Traffic Impact Study

Frontenac Forest Draft Plan of Subdivision – MP4 Trafalgar

June 2025 | Contract # 10218

FRONTENAC FOREST ESTATES INC. a division of M.A.M. Group

TYLin

EXECUTIVE SUMMARY

Introduction

T.Y. Lin International Canada Inc. (TYLin) was retained by Milton P4 Trafalgar Landowners Group Inc. to prepare a Tertiary Plan Road Network Assessment (RNA) for all lands within the Trafalgar Secondary Plan area. Envisioned as a complete community, the Trafalgar Secondary Plan is focused on delivering connected neighborhood, parks and open space and a mix of uses and built form with densities that support future higher order transit.

In order to realize the vision, the Secondary Plan requires a more detailed Tertiary Plan, the last layer between the policies and implementation by the draft plans of subdivision. The preparation of this Tertiary Plan has been guided by the objectives and detailed policies of the Secondary Plan.

The RNA, required by the Town of Milton and Halton Region, was prepared in tandem with, and in support of, the overall Tertiary Plan for the Trafalgar lands within Milton's Phase 4 Lands. The Phase 4 Lands are defined in the Town's 2018 TMP as the next Urban Expansion Area for the year 2021 and beyond.

Subsequently, TYLin was retained by Frontenac Forest Estates Inc., a division of M.A.M. Group, to prepare a Traffic Impact Study (TIS) in support of a Draft Plan of Subdivision (DPS) Application for the Frontenac Forest Mixed-Use subdivision (herein referred to as the Frontenac lands), located within the Milton Phase 4 Trafalgar Secondary (Tertiary) Plan (herein referred to as the MP4TC lands) in the Town of Milton.

The base of the traffic forecast utilized within this study is sourced within the RNA study for the MP4TC lands, with changes to the densities considered for various land parcels as applicable.

The study intersections have been detailed below:

- Derry Road and Trafalgar Road
- Derry Road and Street 'B' (Collector G)
- Derry Road and Street 'D' (Collector H)
- Derry Road and Street 'F' (Collector J)
- Derry Road and Eighth Line
- Trafalgar Road and Street 'A' (Collector K)
- Street 'A' (Collector K) and Street 'B' (Collector G)
- Street 'A' (Collector K) and Street 'D' (Collector H)
- Street 'A' (Collector K) and Street 'F' (Collector J)
- Street 'A' (Collector K) and Eighth Line

As per the January 10, 2025 draft plan, the proposed subdivision development statistics for the Frontenac lands consist of the following:

- Detached House Dwellings (of all types) – 435 units
- Townhouse Dwellings (of all types) – 855 units
- Neighbourhood Centre Mixed Use II Units – 701 units
- Medium Density Residential II Units – 208 units
- Medium Density Mixed Use Units – 148 units
- Retail and Commercial Area – 37,770 m^2 (Lot Area)
- Number of School: 1
- The remaining development areas include parks, village square blocks, stormwater management ponds, environmental lands, and environmental enhancement blocks.

TYLin completed a review of the proposed subdivision draft plan design for the Frontenac lands based on the requirements on right-of-way, cul-de-sac and road bends, horizontal curvature, intersection spacing, intersection angle, daylight triangle / rounding and minimum tangent length at intersections. It is considered that the design of the roadways is deemed acceptable.

TYLin's 2023 TMC data, sourced from the RNA study, was collected after the recent (2022) Highway 401 widening from Mississauga to Milton, and will form the baseline/existing traffic volume dataset for the purposes of the TIS.

The proposed development was assessed based on the 2031 (Frontenac Lands completion) and 2041 (ten-year horizon year) future background traffic volumes.

The 2031 future total analysis does not include traffic from nearby background developments such as the Milton Phase 4 Agerton Secondary Plan (Agerton). However, for the 2041 analysis, background growth rates were adjusted to include cumulative traffic impacts from planned developments, including the Agerton lands.

For trip generation purposes, the Frontenac lands accounted for 7 out of a total 38 Traffic Analysis Zones (TAZ) identified in the MP4TC RNA. The resulting trips were then assigned to the collector road and broader transportation network based on each TAZ's location within the Tertiary Plan.

A total of 1,278 net auto trips, consisting of 483 inbound and 795 outbound trips, are estimated to be generated by the Frontenac Lands during the weekday AM peak hour. During the weekday PM peak hour, 749 inbound and 548 outbound net auto site trips are estimated, totaling 1,297 trips.

The updated Frontenac Lands (TAZs 1 – 7) trip generation would result in a net difference of +65 two-way trips in the AM peak hour and -100 two-way trips in the PM peak hour when compared

to the MP4TC RNA Study.

Based on the recommendations outlined in the Milton Transportation Master Plan (TMP) and the proposed lane configuration modifications detailed in the RNA for the MP4TC area, phased improvements have been adopted for the study intersections.

2031 Future Lane Configuration Modification and Responsibility

Intersection	Approach	Modification	Responsibility
Existing Intersections			
Trafalgar Road & Derry Road	Northbound	▶ Dual left turn lanes ▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region
	Eastbound and Southbound	▶ Dual left turn lanes ▶ 1 additional through lane (HOV)	Region
	Westbound	▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region
Eighth Line & Derry Road	Eastbound and Westbound	▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region / Town / MP4 Developers
Arterial-to-Collector Intersections			
Derry Road & Collector G	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Right turn only lane	MP4 Developers
	Eastbound	▶ Auxiliary right turn lane	
Derry Road & Collector H	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Single lane with shared left/right movements	MP4 Developers
	Eastbound	▶ Shared right turn movement	
	Westbound	▶ Auxiliary left turn lane	
Derry Road & Collector J	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Single lane with shared left/right movements	MP4 Developers
	Eastbound	▶ Shared right turn movement	

Intersection	Approach	Modification	Responsibility
	Westbound	▶ Auxiliary left turn lane	
Trafalgar Road & Collector K	Northbound and Southbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Shared right turn movement	MP4 Developers
	Eastbound	▶ Shared through movement	
	Southbound	▶ Auxiliary left turn lane	
	Westbound	▶ Shared through/right lane ▶ Auxiliary left turn lane	
Collector-to-Collector Intersections			
Collector G & Collector K	Eastbound and Westbound	▶ Single lane approach (shared all movements)	MP4 developers
	Northbound and Southbound	▶ Shared through/right lane ▶ Auxiliary left turn lane	
Collector H & Collector K	All Directions	▶ Single lane approach (shared all movements)	
Collector J & Collector K			
Eighth Line & Collector K	Northbound	▶ Shared left turn movement	
	Eastbound	▶ Single lane with shared left/right movements	
	Southbound	▶ Shared right turn movement	

2041 Future Lane Configuration Modification and Responsibility

Intersection	Approach	Modification	Responsibility
Existing Intersections			
Trafalgar Road & Derry Road	Westbound	▶ Dual left turn lanes	Region
Arterial-to-Collector Intersections			
Derry Road & Collector G	Southbound	▶ Single right turn lane	Agerton Developers
	Westbound	▶ Additional shared right turn movement	
Derry Road & Collector H	Northbound	▶ Shared through movement	
	Eastbound	▶ Auxiliary left turn lane	

Intersection	Approach	Modification	Responsibility
	Southbound	▶ Single lane approach (shared all movements)	
	Westbound	▶ Additional shared right turn movement	
Derry Road & Collector J	Northbound	▶ Shared through movement	
	Eastbound	▶ Auxiliary left turn lane	
	Southbound	▶ Single lane approach (shared all movements)	
	Westbound	▶ Additional shared right turn movement	
Trafalgar Road & Collector K	Northbound, eastbound and southbound	▶ Auxiliary right turn lane	

Frontenac Lands Baseline Traffic Conditions

All study intersections are generally operating well overall, with acceptable delays and capacity during both the weekday AM and PM peak hours. The majority of the exclusive turning movements operate well with sufficient storage for their queues with the exception of the eastbound left movement at Trafalgar Road at Derry Road during the AM peak hour.

Frontenac Lands 2031 Future Background Traffic Conditions

Both Trafalgar Road & Derry Road and Eighth Line & Derry Road intersections are expected to operate within overall acceptable limits, with reserve capacity maintained during both AM and PM peak hours. Although some individual turning movements experience higher delays (LOS 'E' or 'F'), all v/c ratios remain below 1.0, indicating no capacity exceedance.

Frontenac Lands 2031 Future Total Traffic Conditions

All existing, arterial-to-collector, and collector-to-collector intersections are expected to operate well during both the AM and PM peak hours, with overall reserve capacity and no movements over capacity. Although some individual movements experience LOS 'E' or 'F' due to longer delays, particularly on collector roads, all v/c ratios remain below 1.0, indicating no capacity exceedance. These delays are attributed to the 140-second signal cycles and timing plans that prioritize higher-volume arterial roads.

Frontenac Lands 2041 Future Background Traffic Conditions

The Eighth Line at Derry Road is expected to operate well during both the AM and PM peak hours, with overall reserve capacity. Some individual movements are expected to experience LOS 'E' and

'F' due to increased delays, though these movements remain within capacity.

The intersection of Trafalgar Road at Derry Road is anticipated to operate with some reserve capacity. Some critical movements are identified as approaching theoretical capacity (i.e., v/c between 0.85 and 1.00). These include the eastbound through and northbound through movements during the AM peak hour, and the westbound through, northbound left-turn, and southbound through movements during the PM peak hour.

Frontenac Lands 2041 Future Total Traffic Conditions

All the existing, arterial-to-collector and collector-to-collector intersection are expected to operate well during both the AM and PM peak hours, with overall reserve capacity, except for Trafalgar Road at Derry Road and Collector H at Derry Road.

The operation of some critical movements is primarily attributed to the inability to exclude Trafalgar site traffic from the 2051 JBPE forecasting model growth rates, as requested by the Region. This limitation stems from challenges in aligning trip distribution between the traffic models, resulting in the double counting of some Trafalgar site traffic. Consequently, this has led to an overestimation of traffic volumes for the 2041 future background scenario.

Multi-use paths (MUPs) are proposed on both sides of Trafalgar Road, from Derry Road to the southern boundary of the site. Sidewalk connections are proposed along the internal local roads within the site, located south of Derry Road, to facilitate pedestrian access to the broader trail network. On-road bicycle lanes are proposed along Derry Road and Trafalgar Road within the Tertiary Plan area.

The on-street parking plan is subject to refinement at the detailed design stage once residential driveways and all utilities are confirmed.

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1 INTRODUCTION

1.1 Study Background and Purpose

T.Y. Lin International Canada Inc. (TYLin) was retained by Frontenac Forest Estates Inc., a division of M.AM Group, to prepare a Traffic Impact Study (TIS) in support of a Draft Plan of Subdivision (DPS) Application for the Frontenac Forest Mixed-Use subdivision (herein referred to as the Frontenac lands), located within the Milton Phase 4 Trafalgar Secondary Plan (herein referred to as the MP4TC lands) in the Town of Milton.

This TIS study, along with the other traffic studies in support of the Draft Plan of Subdivision Applications for the other land parcels within the MP4TC, have been completed using the most up-to-date development statistics available for each land parcel at the time of study completion.

This study is prepared to assess the land use plan and associated density proposed by Frontenac Forest Estates Inc. and proceed with the application process for the site. The base of the traffic forecast utilized within this study is sourced within the RNA study for the MP4TC lands, with changes to the densities considered for various land parcels as applicable. All analysis has been detailed within this report, and includes the following review:

- Review traffic forecast completed as part of the RNA study and update development density for the applicable land parcels to account for the latest development statistics proposed by each individual landowner.
- Using the updated traffic forecast, derive the 2031 (Frontenac Lands completion) and 2041 (ten-year horizon year) future background traffic volumes at the study intersections in order to assess projected traffic operations without the proposed site traffic in place and derive remedial measures as required.
- Remove and replace the estimated site traffic volumes assumed in the Trafalgar RNA as per updated subdivision statistics. As such, the estimated site generated traffic will be built upon the forecasted traffic volumes provided by the Trafalgar RNA study, which in turn will become our future traffic base model.
- Create a future conditions traffic operations model to assess the traffic impacts of the proposed development after introducing the estimated site generated traffic into the future background traffic model. Report any operational deficiencies and recommend mitigating measures, if necessary, to improve traffic operations, including recommending lane configuration changes, and/or traffic control alterations.
- Determine the future site-related impacts in the context of local transportation modes including reviews of transit, cycling and pedestrian facilities and circulation from the

proposed development to the external road network.

- Compare trip generation assumptions provided in the Trafalgar RNA and the currently proposed draft plan.
- Review the subdivision plan with a study area road inventory review to confirm lane assignments, traffic controls, speed limits, and surrounding land uses and general study area characteristics.

The objective of this study is to determine the traffic volumes anticipated to be generated by the proposed development during the critical 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 internal road network is consistent with Town standards and provides safe operation of vehicles within the proposed subdivision.

A copy of the Terms of Reference communication to date between the Town, Region, and TYLin is provided in **Appendix A**.

1.2 Planning Context and Relevant Background Studies

The Trafalgar Tertiary Plan has been developed within the context of provincial, regional, and municipal planning policies and initiatives. Transportation plans and studies that apply to the Trafalgar Tertiary Plan area have been summarized for reference purposes.

1.2.1 Town of Milton Transportation Master Plan (2018)

The 2018 Milton TMP is a document which outlines the long-term vision for the future of the Town of Milton's transportation system. More specifically, the TMP refers to itself as a "guiding document" for a "more balanced, multi-modal future." As with most master plans, the document provides policy context for the approach to achieving the vision, which includes an outline of capital improvements and additional studies, as required. Input from staff and decision makers, stakeholders, and resident were used to inform the direction of the TMP.

A total of twelve objectives were outlined in the Town's TMP, and a selection of the objectives that are most applicable to the Trafalgar Tertiary Plan are as follows:

- Development of a long-term transportation vision and overall road network philosophy to support the Town's future population projections and employment growth to 2031 and beyond;
- Providing overall direction for the Town to expand its transportation network in an integrated, efficient, and effective manner with respect to safety, transit, active transportation, complete streets, and environmental considerations;

- Development of a road classification hierarchy that reflects the dynamic shift towards sustainable and alternate modes of transportation, and develop road cross sections to reflect any changes;
- Providing input to the preparation of the next Secondary Plan areas, including the Phase 4 Lands, and the required engineering input to develop the road network;
- Review and make recommendations on the Town's current road standards, design criteria, and policies (including roundabouts) to ensure they meet the needs of all modes of transportation, while promoting the development of safe, efficient, livable and traffic calmed street networks;
- Investigate the need and justification for additional Highway 400 series overpasses, railway grade separations as well as mid-block flyovers;
- Investigate current and future deficiencies in roadway connectivity; and
- Enhancing active transportation routes, facilities, and connections throughout the Town's urban and rural areas;
- Provide a framework by which decisions regarding the Town's transportation system can be informed;
- Develop a transportation policy framework for the next Official Plan. This framework will be developed in consultation with all interested parties;
- Meaningully engage the public and interested stakeholders in a dialogue to help shape the outcomes of the T.M.P;
- Review major rights-of-ways to ensure responsibility is appropriately aligned with planned roadway function.

In the context of the MP4TC lands, the TMP provided an evaluation of conceptual road network alternatives, including considerations for land use, transit connectivity, active transportation opportunities, cost, and goods movement. A preferred set of road network alternatives for the MP4TC lands were identified, which has influenced the proposed road network presented herein.

1.2.2 Town of Milton Transportation Master Plan for the Trafalgar and Agerton Secondary Plan (2019-2022)

The TMP for the Trafalgar Agerton Secondary Plan was first completed in March of 2019, with an updated version circulated in December of 2020. Further drafts/addendums were circulated after this while the document was under review by Town and Regional Staff, with the most recent final traffic addendum circulated in March of 2022. The December 2020 TMP and the March 2022 Traffic Addendum were both reviewed as part of the preparation of the enclosed TIS.

The Trafalgar and Agerton TMP was prepared using Milton's 2018 TMP as a guiding document

and further developed the traffic planning already in place for the Trafalgar and Agerton Secondary Plan areas. The TMP assessed the high-level impacts of the proposed Trafalgar and Agerton Secondary Plans on the adjacent arterial roads, collector roads, and major intersections.

The March 2022 TMP Addendum concluded that should the projected future total volumes be actualized, a total of five study intersections are expected to experience capacity issues under future total conditions.

The 2022 TMP Addendum recommends that in addition to applying signal timing optimization to study intersections, dedicated turning lanes, including dual left-turn lanes, can also be implemented to help improve operations for turning movements. However, many intersections will continue to operate with over-capacity movements under future total conditions despite these improvements should the projected volumes be actualized. Regarding the dedicated turn lane improvements, TMP recommends that the "rights-of-way requirement be protected now, and the intersections be monitored regularly through the Region's Traffic Count Program and be further considered in the future Municipal Class Environmental Assessment Studies."

1.2.3 Trafalgar Secondary Plan (2019, 2024)

The Trafalgar Secondary Plan was adopted by the Town of Milton on March 25, 2019 (By-law 030-2019), and has since been amended in accordance with Ontario Land Tribunal Orders issued on February 8, 2024 and July 22, 2024. The Tertiary Plan for the TSPA has been prepared in accordance with the goals and objectives of the Trafalgar Secondary Plan.

From a transportation perspective, the Secondary Plan document outlines several goals and objectives for the TSPA, resulting in the vision of a multi-modal, connected community, requiring a road network of complete streets that are accessible to all users. Three of the mobility goals listed in section C.11.3.2 of the Trafalgar Secondary Plan are:

- Foster a connected and accessible on- and off-road pedestrian and cycling path network which promotes a culture of active transportation;
- Provide the opportunity for a local transit network that can support higher-order transit service on Trafalgar Road;
- Realize a network of Complete Streets that balance the needs of all road users, including pedestrians, cyclists, transit users, and motorists.

The Trafalgar Tertiary Plan includes a robust collector road network that proposes modifications to the Town's standard right-of-way (ROW) collector road cross-sections. These proposed modifications often include active transportation elements, such as in-boulevard cycle tracks, buffered on-street cycle lanes, and Multi-use Paths (MUPs), that differ from the Town's ROW standards in order to better achieve the level of active transportation connectivity envisioned by the Secondary Plan.

In addition to ensuring active transportation infrastructure is available and accessible to all users, the proposed Trafalgar Tertiary Plan collector roads maintain general automobile travel lanes that are able to accommodate local transit vehicles (3.35m wide) while also providing on-street parking on at least one side of the road.

1.2.4 Planning Changes and Population Pledges

In accordance with the planning changes over the last few years, the 2022 Trafalgar TMP aims to target 30% of its new residential units to be designated as either affordable housing, assisted housing, stacked townhouses, back-to-back townhouses or apartments.

Since the completion of the 2022 Trafalgar TMP, the Trafalgar Tertiary Plan has increased its forecasted population and employment to align with the Region's Joint Best Planning Estimates. Population of 32,000 people has increased to 54,681 people. As for the employment population, the 2022 Trafalgar TMP forecasted 4,000 jobs while the Trafalgar Tertiary Plan forecasted 6,040 jobs. It should be noted that the employment jobs forecast in the Trafalgar Tertiary Plan includes work-from-home jobs estimates which accounts for 10% of the population translating to 1,493 jobs consisting of 1,140 commercial, 80 secondary school, 360 elementary school, and 4,500 work-from-home jobs.

1.2.5 Town of Milton Transportation Master Plan (2025)

The 2025 Milton TMP finalized on February, 2025 serves as an update to the previous 2018 Milton TMP that was discussed in **Section 1.2.1**. While the 2025 TMP maintains many of the objectives and goals identified in the 2018 TMP, there are some notable differences between the two plans such as active transportation infrastructure, right-of-way (ROW) widths, and road classifications.

In the 2025 TMP, the Town has recommended updated road classification and right-of-way widths to better accommodate the anticipated growth within Milton by incorporating active transportation infrastructure in urban areas. All ROWs except the laneway and rural roadway ROWs in the 2025 TMP were revised. One of the main differences is the revised ROWs in the 2025 TMP where on-street bicycle lanes were shifted to in-boulevard cycle tracks for all collector and arterial road cross-sections to provide that physical separation between cyclists and vehicles. This change also eliminates the multi-use paths that were previously identified in the 2018 TMP, by incorporating and separating both sidewalks and cycle tracks to be provided on both sides of the collector and arterial roads. In the previous 2018 TMP and Town standards, sidewalk widths were identified to be 1.5m for all local, collector, and arterial roads. In the 2025 TMP, sidewalk widths were increased from 1.5m to 1.8m for all roadway types.

1.2.6 Region of Halton Integrated Master Plan

The Region of Halton's Integrated Master Plan (IMP) is a long-term plan that aims to expand

water, wastewater, and transportation infrastructure to accommodate the growing population in the local municipalities within the Region to 2051 and beyond. The IMP states that it will:

- Guide the management and development of the Region's water, wastewater and transportation systems (including the active transportation network and master plan);
- Maximize capacity, system flexibility and extend the life expectancy of Regional water, wastewater and transportation infrastructure; and
- Outline the strategies for maintaining and improving these critical systems to ensure we meet the needs of the community now and in the future.

A selection of transportation strategies was also outlined in the IMP, in which are applicable to the Trafalgar Tertiary Plan, and are as follow:

- Optimizing existing/planned transportation network;
- Localized corridor widening and improvements;
- Flexibility and adaptability to support the evolution of Transit Priority Corridors;
- Prioritizing walking and cycling facilities, including at intersections;
- Identifying supporting strategies and technologies (for example, transit signal priority).

1.2.7 Trafalgar Tertiary Plan – Road Network Assessment

The Road Network Assessment (RNA) is under preparation in tandem with, and in support of, the overall tertiary plan for the Trafalgar lands within Milton's Phase 4 Lands (MP4TC).

The context of the RNA consists of the following:

- Review of applicable information from the Trafalgar & Agerton Secondary Plan;
- Review of existing transportation infrastructure and traffic operations within study area;
- Assessment of future background traffic operations for the planning horizons of 2031 and 2041 associated with background growth and developments surrounding the Trafalgar lands;
- Identification of traffic operations concerns and the potential mitigation measures or infrastructure improvements necessary to accommodate the impacts of background growth and site generated traffic for the planning horizons of 2031, 2041, and 2051;
- Assessment of Transit and Active Transportation Infrastructure; and
- Recommended public street network that incorporates more sustainable modes of transportation to reduce automobile dependency.

The base of the traffic forecast utilized within this study is sourced within the RNA study for the MP4TC lands, with changes to the densities considered for various land parcels as applicable.

2 DEVELOPMENT CHARACTERISTICS

2.1 Overall MP4TC Study Area

The Frontenac lands are located within the MP4TC study area which is generally bounded by Derry Road to the north, Lower Base Line to the south, Eighth Line to the east and Trafalgar Road to the west. The MP4TC lands study area is illustrated in **Figure 2-1**.

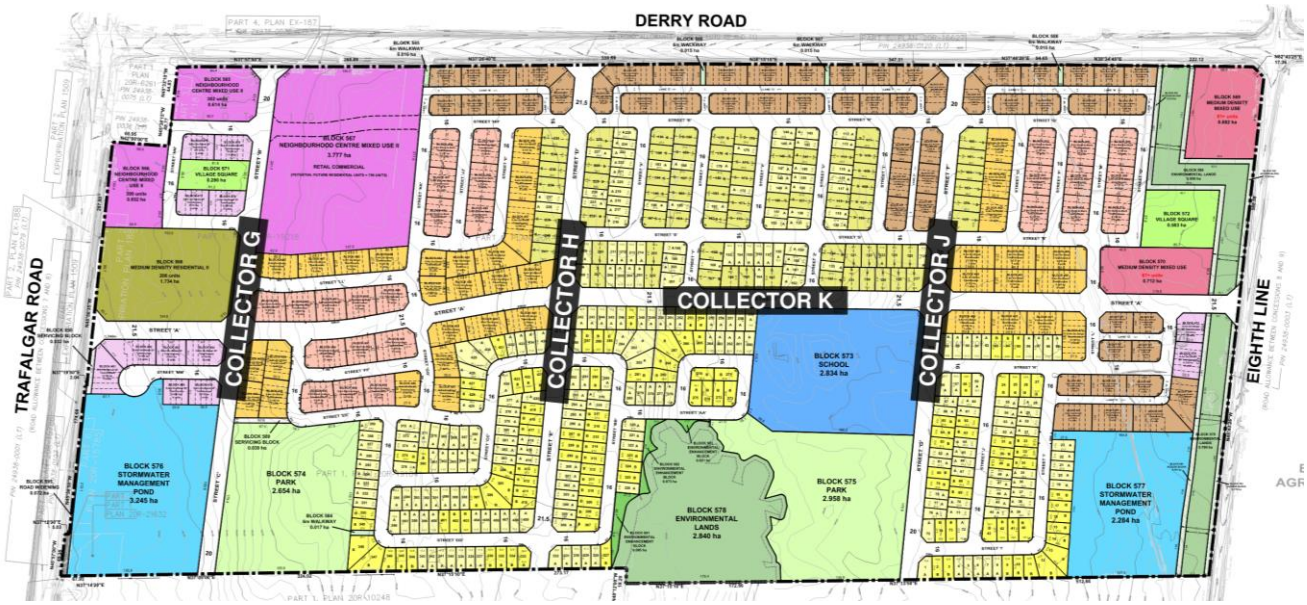
Figure 2-1 MP4TC Study Area

Source: Trafalgar Tertiary Plan SGL Planning & Design Inc.

2.2 Subject Lands Area

The proposed Frontenac development is located on the northern end of the MP4TC lands within the Town of Milton. The site is bounded by Derry Road to the north, Eighth Line to the east, Trafalgar Road to the west and adjacent future development MP4TC lands to the south. An excerpt of the proposed draft plan, dated January 10, 2025, is illustrated in **Figure 2-2** and detailed layout is attached in **Appendix B**.

Figure 2-2 Frontenac Lands Draft Plan Excerpt



Source: Bousfields Inc.

2.3 Study Intersections

For the purposes of this study, intersections were selected as the boundary road network intersections surrounding directly adjacent to the site along with the proposed access intersections to the external municipal roadway system. The study intersections have been detailed below (The proposed street names adopted in the draft plan correspond to the collector naming used in RNA study, as noted below):

- Derry Road and Trafalgar Road
- Derry Road and Street 'B' (Collector G)
- Derry Road and Street 'D' (Collector H)
- Derry Road and Street 'F' (Collector J)
- Derry Road and Eighth Line

- Trafalgar Road and Street 'A' (Collector K)
- Street 'A' (Collector K) and Street 'B' (Collector G)
- Street 'A' (Collector K) and Street 'D' (Collector H)
- Street 'A' (Collector K) and Street 'F' (Collector J)
- Street 'A' (Collector K) and Eighth Line

The remainder of the study intersections that are encompassed by the MP4TC lands are to be assessed as part of the TIS reports completed in support of the surrounding development lands and would consider traffic generated by the Frontenac lands as part of their review. As such the impacts of the overall MP4TC lands development on the overall study area roadway network will be reviewed when looking at the analysis completed for all TIS reports in support of the lands proposed within the area.

2.4 Development Plan

2.4.1 Development Density

As per the January 10, 2025 draft plan, the proposed subdivision development statistics for the Frontenac lands consist of the following:

- Detached House Dwellings (of all types) – 435 units
- Townhouse Dwellings (of all types) – 855 units
- Neighbourhood Centre Mixed Use II Units – 701 units
- Medium Density Residential II Units – 208 units
- Medium Density Mixed Use Units – 148 units
- Retail and Commercial Area – 37,770 m^2 (Lot Area)
- Number of School: 1
- The remaining development areas include parks, village square blocks, stormwater management ponds, environmental lands, and environmental enhancement blocks.

2.5 Development Road Network

The road network is proposed to be compliant with the road classification set forth as part of the Tertiary Plan for the MP4TC lands, dated December 2021. The Frontenac lands are proposed to be accessible from the boundary road network as follows:

- Via one full-moves intersection to Trafalgar Road.
- Via three intersections to Derry Road – two full-moves and the westernmost one being

right-in/right-out.

- Via one full-moves intersection to Eight Line.

The internal roadways intersecting the boundary road network are proposed as collector roadways and also provide three access connections to the lands directly south, while the remainder of the internal network is proposed to consist of predominantly of minor local roads and laneways.

2.5.1 Proposed Road Network

Within the subject site, a total of four future collector roads are proposed, as per the proposed Trafalgar Tertiary Plan road network. A single east-west collector (labeled as Street 'A' (Collector 'K') in **Figure 2-2**) will span the subject site and will begin at Eighth Line at the eastern limit of the site, and extend beyond Trafalgar Road to the west of the site. A ROW of 21.5 metre is proposed for 'Collector K'. As per the latest coordination with the Town, the 21.5 metre ROW collector cross-section for minor collectors consists of two general purpose driving lanes, sidewalks on both sides of the road, in-boulevard bike lanes on both sides and an on-street parking lane.

Three collectors will be oriented in a north-south direction, intersecting Derry Road to the north and extending beyond the southern limit of the subject site and located between Trafalgar Road to the west and Eighth Line to the east. The western-most collector (labeled as Street 'B'/Street 'C' (Collector 'G') on the draft plan) will operate as a restricted right-in/right-out intersection with Derry Road due to its close proximity to Trafalgar Road, however, the remaining north-south collector roads will operate as full-moves intersections at Derry Road.

The centre north-south collector, labeled Street 'D'/Street 'E' (Collector 'H') in **Figure 2-2**, is proposed as a 21.5 metre ROW collector with a cross-section identical to that of Collector K.

The remaining north-south collectors, Street 'B'/Street 'C' (Collector 'G'), and Street 'F'/Street 'G' (Collector 'J'), are proposed to have a 20 metre ROW cross-section. As discussed with the Town, a general 20 metre ROW collector cross-section consists of two general purpose driving lanes with an on-street parking lane, a sidewalk on at least one side and either MUP or buffered commuter cycle track plus sidewalk on the other side of the road.

Local roads and public laneways are proposed throughout the subject site to provide residents and visitor access to collector roads and surrounding road network. The proposed local roads will have a 16 metre ROW cross-section, consisting of two travel lanes with an on-street parking lane and a sidewalk on at least one side of the road. Most public laneways proposed throughout the site have a ROW of 9.5m, however, two public laneways with a ROW of 8.5m are proposed. Both types of laneways will facilitate the circulation of waste collection vehicles and fire vehicles.

Illustrative ROW cross sections discussed with the Town, provided by DSEL are attached in **Appendix C** and the detailed requirements are discussed in **Section 3.1**.

3 DRAFT PLAN DESIGN REVIEW

TYLin completed a review of the proposed subdivision draft plan design for the Frontenac lands. The proposed design was evaluated based on the standards set forth by the Town of Milton 2024 Engineering and Parks Standards Manual, the 2015 Halton Region Access Management Guidelines, the Tertiary Plan completed for the MP4TC lands (dated December 2021), Ontario Building Code as well as the Transportation Association of Canada (TAC) 2017 Geometric Design Guide for Canadian Roads.

It is considered that the design of the roadways is deemed acceptable and detailed review and findings have been summarized below.

3.1 Right-of-Way (ROW)

According to the Town of Milton standards, the minimum ROW width requirement for minor collector roads is 24m, while it is 16m for minor local roads and 11m for laneways.

According to the Tertiary Plan for the MP4TC lands, collector roads are proposed with a ROW width of 21.5m or 20m depending on the roadway, local roads are proposed with a 16m ROW width and laneways are proposed with a ROW width of 8.5m depending on the laneway type.

The proposed ROW widths established as part of the Tertiary Plan for the MP4TC lands derived specifically for the study area would take precedence over the Town of Milton standards.

Based on the draft plan of proposed subdivisions for Frontenac lands as illustrated in **Figure 3-1**, the ROW widths of collector roads, local roads and laneways are summarized in **Table 3-1** below.

Table 3-1 Proposed Right-of-Ways (ROW) Width

ROW Types	Street Index	Design Requirement		Proposed Width
		Town of Milton	Tertiary Plan for the MP4TC lands	
Minor Collector Roads	Street 'A', 'D' and 'E'	24m	21.5m or 20m	21.5m
	Street 'B', 'C', 'F' and 'G'			20m
Minor Local Road	Other remaining streets	16m	-	16m
Laneways	Lane 'A' – 'O', 'S' and 'R'	11m	8.5m	9.5m
	Lane 'P' and 'Q'			8.5m

The proposed ROW widths of 21.5m and 20m for collector roads, 16m for local roads and 8.5m for laneways align with the recommendations specified in the Tertiary Plan for the MP4TC lands. The select laneways with proposed ROW widths of 8.5m and 9.5m are deemed acceptable from design perspective and are proposed for the Town's review and approval.

3.2 Cul-de-Sac and Road Bends

According to the Town of Milton Standard Drawing 02–01.01 as provided in **Appendix D**, cul-de-sacs are required to be designed with a minimum transition radius of 11m at the curbline and minimum ROW radius of 18m. The proposed cul-de-sac is designed with a transition radius of 15m at the ROW line and ROW radius of 18.5m, exceeding the requirements and thus deemed acceptable.

Furthermore, all roadway bends in the draft plan are designed with a centreline radius of 12m or more, with most bends along local roads with a 13m centreline radius. The centreline radii complies with the radius requirement of 12m specified in Ontario Building Code's Access Route Design and is deemed acceptable for the site. Please refer to **Figure 3-1** for the proposed cul-de-sac and road bend designs.

3.3 Horizontal Curvature

Per the Town of Milton standards, a minimum horizontal curvature radius is 90m for local and minor collector roadways and 130m for major collector roads. These requirements have been met within the proposed design, as illustrated in **Figure 3-2**.

3.4 Intersection Spacing

According to the Town of Milton standards and TAC, the minimum intersection spacing required along local and collector roadways is measured from centreline to centreline and summarized as below. Per the Milton Official Plan, Eighth Line is classified as a collector roadway.

- 60m for four-legged intersections;
- 40m for three-legged intersections.

In addition, the Region guidelines specify the following minimum spacing, measured from stop bar to stop bar, for a C4 urban road, encompassing Trafalgar Road and Derry Road.

- 300m for a full-moves intersection;
- 115m for a right-in/right-out intersection.

The above requirements have been met within the proposed draft plan, with the exception of

select spacing for laneway intersections. Most laneways are designed as three-legged intersections, generally with spacings of at least 35m, which is near the 40m minimum requirement. Given that laneways are expected to accommodate lower volumes of traffic compared to local roads. Therefore, it is considered that these spacings would be acceptable.

Several four-legged laneway intersections at Lane 'J' & Lane 'P' at Street 'R' are proposed with substandard spacing compared to the 60m requirement. However, as previously stated, laneways are intended to accommodate lower traffic volumes. As such, the reduced intersection spacing is deemed acceptable subject to the Town's review and approval.

Please refer to **Figure 3-2** for a review of intersection spacing within the lands.

3.5 Intersection Angle

According to the Town and Region design standards, intersection angles are subject to the following requirements:

- 90 degrees for intersections with arterial and collector roadways;
- 80 – 100 degrees for local roads intersections.
- 85 – 95 degrees for laneway intersections.

The majority of proposed intersections within the draft plan conform to the above requirements, with the exception of select collector intersections involving collector roads, which are proposed with intersection angles ranging from 80 to 90 degrees, in accordance with the road alignments in the Secondary and Tertiary plans.

All proposed intersection angles, however, fall within the TAC-approved range of 70 – 110 degrees. Given this, the proposed intersection angles would not result in safety concerns and are considered acceptable for the development lands.

Please refer to **Figure 3-2** for a review of intersection angles within the lands.

3.6 Daylight Triangle / Rounding

According to the Town standards, the following minimum daylight triangle/rounding are applicable to the study intersections:

- 15m x 15m daylight triangles for any intersection with arterial roadways;
- 10m x 10m daylight triangles at collector-to-collector intersections;
- 7.5m x 7.5m daylight triangles at collector-to-local intersections;
- 5.0m daylight radius at local-to-local and local-laneway intersections.

All the above minimum requirements have been met or exceeded within the proposed draft plan as illustrated in **Figure 3-3**.

3.7 Minimum Tangent Length at Intersections

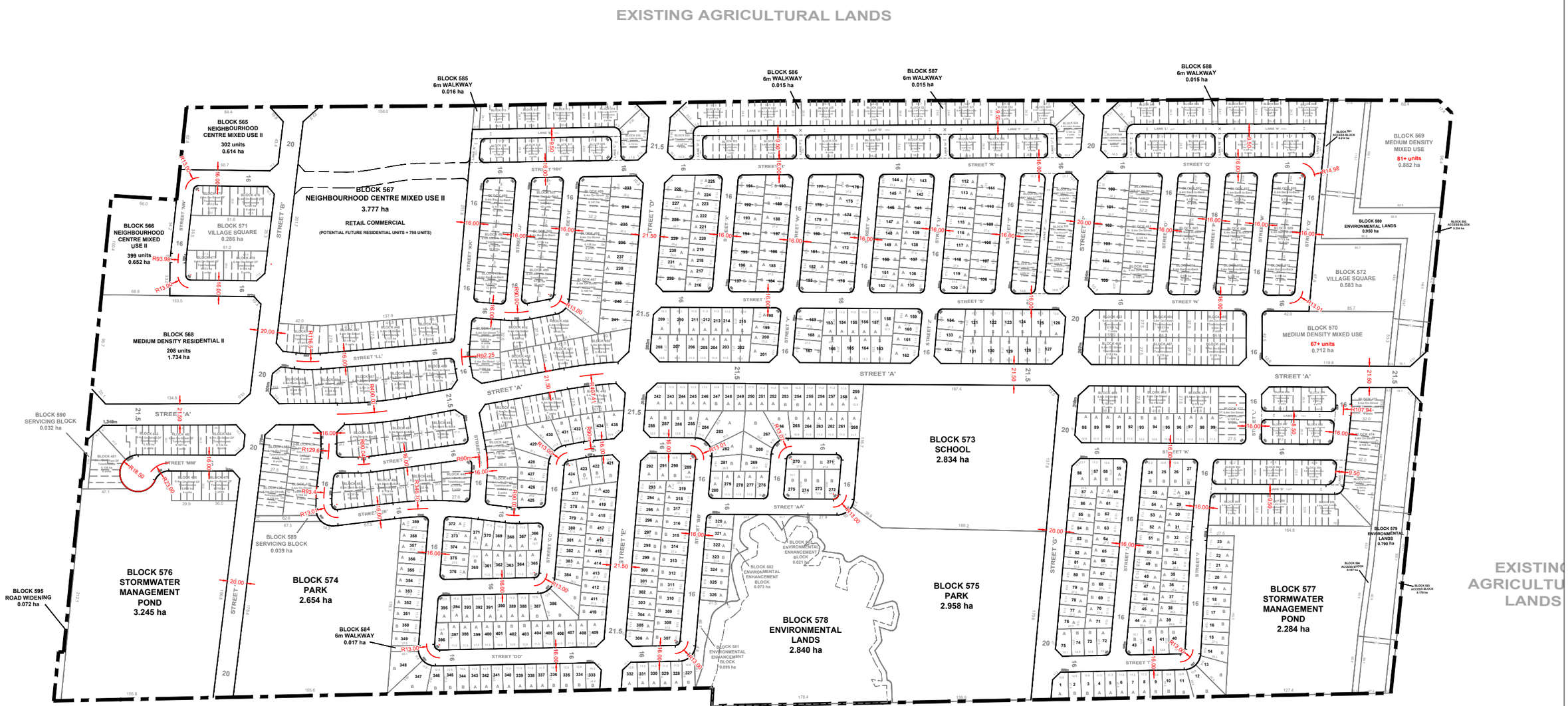
According to the Town standards, the minimum tangent length requirements at intersections are summarized as follows:

- 30m along local roads and laneways;
- 50m along minor collector roads;
- 60m along major collector roads.

The above requirement has been met at most of the intersections.

For intersections where the minimum tangent length is not met or situated along curved road sections, TYLin completed a review of the stopping sight distance, which is required to be 65m for collector roadways and 30m for local roadways.

The review indicated that the available sightlines are fully contained within the ROW, and no concerns are projected regarding visibility or safety at these locations. The tangent length and stopping sight distance reviews have been illustrated in **Figure 3-4**.



Note:

- The proposed ROW widths of 21.5m and 20m for collector roads, 16m for local roads and 8.5m for laneways fall in line with the requirements specified in the Tertiary Plan for the MP4TC lands. The select laneways with proposed ROW width of 9.5m are deemed acceptable from design perspective and are proposed for the Town's review and approval.
- The horizontal curve radius requirement per the Milton Design Standards is a minimum of 90m along local roads, 90m along minor collector roads and 130m along major collector roads.
- The cul-de-sac design requirements per the Milton standard drawing E-13 is a minimum transition radius of 11m and minimum ROW radius of 18m.
- The centreline radii complies with the radius requirement of 12m specified in Ontario Building Code's Access Route Design and is deemed acceptable for the site.

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TRINISON MANAGEMENT CORP. - FRONTENAC FOREST DRAFT PLAN (MP4 LANDS)
TRAFFIC IMPACT STUDY
RIGHT-OF-WAY & HORIZONTAL CURVE RADIUS & CUL-DE-SAC DESIGN

SCALE 1:4

DRAWING No. Fig. 3.1

DATE APR 2025

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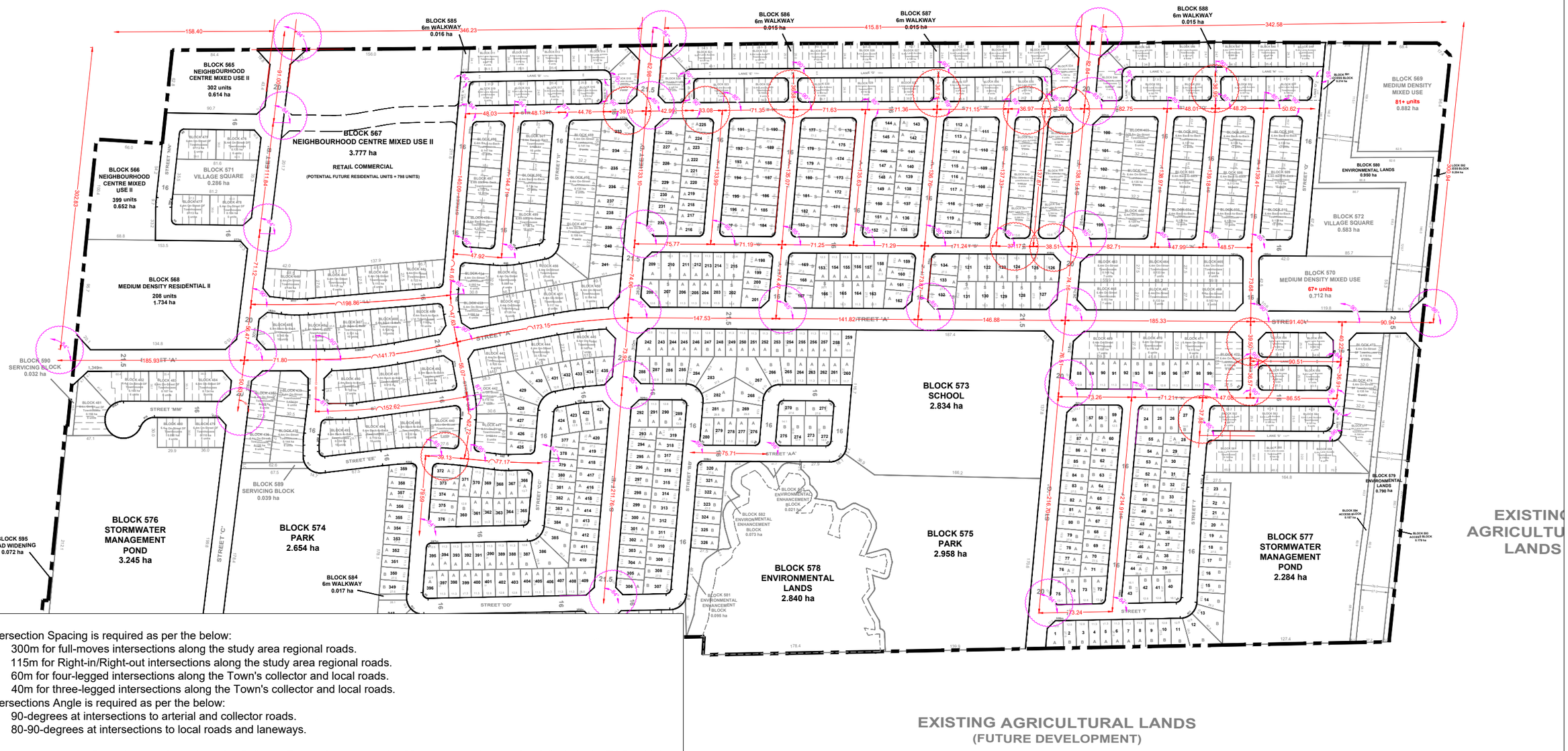

Note:

- Intersection Spacing is required as per the below:
  - 300m for full-moves intersections along the study area regional roads.
  - 115m for Right-in/Right-out intersections along the study area regional roads.
  - 60m for four-legged intersections along the Town's collector and local roads.
  - 40m for three-legged intersections along the Town's collector and local roads.
- Intersections Angle is required as per the below:
  - 90-degrees at intersections to arterial and collector roads.
  - 80-90-degrees at intersections to local roads and laneways.

- **Intersection Angle:** Some intersections along the Collector Roads do not meet the 90-degree requirement but fall within the TAC guideline range 70-110 degrees, which is deemed acceptable.
- **Intersection Spacing:** Most laneways are designed as three-legged intersections, with spacings of at least 35m. Four-legged laneway intersections at Lane 'J' & Lane 'P' at Street 'R' are proposed with substandard spacing. They are expected to accommodate lower volumes of traffic, hence, it is considered that these spacings would be acceptable.

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TRINISON MANAGEMENT CORP. - FRONTENAC FOREST DRAFT PLAN (MP4 LANDS)
TRAFFIC IMPACT STUDY
INTERSECTION SPACING & ANGLE

SCALE	DRAWING No.
1:4	Fig. 3.2
	DATE APR 2025

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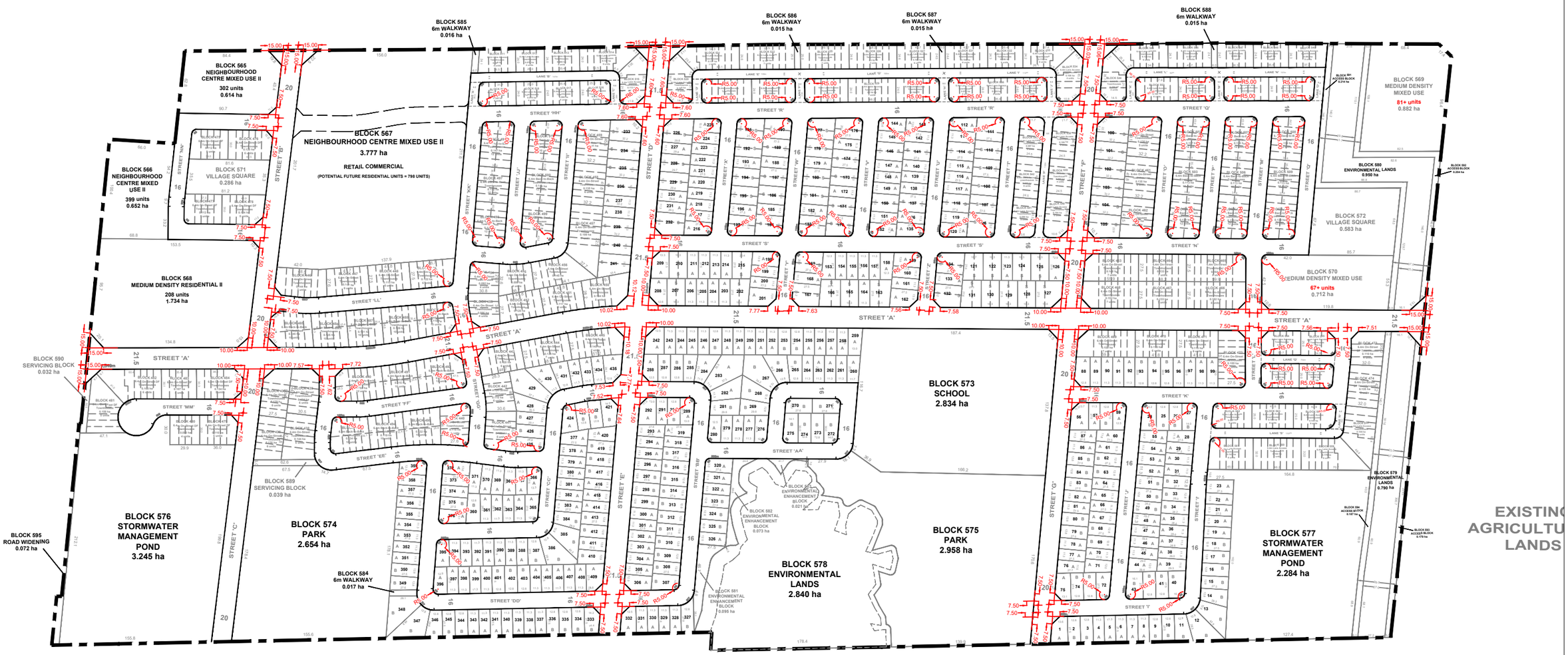

Note:

- Daylight triangles/rounding are required to be designed as follows:
  - 15x15m triangles at arterial intersections
  - 10x10m triangles at collector-to-collector intersections
  - 7.5x7.5m triangles at collector-local intersections
  - 5m rounding for local-local intersections and local-laneway intersections

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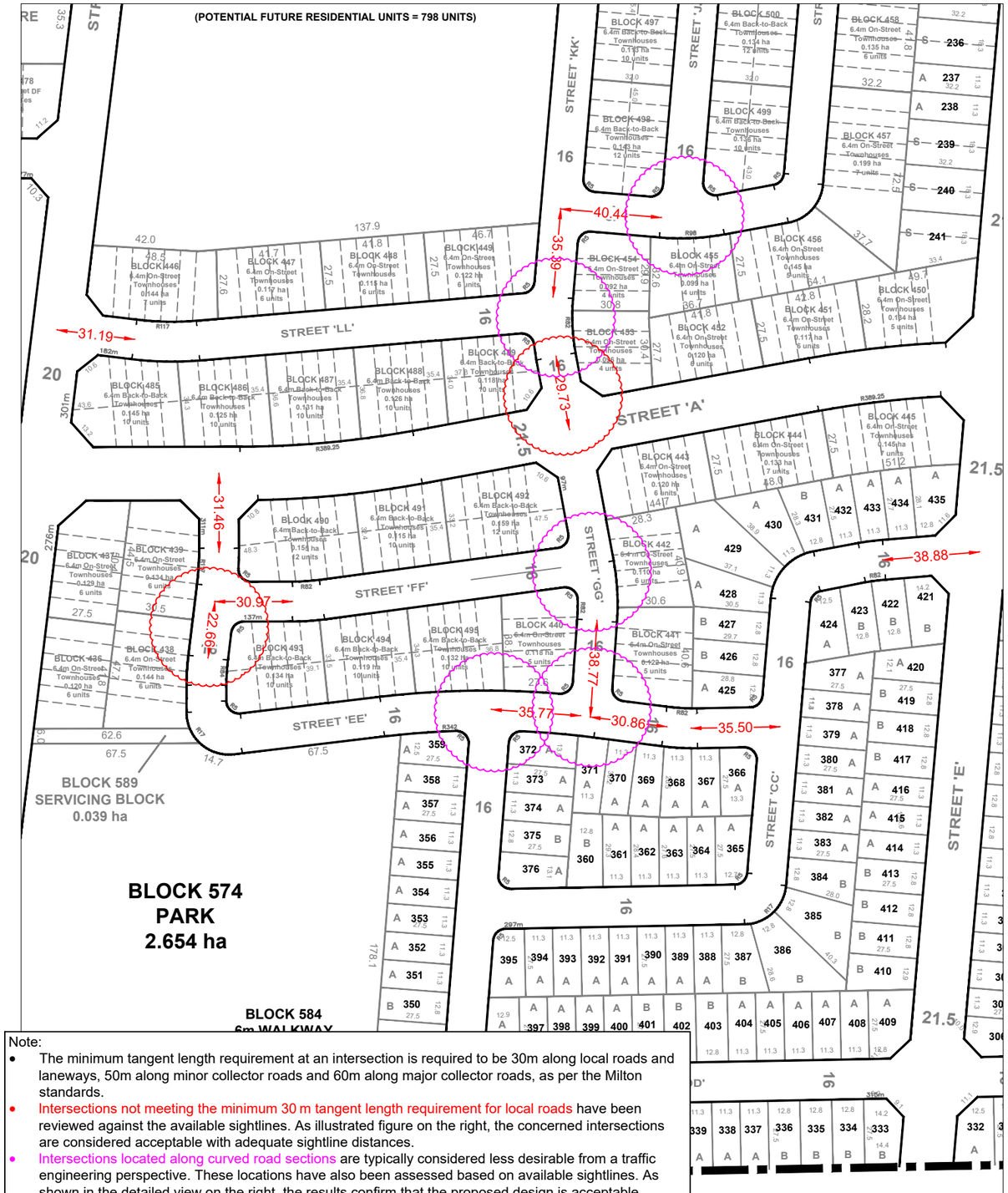
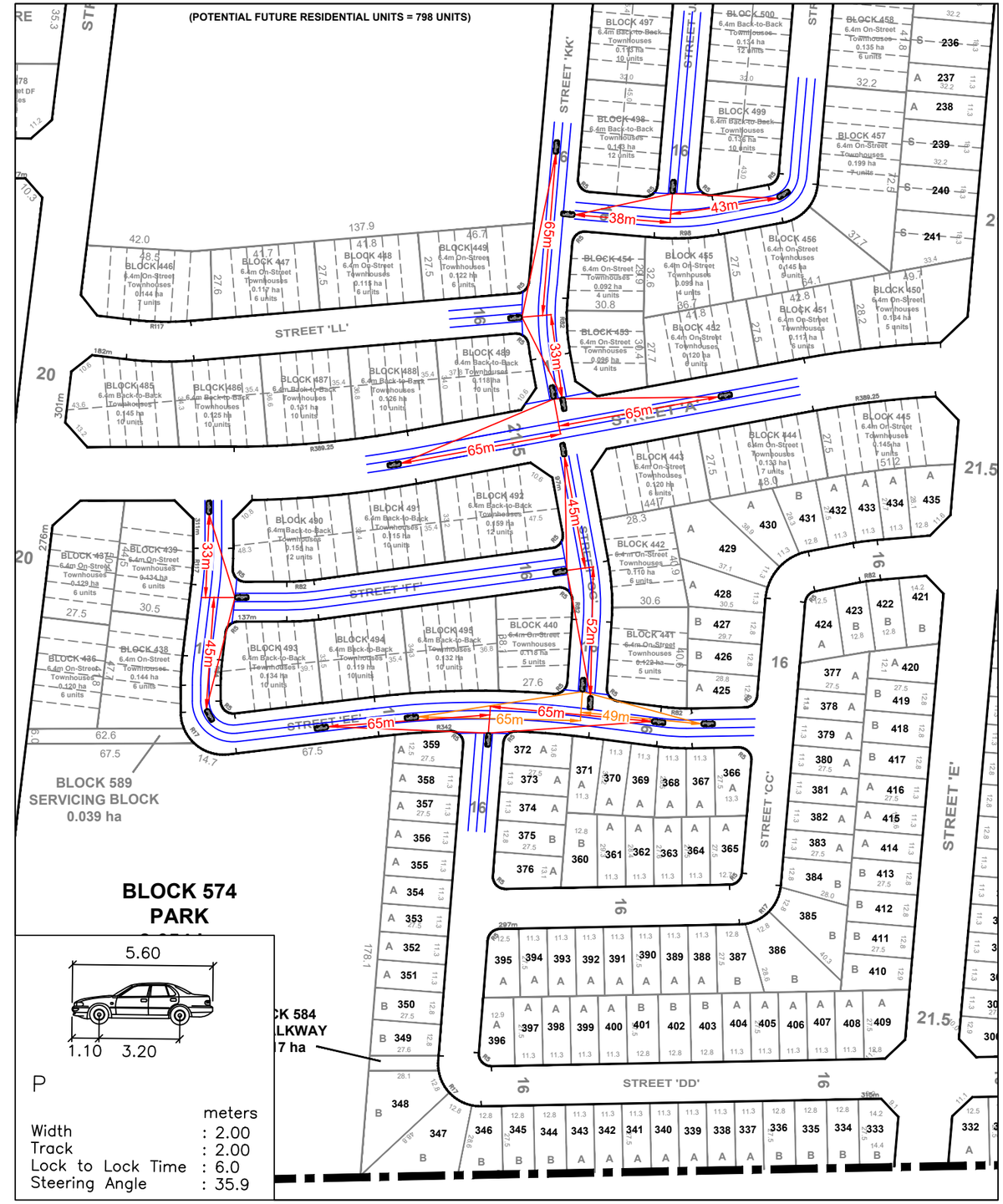
TRINISON MANAGEMENT CORP. - FRONTENAC FOREST DRAFT PLAN (MP4 LANDS)
TRAFFIC IMPACT STUDY
DAYLIGHT TRIANGLES

SCALE	DRAWING No.
1:4	Fig. 3.3
	DATE FEB 2025





Note:

- The minimum tangent length requirement at an intersection is required to be 30m along local roads and laneways, 50m along minor collector roads and 60m along major collector roads, as per the Milton standards.
- Intersections not meeting the minimum 30 m tangent length requirement for local roads have been reviewed against the available sightlines. As illustrated figure on the right, the concerned intersections are considered acceptable with adequate sightline distances.
- Intersections located along curved road sections are typically considered less desirable from a traffic engineering perspective. These locations have also been assessed based on available sightlines. As shown in the detailed view on the right, the results confirm that the proposed design is acceptable.

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TRINISON MANAGEMENT CORP. - FRONTENAC FOREST DRAFT PLAN (MP4 LANDS)
TRAFFIC IMPACT STUDY
MINIMUM TANGENT LENGTH & STOPPING SIGHT DISTANCE REVIEW

SCALE 1:2

DRAWING No. Fig. 3.4

DATE APR 2025

4 EXISTING CONDITIONS

4.1 Existing Roadway Network

The existing roadways included as part of this traffic impact study assessment include the following:

- **Trafalgar Road** is a north-south major arterial roadway under the jurisdiction of the Region of Halton, as per the Region of Halton Official Plan. Currently, the roadway has a five-lane rural cross-section consisting of two lanes in each direction and a centre median. Trafalgar Road has a posted speed limit of 70 km/h in the vicinity of Derry Road, with paved shoulders and no sidewalks.
- **Derry Road** is an east-west major arterial roadway under the jurisdiction of the Region of Halton, as per the Region of Halton Official Plan. Currently, the roadway has a four-lane rural cross-section consisting of two lanes in each direction. Derry Road has a posted speed limit of 80 km/h within the study area, with paved shoulders and no sidewalks.
- **Eighth Line** is a north-south collector roadway under the jurisdiction of the Town of Milton. Currently the roadway has a two-lane rural cross-section consisting of one lane in each direction. Eighth Line has a posted speed limit of 70 km/h in the vicinity of Derry Road, with gravel shoulders and no sidewalks.

4.2 Existing Traffic Data

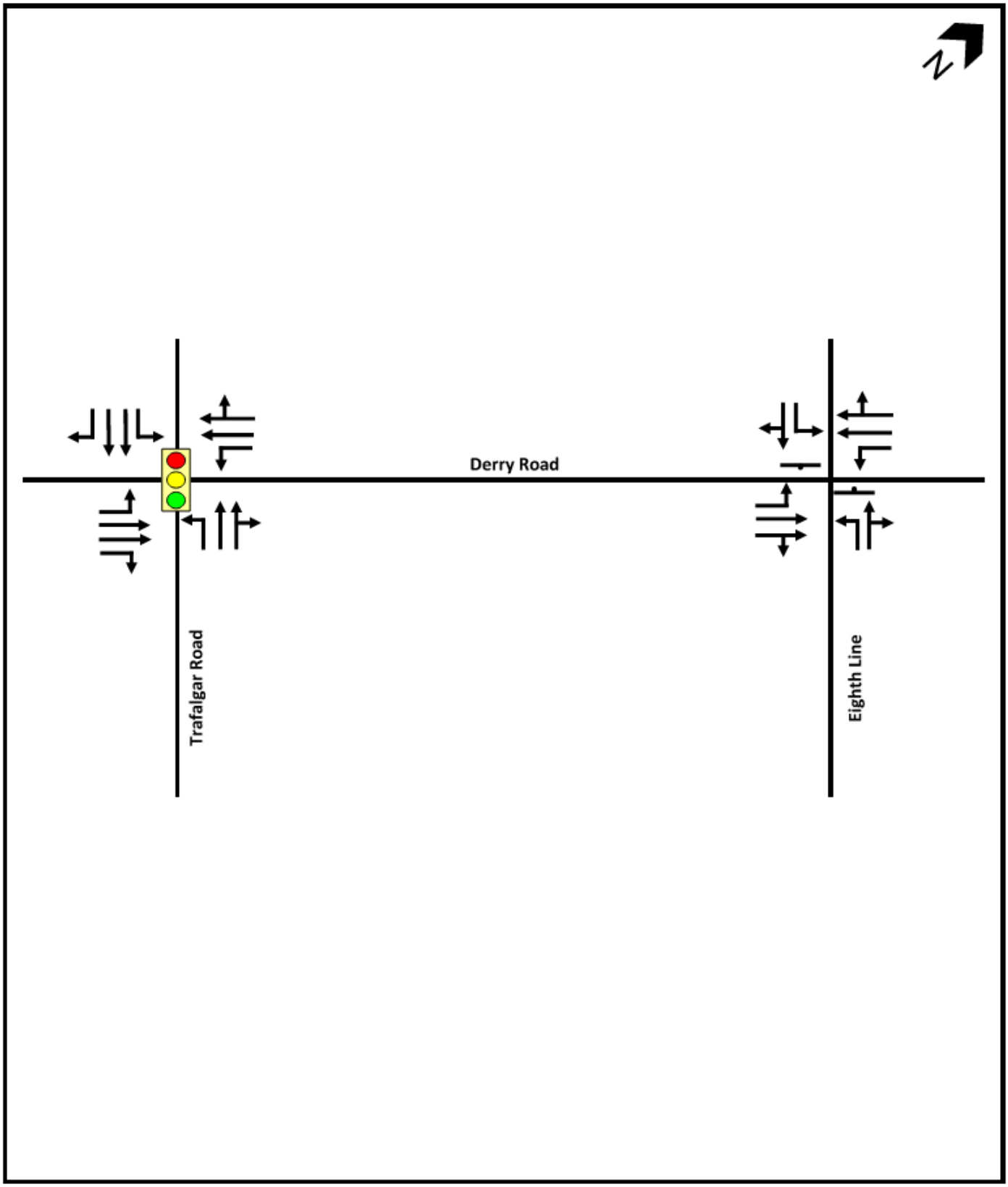
Existing signal timing plans (STPs) were obtained from Halton Region Staff for the existing study intersections, as applicable.

