TRAFFIC IMPACT STUDY

UPPER'S QUARRY

FINAL ▪ OCTOBER 2021

REPORT PREPARED FOR

WALKER AGGREGATES INC.
1206 ROSEWARNE DRIVE
THOROLD, ON L2V 3Y8

REPORT PREPARED BY

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TMIG PROJECT NUMBER 16137

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EXECUTIVE SUMMARY

The Municipal Infrastructure Group Ltd. (TMIG) was retained by Walker Aggregates Inc., to prepare a Traffic Impact Study (TIS) for the proposed Upper's Quarry. The proposed Upper's Quarry is located generally on lands situated south of Beaverdams Road, north of Lundy's Lane, west of Beechwood Road, and east of Thorold Townline Road, in the City of Niagara Falls, Region of Niagara, adjacent to City of Thorold.

The proposed Upper's Quarry has an approximate area of 106.3 hectares (262.7 acres) and an extraction area of 96.8 hectares (239.2 acres). The quarry is anticipated to have an annual extraction limit of 1.8 million tonnes of aggregate and a maximum annual production of 400,000 tonnes of asphalt from a portable asphalt plant to be located on-site.

The proposed Upper's Quarry access is proposed to be located at the Upper's Lane and Thorold Townline Road intersection. This proposed access is not dependent upon the sale of the Upper's Lane road allowance, as quarry traffic will either enter the site directly from this location on Thorold Townline Road, or travel to the same location via Upper's Lane. The proposed haul route will **not** make use of Beechwood Road to the east of Upper's Lane.

Two possible routes have been considered as appropriate 'haul routes' for material that will be shipped from the proposed Upper's Quarry to serve local and broader markets.

Haul Route Option 1

The first option of a haul route for trucks to / from Upper's Quarry would utilize Thorold Townline Road to the north of the site, as it is a regional road and provides the most direct route to / from the quarry. The haul route includes the following roads:

- Thorold Townline Road north of the site access to Thorold Stone Road
- Highway 406 via Thorold Stone Road westbound
- Queen Elizabeth Way (QEW) via Taylor Rd northbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road eastbound

Haul Route Option 2

Davis Road is designated as a provincial highway and is a major boundary road in close proximity to the site. Accordingly, it can also be considered an appropriate roadway to accommodate truck traffic to / from the quarry. The use of Davis Road as a second option for a haul route would result in a more circuitous haul route, as access to Davis Road would require quarry trucks to first travel south on Thorold Townline Road to Lundy's Lane, and then proceed west to Davis Road. The second haul route option includes the following roadways:

- Thorold Townline Road south of the site access to Lundy's Lane
- Lundy's Lane west to Davis Road
- Davis Road north to Thorold Stone Road
- Highway 406 via Thorold Stone Road westbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road (eastbound) and Taylor Road northbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road eastbound

Based on analysis results for both haul routes and the future transportation network, TMIG recommends that Haul Route Option 1 be chosen as the preferred Haul Route, subject to approval by the Town and an appraisal of the cost of any road improvements potentially required to accommodate truck traffic.

Haul Route Option 1 will also be seen as a preferable route by current and future residents within the vicinity of the proposed Upper's Quarry, as the Rolling Meadows Secondary Plan area represents a large amount of future residential traffic that will travel along Davis Road and Lundy's Lane. As such, it would be ideal to have truck traffic travel north directly on Thorold Townline Road (Haul Route Option 1), compared to the more circuitous route around the boundary of the future Rolling Meadows area (Haul Route Option 2).

The traffic analysis considers traffic conditions at planning horizon years of 2025 and 2035. It is assumed that the proposed Upper's Quarry will be fully operational by the 2025 study horizon year. There are no planned changes to the existing local road network in the immediate vicinity of the proposed Upper's Quarry.

Two background developments were identified that are expected to be built-out by the 2035 planning horizon, and have been included in traffic analysis efforts. Approximately 100 acres of employment lands are owned by Walker on the west side of Thorold Townline Road, opposite Upper's Lane. These employment lands fall within The Neighbourhoods of Rolling Meadows Secondary Plan area.

The Rolling Meadows Development will consist of a mix of residential and employment land uses, is proposed to be built in five phases, and is planned to be fully built-out by 2030. Combined, the Thorold Townline Road Employment Lands and the Rolling Meadows Development are expected to generate a total of 2,254 trips during the a.m. peak hour, and 2,880 trips during the p.m. peak hour. Due to the significant amount of growth represented by the background developments (the equivalent of an annual growth rate of 5.14% in the a.m. peak hour and 4.51% in the p.m. peak), no additional background growth has been applied to the study area road network to avoid an over conservative analysis of future traffic conditions.

Based on the proposed annual extraction limit of aggregate and operation hours, hourly truck traffic of up to 47 inbound and 31 outbound trucks during the a.m. peak hour and 31 inbound and 31 outbound trucks during the p.m. peak hour were predicted. It was assumed that 7 aggregate-related employees would travel inbound and outbound during each peak hour.

Based on the proposed annual production limit of asphalt and operation hours, hourly truck traffic of up to 11 inbound and 7 outbound trucks during the a.m. peak hour and 7 inbound and 7 outbound trucks during the p.m. peak hour was predicted. It was assumed that 4 asphalt-related employees would travel inbound and outbound during each peak hour.

Walker Aggregates Inc. supplied TMIG with historical shipping data upon which to base the distribution of truck traffic to the broader transportation network outside of the proposed Upper's Quarry study area.

Overall, the study area intersections operate well or at acceptable levels under all planning horizons. Some individual movements are approaching capacity, particularly under 2035 conditions, but still operate with acceptable delays of 80 seconds or less, indicating a Level of Service (LOS) 'E' or better. Some geometric changes and modifications to signal timing plans are recommended in order to address any capacity or queuing issues in order to allow for efficient movement of traffic through the study area.

Haul Route Option 1 via Thorold Townline to the north was identified as the preferred haul route, and accordingly future total traffic operations were analyzed for Haul Route Option 1 only. A summary of recommendations and timing of the improvements are provided below.

Background Conditions (2025 & 2035)

- With adjustments to existing signal timing plans, all study intersections operate at acceptable levels under 2025 and 2035 background conditions. Some individual movements are approaching capacity but operate at acceptable levels of service.
- A signal warrant was conducted for the intersection of Thorold Townline Road and Beaverdams Road under 2025 Background conditions to confirm if the combined existing and 2025 background traffic would justify the installation of a traffic signal. Based on Justification 7 of Book 12 of the Ontario Traffic Manual (OTM), the estimated 2025 background traffic volumes fulfill Justification 1A and 1B at 97% and 100% respectively. Although not warranted under 2025 Background conditions, based on the 120% threshold applied to Justification 7 and the near 100% justification fulfillment it is TMIG's opinion signals should be considered at this intersection under 2025 Background conditions.
- Construction of an auxiliary southbound right turn lane at the intersection of Thorold Townline Road and Lundy's Lane by the 2035 background planning horizon was found to provide better overall operations at the intersection. Interim adjustments to signal timings and introduction of protected phases could potentially negate the need for a southbound right turn lane, however, high volumes of southbound right-turning vehicles are predicted in 2035 that would benefit from a dedicated lane compared to the existing shared through/right turn lane. Given that the proposed Upper's Quarry is assumed to be active by 2025,

quarry related traffic is not the primary cause of the high volume of right-turning vehicles predicted in 2035, particularly based on preferred Haul Route Option 1 (via Thorold Townline Road), as minimal staff site traffic travels through the intersection, and heavy vehicle site traffic will **not** travel through the Thorold Townline Road and Lundy's Lane intersection. The operational impact of Haul Route Option 1 site-related traffic at this intersection is negligible and will not trigger the aforementioned road improvements.

- There is opportunity to widen the existing 24 metre ROW at the Thorold Townline Road and Lundy's Lane intersection to the designated 26.2 metre road allowance to accommodate a southbound right turn lane. Furthermore, the Region may require road widening dedications in addition to the designated road allowances without the need for amendments to the Official Plan for purposes such as turning lanes at intersections.
- It is recommended the Thorold Townline Road and Lundy's Lane intersection be monitored in the future to determine whether constructing the dedicated southbound right turn lane would be the most appropriate solution to accommodate background development traffic volumes within the vicinity of the intersection.

Total Conditions (2025 & 2035)

- With adjustments to existing signal timing plans, all study intersections operate acceptably under 2025 and 2035 total conditions. Some intersections/movements are approaching, or are at capacity, but operate at acceptable levels of service.
- The proposed access design will be constructed in 2025 prior to the quarry becoming active. The proposed access design provides deceleration and accelerations lanes northbound at the site access (via Upper's Lane). A slip around lane is provided southbound, thus accommodating left-turning vehicles into the site and preventing blockage of through traffic at the site access.
- The southbound queue at Thorold Stone Road and Thorold Townline Road should be monitored in 2035 to determine if any upgrades to the intersection are needed to address the potential for long queues to build up (southbound left experiences a queue up to 160m according to simulations). The long southbound left queue buildup does not occur under 2025 total conditions when Upper's Quarry is active, as such, quarry related traffic is **not** the cause of the long queues predicted in 2035.
- In general, it is suggested that the Thorold Townline Road and Beaverdams Road intersection be monitored for signalization in 2025, and that signals be installed prior to the 2035 planning horizon (i.e. prior to the combined full build-out of the Rolling Meadows development, Thorold Townline Road Employment Lands, and the proposed Upper's Lane Quarry).

Preferred Haul Route

TMIG recommends that Haul Route Option 1 be chosen as the preferred Haul Route, subject to approval by the Town and an appraisal of the cost of any road improvements required to accommodate truck traffic.

Haul Route Option 1 will also be seen as a preferable route by current and future residents within the vicinity of Upper's Quarry, as the Rolling Meadows Secondary Plan area represents a large amount of future residential traffic that will travel along Davis Road and Lundy's Lane. As such, it would be ideal to have truck traffic travel north directly on Thorold Townline Road (Haul Route Option 1), compared to the more circuitous route around the boundary of the future Rolling Meadows area (Haul Route Option 2).

Of note, Haul Route Option 1 will direct trucks northbound on Thorold Townline Road through a non-residential area, however, a causeway has been constructed along Thorold Townline Road to cross a waterway immediately south of Beaverdams Road. Depending on the structural properties of the causeway, improvements may need to be made in order to sustain the regular truck traffic associated with the proposed Upper's Quarry. Before the choice of haul route is finalized, it is recommended that Walker Aggregates Inc. and the Town perform a review of the existing load capacity of Thorold Townline Road in order to determine if any upgrades are required, and if so, what cost would be associated with the upgrades. If it is found that upgrades are required, it should be determined if the upgrades would be needed to service the future Rolling Meadows development regardless of any Upper's Quarry operations. The cost of the roadway upgrades should be assigned proportionately to the parties that will derive direct benefits from the upgrades.

Additionally, the City of Thorold Official Plan (Section B1.8.12.3) Aggregate Resource Protection Policy states the following:

"It shall also be recognized that Thorold Townline Road is a Regional arterial road and is the likely aggregate haul route required to serve any future aggregate extraction operation to the east. Accordingly, all studies required by any policy of this Plan shall recognize that Thorold Townline Road is a future aggregate haul route. The haul route shall be restricted from the future extraction operation entrance southerly to Highway 20, a major arterial."

Based on our interpretation of the policy above the City prefers the proposed Haul Route Option 1.

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A T.Y. LIN INTERNATIONAL COMPANY

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CONTENTS

APPENDICES

FIGURES

TABLES

1 INTRODUCTION

The Municipal Infrastructure Group Ltd. (TMIG), a T.Y. Lin International Company, was retained by Walker Aggregates Inc., to prepare a Traffic Impact Study (TIS) for the proposed Upper's Quarry. The proposed Upper's Quarry is located generally on lands situated south of Beaverdams Road, north of Lundy's Lane, west of Beechwood Road, and east of Thorold Townline Road, in the City of Niagara Falls, Region of Niagara, adjacent to City of Thorold.

This TIS has been prepared in support of a Class A Licence (Quarry Below Groundwater) under the Aggregate Resources Act (ARA) application, Regional Official Plan Amendment (ROPA), City Official Plan Amendment (OPA), and City Zoning By-Law Amendment (ZBA). The proposed Upper's Quarry has an approximate licence area of 106.3 hectares (262.7 acres) and an extraction area of 96.8 hectares (239.2 acres). The site will incorporate setbacks of 15m along the north and south boundaries. Setbacks of 30m will be provided along the western boundary, and setbacks of 15m and 30m will be provided along the east boundary. A preliminary Existing Features and Cross Sections Plan is provided in **Appendix A.**

The proposed Upper's Quarry access is proposed to be located at the Upper's Lane and Thorold Townline Road intersection. This proposed access is not dependent upon the sale of the Upper's Lane road allowance, as quarry traffic will either enter the site directly from this location on Thorold Townline Road, or travel to the same location via Upper's Lane. The proposed haul route will **not** make use of Beechwood Road to the east of Upper's Lane.

The quarry is anticipated to have an annual extraction limit of 1.8 million tonnes of aggregate and a maximum annual production of 400,000 tonnes of asphalt from a portable asphalt plant to be located on-site. As per the proposed Upper's Quarry Operational Plan, the proposed quarry will have the following hours of operation:

- Drilling, extraction: Monday to Saturday 7:00 am - 7:00 pm
- Processing: Monday to Saturday 7:00 am - 7:00 pm
- Blasting: Monday to Friday 8:00 am - 6:00 pm
- Shipping: 24 hours (7 days/week)

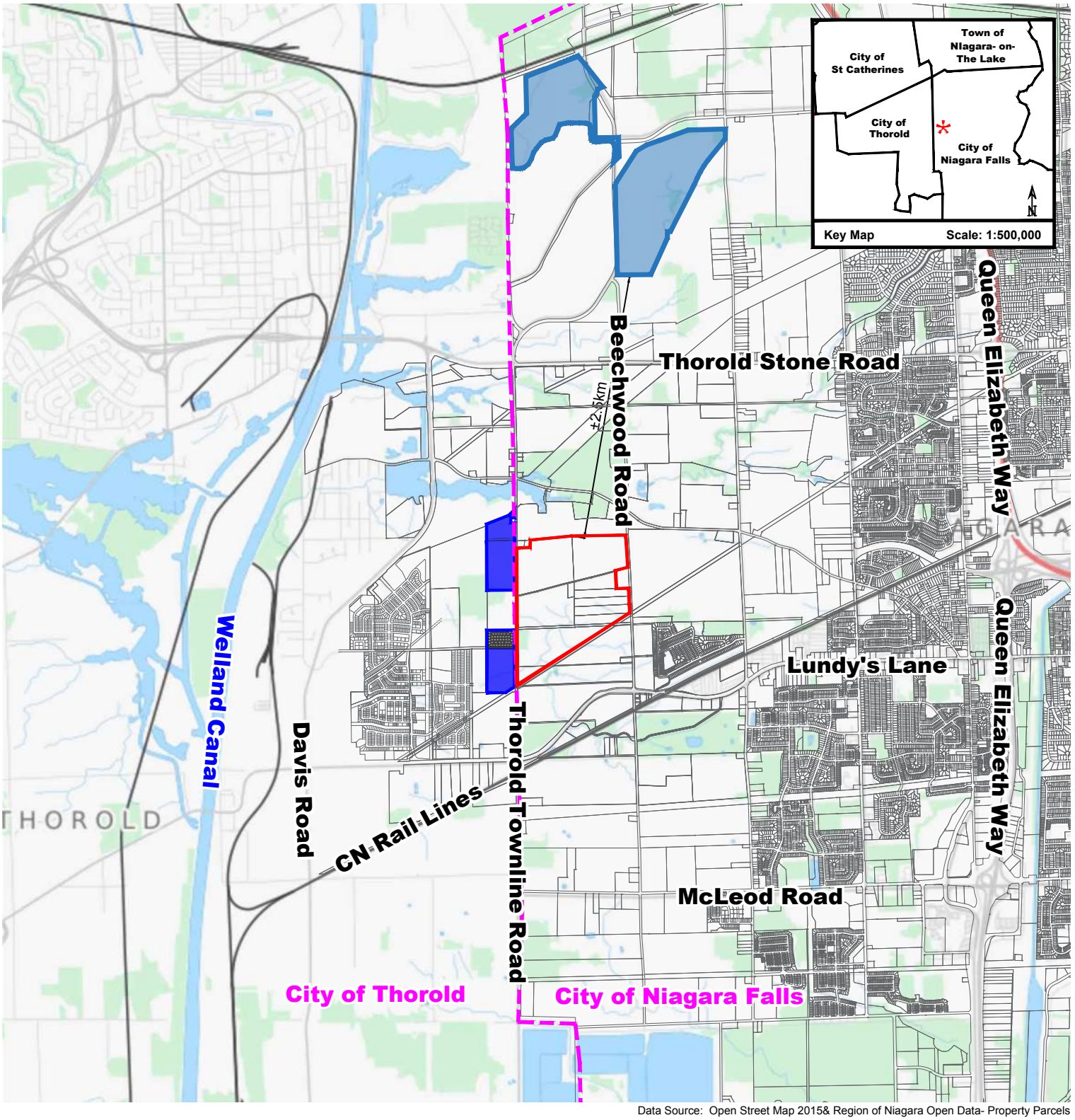
It is noted that a response to emergencies is not limited by the hours of operation. A preliminary Operational Plan is provided in **Appendix A.**

1.1 Retainer and Objective

The Traffic Impact Study will assess the extent of traffic-related impacts on the abutting roadway system generated by the proposed quarry. The objectives of this study are to:

- Establish baseline traffic conditions for the study area and update the existing traffic conditions,
- Derive the future background operating conditions for the study intersections at a future 2025 and 2035 planning horizon,
- Analyze future operating conditions for the study intersections at a future 2025 and 2035 planning horizon,
- Determine what, if any, traffic impacts there are on the study area haul route from the proposed quarry,
- Recommend road network improvements to address any future traffic impacts within the study area.

The proposed Upper's Quarry location is illustrated in **Figure 1-1**.



Data Source: Open Street Map 2015& Region of Niagara Open Data- Property Parcels

Figure 1-1

Location Map

Upper's Quarry,
City of Niagara Falls,
Region of Niagara, Ontario

LEGEND

- Proposed Upper's Quarry Site (±106.3 ha)
- Other Lands Owner by Walker Aggregates (±31.6 ha)
- Municipal Boundary
- Existing Walker Brothers Quarry
- Property Line

DATE: September 30, 2021

SCALE 1:50,000

north

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2 BASELINE TRAFFIC CONDITIONS

This section summarizes the surrounding road network, the data collection program, presents the existing traffic volume conditions on the proximate study area roadways and assesses the current operating conditions at the intersections examined in this study. These 'baseline conditions' form the foundation for future background traffic projections and the incremental site-impact analyses investigated later herein.

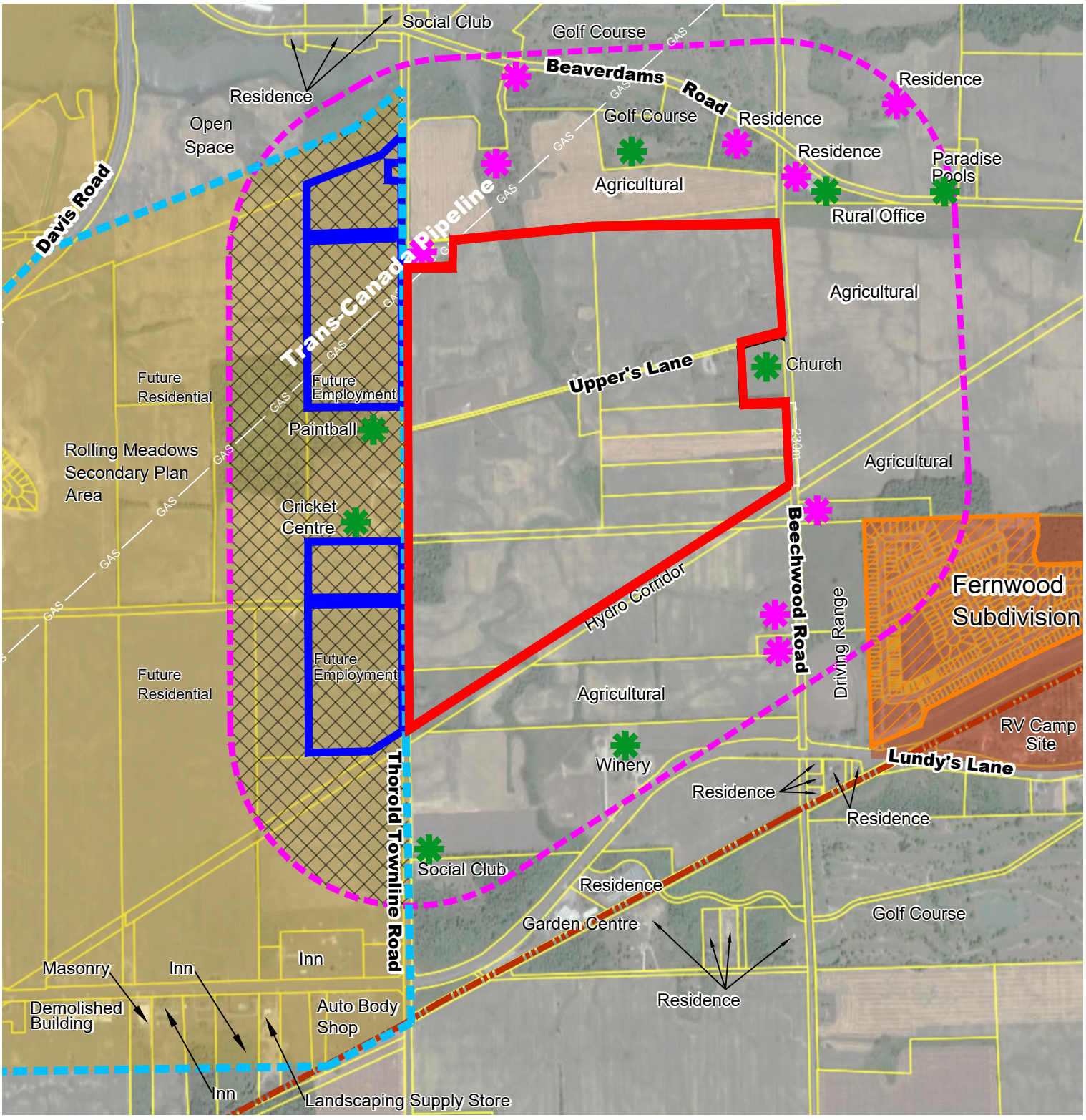
2.1 Site Environs

The proposed quarry is generally located on the east side of Thorold Townline Road, west of Beechwood Road, south of Beaverdams Road, and north of Lundy's Lane. A solitary quarry access is proposed via the Upper's Lane and Thorold Townline Road intersection.

The site is located on lands designated as "Good General Agriculture Area" by the Region's and City's Official Plans, as are the surrounding lands to the north, south and east of the site, whilst lands to the west are designated as an urban area. The lands immediately west of Thorold Townline Road have been identified in the Rolling Meadows Secondary Plan as a future employment area, and the lands further west are designated as a residential area.

The site and surrounding lands are largely undeveloped with a few residential farms which will be demolished. An existing church is situated immediately east of the proposed quarry and has direct access to Beechwood Road. The existing Fernwood subdivision is located southeast of the proposed quarry, to the east of Beechwood Road.

The existing watercourse which currently runs through the site is to be realigned and enhanced as part of the future quarry operations. Upon completion, the realigned watercourse will be referred to as Upper's Creek and run along the east side of Thorold Townline Road. The proposed quarry and adjacent land uses are illustrated in **Figure 2-1**.



Data Source: First Base Solutions Aerial Flown 2017

Figure 2-1

Surrounding Land Use

Upper's Quarry,
City of Niagara Falls,
Region of Niagara, Ontario

LEGEND

- Proposed Upper's Quarry Site
- Adjacent Lands Owned By Walker Aggregates
- 500 m Radius Buffer
- City of Thorold Urban Area
- Rolling Meadows Secondary Plan Area
- Existing (Residential) Dwelling within 500m Radius (Outside Urban Area)
- Existing (Non- Residential) Rural Use within 500m Radius (Outside Urban Area)
- City of Niagara Falls Urban Area
- TransCanada Pipeline
- Fernwood Subdivision
- CN Railway
- Aggregate Impact Area (Rolling Meadows Secondary Plan

DATE: April 8, 2020

SCALE 1:15000

north

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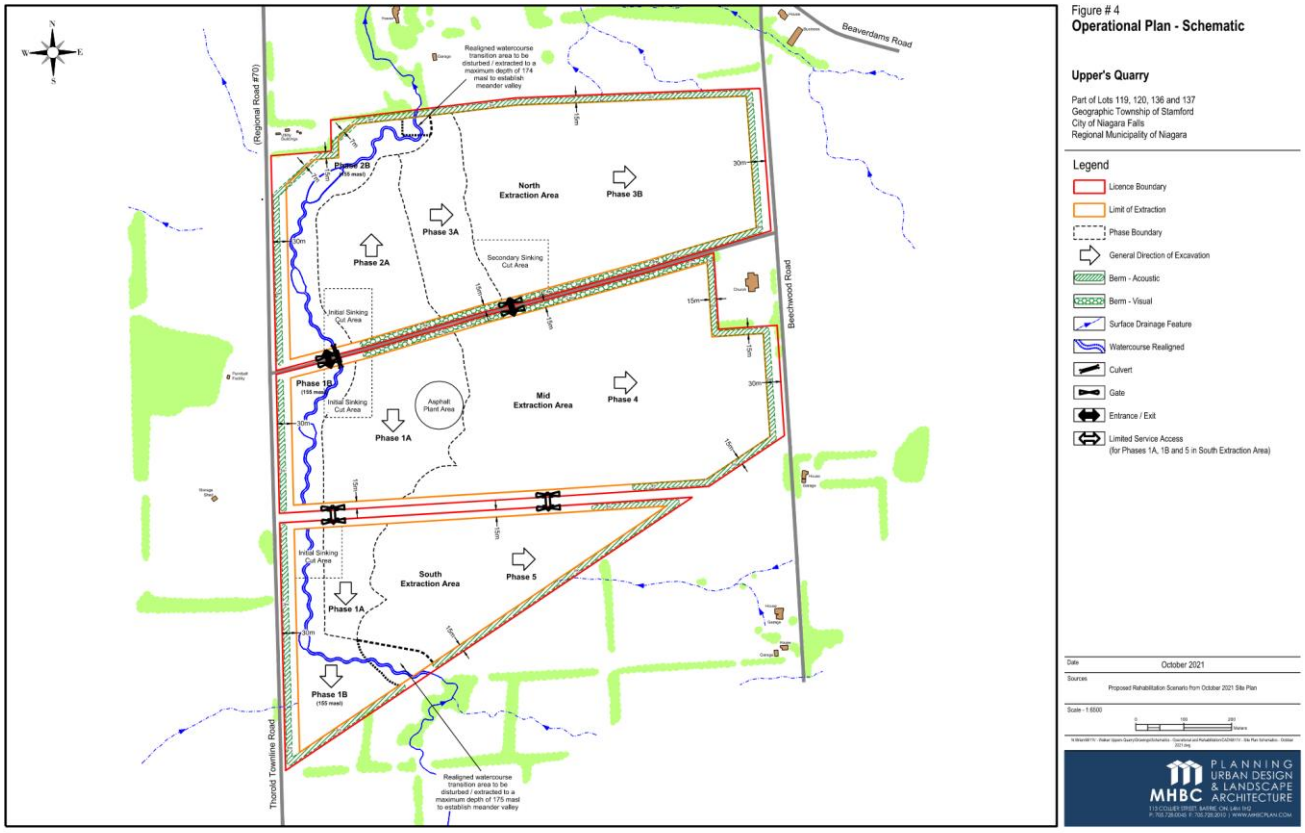
2.2 Phasing Plan

The phasing plan for the proposed quarry has been designed to identify the sequence of operation throughout the life of the quarry and maximize progressive rehabilitation of the site. Overall, the proposed quarry includes three (3) phases which have been illustrated in **Figure 2-2**.

Figure 2-2 Simplified Operation Schematics



2.3 Existing Road Network

Based on road network connectivity and proposed access to the quarry, the abutting Thorold Townline Road will be an integral part of the quarry's haul route. Boundary roadways that make up the haul route(s) to the quarry include:

- Thorold Townline Road/Taylor Road (Regional Road 70) is a two-lane regional road generally oriented in a north-south direction, with a posted speed limit of 80 km/h in the study area and is under the jurisdiction of Niagara Region. Thorold Townline Road provides a connection to Thorold Stone Road Road to north and Lundy's Lane to the south.
- Thorold Stone Road (Regional Road 57 / Highway 58) is generally oriented in an east-west direction and has a four-lane cross section with a posted speed limit of 80 km/h in the study area. It is under the jurisdiction of Niagara Region east of Davis Road. Thorold Stone Road provides a connection to Highway 406 to the west via the Thorold Tunnel, and a connection to the Queen Elizabeth Way (QEW) to the east. Within the study area, Thorold Stone Road is under the jurisdiction of the Ministry of Transportation (MTO) west of Davis Road, and is known as Highway 58.
- Davis Road (Highway 58) is a north-south highway under the jurisdiction of the MTO, and has a posted speed limit of 80 km/h. Davis Road provides a connection between Lundy's Lane to the south and Thorold Stone Road to the north. Davis Road has a 2-lane cross-section between Lundy's Lane and a point approximately 300 metres south of Beaverdams Road where it transitions to a 4-lane cross-section northward to Thorold Stone Road.
- Lundy's Lane (Regional Road 20 / Highway 20) is generally oriented in an east-west direction within the study area and has a two-lane cross section with a posted speed limit of 80 km/h. Lundy's Lane is under the jurisdiction of Niagara Region, with the exception of the portion between Davis Road and Thorold Townline Road, which is under the jurisdiction of the MTO. Lundy's Lane provides a connection to Highway 406 in the west, and Highway 420 and the QEW in the east.

2.4 Thorold Townline Road Right-of-Way

Thorold Townline Road currently provides a right-of-way (ROW) width of 20 metres, within proximity of the proposed site access, between Thorold Stone Road and a distance approximately 320 metres north of Lundy's Lane at which point the ROW width increases to approximately 24 metres.

Niagara Region OP Chapter 9 - Transportation (adopted as Amendment 13 to the OP) has policies set in place to ensure the Region will:

- Ensure that corridors are identified and protected to meet current and projected needs for various modes of travel including active transportation.
- Support opportunities for multi-modal use where feasible, in particular prioritizing transit and goods movement needs over those of single occupant automobiles.
- For goods movement corridors, provide for linkages to planned or existing intermodal opportunities where feasible.

Moreover, the Region's OP (Policy 9.C.7) states:

> *'The widths for Regional Road allowances are designated in the Table titled "Road Allowance Widths". Each Regional Road allowance which is not presently at its designated width is a highway to be widened.'*

Region OP Table 9-1 (Road Allowance Widths) identifies a designated 26.2 metre road Thorold Townline Road allowance width between Thorold Stone Road and Chippawa Creek Road, inclusive of the proposed site access (via Upper's Lane) and its intersection with Lundy's Lane. Road widening requirements will be confirmed with the Region as part of the application review process, and, as necessary, the Site Plans will be modified to reflect those requirements at that time.

Region OP Policy 9.C.12 states:

> *'Land for Regional Road widening normally will be required equally from both sides of the centreline of the designated Regional Road unless existing land uses, topographic features or other physical or environmental constraints necessitate taking greater widening on one side than the other'*

Additionally, Region OP Policy 9.C.13 states:

> *'The Region may require road widening dedications in addition to the designated road allowances indicated in the Table titled "Road Allowance Widths" without the need for amendments to this Plan for purposes such as turning lanes at intersections or to provide suitable access to major traffic generator developments.'*

Therefore, as discussed in **Section 6.5**, there is opportunity to widen the existing 24 metre ROW at the Thorold Townline Road and Lundy's Lane intersection to the designated 26.2 metre road allowance and/or provide a road widening dedications in addition to the designated road allowance to accommodate a southbound right turn lane.

2.5 Proposed Haul Routes

Two possible routes have been considered as appropriate 'haul routes' for material that will be shipped from the proposed Upper's Quarry to serve local and broader markets. Haul Route Option 1 and Option 2 are illustrated in **Figure 2-3**.

Haul Route Option 1

The first option of a haul route for trucks to / from the proposed Upper's Quarry would utilize Thorold Townline Road to the north of the site, as it is a regional road and provides the most direct route to / from the quarry. The haul route includes the following roads:

- Thorold Townline Road north of the site access to Thorold Stone Road
- Highway 406 via Thorold Stone Road westbound
- Queen Elizabeth Way (QEW) via Taylor Rd northbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road eastbound

Haul Route Option 2

Davis Road is designated as a provincial highway and is a major boundary road in close proximity to the site. Accordingly, it can also be considered an appropriate roadway to accommodate truck traffic to / from the quarry. The use of Davis Road as a second option for a haul route would result in a more circuitous haul route, as access to Davis Road would require quarry trucks to first travel south on Thorold Townline Road to Lundy's Lane, and then proceed west to Davis Road. The second haul route option includes the following roadways:

- Thorold Townline Road south of the site access to Lundy's Lane
- Lundy's Lane west to Davis Road
- Davis Road north to Thorold Stone Road
- Highway 406 via Thorold Stone Road westbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road (eastbound) and Taylor Road northbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road eastbound

HWY 58

TAYLOR ROAD

THOROLD STONE ROAD (R.R. 57)

NIAGARA FALLS ROAD

BEAVERDAMS ROAD

DAVIS ROAD (HWY 58)

THOROLD TOWNLINE ROAD (R.R. 70)

PROPOSED UPPER'S QUARRY ACCESS

LUNDY'S LANE (R.R. 20)

LEGEND

- Haul Route—Option 1 via Thorold Townline Road
- Haul Route—Option 2 via Davis Road
- Upper's Quarry Boundary
- Rolling Meadows Secondary Plan Area
- Provincial Road
- Regional Road
- Local Road

TMIG

PROPOSED HAUL ROUTE OPTIONS

FIGURE 2-3

TMIG recommends that Haul Route Option 1 be chosen as the preferred Haul Route, subject to approval by the Town and an appraisal of the cost of any road improvements potentially required to accommodate truck traffic.

Haul Route Option 1 will also be seen as a preferable route by current and future residents within the vicinity of the proposed Upper's Quarry, as the Rolling Meadows Secondary Plan area represents a large amount of future residential traffic that will travel along Davis Road and Lundy's Lane. As such, it would be ideal to have truck traffic travel north directly on Thorold Townline Road (Haul Route Option 1), compared to the more circuitous route around the boundary of the future Rolling Meadows area (Haul Route Option 2).

Additionally, the City of Thorold Official Plan (Section B1.8.12.3) Aggregate Resource Protection Policy states the following:

> *"It shall also be recognized that Thorold Townline Road is a Regional arterial road and is the likely aggregate haul route required to serve any future aggregate extraction operation to the east. Accordingly, all studies required by any policy of this Plan shall recognize that Thorold Townline Road is a future aggregate haul route. The haul route shall be restricted from the future extraction operation entrance southerly to Highway 20, a major arterial."*

Based on our interpretation of the policy above, the City prefers the proposed Haul Route Option 1.

Of note, Haul Route Option 1 will direct trucks northbound on Thorold Townline Road through a non-residential area, however, a causeway has been constructed along Thorold Townline Road to cross a waterway immediately south of Beaverdams Road. Depending on the structural properties of the causeway, improvements may need to be made in order to sustain the regular truck traffic associated with the proposed Upper's Quarry. Before the choice of haul route is finalized, it is recommended that Walker Aggregates Inc. and the Town perform a review of the existing load capacity of Thorold Townline Road in order to determine if any upgrades are required, and if so, what cost would be associated with the upgrades. If it is found that upgrades are required, it should be determined if the upgrades would be needed to service the future Rolling Meadows development regardless of any Upper's Quarry operations. The cost of the roadway upgrades should be assigned proportionately to the parties that will derive direct benefits from the upgrades.

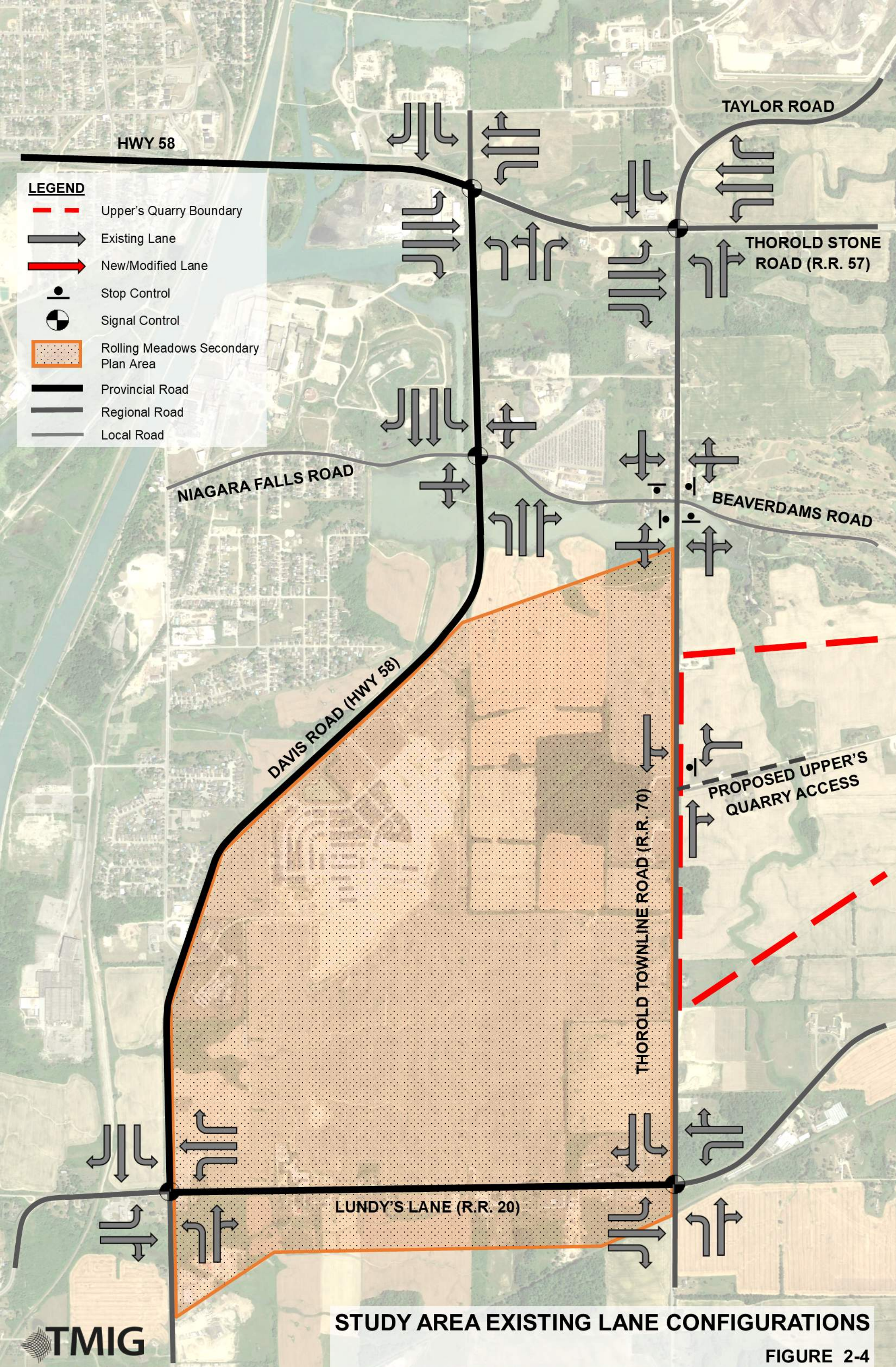
As Haul Route Option 1 via Thorold Townline to the north has been identified as the preferred haul route, future total traffic operations were analyzed for Haul Route Option 1 only.

2.6 Study Area Intersections

The following study area intersections were analyzed:

- Thorold Townline Road at Thorold Stone Road
- Thorold Townline Road at Beaverdams Road
- Thorold Townline Road at Upper's Lane (proposed Upper's Quarry access via Upper's Lane)
- Thorold Townline Road at Lundy's Lane
- Davis Road at Thorold Stone Road
- Davis Road at Beaverdams Road
- Davis Road at Lundy's Lane

The existing lane configurations at each study area intersection and the extent of the study area can be seen in **Figure 2-4**.



TMIG

STUDY AREA EXISTING LANE CONFIGURATIONS

FIGURE 2-4

2.7 Baseline Traffic Volumes

Turning movement counts were commissioned by TMIG for study intersections identified in **Section 2.6**. Weekday a.m. and p.m. peak period counts were collected twice for each study location over two days. Count data was collected on June 14 and June 19, 2018. Traffic volumes from the two surveys were then averaged to establish baseline volumes for existing conditions. Count data collected at study intersections over the two day period is provided in **Appendix B**.

Baseline existing weekday a.m. and p.m. peak hour volumes are shown in **Figure 2-5**.

2.8 Upper's Lane Quarry Access Considerations

Upper's Lane is a rural public road that operates in a general east-west direction and provides access between Thorold Townline Road and Beechwood Road. Upper's Lane bisects the land owned by Walker Aggregates Inc. that will form the proposed Upper's Quarry.

Although the road is open to the public, negligible existing traffic utilizes the road, as evidenced by the volumes recorded at the intersection of Thorold Townline and Upper's Lane. The a.m. peak hour records a total of 1 inbound and 1 outbound vehicle, and the p.m. peak hour records a total of 2 inbound and 1 outbound vehicles (refer to **Figure 2-5**). It is noted that these traffic counts were taken when Bible Baptist Church was still being accessed from Upper's Lane. The access to Bible Baptist Church was re-located and only has access points to Beechwood Road, resulting in minimal traffic expected to access the church property via Upper's Lane given the surrounding land uses and alternative routes to the church from populated areas.

Figure 2-5 identifies the intersection of Upper's Lane and Thorold Townline Road as the location of the "Proposed Upper's Quarry Access", as although Upper's Lane is a public road and is not considered to be the Quarry's physical entrance, this intersection represents the primary point at which the proposed quarry traffic will enter and exit the broader study area road network and interact with non-quarry traffic sources. In other words, regardless as to where the access to the proposed quarry is physically located along Upper's Lane, all property (and access points) along the Upper's Lane corridor is now owned by the applicant and minimal public traffic is expected to interact with proposed quarry traffic along Upper's Lane.

2.9 Existing Quarry Operations

Traffic generated by Walker Brothers Quarry (WBQ) located at 2800 Thorold Townline Road, north of Thorold Stone Road, was captured by the weekday a.m. and p.m. peak period turning movement counts collected at the study area intersections.

It is expected the WBQ will be depleted in +/-10 years. Ideally Walker Aggregates would prefer to have +/-5 years to transition between the WBQ and Uppers Quarry so production at Uppers Quarry can begin lower than maximum permitted (when operations are at the surface) and scale up when operations are deeper into the quarry.

As result, the forecasted total truck volumes on the road network contained herein provides a more conservative analysis and is expected to have less of an impact on the operations of the study intersections than reported.

3 FUTURE BACKGROUND CONDITIONS

3.1 Study Horizon Years

The analysis considers future background traffic conditions at planning horizon years of 2025 and 2035. For analysis purposes, it is assumed that the proposed Upper's Quarry will be fully operational by the 2025 study horizon year.

3.2 Study Area Road Network Improvements

There are no planned changes to the existing local road network in the immediate vicinity of the proposed Upper's Quarry.

Niagara Region's 2017 Transportation Master Plan (TMP) identified capacity improvements to Highway 20 (Lundy's Lane) on the capital works list, however, these improvements to Highway 20 have not yet been placed in the capital budget. The type of capacity improvements were not detailed in the TMP, as the improvements are not planned until sometime between the years of 2032 and 2041. The improvements will occur between Kottmeier Rd (west of the Welland Canal) and Davis Road. Given that the improvements fall outside of the immediate study area and could potentially be completed beyond the 2035 study horizon year, no capacity improvements to Highway 20 were assumed as a conservative measure.

3.3 Future Background Developments

3.3.1 Rolling Meadows Development

The Neighbourhoods of Rolling Meadows Secondary Plan was first approved in 2000, was updated in 2007 to conform to the Provincial Growth Plan, and was later integrated into the City of Thorold's OP in 2015. The Rolling Meadows Secondary Plan Area is generally bounded by Thorold Townline Road to the east, Davis Road to the west, Lundy's Lane to the south, and a hydro corridor to the north (south of Beaverdams Road). Schedule A-3 of the City's OP outlines the planned Land Uses of the Rolling Meadows Secondary Plan area, and is provided in **Figure 3-1.**

According to the *Rolling Meadows Development Traffic Impact Study* dated October 31st, 2018, the Rolling Meadows development covers approximately 160 hectares of land within the City of Thorold and is,

> *"… a proposed multi-phase development consisting of primarily residential land uses, including single-family homes, townhouses, medium density units and high density units. A total of approximately 2,099 residential units are currently proposed. Commercial/Retail areas totaling a gross floor area (GFA) of approximately 240,800 ft^2 are proposed with the majority situated along the Highway 20 frontage with some located centrally within the neighbourhood. Two institutional blocks are also proposed; assumed to be Elementary Schools accommodating up to 300 students each."*

Given the wide range of uses within the proposed Rolling Meadows development, TMIG did not generate the background traffic of the development from first principles in favour of adopting the site traffic volumes detailed in the 2018 Rolling Meadows traffic study to remain consistent with traffic modeling efforts that have already been undertaken.

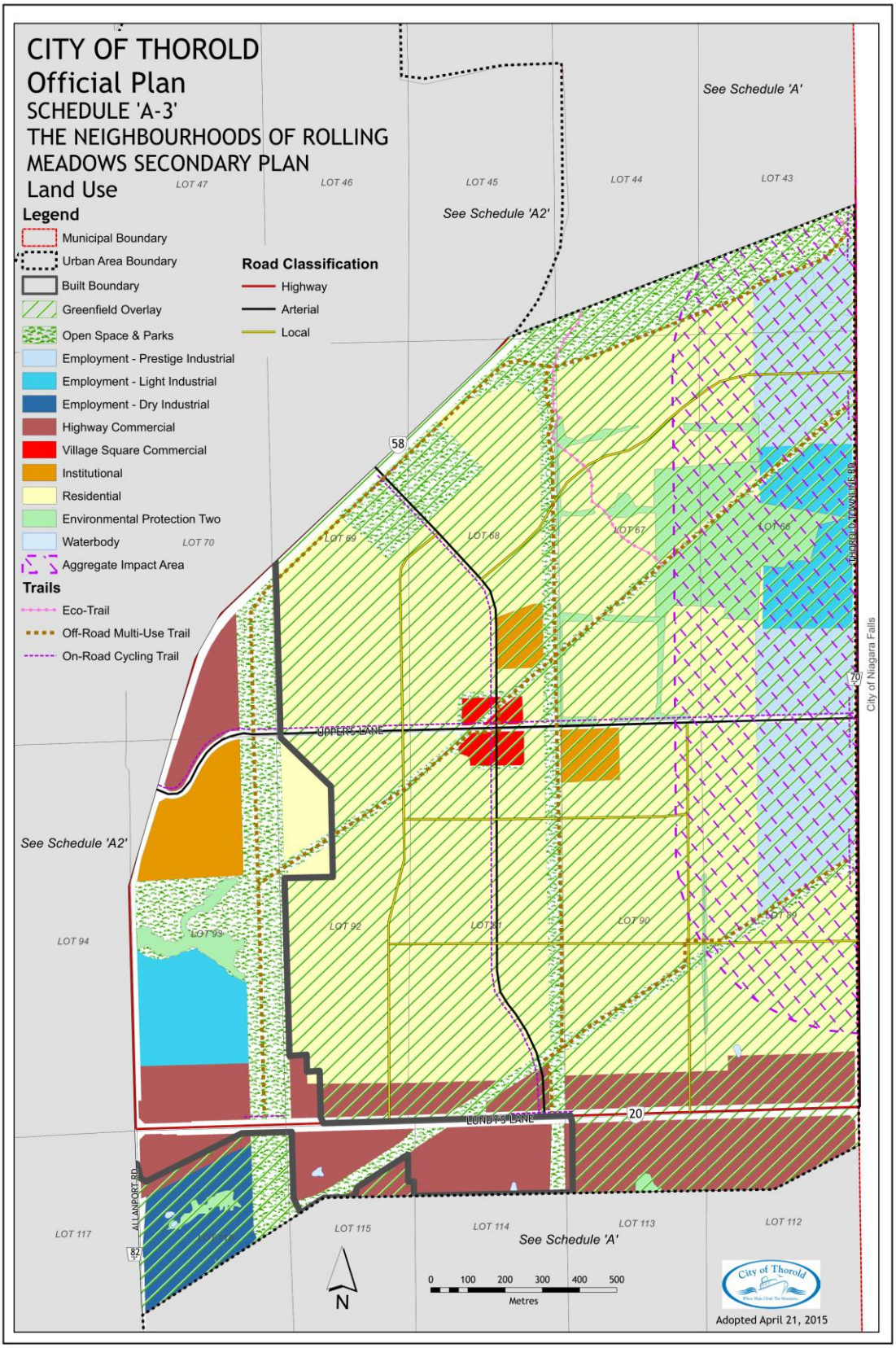
The site traffic assignment developed for the Rolling Meadows traffic report was generally maintained, however, the intersections of Davis Road and Thorold Townline at Thorold Stone Road were not included within the Rolling Meadows study area. A significant percentage of Rolling Meadows site traffic, 49%, was assigned to/from the north via Davis Road, however, the distribution of the site traffic at the intersection of Davis Road and Thorold Stone Road is unknown. Due to the high delays observed under future background traffic conditions at the Davis Road and Thorold Townline at Thorold Stone Road intersection, TMIG reassigned some of this northbound traffic (14% of total traffic) to an alternate routing via Lundy's Lane to the

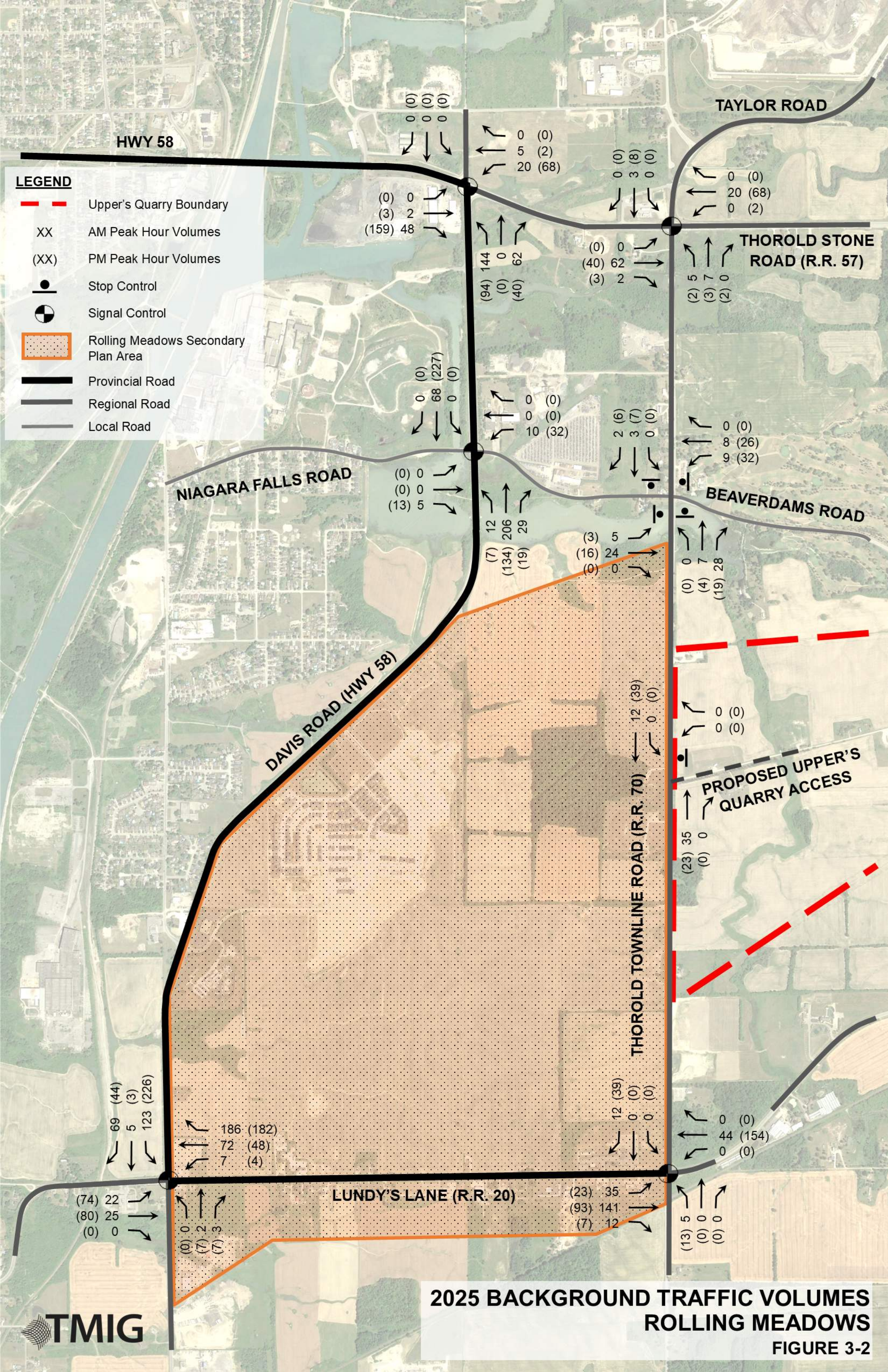
west, assuming that a large portion of the 49% of Rolling Meadows traffic that travels north on Davis Road is ultimately bound for Highway 406, which is also accessible via Lundy's Lane.

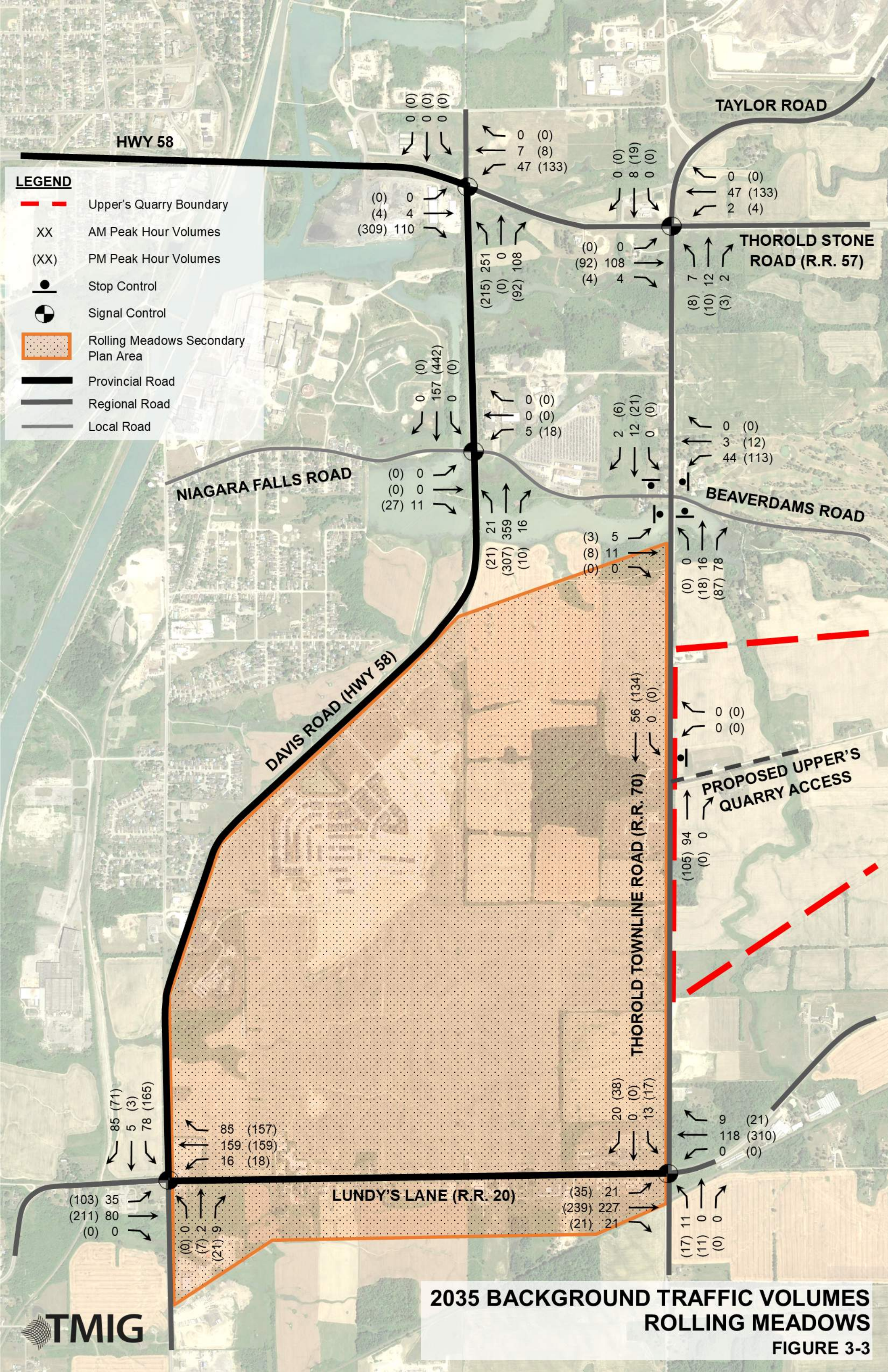
The Rolling Meadows development is proposed to be constructed in five phases. Phases 1 through 5 are proposed to be completed in 2019, 2021, 2023, 2028, and 2030, respectively. Accordingly, site traffic generated by Phases 1 through 3 was included as background traffic for the 2025 planning horizon, and the total site traffic generated by Phases 1 through 5 was included as background traffic for the 2035 planning horizon.

Figures 3-2 and **3-3** provide the weekday a.m. and p.m. peak hour site traffic volumes produced by the Rolling Meadows development by 2025 and 2035, respectively.

Figure 3-1 Rolling Meadows Secondary Plan Land Uses




LEGEND
Upper's Quarry Boundary
XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes
Stop Control
Signal Control
Rolling Meadows Secondary Plan Area
Provincial Road
Regional Road
Local Road
HWY 58
TAYLOR ROAD
THOROLD STONE ROAD (R.R. 57)
NIAGARA FALLS ROAD
BEAVERDAMS ROAD
DAVIS ROAD (HWY 58)
THOROLD TOWNLINE ROAD (R.R. 70)
PROPOSED UPPER'S QUARRY ACCESS
LUNDY'S LANE (R.R. 20)
0 (0) 0 (0) 0 (0)
0 (0) 5 (2) 20 (68)
0 (0) 3 (8) 0 (0)
0 (0) 20 (68) 0 (2)
(0) 0 (3) 2 (159) 48
(94) 144 (0) 0 (40) 62
(0) 0 (40) 62 (3) 2
(2) 5 (3) 7 (2) 0
0 (0) 68 (227) 0 (0)
0 (0) 0 (0) 10 (32)
2 (6) 3 (7) 0 (0)
0 (0) 8 (26) 9 (32)
(0) 0 (0) 0 (13) 5
12 206 29 (7) (134) (19)
(3) 5 (16) 24 (0) 0
(0) 0 (4) 7 (19) 28
12 (39) 0 (0) 0 (0)
0 (0) 0 (0)
(23) 35 (0) 0
69 (44) 5 (3) 123 (226)
186 (182) 72 (48) 7 (4)
(74) 22 (80) 25 (0) 0
(0) 0 (7) 2 (7) 3
12 (39) 0 (0) 0 (0)
0 (0) 44 (154) 0 (0)
(23) 35 (93) 141 (7) 12
(13) 5 (0) 0 (0) 0
2025 BACKGROUND TRAFFIC VOLUMES
ROLLING MEADOWS
FIGURE 3-2
TMIG



2035 BACKGROUND TRAFFIC VOLUMES
ROLLING MEADOWS

FIGURE 3-3

TMIG

3.3.2 Thorold Townline Road Employment Lands

Approximately 100 acres of future employment lands are located west of Thorold Townline Road (within the Rolling Meadows Secondary Plan area) to the north and south of Upper's Lane. Walker Aggregates Inc. currently owns the majority of these employment lands in addition to the proposed Upper's Quarry.

The City of Thorold's OP (2015) has designated the Thorold Townline Road Employment Lands as a mix of Light Industrial and "Prestige Industrial" land uses. Descriptions of the types of permitted uses allowed on these lands are located in Section B1.8.8 of the Official Plan.

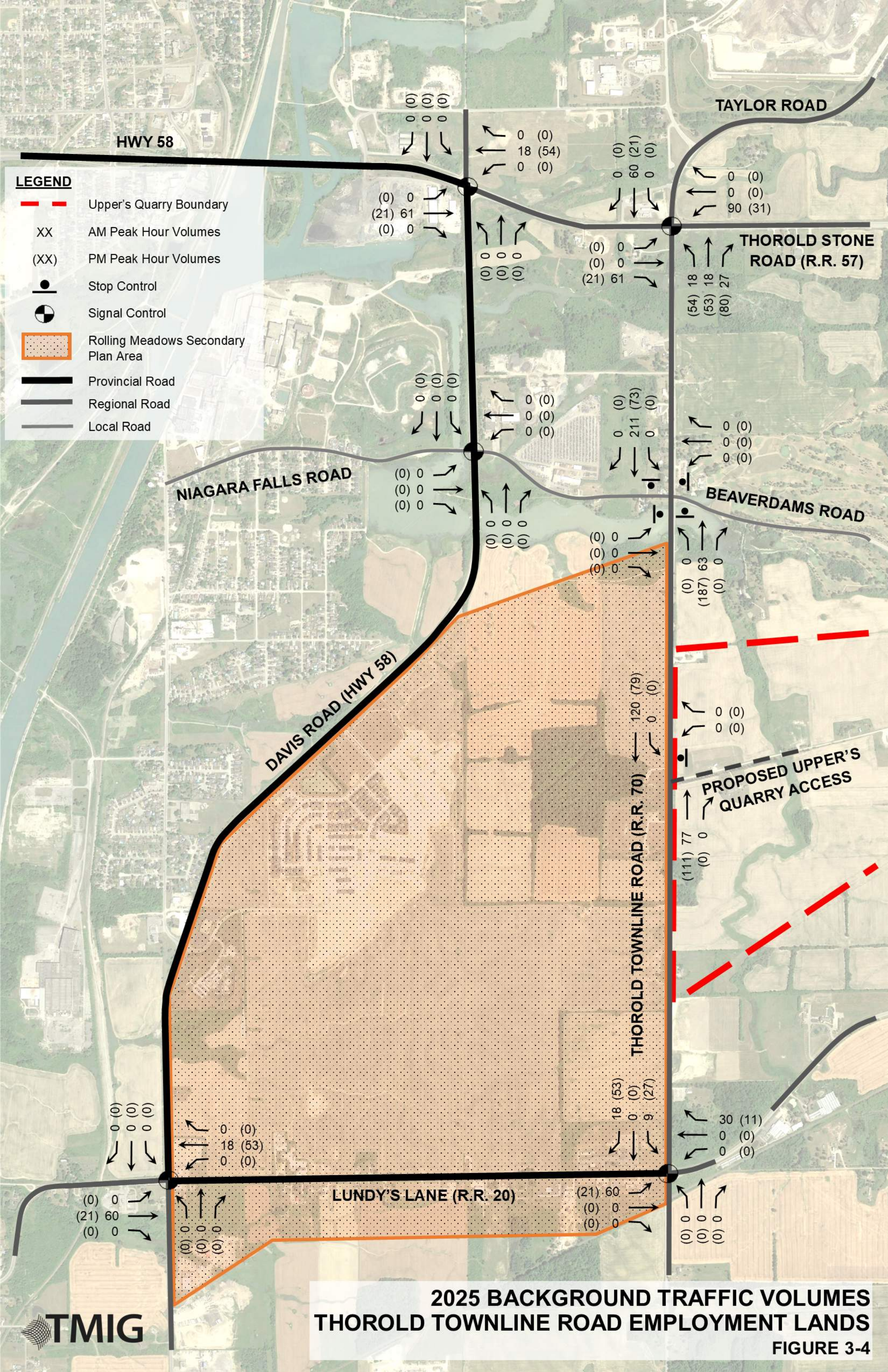
At the time of this report, a specific development timeline for the Thorold Townline Road Employment Lands was not available. For analysis purposes, it was assumed that half of the employment lands would be constructed by the 2025 study horizon year, and that full build-out would occur before the 2035 study horizon year.

Site traffic generated by the future employment lands during the weekday a.m. and p.m. peak hours was estimated by applying the fitted curve equations for Land Use Code (LUC) 130 Industrial Park and LUC 150 Warehousing in Trip Generation, 10th Edition, published by the Institute of Transportation Engineers (ITE). No reductions for transit or active transportation were applied to the base trips generated by the ITE fitted curve equations. **Table 3-1** summarizes the estimated trips generated by the future employment lands.

Table 3-1 Future Thorold Townline Road Employment Lands Site Trip Generation

Parameters	Peak Hour Trip Generation					
	Weekday AM			Weekday PM		
	In	Out	Total	In	Out	Total
	ITE LUC 130 – Industrial Park (50 acres)					
ITE Equation	Ln(T) = 0.78 Ln(X) + 2.82			ln(T) = 0.72 Ln(X) + 3.06		
Gross Trip Rate	5.90	1.20	7.10	1.50	5.64	7.14
Trip Ratio	83%	17%	-	21%	79%	-
Gross Trips	295	60	355	75	282	357
	ITE LUC 150 – Warehousing (50 acres)					
ITE Equation	T = 7.55(X) + 49.85			T = 6.74(X) + 49.08		
Gross Trip Rate	6.14	2.40	8.54	2.70	5.02	7.72
Trip Ratio	72%	28%	-	35%	65%	-
Gross Trips	307	120	427	135	251	386
Total (2035)	**602**	**180**	**782**	**210**	**533**	**743**

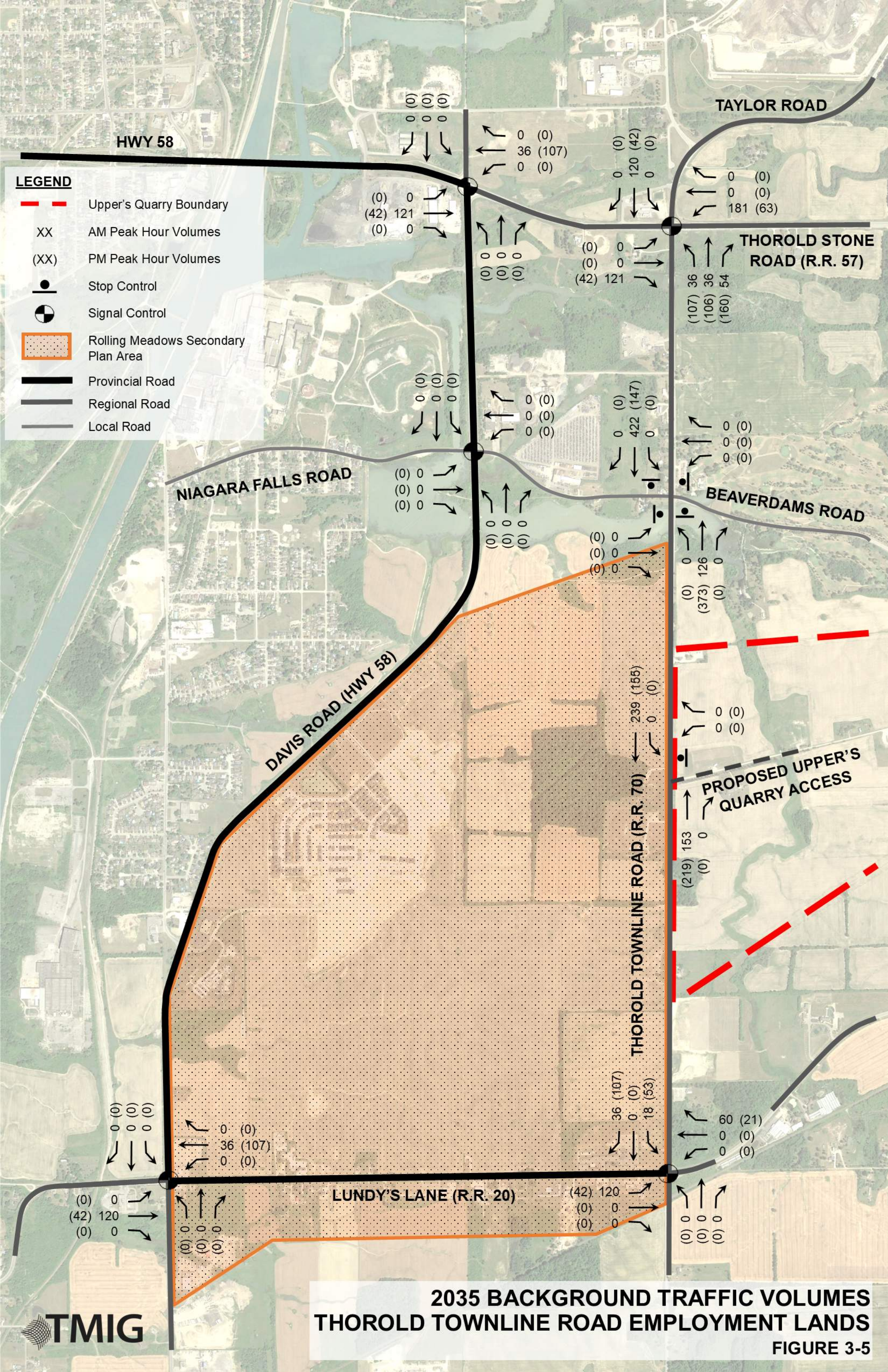
The estimated 2025 and 2035 weekday a.m. and p.m. peak hour trips generated by the Thorold Townline Road Employment Lands were assigned to the study road network as shown in **Figure 3-4** and **Figure 3-5**.



TMIG

2025 BACKGROUND TRAFFIC VOLUMES
THOROLD TOWNLINE ROAD EMPLOYMENT LANDS

FIGURE 3-4



TMIG

2035 BACKGROUND TRAFFIC VOLUMES
THOROLD TOWNLINE ROAD EMPLOYMENT LANDS

FIGURE 3-5

3.4 Future Background Growth

A significant amount of growth is expected to occur within the study area due largely to the implementation of the Rolling Meadows Secondary Plan. By 2035, the Rolling Meadows residential and employment uses (including the Thorold Townline Road Employment Lands) are projected to generate a combined total of 2,254 trips during the weekday a.m. peak hour, and 2,880 trips during the weekday p.m. peak hour. This represents a substantial amount of growth that will occur across the study area road network.

