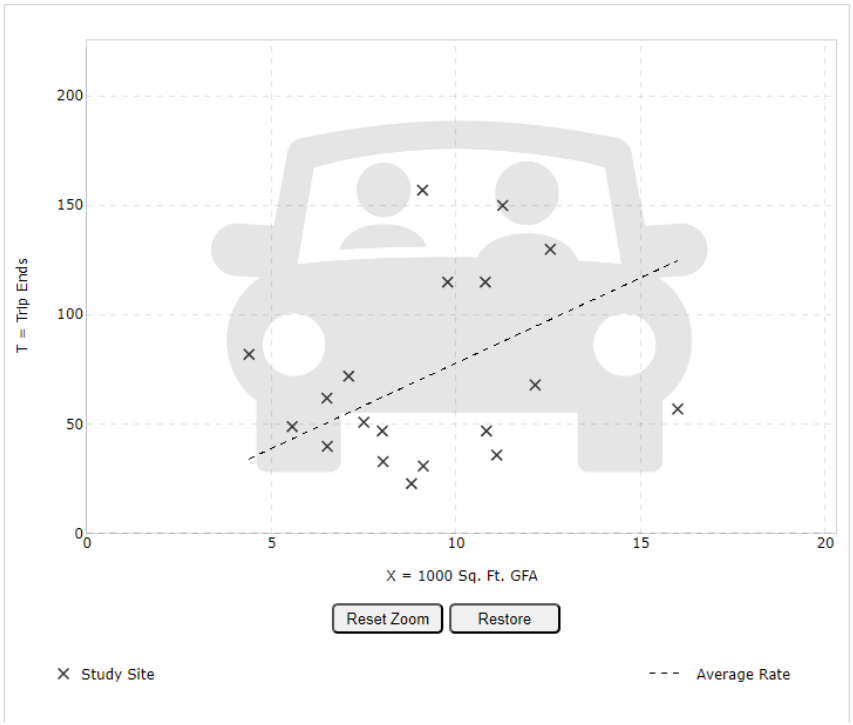
Standard Deviation:
0.42

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
Not available

Data Plot and Equation



DATA STATISTICS

Land Use:
Fine Dining Restaurant (931) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
19

Avg. 1000 Sq. Ft. GFA:
9

Average Rate:
7.80

Range of Rates:
2.62 - 18.68

Standard Deviation:
4.49

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
67% entering, 33% exiting

APPENDIX H

Level of Service Definition

LEVEL OF SERVICE

CAPACITY ANALYSIS AT SIGNALIZED INTERSECTIONS
Highway Capacity Manual Methodology

The capacity of signalized intersections has been determined in terms of delay, as prescribed in the Highway Capacity Manual 2000, by the Transportation Research Board. To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to intersection control, geometrics, traffic volume, and road network influences. The portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay, and acceleration delay. The following table describes in detail the characteristics of each Level of Service:

Level of Service	Features	Control Delay (sec/veh)
A	Describes operations with minimal control delay, from 0 up to 10 seconds/ vehicle. This LOS occurs when progression is favorable and most vehicles arrive during the green phase. Most vehicles do not need to stop at all at this LOS. Short cycle lengths also contribute to low delay.	**≤ 10**
B	Describes operations with control delay greater than 10 seconds and up to 20 seconds/vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing slightly longer average delays.	**> 10 to 20**
C	Describes operations with control delay greater than 20 seconds and up to 35 seconds/vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is more significant, though many still pass through the intersection without stopping.	**> 20 to 35**
D	Describes operations with control delay greater than 35 seconds and up to 55 seconds/vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	**> 35 to 55**
E	Describes operations with control delay greater than 55 seconds and up to 80 seconds/vehicle. This level is considered by many agencies to be near the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	**> 55 to 80**
F	**LOS F** describes operations with control delay in excess of 80 seconds/vehicle. This *oversaturation*, considered to be unacceptable to most drivers, occurs when arrival flow rates exceed the design capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such high delay levels.	**> 80**

LEVEL OF SERVICE

CAPACITY ANALYSIS AT UNSIGNALIZED INTERSECTIONS
Highway Capacity Manual Methodology

The Level of Service (LOS) at an unsignalized intersection is determined on the basis of control delay for each critical lane. This method of analysis is taken from the Highway Capacity Manual 2000, by the Transportation Research Board.

The average control delay for any particular critical movement (control delay includes initial deceleration, queue move-up time, stopped delay, and acceleration delay) is a function of the service rate or capacity of the approach and degree of saturation. The level of service criteria for unsignalized intersections is outlined below and is related to ranges in vehicle delay.

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay (sec. / veh.)
A	Little or no delays	0 < to 10
B	Short traffic delays	> 10 to 15
C	Average traffic delays	> 15 to 25
D	Long traffic delays	> 25 to 35
E	Very long traffic delays	> 35 to 50
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	> 50

APPENDIX I

Synchro Results

APPENDIX I1

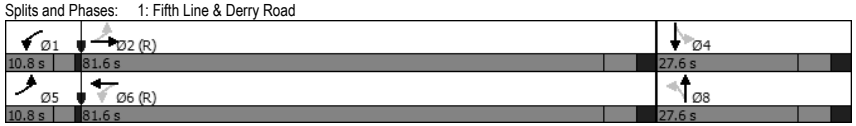
Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	1915	128	82	610	125	42	33	122	76	66	7
Future Volume (vph)	34	1915	128	82	610	125	42	33	122	76	66	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		0.0	95.0		0.0	95.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.974			0.882			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1372	3575	0	1148	3236	0	1587	1285	0	1573	1767	0
Flt Permitted	0.356			0.049			0.707			0.530		
Satd. Flow (perm)	514	3575	0	59	3236	0	1181	1285	0	878	1767	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			37			104			4	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			1279.7			1020.0			1136.7	
Travel Time (s)		16.4			57.6			52.5			58.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Adj. Flow (vph)	36	2037	136	87	649	133	45	35	130	81	70	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	2173	0	87	782	0	45	165	0	81	77	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.0	29.6		9.0	29.6		37.6	37.6		37.6	37.6	
Total Split (s)	10.8	81.6		10.8	81.6		27.6	27.6		27.6	27.6	
Total Split (%)	9.0%	68.0%		9.0%	68.0%		23.0%	23.0%		23.0%	23.0%	
Maximum Green (s)	6.8	74.0		6.8	74.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.0	4.6		3.0	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	1.0	3.0		1.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	5.6		4.0	7.6		7.6	7.6		7.6	7.6	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		15.0			15.0		23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	86.8	80.2		92.1	83.8		15.6	15.6		15.6	15.6	
Actuated g/C Ratio	0.72	0.67		0.77	0.70		0.13	0.13		0.13	0.13	
v/c Ratio	0.09	0.91		0.81	0.34		0.29	0.64		0.71	0.33	
Control Delay	4.5	24.7		70.7	8.2		50.7	30.9		81.2	47.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.5	24.7		70.7	8.2		50.7	30.9		81.2	47.5	
LOS	A	C		E	A		D	C		F	D	
Approach Delay		24.4			14.5			35.2			64.8	
Approach LOS		C			B			D			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 99.8%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Fifth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

01/24/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	1915	128	82	610	125	42	33	122	76	66	7
Future Volume (vph)	34	1915	128	82	610	125	42	33	122	76	66	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6		4.0	7.6		7.6	7.6		7.6	7.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.88		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1372	3573		1148	3237		1587	1284		1573	1768	
Flt Permitted	0.36	1.00		0.05	1.00		0.71	1.00		0.53	1.00	
Satd. Flow (perm)	514	3573		59	3237		1181	1284		877	1768	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	36	2037	136	87	649	133	45	35	130	81	70	7
RTOR Reduction (vph)	0	4	0	0	12	0	0	90	0	0	3	0
Lane Group Flow (vph)	36	2169	0	87	770	0	45	75	0	81	74	0
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	81.2	78.2		89.2	82.2		15.6	15.6		15.6	15.6	
Effective Green, g (s)	81.2	80.2		89.2	82.2		15.6	15.6		15.6	15.6	
Actuated g/C Ratio	0.68	0.67		0.74	0.69		0.13	0.13		0.13	0.13	
Clearance Time (s)	4.0	7.6		4.0	7.6		7.6	7.6		7.6	7.6	
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	369	2387		107	2217		153	166		114	229	
v/s Ratio Prot	0.00	c0.61		c0.05	0.24			0.06			0.04	
v/s Ratio Perm	0.06			0.56			0.04			c0.09		
v/c Ratio	0.10	0.91		0.81	0.35		0.29	0.45		0.71	0.32	
Uniform Delay, d1	6.4	16.8		36.7	7.8		47.2	48.2		50.0	47.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	6.5		34.2	0.4		1.3	2.3		19.4	1.0	
Delay (s)	6.5	23.3		71.0	8.2		48.5	50.5		69.4	48.4	
Level of Service	A	C		E	A		D	D		E	D	
Approach Delay (s)		23.0			14.5			50.1			59.1	
Approach LOS		C			B			D			E	

Intersection Summary				
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	99.8%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

01/24/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	1918	94	4	617	18	72	58	25	20	127	132
Future Volume (vph)	107	1918	94	4	617	18	72	58	25	20	127	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.996			0.954			0.924	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3485	0	1825	3195	0	1630	1762	0	1587	1674	0
Flt Permitted	0.349			0.059			0.302			0.699		
Satd. Flow (perm)	670	3485	0	113	3195	0	518	1762	0	1168	1674	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			4			18			42	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		1279.7			1506.9			1008.8			589.5	
Travel Time (s)		57.6			67.8			60.5			35.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Adj. Flow (vph)	114	2040	100	4	656	19	77	62	27	21	135	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	2140	0	4	675	0	77	89	0	21	275	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

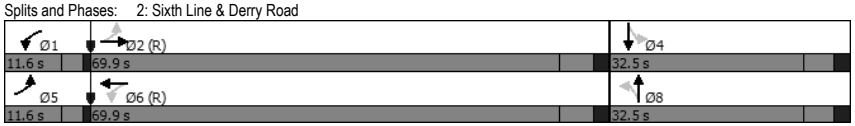
Lanes, Volumes, Timings
2: Sixth Line & Derry Road

01/24/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.5	31.8		32.5	32.5		32.5	32.5	
Total Split (s)	11.6	69.9		11.6	69.9		32.5	32.5		32.5	32.5	
Total Split (%)	10.2%	61.3%		10.2%	61.3%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	7.6	63.1		7.6	63.1		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.0	4.6		3.0	4.6		4.2	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	-2.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	81.8	79.5		77.9	68.1		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.72	0.70		0.68	0.60		0.18	0.18		0.18	0.18	
v/c Ratio	0.21	0.88		0.02	0.35		0.81	0.26		0.10	0.80	
Control Delay	6.3	20.8		6.0	13.0		94.8	32.0		37.2	54.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.3	20.8		6.0	13.0		94.8	32.0		37.2	54.7	
LOS	A	C		A	B		F	C		D	D	
Approach Delay		20.1			12.9			61.1			53.5	
Approach LOS		C			B			E			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 114			
Actuated Cycle Length: 114			
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 23.6		Intersection LOS: C	
Intersection Capacity Utilization 103.1%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

01/24/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	1918	94	4	617	18	72	58	25	20	127	132
Future Volume (vph)	107	1918	94	4	617	18	72	58	25	20	127	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.95		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3485		1825	3195		1630	1763		1587	1673	
Flt Permitted	0.35	1.00		0.06	1.00		0.30	1.00		0.70	1.00	
Satd. Flow (perm)	670	3485		113	3195		517	1763		1168	1673	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	114	2040	100	4	656	19	77	62	27	21	135	140
RTOR Reduction (vph)	0	2	0	0	2	0	0	15	0	0	34	0
Lane Group Flow (vph)	114	2138	0	4	673	0	77	74	0	21	241	0
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	79.7	74.3		69.6	68.2		21.0	21.0		21.0	21.0	
Effective Green, g (s)	79.7	76.3		69.6	68.2		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.70	0.67		0.61	0.60		0.18	0.18		0.18	0.18	
Clearance Time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	544	2332		90	1911		95	324		215	308	
v/s Ratio Prot	c0.01	c0.61		0.00	0.21			0.04			0.14	
v/s Ratio Perm	0.13			0.03			c0.15			0.02		
v/c Ratio	0.21	0.92		0.04	0.35		0.81	0.23		0.10	0.78	
Uniform Delay, d1	5.9	16.1		20.7	11.7		44.6	39.6		38.6	44.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	7.1		0.2	0.5		39.6	0.4		0.2	12.5	
Delay (s)	6.1	23.3		20.9	12.2		84.2	40.0		38.9	56.8	
Level of Service	A	C		C	B		F	D		D	E	
Approach Delay (s)		22.4			12.2			60.5			55.5	
Approach LOS		C			B			E			E	

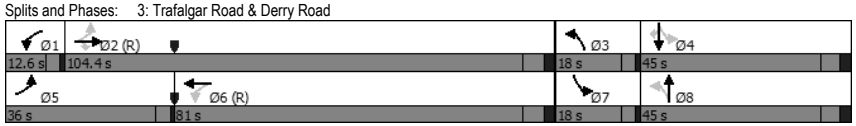
Intersection Summary					
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.90				
Actuated Cycle Length (s)	114.0	Sum of lost time (s)		17.3	
Intersection Capacity Utilization	103.1%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

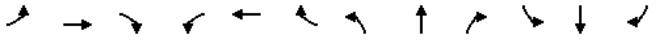
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	478	1289	234	54	476	102	103	367	59	52	247	39
Future Volume (vph)	478	1289	234	54	476	102	103	367	59	52	247	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.974			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1755	3579	1384	1825	3424	0	1323	3110	0	1659	2944	1060
Flt Permitted	0.342			0.164			0.441			0.322		
Satd. Flow (perm)	632	3579	1384	315	3424	0	614	3110	0	562	2944	1060
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			233		17			9				96
Link Speed (k/h)		80			80			70			60	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			66.0	
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
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Adj. Flow (vph)	493	1329	241	56	491	105	106	378	61	54	255	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	493	1329	241	56	596	0	106	439	0	54	255	40
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8			4		4
Detector Phase	5	2	2	1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	36.0	104.4	104.4	12.6	81.0		18.0	45.0		18.0	45.0	45.0
Total Split (%)	20.0%	58.0%	58.0%	7.0%	45.0%		10.0%	25.0%		10.0%	25.0%	25.0%
Maximum Green (s)	32.0	97.5	97.5	8.6	74.1		14.0	38.2		14.0	38.2	38.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0	24.0		24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	121.4	107.9	107.9	96.3	84.6		48.6	34.6		44.6	30.1	30.1
Actuated g/C Ratio	0.67	0.60	0.60	0.54	0.47		0.27	0.19		0.25	0.17	0.17
v/c Ratio	0.81	0.62	0.26	0.23	0.37		0.48	0.73		0.26	0.52	0.16
Control Delay	25.8	26.2	3.1	16.2	32.2		57.0	74.5		48.9	71.2	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	25.8	26.2	3.1	16.2	32.2		57.0	74.5		48.9	71.2	1.3
LOS	C	C	A	B	C		E	E		D	E	A
Approach Delay		23.4			30.8			71.1			59.7	
Approach LOS		C			C			E			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 180		
Actuated Cycle Length: 180		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 100		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.81		
Intersection Signal Delay: 35.4		Intersection LOS: D
Intersection Capacity Utilization 83.5%		ICU Level of Service E
Analysis Period (min) 15		

Splits and Phases: 3: Trafalgar Road & Derry Road



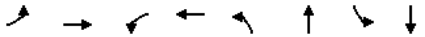


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	478	1289	234	54	476	102	103	367	59	52	247	39
Future Volume (vph)	478	1289	234	54	476	102	103	367	59	52	247	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1755	3579	1384	1825	3423		1323	3110		1659	2944	1060
Flt Permitted	0.34	1.00	1.00	0.16	1.00		0.44	1.00		0.32	1.00	1.00
Satd. Flow (perm)	632	3579	1384	314	3423		614	3110		562	2944	1060
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)	493	1329	241	56	491	105	106	378	61	54	255	40
RTOR Reduction (vph)	0	0	95	0	9	0	0	7	0	0	0	33
Lane Group Flow (vph)	493	1329	146	56	587	0	106	432	0	54	255	7
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	117.7	106.4	106.4	91.1	83.8		48.3	34.6		40.9	30.9	30.9
Effective Green, g (s)	117.7	106.4	106.4	91.1	83.8		48.3	34.6		40.9	30.9	30.9
Actuated g/C Ratio	0.65	0.59	0.59	0.51	0.47		0.27	0.19		0.23	0.17	0.17
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	599	2115	818	220	1593		218	597		188	505	181
v/s Ratio Prot	c0.14	0.37		0.01	0.17		c0.04	c0.14		0.02	0.09	
v/s Ratio Perm	c0.40		0.11	0.12			0.09			0.05		0.01
v/c Ratio	0.82	0.63	0.18	0.25	0.37		0.49	0.72		0.29	0.50	0.04
Uniform Delay, d1	17.2	23.9	16.8	23.6	31.0		52.6	68.2		55.9	67.6	62.2
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	10.0	1.4	0.5	1.3	0.7		3.5	5.3		1.8	1.7	0.2
Delay (s)	27.2	25.4	17.3	24.9	31.7		56.2	73.5		57.7	69.3	62.3
Level of Service	C	C	B	C	C		E	E		E	E	E
Approach Delay (s)		24.9			31.1			70.1			66.7	
Approach LOS		C			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	21.7	
Intersection Capacity Utilization	83.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Queues
1: Fifth Line & Derry Road

01/31/2023



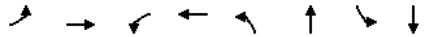
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	2173	87	782	45	165	81	77
v/c Ratio	0.09	0.91	0.81	0.34	0.29	0.64	0.71	0.33
Control Delay	4.5	24.7	70.7	8.2	50.7	30.9	81.2	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	24.7	70.7	8.2	50.7	30.9	81.2	47.5
Queue Length 50th (m)	1.7	222.4	9.6	37.0	9.7	13.3	18.5	15.7
Queue Length 95th (m)	4.6	#309.2	#40.5	52.9	20.5	35.2	34.8	29.3
Internal Link Dist (m)		341.5		1255.7		996.0		1112.7
Turn Bay Length (m)	90.0		95.0		95.0		55.0	
Base Capacity (vph)	428	2394	113	2271	196	300	146	297
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.91	0.77	0.34	0.23	0.55	0.55	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

01/31/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	114	2140	4	675	77	89	21	275
v/c Ratio	0.21	0.88	0.02	0.35	0.81	0.26	0.10	0.80
Control Delay	6.3	20.8	6.0	13.0	94.8	32.0	37.2	54.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.3	20.8	6.0	13.0	94.8	32.0	37.2	54.7
Queue Length 50th (m)	6.8	167.0	0.3	38.5	16.5	13.5	3.9	50.0
Queue Length 95th (m)	13.8	#320.1	1.3	55.1	#38.5	26.4	10.4	76.4
Internal Link Dist (m)		1255.7		1482.9		984.8		565.5
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	559	2431	191	1910	118	415	266	414
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.88	0.02	0.35	0.65	0.21	0.08	0.66

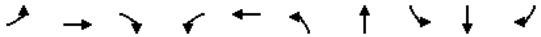
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Trafalgar Road & Derry Road

01/31/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	493	1329	241	56	596	106	439	54	255	40
v/c Ratio	0.81	0.62	0.26	0.23	0.37	0.48	0.73	0.26	0.52	0.16
Control Delay	25.8	26.2	3.1	16.2	32.2	57.0	74.5	48.9	71.2	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	26.2	3.1	16.2	32.2	57.0	74.5	48.9	71.2	1.3
Queue Length 50th (m)	77.6	164.0	1.2	6.5	72.8	29.8	78.5	14.4	44.4	0.0
Queue Length 95th (m)	114.5	204.1	15.0	13.6	94.8	45.5	95.5	25.0	57.0	0.0
Internal Link Dist (m)		1482.9			495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		110.0	300.0		125.0		135.0		80.0
Base Capacity (vph)	631	2146	923	244	1617	220	667	231	624	300
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.62	0.26	0.23	0.37	0.48	0.66	0.23	0.41	0.13

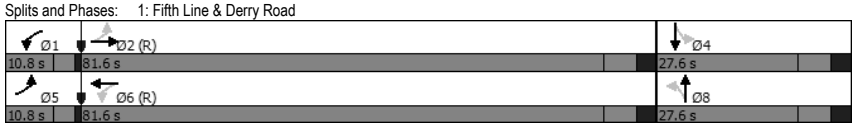
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	968	59	62	1377	81	98	67	113	138	54	27
Future Volume (vph)	8	968	59	62	1377	81	98	67	113	138	54	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		0.0	95.0		0.0	95.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.992			0.906			0.949	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3510	0	1630	3498	0	1755	1591	0	1615	1709	0
Flt Permitted	0.131			0.225			0.703			0.528		
Satd. Flow (perm)	252	3510	0	386	3498	0	1299	1591	0	898	1709	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			9			61			18	
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		365.5			1279.7			1020.0			1136.7	
Travel Time (s)		21.9			76.8			52.5			58.5	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Adj. Flow (vph)	8	988	60	63	1405	83	100	68	115	141	55	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1048	0	63	1488	0	100	183	0	141	83	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	9.0	29.6		9.0	29.6		37.6	37.6		37.6	37.6	
Total Split (s)	10.8	81.6		10.8	81.6		27.6	27.6		27.6	27.6	
Total Split (%)	9.0%	68.0%		9.0%	68.0%		23.0%	23.0%		23.0%	23.0%	
Maximum Green (s)	6.8	74.0		6.8	74.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.0	4.6		3.0	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	1.0	3.0		1.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		-2.0	0.0	
Total Lost Time (s)	4.0	7.6		4.0	7.6		7.6	7.6		5.6	7.6	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		15.0			15.0		23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	85.9	78.3		88.3	83.7		19.3	19.3		21.3	19.3	
Actuated g/C Ratio	0.72	0.65		0.74	0.70		0.16	0.16		0.18	0.16	
v/c Ratio	0.03	0.46		0.19	0.61		0.48	0.60		0.89	0.29	
Control Delay	4.5	11.5		5.6	11.4		54.0	39.4		95.9	37.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.5	11.5		5.6	11.4		54.0	39.4		95.9	37.0	
LOS	A	B		A	B		D	D		F	D	
Approach Delay		11.4			11.1			44.5			74.1	
Approach LOS		B			B			D			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 18.8		Intersection LOS: B	
Intersection Capacity Utilization 84.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Fifth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

01/24/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	968	59	62	1377	81	98	67	113	138	54	27
Future Volume (vph)	8	968	59	62	1377	81	98	67	113	138	54	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6		4.0	7.6		7.6	7.6		5.6	7.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.91		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3511		1630	3497		1755	1590		1615	1709	
Flt Permitted	0.13	1.00		0.23	1.00		0.70	1.00		0.53	1.00	
Satd. Flow (perm)	251	3511		386	3497		1299	1590		897	1709	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	8	988	60	63	1405	83	100	68	115	141	55	28
RTOR Reduction (vph)	0	4	0	0	3	0	0	51	0	0	15	0
Lane Group Flow (vph)	8	1044	0	63	1485	0	100	132	0	141	68	0
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	78.5	77.5		84.5	80.5		19.3	19.3		19.3	19.3	
Effective Green, g (s)	78.5	77.5		84.5	80.5		19.3	19.3		21.3	19.3	
Actuated g/C Ratio	0.65	0.65		0.70	0.67		0.16	0.16		0.18	0.16	
Clearance Time (s)	4.0	7.6		4.0	7.6		7.6	7.6		7.6	7.6	
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	177	2267		313	2345		208	255		159	274	
v/s Ratio Prot	0.00	0.30		c0.01	c0.42			0.08			0.04	
v/s Ratio Perm	0.03			0.13			0.08			c0.16		
v/c Ratio	0.05	0.46		0.20	0.63		0.48	0.52		0.89	0.25	
Uniform Delay, d1	8.9	10.7		6.4	11.3		45.8	46.1		48.2	44.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.7		0.1	1.3		2.1	2.1		40.8	0.6	
Delay (s)	8.9	11.4		6.5	12.6		47.9	48.1		89.0	44.6	
Level of Service	A	B		A	B		D	D		F	D	
Approach Delay (s)		11.4			12.4			48.0			72.5	
Approach LOS		B			B			D			E	

Intersection Summary				
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	84.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

01/24/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	1000	61	11	1296	9	105	82	13	27	97	123
Future Volume (vph)	149	1000	61	11	1296	9	105	82	13	27	97	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.999			0.980			0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1772	3424	0	1825	3536	0	1807	1835	0	1755	1697	0
Flt Permitted	0.136			0.249			0.385			0.694		
Satd. Flow (perm)	254	3424	0	478	3536	0	732	1835	0	1282	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			1			6			52	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		1279.7			1506.9			1008.8			589.5	
Travel Time (s)		57.6			67.8			60.5			35.4	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Adj. Flow (vph)	152	1020	62	11	1322	9	107	84	13	28	99	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	152	1082	0	11	1331	0	107	97	0	28	225	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

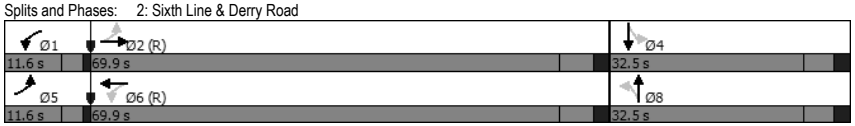
Lanes, Volumes, Timings
2: Sixth Line & Derry Road

01/24/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.5	31.8		32.5	32.5		32.5	32.5	
Total Split (s)	11.6	69.9		11.6	69.9		32.5	32.5		32.5	32.5	
Total Split (%)	10.2%	61.3%		10.2%	61.3%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	7.6	63.1		7.6	63.1		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.0	4.6		3.0	4.6		4.2	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	84.0	79.7		79.8	70.0		18.8	18.8		18.8	18.8	
Actuated g/C Ratio	0.74	0.70		0.70	0.61		0.16	0.16		0.16	0.16	
v/c Ratio	0.52	0.45		0.03	0.61		0.89	0.32		0.13	0.70	
Control Delay	11.8	9.6		5.5	16.2		102.8	40.1		39.0	45.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	11.8	9.6		5.5	16.2		102.8	40.1		39.0	45.0	
LOS	B	A		A	B		F	D		D	D	
Approach Delay		9.9			16.1			73.0			44.4	
Approach LOS		A			B			E			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 114			
Actuated Cycle Length: 114			
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 19.8		Intersection LOS: B	
Intersection Capacity Utilization 85.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

01/24/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	1000	61	11	1296	9	105	82	13	27	97	123
Future Volume (vph)	149	1000	61	11	1296	9	105	82	13	27	97	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	3425		1825	3536		1807	1835		1755	1697	
Flt Permitted	0.14	1.00		0.25	1.00		0.38	1.00		0.69	1.00	
Satd. Flow (perm)	253	3425		478	3536		731	1835		1282	1697	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	152	1020	62	11	1322	9	107	84	13	28	99	126
RTOR Reduction (vph)	0	3	0	0	0	0	0	5	0	0	43	0
Lane Group Flow (vph)	152	1079	0	11	1331	0	107	92	0	28	182	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	81.9	76.5		71.4	70.0		18.8	18.8		18.8	18.8	
Effective Green, g (s)	81.9	76.5		71.4	70.0		18.8	18.8		18.8	18.8	
Actuated g/C Ratio	0.72	0.67		0.63	0.61		0.16	0.16		0.16	0.16	
Clearance Time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	287	2298		315	2171		120	302		211	279	
v/s Ratio Prot	c0.04	0.32		0.00	c0.38			0.05			0.11	
v/s Ratio Perm	0.34			0.02			c0.15			0.02		
v/c Ratio	0.53	0.47		0.03	0.61		0.89	0.30		0.13	0.65	
Uniform Delay, d1	9.6	9.0		8.1	13.6		46.6	41.9		40.6	44.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.7		0.0	1.3		51.0	0.7		0.3	5.6	
Delay (s)	11.3	9.7		8.1	14.9		97.6	42.5		41.0	50.1	
Level of Service	B	A		A	B		F	D		D	D	
Approach Delay (s)		9.9			14.9			71.4			49.1	
Approach LOS		A			B			E			D	

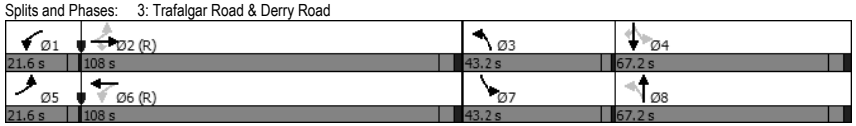
Intersection Summary					
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	114.0	Sum of lost time (s)		17.3	
Intersection Capacity Utilization	85.2%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

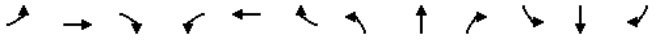
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	750	105	76	1094	108	152	562	60	110	300	69
Future Volume (vph)	188	750	105	76	1094	108	152	562	60	110	300	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.987			0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1573	3510	1570	1825	3498	0	1706	3437	0	1807	3380	1555
Flt Permitted	0.045			0.344			0.387			0.135		
Satd. Flow (perm)	75	3510	1570	661	3498	0	695	3437	0	257	3380	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		5			4				75
Link Speed (k/h)		80			80			70			60	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			66.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Adj. Flow (vph)	204	815	114	83	1189	117	165	611	65	120	326	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	204	815	114	83	1306	0	165	676	0	120	326	75
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8			4		4
Detector Phase	5	2	2	1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	21.6	108.0	108.0	21.6	108.0		43.2	67.2		43.2	67.2	67.2
Total Split (%)	9.0%	45.0%	45.0%	9.0%	45.0%		18.0%	28.0%		18.0%	28.0%	28.0%
Maximum Green (s)	17.6	101.1	101.1	17.6	101.1		39.2	60.4		39.2	60.4	60.4
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0	24.0		24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	148.7	129.8	129.8	116.0	101.1		83.2	56.3		75.0	52.0	52.0
Actuated g/C Ratio	0.62	0.54	0.54	0.48	0.42		0.35	0.23		0.31	0.22	0.22
v/c Ratio	0.68	0.43	0.13	0.22	0.88		0.48	0.84		0.57	0.45	0.19
Control Delay	77.5	35.4	5.8	23.6	72.3		60.0	96.4		64.3	82.7	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	77.5	35.4	5.8	23.6	72.3		60.0	96.4		64.3	82.7	12.3
LOS	E	D	A	C	E		E	F		E	F	B
Approach Delay		40.0			69.4			89.3			68.3	
Approach LOS		D			E			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 65.0		Intersection LOS: E	
Intersection Capacity Utilization 87.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Trafalgar Road & Derry Road



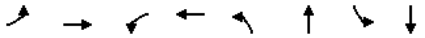


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	750	105	76	1094	108	152	562	60	110	300	69
Future Volume (vph)	188	750	105	76	1094	108	152	562	60	110	300	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1573	3510	1570	1825	3496		1706	3436		1807	3380	1555
Flt Permitted	0.04	1.00	1.00	0.34	1.00		0.39	1.00		0.14	1.00	1.00
Satd. Flow (perm)	74	3510	1570	661	3496		694	3436		257	3380	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	204	815	114	83	1189	117	165	611	65	120	326	75
RTOR Reduction (vph)	0	0	49	0	3	0	0	3	0	0	0	59
Lane Group Flow (vph)	204	815	65	83	1303	0	165	673	0	120	326	16
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	145.8	129.8	129.8	113.1	101.1		80.5	56.3		72.3	52.1	52.1
Effective Green, g (s)	145.8	129.8	129.8	113.1	101.1		80.5	56.3		72.3	52.1	52.1
Actuated g/C Ratio	0.61	0.54	0.54	0.47	0.42		0.34	0.23		0.30	0.22	0.22
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	299	1898	849	369	1472		335	806		207	733	337
v/s Ratio Prot	c0.12	0.23		0.01	c0.37		c0.05	c0.20		c0.05	0.10	
v/s Ratio Perm	0.30		0.04	0.09			0.11			0.13		0.01
v/c Ratio	0.68	0.43	0.08	0.22	0.89		0.49	0.83		0.58	0.44	0.05
Uniform Delay, d1	74.2	33.0	26.4	35.1	64.1		59.4	87.4		65.7	81.4	74.3
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	8.0	0.7	0.2	0.6	8.1		2.4	8.3		6.2	0.9	0.1
Delay (s)	82.2	33.7	26.6	35.8	72.2		61.8	95.7		71.8	82.3	74.5
Level of Service	F	C	C	D	E		E	F		E	F	E
Approach Delay (s)		41.7			70.1			89.1			78.8	
Approach LOS		D			E			F			E	

Intersection Summary				
HCM 2000 Control Delay	67.1	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	240.0	Sum of lost time (s)	21.7	
Intersection Capacity Utilization	87.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Queues
1: Fifth Line & Derry Road

01/31/2023



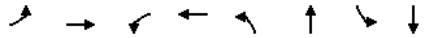
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	8	1048	63	1488	100	183	141	83
v/c Ratio	0.03	0.46	0.19	0.61	0.48	0.60	0.89	0.29
Control Delay	4.5	11.5	5.6	11.4	54.0	39.4	95.9	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	11.5	5.6	11.4	54.0	39.4	95.9	37.0
Queue Length 50th (m)	0.4	62.7	3.6	83.5	21.5	26.5	32.5	13.4
Queue Length 95th (m)	1.7	77.4	7.1	132.1	39.1	50.4	#68.9	28.2
Internal Link Dist (m)		341.5		1255.7		996.0		1112.7
Turn Bay Length (m)	90.0		95.0		95.0		55.0	
Base Capacity (vph)	272	2293	355	2443	216	316	164	299
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.46	0.18	0.61	0.46	0.58	0.86	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

01/31/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	152	1082	11	1331	107	97	28	225
v/c Ratio	0.52	0.45	0.03	0.61	0.89	0.32	0.13	0.70
Control Delay	11.8	9.6	5.5	16.2	102.8	40.1	39.0	45.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.6	5.5	16.2	102.8	40.1	39.0	45.0
Queue Length 50th (m)	8.3	46.1	0.6	91.7	23.5	18.0	5.4	36.6
Queue Length 95th (m)	17.8	95.8	2.5	130.1	#46.3	31.0	12.6	58.4
Internal Link Dist (m)		1255.7		1482.9		984.8		565.5
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	294	2397	426	2172	166	423	292	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.45	0.03	0.61	0.64	0.23	0.10	0.53

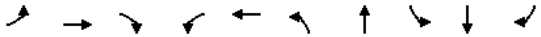
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Trafalgar Road & Derry Road