Turning movement count (TMC) data was collected on January 18, 2023 from 6:00 AM to 9:00 AM, 11:00 AM to 1:00 PM, and from 4:00 PM to 7:00 PM, from which the weekday AM and PM peak hours were identified.

TYLin's 2023 TMC data, sourced from the RNA study, was collected after the recent (2022) Highway 401 widening from Mississauga to Milton, and will form the baseline/existing traffic volume dataset for the purposes of the TIS.

The existing signal timing plans and baseline traffic data are provided in **Appendix E**. Baseline traffic volumes and lane configurations at the existing study area intersections are provided in **Figure 4-1** and **Figure 4-2** respectively.

Figure 4-1 Existing Baseline Lane Configuration



TYLin

Legend

Signalized Intersection

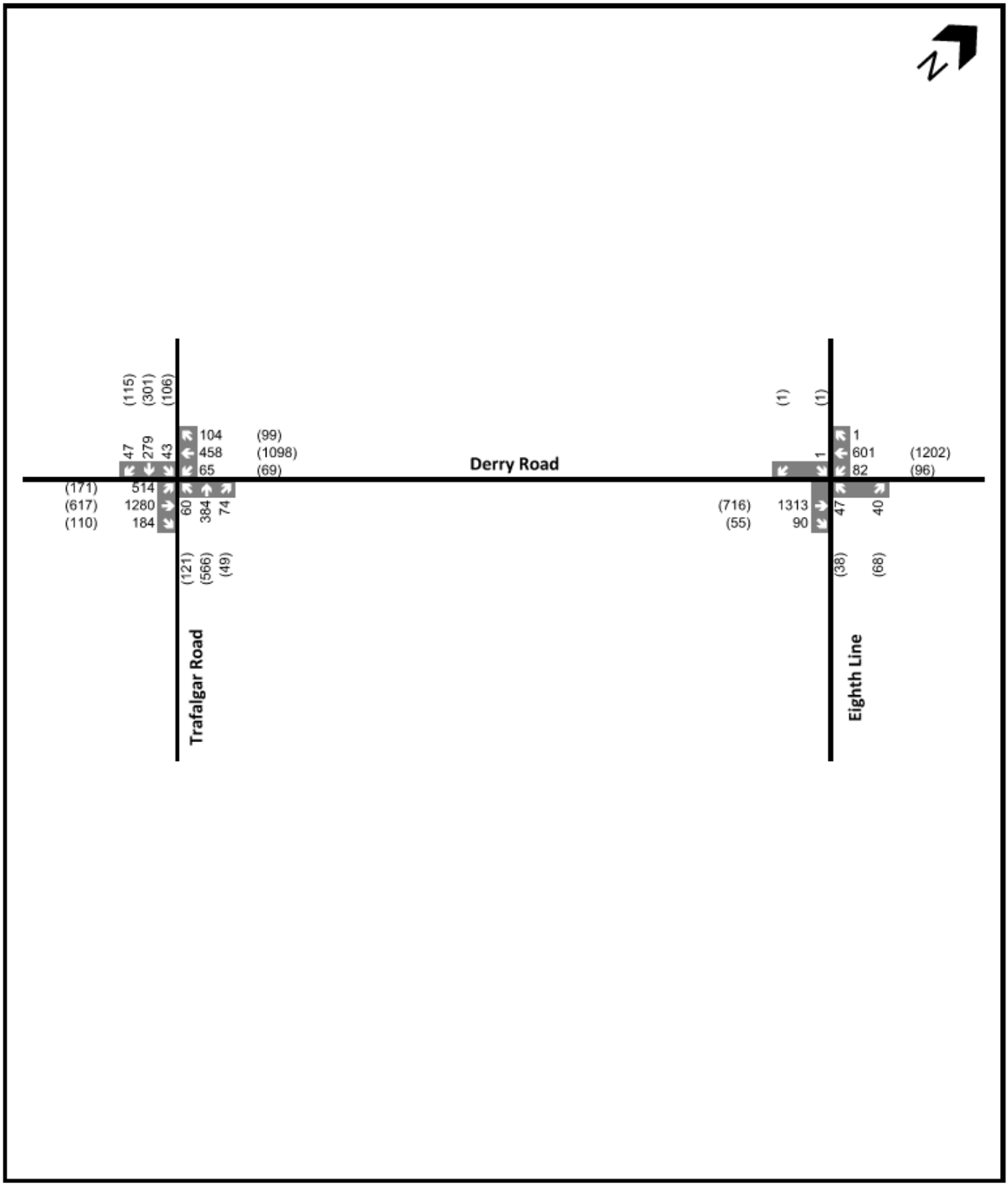
Unsignalized Intersection

Existing Lane

Figure 4-1

Existing Baseline Lane Configurations

Figure 4-2 Baseline Traffic Volumes



Legend

xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TYLin

Figure 4-2

Baseline Traffic Volumes

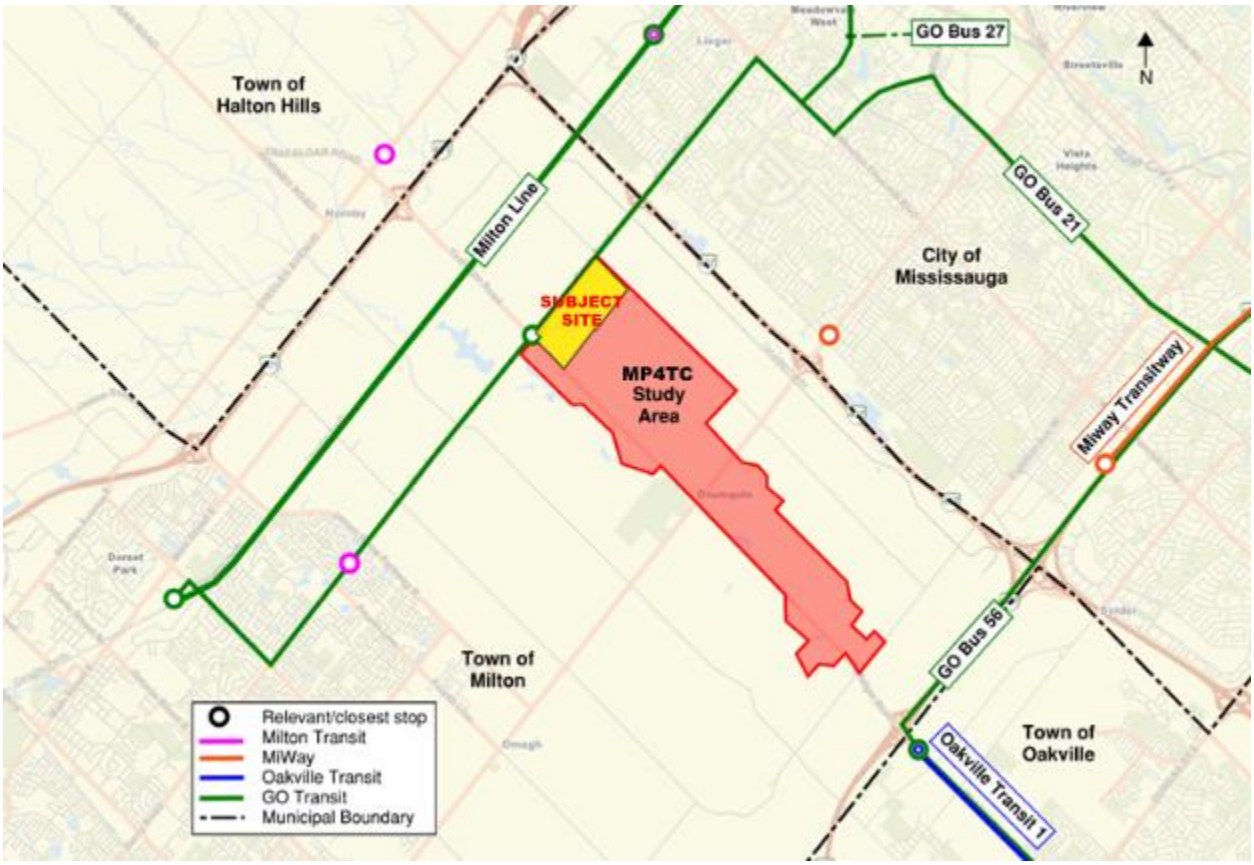
4.3 Existing Active Transportation Network

Given the rural context of the subject site, the existing road network does not provide sidewalks for pedestrians or other dedicated active transportation infrastructure, such as on-road bicycle lanes. While cyclists may use these roads under existing conditions, sharing the general purpose lanes with vehicles traveling at high operating speeds (70 km/h or higher) or using the paved shoulders, these are not considered safe cycling conditions.

4.4 Existing Transit Network

The study area is located outside of existing urban areas that provide local transit services, such as Milton to the northwest, Mississauga to the east, and Oakville to the south. Regional GO Transit routes and Bus Rapid Transit (BRT) Stations are located within the vicinity of the study area, however, the study area is not directly serviced by Regional transit at the time of this report. The existing transit route and stop plan is illustrated in **Figure 4-3**.

Figure 4-3 Existing Transit Routes and Stops



4.4.1 GO Transit

The Milton GO Station, located west of the subject site, is approximately an 8 km drive away from the intersection of Trafalgar Road and Derry Road. The Milton GO Station provides access to the GO Train Milton Line, GO bus routes 21 – Milton and 27 – Milton / North York.

GO Train Milton Line is a generally east-west train line that operates from Union Station in the City of Toronto to Milton Station in the Town of Milton. The line runs on weekdays with a frequency of as low as 15 minutes. Eastbound service is available between 6:00 AM and 8:30 AM, while westbound service is available between 3:40 PM and 7:10 PM.

There are two stops in the vicinity of the study area.

- Milton Station is located approximately 8 km from the northwestern limit of the study area and is a 12-minute drive away.
- Lisgar Station, located in Mississauga, is located approximately 5 km from the northeastern limit of the study area and is a 7-minute drive away. This train service is not provided at weekends.

GO Bus Route 21 – Milton is a generally east-west bus route that operates between Union Station in the City of Toronto and Milton Station in the Town of Milton. Eastbound service is provided throughout the day on weekdays, except during the times which overlap with the GO Train schedule, starting from 3:45 AM to 12:25 AM into the following day. The earliest westbound service towards Milton Station departs Union Station at 5:40 AM while the final bus departs at 2:20 AM the next day. Service frequency is approximately 1-hour for both directions.

At the weekend the route operates with 1-hour service frequency from 5:00 AM to 2:00 AM The nearest stop is at Derry Road and Trafalgar Road which is directly at the northern boundary of the study area.

GO Bus Route 27 – Milton / North York 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 AM and 7:30 PM. Westbound service is provided at a frequency of 30-minutes between 5:00 and 9:00 PM on weekdays. The nearest stop is at Derry Road and Trafalgar Road which is directly at the northern boundary of the study area. During the weekends, the complete route service is only provided in the eastbound direction, departing Milton GO at 5:35 AM and in the westbound direction, departing Finch Bus Terminal at 6:30 AM.

4.4.2 Milton Transit

The urban area of the Town of Milton is located to the northwest of the study area, and Milton Transit operates a total of 9 bus routes. The closest Milton Transit bus stops are located at the

Lisgar GO Station, Toronto Premium Outlets, and Trudeau Drive at Derry Road as indicated in **Figure 4-3**.

4.4.3 MiWay Transit

The City of Mississauga is generally located east and southeast of the study area, and MiWay Transit operates an extensive network of bus routes through the entire city. The closest bus stop is located at Britannia Road and 9th Line which is approximately 2 km from the eastern edge of the study area. **Figure 4-3** illustrates the existing transit routes in proximity to the study area.

4.4.4 City of Mississauga's Transitway

The western terminus of the Mississauga Transitway (BRT service that serves as an east-west transit spine through Mississauga), located at the interchange of Highway 403 and Winston Churchill, is approximately a 12 km drive away from the subject site and provides potential connections to other Mississauga bus routes and Toronto transit at the eastern terminus of the Transitway.

5 BACKGROUND CONDITIONS

5.1 Study Horizon Years

In this TIS, the horizon years of 2031 (build-out year of the Frontenac Lands) and 2041 (ten-year horizon) were adopted to assess the future traffic conditions. The study horizons align with the horizons assessed in the ongoing Trafalgar Tertiary Plan RNA study. The future traffic volume in 2031 horizon will include the Frontenac Lands trips plus the balance of MP4 Phase 1 lands, while the 2041 horizon will further incorporate the balance of MP4 Phase 2 lands.

5.2 Study Area Road Network Improvement

The existing roads within the study area (Trafalgar Road, Derry Road, and Eighth Line) are expected to have road improvements completed by 2031, as per Halton Region's TMP, and recommendations made in the TMP for the Trafalgar (April 2024) and Agerton (June 2022) Secondary Plan Areas. Improvements to the existing road network to accommodate future development are also addressed in this report, as well as the RNA study.

The Region's TMP classifies Trafalgar Road and Derry Road as C4 Urban roads with a 47 metre right-of-way that includes six vehicular travels lanes, as shown in **Figure 5-1** and **Figure 5-2**, excerpts from the Halton TMP. The excerpt of **Figure 5-1** from the Halton TMP has been attached in **Appendix F** for clarity.

This will result in the existing roadways being widened from two lanes in each direction to three lanes, accommodating a High Occupancy Vehicle (HOV) lane in addition to two general purpose travel lanes in each direction. The urbanization of the roads will occur when they are widened, and the C4 urban road cross section includes provision for new active transportation infrastructure such as sidewalks, multi-use paths, and/or on-street bicycle lanes.

As per Halton Region's 2024 Budget and Business Plan, construction is proposed to start by 2031 to widen Derry Road to six lanes within the limits of the RNA study area. Construction to widen Trafalgar Road to six lanes within the RNA study area is proposed to start in 2029/2030, as per the 2024 Budget and Business Plan. Halton Region staff confirmed the planned regional road widenings within the study area were accounted in the 2031 JBPE travel demand forecasting model. Therefore, for the purposes of assessing/accounting for the impact of the Regional Road widening projects, Derry Road and Trafalgar Road were analyzed as six lane roads under 2031 future traffic conditions, as well as the subsequent 2041 horizon years. The intersection of Derry Road and Eighth Line is to be signalized, and in addition to the planned widening of Derry Road, eastbound and westbound dedicated right-turn lanes are recommended.

Figure 5-1 Right-of-Way Classification for Regional Roads

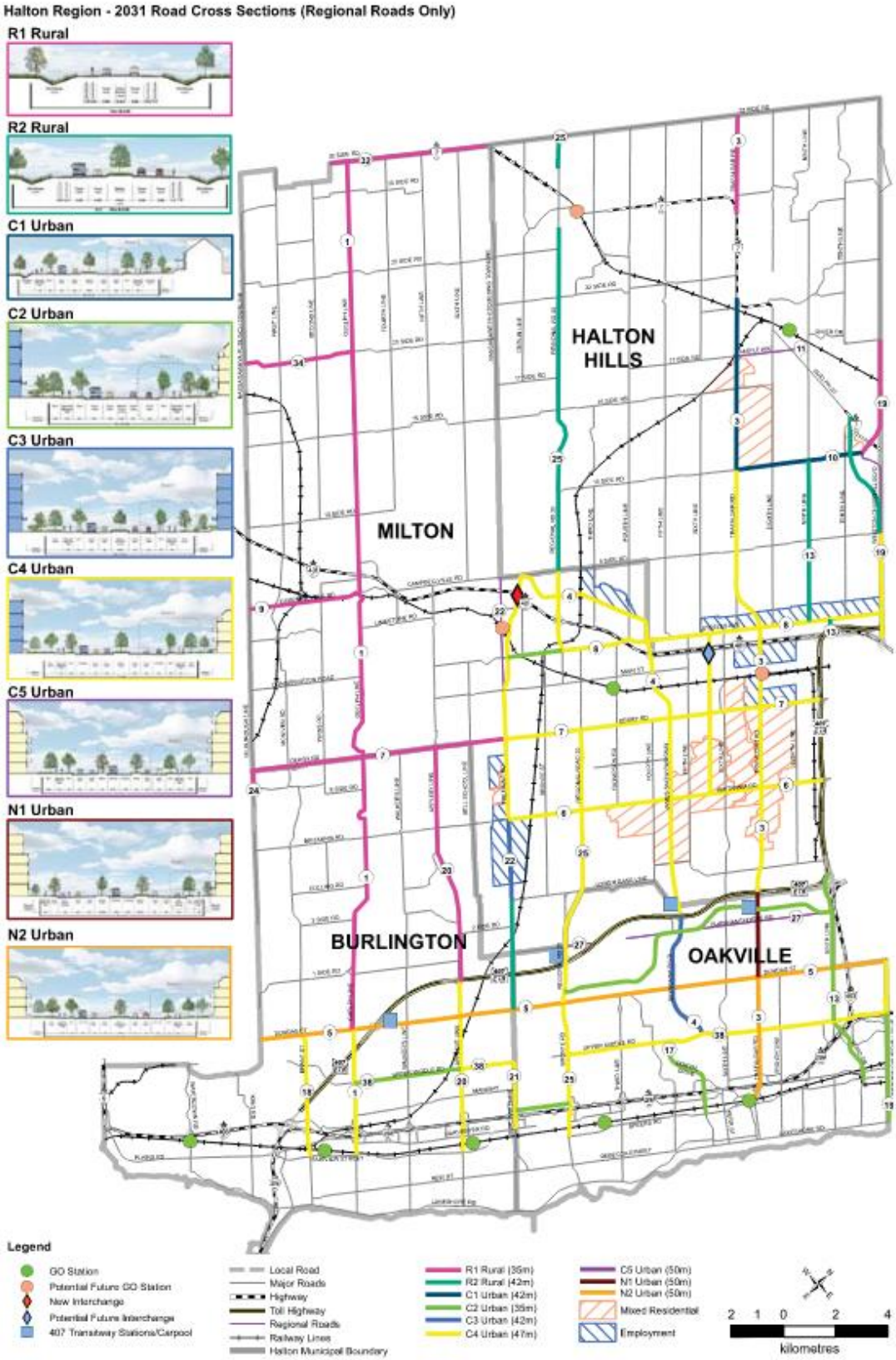
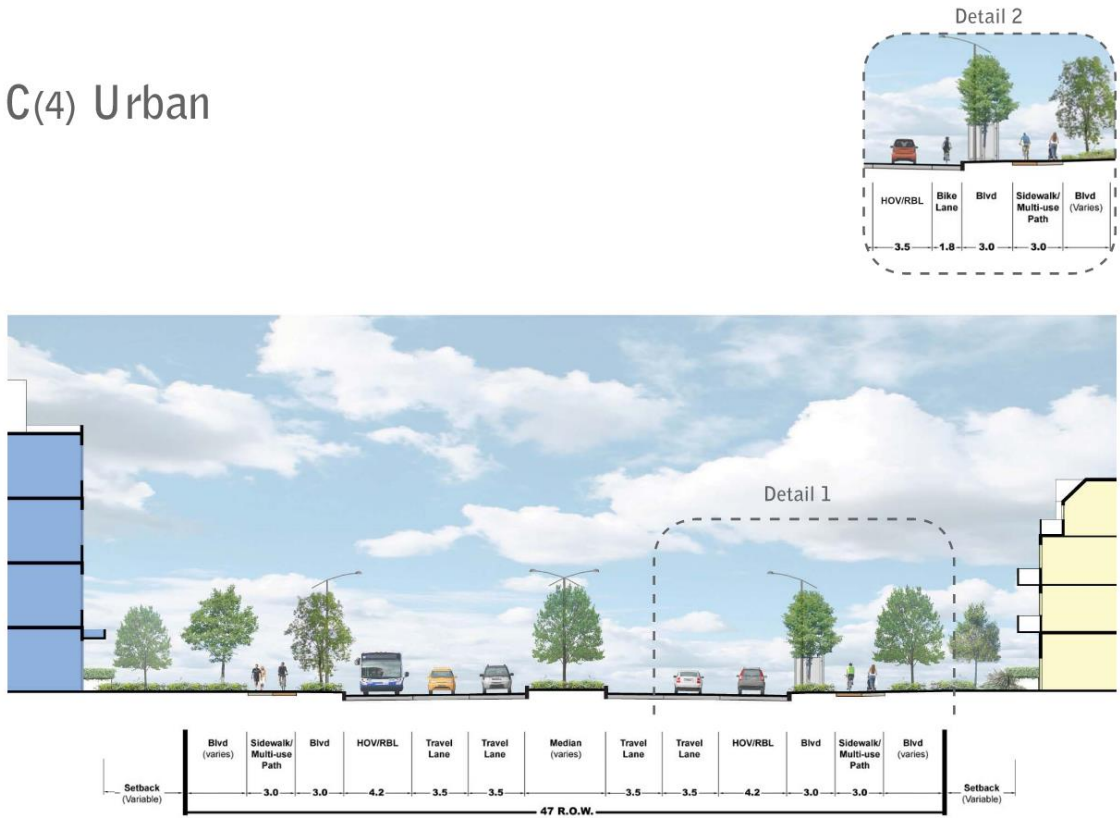
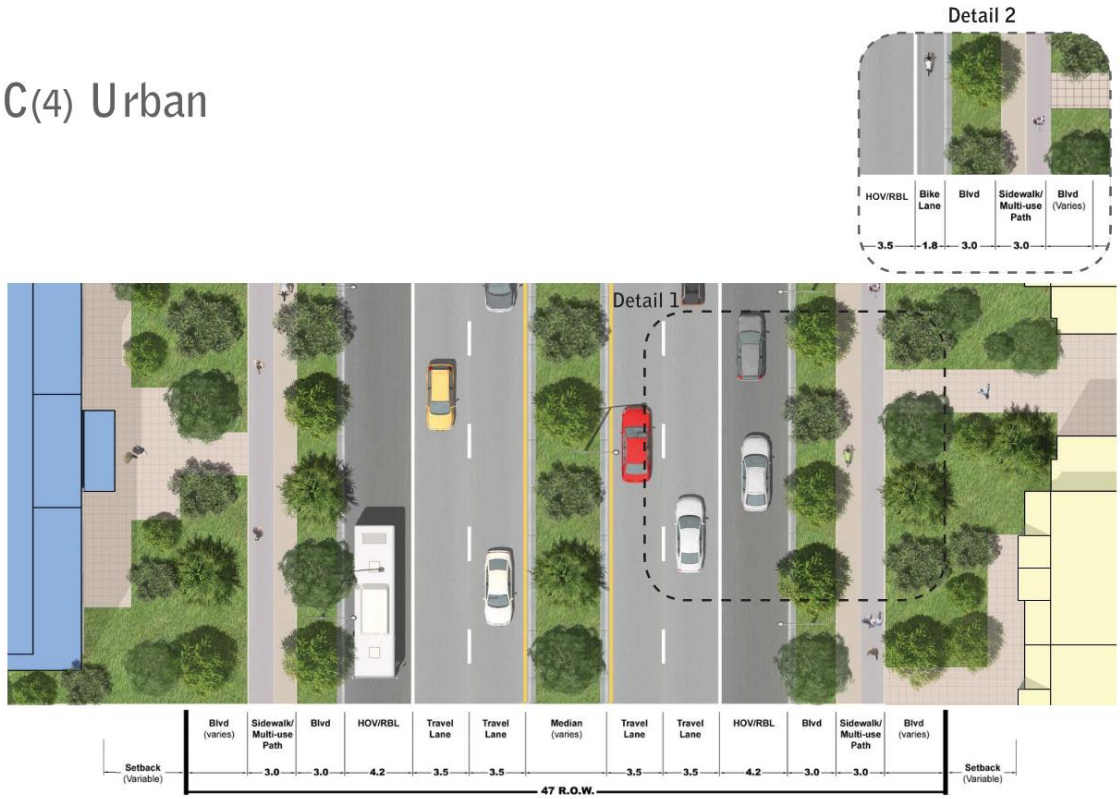


Figure 5-2 Halton Region C(4) Urban 2031 Road Cross Section





5.3 Background Corridor Growth

In alignment with the methodology used in the MP4TC RNA study, the background growth rates for the Trafalgar–Frontenac area were derived consistently with the MP4 RNA analysis for the 2031 and 2041 planning horizons. These growth rates account for cumulative impacts of population and employment forecasts based on the Region's Joint Best Practices Estimates (JBPE) travel demand model to 2051 including background developments such as the Trafalgar GO Station and Agerton lands.

The Trafalgar GO Station is a significant transit development within the vicinity of the subject site. It is proposed to be located within the Agerton Secondary Plan Lands, north of the Trafalgar Tertiary Plan area. The Trafalgar GO Station is proposed to be placed within the Major Transit Station Area (MTSA) to provide effective rail connections to users as this is planned to have high-density employment and residential areas. As per the Transportation Master Plan for the Trafalgar and Agerton Secondary Plan (dated March 2022), the preferred location for the proposed Trafalgar GO Station is west of Trafalgar Road along the existing rail line.

For the 2031 horizon, the same background growth rate of 2.65%, applied to Regional Roads in the MP4 RNA, was used to project traffic volumes within this study area.

For the 2041 horizon, growth rates provided by Region and Town staff were applied to the 2031 volumes to reflect full background development impacts. As the Town's growth rates did not include all of these developments, a combined growth rate approach was used for Town roads. Regional growth rates were added to the Town's to better capture total background traffic growth, in line with MP4 RNA assumptions.

The updated growth rates applied to the study area corridors are summarized below:

Table 5-1 Updated Growth Rates Applied to Network

Corridor	2031 to 2041
Trafalgar Road	1%
Derry Road east of Trafalgar Road	2%
Eighth Line	2.5%

5.4 Background Development

The RNA study incorporates a set of tertiary plan land uses and statistics provided by SGL for trip generation estimates. These site statistics are derived from the JBPE for the Trafalgar Secondary Plan area, as provided by the Town to the MP4T Local Operations Group (LOG).

For the purposes of this TIS, the site statistics and trip generation estimate from the RNA study

have been adjusted by excluding the Frontenac Lands site statistics to establish the background development traffic.

5.4.1 2031 Background Development – MP4 Phase 1

For the 2031 horizon year, the design parameters for the MP4 Phase 1 developments, excluding the Frontenac Lands, have been adopted to estimate the 2031 background development trip generation. The overall site statistics for the Trafalgar Tertiary Plan, along with the applicable Institute of Transportation Engineers (ITE) Land Use Codes for residential and non-residential land uses, are presented in **Table 5-2** for trip generation calculations. The corresponding trip generation estimates are summarized in **Table 5-2**.

Table 5-2 MP4 Phase 1 (without Frontenac Lands) – Overall Site Statistics

Land Use Type	Land Use	ITE Land Use Code	Parameters	Unit
Residential	Single Family Detached	LUC 210	1,857	Units
	Multifamily Housing (Low-rise)	LUC 220	1,823	Units
	Multifamily Housing (Mid-rise)	LUC 221	481	Units
	Multifamily Housing (High-rise)	LUC 222	8,348	Units
	Total Residential Units		**12,509**	**Units**
Non-Residential	Shopping Center	LUC 820	281,000	GFA (ft^2)
	Elementary School	LUC 520	2,900	Students
	High School	LUC 530	1,500	Students
	District Park	LUC 411	15	Acres

Table 5-3 MP4 Phase 1 (without Frontenac Lands) – Trip Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 1,857 Units	Trip Generation Equation or Average Rate	T = 0.71(X) +4.8			Ln(T) = 0.96Ln(X) +0.2		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	343	1023	1366	1153	676	1829
	Mode Split Reduction (28%)	-97	-286	-383	-322	-190	-512
	Net Trips	**246**	**737**	**983**	**831**	**486**	**1317**
Multi-family Housing (Low-rise) ITE LUC 220 1,823 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.95Ln(X) -0.51			Ln(T) = 0.89Ln(X) -0.02		
	Directional Split	23%	77%	-	63%	37%	-
	Gross Trips	197	656	853	653	381	1034
	Mode Split Reduction (28%)	-55	-182	-237	-184	-107	-291
	Net Trips	**142**	**474**	**616**	**469**	**274**	**743**
Multi-family Housing (Mid-rise) ITE LUC 221 481 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.98Ln(X) -0.98			Ln(T) = 0.96Ln(X) -0.63		
	Directional Split	26%	74%	-	61%	39%	-
	Gross Trips	44	122	166	132	88	220
	Mode Split Reduction (28%)	-12	-33	-45	-37	-26	-63
	Net Trips	**32**	**89**	**121**	**95**	**62**	**157**
Multi-family Housing (High-rise) ITE LUC 222 8,348 Units	Trip Generation Equation or Average Rate	T = 0.28(X) +12.86			T = 0.34(X) +8.56		
	Directional Split	24%	76%	-	61%	39%	-
	Gross Trips	603	1912	2515	1803	1155	2958
	Mode Split Reduction (28%)	-169	-535	-704	-506	-322	-828
	Net Trips	**434**	**1377**	**1811**	**1297**	**833**	**2130**
Total Residential 12,509 Units	**Net Trips**	**854**	**2677**	**3531**	**2692**	**1655**	**4347**
Shopping Center ITE LUC 820 281,000 sq.ft. GFA	Trip Generation Equation or Average Rate	0.94			Ln(T) = 0.74Ln(X) +2.89		
	Directional Split	62%	38%	-	48%	52%	-
	Gross Trips	162	101	263	872	944	1816
	Mode Split Reduction (28%)	-47	-30	-77	-243	-263	-506
	Pass-by (34% PM)	0	0	0	-228	-228	-456
	Net Trips	**115**	**71**	**186**	**401**	**453**	**854**
	Net Trips (90% Internal)	104	64	168	363	407	770
	Net Trips (10% External)	11	7	18	38	46	84

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Elementary School ITE LUC 520 2,900 Students	Trip Generation Equation or Average Rate	0.67			0.17		
	Directional Split	54%	46%	-	48%	52%	-
	Gross Trips	1048	896	1944	236	256	492
	Mode Split Reduction (28%)	-292	-252	-544	-68	-72	-140
	Net Trips	**756**	**644**	**1400**	**168**	**184**	**352**
	Net Trips (85% Internal)	644	548	1192	144	156	300
	Net Trips (15% External)	112	96	208	24	28	52
High School ITE LUC 530 1,500 Students	Trip Generation Equation or Average Rate	0.52			0.14		
	Directional Split	67%	33%	-	48%	52%	-
	Gross Trips	523	257	780	101	109	210
	Mode Split Reduction (28%)	-146	-72	-218	-28	-31	-59
	Net Trips	**377**	**185**	**562**	**73**	**78**	**151**
	Net Trips (85% Internal)	320	157	477	62	66	128
	Net Trips (15% External)	57	28	85	11	12	23
District Park ITE LUC 411 15 Acres	Trip Generation Equation or Average Rate	0.02			T = 0.06(X) +22.6		
	Directional Split	-	-	-	-	-	-
	Gross Trips	0	0	0	13	11	24
	Mode Split Reduction (28%)	0	0	0	0	0	0
	Net Trips	**0**	**0**	**0**	**13**	**11**	**24**
	Net Trips (0% Internal)	0	0	0	0	0	0
	Net Trips (100% External)	0	0	0	13	11	24
Total Non-Residential	**Net Trips**	**1248**	**900**	**2148**	**655**	**726**	**1381**
Total Trips	**Net Trips**	**2102**	**3577**	**5679**	**3347**	**2381**	**5728**

5.4.3 2041 Background Development – MP4 Full Build-out

For the 2041 horizon year, the design parameters for the full build-out of the MP4 developments, excluding the Frontenac Lands, have been adopted to estimate the 2041 background development trip generation. The overall site statistics are presented in **Table 5-4** for the purposes of trip generation calculations. The corresponding trip generation estimates are summarized in **Table 5-5**.

Table 5-4 MP4 Full Build-out (without Frontenac Lands) – Overall Site Statistics

Land Use Type	Land Use	ITE Land Use Code	Parameters	Unit
Residential	Single Family Detached	LUC 210	3,093	Units
	Multifamily Housing (Low-rise)	LUC 220	3,516	Units
	Multifamily Housing (Mid-rise)	LUC 221	972	Units
	Multifamily Housing (High-rise)	LUC 222	12,774	Units
	Total Residential Units		**20,355**	**Units**
Non-Residential	Shopping Center	LUC 820	431,000	GFA (ft^2)
	Elementary School	LUC 520	5,075	Students
	High School	LUC 530	1,500	Students
	District Park	LUC 411	30	Acres

Table 5-5 MP4 Full Build-out (without Frontenac Lands) – Trip Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 3,093 Units	Trip Generation Equation or Average Rate	T = 0.71(X) +4.8			Ln(T) = 0.96Ln(X) +0.2		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	571	1712	2283	1928	1131	3059
	Mode Split Reduction (28%)	-161	-478	-639	-538	-317	-855
	Net Trips	**410**	**1234**	**1644**	**1390**	**814**	**2204**
Multi-family Housing (Low-rise) ITE LUC 220 3,516 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.95Ln(X) -0.51			Ln(T) = 0.89Ln(X) -0.02		
	Directional Split	23%	77%	-	63%	37%	-
	Gross Trips	377	1256	1633	1239	726	1965
	Mode Split Reduction (28%)	-105	-349	-454	-349	-205	-554
	Net Trips	**272**	**907**	**1179**	**890**	**521**	**1411**

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Multi-family Housing (Mid-rise) ITE LUC 221 972 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.98Ln(X) -0.98			Ln(T) = 0.96Ln(X) -0.63		
	Directional Split	26%	74%	-	61%	39%	-
	Gross Trips	88	244	332	265	171	436
	Mode Split Reduction (28%)	-25	-68	-93	-74	-50	-124
	Net Trips	**63**	**176**	**239**	**191**	**121**	**312**
Multi-family Housing (High-rise) ITE LUC 222 12,774 Units	Trip Generation Equation or Average Rate	T = 0.28(X) +12.86			T = 0.34(X) +8.56		
	Directional Split	24%	76%	-	61%	39%	-
	Gross Trips	916	2901	3817	2747	1760	4507
	Mode Split Reduction (28%)	-256	-811	-1067	-771	-491	-1262
	Net Trips	**660**	**2090**	**2750**	**1976**	**1269**	**3245**
Total Residential 20,355 Units	**Net Trips**	**1405**	**4407**	**5812**	**4447**	**2725**	**7172**
Shopping Center ITE LUC 820 431,000 sq.ft. GFA	Trip Generation Equation or Average Rate	0.94			Ln(T) = 0.74Ln(X) +2.89		
	Directional Split	62%	38%	-	48%	52%	-
	Gross Trips	249	154	403	1328	1437	2765
	Mode Split Reduction (28%)	-71	-44	-115	-372	-401	-773
	Pass-by (34% PM)	0	0	0	-346	-346	-692
	Net Trips	**178**	**110**	**288**	**610**	**690**	**1300**
	Net Trips (90% Internal)	161	100	261	551	621	1172
	Net Trips (10% External)	17	10	27	59	69	128
Elementary School ITE LUC 520 5,075 Students	Trip Generation Equation or Average Rate	0.67			0.17		
	Directional Split	54%	46%	-	48%	52%	-
	Gross Trips	1834	1568	3402	413	448	861
	Mode Split Reduction (28%)	-511	-441	-952	-119	-126	-245
	Net Trips	**1323**	**1127**	**2450**	**294**	**322**	**616**
	Net Trips (85% Internal)	1127	959	2086	252	273	525
	Net Trips (15% External)	196	168	364	42	49	91
High School ITE LUC 530 1,500 Students	Trip Generation Equation or Average Rate	0.52			0.14		
	Directional Split	67%	33%	-	48%	52%	-
	Gross Trips	523	257	780	101	109	210
	Mode Split Reduction (28%)	-146	-72	-218	-28	-31	-59

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
	Net Trips	**377**	**185**	**562**	**73**	**78**	**151**
	Net Trips (85% Internal)	320	157	477	62	66	128
	Net Trips (15% External)	57	28	85	11	12	23
District Park ITE LUC 411 30 Acres	Trip Generation Equation or Average Rate	0.02			T = 0.06(X) +22.6		
	Directional Split	-	-	-	-	-	-
	Gross Trips	0	0	0	26	22	48
	Mode Split Reduction (28%)	0	0	0	0	0	0
	Net Trips	**0**	**0**	**0**	**26**	**22**	**48**
	Net Trips (0% Internal)	0	0	0	0	0	0
	Net Trips (100% External)	0	0	0	26	22	48
Total Non-Residential	**Net Trips**	**1878**	**1422**	**3300**	**1003**	**1112**	**2115**
Total Trips	**Net Trips**	**3283**	**5829**	**9112**	**5450**	**3837**	**9287**

5.5 Future Background Traffic Volumes

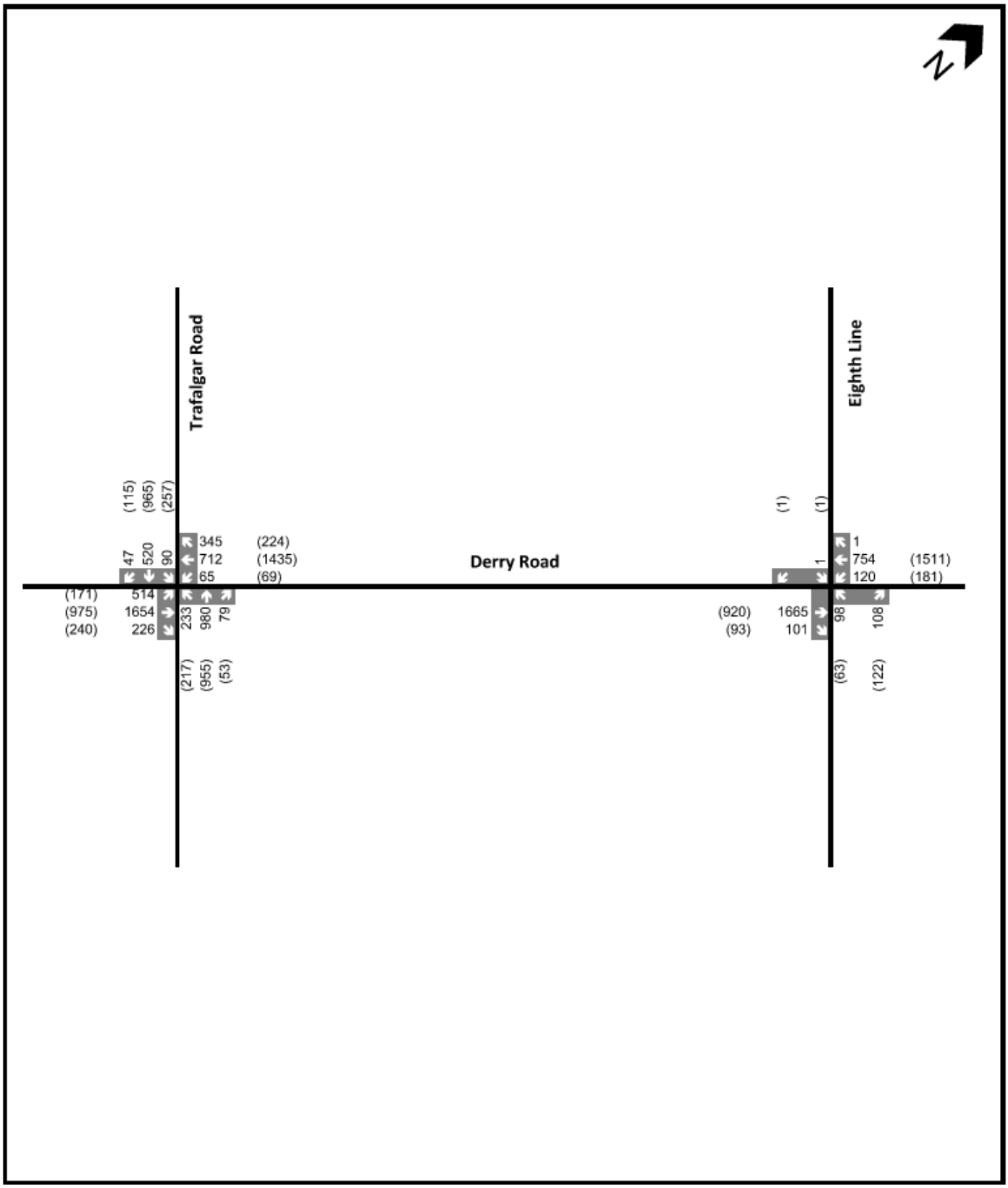
For each horizon year, future background traffic volumes were derived by applying annual background corridor growth rates to the baseline traffic volumes and incorporating traffic from background developments.

For the 2031 horizon, growth rates were applied to existing baseline volumes without including traffic from the Agerton development or the full build-out of the Trafalgar Tertiary Plan's collector road network and arterial-to-collector intersections, as confirmed through RNA discussions with Region and Town staff.

For the 2041 horizon, baseline volumes were updated to reflect continued growth, and background volumes were adjusted to account for cumulative traffic from planned developments, including the Agerton lands.

The resulting 2031 and 2041 future background volumes are provided in **Figure 5-3** and **Figure 5-4**, respectively.

Figure 5-3 2031 Future Background Traffic Volumes



Legend

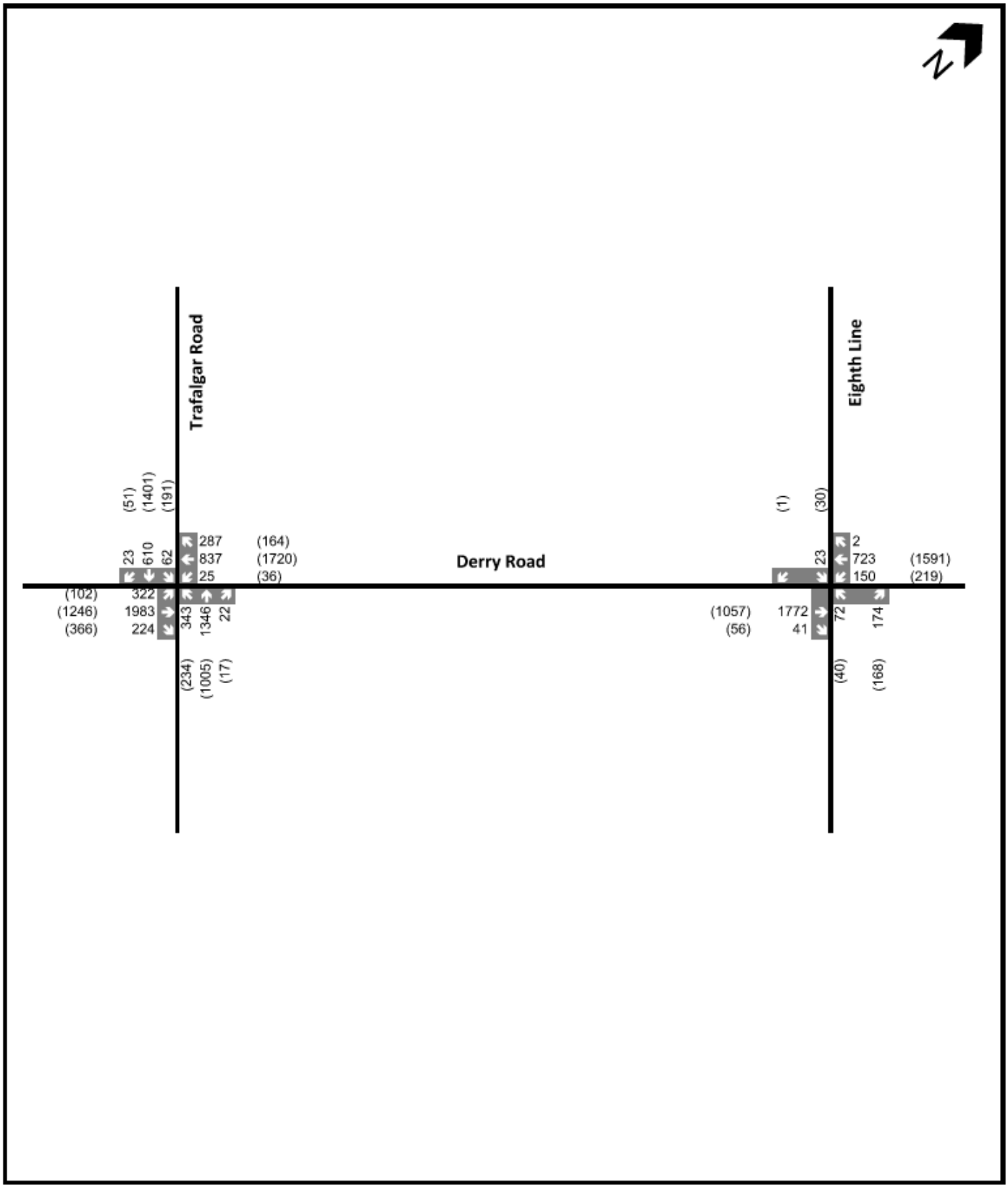
xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TYLin

Figure 5-3

2031 Future Background Traffic Volumes

Figure 5-4 2041 Future Background Traffic Volumes



Legend

xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TYLin

Figure 5-4

2041 Future Background Traffic Volumes

5.6 Future Active Transportation Network

With detailed cross section of the proposed collector attached in **Appendix B**, the 21.5 metre ROW collectors will provide on-street bicycle lanes on both sides of the road for cyclists, and sidewalks will be provided on one or both sides of the road for all collectors and 16 metre ROW local roads. In addition to sidewalks, the Tertiary Plan proposes off-street connections to parks via a trail system that will connect pedestrians not only to destinations within the Trafalgar Tertiary Plan area but also existing external trail systems.

5.7 Future Transit Network

As identified in Halton Region's 2011 TMP, a future GO Train Station on the Milton line is to be located north of the subject lands. The proposed location is to be located along the existing Milton Line railway and its crossing of Trafalgar Road to the north of Derry Road. This future GO Train Station has also been identified within the TMP for the Trafalgar Agerton Secondary Plan area. The construction of a GO Train station at this location will provide future residents of the subject site access to regional, higher-order transit within the immediate vicinity of the site.

Based on Figure 7.1 – Transit Servicing Concept in Halton Region's TMP, Trafalgar Road has been identified as a higher order transit corridor with conceptual plans for transit in reserved right of way. Similarly, Britannia Road within the MP4 RNA study area (south of the subject site) has also been identified as a regional higher order transit corridor and has been planned in concept to have semi-exclusive and/or exclusive right of way for transit operations. The Trafalgar Tertiary Plan has located higher density development along Trafalgar Road to provide the needed density of residences and employment uses to support the planned higher order transit corridor.

The planned regional higher order transit corridors within the broader Trafalgar Agerton Secondary Plan area could be further supplemented by local transit routes. These local transit routes would serve the residential areas and neighbourhood mixed use nodes while also providing connections to regional transit, such as GO Train and bus routes at the future GO Station within the Agerton lands. Provision of local transit routes through the subject site and the MP4 RNA area will be confirmed through the development application process.

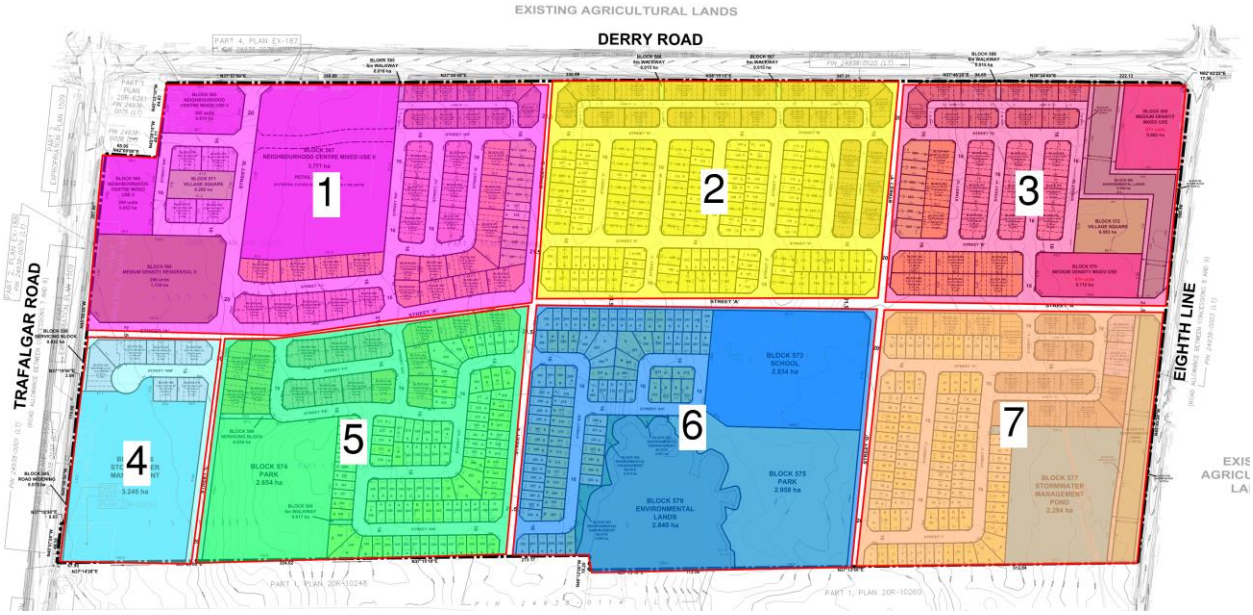
6 SITE GENERATED TRAFFIC

6.1 Traffic Analysis Zones

The overall Trafalgar Tertiary Plan was divided into a total of 38 Traffic Analysis Zones (TAZs) for trip generation and assignment. The TAZ boundaries are generally defined by the collector road network and Natural Heritage System features, mostly conforming to the shape of future development blocks where possible.

For this TIS, 7 out of total 38 TAZs within the Frontenac lands are identified as the proposed subdivision for trip generation purposes. The resulting trips were then assigned to the collector road and broader transportation network based on each TAZ's location within the Tertiary Plan. The boundaries of these 7 TAZs are illustrated in **Figure 6-1**.

Figure 6-1 Traffic Analysis Zones (TAZ) for Trinison Frontenac Lands



6.2 Mode Split

A non-automobile mode split reduction of 28% was applied to trips generated by all land use types in the Tertiary Plan area. The 28% mode split reduction is in line with that applied in the Trafalgar TMP, which was explained as being applied "as per the 2031 targets specified by the Region's 2011 TMP (5 percent active transportation, 20 percent transit, and 3 percent other transportation demand management)".

Taking into account the future active transportation infrastructure, trail network, High-Occupancy-

Vehicle (HOV) / Transit priority lanes, and Trafalgar GO Stations that will be implemented within, or in close proximity to, the Trafalgar Tertiary Plan, it is TYLin's opinion that a mode split reduction of 28% is reasonable.

6.3 Site Trip Generation

As discussed in **Section 2.4.1**, the proposed subdivision consists of detached house dwellings, townhouse dwellings, neighbourhood centre, medium density residential units, retail & commercial areas, school and lands with other usage. For analysis purposes, the types of development are categorized using Institute of Transportation Engineers (ITE) Land Use Code (LUC) and summarized in the **Table 6-1**.

Table 6-1 Frontenac Lands Draft Plan– Overall Site Statistics for Trip Generation

Land Use Type	Proposed Land Use	ITE Land Use Code	Quantity of Unit	Unit
Residential	Detached House Dwellings (of all types)	Single Family Detached (LUC 210)	435	Units
	Townhouse Dwellings (of all types)	Multifamily Housing (Low-rise) (LUC 220)	855	Units
	Medium Density Residential II	Multifamily Housing (Mid-rise) (LUC 221)	356	Units
	Medium Density Mixed Use			
	Neighbourhood Centre Mixed Use II – Unit	Multifamily Housing (High-rise) (LUC 222)	701	Units
		Total Residential Units	*2,347*	*Units*
Non-Residential	Retail & Commercial Areas	Shopping Center (LUC 820)	116,000 [1]	GFA (ft^2)
	School	Elementary School (LUC 520)	725 [1]	Students

[1] *The design parameters for Shopping Center and Elementary School are to be confirmed in the later stage. To ensure consistency, the GFA and number of students adopted in RNA study were applied for analysis of this TIS.*

Site trips of different zones, illustrated in **Figure 6-1**, were estimated using the ITE 11th Edition Trip Generation Manual using LUCs as noted in **Table 6-1**. The detailed estimated trip generation of the development from each zone are summarized in **Table 6-2** to **Table 6-8**.

Table 6-2 Frontenac Lands Zone 1 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 9 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.91Ln(X) + 0.12			Ln(T) = 0.94Ln(X) + 0.27		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	2	6	8	6	4	10
	Mode Split Reduction (28%)	-1	-2	-3	-2	-1	-3
	Net Trips	**1**	**4**	**5**	**4**	**3**	**7**
Multi-family Housing (Low-rise) ITE LUC 220 257 Units	Trip Generation Equation or Average Rate	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
	Directional Split	24%	76%	-	63%	37%	-
	Gross Trips	25	78	103	83	48	131
	Mode Split Reduction (28%)	-7	-22	-29	-23	-13	-36
	Net Trips	**18**	**56**	**74**	**60**	**35**	**95**
Multi-family Housing (Mid-rise) ITE LUC 221 208 Units	Trip Generation Equation or Average Rate	T = 0.44(X) - 11.61			T = 0.39(X) + 0.34		
	Directional Split	23%	77%	-	61%	39%	-
	Gross Trips	18	62	80	49	32	81
	Mode Split Reduction (28%)	-5	-17	-22	-14	-9	-23
	Net Trips	**13**	**45**	**58**	**35**	**23**	**58**
Multi-family Housing (High-rise) ITE LUC 222 701 Units	Trip Generation Equation or Average Rate	T = 0.22(X) +18.85			T = 0.26(X) +23.12		
	Directional Split	26%	74%	-	62%	38%	-
	Gross Trips	45	128	173	127	78	205
	Mode Split Reduction (28%)	-13	-36	-49	-36	-22	-58
	Net Trips	**32**	**92**	**124**	**91**	**56**	**147**
Shopping Center ITE LUC 820 116,000 sq.ft. GFA	Trip Generation Equation or Average Rate	T = 0.59(X) + 133.55			Ln(T) = 0.72Ln(X) + 3.02		
	Directional Split	62%	38%	-	48%	52%	-
	Gross Trips	125	77	202	301	327	628
	Mode Split Reduction (28%)	-35	-22	-57	-84	-92	-176
	Pass-by (34% PM)	0	0	0	-74	-74	-148
	Net Trips	**90**	**55**	**145**	**143**	**161**	**304**
	Net Trips (90% Internal)	81	50	131	129	145	274
	Net Trips (10% External)	9	5	14	14	16	30
Total Trips Zone 1		**154**	**252**	**406**	**333**	**278**	**611**

Table 6-3 Frontenac Lands Zone 2 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 127 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.91Ln(X) + 0.12			Ln(T) = 0.94Ln(X) + 0.27		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	23	70	93	78	46	124
	Mode Split Reduction (28%)	-6	-20	-26	-22	-13	-35
	Net Trips	**17**	**50**	**67**	**56**	**33**	**89**
Multi-family Housing (Low-rise) ITE LUC 220 133 Units	Trip Generation Equation or Average Rate	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
	Directional Split	24%	76%	-	63%	37%	-
	Gross Trips	15	49	64	49	29	78
	Mode Split Reduction (28%)	-4	-14	-18	-14	-8	-22
	Net Trips	**11**	**35**	**46**	**35**	**21**	**56**
Total Trips Zone 2		**28**	**85**	**113**	**91**	**54**	**145**

Table 6-4 Frontenac Lands Zone 3 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 6 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.91Ln(X) + 0.12			Ln(T) = 0.94Ln(X) + 0.27		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	2	4	6	4	3	7
	Mode Split Reduction (28%)	-1	-1	-2	-1	-1	-2
	Net Trips	**1**	**3**	**4**	**3**	**2**	**5**
Multi-family Housing (Low-rise) ITE LUC 220 216 Units	Trip Generation Equation or Average Rate	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
	Directional Split	24%	76%	-	63%	37%	-
	Gross Trips	22	68	90	71	42	113
	Mode Split Reduction (28%)	-6	-19	-25	-20	-12	-32
	Net Trips	**16**	**49**	**65**	**51**	**30**	**81**
Multi-family Housing (Mid-rise) ITE LUC 221 148 Units	Trip Generation Equation or Average Rate	T = 0.44(X) - 11.61			T = 0.39(X) + 0.34		
	Directional Split	23%	77%	-	61%	39%	-
	Gross Trips	12	42	54	35	23	58
	Mode Split Reduction (28%)	-3	-12	-15	-10	-6	-16
	Net Trips	**9**	**30**	**39**	**25**	**17**	**42**
Total Trips Zone 3		**26**	**82**	**108**	**79**	**49**	**128**

Table 6-5 Frontenac Lands Zone 4 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Multi-family Housing (Low-rise) ITE LUC 220 30 Units	Trip Generation Equation or Average Rate	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
	Directional Split	24%	76%	-	63%	37%	-
	Gross Trips	8	24	32	21	12	33
	Mode Split Reduction (28%)	-2	-7	-9	-6	-3	-9
	Net Trips	**6**	**17**	**23**	**15**	**9**	**24**
Total Trips Zone 4		**6**	**17**	**23**	**15**	**9**	**24**

Table 6-6 Frontenac Lands Zone 5 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 103 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.91Ln(X) + 0.12			Ln(T) = 0.94Ln(X) + 0.27		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	19	58	77	64	38	102
	Mode Split Reduction (28%)	-5	-16	-21	-18	-11	-29
	Net Trips	**14**	**42**	**56**	**46**	**27**	**73**
Multi-family Housing (Low-rise) ITE LUC 220 124 Units	Trip Generation Equation or Average Rate	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
	Directional Split	24%	76%	-	63%	37%	-
	Gross Trips	15	46	61	47	27	74
	Mode Split Reduction (28%)	-4	-13	-17	-13	-8	-21
	Net Trips	**11**	**33**	**44**	**34**	**19**	**53**
Total Trips Zone 5		**25**	**75**	**100**	**80**	**46**	**126**

Table 6-7 Frontenac Lands Zone 6 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 91 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.91Ln(X) + 0.12			Ln(T) = 0.94Ln(X) + 0.27		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	17	51	68	57	34	91
	Mode Split Reduction (28%)	-5	-14	-19	-16	-10	-26
	Net Trips	**12**	**37**	**49**	**41**	**24**	**65**
Elementary School ITE LUC 520 725 Students	Trip Generation Equation or Average Rate	0.74			0.16		
	Directional Split	54%	46%	-	46%	54%	-
	Gross Trips	290	247	537	53	63	116
	Mode Split Reduction (28%)	-81	-69	-150	-15	-18	-33
	Net Trips	**209**	**178**	**387**	**38**	**45**	**83**
	Net Trips (85% Internal)	178	151	329	32	38	70
	Net Trips (15% External)	31	27	58	6	7	13
Total Trips Zone 6		**221**	**215**	**436**	**79**	**69**	**148**

Table 6-8 Frontenac Lands Zone 7 – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing ITE LUC 210 99 Units	Trip Generation Equation or Average Rate	Ln(T) = 0.91Ln(X) + 0.12			Ln(T) = 0.94Ln(X) + 0.27		
	Directional Split	25%	75%	-	63%	37%	-
	Gross Trips	19	55	74	62	36	98
	Mode Split Reduction (28%)	-5	-15	-20	-17	-10	-27
	Net Trips	**14**	**40**	**54**	**45**	**26**	**71**
Multi-family Housing (Low-rise) ITE LUC 220 95 Units	Trip Generation Equation or Average Rate	T = 0.31(X) + 22.85			T = 0.43(X) + 20.55		
	Directional Split	24%	76%	-	63%	37%	-
	Gross Trips	12	40	52	38	23	61
	Mode Split Reduction (28%)	-3	-11	-14	-11	-6	-17
	Net Trips	**9**	**29**	**38**	**27**	**17**	**44**
Total Trips Zone 7		**23**	**69**	**92**	**72**	**43**	**115**

Table 6-9 Frontenac Lands Total – Trip Generation Summary

Land Use	Parameter	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Total Trips	Gross Trips	669	1105	1774	1145	865	2010
	Mode Split Reduction (28%)	-186	-310	-496	-322	-243	-565
	Pass-by (34% PM)	0	0	0	-74	-74	-148
	Net Trips	**483**	**795**	**1278**	**749**	**548**	**1297**
Total Adopted Trips in Frontenac TIS for TAZ 1-7		483	795	1278	749	548	1297
Total **Adopted** Trips **Trafalgar RNA** for TAZ 1-7		434	779	1213	803	594	1397
Net Difference		**+49**	**+16**	**+65**	**-54**	**-46**	**-100**

As summarized in **Table 6-9**, a total of 1,278 net auto trips, consisting of 483 inbound and 795 outbound trips, are estimated to be generated by the Frontenac Lands during the weekday AM peak hour. During the weekday PM peak hour, 749 inbound and 548 outbound net auto site trips are estimated, totaling 1,297 trips.

The current draft site plan adopts the latest design parameters for computing site trip generation, differing from the assumptions used in RNA study for the MP4TC area. As requested by the Town, the net difference in trip generation is presented. The updated trip generation for the Frontenac lands (TAZ 1–7) results in a net +65 two-way trips in AM peak hour and a net -100 two-way trips in PM peak hour. These additional 65 trips, distributed/assigned to multiple study intersections,

are expected to have minimal impact on traffic operations at the two arterial-to-arterial intersections, as discussed in **Session 8.3** and **8.5**.

6.4 Site Trip Distribution

To ensure consistency, the site trip distribution and assignment adopted for this TIS is sourced from the RNA study conducted for the MP4TC area. The key assumptions made in the RNA study are as follows.

Due to the current rural / greenfield status of the Frontenac lands, the Transportation Tomorrow Survey (TTS) data would not properly reflect the future land uses and associated travel patterns within the study area. Further, nearby future infrastructure improvements, the proposed GO Station, and other proposed developments will all contribute to changes in existing traffic patterns within the vicinity of the study area.

The Trafalgar TMP estimated the trip distribution of the Trafalgar and Agerton Secondary Plans using the Region's 2031 EMME model. The external distribution was broken down by locations in the GTA, as summarized in Table 4-7 of the 2022 Trafalgar TMP Addendum, which is provided in **Appendix G**. TYLin used Table 4-7 as a base for trip distribution for the RNA area (also applied to this TIS study area) to remain in line with data upon which the Trafalgar TMP was based. TYLin's distribution calculations based on the percentages and destinations in the TMP's Table 4-7 have also been provided in **Appendix G**.

Table 6-10 summarizes the overall trip distribution for the TIS study area, while **Table 6-11** details the trip distribution at specific external gateways along the study area boundaries.

Table 6-10 Overall Directional Trip Distribution

Direction	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
North	21.7%	26.7%	26.7%	21.7%
South	15.3%	14.5%	14.5%	15.3%
East	19.1%	14.8%	14.8%	19.1%
West	43.9%	44.0%	44.0%	43.9%
Total	**100%**	**100%**	**100%**	**100%**

Table 6-11 External Gateway Trip Distribution

Direction	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Trafalgar Road to/from North	21.74%	26.74%	26.74%	21.74%
Derry Road to/from East	5.25%	4.12%	4.12%	5.25%
Britannia Road to/from East	8.45%	6.52%	6.52%	8.45%
Lower Baseline to/from East	5.39%	4.11%	4.11%	5.39%
Trafalgar Road to/from South	15.28%	14.47%	14.47%	15.28%
Lower Baseline to/from West	1.76%	1.91%	1.91%	1.76%
Britannia Road to/from West	28.53%	26.87%	26.87%	28.53%
Derry Road to/from West	13.60%	15.26%	15.26%	13.60%
Total	**100%**	**100%**	**100%**	**100%**

6.5 Site Trip Assignment

Site assignment was based on a TAZ-specific level, as trip generation estimates were tailored to each TAZ's proposed land uses and residential unit types. Trips were further subdivided into internal and external trips for assignment purposes.