For example, under existing conditions the northbound through movement at the intersection of Davis Road and Beaverdams Road is recorded to have a volume of 267 and 275 vehicles during the existing weekday a.m. and p.m. peak hour, respectively. By 2035, volumes of 626 and 582 vehicles during the weekday a.m. and p.m. peak hours are predicted under future background traffic conditions. This represents an increase of 359 and 307 vehicles from existing traffic conditions. This increase in traffic is equivalent to an annual growth rate of 5.14% in the weekday a.m. peak hour and 4.51% in the weekday p.m. peak hour, calculated based on growth over 17 years (from 2018 to 2035). Similar increases in traffic can be seen throughout the study area road network.

As the Rolling Meadows residential and employment uses (including the Thorold Townline Road Employment Lands) are the only projected developments within the area, and create a substantial growth on the road network (approximately 5% annual growth rate) it was deemed that no further growth on the road network should be applied. As the Rolling Meadows Secondary Plan area provides a large volume of residential and employment traffic, applying additional annual growth on the major roads would over-estimate the future traffic analysis. To ensure an accurate estimation of the future traffic volumes, the annual growth rate applied on the roadways only included the growth due to the substantial, confirmed background traffic.

3.5 Background Traffic Volumes

The 2018 baseline traffic and the background development site traffic were combined to produce the 2025 and 2035 background total weekday a.m. and p.m. peak hour traffic volumes.

The background total (2025 and 2035) traffic volumes are presented in **Figures 3-6** and **3-7**.

2025 BACKGROUND TOTAL TRAFFIC VOLUMES

FIGURE 3-6

TMIG

LEGEND

- Upper's Quarry Boundary
- XX — AM Peak Hour Volumes
- (XX) — PM Peak Hour Volumes
- Stop Control
- Signal Control
- Rolling Meadows Secondary Plan Area
- Provincial Road
- Regional Road
- Local Road

HWY 58

TAYLOR ROAD

THOROLD STONE ROAD (R.R. 57)

NIAGARA FALLS ROAD

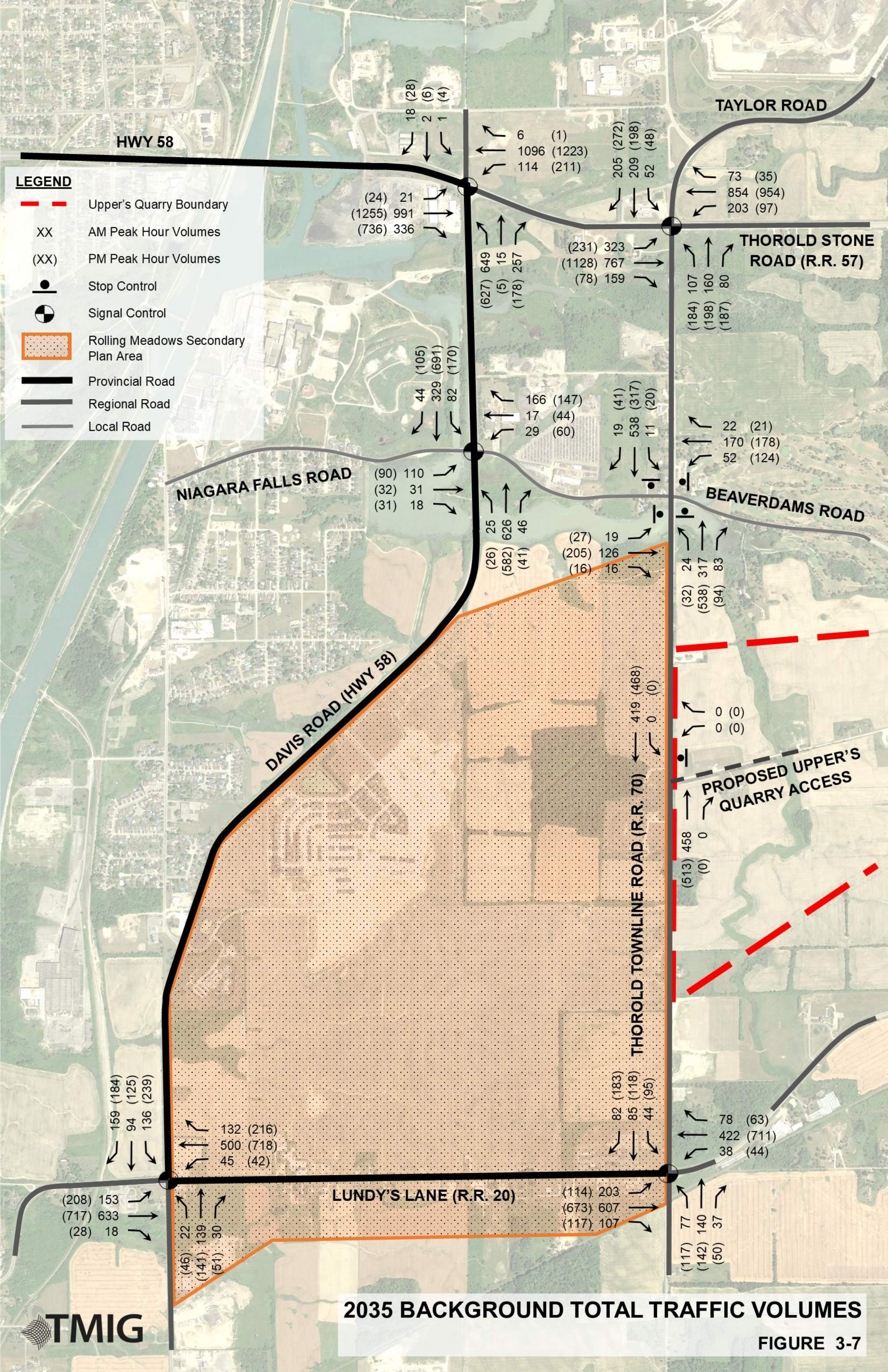
BEAVERDAMS ROAD

DAVIS ROAD (HWY 58)

THOROLD TOWNLINE ROAD (R.R. 70)

LUNDY'S LANE (R.R. 20)

PROPOSED UPPER'S QUARRY ACCESS



2035 BACKGROUND TOTAL TRAFFIC VOLUMES

FIGURE 3-7

4 SITE GENERATED TRAFFIC

For analysis purposes, it is assumed that the proposed Upper's Quarry will be fully operational by the 2025 study horizon year (i.e. ship maximum annual amount of material allowed to be extracted). However, this is understood to be a conservative assumption, and operations will begin lower than the maximum annual limit when quarry operations start at the surface. Over time, once operations are deeper into the quarry, annual extraction levels will increase and approach the maximum annual extraction limit. Accordingly, truck traffic from the quarry will increase over time to eventually meet the maximum operations outlined in this report. In this sense, the 2025 analysis results in particular can be considered conservative in terms of the assumed volume of trucks assigned to the study area road network.

4.1 Site Trip Generation

In order to generate the estimated truck traffic associated with the proposed Upper's Quarry, the following assumptions and base data have been adopted:

- Aggregate Maximum Annual Shipping Limit (License application) = 1,800,000 tonnes
- Asphalt Maximum Annual Shipping Limit (License application) = 400,000 tonnes
- Quarry operations proposed as follows:
  - Shipping hours of 7:00 am to 7:00 pm (12.0 hours) from Monday to Saturday
  - Total of 72 shipping hours a week or an average of 312 hours a month
  - Average truck capacity of 35 tonnes

The quarry is proposed to operate year-round from January to December with variable amounts of material extraction and shipping depending on the month. Based on historical shipping data records archived by TMIG, peak shipping generally occurs during the 'construction season' between the months of May and October. **Table 4-1** summarizes the average monthly breakdown of material extraction based on archived historical data from existing quarry operations in the area. The estimated percentage of total annual material shipped per month was applied to the 1,800,000-tonne annual shipping limit.

Table 4-1 Monthly Material Shipping Estimates

Month	Material Volume Per Month (Percent of Total)
January	3%
February	4%
March	5%
April	7%
May	12%
June	13%
July	11%
August	10%
September	12%
October	10%
November	7%
December	6%
Total	100%

To account for the occasional periods of higher-volume trucking that is likely to occur during high-construction activity (typically between May and October), the trip generation used in the analysis of quarry-generated traffic impacts is based on the peak level of shipping / trucking activity during these busy summertime periods. Based on **Table 4-1**, June represents the peak month during the peak construction season, with approximately 13% of the total annual material shipped during that month. As a conservative measure, an additional 5% was added onto the peak month percentage to account for potential fluctuations in monthly material shipped due to variations in market demand from year to year. Approximately 18% was applied to the annual Upper's Quarry extraction limit, resulting in 330,000 tonnes of the annual aggregate material estimated to be extracted during the peak summer month. This equates to 1,058 tonnes of material per hour based on an average of 312 shipping hours per month. With a capacity of approximately 35 tonnes per truck, 1,058 tonnes of material extraction generate approximately 31 outbound loaded aggregate truck trips per hour (plus the same number of returning trucks).

31 aggregate trucks trips per hour is considered to be a highly conservative estimate of the number of trucks that will be able to leave the quarry each hour, given there is only one weighing scale planned to service all outbound loaded trucks. The quarry is capable of shipping outside of the peak demand period (7:00 a.m. to 7:00 p.m.), which will likely be required during the peak construction season to fulfill all aggregate orders.

During the peak month of demand, approximately 73,333 tonnes of the annual asphalt limit is estimated to be produced by the on-site portable asphalt plant. This equates to 235 tonnes of asphalt per hour based on an average of 312 shipping hours per month. With a capacity of approximately 35 tonnes per truck, 235 tonnes of asphalt generate approximately 7 outbound loaded truck trips per hour (plus the same number of returning trucks).

It has been TMIG's experience that additional peaking occurs during early morning shipping activity, to provide material to construction sites in the morning. As a result, additional outbound loaded trucks could occasionally occur, creating a short-lived 'peak within a peak' condition (generally occurring prior to the adjacent street peak).

To account for this peaking, the a.m. peak hour outbound truck volume was increased by an additional 50%, equating to 47 aggregate and 11 asphalt loaded truck trips per hour. We have adopted this peak trip

generation as the design-hour vehicle volume for our site-impact analysis that follows. As alluded to above, these 'peak within a peak' activities are predicted to occur largely outside of the adjacent street peak hours, so in this respect we are predicting an unlikely (and conservative) scenario of the quarry and adjacent street peaks coinciding.

Aggregate recycling will be part of the tonnage limit under the new Aggregate Resources Act. These loads are already accounted for in the analysis. Extracted aggregate and recycled aggregate will be limited to 1,800,000 tonnes per year.

With adoption of the various peaking factors described above and employed in the regular aggregate shipping activity estimates, we have portrayed a conservative (high) trucking activity level of site-related traffic flows, and therefore impacts on the abutting street system.

It is assumed that approximately 7 aggregate-related and 4 asphalt-related employees will be working at the quarry per shift. Therefore, as a conservative measure, a total of 11 inbound and outbound employee trips were generated during both the a.m. and p.m. peak hours (assuming a shift change occurs within the peak hour of the surrounding road network).

4.2 Traffic Distribution and Assignment

Walker Aggregates Inc. supplied TMIG with two years of historical shipping data from an existing quarry in Niagara Region which is similar in size to the proposed Upper's Quarry. The historical shipping data was used to base the distribution of truck traffic to the broader transportation network outside of the Upper's Quarry study area. The total tonnage shipped each year was separated into the geographical location of the customers, averaged, and the percent of the total aggregate shipped to each location was determined. A summary of the directional distribution of truck traffic for the proposed Upper's Quarry is provided in **Table 4-2**.

Of note, approximately 5% of all truck trips are expected to make use of either Highway 406 or the Queen Elizabeth Way (QEW) to travel south to make local deliveries. A load limit on Lundy's Lane was identified at the Allanburg Bridge that crosses the Welland Canal, and as such, no southbound truck traffic was assigned via Lundy's Lane/R.R. 20 to the west of the subject site.

Table 4-2 Directional Distribution of Upper's Quarry Truck Trips

Direction To / From	% Distribution
North via Taylor Road and QEW	30%
East via Thorold Stone Road and QEW	30%
West via Thorold Stone Road and Hwy 406	40%
Total	**100%**

As discussed in **Section 2.5**, two possible haul routes were identified, however, only the preferred haul route was used for analysis purposes. The preferred haul route (Haul Route Option 1 via Thorold Townline Road) is the most direct and would primarily make use of Thorold Townline Road to access the broader transportation network. The preferred haul route option is described in greater detail below (the inbound trucks will follow the reverse of the outbound route described).

Haul Route Option 1

Outbound aggregate and asphalt trucks were assigned to the road network as follows:

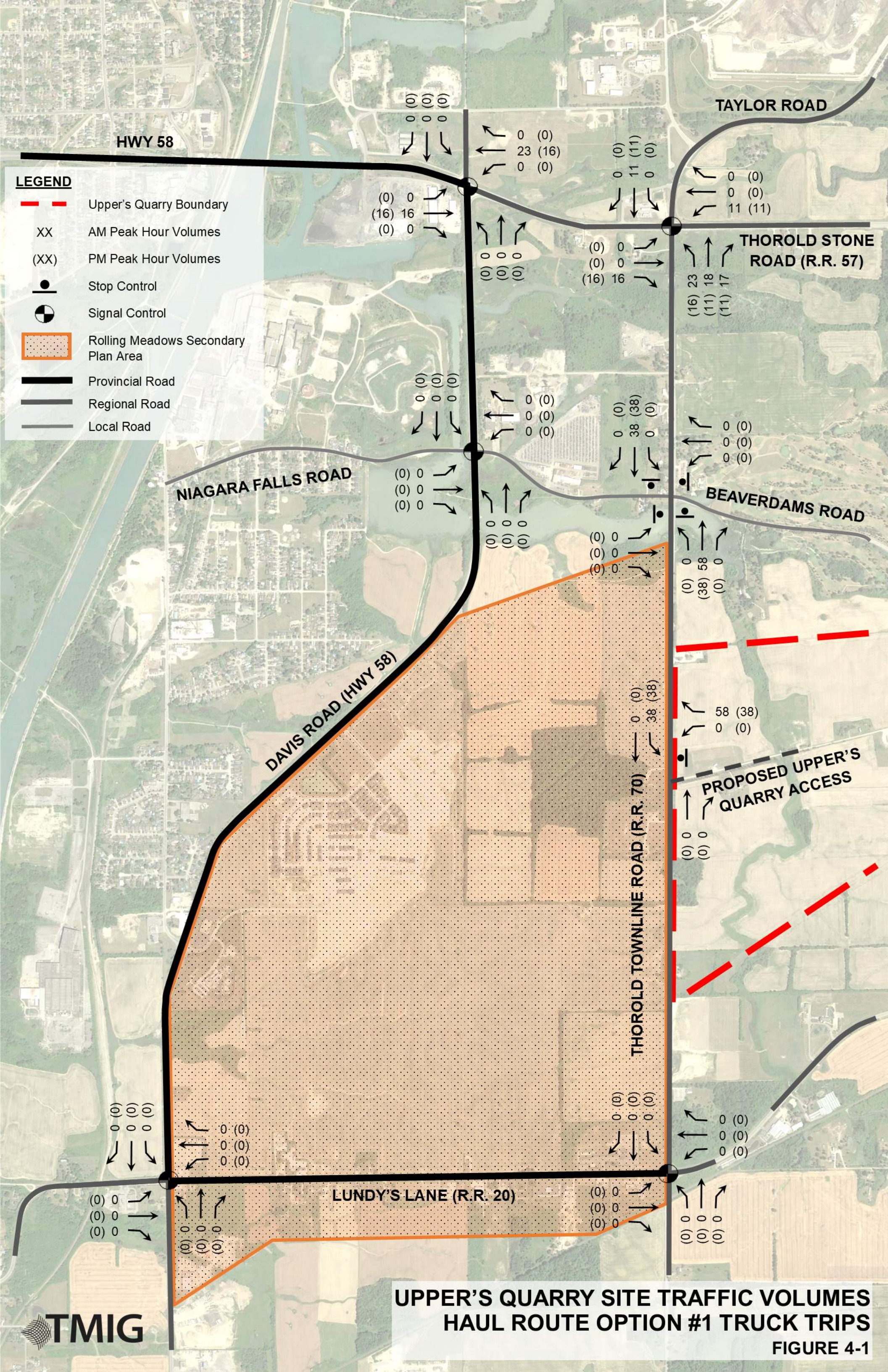
- Right turn out of quarry access to travel north on Thorold Townline Road to Thorold Stone Road
  - Trucks traveling west to Highway 406 turn left onto Thorold Stone Road
  - Trucks traveling north to the QEW via Taylor Road continue northbound at Thorold Stone Road
  - Trucks traveling east to the QEW turn right onto Thorold Stone Road

All of the above-mentioned roadways are either regional or provincial roads, and as such, have been assumed to be designed to road standards acceptable and appropriate for use as aggregate haul routes.

The trip distribution summarized in **Table 4-2** has been applied to the calculated estimates of the peak hourly truck trips as described in **Section 4.1,** and the resultant truck traffic volume assignments are shown in **Figure 4-1** for Haul Route Option 1.

Given the lack of current employment uses in direct vicinity of the subject site, it was determined that Transportation Tomorrow Survey (TTS) Data would not provide a correct representation of traffic patterns for employment trip assignment purposes. The distribution of quarry employee traffic was based on logical routing between the quarry and surrounding major towns and cities that are likely to house quarry employees. The estimated employee site trips in each of the study peak hours are shown in **Figure 4-2**.

The estimated truck and employee site trips were combined to produce the total site-related trips presented in **Figure 4-3**.


LEGEND
Upper's Quarry Boundary
XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes
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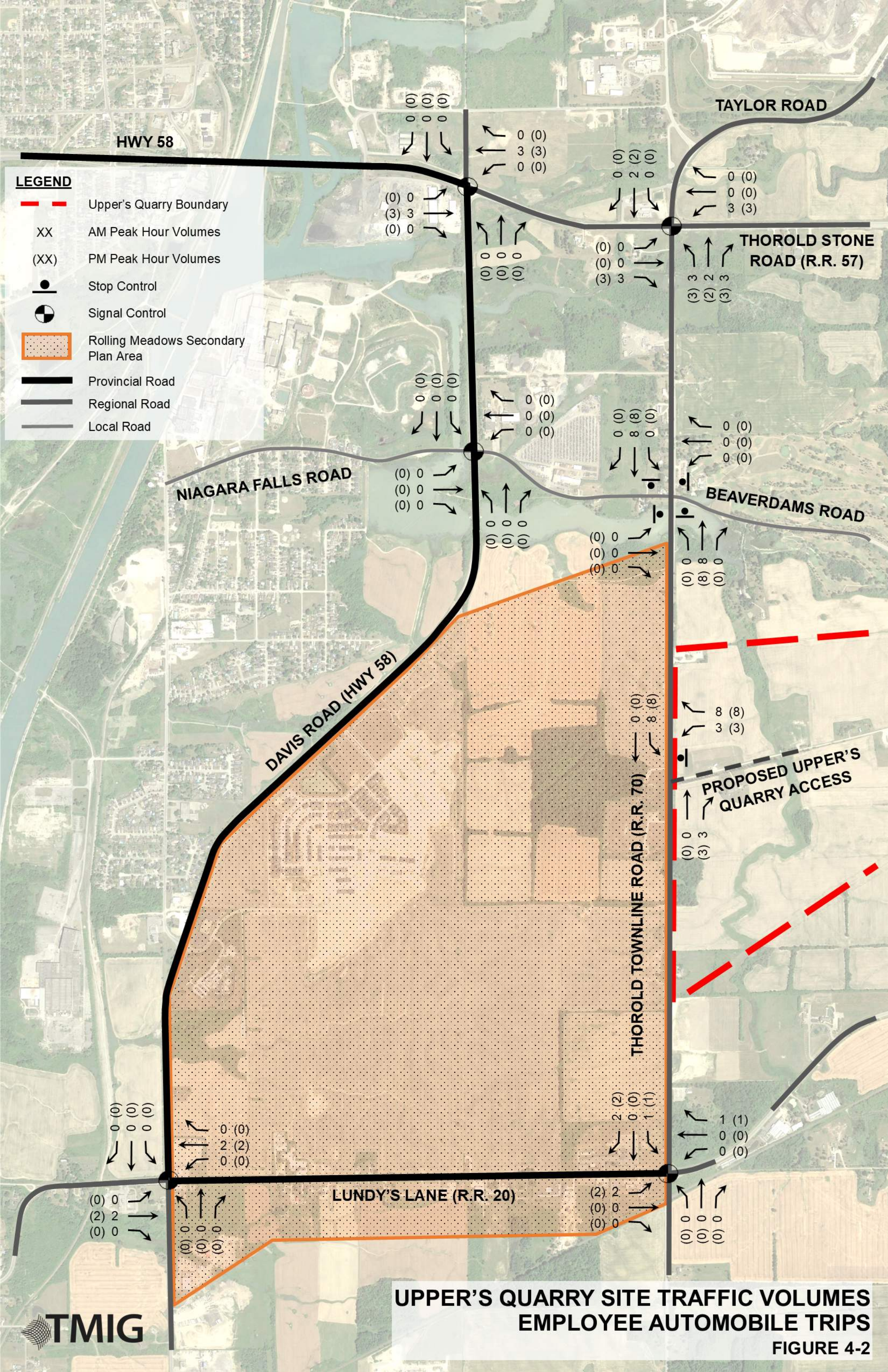
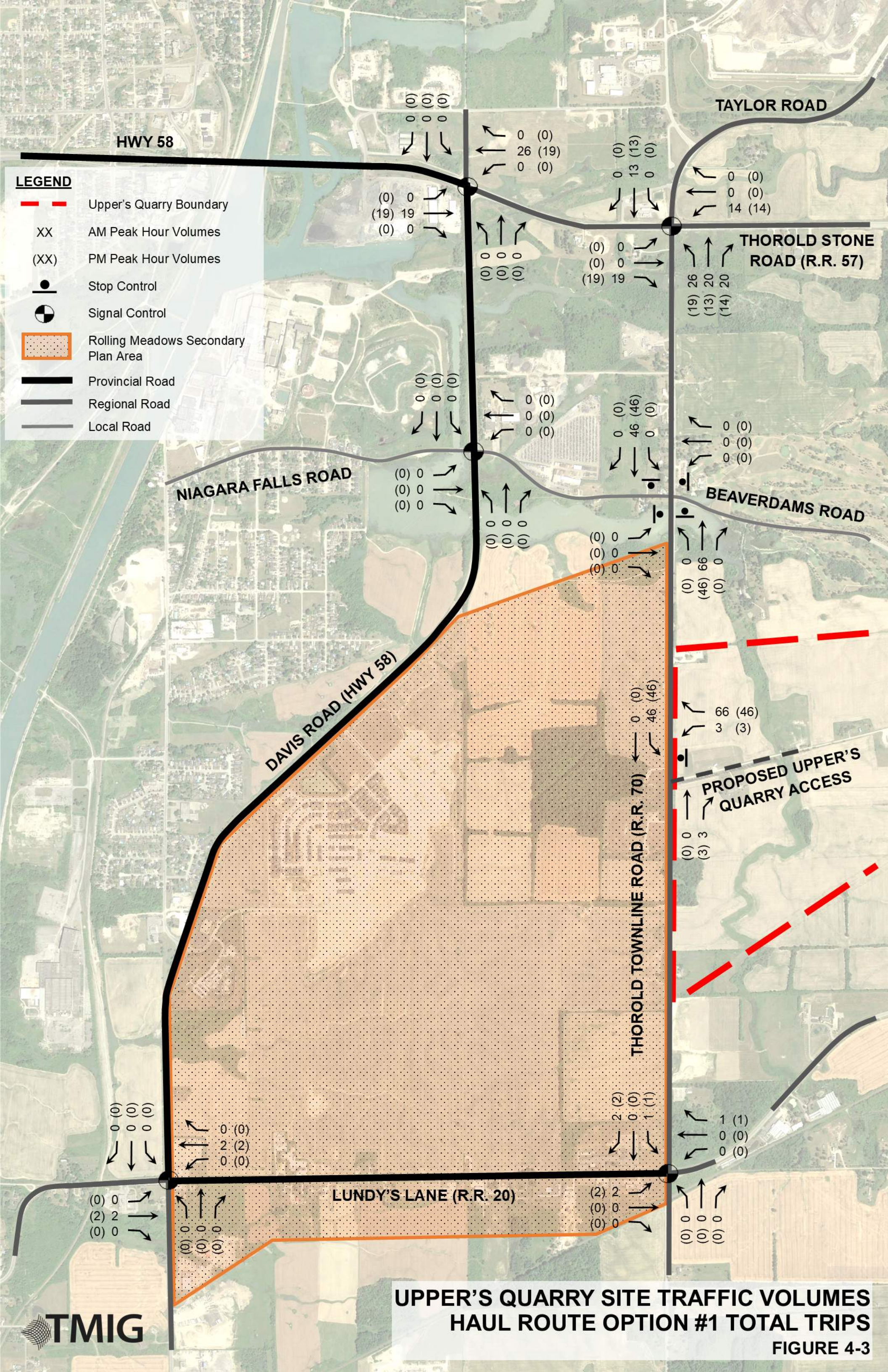
THOROLD TOWNLINE ROAD (R.R. 70)
PROPOSED UPPER'S QUARRY ACCESS
LUNDY'S LANE (R.R. 20)
TMIG
UPPER'S QUARRY SITE TRAFFIC VOLUMES
HAUL ROUTE OPTION #1 TRUCK TRIPS
FIGURE 4-1



UPPER'S QUARRY SITE TRAFFIC VOLUMES
EMPLOYEE AUTOMOBILE TRIPS

FIGURE 4-2

TMIG



TMIG

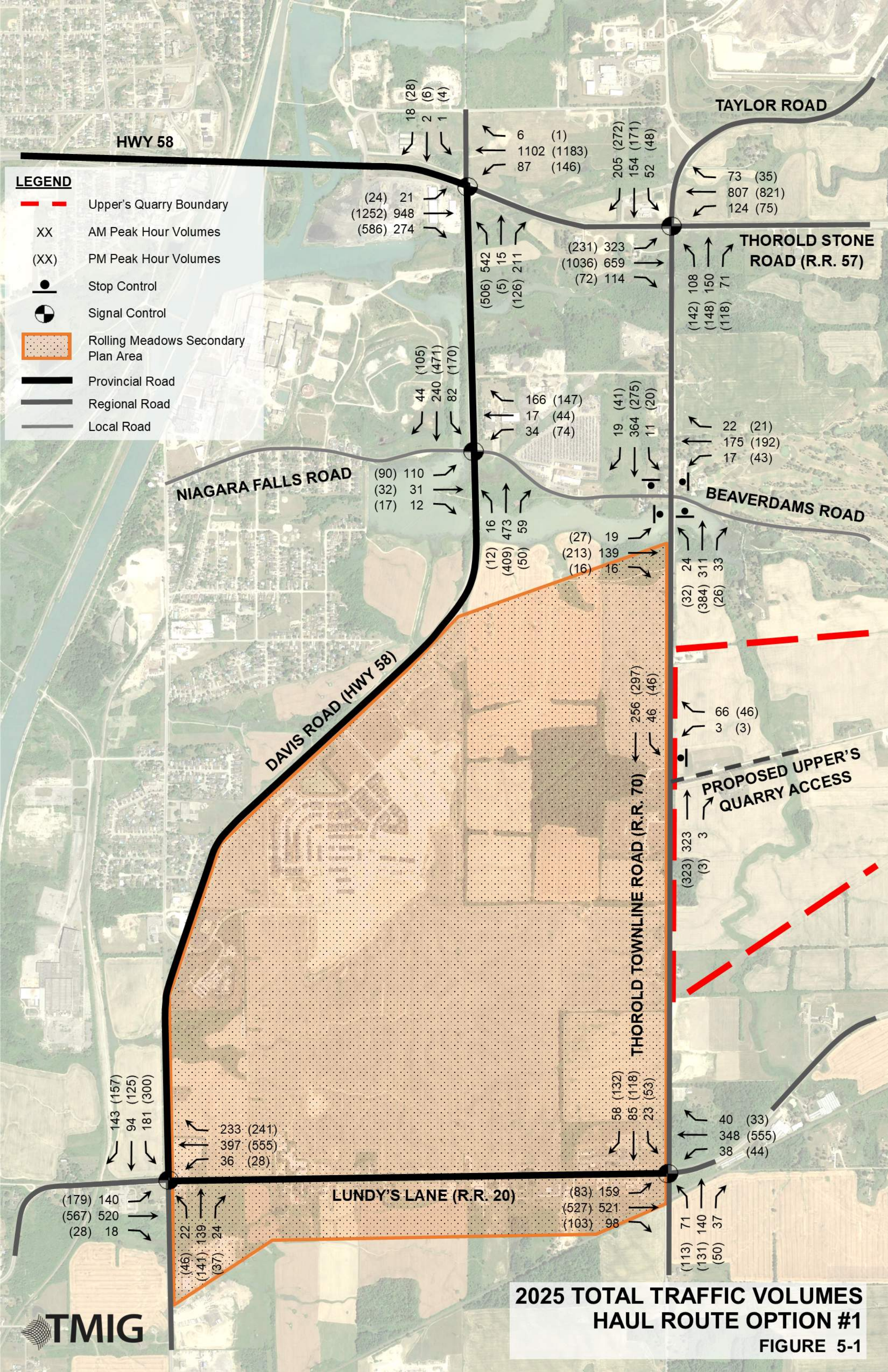
UPPER'S QUARRY SITE TRAFFIC VOLUMES
HAUL ROUTE OPTION #1 TOTAL TRIPS

FIGURE 4-3

5 FUTURE TOTAL TRAFFIC

The future total traffic conditions for the peak study hours in the 2025 and 2035 planning horizons were derived by combining the projected future background traffic with the corresponding estimate of the total site generated traffic (quarry trucks and employees).

Figure 5-1 summarizes the future total traffic volumes for Haul Route Option 1 for the 2025 planning horizon during the weekday a.m. and p.m. peak hours. **Figure 5-2** summarizes the future total traffic volumes for Haul Route Option 1 for the 2035 planning horizon during the weekday a.m. and p.m. peak hours.



2025 TOTAL TRAFFIC VOLUMES
HAUL ROUTE OPTION #1

FIGURE 5-1

TMIG

2035 TOTAL TRAFFIC VOLUMES
HAUL ROUTE OPTION #1
FIGURE 5-2

TMIG

LEGEND

- Upper's Quarry Boundary
- XX — AM Peak Hour Volumes
- (XX) — PM Peak Hour Volumes
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THOROLD TOWNLINE ROAD (R.R. 70)
LUNDY'S LANE (R.R. 20)
PROPOSED UPPER'S QUARRY ACCESS

18 (28)
2 (6)
1 (4)
6 (1)
1122 (1242)
114 (211)
205 (272)
222 (211)
52 (48)
73 (35)
854 (954)
217 (111)
(24) 21
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82 (170)
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(41)
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(46)
(141)
(51)
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77
140
37
(117)
(142)
(50)

6 CAPACITY ANALYSIS

The capacity analysis identifies how well the intersections and driveways are operating under existing conditions and how they are expected to operate in the future. The analysis contained within this report utilized the Highway Capacity Manual (HCM) 2000 techniques within the Synchro Version 10 Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the volume versus the capacity of each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement. Queuing characteristics are reported as the predicted 95th percentile queue for each turning movement.

Synchro Calibration Volume and Lane Settings:

The ideal saturated flow (flow rate) used in the analysis follows the Synchro 10 recommended default of 1,900 vphpl.

The peak hour factor (PHF) of the flow rate has been calculated to provide the most accurate representation of the peak 15-minutes for the study times. The specific calculated peak hour factors used are provided in **Table 6-1**.

Table 6-1 Study Area Peak Hour Factors

Intersection Name	AM PHF	PM PHF
Davis Road & Thorold Stone Road	0.96	0.95
Davis Rd & Niagara Falls Road /Beaverdams Road	0.95	0.95
Davis Road & Lundy's Lane	0.94	0.93
Thorold Townline Road /Taylor Road & Thorold Stone Road	0.96	0.96
Thorold Townline Road & Lundy's Lane	0.93	0.91
Thorold Townline Road & Beaverdams Road	0.92	0.93
Thorold Townline Road & Upper's Lane	0.93	0.91

For the purpose of the future site impact analyses, the heavy vehicle percentages calculated from the existing turning movement counts and applied to the Synchro analysis were updated for the 2025 and 2035 future total scenarios. The heavy vehicle percentages were increased for movements throughout the study area network to which proposed Upper's Quarry aggregate and asphalt traffic will be added to, as per the preferred haul route. The increased percentages were calculated by estimating the volume of heavy vehicles performing a given movement under 2025 or 2035 future background conditions (existing heavy vehicle percentage assumed), adding the estimated volume of heavy vehicle site traffic, and finally dividing the 2025 or 2035 future total heavy vehicle volumes by the total mixed-traffic volume for each 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 shall be highlighted (in bold). 'Critical' intersections and movements include:

- through, shared through, or right-turn movements with a v/c ratio greater than 0.85 at signalized intersections
- exclusive turning movements with a v/c ratio greater than 0.90 at signalized intersections
- queue length of an individual movement is projected to exceed available turning lane storage at 95th percentile volumes at signalized intersections
- movements at unsignalized intersections that are expected to operate at LOS 'D' or worse, and/or the estimated 95th percentile queue length exceeds the available storage space

The following tables summarize the Synchro/HCM capacity results for the study intersections during the weekday a.m. and p.m. peak hours under existing, future background, and future total traffic conditions (for both haul route options). Detailed Synchro intersection capacity sheets are provided in **Appendix C.**

6.1 Davis Road at Thorold Stone Road

Signalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-2** for the intersection of Davis Road at Thorold Stone Road.

Table 6-2 Capacity Analysis of Davis Road at Thorold Stone Road

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing	*Overall*	*0.59*	*22*	*C*	*0.62*	*23*	*C*
	EBL	0.13	13	B	0.19	16	B
	EBT	0.49	16	B	0.67	20	C
	EBR	0.20	13	B	0.40	16	B
	WBL	0.31	17	B	0.66	42	D
	WBTR	0.60	18	B	0.62	19	B
	NBL	0.66	45	D	0.66	45	D
	NBLT	0.66	45	D	0.65	45	D
	NBR	0.11	34	C	0.06	35	C
	SBL	0.02	50	D	0.04	48	D
	SBT	0.03	50	D	0.06	48	D
	SBR	0.01	50	D	0.02	48	D
Future Background (2025)	*Overall*	0.66	35	D	0.72	33	C
	EBL	0.13	21	C	0.18	23	C
	EBT	0.64	28	C	0.76	32	C
	EBR	0.29	22	C	0.62	30	C
	WBL	0.36	32	C	0.69	31	C
	WBTR	0.60	34	C	0.59	19	B
	NBL	0.80	56	E	0.77	64	E
	NBLT	0.81	58	E	0.79	65	E
	NBR	0.15	37	D	0.09	45	D
	SBL	0.02	56	E	0.05	65	E
	SBT	0.04	57	E	0.08	65	E
	SBR	0.01	56	E	0.02	64	E

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Future Total (2025) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.66	29	C	0.77	34	C
	EBL	0.14	15	B	0.20	23	C
	EBT	0.54	19	B	0.82	33	C
	EBR	0.24	15	B	0.62	28	C
	WBL	0.47	28	C	0.77	51	D
	WBTR	0.63	25	C	0.63	24	C
	NBL	0.78	55	D	0.80	60	E
	NBLT	0.80	56	E	0.82	62	E
	NBR	0.15	37	D	0.09	40	D
	SBL	0.02	56	E	0.04	55	D
	SBT	0.04	57	E	0.07	55	D
	SBR	0.01	56	E	0.02	54	D
Future Background (2035)	*Overall*	0.74	41	D	**0.86**	46	D
	EBL	0.15	24	C	0.23	28	C
	EBT	0.72	32	C	**0.91**	44	D
	EBR	0.38	26	C	0.84	44	D
	WBL	0.52	43	D	0.88	67	E
	WBTR	0.64	41	D	0.66	29	C
	NBL	0.88	64	E	**0.92**	76	E
	NBLT	**0.89**	65	E	**0.94**	78	E
	NBR	0.18	36	D	0.13	39	D
	SBL	0.02	56	E	0.04	55	D
	SBT	0.04	57	E	0.07	55	D
	SBR	0.01	56	E	0.02	54	D
Future Total (2035) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.75	33	C	**0.87**	46	D
	EBL	0.16	17	B	0.24	29	C
	EBT	0.59	21	C	**0.94**	47	D
	EBR	0.31	17	B	0.84	45	D
	WBL	0.73	47	D	0.88	65	E
	WBTR	0.67	29	C	0.68	30	C
	NBL	0.87	61	E	**0.92**	76	E
	NBLT	**0.87**	63	E	**0.94**	78	E
	NBR	0.18	35	D	0.13	39	D
	SBL	0.02	56	E	0.04	55	D
	SBT	0.04	57	E	0.07	55	D
	SBR	0.01	56	E	0.02	54	D

Under existing conditions, the intersection operates well during the a.m. and p.m. peak hours with overall LOS 'C' and v/c ratios of 0.59 and 0.62 during the a.m. and p.m. peak hours, respectively, indicating reserve capacity. Individual movements operate with v/c ratios of 0.67 or less and LOS 'D' or better.

Under 2025 background conditions, the intersection is expected to continue operating at acceptable levels with overall v/c ratios of 0.66 and 0.72 with LOS 'D' and 'C' during the a.m. and p.m. peak hours, respectively. However, some individual movements are predicted to experience longer delays (LOS 'E'), during the a.m. and p.m. peak hours compared to existing conditions. Individual movements are predicted to operate with v/c ratios of 0.80 or less, indicating reserve capacity remains.

Based on 2025 future total traffic conditions for Haul Route Option 1, the intersection is expected to continue operating at acceptable levels with an overall LOS 'C' and v/c ratios of 0.66 and 0.77 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to experience LOS 'E' or better and v/c ratios of 0.82 or less.

The intersection is expected to operate at acceptable levels under 2035 background conditions with overall LOS 'D' and v/c ratios of 0.74 and 0.86 during the a.m. and p.m. peak hours, respectively. During the p.m. peak hour, the northbound left and shared left/through movements are approaching capacity (v/c of 0.92 and 0.94), however, both movements still operate with acceptable delays and LOS 'E'. The eastbound through movement is also approaching capacity during the p.m. peak hour, predicted to operate with a v/c ratio of 0.91, however, it is expected to operate with acceptable delay and LOS 'D'.

Under 2035 future total traffic conditions for Haul Route Option 1, the intersection is expected to operate at acceptable levels with overall LOS 'C' and 'D' and v/c ratios of 0.75 and 0.87 during the a.m. and p.m. peak hours, respectively. During the p.m. peak hour, the northbound left and shared left/through movements are approaching capacity (v/c of 0.92 and 0.94), however, both movements still operate with acceptable delays and LOS 'E'. The eastbound through movement continues to approach capacity during the p.m. peak hour, predicted to operate with a v/c ratio of 0.94, however, it is expected to continue operating with acceptable delay and LOS 'D'.

Overall, this intersection is expected to have acceptable future operations despite some movements approaching capacity in 2035, and there are no required geometric improvements to the intersection.

6.2 Davis Road at Niagara Falls Road/Beaverdams Road

Signalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-3** for the intersection of Davis Road at Niagara Falls Road/Beaverdams Road.

Table 6-3 Capacity Analysis of Davis Road at Niagara Falls Road/Beaverdams Road

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing	*Overall*	*0.28*	*22*	*C*	*0.35*	*23*	*C*
	EBLTR	0.24	11	B	0.20	12	B
	WBLTR	0.16	10	A	0.23	12	B
	NBL	0.02	26	C	0.02	24	C
	NBTR	0.37	29	C	0.32	26	C
	SBL	0.31	30	C	0.58	33	C
	SBT	0.23	28	C	0.26	26	C
	SBR	0.03	26	C	0.07	24	C
Future Background (2025)	*Overall*	0.37	26	C	0.47	25	C
	EBLTR	0.24	11	B	0.23	14	B
	WBLTR	0.17	11	B	0.32	15	B
	NBL	0.07	27	C	0.05	23	C
	NBTR	0.64	34	C	0.44	27	C
	SBL	0.51	36	D	0.72	41	D
	SBT	0.31	29	C	0.46	28	C
	SBR	0.03	27	C	0.07	24	C

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Future Total (2025) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.37	26	C	0.47	25	C
	EBLTR	0.24	11	B	0.23	14	B
	WBLTR	0.17	11	B	0.32	15	B
	NBL	0.07	27	C	0.05	23	C
	NBTR	0.64	34	C	0.44	27	C
	SBL	0.51	36	D	0.72	41	D
	SBT	0.31	29	C	0.46	28	C
	SBR	0.03	27	C	0.07	24	C
Future Background (2035)	*Overall*	0.43	26	C	0.53	25	C
	EBLTR	0.27	14	B	0.27	17	B
	WBLTR	0.17	13	B	0.32	18	B
	NBL	0.10	24	C	0.13	21	C
	NBTR	0.70	32	C	0.51	25	C
	SBL	0.56	35	D	0.79	46	D
	SBT	0.36	27	C	0.57	26	C
	SBR	0.03	23	C	0.07	20	B
Future Total (2035) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.43	27	C	0.53	25	C
	EBLTR	0.27	14	B	0.27	17	B
	WBLTR	0.19	13	B	0.32	18	B
	NBL	0.11	25	C	0.13	21	C
	NBTR	0.71	33	C	0.51	25	C
	SBL	0.57	36	D	0.79	46	D
	SBT	0.36	27	C	0.57	26	C
	SBR	0.03	24	C	0.07	20	B

Under existing conditions, the intersection operates very well during the a.m. and p.m. peak hours with overall LOS 'C' and v/c ratios of 0.28 and 0.35 during the a.m. and p.m. peak hours, respectively, indicating significant reserve capacity.

Under 2025 background conditions, the intersection is expected to continue operating at acceptable levels, maintaining an overall LOS 'C' during peak hours with predicted overall v/c ratios of 0.37 and 0.47 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to operate with v/c ratios of 0.72 or less and experience LOS 'D' or better during both peak hours.

Based on 2025 future total traffic conditions for Haul Route Option 1, the intersection is expected to continue operating at acceptable levels with an overall LOS 'C' and v/c ratios of 0.37 and 0.47 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to continue experiencing LOS 'D' or better and operate with v/c ratios of 0.72 or less.

The intersection is expected to operate at acceptable levels under 2035 background conditions with overall LOS 'C' and v/c ratios of 0.43 and 0.53 during the a.m. and p.m. peak hours, respectively, indicating reserve capacity remains. Individual movements are predicted to experience LOS 'D' or better and v/c ratios of 0.79 or less.

Under 2035 future total traffic conditions for Haul Route Option 1, the intersection is expected to operate at acceptable levels with overall LOS 'C' and v/c ratios of 0.43 and 0.53 during the a.m. and p.m. peak hours, respectively. Similar to 2035 background conditions, reserve capacity remains, and individual movements are predicted to experience LOS 'D' or better and operate with v/c ratios of 0.79 or less.

Overall, this intersection is expected to have acceptable future operations and there are no required geometric improvements to the intersection.

6.3 Davis Road at Lundy's Lane

Signalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-4** for the intersection of Davis Road at Lundy's Lane.

Table 6-4 Capacity Analysis of Davis Road at Lundy's Lane

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing	*Overall*	*0.43*	*15*	*B*	*0.46*	*20*	*C*
	EBL	0.19	6	A	0.36	19	B
	EBTR	0.39	8	A	0.61	21	C
	WBL	0.07	5	A	0.10	14	B
	WBT	0.28	7	A	0.55	20	B
	WBR	0.03	5	A	0.04	13	B
	NBL	0.12	33	C	0.11	20	B
	NBTR	0.60	38	D	0.27	22	C
	SBL	0.36	35	C	0.19	21	C
	SBT	0.35	34	C	0.20	21	C
	SBR	0.06	32	C	0.08	19	B
Future Background (2025)	*Overall*	0.59	18	B	0.78	36	D
	EBL	0.30	10	B	0.77	37	D
	EBTR	0.52	12	B	0.72	29	C
	WBL	0.11	9	A	0.15	28	C
	WBT	0.40	11	B	0.82	44	D
	WBR	0.17	9	A	0.20	45	D
	NBL	0.09	26	C	0.18	40	D
	NBTR	0.44	29	C	0.51	46	D
	SBL	0.76	42	D	0.70	32	C
	SBT	0.27	28	C	0.20	25	C
	SBR	0.11	26	C	0.11	24	C
Future Total (2025) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.59	18	B	0.79	36	D
	EBL	0.30	10	B	0.69	28	C
	EBTR	0.52	12	B	0.68	26	C
	WBL	0.11	8	A	0.14	26	C
	WBT	0.40	11	B	0.78	41	D
	WBR	0.17	8	A	0.19	52	D
	NBL	0.09	27	C	0.19	41	D
	NBTR	0.45	29	C	0.53	48	D
	SBL	0.78	45	D	0.77	39	D
	SBT	0.27	28	C	0.21	27	C
	SBR	0.11	27	C	0.11	26	C
Future Background (2035)	*Overall*	0.62	17	B	**0.94**	39	D
	EBL	0.36	10	A	0.89	58	E
	EBTR	0.59	12	B	0.74	23	C

	WBL	0.16	8	A	0.23	22	C
	WBT	0.48	10	A	**0.87**	42	D
	WBR	0.10	7	A	0.19	34	C
	NBL	0.11	29	C	0.19	41	D
	NBTR	0.54	33	C	0.57	49	D
	SBL	0.71	43	D	**0.91**	71	E
	SBT	0.32	31	C	0.26	34	C
	SBR	0.12	29	C	0.13	32	C
Future Total (2035) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.62	17	B	**0.95**	39	D
	EBL	0.36	10	A	**0.90**	59	E
	EBTR	0.59	12	B	0.75	23	C
	WBL	0.16	8	A	0.23	22	C
	WBT	0.48	10	A	**0.88**	43	D
	WBR	0.10	7	A	0.19	33	C
	NBL	0.11	29	C	0.19	41	D
	NBTR	0.55	33	C	0.57	49	D
	SBL	0.72	43	D	**0.91**	71	E
	SBT	0.32	31	C	0.26	34	C
	SBR	0.12	29	C	0.13	32	C

Under existing conditions, the intersection operates well during the a.m. and p.m. peak hours with overall LOS 'B' and 'C' and v/c ratios of 0.43 and 0.46 during the a.m. and p.m. peak hours, respectively, indicating significant reserve capacity. Individual movements operate with a v/c of 0.61 or less and LOS 'D' or better.

Under 2025 background conditions, the intersection is expected to continue operating at acceptable levels with overall LOS 'B' and 'D' and v/c ratios of 0.59 and 0.78 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to experience LOS 'D' or better and v/c ratios of 0.82.

Based on 2025 future total traffic conditions for Haul Route Option 1, the intersection is expected to continue operating at acceptable levels with overall LOS 'B' and 'D' and v/c ratios of 0.59 and 0.79 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to experience LOS 'D' or better and v/c ratios of 0.78 or less.

The intersection is expected to operate at acceptable levels under 2035 background conditions with overall LOS 'B' and 'D' and v/c ratios of 0.62 and 0.94 during the a.m. and p.m. peak hours, respectively. During the p.m. peak hour, the southbound left movement is approaching capacity (v/c of 0.91), however, the movement operates with acceptable delay and LOS 'E'. All other movements at the intersection experience LOS 'E' or better and v/c ratios of 0.89 or less during both peak hours.

Under 2035 future total traffic conditions for Haul Route Option 1, the intersection is expected to operate at acceptable levels with overall LOS 'B' and 'D' and v/c ratios of 0.62 and 0.95 during the a.m. and p.m. peak hours, respectively. During the p.m. peak hour, the eastbound left and southbound left movements are approaching capacity (v/c ratios of 0.90 and 0.91, respectively), however, the movements operate with acceptable delays and LOS 'E' or better. All other movements at the intersection experience LOS 'E' or better and v/c ratios of 0.88 or less during both peak hours.

Overall, this intersection is expected to have acceptable future operations despite some movements approaching capacity in 2035, and there are no required geometric improvements to the intersection.

6.4 Thorold Townline Road at Thorold Stone Road

Signalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-5** for the intersection of Thorold Townline Road at Thorold Stone Road.

Table 6-5 Capacity Analysis of Thorold Townline Road and Thorold Stone Road

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing	*Overall*	*0.78*	*24*	*C*	*0.73*	*26*	*C*
	EBL	0.69	12	B	0.59	13	B
	EBT	0.28	6	A	0.47	11	B
	EBR	0.03 *(0.04)*	5 *(3)*	A *(A)*	0.02 *(0.03)*	8 *(4)*	A *(A)*
	WBL	0.06	12	B	0.13	16	B
	WBT	0.43	16	B	0.48	19	B
	WBR	0.05	12	B	0.02	14	B
	NBL	**1.03**	168	F	**1.04**	164	F
	NBTR	0.47	43	D	0.24	34	C
	SBL	0.29	41	D	0.17	34	C
	SBTR	0.79	59	E	**0.88**	59	E
Future Background (2025)	*Overall*	0.83	40	D	0.79	35	C
	EBL	0.80	52	D	0.74	28	C
	EBT	0.42	34	C	0.67	29	C
	EBR	0.08 *(0.14)*	68 *(22)*	E *(C)*	0.04 *(0.07)*	19 *(2)*	B *(A)*
	WBL	0.34	20	B	0.34	23	C
	WBT	0.65	34	C	0.65	34	C
	WBR	0.05	24	C	0.02	24	C
	NBL	0.50	33	C	0.59	32	C
	NBTR	0.35	31	C	0.46	34	C
	SBL	0.20	36	D	0.15	30	C
	SBTR	**0.88**	65	E	**0.89**	62	E
Future Total (2025) Haul Route Option 1 (Thorold Townline Road)	*Overall*	**0.87**	45	D	0.82	47	D
	EBL	0.88	68	E	0.76	53	D
	EBT	0.48	39	D	0.69	50	D
	EBR	0.11 *(0.21)*	68 *(24)*	E *(C)*	0.06 *(0.12)*	122 *(25)*	F *(C)*
	WBL	0.42	23	C	0.48	26	C
	WBT	0.74	40	D	0.68	36	D
	WBR	0.05	28	C	0.02	25	C
	NBL	0.56	31	C	0.73	41	D
	NBTR	0.42	29	C	0.54	34	C
	SBL	0.20	35	D	0.15	28	C
	SBTR	**0.88**	64	E	**0.91**	63	E
Future Background (2035)	*Overall*	**0.93**	50	D	**0.91**	57	E
	EBL	**0.93**	79	E	0.87	66	E
	EBT	0.60	43	D	0.79	59	E
	EBR	0.16 *(0.27)*	76 *(24)*	E *(C)*	0.05 *(0.11)*	245 *(20)*	F *(B)*

	WBL	0.74	33	C	0.63	34	C
	WBT	0.82	45	D	0.83	43	D
	WBR	0.05	29	C	0.02	26	C
	NBL	0.58	31	C	0.88	60	E
	NBTR	0.40	28	C	0.72	39	D
	SBL	0.18	32	C	0.20	29	C
	SBTR	**0.94**	70	E	**0.93**	67	E
Future Total (2035) Haul Route Option 1 (Thorold Townline Road)	*Overall*	**0.95**	52	D	**0.93**	61	E
	EBL	**0.94**	79	E	**0.90**	76	E
	EBT	0.65	47	D	**0.89**	68	E
	EBR	0.21 *(0.34)*	74 *(26)*	E *(C)*	0.07 *(0.17)*	157 *(25)*	F *(C)*
	WBL	0.80	39	D	0.79	55	D
	WBT	**0.86**	49	D	**0.92**	55	D
	WBR	0.05	31	C	0.02	29	C
	NBL	0.78	48	D	0.83	46	D
	NBTR	0.50	28	C	0.71	35	D
	SBL	0.18	31	C	0.18	27	C
	SBTR	**0.94**	69	E	**0.94**	68	E

Note: Italicized rows indicate values where the Highway Capacity Manual (HCM) 2000 result differed significantly from the Intersection Capacity Utilization (ICU) results, which have been provided in brackets. Based on the capacity and demand at these locations, the level of delay is not reasonable according to HCM.

Under existing conditions, the intersection operates at acceptable levels during the a.m. and p.m. peak hours with overall LOS 'C' and v/c ratios of 0.78 and 0.73 during the a.m. and p.m. peak hours, respectively. The northbound left movement is currently operating at capacity with LOS 'F' and v/c ratios of 1.03 and 1.04 during the a.m. and p.m. peak hours, respectively. Capacity issues at this intersection are addressed in future background and total conditions through adjustments to the existing signal timing plan.

Under 2025 background conditions, the intersection is expected to continue operating at acceptable levels with overall LOS 'D' and 'C' and v/c ratios of 0.87 and 0.82 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to experience LOS 'E' or better.

Based on 2025 future total traffic conditions for Haul Route Option 1, the intersection is expected to continue operating at acceptable levels with overall LOS 'D' and v/c ratios of 0.87 and 0.82 during the a.m. and p.m. peak hours, respectively. The southbound shared through/right movement is approaching capacity with v/c ratios of 0.88 and 0.91 during the a.m. and p.m. peak hours, respectively, however, the movement is still experiencing acceptable delays. The eastbound right movement is expected to operate with relatively high delay during both peak hours, however, given the relatively low turning volumes and the queueing results, it was determined that the HCM delay calculation for the movement was not reasonable and that lower delays would be experienced (closer to those predicted in the ICU results for the intersection).

The intersection is expected to operate at acceptable levels under 2035 background conditions with overall LOS 'D' and 'E' and v/c ratios of 0.93 and 0.91 during the a.m. and p.m. peak hours, respectively. The southbound shared through/right movement continues to approach capacity with v/c ratios of 0.94 and 0.93 during the a.m. and p.m. peak hours, respectively, and experiences acceptable delays of 70 seconds or less. The eastbound left movement is approaching capacity with a v/c ratio of 0.93 during the a.m. peak hour and continues to experience acceptable delay (LOS 'E'). As mentioned previously, while the eastbound right movement is predicted to experience high delays, this is likely due to an error in Synchro's HCM 2000 capacity analysis methodology. Based on ICU results, the movement is expected to operate with acceptable levels of delay.

Under 2035 future total traffic conditions for Haul Route Option 1, the intersection is predicted to approach capacity with overall LOS 'D' and 'E' and v/c ratios of 0.95 and 0.93 during the a.m. and p.m. peak hours, respectively. The southbound shared through/right movement continues to approach capacity with v/c ratios

of 0.94 during both the a.m. and p.m. peak hours. Overall, all movements at the intersection experience acceptable levels of delay (LOS 'E' or better) despite several movements approaching capacity. Based on ICU results, the eastbound right movement is expected to operate with acceptable levels of delay compared to the HCM results.

Overall, this intersection is expected to have acceptable future operations despite some movements approaching capacity in 2025 and 2035. There are no required geometric improvements to the intersection, however, the intersection could benefit from monitoring to determine if constructing a dedicated southbound right turn lane will improve overall operations of the intersection and address any potential queueing problems for the southbound left turn lane identified in **Section 7** of this report.

6.5 Thorold Townline Road at Lundy's Lane

In order to address significant delays and capacity issues experienced by the northbound left movement under 2035 future total conditions, a variety of signal timing plans were tested to determine if all intersection movements could operate under capacity with acceptable delays. It was found that the addition of a dedicated southbound right turn lane aided in improving not only southbound operations, but the northbound left operations as well.

This is due in part to the high volume of southbound right vehicles being blocked by southbound through movements in the existing shared lane that are stopped by a red light. By constructing a southbound right turn lane, more southbound right turning vehicles are able to move through the intersection on a red light, providing more gaps for northbound left turning traffic during the green phase.

The southbound right turn lane was applied to all 2025 and 2035 analysis scenarios to provide consistent signal timing plans and the associated benefits of the dedicated lane on the overall traffic operations at the intersection. It is suggested that the intersection be monitored in the future to determine whether constructing the dedicated right turn lane in 2025 or making adjustments to the signal timings in the interim condition, including the addition of protected phases, would be the most economical solution.

As discussed in **Section 2.4**, there is opportunity to widen the existing 24 metre ROW at the Thorold Townline Road and Lundy's Lane intersection to the designated 26.2 metre road allowance to accommodate a southbound right turn lane. Furthermore, the Region may require road widening dedications in addition to the designated road allowances without the need for amendments to the Official Plan for purposes such as turning lanes at intersections.

Signalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-6** for the intersection of Thorold Townline Road at Lundy's Lane.

Table 6-6 Capacity Analysis of Thorold Townline Road at Lundy's Lane

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing	*Overall*	*0.39*	*17*	*B*	*0.43*	*18*	*B*
	EBL	0.10	6	A	0.07	5	A
	EBT	0.33	7	A	0.37	7	A
	EBR	0.07	5	A	0.08	5	A
	WBL	0.06	5	A	0.08	5	A
	WBTR	0.27	7	A	0.36	7	A
	NBL	0.34	39	D	0.65	51	D
	NBTR	0.62	44	D	0.59	44	D
	SBL	0.09	36	D	0.18	37	D
	SBTR	0.38	39	D	0.52	42	D
Future Background	*Overall*	0.48	16	B	0.52	21	C

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
(2025)	EBL	0.29	7	A	0.20	7	A
	EBT	0.45	8	A	0.44	10	A
	EBR	0.09	5	A	0.09	6	A
	WBL	0.08	5	A	0.09	5	A
	WBTR	0.34	7	A	0.49	9	A
	NBL	0.35	38	D	0.67	58	E
	NBTR	0.62	43	D	0.63	52	D
	SBL	0.15	35	D	0.43	49	D
	SBT	0.31	37	D	0.43	47	D
	SBR	0.05	34	C	0.09	42	D
Future Total (2025) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.48	16	B	0.52	21	C
	EBL	0.30	8	A	0.20	6	A
	EBT	0.45	8	A	0.44	8	A
	EBR	0.09	5	A	0.09	4	A
	WBL	0.08	5	A	0.09	5	A
	WBTR	0.34	7	A	0.49	8	A
	NBL	0.35	38	D	0.67	59	E
	NBTR	0.62	43	D	0.63	52	D
	SBL	0.15	35	D	0.44	49	D
	SBT	0.31	37	D	0.43	47	D
	SBR	0.05	34	C	0.10	42	D
Future Background (2035)	*Overall*	0.54	16	B	0.68	23	C
	EBL	0.45	10	B	0.41	11	B
	EBT	0.52	9	A	0.57	12	B
	EBR	0.10	5	A	0.10	6	A
	WBL	0.09	6	A	0.12	6	A
	WBTR	0.44	8	A	0.65	12	B
	NBL	0.39	38	D	0.66	57	E
	NBTR	0.62	43	D	0.64	52	D
	SBL	0.29	37	D	0.77	74	E
	SBT	0.31	37	D	0.41	46	D
	SBR	0.07	34	C	0.13	42	D
Future Total (2035) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.54	16	B	0.68	23	C
	EBL	0.46	10	B	0.42	11	B
	EBT	0.52	9	A	0.57	12	B
	EBR	0.10	5	A	0.10	6	A
	WBL	0.09	6	A	0.12	6	A
	WBTR	0.44	8	A	0.65	12	B
	NBL	0.39	38	D	0.66	56	E
	NBTR	0.62	43	D	0.64	52	D
	SBL	0.30	38	D	0.77	74	E
	SBT	0.31	37	D	0.41	46	D
	SBR	0.07	34	C	0.13	42	D

Under existing conditions, the intersection operates very well during the a.m. and p.m. peak hours with overall LOS 'B' and v/c ratios of 0.39 and 0.43 during the a.m. and p.m. peak hours, respectively, indicating reserve capacity. Individual movements experience LOS 'D' or better.

Under 2025 background conditions, the intersection is expected to continue operating at acceptable levels with overall LOS 'B' and 'C' and v/c ratios of 0.48 and 0.52 during the a.m. and p.m. peak hours, respectively. Individual movements are predicted to experience LOS 'D' or better with the exception of the northbound left movement that is predicted to experience LOS 'E' during the p.m. peak hour.

Based on 2025 future total traffic conditions for Haul Route Option 1, the intersection is expected to continue operating at acceptable levels with an overall LOS 'B' and 'C' and v/c ratios of 0.48 and 0.52 during the a.m. and p.m. peak hours, respectively. With the exception of the northbound left movement that is predicted to experience LOS 'E' during the p.m. peak hour, all other individual movements are predicted to experience LOS 'D' or better.

The intersection is expected to operate at acceptable levels under 2035 background conditions with overall LOS 'B' and 'C' and v/c ratios of 0.54 and 0.68 during the a.m. and p.m. peak hours, respectively, indicating reserve capacity remains. With the exception of the northbound left and southbound left movements that are predicted to experience LOS 'E' during the p.m. peak hour, all other individual movements are predicted to experience LOS 'D' or better.

Under 2035 future total traffic conditions for Haul Route Option 1, the intersection is expected to operate with overall LOS 'B' and 'C' and v/c ratios of 0.54 and 0.68 during the a.m. and p.m. peak hours, respectively. With the exception of the northbound left and southbound left movements that are predicted to experience LOS 'E' during the p.m. peak hour, all other individual movements are predicted to experience LOS 'D' or better during both peak hours.

Overall, this intersection is expected to have acceptable future operations upon the construction of a dedicated southbound right turn lane. It is suggested that the southbound right turn lane be constructed prior to the 2035 planning horizon to facilitate efficient movement of traffic at the intersection. It should be noted that under the preferred Haul Route Option 1 traffic scenario, the site attributes a nominal volume of traffic to the southbound right turn movement (4 two-way trips) during the peak hour, as result the impact of site-related traffic on the intersection is negligible. Therefore, as previously mentioned, it is suggested that the intersection be monitored in the future to determine whether constructing the dedicated southbound right turn lane or making adjustments to the signal timings in the interim condition, including the addition of protected phases, would be the most appropriate solution to accommodate background traffic volumes.

6.6 Thorold Townline Road at Beaverdams Road

A signal warrant was conducted for the intersection of Thorold Townline Road and Beaverdams Road under 2025 Background conditions to confirm if the combined existing and 2025 background traffic would justify the installation of a traffic signal. Based on Justification 7 of Book 12 of the Ontario Traffic Manual (OTM), the estimated 2025 background traffic volumes fulfill Justification 1A and 1B at 97% and 100% respectively. Although not warranted under 2025 Background conditions, based on the 120% threshold applied to Justification 7 and the near 100% justification fulfillment it is TMIG's opinion signals should be considered at this intersection under 2025 Background conditions.

In general, it is suggested that the intersection be monitored for signalization in 2025, and that signals be installed prior to the 2035 planning horizon (i.e. prior to the combined full build-out of the Rolling Meadows development, Thorold Townline Road Employment Lands, and the proposed Upper's Lane Quarry).

Unsignalized and Signalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-7** for the intersection of Thorold Townline Road at Beaverdams Road.

Table 6-7 Capacity Analysis of Thorold Townline Road at Beaverdams Road

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Existing	EBLTR	0.23	10	A	0.39	12	B
	WBLTR	0.31	10	B	0.33	11	B
	NBLTR	0.33	11	B	0.32	12	B
	SBLTR	0.22	10	B	0.34	12	B
Future Background (2025)	EBLTR	0.36	14	B	0.57	20	C
	WBLTR	0.43	15	B	0.57	20	C
	NBLTR	0.58	18	C	0.83	36	**E**
	SBLTR	0.67	22	C	0.63	22	C
Future Total (2025) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.48	18	B	0.54	23	C
	EBLTR	0.39	29	C	0.34	17	B
	WBLTR	0.46	30	C	0.35	17	B
	NBLTR	0.48	13	B	0.76	30	C
	SBLTR	0.50	13	B	0.58	23	C
Future Background (2035)	*Overall*	0.64	20	B	0.79	27	C
	EBLTR	0.36	28	C	0.40	22	C
	WBLTR	0.57	33	C	0.68	31	C
	NBLTR	0.49	13	B	**0.87**	32	C
	SBLTR	0.67	17	B	0.49	17	B
Future Total (2035) Haul Route Option 1 (Thorold Townline Road)	*Overall*	0.70	21	C	**0.86**	29	C
	EBLTR	0.36	28	C	0.45	26	C
	WBLTR	0.57	33	C	0.79	41	D
	NBLTR	0.62	15	B	**0.90**	32	C
	SBLTR	0.76	20	B	0.55	15	B

Under existing conditions, the unsignalized intersection operates with excellent operational characteristics during the a.m. and p.m. peak hours with delays of 12 seconds or less.

Under 2025 background conditions, the unsignalized intersection is expected to continue operating at acceptable levels, however, northbound traffic is expected to experience LOS 'E', and a delay of 36 seconds during the p.m. peak hour.

Under 2025 future total traffic conditions for Haul Route Option 1, the signalized intersection is expected to operate well with LOS 'C' or better, and reserve capacity during both the weekday a.m. and p.m. peak hours.

The signalized intersection is expected to operate well under 2035 background conditions with LOS 'C' or better, and delays of 33 seconds or less during the a.m. and p.m. peak hours. In general, all movements have considerable reserve capacity with the exception of the shared northbound movement during the p.m. peak hour that experiences a v/c ratio of 0.87. The northbound shared left/through/right lane is approaching capacity, but still operates with acceptable levels of delay.

Under 2035 future total traffic conditions for Haul Route Option 1, the intersection continues to operate well with individual movements at LOS 'C' or better and delays of 33 seconds or less during the a.m. peak hour. During the p.m. peak hour, movements operate at LOS 'D' or better and delays of 41 seconds or less. The northbound shared left/through/right movement is approaching capacity with a v/c ratio of 0.90, but still operates with acceptable levels of delay. During the p.m. peak hour, the intersection is expected to operate with an overall v/c ratio of 0.86, however, it operates with an acceptable overall LOS 'C'.

Overall, this intersection should be monitored for signalization under 2025 background and total conditions, and is expected to have acceptable future operations upon signalization prior to 2035.

6.7 Thorold Townline Road at Proposed Upper's Quarry Access

It is proposed that the access to Upper's Quarry be located at the Upper's Lane intersection with Thorold Townline Road as, regardless of ownership of the road, Upper's Lane will primarily serve Quarry traffic, not public traffic.

Unsignalized capacity analyses during the weekday a.m. and p.m. peak hours are summarized in **Table 6-8** for the intersection of Thorold Townline Road at Upper's Lane.

Table 6-8 Capacity Analysis of Thorold Townline Road at Proposed Upper's Quarry Access

Condition	Movement	AM Peak Hour			PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Future Total (2025)	WBLR	0.14	13	B	0.10	13	B
Haul Route Option 1 (Thorold Townline Road)	SBL	0.06	9	A	0.06	9	A
Future Total (2035)	WBLR	0.18	15	C	0.14	16	C
Haul Route Option 1 (Thorold Townline Road)	SBL	0.06	10	B	0.07	11	B

Under 2025 future total traffic conditions, the quarry access via Thorold Townline Road is expected to operate with excellent operational characteristics and substantial reserve capacity during both the weekday a.m. and p.m. peak hours. The delay to the westbound vehicles exiting the quarry is minimal, a mere 13 seconds during both the peak hours.

Under 2035 future total traffic conditions, Haul Route Option 1 (via Thorold Townline Road), continues to operate well with acceptable delay to westbound vehicles exiting the quarry.

Overall, the proposed Upper's Quarry access via Thorold Townline Road is expected to have acceptable future operations and there are no required improvements other than the conceptual access design discussed in **Section 8** of this report.

7 QUEUEING ANALYSIS

Queuing analysis of the study intersections and the proposed Upper's Quarry site access was undertaken, and detailed reports are provided in **Appendix D**. A summary of the predicted 95th percentile queues for the weekday a.m. and p.m. peak hours under existing, background, and future total traffic is provided in **Table 7-1** and **Table 7-2**. The queuing reports were prepared using SimTraffic microsimulation software using the following methodology: 30 minutes seeding time, one-hour recording, and 5 simulation runs.

Table 7-1 Existing (2018) and Future Total Background (2025 & 2035) Queuing Analysis

Intersection	Movement	Available Storage (m)	95th Percentile Queue Length (m)					
			2018 Existing		2025 Total Background		2035 Total Background	
			AM	PM	AM	PM	AM	PM
Davis Road at Thorold Stone Road	EBL	105	12	16	11	15	13	15
	WBL	70	30	46	41	42	**104**	62
	NBL	275	55	54	86	72	96	142
	SBL	30	-	1 veh	1 veh	1 veh	1 veh	1 veh
Davis Road at Niagara Falls Road / Beaverdams Road	NBL	80	1 veh	1 veh	14	9	21	15
	SBL	140	27	47	32	48	31	53
Davis Road at Lundy's Lane	EBL	85	27	34	46	57	42	72
	WBL	65	17	17	22	17	26	52
	WBR	80	11	14	29	43	21	**90**
	NBL	55	19	20	18	23	18	23
	SBL	90	33	23	**95**	**104**	70	**191**
	SBR	100	21	19	29	34	41	61
Thorold Townline Road at Thorold Stone Road	EBL	100	82	67	**102**	79	**117**	83
	EBR	50	12	8	32	24	54	72
	WBL	85	15	15	51	31	**104**	60
	WBR	90	18	11	20	14	18	14
	NBL	80	34	27	50	57	66	62
	SBL	75	26	25	27	33	**123**	**183**
Thorold Townline Road at Lundy's Lane	EBL	90	19	20	41	33	61	76
	EBR	20	18	**23**	16	**26**	**34**	**27**
	WBL	55	12	16	14	16	16	17
	NBL	25	**30**	**42**	**34**	**44**	**34**	**55**
	SBL	25	12	14	20	**31**	22	**48**
	SBR	30	-	-	20	30	27	**52**
Thorold Townline Road at Beaverdams Road	EBLTR	-	21	35	46	58	44	65
	WBLTR	-	16	19	45	49	58	98
	NBLTR	-	36	32	74	113	148	254
	SBLTR	-	25	26	68	91	122	216
Thorold Townline Road at Upper's Lane	WBLR	-	1 veh	1 veh	29	23	25	26

Existing Conditions

Under existing conditions, the 95th percentile queue lengths of dedicated movements at study intersections are not predicted to exceed the available storage, with the exception of the intersection of Thorold Townline Road and Lundy's Lane. The northbound left turn queue exceeds its storage by 5 metres during the a.m. peak hour, and by 17 metres during the p.m. peak hour. The 5 and 17 metres that the queue exceeds the existing storage for these two movements is representative of approximately one and two vehicles, respectively, and is considered to be an acceptable level of queueing although the extra vehicles may not fully fit in the allotted storage area.

2025 Background Conditions

Under 2025 background conditions, the 95th percentile queue lengths at study intersections are generally not predicted to exceed the available storage. The northbound left queue at Thorold Townline Road and Lundy's Lane continues to exceed available storage during both peak hours by up to 19 metres.

2035 Background Conditions

Overall, the study intersections experience minimal 95th percentile queuing problems under 2035 background traffic conditions.