01/31/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	204	815	114	83	1306	165	676	120	326	75
v/c Ratio	0.68	0.43	0.13	0.22	0.88	0.48	0.84	0.57	0.45	0.19
Control Delay	77.5	35.4	5.8	23.6	72.3	60.0	96.4	64.3	82.7	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.5	35.4	5.8	23.6	72.3	60.0	96.4	64.3	82.7	12.3
Queue Length 50th (m)	75.9	122.4	1.6	15.6	306.6	58.2	165.3	41.0	73.1	0.0
Queue Length 95th (m)	#146.1	163.5	15.3	28.8	336.0	73.4	180.9	54.3	86.3	15.8
Internal Link Dist (m)		1482.9			495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		110.0	300.0		125.0		135.0		80.0
Base Capacity (vph)	300	1898	898	420	1476	406	882	342	853	448
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.43	0.13	0.20	0.88	0.41	0.77	0.35	0.38	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX I2

2028 Future Background Conditions Unoptimized

Lanes, Volumes, Timings
1: Fifth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Future Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		0.0	95.0		0.0	95.0		55.0	55.0		55.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.987			0.941				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1372	3558	0	1148	3058	0	1587	3230	1192	1573	3476	1266
Flt Permitted	0.172			0.054			0.663			0.328		
Satd. Flow (perm)	248	3558	0	65	3058	0	1108	3230	1192	543	3476	1266
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			80				98			78
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Adj. Flow (vph)	212	2345	223	111	747	482	62	433	161	185	140	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	2568	0	111	1229	0	62	433	161	185	140	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
1: Fifth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8		8	4		4
Detector Phase	5	2		1	6		8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	29.6		9.0	29.6		37.6	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.8	81.6		10.8	81.6		27.6	27.6	27.6	27.6	27.6	27.6
Total Split (%)	9.0%	68.0%		9.0%	68.0%		23.0%	23.0%	23.0%	23.0%	23.0%	23.0%
Maximum Green (s)	6.8	74.0		6.8	74.0		20.0	20.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.0	4.6		3.0	4.6		4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.0	3.0		1.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	-2.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.6		4.0	7.6		7.6	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5	3.5	3.5	3.5	3.5
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		15.0			15.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0	0	0
Act Effct Green (s)	84.4	76.0		84.4	74.0		20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.70	0.63		0.70	0.62		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.89	1.14		1.04	0.64		0.34	0.80	0.57	2.06	0.24	0.17
Control Delay	46.4	90.8		124.5	18.7		50.1	60.7	28.0	538.0	44.7	4.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.4	90.8		124.5	18.7		50.1	60.7	28.0	538.0	44.7	4.4
LOS	D	F		F	B		D	E	C	F	D	A
Approach Delay		87.4			27.5			51.6			284.9	
Approach LOS		F			C			D			F	

Intersection Summary		
Area Type:	Other	
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 150		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 2.06		
Intersection Signal Delay: 81.5	Intersection LOS: F	
Intersection Capacity Utilization 112.9%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 1: Fifth Line & Derry Road

HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Future Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6		4.0	7.6		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1372	3558		1148	3059		1587	3230	1192	1573	3476	1266
Flt Permitted	0.17	1.00		0.05	1.00		0.66	1.00	1.00	0.33	1.00	1.00
Satd. Flow (perm)	248	3558		65	3059		1108	3230	1192	543	3476	1266
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	2345	223	111	747	482	62	433	161	185	140	47
RTOR Reduction (vph)	0	6	0	0	31	0	0	0	82	0	0	39
Lane Group Flow (vph)	212	2562	0	111	1198	0	62	433	79	185	140	8
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	80.8	74.0		80.8	74.0		20.0	20.0	20.0	20.0	20.0	20.0
Effective Green, g (s)	80.8	76.0		80.8	74.0		20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.67	0.63		0.67	0.62		0.17	0.17	0.17	0.17	0.17	0.17
Clearance Time (s)	4.0	7.6		4.0	7.6		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5	3.5	3.5	3.5	3.5
Lane Grp Cap (vph)	230	2253		105	1886		184	538	198	90	579	211
v/s Ratio Prot	0.05	c0.72		c0.06	0.39			0.13			0.04	
v/s Ratio Perm	0.57			0.65			0.06		0.07	c0.34		0.01
v/c Ratio	0.92	1.14		1.06	0.64		0.34	0.80	0.40	2.06	0.24	0.04
Uniform Delay, d1	12.3	22.0		39.5	14.5		44.1	48.1	44.6	50.0	43.4	41.9
Progression Factor	1.00	1.00		0.89	1.25		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.0	67.8		102.9	1.6		1.3	8.8	1.6	511.2	0.3	0.1
Delay (s)	50.3	89.8		137.9	19.7		45.4	56.9	46.2	561.2	43.7	42.0
Level of Service	D	F		F	B		D	E	D	F	D	D
Approach Delay (s)		86.8			29.5			53.2			300.8	
Approach LOS		F			C			D			F	

Intersection Summary				
HCM 2000 Control Delay	83.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.33			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	112.9%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Future Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.994			0.954			0.917	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3482	0	1825	3192	0	1630	1762	0	1587	1659	0
Flt Permitted	0.288			0.063			0.221			0.689		
Satd. Flow (perm)	553	3482	0	121	3192	0	379	1762	0	1151	1659	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			6			18			51	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			709.7	
Travel Time (s)		25.8			67.8			60.5			42.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Adj. Flow (vph)	136	2348	129	9	755	34	130	73	32	42	161	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	2477	0	9	789	0	130	105	0	42	360	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.5	31.8		32.5	32.5		32.5	32.5	
Total Split (s)	11.6	69.9		11.6	69.9		32.5	32.5		32.5	32.5	
Total Split (%)	10.2%	61.3%		10.2%	61.3%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	7.6	63.1		7.6	63.1		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.0	4.6		3.0	4.6		4.2	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	-2.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	76.8	74.5		73.0	63.2		26.0	26.0		26.0	26.0	
Actuated g/C Ratio	0.67	0.65		0.64	0.55		0.23	0.23		0.23	0.23	
v/c Ratio	0.30	1.09		0.05	0.45		1.51	0.25		0.16	0.86	
Control Delay	8.1	68.6		6.5	15.9		313.9	31.6		37.3	57.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	8.1	68.6		6.5	15.9		313.9	31.6		37.3	57.5	
LOS	A	E		A	B		F	C		D	E	
Approach Delay		65.5			15.8			187.8			55.4	
Approach LOS		E			B			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 114			
Actuated Cycle Length: 114			
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.51			
Intersection Signal Delay: 61.8		Intersection LOS: E	
Intersection Capacity Utilization 114.8%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road

HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Future Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.95		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3482		1825	3191		1630	1763		1587	1659	
Flt Permitted	0.29	1.00		0.06	1.00		0.22	1.00		0.69	1.00	
Satd. Flow (perm)	553	3482		122	3191		378	1763		1151	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	2348	129	9	755	34	130	73	32	42	161	199
RTOR Reduction (vph)	0	3	0	0	3	0	0	14	0	0	39	0
Lane Group Flow (vph)	136	2474	0	9	786	0	130	91	0	42	321	0
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	74.7	69.3		64.6	63.2		26.0	26.0		26.0	26.0	
Effective Green, g (s)	74.7	71.3		64.6	63.2		26.0	26.0		26.0	26.0	
Actuated g/C Ratio	0.66	0.63		0.57	0.55		0.23	0.23		0.23	0.23	
Clearance Time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	446	2177		90	1769		86	402		262	378	
v/s Ratio Prot	c0.02	c0.71		0.00	0.25			0.05			0.19	
v/s Ratio Perm	0.18			0.06			c0.34			0.04		
v/c Ratio	0.30	1.14		0.10	0.44		1.51	0.23		0.16	0.85	
Uniform Delay, d1	8.2	21.4		26.2	15.0		44.0	35.8		35.3	42.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	67.6		0.5	0.8		280.9	0.3		0.3	16.4	
Delay (s)	8.6	89.0		26.7	15.8		324.9	36.2		35.6	58.5	
Level of Service	A	F		C	B		F	D		D	E	
Approach Delay (s)		84.8			16.0			195.9			56.1	
Approach LOS		F			B			F			E	

Intersection Summary					
HCM 2000 Control Delay	74.8	HCM 2000 Level of Service		E	
HCM 2000 Volume to Capacity ratio	1.25				
Actuated Cycle Length (s)	114.0	Sum of lost time (s)		17.3	
Intersection Capacity Utilization	114.8%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Future Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.974			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1755	3579	1384	1825	3424	0	1323	3110	0	1659	2944	1060
Flt Permitted	0.261			0.085			0.408			0.200		
Satd. Flow (perm)	482	3579	1384	163	3424	0	568	3110	0	349	2944	1060
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			233		17			9				96
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Adj. Flow (vph)	586	1578	287	66	584	125	134	477	77	68	321	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	586	1578	287	66	709	0	134	554	0	68	321	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8			4		4
Detector Phase	5	2	2	1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	36.0	104.4	104.4	12.6	81.0		18.0	45.0		18.0	45.0	45.0
Total Split (%)	20.0%	58.0%	58.0%	7.0%	45.0%		10.0%	25.0%		10.0%	25.0%	25.0%
Maximum Green (s)	32.0	97.5	97.5	8.6	74.1		14.0	38.2		14.0	38.2	38.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0	24.0		24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	116.1	100.6	100.6	85.6	74.1		53.4	36.7		50.3	35.1	35.1
Actuated g/C Ratio	0.64	0.56	0.56	0.48	0.41		0.30	0.20		0.28	0.20	0.20
v/c Ratio	1.05	0.79	0.33	0.42	0.50		0.59	0.86		0.36	0.56	0.18
Control Delay	76.3	35.6	5.5	25.8	39.7		59.3	82.4		49.2	69.0	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	76.3	35.6	5.5	25.8	39.7		59.3	82.4		49.2	69.0	1.4
LOS	E	D	A	C	D		E	F		D	E	A
Approach Delay		41.8			38.5			77.9			58.1	
Approach LOS		D			D			E			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 180		
Actuated Cycle Length: 180		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 120		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.05		
Intersection Signal Delay: 48.6	Intersection LOS: D	
Intersection Capacity Utilization 89.9%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 3: Trafalgar Road & Derry Road

HCM Signalized Intersection Capacity Analysis
3: Trafalgar Road & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Future Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1755	3579	1384	1825	3423		1323	3110		1659	2944	1060
Flt Permitted	0.26	1.00	1.00	0.09	1.00		0.41	1.00		0.20	1.00	1.00
Satd. Flow (perm)	482	3579	1384	164	3423		569	3110		350	2944	1060
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	586	1578	287	66	584	125	134	477	77	68	321	51
RTOR Reduction (vph)	0	0	103	0	10	0	0	7	0	0	0	41
Lane Group Flow (vph)	586	1578	184	66	699	0	134	547	0	68	321	10
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	113.2	100.6	100.6	82.7	74.1		50.7	36.7		47.5	35.1	35.1
Effective Green, g (s)	113.2	100.6	100.6	82.7	74.1		50.7	36.7		47.5	35.1	35.1
Actuated g/C Ratio	0.63	0.56	0.56	0.46	0.41		0.28	0.20		0.26	0.20	0.20
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	551	2000	773	154	1409		218	634		182	574	206
v/s Ratio Prot	c0.21	0.44		0.02	0.20		c0.05	c0.18		0.03	0.11	
v/s Ratio Perm	c0.46		0.13	0.18			0.12			0.07		0.01
v/c Ratio	1.06	0.79	0.24	0.43	0.50		0.61	0.86		0.37	0.56	0.05
Uniform Delay, d1	30.3	31.3	20.2	31.5	39.1		52.3	69.2		52.0	65.5	58.9
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	56.3	3.3	0.7	4.0	1.3		7.2	12.6		2.7	2.0	0.2
Delay (s)	86.7	34.6	20.9	35.5	40.4		59.6	81.8		54.7	67.5	59.1
Level of Service	F	C	C	D	D		E	F		D	E	E
Approach Delay (s)		45.4			40.0			77.5			64.5	
Approach LOS		D			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	51.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.01			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	21.7	
Intersection Capacity Utilization	89.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Future Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		50.0	80.0		50.0	60.0		50.0	60.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.995			0.869			0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3621	0	1825	3632	0	1825	1669	0	1825	1729	0
Flt Permitted	0.266			0.044			0.724			0.638		
Satd. Flow (perm)	511	3621	0	85	3632	0	1391	1669	0	1226	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			6			3			34	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			573.7			1054.3			1121.4	
Travel Time (s)		31.8			25.8			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	105	2784	158	110	972	35	71	16	110	108	17	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	2942	0	110	1007	0	71	126	0	108	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

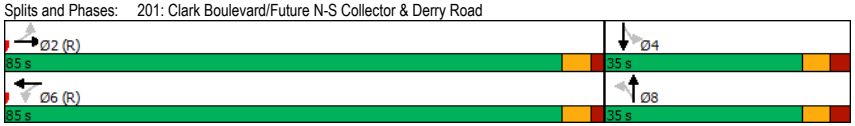
Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		35.0	35.0		35.0	35.0	
Total Split (s)	85.0	85.0		85.0	85.0		35.0	35.0		35.0	35.0	
Total Split (%)	70.8%	70.8%		70.8%	70.8%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	79.0	79.0		79.0	79.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		7.0	7.0		7.0	7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	91.5	91.5		91.5	91.5		15.5	15.5		15.5	15.5	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.13	0.13		0.13	0.13	
v/c Ratio	0.27	1.07		1.72	0.36		0.40	0.58		0.68	0.20	
Control Delay	2.2	41.5		398.9	5.5		53.0	57.6		70.3	22.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	2.2	41.5		398.9	5.5		53.0	57.6		70.3	22.4	
LOS	A	D		F	A		D	E		E	C	
Approach Delay		40.1			44.2			56.0			55.0	
Approach LOS		D			D			E			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 48 (40%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.72			
Intersection Signal Delay: 42.4		Intersection LOS: D	
Intersection Capacity Utilization 106.9%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road



HCM Signalized Intersection Capacity Analysis
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Future Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.87		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3621		1825	3631		1825	1670		1825	1729	
Flt Permitted	0.27	1.00		0.04	1.00		0.72	1.00		0.64	1.00	
Satd. Flow (perm)	512	3621		84	3631		1390	1670		1226	1729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	2784	158	110	972	35	71	16	110	108	17	34
RTOR Reduction (vph)	0	2	0	0	1	0	0	3	0	0	30	0
Lane Group Flow (vph)	105	2940	0	110	1006	0	71	123	0	108	21	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	91.5	91.5		91.5	91.5		15.5	15.5		15.5	15.5	
Effective Green, g (s)	91.5	91.5		91.5	91.5		15.5	15.5		15.5	15.5	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.13	0.13		0.13	0.13	
Clearance Time (s)	6.0	6.0		6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	390	2761		64	2768		179	215		158	223	
v/s Ratio Prot		0.81			0.28			0.07			0.01	
v/s Ratio Perm	0.21			c1.31			0.05			c0.09		
v/c Ratio	0.27	1.06		1.72	0.36		0.40	0.57		0.68	0.10	
Uniform Delay, d1	4.3	14.2		14.2	4.7		48.0	49.1		49.9	46.1	
Progression Factor	0.38	0.54		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	30.0		380.6	0.4		1.4	3.7		11.6	0.2	
Delay (s)	1.8	37.7		394.8	5.1		49.4	52.8		61.5	46.3	
Level of Service	A	D		F	A		D	D		E	D	
Approach Delay (s)		36.4			43.4			51.6			56.6	
Approach LOS		D			D			D			E	

Intersection Summary					
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	1.57				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	106.9%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
1: Fifth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	212	2568	111	1229	62	433	161	185	140	47
v/c Ratio	0.89	1.14	1.04	0.64	0.34	0.80	0.57	2.06	0.24	0.17
Control Delay	46.4	90.8	124.5	18.7	50.1	60.7	28.0	538.0	44.7	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.4	90.8	124.5	18.7	50.1	60.7	28.0	538.0	44.7	4.4
Queue Length 50th (m)	13.5	~371.5	~17.8	80.2	13.0	52.2	13.2	~68.5	15.2	0.0
Queue Length 95th (m)	#40.4	#412.1	#54.6	139.6	26.7	#74.4	36.1	#113.6	24.7	4.0
Internal Link Dist (m)		341.5		681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		95.0		95.0		55.0	55.0		55.0
Base Capacity (vph)	238	2259	107	1916	184	538	280	90	579	276
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	1.14	1.04	0.64	0.34	0.80	0.57	2.06	0.24	0.17

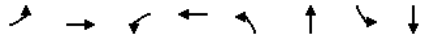
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	2477	9	789	130	105	42	360
v/c Ratio	0.30	1.09	0.05	0.45	1.51	0.25	0.16	0.86
Control Delay	8.1	68.6	6.5	15.9	313.9	31.6	37.3	57.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	68.6	6.5	15.9	313.9	31.6	37.3	57.5
Queue Length 50th (m)	9.5	~319.2	0.6	51.8	~40.3	15.9	7.6	67.5
Queue Length 95th (m)	16.2	#402.9	2.2	66.4	#78.4	31.0	17.3	#118.0
Internal Link Dist (m)		549.7		1482.9		984.8		685.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	457	2278	191	1772	86	415	262	417
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	1.09	0.05	0.45	1.51	0.25	0.16	0.86

Intersection Summary

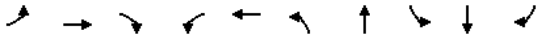
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Trafalgar Road & Derry Road

11/01/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	586	1578	287	66	709	134	554	68	321	51
v/c Ratio	1.05	0.79	0.33	0.42	0.50	0.59	0.86	0.36	0.56	0.18
Control Delay	76.3	35.6	5.5	25.8	39.7	59.3	82.4	49.2	69.0	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.3	35.6	5.5	25.8	39.7	59.3	82.4	49.2	69.0	1.4
Queue Length 50th (m)	~157.1	239.9	9.1	8.8	96.7	36.2	99.3	17.2	54.3	0.0
Queue Length 95th (m)	#233.8	270.1	26.4	15.5	116.0	56.2	123.1	30.3	71.4	0.0
Internal Link Dist (m)		1482.9			495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		110.0	300.0		125.0		135.0		80.0
Base Capacity (vph)	558	2000	876	157	1419	227	670	202	624	300
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.05	0.79	0.33	0.42	0.50	0.59	0.83	0.34	0.51	0.17

Intersection Summary

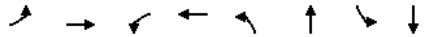
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	2942	110	1007	71	126	108	51
v/c Ratio	0.27	1.07	1.72	0.36	0.40	0.58	0.68	0.20
Control Delay	2.2	41.5	398.9	5.5	53.0	57.6	70.3	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.2	41.5	398.9	5.5	53.0	57.6	70.3	22.4
Queue Length 50th (m)	1.8	~406.8	~22.6	34.2	15.6	27.7	24.7	3.6
Queue Length 95th (m)	m2.8	m#342.8	#61.9	54.6	28.4	44.5	41.6	14.2
Internal Link Dist (m)		681.9		549.7		1030.3		1097.4
Turn Bay Length (m)	80.0		80.0		60.0		60.0	
Base Capacity (vph)	389	2762	64	2769	324	391	286	429
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	1.07	1.72	0.36	0.22	0.32	0.38	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Future Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		0.0	95.0		0.0	95.0		55.0	55.0		55.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.991			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3510	0	1630	3460	0	1755	3650	1420	1615	3510	1458
Flt Permitted	0.052			0.168			0.350			0.641		
Satd. Flow (perm)	100	3510	0	288	3460	0	647	3650	1420	1090	3510	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			19				149			116
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Adj. Flow (vph)	54	1186	78	86	1686	189	236	175	149	426	416	220
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1264	0	86	1875	0	236	175	149	426	416	220
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8		8	4		4
Detector Phase	5	2		1	6		8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	29.6		9.0	29.6		37.6	37.6	37.6	37.6	37.6	37.6
Total Split (s)	10.8	81.6		10.8	81.6		27.6	27.6	27.6	27.6	27.6	27.6
Total Split (%)	9.0%	68.0%		9.0%	68.0%		23.0%	23.0%	23.0%	23.0%	23.0%	23.0%
Maximum Green (s)	6.8	74.0		6.8	74.0		20.0	20.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.0	4.6		3.0	4.6		4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	1.0	3.0		1.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
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)	4.0	7.6		4.0	7.6		7.6	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5	3.5	3.5	3.5	3.5
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		15.0			15.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0	0	0
Act Effct Green (s)	85.0	77.4		85.4	77.6		20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.71	0.64		0.71	0.65		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.38	0.56		0.33	0.84		2.21	0.29	0.41	2.35	0.71	0.65
Control Delay	14.8	13.2		8.3	28.2		596.9	45.2	10.6	649.6	54.8	31.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	13.2		8.3	28.2		596.9	45.2	10.6	649.6	54.8	31.5
LOS	B	B		A	C		F	D	B	F	D	C
Approach Delay		13.3			27.3			268.5			288.6	
Approach LOS		B			C			F			F	

Intersection Summary		
Area Type:	Other	
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 150		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 2.35		
Intersection Signal Delay: 107.7		Intersection LOS: F
Intersection Capacity Utilization 105.0%		ICU Level of Service G
Analysis Period (min) 15		

Splits and Phases: 1: Fifth Line & Derry Road

HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Future Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6		4.0	7.6		7.6	7.6	7.6	7.6	7.6	7.6
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3509		1630	3460		1755	3650	1420	1615	3510	1458
Flt Permitted	0.05	1.00		0.17	1.00		0.35	1.00	1.00	0.64	1.00	1.00
Satd. Flow (perm)	100	3509		289	3460		646	3650	1420	1090	3510	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1186	78	86	1686	189	236	175	149	426	416	220
RTOR Reduction (vph)	0	4	0	0	7	0	0	0	124	0	0	97
Lane Group Flow (vph)	54	1260	0	86	1868	0	236	175	25	426	416	123
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	80.6	76.6		81.0	76.8		20.0	20.0	20.0	20.0	20.0	20.0
Effective Green, g (s)	80.6	76.6		81.0	76.8		20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/C Ratio	0.67	0.64		0.68	0.64		0.17	0.17	0.17	0.17	0.17	0.17
Clearance Time (s)	4.0	7.6		4.0	7.6		7.6	7.6	7.6	7.6	7.6	7.6
Vehicle Extension (s)	0.2	5.0		0.2	5.0		3.5	3.5	3.5	3.5	3.5	3.5
Lane Grp Cap (vph)	124	2239		242	2214		107	608	236	181	585	243
v/s Ratio Prot	c0.01	0.36		0.01	c0.54			0.05			0.12	
v/s Ratio Perm	0.28			0.23			0.37		0.02	c0.39		0.08
v/c Ratio	0.44	0.56		0.36	0.84		2.21	0.29	0.11	2.35	0.71	0.51
Uniform Delay, d1	17.4	12.2		8.4	16.9		50.0	43.8	42.4	50.0	47.3	45.5
Progression Factor	1.00	1.00		1.31	1.47		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	1.0		0.2	3.0		571.7	0.3	0.2	625.9	4.2	2.0
Delay (s)	18.3	13.3		11.3	27.9		621.7	44.1	42.6	675.9	51.5	47.5
Level of Service	B	B		B	C		F	D	D	F	D	D
Approach Delay (s)		13.5			27.2			287.1			301.1	
Approach LOS		B			C			F			F	

Intersection Summary				
HCM 2000 Control Delay	112.6	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.13			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	105.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Future Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.998			0.980			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1772	3418	0	1825	3528	0	1807	1835	0	1755	1695	0
Flt Permitted	0.060			0.147			0.366			0.681		
Satd. Flow (perm)	112	3418	0	282	3528	0	696	1835	0	1258	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			2			6			54	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			709.7	
Travel Time (s)		25.8			67.8			60.5			42.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Adj. Flow (vph)	216	1225	109	20	1587	20	175	103	16	86	121	160
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	1334	0	20	1607	0	175	119	0	86	281	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.5	31.8		32.5	32.5		32.5	32.5	
Total Split (s)	11.6	69.9		11.6	69.9		32.5	32.5		32.5	32.5	
Total Split (%)	10.2%	61.3%		10.2%	61.3%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	7.6	63.1		7.6	63.1		26.0	26.0		26.0	26.0	
Yellow Time (s)	3.0	4.6		3.0	4.6		4.2	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	76.1	70.3		72.9	63.1		26.0	26.0		26.0	26.0	
Actuated g/C Ratio	0.67	0.62		0.64	0.55		0.23	0.23		0.23	0.23	
v/c Ratio	1.17	0.63		0.07	0.82		1.11	0.28		0.30	0.66	
Control Delay	145.9	16.1		6.6	25.4		145.4	36.6		39.9	40.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	145.9	16.1		6.6	25.4		145.4	36.6		39.9	40.3	
LOS	F	B		A	C		F	D		D	D	
Approach Delay		34.2			25.2			101.3			40.2	
Approach LOS		C			C			F			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 114			
Actuated Cycle Length: 114			
Offset: 5 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 36.1		Intersection LOS: D	
Intersection Capacity Utilization 95.6%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road

HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Future Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	3417		1825	3529		1807	1835		1755	1694	
Flt Permitted	0.06	1.00		0.15	1.00		0.37	1.00		0.68	1.00	
Satd. Flow (perm)	111	3417		282	3529		697	1835		1257	1694	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	1225	109	20	1587	20	175	103	16	86	121	160
RTOR Reduction (vph)	0	5	0	0	1	0	0	5	0	0	42	0
Lane Group Flow (vph)	216	1329	0	20	1606	0	175	114	0	86	239	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	74.7	67.9		65.9	63.1		26.0	26.0		26.0	26.0	
Effective Green, g (s)	74.7	67.9		65.9	63.1		26.0	26.0		26.0	26.0	
Actuated g/C Ratio	0.66	0.60		0.58	0.55		0.23	0.23		0.23	0.23	
Clearance Time (s)	4.0	6.8		4.0	6.8		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	183	2035		200	1953		158	418		286	386	
v/s Ratio Prot	c0.08	0.39		0.00	0.46			0.06			0.14	
v/s Ratio Perm	c0.69			0.06			c0.25			0.07		
v/c Ratio	1.18	0.65		0.10	0.82		1.11	0.27		0.30	0.62	
Uniform Delay, d1	33.3	15.3		11.7	20.9		44.0	36.2		36.5	39.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	123.5	1.6		0.2	4.1		103.4	0.4		0.7	3.1	
Delay (s)	156.8	16.9		12.0	24.9		147.4	36.6		37.2	42.7	
Level of Service	F	B		B	C		F	D		D	D	
Approach Delay (s)		36.4			24.8			102.5			41.4	
Approach LOS		D			C			F			D	

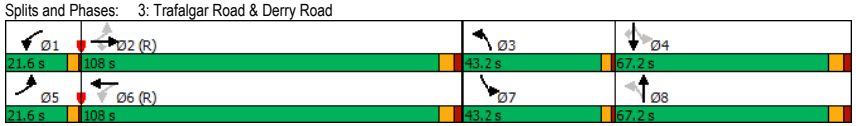
Intersection Summary					
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	1.19				
Actuated Cycle Length (s)	114.0	Sum of lost time (s)		17.3	
Intersection Capacity Utilization	95.6%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Future Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.986			0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1573	3510	1570	1825	3494	0	1706	3437	0	1807	3380	1555
Flt Permitted	0.038			0.237			0.375			0.101		
Satd. Flow (perm)	63	3510	1570	455	3494	0	673	3437	0	192	3380	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		5			5				90
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Adj. Flow (vph)	230	918	129	93	1340	133	198	730	78	143	390	90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	230	918	129	93	1473	0	198	808	0	143	390	90
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8			4		4
Detector Phase	5	2	2	1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	21.6	108.0	108.0	21.6	108.0		43.2	67.2		43.2	67.2	67.2
Total Split (%)	9.0%	45.0%	45.0%	9.0%	45.0%		18.0%	28.0%		18.0%	28.0%	28.0%
Maximum Green (s)	17.6	101.1	101.1	17.6	101.1		39.2	60.4		39.2	60.4	60.4
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0	24.0		24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	135.2	115.7	115.7	117.3	101.1		94.5	65.5		89.7	63.1	63.1
Actuated g/C Ratio	0.56	0.48	0.48	0.49	0.42		0.39	0.27		0.37	0.26	0.26
v/c Ratio	1.10	0.54	0.16	0.31	1.00		0.52	0.86		0.62	0.44	0.19
Control Delay	154.5	46.7	9.4	29.2	90.6		52.8	92.3		59.6	74.8	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	154.5	46.7	9.4	29.2	90.6		52.8	92.3		59.6	74.8	10.2
LOS	F	D	A	C	F		D	F		E	E	B
Approach Delay		62.4			86.9			84.5			62.0	
Approach LOS		E			F			F			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 240		
Actuated Cycle Length: 240		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 130		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.10		
Intersection Signal Delay: 75.9	Intersection LOS: E	
Intersection Capacity Utilization 96.0%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 3: Trafalgar Road & Derry Road



HCM Signalized Intersection Capacity Analysis
3: Trafalgar Road & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Future Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1573	3510	1570	1825	3496		1706	3435		1807	3380	1555
Flt Permitted	0.04	1.00	1.00	0.24	1.00		0.38	1.00		0.10	1.00	1.00
Satd. Flow (perm)	63	3510	1570	455	3496		674	3435		191	3380	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	918	129	93	1340	133	198	730	78	143	390	90
RTOR Reduction (vph)	0	0	55	0	3	0	0	4	0	0	0	66
Lane Group Flow (vph)	230	918	74	93	1470	0	198	804	0	143	390	24
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	132.9	115.6	115.6	114.3	101.0		91.8	65.5		87.0	63.1	63.1
Effective Green, g (s)	132.9	115.6	115.6	114.3	101.0		91.8	65.5		87.0	63.1	63.1
Actuated g/C Ratio	0.55	0.48	0.48	0.48	0.42		0.38	0.27		0.36	0.26	0.26
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	210	1690	756	292	1471		370	937		230	888	408
v/s Ratio Prot	c0.13	0.26		0.02	0.42		c0.06	c0.23		c0.06	0.12	
v/s Ratio Perm	c0.48		0.05	0.13			0.15			0.16		0.02
v/c Ratio	1.10	0.54	0.10	0.32	1.00		0.54	0.86		0.62	0.44	0.06
Uniform Delay, d1	89.8	43.7	33.8	36.1	69.5		52.7	82.8		58.3	73.7	66.2
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	89.9	1.3	0.3	1.3	23.3		2.7	8.6		7.2	0.7	0.1
Delay (s)	179.7	44.9	34.1	37.4	92.8		55.4	91.5		65.5	74.4	66.3
Level of Service	F	D	C	D	F		E	F		E	E	E
Approach Delay (s)		68.1			89.5			84.4			71.2	
Approach LOS		E			F			F			E	

Intersection Summary				
HCM 2000 Control Delay	79.7	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	240.0	Sum of lost time (s)	21.7	
Intersection Capacity Utilization	96.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Future Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		50.0	80.0		50.0	60.0		50.0	60.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.875			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3636	0	1825	3639	0	1825	1681	0	1825	1668	0
Flt Permitted	0.065			0.138			0.696			0.480		
Satd. Flow (perm)	125	3636	0	265	3639	0	1337	1681	0	922	1668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			3			55			20	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			573.7			1054.3			1121.4	
Travel Time (s)		31.8			25.8			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	1483	41	73	1968	35	134	27	137	82	11	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1524	0	73	2003	0	134	164	0	82	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	97		97	97		97	97		97
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

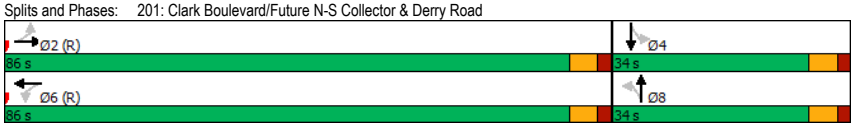
Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		34.0	34.0		34.0	34.0	
Total Split (s)	86.0	86.0		86.0	86.0		34.0	34.0		34.0	34.0	
Total Split (%)	71.7%	71.7%		71.7%	71.7%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	91.5	91.5		91.5	91.5		16.5	16.5		16.5	16.5	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.14	0.14		0.14	0.14	
v/c Ratio	0.37	0.55		0.36	0.72		0.73	0.59		0.65	0.38	
Control Delay	12.1	7.7		11.9	10.2		71.3	39.8		71.1	39.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	12.1	7.7		11.9	10.2		71.3	39.8		71.1	39.9	
LOS	B	A		B	B		E	D		E	D	
Approach Delay		7.8			10.3			54.0			54.5	
Approach LOS		A			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 63 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 14.4		Intersection LOS: B	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road



HCM Signalized Intersection Capacity Analysis
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Future Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3635		1825	3641		1825	1680		1825	1667	
Flt Permitted	0.06	1.00		0.14	1.00		0.70	1.00		0.48	1.00	
Satd. Flow (perm)	124	3635		265	3641		1337	1680		922	1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1483	41	73	1968	35	134	27	137	82	11	83
RTOR Reduction (vph)	0	1	0	0	1	0	0	47	0	0	17	0
Lane Group Flow (vph)	35	1523	0	73	2002	0	134	117	0	82	77	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	91.5	91.5		91.5	91.5		16.5	16.5		16.5	16.5	
Effective Green, g (s)	91.5	91.5		91.5	91.5		16.5	16.5		16.5	16.5	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.14	0.14		0.14	0.14	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	94	2771		202	2776		183	231		126	229	
v/s Ratio Prot		0.42			c0.55			0.07			0.05	
v/s Ratio Perm	0.28			0.28			c0.10			0.09		
v/c Ratio	0.37	0.55		0.36	0.72		0.73	0.50		0.65	0.34	
Uniform Delay, d1	4.7	5.8		4.7	7.5		49.6	48.0		49.0	46.8	
Progression Factor	1.03	1.16		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	0.2		5.0	1.7		14.0	1.7		11.4	0.9	
Delay (s)	7.9	7.0		9.6	9.2		63.7	49.7		60.4	47.7	
Level of Service	A	A		A	A		E	D		E	D	
Approach Delay (s)		7.0			9.2			56.0			53.6	
Approach LOS		A			A			E			D	

Intersection Summary					
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	88.1%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
1: Fifth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1264	86	1875	236	175	149	426	416	220
v/c Ratio	0.38	0.56	0.33	0.84	2.21	0.29	0.41	2.35	0.71	0.65
Control Delay	14.8	13.2	8.3	28.2	596.9	45.2	10.6	649.6	54.8	31.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	13.2	8.3	28.2	596.9	45.2	10.6	649.6	54.8	31.5
Queue Length 50th (m)	3.0	83.0	0.0	225.8	~89.2	19.2	0.0	~164.2	49.3	22.6
Queue Length 95th (m)	8.8	103.6	m7.6	248.3	#138.7	29.8	17.7	#225.5	66.6	49.7
Internal Link Dist (m)		341.5		681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		95.0		95.0		55.0	55.0		55.0
Base Capacity (vph)	169	2267	283	2243	107	608	360	181	585	339
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.56	0.30	0.84	2.21	0.29	0.41	2.35	0.71	0.65