The location of existing and future study intersections throughout the TIS study area is outlined in **Figure 6-2**, providing the intersection ID number assigned to each intersection and collector road names to be used in conjunction with site traffic volume figures.

The estimated site traffic volumes at the intersections in the study area are provided in **Figure 6-3**.

6.5.1 External Assignment

External trips to/from each TAZ were assigned first to a collector road within or adjacent to the TAZ and then traveled via logical routing to one of the eight external road network gateways, dependent upon the direction of the trip and overall distribution of trips.

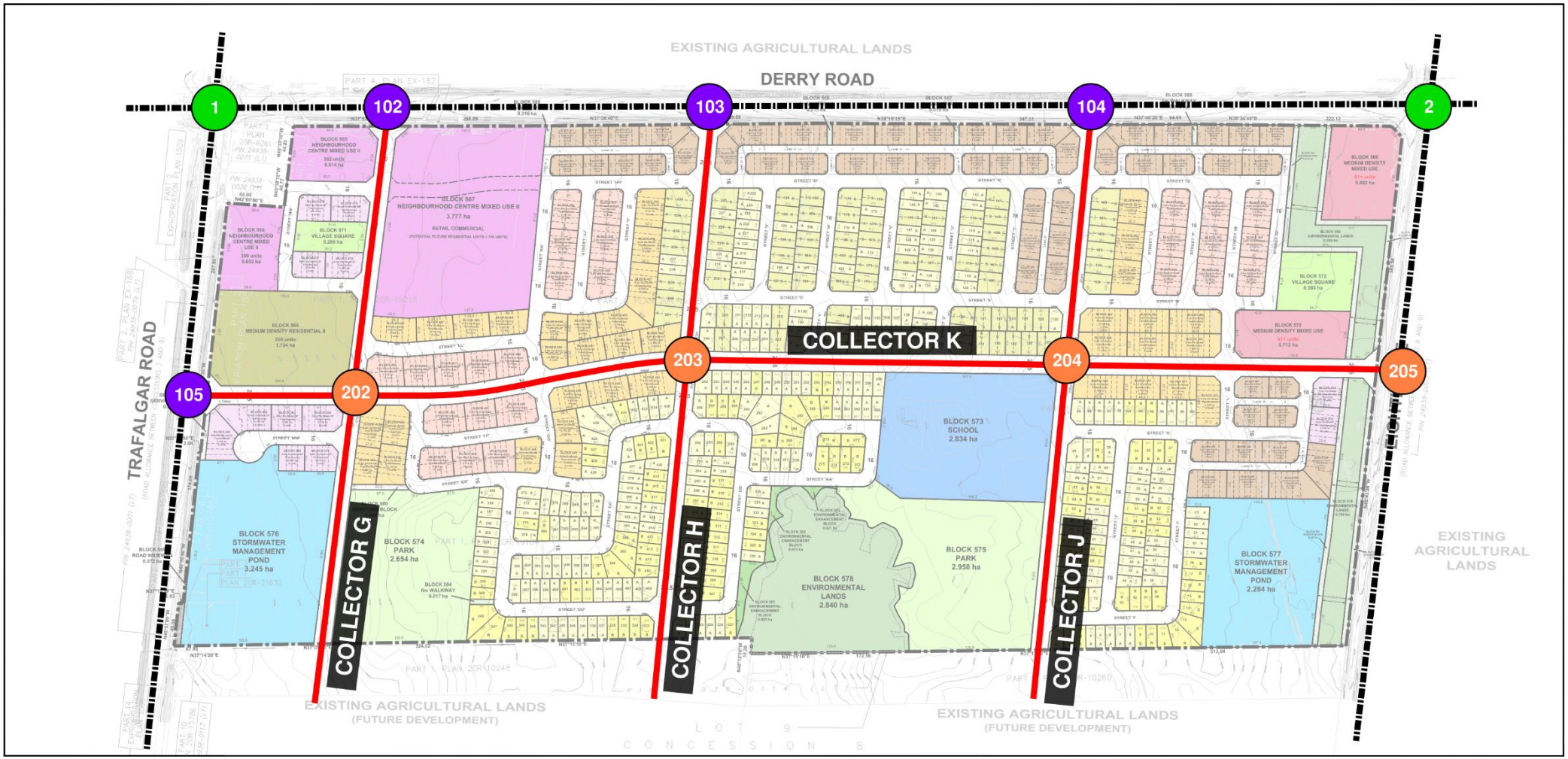
6.5.2 Internal Assignment

Internal site assignment was applied to non-residential land uses such as schools and commercial blocks that would attract vehicle trips from within the Tertiary Plan's boundaries. The internal assignment of site trips did not further reduce the total net trips generated by the Tertiary Plan, it merely kept a portion of the trips internal to the site instead of 100% of the net trips being assigned to external road network gateways.

In the case of land uses for which internal assignment applied, such as schools, a "catchment area" approach as taken. For example, inbound and outbound internal trips generated by the school were assigned to/from each TAZ in the catchment area proportionate to the number of residential units in each TAZ.

Completing internal assignments should be considered a conservative measure, particularly when it comes to the design of the collector road intersections and assessment of capacity. Internal assignment accounts for trips completed between TAZs (between residential and non-residential land uses), and not just commuter traffic in and out of the Tertiary Plan area. This results in more varied travel patterns throughout the collector road network, ensuring the collector roads and intersections have been designed with sufficient capacity for both internal and external traffic travel patterns.

Figure 6-2 Study Intersections Key Map - Future Conditions



TYLin

Legend

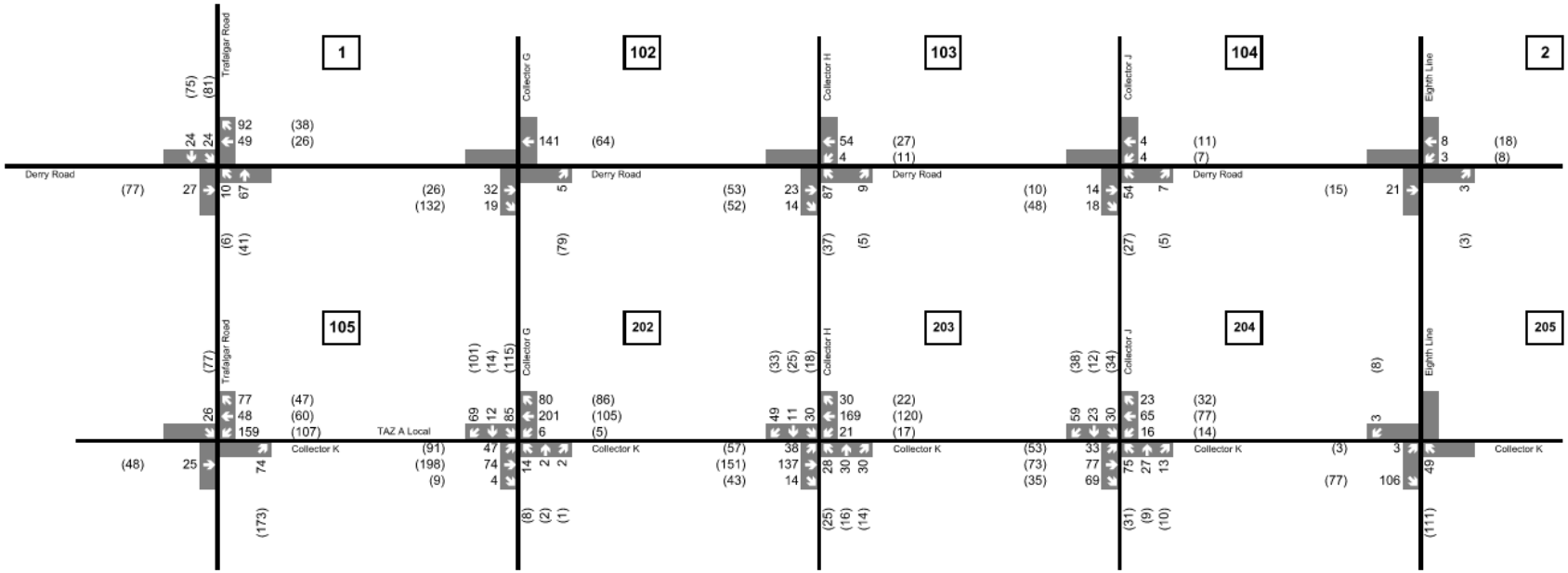
- Existing Arterial/Collector Roads
- Proposed Collector Roads

Intersection IDs

- Existing Intersections
- Future Arterial-Collector Intersections
- Future Collector-Collector Intersections

Figure 7-2
Study Intersections Key Map - Future Conditions

Figure 6-3 Site Traffic Volumes



Legend

xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TYLin

Figure 6-3

SiteTraffic Volumes

7 FUTURE CONDITIONS

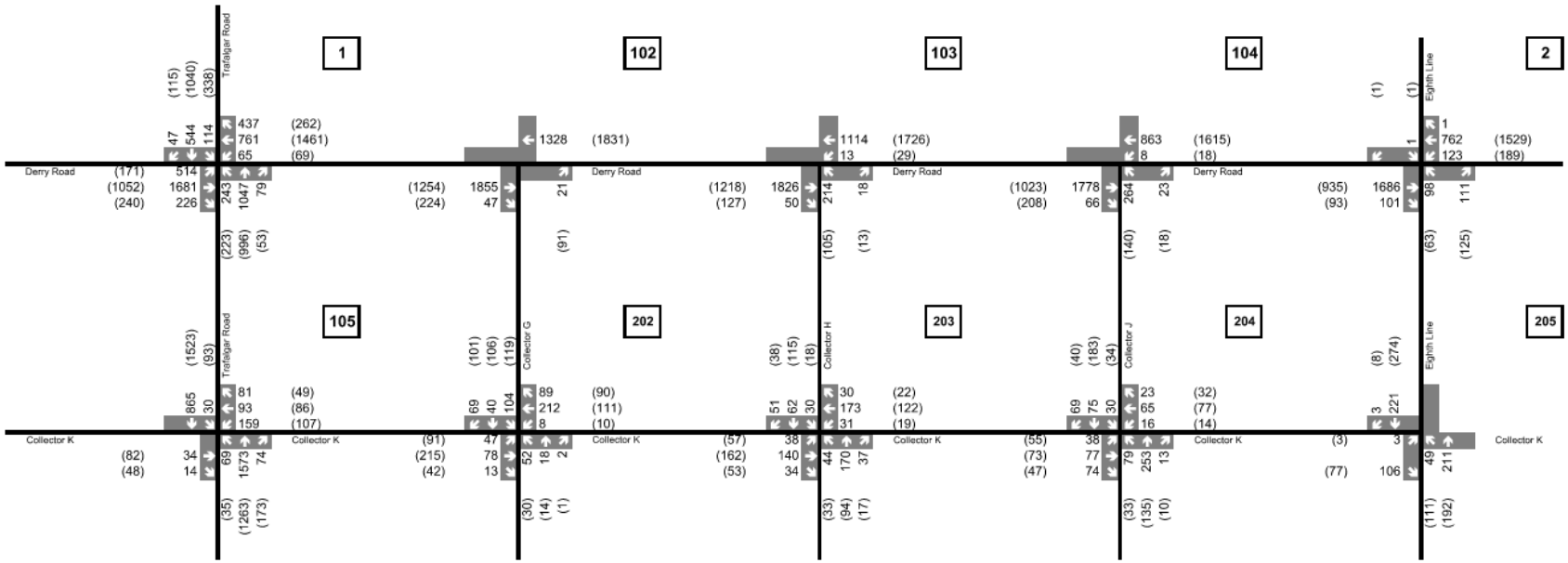
7.1 2031 Future Total

The 2031 future total volumes were developed by combining the 2031 future background volumes (annual growth only) with the estimated site generated traffic. The resulting 2031 future total traffic volumes are provided in **Figure 7-1**.

7.2 2041 Future Total

The 2041 future total volumes were developed by combining the 2041 future background volumes with the estimated site generated traffic, Agerton development trips, and the background traffic rerouting adjustments derived from the March 2022 Trafalgar TMP Addendum. The resulting 2041 future total traffic volumes are provided in **Figure 7-2**.

Figure 7-1 2031 Future Total Traffic Volumes



Legend

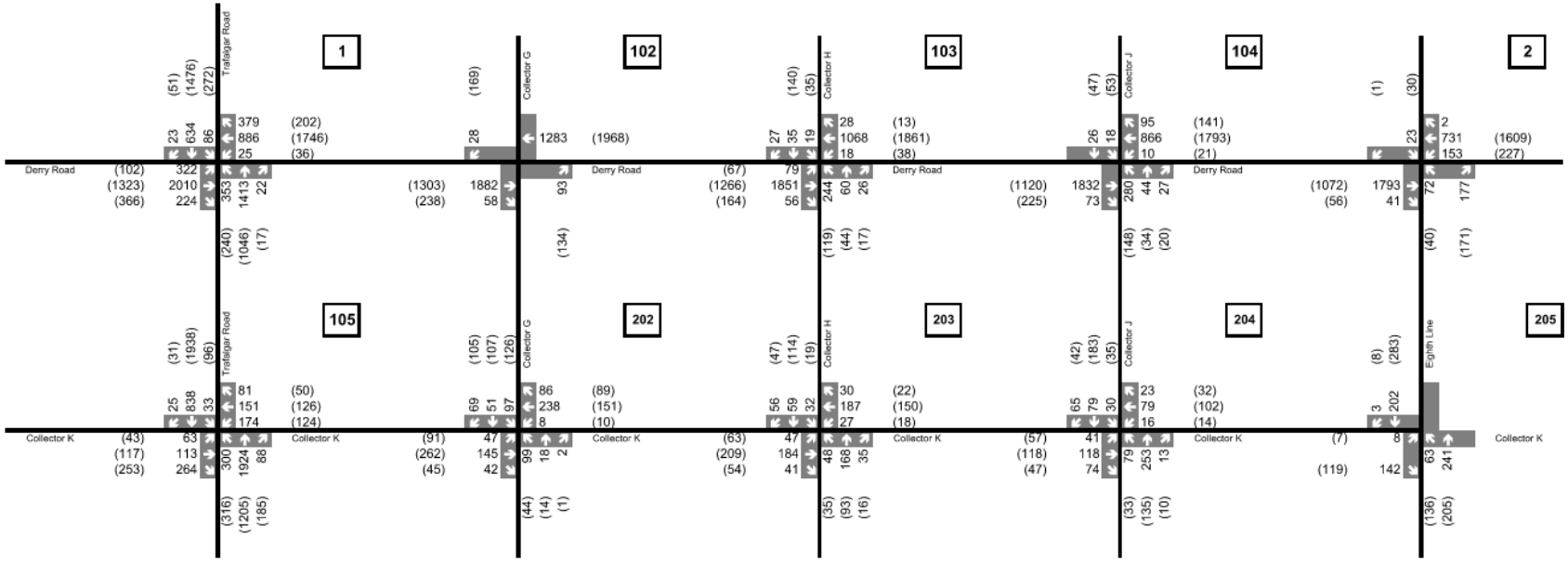
xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TYLin

Figure 7-1

2031 Future Total Traffic Volumes

Figure 7-2 2041 Future Total Traffic Volumes



Legend

xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TYLin

Figure 7-2

2041 Future Total Traffic Volumes

7.3 Lane Configuration Modifications

Based on the recommendations outlined in the Milton Transportation Master Plan (TMP) and the proposed lane configuration modifications detailed in the RNA for the MP4TC area, phased improvements have been adopted for the study intersections.

For the 2031 horizon year, Phase 1 improvements, including the implementation of a High Occupancy Vehicle (HOV) curb lane on three regional roads, have been incorporated into both the future background and future total scenarios. Detailed improvement and associated responsibility for 2031 scenario are summarized in **Table 7-1** and illustrated in **Figure 7-3**.

Table 7-1 2031 Future Lane Configuration Modification and Responsibility

Intersection	Approach	Modification	Responsibility
Existing Intersections			
Trafalgar Road & Derry Road	Northbound	▶ Dual left turn lanes ▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region
	Eastbound and Southbound	▶ Dual left turn lanes ▶ 1 additional through lane (HOV)	Region
	Westbound	▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region
Eighth Line & Derry Road	Eastbound and Westbound	▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region / Town / MP4 Developers
Arterial-to-Collector Intersections			
Derry Road & Collector G	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Right turn only lane	MP4 Developers
	Eastbound	▶ Auxiliary right turn lane	
Derry Road & Collector H	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Single lane with shared left/right movements	MP4 Developers
	Eastbound	▶ Shared right turn movement	
	Westbound	▶ Auxiliary left turn lane	

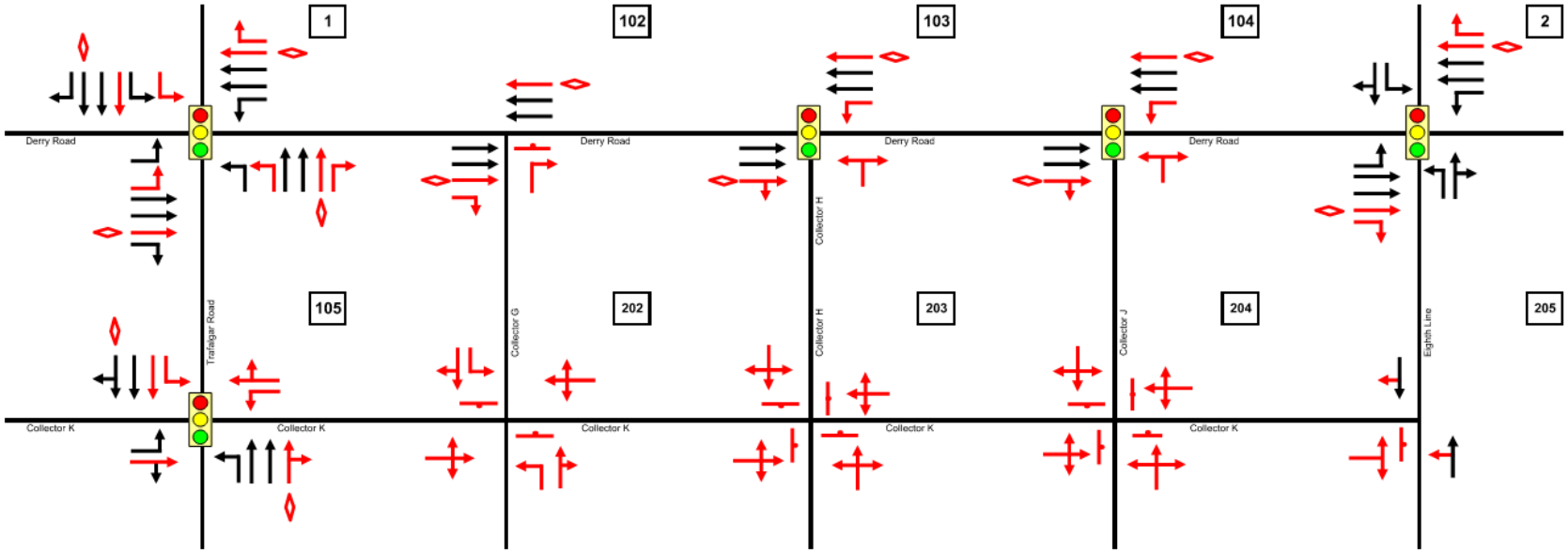
Intersection	Approach	Modification	Responsibility
Derry Road & Collector J	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Single lane with shared left/right movements	MP4 Developers
	Eastbound	▶ Shared right turn movement	
	Westbound	▶ Auxiliary left turn lane	
Trafalgar Road & Collector K	Northbound and Southbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Shared right turn movement	MP4 Developers
	Eastbound	▶ Shared through movement	
	Southbound	▶ Auxiliary left turn lane	
	Westbound	▶ Shared through/right lane ▶ Auxiliary left turn lane	
Collector-to-Collector Intersections			
Collector G & Collector K	Eastbound and Westbound	▶ Single lane approach (shared all movements)	MP4 Developers
	Northbound and Southbound	▶ Shared through/right lane ▶ Auxiliary left turn lane	
Collector H & Collector K	All Directions	▶ Single lane approach (shared all movements)	
Collector J & Collector K			
Eighth Line & Collector K	Northbound	▶ Shared left turn movement	
	Eastbound	▶ Single lane with shared left/right movements	
	Southbound	▶ Shared right turn movement	

For the 2041 horizon year, MP4TC full build-out improvements, as well as the Agerton developments associated improvements, have been adopted for both the future background and future total scenarios. Detailed improvement and associated responsibility for 2041 scenario are summarized in **Table 7-2** and illustrated in **Figure 7-4**.

Table 7-2 2041 Future Lane Configuration Modification and Responsibility

Intersection	Approach	Modification	Responsibility
Existing Intersections			
Trafalgar Road & Derry Road	Westbound	▶ Dual left turn lanes	Region
Arterial-to-Collector Intersections			
Derry Road & Collector G	Southbound	▶ Single right turn lane	Agerton Developers
	Westbound	▶ Additional shared right turn movement	
Derry Road & Collector H	Northbound	▶ Shared through movement	
	Eastbound	▶ Auxiliary left turn lane	
	Southbound	▶ Single lane approach (shared all movements)	
	Westbound	▶ Additional shared right turn movement	
Derry Road & Collector J	Northbound	▶ Shared through movement	
	Eastbound	▶ Auxiliary left turn lane	
	Southbound	▶ Single lane approach (shared all movements)	
	Westbound	▶ Additional shared right turn movement	
Trafalgar Road & Collector K	Northbound, eastbound and southbound	▶ Auxiliary right turn lane	

Figure 7-3 2031 Future Lane Configurations



TYLin

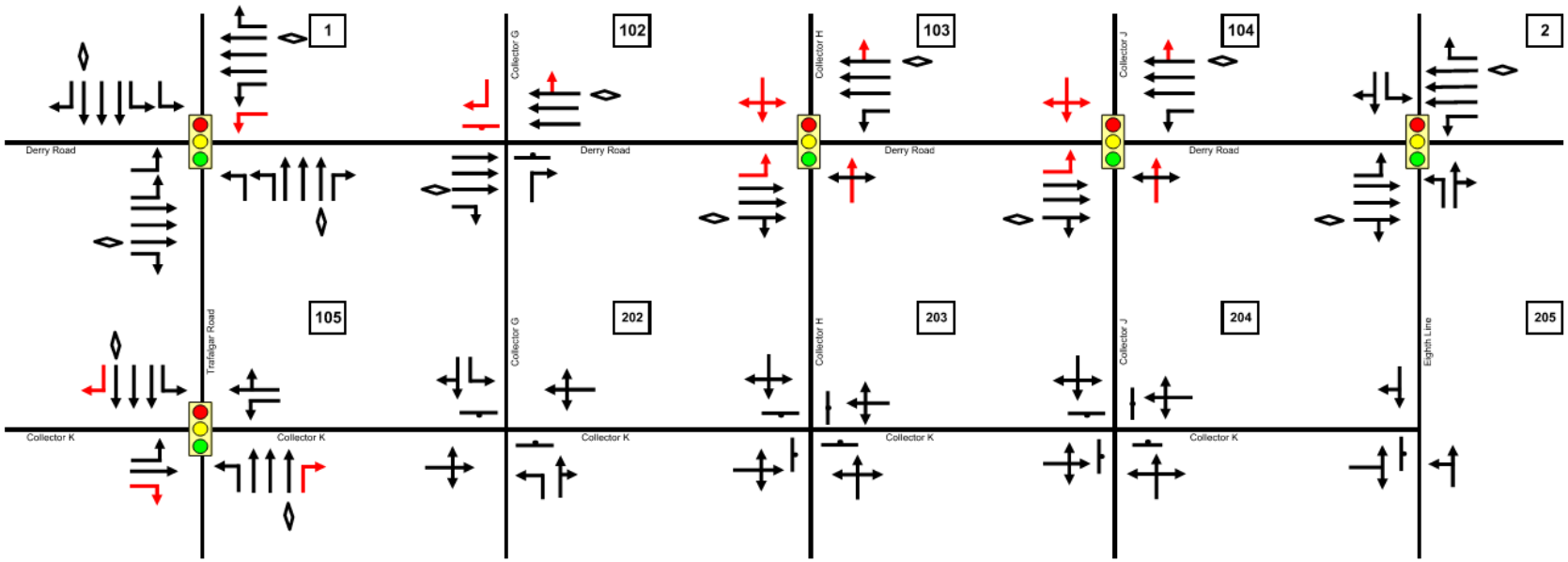
Legend

Signalized Intersection | Unsignalized Intersection | Lane | Future Improvement | HOV Lane

Figure 7-3

2031 Future Lane Configurations

Figure 7-4 2041 Future Lane Configurations



Legend

Signalized Intersection | Unsignalized Intersection | Lane | Future Improvement | HOV Lane

TYLin

Figure 7-4

2041 Future Lane Configurations

8 TRAFFIC CAPACITY ANALYSIS

The capacity analysis identifies how well the existing and proposed intersections are operating and how they are expected to operate in the future. The analysis contained in this report utilized the Highway Capacity Manual (HCM) 2000 techniques within the Synchro Version 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 analysis includes identification of all intersections and for all movements; v/c ratios, LOS indicators and 95th percentile queue lengths. 'Critical' intersections and movements, as defined by Halton Region, include:

Signalized Intersections

- v/c ratios for overall intersection operations, through movements, or shared through/turning movements increased to 0.85 or above;
- v/c ratios for exclusive turning movements increased to 0.95 or above; or
- queues for an individual movement are projected to exceed available turning lane storage.

Unsignalized Intersections

- LOS, based on average delay per vehicle, on individual movements exceeds LOS 'D'; or
- The estimated 95th percentile queue length for an individual movement exceeds the available queue storage.

The following tables summarize the capacity analysis results for the study intersections during the weekday AM and PM peak hours under baseline, future background and future total traffic conditions. Detailed Synchro reports are attached in **Appendix H**, **Appendix I** and **Appendix J** respectively.

8.1 Baseline Conditions

Under baseline 2023 conditions, some assumptions were made based on the signal timing plans (STP) received from the Region. The details of these assumptions and any related modifications are presented in **Table 8-1**. Existing Signal Timing Plans are provided in **Appendix E**. It should be noted that calibrations applied to existing intersections by the Trafalgar TMP (such as lost time adjustments) have also been applied to the analysis to remain consistent with prior analysis efforts of the Trafalgar TMP.

An excerpt of the Trafalgar TMP calibrations is located in **Appendix E** and summarized below for each intersection to calibrate the existing baseline conditions:

- **Trafalgar Road and Derry Road**
  1. Assumed to be semi-actuated with minimum recall in Derry Road;
  2. Lost time adjustment of -1.0 second for protected/permitted left-turn -movements and -2.0 seconds for through or right-turn movements for both peak hours; and
  3. Phasing splits were optimized for both peak hours.

Existing Peak Hour Factors (PHF) from the TMC data was applied to the baseline analysis.

Table 8-1 Baseline Signal Timing Interpretation and Modifications

Intersection	AM Peak Hour	PM Peak Hour
All	"Max" timings assumed to be maximum split timings and not maximum green time. Max 1 and Max 2 were used for the AM and PM peak periods accordingly.	
	If a vehicle extension was not identified for a particular phase, a default value of 3 seconds was implemented.	
Trafalgar Road & Derry Road	Assumed a 110-second cycle length.	Assumed a 125-second cycle length.
	In order to maintain a cycle length of 110 seconds, the minimum initial times for the left turning phases were changed from 7 seconds to 6 seconds.	–
	–	Added 5 seconds to the total split time for the northbound through phase (phase 8) to have a total split time of 45 seconds.

The capacity results for study intersections during the weekday AM and PM peak hours under baseline traffic conditions are summarized in **Table 8-2**.

Table 8-2 Baseline Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Trafalgar Road & Derry Road (signalized)	*Overall*	*0.83*	*32*	*C*	*0.77*	*39*	*D*
	EBL	**0.96**	45	D	0.76	49	D
	EBT	0.79	27	C	0.43	25	C
	EBR	0.14	16	B	0.07	21	C
	WBL	0.32	22	C	0.19	20	C
	WBTR	0.47	29	C	0.92	47	D
	NBL	0.21	30	C	0.31	27	C
	NBTR	0.59	39	D	0.68	43	D
	SBL	0.20	30	C	0.42	32	C
	SBT	0.38	36	D	0.36	39	D
	SBR	0.05	32	C	0.09	36	D
Eighth Line & Derry Road (unsignalized)	EBL	0.00	0	A	0.00	0	A
	EBTR	0.54	0	A	0.32	0	A
	WBL	0.19	15	B	0.14	10	B
	WBTR	0.25	0	A	0.53	0	A
	NBL	**1.37**	**452**	**F**	0.83	**202**	**F**
	NBTR	0.12	16	C	0.13	12	B
	SBL	0.02	**65**	**F**	0.04	**149**	**F**
	SBTR	0.00	0	A	0	14	B

Under baseline conditions, all study intersections are generally operating well overall, with acceptable delays and capacity during both the weekday AM and PM peak hours.

The eastbound left at the intersection of Derry Road and Trafalgar Road is operating at or above v/c ratios deemed critical by the Region in the AM peak hour, however, only the northbound left movement at the unsignalized intersection of Derry Road and Eighth Line operates with a v/c ratio above 1.0 (1.37 during the AM peak hour), exceeding theoretical capacity. Given the high volume of eastbound and westbound traffic on Derry Road, it is likely that northbound and southbound traffic are more aggressive in their movements and accept smaller gaps in traffic than is typical in the HCM analysis methodology. Adjustments to saturation flow and other Synchro settings would need to be applied to bring the unsignalized movement to a v/c ratio of 1.0 or less. The issue instead is addressed under future conditions upon signalization of the intersection after Derry Road is widened to 6 lanes.

8.2 2031 Future Background Conditions

In accordance with the MP4TC RNA study, adjustments to the signal timing plans were implemented for the 2031 horizon year to accommodate the additional traffic generated by the MP4 development in the Phase 1 scenario. For analysis purposes, these modifications were incorporated into the future background scenario to address the increased traffic volumes across the MP4TC area. A summary of these adjustments is provided in **Table 8-3**.

Table 8-3 2031 Future Background Signal Timing Assumptions and Modifications

Intersection	AM Peak Hour	PM Peak Hour
All	It is noted that several intersections have additional lanes added under future conditions. Therefore, additional phases have been added to the signal timing plans accordingly.	
Trafalgar Road & Derry Road	Increased cycle length to 140 seconds with optimized splits.	
Derry Road & Eighth Line	This intersection is unsignalized under existing conditions. However, it is assumed that this intersection will be signalized with the proposed widening of Derry Road to 6 lanes per Region policy.	
	Increased cycle length to 140 seconds with optimized splits.	

HOV / Bus lanes are planned for implementation in 2031, contingent upon the widening of Trafalgar Road and Derry Road to three lanes in each direction. To simulate the impact of the HOV lane in the SYNCHRO model, a lane utilization factor of 0.80 was applied to through movements on these roads.

For 2031 future background scenario, the intersections of Trafalgar Road at Derry Road and Eighth Line at Derry Road were analyzed in SYNCHRO suite using the future lane configurations outlined in **Session 7.3** and **Table 7-1**. The capacity analysis results for the study intersections during weekday AM and PM peak hours are summarized in **Table 8-4**.

Table 8-4 2031 Future Background Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Trafalgar Road & Derry Road	*Overall*	*0.78*	*44*	*D*	*0.74*	*41*	*D*
	EBL	0.80	**69**	**E**	0.64	**64**	**E**
	EBT	0.76	30	C	0.49	35	C
	EBR	0.14	37	D	0.15	**92**	**F**
	WBL	0.46	41	D	0.30	18	B
	WBT	0.47	38	D	0.77	33	C

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
	WBR	0.44	41	D	0.19	27	C
	NBL	0.63	**86**	**F**	0.63	**70**	**E**
	NBT	0.77	42	D	0.79	33	C
	NBR	0.05	**105**	**F**	0.03	38	D
	SBL	0.45	**67**	**E**	0.60	**62**	**E**
	SBT	0.51	46	D	0.73	47	D
	SBR	0.05	40	D	0.08	36	D
Eighth Line & Derry Road	*Overall*	*0.53*	*11*	*B*	*0.42*	*10*	*A*
	EBL	0.00	0	A	0.00	0	A
	EBT	0.52	9	A	0.28	9	A
	EBR	0.07	4	A	0.06	14	B
	WBL	0.51	9	A	0.40	3	A
	WBT	0.21	3	A	0.40	4	A
	WBR	0.00	3	A	0.00	0	A
	NBL	0.63	**73**	**E**	0.50	**81**	**F**
	NBTR	0.07	**56**	**E**	0.08	**59**	**E**
	SBL	0.01	**56**	**E**	0.01	**58**	**E**
	SBTR	0.00	0	A	0.00	**58**	**E**

Under 2031 future background conditions, both Trafalgar Road & Derry Road and Eighth Line & Derry Road intersections are expected to operate within overall acceptable limits, with reserve capacity maintained during both AM and PM peak hours. Although some individual turning movements experience higher delays (LOS 'E' or 'F'), all v/c ratios remain below 1.0, indicating no capacity exceedance.

The proposed signalization and widening at Eighth Line & Derry Road significantly improve performance compared to baseline conditions, ensuring efficient operation across the study area.

8.3 2031 Future Total Conditions

Under the 2031 future total traffic conditions, no additional adjustment was made to the signal timing plans compared to future background scenario.

The capacity results for existing arterial, arterial-to-collector, and collector-to-collector intersections during the weekday AM and PM peak hours under 2031 future total traffic conditions are summarized in **Table 8-5**.

Table 8-5 2031 Future Total Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing Arterial Intersections							
Trafalgar Road & Derry Road	*Overall*	*0.81*	*50*	*D*	*0.79*	*42*	*D*
	EBL	0.80	**68**	**E**	0.64	**63**	**E**
	EBT	0.78	32	C	0.53	37	D
	EBR	0.14	48	D	0.15	**96**	**F**
	WBL	0.46	39	D	0.34	19	B
	WBT	0.51	37	D	0.80	35	C
	WBR	0.61	42	D	0.23	27	C
	NBL	0.66	**88**	**F**	0.65	**90**	**F**
	NBT	0.81	53	D	0.83	22	C
	NBR	0.05	**362**	**F**	0.03	38	D
	SBL	0.56	**70**	**E**	0.76	**68**	**E**
	SBT	0.53	46	D	0.77	48	D
	SBR	0.05	40	D	0.08	35	D
Derry Road & Eighth Line	*Overall*	*0.55*	*11*	*B*	*0.44*	*9*	*A*
	EBL	0.00	0	A	0.00	0	A
	EBT	0.53	8	A	0.28	7	A
	EBR	0.07	2	A	0.06	10	A
	WBL	0.52	10	B	0.42	3	A
	WBT	0.21	3	A	0.41	4	A
	WBR	0.00	3	A	0.00	0	A
	NBL	0.63	**72**	**E**	0.50	**82**	**F**
	NBTR	0.07	**56**	**E**	0.08	**59**	**E**
	SBL	0.01	**56**	**E**	0.01	**58**	**E**

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
	SBTR	0.00	0	A	0.00	**58**	**E**
Arterial-to-Collector Intersections							
Collector G & Derry Road	EBT	0.36	0	A	0.25	0	A
	EBR	0.03	0	A	0.13	0	A
	WBT	0.26	0	A	0.36	0	A
	NBR	0.03	10	A	0.10	9	A
Collector H & Derry Road	*Overall*	*0.60*	*9*	*A*	*0.49*	*8*	*A*
	EBTR	0.56	3	A	0.37	10	A
	WBL	0.14	10	B	0.13	4	A
	WBT	0.33	7	A	0.47	4	A
	NBLR	0.75	**64**	**E**	0.61	**65**	**E**
Collector J & Derry Road	*Overall*	*0.62*	*12*	*B*	*0.49*	*8*	*A*
	EBTR	0.57	6	A	0.35	3	A
	WBL	0.09	8	A	0.07	4	A
	WBT	0.27	6	A	0.45	5	A
	NBLR	0.80	**65**	**E**	0.69	**68**	**E**
Trafalgar Road & Collector K	*Overall*	*0.55*	*19*	*B*	*0.54*	*18*	*B*
	EBL	0.00	0	A	0.00	0	A
	EBTR	0.13	51	D	0.50	**59**	**E**
	WBL	0.75	**71**	**E**	0.84	**95**	**F**
	WBTR	0.55	**57**	**E**	0.52	**59**	**E**
	NBL	0.17	5	A	0.19	11	B
	NBTR	0.52	18	B	0.49	21	C
	SBL	0.18	6	A	0.28	8	A
	SBTR	0.28	3	A	0.47	4	A
Collector-to-Collector Intersections							
Eighth Line & Collector K	EBLR	0.14	10	B	0.11	11	B
	NBLT	0.04	2	A	0.09	4	A
	SBTR	0.13	0	A	0.17	0	A
Collector G & Collector K	EBT	0.04	3	A	0.07	3	A
	WBT	0.01	0	A	0.01	0	A
	NBL	0.14	16	C	0.14	24	C

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
	NBTR	0.04	13	B	0.04	15	B
	SBL	0.22	15	B	0.32	19	C
	SBTR	0.17	12	B	0.39	16	C
Collector H & Collector K	EBTR	0.32	11	B	0.37	11	B
	WBTR	0.35	11	B	0.23	10	A
	NBTR	0.37	12	B	0.21	10	A
	SBTR	0.22	10	A	0.25	10	A
Collector J & Collector K	EBTR	0.28	10	B	0.25	10	A
	WBTR	0.16	10	A	0.18	9	A
	NBTR	0.48	13	B	0.25	10	A
	SBTR	0.24	10	A	0.35	11	B

Under 2031 future total conditions, all existing, arterial-to-collector, and collector-to-collector intersections are expected to operate well during both the AM and PM peak hours, with overall reserve capacity and no movements over capacity. Although some individual movements experience LOS 'E' or 'F' due to longer delays, particularly on collector roads, all v/c ratios remain below 1.0, indicating no capacity exceedance. These delays are attributed to the 140-second signal cycles and timing plans that prioritize higher-volume arterial roads.

8.4 2041 Future Background Conditions

The previous signal modifications made under the 2031 future conditions were carried over and applied to the 2041 future background conditions.

For 2041 future background scenario, the intersections of Trafalgar Road at Derry Road and Eighth Line at Derry Road were analyzed in SYNCHRO suite using the future lane configurations outlined in **Session 7.3** and **Table 7-2**. The capacity results for study intersections during the weekday AM and PM peak hours under 2041 future background conditions are summarized in **Table 8-6**.

Table 8-6 2041 Future Background Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Trafalgar Road & Derry Road	*Overall*	***0.93***	*48*	*D*	***0.89***	*47*	*D*
	EBL	0.69	**81**	**F**	0.59	**90**	**F**
	EBT	**0.97**	35	C	0.66	20	C
	EBR	0.17	21	C	0.35	10	A
	WBL	0.19	**69**	**E**	0.22	**62**	**E**
	WBT	0.54	44	D	**0.91**	**58**	**E**
	WBR	0.33	51	D	0.15	**59**	**E**
	NBL	0.75	**72**	**E**	**0.95**	**109**	**F**
	NBT	**0.90**	**61**	**E**	0.70	42	D
	NBR	0.01	30	C	0.01	32	C
	SBL	0.37	**68**	**E**	0.59	**65**	**E**
	SBT	0.58	46	D	**0.91**	53	D
	SBR	0.02	39	D	0.04	31	C
Eighth Line & Derry Road	*Overall*	*0.65*	*38*	*D*	*0.55*	*17*	*B*
	EBL	0.00	0	A	0.00	0	A
	EBTR	0.63	23	C	0.39	23	C
	WBL	0.68	37	D	0.56	8	A
	WBT	0.21	5	A	0.46	6	A
	WBR	0.00	4	A	0.00	0	0
	NBL	0.29	**58**	**E**	0.36	**63**	**E**
	NBTR	0.11	**316**	**F**	0.11	**61**	**E**
	SBL	0.35	**69**	**E**	0.28	53	D
	SBTR	0.00	0	A	0.00	51	D

Under 2041 future background conditions, the Eighth Line at Derry Road is expected to operate well during both the AM and PM peak hours, with overall reserve capacity. Some individual movements are expected to experience LOS 'E' and 'F' due to increased delays, though these movements remain within capacity.

The intersection of Trafalgar Road at Derry Road is anticipated to operate with some reserve capacity. Some critical movements are identified as approaching theoretical capacity (i.e., v/c between 0.85 and 1.00). These include the eastbound through and northbound through movements during the AM peak hour, and the westbound through, northbound left-turn, and southbound through movements during the PM peak hour.

8.5 2041 Future Total Conditions

Under the 2041 future total traffic conditions, no additional adjustment was made to the signal timing plans compared to 2041 future background scenario.

The capacity results for study intersections during the weekday AM and PM peak hours under 2041 future total traffic conditions are summarized in **Table 8-7**.

Table 8-7 2041 Future Total Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing Arterial Intersections							
Trafalgar Road & Derry Road	*Overall*	***0.96***	*48*	*D*	***0.91***	*50*	*D*
	EBL	0.69	**80**	**E**	0.59	**90**	**F**
	EBT	**0.99**	38	D	0.70	21	C
	EBR	0.17	22	C	0.35	11	B
	WBL	0.19	**72**	**E**	0.22	**62**	**E**
	WBT	0.57	41	D	**0.92**	**58**	**E**
	WBR	0.49	44	D	0.19	**58**	**E**
	NBL	0.76	**65**	**E**	**0.97**	**115**	**F**
	NBT	**0.97**	**62**	**E**	0.73	45	D
	NBR	0.01	30	C	0.01	32	C
	SBL	0.43	**67**	**E**	0.84	**81**	**F**
	SBT	0.59	47	D	**0.96**	**59**	**E**
	SBR	0.02	39	D	0.04	31	C
Derry Road & Eighth Line	*Overall*	*0.66*	*37*	*D*	*0.56*	*16*	*B*
	EBL	0.00	0	A	0.00	0	A

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
	EBTR	0.64	23	C	0.40	21	C
	WBL	0.69	41	D	0.58	9	A
	WBT	0.22	5	A	0.46	7	A
	WBR	0.00	4	A	0.00	0	A
	NBL	0.29	**60**	**E**	0.36	**63**	**E**
	NBTR	0.11	**301**	**F**	0.11	**61**	**E**
	SBL	0.35	**69**	**E**	0.28	53	D
	SBTR	0.00	0	A	0.00	51	D
Arterial-to-Collector Intersections							
Collector G & Derry Road	EBT	0.37	0	A	0.26	0	A
	EBR	0.03	0	A	0.14	0	A
	WBTR	0.30	0	A	0.46	0	A
	NBR	0.15	12	B	0.16	10	A
	SBR	0.03	9	A	0.20	10	B
Collector H & Derry Road	*Overall*	*0.72*	*10*	*A*	***0.86***	*10*	*A*
	EBL	0.39	3	A	**0.94**	**97**	**F**
	EBTR	0.71	2	A	0.48	4	A
	WBL	0.33	24	C	0.26	5	A
	WBTR	0.41	10	A	0.62	3	A
	NBLTR	0.75	50	D	0.64	53	D
	SBLTR	0.14	35	C	0.42	48	D
Collector J & Derry Road	*Overall*	*0.74*	*18*	*B*	*0.63*	*20*	*C*
	EBL	0.00	0	A	0.00	0	A
	EBTR	0.72	12	B	0.46	9	A
	WBL	0.19	21	C	0.13	14	B
	WBTR	0.37	17	B	0.66	24	C
	NBLTR	0.77	50	D	0.56	47	D
	SBLTR	0.09	33	C	0.26	42	D
Trafalgar Road & Collector K	*Overall*	*0.69*	*31*	*C*	*0.78*	*36*	*D*
	EBL	0.55	**58**	**E**	0.40	**58**	**E**
	EBT	0.34	51	D	0.45	**57**	**E**
	EBR	0.17	49	D	0.35	**56**	**E**

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
	WBL	0.82	**76**	**E**	0.79	**82**	**F**
	WBTR	0.69	**60**	**E**	0.66	**64**	**E**
	NBL	0.64	25	C	0.75	**57**	**E**
	NBT	0.63	24	C	0.38	12	B
	NBR	0.06	23	C	0.12	23	C
	SBL	0.28	11	B	0.34	21	C
	SBT	0.30	21	C	0.79	39	D
	SBR	0.02	11	B	0.02	**88**	**F**
Collector-to-Collector Intersections							
Eighth Line & Collector K	EBLR	0.19	11	B	0.18	11	B
	NBLT	0.05	2	A	0.11	4	A
	SBTR	0.12	0	A	0.17	0	A
Collector G & Collector K	EBT	0.04	2	A	0.07	2	A
	WBT	0.01	0	A	0.01	0	A
	NBL	0.32	22	C	0.25	32	D
	NBTR	0.05	14	B	0.04	16	C
	SBL	0.24	16	C	0.38	22	C
	SBTR	0.21	13	B	0.44	18	C
Collector H & Collector K	EBTR	0.41	12	B	0.46	12	B
	WBTR	0.37	12	B	0.28	10	B
	NBTR	0.39	12	B	0.22	10	B
	SBTR	0.23	10	B	0.27	10	B
Collector J & Collector K	EBTR	0.35	11	B	0.33	11	B
	WBTR	0.19	10	A	0.22	10	A
	NBTR	0.50	13	B	0.27	10	B
	SBTR	0.26	10	B	0.37	11	B

Under 2041 future total conditions, all the existing, arterial-to-collector and collector-to-collector intersections are expected to operate well during both the AM and PM peak hours, with overall reserve capacity, except for Trafalgar Road at Derry Road and Collector H at Derry Road.

Some individual movements experience LOS 'E' and 'F' due to longer delays but remain within capacity. The higher delays are due in part to relatively long cycle lengths of 140 seconds implemented along the Reginal corridors which inherently add delay to dedicated turning

movements and vehicles on the minor approaches.

For Collector H at Derry Road, the intersection is expected to operate some reserve capacity during AM peak hour, while a critical movement is identified at eastbound left-turn, experiencing LOS 'F' due to longer delays, but still within capacity (i.e. 0.85 < v/c < 1.00).

For Trafalgar Road at Derry Road, similar to 2041 future background condition, the intersection is expected to operate with some reserve capacity. However, some critical movements are identified, approaching theoretical capacity (i.e., v/c between 0.85 and 1.00). These include the eastbound through and northbound through movements during the AM peak hour, and the westbound through, northbound left-turn, and southbound through movements during the PM peak hour. This performance is typical for the intersection of two major arterial roads during peak hours, where operations are expected to approach theoretical capacity. Outside of peak periods, traffic flow at this intersection is anticipated to return to manageable levels.

The operation of some critical movements is primarily attributed to the inability to exclude Trafalgar site traffic from the 2051 JBPE forecasting model growth rates, as requested by the Region. This limitation stems from challenges in aligning trip distribution between the traffic models, resulting in the double counting of some Trafalgar site traffic. Consequently, this has led to an overestimation of traffic volumes for the 2041 future background and future total scenario.

9 QUEUEING ANALYSIS

As part of the traffic analysis, the 50th and 95th percentile queue lengths were derived from the Synchro HCM queueing reports for the baseline, 2031 & 2041 future background, and 2031 & 2041 future total traffic conditions. The queueing reports were prepared using Synchro version 11 software and full queuing results are attached in **Appendix H**, **Appendix I** and **Appendix J**.

9.1 Existing Baseline Queues

Individual critical movements that exceed existing storage lengths under baseline conditions, during either peak hour, are listed in **Table 9-1**.

Table 9-1 Baseline Queueing Analysis: Critical Movements

Intersection	Movement	Storage (m)	Weekday AM Peak Hour		Weekday PM Peak Hour	
			50th Percentile Queue (m)	95th Percentile Queue (m)	50th Percentile Queue (m)	95th Percentile Queue (m)
Trafalgar Road & Derry Road	EBL	110	64	**157**	-	-

Under existing conditions, the majority of the exclusive turning movements operate well with sufficient storage for their queues with the exception of the eastbound left movement at Trafalgar Road at Derry Road during the AM peak hour.

In this case, the 95th percentile queue exceeding the available storage length is expected to be less than seven vehicles in length. These queues are expected to clear within a single signal cycle and are considered acceptable. Further monitoring by the Region should be considered with regards to the specific movements.

9.2 2031 Future Background Queues

The 2031 future background traffic conditions queuing results are provided together with SYNCHRO results in **Appendix I** and summary is provided in **Table 9-2** below.

Table 9-2 2031 Future Background Queueing Analysis

Intersection	Movement	Storage (m)	Weekday AM Peak Hour		Weekday PM Peak Hour	
			50th Percentile Queue (m)	95th Percentile Queue (m)	50th Percentile Queue (m)	95th Percentile Queue (m)
Trafalgar Road & Derry Road	EBL	130	78	96	9	25
	EBR	110	0	22	0	6
	WBL	300	8	17	2	5
	WBR	70	51	**85**	0	0
	NBL	110	30	49	10	19
	NBR	70	2	5	0	0
	SBL	130	13	22	8	15
	SBR	85	0	0	0	0
Eighth Line & Derry Road	EBL	90	0	0	0	0
	EBR	70	0	9	7	14
	WBL	140	5	19	7	13
	WBR	70	0	0	0	0
	NBL	50	28	46	18	34
	SBL	35	0	2	0	0

Under the 2031 future background conditions, all the exclusive turning movements operate well with sufficient storage for their queues, except for the westbound left movement at Trafalgar Road at Derry Road during the AM peak hour.

In this movement, the 95th percentile queue exceeding the available storage length is expected to be less than three vehicles in length. These queues are expected to clear within a single signal cycle and are considered acceptable. Further monitoring by the Region should be considered with regards to the specific movements.

9.3 2031 Future Total Queues

The 2031 future total traffic conditions queuing results are provided together with SYNCHRO results in **Appendix J** and summary is provided in **Table 9-3** below. The 50th and 95th percentile queue lengths remain below the available storage, indicating that the proposed lane storage is sufficient to accommodate anticipated traffic volumes without significant queueing concerns.

Table 9-3 2031 Future Total Queueing Analysis

Intersection	Movement	Storage (m)	Weekday AM Peak Hour		Weekday PM Peak Hour	
			50th Percentile Queue (m)	95th Percentile Queue (m)	50th Percentile Queue (m)	95th Percentile Queue (m)
Trafalgar Road & Derry Road	EBL	130	78	96	24	36
	EBR	110	1	25	12	35
	WBL	130	8	17	7	12
	WBR	70	52	56	20	37
	NBL	110	37	51	27	46
	NBR	70	4	17	1	1
	SBL	130	16	26	47	64
	SBR	85	0	0	0	12
Eighth Line & Derry Road	EBL	90	0	0	0	0
	EBR	70	2	5	5	10
	WBL	140	5	21	7	14
	WBR	70	0	0	0	0
	NBL	50	28	46	18	33
	SBL	35	0	2	0	2
Collector G & Derry Road	EBR	50	0	0	0	0
	NBR	-	0	1	0	3
Collector H & Derry Road	WBL	50	1	5	1	4
Collector J & Derry Road	WBL	50	1	3	1	3
Trafalgar Road & Collector K	EBL	50	0	0	0	0
	WBL	70	43	63	29	48
	NBL	120	7	8	6	6
	SBL	50	1	2	3	8

9.4 2041 Future Background Queues

The 2041 future background traffic conditions queuing results are provided together with SYNCHRO results in **Appendix J** and summary is provided in **Table 9-4** below. The 50th and 95th percentile queue lengths remain below the available storage, indicating that the proposed lane storage is sufficient to accommodate anticipated traffic volumes without significant queueing concerns.

Table 9-4 2041 Future Background Queueing Analysis

Intersection	Movement	Storage (m)	Weekday AM Peak Hour		Weekday PM Peak Hour	
			50th Percentile Queue (m)	95th Percentile Queue (m)	50th Percentile Queue (m)	95th Percentile Queue (m)
Trafalgar Road & Derry Road	EBL	130	44	50	15	22
	EBR	110	6	13	8	19
	WBL	130	4	8	5	9
	WBR	70	26	45	18	36
	NBL	110	44	67	30	58
	NBR	70	0	0	0	1
	SBL	130	9	16	27	39
	SBR	85	0	0	0	1
Eighth Line & Derry Road	EBL	90	0	0	0	0
	WBL	140	18	40	14	24
	WBR	70	0	0	0	0
	NBL	50	15	32	11	23
	SBL	35	6	16	7	16

9.5 2041 Future Total Queues

The 2041 future total traffic conditions queuing results are provided together with SYNCHRO results in **Appendix K** and summary is provided in **Table 9-5** below. The 50th and 95th percentile queue lengths remain below the available storage, indicating that the proposed lane storage is sufficient to accommodate anticipated traffic volumes without significant queueing concerns.

Table 9-5 2041 Future Total Queueing Analysis

Intersection	Movement	Storage (m)	Weekday AM Peak Hour		Weekday PM Peak Hour	
			50th Percentile Queue (m)	95th Percentile Queue (m)	50th Percentile Queue (m)	95th Percentile Queue (m)
Trafalgar Road & Derry Road	EBL	130	44	50	15	21
	EBR	110	6	13	8	23
	WBL	130	4	8	5	9
	WBR	70	42	62	22	41
	NBL	110	47	68	32	60
	NBR	70	0	0	0	1
	SBL	130	12	21	39	61
	SBR	85	0	0	0	1
Eighth Line & Derry Road	EBL	90	0	0	0	0
	WBL	140	20	42	15	25
	WBR	70	0	0	0	0
	NBL	50	15	33	11	23
	SBL	35	6	16	7	16
Collector G & Derry Road	EBR	50	0	0	0	0
	NBR	-	0	4	0	4
	SBR	-	0	1	0	6
Collector H & Derry Road	EBL	50	1	1	14	36
	WBL	50	2	10	1	1
Collector J & Derry Road	EBL	50	0	0	0	0
	WBL	50	2	6	3	8
Trafalgar Road & Collector K	EBL	50	16	30	11	22
	EBR	100	0	22	12	37
	WBL	70	47	69	34	53
	NBL	120	55	80	83	111
	NBR	50	9	15	9	21
	SBL	50	2	8	11	10
	SBR	50	1	4	1	3

10 ACTIVE TRANSPORTATION

10.1 Existing Facilities

The following summary of active transportation facilities is based on a review of Halton Region's 2015 Active Transportation Master Plan (ATMP) within the study area.

10.1.1 Sidewalk / Pedestrian Routes

There are currently no continuous pedestrian facilities (i.e., sidewalks or designated pedestrian pathways) along Derry Road, Trafalgar Road, and Eighth Line within the study area limits.

10.1.2 Bicycle Paths and Connectivity

There are no dedicated on-road bicycle lanes or signed cycling routes along Derry Road, Trafalgar Road, or Eighth Line within the study area.

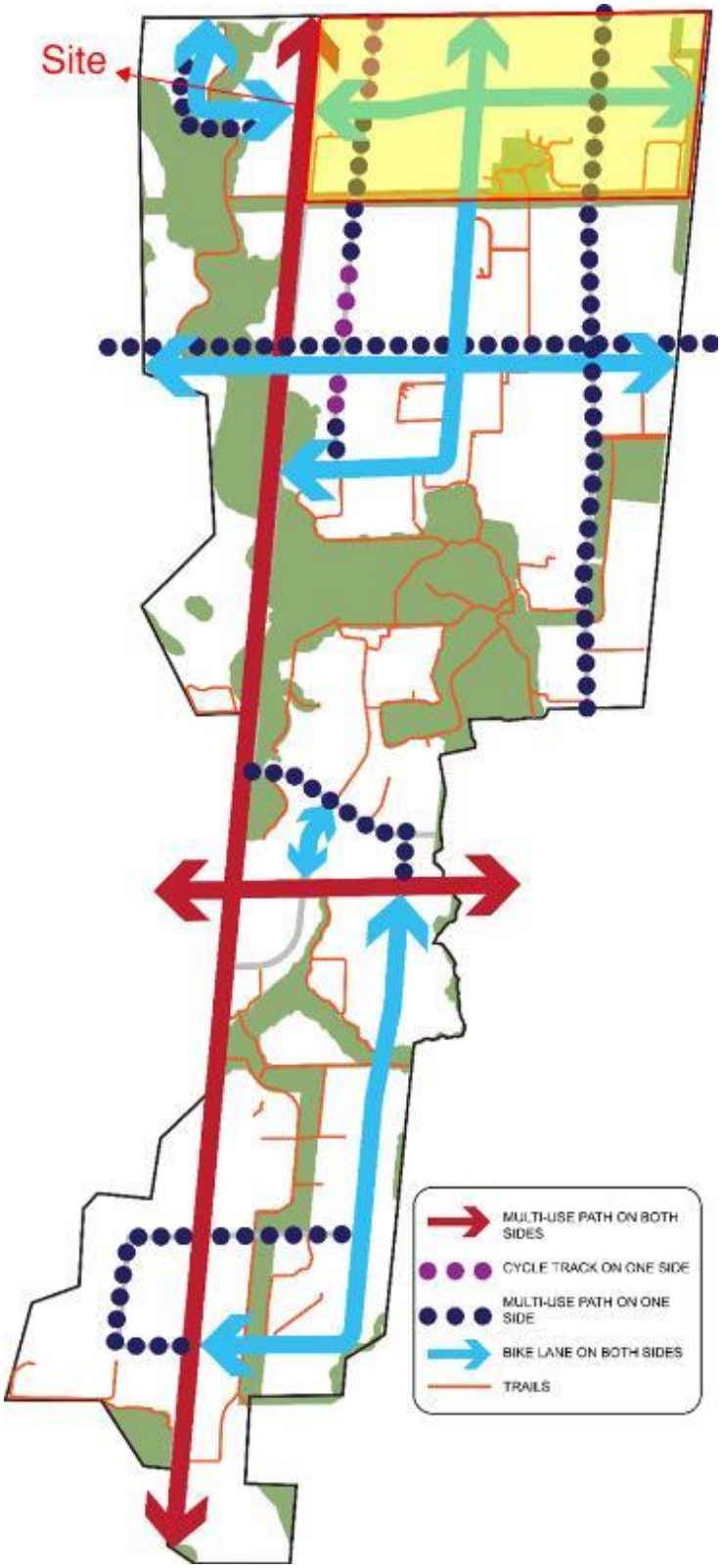
10.1.3 Off-Road Trails

There are no public off-road multi-use trails currently located within the study area.

10.2 Proposed Facilities

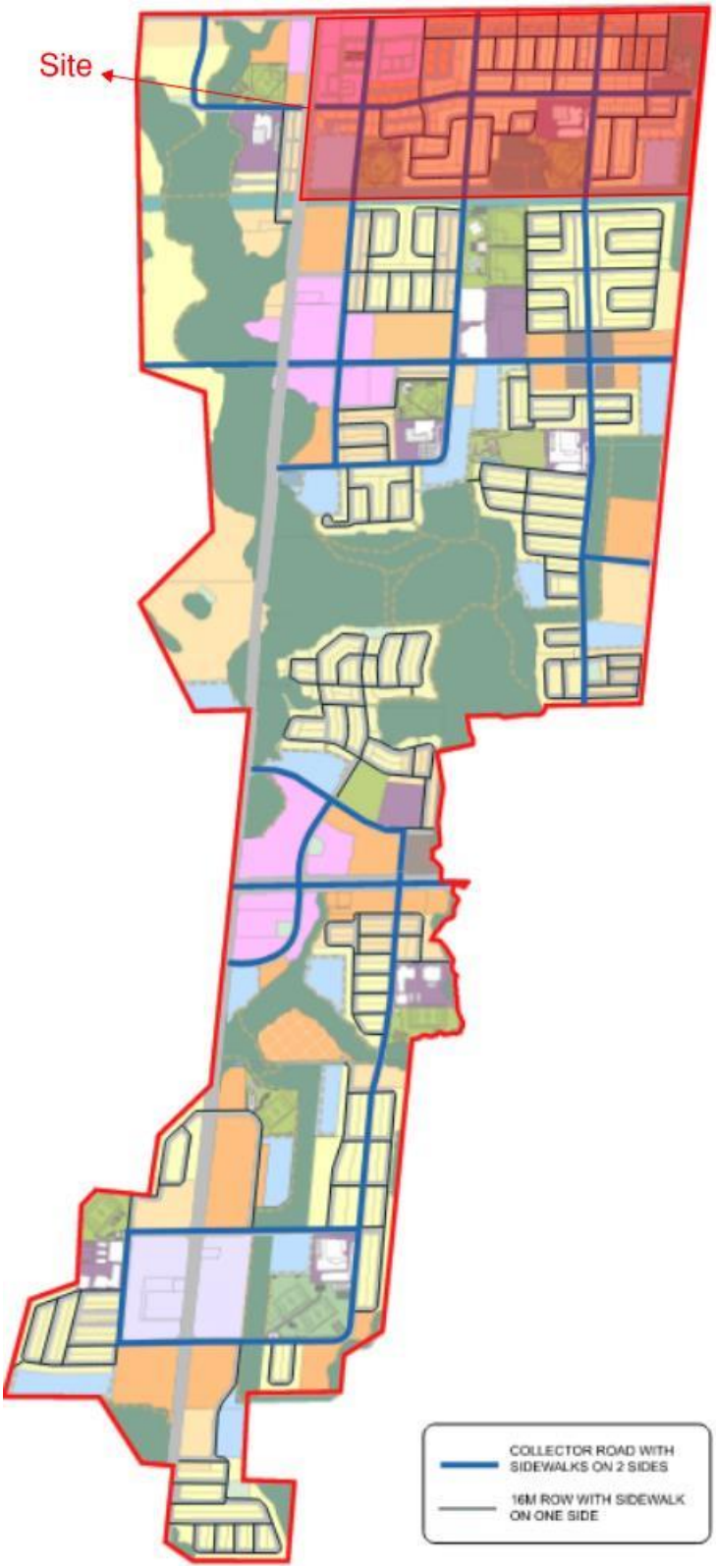
The Trafalgar Tertiary Plan includes several proposed active transportation facilities to serve pedestrians and cyclists within the study area and improve connectivity to the surrounding network. These include multi-use paths, cycling routes, trails and sidewalks, as shown in **Figure 10-1** and **Figure 10-2**.

Figure 10-1 Active Transportation Plan – Multi-Use Paths, Cycling Routes and Trails



Source: Trafalgar Tertiary Plan SGL Planning & Design Inc.

Figure 10-2 Active Transportation Plan – Sidewalk



Source: SGL Planning & Design Inc.

10.2.1 Sidewalks and Multi-Use Paths

In accordance with Halton Region's Transportation Master Plan (TMP), multi-use paths (MUPs), shown in **Figure 10-1**, are proposed on both sides of Trafalgar Road, from Derry Road to the southern boundary of the site, subject to confirmation through the Municipal Class Environmental Assessment process. MUPs are also planned on both sides of Derry Road within the Tertiary Plan area.