Under 2035 background conditions, the intersection of Davis Road and Lundy's Lane becomes congested with background traffic and it is predicted that several dedicated turn movements may have 95th percentile queues that will extend beyond existing storage (eastbound left, westbound left, westbound right, and southbound left). In particular, the southbound left turn at Davis Road and Lundy's Lane during the p.m. peak hour experiences a large increase in the 95th percentile queue length between 2025 and 2035 background conditions. The queue length is predicted to be 211 metres long, exceeding the 90 metres of available storage.

As seen in **Table 7-2**, this queue continues to exceed the available storage under 2025 and 2035 future total conditions. It is recommended the intersection be monitored as the Rolling Meadows development phases are constructed to determine if any adjustments to signal timings and/or physical improvements to the roadway, such as extending the storage, is required. A minimal amount of non-aggregate site traffic is expected to travel through this intersection and will not create any measurable impacts to operations.

The 95th percentile queue of eastbound left turn and westbound left turn movements at the intersection of Thorold Townline Road and Thorold Stone Road are predicted to exceed storage during the a.m. peak hour under 2035 background conditions. The eastbound left is predicted to exceed storage by 17 metres, equivalent to approximately two cars. The westbound left is predicted to exceed storage by 21 metres, which is equivalent to approximately three cars. During the p.m. peak hour, the 95th percentile queue of the southbound left movement is expected to exceed available storage by 61 metres.

As discussed in Section 6.4, the intersection could benefit from monitoring in the future to determine if further signal timing modification or geometric improvements (such as a dedicated southbound right turn lane) would improve overall operations of the intersection and aid in moving the southbound traffic through the intersection more efficiently. A dedicated right-turn lane could potentially assist in reducing the queue spillback of the southbound through and right-turn traffic that may block the southbound left-turn lane at times.

Under 2035 background traffic conditions, the northbound left and southbound left queues at Thorold Townline Road and Lundy's Lane continue to meet or exceed available storage during the a.m. and p.m. peak hours. It should be noted that a railway crossing is located approximately 80 metres south of the intersection and extending the northbound left turn lane will not be a viable option. It is recommended that queue lengths be monitored at this intersection, and that the adjustment of the signal timings and phases should be reviewed to address the 95th percentile queues given the geometric constraints.

As discussed in **Section 6.5**, the dedicated southbound right lane at Thorold Townline Road and Lundy's Lane is suggested to be constructed prior to 2035 to aid in the overall operation of the intersection and to reduce delays. It should be noted under the preferred Haul Route Option 1 traffic scenario, the site attributes a nominal volume of traffic to the southbound right turn movement (4 two-way trips) during the peak hour. As a result, the operational impact of site-related traffic at this intersection is negligible and will not trigger the aforementioned road improvements. As such, it is suggested that the intersection be monitored in the future

to determine whether constructing the dedicated southbound right turn lane would be the most appropriate solution to accommodate background development traffic volumes within the vicinity of the intersection.

Table 7-2 Future Total (2025 & 2035) Haul Route Option 1 Queuing Analysis

Intersection	Movement	Available Storage (m)	95th Percentile Queue Length (m)			
			2025 Total Haul Route Option 1 (Thorold Townline Rd)		2035 Total Haul Route Option 1 (Thorold Townline Rd)	
			AM	PM	AM	PM
Davis Road at Thorold Stone Road	EBL	105	11	16	12	16
	WBL	70	56	42	**79**	61
	NBL	275	88	75	101	112
	SBL	30	1 veh	1 veh	1 veh	1 veh
Davis Road at Niagara Falls Road / Beaverdams Road	NBL	80	16	8	18	15
	SBL	140	29	47	28	48
Davis Road at Lundy's Lane	EBL	85	45	58	43	81
	WBL	65	23	18	23	24
	WBR	80	30	45	23	54
	NBL	55	21	22	20	24
	SBL	90	76	**112**	54	**162**
	SBR	100	31	30	38	48
Thorold Townline Road at Thorold Stone Road	EBL	100	**103**	76	**115**	98
	EBR	50	34	35	46	96
	WBL	85	42	31	**94**	82
	WBR	90	34	13	21	39
	NBL	80	52	50	65	85
	SBL	75	40	33	67	**159**
Thorold Townline Road at Lundy's Lane	EBL	90	41	30	68	60
	EBR	20	**21**	20	**27**	**27**
	WBL	55	12	18	15	19
	NBL	25	**35**	**42**	**32**	**58**
	SBL	25	17	**29**	22	**50**
	SBR	30	22	**31**	24	**53**
Thorold Townline Road at Beaverdams Road	EBLTR	-	45	54	45	59
	WBLTR	-	47	46	55	102
	NBLTR	-	63	113	112	540
	SBLTR	-	69	81	109	225
Thorold Townline Road at Upper's Lane	WBLR	-	24	26	29	27
	SBL	15	**19**	**16**	**21**	**19**

2025 Total Conditions

Under 2025 total traffic (Haul Route Option #1) conditions, study intersections experience minimal queueing problems with the exception of the following movements that experience 95th percentile queues that exceed the available storage length by 5 metres or more:

- Southbound Left at Davis Road and Lundy's Lane (p.m. peak hour)
- Northbound Left at Thorold Townline Road and Lundy's Lane (a.m. and p.m. peak hours)

The 95th percentile queue for the southbound left movement at the intersection of Thorold Townline Road and the proposed Upper's Quarry access is predicted to be 19 and 16 metres during the weekday a.m. and p.m. peak hours, respectively. Given the minor predicted exceedance, the southbound left turn storage of 30 metres, as proposed in the conceptual site access design, can adequately accommodate the predicted 95th percentile queues under 2025 total conditions. The westbound queues at the site access will be accommodated by internal site roadways.

2035 Total Conditions

Under 2035 total traffic (Haul Route Option #1) conditions, study intersections experience longer queues than under 2025 total conditions, however, only the following movements experience 95th percentile queues that exceed the available storage length by 5 metres or more:

- Westbound Left at Davis Road and Thorold Stone Road (a.m. peak hour)
- Southbound Left at Davis Road and Lundy's Lane (p.m. peak hour)
- Eastbound Left at Thorold Townline Road and Thorold Stone Road (a.m. peak hour)
- Westbound Left at Thorold Townline Road and Thorold Stone Road (a.m. peak hour)
- Southbound Left at Thorold Townline Road and Thorold Stone Road (p.m. peak hour)
- Eastbound Right at Thorold Townline Road and Lundy's Lane (a.m. and p.m. peak hours)
- Northbound Left at Thorold Townline Road and Lundy's Lane (a.m. and p.m. peak hours)
- Southbound Left at Thorold Townline Road and Lundy's Lane (p.m. peak hour)
- Southbound Right at Thorold Townline Road and Lundy's Lane (p.m. peak hour)

The 95th percentile queue lengths that exceed the available storage space under 2035 total conditions are generally longer than the 2025 total conditions because of the sizeable increase in background traffic volumes from 2025 to 2035, which is particularly true at intersections that are not included in the preferred haul route.

Under 2035 future total conditions, the 95th percentile queue for the southbound left movement at the intersection of Thorold Townline Road and the proposed Upper's Quarry access is predicted to be 21 and 19 metres during the weekday a.m. and p.m. peak hours, respectively. Given the minor predicted exceedance, the southbound left turn storage of 30 metres, as proposed in the conceptual site access design, can adequately accommodate the predicted 95th percentile queues under 2035 total conditions. The westbound queues at the site access will be accommodated by internal site roadways.

8 QUARRY ACCESS

8.1 Location

The intersection of Uppers Lane and Thorold Townline Road is to be modified to accommodate truck traffic and function as the future access to the proposed Upper's Quarry. Access to the proposed Upper's Quarry via Upper's Lane will be achieved regardless as to the ownership of the road allowance, as the location will serve either as a direct access to the quarry, or as a roadway to access the quarry. Aggregate and Asphalt traffic (heavy vehicles) will access Upper's Lane / the proposed Upper's Quarry via Thorold Townline Road to/from the north, and will **not** access the proposed quarry via Beechwood Road. The quarry access will thus be located approximately one kilometre south of the Beaverdams Road and Thorold Townline Road intersection.

8.2 Access Design

The proposed design for the access incorporates engineering design criteria as per the 2017 Transportation of Canada (TAC) geometric design guideline for Canadian roads and The Ontario Ministry of Transportation's (MTO) Commercial Site Access Policy and Standard Designs. The proposed access design provides deceleration and accelerations lanes northbound at the site access. A slip around lane is provided southbound, thus accommodating left-turning vehicles into the site and preventing blockage of through traffic at the site access.

Access design includes curb radii of 16m and 18m to accommodate future truck turning movements into and out of the site. The access design can accommodate site-related traffic for both Haul Route Options 1 and 2, although the preferred Haul Route Option 1 will only require heavy vehicle site traffic to be accommodated for the southbound left and westbound right movements.

Of note, while the preferred aggregate haul route is to the north via Thorold Townline (thus the provision of a northbound acceleration lane and southbound left-turn lane in the conceptual design), other forms of site traffic may access the quarry from the south. A dedicated northbound right turn lane has been included in the conceptual design to accommodate non-aggregate site traffic without impeding northbound through traffic.

The design of the site access is provided in **Appendix E**.

8.3 Site Access Operation

Site access operation was reviewed using a heavy single unit (HSU) truck to simulate turning movements of aggregate trucks accessing and departing the site. Turning movement simulations show that all required turning movement operations can be accommodated at the site access.

Truck turning movement simulations at the future site access are provided in **Appendix E**.

8.4 Sightline Assessment

Sight distances were examined in both directions on Thorold Townline Road at the proposed site access. Our examination is based on the criteria contained in the Transportation Association of Canada (TAC) Guideline, 2017 edition. Thorold Townline Road has a posted speed of 80 km/h in the vicinity of the subject site. As per industry standard, sight distance was examined a design speed of 100 km/h or 20 km/h over the posted speed.

The criteria in the TAC guideline is based on passenger car operations and does not explicitly consider a variation for truck movements. Section 2.5.3.1 in the TAC Guideline indicates that although trucks need longer

stopping sight distances than passenger cars, the additional lengths required by trucks is balanced by the fact that a truck driver can generally see further than a passenger car driver due to the eye height advantage. The TAC Guideline goes on to say that "As a result, separate stopping sight distances for trucks are not generally used in highway design".

Our research of the policies employed by other jurisdictions in this regard revealed that a variation for trucks is likewise not applied. According to Section 3-6 in 'A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, published by the American Association of State Highway and Transportation Officials (AASHTO), the additional lengths required by trucks is balanced by the fact that "the truck driver is able to see substantially farther beyond vertical sight obstructions because of the higher position of the seat in the vehicle." Likewise, passenger cars approaching the site access would have longer sight lines due to the height of the trucks entering and exiting the site. In addition, due to their training, the average truck driver is typically more adept than the average passenger car driver at recognizing potential risks and reacting to same.

Based on the foregoing, we have utilized the criteria as presented in the TAC guideline. However, we have based our analysis on the maximum values contained therein to ensure a conservative analysis.

Assessment Criteria

Based on Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles contained in the Transportation Association of Canada (TAC) Guideline (see **Appendix F**) the maximum stopping sight distance for an 100 km/h design speed is 185 metres.

Based on Table 2.5.3: Stopping Sight Distance on Grades contained in the Transportation Association of Canada (TAC) Guideline (see **Appendix F**) the maximum stopping sight distance for an 100 km/h design speed on a downgrade of 9% is 223 metres.

Based on Table 2.5.6 Decision Sight Distance contained in the Transportation Association of Canada (TAC) Guideline (see **Appendix F**) the maximum decision sight distance for a 100 km/h design speed on a roadway is 415 metres for an avoidance manoeuvre.

Analysis Results

The proposed access is located approximately 1.5 km north of the intersection of Lundy's Lane and 1.1 km south of Beaverdams Road. Based on our online review of Google aerial mapping, Thorold Townline Road is straight roadway with no horizontal curvature and minor vertical deflection gradually sloping upward from south to north, south of the proposed site access via Upper's Lane. The slope does not create any obstacles to drivers approaching the intersection nor to trucks at the site access. The proposed site access via Upper's Lane is located such that drivers approaching on Thorold Townline Road have an unimpeded view in excess of 415 metres in both directions.

Based on our review, the sight lines on Thorold Townline Road at the site access via Upper's Lane exceed those recommended for stopping and decision sight distances as contained in the TAC guideline.

9 CONCLUSION

Overall, the traffic generated by the proposed Upper's Quarry can be accommodated by the existing study area road network for the preferred haul route with minimal changes or upgrades to study area intersections. Two possible routes have been considered as appropriate 'haul routes' for material that will be shipped from the proposed Upper's Quarry to serve local and broader markets, however, Haul Route Option 1 (via Thorold Townline Road) was identified as the preferred haul route.

9.1 Haul Route Options

Haul Route Option 1

The first option of a haul route for trucks to / from the proposed Upper's Quarry would utilize Thorold Townline Road to the north of the site, as it is a regional road and provides the most direct route to / from the quarry. The haul route includes the following roads:

- Thorold Townline Road north of the site access to Thorold Stone Road
- Highway 406 via Thorold Stone Road westbound
- Queen Elizabeth Way (QEW) via Taylor Rd northbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road eastbound

Haul Route Option 2

Davis Road is designated as a provincial highway and is a major boundary road in close proximity to the site. Accordingly, it can also be considered an appropriate roadway to accommodate truck traffic to / from the quarry. The use of Davis Road as a second option for a haul route would result in a more circuitous haul route, as access to Davis Road would require quarry trucks to first travel south on Thorold Townline Road to Lundy's Lane, and then proceed west to Davis Road. The second haul route option includes the following roadways:

- Thorold Townline Road south of the site access to Lundy's Lane
- Lundy's Lane west to Davis Road
- Davis Road north to Thorold Stone Road
- Highway 406 via Thorold Stone Road westbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road (eastbound) and Taylor Road northbound
- Queen Elizabeth Way (QEW) via Thorold Stone Road eastbound

9.2 Preferred Haul Route

TMIG recommends that Haul Route Option 1 be chosen as the preferred Haul Route, subject to approval by the Town and an appraisal of the cost of any road improvements required to accommodate truck traffic.

Haul Route Option 1 will also be seen as a preferable route by current and future residents within the vicinity of the proposed Upper's Quarry, as the Rolling Meadows Secondary Plan area represents a large amount of future residential traffic that will travel along Davis Road and Lundy's Lane. As such, it would be ideal to have truck traffic travel north directly on Thorold Townline Road (Haul Route Option 1), compared to the more circuitous route around the boundary of the future Rolling Meadows area (Haul Route Option 2).

Of note, Haul Route Option 1 will direct trucks northbound on Thorold Townline Road through a non-residential area, however, a causeway has been constructed along Thorold Townline Road to cross a waterway immediately south of Beaverdams Road. Depending on the structural properties of the causeway, improvements may need to be made in order to sustain the regular truck traffic associated with the proposed Upper's Quarry. Before the choice of haul route is finalized, it is recommended that Walker Aggregates Inc. and the Town perform a review of the existing load capacity of Thorold Townline Road in order to determine if any upgrades are required, and if so, what cost would be associated with the upgrades. If it is found that

upgrades are required, it should be determined if the upgrades would be needed to service the future Rolling Meadows development regardless of any Upper's Quarry operations. The cost of the roadway upgrades should be assigned proportionately to the parties that will derive direct benefits from the upgrades.

9.3 Capacity Analysis Results and Recommendations

Overall, the study area intersections operate well or at acceptable levels under all planning horizons. Some individual movements are approaching capacity, particularly under 2035 conditions, but still operate with acceptable delays of 80 seconds or less, indicating a Level of Service (LOS) 'E' or better. Some geometric changes and modifications to signal timing plans are recommended in order to address any capacity or queuing issues in order to allow for efficient movement of traffic through the study area.

Haul Route Option 1 via Thorold Townline to the north was identified as the preferred haul route, and accordingly future total traffic operations were analyzed for Haul Route Option 1 only. A summary of recommendations and timing of the improvements are provided below.

Background Conditions (2025 & 2035)

- With adjustments to existing signal timing plans, all study intersections operate at acceptable levels under 2025 and 2035 background conditions. Some individual movements are approaching capacity, but operate at acceptable levels of service.
- In general, it is suggested that the Thorold Townline Road and Beaverdams Road intersection be monitored for signalization in 2025, and that signals be installed prior to the 2035 planning horizon (i.e. prior to the combined full build-out of the Rolling Meadows development, Thorold Townline Road Employment Lands, and the proposed Upper's Lane Quarry).
- Construction of an auxiliary southbound right turn lane at the intersection of Thorold Townline Road and Lundy's Lane by the 2035 background planning horizon was found to provide better overall operations at the intersection. Interim adjustments to signal timings and introduction of protected phases could potentially negate the need for a southbound right turn lane, however, high volumes of southbound right-turning vehicles are predicted in 2035 that would benefit from a dedicated lane compared to the existing shared through/right turn lane. Given that the proposed Upper's Quarry is assumed to be active by 2025, quarry related traffic is not the primary cause of the high volume of right-turning vehicles predicted in 2035, particularly based on preferred Haul Route Option 1 (via Thorold Townline Road), as minimal staff site traffic travels through the intersection, and heavy vehicle site traffic will **not** travel through the Thorold Townline Road and Lundy's Lane intersection. The operational impact of Haul Route Option 1 site-related traffic at this intersection is negligible and will not trigger the aforementioned road improvements.
- There is opportunity to widen the existing 24 metre ROW at the Thorold Townline Road and Lundy's Lane intersection to the designated 26.2 metre road allowance to accommodate a southbound right turn lane. Furthermore, the Region may require road widening dedications in addition to the designated road allowances without the need for amendments to the Official Plan for purposes such as turning lanes at intersections.
- It is recommended the Thorold Townline Road and Lundy's Lane intersection be monitored in the future to determine whether constructing the dedicated southbound right turn lane would be the most appropriate solution to accommodate background development traffic volumes within the vicinity of the intersection.

Total Conditions (2025 & 2035)

- With adjustments to existing signal timing plans, all study intersections operate acceptably under 2025 and 2035 total conditions. Some intersections/movements are approaching, or are at capacity, but operate at acceptable levels of service.
- The proposed access design will be constructed in 2025 prior to the quarry becoming active. The proposed access design provides deceleration and accelerations lanes northbound at the site access (via Upper's Lane). A slip around lane is provided southbound, thus accommodating left-turning vehicles into the site and preventing blockage of through traffic at the site access.

- The southbound queue at Thorold Stone Road and Thorold Townline Road should be monitored in 2035 to determine if any upgrades to the intersection are needed to address the potential for long queues to build up (southbound left experiences a queue up to 160m according to simulations). The long southbound left queue buildup does not occur under 2025 total conditions when Upper's Quarry is active, as such, quarry related traffic is **not** the cause of the long queues predicted in 2035.

9.4 Conceptual Site Access Design

The intersection of Uppers Lane and Thorold Townline Road is to be modified to accommodate truck traffic and function as the future access to the proposed Upper's Quarry. Access to the proposed Upper's Quarry via Upper's Lane will be achieved regardless as to the ownership of the road allowance, as the location will serve either as a direct access to the quarry, or as a roadway to access the quarry. Aggregate and Asphalt traffic (heavy vehicles) will access Upper's Lane / the proposed Upper's Quarry via Thorold Townline Road to/from the north, and will **not** access the proposed quarry via Beechwood Road. The quarry access will thus be located approximately one kilometre south of the Beaverdams Road and Thorold Townline Road intersection.

The proposed design for the access incorporates engineering design criteria as per the 2017 Transportation of Canada (TAC) geometric design guideline for Canadian roads and The Ontario Ministry of Transportation's (MTO) Commercial Site Access Policy and Standard Designs. The proposed access design provides deceleration and accelerations lanes northbound at the site access. A slip around lane is provided southbound, thus accommodating left-turning vehicles into the site and preventing blockage of through traffic at the site access.

Access design includes curb radii of 16m and 18m to accommodate future truck turning movements into and out of the site.

Entrance improvements shall be implemented prior to the haulage of extracted material off-site:

- At the intersection of Upper's Lane and Thorold Townline Road: including the installation of a southbound slip-around lane consisting of a parallel lane with 30 metres of storage plus approach / departure tapers of 150 metres, along with a northbound right-turn lane with a taper of 85 metres and a parallel length of 170 metres.
- Along Upper's Lane: including a widening of approximately 1.0 to 1.5 metres west of any proposed entrance along Upper's Lane and installation of a culvert for the future watercourse realignment.

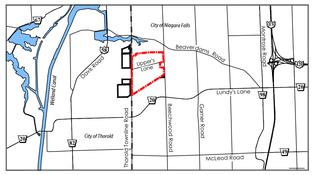
APPENDIX A

Preliminary Site Plan

Key Map - (N.T.S.)

Subject Lands

Additional Lands Owned by Applicant



A. General

1. This Site Plan is prepared under the Aggregate Resources Act for a Class A Licence for a quarry below the ground water table.

2. Area to be licenced 103.6 ha. (±256.0 ac.)
   Area to be extracted 89.1 ha. (±220.2 ac.)

B. References

1. Contour information was obtained from a topographic survey prepared by TEC Engineering (formerly Renishaw (Canada) Limited) using October 2016 and February 2017 aerial photography and are displayed in one metre intervals. Elevations shown are in metres above sea level (masl).

2. Topographic information was obtained from numerous sources including Ontario GeoHub (Land Information Ontario), Google Earth Pro aerial photography captured on July 18, 2018 and field investigations for technical reports.

3. All topographic features and structures are shown to scale in Universal Transverse Mercator (UTM) with North American Datum 1983 (NAD83), Zone 17 (metre), Central Meridian 81 degrees west coordinate system.

4. Property boundaries were obtained from a Plan of Survey prepared by Matthews, Cameron, Heywood-Kerry T. Howe Surveying Ltd. dated April 5, 2012. Other property boundaries were established using Municipal Property Assessment Corporation (MPAC) parcel fabric data.

5. Zoning categories on or within 120 metres of the licence boundary are from the City of Niagara Falls Zoning By-law No. 79-200 (Schedules A3 and A4 - Consolidation April 2015).

6. Land use information on or within 120 metres of the licence boundary has been compiled from October 2016 ortho photography, site visits and water well survey data.

C. Groundwater

1. The maximum predicted water table is 184.9 masl and the contact aquifer potentiometric contours ranges between 176.0 and 184.9 masl (as per WSP's "Proposed Upper's Quarry - Maximum Predicted Water Table Report", dated October 2021.

D. Drainage

1. Existing surface water drainage on and within 120 metres of the licence boundaries are by overland flow in the direction shown by arrows on the plan view.

E. Site Access and Fencing

1. There are two (2) existing site accesses on Thorold Townline Road, six (6) existing site accesses on Upper's Lane, and three (3) existing site accesses on Beechwood Road.

2. Post and wire fencing (unless otherwise noted) exists in the locations shown on the plan view.

F. Aggregate Related Site Features

1. There are no existing aggregate operations or features within the licence boundaries such as stationary or portable equipment, stockpiles, recyclable materials, scrap, fuel storage, haul roads, berms or excavation faces.

G. Technical Reports - References

1. Upper's Quarry: Acoustic Assessment Report, RWDI, October 2021.

2. Agricultural Impact Assessment for Upper's Quarry, Colville Consulting Inc., October 2021.

3. Upper's Quarry: Air Quality Assessment, RWDI Air Inc., October 2021.

4. Archaeological Assessments:

   a. Stage 1 Archeological Resource Assessment of Walker Aggregates Proposed South Niagara Quarry, Part of Lots 102, 119, 120, 136 & 137, Archeological Services Inc., December 2008.

   b. Stage 1-2 Archeological Assessment of Part 9764 Uppers Lane, Part of Lots 119 & 120, Archeological Assessments Ltd., November 3, 2005.

   c. Stage 2-3 Archeological Assessment, Part of Lots 102, 119, 120, 136 & 137, Archeological Assessments Ltd., November 21, 2012.

   d. Stage 1-2 Archeological Assessments, Upper's Quarry Additional Lands, Part of Lots 119& 120, Archaeological Research Associates Ltd., April 20, 2020.

   e. Stage 3 Mitigation of Development Impacts, Final Excavation Report, Walker XI (AgGT-411), Upper's Quarry, Archaeological Research Associates Ltd., May 26, 2021.

   f. Stage 4 Mitigation of Development Impacts, Final Excavation Report, Walker XI (AgGT-178), Upper's Quarry, Archeological Research Associates Ltd., July 22, 2021.

5. Blast Impact Analysis, Upper's Quarry, Explotech, October 2021.

6. Cultural Heritage Impact Assessment Report, Proposed Upper's Quarry, MHBC, October 2021.

7. Economic Benefits Analysis, Prism, October 2021.

8. Level 2 Water Study Report, WSP, October 2021.

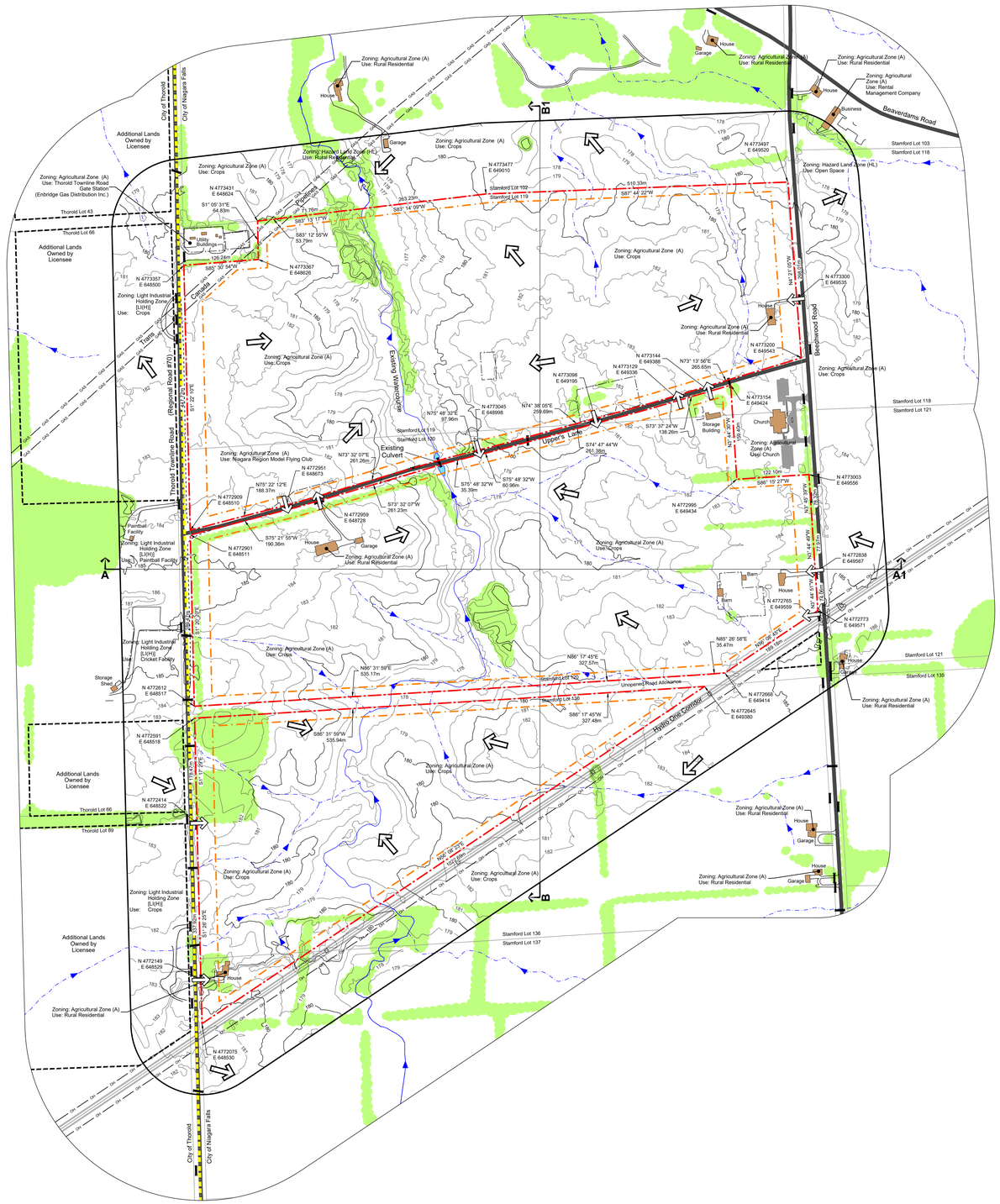
9. Maximum Predicted Water Table Report, WSP, October 2021.

10. Upper's Quarry, Niagara: Level 1 and Level 2 Natural Environment Technical Report and Environmental Impact Study, Stantec, October 2021.

11. Planning Justification Report and Summary Statement, MHBC, October 2021.

12. Traffic Impact Study, Upper's Quarry, TMIG, October 2021.

13. Visual Impact Assessment, Proposed Upper's Quarry, MHBC, October 2021.



Legal Description

Part of Lots 119, 120, 136 & 137
City of Niagara Falls (Geographic Township of Stamford)
Regional Municipality of Niagara

- Licence Boundary
- Limit of Extraction
- Additional Lands Owned by Licensee
- Municipal Boundary
- Contours with Elevation (Metres above sea level (MASL))
- Public Road
- Fence (1.2m post & wire farm fence unless otherwise noted)
- Watercourse (Direction of flow indicated by arrows)
- Surface Drainage Feature (Direction of flow indicated by arrows)
- Water Feature
- Wooded Area
- 120m Offset From Licence Boundary
- Parcel Fabric
- Trans Canada Pipeline Easement
- Hydro One Easement
- Existing Site Access
- Direction of Surface Drainage
- Existing Culvert
- Building/Structure
- Cross Sections (A1)

Site Plan Acronyms

1. ARA - Aggregate Resources Act
2. MNDMNRF - Ministry of Northern Development, Mines, Natural Resources and Forestry
3. MHSTCI - Ministry of Heritage, Sport, Tourism and Culture Industries
4. MECP - Ministry of the Environment, Conservation and Parks
5. MGCS - Ministry of Government and Consumer Services
6. DFO - Department of Fisheries and Oceans Canada
7. ECA - Environmental Compliance Approval
8. BMPP - Best Management Practices Plan
9. PTTW - Permit to Take Water
10. MASL - Metres above sea level
11. ROW - Right of way
12. HMA - Hot mix asphalt

Site Plan Amendments

No.	Date	Description	By

Site Plan Revisions (Pre-Licencing)

No.	Date	Description	By

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
113 COLLIER STREET, BARRIE, ON. L4M 1H2 | P: 705.728.0045 F: 705.728.2010 | WWW.MHBCPLAN.COM

MHBC Stamp
Debra Walker
Is authorized by the Ministry of Northern Development, Mines, Natural Resources and Forestry pursuant to Section 2 (1) of the Aggregate Resources Act to prepare and certify site plans.

MHBC Stamp
Christopher Poole
Is authorized by the Ministry of Northern Development, Mines, Natural Resources and Forestry pursuant to Section 2 (1) of the Aggregate Resources Act to prepare and certify site plans.

Applicant

Walker Aggregates Inc.
2800 Thorold Townline Road
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Project

Upper's Quarry

MNDMNRF Licence Reference No.

Applicant's Signature

Plan Scale: 1:3000 (Arch E)
0 90 180 Meters

Date October 2021
Drawn By C.P.
Checked By D.W.
File No. 9811V

File Name
Existing Features

Drawing No.
1 of 6

File Path N:\Brian\9811V - Walker Uppers Quarry\Drawings\Site Plan\CAD\9811V - Site Plan - Proposed Scenario.dwg

A. General

1. Area to be licenced 103.6 ha. (±256.0 ac.)
   Area to be extracted 89.1 ha. (±220.2 ac.)
2. The maximum amount of aggregate to be removed from this site in any calendar year is 1,800,000 tonnes.
3. In the event that Walker obtains permission from the City of Niagara Falls to extract the road allowance(s), the licensee may apply to the MNDMNRF to amend the licence and site plan to expand the licence boundary to include the road allowance directly adjacent to the licence boundary (i.e. Upper's Lane and/or the road allowance between Lots 120 and 136). An expansion to the licence boundary for this purpose will not require a new licence under Section 7 of the Aggregate Resources Act (ARA).
4. All technical reports have taken into consideration the potential removal of the road allowance(s).
5. Table 1 on this drawing identifies the number of sensitive receptors within 500 metres of the licence boundary and the distance from the licence boundary to each receptor.

B. Hours of Operation

1. The proposed quarry will have the following hours of operation:

Activity	Monday to Friday	Saturday	Sunday
Drilling, extraction (at working face)	7:00 am to 7:00 pm	7:00 am to 7:00 pm	N/A
Blasting	8:00 am to 6:00 pm	N/A	N/A
Aggregate processing at mobile crusher plant	7:00 am to 7:00 pm	7:00 am to 7:00 pm	N/A
Asphalt plant operations	24 hours per day	24 hours per day	24 hours per day
Internal hauling of aggregate and/or recycled material: - From working face (shot rock) to mobile crusher plant - From mobile crusher plant/stockpiles to asphalt plant	7:00am to 7:00pm 24 hours per day	7:00am to 7:00pm 24 hours per day	N/A 24 hours per day
Aggregate and recycling shipping to and/or from the quarry (including hot mix asphalt shipping from quarry and receiving recycled asphalt to quarry)	24 hours per day	24 hours per day	24 hours per day
Maintenance	24 hours per day	24 hours per day	24 hours per day

A response to emergencies is not limited by the hours of operations shown on this plan.

C. Proposed Entrances/Exits and Fencing

1. For the Mid Extraction Area:
   a. All traffic for operations will enter and exit the Mid Extraction Area from Upper's Lane using a main entrance/exit in the location generally shown on the plan view.
   b. If an entrance/exit off of Upper's Lane is not permitted, traffic for operations will enter and exit the Mid Extraction area from Thorold Townline Road. If approved, the site plan will be updated to accurately depict the location of the entrance/exit off of Thorold Townline Road.
2. For the South Extraction Area:
   a. Material will be transported to the Mid Extraction Area for processing via a conveyor over the unopened road allowance between Lots 120 and 136. Limited traffic required for operations will enter and exit the South Extraction Area via a crossing over the unopened road allowance between Lots 120 and 136, subject to approval from the City, in the location generally shown on the plan view.
   b. If permission to cross the unopened road allowance is not granted, traffic for operations will enter and exit the South Extraction area from Thorold Townline Road. If approved, the site plan will be updated to accurately depict the location of the entrance/exit off of Thorold Townline Road.
3. For the North Extraction Area:
   a. All traffic for operations will enter and exit the North Extraction Area from Upper's Lane using a main entrance/exit in the locations generally shown on the plan view.
   b. If an entrance/exit off of Upper's Lane is not permitted, traffic for operations will enter and exit the North Extraction area from Thorold Townline Road. If approved, the site plan will be updated to accurately depict the location of the entrance/exit off of Thorold Townline Road.
4. Only one operational entrance/exit will be utilized at any one time.
5. Once established, each operational entrance/exit shall be gated. All gates shall be kept closed during hours of non-operation and shall be maintained throughout the life of the licence.
6. The licence boundaries shall be fenced in the locations shown on the plan view (prior to the commencement of operations) and shall be maintained for the life of the licence with upkeep during periodic inspections (see Section N Variations from Control and Operation Standards on this drawing).

D. Drainage and Siltation Control

1. Silt fencing/sediment control measures will be installed within the Watercourse Realignment Transition Area prior to extraction in each extraction area and along the easterly and northerly limits of Phase 1B after the watercourse realignment is completed.

E. Site Preparation

1. All existing structures within the licence boundary shall be demolished or removed prior to extraction in each extraction area.
2. Timber resources (if any) will be salvaged for use as saw logs, fence posts and fuel wood where appropriate. Stumps and brush cleared will be burned (with applicable permits), used for shoreline habitat enhancement or mulched for use in progressive rehabilitation.
3. Areas of the site will be stripped of topsoil/overburden in stages in accordance with the phases. Topsoil and overburden will be stripped and stored in berms and/or stockpiles wherever feasible.
4. Topsoil and overburden shall be placed in perimeter acoustic/visual berms, pond construction, watercourse realignment or used immediately for progressive rehabilitation in this licence or existing Licence Numbers 11175 and 4437 (see Section N Variations from Control and Operation Standards on this drawing).
5. Excess topsoil and overburden not required for immediate use in berms or rehabilitation may be temporarily stockpiled on the quarry floor. Topsoil and overburden stockpiles shall be located within the limit of extraction and remain a minimum of 30 metres from the licence boundary and 90 metres from a property with a residential use.
6. Temporary topsoil and overburden stockpiles which remain for more than one year shall have their slopes vegetated to control erosion. Seeding shall not be required if these stockpiles have vegetated naturally in the first year.

F. Setbacks, Berms and Screening

1. Setbacks are as shown on the plan view. Excavation will occur within the extraction setback area along the west and northwest area of the licensed boundary to accommodate grading required for the realignment of the existing watercourse. Furthermore, areas within the setbacks will be accessed as necessary to perform general site servicing, maintenance (berming, fencing etc.) and progressive rehabilitation. See Section N Variations from Control and Operation Standards on drawing 2 of 6.
2. Locations and heights for all acoustic/visual berms are provided on the plan view. All proposed berms shall be constructed in accordance with the "Typical Acoustic Berm Detail" (on this drawing), "Typical Visual Berm Detail" (on drawing 4 of 6) and, more specifically, berms adjacent to Beechwood Road will be constructed in accordance with "Typical Berm - Adjacent to Beechwood Berm Detail" (on this drawing). Where the proposed berm transects the existing watercourse along the north perimeter, a culvert shall be installed in accordance with DFO requirements. Culverts will also be installed under berms, where necessary, to maintain existing drainage to and from off-site and to the existing watercourse. All proposed berms and will be vegetated and maintained to control erosion. Temporary erosion control will be implemented as required.
3. Perimeter acoustic berms may be removed for final rehabilitation in the final Phase when they are no longer required for noise attenuation.
4. Any natural treed buffer areas in the setbacks will be maintained where feasible subject to berm requirements.

G. Site Dewatering

1. Surface water will be discharged from the sump areas to the existing watercourse until the watercourse is realigned to the location of Phases 1B and 2B. Once the watercourse realignment has been completed, surface water will be discharged from the sumps to the realigned watercourse in Phase 1B.
2. Sump: During quarry development, a portable submersible pumps will be installed in each Initial Sinking Cut Area for the purpose of dewatering to maintain a dry working area and/or aggregate washing. Water will be pumped from the sumps to a pond where it is either used for aggregate washing or discharged to the existing watercourse. The sumps shall be relocated (as required) within each extraction area during the operational life of the quarry.

H. Extraction Details

1. The extraction sequence is outlined on drawing 3 of 6.
2. The proposed maximum depth of extraction is indicated by the spot elevations shown on the plan view. Extraction shall proceed to a maximum depth of approximately 42 m below ground surface (ranging in elevation from 141 masl in the southwest to 149 masl in the northeast portions of the site), corresponding to the geologic base of the Gasport dolostone of the Lockport Group.
3. For Phases 1B and 2B, the maximum depth of extraction is approximately 30 metres (down to an elevation of 155 masl) and may be extracted in 1-2 lifts.
4. For the "Watercourse Realignment Transition Area", the maximum depth of extraction is approximately 1 metre (down to an elevation of 174 masl) and any extraction in the "Watercourse Realignment Transition Area" shall be completed as part of site preparation (construction of compensatory ponds). No drilling or blasting shall be permitted in the "Watercourse Realignment Transition Area".
5. Internal haul road locations shall vary as extraction progresses and will be located on the quarry floor with the exception of at grade crossings.
6. Blasted aggregate will be transported back to the mobile crusher plant and processing area on the quarry floor for processing and shipping.
7. An office/scale house and weigh scale will be established on site. A maintenance shop and shed(s) may be constructed on site. Portable office/storage trailers and structures associated with fuel storage may be brought onto the site for temporary periods for uses associated with quarry activity. All structures shall remain 30 metres from the licence boundary / Trans Canada Pipelines easement or 90 metres from the licence boundary if the boundary abuts land that is used for residential purposes or is restricted to residential use by the Zoning By-law at the time the licence is issued.
8. Aggregate stockpiles (including recyclable material) shall be located within the limits of extraction and remain a minimum of 30 metres from the licence boundaries (except where the licence boundaries abut Upper's Lane and the unopened road allowance - See Section N Variations from Control and Operation Standards on this drawing) and 90 metres from a property with a residential use.

I. Equipment and Processing

1. A portable processing plant (including primary, secondary and tertiary crushing and screening units) will be permitted within the North and Mid Extraction Areas inclusive.
2. Processing shall be located within the limit of extraction and remain a minimum of 30 metres from the licence boundary and 90 metres from a property with a residential use.
3. During the sinking cuts and early phases of operation, the primary crusher will be integrated into a single processing plant located near the working face. In later phases, the primary crusher will split from the single integrated plant and start to follow the working face. The processing plant, which contains the secondary and tertiary crushers, will remain close to the quarry entrance. The processing plant will be located at varying elevations, beginning at the top of rock during the sinking cut portion of operations, and moving to the first bench and then the final quarry floor as space becomes available.
4. Once processing has progressed to Phase 2A, a hot mix asphalt (HMA) batch plant facility shall be established on the quarry floor (in the location shown on the plan view) in Phase 1A. The HMA batch plant shall remain in the location shown on the plan view for the life of the quarry.
5. In Phase 4, the portable processing plant shall require additional shielding in accordance with note A.5 on drawing 4 of 6.
6. A wash plant and temporary wash ponds may be established and located to move together with the portable processing plant, subject to permit approval from MECP.
7. Equipment to be used onsite may include, but shall not be limited to:
   a. Working Face - 1 silenced rock drill; 1 loader;
   b. Processing - 1 portable processing plant including crushers, screeners, and stackers; 2 loaders (at stockpiles);
   c. Asphalt - 1 asphalt plant; 2 loaders, 1 compressor vent, 1 dust controller blower (motor and stack); elevator motor, conveyor motor, oven motor, pug mill (door and motor);
   d. Conveyor(s);
   e. Generator(s) (diesel-fueled); and
   f. Rock trucks, haul trucks, shipment trucks and fuel trucks.
8. All processing equipment is subject to applicable permitting under MECP Environmental Compliance Approvals and Ontario Water Resources Act where water use requires water taking and/or discharge. If required, a Certificate of Approval will be obtained for processing equipment to be used on site.
9. Equipment used for construction of the perimeter berms/barriers, overburden stripping, rehabilitation, the new watercourse corridor, as well as other quarry related construction projects will be utilized on site.

J. Frequency / Timing of Blasts

1. Prior to blasting being permitted within the 100 m setback of the TransCanada Pipeline, identified as 'TransCanada Blasting Buffer Area' on this Plan, the licensee shall address the requirements of notes D.5 on drawing 4 of 6.
2. All blast monitoring reports shall be retained by the licensee for a period of seven years after each blast and made available upon request for audit purposes. See Section D on drawing 4 of 6 for detailed blasting requirements.

K. Fuel Storage

1. Fuel storage tanks will be located in close proximity to the main processing plant (or in an alternative location subject to approval by the MNDMNRF). Fuel storage tanks shall be installed and maintained in accordance with Technical Standards and Safety Act, 2000, Liquid Fuels Handling Code, 2000 and Liquid Fuels Regulation Reg. 217/01.
2. All fuel tanks shall be doubled sided or placed in containment facilities large enough to hold the tanks maximum volume.
3. Fuel trucks shall be used to transfer fuel to on-site equipment in accordance with the Liquid Fuels Handling Code, 2000.
4. A Spills Contingency Plan shall be prepared and implemented prior to site preparation. The Spills Contingency Plan shall be available on site and all employees and contractors shall be informed and required to comply with this plan.

L. Spills Plan

1. In case of an accidental spill of petroleum products, the following contingency plan will be activated:
   a. The Ministry of Environment, Conservation and Parks (MECP) (see address and phone number below) and surrounding landowners will be notified.
   b. For a leakage or spill, immediate action will be taken to stop it. At the same, measures will be taken to prevent spreading. These measures may include building or berm or construction of a ditch, for instance.
   c. The quarry operator shall commence recovery procedures by collecting the spilled substance into containers.
   d. The soil in the area affected by the spill or leak shall be removed and disposed of at a location prescribed by the MECP.

   Ministry of Environment, Conservation and Parks
   Niagara District Office
   Garden City Tower 9th Floor Suite 15
   301 St. Paul Street
   St. Catharines, Ontario
   L2R 7R4

   Spills Action Centre: 1-800-268-6060

M. Scrap and Recycling

1. Scrap may be stored on-site and shall be removed on an on-going basis.
2. Scrap shall only include material generated directly as a result of the aggregate operation such as refuse, debris, scrap metal, lumber, discarded machinery, equipment and motor vehicles.
3. All fluids shall be drained from any discarded equipment, machinery or motor vehicle prior to storage and disposed of in accordance with the Environmental Protection Act.
4. Scrap shall not be stored within 30 metres of any body of water or the licence boundary and shall be kept in close proximity to the main processing plant.
5. Recycling of asphalt, concrete, porcelain and glass shall be permitted on-site.
6. Recyclable asphalt materials shall not be stockpiled within:
   6.1. 30 metres of any waterbody or man-made pond; or
   6.2. 2 metres of the ground water table.
7. Recyclable material shall be kept in close proximity to the main processing plant.
8. Rebar or other structural metal shall be separated from recyclable aggregate material during processing and placed in a designated scrap pile on-site which shall be removed on an o-going basis.
9. Recycled aggregate shall be removed on an on-going basis.
10. Recycling activities shall not interfere with the operational phases of the site or with rehabilitation.
11. Once the site is depleted, no further importation of recyclable material shall be permitted.
12. Once final rehabilitation has been completed and approved in accordance with the site plan, all recycling operations shall cease.
13. The site shall be kept in an orderly condition.

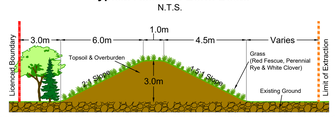
N. Variations from Control and Operation Standards

Variations from Control and Operation Standards

No.	Variation	Standard (O.13)
1	Extraction shall occur within 30 metres but no closer than 15 metres from the Upper's Lane road allowance and the unopened road allowance between Lots 120 and 136. In addition, as part of construction of any access shown on the Site Plan and the existing watercourse realignment, extraction may occur: - Within the 15 metre setback from the Upper's Lane road allowance and the unopened road allowance between Lots 120 and 136 for access purposes, - Within the 15 metre setback from the north and south boundaries of the site for riparian corridor construction and - Within the 30 metre setback from Thorold Townline Road for riparian corridor construction.	(1) 9 and 10
2	Overburden may be removed from the extraction setback area to permit: - Extraction within 30 metres but no closer than 15 metres from Upper's Lane road allowance and the unopened road allowance between Lots 120 and 136 Overburden and aggregate may be removed from the excavation setback areas to permit the construction of any access or to implement the existing watercourse realignment as follows: - Within the 15 metre setback from the Upper's Lane road allowance and the unopened road allowance between Lots 120 and 136 for access purposes, - Within the 15 metre setback from the north and south boundaries of the site for riparian corridor construction and - Within the 30 metre setback from Thorold Townline Road for riparian corridor construction.	(1) 11
3	Topsoil and overburden may be moved between this Licence and Licence Numbers 11175 & 4437 to provide for effective rehabilitation of these licences.	(1) 18
4	A portion of the quarry face shall remain vertical. See Rehabilitation Plan, drawing 5 of 6.	(1) 19
5	The licence boundary for the North Extraction Area shall not be fenced on or west of the Trans Canada Pipeline easement. Fencing shall be erected on the eastern extent of the easement.	(3)(a)

Typical Acoustic Berm Detail

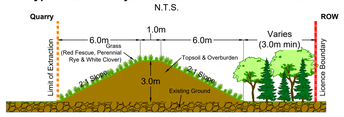
N.T.S.



Note: The existing vegetation shall be maintained within the three metre setback from the licence boundary (where applicable) if feasible.

Typical Berm - Adjacent to Beechwood Road Detail

N.T.S.



Note: Construct berm in close proximity to limit of extraction to provide additional vegetative screening along Beechwood Road.

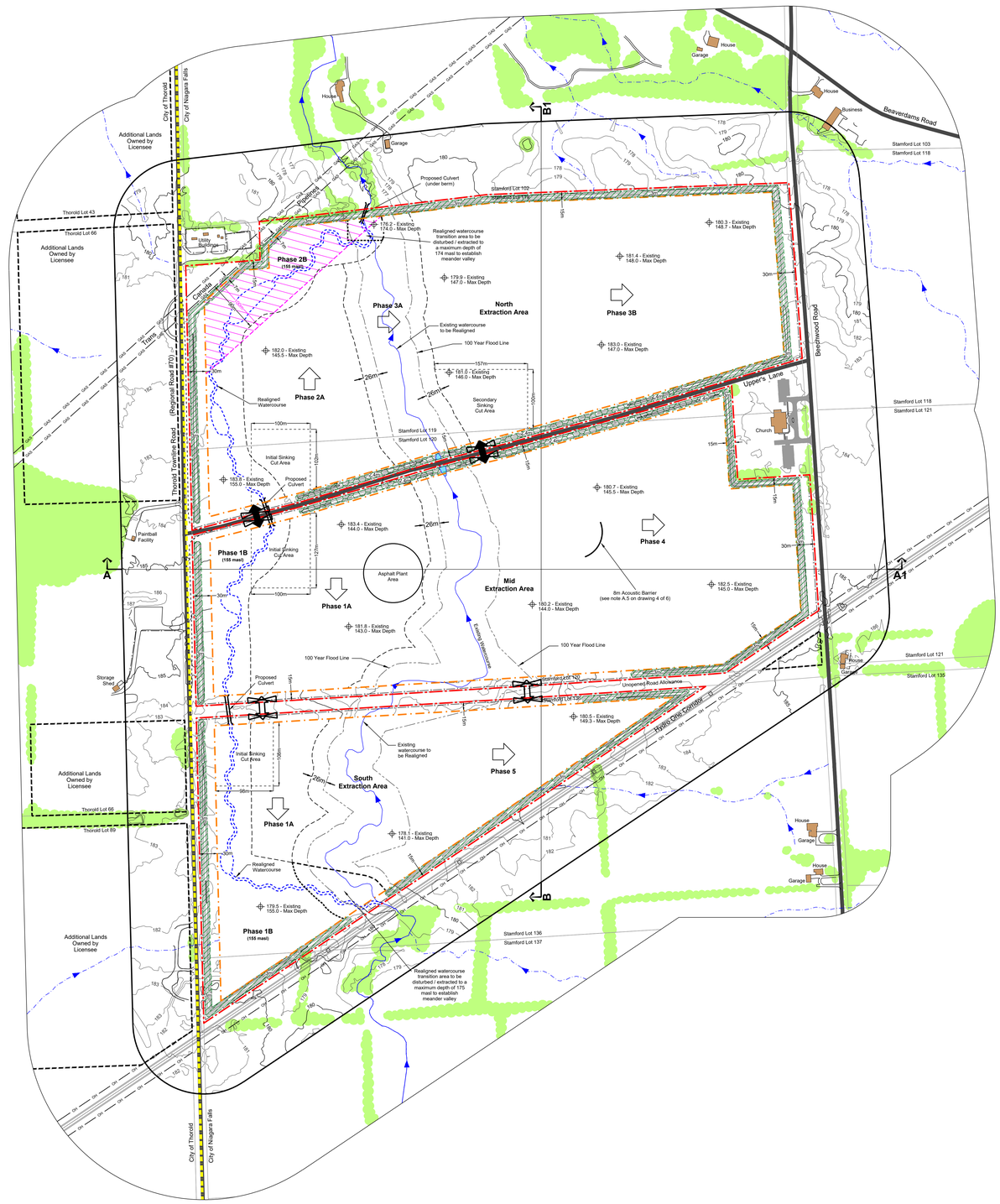


Table 1: Receptors Within 500m of Licence Boundary

Receptor	Address	Distance	Receptor	Address	Distance	Receptor	Address	Distance	Receptor	Address	Distance	Receptor	Address	Distance	Receptor	Address	Distance
101	10148 Beavers Road	184 m	121	5695 Osprey Avenue	374 m	141	9349 Madison Crescent	415 m	161	9245 Shoveller Drive	489 m	181	9414 Shoveller Drive	416 m	201	9461 Eagle Ridge Drive	427 m
102	10138 Beavers Road	442 m	122	5687 Osprey Avenue	362 m	142	9337 Madison Crescent	423 m	162	9245 Shoveller Drive	495 m	182	9404 Shoveller Drive	423 m	202	9500 Eagle Ridge Drive	474 m
103	9722 Beavers Road	234 m	123	5679 Osprey Avenue	350 m	143	9325 Madison Crescent	434 m	163	9312 Madison Crescent	417 m	183	9394 Shoveller Drive	428 m	203	9494 Eagle Ridge Drive	477 m
104	9582 Beavers Road	151 m	124	5671 Osprey Avenue	339 m	144	9315 Madison Crescent	445 m	164	9324 Madison Crescent	404 m	184	9374 Shoveller Drive	443 m	204	9490 Eagle Ridge Drive	478 m
105	9417 Beavers Road	447 m	125	5663 Osprey Avenue	333 m	145	9245 Shoveller Drive	469 m	165	9336 Madison Crescent	390 m	185	9364 Shoveller Drive	450 m	205	9484 Eagle Ridge Drive	480 m
106	9337 Beavers Road	475 m	126	5655 Osprey Avenue	321 m	146	9245 Shoveller Drive	461 m	166	9352 Madison Crescent	370 m	186	9354 Shoveller Drive	460 m	206	9440 Eagle Ridge Drive	484 m
107	5584 Beavers Road	81 m	127	5647 Osprey Avenue	311 m	147	9245 Shoveller Drive	453 m	167	9366 Madison Crescent	354 m	187	9344 Shoveller Drive	467 m	207	9440 Eagle Ridge Drive	495 m
108	5769 Beavers Road	287 m	128	5639 Osprey Avenue	299 m	148	9245 Shoveller Drive	447 m	168	9380 Madison Crescent	338 m	188	9334 Shoveller Drive	478 m	208	5772 Osprey Avenue	499 m
109	5821 Beavers Road	360 m	129	5631 Osprey Avenue	290 m	149	9245 Shoveller Drive	440 m	169	5610 Osprey Avenue	311 m	189	9324 Shoveller Drive	488 m	209	9440 Eagle Ridge Drive	494 m
110	5783 Osprey Avenue	490 m	130	5623 Osprey Avenue	284 m	150	9245 Shoveller Drive	410 m	170	5622 Osprey Avenue	323 m	190	9314 Shoveller Drive	494 m			
111	5775 Osprey Avenue	480 m	131	5615 Osprey Avenue	271 m	151	9245 Shoveller Drive	425 m	171	5632 Osprey Avenue	331 m	191	9355 Eagle Ridge Drive	494 m			
112	5767 Osprey Avenue	470 m	132	5607 Osprey Avenue	259 m	152	9245 Shoveller Drive	435 m	172	5642 Osprey Avenue	341 m	192	9365 Eagle Ridge Drive	481 m			
113	5759 Osprey Avenue	459 m	133	9445 Madison Crescent	280 m	153	9245 Shoveller Drive	443 m	173	5652 Osprey Avenue	350 m	193	9375 Eagle Ridge Drive	469 m			
114	5751 Osprey Avenue	448 m	134	9433 Madison Crescent	299 m	154	9245 Shoveller Drive	457 m	174	5668 Osprey Avenue	362 m	194	9385 Eagle Ridge Drive	471 m			
115	5743 Osprey Avenue	438 m	135	9421 Madison Crescent	316 m	155	9245 Shoveller Drive	467 m	175	9405 Shoveller Drive	374 m	195	9395 Eagle Ridge Drive	464 m			
116	5735 Osprey Avenue	424 m	136	9409 Madison Crescent	334 m	156	9245 Shoveller Drive	476 m	176	9395 Shoveller Drive	383 m	196	9045 Eagle Ridge Drive	457 m			
117	5727 Osprey Avenue	415 m	137	9397 Madison Crescent	351 m	157	9245 Shoveller Drive	485 m	177	9385 Shoveller Drive	392 m	197	9415 Eagle Ridge Drive	448 m			
118	5719 Osprey Avenue	404 m	138	9385 Madison Crescent	371 m	158	9245 Shoveller Drive	498 m	178	9446 Shoveller Drive	400 m	198	9425 Eagle Ridge Drive	445 m			
119	5711 Osprey Avenue	393 m	139	9373 Madison Crescent	391 m	159	9245 Shoveller Drive	474 m	179	9434 Shoveller Drive	405 m	199	9435 Eagle Ridge Drive	443 m			
120	5703 Osprey Avenue	383 m	140	9361 Madison Crescent	407 m	160	9245 Shoveller Drive	482 m	180	9424 Shoveller Drive	412 m	200	9445 Eagle Ridge Drive	436 m			

Legal Description

Part of Lots 119, 120, 136 & 137
City of Niagara Falls (Geographic Township of Stamford)
Regional Municipality of Niagara

Legend

- Licence Boundary
- Limit of Extraction
- Additional Lands Owned by Licensee
- Municipal Boundary
- Contours with Elevation (Metres above sea level (MASL))
- Public Road
- Fence (1.2m post & wire farm fence unless otherwise noted)
- Watercourse (Direction of flow indicated by arrows)
- Surface Drainage Feature (Direction of flow indicated by arrows)
- Watercourse - Realigned (Stantec, 2020)
- Water Feature
- Wooded Area
- 120m Offset From Licence Boundary
- Trans Canada Blasting Buffer Area - See Note D.5 on drawing 4 of 6
- Parcel Fabric
- Trans Canada Pipeline Easement
- Hydro One Easement
- Entrance / Exit
- Limited Service Access (For Phases 1A, 1B and 5 in South Extraction Area)
- Gate
- Culvert
- General Direction of Excavation & Boundary
- Berm (Top - Noise Attenuation Berm; Bottom - Visual Berm)
- Building/Structure
- Spot Elevation (Metres above sea level (MASL)) (Top - Existing; Bottom - Maximum Depth of Extraction)
- Cross Sections (A1)

Site Plan Acronyms

1. ARA - Aggregate Resources Act
2. MNDMNRF - Ministry of Northern Development, Mines, Natural Resources and Forestry
3. MHSTCI - Ministry of Heritage, Sport, Tourism and Culture Industries
4. MECP - Ministry of the Environment, Conservation and Parks
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7. ECA - Environmental Compliance Approval
8. BMPP - Best Management Practices Plan
9. PTTW - Permit to Take Water
10. MASL - Metres above sea level
11. ROW - Right of way
12. HMA - Hot mix asphalt

Site Plan Amendments

No.	Date	Description	By

Site Plan Revisions (Pre-Licencing)

No.	Date	Description	By

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
113 COLLIER STREET, BARRIE, ON. L4M 1H2 | P: 705.728.0045 F: 705.728.2010 | WWW.MHBCPLAN.COM

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Applicant

Walker Aggregates Inc.
2800 Thorold Townline Road
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Project

Upper's Quarry

MNDMNRF Licence Reference No.

Applicant's Signature

Plan Scale: 1:3000 (Arch E)
0 90 180 Meters

Date October 2021
Drawn By C.P.
Checked By D.W.
File No. 9811V

File Name

Operational Plan

Drawing No.

2 of 6

File Path N:\Brian\9811V - Walker Uppers Quarry\Drawings\Site Plan\CAD\9811V - Site Plan - Proposed Scenario.dwg

A. General

1. This plan depicts a schematic operations sequence for the property based on the best information available at the time of preparation.
2. Phases do not represent any specific or equal time period.
3. The direction of extraction will generally be in accordance with the General Direction of Excavation (shown on the plan view). Notwithstanding the operational and rehabilitation notes, demand for certain products, blending of materials or Water Study Contingency measures may require minor deviations in the extraction and rehabilitation sequence.
4. Progressive and final rehabilitation will be completed in direct correlation to the development of the quarry as the extraction limits are reached and enough area is available to ensure that rehabilitation activities will not interfere with the production, stockpiling and processing of aggregate materials.

B. Initial Site Preparation

1. Generally, site preparation in Phases 1 and 2 to include but not limited to:
   a. Constructing the main entrance and cross over(s) in accordance with entrance permit approvals
   b. Establishing fencing around licenced boundary (see Section N Variations from Control and Operation Standards on drawing 2 of 6)
   c. Removal of trees and existing buildings (in accordance with all site plan requirements and applicable regulations)
   d. Proceed with stripping of overburden/topsoil from Phase 1 and, if necessary, Phase 2
   e. Construction of berms/acoustic barriers within the perimeter setback of the licence boundary (as shown on the plan view).
2. Install water management and erosion and sediment control measures (silt fencing) in accordance with note D.1 on this drawing and note E.1.c on drawing 4 of 6.
3. Commence portable crushing/screening plant set up. The plant shall operate in accordance with Section A on drawing 4 of 6 for all Phases.

C. Phase 1 (1A and 1B)

1. Commence extraction in the 'Initial Sinking Cut Area' identified in the Mid Extraction Area (see plan view for location).
2. Phase 1A shall be extracted in up to three (3) lifts to a depth ranging between 140 masl and 145 masl.
3. Phase 1B shall be extracted in one (1) to two (2) lifts to a depth of 155 masl.
4. A portable pump shall be utilized as necessary in the Mid Extraction Area and the South Extraction Area to discharge water to a man-made pond for aggregate washing or to a sediment forebay before being discharged to the existing watercourse. During heavy rainfall events (25 mm or more), the pump will be deactivated as necessary to prevent flooding along the watercourse downstream of the site. The discharge pond and forebay locations will move with the quarry face until the final quarry depth is reached in each extraction area. At this point, a permanent sump shall be established in each extraction area.
5. During Phase 1, a new watercourse channel shall be constructed along the east side of Thorold Townline Road (within Phase 1B) for the eventual realignment of the existing watercourse. As resource extraction is completed in Phase 1B, this area will be filled with clay overburden material from on-site to an elevation ranging between 173 to 178 masl. The new watercourse and riparian wetland channel shall be constructed, designed and vegetated in accordance with this Rehabilitation Plan (drawing 5 of 6).
6. As extraction reaches the final quarry floor, and there is sufficient separation from the quarry floor working areas in Phase 1A, a 2:1 sideslope along the easterly and northerly limit of Phase 1B shall be backfilled with either: (i) overburden stockpiled on-site; (ii) overburden in Phase 2; or (iii) material imported from Licence Numbers 11175 4437.
7. Commence site preparation of Phase 2.

D. Phase 2 (2A & 2B)

1. Commence extraction in the 'Initial Sinking Cut Area' identified in the North Extraction Area (see plan view for location).
2. Phase 2A shall be extracted in up to three (3) lifts to a depth ranging between 141 masl to 145 masl.
3. Phase 2B shall be extracted in one (1) to two (2) lifts to a depth of 155 masl.
4. A portable pump shall be utilized as necessary to discharge water to a man-made pond for aggregate washing or to a sediment forebay before being discharged to the existing watercourse. During heavy rainfall events (25 mm or more), the pump will be deactivated as necessary to prevent flooding along the watercourse downstream of the site. The discharge, pond and forebay locations will move with the quarry face until the final quarry depth is reached. At this point, a permanent sump will be established.
5. Similar to Phase 1, the new watercourse channel shall be constructed within Phase 2 running along the east side of Thorold Townline Road (Phase 2B) for the eventual realignment of the existing watercourse. As resource extraction is completed in Phase 2B, this area will be filled with clay overburden material from on-site to an elevation ranging between 173 to 178 masl. The new watercourse and riparian wetland channel will be constructed, designed and vegetated in accordance DFO authorization and Rehabilitation Plan (drawing 5 of 6).
6. As extraction reaches the final quarry floor, and there is sufficient separation from the quarry floor working areas in Phase 2A, a 2:1 sideslope along the easterly and northerly limit of Phase 2B shall be backfilled with either: (i) overburden stockpiled on-site; (ii) overburden in Phase 3B; or (iii) material imported from Licence Numbers 11175 and 4437.
7. Commence site preparation of Phase 3.

E. Phase 3 (3A & 3B)

1. Proceed with stripping of overburden/topsoil.
2. Prior to undertaking any works within Phase 3A that may result in any serious harm to fish, according to 35(1) of the Fisheries Act, the Licensee shall obtain a Fisheries Act Authorization from the Department of Fisheries and Oceans (DFO) and shall fulfill any other conditions required by the DFO as stated on its authorization. Once the watercourse has been realigned to the satisfaction of DFO, stripping of overburden and topsoil can proceed in Phase 3A.
3. In the event that watercourse relocation has not been approved or completed, extraction in Phase 3B may proceed before extraction in Phase 3A.
4. In the event that Phase 3B is extracted before Phase 3A, a portable pump shall be utilized as necessary to discharge water to a man-made pond for aggregate washing or to a sediment forebay before being discharged to the existing watercourse. During heavy rainfall events (25 mm or more), the pump will be deactivated as necessary to prevent flooding along the watercourse downstream of the site. The discharge, pond and forebay locations will move with the quarry face until the final quarry depth is reached. At this point, a permanent sump will be established.
5. Phase 3A and 3B shall be extracted in up to three (3) lifts to a depth ranging between 145 masl to 149 masl. Extraction will proceed in an easterly direction, moving gradually from north to south.
6. Once the existing watercourse has been realigned, extraction in Phase 3A may proceed.
7. Continue progressive rehabilitation of the quarry perimeter where limits of extraction have been reached and there is sufficient separation from the quarry floor working areas.
8. Commence site preparation of Phase 4.

F. Phase 4

1. Proceed with stripping of overburden/topsoil.
2. Commence Phase 4 extraction in an easterly direction, moving gradually from north to south.
3. Phase 4 shall be extracted in up to three (3) lifts to a depth ranging between 142 masl in and 147 masl.
4. Continue progressive rehabilitation of the quarry perimeter where limits of extraction have been reached and there is sufficient separation from the quarry floor working areas.

G. Phase 5

1. Proceed with stripping of overburden/topsoil.
2. Commence Phase 5 extraction in an easterly direction, moving gradually from north to south.
3. Phase 5 shall be extracted in up to three (3) lifts to a depth ranging between 140 masl and 143 masl.
4. Continue progressive rehabilitation of the quarry perimeter where limits of extraction have been reached and there is sufficient separation from the quarry floor working areas.

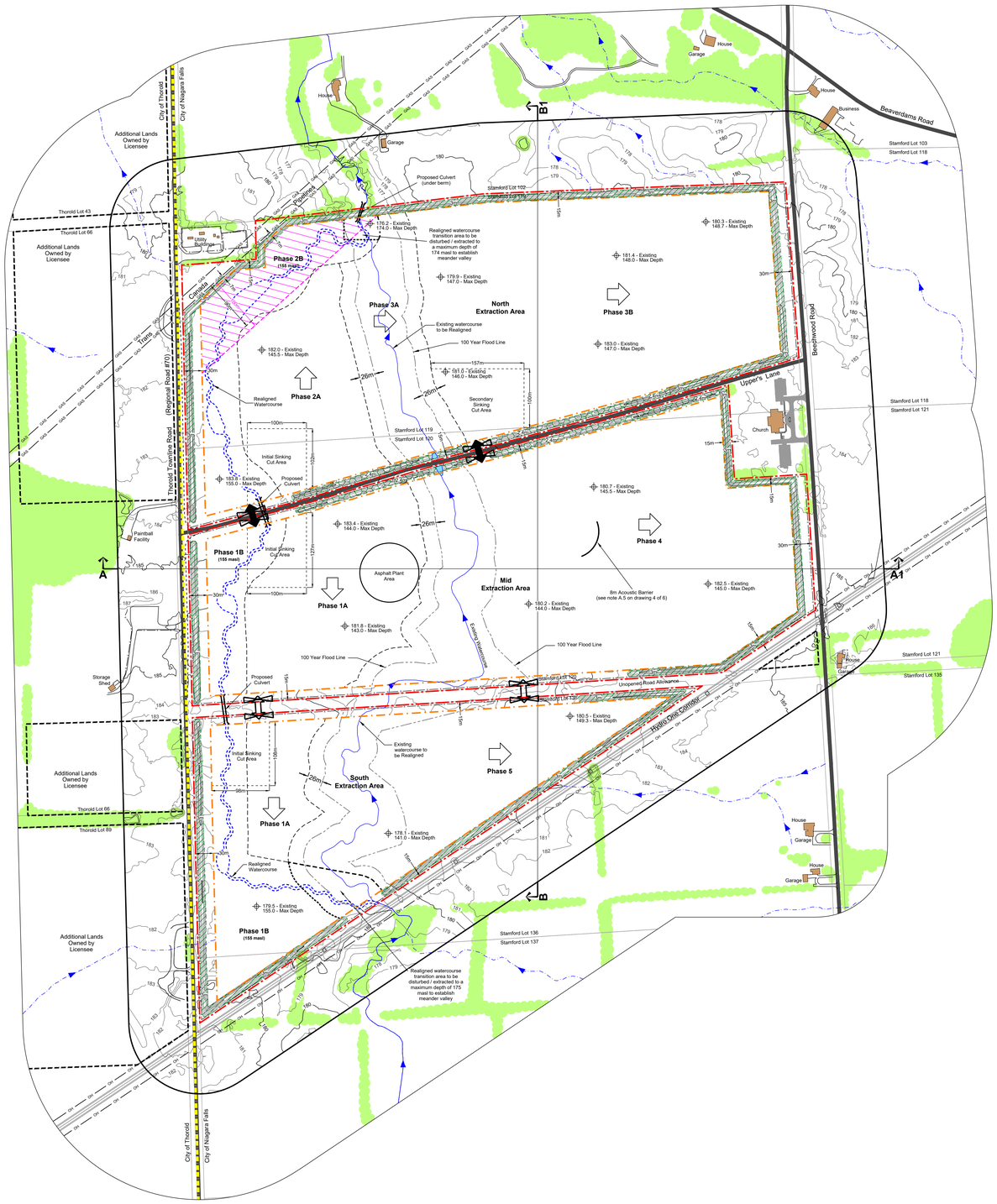
H. Final Phase

1. Complete extraction of any remaining resource in the extraction limit near the entrance in Phase 1A and 1B (e.g. ramp).
2. As part of the final operations of the site, remove office/scale house and scales and any other equipment and scrap from the site.
3. Continue with final rehabilitation of the site. Complete quarry face backfilling on the remaining quarry faces as identified on drawing 5 of 6.