Intersection Summary

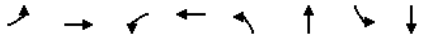
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
2: Sixth Line & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	216	1334	20	1607	175	119	86	281
v/c Ratio	1.17	0.63	0.07	0.82	1.11	0.28	0.30	0.66
Control Delay	145.9	16.1	6.6	25.4	145.4	36.6	39.9	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	145.9	16.1	6.6	25.4	145.4	36.6	39.9	40.3
Queue Length 50th (m)	~40.7	80.1	1.3	147.3	~44.4	20.8	16.0	46.3
Queue Length 95th (m)	#90.1	131.1	3.7	179.0	#87.2	37.2	30.6	75.3
Internal Link Dist (m)		549.7		1482.9		984.8		685.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	185	2112	284	1953	158	423	286	428
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.63	0.07	0.82	1.11	0.28	0.30	0.66

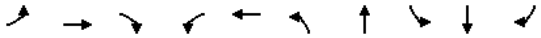
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: Trafalgar Road & Derry Road

11/01/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	230	918	129	93	1473	198	808	143	390	90
v/c Ratio	1.10	0.54	0.16	0.31	1.00	0.52	0.86	0.62	0.44	0.19
Control Delay	154.5	46.7	9.4	29.2	90.6	52.8	92.3	59.6	74.8	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	154.5	46.7	9.4	29.2	90.6	52.8	92.3	59.6	74.8	10.2
Queue Length 50th (m)	~116.4	165.8	5.7	20.7	374.7	64.3	194.3	44.5	82.7	0.0
Queue Length 95th (m)	#209.2	205.4	21.8	34.4	#423.7	82.3	219.5	62.8	99.6	16.3
Internal Link Dist (m)		1482.9			495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		110.0	300.0		125.0		135.0		80.0
Base Capacity (vph)	210	1692	812	331	1474	438	950	340	909	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.54	0.16	0.28	1.00	0.45	0.85	0.42	0.43	0.19

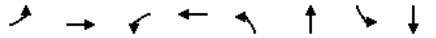
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	1524	73	2003	134	164	82	94
v/c Ratio	0.37	0.55	0.36	0.72	0.73	0.59	0.65	0.38
Control Delay	12.1	7.7	11.9	10.2	71.3	39.8	71.1	39.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	7.7	11.9	10.2	71.3	39.8	71.1	39.9
Queue Length 50th (m)	3.6	95.5	4.8	111.3	30.7	24.1	18.5	16.0
Queue Length 95th (m)	m7.0	m95.4	17.0	172.7	48.9	43.4	33.9	30.2
Internal Link Dist (m)		681.9		549.7		1030.3		1097.4
Turn Bay Length (m)	80.0		80.0		60.0		60.0	
Base Capacity (vph)	95	2773	202	2775	311	434	215	404
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.55	0.36	0.72	0.43	0.38	0.38	0.23

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

APPENDIX I3

2028 Future Background Conditions Optimized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Future Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.941				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1372	5193	1570	1148	4394	0	1587	3230	1192	1573	3476	1266
Flt Permitted	0.167			0.041			0.663			0.184		
Satd. Flow (perm)	241	5193	1570	50	4394	0	1108	3230	1192	305	3476	1266
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		118				131			104
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Adj. Flow (vph)	212	2345	223	111	747	482	62	433	161	185	140	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	2345	223	111	1229	0	62	433	161	185	140	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.0	29.6	29.6	9.0	29.6		9.5	33.6	33.6	9.5	37.6	37.6
Total Split (s)	36.0	105.7	105.7	19.5	89.2		11.6	33.6	33.6	21.2	43.2	43.2
Total Split (%)	20.0%	58.7%	58.7%	10.8%	49.6%		6.4%	18.7%	18.7%	11.8%	24.0%	24.0%
Maximum Green (s)	32.0	98.1	98.1	15.5	81.6		7.1	26.0	26.0	16.7	35.6	35.6
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	118.1	99.6	99.6	115.1	97.3		36.0	25.8	25.8	50.1	35.5	35.5
Actuated g/C Ratio	0.66	0.55	0.55	0.64	0.54		0.20	0.14	0.14	0.28	0.20	0.20
v/c Ratio	0.81	0.82	0.24	0.94	0.51		0.26	0.94	0.57	0.92	0.20	0.14
Control Delay	38.6	36.0	11.3	118.8	24.9		53.3	103.6	25.1	98.7	61.4	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	36.0	11.3	118.8	24.9		53.3	103.6	25.1	98.7	61.4	0.9
LOS	D	D	B	F	C		D	F	C	F	E	A
Approach Delay		34.2			32.7			79.6			72.3	
Approach LOS		C			C			E			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 180		
Actuated Cycle Length: 180		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 110		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.94		
Intersection Signal Delay: 42.4	Intersection LOS: D	
Intersection Capacity Utilization 87.5%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 1: Fifth Line & Derry Road

HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Future Volume (vph)	195	2157	205	102	687	443	57	398	148	170	129	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1372	5193	1570	1148	4395		1587	3230	1192	1573	3476	1266
Flt Permitted	0.17	1.00	1.00	0.04	1.00		0.66	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	242	5193	1570	50	4395		1108	3230	1192	304	3476	1266
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	2345	223	111	747	482	62	433	161	185	140	47
RTOR Reduction (vph)	0	0	48	0	54	0	0	0	112	0	0	38
Lane Group Flow (vph)	212	2345	175	111	1175	0	62	433	49	185	140	9
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	116.0	99.5	99.5	111.4	97.2		33.0	25.9	25.9	47.1	35.5	35.5
Effective Green, g (s)	116.0	99.5	99.5	111.4	97.2		33.0	25.9	25.9	47.1	35.5	35.5
Actuated g/C Ratio	0.64	0.55	0.55	0.62	0.54		0.18	0.14	0.14	0.26	0.20	0.20
Clearance Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	259	2870	867	117	2373		222	464	171	197	685	249
v/s Ratio Prot	c0.07	0.45		c0.07	0.27		0.01	0.13		c0.09	0.04	
v/s Ratio Perm	0.45		0.11	c0.51			0.04		0.04	c0.16		0.01
v/c Ratio	0.82	0.82	0.20	0.95	0.50		0.28	0.93	0.29	0.94	0.20	0.04
Uniform Delay, d1	17.8	32.8	20.3	60.1	26.0		62.5	76.2	68.8	58.0	60.4	58.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.1	2.7	0.5	65.9	0.7		0.7	26.1	1.1	46.4	0.2	0.1
Delay (s)	34.8	35.5	20.8	126.0	26.7		63.2	102.3	69.9	104.4	60.6	58.5
Level of Service	C	D	C	F	C		E	F	E	F	E	E
Approach Delay (s)		34.3			35.0			90.7			82.1	
Approach LOS		C			C			F			F	

Intersection Summary				
HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	23.7	
Intersection Capacity Utilization	87.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Future Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.994			0.954			0.917	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5003	0	1825	4587	0	1630	1762	0	1587	1659	0
Flt Permitted	0.291			0.044			0.139			0.689		
Satd. Flow (perm)	559	5003	0	85	4587	0	238	1762	0	1151	1659	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			4			3			32	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			746.3	
Travel Time (s)		25.8			67.8			60.5			44.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Adj. Flow (vph)	136	2348	129	9	755	34	130	73	32	42	161	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	2477	0	9	789	0	130	105	0	42	360	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	

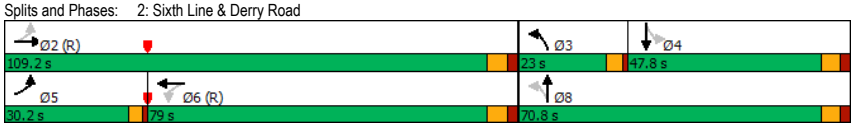
Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		31.8	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	30.2	109.2		79.0	79.0		23.0	70.8		47.8	47.8	
Total Split (%)	16.8%	60.7%		43.9%	43.9%		12.8%	39.3%		26.6%	26.6%	
Maximum Green (s)	26.2	102.4		72.2	72.2		18.5	64.3		41.3	41.3	
Yellow Time (s)	3.0	4.6		4.6	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		2.2	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		7.0		7.0	7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0		14.0	14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	110.0	107.2		91.9	91.9		61.5	59.5		39.7	39.7	
Actuated g/C Ratio	0.61	0.60		0.51	0.51		0.34	0.33		0.22	0.22	
v/c Ratio	0.32	0.83		0.21	0.34		0.66	0.18		0.17	0.92	
Control Delay	17.8	33.1		76.4	45.2		57.1	41.2		57.4	90.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	17.8	33.1		76.4	45.2		57.1	41.2		57.4	90.9	
LOS	B	C		E	D		E	D		E	F	
Approach Delay		32.3			45.5			50.0			87.4	
Approach LOS		C			D			D			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 41.4		Intersection LOS: D	
Intersection Capacity Utilization 111.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Future Volume (vph)	125	2160	119	8	695	31	120	67	29	39	148	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.95		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5004		1825	4585		1630	1763		1587	1659	
Flt Permitted	0.29	1.00		0.04	1.00		0.14	1.00		0.69	1.00	
Satd. Flow (perm)	560	5004		84	4585		238	1763		1151	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	2348	129	9	755	34	130	73	32	42	161	199
RTOR Reduction (vph)	0	3	0	0	2	0	0	2	0	0	25	0
Lane Group Flow (vph)	136	2474	0	9	787	0	130	103	0	42	335	0
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	107.2	107.2		91.9	91.9		59.5	59.5		39.8	39.8	
Effective Green, g (s)	107.2	107.2		91.9	91.9		59.5	59.5		39.8	39.8	
Actuated g/C Ratio	0.60	0.60		0.51	0.51		0.33	0.33		0.22	0.22	
Clearance Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	412	2980		42	2340		196	582		254	366	
v/s Ratio Prot	0.02	c0.49			0.17		c0.06	0.06			c0.20	
v/s Ratio Perm	0.18			0.11			0.16			0.04		
v/c Ratio	0.33	0.83		0.21	0.34		0.66	0.18		0.17	0.92	
Uniform Delay, d1	16.6	29.1		24.2	26.0		47.4	42.8		56.7	68.5	
Progression Factor	1.00	1.00		2.02	1.66		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.8		10.7	0.4		8.2	0.2		0.4	27.2	
Delay (s)	17.1	32.0		59.7	43.5		55.5	43.0		57.0	95.6	
Level of Service	B	C		E	D		E	D		E	F	
Approach Delay (s)		31.2			43.7			49.9			91.6	
Approach LOS		C			D			D			F	

Intersection Summary					
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.86				
Actuated Cycle Length (s)	180.0	Sum of lost time (s)		21.8	
Intersection Capacity Utilization	111.4%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Future Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.977			0.974			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3404	4905	0	1825	4920	0	1323	3110	0	1659	2944	1060
Flt Permitted	0.950			0.088			0.373			0.266		
Satd. Flow (perm)	3404	4905	0	169	4920	0	519	3110	0	465	2944	1060
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			29			10				124
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Adj. Flow (vph)	586	1578	287	66	584	125	134	477	77	68	321	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	586	1865	0	66	709	0	134	554	0	68	321	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	9.5	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	34.9	94.0		12.0	71.1		20.0	61.0		13.0	54.0	54.0
Total Split (%)	19.4%	52.2%		6.7%	39.5%		11.1%	33.9%		7.2%	30.0%	30.0%
Maximum Green (s)	30.4	87.1		8.0	64.2		16.0	54.2		9.0	47.2	47.2
Yellow Time (s)	3.5	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	38.6	98.8		83.2	70.0		56.0	40.2		45.2	33.4	33.4
Actuated g/C Ratio	0.21	0.55		0.46	0.39		0.31	0.22		0.25	0.19	0.19
v/c Ratio	0.80	0.69		0.38	0.37		0.58	0.79		0.39	0.59	0.17
Control Delay	71.8	45.8		25.0	38.8		57.1	72.9		49.7	70.9	1.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	71.8	45.8		25.0	38.8		57.1	72.9		49.7	70.9	1.3
LOS	E	D		C	D		E	E		D	E	A
Approach Delay		52.0			37.7			69.8			59.5	
Approach LOS		D			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 53.0		Intersection LOS: D	
Intersection Capacity Utilization 81.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Trafalgar Road & Derry Road

HCM Signalized Intersection Capacity Analysis
3: Trafalgar Road & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Future Volume (vph)	539	1452	264	61	537	115	123	439	71	63	295	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3404	4905		1825	4918		1323	3110		1659	2944	1060
Flt Permitted	0.95	1.00		0.09	1.00		0.37	1.00		0.27	1.00	1.00
Satd. Flow (perm)	3404	4905		169	4918		519	3110		464	2944	1060
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	586	1578	287	66	584	125	134	477	77	68	321	51
RTOR Reduction (vph)	0	13	0	0	18	0	0	8	0	0	0	42
Lane Group Flow (vph)	586	1852	0	66	691	0	134	546	0	68	321	9
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	38.6	98.8		80.3	70.0		53.2	40.2		42.4	33.4	33.4
Effective Green, g (s)	38.6	98.8		80.3	70.0		53.2	40.2		42.4	33.4	33.4
Actuated g/C Ratio	0.21	0.55		0.45	0.39		0.30	0.22		0.24	0.19	0.19
Clearance Time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	729	2692		170	1912		223	694		169	546	196
v/s Ratio Prot	c0.17	c0.38		0.02	0.14		c0.05	c0.18		0.02	0.11	
v/s Ratio Perm				0.15			0.12			0.07		0.01
v/c Ratio	0.80	0.69		0.39	0.36		0.60	0.79		0.40	0.59	0.05
Uniform Delay, d1	67.1	29.4		29.4	39.1		50.2	65.9		55.4	67.0	60.2
Progression Factor	0.99	1.49		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.8	0.8		3.1	0.5		6.6	6.8		3.3	2.5	0.2
Delay (s)	70.1	44.6		32.5	39.6		56.8	72.7		58.6	69.5	60.5
Level of Service	E	D		C	D		E	E		E	E	E
Approach Delay (s)		50.7			39.0			69.6			66.8	
Approach LOS		D			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	53.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	22.2	
Intersection Capacity Utilization	81.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Future Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.995			0.869			0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5203	0	1825	5218	0	1825	1669	0	1825	1729	0
Flt Permitted	0.272			0.039			0.724			0.623		
Satd. Flow (perm)	523	5203	0	75	5218	0	1391	1669	0	1197	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			9			81			34	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			573.7			1054.3			1121.4	
Travel Time (s)		31.8			25.8			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	105	2784	158	110	972	35	71	16	110	108	17	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	2942	0	110	1007	0	71	126	0	108	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	

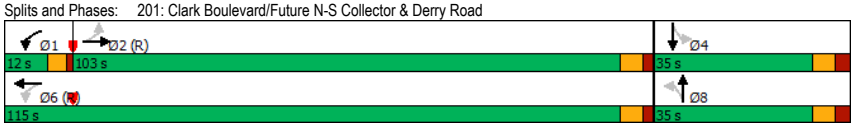
Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		4.5	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		9.0	41.0		35.0	35.0		35.0	35.0	
Total Split (s)	103.0	103.0		12.0	115.0		35.0	35.0		35.0	35.0	
Total Split (%)	68.7%	68.7%		8.0%	76.7%		23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	97.0	97.0		7.5	109.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		3.5	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	97.1	97.1		110.5	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.74	0.73		0.19	0.19		0.19	0.19	
v/c Ratio	0.31	0.87		0.78	0.27		0.27	0.33		0.48	0.15	
Control Delay	14.7	25.2		62.9	7.1		55.6	23.2		62.9	23.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.7	25.2		62.9	7.1		55.6	23.2		62.9	23.7	
LOS	B	C		E	A		E	C		E	C	
Approach Delay		24.9			12.6			34.9			50.3	
Approach LOS		C			B			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 86.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road



HCM Signalized Intersection Capacity Analysis
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Future Volume (vph)	97	2561	145	101	894	32	65	15	101	99	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.87		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5202		1825	5217		1825	1670		1825	1729	
Flt Permitted	0.27	1.00		0.04	1.00		0.72	1.00		0.62	1.00	
Satd. Flow (perm)	523	5202		76	5217		1390	1670		1198	1729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	2784	158	110	972	35	71	16	110	108	17	34
RTOR Reduction (vph)	0	4	0	0	2	0	0	66	0	0	28	0
Lane Group Flow (vph)	105	2938	0	110	1005	0	71	60	0	108	23	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	97.1	97.1		109.0	109.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	97.1	97.1		109.0	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.73	0.73		0.19	0.19		0.19	0.19	
Clearance Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	338	3367		141	3791		259	311		223	322	
v/s Ratio Prot		c0.56		c0.04	0.19			0.04			0.01	
v/s Ratio Perm	0.20			0.53			0.05			c0.09		
v/c Ratio	0.31	0.87		0.78	0.26		0.27	0.19		0.48	0.07	
Uniform Delay, d1	11.7	21.4		44.2	6.9		52.3	51.5		54.5	50.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	3.5		23.8	0.2		2.6	1.4		7.3	0.4	
Delay (s)	14.1	24.9		68.0	7.1		54.9	52.9		61.9	50.7	
Level of Service	B	C		E	A		D	D		E	D	
Approach Delay (s)		24.5			13.1			53.6			58.3	
Approach LOS		C			B			D			E	

Intersection Summary					
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.5		
Intersection Capacity Utilization	86.3%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Queues
1: Fifth Line & Derry Road

11/01/2023

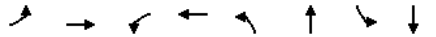
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	212	2345	223	111	1229	62	433	161	185	140	47
v/c Ratio	0.81	0.82	0.24	0.94	0.51	0.26	0.94	0.57	0.92	0.20	0.14
Control Delay	38.6	36.0	11.3	118.8	24.9	53.3	103.6	25.1	98.7	61.4	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	36.0	11.3	118.8	24.9	53.3	103.6	25.1	98.7	61.4	0.9
Queue Length 50th (m)	28.0	251.0	20.1	29.3	89.8	16.9	82.2	9.6	54.8	22.4	0.0
Queue Length 95th (m)	52.0	268.3	36.6	#71.2	117.6	30.3	#114.8	35.9	#94.0	33.3	0.0
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	363	2874	916	126	2429	240	466	284	202	687	333
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.82	0.24	0.88	0.51	0.26	0.93	0.57	0.92	0.20	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	2477	9	789	130	105	42	360
v/c Ratio	0.32	0.83	0.21	0.34	0.66	0.18	0.17	0.92
Control Delay	17.8	33.1	76.4	45.2	57.1	41.2	57.4	90.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	33.1	76.4	45.2	57.1	41.2	57.4	90.9
Queue Length 50th (m)	21.1	268.1	2.3	74.1	32.4	25.2	12.0	114.6
Queue Length 95th (m)	32.7	289.1	m8.4	105.3	49.8	40.5	24.4	#174.9
Internal Link Dist (m)		549.7		1482.9		984.8		722.3
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	525	2983	43	2344	224	631	268	411
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.83	0.21	0.34	0.58	0.17	0.16	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues
3: Trafalgar Road & Derry Road

11/01/2023

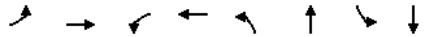
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	586	1865	66	709	134	554	68	321	51
v/c Ratio	0.80	0.69	0.38	0.37	0.58	0.79	0.39	0.59	0.17
Control Delay	71.8	45.8	25.0	38.8	57.1	72.9	49.7	70.9	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.8	45.8	25.0	38.8	57.1	72.9	49.7	70.9	1.3
Queue Length 50th (m)	113.2	179.5	8.4	64.4	37.0	98.1	17.6	56.2	0.0
Queue Length 95th (m)	#135.2	200.2	16.9	79.8	53.6	113.5	28.9	69.6	0.0
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	729	2704	172	1931	233	943	176	771	369
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.69	0.38	0.37	0.58	0.59	0.39	0.42	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	2942	110	1007	71	126	108	51
v/c Ratio	0.31	0.87	0.78	0.27	0.27	0.33	0.48	0.15
Control Delay	14.7	25.2	62.9	7.1	55.6	23.2	62.9	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	25.2	62.9	7.1	55.6	23.2	62.9	23.7
Queue Length 50th (m)	13.0	245.0	16.4	33.4	18.3	11.3	29.1	4.2
Queue Length 95th (m)	24.8	265.1	#48.5	39.0	33.7	30.2	49.5	16.3
Internal Link Dist (m)		681.9		549.7		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	338	3370	142	3794	259	377	223	350
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.87	0.77	0.27	0.27	0.33	0.48	0.15

Intersection Summary

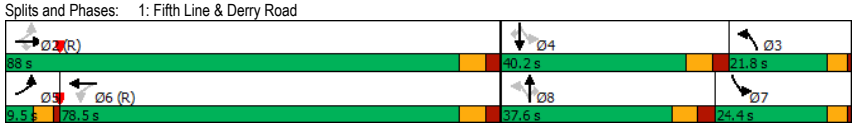
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Future Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5092	1570	1630	4972	0	1755	3650	1420	1615	3510	1458
Flt Permitted	0.053			0.217			0.288			0.641		
Satd. Flow (perm)	102	5092	1570	372	4972	0	532	3650	1420	1090	3510	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			70		17				99			102
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Adj. Flow (vph)	54	1186	78	86	1686	189	236	175	149	426	416	220
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1186	78	86	1875	0	236	175	149	426	416	220
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	6	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	20.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.5	29.6	29.6	29.6	29.6		9.5	37.6	37.6	9.5	37.6	37.6
Total Split (s)	9.5	88.0	88.0	78.5	78.5		21.8	37.6	37.6	24.4	40.2	40.2
Total Split (%)	6.3%	58.7%	58.7%	52.3%	52.3%		14.5%	25.1%	25.1%	16.3%	26.8%	26.8%
Maximum Green (s)	5.0	80.4	80.4	70.9	70.9		17.3	30.0	30.0	19.9	32.6	32.6
Yellow Time (s)	3.5	4.6	4.6	4.6	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	3.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead			Lag	Lag		Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0	15.0	15.0			23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0	0	0			0	0		0	0
Act Effct Green (s)	90.0	86.9	86.9	78.5	78.5		35.8	13.9	13.9	51.0	24.7	24.7
Actuated g/C Ratio	0.60	0.58	0.58	0.52	0.52		0.24	0.09	0.09	0.34	0.16	0.16
v/c Ratio	0.42	0.40	0.08	0.44	0.72		0.85	0.52	0.67	0.90	0.72	0.68
Control Delay	23.8	18.5	4.5	34.7	30.5		80.9	69.6	38.8	71.8	66.5	41.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	18.5	4.5	34.7	30.5		80.9	69.6	38.8	71.8	66.5	41.3
LOS	C	B	A	C	C		F	E	D	E	E	D
Approach Delay		17.9			30.7			66.2			63.4	
Approach LOS		B			C			E			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 150		
Actuated Cycle Length: 150		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 110		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.90		
Intersection Signal Delay: 38.4	Intersection LOS: D	
Intersection Capacity Utilization 90.5%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 1: Fifth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Future Volume (vph)	50	1091	72	79	1551	174	217	161	137	392	383	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	5092	1570	1630	4971		1755	3650	1420	1615	3510	1458
Flt Permitted	0.05	1.00	1.00	0.22	1.00		0.29	1.00	1.00	0.64	1.00	1.00
Satd. Flow (perm)	103	5092	1570	371	4971		532	3650	1420	1090	3510	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1186	78	86	1686	189	236	175	149	426	416	220
RTOR Reduction (vph)	0	0	29	0	8	0	0	0	90	0	0	85
Lane Group Flow (vph)	54	1186	49	86	1867	0	236	175	59	426	416	135
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	86.8	86.8	86.8	77.5	77.5		32.7	13.9	13.9	51.1	24.7	24.7
Effective Green, g (s)	86.8	86.8	86.8	77.5	77.5		32.7	13.9	13.9	51.1	24.7	24.7
Actuated g/C Ratio	0.58	0.58	0.58	0.52	0.52		0.22	0.09	0.09	0.34	0.16	0.16
Clearance Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	114	2946	908	191	2568		269	338	131	474	577	240
v/s Ratio Prot	0.02	c0.23			c0.38		0.11	0.05		c0.18	0.12	
v/s Ratio Perm	0.26		0.03	0.23			0.08		0.04	c0.13		0.09
v/c Ratio	0.47	0.40	0.05	0.45	0.73		0.88	0.52	0.45	0.90	0.72	0.56
Uniform Delay, d1	21.5	17.4	13.7	22.8	28.1		60.7	64.9	64.4	44.9	59.4	57.7
Progression Factor	1.00	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	0.4	0.1	7.5	1.8		25.8	1.6	2.9	19.5	4.6	3.3
Delay (s)	24.6	17.8	13.9	30.3	29.9		86.6	66.4	67.4	64.3	64.0	60.9
Level of Service	C	B	B	C	C		F	E	E	E	E	E
Approach Delay (s)		17.8			29.9			75.2			63.5	
Approach LOS		B			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	24.2	
Intersection Capacity Utilization	90.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Future Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.998			0.980			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1772	4911	0	1825	5069	0	1807	1835	0	1755	1695	0
Flt Permitted	0.080			0.183			0.205			0.681		
Satd. Flow (perm)	149	4911	0	352	5069	0	390	1835	0	1258	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			1			6			42	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			746.3	
Travel Time (s)		25.8			67.8			60.5			44.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Adj. Flow (vph)	216	1225	109	20	1587	20	175	103	16	86	121	160
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	1334	0	20	1607	0	175	119	0	86	281	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

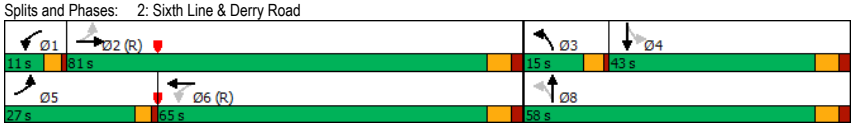
Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.0	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	27.0	81.0		11.0	65.0		15.0	58.0		43.0	43.0	
Total Split (%)	18.0%	54.0%		7.3%	43.3%		10.0%	38.7%		28.7%	28.7%	
Maximum Green (s)	23.0	74.2		7.0	58.2		10.5	51.5		36.5	36.5	
Yellow Time (s)	3.0	4.6		3.0	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	97.2	87.8		83.0	73.2		44.3	42.3		27.3	27.3	
Actuated g/C Ratio	0.65	0.59		0.55	0.49		0.30	0.28		0.18	0.18	
v/c Ratio	0.77	0.46		0.08	0.65		0.82	0.23		0.38	0.82	
Control Delay	46.5	19.7		13.2	32.2		70.0	38.7		56.8	68.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	46.5	19.7		13.2	32.2		70.0	38.7		56.8	68.4	
LOS	D	B		B	C		E	D		E	E	
Approach Delay		23.4			32.0			57.3			65.6	
Approach LOS		C			C			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 33.7		Intersection LOS: C	
Intersection Capacity Utilization 81.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Future Volume (vph)	199	1127	100	18	1460	18	161	95	15	79	111	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	4910		1825	5070		1807	1835		1755	1694	
Flt Permitted	0.08	1.00		0.18	1.00		0.20	1.00		0.68	1.00	
Satd. Flow (perm)	149	4910		351	5070		390	1835		1257	1694	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	1225	109	20	1587	20	175	103	16	86	121	160
RTOR Reduction (vph)	0	6	0	0	1	0	0	4	0	0	34	0
Lane Group Flow (vph)	216	1328	0	20	1606	0	175	115	0	86	247	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	94.4	86.2		77.5	73.3		42.3	42.3		27.3	27.3	
Effective Green, g (s)	94.4	86.2		77.5	73.3		42.3	42.3		27.3	27.3	
Actuated g/C Ratio	0.63	0.57		0.52	0.49		0.28	0.28		0.18	0.18	
Clearance Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	278	2821		222	2477		209	517		228	308	
v/s Ratio Prot	c0.09	0.27		0.00	0.32		c0.06	0.06			0.15	
v/s Ratio Perm	c0.40			0.04			c0.18			0.07		
v/c Ratio	0.78	0.47		0.09	0.65		0.84	0.22		0.38	0.80	
Uniform Delay, d1	34.3	18.6		17.8	28.7		46.1	41.2		53.9	58.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.8	0.6		0.2	1.3		24.2	0.3		1.2	14.2	
Delay (s)	47.1	19.2		17.9	30.0		70.4	41.5		55.1	72.9	
Level of Service	D	B		B	C		E	D		E	E	
Approach Delay (s)		23.1			29.9			58.7			68.8	
Approach LOS		C			C			E			E	

Intersection Summary					
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.83				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)		21.8	
Intersection Capacity Utilization	81.6%	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												
Traffic Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Future Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.982			0.986			0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3052	4952	0	1825	5021	0	1706	3437	0	1807	3380	1555
Flt Permitted	0.950			0.233			0.359			0.101		
Satd. Flow (perm)	3052	4952	0	448	5021	0	645	3437	0	192	3380	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			8			5				90
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Adj. Flow (vph)	230	918	129	93	1340	133	198	730	78	143	390	90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	230	1047	0	93	1473	0	198	808	0	143	390	90
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	38.5	121.0		16.0	98.5		30.0	77.0		26.0	73.0	73.0
Total Split (%)	16.0%	50.4%		6.7%	41.0%		12.5%	32.1%		10.8%	30.4%	30.4%
Maximum Green (s)	34.5	114.1		12.0	91.6		26.0	70.2		22.0	66.2	66.2
Yellow Time (s)	3.0	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	25.2	121.1		122.1	107.5		92.4	65.1		84.1	60.8	60.8
Actuated g/C Ratio	0.10	0.50		0.51	0.45		0.38	0.27		0.35	0.25	0.25
v/c Ratio	0.72	0.42		0.32	0.65		0.55	0.86		0.70	0.46	0.20
Control Delay	116.6	38.2		27.3	54.5		56.7	92.9		69.8	76.9	10.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	116.6	38.2		27.3	54.5		56.7	92.9		69.8	76.9	10.4
LOS	F	D		C	D		E	F		E	E	B
Approach Delay		52.3			52.9			85.8			65.7	
Approach LOS		D			D			F			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 240		
Actuated Cycle Length: 240		
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green		
Natural Cycle: 100		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.86		
Intersection Signal Delay: 61.9	Intersection LOS: E	
Intersection Capacity Utilization 78.9%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 3: Trafalgar Road & Derry Road

HCM Signalized Intersection Capacity Analysis
3: Trafalgar Road & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Future Volume (vph)	212	845	119	86	1233	122	182	672	72	132	359	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3052	4950		1825	5023		1706	3435		1807	3380	1555
Flt Permitted	0.95	1.00		0.23	1.00		0.36	1.00		0.10	1.00	1.00
Satd. Flow (perm)	3052	4950		447	5023		644	3435		193	3380	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	918	129	93	1340	133	198	730	78	143	390	90
RTOR Reduction (vph)	0	7	0	0	4	0	0	4	0	0	0	67
Lane Group Flow (vph)	230	1040	0	93	1469	0	198	804	0	143	390	23
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	25.2	121.1		119.1	107.5		89.6	65.1		81.4	60.9	60.9
Effective Green, g (s)	25.2	121.1		119.1	107.5		89.6	65.1		81.4	60.9	60.9
Actuated g/C Ratio	0.10	0.50		0.50	0.45		0.37	0.27		0.34	0.25	0.25
Clearance Time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	320	2497		288	2249		349	931		203	857	394
v/s Ratio Prot	c0.08	0.21		0.02	c0.29		c0.06	c0.23		c0.06	0.12	
v/s Ratio Perm				0.14			0.15			0.18		0.01
v/c Ratio	0.72	0.42		0.32	0.65		0.57	0.86		0.70	0.46	0.06
Uniform Delay, d1	104.0	37.3		32.4	51.7		54.4	83.2		61.9	75.6	67.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.2	0.5		1.4	1.5		3.5	9.1		13.1	0.8	0.1
Delay (s)	113.2	37.8		33.8	53.2		57.9	92.3		74.9	76.4	68.0
Level of Service	F	D		C	D		E	F		E	E	E
Approach Delay (s)		51.4			52.0			85.6			74.8	
Approach LOS		D			D			F			E	

Intersection Summary				
HCM 2000 Control Delay	62.6	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	240.0	Sum of lost time (s)	21.7	
Intersection Capacity Utilization	78.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Future Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.875			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5224	0	1825	5229	0	1825	1681	0	1825	1668	0
Flt Permitted	0.069			0.134			0.696			0.578		
Satd. Flow (perm)	133	5224	0	257	5229	0	1337	1681	0	1110	1668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			5			55			20	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			573.7			1054.3			1121.4	
Travel Time (s)		31.8			25.8			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	1483	41	73	1968	35	134	27	137	82	11	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1524	0	73	2003	0	134	164	0	82	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	97		97	97		97	97		97
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

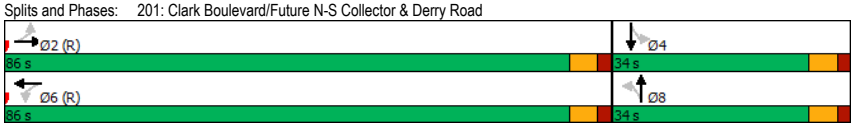
Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		34.0	34.0		34.0	34.0	
Total Split (s)	86.0	86.0		86.0	86.0		34.0	34.0		34.0	34.0	
Total Split (%)	71.7%	71.7%		71.7%	71.7%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
v/c Ratio	0.40	0.44		0.43	0.57		0.43	0.38		0.32	0.23	
Control Delay	25.2	9.8		18.7	11.6		44.3	28.2		42.2	31.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.2	9.8		18.7	11.6		44.3	28.2		42.2	31.0	
LOS	C	A		B	B		D	C		D	C	
Approach Delay		10.2			11.8			35.5			36.2	
Approach LOS		B			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 98 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road



HCM Signalized Intersection Capacity Analysis
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Future Volume (vph)	32	1364	38	67	1811	32	123	25	126	75	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5223		1825	5231		1825	1680		1825	1667	
Flt Permitted	0.07	1.00		0.13	1.00		0.70	1.00		0.58	1.00	
Satd. Flow (perm)	133	5223		258	5231		1337	1680		1111	1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1483	41	73	1968	35	134	27	137	82	11	83
RTOR Reduction (vph)	0	2	0	0	2	0	0	42	0	0	15	0
Lane Group Flow (vph)	35	1522	0	73	2001	0	134	122	0	82	79	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	88	3482		172	3487		311	392		259	388	
v/s Ratio Prot		0.29			c0.38			0.07			0.05	
v/s Ratio Perm	0.26			0.28			c0.10			0.07		
v/c Ratio	0.40	0.44		0.42	0.57		0.43	0.31		0.32	0.20	
Uniform Delay, d1	9.1	9.4		9.3	10.8		39.2	38.0		38.1	37.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.9	0.4		7.5	0.7		4.3	2.1		3.2	1.2	
Delay (s)	22.0	9.8		16.8	11.5		43.5	40.1		41.3	38.2	
Level of Service	C	A		B	B		D	D		D	D	
Approach Delay (s)		10.1			11.7			41.6			39.6	
Approach LOS		B			B			D			D	

Intersection Summary					
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.54				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	88.1%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
1: Fifth Line & Derry Road