As shown in **Figure 10-2**, Sidewalk connections are proposed along the internal local roads within the site, located south of Derry Road, to facilitate pedestrian access to the broader trail network.

All proposed collector roads within the Frontenac area will include sidewalks and / or MUPs on one or both sides, depending on the specific location and available right-of-way width.

10.2.2 Bicycle Infrastructure

According to Maps 3 and 4 in Appendix H of Halton Region's 2015 Active Transportation Master Plan (ATMP), on-road bicycle lanes are proposed along Derry Road and Trafalgar Road within the Tertiary Plan area. In addition, boulevard multi-use paths (MUPs) are planned along Regional Roads to support safe and accessible cycling routes, as illustrated in **Figure 10-1**.

As shown in **Figure 5-2** discussed previously, the Region's C(4) Urban cross-section can accommodate on-street bicycle lanes. All proposed collector roads within the Tertiary Plan are designed to include on-street bicycle lanes, in-boulevard cycle tracks, or MUPs, ensuring a connected cycling network throughout the area.

11 PARKING PLAN

11.1 On-Street Parking Plan

A conceptual on-street parking plan is conducted and shown in **Appendix K**.

The on-street parking plan is subject to refinement at the detailed design stage once residential driveways and all utilities are confirmed.

12 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations for the analysis associated with the proposed development are as follows:

- A review of the proposed subdivision draft plan design for the Frontenac lands is completed based on the requirements on right-of-way, cul-de-sac and road bends, horizontal curvature, intersection spacing, intersection angle, daylight triangle / rounding and minimum tangent length at intersections. It is considered that the design of the roadways is deemed acceptable.
- The existing intersections within the study area are generally operating with reserve capacity under baseline traffic conditions, however, some individual movements currently exceed the Region's definition of a critical movement.
- Based on the recommendations outlined in the Milton Transportation Master Plan (TMP) and the proposed lane configuration modifications detailed in the RNA for the MP4TC area, phased improvements have been adopted for the study intersections.

2031 Future Lane Configuration Modification and Responsibility

Intersection	Approach	Modification	Responsibility
Existing Intersections			
Trafalgar Road & Derry Road	Northbound	▶ Dual left turn lanes ▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region
	Eastbound and Southbound	▶ Dual left turn lanes ▶ 1 additional through lane (HOV)	Region
	Westbound	▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region
Eighth Line & Derry Road	Eastbound and Westbound	▶ 1 additional through lane (HOV) ▶ Auxiliary right turn lane	Region / Town / MP4 Developers
Arterial-to-Collector Intersections			
Derry Road & Collector G	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Right turn only lane	MP4 Developers
	Eastbound	▶ Auxiliary right turn lane	

Intersection	Approach	Modification	Responsibility
Derry Road & Collector H	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Single lane with shared left/right movements	MP4 Developers
	Eastbound	▶ Shared right turn movement	
	Westbound	▶ Auxiliary left turn lane	
Derry Road & Collector J	Eastbound and Westbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Single lane with shared left/right movements	MP4 Developers
	Eastbound	▶ Shared right turn movement	
	Westbound	▶ Auxiliary left turn lane	
Trafalgar Road & Collector K	Northbound and Southbound	▶ 1 additional through lane (HOV)	Region
	Northbound	▶ Shared right turn movement	MP4 Developers
	Eastbound	▶ Shared through movement	
	Southbound	▶ Auxiliary left turn lane	
	Westbound	▶ Shared through/right lane ▶ Auxiliary left turn lane	
Collector-to-Collector Intersections			
Collector G & Collector K	Eastbound and Westbound	▶ Single lane approach (shared all movements)	MP4 developers
	Northbound and Southbound	▶ Shared through/right lane ▶ Auxiliary left turn lane	
Collector H & Collector K	All Directions	▶ Single lane approach (shared all movements)	
Collector J & Collector K			
Eighth Line & Collector K	Northbound	▶ Shared left turn movement	
	Eastbound	▶ Single lane with shared left/right movements	
	Southbound	▶ Shared right turn movement	

2041 Future Lane Configuration Modification and Responsibility

Intersection	Approach	Modification	Responsibility
Existing Intersections			
Trafalgar Road & Derry Road	Westbound	▶ Dual left turn lanes	Region
Arterial-to-Collector Intersections			
Derry Road & Collector G	Southbound	▶ Single right turn lane	Agerton Developers
	Westbound	▶ Additional shared right turn movement	
Derry Road & Collector H	Northbound	▶ Shared through movement	
	Eastbound	▶ Auxiliary left turn lane	
	Southbound	▶ Single lane approach (shared all movements)	
	Westbound	▶ Additional shared right turn movement	
Derry Road & Collector J	Northbound	▶ Shared through movement	
	Eastbound	▶ Auxiliary left turn lane	
	Southbound	▶ Single lane approach (shared all movements)	
	Westbound	▶ Additional shared right turn movement	
Trafalgar Road & Collector K	Northbound, eastbound and southbound	▶ Auxiliary right turn lane	

- Under 2031 Future Background Traffic Conditions, both Trafalgar Road & Derry Road and Eighth Line & Derry Road intersections are expected to operate within overall acceptable limits, with reserve capacity maintained during both AM and PM peak hours. Although some individual turning movements experience higher delays (LOS 'E' or 'F'), all v/c ratios remain below 1.0, indicating no capacity exceedance.
- Under 2031 Future Total Traffic Conditions, all existing, arterial-to-collector, and collector-to-collector intersections are expected to operate well during both the AM and PM peak hours, with overall reserve capacity and no movements over capacity. Although some individual movements experience LOS 'E' or 'F' due to longer delays, particularly on collector roads, all v/c ratios remain below 1.0, indicating no capacity exceedance. These delays are attributed to the 140-second signal cycles and timing plans that prioritize higher-volume arterial roads.
- Under 2041 Future Background Traffic Conditions, the Eighth Line at Derry Road is

expected to operate well during both the AM and PM peak hours, with overall reserve capacity. Some individual movements are expected to experience LOS 'E' and 'F' due to increased delays, though these movements remain within capacity.

- The intersection of Trafalgar Road at Derry Road is anticipated to operate with some reserve capacity. Some critical movements are identified as approaching theoretical capacity (i.e., v/c between 0.85 and 1.00). These include the eastbound through and northbound through movements during the AM peak hour, and the westbound through, northbound left-turn, and southbound through movements during the PM peak hour.
- Under 2041 Future Total Traffic Conditions, all the existing, arterial-to-collector and collector-to-collector intersections are expected to operate well during both the AM and PM peak hours, with overall reserve capacity, except for Trafalgar Road at Derry Road and Collector H at Derry Road.
- This performance is typical for the intersection of two major arterial roads during peak hours, where operations are expected to approach theoretical capacity. Outside of peak periods, traffic flow at this intersection is anticipated to return to manageable levels.
- The operation of some critical movements is primarily attributed to the inability to exclude Trafalgar site traffic from the 2051 JBPE forecasting model growth rates, as requested by the Region. This limitation stems from challenges in aligning trip distribution between the traffic models, resulting in the double counting of some Trafalgar site traffic. Consequently, this has led to an overestimation of traffic volumes for the 2041 future background and future total scenario.

APPENDIX A

Terms of Reference

Alex Cheng

From: Michael Dowdall
Sent: Wednesday, April 23, 2025 10:33 PM
To: Loro, Darren; Sian.Younan@milton.ca
Cc: Jessica Deng; Baharak Hosseini; Alex Cheng
Subject: Frontenac Forest Estates - TIS Terms of Reference
Attachments: 94dp 2070 Jan10-25 - FForest - Revised Draft Plan of Subdivision.pdf

Darren and Sian

TYLin has been retained to prepare a Transportation Impact Study (TIS) for the proposed Frontenac Forest Estates draft plan of subdivision located south of Derry Road between Trafalgar Road and Eighth Line in the Town of Milton.

The proposed subdivision contains a mix of residential development that includes townhouses, single-family homes, and medium density residential/mixed-use units. As per the preliminary concept plan, dated January 10, 2025, there are a total 856 townhouse dwelling units and 504 single-family detached dwelling units proposed for the development.

According to the pre-consultation checklist and subsequent discussions, the following studies are required for the application and will be consolidated into one deliverable for the final submission, entitled “Transportation Impact Study”:

- Traffic Impact Study
- Active Transportation and Pedestrian Routing Plan
- Parking Justification Report - On-Street Parking Plan

In order to properly scope this project, we ask that the Town & Region provide comments on the following terms of reference and confirm if there are any additional items required as part of the study.

Terms of Reference

1) The Study shall be prepared in accordance with Town of Milton and Halton Region’s Transportation Impact Study Guidelines.
2) Conduct a study area road inventory review to confirm lane assignments, traffic controls, speed limits, and surrounding land uses and general study area characteristics. The proposed study intersections consist of:
    - Derry Road and Trafalgar Road
    - Derry Road and Street ‘B’
    - Derry Road and Street ‘D’
    - Derry Road and Street ‘F’
    - Derry Road and Eighth Line
    - Trafalgar Road and Street ‘A’
    - Eighth Line and Street ‘A’
    - Street ‘A’ and Street ‘B’
    - Street ‘A’ and Street ‘D’
    - Street ‘A’ and Street ‘F’
    - Street ‘A’ and Eighth Line
3) Develop future background traffic estimates for any nearby and relevant developments in the immediate vicinity of the subject site. This will include our experience working on the Trafalgar RNA. Background traffic growth rates within the Study Area will also be extracted from the Trafalgar RNA as part of this study. Additionally, the Trafalgar Teritary Plan Phase 1 and Phase 2 site traffic will be included as part of the background traffic estimates.

4) Obtain any available information relating to potential/committed future road / intersection / other transportation infrastructure improvements in the vicinity of the subject site, beyond those proposed in the Trafalgar RNA, that could impact local traffic distribution or assignments. Their effects on traffic patterns will be accounted for in the appropriate planning horizon as specified by Town/Regional staff.

5) As per Town and Regional guidelines, traffic analyses will include the year of anticipated full occupancy year (full build-out) plus a five-year horizon year analysis. The proposed 2031 (build-out) and 20241 horizon years have been selected to remain consistent with the Trafalgar RNA.

6) Remove and replace the estimated site traffic volumes assumed in the Trafalgar RNA as per updated subdivision statistics. As such, the estimated site generated traffic will be built upon the forecasted traffic volumes provided by the Trafalgar RNA study, which in turn will become our future traffic base model. Ensure that all assumptions and methodologies are well documented within the report including supporting diagrams, excerpts, and detailed text with justification.

7) Estimate the weekday a.m. and p.m. peak period traffic to be generated by the proposed development using the industry-accepted, and agency-preferred data published in the Institute of Transportation Engineers, Trip Generation (11th Edition). The directional distribution of traffic approaching and departing the site will be based upon the distribution derived as part of the Trafalgar..

8) Create a future conditions traffic operations model to assess the traffic impacts of the proposed development after introducing the estimated site generated traffic into the future background traffic model. Report any operational deficiencies and recommend mitigating measures, if necessary, to improve traffic operations, including recommending lane configuration changes, and/or traffic control alterations.

9) Prepare peak-hour operational analyses to investigate and document the impacts of the proposed development on the site accesses and study area intersections using Synchro (an industry-accepted analysis software). This will include a review of turning movement delays, volume-to-capacity ratios, and vehicular queuing. Input parameters to the Synchro software will be consistent with the recommended municipal practices and guidelines.

10) Based on the results of the traffic analyses, recommend any improvements to the study area roadway system and traffic controls, as necessary, to accommodate future traffic volumes (be they triggered by background and/or site related trips).

11) A comparison of trip generation assumptions provided in the Trafalgar RNA and the currently proposed draft plan will be provided.

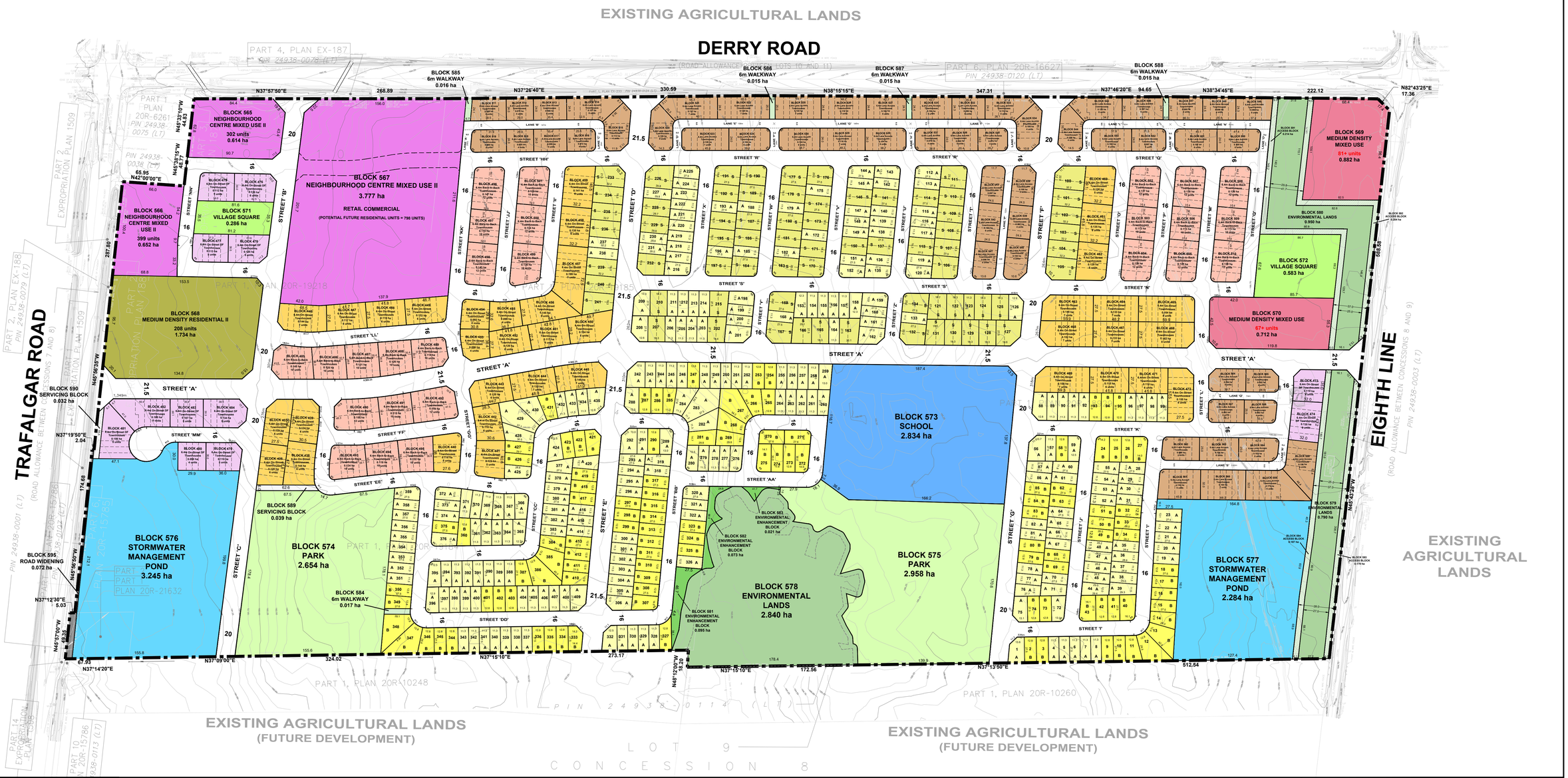
Thank you in advance for your attention to this matter. We look forward to your comments on the preceding scope of work and the requested information.

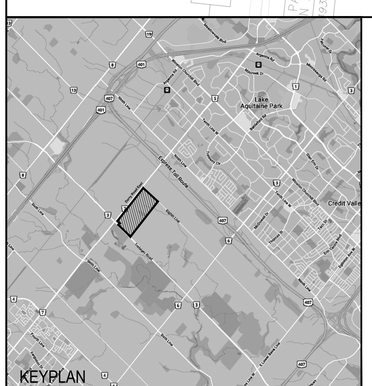
Regards,

Michael Dowdall
DIRECTOR, TRAFFIC
T +1 289.902.0372
M +1 437.993.2662
michael.dowdall@tylin.com
TYLin
Suite 315
3381 Steeles Avenue East
Toronto, ON M2H 3S7, Canada
TYLin.com

APPENDIX B

Site Plan





Subject Property

LEGEND

Subject Property

NOTES

All dimensions are in metres.
All area measurements are computer generated.
All elevations refer to Geodetic Datum.

LAND USE	2070 - 94dp		January 10, 2025	
Low Density Residential	Lots	1-435	21%	16.857 ha±
On-Street Townhouses	Blocks	436-484	8%	6.364
Back-to-Back Townhouses	Blocks	485-510	4%	3.433
Lane Access Townhouses	Blocks	511-564	7%	5.599
Neighbourhood Centre Mixed Use II	Blocks	565-567	6%	5.043
Medium Density Residential II	Block	568	2%	1.734
Medium Density Mixed Use	Blocks	569-570	2%	1.594
Village Square Blocks	Blocks	571-572	1%	0.869
School	Block	573	4%	2.834
Parks	Blocks	574-575	7%	5.612
Stormwater Management Ponds	Blocks	576-577	7%	5.529
Environmental Lands	Blocks	578-580	6%	4.580
Environmental Enhancement Blocks	Blocks	581-583	0%	0.189
Walkways	Blocks	584-588	0%	0.078
Servicing Blocks	Blocks	589-590	0%	0.039
Access Blocks	Blocks	591-594	1%	0.784
Road Widening	Block	595	0%	0.071
Public Roads and Lanes			23%	18.672
TOTAL			**100%**	**79.880 ha±**

PUBLIC ROWs			
20m / 21.5m Public ROW	3,085	m	6.631
16m Public ROW - Local Roads	6,550	m	10.818
Public Lanes	1,284	m	1.222
TOTAL	**10,919**	**m**	**18.672 ha±**

PRELIMINARY UNIT COUNT			
11.3m (37') Single Detached	A	11%	255
12.8m (42') Single Detached	B	5%	111
18.3m (60') Semi-Detached	S	6%	138
6.4m (21') On-Street Townhouse		9%	224
6.4m (21') Double-Frontage Townhouse		3%	61
6.4m (21') Lane Access Townhouse		12%	289
6.4m (21') Back-to-Back Townhouse		12%	282
Neighbourhood Centre Mixed Use II Units		29%	701
Medium Density Residential II Units		9%	208
Medium Density Mixed Use Units		6%	148
Total		**100%**	**2,417 units**

0 25 50 100 200 m

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

A, B, E, F, G, J, L - As Shown on Plan

C. This represents the Applicant's entire holding of undeveloped land in the vicinity.

D. Residential Singles, On-Street Townhouses, Back-to-Back Townhouses, Lane Access Townhouses, Neighbourhood Centre Mixed Use II Blocks, Medium Density Residential II Blocks, Medium Density Mixed Use Blocks, Village Square, School, Parks, Stormwater Management Ponds, Environmental Lands, Environmental Enhancement Blocks, Walkways, Servicing Blocks, Access Blocks, Road Widening, Roads and Lanes.

H. Piped water to be provided.

I. Clay loam soil.

K. Sanitary & storm sewers to be provided.

SURVEYOR'S CERTIFICATE

I certify that: the boundaries of the lands to be subdivided and their relationship to the adjacent lands are correctly shown.

Xxxxxxx Xxxxxxxxxxx — Day Month Year
J.D.BARNES LIMITED

OWNER'S AUTHORIZATION

I/we, **FRONTENAC FOREST ESTATES INC.**
being the registered owner(s) of the subject lands hereby authorize **BOUSFIELDs INC.** to prepare and submit a draft plan of subdivision for approval.

Xxxxxxx Xxxxxxxxxxx — Day Month Year
FRONTENAC FOREST ESTATES INC.

DRAFT PLAN OF PROPOSED SUBDIVISION PART OF LOT 10 CONCESSION 8, NEW SURVEY

(GEOGRAPHIC TOWNSHIP OF TRAFALGER)
TOWN OF MILTON
(REGIONAL MUNICIPALITY OF HALTON)

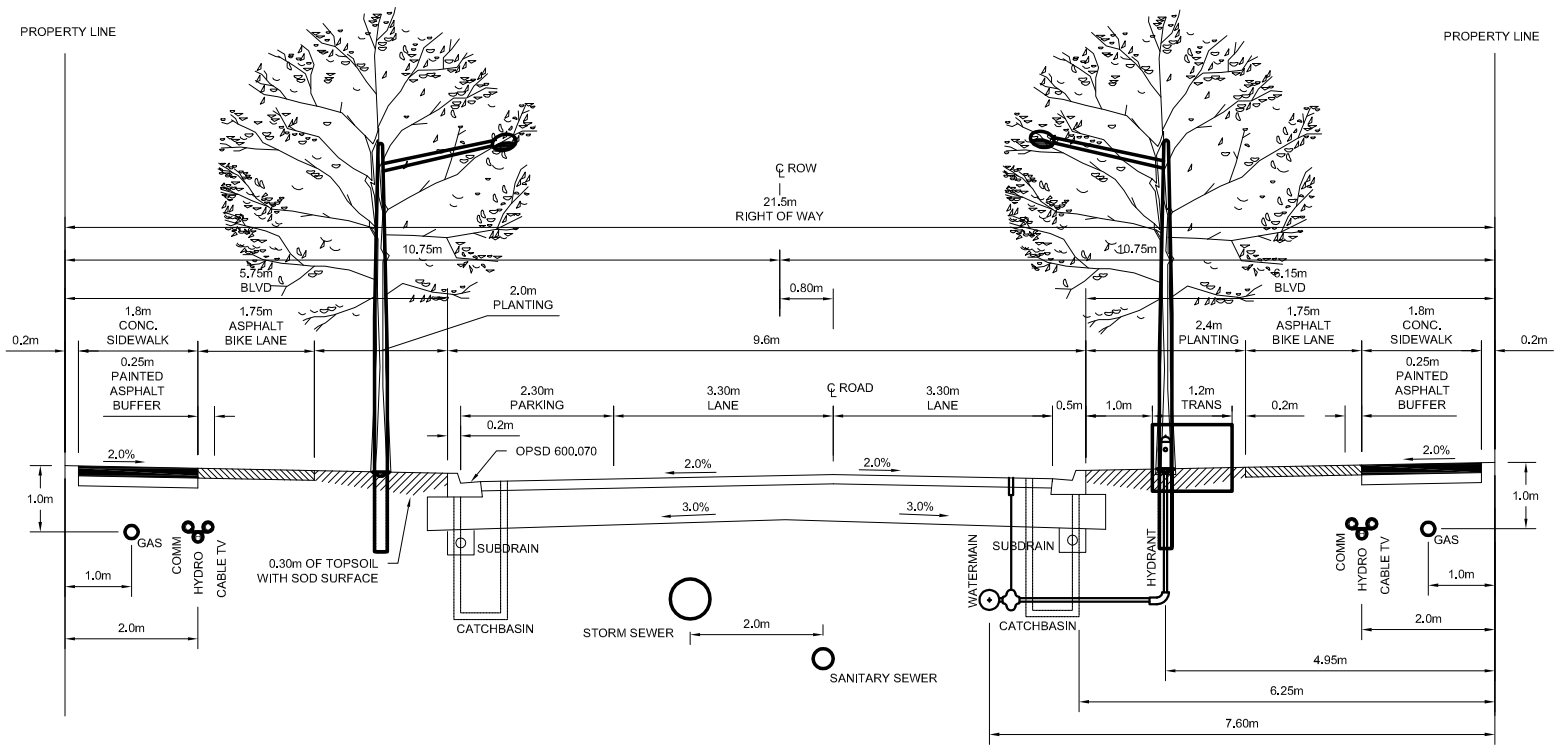
BOUSFIELDs INC.
3 Church Street, Suite 200
Toronto, Ontario M5E 1M2
P (416) 947-9744
F (416) 947-0781

1 : 2000	January 10, 2025	2070 - 94dp
Scale	Date	Drawing Number

APPENDIX C

ROW Cross Section

21.5m


PROPERTY LINE
PROPERTY LINE
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10.75m
5.75m
BLVD
6.15m
BLVD
2.0m
PLANTING
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1.8m
CONC.
SIDEWALK
1.75m
ASPHALT
BIKE LANE
2.4m
PLANTING
1.75m
ASPHALT
BIKE LANE
1.8m
CONC.
SIDEWALK
0.2m
9.6m
0.2m
0.25m
PAINTED
ASPHALT
BUFFER
0.25m
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ASPHALT
BUFFER
2.30m
PARKING
3.30m
LANE
℄ ROAD
3.30m
LANE
0.5m
1.0m
1.2m
TRANS
0.2m
0.2m
OPSD 600.070
2.0%
2.0%
2.0%
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1.0m
1.0m
3.0%
3.0%
GAS
COMM
HYDRO
CABLE TV
1.0m
2.0m
0.30m OF TOPSOIL
WITH SOD SURFACE
SUBDRAIN
CATCHBASIN
STORM SEWER
2.0m
SANITARY SEWER
WATERMAIN
SUBDRAIN
CATCHBASIN
HYDRANT
COMM
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CABLE TV
GAS
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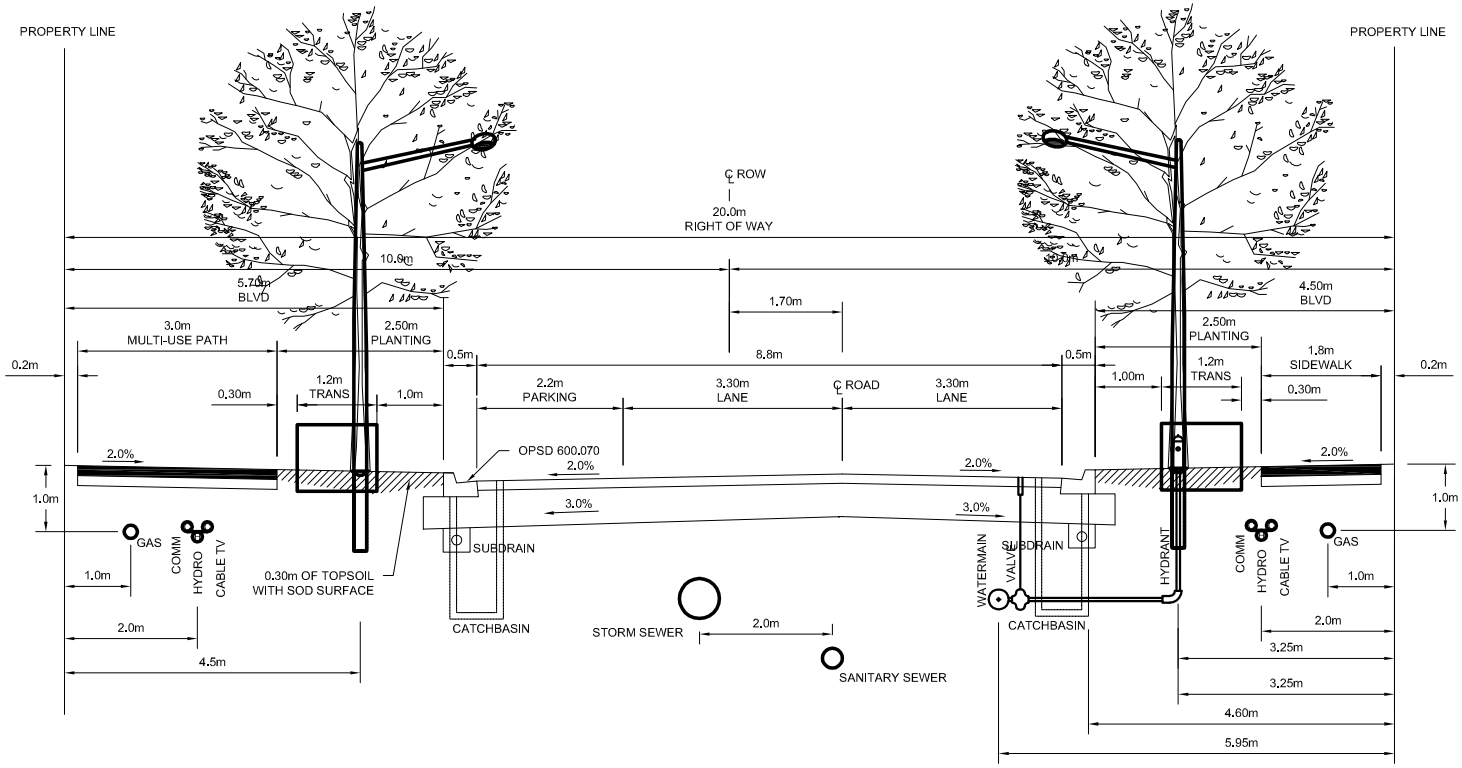
2.0m
4.95m
6.25m
7.60m

20m MUP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BLVD
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BLVD
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3.0m
MULTI-USE PATH
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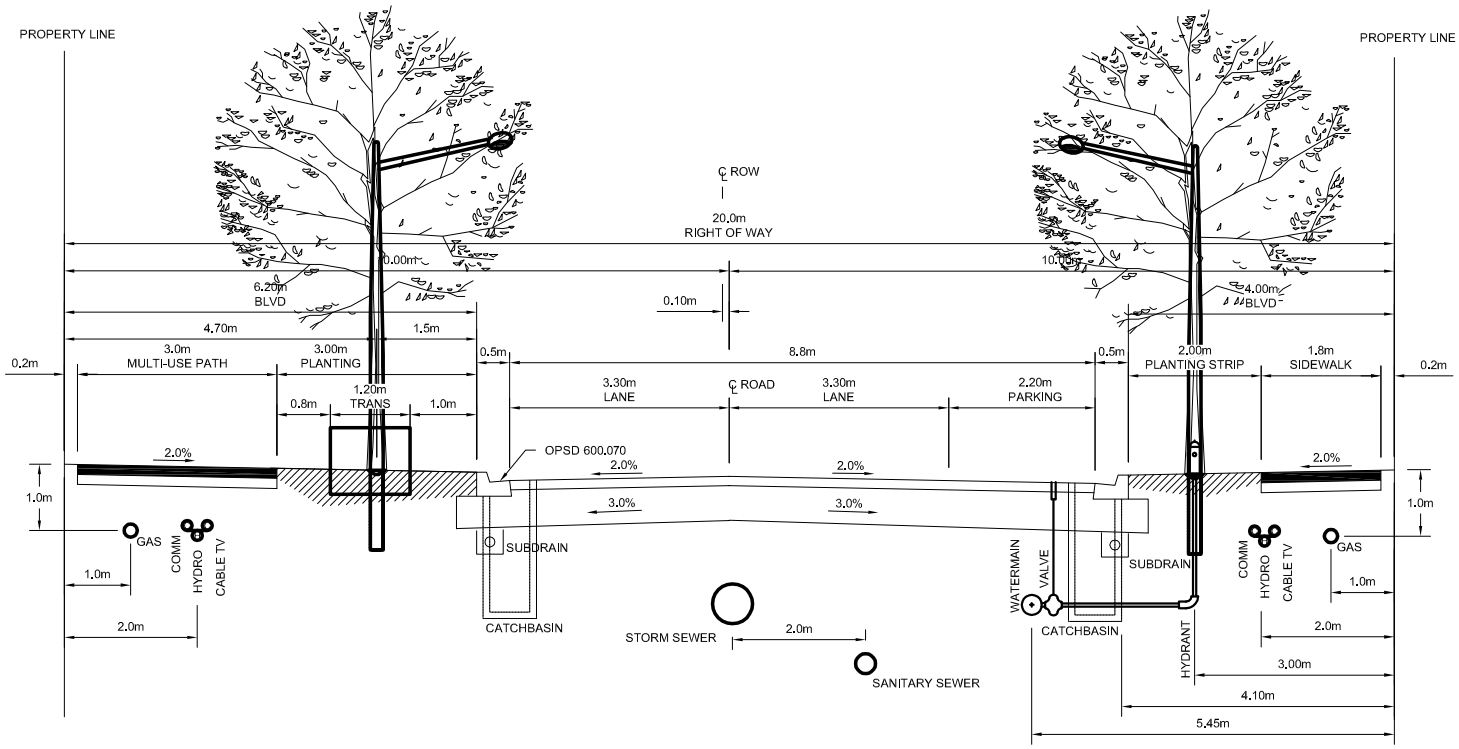
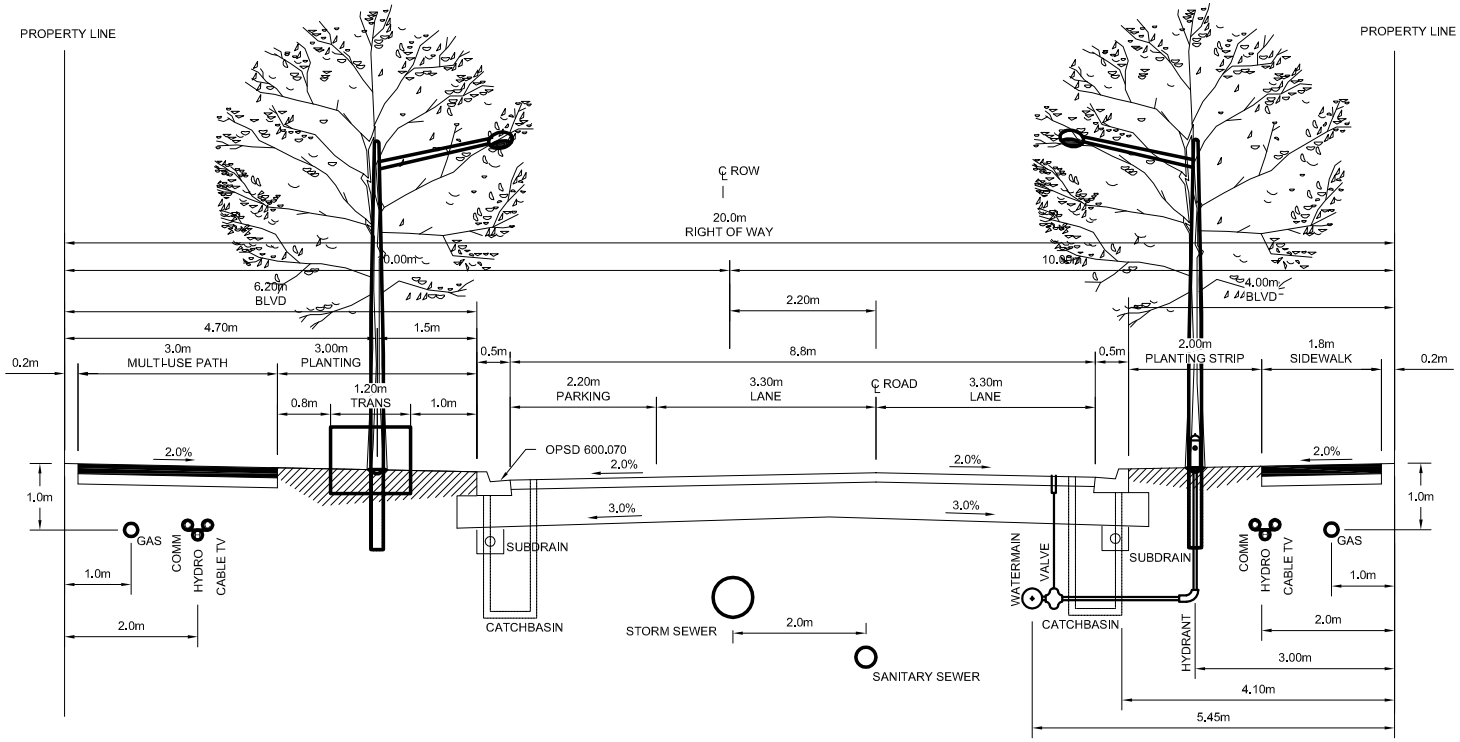
PLANTING
2.50m
PLANTING
0.5m
8.8m
0.5m
1.8m
SIDEWALK
0.2m
0.2m
1.2m
TRANS
1.00m
1.2m
TRANS
0.30m
1.0m
2.2m
PARKING
3.30m
LANE
℄ ROAD
3.30m
LANE
0.30m
2.0%
OPSD 600.070
2.0%
2.0%
2.0%
1.0m
3.0%
3.0%
1.0m
GAS
COMM
HYDRO
CABLE TV
SUBDRAIN
SUBDRAIN
WATERMAIN
VALVE
HYDRANT
COMM
HYDRO
CABLE TV
GAS
1.0m
1.0m
0.30m OF TOPSOIL
WITH SOD SURFACE
CATCHBASIN
STORM SEWER
2.0m
CATCHBASIN
2.0m
2.0m
SANITARY SEWER
4.5m
3.25m
3.25m
4.60m
5.95m

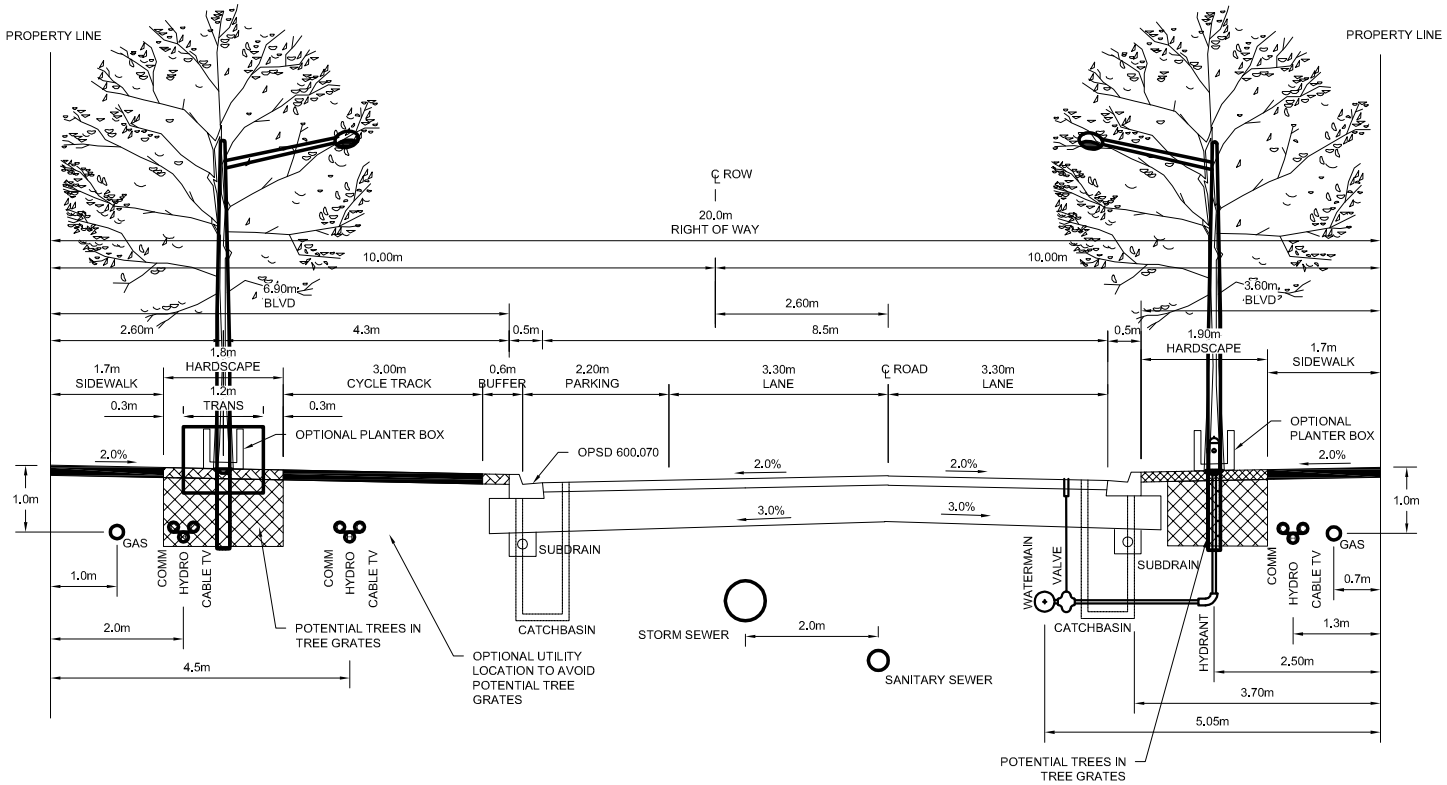
20m Character Road (outside Node - A)



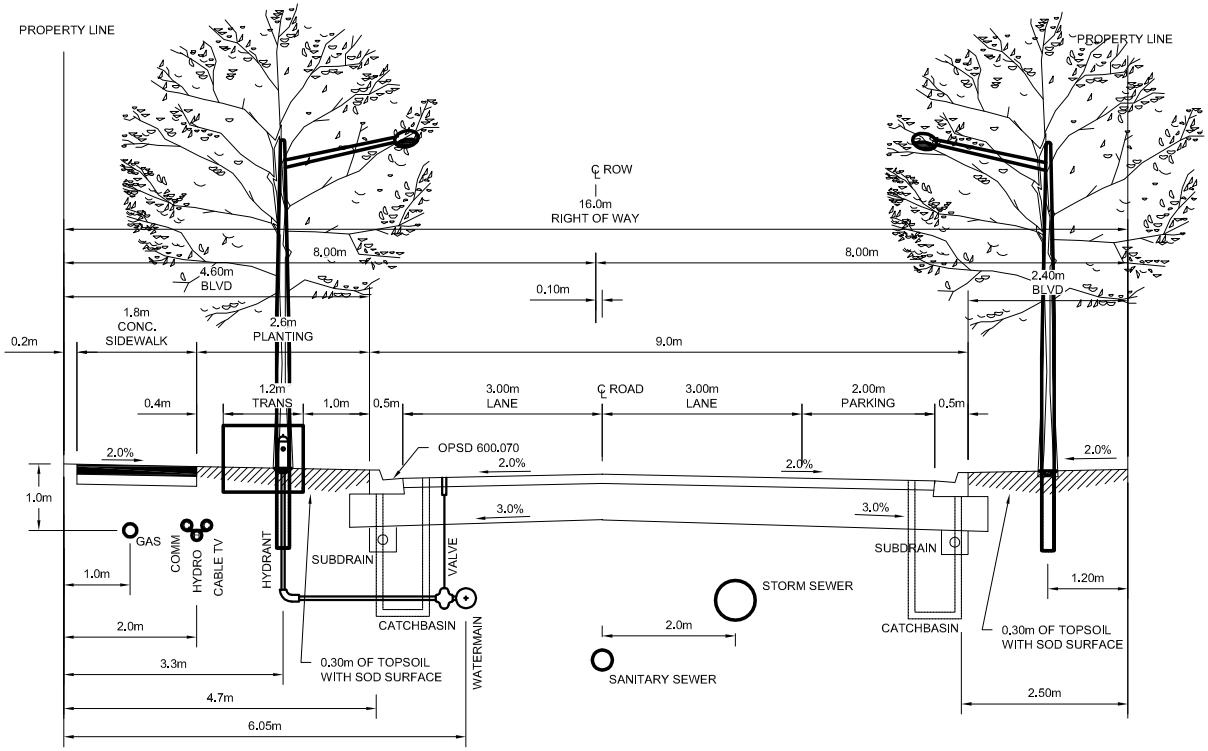
20m Character Road (outside Node - B)

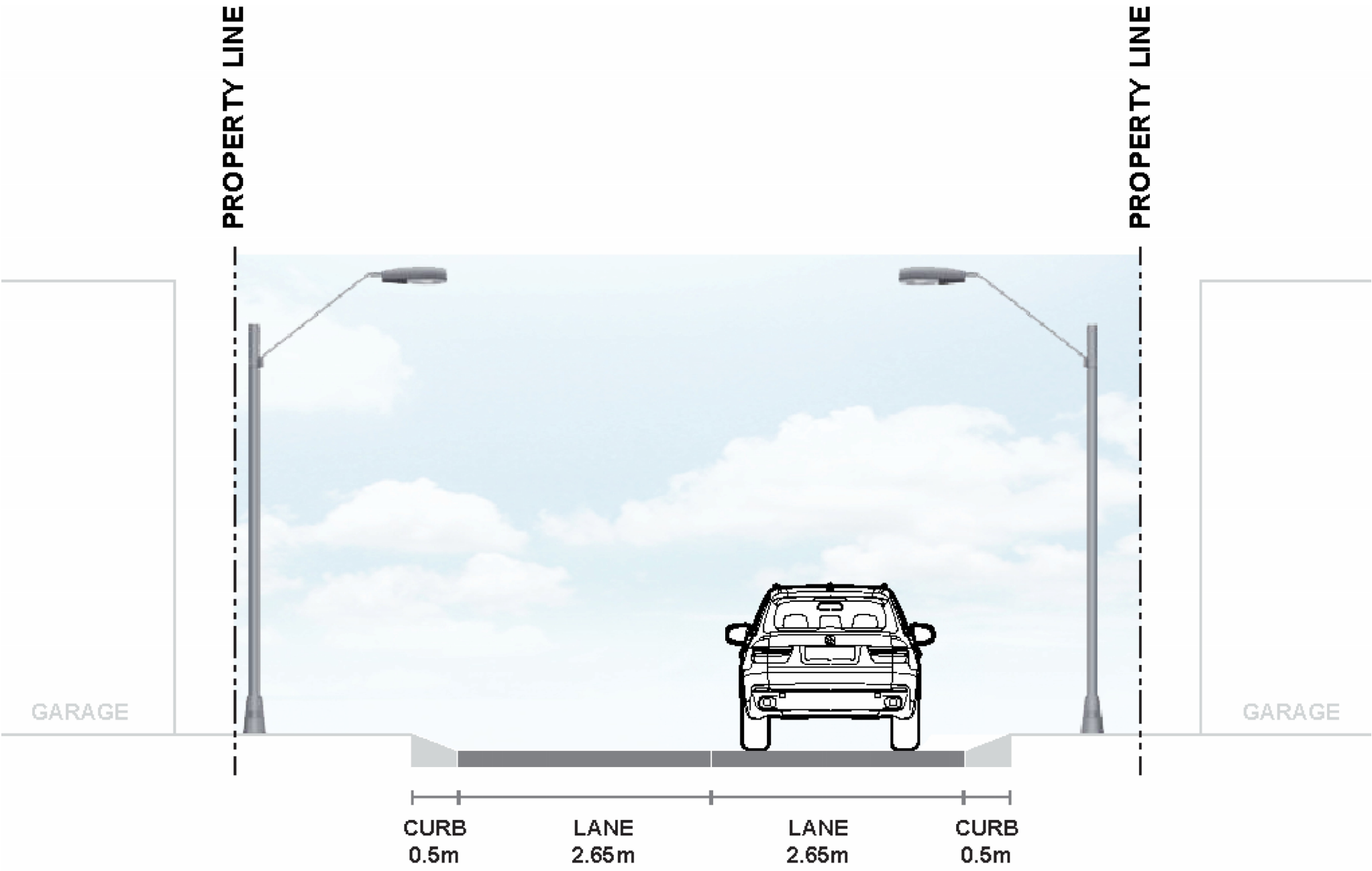


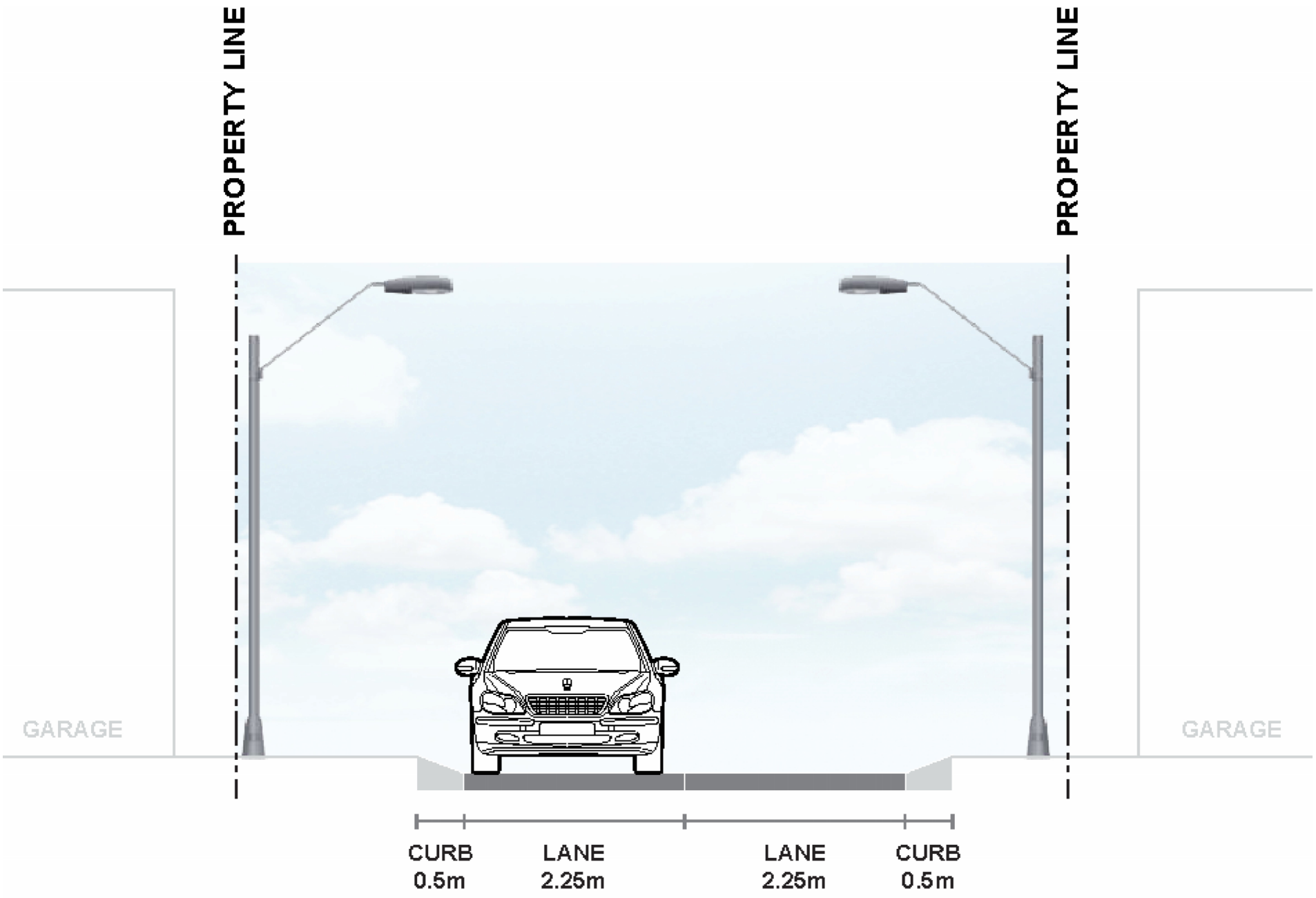
20m Character Road (in node)



16m

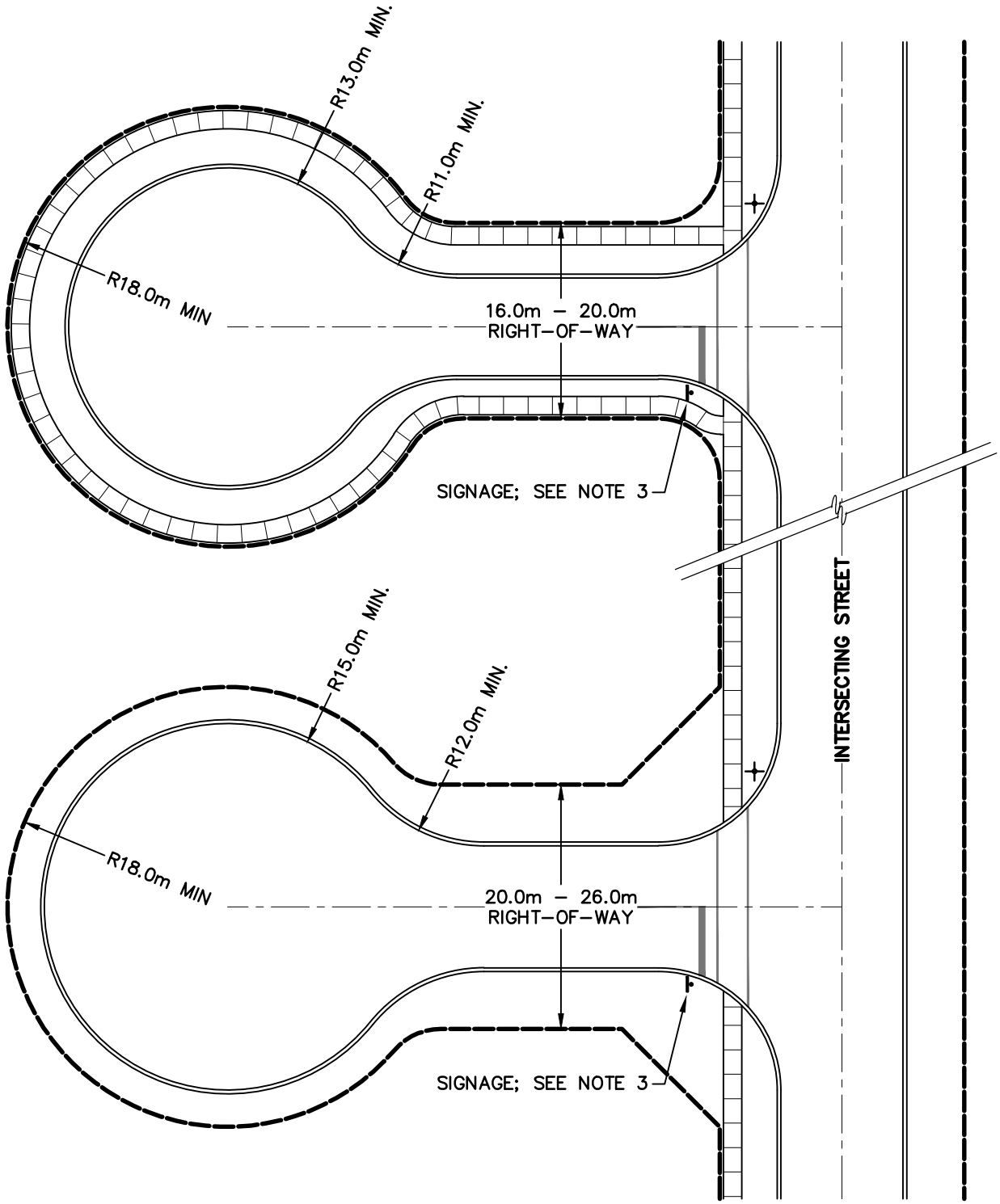

PROPERTY LINE
PROPERTY LINE
℄ ROW
16.0m
RIGHT OF WAY
8.00m
8.00m
4.60m
BLVD
2.40m
BLVD
0.10m
1.8m
CONC.
SIDEWALK
0.2m
2.6m
PLANTING
9.0m
1.2m
TRANS
0.4m
1.0m
0.5m
3.00m
LANE
℄ ROAD
3.00m
LANE
2.00m
PARKING
0.5m
OPSD 600.070
2.0%
2.0%
2.0%
2.0%
1.0m
3.0%
3.0%
GAS
COMM
HYDRO
CABLE TV
HYDRANT
SUBDRAIN
VALVE
SUBDRAIN
1.0m
STORM SEWER
1.20m
2.0m
CATCHBASIN
CATCHBASIN
2.0m
0.30m OF TOPSOIL
WITH SOD SURFACE
3.3m
0.30m OF TOPSOIL
WITH SOD SURFACE
WATERMAIN
SANITARY SEWER
4.7m
2.50m
6.05m


PROPERTY LINE
PROPERTY LINE
GARAGE
GARAGE
CURB
0.5m
LANE
2.65m
LANE
2.65m
CURB
0.5m


PROPERTY LINE
PROPERTY LINE
GARAGE
GARAGE
CURB
0.5m
LANE
2.25m
LANE
2.25m
CURB
0.5m

APPENDIX D

Town of Milton Standard Drawing – Urban Cul-de-sac



NOTES:

1. REQUIREMENT FOR SIDEWALK INSTALLATION AT CUL–DE–SAC WILL BE AT THE DISCRETION OF THE TOWN OF MILTON.
2. GUTTER SLOPES WITHIN A CUL–DE–SAC SHALL BE A MINIMUM OF 0.75%.
3. TRAFFIC CONTROL AND STREET NAME SIGNS ARE TO BE PLACED PER TMSD 15–01.01.
4. MAXIMUM LENGTH FROM INTERSECTING STREET TO CENTRE OF BULB IS 230m.
5. PAVEMENT WIDTHS SHALL BE PER TOWN OF MILTON STANDARD ROAD CROSS–SECTIONS.
6. TEMPORARY TURNING CIRCLES ARE TO COMPLY WITH WIDTHS ABOVE.

Title	Scale	
URBAN CUL–DE–SAC	1:500	MILTON
	Rev. Date 2024/SEP	
	Standard No. 02–01.01	

APPENDIX E

Existing Traffic Data

Date: 31-Oct-22
Intersection: Derry Rd & Trafalgar Rd

8 Phase Basic Timing Sheet

	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use	X	X	X	X	X	X	X	X	X	X	X	X
Direction	WBL	EB	NBL	SB	EBL	WB	SBL	NB				
Min Green	7	10	7	20	7	10	7	20				
Veh Ext.	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Yellow	3	4.6	3	4.2	3	4.6	3	4.2				
Red	1	2.3	1	2.6	1	2.3	1	2.6				
Walk		7		7		7		7				
Don't Walk		24		23		24		23				
Max 1	10	45	10	45	10	45	10	45				
Max 2	15	50	20	40	15	50	15	40				
Max 3	10	45	10	45	10	45	10	45				
Veh Recall		x				x						
Ped Recall												

Notes: Sync Reference 3:15

2.4 Model Calibration

The traffic models were calibrated according to the Region's TIS Guidelines and using the existing traffic data. Peak hour factors (PHF) were calculated based on the 15-minute volume breakdown of existing TMCs and are summarized in **Table 2-3**. Saturation flow rates and lane widths were set to the Synchro defaults of 1,900 vehicles per hour and 3.7 metres, respectively, as no specific values were provided in the Region's guidelines.

Table 2-3: Modeled Intersection Peak Hour Factors

No.	Intersection	Intersection Control	Peak Hours	
			a.m.	p.m.
1	Trafalgar Road and Highway 401 Westbound Off-Ramp	Signalized	0.94	0.93
2	Trafalgar Road and Highway 401 Eastbound Off-Ramp	Signalized	0.97	0.89
3	Trafalgar Road and Derry Road	Signalized	0.98	0.95
4	Eighth Line and Derry Road	Two-way-stop-controlled	0.96	0.97
5	Trafalgar Road and Britannia Road	Signalized	0.97	0.97
6	Eighth Line and Britannia Road	Two-way-stop-controlled	0.95	0.96
7	Trafalgar Road and E Lower Base Line	Signalized	0.99	0.94

After applying the calculated parameters noted above to the base model, three out of the seven analyzed intersections were either operating over capacity overall or had several movements operating over capacity based on the Region's critical intersection criteria, which is:

- V/C ratios of 0.85 or above for overall intersection operations, through movements, or shared through/turning movements;
- V/C ratios of 0.95 or above for exclusive movements; or
- Queues for an individual movement are projected to exceed available turning lane storage.

The following measures were implemented at the signalized intersection to calibrate the existing traffic models:

- Trafalgar Road and Derry Road:
  - Assumed to be semi-actuated with minimum recall on Derry Road;
  - Lost time adjustment of -1.0 seconds for protected/permitted left-turn movements and -2.0 seconds for through or right-turn movements for both peak hours; and
  - Phasing splits were optimized for both peak hours.
- Trafalgar Road and Britannia Road:
  - Lost time adjustment of -1.0 seconds for protected/permitted left-turn movements and -2.0 seconds for through or right-turn movements in the p.m. peak hour; and
  - Phasing splits were optimized in the peak hour.
- Trafalgar Road and E Lower Base Line:
  - Only southbound and westbound left-turn phases are included in the provided signal timing plan. However, an examination of Google Maps street view demonstrates a northbound left-turn signal head in operation. Therefore, northbound left-turn phases were coded into the signal timing plan for both peak hours;
  - The timing plan specifies Max 2 during the p.m. peak period (3:00 – 7:00 p.m.), which does not include left-turn phases. With this timing plan the southbound left-turn movement is significantly over capacity. Therefore, we have assumed the timing plan follows Max 1 in the p.m. peak hour with the addition of the northbound left-turn phase (same as the a.m. peak hour);
  - Lost time adjustment of -1.0 seconds for protected/permitted left-turn movements and -2.0 seconds for through or right-turn movements for both peak hours; and
  - Phasing splits were optimized for both peak hours.

The additional calibration measures such as optimizing signal timing plans and implementing lost time adjustments used to calibrate the existing traffic models are described in the following subsections.

2.4.1 Optimizing Signal Timing Plans

When the provided signal timing plans were combined with the existing traffic volumes in Synchro, there were several movements at most of the intersections that were operating over capacity. This is not possible under existing conditions as this would mean that some vehicles could not clear the intersection, but all the vehicles counted have done so after they clear the intersection. The Region advised that they regularly review and update their signal timing plans to accommodate the most current traffic volumes, and that optimizing signal timing plans under existing conditions would be acceptable to calibrate the traffic model for a Secondary Plan level study. More detailed studies should conform to the current version of the Regional Synchro Guidelines.

2.4.2 Lost Time Adjustment

Total lost time represents the time that is not usable by vehicles for a signal phase. It is the sum of the start-up lost time at the beginning of each green period and a portion of each clearance interval (yellow plus all-red time). Start-up lost time occurs at the beginning of the cycle when the traffic signal changes from red to green; it is the time that elapses between the signal changing and the queued vehicles moving through the intersection. The extension of effective green is the time that vehicles continue to pass through the intersection after the yellow interval begins. Total lost time is calculated via the following formula:

$$Total\ Lost\ Time = Yellow\ plus\ All\ Red\ Time + Start\ Up\ Lost\ Time - Extension\ of\ Effective\ Green$$

It is typical driver behaviour in the GTA to treat a portion or even all of the yellow time as green time, entering the intersection during the yellow interval, which impacts the intersection capacity. The Lost Time Adjustment (LTA) parameter in Synchro, defined as the following formula, is used in estimating the overall capacity of the intersection:

$$Lost\ Time\ Adjustment = Start\ Up\ Lost\ Time - Extension\ of\ Effective\ Green$$

The default start-up lost time and extension of effective green time are both 2.0 seconds according to the Highway Capacity Manual (HCM). This explains the default LTA of zero seconds.

Recognizing that the extension of effective green is increased when motorists enter the intersection during the yellow time, several municipalities, including York Region, Niagara Region, City of Mississauga and City of Toronto, recognize these driver behaviours and include recommendations for applying LTA to reflect these conditions within their TIS guidelines. Although this driver behaviour is not limited to only locations or time periods that experience traffic congestion, in the interest of providing a more conservative analysis, LTA was only applied to the three critical intersections based on the Region's criteria.

Also, as the length of clearance interval (yellow plus all-red time) increases for a phase, the extension of effective green time increases. However, as a rule of thumb, the maximum extension of effective green does not exceed the yellow interval time.

Therefore, a lost time adjustment of -1.0 second was applied to left-turn movements and -2.0 seconds for through movements at these intersections, considering the typical yellow interval of 3.0 seconds for a left-turn phase and 4.0 seconds for a through movement phase.