Extraction Sequence Schematic

Scale 1:7500

0 200 400 Meters



Legend

- Licence Boundary
- Limit of Extraction
- Additional Lands Owned by Licensee
- Municipal Boundary
- Contours with Elevation — Metres above sea level (MASL)
- Public Road
- Fence — 1.2m post & wire farm fence unless otherwise noted
- Watercourse — Direction of flow indicated by arrows
- Surface Drainage Feature — Direction of flow indicated by arrows
- Watercourse - Realigned (Stantec, 2020)
- Water Feature
- Wooded Area
- 120m Offset From Licence Boundary
- Trans Canada Blasting Buffer Area - See Note D.5 on drawing 4 of 6
- Parcel Fabric
- Trans Canada Pipeline Easement
- Hydro One Easement
- Entrance / Exit
- Limited Service Access — For Phases 1A, 1B and 5 in South Extraction Area
- Gate
- Culvert
- General Direction of Excavation & Boundary
- Berm — Top - Noise Attenuation Berm; Bottom - Visual Berm
- Building/Structure
- Spot Elevation — Metres above sea level (MASL); Top - Existing; Bottom - Maximum Depth of Extraction
- Cross Sections

Legal Description

Part of Lots 119, 120, 136 & 137
City of Niagara Falls (Geographic Township of Stamford)
Regional Municipality of Niagara

Site Plan Acronyms

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8. BMPP - Best Management Practices Plan
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10. MASL - Metres above sea level
11. ROW - Right of way
12. HMA - Hot mix asphalt

Site Plan Amendments

No.	Date	Description	By

Site Plan Revisions (Pre-Licencing)

No.	Date	Description	By

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N W E S

Applicant

walker aggregates

Walker Aggregates Inc.
2800 Thorold Townline Road
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Project

Upper's Quarry

MNDMNRF Licence Reference No.	**Applicant's Signature**
Plan Scale: 1:3000 (Arch E) 0 90 180 Meters	**Date** October 2021
	Drawn By C.P.
	Checked By D.W.
	File No. 9811V
File Name	**Extraction Sequence**
Drawing No.	**3 of 6**
File Path	N:\Brian\9811V - Walker Uppers Quarry\Drawings\Site Plan\CAD\9811V - Site Plan - Proposed Scenario.dwg

A. Acoustic Assessment

1. Minimum 3 metre tall acoustic berms shall be constructed in the locations shown on the plan view.
2. The acoustic berms shall be constructed during site preparation and prior to extraction.
3. The primary crusher shall stay within 30 metres of the working face to maximize shielding effect of the quarry terrain.
4. Material extracted from the South Extraction Area shall be processed in the Mid Extraction Area.
5. While processing in Phase 4, the licensee shall maintain an 8 metre tall barrier at a radius of 40 metres to the southeast of the processing plant's secondary crushers (see plan view for location). The barrier can be material stockpiles, noise walls, or a combination of both. The barrier shall extend long enough to shield receptors R4 and R5 (see plan view) from the secondary crushers.
6. All construction equipment shall meet the sound emission standards defined in MECP Publication NPC-115.
7. The following best practice measures shall be undertaken to minimize the potential for construction noise impacts:
   a. Construction will be limited to time periods allowed by the City's applicable by-laws. If construction activities are required outside of these hours, the licensee will seek permits / exemptions directly from the City in advance.
   b. All internal combustion engines will be fitted with appropriate muffler systems.
   c. The licensee's operating procedures will contain a provision that any initial complaint will trigger verification that the general noise control measures agreed to on this Plan are in effect.
   d. In the presence of persistent noise complaints, all construction equipment will be verified to comply with MECP's NPC-115 guidelines.
   e. In the event of verified noise complaints, alternative noise control measures may be required where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.

B. Air Quality

1. The licensee shall apply water or another provincially approved dust suppressant to internal haul roads and processing areas, as necessary to mitigate dust.
2. Processing equipment shall be equipped with dust suppressing or collection devices, where the equipment creates dust and is operating within 300 metres of an air quality sensitive receptor (as set out in the Air Quality Impact Assessment).
3. The licensee shall obtain an environmental compliance approval under the Environmental Protection Act where required to carry out operations at the quarry.
4. The site will operate in accordance with the Best Management Practices Plan (BMPP) for Fugitive Dust Emissions. The BMPP may be amended from time to time, considering actual impacts and operational considerations. The recommendations in the BMPP are based on the maximum daily production rates. At lower production rates, the control measures specified in the BMPP can be reduced accordingly, provided dust remains mitigated on site.
5. The following mitigation measures shall be incorporated into the BMPP:
   a. Blasting operations occurring within 300 metres of a residential receptor shall have a smaller blast area, not exceeding 200 m² in area.
   b. Aggregate extraction, processing and shipping does not exceed 9,000 tonnes per day.

C. Archaeology

1. Areas identified as "Archaeological Site - Protected Areas Requiring Further Archaeological Assessment" on this drawing reflect areas that require further archaeological assessment and are protected by a 20 to 30 metre protective buffer. A 50 metre monitoring buffer is also identified on this drawing.
2. No ground alterations including overburden stripping and excavation, or development of any kind shall occur within areas identified as "Archaeological Site - Protected Areas Requiring Further Archaeological Assessment" and their respective protective buffers until:
   a. the required investigations are completed in accordance with the Stage 1 and 2 Archaeological Assessment prepared by Archaeological Research Associates Ltd. (April 2020),
   b. any recommendations that the respective site(s) has no further cultural heritage value or interest are made as a result of completing further investigations, and,
   c. the associated reports are entered into the Ontario Public Register of Archaeological Reports.
3. A temporary barrier shall be established around the perimeter of each 'Archaeological Site - Protected Areas Requiring Further Archeological Assessment" identified on this drawing as part of site preparation and in advance of extraction.
4. All soil disturbing activities within the 50 metres monitoring buffers shall be monitored by a licensed archaeologist to ensure the effectiveness of the avoidance strategy. The archaeologist shall ensure that the temporary barrier is in the appropriate location and shall be empowered to stop construction if there is a concern for impacts to an archaeological site. 'No go' instructions shall be issued to all work crews for the protected areas, and the locations of the protected areas shall be shown on all appropriate contract drawings. The protected areas shall be inspected by a licensed archaeologist once the strategy is no longer required, and the effectiveness of the strategy shall be reported to the MHSTCI.
5. Immediately upon issuance of the Licence, and once the construction schedule has been finalized, a licensed archaeologist will be retained by the licensee so that monitoring can occur where required. The remaining archaeological fieldwork will be completed upon issuance of the licence by the MNDMNRF.
6. Should deeply buried archaeology remains be found during the course of site preparation and/or extraction related activities, the MHSTCI shall be notified.
7. In the event that human remains are encountered during construction or extraction activities, the licensee shall immediately contact both the MHSTCI and Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services (MGCS).

D. Blasting

1. An attenuation study shall be undertaken by an independent blasting consultant during the first 12 months of operation in order to obtain sufficient quarry data to confirm the initial guideline parameters and assist in refining future blast designs.
2. All blasts shall be monitored for both ground vibration and overpressure at the closest privately owned sensitive receptors adjacent the site, or closer, with a minimum of two (2) instruments - one installed in front of the blast and one installed behind the blast.
3. Blasts shall be designed to maintain vibrations below 13mm/s at the location of the closest identified active spawning bed as per DFO guidelines. When blasting during active spawning season, a minimum of one supplemental vibration monitor shall be installed on the shoreline closest to the spawning bed to confirm the vibration levels.
4. The guideline limits for vibration and water overpressure shall adhere to standards as outlined in the Guidelines For the Use of Explosives In or Near Canadian Fisheries Waters (1998) or any such document, regulation or guideline which supersedes this standard.
5. All blasts shall be monitored for ground vibration at the adjacent Trans Canada Energy High Pressure Natural Gas Pipeline when blasting within 100m of the pipeline or when calculations suggest vibrations in excess of 35mm/s.
6. Blasts shall be designed to maintain vibrations at the transmission towers in the Hydro One Corridor below 50mm/s or any such document, regulation or corporate policy in effect at the time. When vibration calculations suggest vibrations at the towers may exceed 35mm/s, the towers shall be monitored for ground vibration.
7. Blasts shall be designed to maintain vibrations at the 4832 Thorold Townline Road utility buildings below 50mm/s. When vibration calculations suggest vibrations at the utility buildings may exceed 35mm/s, the buildings shall be monitored for ground vibration.
8. The guideline limits for ground vibration and air overpressure shall adhere to standards as outlined in the Model Municipal Noise Control By-law publication NPC 119 (1978) or any such document, regulation or guideline which supersedes this standard.
9. Orientation of the aggregate extraction operation shall be designed and maintained so that the direction of the overpressure propagation will be away from structures as much as possible.
10. Blast designs shall be continually reviewed with respect to fragmentation, ground vibration and overpressure. Blast designs shall be modified as required to maintain compliance with current applicable guidelines and regulations.
11. Detailed blast records shall be maintained in accordance with current industry best practices.

E. Natural Heritage

1. General
   a. Existing vegetation within the setbacks shall be maintained except where berms, haul roads and conveyors are required.
   b. New vegetation shall be maintained in accordance with note G.5 on this drawing.
   c. Silt fencing shall be installed at the easterly limit of Phases 1A and 2A where field drainage enters the existing watercourse. Silt fencing will serve to demarcate the limit of protected area until the watercourse is diverted.
   d. Stockpiling of all excavated material shall be in accordance with note H.7 on drawing 2 of 6.
   e. Topsoil and overburden stockpiles shall be maintained in accordance with the Best Management Practices for the Protection, Creation and Maintenance of Bank Swallow Habitat in Ontario (MNRF 2017). Stripped overburden and topsoil for rehabilitation shall be utilized in accordance with notes E.4, E.5 and E.6 on drawing 2 of 6.
   f. Dust control will be implemented in accordance with Section B on this drawing.
   g. Fuel storage shall be in accordance with the notes under Section K on drawing 2 of 6.
2. Natural Channel Design
   a. The existing watercourse will remain open (not culverted) where it enters the south limit of the South Extraction Area.
   b. Where the watercourse exits the North Extraction Area, a culvert will be installed to maintain the watercourse while allowing an acoustic berm to be constructed. As part of final rehabilitation, the berm and culvert shall be removed to allow for the watercourse to be open.
   c. As part of site preparation, a compensation pond will be constructed in the Watercourse Realignment Transition Area within Phase 2B, in accordance with the Natural Channel Design Report (Stantec 2021). The compensation pond will be excavated to a maximum depth of 174 masl in this area and in accordance with DFO authorization. No drilling or blasting shall occur in this Transition Area.
   d. As extraction is completed in Phases 1B and 2B, these areas will be filled with clay overburden material to an elevation ranging between 173 to 178 masl. In accordance with the Natural Channel Design Report (Stantec 2021), a new watercourse channel will be constructed, vegetated and designed in these areas and will include the following design elements:
      d.1. Floodplain wetlands
      d.2. Fish habitat ponds, including new pike spawning habitat as well as foraging, spawning and rearing habitat for other fish species
      d.3. Creek sections
      d.4. Wood debris toe protection and wood reinforced banks
      d.5. Log sills
      d.6. Augmented riffle.
   e. Culverts will be installed under Upper's Lane and the unopened road allowance.
   f. 2:1 side slopes shall be established on the east side of the new watercourse channel down to the quarry floor.
   g. Once the realigned watercourse channel has been constructed in Phases 1B and 2B and adequate vegetation has been established (as confirmed by an ecologist), water from the existing watercourse will be diverted to the realigned watercourse in consultation with regulatory authorities.
3. Woodland and Terrestrial Habitat Enhancement
   a. The 2.0 ha woodland situated on the east side of Thorold Townline Road shall be removed during the advancement of operations in Phase 1A/1B. Tree clearing in the woodlot shall be undertaken outside of the breeding bird period and the active bat season from March 23 and August 26.
   b. The lands identified off-site as "Woodland Compensation Area" on this drawing, an area of 4.7 ha, shall be planted in accordance with the Rehabilitation Plan (drawing 5 of 6).
   c. The lands identified on-site as Deciduous Woodland, Treed Deciduous Swamp and Swamp Thicket / Marsh Meadow on drawing 5 of 6, an area of 4.0 ha, shall be planted in accordance with the Rehabilitation Plan.
   d. Planting for the off-site woodland compensation will commence in the appropriate planting season following licence approval.
4. Significant Wildlife Habitat and Wildlife
   a. Vegetation clearing where milkweed plants are present will proceed when monarch larvae are absent (September 30 to April 1).
   b. The setbacks along Thorold Townline Road and Beechwood Road shall be planted with a mix of deciduous and coniferous trees and shrubs with a range of sizes. Native plant materials that are complementary to the regional and local landscape shall be used (see Rehabilitation Plan, drawing 5 of 6).
5. Woodland and Wildlife Habitat Compensation Plan
   a. A woodland and wildlife habitat compensation plan shall be prepared in consultation with regulatory authorities to: (i) allow practices and management to respond to changing forest dynamics in the Woodland Compensation Areas such as pest infestations, climatic conditions (e.g. species selection) and restoration ecology; and (ii) achieve a net gain in the ecological functions of the local and regional landscape through:
      a.1. Increasing the total area of woodland cover in the regional landscape;
      a.2. Improving associated landscape functions such as vegetative linkages and interior forest areas
      a.3. Improving forest ecological characteristics such as species diversity, age class distribution and structural diversity, while retaining native genetics through seed collection and replanting. For example, prior to the removal of the existing 2 ha woodland:
         a.3.1. Tree seeds and nuts will be gathered from the woodland for direct planting in the Woodland Compensation Area to promote the continuity of genetic stock and a similar community composition to the removed vegetation community (FOD9)
         a.3.2. Leaf litter and sods containing native understory vegetation will be transplanted to promote rapid establishment of a healthy forest soil microbiome
         a.3.3. Transplanting of native saplings and small shrubs from the woodland to the compensation planting area, where feasible.
      a.4. Incorporating specific wildlife habitat features for bats, deer and other wildlife, such as bat roosting structures (bat boxes or condos), coniferous tree clusters for cover, browse-tolerant shrubs and mast producing trees;
      a.5. Incorporating specific planting in setbacks and the watercourse realignment channel. For example, plantings that provide habitat for monarch including common milkweed (Asclepias syriaca), swamp milkweed (Asclepias incarnata) and nectar producing plants.
6. Fish and Fish Habitat
   a. Implement notes D.3 and D.4 on this drawing.
   b. Water shall be discharged from the sump area to the existing watercourse until water flow is diverted to the watercourse realignment channel. Once the watercourse realignment has been completed, water shall be discharged from the sump locations to the realigned watercourse. Pumping and discharge shall occur as required to support fish habitat.
   c. Water collected from the sump area shall be directed to a holding pond for storage to allow for settling of suspended solids and dissipation of other constituents such as hydrogen sulfide an alkalinity. Following this pond treatment, water will be discharged to the existing watercourse until water flow is diverted to the watercourse realignment channel. Once the watercourse realignment has been completed, water shall be discharged from the holding pond to the realigned watercourse. Pumping and discharge shall occur as required to support fish habitat.
7. Wetlands
   a. Wetlands along the existing watercourse will be maintained until the watercourse has been diverted to the watercourse realignment channel.
   b. Once the watercourse has been diverted, the created wetlands in the watercourse realignment channel shall be maintained.
8. Monitoring Program
   a. A monitoring plan shall be prepared in consultation with regulatory authorities to assess the performance of the watercourse realignment channel and to confirm that impacts to off-site wetlands are not occurring as a result of dewatering.
   b. A monitoring program of compensation planting shall be prepared in consultation with regulatory authorities to confirm stable conditions have been established.
   c. A trigger mechanism and contingency plan, as detailed in WSP's Water Study Report, shall be implemented upon licence approval to proactively ensure natural heritage features and their functions are maintained (i.e. fish habitat, wetland features downstream and at 5584 Beechwood Road, and woodlands) during operational and rehabilitation phases.

F. Traffic

1. Prior to commencement of extraction operations, the required entrance improvements, road improvements and road widenings (to Thorold Townline Road) shall be completed to the satisfaction of the applicable road authorities and in general accordance with the figures titled "Uppers Lane Conceptual Intersection Design" and "Uppers Lane Vehicle Movement Diagram" provided on this drawing.

G. Visual

1. Where possible and to the extent to which it is present, existing vegetation located along the site perimeter within the setback area shall be retained.
2. 3.0 metre high acoustic berms and 2.4 metre high visual berms shall be established in the locations shown on the plan view. Berms shall be constructed in a smooth, rolling manner with varying highpoints (where space permits while respecting minimum height requirements), and variations along the berm length to create a more natural appearance. Berms shall be seeded with a naturalizing mix of wildflowers and grasses to stabilize slopes and minimize mowing and maintenance.
3. Within the "Extended Planting Areas" (as shown on this drawing), trees shall be planted at a spacing of 5 to 10 metres on centre, depending on species. Where possible, plantings shall be randomly spaced and staggered up on the berm up to one third of its maximum height to appear more natural. Plantings shall also extend a minimum of 3 metres out from the berm towards the road where available space permits. All vegetation shall be selected for wind and salt tolerance and hardiness. Native species that complement the existing surroundings shall be utilized.

   Where "Large Planting Stock" is indicated (see plan view and "Typical Visual Berm Detail" on this drawing), this area shall be planted with deciduous trees of minimum 40 millimetres caliper, coniferous trees of minimum 1.0 metre in height, and shrub species of minimum 40 centimetres height.

   Where "Small Planting Stock" is indicated (see plan view and "Typical Visual Berm Detail" on this drawing), this area shall be planted with deciduous tree whips of minimum 1.2 metres in height, coniferous trees of minimum 0.6 metre in height, and shrub species of minimum 20 centimetres height (or bare root stock when in season).

   Planting shall occur for 40 metre stretches on either side of Upper's Lane and the unopened road allowance facing Thorold Town Line Road. The large planting stock shall be planted 3 metres beyond the berm and small planting stock shall extend from the toe of the berm to 2 metres up the berm.

   Plant species for berms may include, but shall not be limited to the following:

   Trees

White Pine	Common Hackberry	Chokecherry
White Spruce	Paper Birch	Pin Oak
Sugar / Silver Maple	Trembling Aspen	Basswood
White Pine	White Spruce	White Cedar

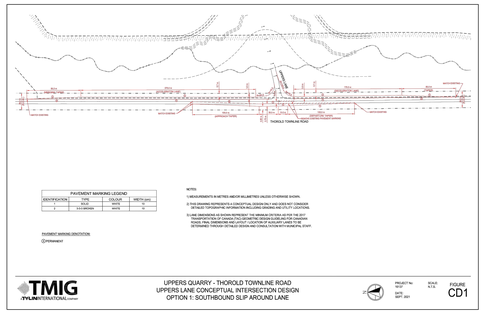
   Shrubs

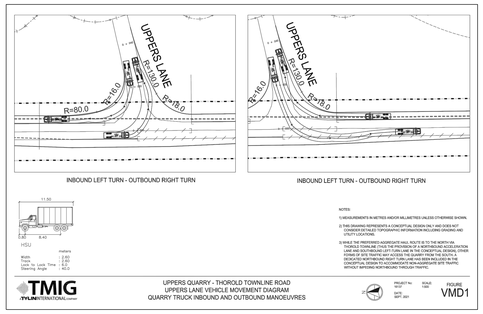
Staghorn Sumac	Nannyberry	Common Ninebark
American Elder	Dogwood	Highbush Cranberry

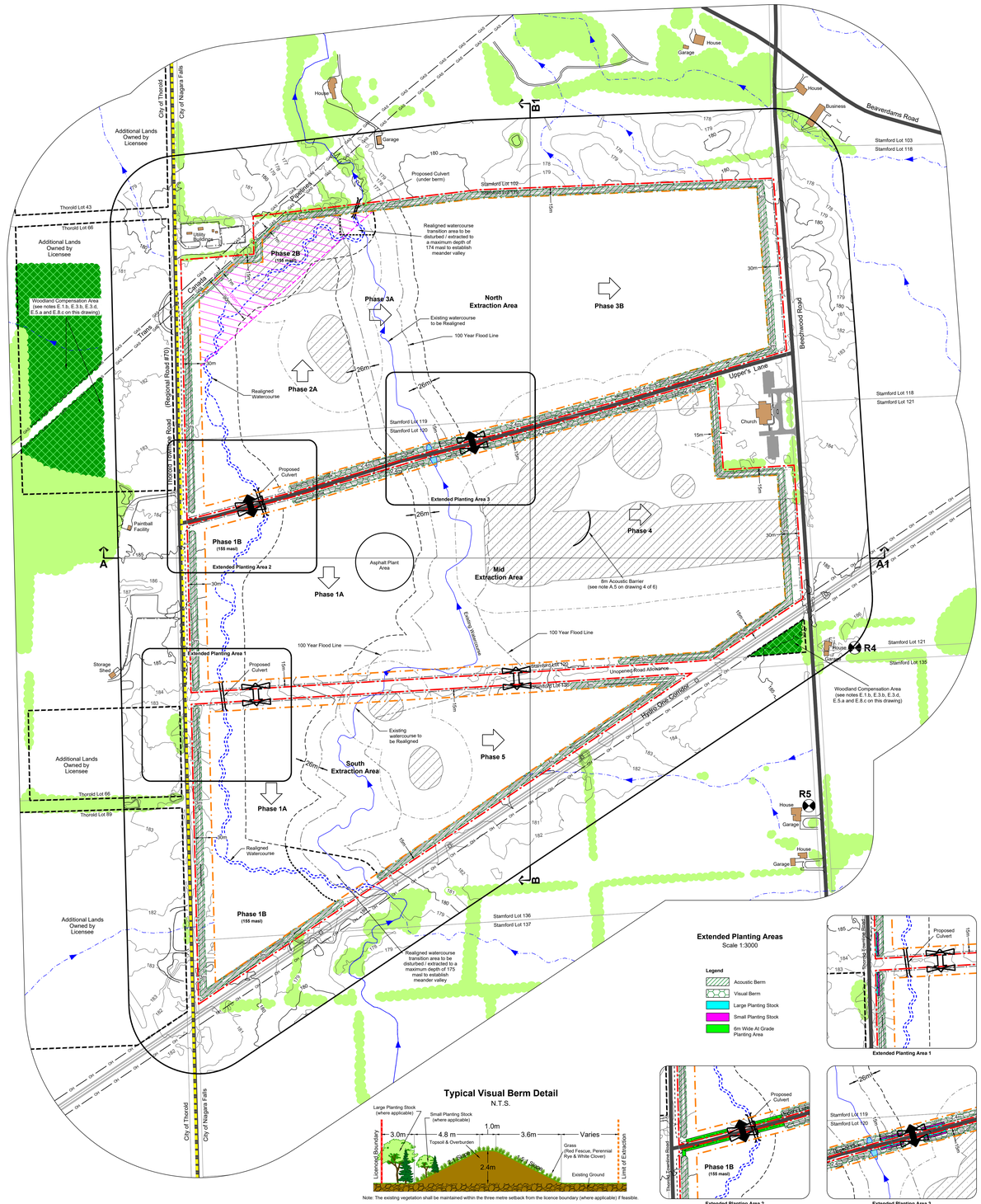
4. To ensure survival and positive growth rate, the vegetative screening shall be maintained as an effective visual screen over time. Allowance of natural succession is encouraged.
5. During the first year, planted trees shall be watered and monitored until established. After the first year and up to five years, trees shall be inspected biannually (end of Year 1, beginning of Year 3 and end of Year 4). Trees which are in poor condition at the time shall be fertilized, watered and monitored to improve their health and vigor.
6. A mortality rate of up to 15% of all trees planted over the course of the five year maintenance period is expected. Trees that die exceeding this percentage shall be replaced yearly, preferably in the spring or late summer.

H. Water Study

1. A long-term monitoring program will be implemented during the quarry operational and rehabilitation phases, until stable conditions are observed after quarry decommissioning.
2. In the event a well interference claim is received, the licensee shall implement the following mitigation plan to proect the local groundwater users.
   a. Prior to extraction, landowners shall be provided with a copy of the water well interference plan as well as the contact information for the licensee and MECP (Wells Help Desk 1-888-396-9355 or email wellshelpdesk@ontario.ca).
   b. If a water well interference claim is received by the licensee the following actions shall be taken:
      b.1. The licensee shall immediately notify MNDMNRF and MECP of the complaint.
      b.2. The licensee shall contact a well contractor in the event of a well malfunction and residents will be provided a temporary water supply within 24 hours, if the issue cannot be easily determined and rectified.
   c. The well contractor shall contact the resident with the supply issue to rectify the problem as expeditently as possible, provided landowner authorization of the work.
   d. If the issue raised by the landowner is related to loss of water supply, the licensee shall have a qualified hydrogeologist / well contractor determine the likely causes of the loss of water supply, which can result from a number of factors, including pump failure (owner's expense), extended overuse of the well (owner's expense), lack of well maintenance / well cleaning (owner's expense) or lowering of the water level in the well from the quarry development (licensee expense). This assessment process shall be carried out at the expense of the licensee and the results provided to the homeowner.
   e. If it has been determined that the quarry caused the water supply interference (i.e., lowering of the water level), the licensee shall continue to supply water at their expense until the problem is rectified. The following mitigation measures shall be considered, and the appropriate measure(s) implemented at the expense of the licensee:
      e.1. Adjust pump pressure;
      e.2. Lowering of the pump to take advantage of existing water storage within the well;
      e.3. Deepening of the well to increase the available drawdown, if the well deepening changes the water quality a water treatment shall be provided;
      e.4. Widening of the well to increase the available storage of water;
      e.5. Relocation of the well to another area on the property; or
      e.6. Drilling multiple wells.
   f. If the issue raised by the landowner is related to water quality, the licensee shall have a qualified hydrogeologist / well contractor determine the likely causes of the change in water quality, and review monitoring results at the quarry and background monitoring results from the baseline well survey to determine if there is any potential correlation with the quarry. If it has been determined that the quarry caused a water quality issue, the licensee shall continue to supply water at their expense until the problem is rectified. The licensee shall be responsible for restoring the water supply by replacing the well or providing a water treatment system. The licensee is responsible for the expense to restore the water quality.
3. A spill action plan shall be carried out in accordance with the notes in Section N Spills Plan on drawing 2 of 3.
4. A trigger mechanism and contingency plan as set out in WSP's Level 2 Water Study Report shall be implemented.







Legal Description

Part of Lots 119, 120, 136 & 137
City of Niagara Falls (Geographic Township of Stamford)
Regional Municipality of Niagara

Legend

- Licence Boundary
- Limit of Extraction
- Additional Lands Owned by Licensee
- Municipal Boundary
- Contours with Elevation (Metres above sea level (MASL))
- Public Road
- Fence (1.2m post & wire farm fence unless otherwise noted)
- Watercourse (Direction of flow indicated by arrows)
- Surface Drainage Feature (Direction of flow indicated by arrows)
- Watercourse - Realigned (Stantec, 2020)
- Water Feature
- Wooded Area
- Woodland Compensation Area (Off-site)
- Archaeological Site (Protected Areas Requiring Further Assessment (Includes 20-30m Buffer))
- Archaeological Offset (50m Monitoring Buffer)
- 120m Offset From Licence Boundary
- Trans Canada Blasting Buffer Area - See Note D.5 on this drawing
- Parcel Fabric
- Trans Canada Pipeline Easement
- Hydro One Easement
- Entrance / Exit
- Limited Service Access (For Phases 1A, 1B and 5 in South Extraction Area)
- Gate
- Culvert
- General Direction of Excavation & Boundary
- Berm (Top - Noise Attenuation Berm; Bottom - Visual Berm)
- Building/Structure
- Noise Receptor
- Cross Sections

Site Plan Acronyms

1. ARA - Aggregate Resources Act
2. MNDMNRF - Ministry of Northern Development, Mines, Natural Resources and Forestry
3. MHSTCI - Ministry of Heritage, Sport, Tourism and Culture Industries
4. MECP - Ministry of the Environment, Conservation and Parks
5. MGCS - Ministry of Government and Consumer Services
6. DFO - Department of Fisheries and Oceans Canada
7. ECA - Environmental Compliance Approval
8. BMPP - Best Management Practices Plan
9. PTTW - Permit to Take Water
10. MASL - Metres above sea level
11. ROW - Right of way
12. HMA - Hot mix asphalt

Site Plan Amendments

No.	Date	Description	By

Site Plan Revisions (Pre-Licencing)

No.	Date	Description	By

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
113 COLLIER STREET, BARRIE, ON. L4M 1H2 | P: 705.728.0045 F: 705.728.2010 | WWW.MHBCPLAN.COM

MHBC Stamp
Debra Walker
Is authorized by the Ministry of Northern Development, Mines, Natural Resources and Forestry pursuant to Section 2 (1) of the Aggregate Resources Act to prepare and certify site plans.

MHBC Stamp
Christopher Poole
Is authorized by the Ministry of Northern Development, Mines, Natural Resources and Forestry pursuant to Section 2 (1) of the Aggregate Resources Act to prepare and certify site plans.

N W E S

Applicant

walker aggregates

Walker Aggregates Inc.
2800 Thorold Townline Road
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Project

Upper's Quarry

MNDMNRF Licence Reference No.

Applicant's Signature

Plan Scale: 1:3000 (Arch E)
0 90 180 Meters

Date: October 2021
Drawn By: C.P.
Checked By: D.W.
File No.: 9811V

File Name

Report Recommendations

Drawing No.

4 of 6

File Path N:\Brian\9811V - Walker Uppers Quarry\Drawings\Site Plan\CAD\9811V - Site Plan - Proposed Scenario.dwg

PROGRESSIVE REHABILITATION

A. General

1. Area calculations:

a.	Licenced area	**103.6 ha**
b.	To be extracted	**89.1 ha**
c.	Final rehabilitation within licence (total)	**103.6 ha**
c.a.	Lake	68.8 ha
c.b.	Shoreline wetland	1.3 ha
c.c.	Wetland/pond/stream	2.9 ha
c.d.	Terrestrial	22.7 ha
c.e.	Deciduous Woodland	1.2 ha
c.f.	Treed Deciduous Swamp	2.0 ha
c.g.	Swamp Thicket & Marsh Meadow	0.8 ha
c.h.	Undisturbed	3.9 ha
d.	To be rehabilitated outside of licence:	**4.7 ha**
d.a.	Woodland Compensation Area	4.7 ha

2. The maximum predicted water table is 184.9 masl and the contact aquifer potentiometric contours ranges between 176.0 and 184.9 masl (as per WSP's "Proposed Upper's Quarry - Maximum Predicted Water Table Report", dated October 2021.

B. Phasing

1. As excavation reaches the limit of extraction or maximum depth, progressive rehabilitation shall commence.
2. Progressive rehabilitation shall follow the general direction and sequence of extraction identified on the plan view and described in the notes on drawing 3 of 6. Minor deviations in operational/rehabilitation sequence will be permitted in order to adjust for any variable resource and market conditions.
3. Prior to extraction commencing in Phases 3A and 3B, side sloping adjacent to Phases 1B and 2B shall be completed to allow for the existing watercourse realignment to be finalized.
4. Dewatering of the quarry will ultimately discharge to the watercourse (pre and post realignment). The quarry will continue dewatering operations to maintain a dry quarry floor. When the rock is fully extracted, it is proposed that dewatering operations will cease and the quarry will be permitted to fill naturally with surplus precipitation, surface water and any contribution from groundwater seepage to form a lake. As shown on the plan view, shallow shoreline wetland areas shall be created to provide aquatic habitat.
5. Watercourse Realignment Channel Area - As portions of the watercourse realignment channel are constructed, the channel shall be planted according to the requirements of each respective planting zone; (i) riparian planting zone; (ii) upland planting zone; (iii) shoreline planting zone and (iv) life staking planting zone. Details relating to construction, planting and monitoring requirements for the watercourse realignment corridor are contained within the "Natural Channel Design Report" prepared by Stantec Consulting Ltd. (dated October 2021).
6. Reforestation Areas - There are two main reforestation areas:
   - 6.1. The Woodland Compensation Area (Off-site) to be no less than 4.3 ha in area. Plantings in this area are set out in Table 1 on this drawing. Planting for this Area (Off-site) will commence in the appropriate planting season following licence approval.
   - 6.2. The on-site Woodland Compensation Area includes the areas identified as the Deciduous Woodland, Treed Deciduous Swamp and Swamp Thicket/Marsh Meadow, to be no less than 4.0 ha in total area. Plantings in these areas are set out in Tables 1 to 3 on this drawing respectively. In the Deciduous Woodlands (on-site), additional conifer species will be added to the species mix to provide additional screening.
7. A woodland and wildlife habitat compensation plan shall be prepared in consultation with regulatory authorities in accordance with Note E.5.a on drawing 4 of 6.

C. Slopes and Grading

1. Progressive rehabilitation will utilize a variety of rehabilitation techniques including:
   - a. backfilling extraction faces and quarry floors; or
   - b. Leaving extraction faces vertical
2. Excess soil, as defined by Ontario Regulation 406/19 under the Environmental Protection Act, may be imported for the following rehabilitation purposes:
   - 2.1. To establish the final elevations, slopes and grades depicted on the plan view
3. Excess soil imported for the rehabilitation purposes described above shall meet the soil quality, tracking and testing standards required by Ontario Regulation 406/19 or the applicable MECP standards at the time.
4. The final rehabilitated landforms established using the rehabilitation techniques will consist of a lake, shoreline wetlands, riparian corridor, woodlands, gradually sloping grades, 2:1 and 3:1 side slopes, and vertical faces as shown on the plan view.

D. Seeding and Planting

1. Side slopes steeper than 3:1 shall be seeded with the Ministry of Transportation's (MTO) Ontario Roadside Seed Mix (Creeping Red Fescue, Kentucky Bluegrass, Perennial Ryegrass and White Clover) or equivalent.
2. The deciduous woodlands, treed deciduous swamp, swamp thicket/marsh meadow, shoreline wetland, and realigned watercourse channel (riparian corridor) shall be planted with species identified in Tables 1-5 on this drawing respectively.

E. Drainage

1. Final surface drainage will follow the rehabilitated contours and directional arrows shown on the plan view.
2. Once the quarry is depleted, pumping will cease and portions of the site below the ground water table will fill with water.
3. The quarry dewatering discharge will be directed to the watercourse (pre and post alignment) and ultimately flow to Beaverdams Creek to support fish habitat and downstream wetlands.
4. The licensee shall operate in accordance with the conditions of the MECP, PTTW and ECA for the ongoing dewatering of the site.

F. Trigger Mechanism and Contingency Plan

1. During progressive rehabilitation, until surrendering the licence, the licensee is required to operate in accordance with the Trigger Mechanism and Contingency Plan, included in the Upper's Quarry Level 2 Water Study Report prepared by WSP, dated October 2021, as may be amended from time to time with approval from MNDMNRF.

FINAL REHABILITATION

A. General

1. All equipment shall be removed from the licenced area.
2. A field/property access entrance shall remain to access the watercourse (as realigned).
3. The long term average surface water and lake level elevation is estimated to be approximately 175.15 masl.
4. At final rehabilitation, outflow from the realigned watercourse and the quarry lake will continue to discharge from the licence area at the present location where the existing watercourse channel crosses the northern licence boundary.

Table 1: Deciduous Woodland Planting List

%	Botanical Name	Common Name
TREES		
5	*Acer saccharum*	Sugar Maple
25	*Carya ovata*	Shagbark Hickory
15	*Fagus grandifolia*	American Beech
15	*Ostrya virginiana*	Ironwood
20	*Prunus serotina*	Black Cherry
5	*Quercus rubra*	Red Oak
15	*Tilia Americana*	Basswood
SHRUBS		
15	*Amelanchier arborea*	Juneberry
20	*Carpinus caroliniana*	Blue-beech
15	*Hamamelis virginiana*	Witch Hazel
15	*Prunus virginiana*	Chokecherry
20	*Rhus typhina*	Staghorn Sumac
20	*Cornus racemosa*	Grey Dogwood
15	*Rubus odoratus*	Purple-flowering Raspberry
GROUND COVER		
20	*Schizachyrium scoparium*	*Little Bluestem*
15	*Elymus histrix*	*Bottlebrush grass*
15	*Rudbeckia hirta*	*Black Eyed Susan*
15	*Carex granularis*	*Meadow Sedge*
8	*Solidago canadensis*	*Canada Goldenrod*
8	*Oenothera biennis*	*Evening Primrose*
5	*Asclepias syriaca*	*Common Milkweed*
5	*Clematis virginiana*	*Virgin's Bower*
5	*Monarda fistulosa*	*Wild Benjamin*
1	*Anemone canadensis*	*Canada Anemone*
1	*Euthamia graminifolia*	*Grass Leaved Goldenrod*
1	*Symphyotrichum cordifolium*	*Heart-leaved Aster*
1	*Aster novae-angliae*	*New England Aster*

Table 2: Treed Deciduous Swamp Planting List

%	Botanical Name	Common Name
TREES		
20	*Acer x freemani*	Freeman's Maple
20	*Juglans nigra*	Black Walnut
20	*Populus deltoides*	Eastern Cottonwood
20	*Quercus macrocarpa*	Bur Oak
20	*Thuja occidentalis*	Eastern White Cedar
SHRUBS		
14	*Cornus amomum*	Silky Dogwood
12	*Cornus foemina*	Gray Dogwood
12	*Ilex verticillata*	Winterberry
12	*Rosa palustris*	Swamp Rose
12	*Salix bebbiana*	Bebb's Willow
14	*Spirea alba*	Meadowsweet
12	*Viburnum lentago*	Nannyberry
12	*Viburnum trilobum*	American Cranberry-bush

Table 3: Swamp Thicket / Marsh Meadow Planting List

%	Botanical Name	Common Name
SHRUBS		
14	*Cornus amomum*	Silky Dogwood
12	*Cornus foemina*	Gray Dogwood
12	*Ilex verticillata*	Winterberry
12	*Rosa palustris*	Swamp Rose
12	*Salix bebbiana*	Bebb's Willow
14	*Spirea alba*	Meadowsweet
12	*Viburnum lentago*	Nannyberry
12	*Viburnum trilobum*	American Cranberry-bush
LIVE STAKES		
34	*Cornus sericea*	Red Osier Dogwood
33	*Salix discolor*	Pussy Willow
33	*Salix eriocephala*	Heartleaf Willow
MARSH SEED MIX		
20	*Poa palustris*	Fowl Bluegrass
15	*Carex vulpinoidea*	Fox Sedge
10	*Verbena hastata*	Blue Vervain
10	*Carex granularis*	Meadow Sedge
10	*Euthamia graminifolia*	Grass Leaved Goldenrod
10	*Asclepias incarnata*	Swamp Milkweed
5	*Scirpus atrovirens*	Dark Green Bulrush
5	*Juncus effusus*	Soft Rush
2	*Eupatorium perfoliatus*	Boneset
2	*Carex stipata*	Stalk Grain Sedge
2	*Glyceria grandis*	Tall Manna Grass
2	*Scirpus cyperinus*	Woolgrass
2	*Eupatorium maculatum*	Spotted Joe Pye Weed
2	*Carex bebbii*	Bebb's Sedge
1	*Lobelia siphilitica*	Blue Lobelia
1	*Symphyotrichum puniceum*	Purple Stemmed Aster
1	*Mimulus ringens*	Square Stemmed Monkey Flower

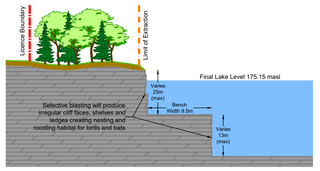
Table 4: Shoreline Wetland

%	Botanical Name	Common Name
PLUGS		
10	*Alisma plantago-aquatica*	Water-plantain
15	*Asclepias incarnata*	Swamp Milkweed
10	*Calla palustris*	Wild Calla
10	*Carex stricta*	Tussock Sedge
10	*Carex vulpinoidea*	Fox Sedge
5	*Chelone glabra*	Turtlehead
5	*Iris versacolor*	Blue Flag Iris
10	*Lemna minor*	Little Duckweed
10	*Polygonum amphibium*	Water Smartweed
10	*Sagittaria latifolia*	Broad-leaved Arrowhead
5	*Scirpus cyperinus*	Wool-grass

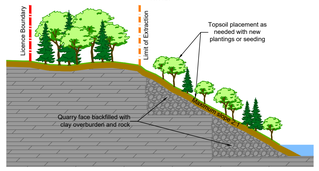
Table 5: Riparian Planting List

%	Common Name	Latin Name
SHRUBS		
14	*Cornus amomum*	Silky Dogwood
12	*Cornus foemina*	Gray Dogwood
12	*Ilex verticillata*	Winterberry
12	*Rosa palustris*	Swamp Rose
12	*Salix bebbiana*	Bebb's Willow
14	*Spirea alba*	Meadowsweet
12	*Viburnum lentago*	Nannyberry
12	*Viburnum trilobum*	American Cranberry-bush
LIKES STAKES (Along Creek)		
34	*Cornus sericea*	Red Osier Dogwood
33	*Salix discolor*	Pussy Willow
33	*Salix eriocephala*	Heartleaf Willow
RIPARIAN SEED MIX		
20	*Poa palustris*	Fowl Bluegrass
20	*Carex granularis*	Meadow Sedge
10	*Asclepias syriaca*	Common Milkweed
10	*Verbena hastata*	Blue Vervain
10	*Andropogon gerardii*	Big Bluestem
10	*Juncus tenuis*	Path Rush
5	*Rudbeckia hirta*	Black Eyed Susan
4	*Solidago canadensis*	Canada Goldenrod
4	*Clematis virginiana*	Virgin's Bower
4	*Monarda fistulosa*	Wild Benjamin
1	*Anemone canadensis*	Canada Anemone
1	*Symphyotrichum novae-angliae*	New England Aster
1	*Symphyotrichum puniceum*	Purple Stemmed Aster

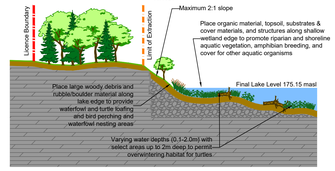
Stepped Cliff Face Detail
N.T.S.

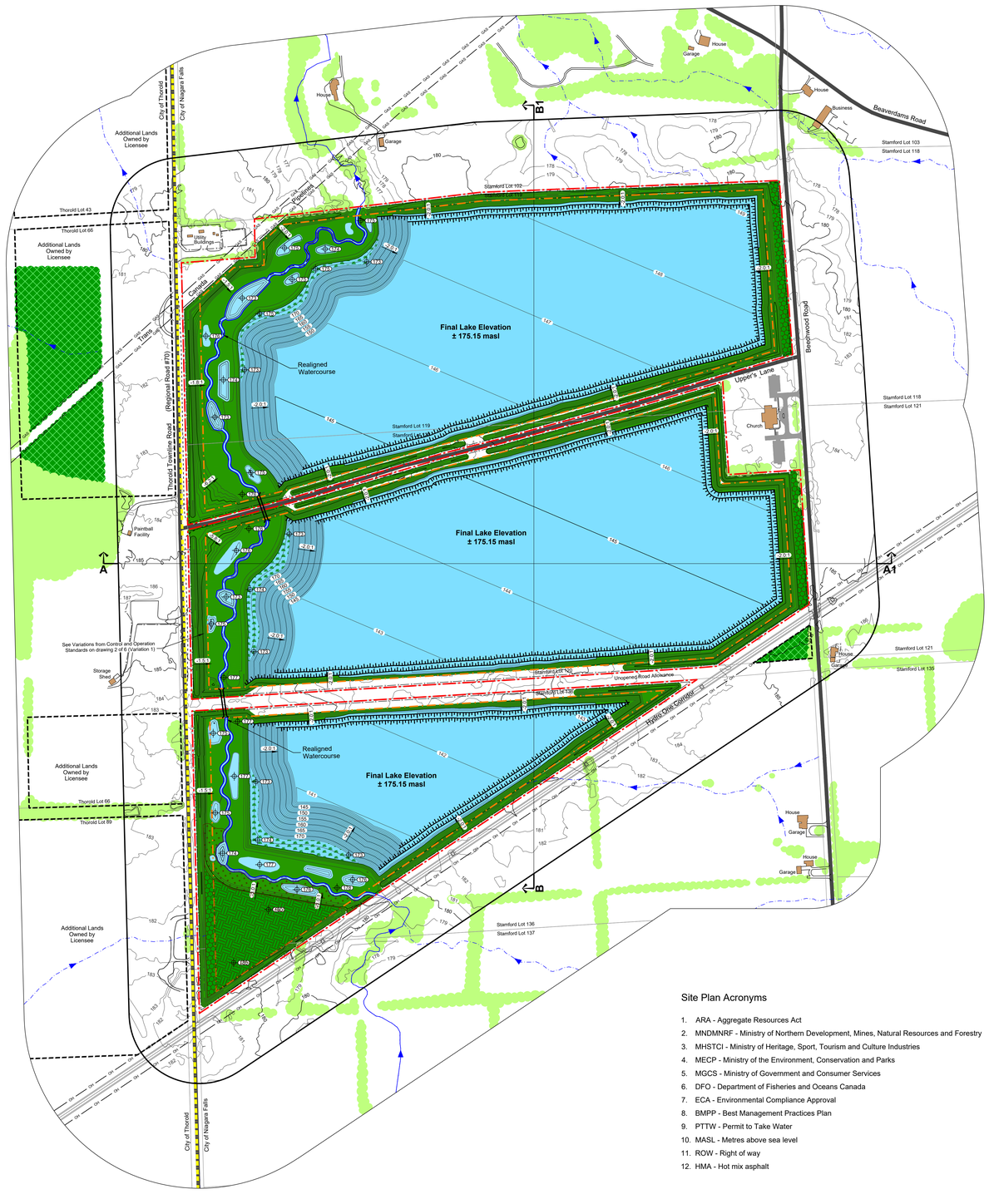


Typical Backfilled Side Slope Detail - Quarry
N.T.S.



Typical Shoreline Wetland Detail
N.T.S.





Site Plan Acronyms

1. ARA - Aggregate Resources Act
2. MNDMNRF - Ministry of Northern Development, Mines, Natural Resources and Forestry
3. MHSTCI - Ministry of Heritage, Sport, Tourism and Culture Industries
4. MECP - Ministry of the Environment, Conservation and Parks
5. MGCS - Ministry of Government and Consumer Services
6. DFO - Department of Fisheries and Oceans Canada
7. ECA - Environmental Compliance Approval
8. BMPP - Best Management Practices Plan
9. PTTW - Permit to Take Water
10. MASL - Metres above sea level
11. ROW - Right of way
12. HMA - Hot mix asphalt

Legal Description

Part of Lots 119, 120, 136 & 137
City of Niagara Falls (Geographic Township of Stamford)
Regional Municipality of Niagara

Legend

- Licence Boundary
- Limit of Extraction
- Additional Lands Owned by Licensee
- Municipal Boundary
- Watercourse — Direction of flow indicated by arrows
- Surface Drainage Feature — Direction of flow indicated by arrows
- Watercourse - Realigned (Stantec, 2020)
- Waterbody
- Shoreline Wetland
- Terrestrial Habitat
- Deciduous Woodland
- Treed Deciduous Swamp
- Swamp Thicket and Marsh Meadow
- Woodland Compensation Area (Off-site)
- Wooded Area
- 120m Offset From Licence Boundary
- Parcel Fabric
- Contours with Elevation — Metres above sea level (MASL)
- Public Road
- Trans Canada Pipeline Easement
- Hydro One Easement
- Extraction Face (Below water)
- Entrance / Exit
- Gate
- Culvert
- Fence — 1.2m post & wire farm fence unless otherwise noted
- Building/Structure
- Proposed Floor Elevation — Metres above sea level (MASL)
- Proposed Final Grade
- Cross Sections

Legend - Cross Sections

- Licence Boundary
- Limit of Extraction
- Existing Grade - Undisturbed
- Existing Grade - Removed / Altered
- Maximum Predicted Water Table (See note A.2 on this drawing)
- Quarry Floor / Face
- Backfilled
- Lake or Pond
- Hydro Corridor

Site Plan Amendments

No.	Date	Description	By

Site Plan Revisions (Pre-Licencing)

No.	Date	Description	By

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
113 COLLIER STREET, BARRIE, ON. L4M 1H2 | P: 705.728.0045 F: 705.728.2010 | WWW.MHBCPLAN.COM

MHBC Stamp
Debra Walker
Is authorized by the Ministry of Northern Development, Mines, Natural Resources and Forestry pursuant to Section 2 (1) of the Aggregate Resources Act to prepare and certify site plans.

MHBC Stamp
Christopher Poole
Is authorized by the Ministry of Northern Development, Mines, Natural Resources and Forestry pursuant to Section 2 (1) of the Aggregate Resources Act to prepare and certify site plans.

Applicant

walker aggregates
Walker Aggregates Inc.
2800 Thorold Townline Road
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Project

Upper's Quarry

MNDMNRF Licence Reference No.	**Applicant's Signature**
Plan Scale: 1:3000 (Arch E)	**Date** October 2021
0 90 180 Meters	**Drawn By** C.P.
	Checked By D.W.
	File No. 9811V

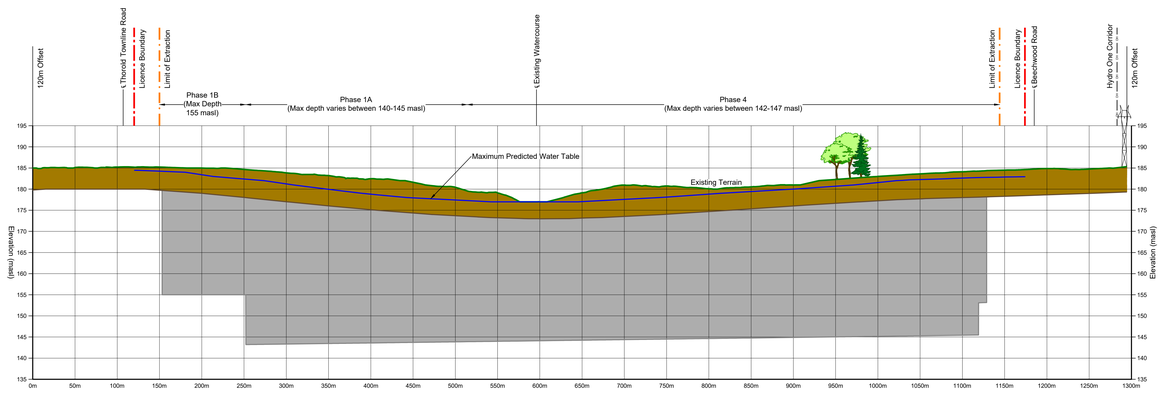
File Name

Rehabilitation Plan

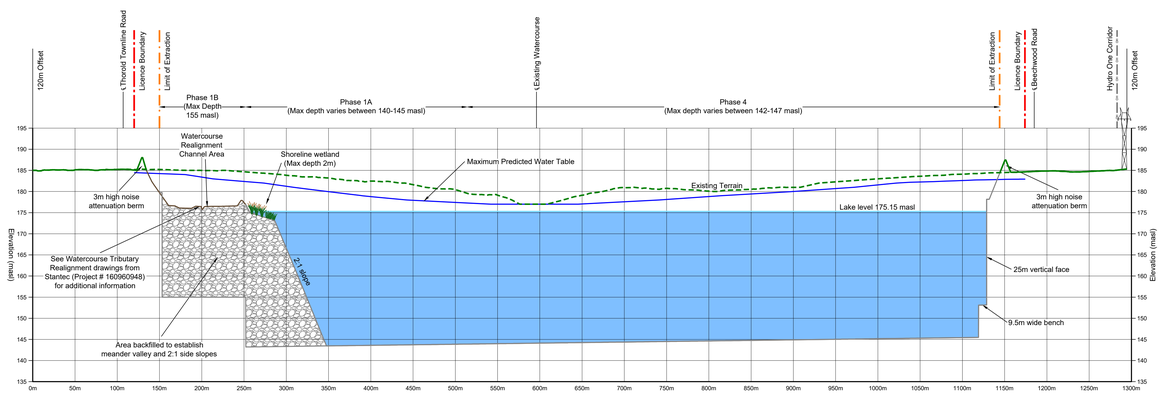
Drawing No.

5 of 6

File Path N:\9\barr\9811V - Walker Uppers Quarry\Drawings\Site Plan\CAD\9811V - Site Plan - Proposed Scenario.dwg



Section A-A' - Existing
Horizontal - 1:2500
Vertical - 1:500



Section A-A' - Rehabilitation
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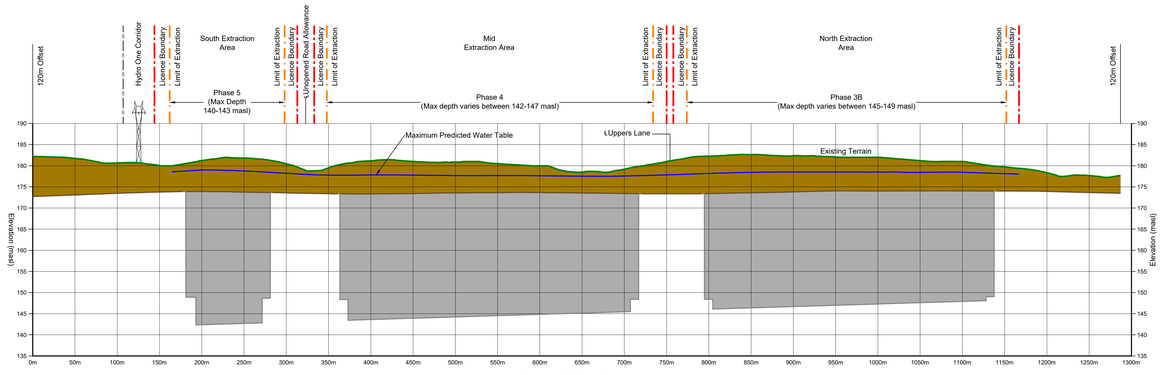
Vertical - 1:500



Section B-B' - Existing
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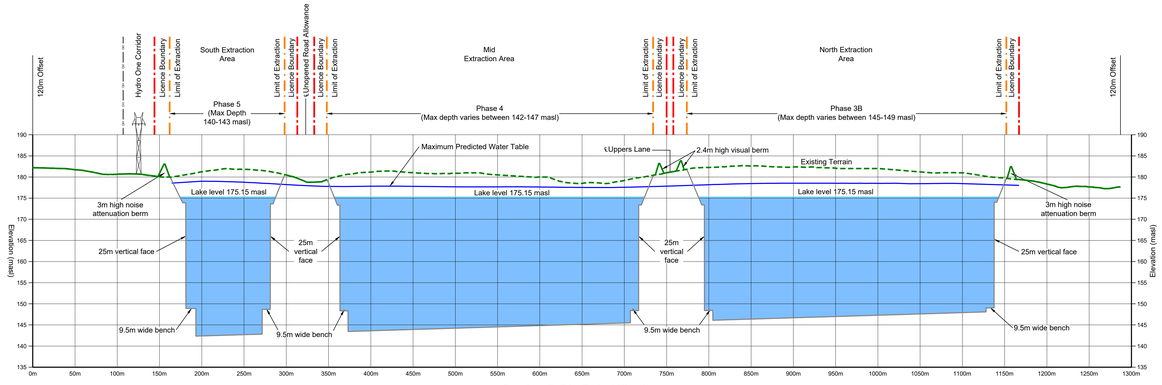
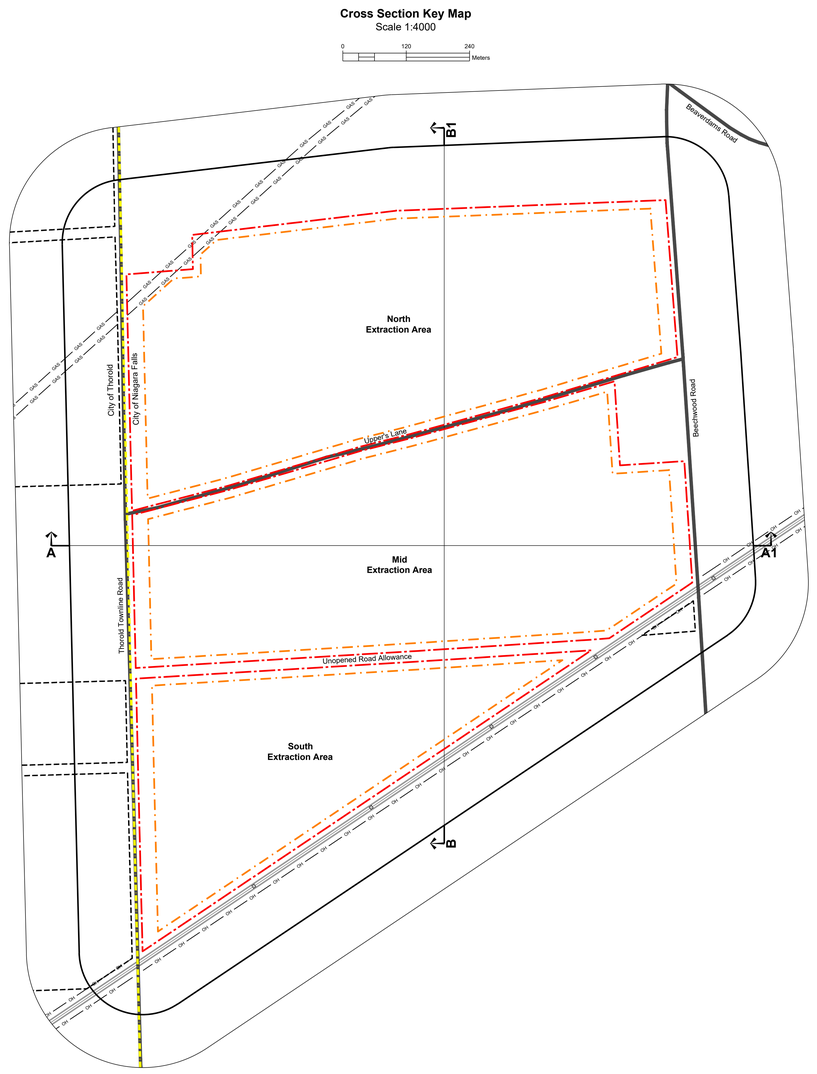
Vertical - 1:500



Section B-B' - Rehabilitation
Horizontal - 1:2500
Vertical - 1:500

Cross Section Key Map
Scale 1:4000



Legal Description

Part of Lots 119, 120, 136 & 137
City of Niagara Falls (Geographic Township of Stamford)
Regional Municipality of Niagara

Legend

- Licence Boundary
- Limit of Extraction
- Additional Lands Owned by Licensee
- Municipal Boundary
- 120m Offset From Licence Boundary
- Public Road
- Trans Canada Pipeline Easement
- Hydro One Easement
- Cross Sections (A1)

Legend - Cross Sections

- Licence Boundary
- Limit of Extraction
- Existing Grade - Undisturbed
- Existing Grade - Removed / Altered
- Berm
- Maximum Predicted Water Table (See note A.2 on drawing 5 of 6)
- Quarry Floor / Face
- Topsoil and/or Overburden
- Aggregate Available for Extraction
- Backfilled
- Lake or Pond
- Hydro Corridor

Site Plan Amendments

No.	Date	Description	By

Site Plan Revisions (Pre-Licencing)

No.	Date	Description	By

PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
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Applicant

walker aggregates

Walker Aggregates Inc.
2800 Thorold Townline Road
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Project

Upper's Quarry

MNDMNRF Licence Reference No.

Applicant's Signature

Plan Scale: (Arch E)
Horizontal 1:2500
Vertical 1:500

Date October 2021
Drawn By C.P.
Checked By D.W.
File No. 9811V

File Name

Cross Sections

Drawing No.

6 of 6

File Path N:\Brian\9811V - Walker Uppers Quarry\Drawings\Site Plan\CAD\9811V - Site Plan - Proposed Scenario.dwg

APPENDIX B

Traffic Data

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

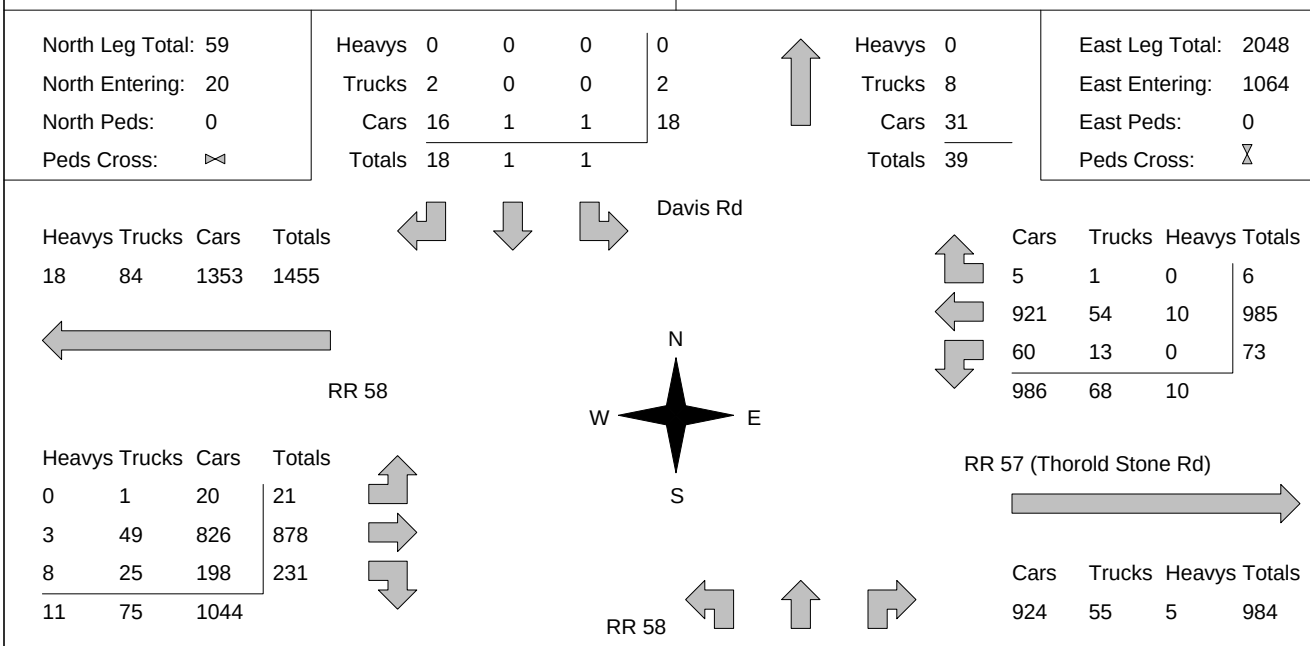
Municipality: Thorold
Site #: 1822100007
Intersection: Thorold Stone Rd - RR 58 (Davis R
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd - RR 58 (Davis R



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

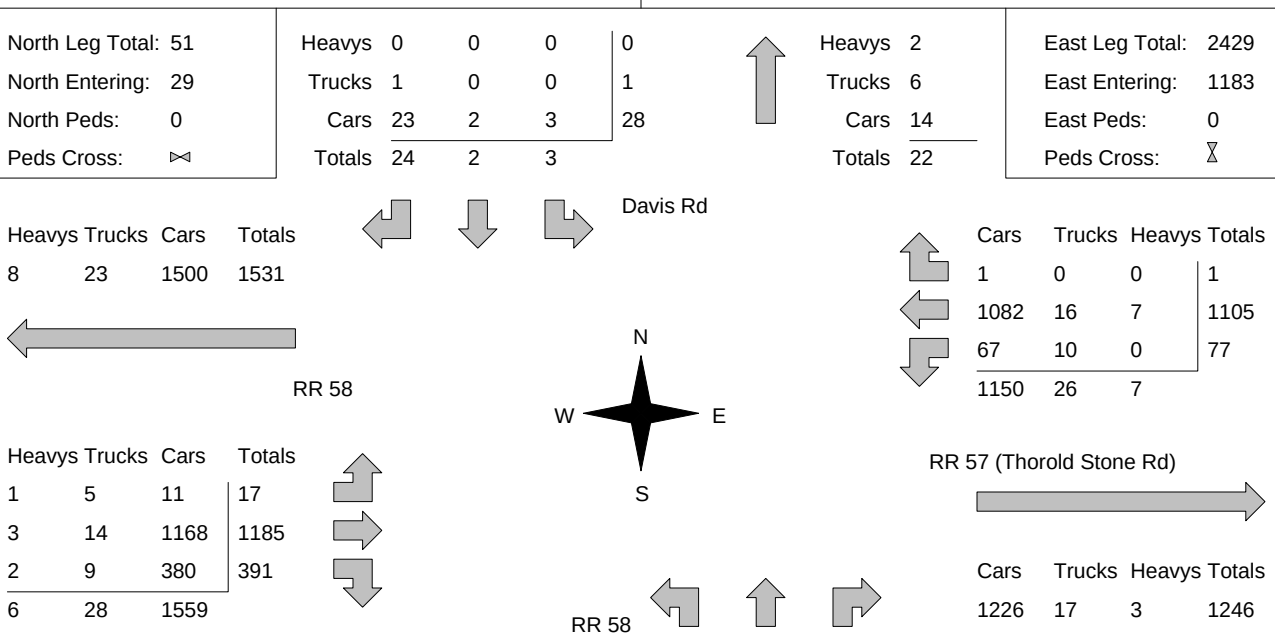
Municipality: Thorold
Site #: 1822100007
Intersection: Thorold Stone Rd - RR 58 (Davis R
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd - RR 58 (Davis R



Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100007
Intersection: Thorold Stone Rd - RR 58 (Davis R
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd - RR 58 (Davis R

North Leg Total:	390
North Entering:	155
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	18	4	2	24
Cars	103	17	11	131
Totals	121	21	13	

Heavys	2
Trucks	32
Cars	201
Totals	235

East Leg Total:	10807
East Entering:	5278
East Peds:	0
Peds Cross:	⧖

Davis Rd

Heavys	Trucks	Cars	Totals
52	274	6651	6977

Cars	Trucks	Heavys	Totals
32	4	0	36
4620	174	35	4829
365	45	3	413
5017	223	38	

RR 58

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Heavys	Trucks	Cars	Totals
1	16	134	151
17	143	4924	5084
15	86	1508	1609
33	245	6566	

RR 57 (Thorold Stone Rd)

Cars	Trucks	Heavys	Totals
5327	178	24	5529

RR 58

Peds Cross:	⧖
West Peds:	0
West Entering:	6844
West Leg Total:	13821

Cars	1890
Trucks	135
Heavys	18
Totals	2043

Cars	1928	35	392	2355
Trucks	82	12	33	127
Heavys	17	1	7	25
Totals	2027	48	432	

Peds Cross:	⋈
South Peds:	0
South Entering:	2507
South Leg Total:	4550

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Thorold Stone Rd - RR 58 (Davis F | **Count Date:** 19-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	1	2	14	17	0	284
8:00:00	3	0	20	23	0	417
9:00:00	0	2	18	20	0	593
16:00:00	0	0	0	0	0	0
17:00:00	5	8	28	41	0	550
18:00:00	2	5	29	36	0	466
19:00:00	2	4	12	18	0	344
Totals:	13	21	121	155	0	2654

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	187	9	71	267	0
8:00:00	295	6	93	394	0
9:00:00	452	11	110	573	0
16:00:00	0	0	0	0	0
17:00:00	436	6	67	509	0
18:00:00	380	5	45	430	0
19:00:00	269	11	46	326	0
	2019	48	432	2499	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	2	0	2	0	4
7:00:00	42	283	10	335	0	954
8:00:00	68	679	7	754	0	1597
9:00:00	71	977	8	1056	0	2167
16:00:00	2	16	0	18	0	34
17:00:00	94	1003	4	1101	0	2677
18:00:00	70	1119	3	1192	0	2711
19:00:00	66	746	4	816	0	1969
Totals:	413	4825	36	5274	0	12113

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	2	0	2	0
7:00:00	48	407	164	619	0
8:00:00	28	621	194	843	0
9:00:00	26	880	205	1111	0
16:00:00	0	15	1	16	0
17:00:00	19	1183	374	1576	0
18:00:00	20	1114	385	1519	0
19:00:00	10	858	285	1153	0
	151	5080	1608	6839	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	197	304	463	0	449	387	282

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

Municipality: Thorold
Site #: 1822100013
Intersection: Thorold Stone Rd - RR 58 (Davis R
TFR File #: 10
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd - RR 58 (Davis R

North Leg Total:	64
North Entering:	22
North Peds:	1
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	5	1	1	7
Cars	13	2	0	15
Totals	18	3	1	

Heavys	0
Trucks	8
Cars	34
Totals	42

East Leg Total:	2232
East Entering:	1186
East Peds:	1
Peds Cross:	⧖

Davis Rd

Heavys	Trucks	Cars	Totals
20	86	1377	1483

RR 58

Cars	Trucks	Heavys	Totals
1	4	0	5
1059	53	9	1121
49	8	3	60
1109	65	12	

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Heavys	Trucks	Cars	Totals
0	3	17	20
5	50	798	853
7	15	199	221
12	68	1014	

RR 57 (Thorold Stone Rd)

Cars	Trucks	Heavys	Totals
974	65	7	1046

RR 58

Peds Cross:	⧖
West Peds:	1
West Entering:	1094
West Leg Total:	2577

Cars	250
Trucks	24
Heavys	10
Totals	284

Cars	305	16	176	497
Trucks	28	1	14	43
Heavys	11	0	2	13
Totals	344	17	192	

Peds Cross:	⋈
South Peds:	0
South Entering:	553
South Leg Total:	837

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

Municipality: Thorold
Site #: 1822100013
Intersection: Thorold Stone Rd - RR 58 (Davis R
TFR File #: 10
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd - RR 58 (Davis R

North Leg Total:	81
North Entering:	46
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	1	1	0	2
Cars	31	9	4	44
Totals	32	10	4	

Heavys	0
Trucks	6
Cars	29
Totals	35

East Leg Total:	2538
East Entering:	1189
East Peds:	0
Peds Cross:	⧖

Davis Rd

Heavys	Trucks	Cars	Totals
7	34	1523	1564

RR 58

Cars	Trucks	Heavys	Totals
0	0	0	0
1078	26	6	1110
76	2	1	79
1154	28	7	

N
W E
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Heavys	Trucks	Cars	Totals
0	5	25	30
6	22	1204	1232
1	13	448	462
7	40	1677	

RR 57 (Thorold Stone Rd)

Cars	Trucks	Heavys	Totals
1307	35	7	1349

RR 58

Peds Cross:	⧖
West Peds:	1
West Entering:	1724
West Leg Total:	3288

Cars	533
Trucks	16
Heavys	2
Totals	551

Cars	414	4	99	517
Trucks	7	1	13	21
Heavys	1	0	1	2
Totals	422	5	113	

Peds Cross:	⋈
South Peds:	0
South Entering:	540
South Leg Total:	1091

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100013
Intersection: Thorold Stone Rd - RR 58 (Davis R
TFR File #: 10
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd - RR 58 (Davis R

North Leg Total:	392
North Entering:	162
North Peds:	4
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	22	5	6	33
Cars	97	23	9	129
Totals	119	28	15	

Heavys	0
Trucks	30
Cars	200
Totals	230

East Leg Total:	11341
East Entering:	5500
East Peds:	5
Peds Cross:	⧖

Davis Rd

Heavys	Trucks	Cars	Totals
46	318	6696	7060

Cars	Trucks	Heavys	Totals
12	6	0	18
4844	211	26	5081
365	29	7	401
5221	246	33	

RR 58

N
W E
S

Heavys	Trucks	Cars	Totals
0	16	150	166
33	158	4915	5106
18	75	1665	1758
51	249	6730	

RR 57 (Thorold Stone Rd)