11/01/2023

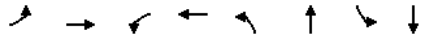
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1186	78	86	1875	236	175	149	426	416	220
v/c Ratio	0.42	0.40	0.08	0.44	0.72	0.85	0.52	0.67	0.90	0.72	0.68
Control Delay	23.8	18.5	4.5	34.7	30.5	80.9	69.6	38.8	71.8	66.5	41.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	18.5	4.5	34.7	30.5	80.9	69.6	38.8	71.8	66.5	41.3
Queue Length 50th (m)	6.5	69.4	1.0	16.5	161.1	53.0	26.7	14.3	112.5	62.7	33.6
Queue Length 95th (m)	13.8	87.5	9.0	36.7	187.7	#81.4	37.6	36.7	#150.1	76.8	59.8
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	129	2949	939	194	2610	285	730	363	473	762	396
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.40	0.08	0.44	0.72	0.83	0.24	0.41	0.90	0.55	0.56

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	216	1334	20	1607	175	119	86	281
v/c Ratio	0.77	0.46	0.08	0.65	0.82	0.23	0.38	0.82
Control Delay	46.5	19.7	13.2	32.2	70.0	38.7	56.8	68.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.5	19.7	13.2	32.2	70.0	38.7	56.8	68.4
Queue Length 50th (m)	37.1	85.0	2.0	130.1	40.8	25.8	22.7	69.9
Queue Length 95th (m)	68.0	111.6	6.1	175.3	#61.9	39.0	37.2	96.0
Internal Link Dist (m)		549.7		1482.9		984.8		722.3
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	345	2879	263	2474	214	633	306	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.46	0.08	0.65	0.82	0.19	0.28	0.63

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Trafalgar Road & Derry Road

11/01/2023

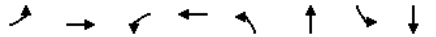
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	230	1047	93	1473	198	808	143	390	90
v/c Ratio	0.72	0.42	0.32	0.65	0.55	0.86	0.70	0.46	0.20
Control Delay	116.6	38.2	27.3	54.5	56.7	92.9	69.8	76.9	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	116.6	38.2	27.3	54.5	56.7	92.9	69.8	76.9	10.4
Queue Length 50th (m)	56.5	118.7	20.2	207.5	65.5	195.2	45.5	83.9	0.0
Queue Length 95th (m)	71.8	133.6	32.1	238.7	87.0	217.3	67.6	100.3	16.4
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	438	2505	298	2253	363	1008	216	932	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.42	0.31	0.65	0.55	0.80	0.66	0.42	0.18

Intersection Summary

Queues

201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	1524	73	2003	134	164	82	94
v/c Ratio	0.40	0.44	0.43	0.57	0.43	0.38	0.32	0.23
Control Delay	25.2	9.8	18.7	11.6	44.3	28.2	42.2	31.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	9.8	18.7	11.6	44.3	28.2	42.2	31.0
Queue Length 50th (m)	3.4	56.3	7.3	85.1	27.0	21.2	16.1	14.1
Queue Length 95th (m)	14.0	65.3	20.4	96.8	46.3	41.1	31.0	28.5
Internal Link Dist (m)		681.9		549.7		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	88	3485	171	3487	311	434	259	404
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.44	0.43	0.57	0.43	0.38	0.32	0.23

Intersection Summary

APPENDIX I4

2033 Future Background Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	2382	220	111	759	458	62	402	162	179	137	44
Future Volume (vph)	199	2382	220	111	759	458	62	402	162	179	137	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.944				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1372	5193	1570	1148	4415	0	1587	3230	1192	1573	3476	1266
Flt Permitted	0.142			0.042			0.658			0.179		
Satd. Flow (perm)	205	5193	1570	51	4415	0	1099	3230	1192	296	3476	1266
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		110				136			104
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Adj. Flow (vph)	216	2589	239	121	825	498	67	437	176	195	149	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	2589	239	121	1323	0	67	437	176	195	149	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.0	29.6	29.6	9.0	29.6		9.5	33.6	33.6	9.5	37.6	37.6
Total Split (s)	36.0	105.7	105.7	19.5	89.2		11.6	33.6	33.6	21.2	43.2	43.2
Total Split (%)	20.0%	58.7%	58.7%	10.8%	49.6%		6.4%	18.7%	18.7%	11.8%	24.0%	24.0%
Maximum Green (s)	32.0	98.1	98.1	15.5	81.6		7.1	26.0	26.0	16.7	35.6	35.6
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	118.0	98.5	98.5	113.6	95.0		36.1	25.9	25.9	50.2	35.5	35.5
Actuated g/C Ratio	0.66	0.55	0.55	0.63	0.53		0.20	0.14	0.14	0.28	0.20	0.20
v/c Ratio	0.85	0.91	0.26	0.98	0.56		0.28	0.94	0.61	0.97	0.22	0.14
Control Delay	48.9	42.9	12.2	125.7	27.7		54.1	104.3	28.6	110.7	61.5	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	42.9	12.2	125.7	27.7		54.1	104.3	28.6	110.7	61.5	0.9
LOS	D	D	B	F	C		D	F	C	F	E	A
Approach Delay		40.9			35.9			79.8			78.6	
Approach LOS		D			D			E			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 180		
Actuated Cycle Length: 180		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 130		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.98		
Intersection Signal Delay: 47.0	Intersection LOS: D	
Intersection Capacity Utilization 93.0%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 1: Fifth Line & Derry Road

HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	2382	220	111	759	458	62	402	162	179	137	44
Future Volume (vph)	199	2382	220	111	759	458	62	402	162	179	137	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1372	5193	1570	1148	4413		1587	3230	1192	1573	3476	1266
Flt Permitted	0.14	1.00	1.00	0.04	1.00		0.66	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	204	5193	1570	51	4413		1098	3230	1192	297	3476	1266
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	2589	239	121	825	498	67	437	176	195	149	48
RTOR Reduction (vph)	0	0	48	0	52	0	0	0	116	0	0	39
Lane Group Flow (vph)	216	2589	191	121	1271	0	67	437	60	195	149	9
Heavy Vehicles (%)	33%	1%	4%	59%	8%	19%	15%	13%	37%	16%	5%	29%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	117.2	98.5	98.5	110.2	95.0		33.0	25.9	25.9	47.1	35.5	35.5
Effective Green, g (s)	117.2	98.5	98.5	110.2	95.0		33.0	25.9	25.9	47.1	35.5	35.5
Actuated g/C Ratio	0.65	0.55	0.55	0.61	0.53		0.18	0.14	0.14	0.26	0.20	0.20
Clearance Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	254	2841	859	123	2329		220	464	171	196	685	249
v/s Ratio Prot	c0.09	0.50		c0.08	0.29		0.01	0.14		c0.09	0.04	
v/s Ratio Perm	0.46		0.12	c0.52			0.04		0.05	c0.17		0.01
v/c Ratio	0.85	0.91	0.22	0.98	0.55		0.30	0.94	0.35	0.99	0.22	0.04
Uniform Delay, d1	23.7	36.8	21.0	63.4	28.2		62.7	76.3	69.4	59.6	60.6	58.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.1	5.7	0.6	75.5	0.9		0.8	27.9	1.5	62.5	0.2	0.1
Delay (s)	45.8	42.5	21.6	138.8	29.1		63.5	104.2	70.9	122.1	60.8	58.5
Level of Service	D	D	C	F	C		E	F	E	F	E	E
Approach Delay (s)		41.1			38.3			91.5			91.0	
Approach LOS		D			D			F			F	

Intersection Summary				
HCM 2000 Control Delay	50.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	23.7	
Intersection Capacity Utilization	93.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	2385	130	8	768	33	128	74	32	41	162	199
Future Volume (vph)	138	2385	130	8	768	33	128	74	32	41	162	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.994			0.954			0.917	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5003	0	1825	4586	0	1630	1762	0	1587	1659	0
Flt Permitted	0.256			0.045			0.120			0.683		
Satd. Flow (perm)	492	5003	0	86	4586	0	206	1762	0	1141	1659	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			4			2			32	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			746.3	
Travel Time (s)		25.8			67.8			60.5			44.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Adj. Flow (vph)	150	2592	141	9	835	36	139	80	35	45	176	216
Shared Lane Traffic (%)												
Lane Group Flow (vph)	150	2733	0	9	871	0	139	115	0	45	392	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	

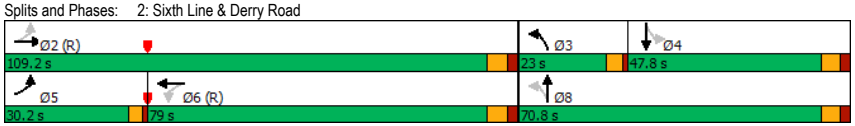
Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		31.8	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	30.2	109.2		79.0	79.0		23.0	70.8		47.8	47.8	
Total Split (%)	16.8%	60.7%		43.9%	43.9%		12.8%	39.3%		26.6%	26.6%	
Maximum Green (s)	26.2	102.4		72.2	72.2		18.5	64.3		41.3	41.3	
Yellow Time (s)	3.0	4.6		4.6	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		2.2	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		7.0		7.0	7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0		14.0	14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	107.0	104.2		88.1	88.1		64.5	62.5		42.4	42.4	
Actuated g/C Ratio	0.59	0.58		0.49	0.49		0.36	0.35		0.24	0.24	
v/c Ratio	0.39	0.94		0.21	0.39		0.71	0.19		0.17	0.94	
Control Delay	19.7	43.3		81.6	61.9		59.7	40.7		56.9	93.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.7	43.3		81.6	61.9		59.7	40.7		56.9	93.0	
LOS	B	D		F	E		E	D		E	F	
Approach Delay		42.0			62.1			51.1			89.2	
Approach LOS		D			E			D			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 51.2		Intersection LOS: D	
Intersection Capacity Utilization 118.1%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	2385	130	8	768	33	128	74	32	41	162	199
Future Volume (vph)	138	2385	130	8	768	33	128	74	32	41	162	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.95		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5004		1825	4585		1630	1763		1587	1659	
Flt Permitted	0.26	1.00		0.05	1.00		0.12	1.00		0.68	1.00	
Satd. Flow (perm)	491	5004		87	4585		205	1763		1141	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	2592	141	9	835	36	139	80	35	45	176	216
RTOR Reduction (vph)	0	3	0	0	2	0	0	1	0	0	24	0
Lane Group Flow (vph)	150	2730	0	9	869	0	139	114	0	45	368	0
Heavy Vehicles (%)	0%	4%	4%	0%	14%	6%	12%	4%	4%	15%	4%	8%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	104.2	104.2		88.1	88.1		62.5	62.5		42.4	42.4	
Effective Green, g (s)	104.2	104.2		88.1	88.1		62.5	62.5		42.4	42.4	
Actuated g/C Ratio	0.58	0.58		0.49	0.49		0.35	0.35		0.24	0.24	
Clearance Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	373	2896		42	2244		194	612		268	390	
v/s Ratio Prot	0.03	c0.55			0.19		c0.06	0.06			c0.22	
v/s Ratio Perm	0.21			0.10			0.19			0.04		
v/c Ratio	0.40	0.94		0.21	0.39		0.72	0.19		0.17	0.94	
Uniform Delay, d1	18.5	35.1		26.2	28.9		46.2	41.0		54.8	67.6	
Progression Factor	1.00	1.00		2.13	2.08		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	7.8		10.3	0.5		11.9	0.2		0.4	31.3	
Delay (s)	19.2	43.0		66.2	60.6		58.1	41.2		55.1	98.9	
Level of Service	B	D		E	E		E	D		E	F	
Approach Delay (s)		41.7			60.7			50.5			94.4	
Approach LOS		D			E			D			F	

Intersection Summary					
HCM 2000 Control Delay	51.1	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.94				
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	21.8		
Intersection Capacity Utilization	118.1%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	595	1603	291	68	592	127	143	509	82	72	342	54
Future Volume (vph)	595	1603	291	68	592	127	143	509	82	72	342	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.977			0.973			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3404	4905	0	1825	4915	0	1323	3110	0	1659	2944	1060
Flt Permitted	0.950			0.062			0.351			0.226		
Satd. Flow (perm)	3404	4905	0	119	4915	0	489	3110	0	395	2944	1060
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			29			10				124
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Adj. Flow (vph)	647	1742	316	74	643	138	155	553	89	78	372	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	647	2058	0	74	781	0	155	642	0	78	372	59
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	9.5	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	34.9	94.0		12.0	71.1		20.0	61.0		13.0	54.0	54.0
Total Split (%)	19.4%	52.2%		6.7%	39.5%		11.1%	33.9%		7.2%	30.0%	30.0%
Maximum Green (s)	30.4	87.1		8.0	64.2		16.0	54.2		9.0	47.2	47.2
Yellow Time (s)	3.5	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	39.0	94.0		76.8	64.2		61.4	45.6		50.4	38.6	38.6
Actuated g/C Ratio	0.22	0.52		0.43	0.36		0.34	0.25		0.28	0.21	0.21
v/c Ratio	0.88	0.80		0.52	0.44		0.65	0.81		0.45	0.59	0.18
Control Delay	72.2	54.6		43.6	43.4		56.6	70.2		48.3	66.9	1.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	72.2	54.6		43.6	43.4		56.6	70.2		48.3	66.9	1.2
LOS	E	D		D	D		E	E		D	E	A
Approach Delay		58.8			43.4			67.5			56.4	
Approach LOS		E			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 57.3		Intersection LOS: E	
Intersection Capacity Utilization 86.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Trafalgar Road & Derry Road

HCM Signalized Intersection Capacity Analysis
3: Trafalgar Road & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	595	1603	291	68	592	127	143	509	82	72	342	54
Future Volume (vph)	595	1603	291	68	592	127	143	509	82	72	342	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3404	4905		1825	4918		1323	3110		1659	2944	1060
Flt Permitted	0.95	1.00		0.06	1.00		0.35	1.00		0.23	1.00	1.00
Satd. Flow (perm)	3404	4905		120	4918		488	3110		394	2944	1060
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	647	1742	316	74	643	138	155	553	89	78	372	59
RTOR Reduction (vph)	0	13	0	0	19	0	0	7	0	0	0	46
Lane Group Flow (vph)	647	2045	0	74	762	0	155	635	0	78	372	13
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	38%	17%	2%	10%	24%	54%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	39.0	94.0		73.9	64.2		58.6	45.6		47.6	38.6	38.6
Effective Green, g (s)	39.0	94.0		73.9	64.2		58.6	45.6		47.6	38.6	38.6
Actuated g/C Ratio	0.22	0.52		0.41	0.36		0.33	0.25		0.26	0.21	0.21
Clearance Time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	737	2561		141	1754		233	787		167	631	227
v/s Ratio Prot	c0.19	c0.42		0.03	0.16		c0.06	c0.20		0.02	0.13	
v/s Ratio Perm				0.19			0.16			0.10		0.01
v/c Ratio	0.88	0.80		0.52	0.43		0.67	0.81		0.47	0.59	0.06
Uniform Delay, d1	68.2	35.2		35.4	44.1		47.2	63.1		52.0	63.6	56.2
Progression Factor	0.98	1.49		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.1	1.1		6.6	0.8		9.1	6.9		4.3	2.2	0.2
Delay (s)	72.1	53.6		42.0	44.9		56.3	69.9		56.3	65.8	56.4
Level of Service	E	D		D	D		E	E		E	E	E
Approach Delay (s)		58.0			44.6			67.3			63.2	
Approach LOS		E			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	57.7	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	22.2	
Intersection Capacity Utilization	86.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2823	145	101	963	32	65	15	101	99	16	31
Future Volume (vph)	97	2823	145	101	963	32	65	15	101	99	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.995			0.869			0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5208	0	1825	5218	0	1825	1669	0	1825	1729	0
Flt Permitted	0.252			0.039			0.724			0.623		
Satd. Flow (perm)	484	5208	0	75	5218	0	1391	1669	0	1197	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			9			80			34	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			573.7			1054.3			1121.4	
Travel Time (s)		31.8			25.8			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	105	3068	158	110	1047	35	71	16	110	108	17	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	3226	0	110	1082	0	71	126	0	108	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	

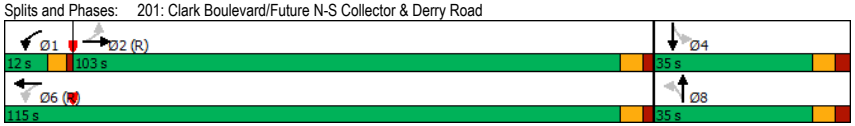
Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		4.5	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		9.0	41.0		35.0	35.0		35.0	35.0	
Total Split (s)	103.0	103.0		12.0	115.0		35.0	35.0		35.0	35.0	
Total Split (%)	68.7%	68.7%		8.0%	76.7%		23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	97.0	97.0		7.5	109.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		3.5	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	97.1	97.1		110.5	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.74	0.73		0.19	0.19		0.19	0.19	
v/c Ratio	0.34	0.96		0.78	0.29		0.27	0.34		0.48	0.15	
Control Delay	15.6	33.0		62.9	7.2		55.6	23.5		62.9	23.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.6	33.0		62.9	7.2		55.6	23.5		62.9	23.7	
LOS	B	C		E	A		E	C		E	C	
Approach Delay		32.4			12.4			35.1			50.3	
Approach LOS		C			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 28.2		Intersection LOS: C	
Intersection Capacity Utilization 90.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road



HCM Signalized Intersection Capacity Analysis
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2823	145	101	963	32	65	15	101	99	16	31
Future Volume (vph)	97	2823	145	101	963	32	65	15	101	99	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5206		1825	5219		1825	1670		1825	1729	
Flt Permitted	0.25	1.00		0.04	1.00		0.72	1.00		0.62	1.00	
Satd. Flow (perm)	484	5206		76	5219		1390	1670		1198	1729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	3068	158	110	1047	35	71	16	110	108	17	34
RTOR Reduction (vph)	0	4	0	0	2	0	0	65	0	0	28	0
Lane Group Flow (vph)	105	3222	0	110	1080	0	71	61	0	108	23	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	97.1	97.1		109.0	109.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	97.1	97.1		109.0	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.73	0.73		0.19	0.19		0.19	0.19	
Clearance Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	313	3370		141	3792		259	311		223	322	
v/s Ratio Prot		c0.62		c0.04	0.21			0.04			0.01	
v/s Ratio Perm	0.22			0.53			0.05			c0.09		
v/c Ratio	0.34	0.96		0.78	0.28		0.27	0.20		0.48	0.07	
Uniform Delay, d1	11.9	24.5		48.9	7.1		52.3	51.5		54.5	50.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	8.2		23.8	0.2		2.6	1.4		7.3	0.4	
Delay (s)	14.8	32.7		72.7	7.3		54.9	52.9		61.9	50.7	
Level of Service	B	C		E	A		D	D		E	D	
Approach Delay (s)		32.1			13.3			53.6			58.3	
Approach LOS		C			B			D			E	

Intersection Summary					
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.85				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.5		
Intersection Capacity Utilization	90.1%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Queues
1: Fifth Line & Derry Road

11/01/2023

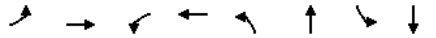
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	216	2589	239	121	1323	67	437	176	195	149	48
v/c Ratio	0.85	0.91	0.26	0.98	0.56	0.28	0.94	0.61	0.97	0.22	0.14
Control Delay	48.9	42.9	12.2	125.7	27.7	54.1	104.3	28.6	110.7	61.5	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	42.9	12.2	125.7	27.7	54.1	104.3	28.6	110.7	61.5	0.9
Queue Length 50th (m)	32.1	303.2	23.4	33.3	104.5	18.3	83.1	12.9	58.2	23.9	0.0
Queue Length 95th (m)	62.6	321.8	40.8	#80.5	136.1	32.1	#116.8	41.6	#103.4	35.2	0.0
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	345	2840	907	126	2381	239	466	288	201	687	333
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.91	0.26	0.96	0.56	0.28	0.94	0.61	0.97	0.22	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	150	2733	9	871	139	115	45	392
v/c Ratio	0.39	0.94	0.21	0.39	0.71	0.19	0.17	0.94
Control Delay	19.7	43.3	81.6	61.9	59.7	40.7	56.9	93.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	43.3	81.6	61.9	59.7	40.7	56.9	93.0
Queue Length 50th (m)	23.8	332.4	2.9	100.8	34.6	28.0	12.9	129.1
Queue Length 95th (m)	35.6	352.8	m6.6	116.9	52.7	44.5	25.7	#200.4
Internal Link Dist (m)		549.7		1482.9		984.8		722.3
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	486	2900	42	2246	220	630	270	418
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.94	0.21	0.39	0.63	0.18	0.17	0.94

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues

3: Trafalgar Road & Derry Road

11/01/2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	647	2058	74	781	155	642	78	372	59
v/c Ratio	0.88	0.80	0.52	0.44	0.65	0.81	0.45	0.59	0.18
Control Delay	72.2	54.6	43.6	43.4	56.6	70.2	48.3	66.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.2	54.6	43.6	43.4	56.6	70.2	48.3	66.9	1.2
Queue Length 50th (m)	124.7	208.9	10.4	75.7	41.6	113.1	19.4	63.7	0.0
Queue Length 95th (m)	m#156.3	222.3	28.2	88.9	58.6	128.5	30.8	77.4	0.0
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	737	2576	142	1771	240	943	173	771	369
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.80	0.52	0.44	0.65	0.68	0.45	0.48	0.16

Intersection Summary

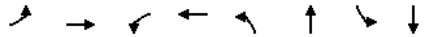
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues

201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	3226	110	1082	71	126	108	51
v/c Ratio	0.34	0.96	0.78	0.29	0.27	0.34	0.48	0.15
Control Delay	15.6	33.0	62.9	7.2	55.6	23.5	62.9	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	33.0	62.9	7.2	55.6	23.5	62.9	23.7
Queue Length 50th (m)	13.3	307.3	16.4	36.6	18.3	11.6	29.1	4.2
Queue Length 95th (m)	25.8	331.0	#48.5	42.4	33.7	30.5	49.5	16.3
Internal Link Dist (m)		681.9		549.7		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	312	3373	142	3794	259	376	223	350
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.96	0.77	0.29	0.27	0.34	0.48	0.15

Intersection Summary

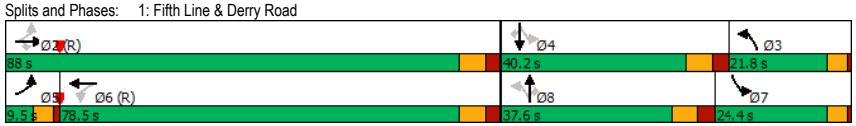
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1204	79	87	1713	183	228	169	150	408	390	205
Future Volume (vph)	50	1204	79	87	1713	183	228	169	150	408	390	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.986				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5092	1570	1630	4979	0	1755	3650	1420	1615	3510	1458
Flt Permitted	0.050			0.180			0.267			0.634		
Satd. Flow (perm)	96	5092	1570	309	4979	0	493	3650	1420	1078	3510	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			70		16				99			99
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Adj. Flow (vph)	54	1309	86	95	1862	199	248	184	163	443	424	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1309	86	95	2061	0	248	184	163	443	424	223
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	6	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	20.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.5	29.6	29.6	29.6	29.6		9.5	37.6	37.6	9.5	37.6	37.6
Total Split (s)	9.5	88.0	88.0	78.5	78.5		21.8	37.6	37.6	24.4	40.2	40.2
Total Split (%)	6.3%	58.7%	58.7%	52.3%	52.3%		14.5%	25.1%	25.1%	16.3%	26.8%	26.8%
Maximum Green (s)	5.0	80.4	80.4	70.9	70.9		17.3	30.0	30.0	19.9	32.6	32.6
Yellow Time (s)	3.5	4.6	4.6	4.6	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	3.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead			Lag	Lag		Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0	15.0	15.0			23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0	0	0			0	0		0	0
Act Effct Green (s)	87.9	84.8	84.8	76.6	76.6		38.6	15.0	15.0	53.1	25.0	25.0
Actuated g/C Ratio	0.59	0.57	0.57	0.51	0.51		0.26	0.10	0.10	0.35	0.17	0.17
v/c Ratio	0.44	0.45	0.09	0.61	0.81		0.83	0.50	0.71	0.90	0.72	0.69
Control Delay	26.7	20.3	5.3	48.3	34.9		77.2	67.9	42.5	70.9	66.3	42.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	20.3	5.3	48.3	34.9		77.2	67.9	42.5	70.9	66.3	42.7
LOS	C	C	A	D	C		E	E	D	E	E	D
Approach Delay		19.6			35.5			64.8			63.3	
Approach LOS		B			D			E			E	

Intersection Summary		
Area Type:	Other	
Cycle Length: 150		
Actuated Cycle Length: 150		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 120		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.90		
Intersection Signal Delay: 40.2	Intersection LOS: D	
Intersection Capacity Utilization 93.6%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 1: Fifth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
1: Fifth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1204	79	87	1713	183	228	169	150	408	390	205
Future Volume (vph)	50	1204	79	87	1713	183	228	169	150	408	390	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	5092	1570	1630	4976		1755	3650	1420	1615	3510	1458
Flt Permitted	0.05	1.00	1.00	0.18	1.00		0.27	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	96	5092	1570	309	4976		493	3650	1420	1077	3510	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1309	86	95	1862	199	248	184	163	443	424	223
RTOR Reduction (vph)	0	0	30	0	8	0	0	0	89	0	0	83
Lane Group Flow (vph)	54	1309	56	95	2053	0	248	184	74	443	424	141
Heavy Vehicles (%)	0%	3%	4%	12%	3%	12%	4%	0%	15%	13%	4%	12%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	84.8	84.8	84.8	75.7	75.7		35.5	15.0	15.0	53.1	25.0	25.0
Effective Green, g (s)	84.8	84.8	84.8	75.7	75.7		35.5	15.0	15.0	53.1	25.0	25.0
Actuated g/C Ratio	0.57	0.57	0.57	0.50	0.50		0.24	0.10	0.10	0.35	0.17	0.17
Clearance Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	107	2878	887	155	2511		289	365	142	490	585	243
v/s Ratio Prot	0.02	c0.26			c0.41		0.12	0.05		c0.18	0.12	
v/s Ratio Perm	0.27		0.04	0.31			0.09		0.05	c0.14		0.10
v/c Ratio	0.50	0.45	0.06	0.61	0.82		0.86	0.50	0.52	0.90	0.72	0.58
Uniform Delay, d1	25.4	19.1	14.7	26.6	31.3		59.3	64.0	64.1	44.0	59.2	57.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	0.5	0.1	16.8	3.1		21.4	1.3	3.9	19.9	4.6	3.6
Delay (s)	29.1	19.6	14.8	43.4	34.4		80.7	65.3	68.0	63.9	63.8	61.2
Level of Service	C	B	B	D	C		F	E	E	E	E	E
Approach Delay (s)		19.7			34.8			72.4			63.3	
Approach LOS		B			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	40.8	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	24.2	
Intersection Capacity Utilization	93.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	217	1244	107	19	1612	19	173	104	17	82	122	161
Future Volume (vph)	217	1244	107	19	1612	19	173	104	17	82	122	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.998			0.979			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1772	4910	0	1825	5070	0	1807	1833	0	1755	1695	0
Flt Permitted	0.054			0.152			0.183			0.673		
Satd. Flow (perm)	101	4910	0	292	5070	0	348	1833	0	1243	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			1			6			42	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			746.3	
Travel Time (s)		25.8			67.8			60.5			44.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Adj. Flow (vph)	236	1352	116	21	1752	21	188	113	18	89	133	175
Shared Lane Traffic (%)												
Lane Group Flow (vph)	236	1468	0	21	1773	0	188	131	0	89	308	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

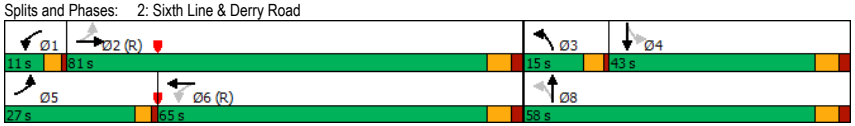
Lanes, Volumes, Timings
2: Sixth Line & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.0	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	27.0	81.0		11.0	65.0		15.0	58.0		43.0	43.0	
Total Split (%)	18.0%	54.0%		7.3%	43.3%		10.0%	38.7%		28.7%	28.7%	
Maximum Green (s)	23.0	74.2		7.0	58.2		10.5	51.5		36.5	36.5	
Yellow Time (s)	3.0	4.6		3.0	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	95.3	85.9		79.5	69.7		46.2	44.2		29.2	29.2	
Actuated g/C Ratio	0.64	0.57		0.53	0.46		0.31	0.29		0.19	0.19	
v/c Ratio	0.86	0.52		0.09	0.75		0.90	0.24		0.37	0.85	
Control Delay	70.2	21.7		14.2	37.3		82.7	38.1		55.3	70.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	70.2	21.7		14.2	37.3		82.7	38.1		55.3	70.7	
LOS	E	C		B	D		F	D		E	E	
Approach Delay		28.4			37.0			64.4			67.2	
Approach LOS		C			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 38.4		Intersection LOS: D	
Intersection Capacity Utilization 87.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	217	1244	107	19	1612	19	173	104	17	82	122	161
Future Volume (vph)	217	1244	107	19	1612	19	173	104	17	82	122	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	4911		1825	5071		1807	1834		1755	1695	
Flt Permitted	0.05	1.00		0.15	1.00		0.18	1.00		0.67	1.00	
Satd. Flow (perm)	101	4911		292	5071		348	1834		1243	1695	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	236	1352	116	21	1752	21	188	113	18	89	133	175
RTOR Reduction (vph)	0	6	0	0	1	0	0	4	0	0	34	0
Lane Group Flow (vph)	236	1462	0	21	1772	0	188	127	0	89	274	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	23%	1%	3%	0%	4%	2%	5%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	92.5	84.3		73.9	69.7		44.2	44.2		29.2	29.2	
Effective Green, g (s)	92.5	84.3		73.9	69.7		44.2	44.2		29.2	29.2	
Actuated g/C Ratio	0.62	0.56		0.49	0.46		0.29	0.29		0.19	0.19	
Clearance Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	271	2759		186	2356		204	540		241	329	
v/s Ratio Prot	c0.11	0.30		0.00	0.35		c0.06	0.07			0.16	
v/s Ratio Perm	c0.43			0.05			c0.21			0.07		
v/c Ratio	0.87	0.53		0.11	0.75		0.92	0.23		0.37	0.83	
Uniform Delay, d1	47.1	20.5		19.7	33.0		46.7	40.1		52.4	58.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	24.8	0.7		0.3	2.3		41.5	0.3		1.1	16.7	
Delay (s)	71.9	21.2		20.0	35.3		88.2	40.4		53.5	74.8	
Level of Service	E	C		B	D		F	D		D	E	
Approach Delay (s)		28.2			35.1			68.6			70.0	
Approach LOS		C			D			E			E	

Intersection Summary					
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.92				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.8		
Intersection Capacity Utilization	87.6%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	933	131	95	1361	135	211	778	84	153	416	96
Future Volume (vph)	234	933	131	95	1361	135	211	778	84	153	416	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.982			0.986			0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3052	4952	0	1825	5021	0	1706	3434	0	1807	3380	1555
Flt Permitted	0.950			0.196			0.325			0.061		
Satd. Flow (perm)	3052	4952	0	377	5021	0	584	3434	0	116	3380	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			8			5				104
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Adj. Flow (vph)	254	1014	142	103	1479	147	229	846	91	166	452	104
Shared Lane Traffic (%)												
Lane Group Flow (vph)	254	1156	0	103	1626	0	229	937	0	166	452	104
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	38.5	121.0		16.0	98.5		30.0	77.0		26.0	73.0	73.0
Total Split (%)	16.0%	50.4%		6.7%	41.0%		12.5%	32.1%		10.8%	30.4%	30.4%
Maximum Green (s)	34.5	114.1		12.0	91.6		26.0	70.2		22.0	66.2	66.2
Yellow Time (s)	3.0	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	27.1	115.6		114.9	100.3		97.5	69.4		90.1	65.7	65.7
Actuated g/C Ratio	0.11	0.48		0.48	0.42		0.41	0.29		0.38	0.27	0.27
v/c Ratio	0.74	0.48		0.41	0.77		0.65	0.94		0.85	0.49	0.21
Control Delay	115.9	42.5		31.5	63.6		57.8	99.5		103.7	75.1	9.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	115.9	42.5		31.5	63.6		57.8	99.5		103.7	75.1	9.9
LOS	F	D		C	E		E	F		F	E	A
Approach Delay		55.7			61.7			91.3			72.3	
Approach LOS		E			E			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 68.4		Intersection LOS: E	
Intersection Capacity Utilization 86.7%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Trafalgar Road & Derry Road

HCM Signalized Intersection Capacity Analysis
3: Trafalgar Road & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	933	131	95	1361	135	211	778	84	153	416	96
Future Volume (vph)	234	933	131	95	1361	135	211	778	84	153	416	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3052	4950		1825	5023		1706	3435		1807	3380	1555
Flt Permitted	0.95	1.00		0.20	1.00		0.33	1.00		0.06	1.00	1.00
Satd. Flow (perm)	3052	4950		376	5023		584	3435		116	3380	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	254	1014	142	103	1479	147	229	846	91	166	452	104
RTOR Reduction (vph)	0	7	0	0	5	0	0	4	0	0	0	76
Lane Group Flow (vph)	254	1149	0	103	1621	0	229	933	0	166	452	28
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	27.1	115.6		111.9	100.2		94.7	69.4		87.3	65.7	65.7
Effective Green, g (s)	27.1	115.6		111.9	100.2		94.7	69.4		87.3	65.7	65.7
Actuated g/C Ratio	0.11	0.48		0.47	0.42		0.39	0.29		0.36	0.27	0.27
Clearance Time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	344	2384		245	2097		348	993		194	925	425
v/s Ratio Prot	c0.08	0.23		0.02	c0.32		c0.07	c0.27		c0.08	0.13	
v/s Ratio Perm				0.17			0.19			0.23		0.02
v/c Ratio	0.74	0.48		0.42	0.77		0.66	0.94		0.86	0.49	0.07
Uniform Delay, d1	103.0	42.0		36.9	60.1		52.4	83.3		75.4	73.1	64.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.7	0.7		2.4	2.8		5.9	16.6		31.2	0.9	0.1
Delay (s)	112.7	42.7		39.4	63.0		58.3	99.8		106.6	73.9	64.6
Level of Service	F	D		D	E		E	F		F	E	E
Approach Delay (s)		55.3			61.6			91.7			80.1	
Approach LOS		E			E			F			F	

Intersection Summary				
HCM 2000 Control Delay	69.4	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	240.0	Sum of lost time (s)	21.7	
Intersection Capacity Utilization	86.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1503	38	67	1970	32	123	25	126	75	10	76
Future Volume (vph)	32	1503	38	67	1970	32	123	25	126	75	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.998			0.875			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5224	0	1825	5234	0	1825	1681	0	1825	1668	0
Flt Permitted	0.053			0.110			0.696			0.578		
Satd. Flow (perm)	102	5224	0	211	5234	0	1337	1681	0	1110	1668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			4			40			13	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			573.7			1054.3			1121.4	
Travel Time (s)		31.8			25.8			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	1634	41	73	2141	35	134	27	137	82	11	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1675	0	73	2176	0	134	164	0	82	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	97		97	97		97	97		97
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