As a reference, the following are some guidelines from other municipalities and regions:

- York Region: Reasonable adjustment values of less than three seconds are permitted for critical movements (*Source: Section 1.12 Software and Input Parameters, page 18, York Region Transportation Mobility Plan Guidelines for Development Applications, November 2016*).
- City of Toronto: -1.0 second is the default LTA for all movements for peak period analysis (*Source: Section 5.2.11 Lost Time Adjust, page 120, City of Toronto Guidelines for Using Synchro 9, March 2016*).

Spectrum

Turning Movement Count
Location Name: DERRY RD & EIGHTH LINE
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (2 . DERRY RD & EIGHTH LINE)

Start Time	N Approach EIGHTH LINE						E Approach DERRY RD						S Approach EIGHTH LINE						W Approach DERRY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	1	0	0	0	0	1	0	46	9	0	0	55	4	0	2	0	0	6	6	101	0	0	0	107	169	
06:15:00	0	0	0	0	0	0	0	60	6	0	0	66	3	1	0	0	0	4	9	132	0	0	0	141	211	
06:30:00	0	0	0	0	0	0	0	104	14	0	0	118	4	0	3	0	0	7	9	161	1	0	0	171	296	
06:45:00	0	0	0	0	0	0	0	90	8	0	0	98	1	0	4	0	0	5	8	168	0	0	0	176	279	955
07:00:00	0	0	0	0	0	0	0	89	10	0	0	99	4	0	7	0	0	11	8	173	0	0	0	181	291	1077
07:15:00	0	0	0	0	0	0	0	113	8	0	0	121	7	0	4	0	0	11	19	268	0	0	0	287	419	1285
07:30:00	0	0	0	0	0	0	0	129	21	0	0	150	7	0	11	0	0	18	24	258	0	0	0	282	450	1439
07:45:00	0	0	1	0	0	1	1	164	23	0	0	188	8	0	9	0	0	17	40	329	0	0	0	369	575	1735
08:00:00	0	0	0	0	0	0	0	134	14	0	0	148	16	0	14	0	0	30	21	311	0	0	0	332	510	1954
08:15:00	0	0	0	0	0	0	0	148	22	0	0	170	5	0	13	0	0	18	16	338	0	0	0	354	542	2077
08:30:00	0	0	0	0	0	0	0	155	23	0	0	178	11	0	11	0	0	22	13	335	0	0	0	348	548	2175
08:45:00	0	0	0	0	0	0	0	133	22	0	0	155	14	0	11	0	0	25	20	261	0	0	0	281	461	2061
BREAK																										
11:00:00	1	0	0	0	0	1	1	89	3	0	0	93	3	1	2	0	0	6	2	81	0	0	0	83	183	
11:15:00	0	0	1	0	0	1	0	93	4	0	0	97	0	0	5	0	0	5	2	123	0	0	0	125	228	
11:30:00	1	0	0	0	0	1	0	108	1	0	0	109	2	0	5	0	0	7	1	128	0	0	0	129	246	
11:45:00	0	0	0	0	0	0	0	88	6	0	0	94	1	0	3	0	0	4	5	99	0	0	0	104	202	859
12:00:00	0	0	1	0	0	1	0	107	0	0	0	107	3	0	8	0	0	11	8	108	0	0	0	116	235	911
12:15:00	0	0	0	0	0	0	1	113	4	0	0	118	1	0	5	0	0	6	6	101	0	0	0	107	231	914
12:30:00	0	0	0	0	0	0	0	102	6	0	0	108	2	0	7	0	0	9	8	123	0	0	0	131	248	916
12:45:00	0	0	0	0	0	0	0	105	3	0	0	108	7	0	1	0	0	8	8	91	0	0	0	99	215	929
BREAK																										
16:00:00	0	0	0	0	0	0	1	282	11	0	0	294	8	0	7	0	0	15	7	163	0	0	0	170	479	
16:15:00	0	0	2	0	0	2	1	252	17	0	0	270	11	0	11	0	0	22	9	180	0	0	0	189	483	
16:30:00	1	0	0	0	0	1	1	267	25	0	0	293	12	1	7	0	0	20	7	185	0	0	0	192	506	
16:45:00	1	0	1	0	0	2	0	294	18	0	0	312	12	0	10	0	0	22	11	151	0	0	0	162	498	1966
17:00:00	0	0	0	0	0	0	0	290	30	1	0	321	16	0	13	0	0	29	15	171	0	0	0	186	536	2023
17:15:00	0	0	0	0	0	0	0	332	26	0	0	358	14	0	10	0	0	24	19	210	0	0	0	229	611	2151
17:30:00	0	0	0	0	0	0	0	286	22	0	0	308	26	0	5	0	0	31	10	184	0	1	0	195	534	2179
17:45:00	0	0	0	0	0	0	0	232	17	0	0	249	18	0	15	0	0	33	12	173	0	0	0	185	467	2148
18:00:00	0	0	0	0	0	0	1	217	9	0	0	227	5	0	4	0	0	9	8	153	0	0	0	161	397	2009
18:15:00	0	0	1	0	0	1	0	181	9	0	0	190	7	0	9	0	0	16	5	178	0	0	0	183	390	1788
18:30:00	0	0	0	0	0	0	0	190	8	0	0	198	9	0	3	0	0	12	8	121	0	0	0	129	339	1593
18:45:00	0	0	0	0	0	0	0	141	3	0	0	144	0	0	5	0	0	5	2	112	0	0	0	114	263	1389
Grand Total	5	0	7	0	0	12	7	5134	402	1	0	5544	241	3	224	0	0	468	346	5670	1	1	0	6018	**12042**	-
Approach%	41.7%	0%	58.3%	0%		-	0.1%	92.6%	7.3%	0%		-	51.5%	0.6%	47.9%	0%		-	5.7%	94.2%	0%	0%		-	-	-
Totals %	0%	0%	0.1%	0%		0.1%	0.1%	42.6%	3.3%	0%		46%	2%	0%	1.9%	0%		3.9%	2.9%	47.1%	0%	0%		50%	-	-
Heavy	0	0	0	0		-	0	153	3	0		-	2	0	5	0		-	7	137	0	0		-	-	-
Heavy %	0%	0%	0%	0%		-	0%	3%	0.7%	0%		-	0.8%	0%	2.2%	0%		-	2%	2.4%	0%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: DERRY RD & EIGHTH LINE
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 07:45 AM - 08:45 AM Weather: Overcast Clouds (3.3 °C)

Start Time	N Approach EIGHTH LINE						E Approach DERRY RD						S Approach EIGHTH LINE						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	0	0	1	0	0	1	1	164	23	0	0	188	8	0	9	0	0	17	40	329	0	0	0	369	575
08:00:00	0	0	0	0	0	0	0	134	14	0	0	148	16	0	14	0	0	30	21	311	0	0	0	332	510
08:15:00	0	0	0	0	0	0	0	148	22	0	0	170	5	0	13	0	0	18	16	338	0	0	0	354	542
08:30:00	0	0	0	0	0	0	0	155	23	0	0	178	11	0	11	0	0	22	13	335	0	0	0	348	548
Grand Total	0	0	1	0	0	1	1	601	82	0	0	684	40	0	47	0	0	87	90	1313	0	0	0	1403	**2175**
Approach%	0%	0%	100%	0%		-	0.1%	87.9%	12%	0%		-	46%	0%	54%	0%		-	6.4%	93.6%	0%	0%		-	-
Totals %	0%	0%	0%	0%		0%	0%	27.6%	3.8%	0%		31.4%	1.8%	0%	2.2%	0%		4%	4.1%	60.4%	0%	0%		64.5%	-
PHF	0	0	0.25	0		0.25	0.25	0.92	0.89	0		0.91	0.63	0	0.84	0		0.73	0.56	0.97	0	0		0.95	-
Heavy	0	0	0	0		0	0	19	0	0		19	0	0	0	0		0	1	14	0	0		15	-
Heavy %	0%	0%	0%	0%		0%	0%	3.2%	0%	0%		2.8%	0%	0%	0%	0%		0%	1.1%	1.1%	0%	0%		1.1%	-
Lights	0	0	1	0		1	1	582	82	0		665	40	0	47	0		87	89	1299	0	0		1388	-
Lights %	0%	0%	100%	0%		100%	100%	96.8%	100%	0%		97.2%	100%	0%	100%	0%		100%	98.9%	98.9%	0%	0%		98.9%	-
Single-Unit Trucks	0	0	0	0		0	0	10	0	0		10	0	0	0	0		0	0	6	0	0		6	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	1.7%	0%	0%		1.5%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	-
Buses	0	0	0	0		0	0	6	0	0		6	0	0	0	0		0	1	4	0	0		5	-
Buses %	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.9%	0%	0%	0%	0%		0%	1.1%	0.3%	0%	0%		0.4%	-
Articulated Trucks	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	0	4	0	0		4	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	-

Spectrum

Turning Movement Count
Location Name: DERRY RD & EIGHTH LINE
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 12:00 PM - 01:00 PM Weather: Overcast Clouds (4.24 °C)

Start Time	N Approach EIGHTH LINE						E Approach DERRY RD						S Approach EIGHTH LINE						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
12:00:00	0	0	1	0	0	1	0	107	0	0	0	107	3	0	8	0	0	11	8	108	0	0	0	116	235
12:15:00	0	0	0	0	0	0	1	113	4	0	0	118	1	0	5	0	0	6	6	101	0	0	0	107	231
12:30:00	0	0	0	0	0	0	0	102	6	0	0	108	2	0	7	0	0	9	8	123	0	0	0	131	248
12:45:00	0	0	0	0	0	0	0	105	3	0	0	108	7	0	1	0	0	8	8	91	0	0	0	99	215
Grand Total	0	0	1	0	0	1	1	427	13	0	0	441	13	0	21	0	0	34	30	423	0	0	0	453	**929**
Approach%	0%	0%	100%	0%		-	0.2%	96.8%	2.9%	0%		-	38.2%	0%	61.8%	0%		-	6.6%	93.4%	0%	0%		-	-
Totals %	0%	0%	0.1%	0%		0.1%	0.1%	46%	1.4%	0%		47.5%	1.4%	0%	2.3%	0%		3.7%	3.2%	45.5%	0%	0%		48.8%	-
PHF	0	0	0.25	0		0.25	0.25	0.94	0.54	0		0.93	0.46	0	0.66	0		0.77	0.94	0.86	0	0		0.86	-
Heavy	0	0	0	0		0	0	35	0	0		35	0	0	1	0		1	2	29	0	0		31	-
Heavy %	0%	0%	0%	0%		0%	0%	8.2%	0%	0%		7.9%	0%	0%	4.8%	0%		2.9%	6.7%	6.9%	0%	0%		6.8%	-
Lights	0	0	1	0		1	1	392	13	0		406	13	0	20	0		33	28	394	0	0		422	-
Lights %	0%	0%	100%	0%		100%	100%	91.8%	100%	0%		92.1%	100%	0%	95.2%	0%		97.1%	93.3%	93.1%	0%	0%		93.2%	-
Single-Unit Trucks	0	0	0	0		0	0	28	0	0		28	0	0	1	0		1	2	23	0	0		25	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	6.6%	0%	0%		6.3%	0%	0%	4.8%	0%		2.9%	6.7%	5.4%	0%	0%		5.5%	-
Buses	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	3	0	0		3	-
Buses %	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.7%	-
Articulated Trucks	0	0	0	0		0	0	5	0	0		5	0	0	0	0		0	0	3	0	0		3	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		1.1%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.7%	-

Turning Movement Count
Location Name: DERRY RD & EIGHTH LINE
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

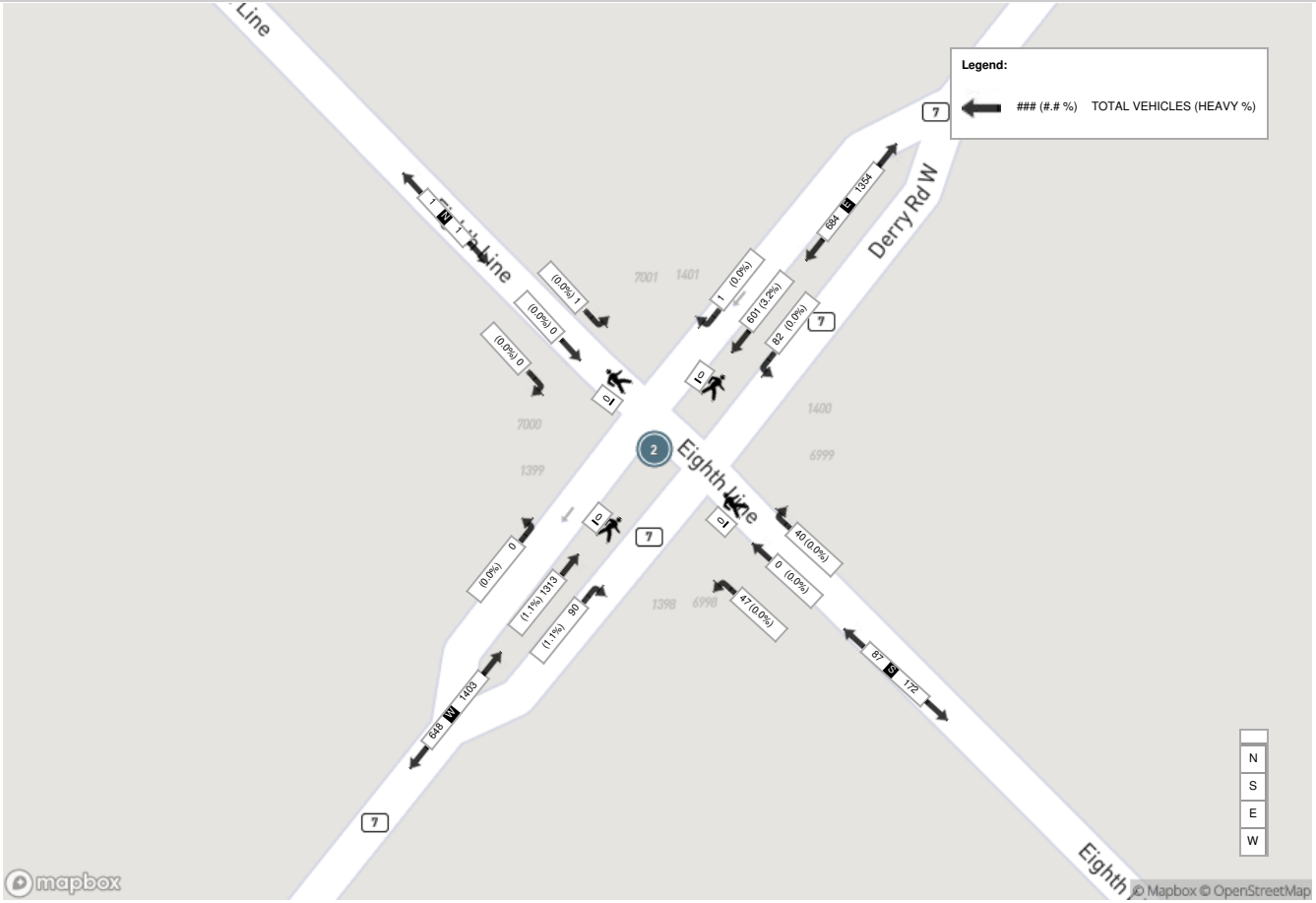
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (4.09 °C)

Start Time	N Approach EIGHTH LINE						E Approach DERRY RD						S Approach EIGHTH LINE						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	1	0	1	0	0	2	0	294	18	0	0	312	12	0	10	0	0	22	11	151	0	0	0	162	498
17:00:00	0	0	0	0	0	0	0	290	30	1	0	321	16	0	13	0	0	29	15	171	0	0	0	186	536
17:15:00	0	0	0	0	0	0	0	332	26	0	0	358	14	0	10	0	0	24	19	210	0	0	0	229	611
17:30:00	0	0	0	0	0	0	0	286	22	0	0	308	26	0	5	0	0	31	10	184	0	1	0	195	534
Grand Total	1	0	1	0	0	2	0	1202	96	1	0	1299	68	0	38	0	0	106	55	716	0	1	0	772	**2179**
Approach%	50%	0%	50%	0%		-	0%	92.5%	7.4%	0.1%		-	64.2%	0%	35.8%	0%		-	7.1%	92.7%	0%	0.1%		-	-
Totals %	0%	0%	0%	0%		0.1%	0%	55.2%	4.4%	0%		59.6%	3.1%	0%	1.7%	0%		4.9%	2.5%	32.9%	0%	0%		35.4%	-
PHF	0.25	0	0.25	0		0.25	0	0.91	0.8	0.25		0.91	0.65	0	0.73	0		0.85	0.72	0.85	0	0.25		0.84	-
Heavy	0	0	0	0		0	0	9	0	0		9	1	0	0	0		1	0	18	0	0		18	-
Heavy %	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.7%	1.5%	0%	0%	0%		0.9%	0%	2.5%	0%	0%		2.3%	-
Lights	1	0	1	0		2	0	1193	96	1		1290	67	0	38	0		105	55	698	0	1		754	-
Lights %	100%	0%	100%	0%		100%	0%	99.3%	100%	100%		99.3%	98.5%	0%	100%	0%		99.1%	100%	97.5%	0%	100%		97.7%	-
Single-Unit Trucks	0	0	0	0		0	0	5	0	0		5	0	0	0	0		0	0	10	0	0		10	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	1.4%	0%	0%		1.3%	-
Buses	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	0	5	0	0		5	-
Buses %	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.6%	-
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	1	0	0	0		1	0	3	0	0		3	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.1%	0%	0%		0.1%	1.5%	0%	0%	0%		0.9%	0%	0.4%	0%	0%		0.4%	-

Turning Movement Count
Location Name: DERRY RD & EIGHTH LINE
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

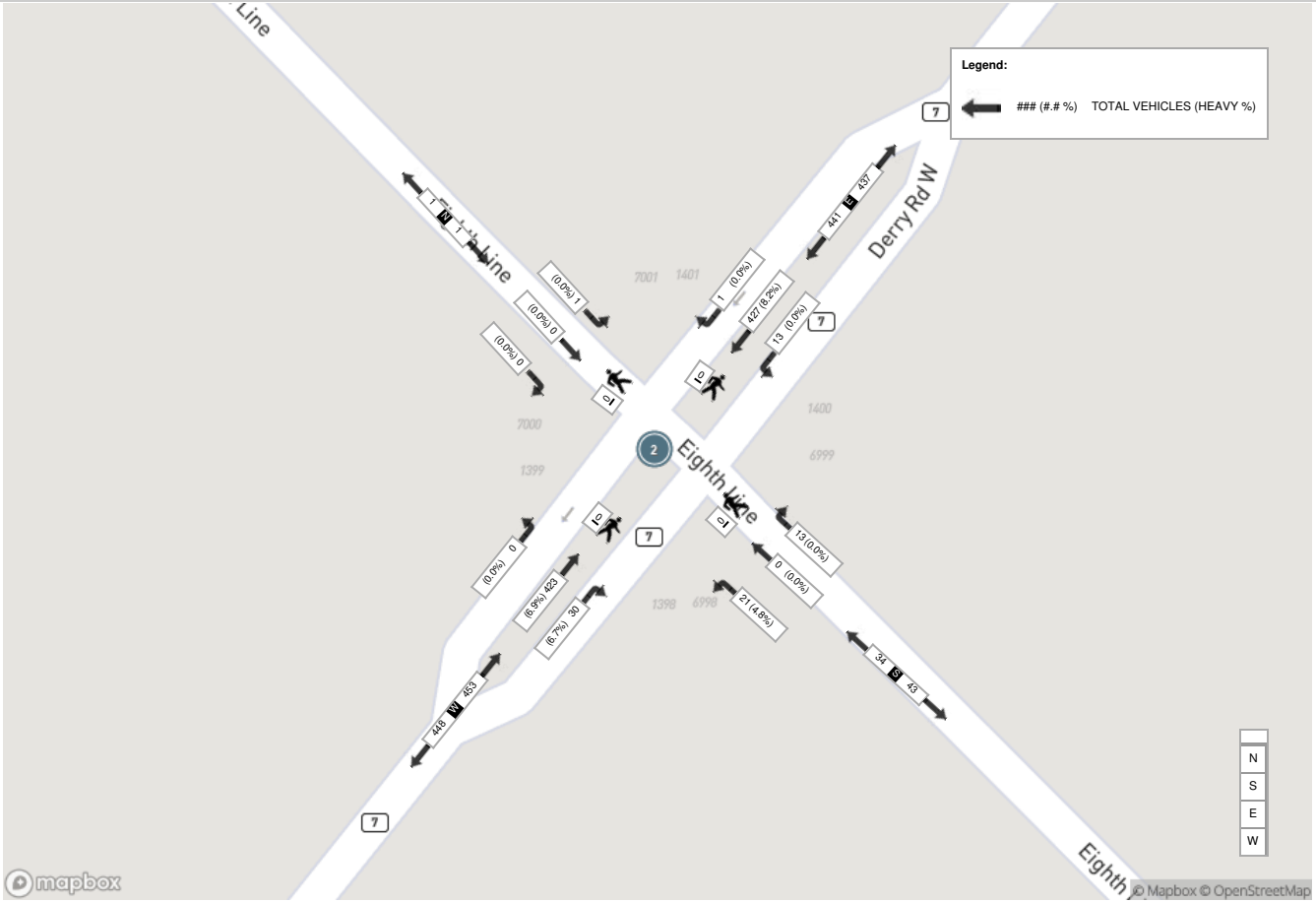
TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 07:45 AM - 08:45 AM Weather: Overcast Clouds (3.3 °C)



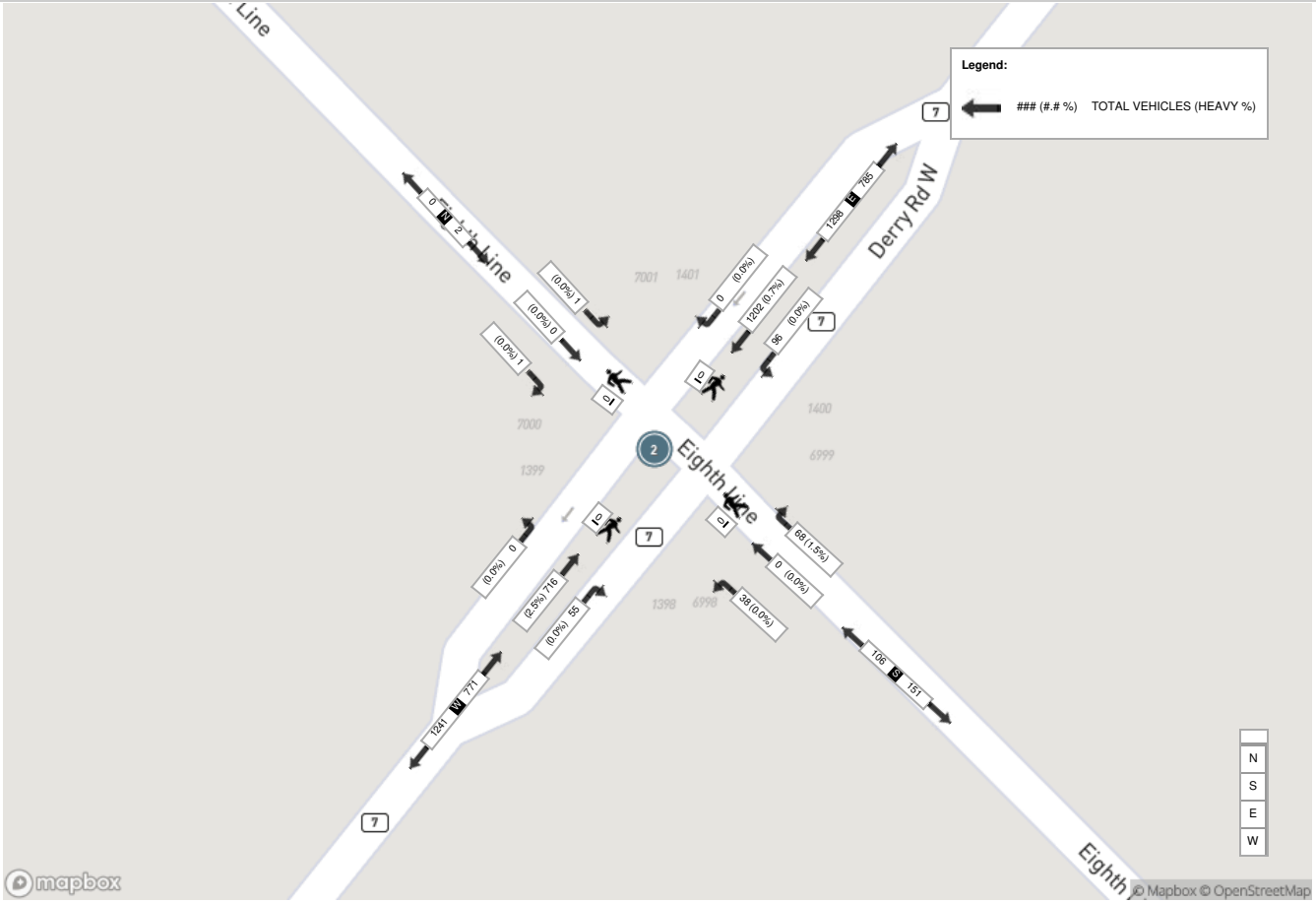
TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 12:00 PM - 01:00 PM Weather: Overcast Clouds (4.24 °C)



TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (4.09 °C)



Spectrum

Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (1 . DERRY RD & TRAFALGAR RD)

Start Time	N Approach TRAFALGAR RD						E Approach DERRY RD						S Approach TRAFALGAR RD						W Approach DERRY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	1	64	11	0	0	76	7	34	5	0	0	46	3	29	7	0	0	39	20	101	107	0	0	228	389	
06:15:00	7	89	7	0	0	103	14	40	5	0	0	59	7	49	12	0	0	68	20	123	86	0	0	229	459	
06:30:00	8	92	12	0	0	112	20	76	6	0	0	102	12	72	9	0	0	93	26	147	98	0	0	271	578	
06:45:00	10	75	12	0	0	97	14	68	15	0	0	97	7	48	10	0	0	65	29	153	118	0	0	300	559	1985
07:00:00	14	84	14	0	0	112	21	59	7	0	0	87	10	71	7	0	0	88	33	163	113	0	0	309	596	2192
07:15:00	4	80	17	0	0	101	19	82	7	0	0	108	16	85	15	0	0	116	49	256	142	0	0	447	772	2505
07:30:00	7	72	14	0	0	93	31	105	19	0	0	155	26	82	18	0	0	126	44	239	112	0	0	395	769	2696
07:45:00	11	78	18	0	0	107	21	123	9	0	0	153	14	86	12	0	0	112	50	337	121	0	0	508	880	3017
08:00:00	14	55	6	0	0	75	22	117	17	0	0	156	17	92	18	0	0	127	42	299	119	0	0	460	818	3239
08:15:00	9	78	12	0	0	99	33	107	20	0	0	160	17	100	16	0	0	133	45	337	138	0	0	520	912	3379
08:30:00	13	68	7	1	0	89	28	111	19	0	0	158	26	106	14	0	0	146	47	307	136	0	0	490	883	3493
08:45:00	7	69	20	0	0	96	27	113	12	0	0	152	26	77	25	0	0	128	46	226	104	0	0	376	752	3365
BREAK																										
11:00:00	17	59	5	0	0	81	9	69	8	0	0	86	6	78	19	0	0	103	22	79	45	0	0	146	416	
11:15:00	32	64	11	0	0	107	18	82	3	0	0	103	9	74	24	0	0	107	27	98	46	0	0	171	488	
11:30:00	27	64	2	0	0	93	16	94	11	0	0	121	4	77	24	0	0	105	25	122	56	0	0	203	522	
11:45:00	20	54	5	0	0	79	12	70	7	0	0	89	9	66	17	0	0	92	18	101	59	0	0	178	438	1864
12:00:00	20	61	6	0	0	87	19	83	6	0	0	108	9	52	9	0	0	70	19	97	62	0	0	178	443	1891
12:15:00	19	71	10	0	0	100	15	94	10	0	0	119	7	70	19	0	0	96	23	90	55	0	0	168	483	1886
12:30:00	17	63	16	0	0	96	13	89	3	0	0	105	8	74	26	0	0	108	25	98	50	0	0	173	482	1846
12:45:00	18	58	12	0	0	88	10	84	6	0	0	100	5	66	12	0	0	83	20	85	53	0	0	158	429	1837
BREAK																										
16:00:00	24	77	20	0	0	121	19	254	19	0	0	292	17	136	32	0	0	185	29	146	40	0	0	215	813	
16:15:00	44	72	21	0	0	137	17	219	21	0	0	257	11	136	43	0	0	190	28	147	47	0	0	222	806	
16:30:00	24	71	18	0	0	113	28	232	25	0	0	285	9	156	27	0	0	192	14	164	43	0	0	221	811	
16:45:00	36	75	31	0	0	142	26	279	21	0	0	326	6	140	24	0	0	170	25	136	37	0	0	198	836	3266
17:00:00	36	71	31	0	0	138	20	216	12	0	0	248	9	166	39	0	0	214	33	153	50	0	0	236	836	3289
17:15:00	24	78	23	0	0	125	31	311	20	0	0	362	16	142	28	0	0	186	30	174	41	0	0	245	918	3401
17:30:00	19	77	21	0	0	117	22	292	16	0	0	330	18	118	30	0	0	166	22	154	43	0	0	219	832	3422
17:45:00	36	68	21	0	0	125	19	232	12	0	0	263	16	118	26	0	0	160	23	156	36	0	0	215	763	3349
18:00:00	19	72	18	0	0	109	8	166	22	0	0	196	14	110	25	0	0	149	21	127	32	0	0	180	634	3147
18:15:00	19	69	31	0	0	119	15	165	17	0	0	197	14	95	29	0	0	138	16	131	37	0	0	184	638	2867
18:30:00	19	55	15	0	0	89	13	175	14	0	0	202	11	84	30	0	0	125	26	101	47	0	0	174	590	2625
18:45:00	20	64	13	0	0	97	9	133	9	0	0	151	9	80	27	0	0	116	23	96	36	0	0	155	519	2381
Grand Total	595	2247	480	1	0	3323	596	4374	403	0	0	5373	388	2935	673	0	0	3996	920	5143	2309	0	0	8372	**21064**	-
Approach%	17.9%	67.6%	14.4%	0%		-	11.1%	81.4%	7.5%	0%		-	9.7%	73.4%	16.8%	0%		-	11%	61.4%	27.6%	0%		-	-	-
Totals %	2.8%	10.7%	2.3%	0%		15.8%	2.8%	20.8%	1.9%	0%		25.5%	1.8%	13.9%	3.2%	0%		19%	4.4%	24.4%	11%	0%		39.7%	-	-
Heavy	190	183	8	0		-	18	133	12	0		-	3	196	31	0		-	43	132	191	0		-	-	-
Heavy %	31.9%	8.1%	1.7%	0%		-	3%	3%	3%	0%		-	0.8%	6.7%	4.6%	0%		-	4.7%	2.6%	8.3%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 07:45 AM - 08:45 AM Weather: Overcast Clouds (3.3 °C)

Start Time	N Approach TRAFALGAR RD						E Approach DERRY RD						S Approach TRAFALGAR RD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	11	78	18	0	0	107	21	123	9	0	0	153	14	86	12	0	0	112	50	337	121	0	0	508	880
08:00:00	14	55	6	0	0	75	22	117	17	0	0	156	17	92	18	0	0	127	42	299	119	0	0	460	818
08:15:00	9	78	12	0	0	99	33	107	20	0	0	160	17	100	16	0	0	133	45	337	138	0	0	520	912
08:30:00	13	68	7	1	0	89	28	111	19	0	0	158	26	106	14	0	0	146	47	307	136	0	0	490	883
Grand Total	47	279	43	1	0	370	104	458	65	0	0	627	74	384	60	0	0	518	184	1280	514	0	0	1978	**3493**
Approach%	12.7%	75.4%	11.6%	0.3%		-	16.6%	73%	10.4%	0%		-	14.3%	74.1%	11.6%	0%		-	9.3%	64.7%	26%	0%		-	-
Totals %	1.3%	8%	1.2%	0%		10.6%	3%	13.1%	1.9%	0%		18%	2.1%	11%	1.7%	0%		14.8%	5.3%	36.6%	14.7%	0%		56.6%	-
PHF	0.84	0.89	0.6	0.25		0.86	0.79	0.93	0.81	0		0.98	0.71	0.91	0.83	0		0.89	0.92	0.95	0.93	0		0.95	-
Heavy	34	34	0	0		68	0	17	0	0		17	0	33	4	0		37	7	15	13	0		35	-
Heavy %	72.3%	12.2%	0%	0%		18.4%	0%	3.7%	0%	0%		2.7%	0%	8.6%	6.7%	0%		7.1%	3.8%	1.2%	2.5%	0%		1.8%	-
Lights	13	245	43	1		302	104	441	65	0		610	74	351	56	0		481	177	1265	501	0		1943	-
Lights %	27.7%	87.8%	100%	100%		81.6%	100%	96.3%	100%	0%		97.3%	100%	91.4%	93.3%	0%		92.9%	96.2%	98.8%	97.5%	0%		98.2%	-
Single-Unit Trucks	25	8	0	0		33	0	8	0	0		8	0	20	2	0		22	4	6	12	0		22	-
Single-Unit Trucks %	53.2%	2.9%	0%	0%		8.9%	0%	1.7%	0%	0%		1.3%	0%	5.2%	3.3%	0%		4.2%	2.2%	0.5%	2.3%	0%		1.1%	-
Buses	0	0	0	0		0	0	6	0	0		6	0	0	1	0		1	2	5	0	0		7	-
Buses %	0%	0%	0%	0%		0%	0%	1.3%	0%	0%		1%	0%	0%	1.7%	0%		0.2%	1.1%	0.4%	0%	0%		0.4%	-
Articulated Trucks	9	26	0	0		35	0	3	0	0		3	0	13	1	0		14	1	4	1	0		6	-
Articulated Trucks %	19.1%	9.3%	0%	0%		9.5%	0%	0.7%	0%	0%		0.5%	0%	3.4%	1.7%	0%		2.7%	0.5%	0.3%	0.2%	0%		0.3%	-

Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 11:15 AM - 12:15 PM Weather: Overcast Clouds (4.24 °C)

Start Time	N Approach TRAFALGAR RD						E Approach DERRY RD						S Approach TRAFALGAR RD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
11:15:00	32	64	11	0	0	107	18	82	3	0	0	103	9	74	24	0	0	107	27	98	46	0	0	171	488
11:30:00	27	64	2	0	0	93	16	94	11	0	0	121	4	77	24	0	0	105	25	122	56	0	0	203	522
11:45:00	20	54	5	0	0	79	12	70	7	0	0	89	9	66	17	0	0	92	18	101	59	0	0	178	438
12:00:00	20	61	6	0	0	87	19	83	6	0	0	108	9	52	9	0	0	70	19	97	62	0	0	178	443
Grand Total	99	243	24	0	0	366	65	329	27	0	0	421	31	269	74	0	0	374	89	418	223	0	0	730	**1891**
Approach%	27%	66.4%	6.6%	0%		-	15.4%	78.1%	6.4%	0%		-	8.3%	71.9%	19.8%	0%		-	12.2%	57.3%	30.5%	0%		-	-
Totals %	5.2%	12.9%	1.3%	0%		19.4%	3.4%	17.4%	1.4%	0%		22.3%	1.6%	14.2%	3.9%	0%		19.8%	4.7%	22.1%	11.8%	0%		38.6%	-
PHF	0.77	0.95	0.55	0		0.86	0.86	0.88	0.61	0		0.87	0.86	0.87	0.77	0		0.87	0.82	0.86	0.9	0		0.9	-
Heavy	66	20	1	0		87	2	36	1	0		39	1	33	6	0		40	7	25	52	0		84	-
Heavy %	66.7%	8.2%	4.2%	0%		23.8%	3.1%	10.9%	3.7%	0%		9.3%	3.2%	12.3%	8.1%	0%		10.7%	7.9%	6%	23.3%	0%		11.5%	-
Lights	33	223	23	0		279	63	293	26	0		382	30	236	68	0		334	82	393	171	0		646	-
Lights %	33.3%	91.8%	95.8%	0%		76.2%	96.9%	89.1%	96.3%	0%		90.7%	96.8%	87.7%	91.9%	0%		89.3%	92.1%	94%	76.7%	0%		88.5%	-
Single-Unit Trucks	52	5	1	0		58	1	32	1	0		34	0	19	5	0		24	4	20	46	0		70	-
Single-Unit Trucks %	52.5%	2.1%	4.2%	0%		15.8%	1.5%	9.7%	3.7%	0%		8.1%	0%	7.1%	6.8%	0%		6.4%	4.5%	4.8%	20.6%	0%		9.6%	-
Buses	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	1	2	0	0		3	-
Buses %	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.2%	0%	0%	0%	0%		0%	1.1%	0.5%	0%	0%		0.4%	-
Articulated Trucks	14	15	0	0		29	1	3	0	0		4	1	14	1	0		16	2	3	6	0		11	-
Articulated Trucks %	14.1%	6.2%	0%	0%		7.9%	1.5%	0.9%	0%	0%		1%	3.2%	5.2%	1.4%	0%		4.3%	2.2%	0.7%	2.7%	0%		1.5%	-

Spectrum

Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

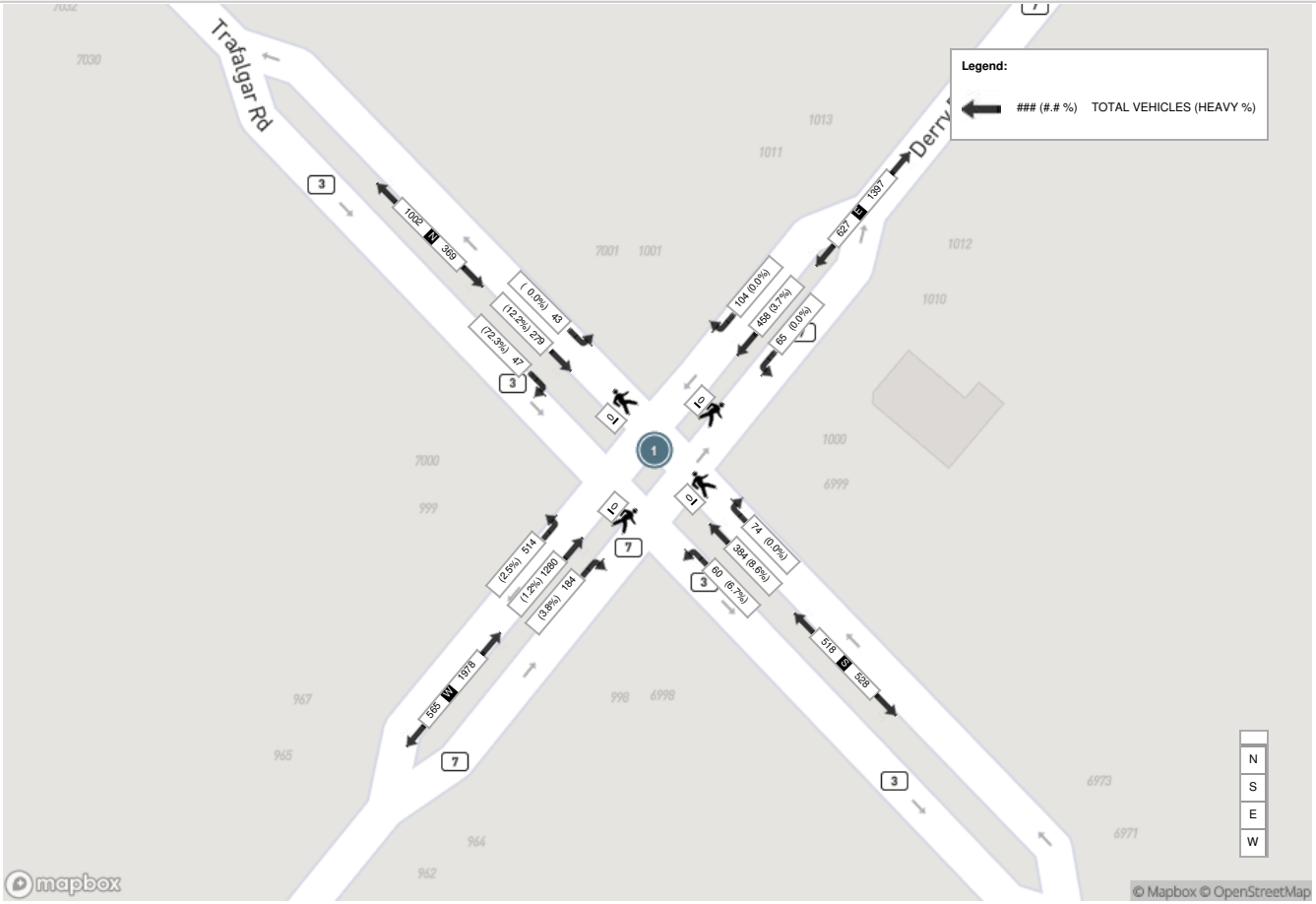
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (4.09 °C)

Start Time	N Approach TRAFALGAR RD						E Approach DERRY RD						S Approach TRAFALGAR RD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	36	75	31	0	0	142	26	279	21	0	0	326	6	140	24	0	0	170	25	136	37	0	0	198	836
17:00:00	36	71	31	0	0	138	20	216	12	0	0	248	9	166	39	0	0	214	33	153	50	0	0	236	836
17:15:00	24	78	23	0	0	125	31	311	20	0	0	362	16	142	28	0	0	186	30	174	41	0	0	245	918
17:30:00	19	77	21	0	0	117	22	292	16	0	0	330	18	118	30	0	0	166	22	154	43	0	0	219	832
Grand Total	115	301	106	0	0	522	99	1098	69	0	0	1266	49	566	121	0	0	736	110	617	171	0	0	898	**3422**
Approach%	22%	57.7%	20.3%	0%		-	7.8%	86.7%	5.5%	0%		-	6.7%	76.9%	16.4%	0%		-	12.2%	68.7%	19%	0%		-	-
Totals %	3.4%	8.8%	3.1%	0%		15.3%	2.9%	32.1%	2%	0%		37%	1.4%	16.5%	3.5%	0%		21.5%	3.2%	18%	5%	0%		26.2%	-
PHF	0.8	0.96	0.85	0		0.92	0.8	0.88	0.82	0		0.87	0.68	0.85	0.78	0		0.86	0.83	0.89	0.86	0		0.92	-
Heavy	17	9	1	0		27	0	9	2	0		11	0	17	2	0		19	2	17	29	0		48	-
Heavy %	14.8%	3%	0.9%	0%		5.2%	0%	0.8%	2.9%	0%		0.9%	0%	3%	1.7%	0%		2.6%	1.8%	2.8%	17%	0%		5.3%	-
Lights	98	292	105	0		495	99	1089	67	0		1255	49	549	119	0		717	108	600	142	0		850	-
Lights %	85.2%	97%	99.1%	0%		94.8%	100%	99.2%	97.1%	0%		99.1%	100%	97%	98.3%	0%		97.4%	98.2%	97.2%	83%	0%		94.7%	-
Single-Unit Trucks	14	3	1	0		18	0	6	1	0		7	0	9	2	0		11	2	9	22	0		33	-
Single-Unit Trucks %	12.2%	1%	0.9%	0%		3.4%	0%	0.5%	1.4%	0%		0.6%	0%	1.6%	1.7%	0%		1.5%	1.8%	1.5%	12.9%	0%		3.7%	-
Buses	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	0	5	0	0		5	-
Buses %	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.6%	-
Articulated Trucks	3	6	0	0		9	0	0	1	0		1	0	8	0	0		8	0	3	7	0		10	-
Articulated Trucks %	2.6%	2%	0%	0%		1.7%	0%	0%	1.4%	0%		0.1%	0%	1.4%	0%	0%		1.1%	0%	0.5%	4.1%	0%		1.1%	-

Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

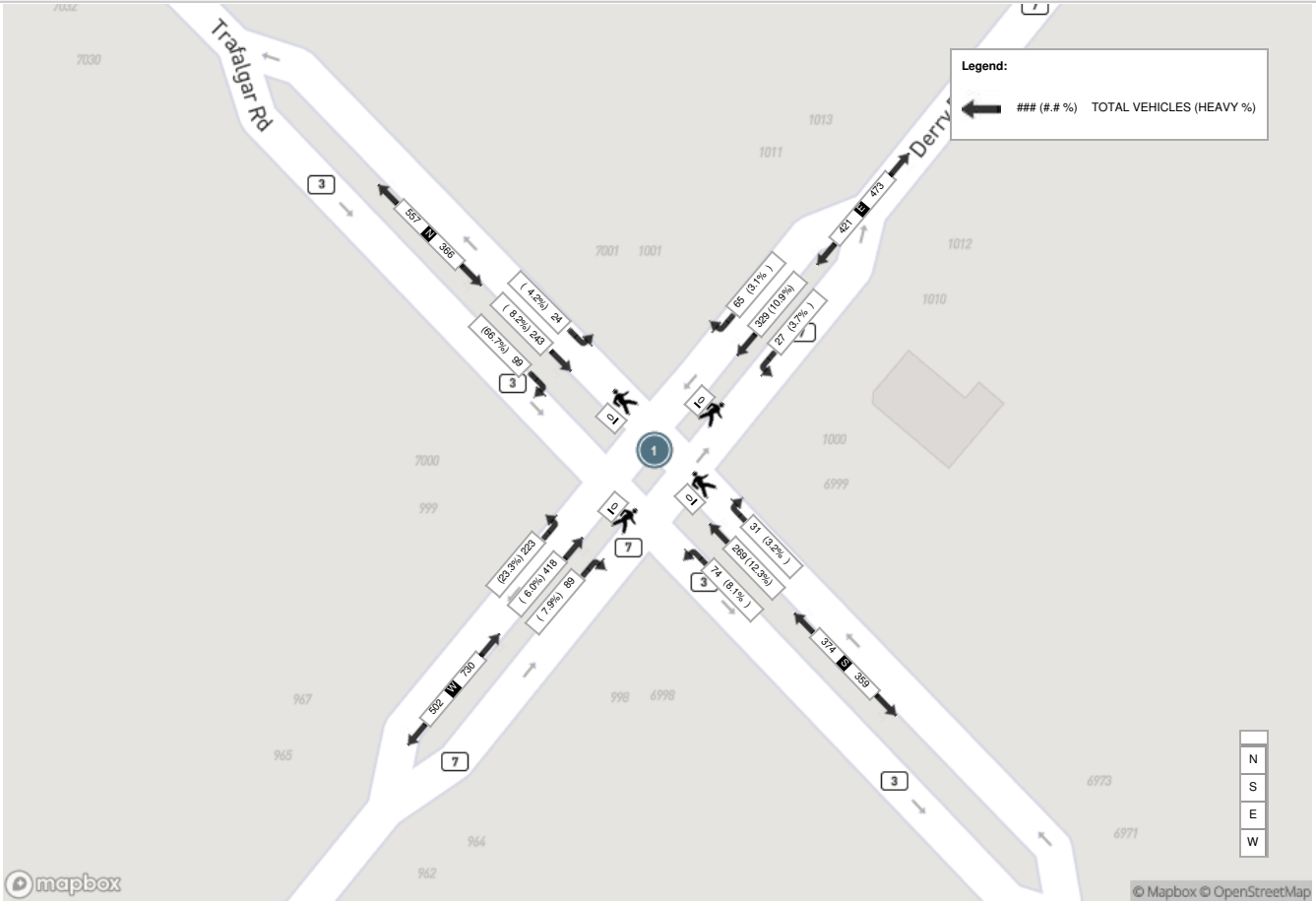
Peak Hour: 07:45 AM - 08:45 AM Weather: Overcast Clouds (3.3 °C)



Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

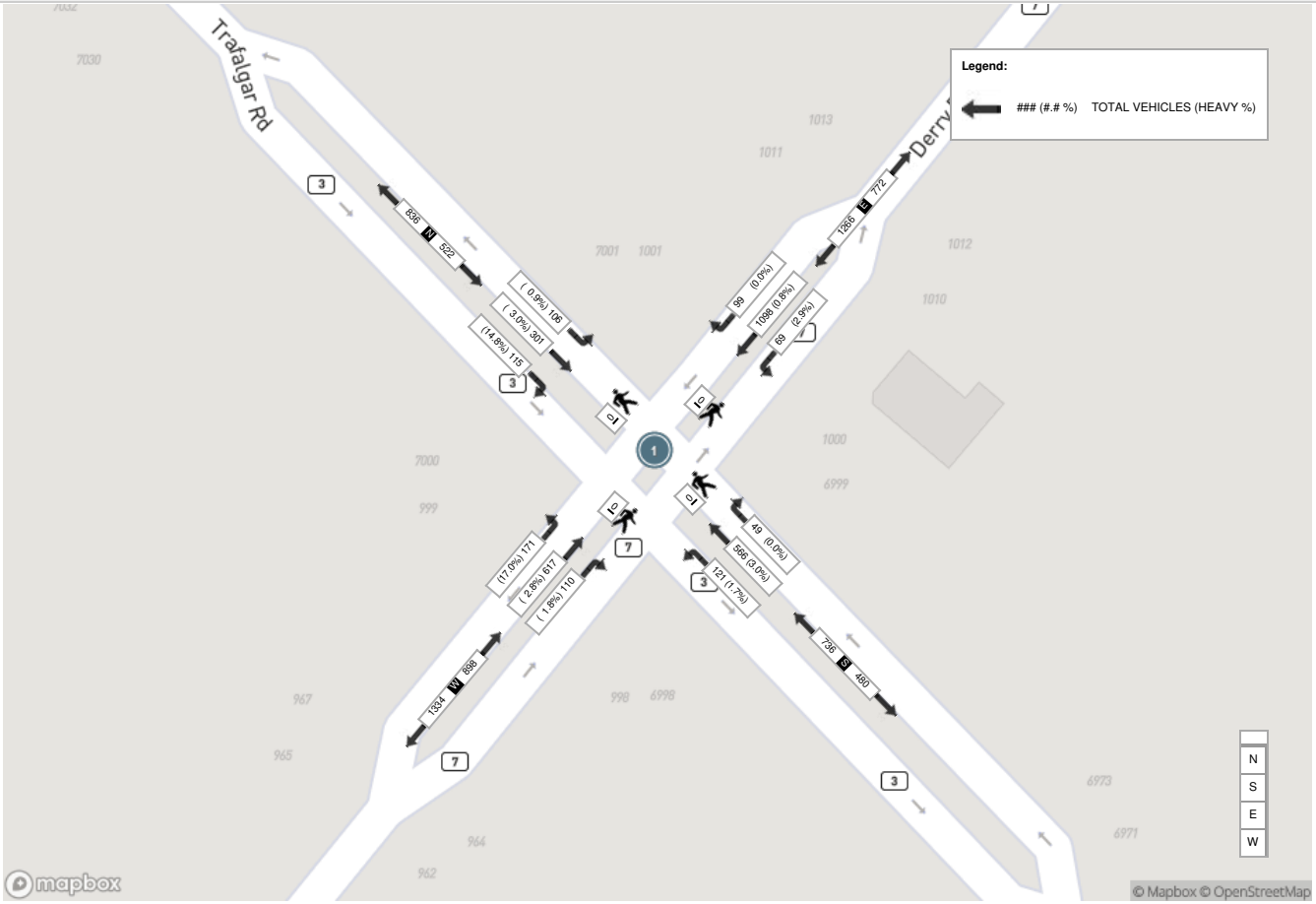
Peak Hour: 11:15 AM - 12:15 PM Weather: Overcast Clouds (4.24 °C)



Turning Movement Count
Location Name: DERRY RD & TRAFALGAR RD
Date: Wed, Jan 18, 2023 Deployment Lead: Walter Fugaj

TYLin
200 8800 DUFFERIN STREET
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (4.09 °C)



APPENDIX F

Excerpts from Halton Region Access Management Guideline and Halton TMP

Rural/Natural Heritage System (R)

Rural lands are designated areas for agriculture and protection of infrastructure that supports farming and Natural Heritage Areas (NHS) are lands designated for natural area conservation. In planning for new urban areas, the Region is seeking to minimize development of prime agricultural lands. Regional Roads in Rural/NHS lands should respect the rural character of the area.

Corridors (C)

Corridors are urban growth areas identified along major roads, arterials or higher order corridors that have the potential to provide a focus for higher density mixed-use development and employment use consistent with planned transit service levels. The design and physical appearance of corridors contribute directly to livability and economic success and therefore should offer a positive community environment and convenient access for residents and businesses to a variety of goods and services.

Corridors will generally vary in use along their length and their design needs to reflect the change in surroundings. Over time, corridors could include a mix of uses such as: sidewalk-fronting shops or businesses, offices, civic uses appropriately scaled and designed public spaces and a broad mix of residential forms and densities. Corridors that travel through employment lands are to provide for development of quality business environment and include a range of offices, industrial-type buildings and services supporting employment such as business related retail and restaurants located in buildings with doors and windows that front the street.

Node (N)

Nodes are defined as compact, transit-oriented, pedestrian/cyclist friendly and mixed use/residential neighbourhood centers that are areas of more intensive urban uses within a community. They provide area residents with a hub to meet a variety of daily needs (goods and services) and serve as a social focus for the community and as concentrations of office employment uses. Nodes are generally located at the intersections of major corridors within the identified intensification areas and extend approximately 200-400 metres from the intersection.

Halton Region's access spacing guidelines are further refined by providing spacing for cross-section type as identified in the Region's Right-of-Way guidelines. Please see Appendix B for the individual cross-sections by Rural/NHS (R), Corridor (C) and Node (N).

Table 1 outlines the minimum spacing requirements for access and road connections to Regional roads. As speed limits increase, greater minimum distance is required between access locations. Access spacing can be reduced to a minimum of 250 metres within the intensification areas (Node) identified within the Regional Official Plan that can substantiated through the submission of a comprehensive corridor analysis and Transportation Impact Study analyzing all possible alternatives and taking into consideration land use and community factors. Access spacing is measured stop bar to stop bar.

Table 1 – Minimum Access Spacing

TYPE*	Full Movement Access (m)	Right in/out Access (m)
R1	400	115
R2	400	115
C1	400	115
C2	300	115
C3	300	115
C4	300	115
C5	300	115
N1	250	115
N2	250	115

3.4 SIGHT DISTANCE REQUIREMENTS

A safe sight distance is the distance needed by a driver on a Major Arterial, or a driver exiting a driveway or street to verify that the road is clear and to avoid conflicts with other vehicles.

Adequate sight distance must be provided for both movements into and out of an access with a minimum of hazard and disruption to traffic. Sight distance requirements must be considered both for vehicles approaching the access and departing from the stopped position at the access.

The sight distances should be designed to enable existing vehicles:

- Upon turning left or right, to accelerate to the operating speed of the street without causing approaching vehicles to reduce speed by more than 15km/h; and
- Upon turning left, to clear the near half of the street without conflicting with vehicles approaching from the left.

The operating characteristics (driver eye elevation, visibility of the vehicle, and vehicle acceleration characteristics) of both trucks and passenger vehicles should be considered if both vehicle types are anticipated to utilize the access.

3.5 DRIVEWAY AND SITE CONFIGURATION

Driveway location and design affects the ability of a driver to safely and easily enter and exit a site. Road classification, right-of-way, design speed, design hour volumes, and land use influence driveway location and design. For driveways to be permitted along major Regional roads, the design of the proposed driveways should be feasible to minimize interference with the mobility of the through traffic by designing the driveway to provide desirable:

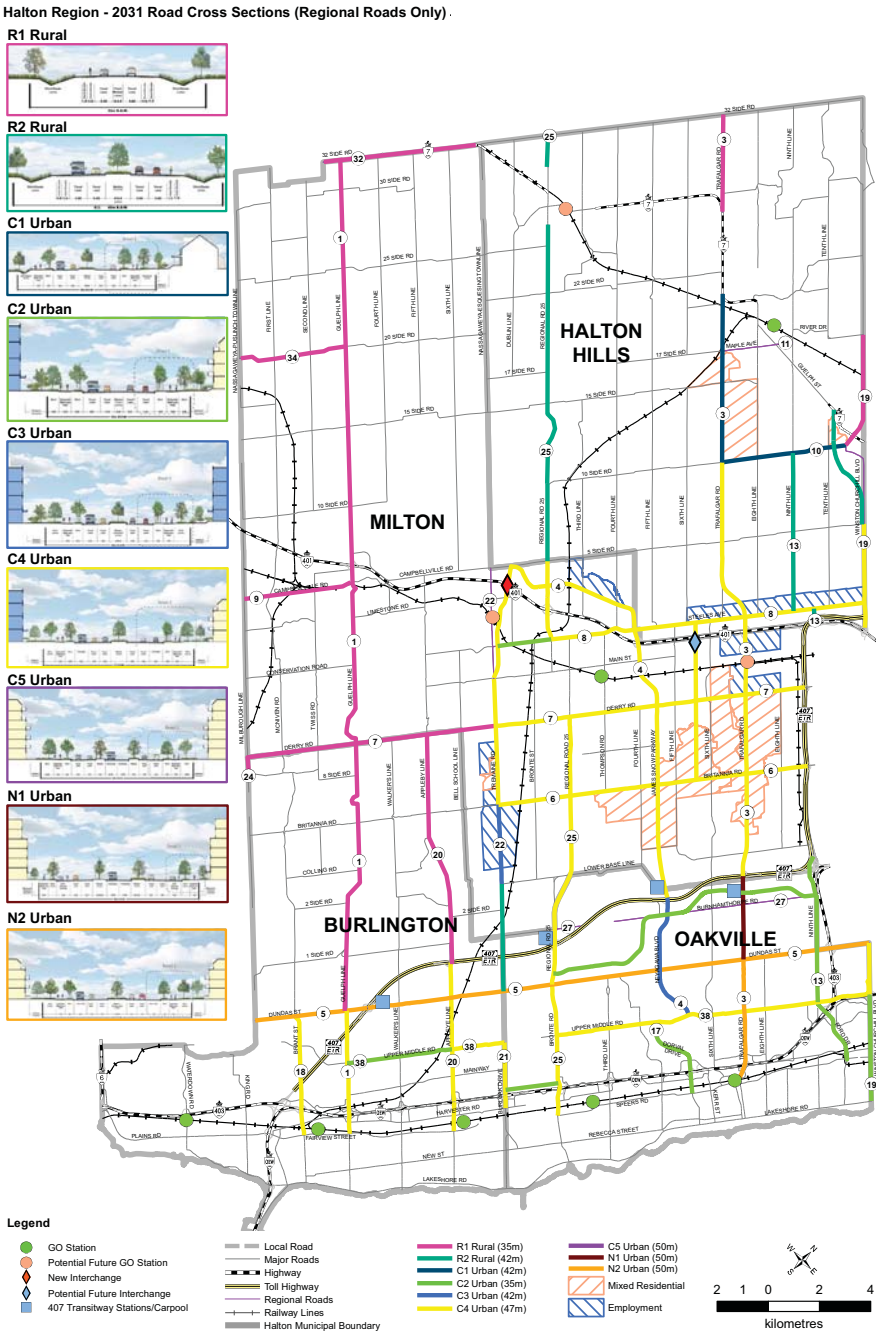
- Driveway width – See Section 5.4 -Table 2
- Driveway radii – See Section 5.4 – Table 3
- Clear throat conditions

3.3 Right-of-Way Classification Code

Each variation within the rural, corridor and node categories is assigned a code, as per the figure below, according to the right-of-way width, the number of shared travel lanes, and presence or absence of priority lanes. Definitions for these terms may be found in the glossary in Appendix C.

Code	Right-of-Way Width	No. of Shared Travel Lanes	No. of Priority Lanes
Rural (R)			
R(1)	35m	2	n/a
R(2)	42m	4	n/a
Corridor (C)			
C(1)	42m	4	n/a
C(2)	35m	4	n/a
C(3)	42m	4	n/a
C(4)	47m	4	HOV / RBL (2)
C(5)	50m	4	Transitway (2)
Node (N)			
N(1)	50m	4	HOV (2); Transitway (2)
N(2)	50m	4	HOV / RBL (2)

Figure 3: Right-of-Way Classification Code



APPENDIX G

Trip Distribution Calculation

4.2 Trip Distribution

Trip distribution for the Trafalgar Corridor development area for the 2031 horizon year was estimated using the origin-destination matrices from the Region's 2031 model run with the proposed densities outlined previously. Trip assignment was subsequently estimated for each TAZ based on potential access locations and the route providing the shortest travel time. The external trip distribution for the Trafalgar Corridor for Scenario A and Scenario B is summarized in **Table 4-7.**

Table 4-7: External Trip Distribution Summary

Location	Scenario A				Scenario B			
	AM Peak Period		PM Peak Period		AM Peak Period		PM Peak Period	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Brampton-Caledon	2.80%	2.90%	2.90%	2.80%	2.60%	2.70%	2.70%	2.60%
York	3.50%	0.50%	0.50%	3.50%	3.70%	0.60%	0.60%	3.70%
Halton Hills	6.30%	13.20%	13.20%	6.30%	6.00%	13.40%	13.40%	6.00%
Oakville	5.90%	8.00%	8.00%	5.90%	6.30%	7.80%	7.80%	6.30%
Burlington South	3.90%	5.10%	5.10%	3.90%	3.70%	5.00%	5.00%	3.70%
Burlington North	0.90%	0.70%	0.70%	0.90%	0.70%	0.60%	0.60%	0.70%
Mississauga North-West	1.20%	1.70%	1.70%	1.20%	1.20%	1.60%	1.60%	1.20%
Mississauga Central-West	3.70%	2.90%	2.90%	3.70%	4.00%	2.80%	2.80%	4.00%
Mississauga South-West	0.80%	0.50%	0.50%	0.80%	0.80%	0.60%	0.60%	0.80%
Mississauga North-East	2.30%	2.20%	2.20%	2.30%	2.20%	2.30%	2.30%	2.20%
Mississauga Central-East	2.30%	1.40%	1.40%	2.30%	1.70%	1.60%	1.60%	1.70%
Mississauga South-East	0.20%	1.10%	1.10%	0.20%	0.00%	0.90%	0.90%	0.00%
Toronto South	1.60%	0.80%	0.80%	1.60%	1.40%	0.80%	0.80%	1.40%
Toronto North	1.00%	1.60%	1.60%	1.00%	0.80%	1.60%	1.60%	0.80%
Hamilton South	10.90%	1.60%	1.60%	10.90%	9.50%	1.60%	1.60%	9.50%
Hamilton North	4.30%	4.90%	4.90%	4.30%	3.60%	4.90%	4.90%	3.60%
Milton Downtown	17.00%	24.30%	24.30%	17.00%	18.50%	24.60%	24.60%	18.50%
Milton South	18.30%	14.60%	14.60%	18.30%	18.60%	14.50%	14.50%	18.60%
Milton North-West	13.10%	11.90%	11.90%	13.10%	14.80%	11.80%	11.80%	14.80%
Durham	0.00%	0.40%	0.40%	0.00%	0.00%	0.40%	0.40%	0.00%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

The external trip distribution obtained from the Region's EMME model illustrates that most of the trips inbound and outbound are contained within Milton, with the rest heavily destined to or originating from various municipalities within Halton Region.