Cars	Trucks	Heavys	Totals
5576	225	40	5841

RR 58

Peds Cross:	⧖
West Peds:	2
West Entering:	7030
West Leg Total:	14090

Cars	2053
Trucks	109
Heavys	25
Totals	2187

Cars	1755	38	652	2445
Trucks	85	8	61	154
Heavys	20	0	7	27
Totals	1860	46	720	

Peds Cross:	⋈
South Peds:	0
South Entering:	2626
South Leg Total:	4813

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Thorold Stone Rd - RR 58 (Davis F | **Count Date:** 14-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	1	4	11	16	0	295
8:00:00	3	2	23	28	0	451
9:00:00	0	3	14	17	1	554
16:00:00	0	0	0	0	0	1
17:00:00	4	7	33	44	1	539
18:00:00	7	10	23	40	0	544
19:00:00	0	2	15	17	2	404
Totals:	15	28	119	162	4	2788

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	170	7	102	279	0
8:00:00	290	6	127	423	0
9:00:00	350	15	172	537	0
16:00:00	0	0	1	1	0
17:00:00	374	8	113	495	0
18:00:00	389	7	108	504	0
19:00:00	287	3	97	387	0
Totals:	1860	46	720	2626	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	43	348	6	397	0	1132
8:00:00	68	771	1	840	2	1788
9:00:00	61	1065	7	1133	2	2220
16:00:00	0	1	0	1	0	1
17:00:00	76	1022	3	1101	0	2744
18:00:00	87	1061	0	1148	0	2688
19:00:00	66	813	1	880	1	1957
Totals:	401	5081	18	5500	5	12530

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	54	492	189	735	0
8:00:00	28	696	224	948	1
9:00:00	26	860	201	1087	0
16:00:00	0	0	0	0	0
17:00:00	25	1189	429	1643	1
18:00:00	20	1096	424	1540	0
19:00:00	13	773	291	1077	0
Totals:	166	5106	1758	7030	2

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	178	302	367	0	387	406	291

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

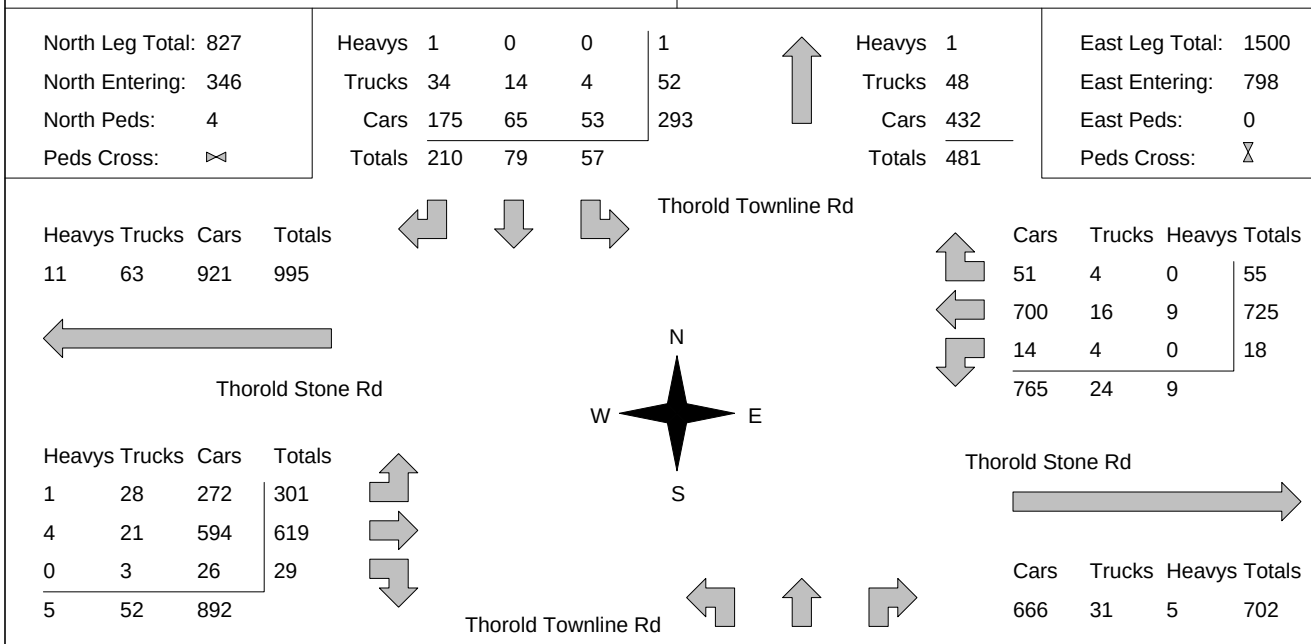
Municipality: Thorold
Site #: 1822100004
Intersection: Thorold Stone Rd & Thorold Townli
TFR File #: 14
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

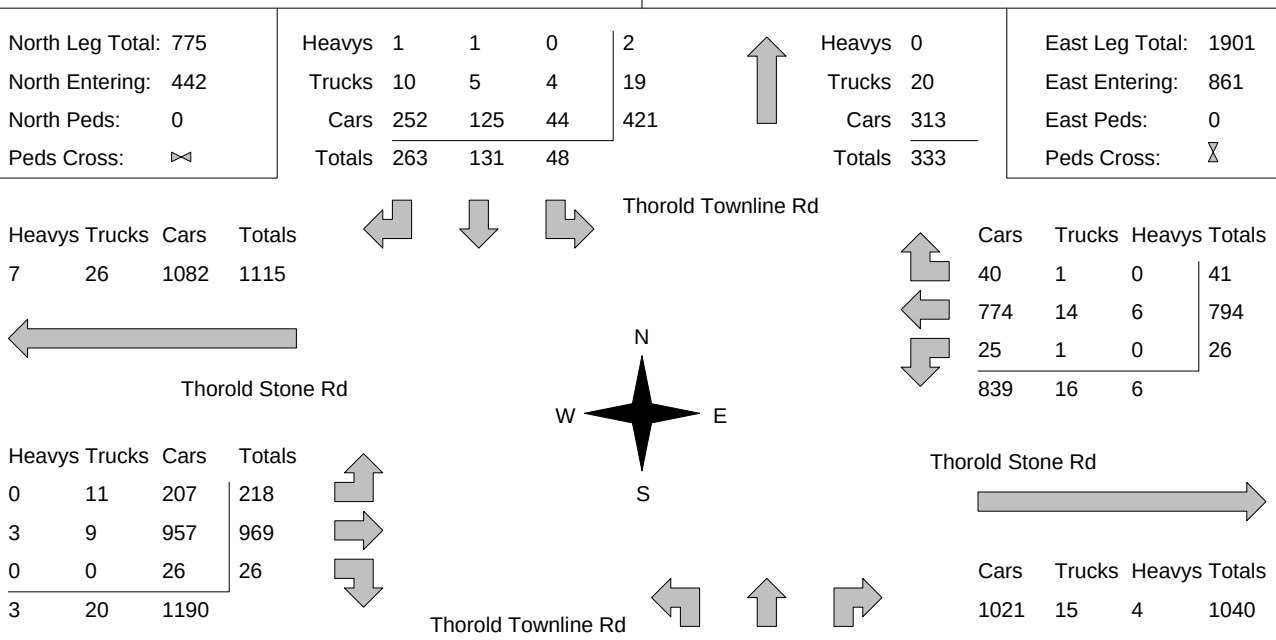
Municipality: Thorold
Site #: 1822100004
Intersection: Thorold Stone Rd & Thorold Townli
TFR File #: 14
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

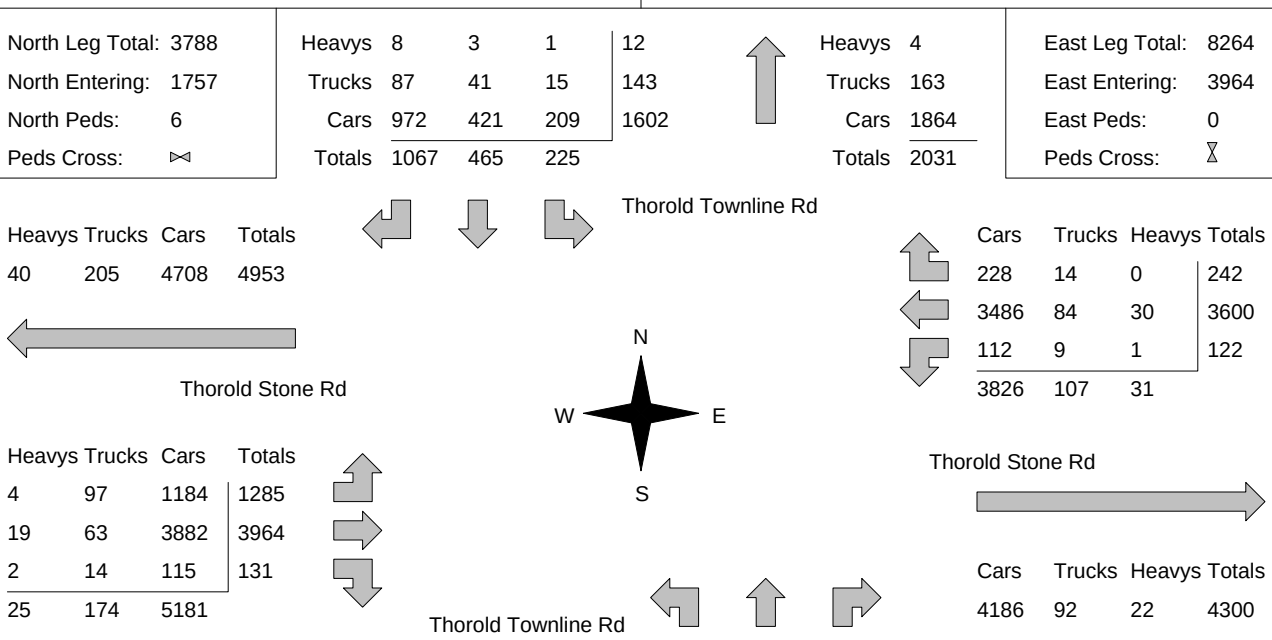
Municipality: Thorold
Site #: 1822100004
Intersection: Thorold Stone Rd & Thorold Townli
TFR File #: 14
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd runs W/E



Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Thorold Stone Rd & Thorold Town | **Count Date:** 19-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	25	36	54	115	1	207
8:00:00	38	83	141	262	0	422
9:00:00	51	70	200	321	4	527
16:00:00	0	0	0	0	0	0
17:00:00	55	127	258	440	0	631
18:00:00	36	97	250	383	1	506
19:00:00	20	52	164	236	0	365
Totals:	225	465	1067	1757	6	2658

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	15	69	8	92	0
8:00:00	38	105	17	160	2
9:00:00	61	124	21	206	0
16:00:00	0	0	0	0	0
17:00:00	61	104	26	191	0
18:00:00	56	46	21	123	0
19:00:00	55	56	18	129	0
Totals:	286	504	111	901	2

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	11	241	53	305	0	789
8:00:00	25	530	45	600	0	1295
9:00:00	12	727	47	786	0	1750
16:00:00	0	0	0	0	0	1
17:00:00	34	721	45	800	0	2027
18:00:00	21	821	25	867	0	1994
19:00:00	19	560	27	606	0	1488
Totals:	122	3600	242	3964	0	9344

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	195	269	20	484	0
8:00:00	252	423	20	695	0
9:00:00	292	648	24	964	0
16:00:00	1	0	0	1	0
17:00:00	245	955	27	1227	0
18:00:00	173	939	15	1127	0
19:00:00	127	730	25	882	0
Totals:	1285	3964	131	5380	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	109	181	236	0	243	189	131

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

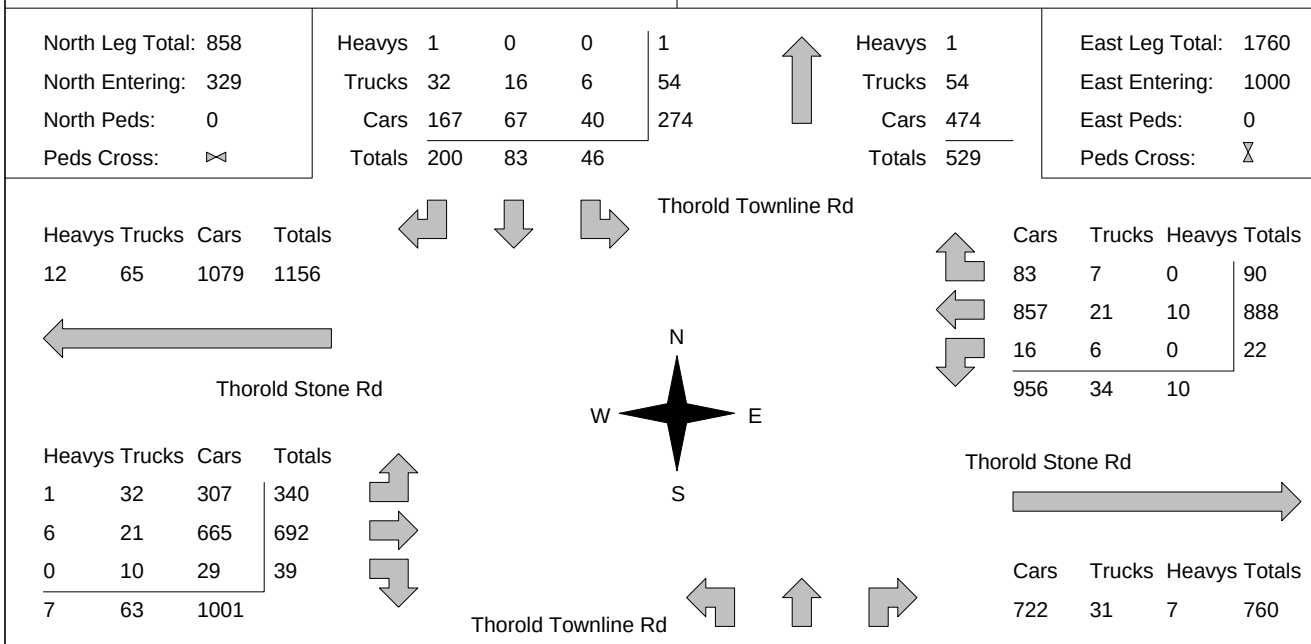
Municipality: Thorold
Site #: 1822100010
Intersection: Thorold Stone Rd & Thorold Townli
TFR File #: 9
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

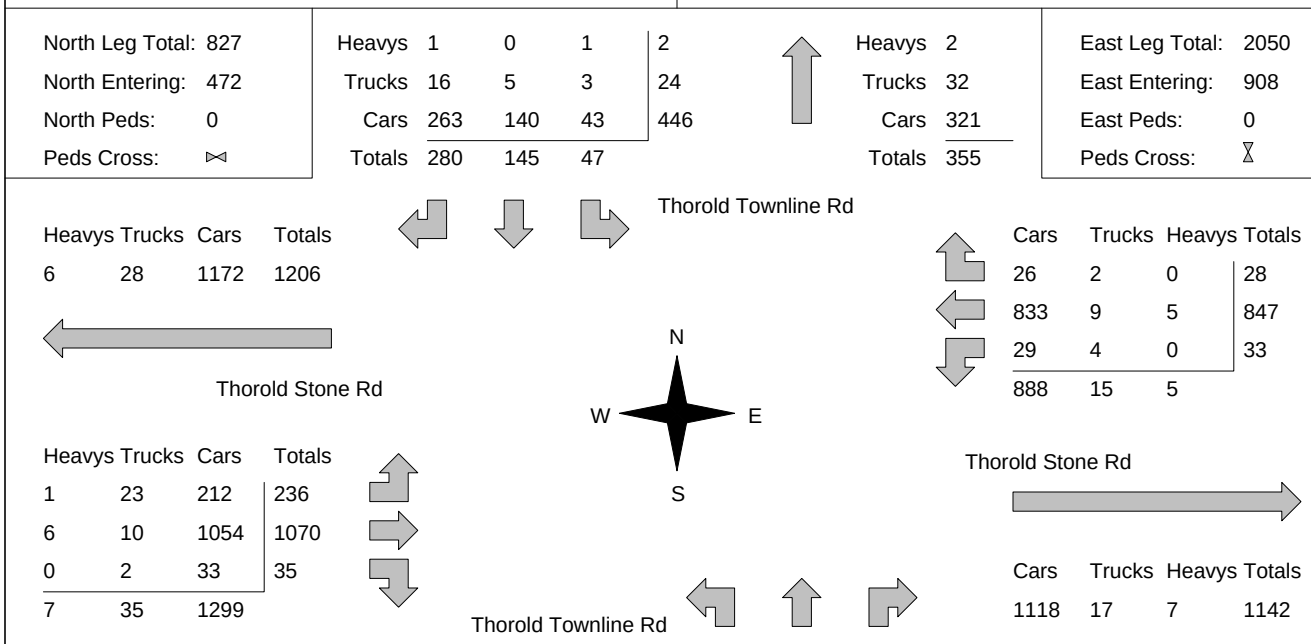
Municipality: Thorold
Site #: 1822100010
Intersection: Thorold Stone Rd & Thorold Townli
TFR File #: 9
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

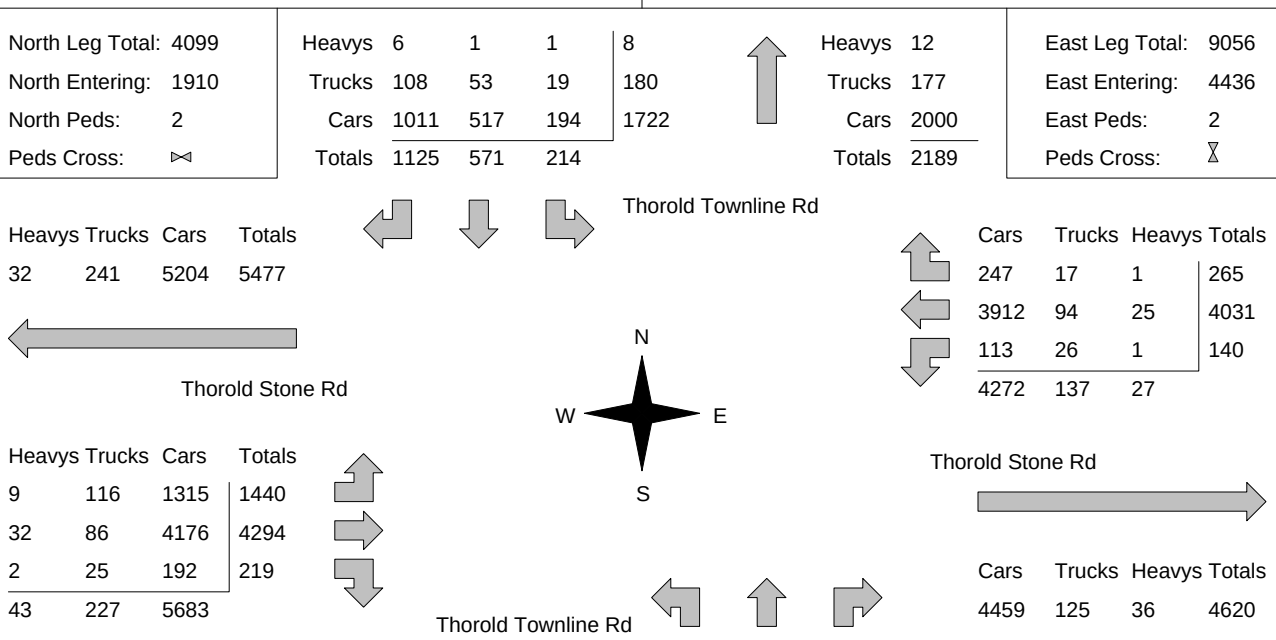
Municipality: Thorold
Site #: 1822100010
Intersection: Thorold Stone Rd & Thorold Townli
TFR File #: 9
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Thorold Stone Rd runs W/E



Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Thorold Stone Rd & Thorold Town | **Count Date:** 14-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	23	44	58	125	0	234
8:00:00	31	80	165	276	0	432
9:00:00	50	74	207	331	0	508
16:00:00	0	6	1	7	0	19
17:00:00	47	159	250	456	2	632
18:00:00	37	136	268	441	0	611
19:00:00	25	71	175	271	0	385
Totals:	213	570	1124	1907	2	2821

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	24	76	9	109	0
8:00:00	49	97	10	156	0
9:00:00	59	97	21	177	0
16:00:00	4	8	0	12	0
17:00:00	67	79	30	176	2
18:00:00	71	76	23	170	0
19:00:00	46	50	18	114	0
	320	483	111	914	2

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	4	0	4	0	6
7:00:00	12	301	43	356	0	962
8:00:00	24	601	69	694	0	1540
9:00:00	16	838	77	931	0	1988
16:00:00	0	35	1	36	0	82
17:00:00	35	787	38	860	2	2173
18:00:00	30	817	23	870	0	2067
19:00:00	23	643	13	679	0	1551
Totals:	140	4026	264	4430	2	10369

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	2	0	2	0
7:00:00	235	335	36	606	0
8:00:00	293	514	39	846	0
9:00:00	316	702	39	1057	0
16:00:00	13	30	3	46	0
17:00:00	249	1038	26	1313	2
18:00:00	200	958	39	1197	0
19:00:00	132	705	35	872	0
	1438	4284	217	5939	2

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	123	177	206	12	277	244	142

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

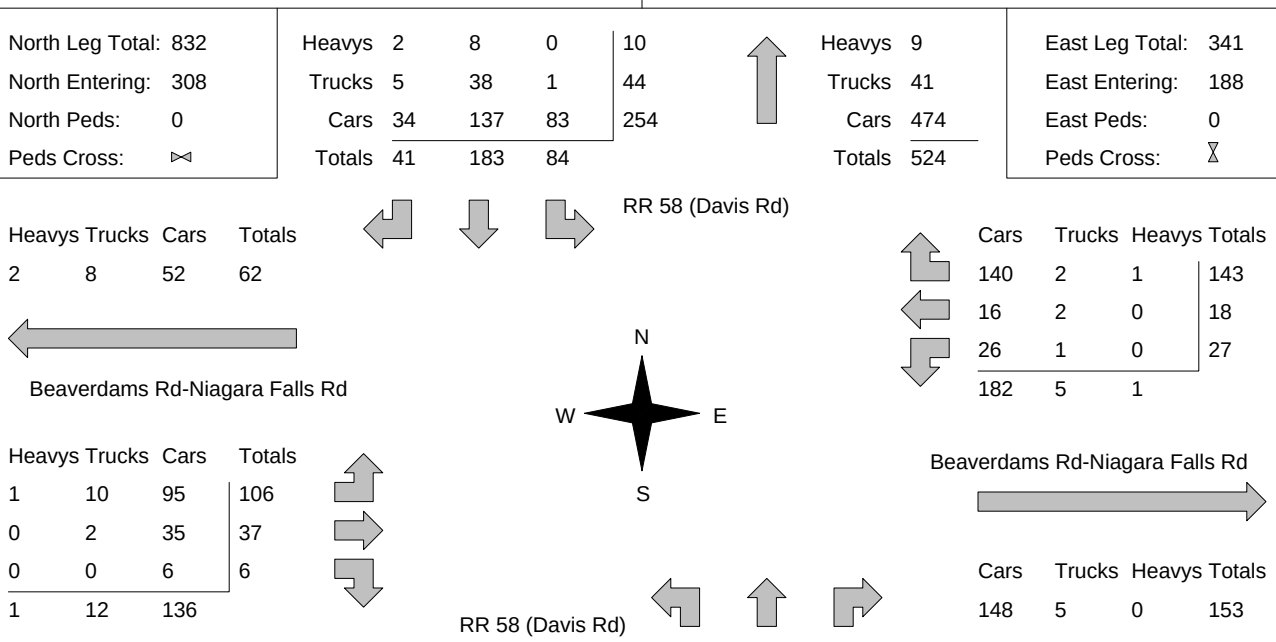
Municipality: Thorold
Site #: 1822100006
Intersection: RR 58 (Davis Rd) & Beaverdams R
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 58 (Davis Rd) runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

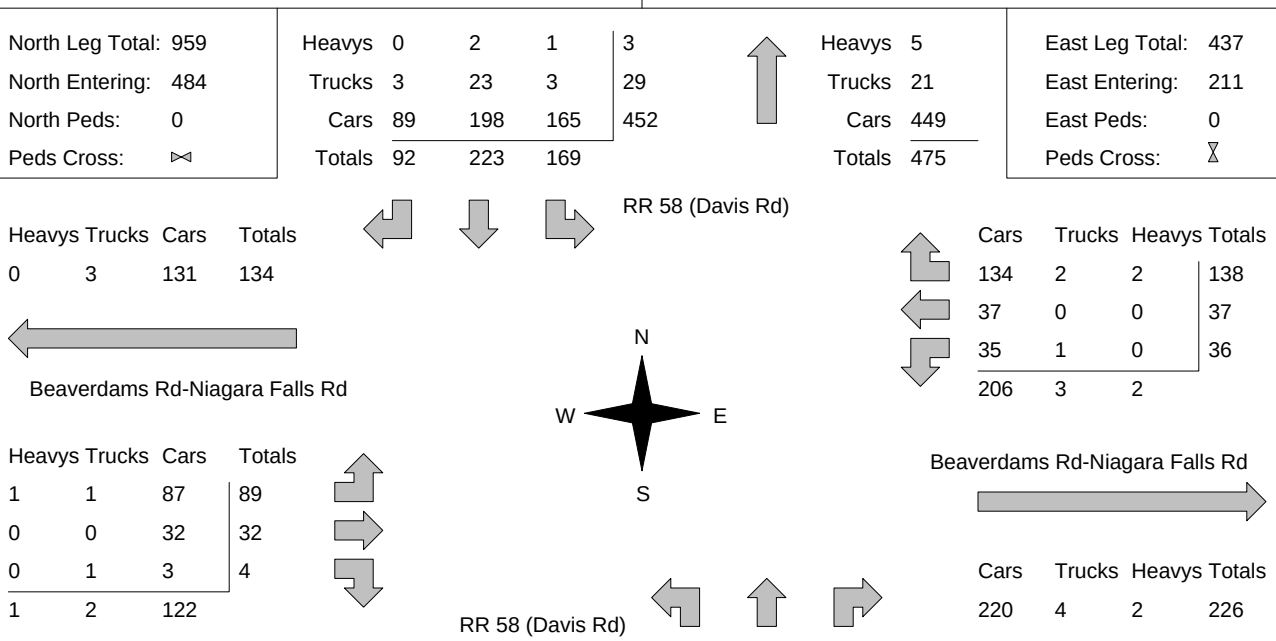
Municipality: Thorold
Site #: 1822100006
Intersection: RR 58 (Davis Rd) & Beaverdams R
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 58 (Davis Rd) runs N/S



Comments

Ontario Traffic Inc.

Total Count Diagram

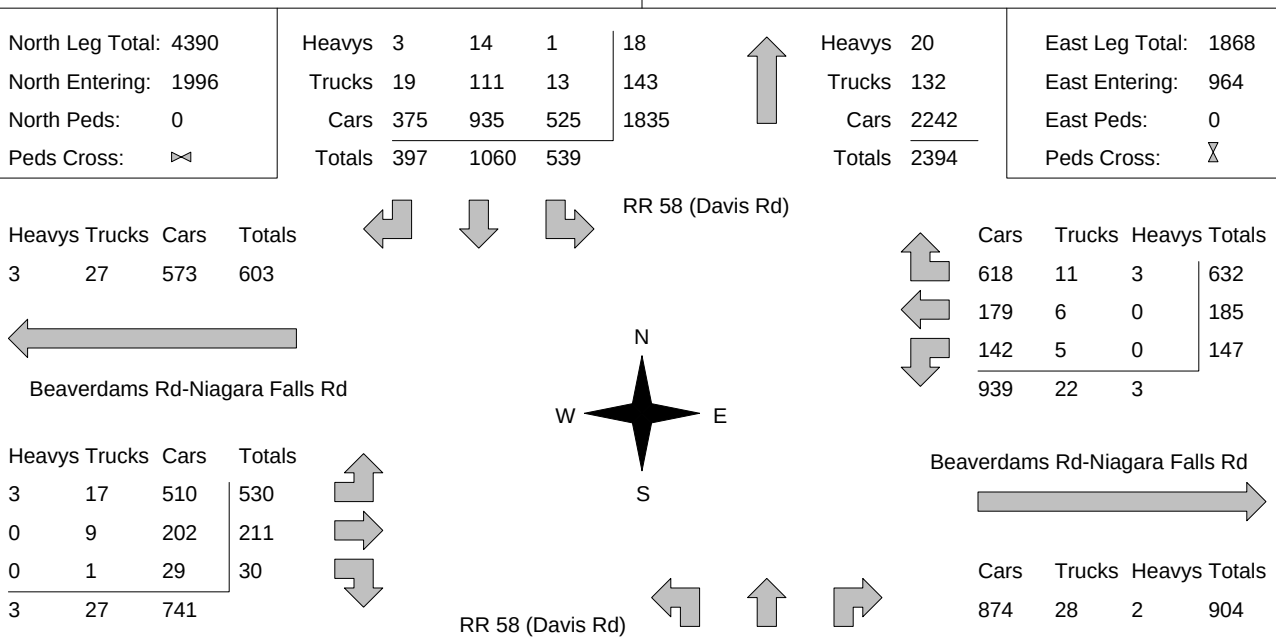
Municipality: Thorold
Site #: 1822100006
Intersection: RR 58 (Davis Rd) & Beaverdams R
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 58 (Davis Rd) runs N/S



Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: RR 58 (Davis Rd) & Beaverdams I | **Count Date:** 19-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	32	148	38	218	0	379
8:00:00	60	171	35	266	0	510
9:00:00	85	151	45	281	0	593
16:00:00	0	4	1	5	0	10
17:00:00	169	223	92	484	0	762
18:00:00	126	203	86	415	0	640
19:00:00	67	158	100	325	0	507
Totals:	539	1058	397	1994	0	3401

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	1	140	20	161	0
8:00:00	1	203	40	244	0
9:00:00	4	280	28	312	0
16:00:00	0	5	0	5	0
17:00:00	5	248	25	278	0
18:00:00	7	197	21	225	0
19:00:00	3	159	20	182	0
Totals:	21	1232	154	1407	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	13	19	48	80	0	188
8:00:00	24	30	101	155	0	293
9:00:00	20	11	146	177	0	327
16:00:00	0	1	5	6	0	8
17:00:00	36	37	138	211	0	336
18:00:00	33	39	113	185	0	319
19:00:00	21	48	81	150	0	264
Totals:	147	185	632	964	0	1735

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	78	27	3	108	0
8:00:00	92	39	7	138	0
9:00:00	113	34	3	150	0
16:00:00	2	0	0	2	0
17:00:00	89	32	4	125	0
18:00:00	85	43	6	134	0
19:00:00	71	36	7	114	0
Totals:	530	211	30	771	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	118	155	167	3	162	161	140

Ontario Traffic Inc.

Count Date: 19-Jun-18 Site #: 1822100006

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
5:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	1	1	11	11	4	4	0	0	4	4	1	1	0	0	0	0	0	0	0	0
6:30:00	9	8	39	28	13	9	1	1	5	1	1	0	0	0	0	0	0	0	0	0
6:45:00	20	11	85	46	23	10	1	0	7	2	2	1	0	0	0	0	0	0	0	0
7:00:00	31	11	137	52	36	13	1	0	11	4	2	0	0	0	0	0	0	0	0	0
7:15:00	38	7	162	25	40	4	1	0	15	4	2	0	0	0	0	0	0	0	0	0
7:30:00	49	11	196	34	48	8	1	0	22	7	5	3	0	0	2	2	0	0	0	0
7:45:00	68	19	226	30	53	5	1	0	34	12	6	1	0	0	5	3	0	0	0	0
8:00:00	90	22	269	43	64	11	2	1	44	10	7	1	0	0	6	1	2	2	0	0
8:15:00	113	23	299	30	72	8	2	0	50	6	8	1	0	0	8	2	2	0	0	0
8:30:00	132	19	333	34	82	10	2	0	60	10	10	2	0	0	10	2	2	0	0	0
8:45:00	151	19	365	32	91	9	3	1	64	4	12	2	0	0	11	1	2	0	0	0
9:00:00	174	23	385	20	102	11	3	0	73	9	14	2	0	0	12	1	2	0	0	0
9:01:13	174	0	389	4	103	1	3	0	73	0	14	0	0	0	12	0	2	0	0	0
15:30:00	174	0	389	0	103	0	3	0	73	0	14	0	0	0	12	0	2	0	0	0
15:45:00	174	0	389	0	103	0	3	0	73	0	14	0	0	0	12	0	2	0	0	0
16:00:00	174	0	389	0	103	0	3	0	73	0	14	0	0	0	12	0	2	0	0	0
16:15:00	210	36	436	47	124	21	4	1	83	10	15	1	0	0	13	1	2	0	0	0
16:30:00	262	52	483	47	152	28	4	0	90	7	16	1	0	0	13	0	2	0	0	0
16:45:00	303	41	541	58	172	20	4	0	95	5	16	0	0	0	14	1	2	0	0	0
17:00:00	339	36	587	46	192	20	6	2	96	1	17	1	1	1	14	0	2	0	0	0
17:15:00	373	34	626	39	211	19	7	1	99	3	17	0	1	0	14	0	2	0	0	0
17:30:00	410	37	682	56	236	25	9	2	103	4	17	0	1	0	14	0	2	0	0	0
17:45:00	432	22	746	64	261	25	10	1	107	4	18	1	1	0	14	0	2	0	0	0
18:00:00	460	28	779	33	276	15	11	1	107	0	19	1	1	0	14	0	2	0	0	0
18:15:00	478	18	817	38	302	26	11	0	107	0	19	0	1	0	14	0	2	0	0	0
18:30:00	492	14	865	48	333	31	11	0	109	2	19	0	1	0	14	0	3	1	0	0
18:45:00	509	17	898	33	355	22	12	1	110	1	19	0	1	0	14	0	3	0	0	0
19:00:00	525	16	933	35	375	20	13	1	111	1	19	0	1	0	14	0	3	0	0	0
19:00:17	525	0	935	2	375	0	13	0	111	0	19	0	1	0	14	0	3	0	0	0

Ontario Traffic Inc.

Count Date: 19-Jun-18 Site #: 1822100006

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Heavys - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
5:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	3	3	2	2	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	6	3	5	3	18	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	8	2	9	4	33	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	13	5	18	9	48	15	0	0	1	1	0	0	0	0	0	0	0	0	0	0
7:15:00	15	2	27	9	63	15	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7:30:00	23	8	34	7	83	20	1	1	1	0	0	0	0	0	0	0	0	0	0	0
7:45:00	27	4	43	9	110	27	2	1	2	1	0	0	0	0	0	0	0	0	0	0
8:00:00	35	8	46	3	149	39	2	0	3	1	0	0	0	0	0	0	0	0	0	0
8:15:00	41	6	49	3	187	38	2	0	3	0	2	2	0	0	0	0	0	0	0	0
8:30:00	49	8	50	1	223	36	2	0	3	0	2	0	0	0	0	0	1	1	0	0
8:45:00	51	2	51	1	259	36	2	0	3	0	4	2	0	0	0	0	1	0	0	0
9:00:00	55	4	57	6	288	29	2	0	3	0	6	2	0	0	0	0	1	0	0	0
9:01:13	55	0	58	1	293	5	2	0	3	0	6	0	0	0	0	0	1	0	0	0
15:30:00	55	0	58	0	293	0	2	0	3	0	6	0	0	0	0	0	1	0	0	0
15:45:00	55	0	58	0	293	0	2	0	3	0	6	0	0	0	0	0	1	0	0	0
16:00:00	55	0	58	0	293	0	2	0	3	0	6	0	0	0	0	0	1	0	0	0
16:15:00	62	7	68	10	328	35	3	1	3	0	6	0	0	0	0	0	1	0	0	0
16:30:00	68	6	81	13	358	30	3	0	3	0	6	0	0	0	0	0	1	0	0	0
16:45:00	80	12	89	8	394	36	3	0	3	0	7	1	0	0	0	0	2	1	0	0
17:00:00	90	10	95	6	427	33	3	0	3	0	8	1	0	0	0	0	3	1	0	0
17:15:00	100	10	105	10	457	30	3	0	3	0	8	0	0	0	0	0	3	0	0	0
17:30:00	111	11	112	7	486	29	5	2	3	0	8	0	0	0	0	0	3	0	0	0
17:45:00	115	4	120	8	518	32	5	0	4	1	8	0	0	0	0	0	3	0	0	0
18:00:00	121	6	133	13	539	21	5	0	4	0	9	1	0	0	0	0	3	0	0	0
18:15:00	126	5	140	7	563	24	5	0	5	1	9	0	0	0	0	0	3	0	0	0
18:30:00	132	6	166	26	588	25	5	0	6	1	9	0	0	0	0	0	3	0	0	0
18:45:00	139	7	175	9	603	15	5	0	6	0	10	1	0	0	0	0	3	0	0	0
19:00:00	142	3	179	4	618	15	5	0	6	0	11	1	0	0	0	0	3	0	0	0
19:00:17	142	0	179	0	618	0	5	0	6	0	11	0	0	0	0	0	3	0	0	0

Ontario Traffic Inc.

Count Date: 19-Jun-18 Site #: 1822100006

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Heavys - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
5:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	0	0	16	16	3	3	0	0	4	4	0	0	0	0	0	0	0	0	0	0
6:30:00	0	0	41	25	6	3	0	0	8	4	0	0	0	0	0	0	0	0	0	0
6:45:00	0	0	83	42	12	6	0	0	12	4	0	0	0	0	0	0	0	0	0	0
7:00:00	1	1	125	42	20	8	0	0	15	3	0	0	0	0	0	0	0	0	0	0
7:15:00	1	0	154	29	39	19	0	0	25	10	0	0	0	0	0	0	0	0	0	0
7:30:00	1	0	185	31	45	6	0	0	27	2	0	0	0	0	0	0	0	0	0	0
7:45:00	1	0	244	59	53	8	1	1	35	8	1	1	0	0	4	4	0	0	0	0
8:00:00	1	0	294	50	59	6	1	0	44	9	1	0	0	0	5	1	0	0	0	0
8:15:00	2	1	363	69	66	7	1	0	52	8	2	1	0	0	6	1	0	0	0	0
8:30:00	3	1	424	61	75	9	1	0	56	4	2	0	0	0	7	1	0	0	0	0
8:45:00	3	0	483	59	81	6	2	1	63	7	2	0	0	0	9	2	0	0	0	0
9:00:00	4	1	540	57	86	5	2	0	73	10	2	0	0	0	10	1	0	0	0	0
9:01:13	4	0	544	4	86	0	2	0	74	1	2	0	0	0	10	0	0	0	0	0
15:30:00	4	0	544	0	86	0	2	0	74	0	2	0	0	0	10	0	0	0	0	0
15:45:00	4	0	544	0	86	0	2	0	74	0	2	0	0	0	10	0	0	0	0	0
16:00:00	4	0	544	0	86	0	2	0	74	0	2	0	0	0	10	0	0	0	0	0
16:15:00	4	0	601	57	88	2	2	0	81	7	2	0	0	0	12	2	0	0	0	0
16:30:00	7	3	649	48	95	7	2	0	87	6	2	0	0	0	12	0	1	1	0	0
16:45:00	7	0	710	61	103	8	2	0	91	4	2	0	0	0	12	0	1	0	0	0
17:00:00	9	2	772	62	109	6	2	0	92	1	3	1	0	0	12	0	1	0	0	0
17:15:00	11	2	825	53	113	4	2	0	93	1	3	0	0	0	12	0	1	0	0	0
17:30:00	13	2	872	47	121	8	2	0	96	3	4	1	0	0	12	0	1	0	0	0
17:45:00	14	1	918	46	126	5	2	0	99	3	4	0	0	0	13	1	1	0	0	0
18:00:00	16	2	959	41	128	2	2	0	101	2	5	1	0	0	13	0	1	0	0	0
18:15:00	16	0	1005	46	134	6	2	0	102	1	5	0	0	0	13	0	1	0	0	0
18:30:00	18	2	1036	31	136	2	2	0	103	1	5	0	0	0	13	0	1	0	0	0
18:45:00	18	0	1076	40	144	8	2	0	103	0	5	0	0	0	14	1	1	0	0	0
19:00:00	19	1	1114	38	147	3	2	0	104	1	6	1	0	0	14	0	1	0	0	0
19:00:17	19	0	1114	0	147	0	2	0	104	0	6	0	0	0	14	0	1	0	0	0

Ontario Traffic Inc.

Count Date: 19-Jun-18 Site #: 1822100006

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Heavys - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
5:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	9	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	25	16	12	11	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	54	29	22	10	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	77	23	27	5	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	101	24	32	5	4	1	2	1	2	2	0	0	0	0	0	0	0	0	0	0
7:30:00	114	13	41	9	5	1	2	0	3	1	0	0	0	0	0	0	0	0	0	0
7:45:00	138	24	54	13	8	3	4	2	4	1	0	0	0	0	0	0	0	0	0	0
8:00:00	164	26	62	8	10	2	5	1	4	0	0	0	1	1	0	0	0	0	0	0
8:15:00	184	20	70	8	10	0	11	6	4	0	0	0	1	0	0	0	0	0	0	0
8:30:00	209	25	76	6	11	1	12	1	5	1	0	0	1	0	0	0	0	0	0	0
8:45:00	237	28	88	12	13	2	14	2	5	0	0	0	1	0	0	0	0	0	0	0
9:00:00	266	29	95	7	13	0	15	1	5	0	0	0	2	1	0	0	0	0	0	0
9:01:13	268	2	95	0	13	0	15	0	5	0	0	0	2	0	0	0	0	0	0	0
15:30:00	268	0	95	0	13	0	15	0	5	0	0	0	2	0	0	0	0	0	0	0
15:45:00	268	0	95	0	13	0	15	0	5	0	0	0	2	0	0	0	0	0	0	0
16:00:00	268	0	95	0	13	0	15	0	5	0	0	0	2	0	0	0	0	0	0	0
16:15:00	295	27	105	10	13	0	15	0	5	0	0	0	2	0	0	0	0	0	0	0
16:30:00	315	20	113	8	15	2	16	1	5	0	0	0	3	1	0	0	0	0	0	0
16:45:00	337	22	120	7	16	1	16	0	5	0	1	1	3	0	0	0	0	0	0	0
17:00:00	355	18	127	7	16	0	16	0	5	0	1	0	3	0	0	0	0	0	0	0
17:15:00	379	24	135	8	17	1	16	0	6	1	1	0	3	0	0	0	0	0	0	0
17:30:00	399	20	143	8	17	0	16	0	7	1	1	0	3	0	0	0	0	0	0	0
17:45:00	421	22	151	8	19	2	16	0	7	0	1	0	3	0	0	0	0	0	0	0
18:00:00	440	19	167	16	22	3	16	0	8	1	1	0	3	0	0	0	0	0	0	0
18:15:00	455	15	183	16	22	0	16	0	8	0	1	0	3	0	0	0	0	0	0	0
18:30:00	474	19	190	7	26	4	17	1	8	0	1	0	3	0	0	0	0	0	0	0
18:45:00	493	19	198	8	27	1	17	0	8	0	1	0	3	0	0	0	0	0	0	0
19:00:00	510	17	202	4	29	2	17	0	9	1	1	0	3	0	0	0	0	0	0	0
19:00:17	510	0	202	0	29	0	17	0	9	0	1	0	3	0	0	0	0	0	0	0

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

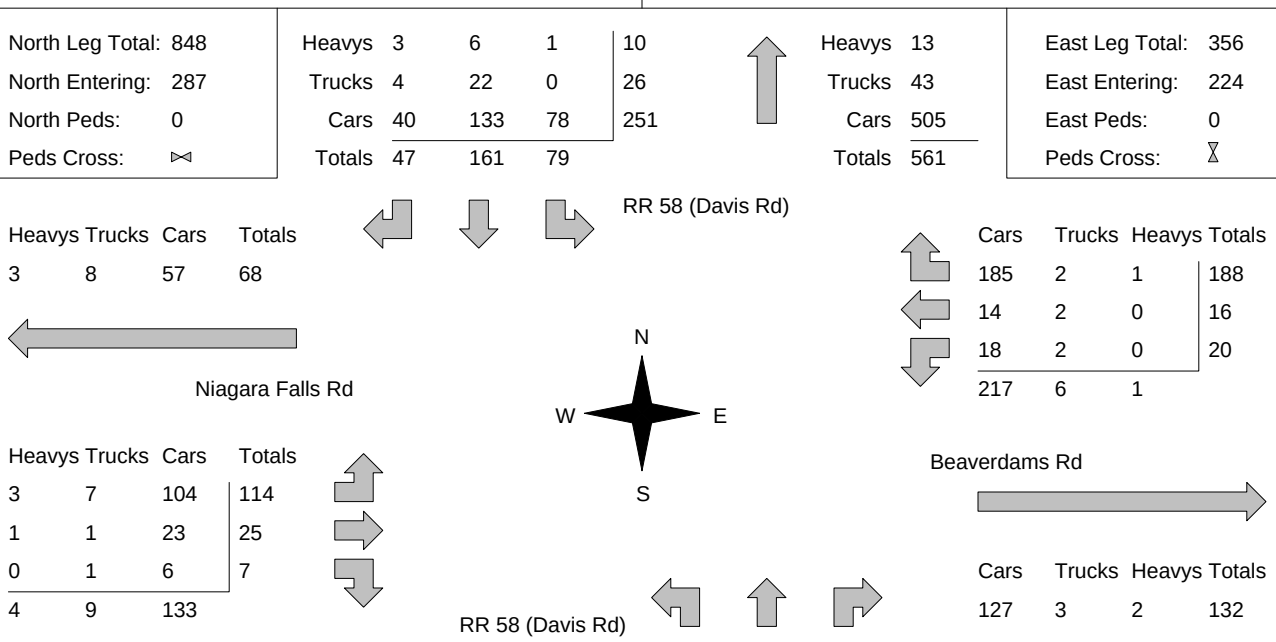
Municipality: Thorold
Site #: 1822100012
Intersection: RR 58 (Davis Rd) & Beaverdams R
TFR File #: 13
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 58 (Davis Rd) runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

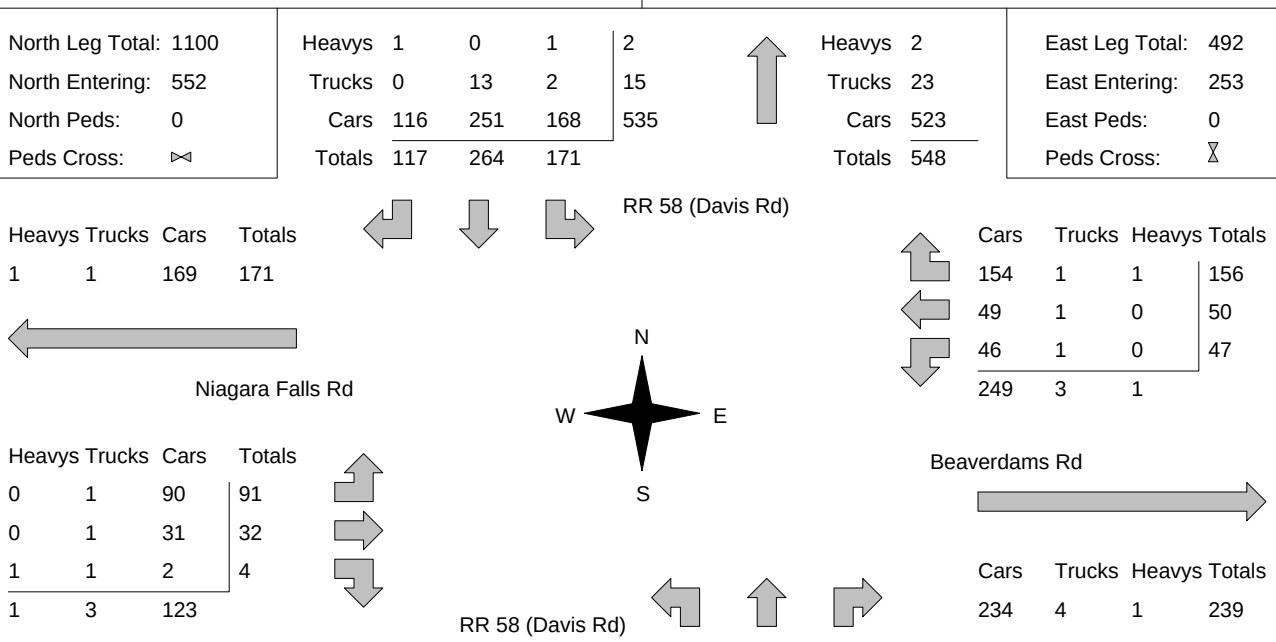
Municipality: Thorold
Site #: 1822100012
Intersection: RR 58 (Davis Rd) & Beaverdams R
TFR File #: 13
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 58 (Davis Rd) runs N/S



Comments

Ontario Traffic Inc.

Total Count Diagram

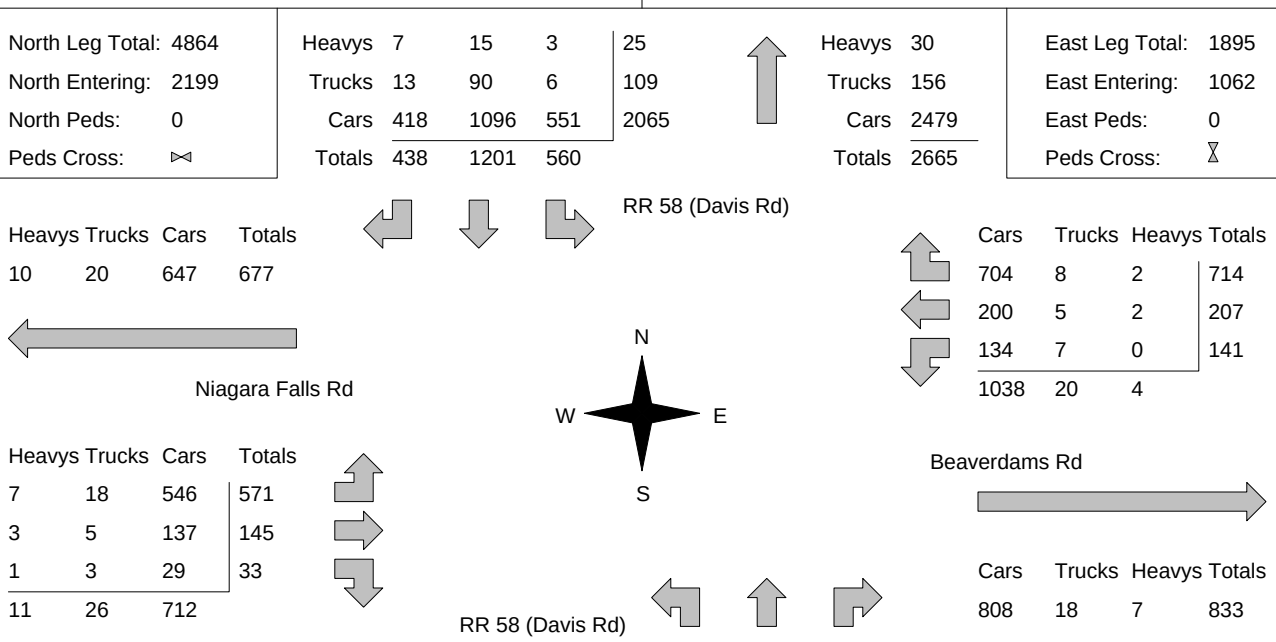
Municipality: Thorold
Site #: 1822100012
Intersection: RR 58 (Davis Rd) & Beaverdams R
TFR File #: 13
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 58 (Davis Rd) runs N/S



Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: RR 58 (Davis Rd) & Beaverdams I | **Count Date:** 14-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	32	166	37	235	0	412
8:00:00	57	188	47	292	0	550
9:00:00	74	148	46	268	0	546
16:00:00	0	0	0	0	0	1
17:00:00	172	235	113	520	0	813
18:00:00	133	280	113	526	0	841
19:00:00	92	184	82	358	0	576
Totals:	560	1201	438	2199	0	3739

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	2	159	16	177	0
8:00:00	6	228	24	258	0
9:00:00	4	249	25	278	0
16:00:00	0	1	0	1	0
17:00:00	4	261	28	293	0
18:00:00	4	282	29	315	0
19:00:00	12	200	6	218	0
	32	1380	128	1540	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	14	13	52	79	0	175
8:00:00	11	43	100	154	0	302
9:00:00	26	14	177	217	0	375
16:00:00	0	0	0	0	0	0
17:00:00	30	56	142	228	0	363
18:00:00	40	58	141	239	0	355
19:00:00	20	23	102	145	0	241
Totals:	141	207	714	1062	0	1811

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	76	16	4	96	0
8:00:00	107	33	8	148	1
9:00:00	124	25	9	158	0
16:00:00	0	0	0	0	0
17:00:00	92	39	4	135	0
18:00:00	92	20	4	116	0
19:00:00	80	12	4	96	1
	571	145	33	749	2

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	106	161	175	0	178	190	123

Ontario Traffic Inc.

Count Date: 14-Jun-18 Site #: 1822100012

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	3	3	17	17	4	4	0	0	2	2	0	0	0	0	0	0	0	0	0	0
6:30:00	7	4	56	39	10	6	0	0	4	2	0	0	0	0	0	0	0	0	0	0
6:45:00	22	15	106	50	19	9	0	0	6	2	1	1	0	0	0	0	0	0	0	0
7:00:00	32	10	157	51	36	17	0	0	8	2	1	0	0	0	1	1	0	0	0	0
7:15:00	40	8	193	36	42	6	0	0	12	4	2	1	0	0	1	0	0	0	0	0
7:30:00	48	8	234	41	56	14	1	1	20	8	3	1	1	1	4	3	1	1	0	0
7:45:00	64	16	270	36	64	8	2	1	29	9	3	0	1	0	6	2	1	0	0	0
8:00:00	86	22	308	38	77	13	2	0	38	9	4	1	1	0	8	2	3	2	0	0
8:15:00	102	16	341	33	83	6	2	0	40	2	5	1	2	1	10	2	3	0	0	0
8:30:00	126	24	369	28	92	9	2	0	44	4	6	1	2	0	11	1	4	1	0	0
8:45:00	142	16	403	34	104	12	2	0	51	7	7	1	2	0	12	1	4	0	0	0
9:00:00	157	15	435	32	118	14	4	2	54	3	8	1	2	0	13	1	4	0	0	0
9:00:08	157	0	435	0	118	0	4	0	54	0	8	0	2	0	13	0	4	0	0	0
16:00:00	157	0	435	0	118	0	4	0	54	0	8	0	2	0	13	0	4	0	0	0
16:15:00	200	43	479	44	139	21	4	0	57	3	11	3	2	0	14	1	4	0	0	0
16:30:00	236	36	532	53	175	36	4	0	65	8	12	1	2	0	15	1	5	1	0	0
16:45:00	280	44	589	57	194	19	4	0	69	4	12	0	3	1	15	0	5	0	0	0
17:00:00	327	47	651	62	226	32	5	1	71	2	12	0	3	0	15	0	5	0	0	0
17:15:00	370	43	720	69	254	28	6	1	72	1	12	0	3	0	15	0	5	0	0	0
17:30:00	404	34	783	63	291	37	6	0	78	6	12	0	3	0	15	0	6	1	0	0
17:45:00	433	29	860	77	317	26	6	0	79	1	12	0	3	0	15	0	6	0	0	0
18:00:00	459	26	921	61	338	21	6	0	81	2	12	0	3	0	15	0	6	0	0	0
18:15:00	494	35	974	53	356	18	6	0	83	2	13	1	3	0	15	0	6	0	0	0
18:30:00	517	23	1018	44	377	21	6	0	85	2	13	0	3	0	15	0	7	1	0	0
18:45:00	534	17	1057	39	402	25	6	0	86	1	13	0	3	0	15	0	7	0	0	0
19:00:00	551	17	1096	39	418	16	6	0	90	4	13	0	3	0	15	0	7	0	0	0
19:00:04	551	0	1096	0	418	0	6	0	90	0	13	0	3	0	15	0	7	0	0	0

Ontario Traffic Inc.

Count Date: 14-Jun-18 Site #: 1822100012

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Heavys - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	2	2	3	3	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	9	7	5	2	17	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	11	2	7	2	37	20	0	0	0	0	1	1	0	0	0	0	0	0	0	0
7:00:00	12	1	13	6	51	14	2	2	0	0	1	0	0	0	0	0	0	0	0	0
7:15:00	13	1	23	10	62	11	2	0	0	0	1	0	0	0	0	0	0	0	0	0
7:30:00	15	2	46	23	75	13	2	0	0	0	2	1	0	0	1	1	0	0	0	0
7:45:00	18	3	50	4	102	27	4	2	0	0	2	0	0	0	1	0	0	0	0	0
8:00:00	20	2	55	5	150	48	5	1	0	0	2	0	0	0	1	0	0	0	0	0
8:15:00	24	4	57	2	205	55	6	1	1	1	3	1	0	0	1	0	0	0	0	0
8:30:00	34	10	62	5	241	36	6	0	2	1	3	0	0	0	1	0	0	0	0	0
8:45:00	36	2	64	2	287	46	6	0	2	0	4	1	0	0	1	0	1	1	0	0
9:00:00	45	9	67	3	322	35	6	0	2	0	6	2	0	0	1	0	1	0	0	0
9:00:08	45	0	67	0	322	0	6	0	2	0	6	0	0	0	1	0	1	0	0	0
16:00:00	45	0	67	0	322	0	6	0	2	0	6	0	0	0	1	0	1	0	0	0
16:15:00	51	6	86	19	353	31	6	0	3	1	6	0	0	0	2	1	1	0	0	0
16:30:00	59	8	98	12	388	35	6	0	3	0	6	0	0	0	2	0	1	0	0	0
16:45:00	63	4	108	10	424	36	7	1	4	1	6	0	0	0	2	0	2	1	0	0
17:00:00	74	11	120	12	462	38	7	0	4	0	7	1	0	0	2	0	2	0	0	0
17:15:00	93	19	131	11	505	43	7	0	4	0	7	0	0	0	2	0	2	0	0	0
17:30:00	105	12	147	16	542	37	7	0	4	0	7	0	0	0	2	0	2	0	0	0
17:45:00	112	7	159	12	573	31	7	0	4	0	7	0	0	0	2	0	2	0	0	0
18:00:00	114	2	177	18	603	30	7	0	5	1	7	0	0	0	2	0	2	0	0	0
18:15:00	120	6	187	10	634	31	7	0	5	0	7	0	0	0	2	0	2	0	0	0
18:30:00	128	8	190	3	664	30	7	0	5	0	8	1	0	0	2	0	2	0	0	0
18:45:00	130	2	195	5	680	16	7	0	5	0	8	0	0	0	2	0	2	0	0	0
19:00:00	134	4	200	5	704	24	7	0	5	0	8	0	0	0	2	0	2	0	0	0
19:00:04	134	0	200	0	704	0	7	0	5	0	8	0	0	0	2	0	2	0	0	0

Ontario Traffic Inc.

Count Date: 14-Jun-18 Site #: 1822100012

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Heavys - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	0	0	18	18	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0
6:30:00	0	0	59	41	4	4	0	0	6	3	0	0	0	0	0	0	0	0	0	0
6:45:00	1	1	100	41	9	5	0	0	14	8	1	1	0	0	0	0	0	0	0	0
7:00:00	2	1	138	38	15	6	0	0	20	6	1	0	0	0	1	1	0	0	0	0
7:15:00	2	0	177	39	20	5	0	0	29	9	2	1	0	0	2	1	0	0	0	0
7:30:00	4	2	225	48	23	3	0	0	38	9	2	0	0	0	2	0	0	0	0	0
7:45:00	5	1	268	43	31	8	0	0	43	5	2	0	1	1	6	4	1	1	0	0
8:00:00	6	1	327	59	37	6	1	1	52	9	2	0	1	0	8	2	1	0	0	0
8:15:00	6	0	368	41	42	5	2	1	61	9	2	0	1	0	11	3	1	0	0	0
8:30:00	6	0	438	70	53	11	2	0	68	7	3	1	1	0	13	2	1	0	0	0
8:45:00	8	2	484	46	57	4	2	0	77	9	4	1	1	0	15	2	1	0	0	0
9:00:00	9	1	534	50	60	3	2	0	86	9	4	0	1	0	16	1	1	0	0	0
9:00:08	9	0	535	1	60	0	2	0	86	0	4	0	1	0	16	0	1	0	0	0
16:00:00	9	0	535	0	60	0	2	0	86	0	4	0	1	0	16	0	1	0	0	0
16:15:00	9	0	590	55	70	10	2	0	94	8	4	0	1	0	17	1	1	0	0	0
16:30:00	10	1	641	51	73	3	2	0	97	3	6	2	1	0	18	1	1	0	0	0
16:45:00	11	1	702	61	80	7	2	0	104	7	6	0	1	0	19	1	1	0	0	0
17:00:00	13	2	770	68	86	6	2	0	109	5	6	0	1	0	19	0	1	0	0	0
17:15:00	13	0	840	70	105	19	2	0	113	4	6	0	1	0	19	0	1	0	0	0
17:30:00	14	1	920	80	108	3	2	0	118	5	7	1	1	0	19	0	1	0	0	0
17:45:00	16	2	980	60	109	1	2	0	121	3	7	0	1	0	20	1	1	0	0	0
18:00:00	17	1	1036	56	114	5	2	0	124	3	7	0	1	0	20	0	1	0	0	0
18:15:00	26	9	1103	67	117	3	2	0	126	2	7	0	1	0	20	0	1	0	0	0
18:30:00	28	2	1162	59	117	0	2	0	128	2	7	0	1	0	20	0	1	0	0	0
18:45:00	28	0	1200	38	119	2	2	0	130	2	7	0	1	0	21	1	1	0	0	0
19:00:00	29	1	1229	29	120	1	2	0	130	0	7	0	1	0	21	0	1	0	0	0
19:00:04	29	0	1229	0	120	0	2	0	130	0	7	0	1	0	21	0	1	0	0	0

Ontario Traffic Inc.