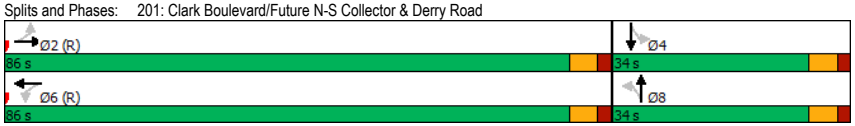
Lanes, Volumes, Timings
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		34.0	34.0		34.0	34.0	
Total Split (s)	86.0	86.0		86.0	86.0		34.0	34.0		34.0	34.0	
Total Split (%)	71.7%	71.7%		71.7%	71.7%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
v/c Ratio	0.51	0.48		0.52	0.62		0.43	0.39		0.32	0.24	
Control Delay	42.2	10.3		26.5	12.4		44.3	32.1		42.2	33.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	42.2	10.3		26.5	12.4		44.3	32.1		42.2	33.9	
LOS	D	B		C	B		D	C		D	C	
Approach Delay		11.0			12.8			37.6			37.8	
Approach LOS		B			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 98 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 14.8		Intersection LOS: B	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road



HCM Signalized Intersection Capacity Analysis
201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1503	38	67	1970	32	123	25	126	75	10	76
Future Volume (vph)	32	1503	38	67	1970	32	123	25	126	75	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5225		1825	5232		1825	1680		1825	1667	
Flt Permitted	0.05	1.00		0.11	1.00		0.70	1.00		0.58	1.00	
Satd. Flow (perm)	102	5225		211	5232		1337	1680		1111	1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1634	41	73	2141	35	134	27	137	82	11	83
RTOR Reduction (vph)	0	2	0	0	1	0	0	31	0	0	10	0
Lane Group Flow (vph)	35	1673	0	73	2175	0	134	133	0	82	84	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	68	3483		140	3488		311	392		259	388	
v/s Ratio Prot		0.32			c0.42			0.08			0.05	
v/s Ratio Perm	0.34			0.35			c0.10			0.07		
v/c Ratio	0.51	0.48		0.52	0.62		0.43	0.34		0.32	0.22	
Uniform Delay, d1	10.1	9.8		10.2	11.4		39.2	38.3		38.1	37.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.2	0.5		13.2	0.9		4.3	2.3		3.2	1.3	
Delay (s)	35.3	10.3		23.4	12.3		43.5	40.7		41.3	38.4	
Level of Service	D	B		C	B		D	D		D	D	
Approach Delay (s)		10.8			12.6			41.9			39.7	
Approach LOS		B			B			D			D	

Intersection Summary					
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.57				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	88.1%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
1: Fifth Line & Derry Road

11/01/2023

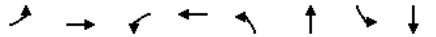
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1309	86	95	2061	248	184	163	443	424	223
v/c Ratio	0.44	0.45	0.09	0.61	0.81	0.83	0.50	0.71	0.90	0.72	0.69
Control Delay	26.7	20.3	5.3	48.3	34.9	77.2	67.9	42.5	70.9	66.3	42.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	20.3	5.3	48.3	34.9	77.2	67.9	42.5	70.9	66.3	42.7
Queue Length 50th (m)	6.9	84.7	2.1	21.2	197.2	53.6	28.1	18.5	113.3	63.9	35.4
Queue Length 95th (m)	14.9	98.7	10.6	#51.8	218.1	#91.5	38.3	41.5	#172.1	77.9	61.6
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	122	2877	918	157	2548	299	730	363	490	762	394
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.45	0.09	0.61	0.81	0.83	0.25	0.45	0.90	0.56	0.57

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
2: Sixth Line & Derry Road

11/01/2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	236	1468	21	1773	188	131	89	308
v/c Ratio	0.86	0.52	0.09	0.75	0.90	0.24	0.37	0.85
Control Delay	70.2	21.7	14.2	37.3	82.7	38.1	55.3	70.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.2	21.7	14.2	37.3	82.7	38.1	55.3	70.7
Queue Length 50th (m)	52.9	101.3	2.2	160.5	43.0	28.1	23.1	77.7
Queue Length 95th (m)	#88.8	126.9	6.3	201.8	#64.0	42.7	38.4	107.2
Internal Link Dist (m)		549.7		1482.9		984.8		722.3
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	322	2818	226	2357	209	633	302	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.52	0.09	0.75	0.90	0.21	0.29	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Trafalgar Road & Derry Road

11/01/2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	254	1156	103	1626	229	937	166	452	104
v/c Ratio	0.74	0.48	0.41	0.77	0.65	0.94	0.85	0.49	0.21
Control Delay	115.9	42.5	31.5	63.6	57.8	99.5	103.7	75.1	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.9	42.5	31.5	63.6	57.8	99.5	103.7	75.1	9.9
Queue Length 50th (m)	62.4	138.0	23.3	249.7	75.4	233.2	63.2	97.3	0.0
Queue Length 95th (m)	78.1	150.9	35.1	277.6	100.9	#269.2	#106.4	116.6	17.6
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	438	2392	253	2102	359	1007	198	932	504
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.48	0.41	0.77	0.64	0.93	0.84	0.48	0.21

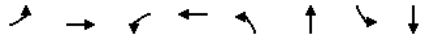
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

201: Clark Boulevard/Future N-S Collector & Derry Road

11/01/2023



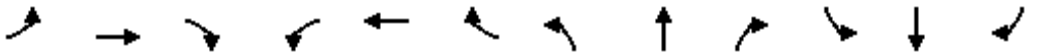
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	1675	73	2176	134	164	82	94
v/c Ratio	0.51	0.48	0.52	0.62	0.43	0.39	0.32	0.24
Control Delay	42.2	10.3	26.5	12.4	44.3	32.1	42.2	33.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	10.3	26.5	12.4	44.3	32.1	42.2	33.9
Queue Length 50th (m)	3.8	64.6	8.0	97.9	27.0	24.4	16.1	15.5
Queue Length 95th (m)	#22.1	74.4	26.9	110.6	46.3	44.5	31.0	30.0
Internal Link Dist (m)		681.9		549.7		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	68	3484	140	3490	311	422	259	399
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.48	0.52	0.62	0.43	0.39	0.32	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX I5

2028 Future Total Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2259	205	103	702	443	57	398	160	170	129	43
Future Volume (vph)	195	2259	205	103	702	443	57	398	160	170	129	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.942				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1372	5193	1570	1155	4401	0	1573	3230	1219	1573	3476	1276
Flt Permitted	0.163			0.041			0.663			0.184		
Satd. Flow (perm)	235	5193	1570	50	4401	0	1098	3230	1219	305	3476	1276
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		116				135			104
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	33%	1%	4%	58%	8%	19%	16%	13%	34%	16%	5%	28%
Adj. Flow (vph)	212	2455	223	112	763	482	62	433	174	185	140	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	2455	223	112	1245	0	62	433	174	185	140	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.0	29.6	29.6	9.0	29.6		9.5	33.6	33.6	9.5	37.6	37.6
Total Split (s)	36.0	105.7	105.7	19.5	89.2		11.6	33.6	33.6	21.2	43.2	43.2
Total Split (%)	20.0%	58.7%	58.7%	10.8%	49.6%		6.4%	18.7%	18.7%	11.8%	24.0%	24.0%
Maximum Green (s)	32.0	98.1	98.1	15.5	81.6		7.1	26.0	26.0	16.7	35.6	35.6
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	118.2	99.6	99.6	114.8	97.0		36.0	25.8	25.8	50.1	35.5	35.5
Actuated g/C Ratio	0.66	0.55	0.55	0.64	0.54		0.20	0.14	0.14	0.28	0.20	0.20
v/c Ratio	0.82	0.85	0.24	0.95	0.51		0.26	0.94	0.60	0.92	0.20	0.14
Control Delay	40.0	38.2	11.3	119.8	25.3		53.4	103.6	27.9	98.7	61.4	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	38.2	11.3	119.8	25.3		53.4	103.6	27.9	98.7	61.4	0.9
LOS	D	D	B	F	C		D	F	C	F	E	A
Approach Delay		36.3			33.1			79.3			72.3	
Approach LOS		D			C			E			E	

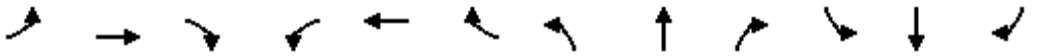
Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 43.4		Intersection LOS: D	
Intersection Capacity Utilization 89.5%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Fifth Line & Derry Road

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	212	2455	223	112	1245	62	433	174	185	140	47
v/c Ratio	0.82	0.85	0.24	0.95	0.51	0.26	0.94	0.60	0.92	0.20	0.14
Control Delay	40.0	38.2	11.3	119.8	25.3	53.4	103.6	27.9	98.7	61.4	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	38.2	11.3	119.8	25.3	53.4	103.6	27.9	98.7	61.4	0.9
Queue Length 50th (m)	28.0	273.2	20.1	29.7	92.1	16.9	82.2	12.6	54.8	22.4	0.0
Queue Length 95th (m)	53.5	291.3	36.6	#71.8	120.8	30.3	#114.8	40.5	#94.0	33.3	0.0
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	360	2873	916	127	2426	238	466	291	202	687	335
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.85	0.24	0.88	0.51	0.26	0.93	0.60	0.92	0.20	0.14

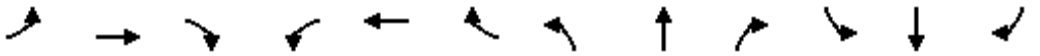
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2259	205	103	702	443	57	398	160	170	129	43
Future Volume (vph)	195	2259	205	103	702	443	57	398	160	170	129	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1372	5193	1570	1155	4401		1573	3230	1219	1573	3476	1276
Flt Permitted	0.16	1.00	1.00	0.04	1.00		0.66	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	236	5193	1570	50	4401		1098	3230	1219	304	3476	1276
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	2455	223	112	763	482	62	433	174	185	140	47
RTOR Reduction (vph)	0	0	48	0	53	0	0	0	116	0	0	38
Lane Group Flow (vph)	212	2455	175	112	1192	0	62	433	58	185	140	9
Heavy Vehicles (%)	33%	1%	4%	58%	8%	19%	16%	13%	34%	16%	5%	28%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	116.2	99.5	99.5	111.2	97.0		33.0	25.9	25.9	47.1	35.5	35.5
Effective Green, g (s)	116.2	99.5	99.5	111.2	97.0		33.0	25.9	25.9	47.1	35.5	35.5
Actuated g/C Ratio	0.65	0.55	0.55	0.62	0.54		0.18	0.14	0.14	0.26	0.20	0.20
Clearance Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	257	2870	867	118	2371		220	464	175	197	685	251
v/s Ratio Prot	c0.08	0.47		c0.07	0.27		0.01	0.13		c0.09	0.04	
v/s Ratio Perm	0.46		0.11	c0.51			0.04		0.05	c0.16		0.01
v/c Ratio	0.82	0.86	0.20	0.95	0.50		0.28	0.93	0.33	0.94	0.20	0.04
Uniform Delay, d1	18.2	34.1	20.3	61.0	26.2		62.5	76.2	69.3	58.0	60.4	58.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.1	3.5	0.5	65.6	0.8		0.7	26.1	1.3	46.4	0.2	0.1
Delay (s)	36.3	37.7	20.8	126.7	27.0		63.2	102.3	70.6	104.4	60.6	58.5
Level of Service	D	D	C	F	C		E	F	E	F	E	E
Approach Delay (s)		36.3			35.2			90.5			82.1	
Approach LOS		D			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	23.7
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

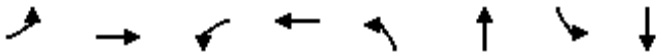


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	2160	119	8	704	42	125	82	29	56	154	188
Future Volume (vph)	255	2160	119	8	704	42	125	82	29	56	154	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.991			0.960			0.918	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	5003	0	1825	4575	0	1644	1778	0	1615	1652	0
Flt Permitted	0.271			0.048			0.132			0.679		
Satd. Flow (perm)	515	5003	0	92	4575	0	228	1778	0	1154	1652	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			6			3			32	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		243.6			1506.9			1008.8			158.7	
Travel Time (s)		11.0			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	4%	4%	0%	14%	7%	11%	4%	3%	13%	4%	9%
Adj. Flow (vph)	277	2348	129	9	765	46	136	89	32	61	167	204
Shared Lane Traffic (%)												
Lane Group Flow (vph)	277	2477	0	9	811	0	136	121	0	61	371	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		31.8	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	30.2	109.2		79.0	79.0		23.0	70.8		47.8	47.8	
Total Split (%)	16.8%	60.7%		43.9%	43.9%		12.8%	39.3%		26.6%	26.6%	
Maximum Green (s)	26.2	102.4		72.2	72.2		18.5	64.3		41.3	41.3	
Yellow Time (s)	3.0	4.6		4.6	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		2.2	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		7.0		7.0	7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0		14.0	14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	108.9	106.1		83.5	83.5		62.6	60.6		40.6	40.6	
Actuated g/C Ratio	0.60	0.59		0.46	0.46		0.35	0.34		0.23	0.23	
v/c Ratio	0.62	0.84		0.21	0.38		0.68	0.20		0.23	0.93	
Control Delay	23.8	34.0		84.1	53.6		58.1	41.4		59.1	92.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.8	34.0		84.1	53.6		58.1	41.4		59.1	92.6	
LOS	C	C		F	D		E	D		E	F	
Approach Delay		33.0			53.9			50.2			87.9	
Approach LOS		C			D			D			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 43.6		Intersection LOS: D	
Intersection Capacity Utilization 112.3%		ICU Level of Service H	
Analysis Period (min) 15			

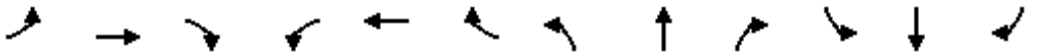
Splits and Phases: 2: Sixth Line & Derry Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	277	2477	9	811	136	121	61	371
v/c Ratio	0.62	0.84	0.21	0.38	0.68	0.20	0.23	0.93
Control Delay	23.8	34.0	84.1	53.6	58.1	41.4	59.1	92.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	34.0	84.1	53.6	58.1	41.4	59.1	92.6
Queue Length 50th (m)	47.5	270.8	2.5	81.5	33.7	29.3	17.7	119.4
Queue Length 95th (m)	65.1	289.1	m8.0	110.6	51.8	46.1	32.7	#184.5
Internal Link Dist (m)		219.6		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	499	2953	42	2124	224	637	268	409
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.84	0.21	0.38	0.61	0.19	0.23	0.91

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	2160	119	8	704	42	125	82	29	56	154	188
Future Volume (vph)	255	2160	119	8	704	42	125	82	29	56	154	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	5004		1825	4577		1644	1778		1615	1651	
Flt Permitted	0.27	1.00		0.05	1.00		0.13	1.00		0.68	1.00	
Satd. Flow (perm)	516	5004		92	4577		228	1778		1155	1651	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	277	2348	129	9	765	46	136	89	32	61	167	204
RTOR Reduction (vph)	0	3	0	0	3	0	0	2	0	0	25	0
Lane Group Flow (vph)	277	2474	0	9	808	0	136	119	0	61	346	0
Heavy Vehicles (%)	1%	4%	4%	0%	14%	7%	11%	4%	3%	13%	4%	9%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	106.1	106.1		83.4	83.4		60.6	60.6		40.7	40.7	
Effective Green, g (s)	106.1	106.1		83.4	83.4		60.6	60.6		40.7	40.7	
Actuated g/C Ratio	0.59	0.59		0.46	0.46		0.34	0.34		0.23	0.23	
Clearance Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	438	2949		42	2120		197	598		261	373	
v/s Ratio Prot	0.07	c0.49			0.18		c0.06	0.07			c0.21	
v/s Ratio Perm	0.31			0.10			0.17			0.05		
v/c Ratio	0.63	0.84		0.21	0.38		0.69	0.20		0.23	0.93	
Uniform Delay, d1	19.2	30.0		28.8	31.5		47.0	42.4		56.9	68.2	
Progression Factor	1.00	1.00		1.91	1.63		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	3.0		10.7	0.5		10.0	0.2		0.5	29.1	
Delay (s)	22.2	33.1		65.7	51.7		56.9	42.6		57.5	97.4	
Level of Service	C	C		E	D		E	D		E	F	
Approach Delay (s)		32.0			51.9			50.2			91.7	
Approach LOS		C			D			D			F	

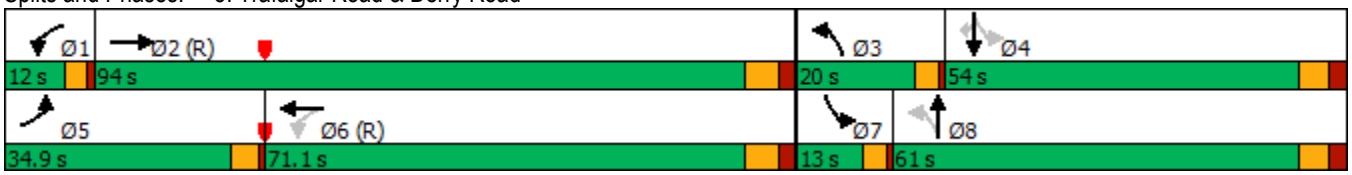
Intersection Summary			
HCM 2000 Control Delay	43.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	21.8
Intersection Capacity Utilization	112.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	550	1465	264	61	549	115	128	439	71	63	295	50
Future Volume (vph)	550	1465	264	61	549	115	128	439	71	63	295	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.977			0.974			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3404	4906	0	1825	4920	0	1332	3113	0	1659	2944	1074
Flt Permitted	0.950			0.087			0.373			0.266		
Satd. Flow (perm)	3404	4906	0	167	4920	0	523	3113	0	465	2944	1074
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			28			10				124
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	37%	17%	1%	10%	24%	52%
Adj. Flow (vph)	598	1592	287	66	597	125	139	477	77	68	321	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	598	1879	0	66	722	0	139	554	0	68	321	54
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	9.5	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	34.9	94.0		12.0	71.1		20.0	61.0		13.0	54.0	54.0
Total Split (%)	19.4%	52.2%		6.7%	39.5%		11.1%	33.9%		7.2%	30.0%	30.0%
Maximum Green (s)	30.4	87.1		8.0	64.2		16.0	54.2		9.0	47.2	47.2
Yellow Time (s)	3.5	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	39.8	98.8		82.0	68.8		56.0	40.2		45.2	33.4	33.4
Actuated g/C Ratio	0.22	0.55		0.46	0.38		0.31	0.22		0.25	0.19	0.19
v/c Ratio	0.79	0.69		0.39	0.38		0.60	0.79		0.39	0.59	0.18
Control Delay	70.7	46.6		25.5	39.8		57.9	72.9		49.8	70.9	1.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	70.7	46.6		25.5	39.8		57.9	72.9		49.8	70.9	1.3
LOS	E	D		C	D		E	E		D	E	A
Approach Delay		52.4			38.6			69.9			59.2	
Approach LOS		D			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 53.4		Intersection LOS: D	
Intersection Capacity Utilization 81.9%		ICU Level of Service D	
Analysis Period (min) 15			

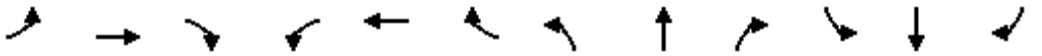
Splits and Phases: 3: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	598	1879	66	722	139	554	68	321	54
v/c Ratio	0.79	0.69	0.39	0.38	0.60	0.79	0.39	0.59	0.18
Control Delay	70.7	46.6	25.5	39.8	57.9	72.9	49.8	70.9	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.7	46.6	25.5	39.8	57.9	72.9	49.8	70.9	1.3
Queue Length 50th (m)	115.4	183.2	8.4	66.5	38.6	98.1	17.7	56.3	0.0
Queue Length 95th (m)	#139.8	202.3	16.9	81.5	55.4	113.5	28.9	69.6	0.0
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	753	2704	171	1897	234	944	176	771	373
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.69	0.39	0.38	0.59	0.59	0.39	0.42	0.14

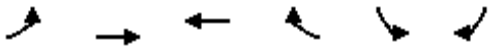
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



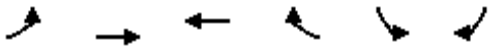
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	550	1465	264	61	549	115	128	439	71	63	295	50
Future Volume (vph)	550	1465	264	61	549	115	128	439	71	63	295	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3404	4906		1825	4920		1332	3114		1659	2944	1074
Flt Permitted	0.95	1.00		0.09	1.00		0.37	1.00		0.27	1.00	1.00
Satd. Flow (perm)	3404	4906		167	4920		523	3114		464	2944	1074
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	598	1592	287	66	597	125	139	477	77	68	321	54
RTOR Reduction (vph)	0	13	0	0	17	0	0	8	0	0	0	44
Lane Group Flow (vph)	598	1866	0	66	705	0	139	546	0	68	321	10
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	37%	17%	1%	10%	24%	52%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	39.8	98.8		79.1	68.8		53.2	40.2		42.4	33.4	33.4
Effective Green, g (s)	39.8	98.8		79.1	68.8		53.2	40.2		42.4	33.4	33.4
Actuated g/C Ratio	0.22	0.55		0.44	0.38		0.30	0.22		0.24	0.19	0.19
Clearance Time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	752	2692		168	1880		225	695		169	546	199
v/s Ratio Prot	c0.18	c0.38		0.02	0.14		c0.05	c0.18		0.02	0.11	
v/s Ratio Perm				0.15			0.13			0.07		0.01
v/c Ratio	0.80	0.69		0.39	0.37		0.62	0.79		0.40	0.59	0.05
Uniform Delay, d1	66.2	29.6		30.1	40.1		50.4	65.8		55.4	67.0	60.3
Progression Factor	0.99	1.50		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.4	0.9		3.2	0.6		7.1	6.8		3.3	2.5	0.2
Delay (s)	69.1	45.3		33.2	40.7		57.5	72.6		58.6	69.5	60.5
Level of Service	E	D		C	D		E	E		E	E	E
Approach Delay (s)		51.1			40.0			69.6			66.7	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	53.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	22.2
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑↱			↱
Traffic Volume (vph)	0	2405	1233	14	0	14
Future Volume (vph)	0	2405	1233	14	0	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	5043	4598	0	0	1662
Flt Permitted						
Satd. Flow (perm)	0	5043	4598	0	0	1662
Link Speed (k/h)		80	48		48	
Link Distance (m)		330.1	243.6		99.7	
Travel Time (s)		14.9	18.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	14%	0%	0%	0%
Adj. Flow (vph)	0	2614	1340	15	0	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2614	1355	0	0	15
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

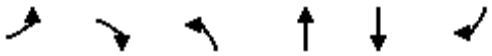
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑			↱
Traffic Volume (veh/h)	0	2405	1233	14	0	14
Future Volume (Veh/h)	0	2405	1233	14	0	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2614	1340	15	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		330	244			
pX, platoon unblocked	0.91				0.55	0.91
vC, conflicting volume	1355				2219	454
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1029				0	35
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	619				563	939

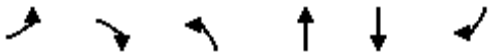
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	871	871	871	536	536	283	15
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	15	15
cSH	1700	1700	1700	1700	1700	1700	939
Volume to Capacity	0.51	0.51	0.51	0.32	0.32	0.17	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.9
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.9
Approach LOS							A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	24	138	231	374	14
Future Volume (vph)	2	24	138	231	374	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.875				0.995	
Flt Protected	0.996			0.982		
Satd. Flow (prot)	1674	0	0	1852	1791	0
Flt Permitted	0.996			0.982		
Satd. Flow (perm)	1674	0	0	1852	1791	0
Link Speed (k/h)	48			48	60	
Link Distance (m)	88.4			158.7	74.8	
Travel Time (s)	6.6			11.9	4.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	3%	7%	0%
Adj. Flow (vph)	2	26	150	251	407	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	0	401	422	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

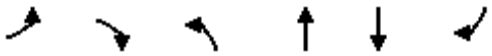
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.7%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	24	138	231	374	14
Future Volume (Veh/h)	2	24	138	231	374	14
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)	2	26	150	251	407	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				159		
pX, platoon unblocked	0.91					
vC, conflicting volume	966	414	422			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	913	414	422			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	87			
cM capacity (veh/h)	242	642	1148			

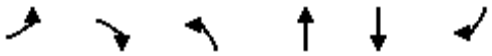
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	28	401	422
Volume Left	2	150	0
Volume Right	26	0	15
cSH	574	1148	1700
Volume to Capacity	0.05	0.13	0.25
Queue Length 95th (m)	1.2	3.4	0.0
Control Delay (s)	11.6	4.0	0.0
Lane LOS	B	A	
Approach Delay (s)	11.6	4.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	11	18	215	377	4
Future Volume (vph)	0	11	18	215	377	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.999	
Flt Protected				0.996		
Satd. Flow (prot)	1308	0	0	1854	1795	0
Flt Permitted				0.996		
Satd. Flow (perm)	1308	0	0	1854	1795	0
Link Speed (k/h)	48			48	60	
Link Distance (m)	93.7			74.8	934.7	
Travel Time (s)	7.0			5.6	56.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	27%	17%	2%	7%	0%
Adj. Flow (vph)	0	12	20	234	410	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	0	254	414	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

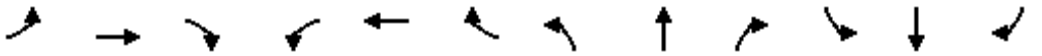
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	11	18	215	377	4
Future Volume (Veh/h)	0	11	18	215	377	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)	0	12	20	234	410	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				233		
pX, platoon unblocked	1.00					
vC, conflicting volume	686	412	414			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	685	412	414			
tC, single (s)	6.4	6.5	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.4			
p0 queue free %	100	98	98			
cM capacity (veh/h)	409	589	1069			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	254	414
Volume Left	0	20	0
Volume Right	12	0	4
cSH	589	1069	1700
Volume to Capacity	0.02	0.02	0.24
Queue Length 95th (m)	0.5	0.4	0.0
Control Delay (s)	11.2	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	11.2	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

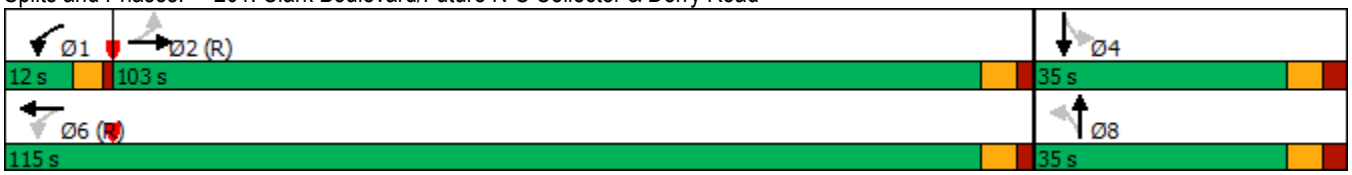


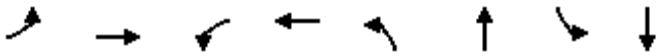
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2675	145	103	910	33	65	15	110	106	16	31
Future Volume (vph)	97	2675	145	103	910	33	65	15	110	106	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.995			0.868			0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5203	0	1825	5169	0	1825	1668	0	1825	1729	0
Flt Permitted	0.267			0.039			0.724			0.599		
Satd. Flow (perm)	513	5203	0	75	5169	0	1391	1668	0	1151	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			9			80			34	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			330.1			1054.3			1121.4	
Travel Time (s)		31.8			14.9			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	105	2908	158	112	989	36	71	16	120	115	17	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	3066	0	112	1025	0	71	136	0	115	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		4.5	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		9.0	41.0		35.0	35.0		35.0	35.0	
Total Split (s)	103.0	103.0		12.0	115.0		35.0	35.0		35.0	35.0	
Total Split (%)	68.7%	68.7%		8.0%	76.7%		23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	97.0	97.0		7.5	109.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		3.5	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	97.0	97.0		110.5	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.74	0.73		0.19	0.19		0.19	0.19	
v/c Ratio	0.32	0.91		0.79	0.27		0.27	0.36		0.54	0.15	
Control Delay	14.9	27.9		64.8	7.1		55.6	25.7		65.5	23.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.9	27.9		64.8	7.1		55.6	25.7		65.5	23.7	
LOS	B	C		E	A		E	C		E	C	
Approach Delay		27.5			12.8			36.0			52.7	
Approach LOS		C			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 25.2		Intersection LOS: C	
Intersection Capacity Utilization 97.7%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road

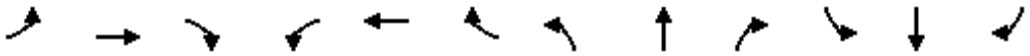




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	3066	112	1025	71	136	115	51
v/c Ratio	0.32	0.91	0.79	0.27	0.27	0.36	0.54	0.15
Control Delay	14.9	27.9	64.8	7.1	55.6	25.7	65.5	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	27.9	64.8	7.1	55.6	25.7	65.5	23.7
Queue Length 50th (m)	13.1	270.4	17.0	34.2	18.3	14.2	31.3	4.2
Queue Length 95th (m)	25.0	292.0	#49.1	39.9	33.7	34.4	52.6	16.3
Internal Link Dist (m)		681.9		306.1		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	331	3369	142	3758	259	376	214	350
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.91	0.79	0.27	0.27	0.36	0.54	0.15

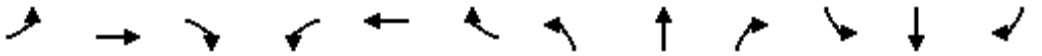
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2675	145	103	910	33	65	15	110	106	16	31
Future Volume (vph)	97	2675	145	103	910	33	65	15	110	106	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.87		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5204		1825	5167		1825	1667		1825	1729	
Flt Permitted	0.27	1.00		0.04	1.00		0.72	1.00		0.60	1.00	
Satd. Flow (perm)	513	5204		76	5167		1390	1667		1151	1729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	2908	158	112	989	36	71	16	120	115	17	34
RTOR Reduction (vph)	0	4	0	0	2	0	0	65	0	0	28	0
Lane Group Flow (vph)	105	3062	0	112	1023	0	71	71	0	115	23	0
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	97.0	97.0		109.0	109.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	97.0	97.0		109.0	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.73	0.73		0.19	0.19		0.19	0.19	
Clearance Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	331	3365		142	3754		259	311		214	322	
v/s Ratio Prot		c0.59		c0.04	0.20			0.04			0.01	
v/s Ratio Perm	0.20			0.53			0.05			c0.10		
v/c Ratio	0.32	0.91		0.79	0.27		0.27	0.23		0.54	0.07	
Uniform Delay, d1	11.8	22.8		46.7	7.0		52.3	51.8		55.1	50.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	4.8		24.5	0.2		2.6	1.7		9.4	0.4	
Delay (s)	14.3	27.6		71.2	7.2		54.9	53.5		64.5	50.7	
Level of Service	B	C		E	A		D	D		E	D	
Approach Delay (s)		27.1			13.5			54.0			60.3	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1119	72	87	1654	174	217	161	140	392	383	202
Future Volume (vph)	50	1119	72	87	1654	174	217	161	140	392	383	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.986				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5092	1570	1659	4979	0	1755	3650	1420	1615	3510	1458
Flt Permitted	0.049			0.208			0.284			0.641		
Satd. Flow (perm)	94	5092	1570	363	4979	0	525	3650	1420	1090	3510	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			69		16				99			100
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	4%	10%	3%	12%	4%	0%	15%	13%	4%	12%
Adj. Flow (vph)	54	1216	78	95	1798	189	236	175	152	426	416	220
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1216	78	95	1987	0	236	175	152	426	416	220
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	6	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	20.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.5	29.6	29.6	29.6	29.6		9.5	37.6	37.6	9.5	37.6	37.6
Total Split (s)	9.5	88.0	88.0	78.5	78.5		21.8	37.6	37.6	24.4	40.2	40.2
Total Split (%)	6.3%	58.7%	58.7%	52.3%	52.3%		14.5%	25.1%	25.1%	16.3%	26.8%	26.8%
Maximum Green (s)	5.0	80.4	80.4	70.9	70.9		17.3	30.0	30.0	19.9	32.6	32.6
Yellow Time (s)	3.5	4.6	4.6	4.6	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	3.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead			Lag	Lag		Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0	15.0	15.0			23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0	0	0			0	0		0	0
Act Effct Green (s)	90.0	86.9	86.9	78.5	78.5		36.0	14.1	14.1	51.0	24.7	24.7
Actuated g/C Ratio	0.60	0.58	0.58	0.52	0.52		0.24	0.09	0.09	0.34	0.16	0.16
v/c Ratio	0.44	0.41	0.08	0.50	0.76		0.85	0.51	0.68	0.90	0.72	0.68
Control Delay	26.0	18.7	4.6	38.0	32.0		81.0	69.3	39.8	72.0	66.5	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	18.7	4.6	38.0	32.0		81.0	69.3	39.8	72.0	66.5	42.1
LOS	C	B	A	D	C		F	E	D	E	E	D
Approach Delay		18.2			32.3			66.2			63.6	
Approach LOS		B			C			E			E	

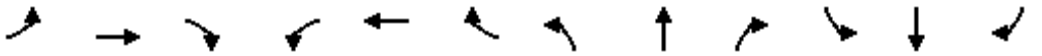
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 38.9		Intersection LOS: D	
Intersection Capacity Utilization 91.1%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Fifth Line & Derry Road

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1216	78	95	1987	236	175	152	426	416	220
v/c Ratio	0.44	0.41	0.08	0.50	0.76	0.85	0.51	0.68	0.90	0.72	0.68
Control Delay	26.0	18.7	4.6	38.0	32.0	81.0	69.3	39.8	72.0	66.5	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	18.7	4.6	38.0	32.0	81.0	69.3	39.8	72.0	66.5	42.1
Queue Length 50th (m)	6.5	71.7	1.1	19.0	177.2	53.0	26.7	15.2	112.5	62.7	34.2
Queue Length 95th (m)	15.2	90.1	9.1	42.7	205.4	#81.2	37.4	37.9	#150.8	76.8	60.4
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	124	2949	938	190	2613	285	730	363	473	762	395
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.41	0.08	0.50	0.76	0.83	0.24	0.42	0.90	0.55	0.56