The Region's EMME model was also used to extract the trip distribution between the zones within the Trafalgar Corridor. The interzonal and intrazonal trip distribution for the Trafalgar Corridor for Scenario A and Scenario B is summarized in **Table 4-8.**

Location	General Direction	Scenario A - Agerton Go Station			
		AM Peak Hour		PM Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Brampton-Caledon	NE	2.80%	2.90%	2.90%	2.80%
York	E	3.50%	0.50%	0.50%	3.50%
Halton Hills	N	6.30%	13.20%	13.20%	6.30%
Oakville	S	5.90%	8.00%	8.00%	5.90%
Burlington South	SW	3.90%	5.10%	5.10%	3.90%
Burlington North	SW	0.90%	0.70%	0.70%	0.90%
Mississauga North-West	E	1.20%	1.70%	1.70%	1.20%
Mississauga Central-West	E	3.70%	2.90%	2.90%	3.70%
Mississauga South-West	SE	0.80%	0.50%	0.50%	0.80%
Mississauga North-East	E	2.30%	2.20%	2.20%	2.30%
Mississauga Central-East	E	2.30%	1.40%	1.40%	2.30%
Mississauga South-East	SE	0.20%	1.10%	1.10%	0.20%
Toronto South	SE	1.60%	0.80%	0.80%	1.60%
Toronto North	E	1.00%	1.60%	1.60%	1.00%
Hamilton South	SW	10.90%	1.60%	1.60%	10.90%
Hamilton North	SW	4.30%	4.90%	4.90%	4.30%
Milton Downtown	NW	17.00%	24.30%	24.30%	17.00%
Milton South	W	18.30%	14.60%	14.60%	18.30%
Milton North-West	NW	13.10%	11.90%	11.90%	13.10%
Durham	NE	0.00%	0.40%	0.40%	0.00%
Total		**100.00%**	**100.30%**	**100.30%**	**100.00%**

0.033% Modification to apply to all movements to account for rounding errors in TMP Summary table (100.30% total previously)

Direction		AM Peak Hour		PM Peak Hour	
		Inbound	Outbound	Inbound	Outbound
N	via Trafalgar NB	6.30%	13.17%	13.17%	6.30%
	via Hwy 401	15.44%	13.58%	13.58%	15.44%
S	via Trafalgar SB	15.28%	14.47%	14.47%	15.28%
E	via Derry EB	5.25%	4.12%	4.12%	5.25%
	via Britannia EB	8.45%	6.52%	6.52%	8.45%
	via LBL EB	5.39%	4.12%	4.12%	5.39%
W	via Derry WB	13.60%	15.26%	15.26%	13.60%
	via Britannia WB	28.53%	26.87%	26.87%	28.53%
	via LBL WB	1.77%	1.91%	1.91%	1.77%
	Total	**100%**	**100%**	**100%**	**100%**

Overall Directional Distribution				
	AM IN	AM OUT	PM IN	PM OUT
N	21.74%	26.74%	26.74%	21.74%
S	15.28%	14.47%	14.47%	15.28%
E	19.09%	14.75%	14.75%	19.09%
W	43.89%	44.04%	44.04%	43.89%
Total	100.00%	100.00%	100.00%	100.00%

		AM (IN)	AM (OUT)	PM (IN)	PM (OUT)
1	Trafalgar Road to/from north	21.74%	26.74%	26.74%	21.74%
2	Eighth Line to/from north	0.00%	0.00%	0.00%	0.00%
3	Derry Road to/from east	5.25%	4.12%	4.12%	5.25%
4	Britannia Road to/from east	8.45%	6.52%	6.52%	8.45%
5	Lower Baseline to/from east	5.39%	4.12%	4.12%	5.39%
6	Trafalgar Road to/from south	15.28%	14.47%	14.47%	15.28%
7	Lower Baseline to/from west	1.77%	1.91%	1.91%	1.77%
8	Britannia Road to/from west	28.53%	26.87%	26.87%	28.53%
9	Derry Road to/from west	13.60%	15.26%	15.26%	13.60%
	Total	100.00%	100.00%	100.00%	100.00%

APPENDIX H

Baseline SYNCHRO Capacity and Queuing Analysis Reports

Timings
1: Trafalgar Road & Derry Road

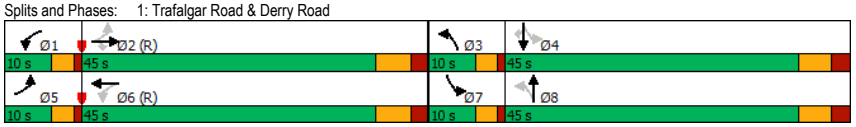
Baseline AM Peak Hour
04/29/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	514	1280	184	65	458	60	384	43	279	47
Future Volume (vph)	514	1280	184	65	458	60	384	43	279	47
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
Detector Phase	5	2	2	1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	6.0	20.0	6.0	20.0	20.0
Minimum Split (s)	10.0	37.9	37.9	10.0	37.9	10.0	36.8	10.0	36.8	36.8
Total Split (s)	10.0	45.0	45.0	10.0	45.0	10.0	45.0	10.0	45.0	45.0
Total Split (%)	9.1%	40.9%	40.9%	9.1%	40.9%	9.1%	40.9%	9.1%	40.9%	40.9%
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)	-1.0	-2.0	-2.0	-1.0	-2.0	-1.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	3.0	4.8	3.0	4.8	4.8
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
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	67.6	54.8	54.8	52.3	40.1	33.9	26.5	33.9	26.5	26.5
Actuated g/C Ratio	0.61	0.50	0.50	0.48	0.36	0.31	0.24	0.31	0.24	0.24
v/c Ratio	0.93	0.76	0.23	0.28	0.47	0.20	0.60	0.18	0.38	0.16
Control Delay	42.2	28.8	5.2	14.2	26.9	24.6	38.0	24.1	35.7	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	28.8	5.2	14.2	26.9	24.6	38.0	24.1	35.7	1.1
LOS	D	C	A	B	C	C	D	C	D	A
Approach Delay		30.1			25.6		36.4		30.0	
Approach LOS		C			C		D		C	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
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: 0.93
Intersection Signal Delay: 30.2 — Intersection LOS: C
Intersection Capacity Utilization 80.9% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Trafalgar Road & Derry Road



Queues
1: Trafalgar Road & Derry Road

Baseline AM Peak Hour
04/29/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	547	1362	196	69	598	64	488	46	297	50
v/c Ratio	0.93	0.76	0.23	0.28	0.47	0.20	0.60	0.18	0.38	0.16
Control Delay	42.2	28.8	5.2	14.2	26.9	24.6	38.0	24.1	35.7	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	28.8	5.2	14.2	26.9	24.6	38.0	24.1	35.7	1.1
Queue Length 50th (m)	64.4	130.3	2.8	5.8	48.8	9.2	46.8	6.6	28.2	0.0
Queue Length 95th (m)	#157.3	#199.1	17.3	13.3	64.8	17.0	59.0	13.2	37.6	0.0
Internal Link Dist (m)		203.5			1316.7		2968.0		599.5	
Turn Bay Length (m)	110.0		85.0	100.0		100.0		85.0		85.0
Base Capacity (vph)	587	1783	868	247	1270	327	1225	259	1180	419
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	0.93	0.76	0.23	0.28	0.47	0.20	0.40	0.18	0.25	0.12

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)	514	1280	184	65	458	104	60	384	74	43	279	47
Future Volume (vph)	514	1280	184	65	458	104	60	384	74	43	279	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9		3.0	4.8		3.0	4.8	4.8
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)	1772	3579	1570	1825	3437		1706	3312		1825	3230	944
Flt Permitted	0.29	1.00	1.00	0.10	1.00		0.50	1.00		0.30	1.00	1.00
Satd. Flow (perm)	543	3579	1570	201	3437		898	3312		586	3230	944
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)	547	1362	196	69	487	111	64	409	79	46	297	50
RTOR Reduction (vph)	0	0	89	0	18	0	0	17	0	0	0	38
Lane Group Flow (vph)	547	1362	107	69	580	0	64	471	0	46	297	12
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
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)	63.0	51.2	51.2	45.1	37.3		29.3	24.5		29.3	24.5	24.5
Effective Green, g (s)	64.0	53.2	53.2	47.1	39.3		31.3	26.5		31.3	26.5	26.5
Actuated g/C Ratio	0.58	0.48	0.48	0.43	0.36		0.28	0.24		0.28	0.24	0.24
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)	569	1730	759	215	1227		298	797		232	778	227
v/s Ratio Prot	c0.20	0.38		0.03	0.17		c0.01	c0.14		0.01	0.09	
v/s Ratio Perm	c0.36		0.07	0.11			0.05			0.05		0.01
v/c Ratio	0.96	0.79	0.14	0.32	0.47		0.21	0.59		0.20	0.38	0.05
Uniform Delay, d1	16.6	23.7	15.7	20.6	27.3		29.3	36.9		29.3	34.9	32.1
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	28.6	3.7	0.4	1.8	1.3		0.8	1.8		0.9	0.7	0.2
Delay (s)	45.2	27.4	16.1	22.4	28.6		30.1	38.7		30.2	35.6	32.3
Level of Service	D	C	B	C	C		C	D		C	D	C
Approach Delay (s)		31.0			28.0			37.7			34.5	
Approach LOS		C			C			D			C	

Intersection Summary				
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.7	
Intersection Capacity Utilization	80.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1313	90	82	601	1	47	0	40	1	0	0
Future Volume (Veh/h)	0	1313	90	82	601	1	47	0	40	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	1382	95	86	633	1	49	0	42	1	0	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)												
pX, platoon unblocked												
vC, conflicting volume	634			1477			1918	2236	738	1538	2282	317
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	634			1477			1918	2236	738	1538	2282	317
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			81			0	100	88	98	100	100
cM capacity (veh/h)	945			462			36	34	365	61	32	685

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	0	921	556	86	422	212	49	42	1	0
Volume Left	0	0	0	86	0	0	49	0	1	0
Volume Right	0	0	95	0	0	1	0	42	0	0
cSH	1700	1700	1700	462	1700	1700	36	365	61	1700
Volume to Capacity	0.00	0.54	0.33	0.19	0.25	0.12	1.37	0.12	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0	5.1	0.0	0.0	39.5	2.9	0.4	0.0
Control Delay (s)	0.0	0.0	0.0	14.6	0.0	0.0	451.5	16.2	65.0	0.0
Lane LOS				B			F	C	F	A
Approach Delay (s)	0.0			1.7			250.6		65.0	
Approach LOS							F		F	

Intersection Summary			
Average Delay	10.5		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

Timings
1: Trafalgar Road & Derry Road

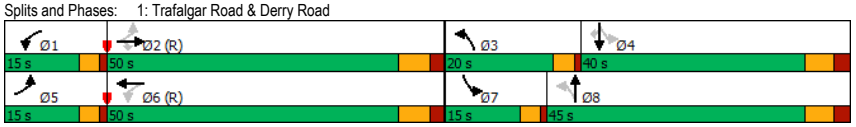
Baseline PM Peak Hour
04/29/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	171	617	110	69	1098	121	566	106	301	115
Future Volume (vph)	171	617	110	69	1098	121	566	106	301	115
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
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)	15.0	50.0	50.0	15.0	50.0	20.0	45.0	15.0	40.0	40.0
Total Split (%)	12.0%	40.0%	40.0%	12.0%	40.0%	16.0%	36.0%	12.0%	32.0%	32.0%
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)	-1.0	-2.0	-2.0	-1.0	-2.0	-1.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	3.0	4.8	3.0	4.8	4.8
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
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	67.7	55.1	55.1	61.2	48.5	49.6	34.1	45.1	31.6	31.6
Actuated g/C Ratio	0.54	0.44	0.44	0.49	0.39	0.40	0.27	0.36	0.25	0.25
v/c Ratio	0.76	0.42	0.15	0.18	0.91	0.30	0.69	0.41	0.36	0.26
Control Delay	48.5	27.0	3.2	16.1	47.9	24.6	43.6	27.1	39.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.5	27.0	3.2	16.1	47.9	24.6	43.6	27.1	39.0	5.4
LOS	D	C	A	B	D	C	D	C	D	A
Approach Delay		28.2			46.2		40.5		29.2	
Approach LOS		C			D		D		C	

Intersection Summary

Cycle Length: 125
Actuated Cycle Length: 125
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: 0.91
Intersection Signal Delay: 37.7 — Intersection LOS: D
Intersection Capacity Utilization 81.1% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Trafalgar Road & Derry Road



Queues
1: Trafalgar Road & Derry Road

Baseline PM Peak Hour
04/29/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	182	656	117	73	1273	129	654	113	320	122
v/c Ratio	0.76	0.42	0.15	0.18	0.91	0.30	0.69	0.41	0.36	0.26
Control Delay	48.5	27.0	3.2	16.1	47.9	24.6	43.6	27.1	39.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.5	27.0	3.2	16.1	47.9	24.6	43.6	27.1	39.0	5.4
Queue Length 50th (m)	28.5	60.0	0.0	8.3	161.3	19.9	74.6	17.2	33.9	0.0
Queue Length 95th (m)	#75.5	84.0	8.6	17.3	#210.1	30.5	88.7	27.2	45.6	10.9
Internal Link Dist (m)		203.5			1316.7		2968.0		599.5	
Turn Bay Length (m)	110.0		85.0	100.0		100.0		85.0		85.0
Base Capacity (vph)	241	1562	783	434	1392	462	1123	283	997	499
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	0.76	0.42	0.15	0.17	0.91	0.28	0.58	0.40	0.32	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)	171	617	110	69	1098	99	121	566	49	106	301	115
Future Volume (vph)	171	617	110	69	1098	99	121	566	49	106	301	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9		3.0	4.8		3.0	4.8	4.8
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)	1560	3544	1601	1772	3572		1789	3479		1807	3544	1420
Flt Permitted	0.08	1.00	1.00	0.35	1.00		0.43	1.00		0.22	1.00	1.00
Satd. Flow (perm)	130	3544	1601	655	3572		818	3479		411	3544	1420
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)	182	656	117	73	1168	105	129	602	52	113	320	122
RTOR Reduction (vph)	0	0	66	0	5	0	0	6	0	0	0	91
Lane Group Flow (vph)	182	656	51	73	1268	0	129	648	0	113	320	31
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
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)	64.5	52.3	52.3	54.7	46.5		45.3	32.1		40.3	29.6	29.6
Effective Green, g (s)	65.5	54.3	54.3	56.7	48.5		47.3	34.1		42.3	31.6	31.6
Actuated g/C Ratio	0.52	0.43	0.43	0.45	0.39		0.38	0.27		0.34	0.25	0.25
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)	239	1539	695	379	1385		419	949		269	895	358
v/s Ratio Prot	c0.09	0.19		0.01	c0.35		c0.03	c0.19		c0.04	0.09	
v/s Ratio Perm	0.31		0.03	0.07			0.08			0.10		0.02
v/c Ratio	0.76	0.43	0.07	0.19	0.92		0.31	0.68		0.42	0.36	0.09
Uniform Delay, d1	33.1	24.5	20.6	19.6	36.3		26.3	40.6		30.1	38.4	35.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.5	0.9	0.2	0.5	10.9		0.9	2.6		2.2	0.5	0.2
Delay (s)	48.6	25.4	20.9	20.1	47.3		27.1	43.3		32.3	38.9	35.9
Level of Service	D	C	C	C	D		C	D		C	D	D
Approach Delay (s)		29.3			45.8			40.6			36.9	
Approach LOS		C			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	15.7	
Intersection Capacity Utilization	81.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	716	55	96	1202	0	38	0	68	1	0	1
Future Volume (Veh/h)	0	716	55	96	1202	0	38	0	68	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	804	62	108	1351	0	43	0	76	1	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1351			866			1728	2402	433	2045	2433	676
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1351			866			1728	2402	433	2045	2433	676
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			86			17	100	87	96	100	100
cM capacity (veh/h)	505			786			52	28	571	26	27	401

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	0	536	330	108	901	450	43	76	1	1
Volume Left	0	0	0	108	0	0	43	0	1	0
Volume Right	0	0	62	0	0	0	0	76	0	1
cSH	1700	1700	1700	786	1700	1700	52	571	26	401
Volume to Capacity	0.00	0.32	0.19	0.14	0.53	0.26	0.83	0.13	0.04	0.00
Queue Length 95th (m)	0.0	0.0	0.0	3.6	0.0	0.0	26.6	3.5	0.9	0.1
Control Delay (s)	0.0	0.0	0.0	10.3	0.0	0.0	201.7	12.3	149.3	14.0
Lane LOS				B			F	B	F	B
Approach Delay (s)	0.0			0.8			80.7		81.6	
Approach LOS							F		F	

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

APPENDIX I

Future Background SYNCHRO Capacity and Queuing Analysis Reports

2031-FUTURE BACKGROUND

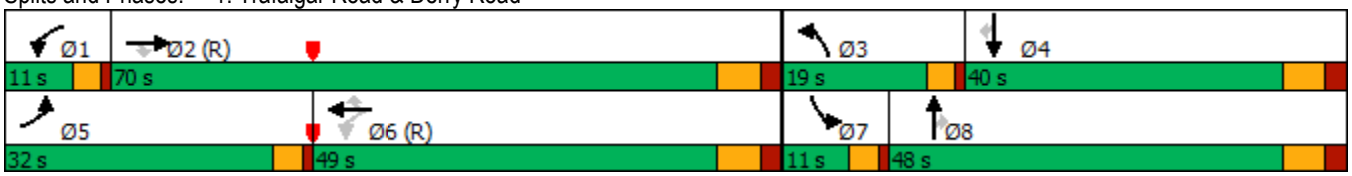
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
Future Volume (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3437	4520	1570	1825	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.950			0.085			0.950			0.950		
Satd. Flow (perm)	3437	4520	1570	163	4433	1633	3309	4230	1633	3541	4080	944
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			226			154			124			155
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Adj. Flow (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	514	1654	226	65	712	345	233	980	79	90	520	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)		7.4			7.4			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	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	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	32.0	70.0	70.0	11.0	49.0	49.0	19.0	48.0	48.0	11.0	40.0	40.0
Total Split (%)	22.9%	50.0%	50.0%	7.9%	35.0%	35.0%	13.6%	34.3%	34.3%	7.9%	28.6%	28.6%
Maximum Green (s)	28.0	63.1	63.1	7.0	42.1	42.1	15.0	41.2	41.2	7.0	33.2	33.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	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	5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	26.2	68.2	68.2	57.9	47.8	47.8	15.6	42.3	42.3	8.0	34.7	34.7
Actuated g/C Ratio	0.19	0.49	0.49	0.41	0.34	0.34	0.11	0.30	0.30	0.06	0.25	0.25
v/c Ratio	0.80	0.75	0.26	0.40	0.47	0.52	0.63	0.77	0.14	0.45	0.51	0.13
Control Delay	71.5	30.2	5.2	30.9	38.4	25.1	89.7	43.1	3.8	71.2	47.4	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.5	30.2	5.2	30.9	38.4	25.1	89.7	43.1	3.8	71.2	47.4	0.8
LOS	E	C	A	C	D	C	F	D	A	E	D	A
Approach Delay		36.7			33.9			49.1			47.3	
Approach LOS		D			C			D			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
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: 0.80
Intersection Signal Delay: 40.3 Intersection LOS: D
Intersection Capacity Utilization 77.3% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
v/c Ratio	0.80	0.75	0.26	0.40	0.47	0.52	0.63	0.77	0.14	0.45	0.51	0.13
Control Delay	71.5	30.2	5.2	30.9	38.4	25.1	89.7	43.1	3.8	71.2	47.4	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.5	30.2	5.2	30.9	38.4	25.1	89.7	43.1	3.8	71.2	47.4	0.8
Queue Length 50th (m)	78.2	106.8	0.0	8.2	69.2	50.8	30.0	114.7	1.7	12.6	51.7	0.0
Queue Length 95th (m)	96.4	135.2	22.1	17.2	90.1	85.4	49.4	58.7	4.6	21.8	65.8	0.0
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	711	2202	880	164	1514	659	378	1305	589	202	1025	353
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.75	0.26	0.40	0.47	0.52	0.62	0.75	0.13	0.45	0.51	0.13

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
Future Volume (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3437	4520	1570	1825	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.95	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3437	4520	1570	164	4433	1633	3309	4230	1633	3541	4080	944
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	514	1654	226	65	712	345	233	980	79	90	520	47
RTOR Reduction (vph)	0	0	117	0	0	101	0	0	55	0	0	35
Lane Group Flow (vph)	514	1654	109	65	712	244	233	980	24	90	520	12
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Actuated Green, G (s)	25.2	65.4	65.4	51.4	45.8	45.8	14.6	40.3	40.3	7.0	32.7	32.7
Effective Green, g (s)	26.2	67.4	67.4	53.4	47.8	47.8	15.6	42.3	42.3	8.0	34.7	34.7
Actuated g/C Ratio	0.19	0.48	0.48	0.38	0.34	0.34	0.11	0.30	0.30	0.06	0.25	0.25
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0	5.0
Lane Grp Cap (vph)	643	2176	755	140	1513	557	368	1278	493	202	1011	233
v/s Ratio Prot	c0.15	c0.37		0.02	0.16		c0.07	c0.23		0.03	0.13	
v/s Ratio Perm			0.07	0.15		0.15			0.01			0.01
v/c Ratio	0.80	0.76	0.14	0.46	0.47	0.44	0.63	0.77	0.05	0.45	0.51	0.05
Uniform Delay, d1	54.4	29.7	20.2	29.7	36.2	35.7	59.5	44.4	34.6	63.9	45.4	40.1
Progression Factor	1.18	0.94	1.79	1.21	1.01	1.07	1.38	0.87	3.03	1.00	1.00	1.00
Incremental Delay, d2	4.9	1.8	0.3	4.9	1.0	2.4	4.6	3.1	0.1	3.3	0.9	0.2
Delay (s)	69.3	29.8	36.6	40.9	37.6	40.6	86.4	41.9	105.0	67.1	46.3	40.3
Level of Service	E	C	D	D	D	D	F	D	F	E	D	D
Approach Delay (s)		39.0			38.7			53.8			48.7	
Approach LOS		D			D			D			D	

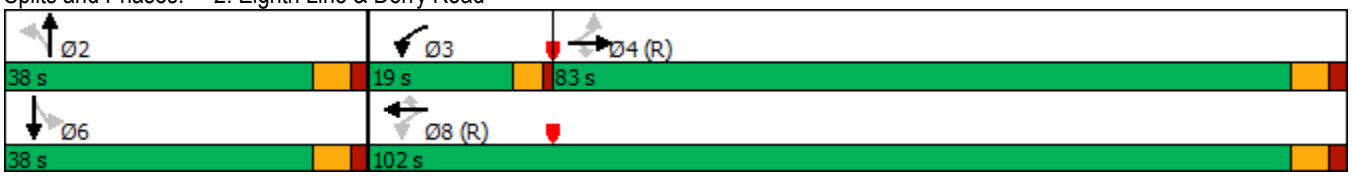
Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1665	101	120	754	1	98	0	108	1	0	0
Future Volume (vph)	0	1665	101	120	754	1	98	0	108	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.850				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4520	1601	1810	4496	1633	1825	1633	0	1825	1921	0
Flt Permitted				0.082			0.757			0.598		
Satd. Flow (perm)	1921	4520	1601	156	4496	1633	1454	1633	0	1149	1921	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			23		193				
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	1665	101	120	754	1	98	0	108	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1665	101	120	754	1	98	108	0	1	0	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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		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	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		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	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	36.0	36.0	36.0	9.0	36.0	36.0	36.0	36.0		36.0	36.0	
Total Split (s)	83.0	83.0	83.0	19.0	102.0	102.0	38.0	38.0		38.0	38.0	
Total Split (%)	59.3%	59.3%	59.3%	13.6%	72.9%	72.9%	27.1%	27.1%		27.1%	27.1%	
Maximum Green (s)	77.0	77.0	77.0	15.0	96.0	96.0	32.0	32.0		32.0	32.0	
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	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		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	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	7.0	
Flash Dont Walk (s)	23.0	23.0	23.0		23.0	23.0	23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)	0	0	0		0	0	0	0		0	0	
Act Effct Green (s)		99.7	99.7	114.9	112.9	112.9	15.1	15.1		15.1		
Actuated g/C Ratio		0.71	0.71	0.82	0.81	0.81	0.11	0.11		0.11		
v/c Ratio		0.52	0.09	0.51	0.21	0.00	0.63	0.31		0.01		
Control Delay		9.8	1.6	13.7	3.5	0.0	82.5	8.9		52.0		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		
Total Delay		9.8	1.6	13.7	3.5	0.0	82.5	8.9		52.0		
LOS		A	A	B	A	A	F	A		D		
Approach Delay		9.3			4.9			43.9			52.0	
Approach LOS		A			A			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 69 (49%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 10.5	Intersection LOS: B
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL
Lane Group Flow (vph)	1665	101	120	754	1	98	108	1
v/c Ratio	0.52	0.09	0.51	0.21	0.00	0.63	0.31	0.01
Control Delay	9.8	1.6	13.7	3.5	0.0	82.5	8.9	52.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.8	1.6	13.7	3.5	0.0	82.5	8.9	52.0
Queue Length 50th (m)	140.0	0.2	5.1	16.6	0.0	27.6	2.3	0.3
Queue Length 95th (m)	221.3	9.0	18.8	26.1	0.0	45.7	10.7	1.9
Internal Link Dist (m)	337.1			616.9			265.9	
Turn Bay Length (m)		70.0	140.0		70.0	50.0		35.0
Base Capacity (vph)	3218	1164	305	3627	1321	332	522	262
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	0.09	0.39	0.21	0.00	0.30	0.21	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1665	101	120	754	1	98	0	108	1	0	0
Future Volume (vph)	0	1665	101	120	754	1	98	0	108	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	4.0	6.0	6.0	6.0	6.0		6.0		
Lane Util. Factor		*0.80	1.00	1.00	*0.80	1.00	1.00	1.00		1.00		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00		
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95		
Satd. Flow (prot)		4520	1601	1810	4496	1633	1825	1633		1825		
Flt Permitted		1.00	1.00	0.08	1.00	1.00	0.76	1.00		0.60		
Satd. Flow (perm)		4520	1601	157	4496	1633	1455	1633		1148		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1665	101	120	754	1	98	0	108	1	0	0
RTOR Reduction (vph)	0	0	24	0	0	0	0	96	0	0	0	0
Lane Group Flow (vph)	0	1665	77	120	754	1	98	12	0	1	0	0
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		99.7	99.7	112.9	112.9	112.9	15.1	15.1		15.1		
Effective Green, g (s)		99.7	99.7	112.9	112.9	112.9	15.1	15.1		15.1		
Actuated g/C Ratio		0.71	0.71	0.81	0.81	0.81	0.11	0.11		0.11		
Clearance Time (s)		6.0	6.0	4.0	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)		3218	1140	235	3625	1316	156	176		123		
v/s Ratio Prot		0.37		c0.03	0.17			0.01				
v/s Ratio Perm			0.05	c0.38		0.00	c0.07			0.00		
v/c Ratio		0.52	0.07	0.51	0.21	0.00	0.63	0.07		0.01		
Uniform Delay, d1		9.2	6.1	7.6	3.2	2.6	59.8	56.1		55.8		
Progression Factor		0.92	0.63	1.00	1.00	1.00	1.10	1.00		1.00		
Incremental Delay, d2		0.5	0.1	1.9	0.1	0.0	7.6	0.2		0.0		
Delay (s)		9.0	3.9	9.4	3.3	2.6	73.3	56.3		55.8		
Level of Service		A	A	A	A	A	E	E		E		
Approach Delay (s)		8.7			4.1			64.4			55.8	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

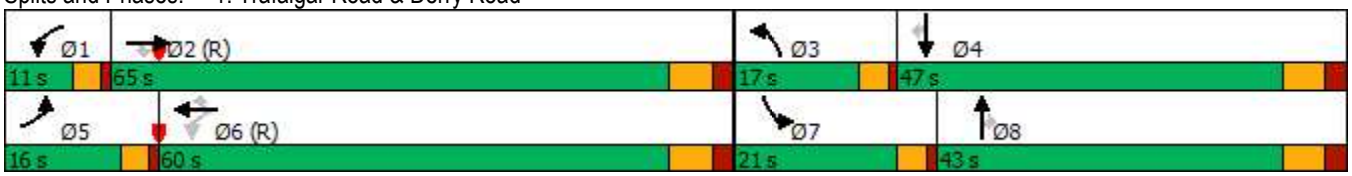
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
Future Volume (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3026	4476	1601	1772	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.950			0.193			0.950			0.950		
Satd. Flow (perm)	3026	4476	1601	360	4565	1633	3471	4433	1633	3506	4476	1420
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			240			162			124			124
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Adj. Flow (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
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			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	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	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	16.0	65.0	65.0	11.0	60.0	60.0	17.0	43.0	43.0	21.0	47.0	47.0
Total Split (%)	11.4%	46.4%	46.4%	7.9%	42.9%	42.9%	12.1%	30.7%	30.7%	15.0%	33.6%	33.6%
Maximum Green (s)	12.0	58.1	58.1	7.0	53.1	53.1	13.0	36.2	36.2	17.0	40.2	40.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	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	5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	12.4	63.5	63.5	67.0	56.9	56.9	13.8	38.0	38.0	17.0	41.2	41.2
Actuated g/C Ratio	0.09	0.45	0.45	0.48	0.41	0.41	0.10	0.27	0.27	0.12	0.29	0.29
v/c Ratio	0.64	0.48	0.28	0.27	0.77	0.30	0.63	0.79	0.10	0.60	0.73	0.23
Control Delay	69.7	35.1	12.2	14.7	33.6	9.2	73.4	34.2	3.1	64.6	48.2	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.7	35.1	12.2	14.7	33.6	9.2	73.4	34.2	3.1	64.6	48.2	6.1
LOS	E	D	B	B	C	A	E	C	A	E	D	A
Approach Delay		35.4			29.7			39.8			47.7	
Approach LOS		D			C			D			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 40 (29%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 37.5 Intersection LOS: D
Intersection Capacity Utilization 73.1% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
v/c Ratio	0.64	0.48	0.28	0.27	0.77	0.30	0.63	0.79	0.10	0.60	0.73	0.23
Control Delay	69.7	35.1	12.2	14.7	33.6	9.2	73.4	34.2	3.1	64.6	48.2	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.7	35.1	12.2	14.7	33.6	9.2	73.4	34.2	3.1	64.6	48.2	6.1
Queue Length 50th (m)	23.8	95.8	11.1	7.0	151.0	15.4	20.9	116.5	1.7	35.0	99.3	0.0
Queue Length 95th (m)	36.2	113.8	34.1	11.3	159.5	31.4	36.1	133.0	6.9	49.3	118.1	12.1
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	280	2029	857	254	1855	759	347	1217	538	450	1349	514
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.48	0.28	0.27	0.77	0.30	0.63	0.78	0.10	0.57	0.72	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
Future Volume (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3026	4476	1601	1772	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.95	1.00	1.00	0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3026	4476	1601	360	4565	1633	3471	4433	1633	3506	4476	1420
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	975	240	69	1435	224	217	955	53	257	965	115
RTOR Reduction (vph)	0	0	133	0	0	96	0	0	39	0	0	81
Lane Group Flow (vph)	171	975	107	69	1435	128	217	955	14	257	965	34
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Actuated Green, G (s)	11.4	60.7	60.7	60.5	54.9	54.9	12.8	36.0	36.0	16.0	39.2	39.2
Effective Green, g (s)	12.4	62.7	62.7	62.5	56.9	56.9	13.8	38.0	38.0	17.0	41.2	41.2
Actuated g/C Ratio	0.09	0.45	0.45	0.45	0.41	0.41	0.10	0.27	0.27	0.12	0.29	0.29
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0	5.0
Lane Grp Cap (vph)	268	2004	717	227	1855	663	342	1203	443	425	1317	417
v/s Ratio Prot	c0.06	0.22		0.01	c0.31		c0.06	c0.22		c0.07	0.22	
v/s Ratio Perm			0.07	0.12		0.08			0.01			0.02
v/c Ratio	0.64	0.49	0.15	0.30	0.77	0.19	0.63	0.79	0.03	0.60	0.73	0.08
Uniform Delay, d1	61.6	27.3	22.9	22.9	36.0	26.8	60.7	47.4	37.5	58.3	44.4	35.7
Progression Factor	0.96	1.24	3.99	0.72	0.83	0.97	1.07	0.61	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.6	0.8	0.4	1.5	3.0	0.6	5.0	4.0	0.1	3.6	2.6	0.2
Delay (s)	63.6	34.6	91.6	18.0	33.0	26.5	70.0	32.9	37.5	61.9	47.1	35.9
Level of Service	E	C	F	B	C	C	E	C	D	E	D	D
Approach Delay (s)		48.0			31.6			39.7			48.9	
Approach LOS		D			C			D			D	

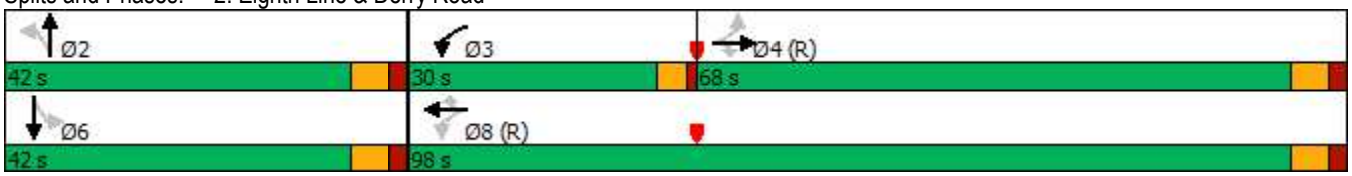
Intersection Summary			
HCM 2000 Control Delay	41.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	920	93	181	1511	0	63	0	122	1	0	1
Future Volume (vph)	0	920	93	181	1511	0	63	0	122	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850					0.850			0.850	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4476	1633	1810	4541	1921	1825	1601	0	1825	1633	0
Flt Permitted				0.242			0.757			0.497		
Satd. Flow (perm)	1921	4476	1633	461	4541	1921	1454	1601	0	955	1633	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			93					370			55	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	920	93	181	1511	0	63	0	122	1	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	920	93	181	1511	0	63	122	0	1	1	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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		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	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		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	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	36.0	36.0	36.0	9.0	36.0	36.0	36.0	36.0		36.0	36.0	
Total Split (s)	68.0	68.0	68.0	30.0	98.0	98.0	42.0	42.0		42.0	42.0	
Total Split (%)	48.6%	48.6%	48.6%	21.4%	70.0%	70.0%	30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	62.0	62.0	62.0	26.0	92.0	92.0	36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	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		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	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	7.0	
Flash Dont Walk (s)	23.0	23.0	23.0		23.0	23.0	23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)	0	0	0		0	0	0	0		0	0	
Act Effct Green (s)		103.7	103.7	117.7	115.7		12.3	12.3		12.3	12.3	
Actuated g/C Ratio		0.74	0.74	0.84	0.83		0.09	0.09		0.09	0.09	
v/c Ratio		0.28	0.08	0.39	0.40		0.50	0.26		0.01	0.01	
Control Delay		9.2	3.6	4.6	3.6		90.9	1.3		56.0	0.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		9.2	3.6	4.6	3.6		90.9	1.3		56.0	0.0	
LOS		A	A	A	A		F	A		E	A	
Approach Delay		8.7			3.7			31.8			28.0	
Approach LOS		A			A			C			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 50 (36%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 7.3	Intersection LOS: A
Intersection Capacity Utilization 71.0%	ICU Level of Service C
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	920	93	181	1511	63	122	1	1
v/c Ratio	0.28	0.08	0.39	0.40	0.50	0.26	0.01	0.01
Control Delay	9.2	3.6	4.6	3.6	90.9	1.3	56.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	3.6	4.6	3.6	90.9	1.3	56.0	0.0
Queue Length 50th (m)	63.5	7.0	6.6	34.7	18.3	0.0	0.3	0.0
Queue Length 95th (m)	102.0	13.8	13.4	51.2	33.5	0.3	2.0	0.0
Internal Link Dist (m)	337.1			616.9		265.9		609.1
Turn Bay Length (m)		70.0	140.0		50.0		35.0	
Base Capacity (vph)	3315	1233	638	3754	373	686	245	460
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	0.28	0.08	0.28	0.40	0.17	0.18	0.00	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	920	93	181	1511	0	63	0	122	1	0	1
Future Volume (vph)	0	920	93	181	1511	0	63	0	122	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		*0.80	1.00	1.00	*0.80		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4476	1633	1810	4541		1825	1601		1825	1633	
Flt Permitted		1.00	1.00	0.24	1.00		0.76	1.00		0.50	1.00	
Satd. Flow (perm)		4476	1633	462	4541		1455	1601		956	1633	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	920	93	181	1511	0	63	0	122	1	0	1
RTOR Reduction (vph)	0	0	24	0	0	0	0	111	0	0	1	0
Lane Group Flow (vph)	0	920	69	181	1511	0	63	11	0	1	0	0
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		103.7	103.7	115.7	115.7		12.3	12.3		12.3	12.3	
Effective Green, g (s)		103.7	103.7	115.7	115.7		12.3	12.3		12.3	12.3	
Actuated g/C Ratio		0.74	0.74	0.83	0.83		0.09	0.09		0.09	0.09	
Clearance Time (s)		6.0	6.0	4.0	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)		3315	1209	458	3752		127	140		83	143	
v/s Ratio Prot		0.21		0.02	c0.33			0.01			0.00	
v/s Ratio Perm			0.04	0.30			c0.04			0.00		
v/c Ratio		0.28	0.06	0.40	0.40		0.50	0.08		0.01	0.00	
Uniform Delay, d1		5.9	4.9	2.7	3.2		60.9	58.6		58.3	58.2	
Progression Factor		1.45	2.89	1.00	1.00		1.29	1.00		1.00	1.00	
Incremental Delay, d2		0.2	0.1	0.6	0.3		2.9	0.2		0.1	0.0	
Delay (s)		8.8	14.3	3.3	3.5		81.4	58.9		58.4	58.2	
Level of Service		A	B	A	A		F	E		E	E	
Approach Delay (s)		9.3			3.5			66.5			58.3	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2041-FUTURE BACKGROUND

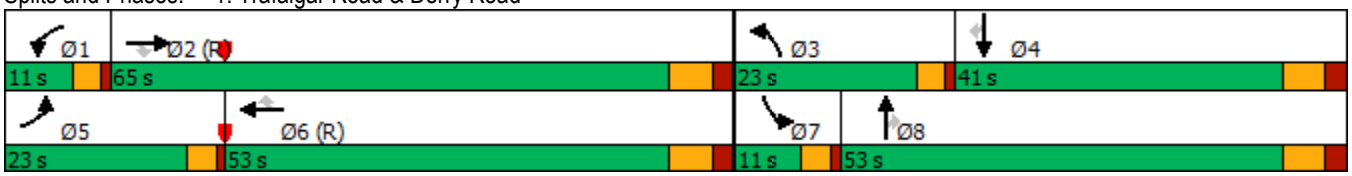
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
Future Volume (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			189			154			124			155
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Adj. Flow (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
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			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	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			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	23.0	65.0	65.0	11.0	53.0	53.0	23.0	53.0	53.0	11.0	41.0	41.0
Total Split (%)	16.4%	46.4%	46.4%	7.9%	37.9%	37.9%	16.4%	37.9%	37.9%	7.9%	29.3%	29.3%
Maximum Green (s)	19.0	58.1	58.1	7.0	46.1	46.1	19.0	46.2	46.2	7.0	34.2	34.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	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	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	19.1	65.6	65.6	8.1	50.1	50.1	19.5	49.3	49.3	8.0	35.5	35.5
Actuated g/C Ratio	0.14	0.47	0.47	0.06	0.36	0.36	0.14	0.35	0.35	0.06	0.25	0.25
v/c Ratio	0.69	0.94	0.27	0.12	0.53	0.42	0.74	0.90	0.03	0.31	0.59	0.06
Control Delay	81.7	31.3	5.2	66.4	44.2	25.3	75.0	62.2	0.1	67.6	48.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.7	31.3	5.2	66.4	44.2	25.3	75.0	62.2	0.1	67.6	48.4	0.3
LOS	F	C	A	E	D	C	E	E	A	E	D	A
Approach Delay		35.4			40.0			64.0			48.5	
Approach LOS		D			D			E			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 45.8 Intersection LOS: D
Intersection Capacity Utilization 90.7% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
v/c Ratio	0.69	0.94	0.27	0.12	0.53	0.42	0.74	0.90	0.03	0.31	0.59	0.06
Control Delay	81.7	31.3	5.2	66.4	44.2	25.3	75.0	62.2	0.1	67.6	48.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.7	31.3	5.2	66.4	44.2	25.3	75.0	62.2	0.1	67.6	48.4	0.3
Queue Length 50th (m)	43.5	~217.7	5.5	3.5	67.0	25.5	44.2	165.7	0.0	8.6	61.7	0.0
Queue Length 95th (m)	m50.4	#271.7	m12.9	m8.2	79.9	45.1	66.5	#186.8	m0.0	16.2	77.0	0.0
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	491	2119	836	204	1586	683	472	1488	654	202	1054	359
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.94	0.27	0.12	0.53	0.42	0.73	0.90	0.03	0.31	0.58	0.06

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
Future Volume (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	1983	224	25	837	287	343	1346	22	62	610	23
RTOR Reduction (vph)	0	0	104	0	0	100	0	0	14	0	0	17
Lane Group Flow (vph)	322	1983	120	25	837	187	343	1346	8	62	610	6
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	18.1	61.2	61.2	4.2	47.3	47.3	18.5	47.3	47.3	5.6	34.4	34.4
Effective Green, g (s)	19.1	63.2	63.2	5.2	49.3	49.3	19.5	49.3	49.3	6.6	36.4	36.4
Actuated g/C Ratio	0.14	0.45	0.45	0.04	0.35	0.35	0.14	0.35	0.35	0.05	0.26	0.26
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0
Lane Grp Cap (vph)	468	2040	708	131	1561	575	460	1489	575	166	1060	245
v/s Ratio Prot	c0.09	c0.44		0.01	0.19		c0.10	c0.32		0.02	0.15	
v/s Ratio Perm			0.08			0.11			0.00			0.01
v/c Ratio	0.69	0.97	0.17	0.19	0.54	0.33	0.75	0.90	0.01	0.37	0.58	0.02
Uniform Delay, d1	57.6	37.5	22.8	65.4	36.2	33.2	57.9	43.1	29.5	64.7	45.1	38.6
Progression Factor	1.36	0.72	0.91	1.04	1.19	1.49	1.14	1.24	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	7.9	0.2	1.4	1.2	1.4	6.7	7.5	0.0	2.9	1.2	0.1
Delay (s)	80.5	34.9	21.0	69.2	44.2	51.0	72.4	61.1	29.5	67.6	46.3	38.7
Level of Service	F	C	C	E	D	D	E	E	C	E	D	D
Approach Delay (s)		39.5			46.4			63.0			47.9	
Approach LOS		D			D			E			D	

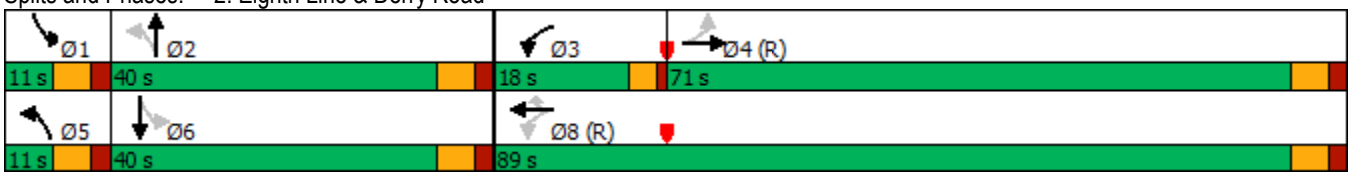
Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1772	41	150	723	2	72	0	174	23	0	0
Future Volume (vph)	0	1772	41	150	723	2	72	0	174	23	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997				0.850		0.850				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4507	0	1810	4496	1633	1825	1633	0	1825	1921	0
Flt Permitted				0.056			0.500					
Satd. Flow (perm)	1921	4507	0	107	4496	1633	961	1633	0	1921	1921	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				70		245				
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	1772	41	150	723	2	72	0	174	23	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1813	0	150	723	2	72	174	0	23	0	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	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	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	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	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	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	36.0	36.0		9.0	36.0	36.0	11.0	36.0		11.0	36.0	
Total Split (s)	71.0	71.0		18.0	89.0	89.0	11.0	40.0		11.0	40.0	
Total Split (%)	50.7%	50.7%		12.9%	63.6%	63.6%	7.9%	28.6%		7.9%	28.6%	
Maximum Green (s)	65.0	65.0		14.0	83.0	83.0	5.0	34.0		5.0	34.0	
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	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	0.0	
Total Lost Time (s)	6.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	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	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)	23.0	23.0			23.0	23.0		23.0			23.0	
Pedestrian Calls (#/hr)	0	0			0	0		0			0	
Act Effct Green (s)		95.7		113.4	111.4	111.4	16.6	10.0		6.0		
Actuated g/C Ratio		0.68		0.81	0.80	0.80	0.12	0.07		0.04		
v/c Ratio		0.59		0.66	0.20	0.00	0.34	0.51		0.29		
Control Delay		20.2		36.0	4.0	0.0	66.3	10.9		75.5		
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0		0.0		
Total Delay		20.2		36.0	4.0	0.0	66.3	10.9		75.5		
LOS		C		D	A	A	E	B		E		
Approach Delay		20.2			9.4			27.1			75.5	
Approach LOS		C			A			C			E	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 75.9%	ICU Level of Service D
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL
Lane Group Flow (vph)	1813	150	723	2	72	174	23
v/c Ratio	0.59	0.66	0.20	0.00	0.34	0.51	0.29
Control Delay	20.2	36.0	4.0	0.0	66.3	10.9	75.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	36.0	4.0	0.0	66.3	10.9	75.5
Queue Length 50th (m)	114.7	18.3	20.5	0.0	15.4	1.5	6.4
Queue Length 95th (m)	118.9	40.2	25.0	0.0	32.0	15.0	16.0
Internal Link Dist (m)	337.1		616.9			265.9	
Turn Bay Length (m)		140.0		70.0	50.0		35.0
Base Capacity (vph)	3080	266	3577	1313	210	582	79
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.56	0.20	0.00	0.34	0.30	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1772	41	150	723	2	72	0	174	23	0	0
Future Volume (vph)	0	1772	41	150	723	2	72	0	174	23	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		4.0	6.0	6.0	6.0	6.0		6.0		
Lane Util. Factor		*0.80		1.00	*0.80	1.00	1.00	1.00		1.00		
Frt		1.00		1.00	1.00	0.85	1.00	0.85		1.00		
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00		0.95		
Satd. Flow (prot)		4505		1810	4496	1633	1825	1633		1825		
Flt Permitted		1.00		0.06	1.00	1.00	0.50	1.00		1.00		
Satd. Flow (perm)		4505		107	4496	1633	961	1633		1921		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1772	41	150	723	2	72	0	174	23	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	157	0	0	0	0
Lane Group Flow (vph)	0	1812	0	150	723	2	72	17	0	23	0	0
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		89.7		105.4	105.4	105.4	22.6	13.6		5.0		
Effective Green, g (s)		89.7		105.4	105.4	105.4	22.6	13.6		5.0		
Actuated g/C Ratio		0.64		0.75	0.75	0.75	0.16	0.10		0.04		
Clearance Time (s)		6.0		4.0	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		
Lane Grp Cap (vph)		2886		222	3384	1229	245	158		66		
v/s Ratio Prot		0.40		c0.06	0.16		c0.03	0.01		0.01		
v/s Ratio Perm				c0.45		0.00	c0.02			0.00		
v/c Ratio		0.63		0.68	0.21	0.00	0.29	0.11		0.35		
Uniform Delay, d1		15.1		29.4	5.1	4.3	51.3	57.7		65.9		
Progression Factor		1.50		1.00	1.00	1.00	1.13	5.48		1.00		
Incremental Delay, d2		0.7		7.9	0.1	0.0	0.7	0.3		3.2		
Delay (s)		23.4		37.3	5.2	4.3	58.4	316.3		69.1		
Level of Service		C		D	A	A	E	F		E		
Approach Delay (s)		23.4			10.7			240.8			69.1	
Approach LOS		C			B			F			E	

Intersection Summary			
HCM 2000 Control Delay	38.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

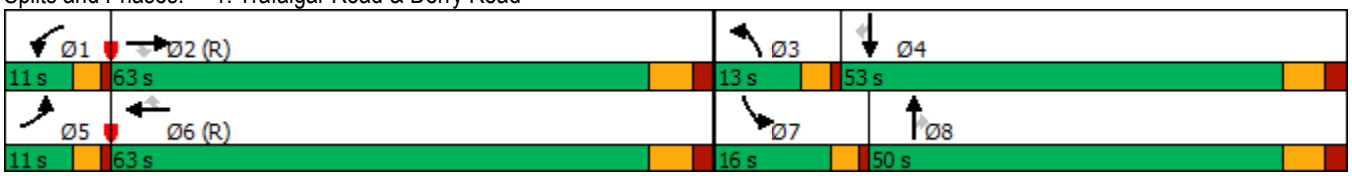
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
Future Volume (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			226			103			93			93
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Adj. Flow (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	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			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	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			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	11.0	63.0	63.0	11.0	63.0	63.0	13.0	50.0	50.0	16.0	53.0	53.0
Total Split (%)	7.9%	45.0%	45.0%	7.9%	45.0%	45.0%	9.3%	35.7%	35.7%	11.4%	37.9%	37.9%
Maximum Green (s)	7.0	56.1	56.1	7.0	56.1	56.1	9.0	43.2	43.2	12.0	46.2	46.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	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	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	8.0	60.3	60.3	8.0	58.1	58.1	10.0	45.3	45.3	12.9	48.2	48.2
Actuated g/C Ratio	0.06	0.43	0.43	0.06	0.42	0.42	0.07	0.32	0.32	0.09	0.34	0.34
v/c Ratio	0.59	0.65	0.45	0.18	0.91	0.22	0.95	0.70	0.03	0.59	0.91	0.09
Control Delay	95.5	20.1	4.6	61.1	58.4	24.2	110.0	43.1	1.2	69.2	53.5	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.5	20.1	4.6	61.1	58.4	24.2	110.0	43.1	1.2	69.2	53.5	0.8
LOS	F	C	A	E	E	C	F	D	A	E	D	A
Approach Delay		21.2			55.5			55.0			53.7	
Approach LOS		C			E			D			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 46.0 Intersection LOS: D
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
v/c Ratio	0.59	0.65	0.45	0.18	0.91	0.22	0.95	0.70	0.03	0.59	0.91	0.09
Control Delay	95.5	20.1	4.6	61.1	58.4	24.2	110.0	43.1	1.2	69.2	53.5	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.5	20.1	4.6	61.1	58.4	24.2	110.0	43.1	1.2	69.2	53.5	0.8
Queue Length 50th (m)	15.4	46.9	7.8	5.2	167.9	18.4	29.6	122.6	0.0	26.5	154.0	0.0
Queue Length 95th (m)	m21.9	63.9	19.1	m9.0	188.2	36.3	#58.1	140.3	1.4	39.3	#177.8	1.3
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	172	1927	818	196	1894	737	247	1435	591	325	1541	549
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.65	0.45	0.18	0.91	0.22	0.95	0.70	0.03	0.59	0.91	0.09

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)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
Future Volume (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	102	1246	366	36	1720	164	234	1005	17	191	1401	51
RTOR Reduction (vph)	0	0	130	0	0	60	0	0	11	0	0	33
Lane Group Flow (vph)	102	1246	236	36	1720	104	234	1005	6	191	1401	18
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	7.0	57.5	57.5	5.6	56.1	56.1	9.0	43.3	43.3	11.9	46.2	46.2
Effective Green, g (s)	8.0	59.5	59.5	6.6	58.1	58.1	10.0	45.3	45.3	12.9	48.2	48.2
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.42	0.42	0.07	0.32	0.32	0.09	0.34	0.34
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0
Lane Grp Cap (vph)	172	1902	680	162	1894	677	247	1434	528	323	1541	488
v/s Ratio Prot	c0.03	0.28		0.01	c0.38		c0.07	0.23		0.05	c0.31	
v/s Ratio Perm			0.15			0.06			0.00			0.01
v/c Ratio	0.59	0.66	0.35	0.22	0.91	0.15	0.95	0.70	0.01	0.59	0.91	0.04
Uniform Delay, d1	64.4	32.1	27.1	64.2	38.4	25.6	64.7	41.4	32.1	61.0	43.8	30.5
Progression Factor	1.31	0.59	0.31	0.94	1.34	2.30	1.04	0.97	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8	1.3	1.0	1.2	6.8	0.4	42.4	1.9	0.0	4.3	8.7	0.1
Delay (s)	90.4	20.1	9.5	61.6	58.2	59.4	109.4	41.9	32.2	65.4	52.5	30.5
Level of Service	F	C	A	E	E	E	F	D	C	E	D	C
Approach Delay (s)		22.0			58.4			54.4			53.3	
Approach LOS		C			E			D			D	

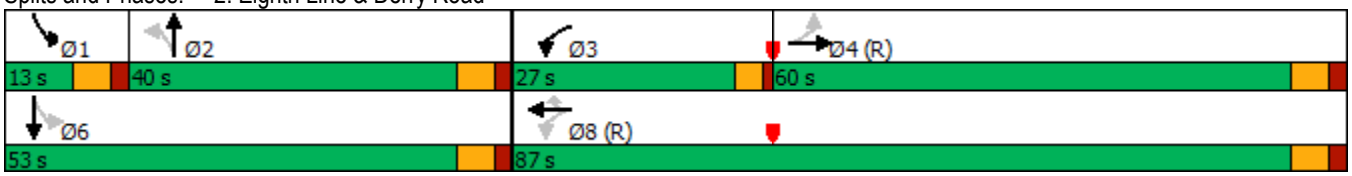
Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1057	56	219	1591	0	40	0	168	30	0	1
Future Volume (vph)	0	1057	56	219	1591	0	40	0	168	30	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992						0.850			0.850	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4447	0	1810	4541	1921	1825	1601	0	1825	1633	0
Flt Permitted				0.174			0.757			0.238		
Satd. Flow (perm)	1921	4447	0	332	4541	1921	1454	1601	0	457	1633	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6						382			55	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	1057	56	219	1591	0	40	0	168	30	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1113	0	219	1591	0	40	168	0	30	1	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	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	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	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	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	Perm	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	36.0	36.0		9.0	36.0	36.0	36.0	36.0		11.0	36.0	
Total Split (s)	60.0	60.0		27.0	87.0	87.0	40.0	40.0		13.0	53.0	
Total Split (%)	42.9%	42.9%		19.3%	62.1%	62.1%	28.6%	28.6%		9.3%	37.9%	
Maximum Green (s)	54.0	54.0		23.0	81.0	81.0	34.0	34.0		7.0	47.0	
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	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	0.0	
Total Lost Time (s)	6.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Vehicle Extension (s)	3.0	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	C-Max	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)	23.0	23.0			23.0	23.0	23.0	23.0			23.0	
Pedestrian Calls (#/hr)	0	0			0	0	0	0			0	
Act Effct Green (s)		92.3		111.4	109.4		10.8	10.8		18.6	18.6	
Actuated g/C Ratio		0.66		0.80	0.78		0.08	0.08		0.13	0.13	
v/c Ratio		0.38		0.55	0.45		0.36	0.35		0.24	0.00	
Control Delay		24.1		9.3	6.3		70.1	2.0		54.4	0.0	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		24.1		9.3	6.3		70.1	2.0		54.4	0.0	
LOS		C		A	A		E	A		D	A	
Approach Delay		24.1			6.6			15.1			52.7	
Approach LOS		C			A			B			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 13.8	Intersection LOS: B
Intersection Capacity Utilization 84.1%	ICU Level of Service E
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1113	219	1591	40	168	30	1
v/c Ratio	0.38	0.55	0.45	0.36	0.35	0.24	0.00
Control Delay	24.1	9.3	6.3	70.1	2.0	54.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	9.3	6.3	70.1	2.0	54.4	0.0
Queue Length 50th (m)	99.7	14.2	62.5	10.8	0.0	7.2	0.0
Queue Length 95th (m)	107.7	23.7	79.2	22.7	0.0	16.1	0.0
Internal Link Dist (m)	337.1		616.9		265.9		609.1
Turn Bay Length (m)		140.0		50.0		35.0	
Base Capacity (vph)	2935	506	3547	353	678	129	584
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.43	0.45	0.11	0.25	0.23	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1057	56	219	1591	0	40	0	168	30	0	1
Future Volume (vph)	0	1057	56	219	1591	0	40	0	168	30	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		*0.80		1.00	*0.80		1.00	1.00		1.00	1.00	
Frt		0.99		1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4449		1810	4541		1825	1601		1825	1633	
Flt Permitted		1.00		0.17	1.00		0.76	1.00		0.24	1.00	
Satd. Flow (perm)		4449		331	4541		1455	1601		457	1633	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1057	56	219	1591	0	40	0	168	30	0	1
RTOR Reduction (vph)	0	2	0	0	0	0	0	155	0	0	1	0
Lane Group Flow (vph)	0	1111	0	219	1591	0	40	13	0	30	0	0
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		90.0		107.0	107.0		10.8	10.8		21.0	21.0	
Effective Green, g (s)		90.0		107.0	107.0		10.8	10.8		21.0	21.0	
Actuated g/C Ratio		0.64		0.76	0.76		0.08	0.08		0.15	0.15	
Clearance Time (s)		6.0		4.0	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	
Lane Grp Cap (vph)		2860		390	3470		112	123		109	244	
v/s Ratio Prot		0.25		c0.05	0.35			0.01		c0.01	0.00	
v/s Ratio Perm				c0.38			c0.03			0.03		
v/c Ratio		0.39		0.56	0.46		0.36	0.11		0.28	0.00	
Uniform Delay, d1		11.9		6.3	6.0		61.3	60.1		52.0	50.6	
Progression Factor		1.92		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4		1.9	0.4		2.0	0.4		1.4	0.0	
Delay (s)		23.3		8.2	6.4		63.3	60.5		53.4	50.6	
Level of Service		C		A	A		E	E		D	D	
Approach Delay (s)		23.3			6.6			61.0			53.3	
Approach LOS		C			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX J

Future Total SYNCHRO Capacity and Queuing Analysis Reports

2031-FUTURE TOTAL

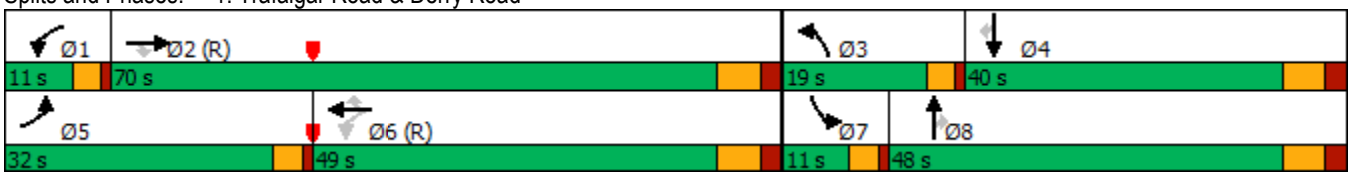
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	514	1681	226	65	761	437	243	1047	79	114	544	47
Future Volume (vph)	514	1681	226	65	761	437	243	1047	79	114	544	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3437	4520	1570	1825	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.950			0.086			0.950			0.950		
Satd. Flow (perm)	3437	4520	1570	165	4433	1633	3309	4230	1633	3541	4080	944
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			226			154			124			155
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Adj. Flow (vph)	514	1681	226	65	761	437	243	1047	79	114	544	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	514	1681	226	65	761	437	243	1047	79	114	544	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)		7.4			7.4			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	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	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	32.0	70.0	70.0	11.0	49.0	49.0	19.0	48.0	48.0	11.0	40.0	40.0
Total Split (%)	22.9%	50.0%	50.0%	7.9%	35.0%	35.0%	13.6%	34.3%	34.3%	7.9%	28.6%	28.6%
Maximum Green (s)	28.0	63.1	63.1	7.0	42.1	42.1	15.0	41.2	41.2	7.0	33.2	33.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	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	5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	26.2	67.7	67.7	57.4	47.3	47.3	15.6	42.8	42.8	8.0	35.1	35.1
Actuated g/C Ratio	0.19	0.48	0.48	0.41	0.34	0.34	0.11	0.31	0.31	0.06	0.25	0.25
v/c Ratio	0.80	0.77	0.26	0.40	0.51	0.67	0.66	0.81	0.14	0.56	0.53	0.13
Control Delay	70.0	32.4	6.6	28.9	37.7	30.4	90.5	54.2	12.2	75.6	47.5	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.0	32.4	6.6	28.9	37.7	30.4	90.5	54.2	12.2	75.6	47.5	0.8
LOS	E	C	A	C	D	C	F	D	B	E	D	A
Approach Delay		38.0			34.7			58.2			49.0	
Approach LOS		D			C			E			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
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: 0.81
Intersection Signal Delay: 43.4 Intersection LOS: D
Intersection Capacity Utilization 79.1% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	514	1681	226	65	761	437	243	1047	79	114	544	47
v/c Ratio	0.80	0.77	0.26	0.40	0.51	0.67	0.66	0.81	0.14	0.56	0.53	0.13
Control Delay	70.0	32.4	6.6	28.9	37.7	30.4	90.5	54.2	12.2	75.6	47.5	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.0	32.4	6.6	28.9	37.7	30.4	90.5	54.2	12.2	75.6	47.5	0.8
Queue Length 50th (m)	78.2	110.5	0.6	8.0	76.9	51.9	36.9	73.3	3.5	16.1	54.5	0.0
Queue Length 95th (m)	96.3	146.5	m24.8	17.0	85.1	55.9	50.8	112.7	16.6	26.4	69.0	0.0
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	711	2186	875	164	1498	654	378	1305	589	202	1025	353
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.77	0.26	0.40	0.51	0.67	0.64	0.80	0.13	0.56	0.53	0.13