Count Date: 14-Jun-18 Site #: 1822100012

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Heavys - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	13	13	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	35	22	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	60	25	11	6	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	76	16	16	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	105	29	23	7	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	121	16	33	10	5	0	4	3	2	2	0	0	1	1	0	0	0	0	1	1
7:45:00	157	36	40	7	8	3	5	1	2	0	1	1	1	0	2	2	0	0	1	0
8:00:00	176	19	44	4	11	3	5	0	2	0	1	0	2	1	3	1	0	0	1	0
8:15:00	205	29	48	4	11	0	7	2	2	0	1	0	3	1	3	0	0	0	1	0
8:30:00	236	31	54	6	14	3	10	3	2	0	2	1	3	0	3	0	0	0	1	0
8:45:00	261	25	63	9	14	0	12	2	3	1	2	0	4	1	3	0	0	0	1	0
9:00:00	287	26	68	5	19	5	14	2	3	0	2	0	6	2	3	0	0	0	1	0
9:00:08	287	0	68	0	19	0	14	0	3	0	2	0	6	0	3	0	0	0	1	0
16:00:00	287	0	68	0	19	0	14	0	3	0	2	0	6	0	3	0	0	0	1	0
16:15:00	310	23	74	6	20	1	14	0	4	1	2	0	7	1	3	0	0	0	1	0
16:30:00	335	25	87	13	21	1	15	1	4	0	2	0	7	0	3	0	0	0	1	0
16:45:00	361	26	96	9	21	0	15	0	5	1	3	1	7	0	3	0	1	1	1	0
17:00:00	376	15	105	9	21	0	16	1	5	0	3	0	7	0	3	0	1	0	1	0
17:15:00	401	25	111	6	22	1	16	0	5	0	3	0	7	0	3	0	1	0	1	0
17:30:00	425	24	118	7	23	1	16	0	5	0	3	0	7	0	3	0	1	0	1	0
17:45:00	444	19	122	4	24	1	16	0	5	0	3	0	7	0	3	0	1	0	1	0
18:00:00	467	23	125	3	25	1	17	1	5	0	3	0	7	0	3	0	1	0	1	0
18:15:00	494	27	128	3	27	2	18	1	5	0	3	0	7	0	3	0	1	0	2	1
18:30:00	511	17	132	4	28	1	18	0	5	0	3	0	7	0	3	0	1	0	2	0
18:45:00	531	20	134	2	28	0	18	0	5	0	3	0	7	0	3	0	1	0	2	0
19:00:00	546	15	137	3	29	1	18	0	5	0	3	0	7	0	3	0	1	0	2	0
19:00:04	546	0	137	0	29	0	18	0	5	0	3	0	7	0	3	0	1	0	2	0

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

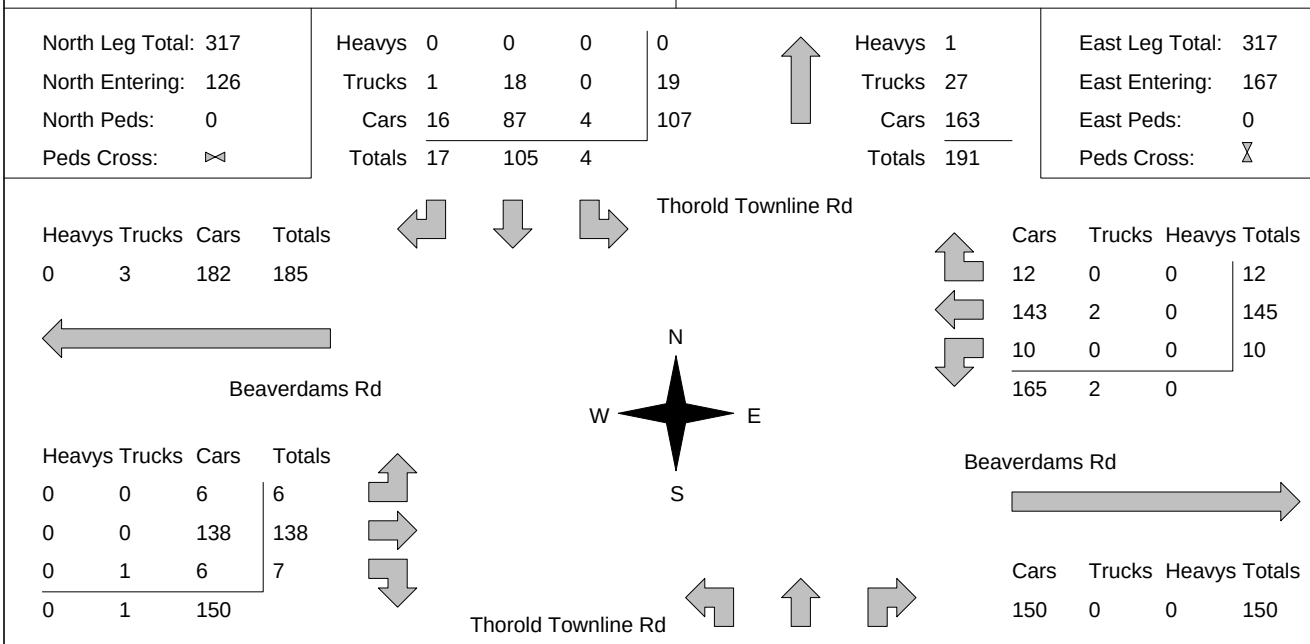
Municipality: Thorold
Site #: 1822100003
Intersection: Beaverdams Rd & Thorold Townlin
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Beaverdams Rd runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

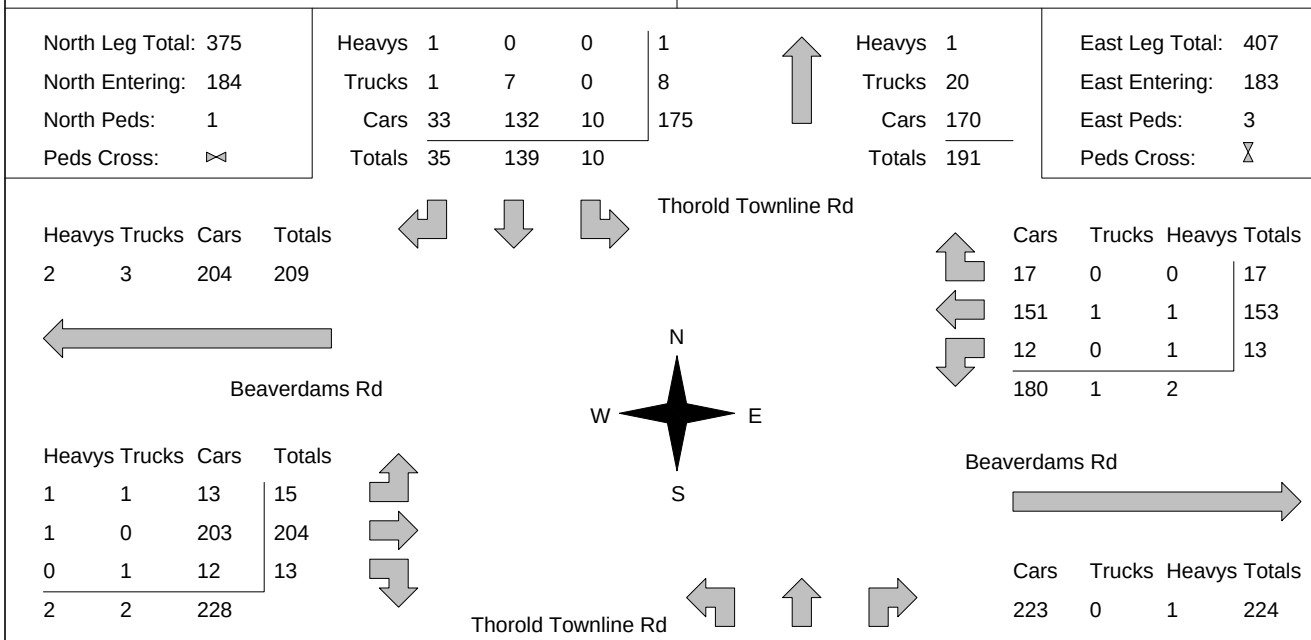
Municipality: Thorold
Site #: 1822100003
Intersection: Beaverdams Rd & Thorold Townlin
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Beaverdams Rd runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100003
Intersection: Beaverdams Rd & Thorold Townlin
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Beaverdams Rd runs W/E

North Leg Total:	1591
North Entering:	710
North Peds:	4
Peds Cross:	⋈

Heavys	1	1	0	2
Trucks	5	55	0	60
Cars	165	444	39	648
Totals	171	500	39	

Heavys	2
Trucks	82
Cars	797
Totals	881

East Leg Total:	1486
East Entering:	748
East Peds:	5
Peds Cross:	⧖

Thorold Townline Rd

Heavys	Trucks	Cars	Totals
2	12	935	949

Cars	Trucks	Heavys	Totals
81	0	0	81
594	5	1	600
66	0	1	67
741	5	2	

Beaverdams Rd

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Heavys	Trucks	Cars	Totals
1	5	121	127
1	5	645	651
0	5	127	132
2	15	893	

Beaverdams Rd

Cars	Trucks	Heavys	Totals
732	5	1	738

Thorold Townline Rd

Peds Cross:	⧖
West Peds:	36
West Entering:	910
West Leg Total:	1859

Cars	637			
Trucks	60			
Heavys	2			
Totals	699			
Cars	176	595	48	819
Trucks	2	77	0	79
Heavys	0	1	0	1
Totals	178	673	48	

Peds Cross:	⋈
South Peds:	47
South Entering:	899
South Leg Total:	1598

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Beaverdams Rd & Thorold Townli | **Count Date:** 19-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	1	57	8	66	0	159
8:00:00	3	106	17	126	0	300
9:00:00	4	83	17	104	0	296
16:00:00	0	0	0	0	0	0
17:00:00	10	139	35	184	1	374
18:00:00	12	70	53	135	2	272
19:00:00	9	45	41	95	1	208
Totals:	39	500	171	710	4	1609

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	13	78	2	93	2
8:00:00	16	147	11	174	8
9:00:00	20	165	7	192	4
16:00:00	0	0	0	0	0
17:00:00	21	159	10	190	5
18:00:00	63	56	18	137	15
19:00:00	45	68	0	113	13
Totals:	178	673	48	899	47

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	2	62	7	71	0	148
8:00:00	5	127	4	136	0	277
9:00:00	9	130	16	155	1	300
16:00:00	0	0	0	0	0	0
17:00:00	13	153	17	183	3	415
18:00:00	9	64	11	84	0	277
19:00:00	29	64	26	119	1	241
Totals:	67	600	81	748	5	1658

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	5	69	3	77	2
8:00:00	7	124	10	141	4
9:00:00	6	129	10	145	8
16:00:00	0	0	0	0	0
17:00:00	15	204	13	232	8
18:00:00	56	81	56	193	6
19:00:00	38	44	40	122	8
Totals:	127	651	132	910	36

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	94	170	198	0	201	151	131

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

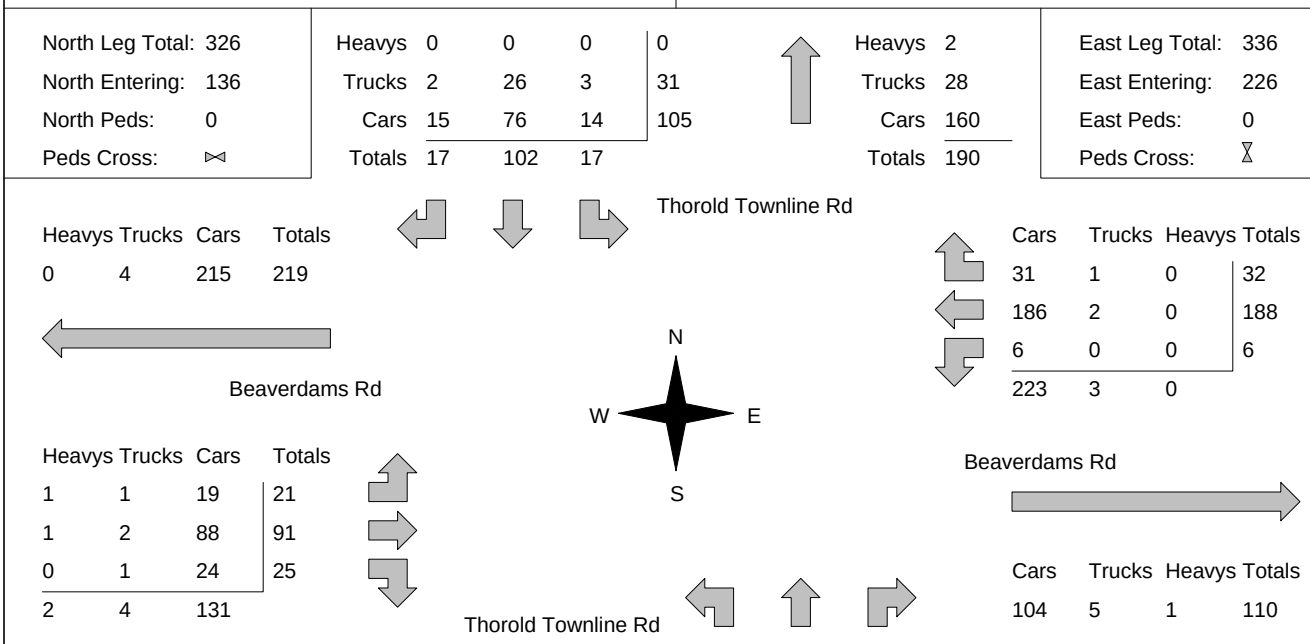
Municipality: Thorold
Site #: 1822100009
Intersection: Beaverdams Rd & Thorold Townlin
TFR File #: 25
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Beaverdams Rd runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

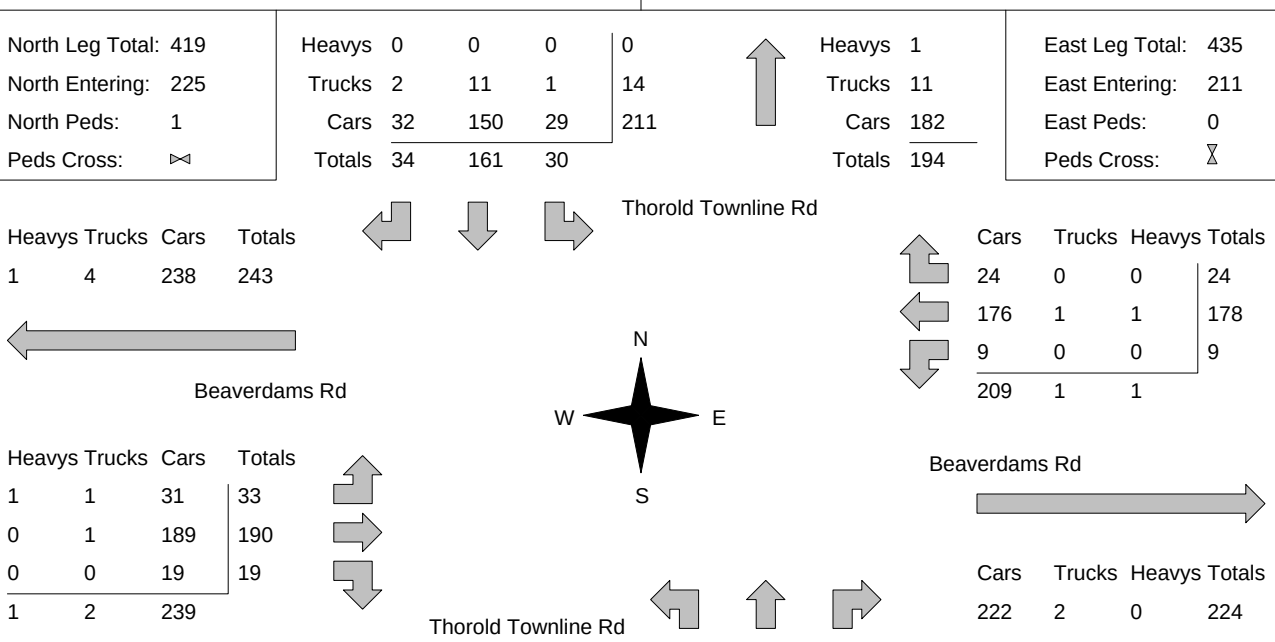
Municipality: Thorold
Site #: 1822100009
Intersection: Beaverdams Rd & Thorold Townlin
TFR File #: 25
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Beaverdams Rd runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100009
Intersection: Beaverdams Rd & Thorold Townlin
TFR File #: 25
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Beaverdams Rd runs W/E

North Leg Total:	1825			
North Entering:	920			
North Peds:	3			
Peds Cross:	⋈			
Heavys	2	2	0	4
Trucks	8	89	7	104
Cars	127	586	99	812
Totals	137	677	106	
Heavys	6			
Trucks	88			
Cars	811			
Totals	905			
East Leg Total:	1668			
East Entering:	970			
East Peds:	1			
Peds Cross:	⧖			

Thorold Townline Rd

Heavys	Trucks	Cars	Totals
3	19	1048	1070

Beaverdams Rd

Cars	Trucks	Heavys	Totals
131	3	0	134
798	9	1	808
26	2	0	28
955	14	1	

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W E
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Heavys	Trucks	Cars	Totals
3	4	104	111
5	6	557	568
0	2	130	132
8	12	791	

Beaverdams Rd

Cars	Trucks	Heavys	Totals
680	13	5	698

Thorold Townline Rd

Peds Cross:	⧖			
West Peds:	1			
West Entering:	811			
West Leg Total:	1881			
Cars	742			
Trucks	93			
Heavys	2			
Totals	837			
Cars	123	576	24	723
Trucks	2	81	0	83
Heavys	0	3	0	3
Totals	125	660	24	
Peds Cross:	⋈			
South Peds:	1			
South Entering:	809			
South Leg Total:	1646			

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Beaverdams Rd & Thorold Townli | **Count Date:** 14-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	2	0	2	0	7
7:00:00	9	74	7	90	0	186
8:00:00	17	99	27	143	0	282
9:00:00	15	95	10	120	1	265
16:00:00	3	1	2	6	0	13
17:00:00	28	156	39	223	1	375
18:00:00	26	157	25	208	0	365
19:00:00	8	93	27	128	1	236
Totals:	106	677	137	920	3	1729

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	4	1	5	0
7:00:00	9	87	0	96	0
8:00:00	22	117	0	139	0
9:00:00	17	126	2	145	0
16:00:00	2	4	1	7	0
17:00:00	25	121	6	152	0
18:00:00	34	116	7	157	1
19:00:00	16	85	7	108	0
Totals:	125	660	24	809	1

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	0	66	12	78	0	129
8:00:00	3	109	19	131	0	240
9:00:00	7	187	33	227	0	354
16:00:00	1	2	1	4	0	9
17:00:00	7	164	28	199	0	429
18:00:00	6	171	26	203	1	380
19:00:00	4	109	15	128	0	238
Totals:	28	808	134	970	1	1779

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	9	27	15	51	1
8:00:00	19	62	28	109	0
9:00:00	21	89	17	127	0
16:00:00	2	2	1	5	0
17:00:00	24	184	22	230	0
18:00:00	24	127	26	177	0
19:00:00	10	77	23	110	0
Totals:	109	568	132	809	1

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	4	106	156	158	9	209	218	117

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

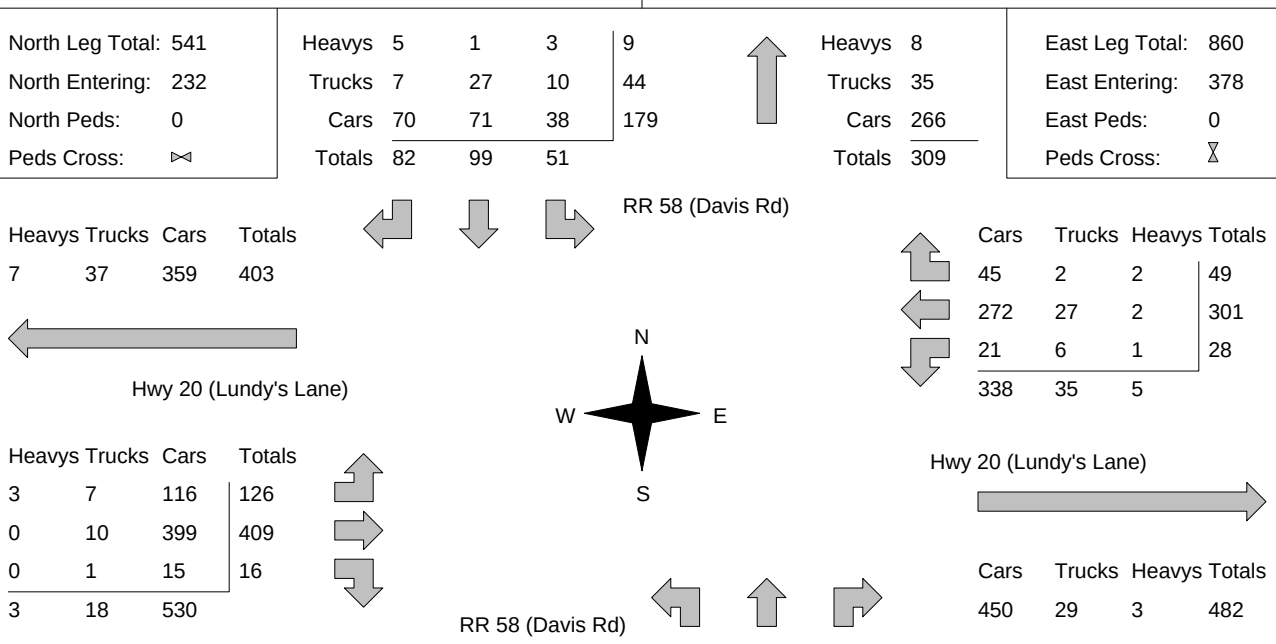
Municipality: Thorold
Site #: 1822100005
Intersection: Hwy 20 (Lundy's Lane) & RR 58 (D
TFR File #: 12
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 20 (Lundy's Lane) runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

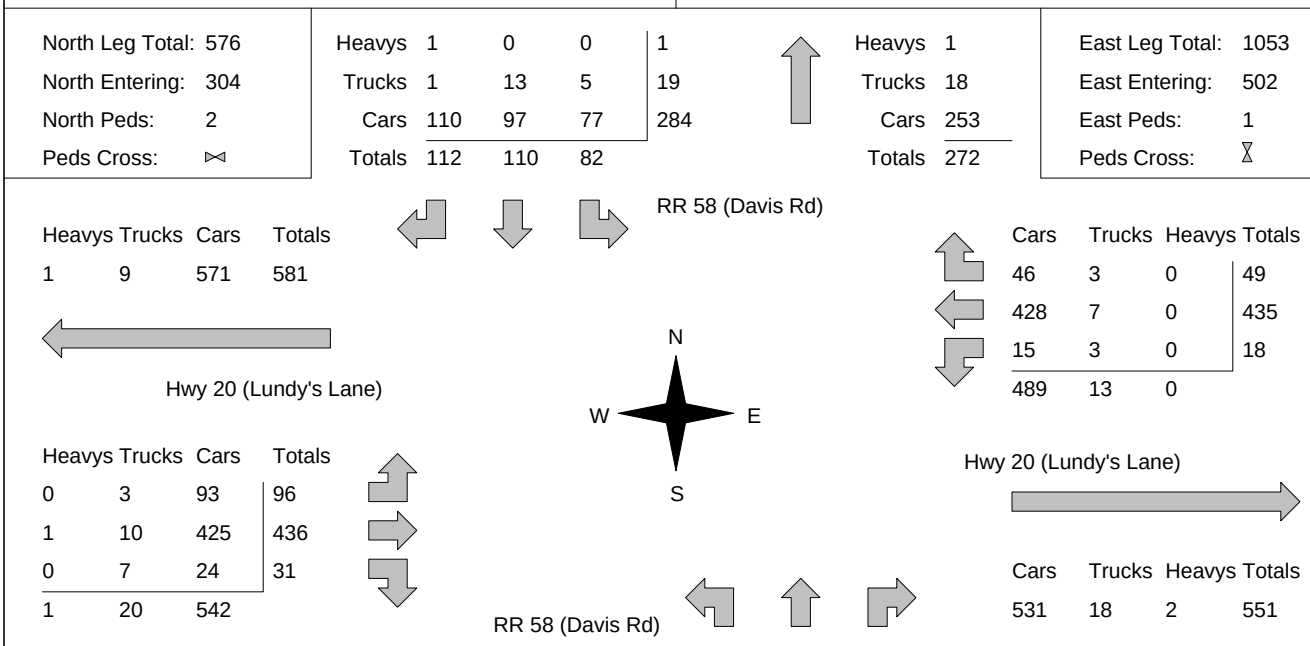
Municipality: Thorold
Site #: 1822100005
Intersection: Hwy 20 (Lundy's Lane) & RR 58 (D
TFR File #: 12
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 20 (Lundy's Lane) runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100005
Intersection: Hwy 20 (Lundy's Lane) & RR 58 (D
TFR File #: 12
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 20 (Lundy's Lane) runs W/E

North Leg Total:	2837
North Entering:	1364
North Peds:	4
Peds Cross:	⋈

Heavys	10	2	3	15
Trucks	18	83	34	135
Cars	403	483	328	1214
Totals	431	568	365	

Heavys	18			
Trucks	117			
Cars	1338			
Totals	1473			

East Leg Total:	4655
East Entering:	2150
East Peds:	5
Peds Cross:	⧖

RR 58 (Davis Rd)

Heavys	Trucks	Cars	Totals
13	99	2185	2297

Hwy 20 (Lundy's Lane)

Cars	Trucks	Heavys	Totals
279	20	3	302
1630	65	3	1698
128	21	1	150
2037	106	7	

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Heavys	Trucks	Cars	Totals
9	20	515	544
2	44	1944	1990
0	17	106	123
11	81	2565	

Hwy 20 (Lundy's Lane)

Cars	Trucks	Heavys	Totals
2396	103	6	2505

RR 58 (Davis Rd)

Peds Cross:	⧖
West Peds:	0
West Entering:	2657
West Leg Total:	4954

Cars	717			
Trucks	121			
Heavys	3			
Totals	841			

Cars	152	544	124	820
Trucks	16	77	25	118
Heavys	0	6	1	7
Totals	168	627	150	

Peds Cross:	⋈
South Peds:	5
South Entering:	945
South Leg Total:	1786

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Hwy 20 (Lundy's Lane) & RR 58 (I	Count Date: 19-Jun-18	Municipality: Thorold

North Approach Totals							South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	42	96	27	165	0	294	7:00:00	17	89	23	129	0
8:00:00	48	85	81	214	0	374	8:00:00	25	107	28	160	0
9:00:00	64	92	54	210	0	375	9:00:00	23	126	16	165	1
16:00:00	0	0	0	0	0	1	16:00:00	1	0	0	1	0
17:00:00	81	109	111	301	2	494	17:00:00	35	126	32	193	1
18:00:00	90	108	97	295	2	485	18:00:00	39	112	39	190	1
19:00:00	40	78	61	179	0	286	19:00:00	28	67	12	107	2
Totals:	365	568	431	1364	4	2309		168	627	150	945	5

East Approach Totals							West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	33	130	43	206	0	442	7:00:00	68	154	14	236	0
8:00:00	33	229	54	316	1	800	8:00:00	116	347	21	484	0
9:00:00	23	303	47	373	0	895	9:00:00	120	385	17	522	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	17	429	50	496	1	1052	17:00:00	94	429	33	556	0
18:00:00	28	381	71	480	2	951	18:00:00	71	380	20	471	0
19:00:00	16	226	37	279	1	667	19:00:00	75	295	18	388	0
Totals:	150	1698	302	2150	5	4807		544	1990	123	2657	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	155	181	213	1	243	243	147

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

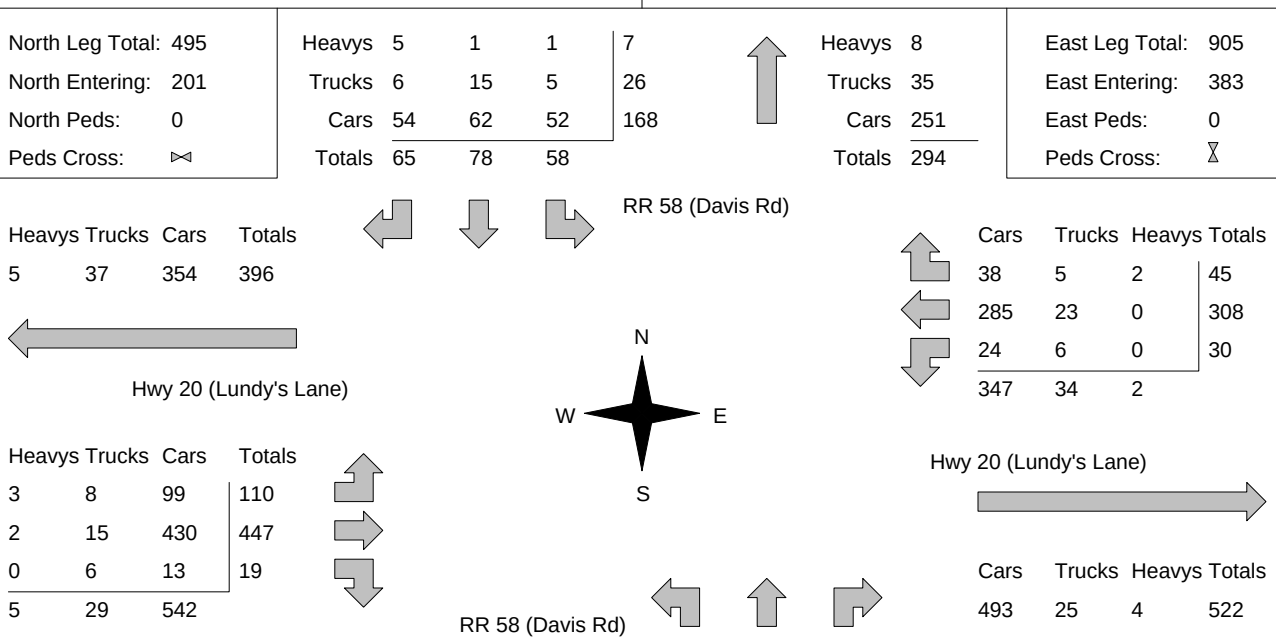
Municipality: Thorold
Site #: 1822100011
Intersection: Hwy 20 (Lundy's Lane) & RR 58 (D
TFR File #: 7
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 20 (Lundy's Lane) runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

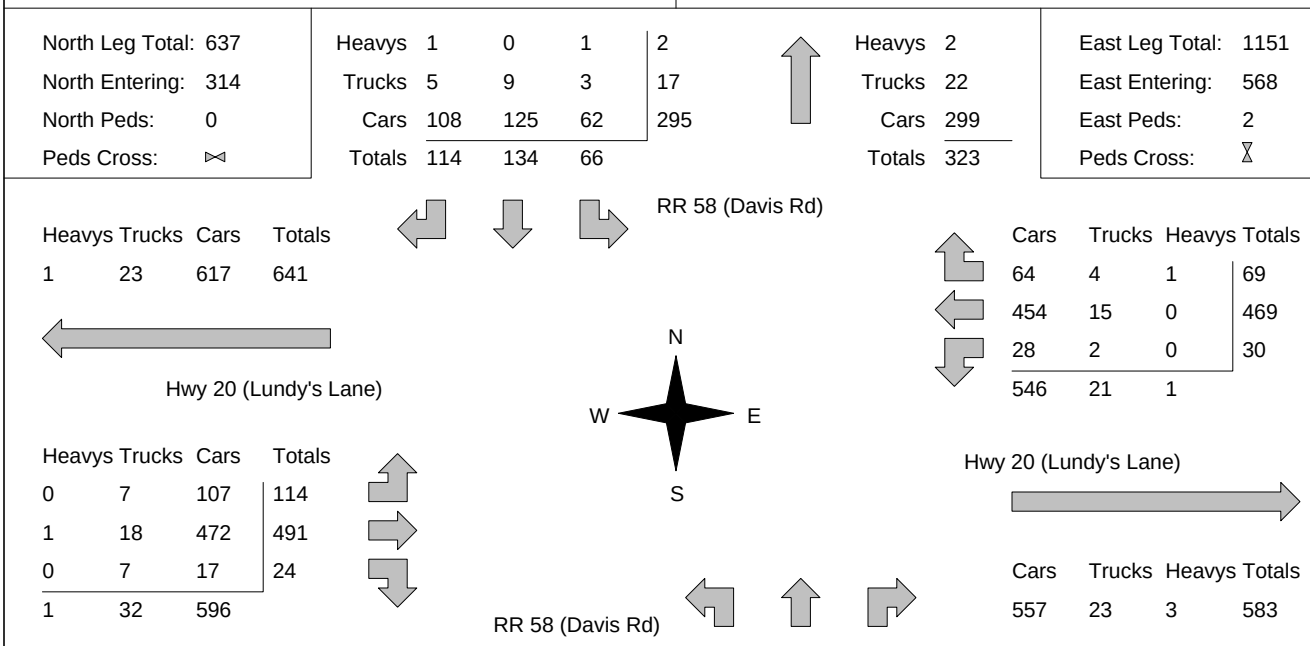
Municipality: Thorold
Site #: 1822100011
Intersection: Hwy 20 (Lundy's Lane) & RR 58 (D
TFR File #: 7
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 20 (Lundy's Lane) runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100011
Intersection: Hwy 20 (Lundy's Lane) & RR 58 (D
TFR File #: 7
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 20 (Lundy's Lane) runs W/E

North Leg Total:	2987
North Entering:	1403
North Peds:	0
Peds Cross:	⋈

Heavys	11	3	4	18
Trucks	32	55	17	104
Cars	428	540	313	1281
Totals	471	598	334	

Heavys	22
Trucks	137
Cars	1425
Totals	1584

East Leg Total:	4896
East Entering:	2286
East Peds:	3
Peds Cross:	⧖

RR 58 (Davis Rd)

Heavys	Trucks	Cars	Totals
14	122	2337	2473

Hwy 20 (Lundy's Lane)

Cars	Trucks	Heavys	Totals
280	21	4	305
1756	65	3	1824
131	26	0	157
2167	112	7	

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Heavys	Trucks	Cars	Totals
11	30	550	591
4	71	2080	2155
0	24	112	136
15	125	2742	

Hwy 20 (Lundy's Lane)

Cars	Trucks	Heavys	Totals
2486	113	11	2610

RR 58 (Davis Rd)

Peds Cross:	⧖
West Peds:	0
West Entering:	2882
West Leg Total:	5355

Cars	783
Trucks	105
Heavys	3
Totals	891

Cars	153	595	93	841
Trucks	25	86	25	136
Heavys	0	7	3	10
Totals	178	688	121	

Peds Cross:	⋈
South Peds:	0
South Entering:	987
South Leg Total:	1878

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Hwy 20 (Lundy's Lane) & RR 58 (I	Count Date: 14-Jun-18	Municipality: Thorold

North Approach Totals / **South Approach Totals** (Includes Cars, Trucks, & Heavys)

Hour Ending	N Left	N Thru	N Right	N Grand Total	N Total Peds	North/South Total Approaches	Hour Ending	S Left	S Thru	S Right	S Grand Total	S Total Peds
6:00:00	1	1	0	2	0	2	6:00:00	0	0	0	0	0
7:00:00	26	92	57	175	0	293	7:00:00	9	90	19	118	0
8:00:00	50	83	75	208	0	385	8:00:00	29	124	24	177	0
9:00:00	60	79	58	197	0	368	9:00:00	26	131	14	171	0
16:00:00	1	4	3	8	0	15	16:00:00	1	6	0	7	0
17:00:00	68	114	102	284	0	495	17:00:00	60	130	21	211	0
18:00:00	78	139	102	319	0	503	18:00:00	30	127	27	184	0
19:00:00	50	85	74	209	0	325	19:00:00	23	77	16	116	0
Totals:	334	597	471	1402	0	2386		178	685	121	984	0

East Approach Totals / **West Approach Totals** (Includes Cars, Trucks, & Heavys)

Hour Ending	E Left	E Thru	E Right	E Grand Total	E Total Peds	East/West Total Approaches	Hour Ending	W Left	W Thru	W Right	W Grand Total	W Total Peds
6:00:00	1	3	0	4	0	10	6:00:00	0	5	1	6	0
7:00:00	24	137	32	193	0	435	7:00:00	61	165	16	242	0
8:00:00	28	222	34	284	0	784	8:00:00	99	375	26	500	0
9:00:00	30	286	55	371	0	886	9:00:00	95	401	19	515	0
16:00:00	0	5	0	5	0	16	16:00:00	0	11	0	11	0
17:00:00	26	437	71	534	2	1151	17:00:00	101	486	30	617	0
18:00:00	28	426	70	524	0	1026	18:00:00	127	356	19	502	0
19:00:00	20	308	43	371	1	860	19:00:00	108	356	25	489	0
Totals:	157	1824	305	2286	3	5168		591	2155	136	2882	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	2	127	203	217	8	260	247	159

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

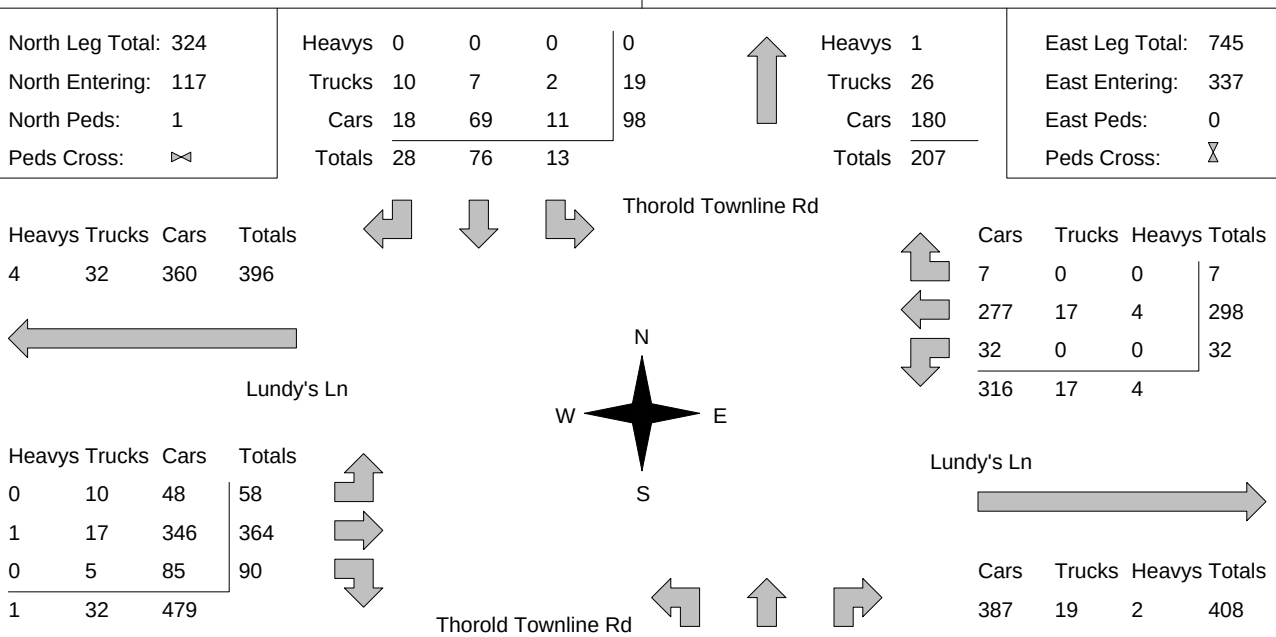
Municipality: Thorold
Site #: 1822100001
Intersection: Lundy's Ln & Thorold Townline Rd
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lundy's Ln runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

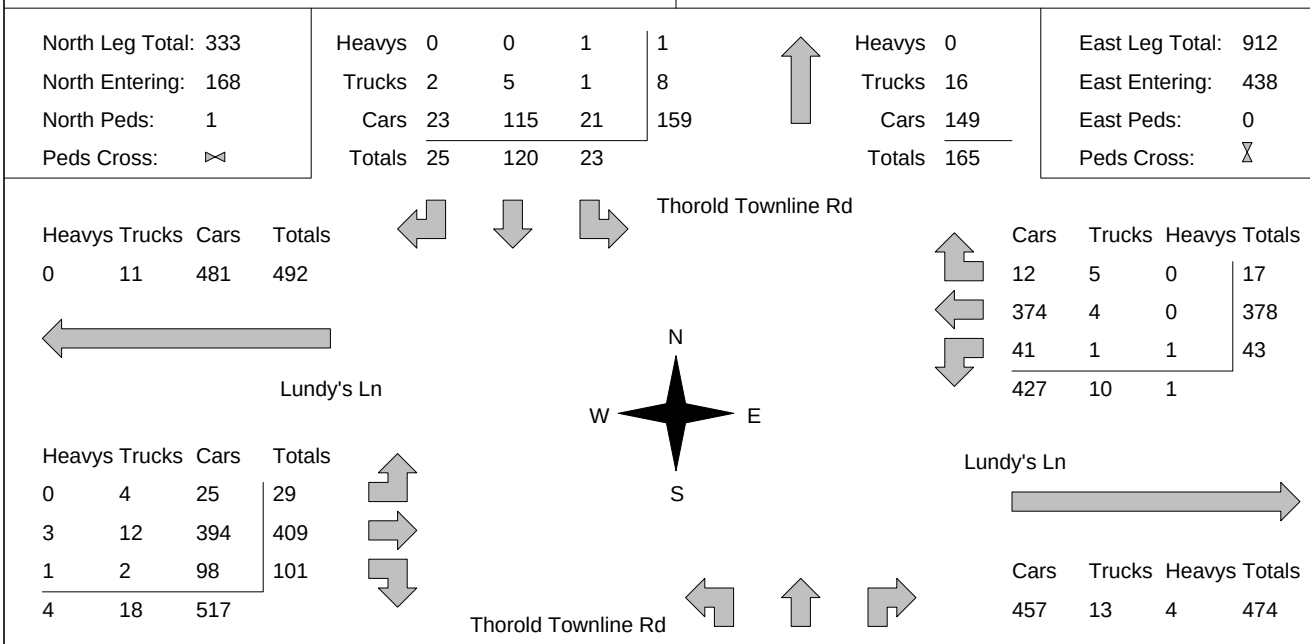
Municipality: Thorold
Site #: 1822100001
Intersection: Lundy's Ln & Thorold Townline Rd
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lundy's Ln runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

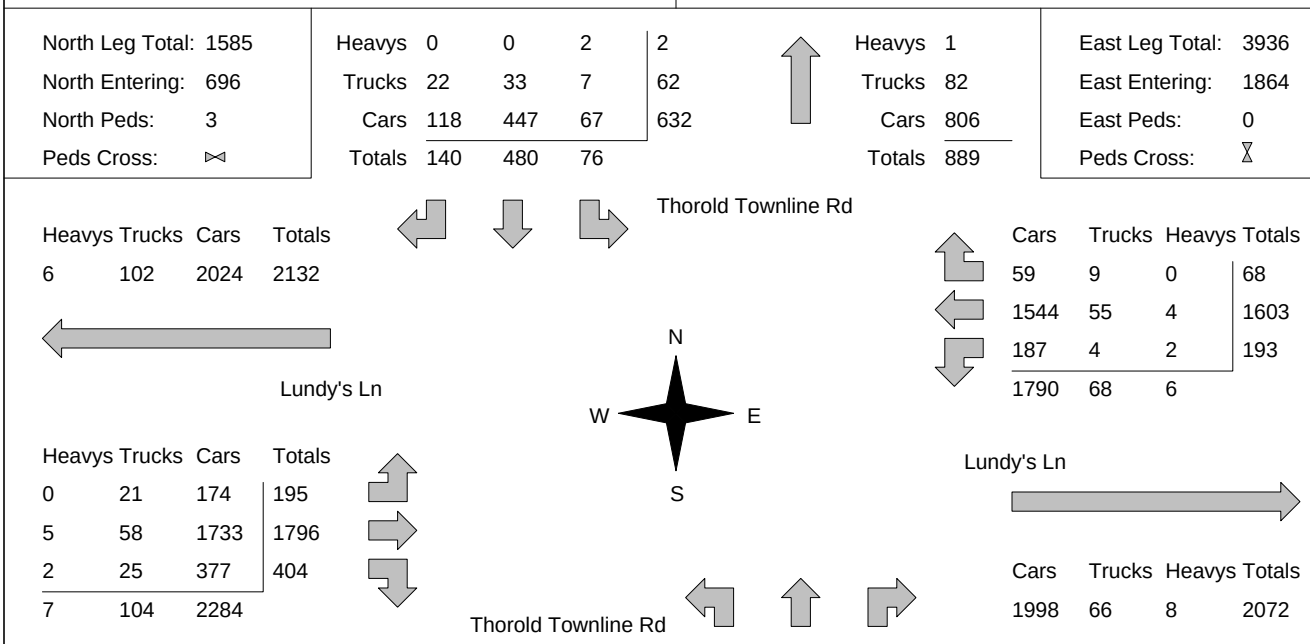
Municipality: Thorold
Site #: 1822100001
Intersection: Lundy's Ln & Thorold Townline Rd
TFR File #: 9
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lundy's Ln runs W/E



Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Lundy's Ln & Thorold Townline Rd | **Count Date:** 19-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	5	49	10	64	1	202
8:00:00	9	84	25	118	0	359
9:00:00	14	67	26	107	1	328
16:00:00	0	0	0	0	0	0
17:00:00	20	118	22	160	1	426
18:00:00	12	84	39	135	0	341
19:00:00	16	78	18	112	0	255
Totals:	76	480	140	696	3	1911

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	40	71	27	138	1
8:00:00	76	129	36	241	0
9:00:00	67	131	23	221	0
16:00:00	0	0	0	0	0
17:00:00	92	130	44	266	1
18:00:00	72	92	42	206	0
19:00:00	42	73	28	143	0
	389	626	200	1215	2

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	35	148	5	188	0	413
8:00:00	34	208	5	247	0	622
9:00:00	25	293	8	326	0	798
16:00:00	0	1	0	1	0	1
17:00:00	41	373	27	441	0	959
18:00:00	42	360	11	413	0	903
19:00:00	16	220	12	248	0	563
Totals:	193	1603	68	1864	0	4259

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	18	159	48	225	0
8:00:00	38	257	80	375	0
9:00:00	53	345	74	472	0
16:00:00	0	0	0	0	0
17:00:00	31	379	108	518	0
18:00:00	30	403	57	490	0
19:00:00	25	253	37	315	0
	195	1796	404	2395	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	116	214	212	0	242	176	136

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

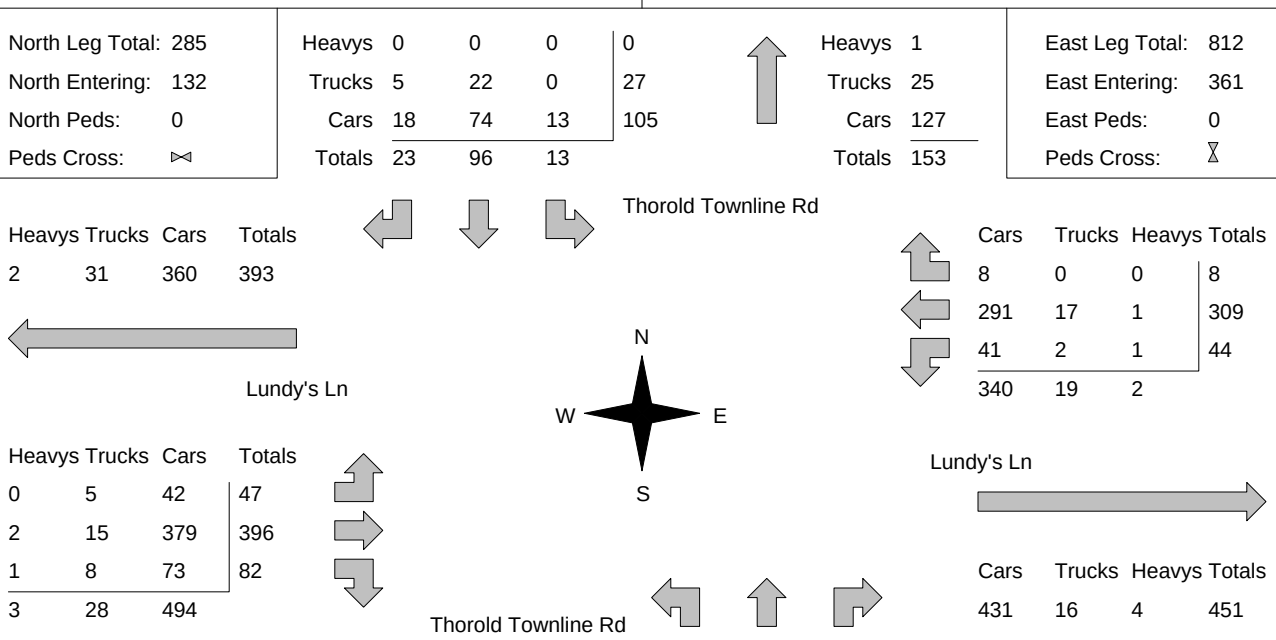
Municipality: Thorold
Site #: 1822100008
Intersection: Lundy's Ln & Thorold Townline Rd
TFR File #: 7
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lundy's Ln runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

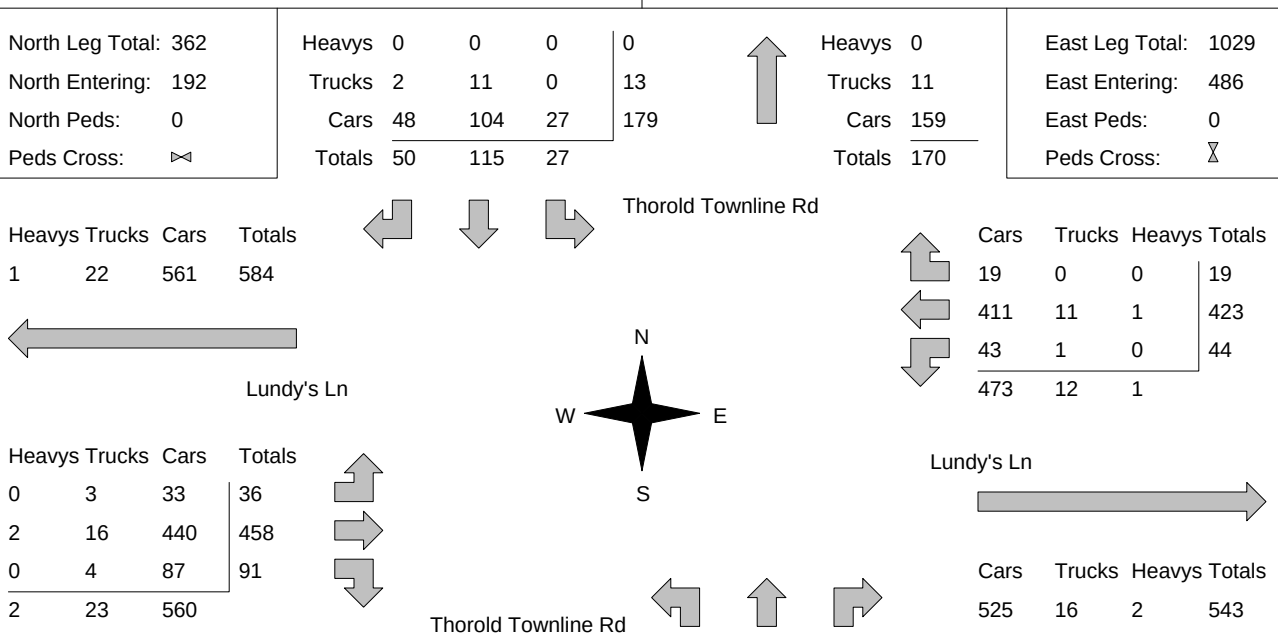
Municipality: Thorold
Site #: 1822100008
Intersection: Lundy's Ln & Thorold Townline Rd
TFR File #: 7
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lundy's Ln runs W/E



Comments

Ontario Traffic Inc.

Total Count Diagram

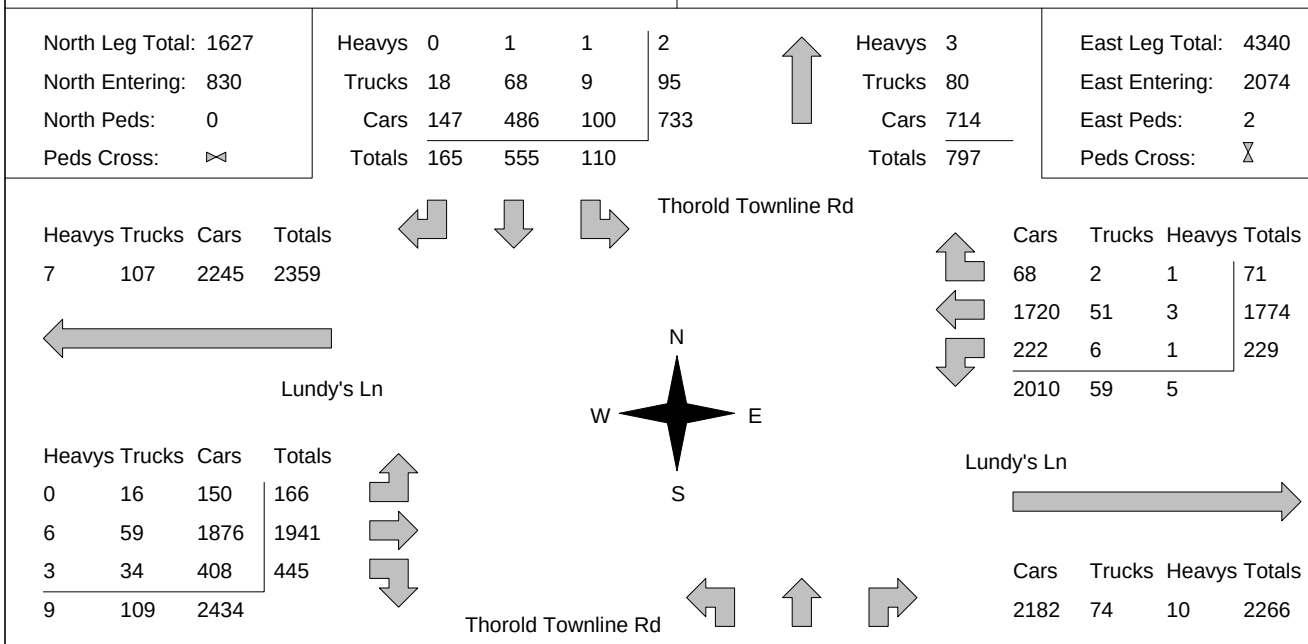
Municipality: Thorold
Site #: 1822100008
Intersection: Lundy's Ln & Thorold Townline Rd
TFR File #: 7
Count date: 14-Jun-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lundy's Ln runs W/E



Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Lundy's Ln & Thorold Townline Rd | **Count Date:** 14-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	6	69	14	89	0	239
8:00:00	10	100	17	127	0	320
9:00:00	19	79	20	118	0	319
16:00:00	0	0	0	0	0	0
17:00:00	25	115	47	187	0	456
18:00:00	30	117	42	189	0	423
19:00:00	20	75	25	120	0	268
Totals:	110	555	165	830	0	2025

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	48	73	29	150	1
8:00:00	61	101	31	193	0
9:00:00	57	104	40	201	0
16:00:00	0	0	0	0	0
17:00:00	108	104	57	269	1
18:00:00	92	109	33	234	4
19:00:00	54	69	25	148	0
Totals:	420	560	215	1195	6

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	38	152	6	196	0	381
8:00:00	36	214	5	255	0	684
9:00:00	32	300	11	343	0	812
16:00:00	0	0	0	0	0	0
17:00:00	48	400	15	463	0	1021
18:00:00	47	399	15	461	1	935
19:00:00	28	309	19	356	1	793
Totals:	229	1774	71	2074	2	4626

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	15	136	34	185	0
8:00:00	37	297	95	429	0
9:00:00	31	364	74	469	0
16:00:00	0	0	0	0	0
17:00:00	32	428	98	558	0
18:00:00	32	367	75	474	1
19:00:00	19	349	69	437	0
Totals:	166	1941	445	2552	1

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	127	172	180	0	248	241	150

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

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

Municipality: Thorold
Site #: 1822100002
Intersection: Thorold Townline Rd & Upper's Ln
TFR File #: 4
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Thorold Townline Rd runs N/S

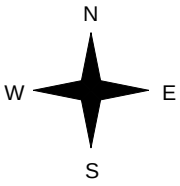
North Leg Total: 326
North Entering: 115
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	19	0	19
Cars	96	0	96
Totals	115	0	

Heavys	1
Trucks	26
Cars	184
Totals	211

East Leg Total: 2
East Entering: 1
East Peds: 0
Peds Cross: ⋈

	Cars	Trucks	Heavys	Totals
	0	0	0	0
	1	0	0	1
	1	0	0	



Upper's Ln

	Cars	Trucks	Heavys	Totals
	1	0	0	1

Thorold Townline Rd

Cars	97		
Trucks	19		
Heavys	0		
Totals	116		

Cars	184	1	185
Trucks	26	0	26
Heavys	1	0	1
Totals	211	1	

Peds Cross: ⋈
South Peds: 0
South Entering: 212
South Leg Total: 328

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

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

Municipality: Thorold
Site #: 1822100002
Intersection: Thorold Townline Rd & Upper's Ln
TFR File #: 4
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

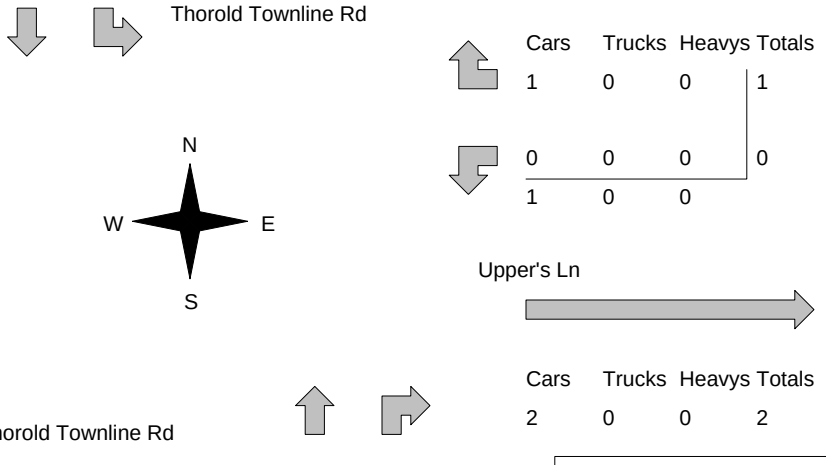
Major Road: Thorold Townline Rd runs N/S

North Leg Total: 353
North Entering: 163
North Peds: 0
Peds Cross: ⋈

Heavys	1	0	1
Trucks	9	0	9
Cars	152	1	153
Totals	162	1	

Heavys	0
Trucks	21
Cars	169
Totals	190

East Leg Total: 3
East Entering: 1
East Peds: 0
Peds Cross: ⋈



Cars	152
Trucks	9
Heavys	1
Totals	162

Cars	168	1	169
Trucks	21	0	21
Heavys	0	0	0
Totals	189	1	

Peds Cross: ⋈
South Peds: 0
South Entering: 190
South Leg Total: 352

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Thorold
Site #: 1822100002
Intersection: Thorold Townline Rd & Upper's Ln
TFR File #: 4
Count date: 19-Jun-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Thorold Townline Rd runs N/S

North Leg Total: 1609
North Entering: 703
North Peds: 1
Peds Cross: ⋈

Heavys	2	0	2
Trucks	61	0	61
Cars	636	4	640
Totals	699	4	

Heavys	1	
Trucks	86	
Cars	819	
Totals	906	

East Leg Total: 15
East Entering: 7
East Peds: 0
Peds Cross: ⋈

Thorold Townline Rd

	Cars	Trucks	Heavys	Totals
	4	0	0	4
	3	0	0	3
	7	0	0	

N
W E
S

Upper's Ln

Cars	Trucks	Heavys	Totals
8	0	0	8

Thorold Townline Rd

Cars	639		
Trucks	61		
Heavys	2		
Totals	702		

Cars	815	4	819
Trucks	86	0	86
Heavys	1	0	1
Totals	902	4	

Peds Cross: ⋈
South Peds: 0
South Entering: 906
South Leg Total: 1608

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Thorold Townline Rd & Upper's Ln | **Count Date:** 19-Jun-18 | **Municipality:** Thorold

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	2	0	2	0	5
7:00:00	0	63	0	63	0	156
8:00:00	1	118	0	119	0	293
9:00:00	0	105	0	105	0	303
16:00:00	0	2	0	2	0	7
17:00:00	1	162	0	163	0	353
18:00:00	1	133	0	134	0	267
19:00:00	1	112	0	113	1	223
Totals:	4	697	0	701	1	1607

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	3	0	3	0
7:00:00	0	93	0	93	0
8:00:00	0	173	1	174	0
9:00:00	0	198	0	198	0
16:00:00	0	5	0	5	0
17:00:00	0	189	1	190	0
18:00:00	0	132	1	133	0
19:00:00	0	109	1	110	0
Totals:	0	902	4	906	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	0
9:00:00	1	0	0	1	0	1
16:00:00	1	0	0	1	0	1
17:00:00	0	0	1	1	0	1
18:00:00	0	0	1	1	0	1
19:00:00	1	0	2	3	0	3
Totals:	3	0	4	7	0	7

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0
9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
19:00:00	0	0	0	0	0
Totals:	0	0	0	0	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	0	0	1	1	0	0	2

Signal Code: H58DVS						
Intersection: HWY 58 & DAVIS RD./THOROLD STONE RD.						
Municipality: thorold						
Owner: MTO						
Last Modified: 4/24/2019 10:46:51 AM						
Timing Parameters	**EBD & WBD THOROLD STONE RD.**	**NBD HWY 58 (SPLIT)**	**SBD DAVIS RD. (SPLIT)**	**n/a**	**n/a**	**n/a**
Min Green	**20**	**10**	**10**	**0**	**0**	**0**
Walk	**15**	**15**	**15**	**0**	**0**	**0**
Ped Clearance	**7**	**7**	**7**	**0**	**0**	**0**
Vehicle Ext.	**4.5**	**3**	**3**	**0**	**0**	**0**
Max Green	**32**	**38**	**15**	**0**	**0**	**0**
Yellow	**5.7**	**5.4**	**5.4**	**0**	**0**	**0**
All Red	**2**	**2**	**1.5**	**0**	**0**	**0**

		Offset
Minimum Cycle	**45.1**	**0**
Pedestrian Cycle	**59.1**	
Maximum Cycle	**107**	**0**
Operation	**FA**	

Installed On:
8/23/1999
Count Date:
--/--/----

FA = Fully Actuated **SA = Semi Actuated** **FT = Fixed Time**

***Note: you need to change the paper orientation from Portriat to Landscape**

Signal Code: 057070						
Intersection: RR57 (THOROLD STONE RD,) & RR70 (THOROLD TOWNLINE RD.)						
Municipality: thorold						
Owner: MTO						
Last Modified: 12/10/2013 9:50:43 AM						
Timing Parameters	**EBD ADVANCE THOROLD STONE RD.**	**EBD & WBD THRU THOROLD STONE RD.**	**NBD & SBD THRU THOROLD TOWNLINE RD.**	**n/a**	**n/a**	**n/a**
Min Green	**8**	**10**	**10**	**0**	**0**	**0**
Walk	**0**	**11**	**15**	**0**	**0**	**0**
Ped Clearance	**0**	**18**	**25**	**0**	**0**	**0**
Vehicle Ext.	**2.5**	**6**	**2.3**	**0**	**0**	**0**
Max Green	**20**	**44**	**35**	**0**	**0**	**0**
Yellow	**3**	**4.1**	**4.1**	**0**	**0**	**0**
All Red	**0**	**2**	**2.3**	**0**	**0**	**0**

		Offset
Minimum Cycle	**32.5**	**0**
Pedestrian Cycle	**81.5**	
Maximum Cycle	**114.5**	**0**
Operation	**FA**	

Installed On:
6/12/2003
Count Date:
5/10/2012

FA = Fully Actuated **SA = Semi Actuated** **FT = Fixed Time**

***Note: you need to change the paper orientation from Portriat to Landscape**

Signal Code: H58BVR						
Intersection: Highway 58 & Beaverdams Rd.						
Municipality: thorold						
Owner: mto						
Last Modified: 5/29/2015 8:46:42 AM						
Timing Parameters	**NBD & SBD THRU HWY 58**	**EBD & WBD THRU BEAVERDAMS RD.**	**n/a**	**n/a**	**n/a**	**n/a**
Min Green	**25**	**10**	**0**	**0**	**0**	**0**
Walk	**10**	**11**	**0**	**0**	**0**	**0**
Ped Clearance	**15**	**19**	**0**	**0**	**0**	**0**
Vehicle Ext.	**5**	**3**	**0**	**0**	**0**	**0**
Max Green	**45**	**35**	**0**	**0**	**0**	**0**
Yellow	**5**	**5**	**0**	**0**	**0**	**0**
All Red	**2**	**3.1**	**0**	**0**	**0**	**0**

		Offset
Minimum Cycle	**50.1**	**0**
Pedestrian Cycle	**70.1**	
Maximum Cycle	**95.1**	**0**
Operation	**FA**	

Installed On:
5/29/2015
Count Date:
--/--/----

FA = Fully Actuated **SA = Semi Actuated** **FT = Fixed Time**

***Note: you need to change the paper orientation from Portriat to Landscape**

Signal Code: H20H58						
Intersection: HWY. 20 & HWY. 58/RR82 (ALLANPORT RD.)						
Municipality: thorold						
Owner: MTO						
Last Modified: 5/18/2017 2:36:50 PM						
Timing Parameters	**EBD & WBD THRU HWY 20**	**NBD & SBD THRU ALLANPORT RD./HWY 58**	**n/a**	**n/a**	**n/a**	**n/a**
Min Green	**22**	**15**	**0**	**0**	**0**	**0**
Walk	**11**	**10**	**0**	**0**	**0**	**0**
Ped Clearance	**18**	**15**	**0**	**0**	**0**	**0**
Vehicle Ext.	**4**	**2**	**0**	**0**	**0**	**0**
Max Green	**45**	**35**	**0**	**0**	**0**	**0**
Yellow	**5**	**5**	**0**	**0**	**0**	**0**
All Red	**2**	**2**	**0**	**0**	**0**	**0**

		Offset
Minimum Cycle	**51**	**0**
Pedestrian Cycle	**68**	
Maximum Cycle	**94**	**0**
Operation	**FA**	

Installed On:
10/2/2000
Count Date:
--/--/----

FA = Fully Actuated **SA = Semi Actuated** **FT = Fixed Time**

***Note: you need to change the paper orientation from Portriat to Landscape**

Signal Code: 070H20						
Intersection: RR70 (TOWNLINE RD.) & HWY 20 (LUNDYS LANE)						
Municipality: thorold						
Owner: MTO						
Last Modified: 3/28/2018 11:28:16 AM						
Timing Parameters	**EBD & WBD LUNDY'S LANE**	**NBD & SBD TOWNLINE RD.**	**--**	**n/a**	**--**	**--**
Min Green	**20**	**10**	**0**	**0**	**0**	**0**
Walk	**15**	**15**	**0**	**0**	**0**	**0**
Ped Clearance	**7**	**14**	**0**	**0**	**0**	**0**
Vehicle Ext.	**5**	**5**	**0**	**0**	**0**	**0**
Max Green	**50**	**40**	**0**	**0**	**0**	**0**
Yellow	**5**	**4**	**0**	**0**	**0**	**0**
All Red	**2**	**2**	**0**	**0**	**0**	**0**

		Offset
Minimum Cycle	**43**	**0**
Pedestrian Cycle	**64**	
Maximum Cycle	**103**	**0**
Operation	**FA**	

Installed On:
5/2/2001
Count Date:
5/14/2008

FA = Fully Actuated **SA = Semi Actuated** **FT = Fixed Time**

***Note: you need to change the paper orientation from Portriat to Landscape**

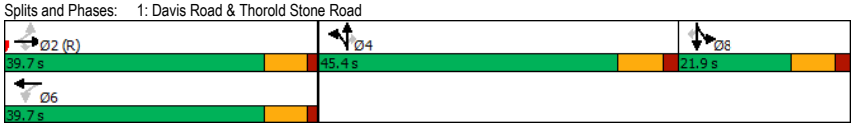
APPENDIX C

Capacity Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	21	866	226	67	1053	398	15	149	1	2	18
Future Volume (vph)	21	866	226	67	1053	398	15	149	1	2	18
Turn Type	Perm	NA	Perm	Perm	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	28.9	28.9	29.7	29.7	29.7	21.7	21.7	21.7
Total Split (s)	39.7	39.7	39.7	39.7	39.7	45.4	45.4	45.4	21.9	21.9	21.9
Total Split (%)	37.1%	37.1%	37.1%	37.1%	37.1%	42.4%	42.4%	42.4%	20.5%	20.5%	20.5%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	62.8	62.8	62.8	62.8	62.8	22.5	22.5	22.5	10.0	10.0	10.0
Actuated g/C Ratio	0.59	0.59	0.59	0.59	0.59	0.21	0.21	0.21	0.09	0.09	0.09
v/c Ratio	0.12	0.45	0.26	0.29	0.55	0.66	0.66	0.36	0.01	0.01	0.08
Control Delay	18.8	16.4	6.0	21.4	18.2	47.5	47.7	7.3	44.0	44.5	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.8	16.4	6.0	21.4	18.2	47.5	47.7	7.3	44.0	44.5	0.7
LOS	B	B	A	C	B	D	D	A	D	D	A
Approach Delay		14.4			18.4		36.9			6.6	
Approach LOS		B			B		D			A	

Intersection Summary			
Cycle Length: 107			
Actuated Cycle Length: 107			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 20.4		Intersection LOS: C	
Intersection Capacity Utilization 82.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	866	226	67	1053	6	398	15	149	1	2	18
Future Volume (vph)	21	866	226	67	1053	6	398	15	149	1	2	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.96	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1640	3406	1442	1530	3398		1559	1549	1475	1388	1624	1338
Flt Permitted	0.19	1.00	1.00	0.26	1.00		0.95	0.96	1.00	0.95	1.00	1.00
Satd. Flow (perm)	321	3406	1442	416	3398		1559	1549	1475	1388	1624	1338
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	902	235	70	1097	6	415	16	155	1	2	19
RTOR Reduction (vph)	0	0	79	0	0	0	0	0	122	0	0	18
Lane Group Flow (vph)	22	902	156	70	1103	0	216	215	33	1	2	1
Confl. Peds. (#/hr)	1					1	1		1	1		1
Heavy Vehicles (%)	10%	6%	12%	18%	6%	30%	10%	28%	8%	30%	17%	19%
Turn Type	Perm	NA	Perm	Perm	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	58.2	58.2	58.2	58.2	58.2		22.5	22.5	22.5	4.0	4.0	4.0
Effective Green, g (s)	58.2	58.2	58.2	58.2	58.2		22.5	22.5	22.5	4.0	4.0	4.0
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54		0.21	0.21	0.21	0.04	0.04	0.04
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	174	1852	784	226	1848		327	325	310	51	60	50
v/s Ratio Prot		0.26			c0.32		0.14	c0.14		0.00	c0.00	
v/s Ratio Perm	0.07		0.11	0.17					0.02			0.00
v/c Ratio	0.13	0.49	0.20	0.31	0.60		0.66	0.66	0.11	0.02	0.03	0.01
Uniform Delay, d1	12.0	15.1	12.5	13.4	16.5		38.7	38.8	34.1	49.6	49.6	49.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.9	0.6	3.5	1.4		5.9	6.0	0.3	0.3	0.4	0.2
Delay (s)	13.4	16.1	13.0	16.9	17.9		44.6	44.7	34.4	49.9	50.0	49.8
Level of Service	B	B	B	B	B		D	D	C	D	D	D
Approach Delay (s)		15.4			17.8			42.0			49.8	
Approach LOS		B			B			D			D	

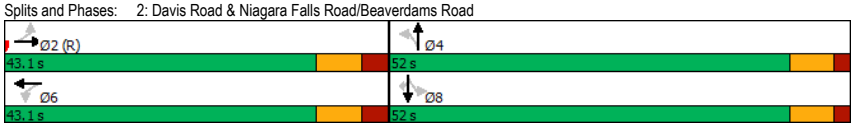
Intersection Summary					
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	107.0	Sum of lost time (s)		22.3	
Intersection Capacity Utilization	82.0%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	110	31	24	17	4	267	82	172	44
Future Volume (vph)	110	31	24	17	4	267	82	172	44
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	43.1	43.1	43.1	43.1	52.0	52.0	52.0	52.0	52.0
Total Split (%)	45.3%	45.3%	45.3%	45.3%	54.7%	54.7%	54.7%	54.7%	54.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		55.0		55.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio		0.58		0.58	0.26	0.26	0.26	0.26	0.26
v/c Ratio		0.24		0.22	0.02	0.38	0.31	0.23	0.11
Control Delay		10.8		3.0	26.5	28.6	32.0	28.5	6.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		10.8		3.0	26.5	28.6	32.0	28.5	6.0
LOS		B		A	C	C	C	C	A
Approach Delay		10.8		3.0		28.6		26.1	
Approach LOS		B		A		C		C	

Intersection Summary			
Cycle Length: 95.1			
Actuated Cycle Length: 95.1			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 19.5		Intersection LOS: B	
Intersection Capacity Utilization 87.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



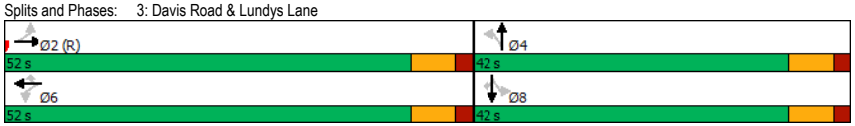
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	31	7	24	17	166	4	267	30	82	172	44
Future Volume (vph)	110	31	7	24	17	166	4	267	30	82	172	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.99			0.89		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1667			1629		1388	3113		1787	2983	1392
Flt Permitted		0.66			0.96		0.64	1.00		0.56	1.00	1.00
Satd. Flow (perm)		1138			1569		932	3113		1054	2983	1392
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	33	7	25	18	175	4	281	32	86	181	46
RTOR Reduction (vph)	0	1	0	0	74	0	0	13	0	0	0	34
Lane Group Flow (vph)	0	155	0	0	144	0	4	300	0	86	181	12
Heavy Vehicles (%)	10%	7%	7%	7%	12%	2%	30%	15%	7%	1%	21%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		55.0			55.0		25.0	25.0		25.0	25.0	25.0
Effective Green, g (s)		55.0			55.0		25.0	25.0		25.0	25.0	25.0
Actuated g/C Ratio		0.58			0.58		0.26	0.26		0.26	0.26	0.26
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		658			907		245	818		277	784	365
v/s Ratio Prot								c0.10			0.06	
v/s Ratio Perm		c0.14			0.09		0.00			0.08		0.01
v/c Ratio		0.24			0.16		0.02	0.37		0.31	0.23	0.03
Uniform Delay, d1		9.8			9.3		25.9	28.6		28.1	27.5	26.1
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.8			0.4		0.1	0.6		1.3	0.3	0.1
Delay (s)		10.6			9.7		26.0	29.2		29.5	27.8	26.1
Level of Service		B			A		C	C		C	C	C
Approach Delay (s)		10.6			9.7			29.1			28.0	
Approach LOS		B			A			C			C	

Intersection Summary					
HCM 2000 Control Delay		21.7	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.28			
Actuated Cycle Length (s)		95.1	Sum of lost time (s)		15.1
Intersection Capacity Utilization		87.6%	ICU Level of Service		E
Analysis Period (min)		15			
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	118	433	29	305	47	22	137	58	89	74
Future Volume (vph)	118	433	29	305	47	22	137	58	89	74
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		2		6			4		8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	2	2	6	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0	22.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	52.0	52.0	52.0	52.0	52.0	42.0	42.0	42.0	42.0	42.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	63.5	63.5	63.5	63.5	63.5	16.5	16.5	16.5	16.5	16.5
Actuated g/C Ratio	0.68	0.68	0.68	0.68	0.68	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.19	0.39	0.06	0.28	0.05	0.12	0.61	0.36	0.35	0.26
Control Delay	7.0	8.2	6.3	7.2	2.0	33.2	43.2	39.6	37.4	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	8.2	6.3	7.2	2.0	33.2	43.2	39.6	37.4	9.8
LOS	A	A	A	A	A	C	D	D	D	A
Approach Delay		7.9		6.5			42.0		28.7	
Approach LOS		A		A			D		C	

Intersection Summary		
Cycle Length: 94		
Actuated Cycle Length: 94		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.61		
Intersection Signal Delay: 15.5	Intersection LOS: B	
Intersection Capacity Utilization 90.8%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	433	18	29	305	47	22	137	21	58	89	74
Future Volume (vph)	118	433	18	29	305	47	22	137	21	58	89	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1656	1821		1466	1743	1442	1444	1535		1530	1532	1392
Flt Permitted	0.56	1.00		0.46	1.00	1.00	0.70	1.00		0.61	1.00	1.00
Satd. Flow (perm)	984	1821		706	1743	1442	1057	1535		986	1532	1392
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)	126	461	19	31	324	50	23	146	22	62	95	79
RTOR Reduction (vph)	0	1	0	0	0	16	0	7	0	0	0	65
Lane Group Flow (vph)	126	479	0	31	324	34	23	161	0	62	95	14
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	3%	19%	23%	9%	12%	25%	20%	30%	18%	24%	16%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	63.5	63.5		63.5	63.5	63.5	16.5	16.5		16.5	16.5	16.5
Effective Green, g (s)	63.5	63.5		63.5	63.5	63.5	16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.68	0.68		0.68	0.68	0.68	0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	664	1230		476	1177	974	185	269		173	268	244
v/s Ratio Prot		c0.26			0.19			c0.10			0.06	
v/s Ratio Perm	0.13			0.04		0.02	0.02			0.06		0.01
v/c Ratio	0.19	0.39		0.07	0.28	0.03	0.12	0.60		0.36	0.35	0.06
Uniform Delay, d1	5.7	6.7		5.2	6.1	5.1	32.7	35.7		34.1	34.1	32.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	0.9		0.3	0.6	0.1	0.1	2.4		0.5	0.3	0.0
Delay (s)	6.3	7.6		5.4	6.7	5.1	32.8	38.1		34.6	34.4	32.3
Level of Service	A	A		A	A	A	C	D		C	C	C
Approach Delay (s)		7.4			6.4			37.4			33.7	
Approach LOS		A			A			D			C	

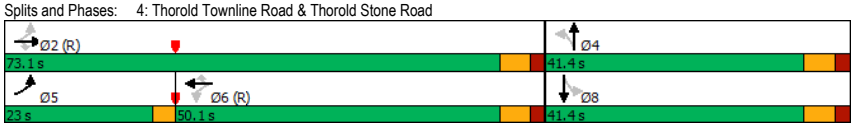
Intersection Summary					
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.43				
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	14.0		
Intersection Capacity Utilization	90.8%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	323	659	34	20	807	73	64	112	52	81
Future Volume (vph)	323	659	34	20	807	73	64	112	52	81
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases	5	2			6			4		8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	6	6	6	4	4	8	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	35.1	35.1	35.1	35.1	35.1	41.4	41.4	41.4	41.4
Total Split (s)	23.0	73.1	73.1	50.1	50.1	50.1	41.4	41.4	41.4	41.4
Total Split (%)	20.1%	63.8%	63.8%	43.8%	43.8%	43.8%	36.2%	36.2%	36.2%	36.2%
Yellow Time (s)	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	6.1	6.1	6.1	6.4	6.4	6.4	6.4
Lead/Lag	Lead			Lag	Lag	Lag				
Lead-Lag Optimize?	Yes			Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	84.6	81.5	81.5	63.2	63.2	63.2	20.5	20.5	20.5	20.5
Actuated g/C Ratio	0.74	0.71	0.71	0.55	0.55	0.55	0.18	0.18	0.18	0.18
v/c Ratio	0.68	0.28	0.04	0.06	0.43	0.09	1.03	0.48	0.29	0.84
Control Delay	13.5	7.2	2.6	18.8	18.7	5.1	165.7	42.7	41.2	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	7.2	2.6	18.8	18.7	5.1	165.7	42.7	41.2	47.5
LOS	B	A	A	B	B	A	F	D	D	D
Approach Delay		9.0			17.6			82.1		46.6
Approach LOS		A			B			F		D