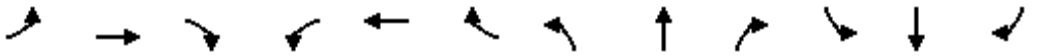
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1119	72	87	1654	174	217	161	140	392	383	202
Future Volume (vph)	50	1119	72	87	1654	174	217	161	140	392	383	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	5092	1570	1659	4978		1755	3650	1420	1615	3510	1458
Flt Permitted	0.05	1.00	1.00	0.21	1.00		0.28	1.00	1.00	0.64	1.00	1.00
Satd. Flow (perm)	94	5092	1570	363	4978		524	3650	1420	1090	3510	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1216	78	95	1798	189	236	175	152	426	416	220
RTOR Reduction (vph)	0	0	29	0	8	0	0	0	90	0	0	84
Lane Group Flow (vph)	54	1216	49	95	1979	0	236	175	62	426	416	136
Heavy Vehicles (%)	0%	3%	4%	10%	3%	12%	4%	0%	15%	13%	4%	12%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	86.8	86.8	86.8	77.5	77.5		32.9	14.1	14.1	51.1	24.7	24.7
Effective Green, g (s)	86.8	86.8	86.8	77.5	77.5		32.9	14.1	14.1	51.1	24.7	24.7
Actuated g/C Ratio	0.58	0.58	0.58	0.52	0.52		0.22	0.09	0.09	0.34	0.16	0.16
Clearance Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	109	2946	908	187	2571		269	343	133	474	577	240
v/s Ratio Prot	0.02	c0.24			c0.40		0.11	0.05		c0.18	0.12	
v/s Ratio Perm	0.27		0.03	0.26			0.08		0.04	c0.13		0.09
v/c Ratio	0.50	0.41	0.05	0.51	0.77		0.88	0.51	0.47	0.90	0.72	0.57
Uniform Delay, d1	23.2	17.5	13.7	23.8	29.1		60.7	64.7	64.4	44.9	59.4	57.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.4	0.1	9.5	2.3		25.8	1.5	3.1	19.5	4.6	3.3
Delay (s)	26.7	17.9	13.9	33.3	31.4		86.5	66.2	67.5	64.3	64.0	61.1
Level of Service	C	B	B	C	C		F	E	E	E	E	E
Approach Delay (s)		18.0			31.5			75.0			63.5	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

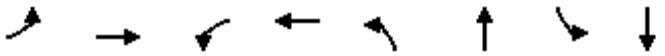


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	1127	100	18	1479	39	166	109	15	94	128	180
Future Volume (vph)	238	1127	100	18	1479	39	166	109	15	94	128	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.996			0.982			0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1772	4911	0	1825	5057	0	1807	1822	0	1738	1689	0
Flt Permitted	0.061			0.186			0.162			0.671		
Satd. Flow (perm)	114	4911	0	357	5057	0	308	1822	0	1228	1689	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			3			5			45	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		243.6			1506.9			1008.8			158.7	
Travel Time (s)		11.0			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	0%	3%	15%	1%	4%	0%	5%	2%	5%
Adj. Flow (vph)	259	1225	109	20	1608	42	180	118	16	102	139	196
Shared Lane Traffic (%)												
Lane Group Flow (vph)	259	1334	0	20	1650	0	180	134	0	102	335	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.0	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	27.0	81.0		11.0	65.0		15.0	58.0		43.0	43.0	
Total Split (%)	18.0%	54.0%		7.3%	43.3%		10.0%	38.7%		28.7%	28.7%	
Maximum Green (s)	23.0	74.2		7.0	58.2		10.5	51.5		36.5	36.5	
Yellow Time (s)	3.0	4.6		3.0	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	93.5	84.1		76.3	66.5		48.0	46.0		31.0	31.0	
Actuated g/C Ratio	0.62	0.56		0.51	0.44		0.32	0.31		0.21	0.21	
v/c Ratio	0.88	0.48		0.08	0.74		0.89	0.24		0.40	0.87	
Control Delay	70.3	21.8		14.6	38.4		79.3	37.3		55.1	71.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	70.3	21.8		14.6	38.4		79.3	37.3		55.1	71.9	
LOS	E	C		B	D		E	D		E	E	
Approach Delay		29.7			38.1			61.4			68.0	
Approach LOS		C			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 39.8		Intersection LOS: D	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			

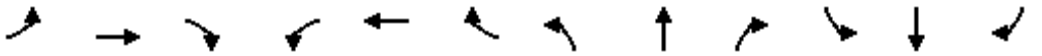
Splits and Phases: 2: Sixth Line & Derry Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	259	1334	20	1650	180	134	102	335
v/c Ratio	0.88	0.48	0.08	0.74	0.89	0.24	0.40	0.87
Control Delay	70.3	21.8	14.6	38.4	79.3	37.3	55.1	71.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.3	21.8	14.6	38.4	79.3	37.3	55.1	71.9
Queue Length 50th (m)	58.0	91.6	2.2	153.7	40.1	28.4	26.3	84.7
Queue Length 95th (m)	#101.4	111.6	6.1	181.8	#65.5	43.7	43.3	118.4
Internal Link Dist (m)		219.6		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	325	2759	250	2242	203	628	298	445
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.48	0.08	0.74	0.89	0.21	0.34	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	1127	100	18	1479	39	166	109	15	94	128	180
Future Volume (vph)	238	1127	100	18	1479	39	166	109	15	94	128	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	4910		1825	5057		1807	1823		1738	1689	
Flt Permitted	0.06	1.00		0.19	1.00		0.16	1.00		0.67	1.00	
Satd. Flow (perm)	114	4910		358	5057		308	1823		1228	1689	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	259	1225	109	20	1608	42	180	118	16	102	139	196
RTOR Reduction (vph)	0	6	0	0	2	0	0	3	0	0	36	0
Lane Group Flow (vph)	259	1328	0	20	1648	0	180	131	0	102	299	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	15%	1%	4%	0%	5%	2%	5%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	90.7	82.5		70.7	66.5		46.0	46.0		31.0	31.0	
Effective Green, g (s)	90.7	82.5		70.7	66.5		46.0	46.0		31.0	31.0	
Actuated g/C Ratio	0.60	0.55		0.47	0.44		0.31	0.31		0.21	0.21	
Clearance Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	292	2700		209	2241		199	559		253	349	
v/s Ratio Prot	c0.12	0.27		0.00	0.33		c0.06	0.07			0.18	
v/s Ratio Perm	c0.42			0.04			c0.21			0.08		
v/c Ratio	0.89	0.49		0.10	0.74		0.90	0.23		0.40	0.86	
Uniform Delay, d1	46.3	20.8		21.2	34.5		44.5	38.8		51.5	57.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.9	0.6		0.2	2.2		38.1	0.3		1.2	18.7	
Delay (s)	72.2	21.5		21.4	36.7		82.6	39.1		52.7	76.1	
Level of Service	E	C		C	D		F	D		D	E	
Approach Delay (s)		29.7			36.5			64.0			70.7	
Approach LOS		C			D			E			E	

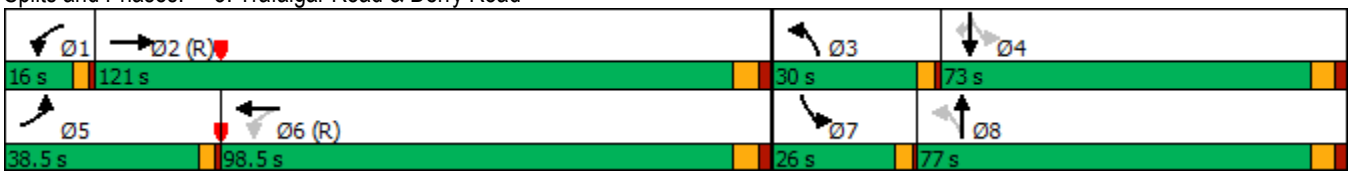
Intersection Summary			
HCM 2000 Control Delay	39.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.8
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	854	121	86	1253	122	182	672	72	132	359	103
Future Volume (vph)	216	854	121	86	1253	122	182	672	72	132	359	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.981			0.987			0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3052	4947	0	1825	5026	0	1706	3440	0	1807	3380	1555
Flt Permitted	0.950			0.229			0.358			0.101		
Satd. Flow (perm)	3052	4947	0	440	5026	0	643	3440	0	192	3380	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			8			5				112
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	1%	1%	8%	5%
Adj. Flow (vph)	235	928	132	93	1362	133	198	730	78	143	390	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	235	1060	0	93	1495	0	198	808	0	143	390	112
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	38.5	121.0		16.0	98.5		30.0	77.0		26.0	73.0	73.0
Total Split (%)	16.0%	50.4%		6.7%	41.0%		12.5%	32.1%		10.8%	30.4%	30.4%
Maximum Green (s)	34.5	114.1		12.0	91.6		26.0	70.2		22.0	66.2	66.2
Yellow Time (s)	3.0	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	25.6	121.1		121.7	107.2		92.3	65.0		84.1	60.8	60.8
Actuated g/C Ratio	0.11	0.50		0.51	0.45		0.38	0.27		0.35	0.25	0.25
v/c Ratio	0.72	0.42		0.32	0.66		0.56	0.86		0.70	0.46	0.23
Control Delay	116.4	38.3		27.5	55.2		56.7	92.9		69.9	76.9	9.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	116.4	38.3		27.5	55.2		56.7	92.9		69.9	76.9	9.8
LOS	F	D		C	E		E	F		E	E	A
Approach Delay		52.5			53.6			85.8			63.7	
Approach LOS		D			D			F			E	

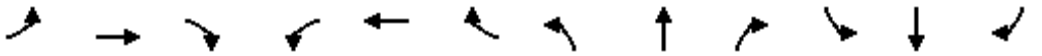
Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 61.8		Intersection LOS: E	
Intersection Capacity Utilization 79.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Trafalgar Road & Derry Road



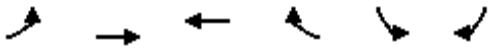
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	235	1060	93	1495	198	808	143	390	112
v/c Ratio	0.72	0.42	0.32	0.66	0.56	0.86	0.70	0.46	0.23
Control Delay	116.4	38.3	27.5	55.2	56.7	92.9	69.9	76.9	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	116.4	38.3	27.5	55.2	56.7	92.9	69.9	76.9	9.8
Queue Length 50th (m)	57.7	120.5	20.2	212.6	65.5	195.2	45.5	83.9	0.0
Queue Length 95th (m)	73.4	135.4	32.1	243.9	87.0	217.2	67.6	100.3	17.9
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	438	2503	294	2249	362	1009	216	932	510
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.42	0.32	0.66	0.55	0.80	0.66	0.42	0.22

Intersection Summary



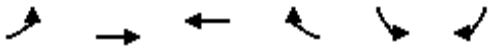
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	854	121	86	1253	122	182	672	72	132	359	103
Future Volume (vph)	216	854	121	86	1253	122	182	672	72	132	359	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3052	4949		1825	5024		1706	3439		1807	3380	1555
Flt Permitted	0.95	1.00		0.23	1.00		0.36	1.00		0.10	1.00	1.00
Satd. Flow (perm)	3052	4949		441	5024		643	3439		192	3380	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	235	928	132	93	1362	133	198	730	78	143	390	112
RTOR Reduction (vph)	0	7	0	0	4	0	0	4	0	0	0	84
Lane Group Flow (vph)	235	1053	0	93	1491	0	198	804	0	143	390	28
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	1%	1%	8%	5%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	25.6	121.2		118.8	107.2		89.5	65.0		81.3	60.8	60.8
Effective Green, g (s)	25.6	121.2		118.8	107.2		89.5	65.0		81.3	60.8	60.8
Actuated g/C Ratio	0.11	0.51		0.49	0.45		0.37	0.27		0.34	0.25	0.25
Clearance Time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	325	2499		285	2244		349	931		202	856	393
v/s Ratio Prot	c0.08	0.21		0.02	c0.30		c0.06	c0.23		c0.06	0.12	
v/s Ratio Perm				0.15			0.15			0.18		0.02
v/c Ratio	0.72	0.42		0.33	0.66		0.57	0.86		0.71	0.46	0.07
Uniform Delay, d1	103.8	37.3		32.6	52.2		54.5	83.3		61.9	75.6	68.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.4	0.5		1.4	1.6		3.5	9.1		13.3	0.8	0.2
Delay (s)	113.2	37.9		34.0	53.8		57.9	92.4		75.3	76.4	68.3
Level of Service	F	D		C	D		E	F		E	E	E
Approach Delay (s)		51.5			52.7			85.6			74.8	
Approach LOS		D			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	62.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	240.0	Sum of lost time (s)	21.7
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑			↱
Traffic Volume (vph)	0	1581	1711	24	0	96
Future Volume (vph)	0	1581	1711	24	0	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	4995	5084	0	0	1662
Flt Permitted						
Satd. Flow (perm)	0	4995	5084	0	0	1662
Link Speed (k/h)		48	48		48	
Link Distance (m)		330.1	243.6		99.7	
Travel Time (s)		24.8	18.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	3%	0%	0%	0%
Adj. Flow (vph)	0	1718	1860	26	0	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1718	1886	0	0	104
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97			97	97	97
Sign Control		Free	Free		Stop	

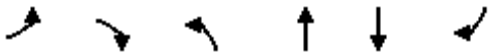
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑			↱
Traffic Volume (veh/h)	0	1581	1711	24	0	96
Future Volume (Veh/h)	0	1581	1711	24	0	96
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1718	1860	26	0	104
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		330	244			
pX, platoon unblocked	0.74				0.80	0.74
vC, conflicting volume	1886				2446	633
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	965				853	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	87
cM capacity (veh/h)	534				243	807

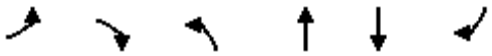
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	573	573	573	744	744	398	104
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	26	104
cSH	1700	1700	1700	1700	1700	1700	807
Volume to Capacity	0.34	0.34	0.34	0.44	0.44	0.23	0.13
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	3.4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.1
Lane LOS							B
Approach Delay (s)	0.0			0.0			10.1
Approach LOS							B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	13	47	62	317	342	5
Future Volume (vph)	13	47	62	317	342	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.894				0.998	
Flt Protected	0.989			0.992		
Satd. Flow (prot)	1699	0	0	1844	1844	0
Flt Permitted	0.989			0.992		
Satd. Flow (perm)	1699	0	0	1844	1844	0
Link Speed (k/h)	48			48	48	
Link Distance (m)	88.4			158.7	74.8	
Travel Time (s)	6.6			11.9	5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	4%	0%
Adj. Flow (vph)	14	51	67	345	372	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	0	0	412	377	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

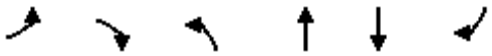
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	47	62	317	342	5
Future Volume (Veh/h)	13	47	62	317	342	5
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)	14	51	67	345	372	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				159		
pX, platoon unblocked	0.89					
vC, conflicting volume	854	374	377			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	774	374	377			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	92	94			
cM capacity (veh/h)	311	676	1193			

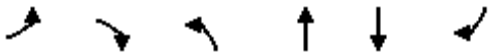
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	65	412	377
Volume Left	14	67	0
Volume Right	51	0	5
cSH	540	1193	1700
Volume to Capacity	0.12	0.06	0.22
Queue Length 95th (m)	3.1	1.4	0.0
Control Delay (s)	12.6	1.8	0.0
Lane LOS	B	A	
Approach Delay (s)	12.6	1.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	18	12	318	329	0
Future Volume (vph)	3	18	12	318	329	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883					
Flt Protected	0.994			0.998		
Satd. Flow (prot)	1415	0	0	1836	1865	0
Flt Permitted	0.994			0.998		
Satd. Flow (perm)	1415	0	0	1836	1865	0
Link Speed (k/h)	48			48	48	
Link Distance (m)	93.7			74.8	934.7	
Travel Time (s)	7.0			5.6	70.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	22%	42%	3%	3%	0%
Adj. Flow (vph)	3	20	13	346	358	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	0	359	358	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

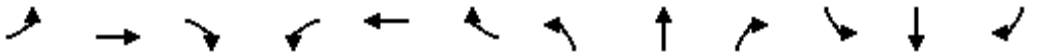
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.5%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	18	12	318	329	0
Future Volume (Veh/h)	3	18	12	318	329	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)	3	20	13	346	358	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				233		
pX, platoon unblocked	0.95					
vC, conflicting volume	730	358	358			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	689	358	358			
tC, single (s)	6.4	6.4	4.5			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.6			
p0 queue free %	99	97	99			
cM capacity (veh/h)	389	644	1010			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	23	359	358
Volume Left	3	13	0
Volume Right	20	0	0
cSH	593	1010	1700
Volume to Capacity	0.04	0.01	0.21
Queue Length 95th (m)	0.9	0.3	0.0
Control Delay (s)	11.3	0.4	0.0
Lane LOS	B	A	
Approach Delay (s)	11.3	0.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		

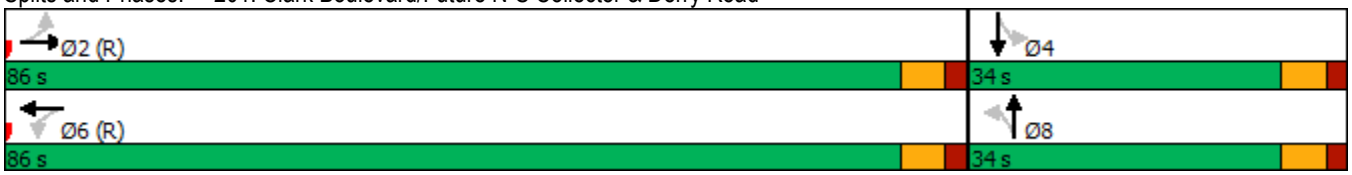


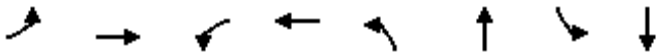
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1395	38	76	1922	41	123	25	131	78	10	76
Future Volume (vph)	32	1395	38	76	1922	41	123	25	131	78	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.874			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5224	0	1825	5229	0	1825	1679	0	1825	1668	0
Flt Permitted	0.057			0.129			0.696			0.568		
Satd. Flow (perm)	110	5224	0	248	5229	0	1337	1679	0	1091	1668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			5			52			15	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			330.1			1054.3			1121.4	
Travel Time (s)		31.8			14.9			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	1516	41	83	2089	45	134	27	142	85	11	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1557	0	83	2134	0	134	169	0	85	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	97		97	97		97	97		97
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		34.0	34.0		34.0	34.0	
Total Split (s)	86.0	86.0		86.0	86.0		34.0	34.0		34.0	34.0	
Total Split (%)	71.7%	71.7%		71.7%	71.7%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
v/c Ratio	0.48	0.45		0.50	0.61		0.43	0.39		0.33	0.23	
Control Delay	36.4	9.9		23.0	12.2		44.3	29.6		42.7	33.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.4	9.9		23.0	12.2		44.3	29.6		42.7	33.1	
LOS	D	A		C	B		D	C		D	C	
Approach Delay		10.5			12.6			36.1			37.6	
Approach LOS		B			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 98 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 95.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road

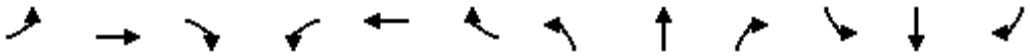




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	1557	83	2134	134	169	85	94
v/c Ratio	0.48	0.45	0.50	0.61	0.43	0.39	0.33	0.23
Control Delay	36.4	9.9	23.0	12.2	44.3	29.6	42.7	33.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	9.9	23.0	12.2	44.3	29.6	42.7	33.1
Queue Length 50th (m)	3.7	58.1	9.0	94.6	27.0	22.9	16.7	15.1
Queue Length 95th (m)	#20.8	67.2	26.8	107.2	46.3	43.2	31.8	29.6
Internal Link Dist (m)		681.9		306.1		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	73	3485	165	3487	311	431	254	400
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.45	0.50	0.61	0.43	0.39	0.33	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

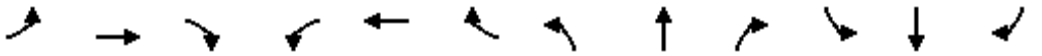


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1395	38	76	1922	41	123	25	131	78	10	76
Future Volume (vph)	32	1395	38	76	1922	41	123	25	131	78	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5224		1825	5228		1825	1679		1825	1667	
Flt Permitted	0.06	1.00		0.13	1.00		0.70	1.00		0.57	1.00	
Satd. Flow (perm)	109	5224		247	5228		1337	1679		1092	1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1516	41	83	2089	45	134	27	142	85	11	83
RTOR Reduction (vph)	0	2	0	0	2	0	0	40	0	0	12	0
Lane Group Flow (vph)	35	1555	0	83	2132	0	134	129	0	85	83	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	72	3482		164	3485		311	391		254	388	
v/s Ratio Prot		0.30			c0.41			0.08			0.05	
v/s Ratio Perm	0.32			0.34			c0.10			0.08		
v/c Ratio	0.49	0.45		0.51	0.61		0.43	0.33		0.33	0.21	
Uniform Delay, d1	9.9	9.5		10.1	11.3		39.2	38.2		38.3	37.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	21.6	0.4		10.7	0.8		4.3	2.3		3.5	1.2	
Delay (s)	31.5	9.9		20.8	12.1		43.5	40.5		41.8	38.4	
Level of Service	C	A		C	B		D	D		D	D	
Approach Delay (s)		10.4			12.4			41.8			40.0	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX I6

2033 Future Total Conditions

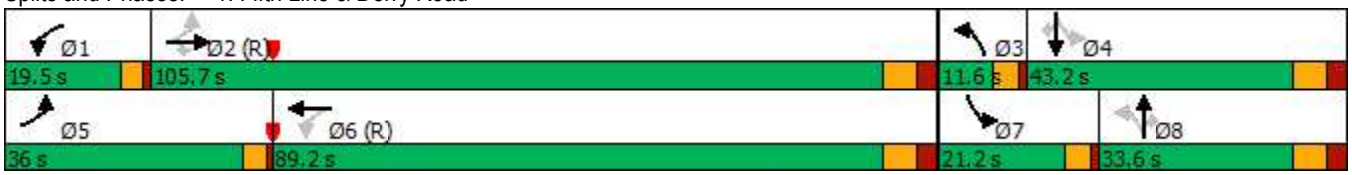


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	2484	220	112	774	458	62	402	174	179	137	44
Future Volume (vph)	199	2484	220	112	774	458	62	402	174	179	137	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.944				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1372	5193	1570	1155	4417	0	1587	3230	1219	1573	3476	1256
Flt Permitted	0.137			0.042			0.658			0.179		
Satd. Flow (perm)	198	5193	1570	51	4417	0	1099	3230	1219	296	3476	1256
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		108				146			104
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	33%	1%	4%	58%	8%	19%	15%	13%	34%	16%	5%	30%
Adj. Flow (vph)	216	2700	239	122	841	498	67	437	189	195	149	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	2700	239	122	1339	0	67	437	189	195	149	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	1	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.0	29.6	29.6	9.0	29.6		9.5	33.6	33.6	9.5	37.6	37.6
Total Split (s)	36.0	105.7	105.7	19.5	89.2		11.6	33.6	33.6	21.2	43.2	43.2
Total Split (%)	20.0%	58.7%	58.7%	10.8%	49.6%		6.4%	18.7%	18.7%	11.8%	24.0%	24.0%
Maximum Green (s)	32.0	98.1	98.1	15.5	81.6		7.1	26.0	26.0	16.7	35.6	35.6
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
Act Effct Green (s)	118.2	98.5	98.5	113.3	94.7		36.1	25.9	25.9	50.2	35.5	35.5
Actuated g/C Ratio	0.66	0.55	0.55	0.63	0.53		0.20	0.14	0.14	0.28	0.20	0.20
v/c Ratio	0.85	0.95	0.26	0.98	0.56		0.28	0.94	0.63	0.97	0.22	0.15
Control Delay	51.1	47.3	12.2	126.7	28.1		54.1	104.3	28.8	110.7	61.5	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.1	47.3	12.2	126.7	28.1		54.1	104.3	28.8	110.7	61.5	0.9
LOS	D	D	B	F	C		D	F	C	F	E	A
Approach Delay		44.9			36.4			78.9			78.6	
Approach LOS		D			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 49.2		Intersection LOS: D	
Intersection Capacity Utilization 95.0%		ICU Level of Service F	
Analysis Period (min) 15			

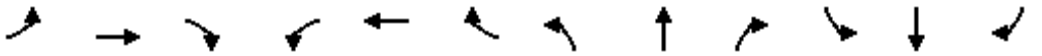
Splits and Phases: 1: Fifth Line & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	216	2700	239	122	1339	67	437	189	195	149	48
v/c Ratio	0.85	0.95	0.26	0.98	0.56	0.28	0.94	0.63	0.97	0.22	0.15
Control Delay	51.1	47.3	12.2	126.7	28.1	54.1	104.3	28.8	110.7	61.5	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.1	47.3	12.2	126.7	28.1	54.1	104.3	28.8	110.7	61.5	0.9
Queue Length 50th (m)	33.7	330.4	23.4	33.8	107.1	18.3	83.1	13.9	58.2	23.9	0.0
Queue Length 95th (m)	64.3	349.7	40.8	#81.1	139.1	32.1	#116.8	43.4	#103.4	35.2	0.0
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	342	2840	907	127	2374	239	466	300	201	687	331
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.95	0.26	0.96	0.56	0.28	0.94	0.63	0.97	0.22	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	2484	220	112	774	458	62	402	174	179	137	44
Future Volume (vph)	199	2484	220	112	774	458	62	402	174	179	137	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1372	5193	1570	1155	4418		1587	3230	1219	1573	3476	1256
Flt Permitted	0.14	1.00	1.00	0.04	1.00		0.66	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	198	5193	1570	51	4418		1098	3230	1219	297	3476	1256
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	2700	239	122	841	498	67	437	189	195	149	48
RTOR Reduction (vph)	0	0	48	0	51	0	0	0	125	0	0	39
Lane Group Flow (vph)	216	2700	191	122	1288	0	67	437	64	195	149	9
Heavy Vehicles (%)	33%	1%	4%	58%	8%	19%	15%	13%	34%	16%	5%	30%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	117.5	98.5	98.5	109.9	94.7		33.0	25.9	25.9	47.1	35.5	35.5
Effective Green, g (s)	117.5	98.5	98.5	109.9	94.7		33.0	25.9	25.9	47.1	35.5	35.5
Actuated g/C Ratio	0.65	0.55	0.55	0.61	0.53		0.18	0.14	0.14	0.26	0.20	0.20
Clearance Time (s)	4.0	7.6	7.6	4.0	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	0.2	5.0	5.0	0.2	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	253	2841	859	124	2324		220	464	175	196	685	247
v/s Ratio Prot	c0.09	0.52		c0.08	0.29		0.01	0.14		c0.09	0.04	
v/s Ratio Perm	0.47		0.12	c0.51			0.04		0.05	c0.17		0.01
v/c Ratio	0.85	0.95	0.22	0.98	0.55		0.30	0.94	0.37	0.99	0.22	0.04
Uniform Delay, d1	25.5	38.4	21.0	64.3	28.5		62.7	76.3	69.6	59.6	60.6	58.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.6	8.7	0.6	75.2	1.0		0.8	27.9	1.5	62.5	0.2	0.1
Delay (s)	48.1	47.2	21.6	139.5	29.5		63.5	104.2	71.2	122.1	60.8	58.5
Level of Service	D	D	C	F	C		E	F	E	F	E	E
Approach Delay (s)		45.3			38.7			91.2			91.0	
Approach LOS		D			D			F			F	

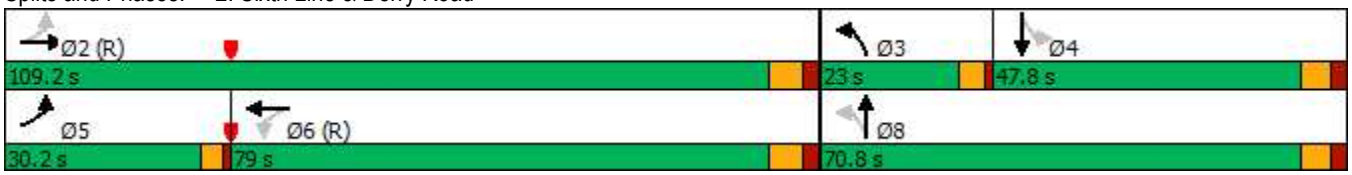
Intersection Summary			
HCM 2000 Control Delay	52.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	23.7
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

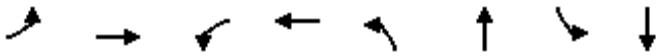
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	2385	130	8	777	44	133	89	32	65	168	204
Future Volume (vph)	268	2385	130	8	777	44	133	89	32	65	168	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.992			0.960			0.918	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	5003	0	1825	4579	0	1644	1791	0	1630	1661	0
Flt Permitted	0.234			0.051			0.114			0.673		
Satd. Flow (perm)	445	5003	0	98	4579	0	197	1791	0	1154	1661	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			6			2			31	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		243.6			1506.9			1008.8			158.7	
Travel Time (s)		11.0			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	4%	4%	0%	14%	7%	11%	3%	3%	12%	4%	8%
Adj. Flow (vph)	291	2592	141	9	845	48	145	97	35	71	183	222
Shared Lane Traffic (%)												
Lane Group Flow (vph)	291	2733	0	9	893	0	145	132	0	71	405	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		31.8	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	30.2	109.2		79.0	79.0		23.0	70.8		47.8	47.8	
Total Split (%)	16.8%	60.7%		43.9%	43.9%		12.8%	39.3%		26.6%	26.6%	
Maximum Green (s)	26.2	102.4		72.2	72.2		18.5	64.3		41.3	41.3	
Yellow Time (s)	3.0	4.6		4.6	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		2.2	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		7.0		7.0	7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0		14.0	14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	105.6	102.8		78.8	78.8		65.9	63.9		43.6	43.6	
Actuated g/C Ratio	0.59	0.57		0.44	0.44		0.37	0.36		0.24	0.24	
v/c Ratio	0.71	0.96		0.21	0.44		0.73	0.21		0.25	0.95	
Control Delay	28.5	45.7		85.8	70.2		61.7	40.7		58.9	93.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.5	45.7		85.8	70.2		61.7	40.7		58.9	93.5	
LOS	C	D		F	E		E	D		E	F	
Approach Delay		44.1			70.4			51.7			88.3	
Approach LOS		D			E			D			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 54.1		Intersection LOS: D	
Intersection Capacity Utilization 119.0%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road

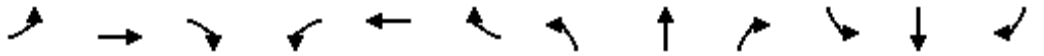




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	291	2733	9	893	145	132	71	405
v/c Ratio	0.71	0.96	0.21	0.44	0.73	0.21	0.25	0.95
Control Delay	28.5	45.7	85.8	70.2	61.7	40.7	58.9	93.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	45.7	85.8	70.2	61.7	40.7	58.9	93.5
Queue Length 50th (m)	50.4	332.4	2.9	105.3	36.2	32.5	20.9	136.1
Queue Length 95th (m)	68.6	352.8	m6.4	122.4	56.7	50.1	37.5	#211.4
Internal Link Dist (m)		219.6		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	459	2859	42	2008	221	641	279	426
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.96	0.21	0.44	0.66	0.21	0.25	0.95

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	2385	130	8	777	44	133	89	32	65	168	204
Future Volume (vph)	268	2385	130	8	777	44	133	89	32	65	168	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	5004		1825	4579		1644	1791		1630	1660	
Flt Permitted	0.23	1.00		0.05	1.00		0.11	1.00		0.67	1.00	
Satd. Flow (perm)	445	5004		97	4579		198	1791		1154	1660	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	291	2592	141	9	845	48	145	97	35	71	183	222
RTOR Reduction (vph)	0	3	0	0	3	0	0	1	0	0	23	0
Lane Group Flow (vph)	291	2730	0	9	890	0	145	131	0	71	382	0
Heavy Vehicles (%)	1%	4%	4%	0%	14%	7%	11%	3%	3%	12%	4%	8%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	102.8	102.8		78.9	78.9		63.9	63.9		43.6	43.6	
Effective Green, g (s)	102.8	102.8		78.9	78.9		63.9	63.9		43.6	43.6	
Actuated g/C Ratio	0.57	0.57		0.44	0.44		0.35	0.35		0.24	0.24	
Clearance Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	404	2857		42	2007		197	635		279	402	
v/s Ratio Prot	0.08	c0.55			0.19		c0.06	0.07			c0.23	
v/s Ratio Perm	0.33			0.09			0.20			0.06		
v/c Ratio	0.72	0.96		0.21	0.44		0.74	0.21		0.25	0.95	
Uniform Delay, d1	21.9	36.4		31.3	35.2		45.7	40.4		55.1	67.1	
Progression Factor	1.00	1.00		1.96	1.94		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	9.2		10.3	0.6		13.3	0.2		0.6	31.9	
Delay (s)	28.1	45.7		71.6	69.1		59.1	40.6		55.6	99.0	
Level of Service	C	D		E	E		E	D		E	F	
Approach Delay (s)		44.0			69.2			50.3			92.6	
Approach LOS		D			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	54.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	21.8
Intersection Capacity Utilization	119.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	606	1616	291	68	604	127	148	509	82	72	342	57
Future Volume (vph)	606	1616	291	68	604	127	148	509	82	72	342	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.977			0.974			0.979				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3404	4906	0	1825	4920	0	1342	3110	0	1659	2944	1067
Flt Permitted	0.950			0.062			0.351			0.226		
Satd. Flow (perm)	3404	4906	0	119	4920	0	496	3110	0	395	2944	1067
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			28			10				124
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	36%	17%	2%	10%	24%	53%
Adj. Flow (vph)	659	1757	316	74	657	138	161	553	89	78	372	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	659	2073	0	74	795	0	161	642	0	78	372	62
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	9.5	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	34.9	94.0		12.0	71.1		20.0	61.0		13.0	54.0	54.0
Total Split (%)	19.4%	52.2%		6.7%	39.5%		11.1%	33.9%		7.2%	30.0%	30.0%
Maximum Green (s)	30.4	87.1		8.0	64.2		16.0	54.2		9.0	47.2	47.2
Yellow Time (s)	3.5	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	39.0	94.0		76.8	64.2		61.4	45.6		50.4	38.6	38.6
Actuated g/C Ratio	0.22	0.52		0.43	0.36		0.34	0.25		0.28	0.21	0.21
v/c Ratio	0.89	0.80		0.52	0.45		0.66	0.81		0.45	0.59	0.19
Control Delay	72.2	55.4		43.6	43.6		57.5	70.2		48.3	66.9	1.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	72.2	55.4		43.6	43.6		57.5	70.2		48.3	66.9	1.3
LOS	E	E		D	D		E	E		D	E	A
Approach Delay		59.5			43.6			67.6			56.1	
Approach LOS		E			D			E			E	

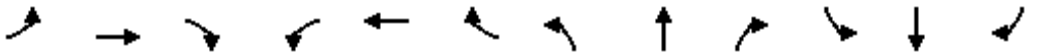
Intersection Summary			
Area Type:	Other		
Cycle Length: 180			
Actuated Cycle Length: 180			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 57.7		Intersection LOS: E	
Intersection Capacity Utilization 86.5%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Trafalgar Road & Derry Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	659	2073	74	795	161	642	78	372	62
v/c Ratio	0.89	0.80	0.52	0.45	0.66	0.81	0.45	0.59	0.19
Control Delay	72.2	55.4	43.6	43.6	57.5	70.2	48.3	66.9	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.2	55.4	43.6	43.6	57.5	70.2	48.3	66.9	1.3
Queue Length 50th (m)	126.4	211.1	10.4	77.5	43.3	113.1	19.4	63.7	0.0
Queue Length 95th (m)	m#158.4	224.7	28.2	90.7	60.7	128.5	30.8	77.4	0.0
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	737	2576	142	1772	244	943	173	771	371
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.80	0.52	0.45	0.66	0.68	0.45	0.48	0.17