Intersection Summary

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)	514	1681	226	65	761	437	243	1047	79	114	544	47
Future Volume (vph)	514	1681	226	65	761	437	243	1047	79	114	544	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3437	4520	1570	1825	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.95	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3437	4520	1570	166	4433	1633	3309	4230	1633	3541	4080	944
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	514	1681	226	65	761	437	243	1047	79	114	544	47
RTOR Reduction (vph)	0	0	118	0	0	102	0	0	55	0	0	35
Lane Group Flow (vph)	514	1681	108	65	761	335	243	1047	24	114	544	12
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Actuated Green, G (s)	25.2	64.9	64.9	50.9	45.3	45.3	14.6	40.8	40.8	7.0	33.2	33.2
Effective Green, g (s)	26.2	66.9	66.9	52.9	47.3	47.3	15.6	42.8	42.8	8.0	35.2	35.2
Actuated g/C Ratio	0.19	0.48	0.48	0.38	0.34	0.34	0.11	0.31	0.31	0.06	0.25	0.25
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0	5.0
Lane Grp Cap (vph)	643	2159	750	140	1497	551	368	1293	499	202	1025	237
v/s Ratio Prot	c0.15	c0.37		0.02	0.17		c0.07	c0.25		0.03	0.13	
v/s Ratio Perm			0.07	0.15		0.21			0.01			0.01
v/c Ratio	0.80	0.78	0.14	0.46	0.51	0.61	0.66	0.81	0.05	0.56	0.53	0.05
Uniform Delay, d1	54.4	30.4	20.5	30.3	37.1	38.6	59.7	44.8	34.2	64.3	45.3	39.7
Progression Factor	1.16	1.00	2.35	1.13	0.96	0.97	1.38	1.09	10.57	1.00	1.00	1.00
Incremental Delay, d2	4.7	1.9	0.3	4.8	1.2	4.8	5.1	3.9	0.1	5.8	1.0	0.2
Delay (s)	67.9	32.2	48.4	38.9	36.9	42.1	87.5	52.8	362.2	70.1	46.2	39.9
Level of Service	E	C	D	D	D	D	F	D	F	E	D	D
Approach Delay (s)		41.3			38.8			76.8			49.7	
Approach LOS		D			D			E			D	

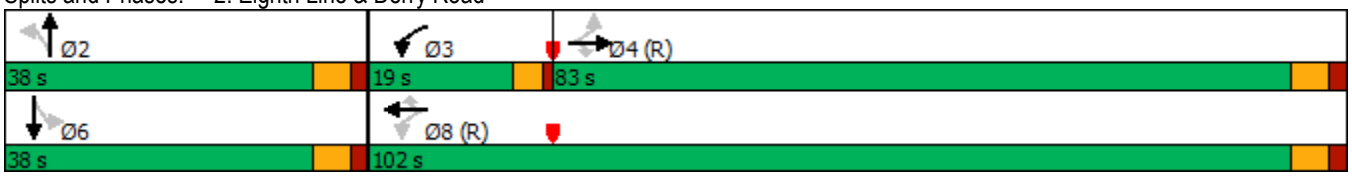
Intersection Summary			
HCM 2000 Control Delay	50.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1686	101	123	762	1	98	0	111	1	0	0
Future Volume (vph)	0	1686	101	123	762	1	98	0	111	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.850				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4520	1601	1810	4496	1633	1825	1633	0	1825	1921	0
Flt Permitted				0.079			0.757			0.585		
Satd. Flow (perm)	1921	4520	1601	151	4496	1633	1454	1633	0	1124	1921	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			84			23		192				
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	1686	101	123	762	1	98	0	111	1	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1686	101	123	762	1	98	111	0	1	0	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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		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	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		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	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	36.0	36.0	36.0	9.0	36.0	36.0	36.0	36.0		36.0	36.0	
Total Split (s)	83.0	83.0	83.0	19.0	102.0	102.0	38.0	38.0		38.0	38.0	
Total Split (%)	59.3%	59.3%	59.3%	13.6%	72.9%	72.9%	27.1%	27.1%		27.1%	27.1%	
Maximum Green (s)	77.0	77.0	77.0	15.0	96.0	96.0	32.0	32.0		32.0	32.0	
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	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		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	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	7.0	
Flash Dont Walk (s)	23.0	23.0	23.0		23.0	23.0	23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)	0	0	0		0	0	0	0		0	0	
Act Effct Green (s)		99.4	99.4	114.9	112.9	112.9	15.1	15.1		15.1		
Actuated g/C Ratio		0.71	0.71	0.82	0.81	0.81	0.11	0.11		0.11		
v/c Ratio		0.53	0.09	0.52	0.21	0.00	0.63	0.32		0.01		
Control Delay		8.3	1.0	14.9	3.5	0.0	80.9	9.2		52.0		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		
Total Delay		8.3	1.0	14.9	3.5	0.0	80.9	9.2		52.0		
LOS		A	A	B	A	A	F	A		D		
Approach Delay		7.9			5.1			42.8			52.0	
Approach LOS		A			A			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 69 (49%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 9.6	Intersection LOS: A
Intersection Capacity Utilization 64.8%	ICU Level of Service C
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL
Lane Group Flow (vph)	1686	101	123	762	1	98	111	1
v/c Ratio	0.53	0.09	0.52	0.21	0.00	0.63	0.32	0.01
Control Delay	8.3	1.0	14.9	3.5	0.0	80.9	9.2	52.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.3	1.0	14.9	3.5	0.0	80.9	9.2	52.0
Queue Length 50th (m)	138.7	1.8	5.3	16.7	0.0	27.7	2.6	0.3
Queue Length 95th (m)	181.4	5.1	21.1	26.3	0.0	46.1	10.8	1.9
Internal Link Dist (m)	337.1			616.9			265.9	
Turn Bay Length (m)		70.0	140.0		70.0	50.0		35.0
Base Capacity (vph)	3207	1160	301	3627	1321	332	521	256
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	0.53	0.09	0.41	0.21	0.00	0.30	0.21	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1686	101	123	762	1	98	0	111	1	0	0
Future Volume (vph)	0	1686	101	123	762	1	98	0	111	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	4.0	6.0	6.0	6.0	6.0		6.0		
Lane Util. Factor		*0.80	1.00	1.00	*0.80	1.00	1.00	1.00		1.00		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00		
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95		
Satd. Flow (prot)		4520	1601	1810	4496	1633	1825	1633		1825		
Flt Permitted		1.00	1.00	0.08	1.00	1.00	0.76	1.00		0.59		
Satd. Flow (perm)		4520	1601	151	4496	1633	1455	1633		1124		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1686	101	123	762	1	98	0	111	1	0	0
RTOR Reduction (vph)	0	0	24	0	0	0	0	99	0	0	0	0
Lane Group Flow (vph)	0	1686	77	123	762	1	98	12	0	1	0	0
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		99.3	99.3	112.9	112.9	112.9	15.1	15.1		15.1		
Effective Green, g (s)		99.3	99.3	112.9	112.9	112.9	15.1	15.1		15.1		
Actuated g/C Ratio		0.71	0.71	0.81	0.81	0.81	0.11	0.11		0.11		
Clearance Time (s)		6.0	6.0	4.0	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)		3205	1135	235	3625	1316	156	176		121		
v/s Ratio Prot		0.37		c0.04	0.17			0.01				
v/s Ratio Perm			0.05	c0.38		0.00	c0.07			0.00		
v/c Ratio		0.53	0.07	0.52	0.21	0.00	0.63	0.07		0.01		
Uniform Delay, d1		9.4	6.2	8.3	3.2	2.6	59.8	56.1		55.8		
Progression Factor		0.75	0.35	1.00	1.00	1.00	1.07	1.00		1.00		
Incremental Delay, d2		0.5	0.1	2.1	0.1	0.0	7.6	0.2		0.0		
Delay (s)		7.6	2.3	10.4	3.3	2.6	71.7	56.3		55.8		
Level of Service		A	A	B	A	A	E	E		E		
Approach Delay (s)		7.3			4.3			63.5			55.8	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1855	47	0	1328	0	21
Future Volume (vph)	1855	47	0	1328	0	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	*0.80	1.00	1.00	*0.80	1.00	1.00
Frt		0.850			0.865	0.865
Flt Protected						
Satd. Flow (prot)	4520	1601	0	4520	0	1629
Flt Permitted						
Satd. Flow (perm)	4520	1601	0	4520	0	1629
Link Speed (k/h)	80			80	48	
Link Distance (m)	198.7			361.0	323.6	
Travel Time (s)	8.9			16.2	24.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1855	47	0	1328	0	21
Shared Lane Traffic (%)						10%
Lane Group Flow (vph)	1855	47	0	1328	2	19
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)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 45.8%	ICU Level of Service A
Analysis Period (min) 15	

* User Entered Value

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1855	47	0	1328	0	21
Future Volume (Veh/h)	1855	47	0	1328	0	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1855	47	0	1328	0	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	199			361		
pX, platoon unblocked			0.70		0.73	0.70
vC, conflicting volume			1902		2298	618
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			785		895	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	97
cM capacity (veh/h)			580		205	758

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	618	618	618	47	443	443	443	21
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	0	47	0	0	0	21
cSH	1700	1700	1700	1700	1700	1700	1700	758
Volume to Capacity	0.36	0.36	0.36	0.03	0.26	0.26	0.26	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9
Lane LOS								A
Approach Delay (s)	0.0				0.0			9.9
Approach LOS								A

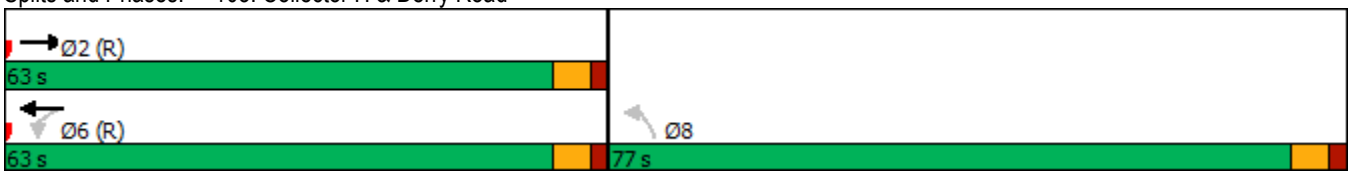
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1826	50	13	1114	214	18
Future Volume (vph)	1826	50	13	1114	214	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	50.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			50.0		2.5	
Lane Util. Factor	*0.80	0.91	1.00	*0.80	1.00	1.00
Frt	0.996				0.990	
Flt Protected			0.950		0.956	
Satd. Flow (prot)	4502	0	1789	4520	1783	0
Flt Permitted			0.065		0.956	
Satd. Flow (perm)	4502	0	122	4520	1783	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	3				2	
Link Speed (k/h)	80			80	48	
Link Distance (m)	361.0			419.8	284.0	
Travel Time (s)	16.2			18.9	21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1826	50	13	1114	214	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1876	0	13	1114	232	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)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	20.0		20.0	20.0	10.0	
Minimum Split (s)	26.0		26.0	26.0	40.0	
Total Split (s)	63.0		63.0	63.0	77.0	
Total Split (%)	45.0%		45.0%	45.0%	55.0%	
Maximum Green (s)	57.0		57.0	57.0	71.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0	6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	9.0		9.0	9.0	27.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	103.7		103.7	103.7	24.3	
Actuated g/C Ratio	0.74		0.74	0.74	0.17	
v/c Ratio	0.56		0.14	0.33	0.75	
Control Delay	3.0		13.7	7.4	68.7	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	3.0		13.7	7.4	68.7	
LOS	A		B	A	E	
Approach Delay	3.0			7.4	68.7	
Approach LOS	A			A	E	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 16 (11%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 59.3%	ICU Level of Service B
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 103: Collector H & Derry Road



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1876	13	1114	232
v/c Ratio	0.56	0.14	0.33	0.75
Control Delay	3.0	13.7	7.4	68.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	3.0	13.7	7.4	68.7
Queue Length 50th (m)	15.7	0.7	25.5	61.3
Queue Length 95th (m)	19.3	m4.5	65.0	83.7
Internal Link Dist (m)	337.0		395.8	260.0
Turn Bay Length (m)		50.0		
Base Capacity (vph)	3336	90	3349	905
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.56	0.14	0.33	0.26

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1826	50	13	1114	214	18
Future Volume (vph)	1826	50	13	1114	214	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	*0.80		1.00	*0.80	1.00	
Frt	1.00		1.00	1.00	0.99	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4502		1789	4520	1782	
Flt Permitted	1.00		0.06	1.00	0.96	
Satd. Flow (perm)	4502		122	4520	1782	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1826	50	13	1114	214	18
RTOR Reduction (vph)	1	0	0	0	2	0
Lane Group Flow (vph)	1875	0	13	1114	230	0
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	
Actuated Green, G (s)	103.7		103.7	103.7	24.3	
Effective Green, g (s)	103.7		103.7	103.7	24.3	
Actuated g/C Ratio	0.74		0.74	0.74	0.17	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3334		90	3348	309	
v/s Ratio Prot	c0.42			0.25		
v/s Ratio Perm			0.11		c0.13	
v/c Ratio	0.56		0.14	0.33	0.75	
Uniform Delay, d1	8.1		5.3	6.2	54.9	
Progression Factor	0.28		1.29	1.05	1.00	
Incremental Delay, d2	0.5		3.2	0.3	9.4	
Delay (s)	2.8		10.0	6.8	64.3	
Level of Service	A		B	A	E	
Approach Delay (s)	2.8			6.8	64.3	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1778	66	8	863	264	23
Future Volume (vph)	1778	66	8	863	264	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	50.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			50.0		2.5	
Lane Util. Factor	*0.80	0.91	1.00	*0.80	1.00	1.00
Frt	0.995				0.989	
Flt Protected			0.950		0.956	
Satd. Flow (prot)	4498	0	1789	4520	1781	0
Flt Permitted			0.065		0.956	
Satd. Flow (perm)	4498	0	122	4520	1781	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	6				3	
Link Speed (k/h)	80			80	48	
Link Distance (m)	419.8			361.1	291.5	
Travel Time (s)	18.9			16.2	21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1778	66	8	863	264	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1844	0	8	863	287	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)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	20.0		20.0	20.0	10.0	
Minimum Split (s)	26.0		26.0	26.0	40.0	
Total Split (s)	88.0		88.0	88.0	52.0	
Total Split (%)	62.9%		62.9%	62.9%	37.1%	
Maximum Green (s)	82.0		82.0	82.0	46.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0	6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	9.0		9.0	9.0	27.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	100.0		100.0	100.0	28.0	
Actuated g/C Ratio	0.71		0.71	0.71	0.20	
v/c Ratio	0.57		0.09	0.27	0.80	
Control Delay	6.8		10.1	6.6	69.1	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	6.8		10.1	6.6	69.1	
LOS	A		B	A	E	
Approach Delay	6.8			6.7	69.1	
Approach LOS	A			A	E	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 37 (26%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 12.7	Intersection LOS: B
Intersection Capacity Utilization 61.8%	ICU Level of Service B
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 104: Collector J & Derry Road

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1844	8	863	287
v/c Ratio	0.57	0.09	0.27	0.80
Control Delay	6.8	10.1	6.6	69.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.8	10.1	6.6	69.1
Queue Length 50th (m)	21.5	0.5	27.6	75.7
Queue Length 95th (m)	211.2	m2.5	36.1	100.1
Internal Link Dist (m)	395.8		337.1	267.5
Turn Bay Length (m)		50.0		
Base Capacity (vph)	3215	87	3229	587
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.09	0.27	0.49

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1778	66	8	863	264	23
Future Volume (vph)	1778	66	8	863	264	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	*0.80		1.00	*0.80	1.00	
Frt	0.99		1.00	1.00	0.99	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4496		1789	4520	1781	
Flt Permitted	1.00		0.06	1.00	0.96	
Satd. Flow (perm)	4496		122	4520	1781	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1778	66	8	863	264	23
RTOR Reduction (vph)	2	0	0	0	2	0
Lane Group Flow (vph)	1842	0	8	863	285	0
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	
Actuated Green, G (s)	100.0		100.0	100.0	28.0	
Effective Green, g (s)	100.0		100.0	100.0	28.0	
Actuated g/C Ratio	0.71		0.71	0.71	0.20	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3211		87	3228	356	
v/s Ratio Prot	c0.41			0.19		
v/s Ratio Perm			0.07		c0.16	
v/c Ratio	0.57		0.09	0.27	0.80	
Uniform Delay, d1	9.7		6.1	7.1	53.3	
Progression Factor	0.59		0.88	0.84	1.00	
Incremental Delay, d2	0.6		2.1	0.2	11.9	
Delay (s)	6.3		7.5	6.1	65.2	
Level of Service	A		A	A	E	
Approach Delay (s)	6.3			6.2	65.2	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
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)	0	34	14	159	93	81	69	1573	74	30	865	0
Future Volume (vph)	0	34	14	159	93	81	69	1573	74	30	865	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		60.0	70.0		50.0	70.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			15.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.80	0.91	1.00	*0.80	0.91
Frt		0.956			0.930			0.993				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1883	1801	0	1789	1752	0	1789	4489	0	1789	4520	0
Flt Permitted				0.726			0.260			0.088		
Satd. Flow (perm)	1883	1801	0	1367	1752	0	490	4489	0	166	4520	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			30			8				
Link Speed (k/h)		48			48			60			60	
Link Distance (m)		434.3			193.0			870.6			323.1	
Travel Time (s)		32.6			14.5			52.2			19.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	34	14	159	93	81	69	1573	74	30	865	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	159	174	0	69	1647	0	30	865	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			7.4			7.4	
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	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	20.0		7.0	20.0	
Minimum Split (s)	40.0	40.0		40.0	40.0		11.0	26.0		11.0	26.0	
Total Split (s)	40.0	40.0		40.0	40.0		25.0	89.0		11.0	75.0	
Total Split (%)	28.6%	28.6%		28.6%	28.6%		17.9%	63.6%		7.9%	53.6%	
Maximum Green (s)	34.0	34.0		34.0	34.0		21.0	83.0		7.0	69.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	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		4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	27.0	27.0		27.0	27.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		21.7		21.7	21.7		106.2	99.7		104.8	97.2	
Actuated g/C Ratio		0.16		0.16	0.16		0.76	0.71		0.75	0.69	
v/c Ratio		0.16		0.75	0.59		0.16	0.51		0.15	0.28	
Control Delay		37.3		77.2	52.2		5.5	19.2		5.2	3.7	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		37.3		77.2	52.2		5.5	19.2		5.2	3.7	
LOS		D		E	D		A	B		A	A	
Approach Delay		37.3			64.2			18.6			3.7	
Approach LOS		D			E			B			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 87 (62%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 19.5	Intersection LOS: B
Intersection Capacity Utilization 66.7%	ICU Level of Service C
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 105: Trafalgar Road & Collector K

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	159	174	69	1647	30	865
v/c Ratio	0.16	0.75	0.59	0.16	0.51	0.15	0.28
Control Delay	37.3	77.2	52.2	5.5	19.2	5.2	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	77.2	52.2	5.5	19.2	5.2	3.7
Queue Length 50th (m)	8.2	42.7	37.5	7.2	134.8	0.9	16.6
Queue Length 95th (m)	18.5	62.9	57.4	m7.8	209.6	m2.3	19.1
Internal Link Dist (m)	410.3		169.0		846.6		299.1
Turn Bay Length (m)		70.0		70.0		50.0	
Base Capacity (vph)	447	331	448	573	3199	205	3137
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.48	0.39	0.12	0.51	0.15	0.28

Intersection Summary

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)	0	34	14	159	93	81	69	1573	74	30	865	0
Future Volume (vph)	0	34	14	159	93	81	69	1573	74	30	865	0
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		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	*0.80		1.00	*0.80	
Frt		0.96		1.00	0.93		1.00	0.99		1.00	1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1801		1789	1752		1789	4490		1789	4520	
Flt Permitted		1.00		0.73	1.00		0.26	1.00		0.09	1.00	
Satd. Flow (perm)		1801		1367	1752		490	4490		166	4520	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	34	14	159	93	81	69	1573	74	30	865	0
RTOR Reduction (vph)	0	12	0	0	25	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	36	0	159	149	0	69	1645	0	30	865	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.7		21.7	21.7		104.0	98.1		100.6	96.4	
Effective Green, g (s)		21.7		21.7	21.7		104.0	98.1		100.6	96.4	
Actuated g/C Ratio		0.15		0.15	0.15		0.74	0.70		0.72	0.69	
Clearance Time (s)		6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		279		211	271		418	3146		167	3112	
v/s Ratio Prot		0.02			0.08		c0.01	c0.37		0.01	0.19	
v/s Ratio Perm				c0.12			0.12			0.12		
v/c Ratio		0.13		0.75	0.55		0.17	0.52		0.18	0.28	
Uniform Delay, d1		51.0		56.6	54.6		5.0	9.9		7.0	8.4	
Progression Factor		1.00		1.00	1.00		1.03	1.75		0.76	0.37	
Incremental Delay, d2		0.2		14.1	2.3		0.2	0.5		0.5	0.2	
Delay (s)		51.2		70.7	56.9		5.3	17.9		5.8	3.3	
Level of Service		D		E	E		A	B		A	A	
Approach Delay (s)		51.2			63.5			17.4			3.4	
Approach LOS		D			E			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	78	13	8	212	89	52	18	2	104	40	69
Future Volume (vph)	47	78	13	8	212	89	52	18	2	104	40	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			25.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.961			0.985			0.905	
Flt Protected		0.983			0.999		0.950			0.950		
Satd. Flow (prot)	0	1827	0	0	1808	0	1789	1855	0	1789	1705	0
Flt Permitted		0.983			0.999		0.950			0.950		
Satd. Flow (perm)	0	1827	0	0	1808	0	1789	1855	0	1789	1705	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		193.0			372.2			875.5			323.6	
Travel Time (s)		14.5			27.9			65.7			24.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	47	78	13	8	212	89	52	18	2	104	40	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	138	0	0	309	0	52	20	0	104	109	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
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.9%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	78	13	8	212	89	52	18	2	104	40	69
Future Volume (Veh/h)	47	78	13	8	212	89	52	18	2	104	40	69
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	47	78	13	8	212	89	52	18	2	104	40	69
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		193										
pX, platoon unblocked												
vC, conflicting volume	301			91			540	496	84	462	458	256
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	301			91			540	496	84	462	458	256
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			86	96	100	78	92	91
cM capacity (veh/h)	1260			1504			374	455	975	478	478	782

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	138	309	52	20	104	109
Volume Left	47	8	52	0	104	0
Volume Right	13	89	0	2	0	69
cSH	1260	1504	374	481	478	634
Volume to Capacity	0.04	0.01	0.14	0.04	0.22	0.17
Queue Length 95th (m)	0.9	0.1	3.6	1.0	6.2	4.7
Control Delay (s)	2.9	0.2	16.2	12.8	14.6	11.8
Lane LOS	A	A	C	B	B	B
Approach Delay (s)	2.9	0.2	15.2		13.2	
Approach LOS			C		B	

Intersection Summary				
Average Delay	6.0			
Intersection Capacity Utilization	46.9%	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)	38	140	34	31	173	30	44	170	37	30	62	51
Future Volume (vph)	38	140	34	31	173	30	44	170	37	30	62	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.983			0.980			0.952	
Flt Protected		0.991			0.993			0.991			0.990	
Satd. Flow (prot)	0	1825	0	0	1838	0	0	1829	0	0	1775	0
Flt Permitted		0.991			0.993			0.991			0.990	
Satd. Flow (perm)	0	1825	0	0	1838	0	0	1829	0	0	1775	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		372.2			419.4			911.3			284.0	
Travel Time (s)		27.9			31.5			68.3			21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	38	140	34	31	173	30	44	170	37	30	62	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	212	0	0	234	0	0	251	0	0	143	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)		0.0			0.0			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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 41.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	38	140	34	31	173	30	44	170	37	30	62	51
Future Volume (vph)	38	140	34	31	173	30	44	170	37	30	62	51
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	38	140	34	31	173	30	44	170	37	30	62	51

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	212	234	251	143
Volume Left (vph)	38	31	44	30
Volume Right (vph)	34	30	37	51
Hadj (s)	-0.03	-0.02	-0.02	-0.14
Departure Headway (s)	5.4	5.3	5.3	5.4
Degree Utilization, x	0.32	0.35	0.37	0.22
Capacity (veh/h)	617	624	617	593
Control Delay (s)	10.8	11.1	11.5	9.9
Approach Delay (s)	10.8	11.1	11.5	9.9
Approach LOS	B	B	B	A

Intersection Summary			
Delay	10.9		
Level of Service	B		
Intersection Capacity Utilization	41.1%	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)	38	77	74	16	65	23	79	253	13	30	75	69
Future Volume (vph)	38	77	74	16	65	23	79	253	13	30	75	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.947			0.970			0.995			0.946	
Flt Protected		0.990			0.992			0.989			0.991	
Satd. Flow (prot)	0	1766	0	0	1812	0	0	1853	0	0	1766	0
Flt Permitted		0.990			0.992			0.989			0.991	
Satd. Flow (perm)	0	1766	0	0	1812	0	0	1853	0	0	1766	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		419.4			345.5			909.0			291.5	
Travel Time (s)		31.5			25.9			68.2			21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	38	77	74	16	65	23	79	253	13	30	75	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	189	0	0	104	0	0	345	0	0	174	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)		0.0			0.0			0.0			0.0	
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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.9%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	38	77	74	16	65	23	79	253	13	30	75	69
Future Volume (vph)	38	77	74	16	65	23	79	253	13	30	75	69
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	38	77	74	16	65	23	79	253	13	30	75	69

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	189	104	345	174
Volume Left (vph)	38	16	79	30
Volume Right (vph)	74	23	13	69
Hadj (s)	-0.16	-0.07	0.06	-0.17
Departure Headway (s)	5.3	5.5	5.0	5.0
Degree Utilization, x	0.28	0.16	0.48	0.24
Capacity (veh/h)	622	578	686	657
Control Delay (s)	10.3	9.5	12.6	9.7
Approach Delay (s)	10.3	9.5	12.6	9.7
Approach LOS	B	A	B	A

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	106	49	211	221	3
Future Volume (vph)	3	106	49	211	221	3
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	0.869				0.998	
Flt Protected	0.999			0.991		
Satd. Flow (prot)	1635	0	0	1866	1880	0
Flt Permitted	0.999			0.991		
Satd. Flow (perm)	1635	0	0	1866	1880	0
Link Speed (k/h)	48			70	70	
Link Distance (m)	345.5			897.4	289.9	
Travel Time (s)	25.9			46.2	14.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	106	49	211	221	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	109	0	0	260	224	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 42.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	106	49	211	221	3
Future Volume (Veh/h)	3	106	49	211	221	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	3	106	49	211	221	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					290	
pX, platoon unblocked						
vC, conflicting volume	532	222	224			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	532	222	224			
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	87	96			
cM capacity (veh/h)	490	817	1345			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	109	260	224
Volume Left	3	49	0
Volume Right	106	0	3
cSH	802	1345	1700
Volume to Capacity	0.14	0.04	0.13
Queue Length 95th (m)	3.6	0.9	0.0
Control Delay (s)	10.2	1.7	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	1.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		

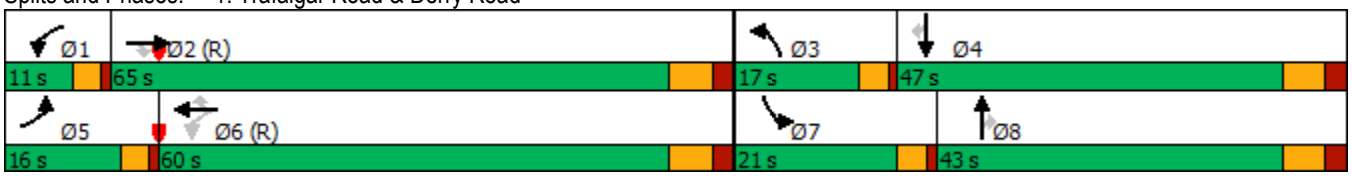
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
Future Volume (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	1		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3026	4476	1601	1772	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.950			0.165			0.950			0.950		
Satd. Flow (perm)	3026	4476	1601	308	4565	1633	3471	4433	1633	3506	4476	1420
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			240			186			124			124
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Adj. Flow (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
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			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	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	6		6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	16.0	65.0	65.0	11.0	60.0	60.0	17.0	43.0	43.0	21.0	47.0	47.0
Total Split (%)	11.4%	46.4%	46.4%	7.9%	42.9%	42.9%	12.1%	30.7%	30.7%	15.0%	33.6%	33.6%
Maximum Green (s)	12.0	58.1	58.1	7.0	53.1	53.1	13.0	36.2	36.2	17.0	40.2	40.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	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	5.0	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	12.4	62.6	62.6	66.1	56.0	56.0	13.9	38.1	38.1	17.8	42.0	42.0
Actuated g/C Ratio	0.09	0.45	0.45	0.47	0.40	0.40	0.10	0.27	0.27	0.13	0.30	0.30
v/c Ratio	0.64	0.53	0.28	0.30	0.80	0.34	0.65	0.83	0.10	0.76	0.77	0.22
Control Delay	68.8	37.1	12.5	15.4	34.9	9.4	93.6	23.3	0.9	70.9	49.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	37.1	12.5	15.4	34.9	9.4	93.6	23.3	0.9	70.9	49.4	6.0
LOS	E	D	B	B	C	A	F	C	A	E	D	A
Approach Delay		36.8			30.4			34.7			50.9	
Approach LOS		D			C			C			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 40 (29%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 37.9 Intersection LOS: D
Intersection Capacity Utilization 76.7% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
v/c Ratio	0.64	0.53	0.28	0.30	0.80	0.34	0.65	0.83	0.10	0.76	0.77	0.22
Control Delay	68.8	37.1	12.5	15.4	34.9	9.4	93.6	23.3	0.9	70.9	49.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	37.1	12.5	15.4	34.9	9.4	93.6	23.3	0.9	70.9	49.4	6.0
Queue Length 50th (m)	23.8	105.8	11.8	6.8	155.8	20.1	26.8	109.6	0.8	47.2	109.4	0.0
Queue Length 95th (m)	36.2	124.8	35.2	12.2	172.7	37.2	45.8	78.7	1.0	63.8	129.1	12.1
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	300.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	280	2002	848	231	1827	765	347	1209	535	450	1349	514
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.53	0.28	0.30	0.80	0.34	0.64	0.82	0.10	0.75	0.77	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
Future Volume (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	1.00	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3026	4476	1601	1772	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.95	1.00	1.00	0.16	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3026	4476	1601	307	4565	1633	3471	4433	1633	3506	4476	1420
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	171	1052	240	69	1461	262	223	996	53	338	1040	115
RTOR Reduction (vph)	0	0	134	0	0	112	0	0	39	0	0	81
Lane Group Flow (vph)	171	1052	106	69	1461	150	223	996	14	338	1040	35
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6			8			4
Actuated Green, G (s)	11.4	59.8	59.8	59.6	54.0	54.0	12.9	36.1	36.1	16.8	40.0	40.0
Effective Green, g (s)	12.4	61.8	61.8	61.6	56.0	56.0	13.9	38.1	38.1	17.8	42.0	42.0
Actuated g/C Ratio	0.09	0.44	0.44	0.44	0.40	0.40	0.10	0.27	0.27	0.13	0.30	0.30
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0	5.0
Lane Grp Cap (vph)	268	1975	706	204	1826	653	344	1206	444	445	1342	426
v/s Ratio Prot	c0.06	0.24		0.02	c0.32		0.06	c0.22		c0.10	0.23	
v/s Ratio Perm			0.07	0.13		0.09			0.01			0.02
v/c Ratio	0.64	0.53	0.15	0.34	0.80	0.23	0.65	0.83	0.03	0.76	0.77	0.08
Uniform Delay, d1	61.6	28.6	23.4	23.7	37.1	27.8	60.7	47.8	37.4	59.0	44.7	35.2
Progression Factor	0.95	1.26	4.09	0.73	0.84	0.94	1.40	0.36	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.5	0.9	0.4	1.9	3.4	0.7	5.1	4.8	0.1	8.6	3.4	0.2
Delay (s)	62.8	36.9	96.1	19.1	34.5	26.7	90.0	22.1	37.5	67.7	48.0	35.3
Level of Service	E	D	F	B	C	C	F	C	D	E	D	D
Approach Delay (s)		49.6			32.7			34.7			51.5	
Approach LOS		D			C			C			D	

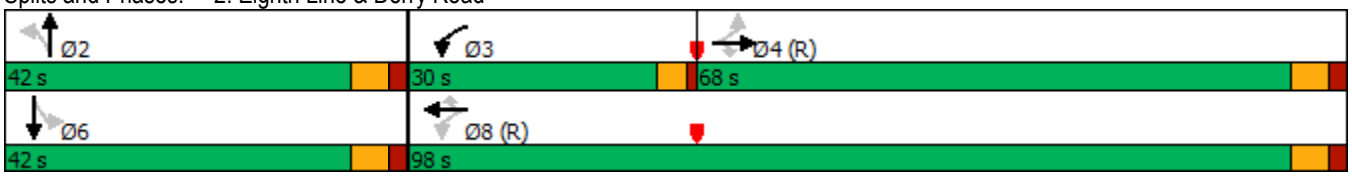
Intersection Summary			
HCM 2000 Control Delay	41.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	935	93	189	1529	0	63	0	125	1	0	1
Future Volume (vph)	0	935	93	189	1529	0	63	0	125	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850					0.850			0.850	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4476	1633	1810	4541	1921	1825	1601	0	1825	1633	0
Flt Permitted				0.237			0.757			0.483		
Satd. Flow (perm)	1921	4476	1633	452	4541	1921	1454	1601	0	928	1633	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			93					368			55	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	935	93	189	1529	0	63	0	125	1	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	935	93	189	1529	0	63	125	0	1	1	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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		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	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		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	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	36.0	36.0	36.0	9.0	36.0	36.0	36.0	36.0		36.0	36.0	
Total Split (s)	68.0	68.0	68.0	30.0	98.0	98.0	42.0	42.0		42.0	42.0	
Total Split (%)	48.6%	48.6%	48.6%	21.4%	70.0%	70.0%	30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	62.0	62.0	62.0	26.0	92.0	92.0	36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	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		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	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	7.0	
Flash Dont Walk (s)	23.0	23.0	23.0		23.0	23.0	23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)	0	0	0		0	0	0	0		0	0	
Act Effct Green (s)		103.6	103.6	117.7	115.7		12.3	12.3		12.3	12.3	
Actuated g/C Ratio		0.74	0.74	0.84	0.83		0.09	0.09		0.09	0.09	
v/c Ratio		0.28	0.08	0.41	0.41		0.50	0.26		0.01	0.01	
Control Delay		7.6	2.4	4.9	3.7		91.6	1.3		56.0	0.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		7.6	2.4	4.9	3.7		91.6	1.3		56.0	0.0	
LOS		A	A	A	A		F	A		E	A	
Approach Delay		7.1			3.8			31.5			28.0	
Approach LOS		A			A			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 50 (36%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 6.8	Intersection LOS: A
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	935	93	189	1529	63	125	1	1
v/c Ratio	0.28	0.08	0.41	0.41	0.50	0.26	0.01	0.01
Control Delay	7.6	2.4	4.9	3.7	91.6	1.3	56.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	2.4	4.9	3.7	91.6	1.3	56.0	0.0
Queue Length 50th (m)	62.9	5.0	6.9	35.2	18.0	0.0	0.3	0.0
Queue Length 95th (m)	97.4	9.5	13.9	52.2	33.3	0.0	2.0	0.0
Internal Link Dist (m)	337.1			616.9		265.9		609.1
Turn Bay Length (m)		70.0	140.0		50.0		35.0	
Base Capacity (vph)	3311	1232	632	3754	373	685	238	460
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	0.28	0.08	0.30	0.41	0.17	0.18	0.00	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	935	93	189	1529	0	63	0	125	1	0	1
Future Volume (vph)	0	935	93	189	1529	0	63	0	125	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		*0.80	1.00	1.00	*0.80		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4476	1633	1810	4541		1825	1601		1825	1633	
Flt Permitted		1.00	1.00	0.24	1.00		0.76	1.00		0.48	1.00	
Satd. Flow (perm)		4476	1633	453	4541		1455	1601		927	1633	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	935	93	189	1529	0	63	0	125	1	0	1
RTOR Reduction (vph)	0	0	24	0	0	0	0	114	0	0	1	0
Lane Group Flow (vph)	0	935	69	189	1529	0	63	11	0	1	0	0
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		103.5	103.5	115.7	115.7		12.3	12.3		12.3	12.3	
Effective Green, g (s)		103.5	103.5	115.7	115.7		12.3	12.3		12.3	12.3	
Actuated g/C Ratio		0.74	0.74	0.83	0.83		0.09	0.09		0.09	0.09	
Clearance Time (s)		6.0	6.0	4.0	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)		3309	1207	453	3752		127	140		81	143	
v/s Ratio Prot		0.21		0.02	c0.34			0.01			0.00	
v/s Ratio Perm			0.04	c0.32			c0.04			0.00		
v/c Ratio		0.28	0.06	0.42	0.41		0.50	0.08		0.01	0.00	
Uniform Delay, d1		6.0	5.0	2.7	3.2		60.9	58.6		58.3	58.2	
Progression Factor		1.18	1.90	1.00	1.00		1.30	1.00		1.00	1.00	
Incremental Delay, d2		0.2	0.1	0.6	0.3		2.9	0.2		0.1	0.0	
Delay (s)		7.3	9.5	3.4	3.5		82.3	58.9		58.4	58.2	
Level of Service		A	A	A	A		F	E		E	E	
Approach Delay (s)		7.5			3.5			66.7			58.3	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1254	224	0	1831	0	91
Future Volume (vph)	1254	224	0	1831	0	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	*0.80	1.00	1.00	*0.80	1.00	1.00
Frt		0.850			0.865	0.865
Flt Protected						
Satd. Flow (prot)	4520	1601	0	4520	0	1629
Flt Permitted						
Satd. Flow (perm)	4520	1601	0	4520	0	1629
Link Speed (k/h)	80			80	48	
Link Distance (m)	198.7			361.0	323.6	
Travel Time (s)	8.9			16.2	24.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1254	224	0	1831	0	91
Shared Lane Traffic (%)						10%
Lane Group Flow (vph)	1254	224	0	1831	9	82
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)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 38.7%	ICU Level of Service A
Analysis Period (min) 15	

* User Entered Value

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1254	224	0	1831	0	91
Future Volume (Veh/h)	1254	224	0	1831	0	91
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1254	224	0	1831	0	91
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	199			361		
pX, platoon unblocked			0.85		0.91	0.85
vC, conflicting volume			1478		1864	418
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			957		801	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	90
cM capacity (veh/h)			609		292	925

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	418	418	418	224	610	610	610	91
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	0	224	0	0	0	91
cSH	1700	1700	1700	1700	1700	1700	1700	925
Volume to Capacity	0.25	0.25	0.25	0.13	0.36	0.36	0.36	0.10
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3
Lane LOS								A
Approach Delay (s)	0.0				0.0			9.3
Approach LOS								A

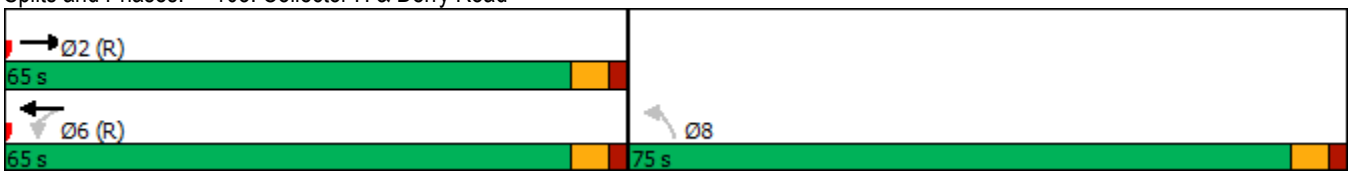
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1218	127	29	1726	105	13
Future Volume (vph)	1218	127	29	1726	105	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	50.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			50.0		2.5	
Lane Util. Factor	*0.80	0.91	1.00	*0.80	1.00	1.00
Frt	0.986				0.985	
Flt Protected			0.950		0.957	
Satd. Flow (prot)	4457	0	1789	4520	1775	0
Flt Permitted			0.149		0.957	
Satd. Flow (perm)	4457	0	281	4520	1775	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	13				6	
Link Speed (k/h)	80			80	48	
Link Distance (m)	361.0			419.8	284.0	
Travel Time (s)	16.2			18.9	21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1218	127	29	1726	105	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1345	0	29	1726	118	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)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	20.0		20.0	20.0	10.0	
Minimum Split (s)	26.0		26.0	26.0	40.0	
Total Split (s)	65.0		65.0	65.0	75.0	
Total Split (%)	46.4%		46.4%	46.4%	53.6%	
Maximum Green (s)	59.0		59.0	59.0	69.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0	6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	9.0		9.0	9.0	27.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	113.3		113.3	113.3	14.7	
Actuated g/C Ratio	0.81		0.81	0.81	0.10	
v/c Ratio	0.37		0.13	0.47	0.62	
Control Delay	10.0		4.3	3.8	70.1	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	10.0		4.3	3.8	70.1	
LOS	B		A	A	E	
Approach Delay	10.0			3.8	70.1	
Approach LOS	B			A	E	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 14 (10%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 8.9	Intersection LOS: A
Intersection Capacity Utilization 51.7%	ICU Level of Service A
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 103: Collector H & Derry Road



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1345	29	1726	118
v/c Ratio	0.37	0.13	0.47	0.62
Control Delay	10.0	4.3	3.8	70.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.0	4.3	3.8	70.1
Queue Length 50th (m)	70.7	1.2	41.7	30.2
Queue Length 95th (m)	87.3	m4.0	47.9	48.8
Internal Link Dist (m)	337.0		395.8	260.0
Turn Bay Length (m)		50.0		
Base Capacity (vph)	3609	227	3658	877
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.37	0.13	0.47	0.13

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1218	127	29	1726	105	13
Future Volume (vph)	1218	127	29	1726	105	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	*0.80		1.00	*0.80	1.00	
Frt	0.99		1.00	1.00	0.99	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4456		1789	4520	1776	
Flt Permitted	1.00		0.15	1.00	0.96	
Satd. Flow (perm)	4456		280	4520	1776	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1218	127	29	1726	105	13
RTOR Reduction (vph)	2	0	0	0	5	0
Lane Group Flow (vph)	1343	0	29	1726	113	0
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	
Actuated Green, G (s)	113.3		113.3	113.3	14.7	
Effective Green, g (s)	113.3		113.3	113.3	14.7	
Actuated g/C Ratio	0.81		0.81	0.81	0.10	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3606		226	3657	186	
v/s Ratio Prot	0.30			c0.38		
v/s Ratio Perm			0.10		c0.06	
v/c Ratio	0.37		0.13	0.47	0.61	
Uniform Delay, d1	3.6		2.8	4.1	59.9	
Progression Factor	2.52		0.86	0.77	1.00	
Incremental Delay, d2	0.3		1.1	0.4	5.5	
Delay (s)	9.5		3.5	3.6	65.4	
Level of Service	A		A	A	E	
Approach Delay (s)	9.5			3.6	65.4	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1023	208	18	1615	140	18
Future Volume (vph)	1023	208	18	1615	140	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	50.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			50.0		2.5	
Lane Util. Factor	*0.80	0.91	1.00	*0.80	1.00	1.00
Frt	0.975				0.985	
Flt Protected			0.950		0.958	
Satd. Flow (prot)	4407	0	1789	4520	1777	0
Flt Permitted			0.171		0.958	
Satd. Flow (perm)	4407	0	322	4520	1777	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	46				5	
Link Speed (k/h)	80			80	48	
Link Distance (m)	419.8			361.1	291.5	
Travel Time (s)	18.9			16.2	21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1023	208	18	1615	140	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1231	0	18	1615	158	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)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	20.0		20.0	20.0	10.0	
Minimum Split (s)	26.0		26.0	26.0	40.0	
Total Split (s)	93.0		93.0	93.0	47.0	
Total Split (%)	66.4%		66.4%	66.4%	33.6%	
Maximum Green (s)	87.0		87.0	87.0	41.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0	6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	9.0		9.0	9.0	27.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	110.5		110.5	110.5	17.5	
Actuated g/C Ratio	0.79		0.79	0.79	0.12	
v/c Ratio	0.35		0.07	0.45	0.70	
Control Delay	3.5		4.8	5.1	72.5	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	3.5		4.8	5.1	72.5	
LOS	A		A	A	E	
Approach Delay	3.5			5.1	72.5	
Approach LOS	A			A	E	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 8.0	Intersection LOS: A
Intersection Capacity Utilization 50.1%	ICU Level of Service A
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 104: Collector J & Derry Road

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1231	18	1615	158
v/c Ratio	0.35	0.07	0.45	0.70
Control Delay	3.5	4.8	5.1	72.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	3.5	4.8	5.1	72.5
Queue Length 50th (m)	9.1	0.9	48.9	41.2
Queue Length 95th (m)	12.0	m3.1	61.3	62.1
Internal Link Dist (m)	395.8		337.1	267.5
Turn Bay Length (m)		50.0		
Base Capacity (vph)	3488	254	3567	523
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.07	0.45	0.30

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1023	208	18	1615	140	18
Future Volume (vph)	1023	208	18	1615	140	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	*0.80		1.00	*0.80	1.00	
Frt	0.97		1.00	1.00	0.98	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4406		1789	4520	1776	
Flt Permitted	1.00		0.17	1.00	0.96	
Satd. Flow (perm)	4406		322	4520	1776	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1023	208	18	1615	140	18
RTOR Reduction (vph)	10	0	0	0	4	0
Lane Group Flow (vph)	1221	0	18	1615	154	0
Turn Type	NA		Perm	NA	Perm	
Protected Phases	2			6		
Permitted Phases			6		8	
Actuated Green, G (s)	110.5		110.5	110.5	17.5	
Effective Green, g (s)	110.5		110.5	110.5	17.5	
Actuated g/C Ratio	0.79		0.79	0.79	0.12	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3477		254	3567	222	
v/s Ratio Prot	0.28			c0.36		
v/s Ratio Perm			0.06		c0.09	
v/c Ratio	0.35		0.07	0.45	0.69	
Uniform Delay, d1	4.3		3.3	4.8	58.7	
Progression Factor	0.74		0.98	0.90	1.00	
Incremental Delay, d2	0.3		0.5	0.4	9.0	
Delay (s)	3.4		3.7	4.8	67.6	
Level of Service	A		A	A	E	
Approach Delay (s)	3.4			4.8	67.6	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

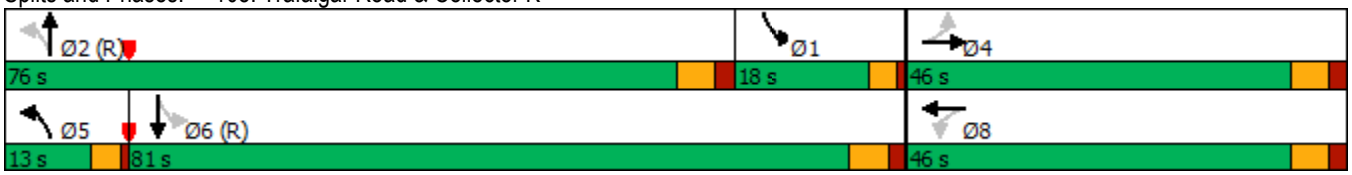
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	82	48	107	86	49	35	1263	173	93	1523	0
Future Volume (vph)	0	82	48	107	86	49	35	1263	173	93	1523	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		60.0	70.0		50.0	70.0		50.0	50.0		50.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			15.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.80	0.91	1.00	*0.80	0.91
Frt		0.945			0.946			0.982				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1883	1780	0	1789	1782	0	1789	4439	0	1789	4520	0
Flt Permitted				0.540			0.098			0.127		
Satd. Flow (perm)	1883	1780	0	1017	1782	0	185	4439	0	239	4520	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			21			21				
Link Speed (k/h)		48			48			60			60	
Link Distance (m)		434.3			193.0			870.6			323.1	
Travel Time (s)		32.6			14.5			52.2			19.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	82	48	107	86	49	35	1263	173	93	1523	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	130	0	107	135	0	35	1436	0	93	1523	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			7.4			7.4	
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	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	20.0		7.0	20.0	
Minimum Split (s)	40.0	40.0		40.0	40.0		11.0	26.0		11.0	26.0	
Total Split (s)	46.0	46.0		46.0	46.0		13.0	76.0		18.0	81.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		9.3%	54.3%		12.9%	57.9%	
Maximum Green (s)	40.0	40.0		40.0	40.0		9.0	70.0		14.0	75.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	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		4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	27.0	27.0		27.0	27.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		17.7		17.7	17.7		94.3	92.3		103.3	101.3	
Actuated g/C Ratio		0.13		0.13	0.13		0.67	0.66		0.74	0.72	
v/c Ratio		0.53		0.84	0.55		0.17	0.49		0.28	0.47	
Control Delay		54.6		102.8	55.8		11.1	21.6		10.2	4.4	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		54.6		102.8	55.8		11.1	21.6		10.2	4.4	
LOS		D		F	E		B	C		B	A	
Approach Delay		54.6			76.6			21.3			4.7	
Approach LOS		D			E			C			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 120 (86%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 70.3%	ICU Level of Service C
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 105: Trafalgar Road & Collector K



Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	130	107	135	35	1436	93	1523
v/c Ratio	0.53	0.84	0.55	0.17	0.49	0.28	0.47
Control Delay	54.6	102.8	55.8	11.1	21.6	10.2	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.6	102.8	55.8	11.1	21.6	10.2	4.4
Queue Length 50th (m)	28.6	29.4	30.0	5.8	170.0	2.7	23.7
Queue Length 95th (m)	46.8	48.1	48.5	m5.7	188.6	m7.7	37.0
Internal Link Dist (m)	410.3		169.0		846.6		299.1
Turn Bay Length (m)		70.0		70.0		50.0	
Base Capacity (vph)	523	290	524	227	2932	331	3271
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.37	0.26	0.15	0.49	0.28	0.47

Intersection Summary

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)	0	82	48	107	86	49	35	1263	173	93	1523	0
Future Volume (vph)	0	82	48	107	86	49	35	1263	173	93	1523	0
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		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	*0.80		1.00	*0.80	
Frt		0.94		1.00	0.95		1.00	0.98		1.00	1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1779		1789	1781		1789	4439		1789	4520	
Flt Permitted		1.00		0.54	1.00		0.10	1.00		0.13	1.00	
Satd. Flow (perm)		1779		1017	1781		184	4439		240	4520	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	82	48	107	86	49	35	1263	173	93	1523	0
RTOR Reduction (vph)	0	18	0	0	18	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	112	0	107	117	0	35	1429	0	93	1523	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.7		17.7	17.7		91.6	91.6		102.6	100.6	
Effective Green, g (s)		17.7		17.7	17.7		91.6	91.6		102.6	100.6	
Actuated g/C Ratio		0.13		0.13	0.13		0.65	0.65		0.73	0.72	
Clearance Time (s)		6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		224		128	225		185	2904		338	3247	
v/s Ratio Prot		0.06			0.07		0.01	c0.32		0.03	c0.34	
v/s Ratio Perm				c0.11			0.12			0.17		
v/c Ratio		0.50		0.84	0.52		0.19	0.49		0.28	0.47	
Uniform Delay, d1		57.0		59.7	57.2		10.1	12.3		11.5	8.4	
Progression Factor		1.00		1.00	1.00		1.09	1.69		0.62	0.43	
Incremental Delay, d2		1.7		35.3	2.0		0.3	0.4		0.4	0.4	
Delay (s)		58.8		95.0	59.2		11.4	21.3		7.5	4.0	
Level of Service		E		F	E		B	C		A	A	
Approach Delay (s)		58.8			75.0			21.1			4.2	
Approach LOS		E			E			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	215	42	10	111	90	30	14	1	119	106	101
Future Volume (vph)	91	215	42	10	111	90	30	14	1	119	106	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			25.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.942			0.990			0.927	
Flt Protected		0.987			0.998		0.950			0.950		
Satd. Flow (prot)	0	1829	0	0	1771	0	1789	1865	0	1789	1746	0
Flt Permitted		0.987			0.998		0.950			0.950		
Satd. Flow (perm)	0	1829	0	0	1771	0	1789	1865	0	1789	1746	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		193.0			372.2			875.5			323.6	
Travel Time (s)		14.5			27.9			65.7			24.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	91	215	42	10	111	90	30	14	1	119	106	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	348	0	0	211	0	30	15	0	119	207	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
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 59.2%	ICU Level of Service B
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	215	42	10	111	90	30	14	1	119	106	101
Future Volume (Veh/h)	91	215	42	10	111	90	30	14	1	119	106	101
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	91	215	42	10	111	90	30	14	1	119	106	101
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		193										
pX, platoon unblocked												
vC, conflicting volume	201			257			748	639	236	602	615	156
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			257			748	639	236	602	615	156
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			86	96	100	68	72	89
cM capacity (veh/h)	1371			1308			216	365	803	377	377	890

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	348	211	30	15	119	207
Volume Left	91	10	30	0	119	0
Volume Right	42	90	0	1	0	101
cSH	1371	1308	216	379	377	524
Volume to Capacity	0.07	0.01	0.14	0.04	0.32	0.39
Queue Length 95th (m)	1.6	0.2	3.6	0.9	10.1	14.2
Control Delay (s)	2.5	0.4	24.4	14.9	18.9	16.3
Lane LOS	A	A	C	B	C	C
Approach Delay (s)	2.5	0.4	21.2		17.2	
Approach LOS			C		C	

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	162	53	19	122	22	33	94	17	18	115	38
Future Volume (vph)	57	162	53	19	122	22	33	94	17	18	115	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.974			0.982			0.984			0.970	
Flt Protected		0.990			0.994			0.989			0.995	
Satd. Flow (prot)	0	1816	0	0	1838	0	0	1833	0	0	1818	0
Flt Permitted		0.990			0.994			0.989			0.995	
Satd. Flow (perm)	0	1816	0	0	1838	0	0	1833	0	0	1818	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		372.2			419.4			911.3			284.0	
Travel Time (s)		27.9			31.5			68.3			21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	57	162	53	19	122	22	33	94	17	18	115	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	272	0	0	163	0	0	144	0	0	171	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)		0.0			0.0			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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	162	53	19	122	22	33	94	17	18	115	38
Future Volume (vph)	57	162	53	19	122	22	33	94	17	18	115	38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	57	162	53	19	122	22	33	94	17	18	115	38

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	272	163	144	171
Volume Left (vph)	57	19	33	18
Volume Right (vph)	53	22	17	38
Hadj (s)	-0.04	-0.02	0.01	-0.08
Departure Headway (s)	5.0	5.1	5.3	5.2
Degree Utilization, x	0.37	0.23	0.21	0.25
Capacity (veh/h)	682	646	607	634
Control Delay (s)	10.9	9.7	9.7	9.9
Approach Delay (s)	10.9	9.7	9.7	9.9
Approach LOS	B	A	A	A

Intersection Summary			
Delay	10.2		
Level of Service	B		
Intersection Capacity Utilization	45.7%	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)	55	73	47	14	77	32	33	135	10	34	183	40
Future Volume (vph)	55	73	47	14	77	32	33	135	10	34	183	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.965			0.992			0.979	
Flt Protected		0.985			0.994			0.991			0.993	
Satd. Flow (prot)	0	1788	0	0	1807	0	0	1852	0	0	1831	0
Flt Permitted		0.985			0.994			0.991			0.993	
Satd. Flow (perm)	0	1788	0	0	1807	0	0	1852	0	0	1831	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		419.4			345.5			909.0			291.5	
Travel Time (s)		31.5			25.9			68.2			21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	73	47	14	77	32	33	135	10	34	183	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	175	0	0	123	0	0	178	0	0	257	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)		0.0			0.0			0.0			0.0	
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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	55	73	47	14	77	32	33	135	10	34	183	40
Future Volume (vph)	55	73	47	14	77	32	33	135	10	34	183	40
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	55	73	47	14	77	32	33	135	10	34	183	40

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	175	123	178	257
Volume Left (vph)	55	14	33	34
Volume Right (vph)	47	32	10	40
Hadj (s)	-0.06	-0.10	0.04	-0.03
Departure Headway (s)	5.1	5.2	5.1	4.9
Degree Utilization, x	0.25	0.18	0.25	0.35
Capacity (veh/h)	639	624	656	687
Control Delay (s)	9.8	9.3	9.8	10.5
Approach Delay (s)	9.8	9.3	9.8	10.5
Approach LOS	A	A	A	B

Intersection Summary			
Delay	10.0		
Level of Service	A		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	77	111	192	274	8
Future Volume (vph)	3	77	111	192	274	8
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	0.870				0.996	
Flt Protected	0.998			0.982		
Satd. Flow (prot)	1635	0	0	1850	1876	0
Flt Permitted	0.998			0.982		
Satd. Flow (perm)	1635	0	0	1850	1876	0
Link Speed (k/h)	48			70	70	
Link Distance (m)	345.5			897.4	289.9	
Travel Time (s)	25.9			46.2	14.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	77	111	192	274	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	0	0	303	282	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 46.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	77	111	192	274	8
Future Volume (Veh/h)	3	77	111	192	274	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	3	77	111	192	274	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					290	
pX, platoon unblocked						
vC, conflicting volume	692	278	282			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	692	278	282			
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	90	91			
cM capacity (veh/h)	374	761	1280			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	80	303	282
Volume Left	3	111	0
Volume Right	77	0	8
cSH	732	1280	1700
Volume to Capacity	0.11	0.09	0.17
Queue Length 95th (m)	2.8	2.2	0.0
Control Delay (s)	10.5	3.5	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	3.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

2041-FUTURE TOTAL

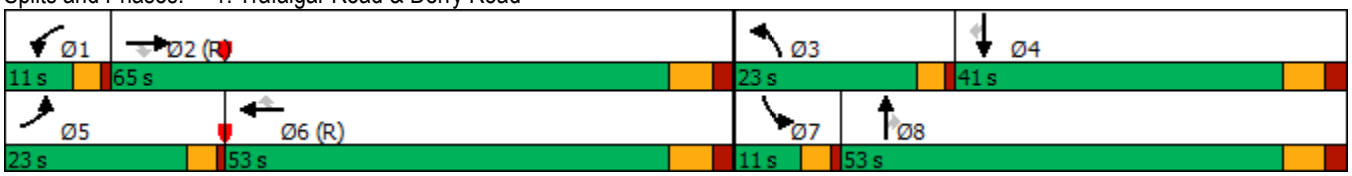
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
Future Volume (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			186			154			124			155
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Adj. Flow (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
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			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	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			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	23.0	65.0	65.0	11.0	53.0	53.0	23.0	53.0	53.0	11.0	41.0	41.0
Total Split (%)	16.4%	46.4%	46.4%	7.9%	37.9%	37.9%	16.4%	37.9%	37.9%	7.9%	29.3%	29.3%
Maximum Green (s)	19.0	58.1	58.1	7.0	46.1	46.1	19.0	46.2	46.2	7.0	34.2	34.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	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	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	19.1	64.5	64.5	8.0	49.0	49.0	19.6	48.2	48.2	8.0	36.6	36.6
Actuated g/C Ratio	0.14	0.46	0.46	0.06	0.35	0.35	0.14	0.34	0.34	0.06	0.26	0.26
v/c Ratio	0.69	0.97	0.27	0.12	0.57	0.56	0.76	0.97	0.03	0.43	0.59	0.06
Control Delay	81.1	34.4	5.4	69.5	41.5	28.1	67.1	62.0	0.1	70.6	48.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.1	34.4	5.4	69.5	41.5	28.1	67.1	62.0	0.1	70.6	48.0	0.3
LOS	F	C	A	E	D	C	E	E	A	E	D	A
Approach Delay		37.7			38.1			62.3			49.2	
Approach LOS		D			D			E			D	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 46.0 Intersection LOS: D
Intersection Capacity Utilization 92.6% ICU Level of Service F
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
v/c Ratio	0.69	0.97	0.27	0.12	0.57	0.56	0.76	0.97	0.03	0.43	0.59	0.06
Control Delay	81.1	34.4	5.4	69.5	41.5	28.1	67.1	62.0	0.1	70.6	48.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.1	34.4	5.4	69.5	41.5	28.1	67.1	62.0	0.1	70.6	48.0	0.3
Queue Length 50th (m)	43.6	~244.8	6.2	3.6	70.6	41.6	47.4	170.1	0.0	12.0	64.5	0.0
Queue Length 95th (m)	m49.8	#278.2	m12.6	m7.8	82.3	62.4	68.4	#201.5	m0.0	21.0	80.3	0.0
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	491	2082	823	202	1550	671	472	1456	643	202	1066	361
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.97	0.27	0.12	0.57	0.56	0.75	0.97	0.03	0.43	0.59	0.06

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
Future Volume (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3437	4520	1570	3541	4433	1633	3309	4230	1633	3541	4080	944
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	2010	224	25	886	379	353	1413	22	86	634	23
RTOR Reduction (vph)	0	0	102	0	0	100	0	0	14	0	0	17
Lane Group Flow (vph)	322	2010	122	25	886	279	353	1413	8	86	634	6
Heavy Vehicles (%)	3%	2%	4%	0%	4%	0%	7%	9%	0%	0%	13%	73%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	18.1	60.9	60.9	4.2	47.0	47.0	18.6	46.2	46.2	7.0	34.6	34.6
Effective Green, g (s)	19.1	62.9	62.9	5.2	49.0	49.0	19.6	48.2	48.2	8.0	36.6	36.6
Actuated g/C Ratio	0.14	0.45	0.45	0.04	0.35	0.35	0.14	0.34	0.34	0.06	0.26	0.26
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0
Lane Grp Cap (vph)	468	2030	705	131	1551	571	463	1456	562	202	1066	246
v/s Ratio Prot	c0.09	c0.44		0.01	0.20		c0.11	c0.33		0.02	0.16	
v/s Ratio Perm			0.08			0.17			0.00			0.01
v/c Ratio	0.69	0.99	0.17	0.19	0.57	0.49	0.76	0.97	0.01	0.43	0.59	0.02
Uniform Delay, d1	57.6	38.2	23.0	65.4	37.0	35.7	58.0	45.2	30.2	63.8	45.2	38.4
Progression Factor	1.35	0.72	0.93	1.09	1.07	1.16	0.99	1.04	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	10.5	0.2	1.3	1.4	2.7	6.9	14.8	0.0	3.0	1.4	0.1
Delay (s)	79.9	38.1	21.5	72.3	41.0	43.9	64.5	61.9	30.3	66.8	46.6	38.5
Level of Service	E	D	C	E	D	D	E	E	C	E	D	D
Approach Delay (s)		41.9			42.5			62.0			48.7	
Approach LOS		D			D			E			D	