Intersection Summary			
Cycle Length: 114.5			
Actuated Cycle Length: 114.5			
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: 1.03			
Intersection Signal Delay: 23.3		Intersection LOS: C	
Intersection Capacity Utilization 86.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	659	34	20	807	73	64	112	24	52	81	205
Future Volume (vph)	323	659	34	20	807	73	64	112	24	52	81	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	6.1	6.1	6.1	6.4	6.4		6.4	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1640	3471	1369	1444	3505	1454	1492	1596		1641	1446	
Flt Permitted	0.27	1.00	1.00	0.39	1.00	1.00	0.23	1.00		0.61	1.00	
Satd. Flow (perm)	460	3471	1369	594	3505	1454	365	1596		1058	1446	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	336	686	35	21	841	76	67	117	25	54	84	214
RTOR Reduction (vph)	0	0	10	0	0	34	0	8	0	0	94	0
Lane Group Flow (vph)	336	686	25	21	841	42	67	134	0	54	204	0
Confl. Peds. (#/hr)	4					4						
Heavy Vehicles (%)	10%	4%	18%	25%	3%	8%	21%	14%	25%	10%	18%	17%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	81.5	81.5	81.5	63.3	63.3	63.3	20.5	20.5		20.5	20.5	
Effective Green, g (s)	81.5	81.5	81.5	63.3	63.3	63.3	20.5	20.5		20.5	20.5	
Actuated g/C Ratio	0.71	0.71	0.71	0.55	0.55	0.55	0.18	0.18		0.18	0.18	
Clearance Time (s)	3.0	6.1	6.1	6.1	6.1	6.1	6.4	6.4		6.4	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	6.0	6.0	6.0	2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	484	2470	974	328	1937	803	65	285		189	258	
v/s Ratio Prot	c0.09	0.20			0.24			0.08			0.14	
v/s Ratio Perm	c0.40		0.02	0.04		0.03	c0.18			0.05		
v/c Ratio	0.69	0.28	0.03	0.06	0.43	0.05	1.03	0.47		0.29	0.79	
Uniform Delay, d1	7.9	5.9	4.8	11.9	15.1	11.8	47.0	42.1		40.7	44.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	0.3	0.0	0.4	0.7	0.1	120.5	0.7		0.5	14.0	
Delay (s)	11.9	6.2	4.9	12.2	15.8	11.9	167.5	42.8		41.2	59.0	
Level of Service	B	A	A	B	B	B	F	D		D	E	
Approach Delay (s)		8.0			15.4			82.8			56.2	
Approach LOS		A			B			F			E	

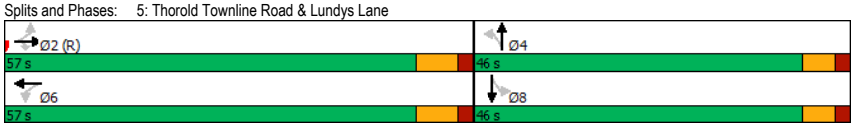
Intersection Summary					
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.78				
Actuated Cycle Length (s)	114.5	Sum of lost time (s)	15.5		
Intersection Capacity Utilization	86.3%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	62	380	86	38	304	66	141	13	86
Future Volume (vph)	62	380	86	38	304	66	141	13	86
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		4		8	
Detector Phase	2	2	2	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0
Total Split (s)	57.0	57.0	57.0	57.0	57.0	46.0	46.0	46.0	46.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None
Act Effct Green (s)	71.3	71.3	71.3	71.3	71.3	18.7	18.7	18.7	18.7
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.18	0.18	0.18	0.18
v/c Ratio	0.10	0.33	0.09	0.06	0.27	0.34	0.63	0.09	0.41
Control Delay	6.9	7.9	3.5	6.7	7.4	39.5	44.5	33.4	34.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	7.9	3.5	6.7	7.4	39.5	44.5	33.4	34.7
LOS	A	A	A	A	A	D	D	C	C
Approach Delay		7.1			7.3		43.2		34.6
Approach LOS		A			A		D		C

Intersection Summary		
Cycle Length: 103		
Actuated Cycle Length: 103		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 65		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.63		
Intersection Signal Delay: 17.0	Intersection LOS: B	
Intersection Capacity Utilization 64.1%	ICU Level of Service C	
Analysis Period (min) 15		

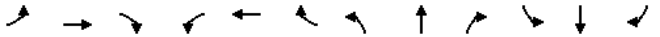
Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	380	86	38	304	9	66	141	37	13	86	26
Future Volume (vph)	62	380	86	38	304	9	66	141	37	13	86	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1581	1810	1495	1752	1786		1612	1608		1671	1540	
Flt Permitted	0.56	1.00	1.00	0.51	1.00		0.68	1.00		0.50	1.00	
Satd. Flow (perm)	924	1810	1495	932	1786		1152	1608		877	1540	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	67	409	92	41	327	10	71	152	40	14	92	28
RTOR Reduction (vph)	0	0	16	0	1	0	0	12	0	0	14	0
Lane Group Flow (vph)	67	409	76	41	336	0	71	180	0	14	106	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	14%	5%	8%	3%	6%	0%	12%	17%	5%	8%	16%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	71.3	71.3	71.3	71.3	71.3		18.7	18.7		18.7	18.7	
Effective Green, g (s)	71.3	71.3	71.3	71.3	71.3		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.18	0.18		0.18	0.18	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	639	1252	1034	645	1236		209	291		159	279	
v/s Ratio Prot		c0.23			0.19			c0.11			0.07	
v/s Ratio Perm	0.07		0.05	0.04			0.06			0.02		
v/c Ratio	0.10	0.33	0.07	0.06	0.27		0.34	0.62		0.09	0.38	
Uniform Delay, d1	5.3	6.3	5.1	5.1	6.0		36.8	38.9		35.1	37.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.7	0.1	0.2	0.5		2.0	5.5		0.5	1.8	
Delay (s)	5.6	7.0	5.3	5.3	6.6		38.8	44.4		35.6	38.9	
Level of Service	A	A	A	A	A		D	D		D	D	
Approach Delay (s)		6.6			6.4			42.9			38.5	
Approach LOS		A			A			D			D	

Intersection Summary				
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.39			
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	115	16	8	167	22	24	175	5	11	104	17
Future Volume (vph)	14	115	16	8	167	22	24	175	5	11	104	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	125	17	9	182	24	26	190	5	12	113	18

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	157	215	221	143
Volume Left (vph)	15	9	26	12
Volume Right (vph)	17	24	5	18
Hadj (s)	0.01	-0.04	0.27	0.26
Departure Headway (s)	5.3	5.1	5.4	5.5
Degree Utilization, x	0.23	0.31	0.33	0.22
Capacity (veh/h)	625	650	623	597
Control Delay (s)	9.8	10.4	11.1	10.1
Approach Delay (s)	9.8	10.4	11.1	10.1
Approach LOS	A	B	B	B

Intersection Summary				
Delay			10.4	
Level of Service			B	
Intersection Capacity Utilization			35.3%	ICU Level of Service
Analysis Period (min)			15	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	0	211	1	0	124
Future Volume (Veh/h)	1	0	211	1	0	124
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1	0	227	1	0	133
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	360	228			228	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360	228			228	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	642	817			1352	

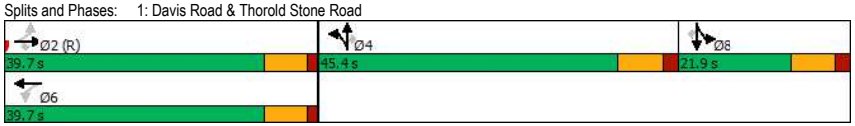
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	228	133
Volume Left	1	0	0
Volume Right	0	1	0
cSH	642	1700	1352
Volume to Capacity	0.00	0.13	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	10.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.6	0.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay			0.0	
Intersection Capacity Utilization			21.2%	ICU Level of Service
Analysis Period (min)			15	A

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	24	1209	427	78	1108	412	5	86	4	6	28
Future Volume (vph)	24	1209	427	78	1108	412	5	86	4	6	28
Turn Type	Perm	NA	Perm	Perm	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	28.9	28.9	29.7	29.7	29.7	21.7	21.7	21.7
Total Split (s)	39.7	39.7	39.7	39.7	39.7	45.4	45.4	45.4	21.9	21.9	21.9
Total Split (%)	37.1%	37.1%	37.1%	37.1%	37.1%	42.4%	42.4%	42.4%	20.5%	20.5%	20.5%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	60.3	60.3	60.3	60.3	60.3	21.5	21.5	21.5	10.0	10.0	10.0
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56	0.20	0.20	0.20	0.09	0.09	0.09
v/c Ratio	0.18	0.64	0.46	0.63	0.59	0.66	0.65	0.23	0.02	0.04	0.12
Control Delay	22.1	21.0	9.9	48.7	19.8	48.0	47.6	4.3	44.5	44.8	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	21.0	9.9	48.7	19.8	48.0	47.6	4.3	44.5	44.8	0.9
LOS	C	C	A	D	B	D	D	A	D	D	A
Approach Delay		18.2			21.7		40.3			12.2	
Approach LOS		B			C		D			B	

Intersection Summary			
Cycle Length: 107			
Actuated Cycle Length: 107			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 22.6		Intersection LOS: C	
Intersection Capacity Utilization 86.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1209	427	78	1108	1	412	5	86	4	6	28
Future Volume (vph)	24	1209	427	78	1108	1	412	5	86	4	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1433	3539	1568	1671	3539		1681	1677	1482	1805	1810	1531
Flt Permitted	0.16	1.00	1.00	0.13	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	245	3539	1568	232	3539		1681	1677	1482	1805	1810	1531
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	1273	449	82	1166	1	434	5	91	4	6	29
RTOR Reduction (vph)	0	0	110	0	0	0	0	0	73	0	0	27
Lane Group Flow (vph)	25	1273	339	82	1167	0	221	218	18	4	6	2
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	26%	2%	3%	8%	2%	0%	2%	30%	9%	0%	5%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	57.2	57.2	57.2	57.2	57.2		21.5	21.5	21.5	6.0	6.0	6.0
Effective Green, g (s)	57.2	57.2	57.2	57.2	57.2		21.5	21.5	21.5	6.0	6.0	6.0
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53		0.20	0.20	0.20	0.06	0.06	0.06
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	130	1891	838	124	1891		337	336	297	101	101	85
v/s Ratio Prot		c0.36			0.33		c0.13	0.13		0.00	c0.00	
v/s Ratio Perm	0.10		0.22	0.35					0.01			0.00
v/c Ratio	0.19	0.67	0.40	0.66	0.62		0.66	0.65	0.06	0.04	0.06	0.02
Uniform Delay, d1	12.9	18.1	14.8	17.9	17.3		39.3	39.3	34.6	47.8	47.8	47.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	1.9	1.5	24.4	1.5		5.5	5.2	0.2	0.3	0.4	0.2
Delay (s)	16.2	20.0	16.2	42.4	18.8		44.8	44.5	34.7	48.1	48.3	47.9
Level of Service	B	C	B	D	B		D	D	C	D	D	D
Approach Delay (s)		19.0			20.4			43.0			48.0	
Approach LOS		B			C			D			D	

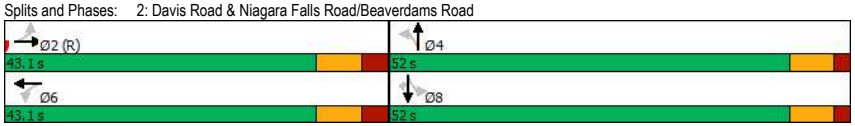
Intersection Summary					
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.62				
Actuated Cycle Length (s)	107.0	Sum of lost time (s)		22.3	
Intersection Capacity Utilization	86.2%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	90	32	42	44	5	275	170	244	105
Future Volume (vph)	90	32	42	44	5	275	170	244	105
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	43.1	43.1	43.1	43.1	52.0	52.0	52.0	52.0	52.0
Total Split (%)	45.3%	45.3%	45.3%	45.3%	54.7%	54.7%	54.7%	54.7%	54.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		51.9		51.9	28.1	28.1	28.1	28.1	28.1
Actuated g/C Ratio		0.55		0.55	0.30	0.30	0.30	0.30	0.30
v/c Ratio		0.20		0.27	0.02	0.33	0.58	0.26	0.20
Control Delay		13.1		8.2	20.8	24.9	36.1	25.5	5.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		13.1		8.2	20.8	24.9	36.1	25.5	5.1
LOS		B		A	C	C	D	C	A
Approach Delay		13.1		8.2		24.8		24.8	
Approach LOS		B		A		C		C	

Intersection Summary			
Cycle Length: 95.1			
Actuated Cycle Length: 95.1			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 20.3		Intersection LOS: C	
Intersection Capacity Utilization 81.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	32	4	42	44	147	5	275	31	170	244	105
Future Volume (vph)	90	32	4	42	44	147	5	275	31	170	244	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		1.00			0.91		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1777			1692		1805	3301		1770	3343	1583
Flt Permitted		0.66			0.93		0.59	1.00		0.56	1.00	1.00
Satd. Flow (perm)		1221			1582		1126	3301		1037	3343	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	34	4	44	46	155	5	289	33	179	257	111
RTOR Reduction (vph)	0	1	0	0	47	0	0	12	0	0	0	78
Lane Group Flow (vph)	0	132	0	0	198	0	5	310	0	179	257	33
Heavy Vehicles (%)	2%	2%	30%	2%	1%	2%	0%	8%	5%	2%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		51.9			51.9		28.1	28.1		28.1	28.1	28.1
Effective Green, g (s)		51.9			51.9		28.1	28.1		28.1	28.1	28.1
Actuated g/C Ratio		0.55			0.55		0.30	0.30		0.30	0.30	0.30
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		666			863		332	975		306	987	467
v/s Ratio Prot								0.09			0.08	
v/s Ratio Perm		0.11			c0.13		0.00			c0.17		0.02
v/c Ratio		0.20			0.23		0.02	0.32		0.58	0.26	0.07
Uniform Delay, d1		11.0			11.2		23.7	26.0		28.5	25.6	24.1
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.7			0.6		0.0	0.4		4.4	0.3	0.1
Delay (s)		11.7			11.8		23.7	26.4		32.9	25.9	24.2
Level of Service		B			B		C	C		C	C	C
Approach Delay (s)		11.7			11.8			26.4			27.8	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.35				
Actuated Cycle Length (s)	95.1	Sum of lost time (s)	15.1		
Intersection Capacity Utilization	81.2%	ICU Level of Service	D		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	105	464	24	452	59	46	134	74	122	113
Future Volume (vph)	105	464	24	452	59	46	134	74	122	113
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		2		6			4		8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	2	2	6	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0	22.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	52.0	52.0	52.0	52.0	52.0	42.0	42.0	42.0	42.0	42.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	45.0	45.0	45.0	45.0	45.0	35.0	35.0	35.0	35.0	35.0
Actuated g/C Ratio	0.48	0.48	0.48	0.48	0.48	0.37	0.37	0.37	0.37	0.37
v/c Ratio	0.36	0.61	0.10	0.55	0.09	0.11	0.28	0.19	0.20	0.19
Control Delay	19.6	21.7	14.8	20.2	4.0	20.2	20.4	21.4	21.1	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	21.7	14.8	20.2	4.0	20.2	20.4	21.4	21.1	4.6
LOS	B	C	B	C	A	C	C	C	C	A
Approach Delay		21.3		18.1			20.4		15.1	
Approach LOS		C		B			C		B	

Intersection Summary		
Cycle Length: 94		
Actuated Cycle Length: 94		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.61		
Intersection Signal Delay: 19.0	Intersection LOS: B	
Intersection Capacity Utilization 101.1%	ICU Level of Service G	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	464	28	24	452	59	46	134	30	74	122	113
Future Volume (vph)	105	464	28	24	452	59	46	134	30	74	122	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1717	1804		1611	1863	1474	1736	1680		1700	1743	1553
Flt Permitted	0.37	1.00		0.33	1.00	1.00	0.67	1.00		0.65	1.00	1.00
Satd. Flow (perm)	662	1804		557	1863	1474	1230	1680		1156	1743	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	499	30	26	486	63	49	144	32	80	131	122
RTOR Reduction (vph)	0	2	0	0	0	33	0	9	0	0	0	77
Lane Group Flow (vph)	113	527	0	26	486	30	49	167	0	80	131	45
Confl. Peds. (#/hr)	2		1	1		2			1	1		
Heavy Vehicles (%)	5%	3%	26%	12%	2%	7%	4%	9%	12%	6%	9%	4%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	45.0	45.0		45.0	45.0	45.0	35.0	35.0		35.0	35.0	35.0
Effective Green, g (s)	45.0	45.0		45.0	45.0	45.0	35.0	35.0		35.0	35.0	35.0
Actuated g/C Ratio	0.48	0.48		0.48	0.48	0.48	0.37	0.37		0.37	0.37	0.37
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	316	863		266	891	705	457	625		430	648	578
v/s Ratio Prot		c0.29			0.26			c0.10			0.08	
v/s Ratio Perm	0.17			0.05		0.02	0.04			0.07		0.03
v/c Ratio	0.36	0.61		0.10	0.55	0.04	0.11	0.27		0.19	0.20	0.08
Uniform Delay, d1	15.4	18.0		13.4	17.3	13.0	19.3	20.6		19.9	20.0	19.1
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	3.1	3.2		0.7	2.4	0.1	0.5	1.0		1.0	0.7	0.3
Delay (s)	18.5	21.3		14.1	19.7	13.2	19.8	21.6		20.8	20.7	19.3
Level of Service	B	C		B	B	B	B	C		C	C	B
Approach Delay (s)		20.8			18.7			21.2			20.2	
Approach LOS		C			B			C			C	

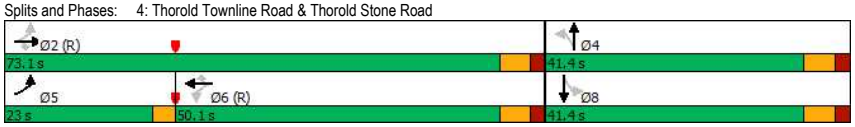
Intersection Summary					
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.46				
Actuated Cycle Length (s)	94.0	Sum of lost time (s)		14.0	
Intersection Capacity Utilization	101.1%	ICU Level of Service		G	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	231	1036	32	30	821	35	69	83	48	138
Future Volume (vph)	231	1036	32	30	821	35	69	83	48	138
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases	5	2			6			4		8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	6	6	6	4	4	8	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	35.1	35.1	35.1	35.1	35.1	41.4	41.4	41.4	41.4
Total Split (s)	23.0	73.1	73.1	50.1	50.1	50.1	41.4	41.4	41.4	41.4
Total Split (%)	20.1%	63.8%	63.8%	43.8%	43.8%	43.8%	36.2%	36.2%	36.2%	36.2%
Yellow Time (s)	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	6.1	6.1	6.1	6.4	6.4	6.4	6.4
Lead/Lag	Lead			Lag	Lag	Lag				
Lead-Lag Optimize?	Yes			Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	76.3	73.2	73.2	58.0	58.0	58.0	28.8	28.8	28.8	28.8
Actuated g/C Ratio	0.67	0.64	0.64	0.51	0.51	0.51	0.25	0.25	0.25	0.25
v/c Ratio	0.57	0.47	0.03	0.13	0.48	0.04	1.04	0.26	0.17	0.90
Control Delay	14.1	12.3	3.6	21.1	21.3	2.1	162.2	30.1	32.3	54.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	12.3	3.6	21.1	21.3	2.1	162.2	30.1	32.3	54.1
LOS	B	B	A	C	C	A	F	C	C	D
Approach Delay		12.4			20.5			82.1		51.8
Approach LOS		B			C			F		D

Intersection Summary			
Cycle Length: 114.5			
Actuated Cycle Length: 114.5			
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: 1.04			
Intersection Signal Delay: 25.7		Intersection LOS: C	
Intersection Capacity Utilization 90.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



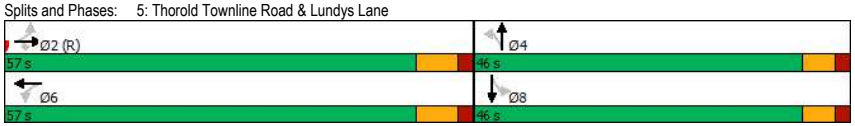
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	1036	32	30	821	35	69	83	24	48	138	272
Future Volume (vph)	231	1036	32	30	821	35	69	83	24	48	138	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	6.1	6.1	6.1	6.4	6.4		6.4	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3574	1568	1671	3539	1538	1736	1652		1671	1635	
Flt Permitted	0.25	1.00	1.00	0.26	1.00	1.00	0.15	1.00		0.69	1.00	
Satd. Flow (perm)	432	3574	1568	466	3539	1538	278	1652		1206	1635	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	241	1079	33	31	855	36	72	86	25	50	144	283
RTOR Reduction (vph)	0	0	12	0	0	18	0	10	0	0	67	0
Lane Group Flow (vph)	241	1079	21	31	855	18	72	101	0	50	360	0
Heavy Vehicles (%)	8%	1%	3%	8%	2%	5%	4%	10%	15%	8%	4%	5%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			4			8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	73.2	73.2	73.2	58.0	58.0	58.0	28.8	28.8		28.8	28.8	
Effective Green, g (s)	73.2	73.2	73.2	58.0	58.0	58.0	28.8	28.8		28.8	28.8	
Actuated g/C Ratio	0.64	0.64	0.64	0.51	0.51	0.51	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.1	6.1	6.1	6.1	6.1	6.4	6.4		6.4	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	6.0	6.0	6.0	2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	408	2284	1002	236	1792	779	69	415		303	411	
v/s Ratio Prot	c0.06	0.30			0.24			0.06			0.22	
v/s Ratio Perm	c0.31		0.01	0.07		0.01	c0.26			0.04		
v/c Ratio	0.59	0.47	0.02	0.13	0.48	0.02	1.04	0.24		0.17	0.88	
Uniform Delay, d1	10.5	10.7	7.6	14.9	18.4	14.1	42.9	34.2		33.5	41.1	
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	1.9	0.7	0.0	1.1	0.9	0.1	120.9	0.2		0.2	18.3	
Delay (s)	12.5	11.4	7.6	16.1	19.3	14.2	163.7	34.3		33.6	59.4	
Level of Service	B	B	A	B	B	B	F	C		C	E	
Approach Delay (s)		11.5			19.0			85.3			56.7	
Approach LOS		B			B			F			E	

Intersection Summary					
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.73				
Actuated Cycle Length (s)	114.5	Sum of lost time (s)		15.5	
Intersection Capacity Utilization	90.1%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	434	96	44	401	100	132	25	118
Future Volume (vph)	37	434	96	44	401	100	132	25	118
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		4		8	
Detector Phase	2	2	2	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0
Total Split (s)	57.0	57.0	57.0	57.0	57.0	46.0	46.0	46.0	46.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None
Act Effct Green (s)	71.9	71.9	71.9	71.9	71.9	18.1	18.1	18.1	18.1
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.18	0.18	0.18	0.18
v/c Ratio	0.07	0.37	0.10	0.08	0.36	0.65	0.62	0.18	0.55
Control Delay	6.6	8.1	3.7	6.6	7.9	56.8	42.4	36.6	40.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	8.1	3.7	6.6	7.9	56.8	42.4	36.6	40.2
LOS	A	A	A	A	A	E	D	D	D
Approach Delay		7.3			7.8		47.5		39.7
Approach LOS		A			A		D		D

Intersection Summary		
Cycle Length: 103		
Actuated Cycle Length: 103		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 65		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.65		
Intersection Signal Delay: 18.9	Intersection LOS: B	
Intersection Capacity Utilization 70.7%	ICU Level of Service C	
Analysis Period (min) 15		

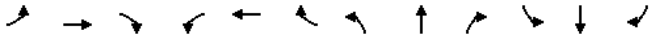
Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	434	96	44	401	21	100	132	50	25	118	38
Future Volume (vph)	37	434	96	44	401	21	100	132	50	25	118	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1624	1827	1553	1752	1835		1687	1746		1736	1715	
Flt Permitted	0.47	1.00	1.00	0.46	1.00		0.54	1.00		0.47	1.00	
Satd. Flow (perm)	804	1827	1553	852	1835		963	1746		861	1715	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	41	477	105	48	441	23	110	145	55	27	130	42
RTOR Reduction (vph)	0	0	16	0	1	0	0	18	0	0	15	0
Lane Group Flow (vph)	41	477	89	48	463	0	110	182	0	27	157	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	11%	4%	4%	3%	2%	15%	7%	6%	0%	4%	7%	6%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	71.9	71.9	71.9	71.9	71.9		18.1	18.1		18.1	18.1	
Effective Green, g (s)	71.9	71.9	71.9	71.9	71.9		18.1	18.1		18.1	18.1	
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70		0.18	0.18		0.18	0.18	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	561	1275	1084	594	1280		169	306		151	301	
v/s Ratio Prot		c0.26			0.25			0.10			0.09	
v/s Ratio Perm	0.05		0.06	0.06			c0.11			0.03		
v/c Ratio	0.07	0.37	0.08	0.08	0.36		0.65	0.59		0.18	0.52	
Uniform Delay, d1	4.9	6.4	5.0	5.0	6.3		39.5	39.1		36.1	38.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8	0.1	0.3	0.8		11.5	4.6		1.2	3.1	
Delay (s)	5.2	7.2	5.1	5.2	7.1		51.0	43.7		37.3	41.6	
Level of Service	A	A	A	A	A		D	D		D	D	
Approach Delay (s)		6.7			6.9			46.3			41.0	
Approach LOS		A			A			D			D	

Intersection Summary				
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	70.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	24	197	16	11	166	21	32	148	7	20	150	35
Future Volume (vph)	24	197	16	11	166	21	32	148	7	20	150	35
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	26	212	17	12	178	23	34	159	8	22	161	38

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	255	213	201	221
Volume Left (vph)	26	12	34	22
Volume Right (vph)	17	23	8	38
Hadj (s)	0.02	-0.04	0.16	0.01
Departure Headway (s)	5.5	5.6	5.8	5.6
Degree Utilization, x	0.39	0.33	0.32	0.34
Capacity (veh/h)	601	592	562	585
Control Delay (s)	12.0	11.2	11.5	11.5
Approach Delay (s)	12.0	11.2	11.5	11.5
Approach LOS	B	B	B	B

Intersection Summary				
Delay			11.6	
Level of Service			B	
Intersection Capacity Utilization			42.3%	ICU Level of Service
Analysis Period (min)			15	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	1	189	1	1	179
Future Volume (Veh/h)	0	1	189	1	1	179
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	1	208	1	1	197
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	408	208			209	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	208			209	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	603	837			1374	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	209	198
Volume Left	0	0	1
Volume Right	1	1	0
cSH	837	1700	1374
Volume to Capacity	0.00	0.12	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	9.3	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	0.0
Approach LOS	A		

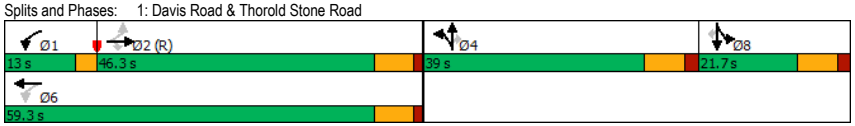
Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		20.2%	ICU Level of Service	A
Analysis Period (min)		15		

Timings <2025 Background> AM Peak Hour
1: Davis Road & Thorold Stone Road 09-14-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	21	929	274	87	1076	542	15	211	1	2	18
Future Volume (vph)	21	929	274	87	1076	542	15	211	1	2	18
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	8.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	12.5	28.9	29.7	29.7	29.7	21.7	21.7	21.7
Total Split (s)	46.3	46.3	46.3	13.0	59.3	39.0	39.0	39.0	21.7	21.7	21.7
Total Split (%)	38.6%	38.6%	38.6%	10.8%	49.4%	32.5%	32.5%	32.5%	18.1%	18.1%	18.1%
Yellow Time (s)	5.4	5.4	5.4	3.0	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	0.0	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	3.0	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag	Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	C-Max	C-Max	C-Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	58.3	58.3	58.3	74.3	70.4	27.9	27.9	27.9	10.0	10.0	10.0
Actuated g/C Ratio	0.49	0.49	0.49	0.62	0.59	0.23	0.23	0.23	0.08	0.08	0.08
v/c Ratio	0.12	0.59	0.36	0.33	0.57	0.80	0.81	0.43	0.01	0.01	0.08
Control Delay	26.1	27.0	10.6	27.4	32.6	59.5	61.1	7.3	51.0	51.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	27.0	10.6	27.4	32.6	59.5	61.1	7.3	51.0	51.0	0.7
LOS	C	C	B	C	C	E	E	A	D	D	A
Approach Delay		23.3			32.2		45.7			7.5	
Approach LOS		C			C		D			A	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 31.9		Intersection LOS: C	
Intersection Capacity Utilization 86.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



HCM Signalized Intersection Capacity Analysis <2025 Background> AM Peak Hour
1: Davis Road & Thorold Stone Road 09-14-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	929	274	87	1076	6	542	15	211	1	2	18
Future Volume (vph)	21	929	274	87	1076	6	542	15	211	1	2	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1640	3406	1442	1530	3398		1559	1553	1475	1388	1624	1337
Flt Permitted	0.22	1.00	1.00	0.18	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	374	3406	1442	289	3398		1559	1553	1475	1388	1624	1337
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	968	285	91	1121	6	565	16	220	1	2	19
RTOR Reduction (vph)	0	0	100	0	0	0	0	0	169	0	0	18
Lane Group Flow (vph)	22	968	185	91	1127	0	288	293	51	1	2	1
Confl. Peds. (#/hr)	1					1	1		1	1		1
Heavy Vehicles (%)	10%	6%	12%	18%	6%	30%	10%	28%	8%	30%	17%	19%
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	53.7	53.7	53.7	65.8	65.8		27.9	27.9	27.9	4.0	4.0	4.0
Effective Green, g (s)	53.7	53.7	53.7	65.8	65.8		27.9	27.9	27.9	4.0	4.0	4.0
Actuated g/C Ratio	0.45	0.45	0.45	0.55	0.55		0.23	0.23	0.23	0.03	0.03	0.03
Clearance Time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	167	1524	645	252	1863		362	361	342	46	54	44
v/s Ratio Prot		c0.28		0.03	c0.33		0.18	c0.19		0.00	c0.00	
v/s Ratio Perm	0.06		0.13	0.17					0.03			0.00
v/c Ratio	0.13	0.64	0.29	0.36	0.60		0.80	0.81	0.15	0.02	0.04	0.01
Uniform Delay, d1	19.5	25.6	21.0	15.6	18.3		43.4	43.6	36.6	56.1	56.1	56.1
Progression Factor	1.00	1.00	1.00	1.99	1.76		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	2.0	1.1	0.5	1.2		12.7	14.2	0.4	0.3	0.5	0.2
Delay (s)	21.1	27.6	22.1	31.5	33.5		56.1	57.8	37.0	56.4	56.6	56.3
Level of Service	C	C	C	C	C		E	E	D	E	E	E
Approach Delay (s)		26.3			33.3			51.4			56.4	
Approach LOS		C			C			D			E	

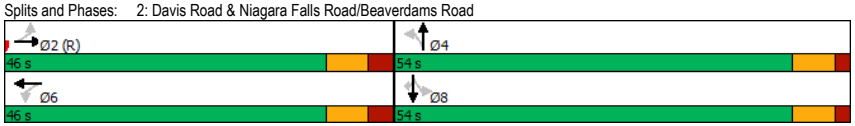
Intersection Summary					
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	25.3		
Intersection Capacity Utilization	86.6%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	110	31	34	17	16	473	82	240	44
Future Volume (vph)	110	31	34	17	16	473	82	240	44
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	46.0	46.0	46.0	46.0	54.0	54.0	54.0	54.0	54.0
Total Split (%)	46.0%	46.0%	46.0%	46.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		57.5		57.5	27.4	27.4	27.4	27.4	27.4
Actuated g/C Ratio		0.58		0.58	0.27	0.27	0.27	0.27	0.27
v/c Ratio		0.25		0.24	0.07	0.65	0.51	0.31	0.11
Control Delay		12.2		3.9	25.9	34.4	41.6	29.3	5.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		12.2		3.9	25.9	34.4	41.6	29.3	5.8
LOS		B		A	C	C	D	C	A
Approach Delay		12.2		3.9		34.1		29.2	
Approach LOS		B		A		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 25.0		Intersection LOS: C	
Intersection Capacity Utilization 88.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



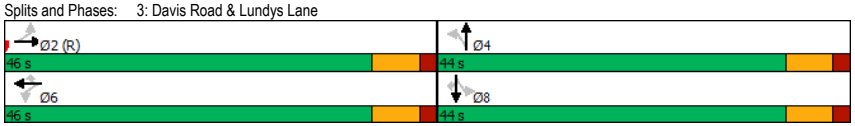
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	31	12	34	17	166	16	473	59	82	240	44
Future Volume (vph)	110	31	12	34	17	166	16	473	59	82	240	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.99			0.90		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1662			1632		1388	3111		1787	2983	1392
Flt Permitted		0.66			0.94		0.60	1.00		0.33	1.00	1.00
Satd. Flow (perm)		1136			1538		870	3111		613	2983	1392
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	33	13	36	18	175	17	498	62	86	253	46
RTOR Reduction (vph)	0	2	0	0	74	0	0	13	0	0	0	33
Lane Group Flow (vph)	0	160	0	0	155	0	17	547	0	86	253	13
Heavy Vehicles (%)	10%	7%	7%	7%	12%	2%	30%	15%	7%	1%	21%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		57.5			57.5		27.4	27.4		27.4	27.4	27.4
Effective Green, g (s)		57.5			57.5		27.4	27.4		27.4	27.4	27.4
Actuated g/C Ratio		0.58			0.58		0.27	0.27		0.27	0.27	0.27
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		653			884		238	852		167	817	381
v/s Ratio Prot								c0.18			0.08	
v/s Ratio Perm		c0.14			0.10		0.02			0.14		0.01
v/c Ratio		0.24			0.17		0.07	0.64		0.51	0.31	0.03
Uniform Delay, d1		10.5			10.0		26.9	32.0		30.7	28.8	26.6
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.9			0.4		0.3	2.3		5.3	0.5	0.1
Delay (s)		11.4			10.5		27.1	34.2		35.9	29.3	26.7
Level of Service		B			B		C	C		D	C	C
Approach Delay (s)		11.4			10.5			34.0			30.4	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.37				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.1		
Intersection Capacity Utilization	88.3%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	140	518	36	395	233	22	139	181	94	143
Future Volume (vph)	140	518	36	395	233	22	139	181	94	143
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		2		6			4		8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	2	2	6	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0	22.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	44.0	44.0	44.0	44.0	44.0
Total Split (%)	51.1%	51.1%	51.1%	51.1%	51.1%	48.9%	48.9%	48.9%	48.9%	48.9%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	53.8	53.8	53.8	53.8	53.8	22.2	22.2	22.2	22.2	22.2
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.25	0.25	0.25	0.25	0.25
v/c Ratio	0.30	0.52	0.11	0.40	0.26	0.09	0.45	0.76	0.27	0.33
Control Delay	12.8	14.2	11.3	12.5	2.4	23.5	29.0	49.5	27.1	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.8	14.2	11.3	12.5	2.4	23.5	29.0	49.5	27.1	5.9
LOS	B	B	B	B	A	C	C	D	C	A
Approach Delay		13.9		8.9			28.4		29.6	
Approach LOS		B		A			C		C	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.76		
Intersection Signal Delay: 16.9	Intersection LOS: B	
Intersection Capacity Utilization 95.0%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	518	18	36	395	233	22	139	24	181	94	143
Future Volume (vph)	140	518	18	36	395	233	22	139	24	181	94	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1656	1825		1467	1743	1442	1444	1529		1530	1532	1392
Flt Permitted	0.48	1.00		0.37	1.00	1.00	0.69	1.00		0.64	1.00	1.00
Satd. Flow (perm)	834	1825		569	1743	1442	1052	1529		1030	1532	1392
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)	149	551	19	38	420	248	23	148	26	193	100	152
RTOR Reduction (vph)	0	1	0	0	0	100	0	9	0	0	0	115
Lane Group Flow (vph)	149	569	0	38	420	148	23	165	0	193	100	37
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	3%	19%	23%	9%	12%	25%	20%	30%	18%	24%	16%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	53.8	53.8		53.8	53.8	53.8	22.2	22.2		22.2	22.2	22.2
Effective Green, g (s)	53.8	53.8		53.8	53.8	53.8	22.2	22.2		22.2	22.2	22.2
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.25	0.25		0.25	0.25	0.25
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	498	1090		340	1041	861	259	377		254	377	343
v/s Ratio Prot		c0.31			0.24			0.11			0.07	
v/s Ratio Perm	0.18			0.07		0.10	0.02			c0.19		0.03
v/c Ratio	0.30	0.52		0.11	0.40	0.17	0.09	0.44		0.76	0.27	0.11
Uniform Delay, d1	8.9	10.6		7.8	9.6	8.1	26.1	28.6		31.4	27.3	26.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	1.8		0.7	1.2	0.4	0.1	0.3		11.0	0.1	0.1
Delay (s)	10.4	12.4		8.5	10.8	8.5	26.2	28.9		42.4	27.5	26.3
Level of Service	B	B		A	B	A	C	C		D	C	C
Approach Delay (s)		12.0			9.9			28.6			33.6	
Approach LOS		B			A			C			C	

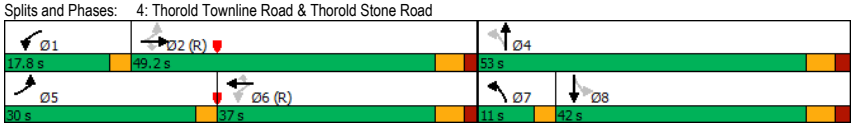
Intersection Summary					
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		14.0	
Intersection Capacity Utilization	95.0%	ICU Level of Service		F	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	323	659	95	110	807	73	82	130	52	141
Future Volume (vph)	323	659	95	110	807	73	82	130	52	141
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6		7	4		8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	8	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0	10.0	8.0	10.0	10.0	10.0
Minimum Split (s)	11.0	35.1	35.1	12.5	35.1	35.1	11.0	41.4	41.4	41.4
Total Split (s)	30.0	49.2	49.2	17.8	37.0	37.0	11.0	53.0	42.0	42.0
Total Split (%)	25.0%	41.0%	41.0%	14.8%	30.8%	30.8%	9.2%	44.2%	35.0%	35.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	72.5	56.6	56.6	58.2	45.1	45.1	41.3	37.9	29.1	29.1
Actuated g/C Ratio	0.60	0.47	0.47	0.48	0.38	0.38	0.34	0.32	0.24	0.24
v/c Ratio	0.79	0.42	0.14	0.32	0.64	0.12	0.44	0.37	0.20	0.89
Control Delay	51.1	37.5	22.0	16.4	37.3	2.5	31.7	28.6	35.6	60.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.1	37.5	22.0	16.4	37.3	2.5	31.7	28.6	35.6	60.2
LOS	D	D	C	B	D	A	C	C	D	E
Approach Delay		40.2			32.4			29.6		57.0
Approach LOS		D			C			C		E

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
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: 0.89		
Intersection Signal Delay: 38.8	Intersection LOS: D	
Intersection Capacity Utilization 85.8%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	659	95	110	807	73	82	130	51	52	141	205
Future Volume (vph)	323	659	95	110	807	73	82	130	51	52	141	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	3471	1369	1444	3505	1453	1492	1554		1641	1474	
Flt Permitted	0.18	1.00	1.00	0.39	1.00	1.00	0.22	1.00		0.64	1.00	
Satd. Flow (perm)	317	3471	1369	594	3505	1453	339	1554		1104	1474	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	336	686	99	115	841	76	85	135	53	54	147	214
RTOR Reduction (vph)	0	0	50	0	0	48	0	13	0	0	47	0
Lane Group Flow (vph)	336	686	49	115	841	28	85	175	0	54	314	0
Confl. Peds. (#/hr)	4					4						
Heavy Vehicles (%)	10%	4%	18%	25%	3%	8%	21%	14%	25%	10%	18%	17%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	69.0	56.0	56.0	54.5	44.5	44.5	38.5	38.5		29.1	29.1	
Effective Green, g (s)	69.0	56.0	56.0	54.5	44.5	44.5	38.5	38.5		29.1	29.1	
Actuated g/C Ratio	0.58	0.47	0.47	0.45	0.37	0.37	0.32	0.32		0.24	0.24	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	2.5	6.0	6.0	2.5	2.3		2.3	2.3	
Lane Grp Cap (vph)	419	1619	638	340	1299	538	170	498		267	357	
v/s Ratio Prot	c0.14	0.20		0.03	0.24		c0.03	0.11			c0.21	
v/s Ratio Perm	c0.32		0.04	0.13		0.02	0.13			0.05		
v/c Ratio	0.80	0.42	0.08	0.34	0.65	0.05	0.50	0.35		0.20	0.88	
Uniform Delay, d1	19.6	21.3	17.7	19.4	31.3	24.2	31.1	31.2		36.2	43.8	
Progression Factor	2.18	1.58	3.81	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.8	0.7	0.2	0.4	2.5	0.2	1.7	0.3		0.2	20.7	
Delay (s)	51.5	34.3	67.6	19.9	33.8	24.4	32.8	31.4		36.4	64.5	
Level of Service	D	C	E	B	C	C	C	C		D	E	
Approach Delay (s)		42.4			31.5			31.9			60.8	
Approach LOS		D			C			C			E	

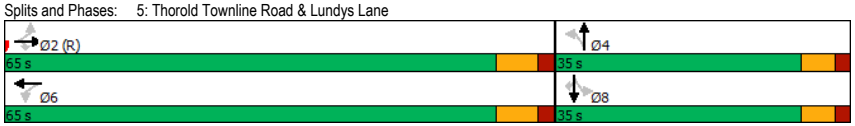
Intersection Summary					
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.83				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
Intersection Capacity Utilization	85.8%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	157	521	98	38	348	71	140	22	85	56
Future Volume (vph)	157	521	98	38	348	71	140	22	85	56
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	65.0	65.0	65.0	65.0	65.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	68.8	68.8	68.8	68.8	68.8	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.29	0.45	0.10	0.08	0.34	0.35	0.63	0.15	0.31	0.22
Control Delay	8.8	9.2	3.6	6.9	7.8	38.8	43.8	34.1	36.6	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	9.2	3.6	6.9	7.8	38.8	43.8	34.1	36.6	10.3
LOS	A	A	A	A	A	D	D	C	D	B
Approach Delay		8.4			7.7		42.4		27.3	
Approach LOS		A			A		D		C	

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 65		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.63		
Intersection Signal Delay: 15.4	Intersection LOS: B	
Intersection Capacity Utilization 79.0%	ICU Level of Service D	
Analysis Period (min) 15		

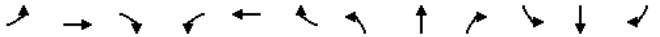
Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	157	521	98	38	348	39	71	140	37	22	85	56
Future Volume (vph)	157	521	98	38	348	39	71	140	37	22	85	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		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)	1581	1810	1495	1752	1771		1612	1607		1671	1638	1252
Flt Permitted	0.50	1.00	1.00	0.41	1.00		0.70	1.00		0.51	1.00	1.00
Satd. Flow (perm)	834	1810	1495	752	1771		1184	1607		893	1638	1252
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	169	560	105	41	374	42	76	151	40	24	91	60
RTOR Reduction (vph)	0	0	17	0	3	0	0	11	0	0	0	49
Lane Group Flow (vph)	169	560	88	41	413	0	76	180	0	24	91	11
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	14%	5%	8%	3%	6%	0%	12%	17%	5%	8%	16%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Effective Green, g (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	573	1245	1028	517	1218		215	292		162	298	227
v/s Ratio Prot		c0.31			0.23			c0.11			0.06	
v/s Ratio Perm	0.20		0.06	0.05			0.06			0.03		0.01
v/c Ratio	0.29	0.45	0.09	0.08	0.34		0.35	0.62		0.15	0.31	0.05
Uniform Delay, d1	6.1	7.0	5.2	5.1	6.3		35.8	37.7		34.4	35.4	33.8
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	1.3	1.2	0.2	0.3	0.8		2.1	5.5		0.9	1.2	0.2
Delay (s)	7.4	8.2	5.3	5.4	7.1		37.8	43.2		35.3	36.6	33.9
Level of Service	A	A	A	A	A		D	D		D	D	C
Approach Delay (s)		7.7			7.0			41.7			35.5	
Approach LOS		A			A			D			D	

Intersection Summary					
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.48				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	79.0%	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												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	139	16	17	175	22	24	245	33	11	318	19
Future Volume (vph)	19	139	16	17	175	22	24	245	33	11	318	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	151	17	18	190	24	26	266	36	12	346	21

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	189	232	328	379
Volume Left (vph)	21	18	26	12
Volume Right (vph)	17	24	36	21
Hadj (s)	0.02	-0.03	0.20	0.31
Departure Headway (s)	6.8	6.7	6.4	6.4
Degree Utilization, x	0.36	0.43	0.58	0.67
Capacity (veh/h)	453	473	525	530
Control Delay (s)	13.6	14.6	18.0	21.6
Approach Delay (s)	13.6	14.6	18.0	21.6
Approach LOS	B	B	C	C

Intersection Summary				
Delay			17.7	
Level of Service			C	
Intersection Capacity Utilization			46.4%	ICU Level of Service
Analysis Period (min)			15	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	323	0	0	256
Future Volume (Veh/h)	0	0	323	0	0	256
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	347	0	0	275
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	622	347			347	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	622	347			347	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	454	701			1223	

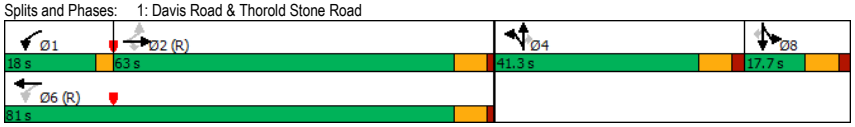
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	347	275
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1223
Volume to Capacity	0.00	0.20	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay			0.0	
Intersection Capacity Utilization			20.3%	ICU Level of Service
Analysis Period (min)			15	A

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	24	1233	586	146	1164	506	5	126	4	6	28
Future Volume (vph)	24	1233	586	146	1164	506	5	126	4	6	28
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	8.0	28.9	29.7	29.7	29.7	17.7	17.7	17.7
Total Split (s)	63.0	63.0	63.0	18.0	81.0	41.3	41.3	41.3	17.7	17.7	17.7
Total Split (%)	45.0%	45.0%	45.0%	12.9%	57.9%	29.5%	29.5%	29.5%	12.6%	12.6%	12.6%
Yellow Time (s)	5.4	5.4	5.4	3.0	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	0.0	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	3.0	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag	Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	71.1	71.1	71.1	89.9	86.0	28.8	28.8	28.8	10.0	10.0	10.0
Actuated g/C Ratio	0.51	0.51	0.51	0.64	0.61	0.21	0.21	0.21	0.07	0.07	0.07
v/c Ratio	0.17	0.72	0.66	0.66	0.56	0.77	0.79	0.32	0.03	0.05	0.13
Control Delay	29.8	33.2	19.9	32.5	19.5	67.3	68.9	8.8	61.2	61.5	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	33.2	19.9	32.5	19.5	67.3	68.9	8.8	61.2	61.5	1.3
LOS	C	C	B	C	B	E	E	A	E	E	A
Approach Delay		28.9			20.9		56.4			16.7	
Approach LOS		C			C		E			B	

Intersection Summary			
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 30.6		Intersection LOS: C	
Intersection Capacity Utilization 87.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1233	586	146	1164	1	506	5	126	4	6	28
Future Volume (vph)	24	1233	586	146	1164	1	506	5	126	4	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1433	3539	1568	1671	3539		1681	1678	1482	1805	1810	1524
Flt Permitted	0.19	1.00	1.00	0.09	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	294	3539	1568	163	3539		1681	1678	1482	1805	1810	1524
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	1298	617	154	1225	1	533	5	133	4	6	29
RTOR Reduction (vph)	0	0	145	0	0	0	0	0	106	0	0	28
Lane Group Flow (vph)	25	1298	472	154	1226	0	266	272	27	4	6	1
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	26%	2%	3%	8%	2%	0%	2%	30%	9%	0%	5%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	68.0	68.0	68.0	82.9	82.9		28.8	28.8	28.8	6.0	6.0	6.0
Effective Green, g (s)	68.0	68.0	68.0	82.9	82.9		28.8	28.8	28.8	6.0	6.0	6.0
Actuated g/C Ratio	0.49	0.49	0.49	0.59	0.59		0.21	0.21	0.21	0.04	0.04	0.04
Clearance Time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	142	1718	761	224	2095		345	345	304	77	77	65
v/s Ratio Prot		c0.37		c0.06	0.35		0.16	c0.16		0.00	c0.00	
v/s Ratio Perm	0.09		0.30	0.35					0.02			0.00
v/c Ratio	0.18	0.76	0.62	0.69	0.59		0.77	0.79	0.09	0.05	0.08	0.02
Uniform Delay, d1	20.2	29.2	26.5	22.6	17.8		52.5	52.7	45.0	64.3	64.3	64.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	3.1	3.8	8.5	1.2		11.4	12.6	0.2	0.5	0.7	0.2
Delay (s)	22.9	32.4	30.3	31.1	19.0		63.8	65.3	45.2	64.8	65.1	64.4
Level of Service	C	C	C	C	B		E	E	D	E	E	E
Approach Delay (s)		31.6			20.4			60.7			64.5	
Approach LOS		C			C			E			E	

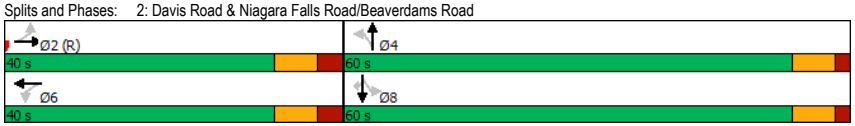
Intersection Summary					
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	140.0	Sum of lost time (s)		25.3	
Intersection Capacity Utilization	87.6%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	90	32	74	44	12	409	170	471	105
Future Volume (vph)	90	32	74	44	12	409	170	471	105
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	40.0	40.0	40.0	40.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		52.5		52.5	32.4	32.4	32.4	32.4	32.4
Actuated g/C Ratio		0.52		0.52	0.32	0.32	0.32	0.32	0.32
v/c Ratio		0.24		0.34	0.05	0.45	0.72	0.46	0.19
Control Delay		15.9		13.5	19.4	25.9	44.6	27.3	4.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.9		13.5	19.4	25.9	44.6	27.3	4.2
LOS		B		B	B	C	D	C	A
Approach Delay		15.9		13.5		25.7		28.0	
Approach LOS		B		B		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 23.9		Intersection LOS: C	
Intersection Capacity Utilization 76.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



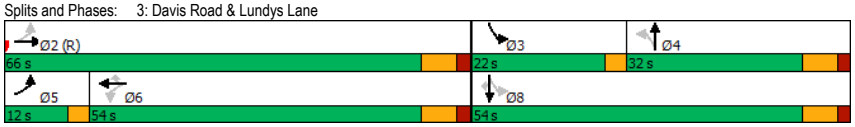
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	32	17	74	44	147	12	409	50	170	471	105
Future Volume (vph)	90	32	17	74	44	147	12	409	50	170	471	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.98			0.93		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1717			1702		1805	3298		1770	3343	1583
Flt Permitted		0.67			0.87		0.41	1.00		0.42	1.00	1.00
Satd. Flow (perm)		1180			1499		771	3298		773	3343	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	34	18	78	46	155	13	431	53	179	496	111
RTOR Reduction (vph)	0	3	0	0	31	0	0	14	0	0	0	75
Lane Group Flow (vph)	0	144	0	0	248	0	13	470	0	179	496	36
Heavy Vehicles (%)	2%	2%	30%	2%	1%	2%	0%	8%	5%	2%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		52.5			52.5		32.4	32.4		32.4	32.4	32.4
Effective Green, g (s)		52.5			52.5		32.4	32.4		32.4	32.4	32.4
Actuated g/C Ratio		0.52			0.52		0.32	0.32		0.32	0.32	0.32
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		619			786		249	1068		250	1083	512
v/s Ratio Prot								0.14			0.15	
v/s Ratio Perm		0.12			c0.17		0.02			c0.23		0.02
v/c Ratio		0.23			0.32		0.05	0.44		0.72	0.46	0.07
Uniform Delay, d1		12.8			13.5		23.2	26.7		29.8	26.8	23.4
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.9			1.0		0.2	0.6		11.5	0.6	0.1
Delay (s)		13.7			14.6		23.4	27.3		41.2	27.5	23.5
Level of Service		B			B		C	C		D	C	C
Approach Delay (s)		13.7			14.6			27.2			30.0	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.47				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		15.1	
Intersection Capacity Utilization	76.1%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	179	565	28	553	241	46	141	300	125	157
Future Volume (vph)	179	565	28	553	241	46	141	300	125	157
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	5	2		6			4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	4	4	3	8	8
Switch Phase										
Minimum Initial (s)	5.0	22.0	22.0	22.0	22.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	8.0	36.0	36.0	36.0	36.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	12.0	66.0	54.0	54.0	54.0	32.0	32.0	22.0	54.0	54.0
Total Split (%)	10.0%	55.0%	45.0%	45.0%	45.0%	26.7%	26.7%	18.3%	45.0%	45.0%
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	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)	3.0	7.0	7.0	7.0	7.0	7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max	Max	Max	Max	Max	Max	None	Max	Max
Act Effct Green (s)	63.0	59.0	47.0	47.0	47.0	26.0	26.0	51.0	47.0	47.0
Actuated g/C Ratio	0.52	0.49	0.39	0.39	0.39	0.22	0.22	0.42	0.39	0.39
v/c Ratio	0.75	0.72	0.16	0.82	0.36	0.18	0.52	0.66	0.20	0.24
Control Delay	35.1	29.4	28.8	45.2	9.1	41.4	45.5	32.0	25.0	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	29.4	28.8	45.2	9.1	41.4	45.5	32.0	25.0	4.3
LOS	D	C	C	D	A	D	D	C	C	A
Approach Delay		30.7		34.1			44.7		23.0	
Approach LOS		C		C			D		C	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 85		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.82		
Intersection Signal Delay: 31.3	Intersection LOS: C	
Intersection Capacity Utilization 108.1%	ICU Level of Service G	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	565	28	28	553	241	46	141	37	300	125	157
Future Volume (vph)	179	565	28	28	553	241	46	141	37	300	125	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1811		1611	1863	1473	1736	1671		1702	1743	1553
Flt Permitted	0.16	1.00		0.29	1.00	1.00	0.67	1.00		0.48	1.00	1.00
Satd. Flow (perm)	286	1811		496	1863	1473	1226	1671		857	1743	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	192	608	30	30	595	259	49	152	40	323	134	169
RTOR Reduction (vph)	0	2	0	0	0	144	0	8	0	0	0	103
Lane Group Flow (vph)	192	636	0	30	595	115	49	184	0	323	134	66
Confl. Peds. (#/hr)	2		1	1		2			1	1		
Heavy Vehicles (%)	5%	3%	26%	12%	2%	7%	4%	9%	12%	6%	9%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	59.0	59.0		47.0	47.0	47.0	26.0	26.0		47.0	47.0	47.0
Effective Green, g (s)	59.0	59.0		47.0	47.0	47.0	26.0	26.0		47.0	47.0	47.0
Actuated g/C Ratio	0.49	0.49		0.39	0.39	0.39	0.22	0.22		0.39	0.39	0.39
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	4.0		4.0	4.0	4.0	2.0	2.0		3.0	2.0	2.0
Lane Grp Cap (vph)	248	890		194	729	576	265	362		462	682	608
v/s Ratio Prot	c0.06	0.35			c0.32			0.11		c0.10	0.08	
v/s Ratio Perm	0.32			0.06		0.08	0.04			c0.17		0.04
v/c Ratio	0.77	0.72		0.15	0.82	0.20	0.18	0.51		0.70	0.20	0.11
Uniform Delay, d1	23.1	23.9		23.6	32.6	24.1	38.4	41.4		27.7	24.1	23.2
Progression Factor	1.00	1.00		1.10	1.08	1.84	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	14.0	4.9		1.5	9.0	0.7	1.5	5.0		4.6	0.6	0.4
Delay (s)	37.1	28.8		27.5	44.4	45.1	39.9	46.4		32.3	24.7	23.6
Level of Service	D	C		C	D	D	D	D		C	C	C
Approach Delay (s)		30.7			44.0			45.1			28.3	
Approach LOS		C			D			D			C	

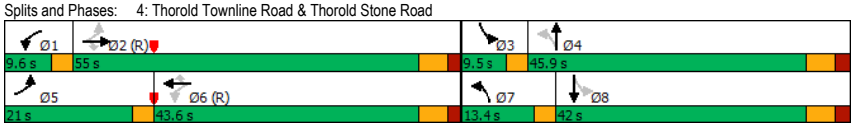
Intersection Summary				
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	108.1%	ICU Level of Service	G	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	231	1036	53	61	821	35	123	135	48	158
Future Volume (vph)	231	1036	53	61	821	35	123	135	48	158
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6		7	4	3	8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	3	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.0	35.1	35.1	8.0	35.1	35.1	8.0	41.4	8.0	41.4
Total Split (s)	21.0	55.0	55.0	9.6	43.6	43.6	13.4	45.9	9.5	42.0
Total Split (%)	17.5%	45.8%	45.8%	8.0%	36.3%	36.3%	11.2%	38.3%	7.9%	35.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	3.0	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	0.0	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	3.0	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	65.9	54.9	54.9	55.1	45.3	45.3	48.1	37.1	41.4	31.7
Actuated g/C Ratio	0.55	0.46	0.46	0.46	0.38	0.38	0.40	0.31	0.34	0.26
v/c Ratio	0.72	0.66	0.07	0.30	0.64	0.05	0.57	0.49	0.13	0.92
Control Delay	29.1	29.4	0.2	18.9	35.2	0.1	32.4	32.1	21.4	60.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	29.4	0.2	18.9	35.2	0.1	32.4	32.1	21.4	60.7
LOS	C	C	A	B	D	A	C	C	C	E
Approach Delay		28.2			32.8			32.2		56.8
Approach LOS		C			C			C		E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.92			
Intersection Signal Delay: 34.5		Intersection LOS: C	
Intersection Capacity Utilization 84.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



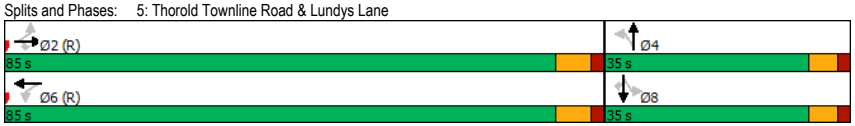
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	1036	53	61	821	35	123	135	104	48	158	272
Future Volume (vph)	231	1036	53	61	821	35	123	135	104	48	158	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3574	1568	1671	3539	1538	1736	1584		1671	1644	
Flt Permitted	0.18	1.00	1.00	0.17	1.00	1.00	0.14	1.00		0.57	1.00	
Satd. Flow (perm)	314	3574	1568	305	3539	1538	251	1584		994	1644	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	241	1079	55	64	855	36	128	141	108	50	165	283
RTOR Reduction (vph)	0	0	30	0	0	23	0	23	0	0	53	0
Lane Group Flow (vph)	241	1079	25	64	855	13	128	226	0	50	395	0
Heavy Vehicles (%)	8%	1%	3%	8%	2%	5%	4%	10%	15%	8%	4%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	62.2	53.7	53.7	50.2	44.7	44.7	45.3	37.1		37.5	32.3	
Effective Green, g (s)	62.2	53.7	53.7	50.2	44.7	44.7	45.3	37.1		37.5	32.3	
Actuated g/C Ratio	0.52	0.45	0.45	0.42	0.37	0.37	0.38	0.31		0.31	0.27	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	3.0	6.0	6.0	3.0	2.3		3.0	2.3	
Lane Grp Cap (vph)	326	1599	701	190	1318	572	218	489		339	442	
v/s Ratio Prot	c0.09	0.30		0.02	0.24		c0.05	0.14		0.01	c0.24	
v/s Ratio Perm	c0.29		0.02	0.13		0.01	0.17			0.04		
v/c Ratio	0.74	0.67	0.04	0.34	0.65	0.02	0.59	0.46		0.15	0.89	
Uniform Delay, d1	19.7	26.2	18.6	22.3	31.2	23.8	28.3	33.4		29.3	42.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.0	2.3	0.1	1.1	2.5	0.1	4.0	0.4		0.2	19.6	
Delay (s)	27.7	28.5	18.7	23.3	33.6	23.9	32.3	33.8		29.5	61.8	
Level of Service	C	C	B	C	C	C	C	C		C	E	
Approach Delay (s)		28.0			32.6			33.3			58.6	
Approach LOS		C			C			C			E	

Intersection Summary					
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
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	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	81	527	103	44	555	113	131	52	118	130
Future Volume (vph)	81	527	103	44	555	113	131	52	118	130
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	86.6	86.6	86.6	86.6	86.6	20.4	20.4	20.4	20.4	20.4
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.72	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.20	0.44	0.10	0.09	0.49	0.67	0.65	0.43	0.43	0.38
Control Delay	8.4	10.9	4.0	6.8	9.4	63.3	51.8	52.5	47.7	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	10.9	4.0	6.8	9.4	63.3	51.8	52.5	47.7	9.2
LOS	A	B	A	A	A	E	D	D	D	A
Approach Delay		9.6			9.3		56.2		31.8	
Approach LOS		A			A		E		C	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 20.0		Intersection LOS: C	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			

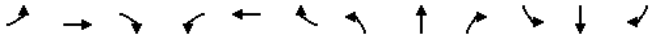
Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	527	103	44	555	32	113	131	50	52	118	130
Future Volume (vph)	81	527	103	44	555	32	113	131	50	52	118	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		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)	1625	1827	1553	1752	1833		1687	1745		1736	1776	1524
Flt Permitted	0.36	1.00	1.00	0.40	1.00		0.62	1.00		0.43	1.00	1.00
Satd. Flow (perm)	621	1827	1553	739	1833		1094	1745		794	1776	1524
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	89	579	113	48	610	35	124	144	55	57	130	143
RTOR Reduction (vph)	0	0	16	0	1	0	0	12	0	0	0	119
Lane Group Flow (vph)	89	579	97	48	644	0	124	187	0	57	130	24
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	11%	4%	4%	3%	2%	15%	7%	6%	0%	4%	7%	6%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	86.6	86.6	86.6	86.6	86.6		20.4	20.4		20.4	20.4	20.4
Effective Green, g (s)	86.6	86.6	86.6	86.6	86.6		20.4	20.4		20.4	20.4	20.4
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.72		0.17	0.17		0.17	0.17	0.17
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	448	1318	1120	533	1322		185	296		134	301	259
v/s Ratio Prot		0.32			c0.35			0.11			0.07	
v/s Ratio Perm	0.14		0.06	0.06			c0.11			0.07		0.02
v/c Ratio	0.20	0.44	0.09	0.09	0.49		0.67	0.63		0.43	0.43	0.09
Uniform Delay, d1	5.4	6.8	5.0	5.0	7.2		46.6	46.3		44.6	44.6	42.0
Progression Factor	1.12	1.30	1.19	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.8	0.1	0.3	1.3		11.8	6.0		4.5	2.1	0.3
Delay (s)	6.8	9.6	6.0	5.3	8.5		58.4	52.3		49.1	46.7	42.3
Level of Service	A	A	A	A	A		E	D		D	D	D
Approach Delay (s)		8.8			8.2			54.6			45.2	
Approach LOS		A			A			D			D	

Intersection Summary					
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.52				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	87.8%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	27	213	16	43	192	21	32	338	26	20	229	41
Future Volume (vph)	27	213	16	43	192	21	32	338	26	20	229	41
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	29	229	17	46	206	23	34	363	28	22	246	44

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	275	275	425	312
Volume Left (vph)	29	46	34	22
Volume Right (vph)	17	23	28	44
Hadj (s)	0.02	0.01	0.13	0.03
Departure Headway (s)	7.5	7.5	7.0	7.3
Degree Utilization, x	0.57	0.57	0.83	0.63
Capacity (veh/h)	426	426	489	450
Control Delay (s)	20.1	20.1	36.0	21.9
Approach Delay (s)	20.1	20.1	36.0	21.9
Approach LOS	C	C	E	C

Intersection Summary				
Delay			25.8	
Level of Service			D	
Intersection Capacity Utilization			56.7%	ICU Level of Service
Analysis Period (min)			15	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	323	0	0	297
Future Volume (Veh/h)	0	0	323	0	0	297
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	355	0	0	326
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	681	355			355	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	681	355			355	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	419	693			1215	

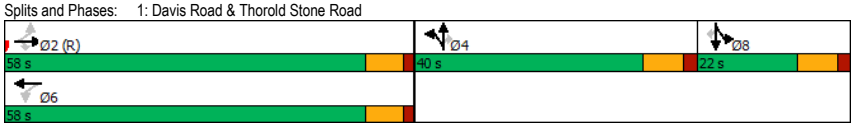
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	355	326
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1215
Volume to Capacity	0.00	0.21	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay			0.0	
Intersection Capacity Utilization			20.3%	ICU Level of Service
Analysis Period (min)			15	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	21	948	274	87	1102	542	15	211	1	2	18
Future Volume (vph)	21	948	274	87	1102	542	15	211	1	2	18
Turn Type	Perm	NA	Perm	Perm	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	28.9	28.9	29.7	29.7	29.7	21.7	21.7	21.7
Total Split (s)	58.0	58.0	58.0	58.0	58.0	40.0	40.0	40.0	22.0	22.0	22.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	48.3%	33.3%	33.3%	33.3%	18.3%	18.3%	18.3%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	70.1	70.1	70.1	70.1	70.1	28.3	28.3	28.3	10.0	10.0	10.0
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.08	0.08	0.08
v/c Ratio	0.13	0.51	0.31	0.44	0.59	0.78	0.80	0.43	0.01	0.01	0.09
Control Delay	19.3	18.3	6.0	33.5	24.8	58.2	59.7	7.2	51.0	51.0	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	18.3	6.0	33.5	24.8	58.2	59.7	7.2	51.0	51.0	0.9
LOS	B	B	A	C	C	E	E	A	D	D	A
Approach Delay		15.6			25.4		44.7			7.7	
Approach LOS		B			C		D			A	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 26.1		Intersection LOS: C	
Intersection Capacity Utilization 87.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	948	274	87	1102	6	542	15	211	1	2	18
Future Volume (vph)	21	948	274	87	1102	6	542	15	211	1	2	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1640	3343	1442	1530	3336		1559	1553	1475	1388	1624	1337
Flt Permitted	0.17	1.00	1.00	0.22	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	289	3343	1442	358	3336		1559	1553	1475	1388	1624	1337
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	988	285	91	1148	6	565	16	220	1	2	19
RTOR Reduction (vph)	0	0	95	0	0	0	0	0	168	0	0	18
Lane Group Flow (vph)	22	988	190	91	1154	0	288	293	52	1	2	1
Confl. Peds. (#/hr)	1					1	1		1	1		1
Heavy Vehicles (%)	10%	8%	12%	18%	8%	30%	10%	28%	8%	30%	17%	19%
Turn Type	Perm	NA	Perm	Perm	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	65.4	65.4	65.4	65.4	65.4		28.3	28.3	28.3	4.0	4.0	4.0
Effective Green, g (s)	65.4	65.4	65.4	65.4	65.4		28.3	28.3	28.3	4.0	4.0	4.0
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55		0.24	0.24	0.24	0.03	0.03	0.03
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	157	1821	785	195	1818		367	366	347	46	54	44
v/s Ratio Prot		0.30			c0.35		0.18	c0.19		0.00	c0.00	
v/s Ratio Perm	0.08		0.13	0.25					0.04			0.00
v/c Ratio	0.14	0.54	0.24	0.47	0.63		0.78	0.80	0.15	0.02	0.04	0.01
Uniform Delay, d1	13.4	17.6	14.3	16.7	19.0		43.0	43.2	36.3	56.1	56.1	56.1
Progression Factor	1.00	1.00	1.00	1.35	1.27		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	1.2	0.7	5.7	1.2		11.7	13.1	0.3	0.3	0.5	0.2
Delay (s)	15.3	18.8	15.0	28.2	25.4		54.7	56.3	36.7	56.4	56.6	56.3
Level of Service	B	B	B	C	C		D	E	D	E	E	E
Approach Delay (s)		17.9			25.6			50.3			56.4	
Approach LOS		B			C			D			E	

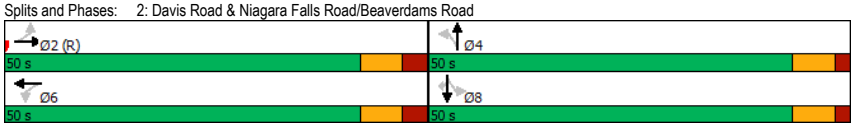
Intersection Summary					
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.3		
Intersection Capacity Utilization	87.3%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	110	31	34	17	16	473	82	240	44
Future Volume (vph)	110	31	34	17	16	473	82	240	44
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		57.5		57.5	27.4	27.4	27.4	27.4	27.4
Actuated g/C Ratio		0.58		0.58	0.27	0.27	0.27	0.27	0.27
v/c Ratio		0.25		0.24	0.07	0.65	0.51	0.31	0.11
Control Delay		12.2		3.9	26.1	34.6	41.8	29.4	5.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		12.2		3.9	26.1	34.6	41.8	29.4	5.8
LOS		B		A	C	C	D	C	A
Approach Delay		12.2		3.9		34.3		29.3	
Approach LOS		B		A		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 25.1		Intersection LOS: C	
Intersection Capacity Utilization 88.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	31	12	34	17	166	16	473	59	82	240	44
Future Volume (vph)	110	31	12	34	17	166	16	473	59	82	240	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.99			0.90		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1662			1632		1388	3111		1787	2983	1392
Flt Permitted		0.66			0.94		0.60	1.00		0.33	1.00	1.00
Satd. Flow (perm)		1136			1538		870	3111		613	2983	1392
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	33	13	36	18	175	17	498	62	86	253	46
RTOR Reduction (vph)	0	2	0	0	74	0	0	12	0	0	0	33
Lane Group Flow (vph)	0	160	0	0	155	0	17	548	0	86	253	13
Heavy Vehicles (%)	10%	7%	7%	7%	12%	2%	30%	15%	7%	1%	21%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		57.5			57.5		27.4	27.4		27.4	27.4	27.4
Effective Green, g (s)		57.5			57.5		27.4	27.4		27.4	27.4	27.4
Actuated g/C Ratio		0.58			0.58		0.27	0.27		0.27	0.27	0.27
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		653			884		238	852		167	817	381
v/s Ratio Prot								c0.18			0.08	
v/s Ratio Perm		c0.14			0.10		0.02			0.14		0.01
v/c Ratio		0.24			0.17		0.07	0.64		0.51	0.31	0.03
Uniform Delay, d1		10.5			10.0		26.9	32.0		30.7	28.8	26.6
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.9			0.4		0.3	2.3		5.3	0.5	0.1
Delay (s)		11.4			10.5		27.1	34.3		35.9	29.3	26.7
Level of Service		B			B		C	C		D	C	C
Approach Delay (s)		11.4			10.5			34.1			30.4	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.37				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.1		
Intersection Capacity Utilization	88.3%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Timings <2025 Total - Thorold Townline> AM Peak Hour
3: Davis Road & Lundys Lane 09-23-2021