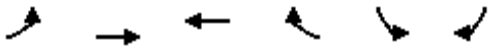
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



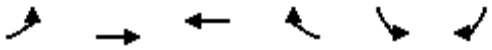
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	606	1616	291	68	604	127	148	509	82	72	342	57
Future Volume (vph)	606	1616	291	68	604	127	148	509	82	72	342	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3404	4907		1825	4920		1342	3110		1659	2944	1067
Flt Permitted	0.95	1.00		0.06	1.00		0.35	1.00		0.23	1.00	1.00
Satd. Flow (perm)	3404	4907		120	4920		495	3110		394	2944	1067
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	659	1757	316	74	657	138	161	553	89	78	372	62
RTOR Reduction (vph)	0	13	0	0	18	0	0	7	0	0	0	49
Lane Group Flow (vph)	659	2060	0	74	777	0	161	635	0	78	372	13
Heavy Vehicles (%)	4%	2%	18%	0%	4%	3%	36%	17%	2%	10%	24%	53%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	39.0	94.0		73.9	64.2		58.6	45.6		47.6	38.6	38.6
Effective Green, g (s)	39.0	94.0		73.9	64.2		58.6	45.6		47.6	38.6	38.6
Actuated g/C Ratio	0.22	0.52		0.41	0.36		0.33	0.25		0.26	0.21	0.21
Clearance Time (s)	4.5	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	737	2562		141	1754		236	787		167	631	228
v/s Ratio Prot	c0.19	c0.42		0.03	0.16		c0.06	c0.20		0.02	0.13	
v/s Ratio Perm				0.19			0.16			0.10		0.01
v/c Ratio	0.89	0.80		0.52	0.44		0.68	0.81		0.47	0.59	0.06
Uniform Delay, d1	68.5	35.4		35.6	44.2		47.7	63.1		52.0	63.6	56.2
Progression Factor	0.97	1.50		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	1.1		6.6	0.8		10.0	6.9		4.3	2.2	0.2
Delay (s)	72.4	54.4		42.1	45.1		57.7	69.9		56.3	65.8	56.5
Level of Service	E	D		D	D		E	E		E	E	E
Approach Delay (s)		58.7			44.8			67.5			63.2	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	58.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	22.2
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	2405	1233	14	0	14
Future Volume (vph)	0	2405	1233	14	0	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	5043	4598	0	0	1662
Flt Permitted						
Satd. Flow (perm)	0	5043	4598	0	0	1662
Link Speed (k/h)		80	48		48	
Link Distance (m)		330.1	243.6		99.7	
Travel Time (s)		14.9	18.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	14%	0%	0%	0%
Adj. Flow (vph)	0	2614	1340	15	0	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2614	1355	0	0	15
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

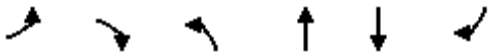
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑			↱
Traffic Volume (veh/h)	0	2405	1233	14	0	14
Future Volume (Veh/h)	0	2405	1233	14	0	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2614	1340	15	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		330	244			
pX, platoon unblocked	0.88				0.45	0.88
vC, conflicting volume	1355				2219	454
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	944				0	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	650				466	965

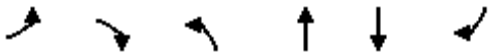
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	871	871	871	536	536	283	15
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	15	15
cSH	1700	1700	1700	1700	1700	1700	965
Volume to Capacity	0.51	0.51	0.51	0.32	0.32	0.17	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.8
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.8
Approach LOS							A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	2	24	138	252	406	14
Future Volume (vph)	2	24	138	252	406	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.875				0.996	
Flt Protected	0.996			0.983		
Satd. Flow (prot)	1674	0	0	1853	1776	0
Flt Permitted	0.996			0.983		
Satd. Flow (perm)	1674	0	0	1853	1776	0
Link Speed (k/h)	48			48	60	
Link Distance (m)	88.4			158.7	74.8	
Travel Time (s)	6.6			11.9	4.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	3%	8%	0%
Adj. Flow (vph)	2	26	150	274	441	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	0	424	456	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

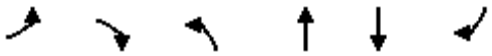
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.4%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	24	138	252	406	14
Future Volume (Veh/h)	2	24	138	252	406	14
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)	2	26	150	274	441	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				159		
pX, platoon unblocked	0.90					
vC, conflicting volume	1022	448	456			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	969	448	456			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	87			
cM capacity (veh/h)	221	615	1115			

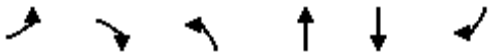
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	28	424	456
Volume Left	2	150	0
Volume Right	26	0	15
cSH	545	1115	1700
Volume to Capacity	0.05	0.13	0.27
Queue Length 95th (m)	1.2	3.5	0.0
Control Delay (s)	12.0	4.0	0.0
Lane LOS	B	A	
Approach Delay (s)	12.0	4.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	11	18	236	409	4
Future Volume (vph)	0	11	18	236	409	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.999	
Flt Protected				0.996		
Satd. Flow (prot)	1308	0	0	1856	1795	0
Flt Permitted				0.996		
Satd. Flow (perm)	1308	0	0	1856	1795	0
Link Speed (k/h)	48			48	60	
Link Distance (m)	93.7			74.8	934.7	
Travel Time (s)	7.0			5.6	56.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	27%	17%	2%	7%	0%
Adj. Flow (vph)	0	12	20	257	445	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	0	277	449	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

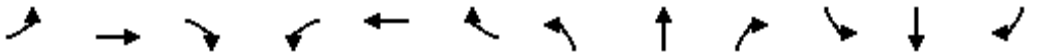
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.3%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	11	18	236	409	4
Future Volume (Veh/h)	0	11	18	236	409	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)	0	12	20	257	445	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				233		
pX, platoon unblocked	0.98					
vC, conflicting volume	744	447	449			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	729	447	449			
tC, single (s)	6.4	6.5	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.4			
p0 queue free %	100	98	98			
cM capacity (veh/h)	378	562	1036			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	277	449
Volume Left	0	20	0
Volume Right	12	0	4
cSH	562	1036	1700
Volume to Capacity	0.02	0.02	0.26
Queue Length 95th (m)	0.5	0.4	0.0
Control Delay (s)	11.5	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	11.5	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

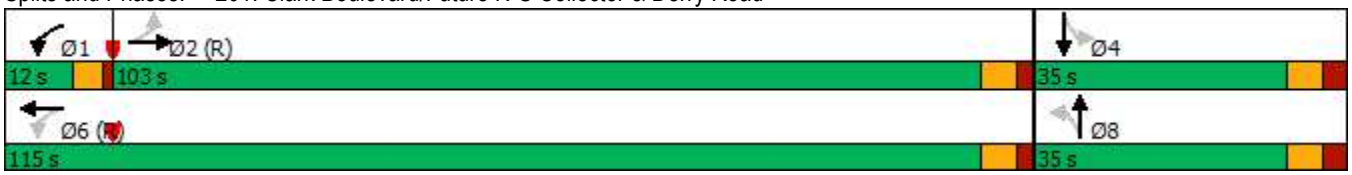


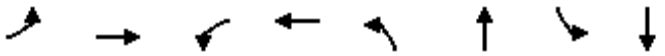
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2937	145	103	979	33	65	15	110	106	16	31
Future Volume (vph)	97	2937	145	103	979	33	65	15	110	106	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.995			0.868			0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5208	0	1825	5218	0	1825	1668	0	1825	1729	0
Flt Permitted	0.247			0.039			0.724			0.599		
Satd. Flow (perm)	475	5208	0	75	5218	0	1391	1668	0	1151	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			9			79			34	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			330.1			1054.3			1121.4	
Travel Time (s)		31.8			14.9			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	105	3192	158	112	1064	36	71	16	120	115	17	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	3350	0	112	1100	0	71	136	0	115	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		4.5	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		9.0	41.0		35.0	35.0		35.0	35.0	
Total Split (s)	103.0	103.0		12.0	115.0		35.0	35.0		35.0	35.0	
Total Split (%)	68.7%	68.7%		8.0%	76.7%		23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	97.0	97.0		7.5	109.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		3.5	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	97.0	97.0		110.5	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.74	0.73		0.19	0.19		0.19	0.19	
v/c Ratio	0.34	0.99		0.79	0.29		0.27	0.36		0.54	0.15	
Control Delay	15.8	40.1		64.8	7.3		55.6	26.1		65.5	23.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.8	40.1		64.8	7.3		55.6	26.1		65.5	23.7	
LOS	B	D		E	A		E	C		E	C	
Approach Delay		39.4			12.6			36.2			52.7	
Approach LOS		D			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 135			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 33.2		Intersection LOS: C	
Intersection Capacity Utilization 102.8%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road

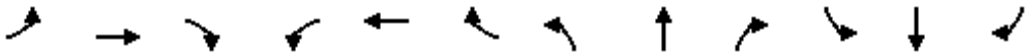




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	3350	112	1100	71	136	115	51
v/c Ratio	0.34	0.99	0.79	0.29	0.27	0.36	0.54	0.15
Control Delay	15.8	40.1	64.8	7.3	55.6	26.1	65.5	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	40.1	64.8	7.3	55.6	26.1	65.5	23.7
Queue Length 50th (m)	13.4	340.3	17.0	37.3	18.3	14.5	31.3	4.2
Queue Length 95th (m)	26.0	#394.6	#49.1	43.2	33.7	34.7	52.6	16.3
Internal Link Dist (m)		681.9		306.1		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	307	3372	142	3794	259	375	214	350
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.99	0.79	0.29	0.27	0.36	0.54	0.15

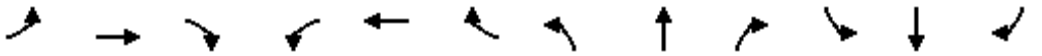
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	2937	145	103	979	33	65	15	110	106	16	31
Future Volume (vph)	97	2937	145	103	979	33	65	15	110	106	16	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5208		1825	5219		1825	1667		1825	1729	
Flt Permitted	0.25	1.00		0.04	1.00		0.72	1.00		0.60	1.00	
Satd. Flow (perm)	475	5208		76	5219		1390	1667		1151	1729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	3192	158	112	1064	36	71	16	120	115	17	34
RTOR Reduction (vph)	0	4	0	0	2	0	0	64	0	0	28	0
Lane Group Flow (vph)	105	3346	0	112	1098	0	71	72	0	115	23	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	97.0	97.0		109.0	109.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	97.0	97.0		109.0	109.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.65	0.65		0.73	0.73		0.19	0.19		0.19	0.19	
Clearance Time (s)	6.0	6.0		4.5	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	307	3367		142	3792		259	311		214	322	
v/s Ratio Prot		c0.64		c0.04	0.21			0.04			0.01	
v/s Ratio Perm	0.22			0.53			0.05			c0.10		
v/c Ratio	0.34	0.99		0.79	0.29		0.27	0.23		0.54	0.07	
Uniform Delay, d1	12.0	26.2		49.2	7.1		52.3	51.8		55.1	50.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	14.2		24.5	0.2		2.6	1.7		9.4	0.4	
Delay (s)	15.0	40.4		73.7	7.3		54.9	53.6		64.5	50.7	
Level of Service	B	D		E	A		D	D		E	D	
Approach Delay (s)		39.6			13.4			54.0			60.3	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1232	79	95	1816	183	228	169	153	408	390	205
Future Volume (vph)	50	1232	79	95	1816	183	228	169	153	408	390	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		50.0	95.0		0.0	95.0		50.0	55.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	80.0			60.0			45.0			50.0		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.986				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5092	1570	1644	4981	0	1755	3650	1420	1615	3510	1458
Flt Permitted	0.050			0.173			0.263			0.634		
Satd. Flow (perm)	96	5092	1570	299	4981	0	486	3650	1420	1078	3510	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			67		15				99			103
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		365.5			705.9			1020.0			1136.7	
Travel Time (s)		16.4			31.8			52.5			58.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	4%	11%	3%	12%	4%	0%	15%	13%	4%	12%
Adj. Flow (vph)	54	1339	86	103	1974	199	248	184	166	443	424	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1339	86	103	2173	0	248	184	166	443	424	223
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8	4		4
Detector Phase	5	2	2	6	6		3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	20.0	20.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.5	29.6	29.6	29.6	29.6		9.5	37.6	37.6	9.5	37.6	37.6
Total Split (s)	9.5	86.4	86.4	76.9	76.9		24.4	37.6	37.6	26.0	39.2	39.2
Total Split (%)	6.3%	57.6%	57.6%	51.3%	51.3%		16.3%	25.1%	25.1%	17.3%	26.1%	26.1%
Maximum Green (s)	5.0	78.8	78.8	69.3	69.3		19.9	30.0	30.0	21.5	31.6	31.6
Yellow Time (s)	3.5	4.6	4.6	4.6	4.6		3.5	4.6	4.6	3.5	4.6	4.6
All-Red Time (s)	1.0	3.0	3.0	3.0	3.0		1.0	3.0	3.0	1.0	3.0	3.0
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
Total Lost Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lead/Lag	Lead			Lag	Lag		Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0	15.0	15.0			23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0	0	0			0	0		0	0
Act Effct Green (s)	87.9	84.8	84.8	76.4	76.4		38.8	15.2	15.2	53.1	25.0	25.0
Actuated g/C Ratio	0.59	0.57	0.57	0.51	0.51		0.26	0.10	0.10	0.35	0.17	0.17
v/c Ratio	0.44	0.47	0.09	0.68	0.85		0.83	0.50	0.72	0.91	0.73	0.68
Control Delay	26.5	20.6	5.8	56.1	37.3		77.6	67.5	43.4	71.3	66.4	41.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	20.6	5.8	56.1	37.3		77.6	67.5	43.4	71.3	66.4	41.2
LOS	C	C	A	E	D		E	E	D	E	E	D
Approach Delay		19.9			38.2			65.0			63.2	
Approach LOS		B			D			E			E	

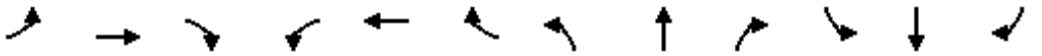
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 41.2		Intersection LOS: D	
Intersection Capacity Utilization 94.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Fifth Line & Derry Road

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1339	86	103	2173	248	184	166	443	424	223
v/c Ratio	0.44	0.47	0.09	0.68	0.85	0.83	0.50	0.72	0.91	0.73	0.68
Control Delay	26.5	20.6	5.8	56.1	37.3	77.6	67.5	43.4	71.3	66.4	41.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	20.6	5.8	56.1	37.3	77.6	67.5	43.4	71.3	66.4	41.2
Queue Length 50th (m)	6.8	85.4	2.5	24.1	215.0	54.4	28.1	19.5	115.1	63.9	34.1
Queue Length 95th (m)	15.2	104.3	11.3	#60.4	243.9	#82.2	38.1	42.7	#162.4	78.1	60.4
Internal Link Dist (m)		341.5			681.9		996.0			1112.7	
Turn Bay Length (m)	90.0		50.0	95.0		95.0		50.0	55.0		50.0
Base Capacity (vph)	124	2879	916	152	2545	306	730	363	489	739	388
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.47	0.09	0.68	0.85	0.81	0.25	0.46	0.91	0.57	0.57

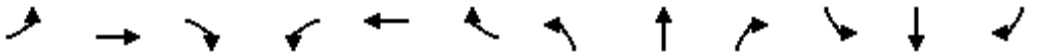
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1232	79	95	1816	183	228	169	153	408	390	205
Future Volume (vph)	50	1232	79	95	1816	183	228	169	153	408	390	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	5092	1570	1644	4982		1755	3650	1420	1615	3510	1458
Flt Permitted	0.05	1.00	1.00	0.17	1.00		0.26	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	96	5092	1570	300	4982		486	3650	1420	1078	3510	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1339	86	103	1974	199	248	184	166	443	424	223
RTOR Reduction (vph)	0	0	29	0	7	0	0	0	89	0	0	86
Lane Group Flow (vph)	54	1339	57	103	2166	0	248	184	77	443	424	137
Heavy Vehicles (%)	0%	3%	4%	11%	3%	12%	4%	0%	15%	13%	4%	12%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	84.8	84.8	84.8	75.5	75.5		35.7	15.2	15.2	53.1	25.0	25.0
Effective Green, g (s)	84.8	84.8	84.8	75.5	75.5		35.7	15.2	15.2	53.1	25.0	25.0
Actuated g/C Ratio	0.57	0.57	0.57	0.50	0.50		0.24	0.10	0.10	0.35	0.17	0.17
Clearance Time (s)	4.5	7.6	7.6	7.6	7.6		4.5	7.6	7.6	4.5	7.6	7.6
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	109	2878	887	151	2507		289	369	143	490	585	243
v/s Ratio Prot	0.02	c0.26			c0.43		0.12	0.05		c0.18	0.12	
v/s Ratio Perm	0.26		0.04	0.34			0.09		0.05	c0.14		0.09
v/c Ratio	0.50	0.47	0.06	0.68	0.86		0.86	0.50	0.54	0.90	0.72	0.56
Uniform Delay, d1	27.2	19.2	14.7	28.2	32.7		59.2	63.8	64.1	44.0	59.2	57.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.5	0.1	22.1	4.3		21.4	1.3	4.3	19.9	4.6	3.2
Delay (s)	30.7	19.8	14.8	50.3	37.0		80.6	65.0	68.4	63.9	63.8	60.7
Level of Service	C	B	B	D	D		F	E	E	E	E	E
Approach Delay (s)		19.9			37.6			72.4			63.2	
Approach LOS		B			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	41.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

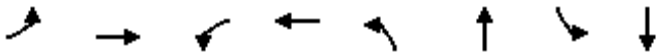


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	1244	107	19	1631	40	178	118	17	97	139	194
Future Volume (vph)	256	1244	107	19	1631	40	178	118	17	97	139	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.996			0.982			0.913	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1755	4910	0	1825	5058	0	1807	1838	0	1738	1697	0
Flt Permitted	0.059			0.154			0.142			0.664		
Satd. Flow (perm)	109	4910	0	296	5058	0	270	1838	0	1215	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			3			5			44	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		243.6			1506.9			1008.8			158.7	
Travel Time (s)		11.0			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	6%	0%	0%	3%	15%	1%	3%	0%	5%	1%	5%
Adj. Flow (vph)	278	1352	116	21	1773	43	193	128	18	105	151	211
Shared Lane Traffic (%)												
Lane Group Flow (vph)	278	1468	0	21	1816	0	193	146	0	105	362	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.0	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	27.0	81.0		11.0	65.0		15.0	58.0		43.0	43.0	
Total Split (%)	18.0%	54.0%		7.3%	43.3%		10.0%	38.7%		28.7%	28.7%	
Maximum Green (s)	23.0	74.2		7.0	58.2		10.5	51.5		36.5	36.5	
Yellow Time (s)	3.0	4.6		3.0	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	91.8	82.4		73.1	63.3		49.7	47.7		32.7	32.7	
Actuated g/C Ratio	0.61	0.55		0.49	0.42		0.33	0.32		0.22	0.22	
v/c Ratio	0.91	0.54		0.10	0.85		0.98	0.25		0.40	0.90	
Control Delay	77.1	23.7		15.2	44.7		99.9	36.8		54.0	74.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	77.1	23.7		15.2	44.7		99.9	36.8		54.0	74.6	
LOS	E	C		B	D		F	D		D	E	
Approach Delay		32.2			44.3			72.7			69.9	
Approach LOS		C			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 44.4		Intersection LOS: D	
Intersection Capacity Utilization 93.8%		ICU Level of Service F	
Analysis Period (min) 15			

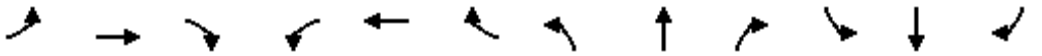
Splits and Phases: 2: Sixth Line & Derry Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	278	1468	21	1816	193	146	105	362
v/c Ratio	0.91	0.54	0.10	0.85	0.98	0.25	0.40	0.90
Control Delay	77.1	23.7	15.2	44.7	99.9	36.8	54.0	74.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.1	23.7	15.2	44.7	99.9	36.8	54.0	74.6
Queue Length 50th (m)	65.6	109.6	2.5	187.7	42.0	30.3	26.5	92.3
Queue Length 95th (m)	#116.8	126.9	6.3	209.0	#82.8	47.4	44.6	#138.2
Internal Link Dist (m)		219.6		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	322	2703	215	2137	196	634	295	446
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.54	0.10	0.85	0.98	0.23	0.36	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	1244	107	19	1631	40	178	118	17	97	139	194
Future Volume (vph)	256	1244	107	19	1631	40	178	118	17	97	139	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4911		1825	5060		1807	1837		1738	1697	
Flt Permitted	0.06	1.00		0.15	1.00		0.14	1.00		0.66	1.00	
Satd. Flow (perm)	110	4911		296	5060		270	1837		1215	1697	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	278	1352	116	21	1773	43	193	128	18	105	151	211
RTOR Reduction (vph)	0	6	0	0	2	0	0	3	0	0	34	0
Lane Group Flow (vph)	278	1462	0	21	1814	0	193	143	0	105	328	0
Heavy Vehicles (%)	4%	6%	0%	0%	3%	15%	1%	3%	0%	5%	1%	5%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	89.0	80.8		67.5	63.3		47.7	47.7		32.7	32.7	
Effective Green, g (s)	89.0	80.8		67.5	63.3		47.7	47.7		32.7	32.7	
Actuated g/C Ratio	0.59	0.54		0.45	0.42		0.32	0.32		0.22	0.22	
Clearance Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	303	2645		176	2135		193	584		264	369	
v/s Ratio Prot	c0.13	0.30		0.00	0.36		c0.07	0.08			0.19	
v/s Ratio Perm	c0.41			0.05			c0.25			0.09		
v/c Ratio	0.92	0.55		0.12	0.85		1.00	0.24		0.40	0.89	
Uniform Delay, d1	48.8	22.7		23.0	39.1		45.5	37.8		50.2	56.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	30.9	0.8		0.3	4.5		64.8	0.3		1.2	22.2	
Delay (s)	79.7	23.6		23.4	43.5		110.3	38.1		51.4	79.1	
Level of Service	E	C		C	D		F	D		D	E	
Approach Delay (s)		32.5			43.3			79.2			72.8	
Approach LOS		C			D			E			E	

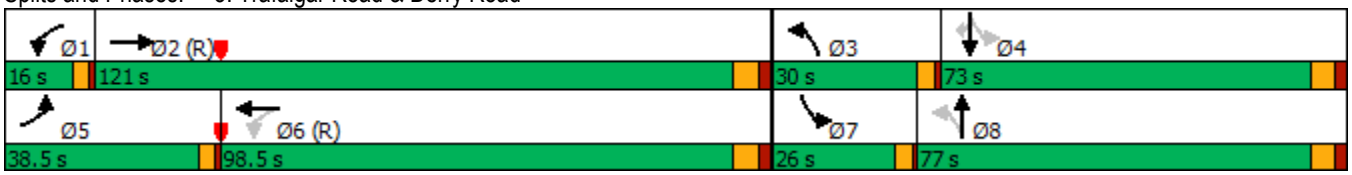
Intersection Summary			
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.8
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	942	133	95	1381	135	211	778	84	153	416	116
Future Volume (vph)	238	942	133	95	1381	135	211	778	84	153	416	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		110.0	300.0		0.0	125.0		0.0	135.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	100.0			90.0			70.0			50.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.981			0.987			0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3052	4947	0	1825	5026	0	1706	3434	0	1807	3380	1555
Flt Permitted	0.950			0.193			0.325			0.061		
Satd. Flow (perm)	3052	4947	0	371	5026	0	584	3434	0	116	3380	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			8			5				126
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		1506.9			519.7			998.3			1099.4	
Travel Time (s)		67.8			23.4			51.3			56.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Adj. Flow (vph)	259	1024	145	103	1501	147	229	846	91	166	452	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	259	1169	0	103	1648	0	229	937	0	166	452	126
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				6			8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.0	37.9		11.0	37.9		11.0	36.8		11.0	36.8	36.8
Total Split (s)	38.5	121.0		16.0	98.5		30.0	77.0		26.0	73.0	73.0
Total Split (%)	16.0%	50.4%		6.7%	41.0%		12.5%	32.1%		10.8%	30.4%	30.4%
Maximum Green (s)	34.5	114.1		12.0	91.6		26.0	70.2		22.0	66.2	66.2
Yellow Time (s)	3.0	4.6		3.0	4.6		3.0	4.2		3.0	4.2	4.2
All-Red Time (s)	1.0	2.3		1.0	2.3		1.0	2.6		1.0	2.6	2.6
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)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		24.0			24.0			23.0			23.0	23.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	27.5	115.6		114.5	99.9		97.5	69.4		90.1	65.7	65.7
Actuated g/C Ratio	0.11	0.48		0.48	0.42		0.41	0.29		0.38	0.27	0.27
v/c Ratio	0.74	0.49		0.42	0.79		0.65	0.94		0.85	0.49	0.24
Control Delay	115.8	42.6		31.7	64.6		57.8	99.5		103.7	75.1	9.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	115.8	42.6		31.7	64.6		57.8	99.5		103.7	75.1	9.3
LOS	F	D		C	E		E	F		F	E	A
Approach Delay		55.9			62.7			91.3			70.4	
Approach LOS		E			E			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 240			
Actuated Cycle Length: 240			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 68.5		Intersection LOS: E	
Intersection Capacity Utilization 87.2%		ICU Level of Service E	
Analysis Period (min) 15			

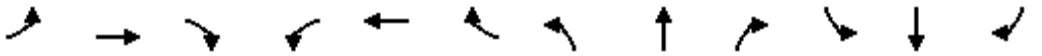
Splits and Phases: 3: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	259	1169	103	1648	229	937	166	452	126
v/c Ratio	0.74	0.49	0.42	0.79	0.65	0.94	0.85	0.49	0.24
Control Delay	115.8	42.6	31.7	64.6	57.8	99.5	103.7	75.1	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.8	42.6	31.7	64.6	57.8	99.5	103.7	75.1	9.3
Queue Length 50th (m)	63.6	140.0	23.3	255.4	75.4	233.2	63.2	97.3	0.0
Queue Length 95th (m)	79.5	152.8	35.1	283.8	100.9	#269.2	#106.4	116.6	19.1
Internal Link Dist (m)		1482.9		495.7		974.3		1075.4	
Turn Bay Length (m)	140.0		300.0		125.0		135.0		80.0
Base Capacity (vph)	438	2390	250	2095	359	1007	198	932	520
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.49	0.41	0.79	0.64	0.93	0.84	0.48	0.24

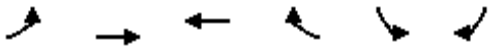
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



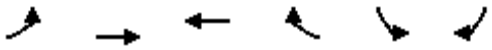
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	942	133	95	1381	135	211	778	84	153	416	116
Future Volume (vph)	238	942	133	95	1381	135	211	778	84	153	416	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3052	4949		1825	5024		1706	3435		1807	3380	1555
Flt Permitted	0.95	1.00		0.19	1.00		0.33	1.00		0.06	1.00	1.00
Satd. Flow (perm)	3052	4949		370	5024		584	3435		116	3380	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	259	1024	145	103	1501	147	229	846	91	166	452	126
RTOR Reduction (vph)	0	8	0	0	5	0	0	4	0	0	0	92
Lane Group Flow (vph)	259	1161	0	103	1643	0	229	933	0	166	452	34
Heavy Vehicles (%)	16%	4%	4%	0%	3%	3%	7%	5%	2%	1%	8%	5%
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases				6			8			4		4
Actuated Green, G (s)	27.5	115.6		111.5	99.8		94.7	69.4		87.3	65.7	65.7
Effective Green, g (s)	27.5	115.6		111.5	99.8		94.7	69.4		87.3	65.7	65.7
Actuated g/C Ratio	0.11	0.48		0.46	0.42		0.39	0.29		0.36	0.27	0.27
Clearance Time (s)	4.0	6.9		4.0	6.9		4.0	6.8		4.0	6.8	6.8
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	349	2383		242	2089		348	993		194	925	425
v/s Ratio Prot	c0.08	0.23		0.02	c0.33		c0.07	c0.27		c0.08	0.13	
v/s Ratio Perm				0.18			0.19			0.23		0.02
v/c Ratio	0.74	0.49		0.43	0.79		0.66	0.94		0.86	0.49	0.08
Uniform Delay, d1	102.8	42.1		37.2	60.9		52.4	83.3		75.4	73.1	64.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.9	0.7		2.5	3.1		5.9	16.6		31.2	0.9	0.2
Delay (s)	112.7	42.8		39.7	63.9		58.3	99.8		106.6	73.9	64.9
Level of Service	F	D		D	E		E	F		F	E	E
Approach Delay (s)		55.5			62.5			91.7			79.7	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	69.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	240.0	Sum of lost time (s)	21.7
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1581	1711	24	0	96
Future Volume (vph)	0	1581	1711	24	0	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	4995	5084	0	0	1662
Flt Permitted						
Satd. Flow (perm)	0	4995	5084	0	0	1662
Link Speed (k/h)		48	48		48	
Link Distance (m)		330.1	243.6		99.7	
Travel Time (s)		24.8	18.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	3%	0%	0%	0%
Adj. Flow (vph)	0	1718	1860	26	0	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1718	1886	0	0	104
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97			97	97	97
Sign Control		Free	Free		Stop	

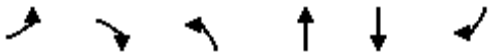
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑			↱
Traffic Volume (veh/h)	0	1581	1711	24	0	96
Future Volume (Veh/h)	0	1581	1711	24	0	96
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1718	1860	26	0	104
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		330	244			
pX, platoon unblocked	0.70				0.77	0.70
vC, conflicting volume	1886				2446	633
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	747				595	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	86
cM capacity (veh/h)	606				337	760

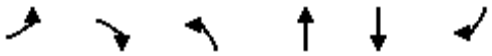
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	573	573	573	744	744	398	104
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	26	104
cSH	1700	1700	1700	1700	1700	1700	760
Volume to Capacity	0.34	0.34	0.34	0.44	0.44	0.23	0.14
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	3.6
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.5
Lane LOS							B
Approach Delay (s)	0.0			0.0			10.5
Approach LOS							B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	13	47	62	345	371	5
Future Volume (vph)	13	47	62	345	371	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.894				0.998	
Flt Protected	0.989			0.992		
Satd. Flow (prot)	1699	0	0	1843	1844	0
Flt Permitted	0.989			0.992		
Satd. Flow (perm)	1699	0	0	1843	1844	0
Link Speed (k/h)	48			48	48	
Link Distance (m)	88.4			158.7	74.8	
Travel Time (s)	6.6			11.9	5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	4%	0%
Adj. Flow (vph)	14	51	67	375	403	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	0	0	442	408	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

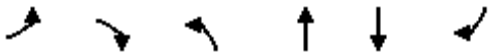
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.0%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	47	62	345	371	5
Future Volume (Veh/h)	13	47	62	345	371	5
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)	14	51	67	375	403	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				159		
pX, platoon unblocked	0.88					
vC, conflicting volume	914	406	408			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	406	408			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	92	94			
cM capacity (veh/h)	282	650	1162			

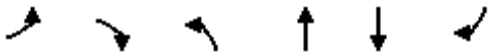
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	65	442	408
Volume Left	14	67	0
Volume Right	51	0	5
cSH	507	1162	1700
Volume to Capacity	0.13	0.06	0.24
Queue Length 95th (m)	3.3	1.4	0.0
Control Delay (s)	13.1	1.8	0.0
Lane LOS	B	A	
Approach Delay (s)	13.1	1.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	18	12	346	358	0
Future Volume (vph)	3	18	12	346	358	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883					
Flt Protected	0.994			0.998		
Satd. Flow (prot)	1415	0	0	1838	1865	0
Flt Permitted	0.994			0.998		
Satd. Flow (perm)	1415	0	0	1838	1865	0
Link Speed (k/h)	48			48	48	
Link Distance (m)	93.7			74.8	934.7	
Travel Time (s)	7.0			5.6	70.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	22%	42%	3%	3%	0%
Adj. Flow (vph)	3	20	13	376	389	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	0	389	389	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

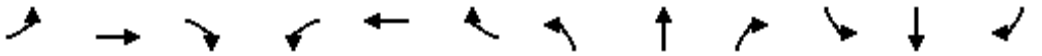
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	18	12	346	358	0
Future Volume (Veh/h)	3	18	12	346	358	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)	3	20	13	376	389	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				233		
pX, platoon unblocked	0.93					
vC, conflicting volume	791	389	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	738	389	389			
tC, single (s)	6.4	6.4	4.5			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.6			
p0 queue free %	99	97	99			
cM capacity (veh/h)	356	618	982			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	23	389	389
Volume Left	3	13	0
Volume Right	20	0	0
cSH	564	982	1700
Volume to Capacity	0.04	0.01	0.23
Queue Length 95th (m)	1.0	0.3	0.0
Control Delay (s)	11.7	0.4	0.0
Lane LOS	B	A	
Approach Delay (s)	11.7	0.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

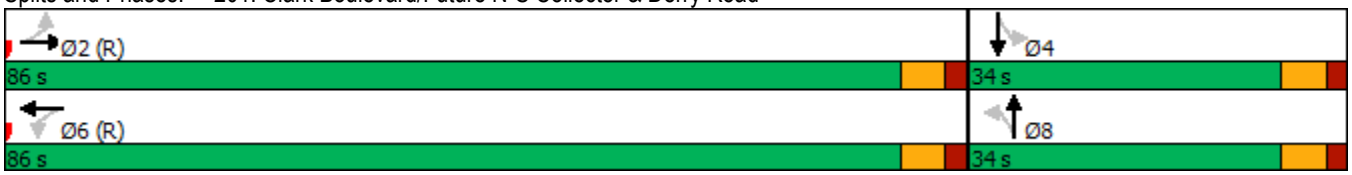


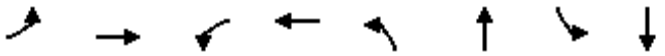
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1534	38	76	2081	41	123	25	131	78	10	76
Future Volume (vph)	32	1534	38	76	2081	41	123	25	131	78	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			25.0			25.0			25.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.874			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	5224	0	1825	5229	0	1825	1679	0	1825	1668	0
Flt Permitted	0.050			0.105			0.696			0.568		
Satd. Flow (perm)	96	5224	0	202	5229	0	1337	1679	0	1091	1668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			5			37			10	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		705.9			330.1			1054.3			1121.4	
Travel Time (s)		31.8			14.9			54.2			57.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	1667	41	83	2262	45	134	27	142	85	11	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1708	0	83	2307	0	134	169	0	85	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	97		97	97		97	97		97
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	35.0	35.0		35.0	35.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		34.0	34.0		34.0	34.0	
Total Split (s)	86.0	86.0		86.0	86.0		34.0	34.0		34.0	34.0	
Total Split (%)	71.7%	71.7%		71.7%	71.7%		28.3%	28.3%		28.3%	28.3%	
Maximum Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
v/c Ratio	0.55	0.49		0.62	0.66		0.43	0.40		0.33	0.24	
Control Delay	47.9	10.4		35.6	13.1		44.3	33.4		42.7	35.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	47.9	10.4		35.6	13.1		44.3	33.4		42.7	35.2	
LOS	D	B		D	B		D	C		D	D	
Approach Delay		11.2			13.8			38.2			38.8	
Approach LOS		B			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 98 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 15.4		Intersection LOS: B	
Intersection Capacity Utilization 95.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 201: Clark Boulevard/Future N-S Collector & Derry Road