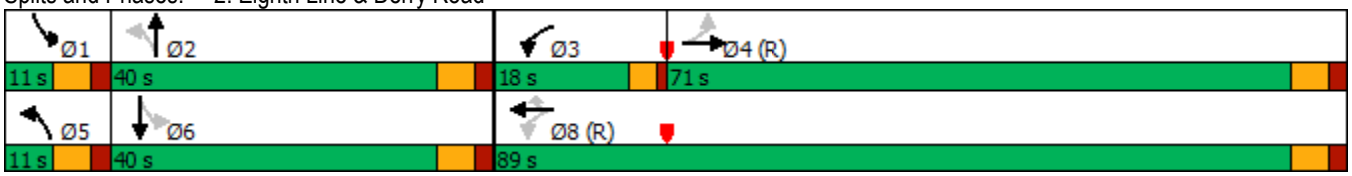
Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1793	41	153	731	2	72	0	177	23	0	0
Future Volume (vph)	0	1793	41	153	731	2	72	0	177	23	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997				0.850		0.850				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4507	0	1810	4496	1633	1825	1633	0	1825	1921	0
Flt Permitted				0.054			0.500					
Satd. Flow (perm)	1921	4507	0	103	4496	1633	961	1633	0	1921	1921	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				70		245				
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	1793	41	153	731	2	72	0	177	23	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1834	0	153	731	2	72	177	0	23	0	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	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	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	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	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	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	36.0	36.0		9.0	36.0	36.0	11.0	36.0		11.0	36.0	
Total Split (s)	71.0	71.0		18.0	89.0	89.0	11.0	40.0		11.0	40.0	
Total Split (%)	50.7%	50.7%		12.9%	63.6%	63.6%	7.9%	28.6%		7.9%	28.6%	
Maximum Green (s)	65.0	65.0		14.0	83.0	83.0	5.0	34.0		5.0	34.0	
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	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	0.0	
Total Lost Time (s)	6.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	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	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)	23.0	23.0			23.0	23.0		23.0			23.0	
Pedestrian Calls (#/hr)	0	0			0	0		0			0	
Act Effct Green (s)		95.5		113.4	111.4	111.4	16.6	10.0		6.0		
Actuated g/C Ratio		0.68		0.81	0.80	0.80	0.12	0.07		0.04		
v/c Ratio		0.60		0.67	0.20	0.00	0.34	0.51		0.29		
Control Delay		19.9		38.6	4.0	0.0	67.9	11.8		75.5		
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0		0.0		
Total Delay		19.9		38.6	4.0	0.0	67.9	11.8		75.5		
LOS		B		D	A	A	E	B		E		
Approach Delay		19.9			9.9			28.0			75.5	
Approach LOS		B			A			C			E	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 76.5%	ICU Level of Service D
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL
Lane Group Flow (vph)	1834	153	731	2	72	177	23
v/c Ratio	0.60	0.67	0.20	0.00	0.34	0.51	0.29
Control Delay	19.9	38.6	4.0	0.0	67.9	11.8	75.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	38.6	4.0	0.0	67.9	11.8	75.5
Queue Length 50th (m)	114.7	20.0	20.7	0.0	15.3	0.2	6.4
Queue Length 95th (m)	117.7	41.9	25.3	0.0	32.8	16.8	16.0
Internal Link Dist (m)	337.1		616.9			265.9	
Turn Bay Length (m)		140.0		70.0	50.0		35.0
Base Capacity (vph)	3075	263	3577	1313	210	582	79
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.58	0.20	0.00	0.34	0.30	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1793	41	153	731	2	72	0	177	23	0	0
Future Volume (vph)	0	1793	41	153	731	2	72	0	177	23	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		4.0	6.0	6.0	6.0	6.0		6.0		
Lane Util. Factor		*0.80		1.00	*0.80	1.00	1.00	1.00		1.00		
Frt		1.00		1.00	1.00	0.85	1.00	0.85		1.00		
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00		0.95		
Satd. Flow (prot)		4505		1810	4496	1633	1825	1633		1825		
Flt Permitted		1.00		0.05	1.00	1.00	0.50	1.00		1.00		
Satd. Flow (perm)		4505		102	4496	1633	961	1633		1921		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1793	41	153	731	2	72	0	177	23	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	160	0	0	0	0
Lane Group Flow (vph)	0	1833	0	153	731	2	72	17	0	23	0	0
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		89.5		105.4	105.4	105.4	22.6	13.6		5.0		
Effective Green, g (s)		89.5		105.4	105.4	105.4	22.6	13.6		5.0		
Actuated g/C Ratio		0.64		0.75	0.75	0.75	0.16	0.10		0.04		
Clearance Time (s)		6.0		4.0	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		
Lane Grp Cap (vph)		2879		221	3384	1229	245	158		66		
v/s Ratio Prot		0.41		c0.06	0.16		c0.03	0.01		0.01		
v/s Ratio Perm				c0.46		0.00	c0.02			0.00		
v/c Ratio		0.64		0.69	0.22	0.00	0.29	0.11		0.35		
Uniform Delay, d1		15.4		31.5	5.1	4.3	51.3	57.7		65.9		
Progression Factor		1.45		1.00	1.00	1.00	1.15	5.22		1.00		
Incremental Delay, d2		0.7		9.0	0.1	0.0	0.7	0.3		3.2		
Delay (s)		23.1		40.5	5.3	4.3	59.9	301.4		69.1		
Level of Service		C		D	A	A	E	F		E		
Approach Delay (s)		23.1			11.3			231.6			69.1	
Approach LOS		C			B			F			E	

Intersection Summary			
HCM 2000 Control Delay	37.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	76.5%	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)	0	1882	58	0	1283	0	0	0	93	0	0	28
Future Volume (vph)	0	1882	58	0	1283	0	0	0	93	0	0	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850					0.865	0.865			0.865
Flt Protected												
Satd. Flow (prot)	0	4520	1601	0	4520	0	0	0	1629	0	0	1629
Flt Permitted												
Satd. Flow (perm)	0	4520	1601	0	4520	0	0	0	1629	0	0	1629
Link Speed (k/h)		80			80			48			48	
Link Distance (m)		198.7			361.0			323.6			143.8	
Travel Time (s)		8.9			16.2			24.3			10.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1882	58	0	1283	0	0	0	93	0	0	28
Shared Lane Traffic (%)									10%			
Lane Group Flow (vph)	0	1882	58	0	1283	0	0	9	84	0	0	28
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
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 48.8%	ICU Level of Service A
Analysis Period (min) 15	

* User Entered Value

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1882	58	0	1283	0	0	0	93	0	0	28
Future Volume (Veh/h)	0	1882	58	0	1283	0	0	0	93	0	0	28
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1882	58	0	1283	0	0	0	93	0	0	28
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		199			361							
pX, platoon unblocked	0.90			0.58			0.63	0.63	0.58	0.63	0.63	0.90
vC, conflicting volume	1283			1940			2338	3165	627	2003	3223	428
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	918			58			0	1276	0	0	1368	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	85	100	100	97
cM capacity (veh/h)	664			890			623	104	625	546	91	974

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	627	627	627	58	513	513	257	93	28
Volume Left	0	0	0	0	0	0	0	0	0
Volume Right	0	0	0	58	0	0	0	93	28
cSH	1700	1700	1700	1700	1700	1700	1700	625	974
Volume to Capacity	0.37	0.37	0.37	0.03	0.30	0.30	0.15	0.15	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.7
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8	8.8
Lane LOS								B	A
Approach Delay (s)	0.0				0.0			11.8	8.8
Approach LOS								B	A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	48.8%	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)	79	1851	56	18	1068	28	244	60	26	19	35	27
Future Volume (vph)	79	1851	56	18	1068	28	244	60	26	19	35	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			50.0			2.5			2.5		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.996			0.989			0.955	
Flt Protected	0.950			0.950				0.964			0.988	
Satd. Flow (prot)	1789	4502	0	1789	4502	0	0	1796	0	0	1777	0
Flt Permitted	0.179			0.048				0.743			0.891	
Satd. Flow (perm)	337	4502	0	90	4502	0	0	1384	0	0	1603	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			4			3			19	
Link Speed (k/h)		80			80			48			48	
Link Distance (m)		361.0			419.8			284.0			140.6	
Travel Time (s)		16.2			18.9			21.3			10.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	79	1851	56	18	1068	28	244	60	26	19	35	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	1907	0	18	1096	0	0	330	0	0	81	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			0.0			0.0	
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	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		40.0	40.0		40.0	40.0	
Total Split (s)	90.0	90.0		90.0	90.0		50.0	50.0		50.0	50.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	84.0	84.0		84.0	84.0		44.0	44.0		44.0	44.0	
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	
Total Lost Time (s)	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		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)	9.0	9.0		9.0	9.0		27.0	27.0		27.0	27.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	84.0	84.0		84.0	84.0			44.0			44.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.31			0.31	
v/c Ratio	0.39	0.71		0.33	0.41			0.76			0.16	
Control Delay	3.2	1.7		26.9	9.7			55.2			27.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	3.2	1.7		26.9	9.7			55.2			27.3	
LOS	A	A		C	A			E			C	
Approach Delay		1.8			10.0			55.2			27.3	
Approach LOS		A			A			E			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 10.0	Intersection LOS: B
Intersection Capacity Utilization 93.6%	ICU Level of Service F
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 103: Collector H & Derry Road

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	79	1907	18	1096	330	81
v/c Ratio	0.39	0.71	0.33	0.41	0.76	0.16
Control Delay	3.2	1.7	26.9	9.7	55.2	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.2	1.7	26.9	9.7	55.2	27.3
Queue Length 50th (m)	0.5	5.2	1.6	42.3	81.6	12.3
Queue Length 95th (m)	m0.5	m5.4	m10.2	43.5	119.3	24.9
Internal Link Dist (m)		337.0		395.8	260.0	116.6
Turn Bay Length (m)	50.0		50.0			
Base Capacity (vph)	202	2703	54	2702	437	516
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.71	0.33	0.41	0.76	0.16

Intersection Summary

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)	79	1851	56	18	1068	28	244	60	26	19	35	27
Future Volume (vph)	79	1851	56	18	1068	28	244	60	26	19	35	27
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	
Lane Util. Factor	1.00	*0.80		1.00	*0.80			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.99			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.99	
Satd. Flow (prot)	1789	4500		1789	4503			1797			1778	
Flt Permitted	0.18	1.00		0.05	1.00			0.74			0.89	
Satd. Flow (perm)	337	4500		90	4503			1385			1602	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	79	1851	56	18	1068	28	244	60	26	19	35	27
RTOR Reduction (vph)	0	2	0	0	2	0	0	2	0	0	13	0
Lane Group Flow (vph)	79	1905	0	18	1094	0	0	328	0	0	68	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)	84.0	84.0		84.0	84.0			44.0			44.0	
Effective Green, g (s)	84.0	84.0		84.0	84.0			44.0			44.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.31			0.31	
Clearance Time (s)	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	
Lane Grp Cap (vph)	202	2700		54	2701			435			503	
v/s Ratio Prot		c0.42			0.24							
v/s Ratio Perm	0.23			0.20				c0.24			0.04	
v/c Ratio	0.39	0.71		0.33	0.41			0.75			0.14	
Uniform Delay, d1	14.6	19.4		14.0	14.8			43.1			34.4	
Progression Factor	0.05	0.05		0.68	0.63			1.00			1.00	
Incremental Delay, d2	2.5	0.7		14.3	0.4			7.3			0.6	
Delay (s)	3.2	1.7		23.8	9.7			50.4			34.9	
Level of Service	A	A		C	A			D			C	
Approach Delay (s)		1.8			9.9			50.4			34.9	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.6%	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)	0	1832	73	10	866	95	280	44	27	18	26	0
Future Volume (vph)	0	1832	73	10	866	95	280	44	27	18	26	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			50.0			2.5			2.5		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.985			0.990				
Flt Protected				0.950				0.962			0.980	
Satd. Flow (prot)	1883	4493	0	1789	4452	0	0	1794	0	0	1846	0
Flt Permitted				0.049				0.740			0.828	
Satd. Flow (perm)	1883	4493	0	92	4452	0	0	1380	0	0	1559	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			19			3				
Link Speed (k/h)		80			80			48			48	
Link Distance (m)		419.8			361.1			291.5			151.2	
Travel Time (s)		18.9			16.2			21.9			11.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1832	73	10	866	95	280	44	27	18	26	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1905	0	10	961	0	0	351	0	0	44	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			0.0			0.0	
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	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		40.0	40.0		40.0	40.0	
Total Split (s)	88.0	88.0		88.0	88.0		52.0	52.0		52.0	52.0	
Total Split (%)	62.9%	62.9%		62.9%	62.9%		37.1%	37.1%		37.1%	37.1%	
Maximum Green (s)	82.0	82.0		82.0	82.0		46.0	46.0		46.0	46.0	
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	
Total Lost Time (s)	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		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)	9.0	9.0		9.0	9.0		27.0	27.0		27.0	27.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		82.0		82.0	82.0			46.0			46.0	
Actuated g/C Ratio		0.59		0.59	0.59			0.33			0.33	
v/c Ratio		0.72		0.19	0.37			0.77			0.09	
Control Delay		11.8		24.2	16.3			54.8			33.2	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		11.8		24.2	16.3			54.8			33.2	
LOS		B		C	B			D			C	
Approach Delay		11.8			16.4			54.8			33.2	
Approach LOS		B			B			D			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 73.2%	ICU Level of Service D
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 104: Collector J & Derry Road

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1905	10	961	351	44
v/c Ratio	0.72	0.19	0.37	0.77	0.09
Control Delay	11.8	24.2	16.3	54.8	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	24.2	16.3	54.8	33.2
Queue Length 50th (m)	49.8	1.5	61.2	86.7	8.4
Queue Length 95th (m)	62.0	m6.0	72.8	#126.0	17.5
Internal Link Dist (m)	395.8		337.1	267.5	127.2
Turn Bay Length (m)		50.0			
Base Capacity (vph)	2634	53	2615	455	512
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.72	0.19	0.37	0.77	0.09

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)	0	1832	73	10	866	95	280	44	27	18	26	0
Future Volume (vph)	0	1832	73	10	866	95	280	44	27	18	26	0
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	
Lane Util. Factor		*0.80		1.00	*0.80			1.00			1.00	
Frt		0.99		1.00	0.99			0.99			1.00	
Flt Protected		1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)		4494		1789	4453			1792			1846	
Flt Permitted		1.00		0.05	1.00			0.74			0.83	
Satd. Flow (perm)		4494		92	4453			1378			1559	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1832	73	10	866	95	280	44	27	18	26	0
RTOR Reduction (vph)	0	2	0	0	8	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1903	0	10	953	0	0	349	0	0	44	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)		82.0		82.0	82.0			46.0			46.0	
Effective Green, g (s)		82.0		82.0	82.0			46.0			46.0	
Actuated g/C Ratio		0.59		0.59	0.59			0.33			0.33	
Clearance Time (s)		6.0		6.0	6.0			6.0			6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		2632		53	2608			452			512	
v/s Ratio Prot		c0.42			0.21							
v/s Ratio Perm				0.11				c0.25			0.03	
v/c Ratio		0.72		0.19	0.37			0.77			0.09	
Uniform Delay, d1		20.8		13.5	15.3			42.3			32.5	
Progression Factor		0.50		1.02	1.06			1.00			1.00	
Incremental Delay, d2		1.2		7.7	0.4			8.0			0.3	
Delay (s)		11.7		21.4	16.5			50.3			32.8	
Level of Service		B		C	B			D			C	
Approach Delay (s)		11.7			16.6			50.3			32.8	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.2%	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)	63	113	264	174	151	81	300	1924	88	33	838	25
Future Volume (vph)	63	113	264	174	151	81	300	1924	88	33	838	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		100.0	70.0		50.0	120.0		50.0	50.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	15.0			15.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.80	1.00	1.00	*0.80	1.00
Frt			0.850		0.948				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1786	0	1789	4520	1601	1789	4520	1601
Flt Permitted	0.342			0.637			0.253			0.058		
Satd. Flow (perm)	644	1883	1601	1200	1786	0	477	4520	1601	109	4520	1601
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			264		18				55			86
Link Speed (k/h)		48			48			60			60	
Link Distance (m)		434.3			193.0			870.6			323.1	
Travel Time (s)		32.6			14.5			52.2			19.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	113	264	174	151	81	300	1924	88	33	838	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	63	113	264	174	232	0	300	1924	88	33	838	25
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			7.4			7.4	
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	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4	4	8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	40.0	40.0	40.0	40.0	40.0		11.0	26.0	26.0	11.0	26.0	26.0
Total Split (s)	40.0	40.0	40.0	40.0	40.0		25.0	89.0	89.0	11.0	75.0	75.0
Total Split (%)	28.6%	28.6%	28.6%	28.6%	28.6%		17.9%	63.6%	63.6%	7.9%	53.6%	53.6%
Maximum Green (s)	34.0	34.0	34.0	34.0	34.0		21.0	83.0	83.0	7.0	69.0	69.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	27.0	27.0	27.0	27.0	27.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0		0	0
Act Effct Green (s)	24.9	24.9	24.9	24.9	24.9		105.1	96.5	96.5	95.1	86.1	86.1
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.75	0.69	0.69	0.68	0.62	0.62
v/c Ratio	0.55	0.34	0.53	0.82	0.70		0.62	0.62	0.08	0.21	0.30	0.02
Control Delay	68.8	51.3	8.9	82.5	60.3		24.6	26.4	14.1	8.7	23.4	7.8
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	68.8	51.3	8.9	82.5	60.3		24.6	26.4	14.1	8.7	23.4	7.8
LOS	E	D	A	F	E		C	C	B	A	C	A
Approach Delay		28.4			69.8			25.7			22.5	
Approach LOS		C			E			C			C	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 29.7	Intersection LOS: C
Intersection Capacity Utilization 82.6%	ICU Level of Service E
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 105: Trafalgar Road & Collector K

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	63	113	264	174	232	300	1924	88	33	838	25
v/c Ratio	0.55	0.34	0.53	0.82	0.70	0.62	0.62	0.08	0.21	0.30	0.02
Control Delay	68.8	51.3	8.9	82.5	60.3	24.6	26.4	14.1	8.7	23.4	7.8
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	68.8	51.3	8.9	82.5	60.3	24.6	26.4	14.1	8.7	23.4	7.8
Queue Length 50th (m)	16.1	27.7	0.0	46.9	56.4	54.5	147.5	9.3	2.0	84.3	0.9
Queue Length 95th (m)	29.9	42.6	21.8	68.7	78.3	m79.7	186.2	m14.8	m8.1	102.5	m4.2
Internal Link Dist (m)		410.3			169.0		846.6			299.1	
Turn Bay Length (m)	50.0		100.0	70.0		120.0		50.0	50.0		50.0
Base Capacity (vph)	156	457	588	291	447	554	3116	1121	158	2780	1017
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	0.40	0.25	0.45	0.60	0.52	0.54	0.62	0.08	0.21	0.30	0.02

Intersection Summary

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)	63	113	264	174	151	81	300	1924	88	33	838	25
Future Volume (vph)	63	113	264	174	151	81	300	1924	88	33	838	25
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		4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	*0.80	1.00	1.00	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	0.95		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)	1789	1883	1601	1789	1785		1789	4520	1601	1789	4520	1601
Flt Permitted	0.34	1.00	1.00	0.64	1.00		0.25	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	644	1883	1601	1200	1785		476	4520	1601	109	4520	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	113	264	174	151	81	300	1924	88	33	838	25
RTOR Reduction (vph)	0	0	217	0	15	0	0	0	18	0	0	10
Lane Group Flow (vph)	63	113	47	174	217	0	300	1924	70	33	838	15
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	24.9	24.9	24.9	24.9	24.9		103.1	94.9	94.9	90.3	86.1	86.1
Effective Green, g (s)	24.9	24.9	24.9	24.9	24.9		103.1	94.9	94.9	90.3	86.1	86.1
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.74	0.68	0.68	0.64	0.61	0.61
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	114	334	284	213	317		472	3063	1085	120	2779	984
v/s Ratio Prot		0.06			0.12		c0.06	0.43		0.01	0.19	
v/s Ratio Perm	0.10		0.03	c0.14			c0.41		0.04	0.17		0.01
v/c Ratio	0.55	0.34	0.17	0.82	0.69		0.64	0.63	0.06	0.28	0.30	0.02
Uniform Delay, d1	52.5	50.3	48.7	55.4	53.9		6.8	12.7	7.6	11.1	12.7	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		3.44	1.88	3.00	0.84	1.64	1.00
Incremental Delay, d2	5.7	0.6	0.3	20.9	6.0		1.7	0.6	0.1	1.1	0.2	0.0
Delay (s)	58.2	50.9	49.0	76.3	59.9		25.1	24.4	22.8	10.5	21.1	10.5
Level of Service	E	D	D	E	E		C	C	C	B	C	B
Approach Delay (s)		50.8			66.9			24.4			20.4	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.6%	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)	47	145	42	8	238	86	99	18	2	97	51	69
Future Volume (vph)	47	145	42	8	238	86	99	18	2	97	51	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			25.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976			0.965			0.985			0.914	
Flt Protected		0.990			0.999		0.950			0.950		
Satd. Flow (prot)	0	1820	0	0	1816	0	1789	1855	0	1789	1721	0
Flt Permitted		0.990			0.999		0.950			0.950		
Satd. Flow (perm)	0	1820	0	0	1816	0	1789	1855	0	1789	1721	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		193.0			372.2			875.5			323.6	
Travel Time (s)		14.5			27.9			65.7			24.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	47	145	42	8	238	86	99	18	2	97	51	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	234	0	0	332	0	99	20	0	97	120	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
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 53.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	145	42	8	238	86	99	18	2	97	51	69
Future Volume (Veh/h)	47	145	42	8	238	86	99	18	2	97	51	69
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	47	145	42	8	238	86	99	18	2	97	51	69
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		193										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	324			187			652	600	166	568	578	281
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	324			129			614	560	107	527	537	281
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			68	96	100	76	88	91
cM capacity (veh/h)	1236			1395			308	400	907	412	412	758

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	234	332	99	20	97	120
Volume Left	47	8	99	0	97	0
Volume Right	42	86	0	2	0	69
cSH	1236	1395	308	424	412	559
Volume to Capacity	0.04	0.01	0.32	0.05	0.24	0.21
Queue Length 95th (m)	0.9	0.1	10.3	1.1	6.9	6.1
Control Delay (s)	1.9	0.2	22.1	13.9	16.4	13.2
Lane LOS	A	A	C	B	C	B
Approach Delay (s)	1.9	0.2	20.7		14.6	
Approach LOS			C		B	

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	53.1%	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)	47	184	41	27	187	30	48	168	35	32	59	56
Future Volume (vph)	47	184	41	27	187	30	48	168	35	32	59	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.983			0.981			0.949	
Flt Protected		0.991			0.994			0.991			0.989	
Satd. Flow (prot)	0	1829	0	0	1840	0	0	1831	0	0	1768	0
Flt Permitted		0.991			0.994			0.991			0.989	
Satd. Flow (perm)	0	1829	0	0	1840	0	0	1831	0	0	1768	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		372.2			419.4			911.3			284.0	
Travel Time (s)		27.9			31.5			68.3			21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	47	184	41	27	187	30	48	168	35	32	59	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	272	0	0	244	0	0	251	0	0	147	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)		0.0			0.0			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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	47	184	41	27	187	30	48	168	35	32	59	56
Future Volume (vph)	47	184	41	27	187	30	48	168	35	32	59	56
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	47	184	41	27	187	30	48	168	35	32	59	56

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	272	244	251	147
Volume Left (vph)	47	27	48	32
Volume Right (vph)	41	30	35	56
Hadj (s)	-0.02	-0.02	-0.01	-0.15
Departure Headway (s)	5.5	5.5	5.6	5.7
Degree Utilization, x	0.41	0.37	0.39	0.23
Capacity (veh/h)	611	603	586	559
Control Delay (s)	12.2	11.7	12.1	10.4
Approach Delay (s)	12.2	11.7	12.1	10.4
Approach LOS	B	B	B	B

Intersection Summary			
Delay	11.8		
Level of Service	B		
Intersection Capacity Utilization	47.1%	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)	41	118	74	16	79	23	79	253	13	30	79	65
Future Volume (vph)	41	118	74	16	79	23	79	253	13	30	79	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957			0.974			0.995			0.950	
Flt Protected		0.991			0.993			0.989			0.991	
Satd. Flow (prot)	0	1786	0	0	1822	0	0	1853	0	0	1773	0
Flt Permitted		0.991			0.993			0.989			0.991	
Satd. Flow (perm)	0	1786	0	0	1822	0	0	1853	0	0	1773	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		419.4			345.5			909.0			291.5	
Travel Time (s)		31.5			25.9			68.2			21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	41	118	74	16	79	23	79	253	13	30	79	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	233	0	0	118	0	0	345	0	0	174	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)		0.0			0.0			0.0			0.0	
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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 53.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	41	118	74	16	79	23	79	253	13	30	79	65
Future Volume (vph)	41	118	74	16	79	23	79	253	13	30	79	65
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	41	118	74	16	79	23	79	253	13	30	79	65

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	233	118	345	174
Volume Left (vph)	41	16	79	30
Volume Right (vph)	74	23	13	65
Hadj (s)	-0.12	-0.06	0.06	-0.16
Departure Headway (s)	5.4	5.7	5.2	5.3
Degree Utilization, x	0.35	0.19	0.50	0.26
Capacity (veh/h)	612	560	647	621
Control Delay (s)	11.2	9.9	13.4	10.1
Approach Delay (s)	11.2	9.9	13.4	10.1
Approach LOS	B	A	B	B

Intersection Summary			
Delay	11.7		
Level of Service	B		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	142	63	241	202	3
Future Volume (vph)	8	142	63	241	202	3
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	0.872				0.998	
Flt Protected	0.997			0.990		
Satd. Flow (prot)	1637	0	0	1865	1880	0
Flt Permitted	0.997			0.990		
Satd. Flow (perm)	1637	0	0	1865	1880	0
Link Speed (k/h)	48			70	70	
Link Distance (m)	345.5			897.4	289.9	
Travel Time (s)	25.9			46.2	14.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	8	142	63	241	202	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	150	0	0	304	205	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 46.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	142	63	241	202	3
Future Volume (Veh/h)	8	142	63	241	202	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	142	63	241	202	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					290	
pX, platoon unblocked						
vC, conflicting volume	570	204	205			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	570	204	205			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	83	95			
cM capacity (veh/h)	460	837	1366			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	150	304	205
Volume Left	8	63	0
Volume Right	142	0	3
cSH	802	1366	1700
Volume to Capacity	0.19	0.05	0.12
Queue Length 95th (m)	5.2	1.1	0.0
Control Delay (s)	10.5	1.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	1.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

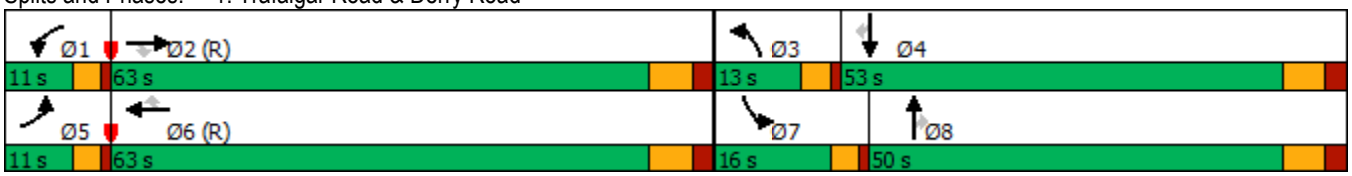
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
Future Volume (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			225			125			93			93
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		455.0			198.7			323.1			623.5	
Travel Time (s)		20.5			8.9			19.4			37.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Adj. Flow (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	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			7.4			7.4	
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	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	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	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	0.0
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	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	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	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	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	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	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	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			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	37.9	37.9	11.0	37.9	37.9	11.0	36.8	36.8	11.0	36.8	36.8
Total Split (s)	11.0	63.0	63.0	11.0	63.0	63.0	13.0	50.0	50.0	16.0	53.0	53.0
Total Split (%)	7.9%	45.0%	45.0%	7.9%	45.0%	45.0%	9.3%	35.7%	35.7%	11.4%	37.9%	37.9%
Maximum Green (s)	7.0	56.1	56.1	7.0	56.1	56.1	9.0	43.2	43.2	12.0	46.2	46.2
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	1.0	2.6	2.6	1.0	2.6	2.6
Lost Time Adjust (s)	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0	-1.0	-2.0	-2.0
Total Lost Time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	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	5.0	5.0
Recall Mode	None	C-Max	C-Max	None	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)		24.0	24.0		24.0	24.0		23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	8.0	60.3	60.3	8.0	58.1	58.1	10.0	45.2	45.2	13.0	48.2	48.2
Actuated g/C Ratio	0.06	0.43	0.43	0.06	0.42	0.42	0.07	0.32	0.32	0.09	0.34	0.34
v/c Ratio	0.59	0.69	0.45	0.18	0.92	0.27	0.97	0.73	0.03	0.84	0.96	0.09
Control Delay	94.5	21.1	5.1	61.9	58.4	23.6	114.6	46.5	1.1	84.3	59.8	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.5	21.1	5.1	61.9	58.4	23.6	114.6	46.5	1.1	84.3	59.8	0.8
LOS	F	C	A	E	E	C	F	D	A	F	E	A
Approach Delay		22.0			54.9			58.5			61.8	
Approach LOS		C			D			E			E	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 48.8 Intersection LOS: D
Intersection Capacity Utilization 89.7% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 1: Trafalgar Road & Derry Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
v/c Ratio	0.59	0.69	0.45	0.18	0.92	0.27	0.97	0.73	0.03	0.84	0.96	0.09
Control Delay	94.5	21.1	5.1	61.9	58.4	23.6	114.6	46.5	1.1	84.3	59.8	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.5	21.1	5.1	61.9	58.4	23.6	114.6	46.5	1.1	84.3	59.8	0.8
Queue Length 50th (m)	15.4	50.3	8.0	5.3	172.2	22.1	31.7	127.2	0.0	38.8	166.2	0.0
Queue Length 95th (m)	m20.9	82.7	23.1	m8.7	192.5	41.0	#60.1	143.2	m1.2	#61.0	#202.3	1.3
Internal Link Dist (m)		431.0			174.7			299.1			599.5	
Turn Bay Length (m)	130.0		110.0	130.0		70.0	110.0		70.0	130.0		85.0
Base Capacity (vph)	172	1927	818	196	1894	750	247	1431	590	325	1541	549
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.69	0.45	0.18	0.92	0.27	0.97	0.73	0.03	0.84	0.96	0.09

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)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
Future Volume (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.9	4.9	3.0	4.9	4.9	3.0	4.8	4.8	3.0	4.8	4.8
Lane Util. Factor	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00	0.97	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3026	4476	1601	3437	4565	1633	3471	4433	1633	3506	4476	1420
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	102	1323	366	36	1746	202	240	1046	17	272	1476	51
RTOR Reduction (vph)	0	0	129	0	0	73	0	0	12	0	0	33
Lane Group Flow (vph)	102	1323	237	36	1746	129	240	1046	5	272	1476	18
Heavy Vehicles (%)	17%	3%	2%	3%	1%	0%	2%	4%	0%	1%	3%	15%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	7.0	57.5	57.5	5.6	56.1	56.1	9.0	43.2	43.2	12.0	46.2	46.2
Effective Green, g (s)	8.0	59.5	59.5	6.6	58.1	58.1	10.0	45.2	45.2	13.0	48.2	48.2
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.42	0.42	0.07	0.32	0.32	0.09	0.34	0.34
Clearance Time (s)	4.0	6.9	6.9	4.0	6.9	6.9	4.0	6.8	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	5.0	5.0
Lane Grp Cap (vph)	172	1902	680	162	1894	677	247	1431	527	325	1541	488
v/s Ratio Prot	c0.03	0.30		0.01	c0.38		c0.07	0.24		0.08	c0.33	
v/s Ratio Perm			0.15			0.08			0.00			0.01
v/c Ratio	0.59	0.70	0.35	0.22	0.92	0.19	0.97	0.73	0.01	0.84	0.96	0.04
Uniform Delay, d1	64.4	32.9	27.2	64.2	38.8	26.0	64.9	42.0	32.2	62.5	44.9	30.5
Progression Factor	1.31	0.60	0.37	0.95	1.31	2.22	1.03	1.03	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	1.5	1.0	1.2	7.6	0.5	48.0	2.2	0.0	18.5	14.3	0.1
Delay (s)	89.7	21.1	10.9	62.4	58.3	58.2	114.9	45.3	32.2	81.0	59.3	30.5
Level of Service	F	C	B	E	E	E	F	D	C	F	E	C
Approach Delay (s)		22.9			58.4			58.0			61.7	
Approach LOS		C			E			E			E	

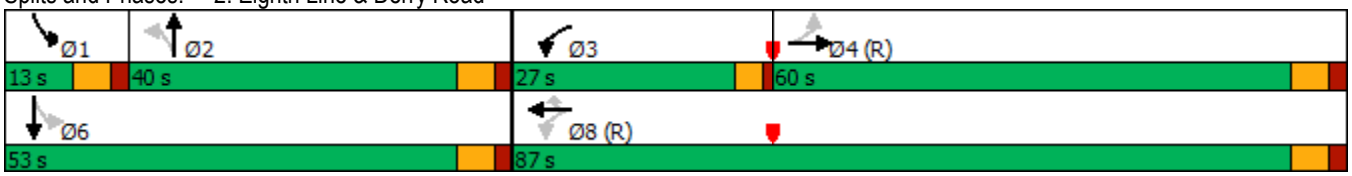
Intersection Summary			
HCM 2000 Control Delay	50.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1072	56	227	1609	0	40	0	171	30	0	1
Future Volume (vph)	0	1072	56	227	1609	0	40	0	171	30	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	90.0		70.0	140.0		70.0	50.0		0.0	35.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993						0.850			0.850	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1921	4451	0	1810	4541	1921	1825	1601	0	1825	1633	0
Flt Permitted				0.169			0.757			0.238		
Satd. Flow (perm)	1921	4451	0	322	4541	1921	1454	1601	0	457	1633	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6						381			55	
Link Speed (k/h)		80			80			70			70	
Link Distance (m)		361.1			640.9			289.9			633.1	
Travel Time (s)		16.2			28.8			14.9			32.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Adj. Flow (vph)	0	1072	56	227	1609	0	40	0	171	30	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1128	0	227	1609	0	40	171	0	30	1	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	1.00	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	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	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	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	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	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	Perm	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0	20.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	36.0	36.0		9.0	36.0	36.0	36.0	36.0		11.0	36.0	
Total Split (s)	60.0	60.0		27.0	87.0	87.0	40.0	40.0		13.0	53.0	
Total Split (%)	42.9%	42.9%		19.3%	62.1%	62.1%	28.6%	28.6%		9.3%	37.9%	
Maximum Green (s)	54.0	54.0		23.0	81.0	81.0	34.0	34.0		7.0	47.0	
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	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	0.0	
Total Lost Time (s)	6.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Vehicle Extension (s)	3.0	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	C-Max	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)	23.0	23.0			23.0	23.0	23.0	23.0			23.0	
Pedestrian Calls (#/hr)	0	0			0	0	0	0			0	
Act Effct Green (s)		91.5		111.4	109.4		10.8	10.8		18.6	18.6	
Actuated g/C Ratio		0.65		0.80	0.78		0.08	0.08		0.13	0.13	
v/c Ratio		0.39		0.56	0.45		0.36	0.36		0.24	0.00	
Control Delay		21.9		9.8	6.3		70.1	2.1		54.4	0.0	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		21.9		9.8	6.3		70.1	2.1		54.4	0.0	
LOS		C		A	A		E	A		D	A	
Approach Delay		21.9			6.7			15.0			52.7	
Approach LOS		C			A			B			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 84.4%	ICU Level of Service E
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 2: Eighth Line & Derry Road



Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1128	227	1609	40	171	30	1
v/c Ratio	0.39	0.56	0.45	0.36	0.36	0.24	0.00
Control Delay	21.9	9.8	6.3	70.1	2.1	54.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	9.8	6.3	70.1	2.1	54.4	0.0
Queue Length 50th (m)	91.9	14.8	63.6	10.8	0.0	7.2	0.0
Queue Length 95th (m)	102.3	24.6	80.7	22.7	0.0	16.1	0.0
Internal Link Dist (m)	337.1		616.9		265.9		609.1
Turn Bay Length (m)		140.0		50.0		35.0	
Base Capacity (vph)	2911	500	3547	353	677	129	584
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.45	0.45	0.11	0.25	0.23	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1072	56	227	1609	0	40	0	171	30	0	1
Future Volume (vph)	0	1072	56	227	1609	0	40	0	171	30	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		*0.80		1.00	*0.80		1.00	1.00		1.00	1.00	
Frt		0.99		1.00	1.00		1.00	0.85		1.00	0.85	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4449		1810	4541		1825	1601		1825	1633	
Flt Permitted		1.00		0.17	1.00		0.76	1.00		0.24	1.00	
Satd. Flow (perm)		4449		322	4541		1455	1601		457	1633	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1072	56	227	1609	0	40	0	171	30	0	1
RTOR Reduction (vph)	0	2	0	0	0	0	0	158	0	0	1	0
Lane Group Flow (vph)	0	1126	0	227	1609	0	40	13	0	30	0	0
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	2	4	0	0	0	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		89.1		107.0	107.0		10.8	10.8		21.0	21.0	
Effective Green, g (s)		89.1		107.0	107.0		10.8	10.8		21.0	21.0	
Actuated g/C Ratio		0.64		0.76	0.76		0.08	0.08		0.15	0.15	
Clearance Time (s)		6.0		4.0	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	
Lane Grp Cap (vph)		2831		393	3470		112	123		109	244	
v/s Ratio Prot		0.25		c0.06	0.35			0.01		c0.01	0.00	
v/s Ratio Perm				c0.38			c0.03			0.03		
v/c Ratio		0.40		0.58	0.46		0.36	0.11		0.28	0.00	
Uniform Delay, d1		12.4		6.6	6.0		61.3	60.1		52.0	50.6	
Progression Factor		1.68		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4		2.1	0.4		2.0	0.4		1.4	0.0	
Delay (s)		21.2		8.7	6.5		63.3	60.5		53.4	50.6	
Level of Service		C		A	A		E	E		D	D	
Approach Delay (s)		21.2			6.7			61.0			53.3	
Approach LOS		C			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	84.4%	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)	0	1303	238	0	1968	0	0	0	134	0	0	169
Future Volume (vph)	0	1303	238	0	1968	0	0	0	134	0	0	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850					0.865	0.865			0.865
Flt Protected												
Satd. Flow (prot)	0	4520	1601	0	4520	0	0	0	1629	0	0	1629
Flt Permitted												
Satd. Flow (perm)	0	4520	1601	0	4520	0	0	0	1629	0	0	1629
Link Speed (k/h)		80			80			48			48	
Link Distance (m)		198.7			361.0			323.6			143.8	
Travel Time (s)		8.9			16.2			24.3			10.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1303	238	0	1968	0	0	0	134	0	0	169
Shared Lane Traffic (%)									10%			
Lane Group Flow (vph)	0	1303	238	0	1968	0	0	13	121	0	0	169
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
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 55.2%	ICU Level of Service B
Analysis Period (min) 15	

* User Entered Value

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1303	238	0	1968	0	0	0	134	0	0	169
Future Volume (Veh/h)	0	1303	238	0	1968	0	0	0	134	0	0	169
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1303	238	0	1968	0	0	0	134	0	0	169
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		199			361							
pX, platoon unblocked	0.78			0.79			0.88	0.88	0.79	0.88	0.88	0.78
vC, conflicting volume	1968			1541			2128	3271	434	2536	3509	656
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1241			746			195	1489	0	657	1759	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	84	100	100	80
cM capacity (veh/h)	433			676			527	108	855	261	74	843

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	434	434	434	238	787	787	394	134	169
Volume Left	0	0	0	0	0	0	0	0	0
Volume Right	0	0	0	238	0	0	0	134	169
cSH	1700	1700	1700	1700	1700	1700	1700	855	843
Volume to Capacity	0.26	0.26	0.26	0.14	0.46	0.46	0.23	0.16	0.20
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	5.7
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.3
Lane LOS								A	B
Approach Delay (s)	0.0				0.0			10.0	10.3
Approach LOS								A	B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	1266	164	38	1861	13	119	44	17	35	140	0
Future Volume (vph)	67	1266	164	38	1861	13	119	44	17	35	140	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			50.0			2.5			2.5		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.983			0.999			0.987				
Flt Protected	0.950			0.950				0.968			0.990	
Satd. Flow (prot)	1789	4443	0	1789	4516	0	0	1799	0	0	1865	0
Flt Permitted	0.057			0.116				0.609			0.910	
Satd. Flow (perm)	107	4443	0	218	4516	0	0	1132	0	0	1714	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30			1			4				
Link Speed (k/h)		80			80			48			48	
Link Distance (m)		361.0			419.8			284.0			140.6	
Travel Time (s)		16.2			18.9			21.3			10.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	1266	164	38	1861	13	119	44	17	35	140	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	1430	0	38	1874	0	0	180	0	0	175	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			0.0			0.0	
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	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		40.0	40.0		40.0	40.0	
Total Split (s)	100.0	100.0		100.0	100.0		40.0	40.0		40.0	40.0	
Total Split (%)	71.4%	71.4%		71.4%	71.4%		28.6%	28.6%		28.6%	28.6%	
Maximum Green (s)	94.0	94.0		94.0	94.0		34.0	34.0		34.0	34.0	
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	
Total Lost Time (s)	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		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)	9.0	9.0		9.0	9.0		27.0	27.0		27.0	27.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	94.0	94.0		94.0	94.0			34.0			34.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67			0.24			0.24	
v/c Ratio	0.94	0.48		0.26	0.62			0.65			0.42	
Control Delay	105.3	4.2		5.2	2.9			58.9			48.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	105.3	4.2		5.2	2.9			58.9			48.4	
LOS	F	A		A	A			E			D	
Approach Delay		8.7			2.9			58.9			48.4	
Approach LOS		A			A			E			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 10.0	Intersection LOS: B
Intersection Capacity Utilization 89.9%	ICU Level of Service E
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 103: Collector H & Derry Road

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	67	1430	38	1874	180	175
v/c Ratio	0.94	0.48	0.26	0.62	0.65	0.42
Control Delay	105.3	4.2	5.2	2.9	58.9	48.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	105.3	4.2	5.2	2.9	58.9	48.4
Queue Length 50th (m)	13.6	18.3	1.0	21.9	44.1	41.1
Queue Length 95th (m)	m#36.1	23.1	m1.2	19.7	71.2	63.8
Internal Link Dist (m)		337.0		395.8	260.0	116.6
Turn Bay Length (m)	50.0		50.0			
Base Capacity (vph)	71	2993	146	3032	277	416
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.48	0.26	0.62	0.65	0.42

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)	67	1266	164	38	1861	13	119	44	17	35	140	0
Future Volume (vph)	67	1266	164	38	1861	13	119	44	17	35	140	0
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	
Lane Util. Factor	1.00	*0.80		1.00	*0.80			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.99			1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1789	4443		1789	4516			1800			1865	
Flt Permitted	0.06	1.00		0.12	1.00			0.61			0.91	
Satd. Flow (perm)	107	4443		219	4516			1133			1713	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	1266	164	38	1861	13	119	44	17	35	140	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	67	1420	0	38	1874	0	0	177	0	0	175	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)	94.0	94.0		94.0	94.0			34.0			34.0	
Effective Green, g (s)	94.0	94.0		94.0	94.0			34.0			34.0	
Actuated g/C Ratio	0.67	0.67		0.67	0.67			0.24			0.24	
Clearance Time (s)	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	
Lane Grp Cap (vph)	71	2983		147	3032			275			416	
v/s Ratio Prot		0.32			0.41							
v/s Ratio Perm	c0.63			0.17				c0.16			0.10	
v/c Ratio	0.94	0.48		0.26	0.62			0.64			0.42	
Uniform Delay, d1	20.6	11.1		9.1	12.9			47.6			44.7	
Progression Factor	0.82	0.34		0.19	0.17			1.00			1.00	
Incremental Delay, d2	80.5	0.4		3.2	0.7			5.1			3.1	
Delay (s)	97.4	4.3		4.9	2.9			52.6			47.8	
Level of Service	F	A		A	A			D			D	
Approach Delay (s)		8.4			2.9			52.6			47.8	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	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)	0	1120	225	21	1793	141	148	34	20	53	47	0
Future Volume (vph)	0	1120	225	21	1793	141	148	34	20	53	47	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			50.0			2.5			2.5		
Lane Util. Factor	1.00	*0.80	0.91	1.00	*0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.975			0.989			0.987				
Flt Protected				0.950				0.965			0.974	
Satd. Flow (prot)	1883	4407	0	1789	4471	0	0	1794	0	0	1834	0
Flt Permitted				0.129				0.723			0.778	
Satd. Flow (perm)	1883	4407	0	243	4471	0	0	1344	0	0	1465	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			16			4				
Link Speed (k/h)		80			80			48			48	
Link Distance (m)		419.8			361.1			291.5			151.2	
Travel Time (s)		18.9			16.2			21.9			11.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1120	225	21	1793	141	148	34	20	53	47	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1345	0	21	1934	0	0	202	0	0	100	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			0.0			0.0	
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	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		40.0	40.0		40.0	40.0	
Total Split (s)	97.0	97.0		97.0	97.0		43.0	43.0		43.0	43.0	
Total Split (%)	69.3%	69.3%		69.3%	69.3%		30.7%	30.7%		30.7%	30.7%	
Maximum Green (s)	91.0	91.0		91.0	91.0		37.0	37.0		37.0	37.0	
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	
Total Lost Time (s)	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		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)	9.0	9.0		9.0	9.0		27.0	27.0		27.0	27.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		91.0		91.0	91.0			37.0			37.0	
Actuated g/C Ratio		0.65		0.65	0.65			0.26			0.26	
v/c Ratio		0.47		0.13	0.66			0.56			0.26	
Control Delay		8.4		14.9	24.5			50.8			42.9	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		8.4		14.9	24.5			50.8			42.9	
LOS		A		B	C			D			D	
Approach Delay		8.4			24.4			50.8			42.9	
Approach LOS		A			C			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 63.7%	ICU Level of Service B
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 104: Collector J & Derry Road

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1345	21	1934	202	100
v/c Ratio	0.47	0.13	0.66	0.56	0.26
Control Delay	8.4	14.9	24.5	50.8	42.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	14.9	24.5	50.8	42.9
Queue Length 50th (m)	34.4	2.9	178.3	47.7	22.0
Queue Length 95th (m)	38.7	m7.5	203.5	74.3	38.1
Internal Link Dist (m)	395.8		337.1	267.5	127.2
Turn Bay Length (m)		50.0			
Base Capacity (vph)	2881	157	2911	358	387
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.13	0.66	0.56	0.26

Intersection Summary

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)	0	1120	225	21	1793	141	148	34	20	53	47	0
Future Volume (vph)	0	1120	225	21	1793	141	148	34	20	53	47	0
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	
Lane Util. Factor		*0.80		1.00	*0.80			1.00			1.00	
Frt		0.97		1.00	0.99			0.99			1.00	
Flt Protected		1.00		0.95	1.00			0.96			0.97	
Satd. Flow (prot)		4407		1789	4471			1793			1835	
Flt Permitted		1.00		0.13	1.00			0.72			0.78	
Satd. Flow (perm)		4407		243	4471			1343			1465	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1120	225	21	1793	141	148	34	20	53	47	0
RTOR Reduction (vph)	0	17	0	0	6	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1328	0	21	1928	0	0	199	0	0	100	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)		91.0		91.0	91.0			37.0			37.0	
Effective Green, g (s)		91.0		91.0	91.0			37.0			37.0	
Actuated g/C Ratio		0.65		0.65	0.65			0.26			0.26	
Clearance Time (s)		6.0		6.0	6.0			6.0			6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		2864		157	2906			354			387	
v/s Ratio Prot		0.30			c0.43							
v/s Ratio Perm				0.09				c0.15			0.07	
v/c Ratio		0.46		0.13	0.66			0.56			0.26	
Uniform Delay, d1		12.3		9.4	15.1			44.5			40.7	
Progression Factor		0.67		1.30	1.54			1.00			1.00	
Incremental Delay, d2		0.5		1.7	1.1			2.0			1.6	
Delay (s)		8.7		13.9	24.4			46.5			42.3	
Level of Service		A		B	C			D			D	
Approach Delay (s)		8.7			24.3			46.5			42.3	
Approach LOS		A			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
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)	43	117	253	124	126	50	316	1205	185	96	1938	31
Future Volume (vph)	43	117	253	124	126	50	316	1205	185	96	1938	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		100.0	70.0		50.0	120.0		50.0	50.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	15.0			15.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	*0.80	1.00	1.00	*0.80	1.00
Frt			0.850		0.957				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1802	0	1789	4520	1601	1789	4520	1601
Flt Permitted	0.411			0.598			0.050			0.186		
Satd. Flow (perm)	774	1883	1601	1126	1802	0	94	4520	1601	350	4520	1601
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			205		13				152			55
Link Speed (k/h)		48			48			60			60	
Link Distance (m)		434.3			193.0			870.6			323.1	
Travel Time (s)		32.6			14.5			52.2			19.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	117	253	124	126	50	316	1205	185	96	1938	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	117	253	124	176	0	316	1205	185	96	1938	31
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			7.4			7.4	
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	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4	4	8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	40.0	40.0	40.0	40.0	40.0		11.0	26.0	26.0	11.0	26.0	26.0
Total Split (s)	40.0	40.0	40.0	40.0	40.0		23.0	80.0	80.0	20.0	77.0	77.0
Total Split (%)	28.6%	28.6%	28.6%	28.6%	28.6%		16.4%	57.1%	57.1%	14.3%	55.0%	55.0%
Maximum Green (s)	34.0	34.0	34.0	34.0	34.0		19.0	74.0	74.0	16.0	71.0	71.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	27.0	27.0	27.0	27.0	27.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0		0	0
Act Effct Green (s)	19.4	19.4	19.4	19.4	19.4		110.6	97.0	97.0	85.2	75.6	75.6
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.79	0.69	0.69	0.61	0.54	0.54
v/c Ratio	0.40	0.45	0.64	0.79	0.67		0.74	0.38	0.16	0.33	0.79	0.03
Control Delay	63.8	59.4	19.6	90.5	65.0		54.4	13.2	7.3	14.3	40.8	7.6
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	63.8	59.4	19.6	90.5	65.0		54.4	13.2	7.3	14.3	40.8	7.6
LOS	E	E	B	F	E		D	B	A	B	D	A
Approach Delay		35.5			75.5			20.2			39.0	
Approach LOS		D			E			C			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 34.0	Intersection LOS: C
Intersection Capacity Utilization 91.3%	ICU Level of Service F
Analysis Period (min) 15	
* User Entered Value	

Splits and Phases: 105: Trafalgar Road & Collector K

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	43	117	253	124	176	316	1205	185	96	1938	31
v/c Ratio	0.40	0.45	0.64	0.79	0.67	0.74	0.38	0.16	0.33	0.79	0.03
Control Delay	63.8	59.4	19.6	90.5	65.0	54.4	13.2	7.3	14.3	40.8	7.6
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	63.8	59.4	19.6	90.5	65.0	54.4	13.2	7.3	14.3	40.8	7.6
Queue Length 50th (m)	11.0	30.2	12.0	33.7	43.5	83.1	46.5	8.6	11.3	219.1	1.3
Queue Length 95th (m)	22.3	46.4	37.4	53.1	64.1	m#110.8	76.9	m20.9	m9.5	m239.0	m3.3
Internal Link Dist (m)		410.3			169.0		846.6			299.1	
Turn Bay Length (m)	50.0		100.0	70.0		120.0		50.0	50.0		50.0
Base Capacity (vph)	187	457	544	273	447	425	3130	1155	398	2440	890
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	0.23	0.26	0.47	0.45	0.39	0.74	0.38	0.16	0.24	0.79	0.03

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)	43	117	253	124	126	50	316	1205	185	96	1938	31
Future Volume (vph)	43	117	253	124	126	50	316	1205	185	96	1938	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	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	*0.80	1.00	1.00	*0.80	1.00
Frt	1.00	1.00	0.85	1.00	0.96		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)	1789	1883	1601	1789	1803		1789	4520	1601	1789	4520	1601
Flt Permitted	0.41	1.00	1.00	0.60	1.00		0.05	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	773	1883	1601	1126	1803		95	4520	1601	350	4520	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	117	253	124	126	50	316	1205	185	96	1938	31
RTOR Reduction (vph)	0	0	177	0	11	0	0	0	47	0	0	14
Lane Group Flow (vph)	43	117	76	124	165	0	316	1205	138	96	1938	17
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	19.4	19.4	19.4	19.4	19.4		108.6	97.0	97.0	83.2	75.6	75.6
Effective Green, g (s)	19.4	19.4	19.4	19.4	19.4		108.6	97.0	97.0	83.2	75.6	75.6
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.78	0.69	0.69	0.59	0.54	0.54
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	107	260	221	156	249		424	3131	1109	286	2440	864
v/s Ratio Prot		0.06			0.09		c0.15	0.27		0.02	c0.43	
v/s Ratio Perm	0.06		0.05	c0.11			0.42		0.09	0.18		0.01
v/c Ratio	0.40	0.45	0.35	0.79	0.66		0.75	0.38	0.12	0.34	0.79	0.02
Uniform Delay, d1	55.0	55.4	54.6	58.4	57.2		42.0	9.0	7.2	12.2	25.9	15.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.24	1.33	3.17	1.72	1.45	5.90
Incremental Delay, d2	2.5	1.2	0.9	23.7	6.5		4.4	0.2	0.1	0.4	1.7	0.0
Delay (s)	57.5	56.6	55.5	82.1	63.6		56.5	12.2	23.0	21.4	39.2	88.3
Level of Service	E	E	E	F	E		E	B	C	C	D	F
Approach Delay (s)		56.0			71.3			21.6			39.1	
Approach LOS		E			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.3%	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)	91	262	45	10	151	89	44	14	1	126	107	105
Future Volume (vph)	91	262	45	10	151	89	44	14	1	126	107	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			25.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985			0.952			0.990			0.926	
Flt Protected		0.989			0.998		0.950			0.950		
Satd. Flow (prot)	0	1835	0	0	1789	0	1789	1865	0	1789	1744	0
Flt Permitted		0.989			0.998		0.950			0.950		
Satd. Flow (perm)	0	1835	0	0	1789	0	1789	1865	0	1789	1744	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		193.0			372.2			875.5			323.6	
Travel Time (s)		14.5			27.9			65.7			24.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	91	262	45	10	151	89	44	14	1	126	107	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	398	0	0	250	0	44	15	0	126	212	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
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	262	45	10	151	89	44	14	1	126	107	105
Future Volume (Veh/h)	91	262	45	10	151	89	44	14	1	126	107	105
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	91	262	45	10	151	89	44	14	1	126	107	105
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		193										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	240			307			840	726	284	690	704	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	240			247			807	687	223	649	664	196
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			75	96	100	62	68	88
cM capacity (veh/h)	1327			1256			178	325	777	332	335	846

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	398	250	44	15	126	212
Volume Left	91	10	44	0	126	0
Volume Right	45	89	0	1	0	105
cSH	1327	1256	178	338	332	478
Volume to Capacity	0.07	0.01	0.25	0.04	0.38	0.44
Queue Length 95th (m)	1.7	0.2	7.1	1.1	13.1	17.0
Control Delay (s)	2.3	0.4	31.8	16.1	22.4	18.4
Lane LOS	A	A	D	C	C	C
Approach Delay (s)	2.3	0.4	27.8		19.9	
Approach LOS			D		C	

Intersection Summary			
Average Delay	9.0		
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	209	54	18	150	22	35	93	16	19	114	47
Future Volume (vph)	63	209	54	18	150	22	35	93	16	19	114	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.984			0.985			0.965	
Flt Protected		0.990			0.995			0.988			0.995	
Satd. Flow (prot)	0	1824	0	0	1844	0	0	1833	0	0	1808	0
Flt Permitted		0.990			0.995			0.988			0.995	
Satd. Flow (perm)	0	1824	0	0	1844	0	0	1833	0	0	1808	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		372.2			419.4			911.3			284.0	
Travel Time (s)		27.9			31.5			68.3			21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	209	54	18	150	22	35	93	16	19	114	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	326	0	0	190	0	0	144	0	0	180	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)		0.0			0.0			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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 52.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	63	209	54	18	150	22	35	93	16	19	114	47
Future Volume (vph)	63	209	54	18	150	22	35	93	16	19	114	47
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	63	209	54	18	150	22	35	93	16	19	114	47

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	326	190	144	180
Volume Left (vph)	63	18	35	19
Volume Right (vph)	54	22	16	47
Hadj (s)	-0.03	-0.02	0.02	-0.10
Departure Headway (s)	5.1	5.3	5.6	5.4
Degree Utilization, x	0.46	0.28	0.22	0.27
Capacity (veh/h)	666	625	570	600
Control Delay (s)	12.4	10.4	10.2	10.4
Approach Delay (s)	12.4	10.4	10.2	10.4
Approach LOS	B	B	B	B

Intersection Summary			
Delay	11.1		
Level of Service	B		
Intersection Capacity Utilization	52.1%	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)	57	118	47	14	102	32	33	135	10	35	183	42
Future Volume (vph)	57	118	47	14	102	32	33	135	10	35	183	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.971			0.992			0.978	
Flt Protected		0.987			0.995			0.991			0.993	
Satd. Flow (prot)	0	1805	0	0	1820	0	0	1852	0	0	1829	0
Flt Permitted		0.987			0.995			0.991			0.993	
Satd. Flow (perm)	0	1805	0	0	1820	0	0	1852	0	0	1829	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		419.4			345.5			909.0			291.5	
Travel Time (s)		31.5			25.9			68.2			21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	57	118	47	14	102	32	33	135	10	35	183	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	222	0	0	148	0	0	178	0	0	260	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)		0.0			0.0			0.0			0.0	
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
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	118	47	14	102	32	33	135	10	35	183	42
Future Volume (vph)	57	118	47	14	102	32	33	135	10	35	183	42
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	57	118	47	14	102	32	33	135	10	35	183	42

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	222	148	178	260
Volume Left (vph)	57	14	33	35
Volume Right (vph)	47	32	10	42
Hadj (s)	-0.04	-0.08	0.04	-0.04
Departure Headway (s)	5.3	5.4	5.4	5.2
Degree Utilization, x	0.33	0.22	0.27	0.37
Capacity (veh/h)	626	604	607	648
Control Delay (s)	10.8	9.9	10.3	11.2
Approach Delay (s)	10.8	9.9	10.3	11.2
Approach LOS	B	A	B	B

Intersection Summary			
Delay	10.7		
Level of Service	B		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	119	136	205	283	8
Future Volume (vph)	7	119	136	205	283	8
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	0.872				0.996	
Flt Protected	0.997			0.980		
Satd. Flow (prot)	1637	0	0	1846	1876	0
Flt Permitted	0.997			0.980		
Satd. Flow (perm)	1637	0	0	1846	1876	0
Link Speed (k/h)	48			70	70	
Link Distance (m)	345.5			897.4	289.9	
Travel Time (s)	25.9			46.2	14.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	7	119	136	205	283	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	126	0	0	341	291	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 51.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	119	136	205	283	8
Future Volume (Veh/h)	7	119	136	205	283	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	119	136	205	283	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					290	
pX, platoon unblocked	0.99	0.99	0.99			
vC, conflicting volume	764	287	291			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	755	272	276			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	84	89			
cM capacity (veh/h)	332	757	1271			

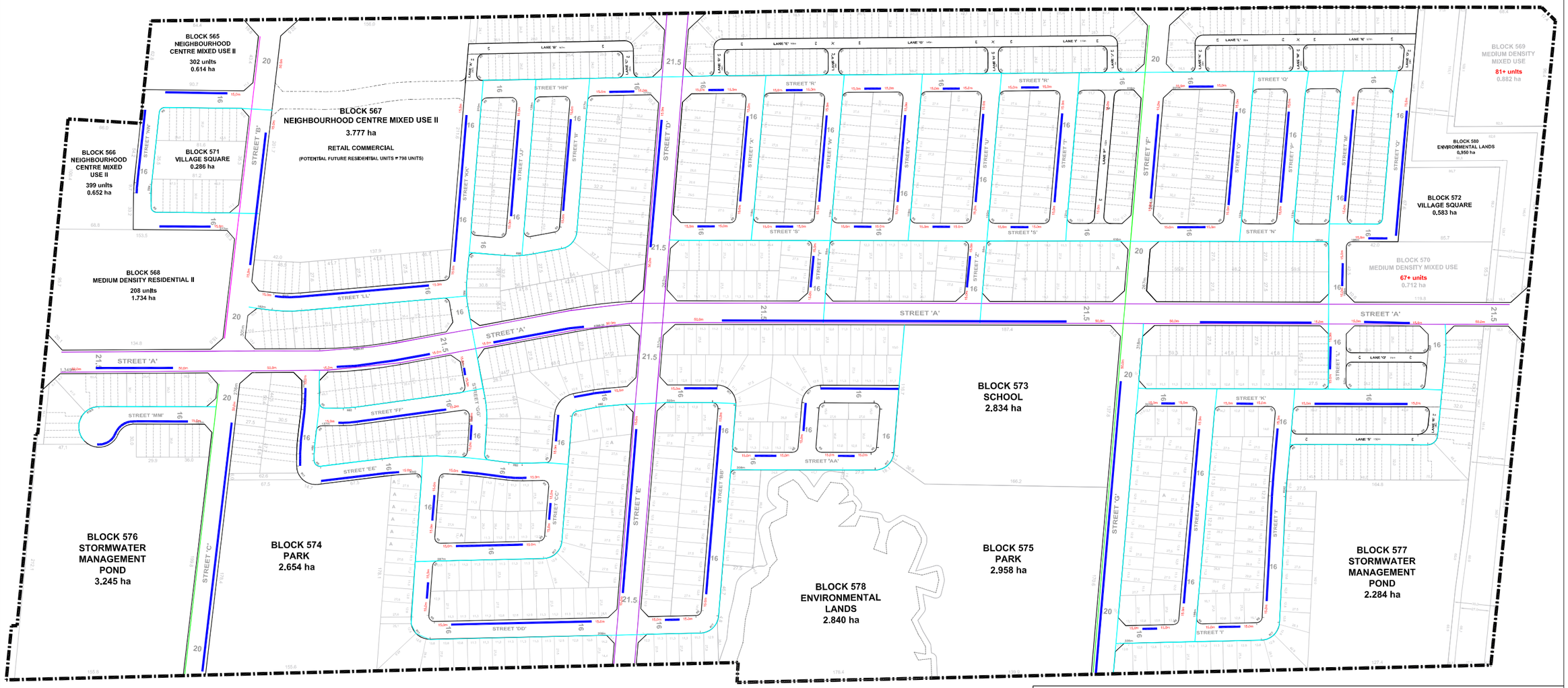
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	126	341	291
Volume Left	7	136	0
Volume Right	119	0	8
cSH	707	1271	1700
Volume to Capacity	0.18	0.11	0.17
Queue Length 95th (m)	4.9	2.7	0.0
Control Delay (s)	11.2	3.9	0.0
Lane LOS	B	A	
Approach Delay (s)	11.2	3.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX K

On-Street Parking Plan

EXISTING AGRICULTURAL LANDS



EXISTING AGRICULTURAL LANDS
(FUTURE DEVELOPMENT)

EXISTI

Note:
On-street parallel parking locations are shown with the following parking prohibition rule as per Town of Milton Engineering and Parks Standards Manual & Town of Milton's Parking Regulation:

- Parking Prohibition Distances:
  - 15.0m parking prohibitions at local-to-local & local-to-collector Intersecting roads
  - 50.0m parking prohibitions at collector-to-collector & collector-to-arterial intersecting roads
- On-street parallel parking is placed on the opposite side of watermain lines. Final placement to be confirmed at the detailed design stage after the location of residential driveways and utilities is finalized.
- On streets with bike lanes on both sides, no on-street parking is permitted.
- On streets with a cycle track and multi-use path (MUP) on one side, on-street parking is only provided on the opposite side of the cycle track and MUP.

Legend:
On-Street Parallel Parking Locations
Watermain Lines (from base plan)
Bike Lane (Both Sides)
Cycle Track (One Side)
Multi- Use Path (One Side)

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TRINISON FRONTENAC DRAFT PLAN STUDY
CONCEPTUAL ON-STREET PARKING LOCATIONS PLAN

N.T.S

DRAWING No. 01

DATE MAY 2025