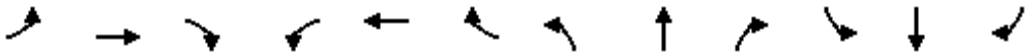




Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	1708	83	2307	134	169	85	94
v/c Ratio	0.55	0.49	0.62	0.66	0.43	0.40	0.33	0.24
Control Delay	47.9	10.4	35.6	13.1	44.3	33.4	42.7	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	10.4	35.6	13.1	44.3	33.4	42.7	35.2
Queue Length 50th (m)	4.0	66.4	10.1	108.4	27.0	26.1	16.7	16.1
Queue Length 95th (m)	#23.0	76.4	#40.0	122.5	46.3	46.6	31.8	30.7
Internal Link Dist (m)		681.9		306.1		1030.3		1097.4
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	64	3484	134	3487	311	420	254	396
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.49	0.62	0.66	0.43	0.40	0.33	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

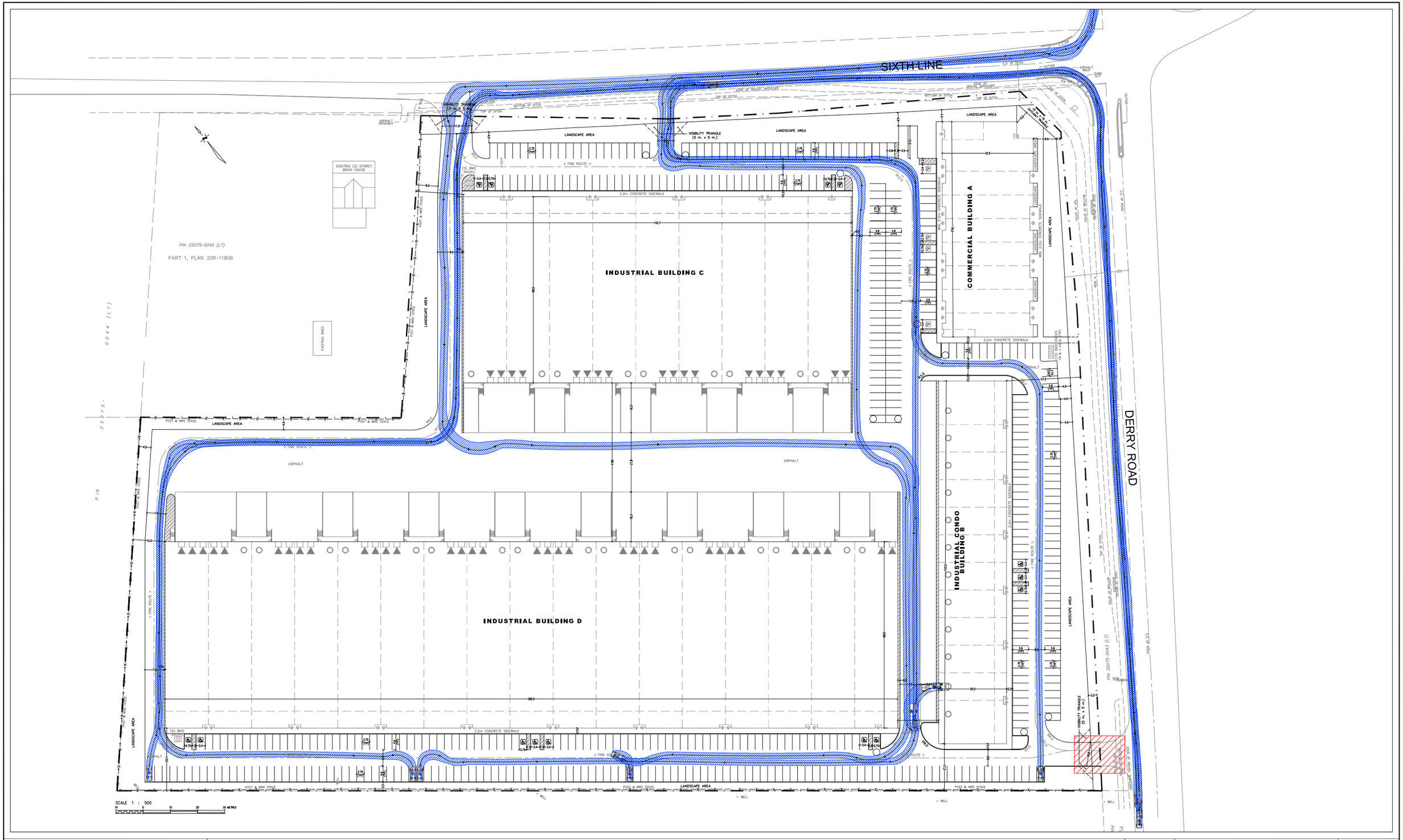


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1534	38	76	2081	41	123	25	131	78	10	76
Future Volume (vph)	32	1534	38	76	2081	41	123	25	131	78	10	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	5226		1825	5229		1825	1679		1825	1667	
Flt Permitted	0.05	1.00		0.10	1.00		0.70	1.00		0.57	1.00	
Satd. Flow (perm)	96	5226		202	5229		1337	1679		1092	1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1667	41	83	2262	45	134	27	142	85	11	83
RTOR Reduction (vph)	0	2	0	0	2	0	0	28	0	0	8	0
Lane Group Flow (vph)	35	1706	0	83	2305	0	134	141	0	85	86	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)	80.0	80.0		80.0	80.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	64	3484		134	3486		311	391		254	388	
v/s Ratio Prot		0.33			c0.44			0.08			0.05	
v/s Ratio Perm	0.36			0.41			c0.10			0.08		
v/c Ratio	0.55	0.49		0.62	0.66		0.43	0.36		0.33	0.22	
Uniform Delay, d1	10.5	9.9		11.4	11.9		39.2	38.5		38.3	37.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	29.6	0.5		19.6	1.0		4.3	2.6		3.5	1.3	
Delay (s)	40.1	10.4		31.0	12.9		43.5	41.1		41.8	38.5	
Level of Service	D	B		C	B		D	D		D	D	
Approach Delay (s)		11.0			13.6			42.1			40.1	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX J

Right-In Right-Out Analysis



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TYLin

8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

11801 DERRY ROAD
ACCESS ANALYSIS
SITE CIRCULATION - NO RIGHT-IN RIGHT-OUT

N

SCALE 1:1250

DRAWING No.
01

DATE
DEC 2023

PIN 25075-0040 (LT)

PART 1, PLAN 20R-11806

EXISTING SHED

INDUSTRIAL BUILDING C

INDUSTRIAL BUILDING D

COMMERCIAL BUILDING

INDUSTRIAL CONDO BUILDING 'B'

LANDSCAPE AREA

POST & WIRE FENCE

< FIRE ROUTE >

ASPHALT

2.2m CONCRETE SIDEWALK

(5) BIKE RACKS

(10) BIKE RACKS 1.8 M. x 0.6 M. (TYP)

VISIBILITY TRIANGLE (5 m. x 5 m.)

WELL

DERRY ROAD

PIN 25075-0043 (LT)

PIN 25075-0045

PART 2, PLAN 20R-16

PIN 25075-0044 (LT)

SCALE 1 : 500

10 0 10 20 30 METRES

G:\Projects\2022\10509 - Takol - 11801 Derry Road, Milton\Transportation\03 Analysis\03 Site Review & Circulation\20231211 Site Update

TYLin

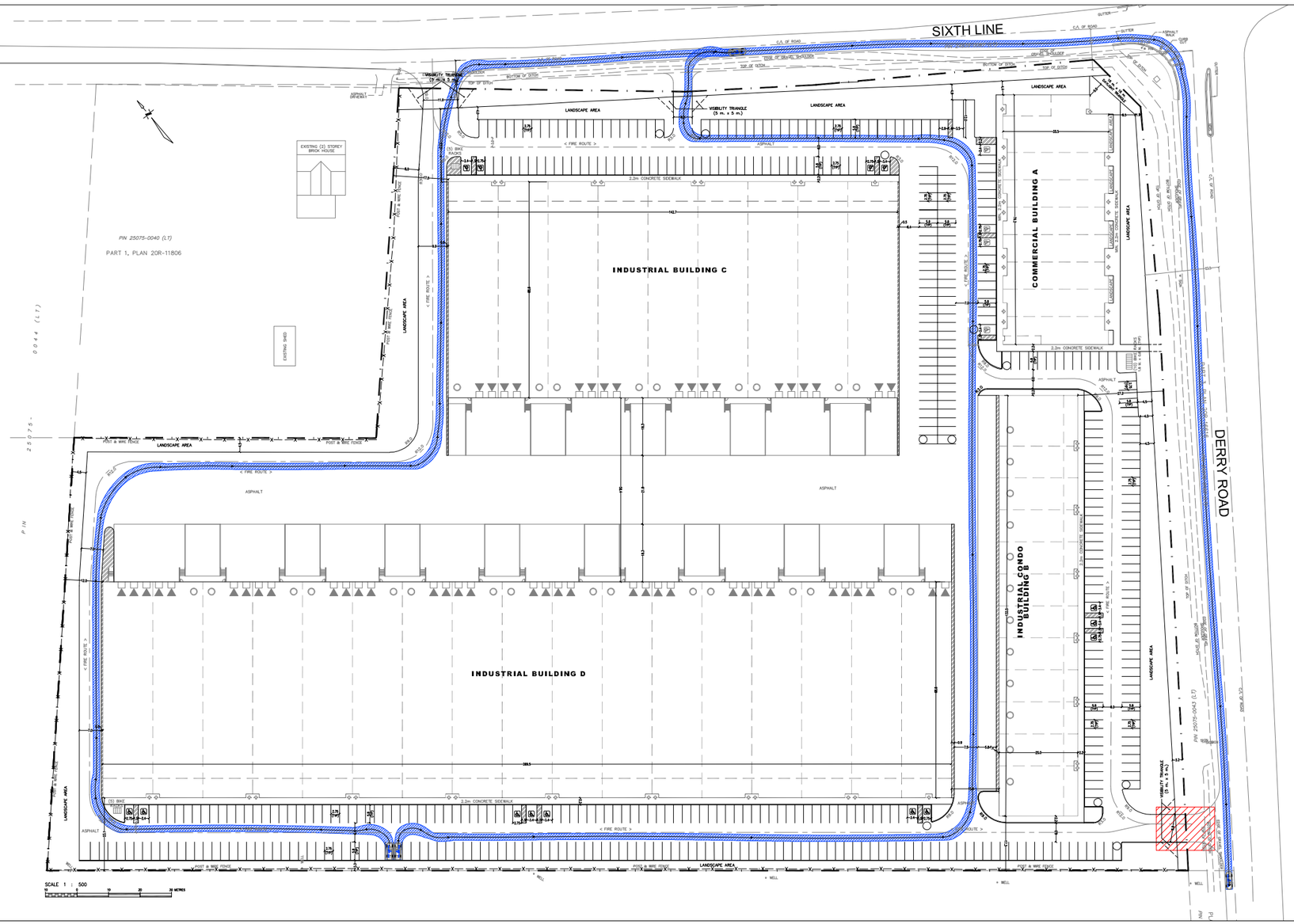
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

11801 DERRY ROAD
ACCESS ANALYSIS
SITE CIRCULATION - WITH RIGHT-IN RIGHT-OUT

SCALE 1:1000

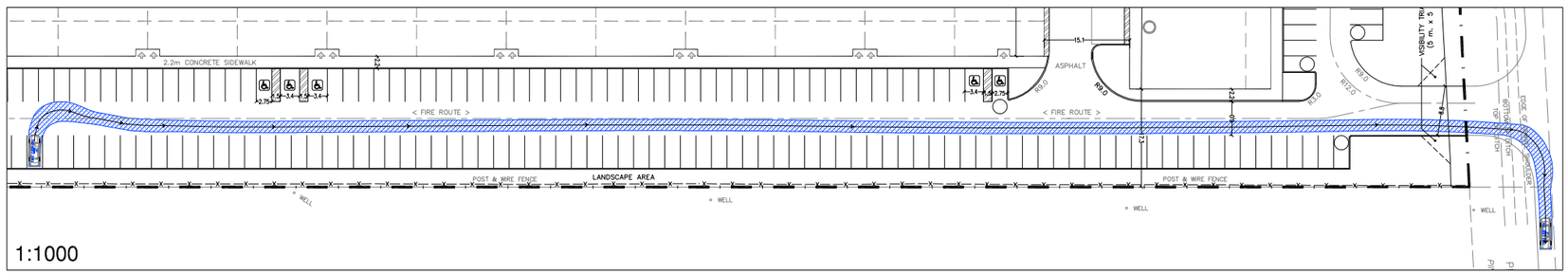
DRAWING No.
02

DATE
DEC 2023



1:1500

NO RIGHT-IN RIGHT-OUT
~940 m TO EXIT WESTBOUND TO DERRY ROAD



1:1000

WITH RIGHT-IN RIGHT-OUT
~270 m TO EXIT WESTBOUND TO DERRY ROAD

TYLin
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700

11801 DERRY ROAD
ACCESS ANALYSIS
SITE CIRCULATION - PATH DIFFERENCE

AS SHOWN

DRAWING No.
03

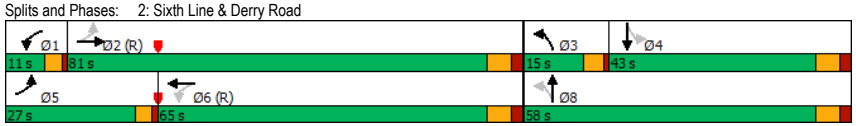
DATE
DEC 2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	1127	100	18	1460	58	161	114	15	94	128	276
Future Volume (vph)	238	1127	100	18	1460	58	161	114	15	94	128	276
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.994			0.983			0.897	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1772	4911	0	1825	5048	0	1807	1824	0	1738	1678	0
Flt Permitted	0.061			0.181			0.099			0.668		
Satd. Flow (perm)	114	4911	0	348	5048	0	188	1824	0	1222	1678	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			5			5			68	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			158.7	
Travel Time (s)		25.8			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	0%	3%	10%	1%	4%	0%	5%	2%	3%
Adj. Flow (vph)	259	1225	109	20	1587	63	175	124	16	102	139	300
Shared Lane Traffic (%)												
Lane Group Flow (vph)	259	1334	0	20	1650	0	175	140	0	102	439	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.0	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	27.0	81.0		11.0	65.0		15.0	58.0		43.0	43.0	
Total Split (%)	18.0%	54.0%		7.3%	43.3%		10.0%	38.7%		28.7%	28.7%	
Maximum Green (s)	23.0	74.2		7.0	58.2		10.5	51.5		36.5	36.5	
Yellow Time (s)	3.0	4.6		3.0	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	88.6	79.2		71.0	61.2		52.9	50.9		35.9	35.9	
Actuated g/C Ratio	0.59	0.53		0.47	0.41		0.35	0.34		0.24	0.24	
v/c Ratio	0.88	0.51		0.09	0.80		0.98	0.23		0.35	0.97	
Control Delay	71.4	24.2		15.2	43.1		98.9	35.1		51.1	82.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	71.4	24.2		15.2	43.1		98.9	35.1		51.1	82.4	
LOS	E	C		B	D		F	D		D	F	
Approach Delay		31.9			42.8			70.5			76.5	
Approach LOS		C			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 45.1		Intersection LOS: D	
Intersection Capacity Utilization 93.5%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Sixth Line & Derry Road



Queues
2: Sixth Line & Derry Road

01/16/2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	259	1334	20	1650	175	140	102	439
v/c Ratio	0.88	0.51	0.09	0.80	0.98	0.23	0.35	0.97
Control Delay	71.4	24.2	15.2	43.1	98.9	35.1	51.1	82.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.4	24.2	15.2	43.1	98.9	35.1	51.1	82.4
Queue Length 50th (m)	59.2	97.7	2.4	162.1	37.0	28.5	25.3	112.9
Queue Length 95th (m)	#101.4	111.6	6.1	181.8	#84.6	45.7	43.3	#180.0
Internal Link Dist (m)		549.7		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	321	2598	233	2063	179	629	297	459
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.51	0.09	0.80	0.98	0.22	0.34	0.96

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

01/16/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	1127	100	18	1460	58	161	114	15	94	128	276
Future Volume (vph)	238	1127	100	18	1460	58	161	114	15	94	128	276
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	4910		1825	5050		1807	1824		1738	1679	
Flt Permitted	0.06	1.00		0.18	1.00		0.10	1.00		0.67	1.00	
Satd. Flow (perm)	114	4910		348	5050		188	1824		1222	1679	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	259	1225	109	20	1587	63	175	124	16	102	139	300
RTOR Reduction (vph)	0	7	0	0	3	0	0	3	0	0	52	0
Lane Group Flow (vph)	259	1327	0	20	1647	0	175	137	0	102	387	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	10%	1%	4%	0%	5%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	85.8	77.6		65.5	61.3		50.9	50.9		35.9	35.9	
Effective Green, g (s)	85.8	77.6		65.5	61.3		50.9	50.9		35.9	35.9	
Actuated g/C Ratio	0.57	0.52		0.44	0.41		0.34	0.34		0.24	0.24	
Clearance Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	291	2540		193	2063		177	618		292	401	
v/s Ratio Prot	c0.12	0.27		0.00	0.33		c0.07	0.07			0.23	
v/s Ratio Perm	c0.39			0.04			c0.27			0.08		
v/c Ratio	0.89	0.52		0.10	0.80		0.99	0.22		0.35	0.97	
Uniform Delay, d1	47.1	23.9		24.1	38.9		41.2	35.4		47.4	56.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	26.8	0.8		0.2	3.3		63.7	0.2		0.9	35.9	
Delay (s)	73.9	24.7		24.4	42.3		104.9	35.6		48.2	92.3	
Level of Service	E	C		C	D		F	D		D	F	
Approach Delay (s)		32.7			42.0			74.1			84.0	
Approach LOS		C			D			E			F	

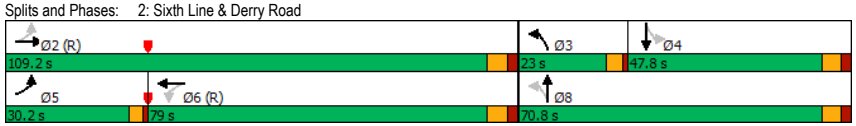
Intersection Summary					
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.96				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)		21.8	
Intersection Capacity Utilization	93.5%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	2160	119	8	695	51	120	86	29	63	154	202
Future Volume (vph)	255	2160	119	8	695	51	120	86	29	63	154	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.990			0.962			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	5003	0	1825	4576	0	1630	1794	0	1615	1654	0
Flt Permitted	0.270			0.049			0.125			0.677		
Satd. Flow (perm)	514	5003	0	94	4576	0	214	1794	0	1151	1654	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			8			3			34	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			158.7	
Travel Time (s)		25.8			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	4%	4%	0%	14%	6%	12%	3%	3%	13%	4%	8%
Adj. Flow (vph)	277	2348	129	9	755	55	130	93	32	68	167	220
Shared Lane Traffic (%)												
Lane Group Flow (vph)	277	2477	0	9	810	0	130	125	0	68	387	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		31.8	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	30.2	109.2		79.0	79.0		23.0	70.8		47.8	47.8	
Total Split (%)	16.8%	60.7%		43.9%	43.9%		12.8%	39.3%		26.6%	26.6%	
Maximum Green (s)	26.2	102.4		72.2	72.2		18.5	64.3		41.3	41.3	
Yellow Time (s)	3.0	4.6		4.6	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		2.2	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		7.0		7.0	7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0		14.0	14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	107.7	104.9		82.1	82.1		63.8	61.8		42.2	42.2	
Actuated g/C Ratio	0.60	0.58		0.46	0.46		0.35	0.34		0.23	0.23	
v/c Ratio	0.63	0.85		0.21	0.39		0.67	0.20		0.25	0.94	
Control Delay	24.4	35.0		83.8	54.1		57.4	41.0		58.9	91.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.4	35.0		83.8	54.1		57.4	41.0		58.9	91.1	
LOS	C	D		F	D		E	D		E	F	
Approach Delay		33.9			54.4			49.3			86.3	
Approach LOS		C			D			D			F	

Intersection Summary		
Area Type:	Other	
Cycle Length: 180		
Actuated Cycle Length: 180		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 95		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.94		
Intersection Signal Delay: 44.3		Intersection LOS: D
Intersection Capacity Utilization 112.8%		ICU Level of Service H
Analysis Period (min) 15		

Splits and Phases: 2: Sixth Line & Derry Road



Queues
2: Sixth Line & Derry Road

01/16/2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	277	2477	9	810	130	125	68	387
v/c Ratio	0.63	0.85	0.21	0.39	0.67	0.20	0.25	0.94
Control Delay	24.4	35.0	83.8	54.1	57.4	41.0	58.9	91.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	35.0	83.8	54.1	57.4	41.0	58.9	91.1
Queue Length 50th (m)	47.5	270.8	2.5	81.2	32.1	30.3	19.8	125.5
Queue Length 95th (m)	65.1	289.1	m7.9	109.8	49.8	47.2	36.1	#195.9
Internal Link Dist (m)		549.7		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	495	2920	42	2090	221	642	274	419
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.85	0.21	0.39	0.59	0.19	0.25	0.92

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

01/16/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	2160	119	8	695	51	120	86	29	63	154	202
Future Volume (vph)	255	2160	119	8	695	51	120	86	29	63	154	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	5004		1825	4576		1630	1794		1615	1654	
Flt Permitted	0.27	1.00		0.05	1.00		0.13	1.00		0.68	1.00	
Satd. Flow (perm)	513	5004		94	4576		214	1794		1151	1654	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	277	2348	129	9	755	55	130	93	32	68	167	220
RTOR Reduction (vph)	0	3	0	0	4	0	0	2	0	0	26	0
Lane Group Flow (vph)	277	2474	0	9	806	0	130	123	0	68	361	0
Heavy Vehicles (%)	1%	4%	4%	0%	14%	6%	12%	3%	3%	13%	4%	8%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	104.9	104.9		82.0	82.0		61.8	61.8		42.2	42.2	
Effective Green, g (s)	104.9	104.9		82.0	82.0		61.8	61.8		42.2	42.2	
Actuated g/C Ratio	0.58	0.58		0.46	0.46		0.34	0.34		0.23	0.23	
Clearance Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	434	2916		42	2084		192	615		269	387	
v/s Ratio Prot	0.07	c0.49			0.18		c0.06	0.07			c0.22	
v/s Ratio Perm	0.30			0.10			0.18			0.06		
v/c Ratio	0.64	0.85		0.21	0.39		0.68	0.20		0.25	0.93	
Uniform Delay, d1	19.9	31.0		29.6	32.4		46.3	41.7		56.1	67.5	
Progression Factor	1.00	1.00		1.91	1.62		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	3.3		10.7	0.5		9.1	0.2		0.6	29.5	
Delay (s)	22.9	34.3		67.3	52.8		55.4	41.9		56.7	97.0	
Level of Service	C	C		E	D		E	D		E	F	
Approach Delay (s)		33.1			53.0			48.8			91.0	
Approach LOS		C			D			D			F	

Intersection Summary

HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	21.8	
Intersection Capacity Utilization	112.8%	ICU Level of Service	H	
Analysis Period (min)	15			

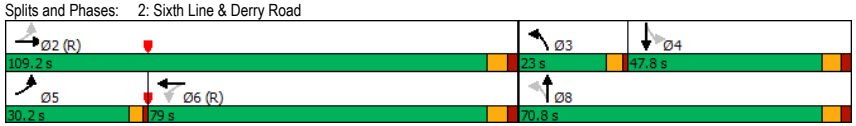
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	2385	130	8	768	53	128	93	32	65	168	218
Future Volume (vph)	268	2385	130	8	768	53	128	93	32	65	168	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.990			0.961			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1807	5003	0	1825	4575	0	1630	1792	0	1630	1654	0
Flt Permitted	0.233			0.051			0.101			0.670		
Satd. Flow (perm)	443	5003	0	98	4575	0	173	1792	0	1149	1654	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			7			2			34	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			158.7	
Travel Time (s)		25.8			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	4%	4%	0%	14%	6%	12%	3%	3%	12%	4%	8%
Adj. Flow (vph)	291	2592	141	9	835	58	139	101	35	71	183	237
Shared Lane Traffic (%)												
Lane Group Flow (vph)	291	2733	0	9	893	0	139	136	0	71	420	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		31.8	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	30.2	109.2		79.0	79.0		23.0	70.8		47.8	47.8	
Total Split (%)	16.8%	60.7%		43.9%	43.9%		12.8%	39.3%		26.6%	26.6%	
Maximum Green (s)	26.2	102.4		72.2	72.2		18.5	64.3		41.3	41.3	
Yellow Time (s)	3.0	4.6		4.6	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		2.2	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		7.0		7.0	7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0		14.0	14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	105.2	102.4		78.4	78.4		66.3	64.3		44.3	44.3	
Actuated g/C Ratio	0.58	0.57		0.44	0.44		0.37	0.36		0.25	0.25	
v/c Ratio	0.71	0.96		0.21	0.45		0.74	0.21		0.25	0.97	
Control Delay	28.7	46.4		85.9	70.5		64.2	40.7		58.6	96.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.7	46.4		85.9	70.5		64.2	40.7		58.6	96.6	
LOS	C	D		F	E		E	D		E	F	
Approach Delay		44.7			70.6			52.6			91.1	
Approach LOS		D			E			D			F	

Intersection Summary		
Area Type:	Other	
Cycle Length: 180		
Actuated Cycle Length: 180		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 115		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.97		
Intersection Signal Delay: 55.0		Intersection LOS: E
Intersection Capacity Utilization 119.6%		ICU Level of Service H
Analysis Period (min) 15		

Splits and Phases: 2: Sixth Line & Derry Road



Queues
2: Sixth Line & Derry Road

01/16/2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	291	2733	9	893	139	136	71	420
v/c Ratio	0.71	0.96	0.21	0.45	0.74	0.21	0.25	0.97
Control Delay	28.7	46.4	85.9	70.5	64.2	40.7	58.6	96.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	46.4	85.9	70.5	64.2	40.7	58.6	96.6
Queue Length 50th (m)	50.4	332.4	2.9	105.3	34.6	33.6	20.8	141.7
Queue Length 95th (m)	68.6	352.8	m6.4	122.3	56.2	51.6	37.5	#222.2
Internal Link Dist (m)		549.7		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	457	2849	42	1997	213	641	282	432
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.96	0.21	0.45	0.65	0.21	0.25	0.97

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

01/16/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	2385	130	8	768	53	128	93	32	65	168	218
Future Volume (vph)	268	2385	130	8	768	53	128	93	32	65	168	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	5004		1825	4577		1630	1793		1630	1655	
Flt Permitted	0.23	1.00		0.05	1.00		0.10	1.00		0.67	1.00	
Satd. Flow (perm)	443	5004		98	4577		173	1793		1149	1655	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	291	2592	141	9	835	58	139	101	35	71	183	237
RTOR Reduction (vph)	0	3	0	0	4	0	0	1	0	0	26	0
Lane Group Flow (vph)	291	2730	0	9	889	0	139	135	0	71	394	0
Heavy Vehicles (%)	1%	4%	4%	0%	14%	6%	12%	3%	3%	12%	4%	8%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	102.4	102.4		78.4	78.4		64.3	64.3		44.3	44.3	
Effective Green, g (s)	102.4	102.4		78.4	78.4		64.3	64.3		44.3	44.3	
Actuated g/C Ratio	0.57	0.57		0.44	0.44		0.36	0.36		0.25	0.25	
Clearance Time (s)	4.0	6.8		6.8	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		5.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	403	2846		42	1993		187	640		282	407	
v/s Ratio Prot	0.08	c0.55			0.19		c0.06	0.08			c0.24	
v/s Ratio Perm	0.33			0.09			0.20			0.06		
v/c Ratio	0.72	0.96		0.21	0.45		0.74	0.21		0.25	0.97	
Uniform Delay, d1	22.1	36.8		31.6	35.6		45.7	40.2		54.5	67.2	
Progression Factor	1.00	1.00		1.96	1.94		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.3	9.7		10.3	0.7		14.7	0.2		0.6	36.3	
Delay (s)	28.4	46.5		72.2	69.7		60.5	40.4		55.1	103.4	
Level of Service	C	D		E	E		E	D		E	F	
Approach Delay (s)		44.8			69.8			50.5			96.4	
Approach LOS		D			E			D			F	

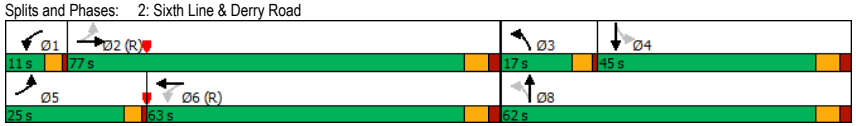
Intersection Summary					
HCM 2000 Control Delay	55.3	HCM 2000 Level of Service		E	
HCM 2000 Volume to Capacity ratio	0.97				
Actuated Cycle Length (s)	180.0	Sum of lost time (s)		21.8	
Intersection Capacity Utilization	119.6%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	1244	107	19	1612	59	173	123	17	97	139	290
Future Volume (vph)	256	1244	107	19	1612	59	173	123	17	97	139	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	95.0		0.0	45.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	90.0			85.0			30.0			30.0		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.995			0.982			0.899	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1755	4910	0	1825	5054	0	1807	1838	0	1738	1687	0
Flt Permitted	0.066			0.140			0.094			0.660		
Satd. Flow (perm)	122	4910	0	269	5054	0	179	1838	0	1208	1687	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			4			5			67	
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		573.7			1506.9			1008.8			158.7	
Travel Time (s)		25.8			67.8			60.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	6%	0%	0%	3%	10%	1%	3%	0%	5%	1%	3%
Adj. Flow (vph)	278	1352	116	21	1752	64	188	134	18	105	151	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	278	1468	0	21	1816	0	188	152	0	105	466	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		7.0	25.0		4.5	10.0		10.0	10.0	
Minimum Split (s)	11.5	31.8		11.0	31.8		9.0	32.5		32.5	32.5	
Total Split (s)	25.0	77.0		11.0	63.0		17.0	62.0		45.0	45.0	
Total Split (%)	16.7%	51.3%		7.3%	42.0%		11.3%	41.3%		30.0%	30.0%	
Maximum Green (s)	21.0	70.2		7.0	56.2		12.5	55.5		38.5	38.5	
Yellow Time (s)	3.0	4.6		3.0	4.6		3.5	4.2		4.2	4.2	
All-Red Time (s)	1.0	2.2		1.0	2.2		1.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			10.0		10.0	10.0	
Flash Dont Walk (s)		14.0			14.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	84.4	75.0		66.8	57.0		57.1	55.1		38.1	38.1	
Actuated g/C Ratio	0.56	0.50		0.45	0.38		0.38	0.37		0.25	0.25	
v/c Ratio	0.95	0.60		0.11	0.94		0.93	0.22		0.34	0.97	
Control Delay	84.9	28.5		17.2	56.1		82.8	32.6		49.3	82.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	84.9	28.5		17.2	56.1		82.8	32.6		49.3	82.4	
LOS	F	C		B	E		F	C		D	F	
Approach Delay		37.4			55.6			60.4			76.3	
Approach LOS		D			E			E			E	

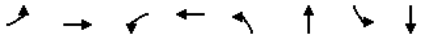
Intersection Summary		
Area Type:	Other	
Cycle Length: 150		
Actuated Cycle Length: 150		
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 115		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.97		
Intersection Signal Delay: 51.5	Intersection LOS: D	
Intersection Capacity Utilization 99.5%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 2: Sixth Line & Derry Road



Queues
2: Sixth Line & Derry Road

01/16/2024

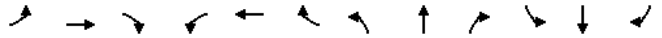


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	278	1468	21	1816	188	152	105	466
v/c Ratio	0.95	0.60	0.11	0.94	0.93	0.22	0.34	0.97
Control Delay	84.9	28.5	17.2	56.1	82.8	32.6	49.3	82.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.9	28.5	17.2	56.1	82.8	32.6	49.3	82.4
Queue Length 50th (m)	66.5	118.4	2.7	192.0	39.3	29.9	25.6	121.6
Queue Length 95th (m)	#121.6	134.3	6.8	#224.6	#85.8	47.0	43.8	#191.3
Internal Link Dist (m)		549.7		1482.9		984.8		134.7
Turn Bay Length (m)	150.0		95.0		45.0		45.0	
Base Capacity (vph)	296	2461	191	1922	203	683	310	482
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.60	0.11	0.94	0.93	0.22	0.34	0.97

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
2: Sixth Line & Derry Road

01/16/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	1244	107	19	1612	59	173	123	17	97	139	290
Future Volume (vph)	256	1244	107	19	1612	59	173	123	17	97	139	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4911		1825	5053		1807	1838		1738	1687	
Flt Permitted	0.07	1.00		0.14	1.00		0.09	1.00		0.66	1.00	
Satd. Flow (perm)	121	4911		269	5053		179	1838		1208	1687	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	278	1352	116	21	1752	64	188	134	18	105	151	315
RTOR Reduction (vph)	0	6	0	0	2	0	0	3	0	0	50	0
Lane Group Flow (vph)	278	1462	0	21	1814	0	188	149	0	105	416	0
Heavy Vehicles (%)	4%	6%	0%	0%	3%	10%	1%	3%	0%	5%	1%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	81.6	73.4		61.2	57.0		55.1	55.1		38.1	38.1	
Effective Green, g (s)	81.6	73.4		61.2	57.0		55.1	55.1		38.1	38.1	
Actuated g/C Ratio	0.54	0.49		0.41	0.38		0.37	0.37		0.25	0.25	
Clearance Time (s)	4.0	6.8		4.0	6.8		4.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.5		3.5	3.5	
Lane Grp Cap (vph)	290	2403		153	1920		201	675		306	428	
v/s Ratio Prot	c0.13	0.30		0.00	0.36		c0.08	0.08			0.25	
v/s Ratio Perm	c0.39			0.05			c0.27			0.09		
v/c Ratio	0.96	0.61		0.14	0.94		0.94	0.22		0.34	0.97	
Uniform Delay, d1	49.5	27.8		26.9	45.0		40.3	32.7		45.7	55.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	41.2	1.2		0.4	11.1		45.1	0.2		0.8	36.2	
Delay (s)	90.7	29.0		27.3	56.0		85.4	32.9		46.5	91.6	
Level of Service	F	C		C	E		F	C		D	F	
Approach Delay (s)		38.8			55.7			61.9			83.3	
Approach LOS		D			E			E			F	

Intersection Summary					
HCM 2000 Control Delay	53.1	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.99				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)		21.8	
Intersection Capacity Utilization	99.5%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					