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	140	520	36	397	233	22	139	181	94	143
Future Volume (vph)	140	520	36	397	233	22	139	181	94	143
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		2		6			4		8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	2	2	6	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0	22.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	52.0	52.0	52.0	52.0	52.0	38.0	38.0	38.0	38.0	38.0
Total Split (%)	57.8%	57.8%	57.8%	57.8%	57.8%	42.2%	42.2%	42.2%	42.2%	42.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	54.2	54.2	54.2	54.2	54.2	21.8	21.8	21.8	21.8	21.8
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.30	0.52	0.11	0.40	0.26	0.09	0.46	0.78	0.27	0.34
Control Delay	12.4	13.8	10.9	12.1	2.3	24.1	29.8	51.7	27.6	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.4	13.8	10.9	12.1	2.3	24.1	29.8	51.7	27.6	6.1
LOS	B	B	B	B	A	C	C	D	C	A
Approach Delay		13.5		8.6			29.1		30.7	
Approach LOS		B		A			C		C	

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 17.0		Intersection LOS: B	
Intersection Capacity Utilization 95.1%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 3: Davis Road & Lundys Lane

HCM Signalized Intersection Capacity Analysis<2025 Total - Thorold Townline> AM Peak Hour
3: Davis Road & Lundys Lane 09-23-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	520	18	36	397	233	22	139	24	181	94	143
Future Volume (vph)	140	520	18	36	397	233	22	139	24	181	94	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1656	1825		1467	1743	1442	1444	1529		1530	1532	1392
Flt Permitted	0.48	1.00		0.37	1.00	1.00	0.69	1.00		0.64	1.00	1.00
Satd. Flow (perm)	834	1825		570	1743	1442	1052	1529		1028	1532	1392
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)	149	553	19	38	422	248	23	148	26	193	100	152
RTOR Reduction (vph)	0	1	0	0	0	99	0	8	0	0	0	115
Lane Group Flow (vph)	149	571	0	38	422	149	23	166	0	193	100	37
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	3%	19%	23%	9%	12%	25%	20%	30%	18%	24%	16%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	54.2	54.2		54.2	54.2	54.2	21.8	21.8		21.8	21.8	21.8
Effective Green, g (s)	54.2	54.2		54.2	54.2	54.2	21.8	21.8		21.8	21.8	21.8
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	502	1099		343	1049	868	254	370		249	371	337
v/s Ratio Prot		c0.31			0.24			0.11			0.07	
v/s Ratio Perm	0.18			0.07		0.10	0.02			c0.19		0.03
v/c Ratio	0.30	0.52		0.11	0.40	0.17	0.09	0.45		0.78	0.27	0.11
Uniform Delay, d1	8.7	10.4		7.6	9.4	7.9	26.4	29.0		31.8	27.6	26.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	1.8		0.7	1.1	0.4	0.1	0.3		12.8	0.1	0.1
Delay (s)	10.2	12.1		8.3	10.5	8.4	26.5	29.3		44.6	27.8	26.6
Level of Service	B	B		A	B	A	C	C		D	C	C
Approach Delay (s)		11.7			9.7			29.0			34.7	
Approach LOS		B			A			C			C	

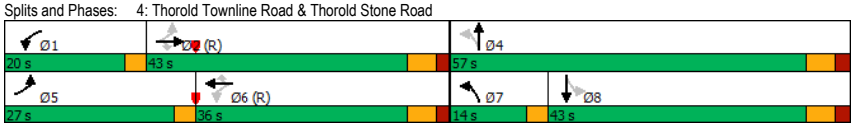
Intersection Summary					
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		14.0	
Intersection Capacity Utilization	95.1%	ICU Level of Service		F	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	323	659	114	124	807	73	108	150	52	154
Future Volume (vph)	323	659	114	124	807	73	108	150	52	154
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6		7	4		8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	8	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0	10.0	8.0	10.0	10.0	10.0
Minimum Split (s)	11.0	35.1	35.1	12.5	35.1	35.1	11.0	41.4	41.4	41.4
Total Split (s)	27.0	43.0	43.0	20.0	36.0	36.0	14.0	57.0	43.0	43.0
Total Split (%)	22.5%	35.8%	35.8%	16.7%	30.0%	30.0%	11.7%	47.5%	35.8%	35.8%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	66.3	49.0	49.0	53.2	38.9	38.9	47.7	44.3	30.9	30.9
Actuated g/C Ratio	0.55	0.41	0.41	0.44	0.32	0.32	0.40	0.37	0.26	0.26
v/c Ratio	0.87	0.48	0.21	0.40	0.74	0.14	0.54	0.43	0.20	0.90
Control Delay	62.5	42.4	23.4	20.0	43.2	2.7	32.0	26.7	34.4	60.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.5	42.4	23.4	20.0	43.2	2.7	32.0	26.7	34.4	60.6
LOS	E	D	C	C	D	A	C	C	C	E
Approach Delay		46.4			37.4			28.4		57.3
Approach LOS		D			D			C		E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.90			
Intersection Signal Delay: 42.7		Intersection LOS: D	
Intersection Capacity Utilization 86.5%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	659	114	124	807	73	108	150	71	52	154	205
Future Volume (vph)	323	659	114	124	807	73	108	150	71	52	154	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	3471	1252	1378	3505	1453	1318	1393		1641	1453	
Flt Permitted	0.15	1.00	1.00	0.37	1.00	1.00	0.22	1.00		0.62	1.00	
Satd. Flow (perm)	257	3471	1252	543	3505	1453	307	1393		1063	1453	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	336	686	119	129	841	76	112	156	74	54	160	214
RTOR Reduction (vph)	0	0	62	0	0	51	0	16	0	0	43	0
Lane Group Flow (vph)	336	686	57	129	841	25	113	214	0	54	331	0
Confl. Peds. (#/hr)	4					4						
Heavy Vehicles (%)	10%	4%	29%	31%	3%	8%	37%	24%	42%	10%	23%	17%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	63.2	49.0	49.0	50.1	38.9	38.9	44.3	44.3		30.9	30.9	
Effective Green, g (s)	63.2	49.0	49.0	50.1	38.9	38.9	44.3	44.3		30.9	30.9	
Actuated g/C Ratio	0.53	0.41	0.41	0.42	0.32	0.32	0.37	0.37		0.26	0.26	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	2.5	6.0	6.0	2.5	2.3		2.3	2.3	
Lane Grp Cap (vph)	381	1417	511	304	1136	471	200	514		273	374	
v/s Ratio Prot	c0.16	0.20		0.04	0.24		c0.05	0.15			c0.23	
v/s Ratio Perm	c0.31		0.05	0.14		0.02	0.16			0.05		
v/c Ratio	0.88	0.48	0.11	0.42	0.74	0.05	0.56	0.42		0.20	0.88	
Uniform Delay, d1	27.7	26.2	22.0	22.5	36.1	27.9	28.1	28.2		34.9	42.8	
Progression Factor	1.78	1.46	3.09	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.6	1.1	0.4	0.7	4.4	0.2	2.9	0.3		0.2	21.0	
Delay (s)	67.9	39.2	68.4	23.2	40.4	28.1	31.0	28.5		35.1	63.8	
Level of Service	E	D	E	C	D	C	C	C		D	E	
Approach Delay (s)		50.7			37.4			29.4			60.2	
Approach LOS		D			D			C			E	

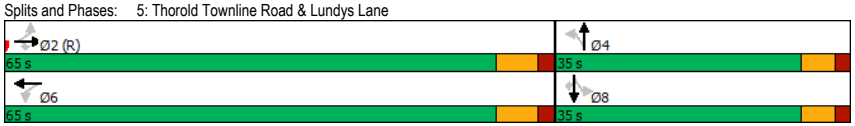
Intersection Summary					
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.87				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.5		
Intersection Capacity Utilization	86.5%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	159	521	98	38	348	71	140	23	85	58
Future Volume (vph)	159	521	98	38	348	71	140	23	85	58
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	65.0	65.0	65.0	65.0	65.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	68.8	68.8	68.8	68.8	68.8	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.30	0.45	0.10	0.08	0.34	0.35	0.63	0.15	0.31	0.22
Control Delay	8.8	9.2	3.6	6.9	7.8	38.8	43.8	34.3	36.6	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	9.2	3.6	6.9	7.8	38.8	43.8	34.3	36.6	10.3
LOS	A	A	A	A	A	D	D	C	D	B
Approach Delay		8.5			7.7		42.4		27.1	
Approach LOS		A			A		D		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 15.4		Intersection LOS: B	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	159	521	98	38	348	40	71	140	37	23	85	58
Future Volume (vph)	159	521	98	38	348	40	71	140	37	23	85	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		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)	1581	1810	1495	1752	1771		1612	1607		1671	1638	1252
Flt Permitted	0.50	1.00	1.00	0.41	1.00		0.70	1.00		0.51	1.00	1.00
Satd. Flow (perm)	833	1810	1495	752	1771		1184	1607		893	1638	1252
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	171	560	105	41	374	43	76	151	40	25	91	62
RTOR Reduction (vph)	0	0	17	0	3	0	0	11	0	0	0	51
Lane Group Flow (vph)	171	560	88	41	414	0	76	180	0	25	91	11
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	14%	5%	8%	3%	6%	0%	12%	17%	5%	8%	16%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Effective Green, g (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	573	1245	1028	517	1218		215	292		162	298	227
v/s Ratio Prot		c0.31			0.23			c0.11			0.06	
v/s Ratio Perm	0.21		0.06	0.05			0.06			0.03		0.01
v/c Ratio	0.30	0.45	0.09	0.08	0.34		0.35	0.62		0.15	0.31	0.05
Uniform Delay, d1	6.1	7.0	5.2	5.1	6.4		35.8	37.7		34.4	35.4	33.8
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	1.3	1.2	0.2	0.3	0.8		2.1	5.5		0.9	1.2	0.2
Delay (s)	7.5	8.2	5.3	5.4	7.1		37.8	43.2		35.4	36.6	34.0
Level of Service	A	A	A	A	A		D	D		D	D	C
Approach Delay (s)		7.7			7.0			41.7			35.5	
Approach LOS		A			A			D			D	

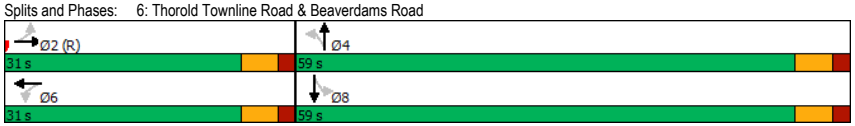
Intersection Summary					
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.48				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	79.9%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	139	17	175	24	311	11	364
Future Volume (vph)	19	139	17	175	24	311	11	364
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	30.5	30.5	30.5	30.5	34.0	34.0	30.5	30.5
Total Split (s)	31.0	31.0	31.0	31.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%
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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		25.0		25.0		53.0		53.0
Actuated g/C Ratio		0.28		0.28		0.59		0.59
v/c Ratio		0.39		0.46		0.48		0.50
Control Delay		28.5		29.8		12.7		13.1
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		28.5		29.8		12.7		13.1
LOS		C		C		B		B
Approach Delay		28.5		29.8		12.7		13.1
Approach LOS		C		C		B		B

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 18.4		Intersection LOS: B	
Intersection Capacity Utilization 57.9%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 6: Thorold Townline Road & Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	139	16	17	175	22	24	311	33	11	364	19
Future Volume (vph)	19	139	16	17	175	22	24	311	33	11	364	19
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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.99			0.99	
Flt Protected		0.99			1.00			1.00			1.00	
Satd. Flow (prot)		1808			1846			1462			1476	
Flt Permitted		0.95			0.97			0.96			0.99	
Satd. Flow (perm)		1723			1794			1407			1459	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	151	17	18	190	24	26	338	36	12	396	21
RTOR Reduction (vph)	0	4	0	0	4	0	0	4	0	0	2	0
Lane Group Flow (vph)	0	185	0	0	228	0	0	396	0	0	427	0
Confl. Peds. (#/hr)			5	5			6					6
Heavy Vehicles (%)	5%	2%	9%	0%	1%	2%	0%	33%	0%	9%	29%	9%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		25.0			25.0			53.0			53.0	
Effective Green, g (s)		25.0			25.0			53.0			53.0	
Actuated g/C Ratio		0.28			0.28			0.59			0.59	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		478			498			828			859	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.13			0.28			c0.29	
v/c Ratio		0.39			0.46			0.48			0.50	
Uniform Delay, d1		26.3			26.9			10.6			10.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.4			3.0			2.0			2.1	
Delay (s)		28.7			29.9			12.6			12.8	
Level of Service		C			C			B			B	
Approach Delay (s)		28.7			29.9			12.6			12.8	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	57.9%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	66	323	3	46	256
Future Volume (Veh/h)	3	66	323	3	46	256
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	3	71	347	3	49	275
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	722	348			350	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	722	348			350	
tC, single (s)	6.4	7.1			4.9	
tC, 2 stage (s)						
tF (s)	3.5	4.1			2.9	
p0 queue free %	99	87			94	
cM capacity (veh/h)	375	537			870	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	74	350	49	275
Volume Left	3	0	49	0
Volume Right	71	3	0	0
cSH	528	1700	870	1700
Volume to Capacity	0.14	0.21	0.06	0.16
Queue Length 95th (m)	3.9	0.0	1.4	0.0
Control Delay (s)	12.9	0.0	9.4	0.0
Lane LOS	B		A	
Approach Delay (s)	12.9	0.0	1.4	
Approach LOS	B			

Intersection Summary				
Average Delay		1.9		
Intersection Capacity Utilization		34.8%	ICU Level of Service	A
Analysis Period (min)		15		

Timings <2025 Total - Thorold Townline> PM Peak Hour
1: Davis Road & Thorold Stone Road 09-23-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	24	1252	586	146	1183	506	5	126	4	6	28
Future Volume (vph)	24	1252	586	146	1183	506	5	126	4	6	28
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	8.0	28.9	29.7	29.7	29.7	17.7	17.7	17.7
Total Split (s)	55.0	55.0	55.0	14.0	69.0	33.3	33.3	33.3	17.7	17.7	17.7
Total Split (%)	45.8%	45.8%	45.8%	11.7%	57.5%	27.8%	27.8%	27.8%	14.8%	14.8%	14.8%
Yellow Time (s)	5.4	5.4	5.4	3.0	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	0.0	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	3.0	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag	Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	58.2	58.2	58.2	74.9	71.0	23.8	23.8	23.8	10.0	10.0	10.0
Actuated g/C Ratio	0.48	0.48	0.48	0.62	0.59	0.20	0.20	0.20	0.08	0.08	0.08
v/c Ratio	0.19	0.78	0.67	0.74	0.60	0.80	0.82	0.33	0.03	0.04	0.12
Control Delay	27.8	32.2	16.6	47.7	24.3	63.9	65.9	8.9	51.2	51.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	32.2	16.6	47.7	24.3	63.9	65.9	8.9	51.2	51.3	1.0
LOS	C	C	B	D	C	E	E	A	D	D	A
Approach Delay		27.2			26.9		53.8			13.9	
Approach LOS		C			C		D			B	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 31.4		Intersection LOS: C	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road

HCM Signalized Intersection Capacity Analysis<2025 Total - Thorold Townline> PM Peak Hour
1: Davis Road & Thorold Stone Road 09-23-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1252	586	146	1183	1	506	5	126	4	6	28
Future Volume (vph)	24	1252	586	146	1183	1	506	5	126	4	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1433	3505	1568	1671	3505		1681	1678	1482	1805	1810	1525
Flt Permitted	0.18	1.00	1.00	0.08	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	276	3505	1568	134	3505		1681	1678	1482	1805	1810	1525
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	1318	617	154	1245	1	533	5	133	4	6	29
RTOR Reduction (vph)	0	0	175	0	0	0	0	0	107	0	0	28
Lane Group Flow (vph)	25	1318	442	154	1246	0	266	272	26	4	6	1
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	26%	3%	3%	8%	3%	0%	2%	30%	9%	0%	5%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	55.1	55.1	55.1	67.9	67.9		23.8	23.8	23.8	6.0	6.0	6.0
Effective Green, g (s)	55.1	55.1	55.1	67.9	67.9		23.8	23.8	23.8	6.0	6.0	6.0
Actuated g/C Ratio	0.46	0.46	0.46	0.57	0.57		0.20	0.20	0.20	0.05	0.05	0.05
Clearance Time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	126	1609	719	201	1983		333	332	293	90	90	76
v/s Ratio Prot		c0.38		c0.06	0.36		0.16	c0.16		0.00	c0.00	
v/s Ratio Perm	0.09		0.28	0.37					0.02			0.00
v/c Ratio	0.20	0.82	0.62	0.77	0.63		0.80	0.82	0.09	0.04	0.07	0.02
Uniform Delay, d1	19.3	28.1	24.5	25.6	17.5		45.8	46.0	39.3	54.3	54.3	54.2
Progression Factor	1.00	1.00	1.00	1.51	1.31		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	4.8	3.9	12.3	1.1		13.9	15.9	0.2	0.4	0.5	0.2
Delay (s)	22.8	32.9	28.4	51.0	24.2		59.7	61.9	39.5	54.6	54.9	54.4
Level of Service	C	C	C	D	C		E	E	D	D	D	D
Approach Delay (s)		31.4			27.1			56.6			54.5	
Approach LOS		C			C			E			D	

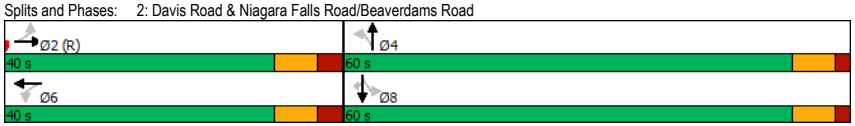
Intersection Summary					
HCM 2000 Control Delay	34.3	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.77				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		25.3	
Intersection Capacity Utilization	88.1%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	90	32	74	44	12	409	170	471	105
Future Volume (vph)	90	32	74	44	12	409	170	471	105
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	40.0	40.0	40.0	40.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		52.5		52.5	32.4	32.4	32.4	32.4	32.4
Actuated g/C Ratio		0.52		0.52	0.32	0.32	0.32	0.32	0.32
v/c Ratio		0.24		0.34	0.05	0.45	0.72	0.46	0.19
Control Delay		15.9		13.5	19.4	25.9	44.6	27.3	4.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.9		13.5	19.4	25.9	44.6	27.3	4.2
LOS		B		B	B	C	D	C	A
Approach Delay		15.9		13.5		25.7		28.0	
Approach LOS		B		B		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 23.9		Intersection LOS: C	
Intersection Capacity Utilization 76.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	32	17	74	44	147	12	409	50	170	471	105
Future Volume (vph)	90	32	17	74	44	147	12	409	50	170	471	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.98			0.93		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1717			1702		1805	3298		1770	3343	1583
Flt Permitted		0.67			0.87		0.41	1.00		0.42	1.00	1.00
Satd. Flow (perm)		1180			1499		771	3298		773	3343	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	34	18	78	46	155	13	431	53	179	496	111
RTOR Reduction (vph)	0	3	0	0	31	0	0	14	0	0	0	75
Lane Group Flow (vph)	0	144	0	0	248	0	13	470	0	179	496	36
Heavy Vehicles (%)	2%	2%	30%	2%	1%	2%	0%	8%	5%	2%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		52.5			52.5		32.4	32.4		32.4	32.4	32.4
Effective Green, g (s)		52.5			52.5		32.4	32.4		32.4	32.4	32.4
Actuated g/C Ratio		0.52			0.52		0.32	0.32		0.32	0.32	0.32
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		619			786		249	1068		250	1083	512
v/s Ratio Prot								0.14			0.15	
v/s Ratio Perm		0.12			c0.17		0.02			c0.23		0.02
v/c Ratio		0.23			0.32		0.05	0.44		0.72	0.46	0.07
Uniform Delay, d1		12.8			13.5		23.2	26.7		29.8	26.8	23.4
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.9			1.0		0.2	0.6		11.5	0.6	0.1
Delay (s)		13.7			14.6		23.4	27.3		41.2	27.5	23.5
Level of Service		B			B		C	C		D	C	C
Approach Delay (s)		13.7			14.6			27.2			30.0	
Approach LOS		B			B			C			C	

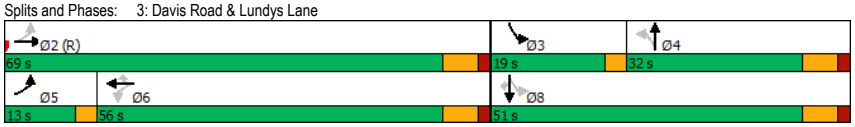
Intersection Summary					
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.47				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		15.1	
Intersection Capacity Utilization	76.1%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Timings <2025 Total - Thorold Townline> PM Peak Hour
3: Davis Road & Lundys Lane 09-23-2021

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	179	567	28	555	241	46	141	300	125	157
Future Volume (vph)	179	567	28	555	241	46	141	300	125	157
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	5	2		6			4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	4	4	3	8	8
Switch Phase										
Minimum Initial (s)	5.0	22.0	22.0	22.0	22.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	8.0	36.0	36.0	36.0	36.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	13.0	69.0	56.0	56.0	56.0	32.0	32.0	19.0	51.0	51.0
Total Split (%)	10.8%	57.5%	46.7%	46.7%	46.7%	26.7%	26.7%	15.8%	42.5%	42.5%
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	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)	3.0	7.0	7.0	7.0	7.0	7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max	Max	Max	Max	Max	Max	None	Max	Max
Act Effct Green (s)	66.0	62.0	49.3	49.3	49.3	25.2	25.2	48.0	44.0	44.0
Actuated g/C Ratio	0.55	0.52	0.41	0.41	0.41	0.21	0.21	0.40	0.37	0.37
v/c Ratio	0.66	0.68	0.14	0.78	0.35	0.19	0.53	0.72	0.21	0.25
Control Delay	25.5	26.2	26.7	41.9	9.6	41.6	46.3	37.4	27.2	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	26.2	26.7	41.9	9.6	41.6	46.3	37.4	27.2	4.7
LOS	C	C	C	D	A	D	D	D	C	A
Approach Delay		26.1		31.9			45.3		26.4	
Approach LOS		C		C			D		C	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 85		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.78		
Intersection Signal Delay: 29.9	Intersection LOS: C	
Intersection Capacity Utilization 108.2%	ICU Level of Service G	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane



HCM Signalized Intersection Capacity Analysis<2025 Total - Thorold Townline> PM Peak Hour
3: Davis Road & Lundys Lane 09-23-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	567	28	28	555	241	46	141	37	300	125	157
Future Volume (vph)	179	567	28	28	555	241	46	141	37	300	125	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1811		1611	1863	1473	1736	1671		1702	1743	1553
Flt Permitted	0.18	1.00		0.32	1.00	1.00	0.67	1.00		0.47	1.00	1.00
Satd. Flow (perm)	322	1811		537	1863	1473	1226	1671		845	1743	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	192	610	30	30	597	259	49	152	40	323	134	169
RTOR Reduction (vph)	0	1	0	0	0	143	0	8	0	0	0	107
Lane Group Flow (vph)	192	639	0	30	597	116	49	184	0	323	134	62
Confl. Peds. (#/hr)	2		1	1		2			1	1		
Heavy Vehicles (%)	5%	3%	26%	12%	2%	7%	4%	9%	12%	6%	9%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	62.0	62.0		49.3	49.3	49.3	25.2	25.2		44.0	44.0	44.0
Effective Green, g (s)	62.0	62.0		49.3	49.3	49.3	25.2	25.2		44.0	44.0	44.0
Actuated g/C Ratio	0.52	0.52		0.41	0.41	0.41	0.21	0.21		0.37	0.37	0.37
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	4.0		4.0	4.0	4.0	2.0	2.0		3.0	2.0	2.0
Lane Grp Cap (vph)	279	935		220	765	605	257	350		422	639	569
v/s Ratio Prot	0.06	c0.35			c0.32			0.11		c0.10	0.08	
v/s Ratio Perm	0.30			0.06		0.08	0.04			c0.18		0.04
v/c Ratio	0.69	0.68		0.14	0.78	0.19	0.19	0.53		0.77	0.21	0.11
Uniform Delay, d1	21.1	21.7		22.1	30.7	22.6	39.0	42.1		30.8	26.1	25.1
Progression Factor	1.00	1.00		1.10	1.10	2.28	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.9	4.0		1.2	7.1	0.6	1.6	5.6		8.1	0.7	0.4
Delay (s)	28.0	25.7		25.5	40.8	52.1	40.7	47.7		38.9	26.8	25.5
Level of Service	C	C		C	D	D	D	D		D	C	C
Approach Delay (s)		26.2			43.6			46.2			32.7	
Approach LOS		C			D			D			C	

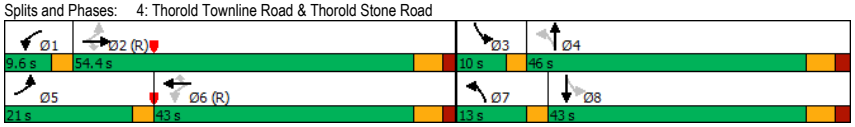
Intersection Summary				
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	108.2%	ICU Level of Service	G	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	231	1036	72	75	821	35	142	148	48	171
Future Volume (vph)	231	1036	72	75	821	35	142	148	48	171
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6		7	4	3	8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	3	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.0	35.1	35.1	8.0	35.1	35.1	8.0	41.4	8.0	41.4
Total Split (s)	21.0	54.4	54.4	9.6	43.0	43.0	13.0	46.0	10.0	43.0
Total Split (%)	17.5%	45.3%	45.3%	8.0%	35.8%	35.8%	10.8%	38.3%	8.3%	35.8%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	3.0	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	0.0	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	3.0	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	64.4	53.4	53.4	53.3	43.5	43.5	49.6	38.2	43.3	33.2
Actuated g/C Ratio	0.54	0.44	0.44	0.44	0.36	0.36	0.41	0.32	0.36	0.28
v/c Ratio	0.73	0.68	0.12	0.42	0.67	0.06	0.71	0.56	0.13	0.93
Control Delay	49.3	51.1	24.5	23.2	36.8	0.2	42.0	34.0	20.9	61.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	51.1	24.5	23.2	36.8	0.2	42.0	34.0	20.9	61.9
LOS	D	D	C	C	D	A	D	C	C	E
Approach Delay		49.4			34.4			36.8		57.9
Approach LOS		D			C			D		E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.93			
Intersection Signal Delay: 44.7		Intersection LOS: D	
Intersection Capacity Utilization 86.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	1036	72	75	821	35	142	148	118	48	171	272
Future Volume (vph)	231	1036	72	75	821	35	142	148	118	48	171	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3574	1292	1492	3539	1538	1570	1482		1671	1613	
Flt Permitted	0.17	1.00	1.00	0.17	1.00	1.00	0.14	1.00		0.52	1.00	
Satd. Flow (perm)	296	3574	1292	262	3539	1538	235	1482		912	1613	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	241	1079	75	78	855	36	148	154	123	50	178	283
RTOR Reduction (vph)	0	0	42	0	0	23	0	25	0	0	50	0
Lane Group Flow (vph)	241	1079	33	78	855	13	148	252	0	50	411	0
Heavy Vehicles (%)	8%	1%	25%	21%	2%	5%	15%	17%	23%	8%	10%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	60.7	52.2	52.2	48.4	42.9	42.9	46.8	38.2		39.4	33.8	
Effective Green, g (s)	60.7	52.2	52.2	48.4	42.9	42.9	46.8	38.2		39.4	33.8	
Actuated g/C Ratio	0.51	0.44	0.44	0.40	0.36	0.36	0.39	0.32		0.33	0.28	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	3.0	6.0	6.0	3.0	2.3		3.0	2.3	
Lane Grp Cap (vph)	319	1554	562	162	1265	549	202	471		334	454	
v/s Ratio Prot	c0.09	0.30		0.02	0.24		c0.06	0.17		0.01	c0.26	
v/s Ratio Perm	c0.29		0.03	0.17		0.01	0.22			0.04		
v/c Ratio	0.76	0.69	0.06	0.48	0.68	0.02	0.73	0.54		0.15	0.91	
Uniform Delay, d1	20.8	27.4	19.6	23.8	32.7	25.0	28.2	33.6		28.0	41.6	
Progression Factor	2.25	1.75	6.20	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.4	1.7	0.1	2.2	2.9	0.1	12.8	0.8		0.2	21.2	
Delay (s)	53.1	49.8	122.0	26.1	35.6	25.1	41.0	34.4		28.2	62.8	
Level of Service	D	D	F	C	D	C	D	C		C	E	
Approach Delay (s)		54.3			34.4			36.7			59.4	
Approach LOS		D			C			D			E	

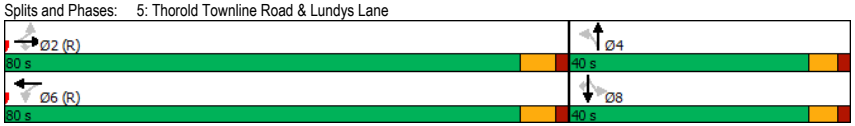
Intersection Summary					
HCM 2000 Control Delay	47.0	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.82				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
Intersection Capacity Utilization	86.1%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Timings <2025 Total - Thorold Townline> PM Peak Hour
5: Thorold Townline Road & Lundys Lane 09-23-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	83	527	103	44	555	113	131	53	118	132
Future Volume (vph)	83	527	103	44	555	113	131	53	118	132
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	80.0	80.0	80.0	80.0	80.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%	33.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	86.7	86.7	86.7	86.7	86.7	20.3	20.3	20.3	20.3	20.3
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.72	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.20	0.44	0.10	0.09	0.49	0.67	0.65	0.44	0.43	0.38
Control Delay	7.2	9.2	3.2	6.7	9.4	63.8	51.7	53.2	47.9	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	9.2	3.2	6.7	9.4	63.8	51.7	53.2	47.9	9.2
LOS	A	A	A	A	A	E	D	D	D	A
Approach Delay		8.1			9.2		56.4		32.0	
Approach LOS		A			A		E		C	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 19.5		Intersection LOS: B	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 5: Thorold Townline Road & Lundys Lane



HCM Signalized Intersection Capacity Analysis<2025 Total - Thorold Townline> PM Peak Hour
5: Thorold Townline Road & Lundys Lane 09-23-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	527	103	44	555	33	113	131	50	53	118	132
Future Volume (vph)	83	527	103	44	555	33	113	131	50	53	118	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		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)	1625	1827	1553	1752	1832		1687	1745		1736	1776	1524
Flt Permitted	0.36	1.00	1.00	0.40	1.00		0.62	1.00		0.43	1.00	1.00
Satd. Flow (perm)	621	1827	1553	740	1832		1093	1745		792	1776	1524
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	91	579	113	48	610	36	124	144	55	58	130	145
RTOR Reduction (vph)	0	0	14	0	1	0	0	13	0	0	0	120
Lane Group Flow (vph)	91	579	99	48	645	0	124	186	0	58	130	25
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	11%	4%	4%	3%	2%	15%	7%	6%	0%	4%	7%	6%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	86.7	86.7	86.7	86.7	86.7		20.3	20.3		20.3	20.3	20.3
Effective Green, g (s)	86.7	86.7	86.7	86.7	86.7		20.3	20.3		20.3	20.3	20.3
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.72		0.17	0.17		0.17	0.17	0.17
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	448	1320	1122	534	1323		184	295		133	300	257
v/s Ratio Prot		0.32			c0.35			0.11			0.07	
v/s Ratio Perm	0.15		0.06	0.06			c0.11			0.07		0.02
v/c Ratio	0.20	0.44	0.09	0.09	0.49		0.67	0.63		0.44	0.43	0.10
Uniform Delay, d1	5.4	6.8	4.9	4.9	7.1		46.7	46.4		44.7	44.7	42.1
Progression Factor	0.94	1.09	0.87	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.8	0.1	0.3	1.3		12.0	5.8		4.7	2.1	0.3
Delay (s)	5.8	8.1	4.4	5.3	8.4		58.8	52.2		49.4	46.8	42.4
Level of Service	A	A	A	A	A		E	D		D	D	D
Approach Delay (s)		7.3			8.2			54.7			45.4	
Approach LOS		A			A			D			D	

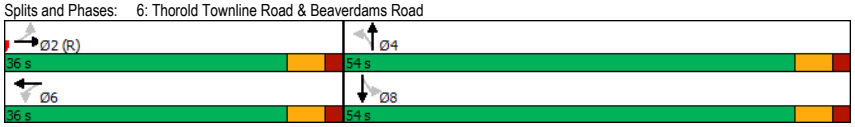
Intersection Summary					
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.52				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0		
Intersection Capacity Utilization	87.8%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	27	213	43	192	32	384	20	275
Future Volume (vph)	27	213	43	192	32	384	20	275
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	32.0	32.0	32.0	32.0	35.0	35.0	35.0	35.0
Total Split (s)	36.0	36.0	36.0	36.0	54.0	54.0	54.0	54.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%
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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None
Act Effct Green (s)		41.7		41.7		36.3		36.3
Actuated g/C Ratio		0.46		0.46		0.40		0.40
v/c Ratio		0.34		0.35		0.76		0.58
Control Delay		18.8		19.0		30.7		23.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		18.8		19.0		30.7		23.0
LOS		B		B		C		C
Approach Delay		18.8		19.0		30.7		23.0
Approach LOS		B		B		C		C

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 24.0		Intersection LOS: C	
Intersection Capacity Utilization 63.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 6: Thorold Townline Road & Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	213	16	43	192	21	32	384	26	20	275	41
Future Volume (vph)	27	213	16	43	192	21	32	384	26	20	275	41
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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.99			0.98	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1831			1832			1605			1594	
Flt Permitted		0.95			0.91			0.95			0.96	
Satd. Flow (perm)		1745			1677			1534			1530	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	29	229	17	46	206	23	34	413	28	22	296	44
RTOR Reduction (vph)	0	2	0	0	3	0	0	3	0	0	7	0
Lane Group Flow (vph)	0	273	0	0	272	0	0	472	0	0	355	0
Confl. Peds. (#/hr)	1		5	5		1	8		3	3		8
Heavy Vehicles (%)	10%	1%	4%	4%	1%	0%	4%	19%	0%	2%	19%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		41.7			41.7			36.3			36.3	
Effective Green, g (s)		41.7			41.7			36.3			36.3	
Actuated g/C Ratio		0.46			0.46			0.40			0.40	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		808			777			618			617	
v/s Ratio Prot												
v/s Ratio Perm		0.16			c0.16			c0.31			0.23	
v/c Ratio		0.34			0.35			0.76			0.58	
Uniform Delay, d1		15.4			15.5			23.2			20.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.1			1.2			6.6			2.1	
Delay (s)		16.5			16.7			29.7			22.9	
Level of Service		B			B			C			C	
Approach Delay (s)		16.5			16.7			29.7			22.9	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.54				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B		
Analysis Period (min)	15				

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	46	323	3	46	297
Future Volume (Veh/h)	3	46	323	3	46	297
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	51	355	3	51	326
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	784	356			358	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	784	356			358	
tC, single (s)	6.4	7.0			4.9	
tC, 2 stage (s)						
tF (s)	3.5	4.0			2.9	
p0 queue free %	99	91			94	
cM capacity (veh/h)	343	538			863	

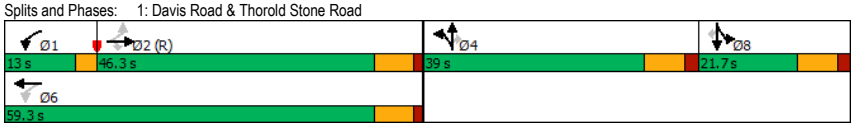
Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	54	358	51	326
Volume Left	3	0	51	0
Volume Right	51	3	0	0
cSH	522	1700	863	1700
Volume to Capacity	0.10	0.21	0.06	0.19
Queue Length 95th (m)	2.8	0.0	1.5	0.0
Control Delay (s)	12.7	0.0	9.4	0.0
Lane LOS	B		A	
Approach Delay (s)	12.7	0.0	1.3	
Approach LOS	B			

Intersection Summary				
Average Delay		1.5		
Intersection Capacity Utilization		33.8%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	21	991	336	114	1096	649	15	257	1	2	18
Future Volume (vph)	21	991	336	114	1096	649	15	257	1	2	18
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	8.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	12.5	28.9	29.7	29.7	29.7	21.7	21.7	21.7
Total Split (s)	46.3	46.3	46.3	13.0	59.3	39.0	39.0	39.0	21.7	21.7	21.7
Total Split (%)	38.6%	38.6%	38.6%	10.8%	49.4%	32.5%	32.5%	32.5%	18.1%	18.1%	18.1%
Yellow Time (s)	5.4	5.4	5.4	3.0	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	0.0	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	3.0	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag	Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	C-Max	C-Max	C-Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	55.0	55.0	55.0	72.0	68.1	30.2	30.2	30.2	10.0	10.0	10.0
Actuated g/C Ratio	0.46	0.46	0.46	0.60	0.57	0.25	0.25	0.25	0.08	0.08	0.08
v/c Ratio	0.14	0.66	0.45	0.48	0.60	0.88	0.89	0.47	0.01	0.01	0.08
Control Delay	28.2	30.5	12.7	33.8	38.7	67.1	68.2	7.1	51.0	51.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	30.5	12.7	33.8	38.7	67.1	68.2	7.1	51.0	51.0	0.7
LOS	C	C	B	C	D	E	E	A	D	D	A
Approach Delay		26.0			38.3		50.8			7.5	
Approach LOS		C			D		D			A	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 36.7		Intersection LOS: D	
Intersection Capacity Utilization 90.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	991	336	114	1096	6	649	15	257	1	2	18
Future Volume (vph)	21	991	336	114	1096	6	649	15	257	1	2	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1640	3406	1442	1530	3399		1559	1554	1475	1388	1624	1337
Flt Permitted	0.21	1.00	1.00	0.14	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	354	3406	1442	228	3399		1559	1554	1475	1388	1624	1337
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	1032	350	119	1142	6	676	16	268	1	2	19
RTOR Reduction (vph)	0	0	121	0	0	0	0	0	201	0	0	18
Lane Group Flow (vph)	22	1032	229	119	1148	0	345	347	67	1	2	1
Confl. Peds. (#/hr)	1					1	1		1	1		1
Heavy Vehicles (%)	10%	6%	12%	18%	6%	30%	10%	28%	8%	30%	17%	19%
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	50.4	50.4	50.4	63.5	63.5		30.2	30.2	30.2	4.0	4.0	4.0
Effective Green, g (s)	50.4	50.4	50.4	63.5	63.5		30.2	30.2	30.2	4.0	4.0	4.0
Actuated g/C Ratio	0.42	0.42	0.42	0.53	0.53		0.25	0.25	0.25	0.03	0.03	0.03
Clearance Time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	148	1430	605	230	1798		392	391	371	46	54	44
v/s Ratio Prot		c0.30		0.04	c0.34		0.22	c0.22		0.00	c0.00	
v/s Ratio Perm	0.06		0.16	0.23					0.05			0.00
v/c Ratio	0.15	0.72	0.38	0.52	0.64		0.88	0.89	0.18	0.02	0.04	0.01
Uniform Delay, d1	21.5	29.0	24.0	18.3	20.1		43.2	43.3	35.2	56.1	56.1	56.1
Progression Factor	1.00	1.00	1.00	2.30	1.99		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	3.2	1.8	0.9	1.1		20.8	21.7	0.4	0.3	0.5	0.2
Delay (s)	23.6	32.1	25.8	43.0	41.0		64.0	65.0	35.6	56.4	56.6	56.3
Level of Service	C	C	C	D	D		E	E	D	E	E	E
Approach Delay (s)		30.4			41.2			56.4			56.4	
Approach LOS		C			D			E			E	

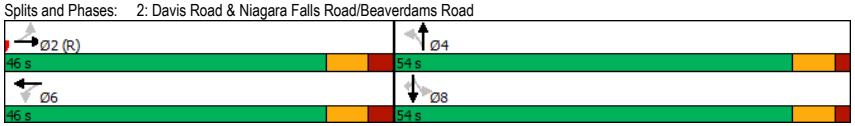
Intersection Summary					
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.74				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		25.3	
Intersection Capacity Utilization	90.1%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	110	31	29	17	25	626	82	329	44
Future Volume (vph)	110	31	29	17	25	626	82	329	44
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	46.0	46.0	46.0	46.0	54.0	54.0	54.0	54.0	54.0
Total Split (%)	46.0%	46.0%	46.0%	46.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		52.8		52.8	32.1	32.1	32.1	32.1	32.1
Actuated g/C Ratio		0.53		0.53	0.32	0.32	0.32	0.32	0.32
v/c Ratio		0.27		0.25	0.10	0.70	0.56	0.36	0.10
Control Delay		15.4		5.0	22.5	32.8	41.6	26.3	4.7
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.4		5.0	22.5	32.8	41.6	26.3	4.7
LOS		B		A	C	C	D	C	A
Approach Delay		15.4		5.0		32.5		27.0	
Approach LOS		B		A		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 25.2		Intersection LOS: C	
Intersection Capacity Utilization 88.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



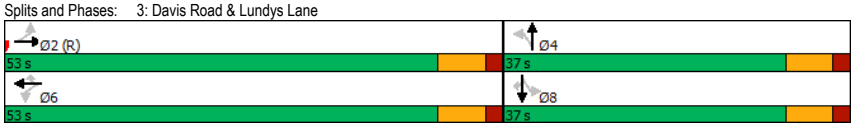
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	31	18	29	17	166	25	626	46	82	329	44
Future Volume (vph)	110	31	18	29	17	166	25	626	46	82	329	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.98			0.89		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1658			1631		1388	3122		1787	2983	1392
Flt Permitted		0.67			0.94		0.53	1.00		0.26	1.00	1.00
Satd. Flow (perm)		1155			1549		779	3122		480	2983	1392
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	33	19	31	18	175	26	659	48	86	346	46
RTOR Reduction (vph)	0	3	0	0	82	0	0	7	0	0	0	31
Lane Group Flow (vph)	0	165	0	0	142	0	26	700	0	86	346	15
Heavy Vehicles (%)	10%	7%	7%	7%	12%	2%	30%	15%	7%	1%	21%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		52.8			52.8		32.1	32.1		32.1	32.1	32.1
Effective Green, g (s)		52.8			52.8		32.1	32.1		32.1	32.1	32.1
Actuated g/C Ratio		0.53			0.53		0.32	0.32		0.32	0.32	0.32
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		609			817		250	1002		154	957	446
v/s Ratio Prot								c0.22			0.12	
v/s Ratio Perm		c0.14			0.09		0.03			0.18		0.01
v/c Ratio		0.27			0.17		0.10	0.70		0.56	0.36	0.03
Uniform Delay, d1		13.0			12.3		23.8	29.7		28.1	26.1	23.3
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.1			0.5		0.4	2.7		7.3	0.5	0.1
Delay (s)		14.1			12.7		24.2	32.4		35.4	26.6	23.4
Level of Service		B			B		C	C		D	C	C
Approach Delay (s)		14.1			12.7			32.2			27.8	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.43				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.1		
Intersection Capacity Utilization	88.4%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	153	633	45	500	132	22	139	136	94	159
Future Volume (vph)	153	633	45	500	132	22	139	136	94	159
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		2		6			4		8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	2	2	6	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0	22.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	53.0	53.0	53.0	53.0	53.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	58.9%	58.9%	58.9%	58.9%	58.9%	41.1%	41.1%	41.1%	41.1%	41.1%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	57.4	57.4	57.4	57.4	57.4	18.6	18.6	18.6	18.6	18.6
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.64	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.36	0.59	0.16	0.48	0.14	0.11	0.56	0.71	0.32	0.40
Control Delay	11.6	13.1	9.6	11.2	2.0	27.9	35.6	52.0	31.8	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.6	13.1	9.6	11.2	2.0	27.9	35.6	52.0	31.8	7.4
LOS	B	B	A	B	A	C	D	D	C	A
Approach Delay		12.8		9.3			34.7		28.9	
Approach LOS		B		A			C		C	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.71		
Intersection Signal Delay: 16.7	Intersection LOS: B	
Intersection Capacity Utilization 101.1%	ICU Level of Service G	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	633	18	45	500	132	22	139	30	136	94	159
Future Volume (vph)	153	633	18	45	500	132	22	139	30	136	94	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1656	1828		1467	1743	1442	1444	1519		1530	1532	1392
Flt Permitted	0.41	1.00		0.31	1.00	1.00	0.69	1.00		0.61	1.00	1.00
Satd. Flow (perm)	718	1828		476	1743	1442	1052	1519		985	1532	1392
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)	163	673	19	48	532	140	23	148	32	145	100	169
RTOR Reduction (vph)	0	1	0	0	0	51	0	10	0	0	0	134
Lane Group Flow (vph)	163	691	0	48	532	89	23	170	0	145	100	35
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	3%	19%	23%	9%	12%	25%	20%	30%	18%	24%	16%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	57.4	57.4		57.4	57.4	57.4	18.6	18.6		18.6	18.6	18.6
Effective Green, g (s)	57.4	57.4		57.4	57.4	57.4	18.6	18.6		18.6	18.6	18.6
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	457	1165		303	1111	919	217	313		203	316	287
v/s Ratio Prot		c0.38			0.31			0.11			0.07	
v/s Ratio Perm	0.23			0.10		0.06	0.02			c0.15		0.03
v/c Ratio	0.36	0.59		0.16	0.48	0.10	0.11	0.54		0.71	0.32	0.12
Uniform Delay, d1	7.6	9.5		6.6	8.5	6.3	29.0	31.9		33.2	30.3	29.1
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	2.2	2.2		1.1	1.5	0.2	0.1	1.0		9.5	0.2	0.1
Delay (s)	9.8	11.7		7.7	10.0	6.5	29.0	32.9		42.7	30.5	29.1
Level of Service	A	B		A	A	A	C	C		D	C	C
Approach Delay (s)		11.4			9.2			32.5			34.2	
Approach LOS		B			A			C			C	

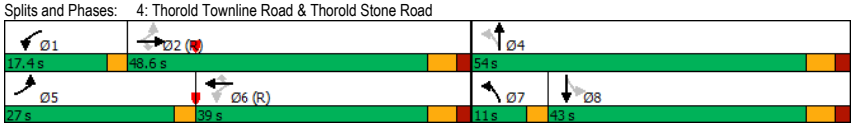
Intersection Summary					
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.62				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0		
Intersection Capacity Utilization	101.1%	ICU Level of Service	G		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	323	767	159	203	854	73	107	160	52	209
Future Volume (vph)	323	767	159	203	854	73	107	160	52	209
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6		7	4		8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	8	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0	10.0	8.0	10.0	10.0	10.0
Minimum Split (s)	11.0	35.1	35.1	12.5	35.1	35.1	11.0	41.4	41.4	41.4
Total Split (s)	27.0	48.6	48.6	17.4	39.0	39.0	11.0	54.0	43.0	43.0
Total Split (%)	22.5%	40.5%	40.5%	14.5%	32.5%	32.5%	9.2%	45.0%	35.8%	35.8%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	65.2	46.1	46.1	53.6	37.5	37.5	48.8	45.4	34.4	34.4
Actuated g/C Ratio	0.54	0.38	0.38	0.45	0.31	0.31	0.41	0.38	0.29	0.29
v/c Ratio	0.92	0.60	0.27	0.71	0.81	0.14	0.56	0.42	0.18	0.94
Control Delay	72.0	44.9	23.9	31.0	46.4	2.6	33.5	26.6	32.9	67.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.0	44.9	23.9	31.0	46.4	2.6	33.5	26.6	32.9	67.9
LOS	E	D	C	C	D	A	C	C	C	E
Approach Delay		49.2			40.8			28.7		64.0
Approach LOS		D			D			C		E

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
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: 0.94		
Intersection Signal Delay: 46.2	Intersection LOS: D	
Intersection Capacity Utilization 89.3%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	767	159	203	854	73	107	160	80	52	209	205
Future Volume (vph)	323	767	159	203	854	73	107	160	80	52	209	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	3471	1369	1444	3505	1453	1492	1535		1641	1497	
Flt Permitted	0.11	1.00	1.00	0.28	1.00	1.00	0.19	1.00		0.60	1.00	
Satd. Flow (perm)	197	3471	1369	422	3505	1453	296	1535		1043	1497	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	336	799	166	211	890	76	111	167	83	54	218	214
RTOR Reduction (vph)	0	0	82	0	0	52	0	16	0	0	30	0
Lane Group Flow (vph)	336	799	84	211	890	24	111	234	0	54	402	0
Confl. Peds. (#/hr)	4					4						
Heavy Vehicles (%)	10%	4%	18%	25%	3%	8%	21%	14%	25%	10%	18%	17%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	62.1	46.1	46.1	50.4	37.4	37.4	45.4	45.4		34.4	34.4	
Effective Green, g (s)	62.1	46.1	46.1	50.4	37.4	37.4	45.4	45.4		34.4	34.4	
Actuated g/C Ratio	0.52	0.38	0.38	0.42	0.31	0.31	0.38	0.38		0.29	0.29	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	2.5	6.0	6.0	2.5	2.3		2.3	2.3	
Lane Grp Cap (vph)	363	1333	525	287	1092	452	191	580		298	429	
v/s Ratio Prot	c0.17	0.23		0.08	0.25		c0.04	0.15			c0.27	
v/s Ratio Perm	c0.31		0.06	0.23		0.02	0.18			0.05		
v/c Ratio	0.93	0.60	0.16	0.74	0.82	0.05	0.58	0.40		0.18	0.94	
Uniform Delay, d1	33.4	29.6	24.2	24.1	38.1	28.9	27.8	27.4		32.2	41.7	
Progression Factor	1.63	1.41	3.12	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	24.4	1.6	0.5	8.9	6.7	0.2	3.7	0.3		0.2	27.8	
Delay (s)	78.8	43.2	76.3	32.9	44.8	29.1	31.4	27.6		32.4	69.6	
Level of Service	E	D	E	C	D	C	C	C		C	E	
Approach Delay (s)		56.6			41.7			28.8			65.4	
Approach LOS		E			D			C			E	

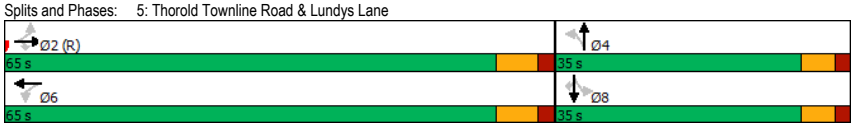
Intersection Summary					
HCM 2000 Control Delay	49.6	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.93				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
Intersection Capacity Utilization	89.3%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	203	607	107	38	422	77	140	44	85	82
Future Volume (vph)	203	607	107	38	422	77	140	44	85	82
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	65.0	65.0	65.0	65.0	65.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	68.8	68.8	68.8	68.8	68.8	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.45	0.52	0.11	0.09	0.44	0.39	0.63	0.29	0.31	0.29
Control Delay	12.0	10.4	4.0	7.1	8.9	39.8	43.8	38.2	36.6	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.0	10.4	4.0	7.1	8.9	39.8	43.8	38.2	36.6	9.6
LOS	B	B	A	A	A	D	D	D	D	A
Approach Delay		10.0			8.8		42.6		26.4	
Approach LOS		A			A		D		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 15.8		Intersection LOS: B	
Intersection Capacity Utilization 88.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	203	607	107	38	422	78	77	140	37	44	85	82
Future Volume (vph)	203	607	107	38	422	78	77	140	37	44	85	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		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)	1582	1810	1495	1752	1760		1612	1607		1671	1638	1252
Flt Permitted	0.42	1.00	1.00	0.35	1.00		0.70	1.00		0.51	1.00	1.00
Satd. Flow (perm)	701	1810	1495	648	1760		1184	1607		893	1638	1252
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	218	653	115	41	454	84	83	151	40	47	91	88
RTOR Reduction (vph)	0	0	17	0	5	0	0	11	0	0	0	72
Lane Group Flow (vph)	218	653	98	41	533	0	83	180	0	47	91	16
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	14%	5%	8%	3%	6%	0%	12%	17%	5%	8%	16%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Effective Green, g (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	482	1245	1028	445	1210		215	292		162	298	227
v/s Ratio Prot		c0.36			0.30			c0.11			0.06	
v/s Ratio Perm	0.31		0.07	0.06			0.07			0.05		0.01
v/c Ratio	0.45	0.52	0.10	0.09	0.44		0.39	0.62		0.29	0.31	0.07
Uniform Delay, d1	7.1	7.6	5.2	5.2	7.0		36.0	37.7		35.3	35.4	33.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.0	1.6	0.2	0.4	1.2		2.4	5.5		2.1	1.2	0.3
Delay (s)	10.1	9.2	5.4	5.6	8.1		38.4	43.2		37.4	36.6	34.2
Level of Service	B	A	A	A	A		D	D		D	D	C
Approach Delay (s)		9.0			8.0			41.8			35.8	
Approach LOS		A			A			D			D	

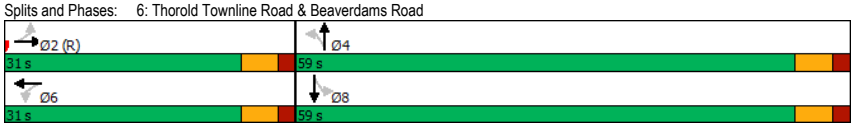
Intersection Summary					
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.54				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	88.2%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	126	52	170	24	317	11	538
Future Volume (vph)	19	126	52	170	24	317	11	538
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	30.5	30.5	30.5	30.5	34.0	34.0	30.5	30.5
Total Split (s)	31.0	31.0	31.0	31.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%
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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		25.0		25.0		53.0		53.0
Actuated g/C Ratio		0.28		0.28		0.59		0.59
v/c Ratio		0.36		0.57		0.50		0.68
Control Delay		27.9		33.0		12.4		17.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		27.9		33.0		12.4		17.2
LOS		C		C		B		B
Approach Delay		27.9		33.0		12.4		17.2
Approach LOS		C		C		B		B

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 19.8		Intersection LOS: B	
Intersection Capacity Utilization 66.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Thorold Townline Road & Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	126	16	52	170	22	24	317	83	11	538	19
Future Volume (vph)	19	126	16	52	170	22	24	317	83	11	538	19
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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.97			1.00	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1804			1838			1625			1568	
Flt Permitted		0.94			0.90			0.95			0.99	
Satd. Flow (perm)		1714			1669			1551			1554	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	137	17	57	185	24	26	345	90	12	585	21
RTOR Reduction (vph)	0	4	0	0	4	0	0	10	0	0	1	0
Lane Group Flow (vph)	0	171	0	0	262	0	0	451	0	0	617	0
Confl. Peds. (#/hr)			5	5			6					6
Heavy Vehicles (%)	5%	2%	9%	0%	1%	2%	0%	18%	0%	9%	21%	9%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		25.0			25.0			53.0			53.0	
Effective Green, g (s)		25.0			25.0			53.0			53.0	
Actuated g/C Ratio		0.28			0.28			0.59			0.59	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		476			463			913			915	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.16			0.29			c0.40	
v/c Ratio		0.36			0.57			0.49			0.67	
Uniform Delay, d1		26.1			27.9			10.7			12.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.1			5.0			1.9			4.0	
Delay (s)		28.2			32.8			12.6			16.6	
Level of Service		C			C			B			B	
Approach Delay (s)		28.2			32.8			12.6			16.6	
Approach LOS		C			C			B			B	

Intersection Summary					
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.64				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	66.7%	ICU Level of Service	C		
Analysis Period (min)	15				

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	458	0	0	419
Future Volume (Veh/h)	0	0	458	0	0	419
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	492	0	0	451
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	943	492			492	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	943	492			492	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	294	581			1082	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	492	0	451
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.29	0.00	0.27
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	27.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	24	1255	736	211	1223	627	5	178	4	6	28
Future Volume (vph)	24	1255	736	211	1223	627	5	178	4	6	28
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	8.0	28.9	29.7	29.7	29.7	17.7	17.7	17.7
Total Split (s)	55.0	55.0	55.0	14.0	69.0	33.3	33.3	33.3	17.7	17.7	17.7
Total Split (%)	45.8%	45.8%	45.8%	11.7%	57.5%	27.8%	27.8%	27.8%	14.8%	14.8%	14.8%
Yellow Time (s)	5.4	5.4	5.4	3.0	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	0.0	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	3.0	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag	Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	52.2	52.2	52.2	73.1	69.2	25.6	25.6	25.6	10.0	10.0	10.0
Actuated g/C Ratio	0.44	0.44	0.44	0.61	0.58	0.21	0.21	0.21	0.08	0.08	0.08
v/c Ratio	0.22	0.86	0.85	0.85	0.63	0.92	0.94	0.40	0.03	0.04	0.12
Control Delay	29.6	38.4	25.2	55.8	28.5	78.2	80.8	8.3	51.2	51.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	38.4	25.2	55.8	28.5	78.2	80.8	8.3	51.2	51.3	1.0
LOS	C	D	C	E	C	E	F	A	D	D	A
Approach Delay		33.5			32.5		63.9			13.9	
Approach LOS		C			C		E			B	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 38.7		Intersection LOS: D	
Intersection Capacity Utilization 92.6%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1255	736	211	1223	1	627	5	178	4	6	28
Future Volume (vph)	24	1255	736	211	1223	1	627	5	178	4	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1433	3539	1568	1671	3539		1681	1680	1482	1805	1810	1525
Flt Permitted	0.18	1.00	1.00	0.08	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	267	3539	1568	135	3539		1681	1680	1482	1805	1810	1525
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	1321	775	222	1287	1	660	5	187	4	6	29
RTOR Reduction (vph)	0	0	239	0	0	0	0	0	147	0	0	28
Lane Group Flow (vph)	25	1321	536	222	1288	0	330	335	40	4	6	1
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	26%	2%	3%	8%	2%	0%	2%	30%	9%	0%	5%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	49.1	49.1	49.1	66.1	66.1		25.6	25.6	25.6	6.0	6.0	6.0
Effective Green, g (s)	49.1	49.1	49.1	66.1	66.1		25.6	25.6	25.6	6.0	6.0	6.0
Actuated g/C Ratio	0.41	0.41	0.41	0.55	0.55		0.21	0.21	0.21	0.05	0.05	0.05
Clearance Time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	109	1448	641	253	1949		358	358	316	90	90	76
v/s Ratio Prot		0.37		c0.10	0.36		0.20	c0.20		0.00	c0.00	
v/s Ratio Perm	0.09		0.34	c0.38					0.03			0.00
v/c Ratio	0.23	0.91	0.84	0.88	0.66		0.92	0.94	0.13	0.04	0.07	0.02
Uniform Delay, d1	23.1	33.4	31.8	34.6	19.0		46.2	46.4	38.2	54.3	54.3	54.2
Progression Factor	1.00	1.00	1.00	1.45	1.48		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.8	10.3	12.3	17.0	1.0		29.3	31.9	0.3	0.4	0.5	0.2
Delay (s)	28.0	43.7	44.1	67.2	29.2		75.5	78.3	38.5	54.6	54.9	54.4
Level of Service	C	D	D	E	C		E	E	D	D	D	D
Approach Delay (s)		43.6			34.8			68.5			54.5	
Approach LOS		D			C			E			D	

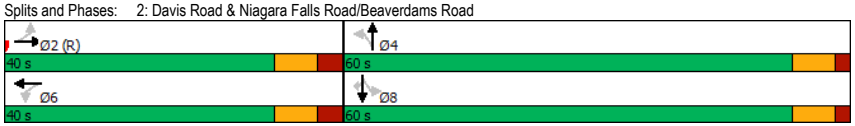
Intersection Summary					
HCM 2000 Control Delay	45.5	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.86				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		25.3	
Intersection Capacity Utilization	92.6%	ICU Level of Service		F	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	90	32	60	44	26	582	170	691	105
Future Volume (vph)	90	32	60	44	26	582	170	691	105
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	40.0	40.0	40.0	40.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		46.8		46.8	38.1	38.1	38.1	38.1	38.1
Actuated g/C Ratio		0.47		0.47	0.38	0.38	0.38	0.38	0.38
v/c Ratio		0.28		0.35	0.13	0.52	0.79	0.57	0.17
Control Delay		20.0		16.1	17.5	23.9	49.3	25.4	3.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		20.0		16.1	17.5	23.9	49.3	25.4	3.2
LOS		B		B	B	C	D	C	A
Approach Delay		20.0		16.1		23.7		27.2	
Approach LOS		B		B		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 24.1		Intersection LOS: C	
Intersection Capacity Utilization 78.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	32	31	60	44	147	26	582	41	170	691	105
Future Volume (vph)	90	32	31	60	44	147	26	582	41	170	691	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.97			0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1667			1698		1805	3316		1770	3343	1583
Flt Permitted		0.70			0.88		0.28	1.00		0.32	1.00	1.00
Satd. Flow (perm)		1203			1520		531	3316		598	3343	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	34	33	63	46	155	27	613	43	179	727	111
RTOR Reduction (vph)	0	7	0	0	40	0	0	7	0	0	0	69
Lane Group Flow (vph)	0	155	0	0	224	0	27	649	0	179	727	42
Heavy Vehicles (%)	2%	2%	30%	2%	1%	2%	0%	8%	5%	2%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		46.8			46.8		38.1	38.1		38.1	38.1	38.1
Effective Green, g (s)		46.8			46.8		38.1	38.1		38.1	38.1	38.1
Actuated g/C Ratio		0.47			0.47		0.38	0.38		0.38	0.38	0.38
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		563			711		202	1263		227	1273	603
v/s Ratio Prot								0.20			0.22	
v/s Ratio Perm		0.13			c0.15		0.05			c0.30		0.03
v/c Ratio		0.27			0.32		0.13	0.51		0.79	0.57	0.07
Uniform Delay, d1		16.2			16.6		20.2	23.8		27.4	24.5	19.7
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.2			1.2		0.6	0.7		18.8	1.0	0.1
Delay (s)		17.4			17.8		20.8	24.5		46.2	25.5	19.8
Level of Service		B			B		C	C		D	C	B
Approach Delay (s)		17.4			17.8			24.4			28.5	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.53				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		15.1	
Intersection Capacity Utilization	78.5%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	208	717	42	718	216	46	141	239	125	184
Future Volume (vph)	208	717	42	718	216	46	141	239	125	184
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	5	2		6			4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	4	4	3	8	8
Switch Phase										
Minimum Initial (s)	5.0	22.0	22.0	22.0	22.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	8.0	36.0	36.0	36.0	36.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	14.0	78.0	64.0	64.0	64.0	32.0	32.0	10.0	42.0	42.0
Total Split (%)	11.7%	65.0%	53.3%	53.3%	53.3%	26.7%	26.7%	8.3%	35.0%	35.0%
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	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)	3.0	7.0	7.0	7.0	7.0	7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max	Max	Max	Max	Max	Max	None	Max	Max
Act Effct Green (s)	75.0	71.0	57.0	57.0	57.0	25.0	25.0	39.0	35.0	35.0
Actuated g/C Ratio	0.62	0.59	0.48	0.48	0.48	0.21	0.21	0.32	0.29	0.29
v/c Ratio	0.87	0.74	0.23	0.87	0.29	0.19	0.58	0.83	0.26	0.33
Control Delay	51.7	23.2	23.4	43.1	8.7	41.6	47.3	58.5	34.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	23.2	23.4	43.1	8.7	41.6	47.3	58.5	34.4	6.0
LOS	D	C	C	D	A	D	D	E	C	A
Approach Delay		29.4		34.7			46.2		35.3	
Approach LOS		C		C			D		D	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 95		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.87		
Intersection Signal Delay: 34.0	Intersection LOS: C	
Intersection Capacity Utilization 112.7%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	208	717	28	42	718	216	46	141	51	239	125	184
Future Volume (vph)	208	717	28	42	718	216	46	141	51	239	125	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1818		1611	1863	1473	1736	1652		1702	1743	1553
Flt Permitted	0.10	1.00		0.25	1.00	1.00	0.67	1.00		0.44	1.00	1.00
Satd. Flow (perm)	188	1818		418	1863	1473	1226	1652		790	1743	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	224	771	30	45	772	232	49	152	55	257	134	198
RTOR Reduction (vph)	0	1	0	0	0	99	0	11	0	0	0	140
Lane Group Flow (vph)	224	800	0	45	772	133	49	196	0	257	134	58
Confl. Peds. (#/hr)	2		1	1		2			1	1		
Heavy Vehicles (%)	5%	3%	26%	12%	2%	7%	4%	9%	12%	6%	9%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	71.0	71.0		57.0	57.0	57.0	25.0	25.0		35.0	35.0	35.0
Effective Green, g (s)	71.0	71.0		57.0	57.0	57.0	25.0	25.0		35.0	35.0	35.0
Actuated g/C Ratio	0.59	0.59		0.48	0.48	0.48	0.21	0.21		0.29	0.29	0.29
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	4.0		4.0	4.0	4.0	2.0	2.0		3.0	2.0	2.0
Lane Grp Cap (vph)	251	1075		198	884	699	255	344		283	508	452
v/s Ratio Prot	c0.08	0.44			0.41			0.12		c0.05	0.08	
v/s Ratio Perm	c0.45			0.11		0.09	0.04			c0.21		0.04
v/c Ratio	0.89	0.74		0.23	0.87	0.19	0.19	0.57		0.91	0.26	0.13
Uniform Delay, d1	27.6	17.9		18.5	28.3	18.2	39.2	42.7		41.0	32.6	31.3
Progression Factor	1.00	1.00		1.07	1.15	1.81	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.2	4.7		2.2	9.8	0.5	1.7	6.7		30.4	1.3	0.6
Delay (s)	57.8	22.5		22.1	42.4	33.5	40.8	49.4		71.4	33.9	31.9
Level of Service	E	C		C	D	C	D	D		E	C	C
Approach Delay (s)		30.3			39.5			47.7			49.6	
Approach LOS		C			D			D			D	

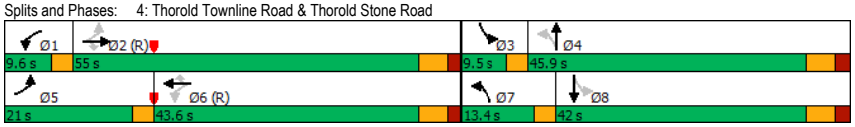
Intersection Summary				
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	112.7%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	231	1128	78	97	954	35	184	198	48	198
Future Volume (vph)	231	1128	78	97	954	35	184	198	48	198
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6		7	4	3	8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	3	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.0	35.1	35.1	8.0	35.1	35.1	8.0	41.4	8.0	41.4
Total Split (s)	21.0	55.0	55.0	9.6	43.6	43.6	13.4	45.9	9.5	42.0
Total Split (%)	17.5%	45.8%	45.8%	8.0%	36.3%	36.3%	11.2%	38.3%	7.9%	35.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	3.0	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	0.0	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	3.0	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	63.1	50.3	50.3	51.3	41.4	41.4	50.9	39.9	43.8	34.1
Actuated g/C Ratio	0.53	0.42	0.42	0.43	0.34	0.34	0.42	0.33	0.36	0.28
v/c Ratio	0.85	0.78	0.11	0.61	0.81	0.06	0.86	0.73	0.18	0.95
Control Delay	60.8	59.5	19.4	34.8	43.2	0.2	58.0	40.8	21.6	67.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.8	59.5	19.4	34.8	43.2	0.2	58.0	40.8	21.6	67.0
LOS	E	E	B	C	D	A	E	D	C	E
Approach Delay		57.5			41.1			46.3		62.8
Approach LOS		E			D			D		E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.95			
Intersection Signal Delay: 51.6		Intersection LOS: D	
Intersection Capacity Utilization 93.5%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



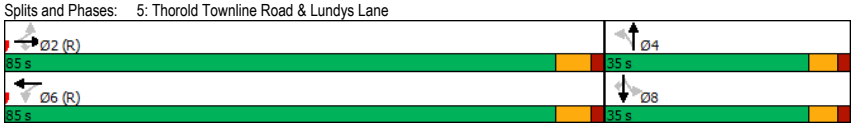
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	1128	78	97	954	35	184	198	187	48	198	272
Future Volume (vph)	231	1128	78	97	954	35	184	198	187	48	198	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3574	1568	1671	3539	1538	1736	1567		1671	1659	
Flt Permitted	0.10	1.00	1.00	0.11	1.00	1.00	0.12	1.00		0.35	1.00	
Satd. Flow (perm)	167	3574	1568	197	3539	1538	218	1567		622	1659	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	241	1175	81	101	994	36	192	206	195	50	206	283
RTOR Reduction (vph)	0	0	47	0	0	24	0	28	0	0	42	0
Lane Group Flow (vph)	241	1175	34	101	994	12	192	373	0	50	447	0
Heavy Vehicles (%)	8%	1%	3%	8%	2%	5%	4%	10%	15%	8%	4%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	59.4	49.7	49.7	47.5	40.8	40.8	48.1	39.9		39.9	34.7	
Effective Green, g (s)	59.4	49.7	49.7	47.5	40.8	40.8	48.1	39.9		39.9	34.7	
Actuated g/C Ratio	0.49	0.41	0.41	0.40	0.34	0.34	0.40	0.33		0.33	0.29	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	3.0	6.0	6.0	3.0	2.3		3.0	2.3	
Lane Grp Cap (vph)	278	1480	649	160	1203	522	218	521		252	479	
v/s Ratio Prot	c0.11	0.33		0.04	0.28		c0.08	0.24		0.01	0.27	
v/s Ratio Perm	c0.32		0.02	0.21		0.01	c0.28			0.06		
v/c Ratio	0.87	0.79	0.05	0.63	0.83	0.02	0.88	0.72		0.20	0.93	
Uniform Delay, d1	32.1	30.7	21.0	25.9	36.3	26.3	28.5	35.1		28.1	41.5	
Progression Factor	1.60	1.84	11.66	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.9	2.6	0.1	7.9	6.6	0.1	31.2	4.2		0.4	25.2	
Delay (s)	66.3	59.1	245.4	33.8	42.9	26.4	59.7	39.2		28.5	66.7	
Level of Service	E	E	F	C	D	C	E	D		C	E	
Approach Delay (s)		70.4			41.6			45.9			63.2	
Approach LOS		E			D			D			E	

Intersection Summary					
HCM 2000 Control Delay	56.8	HCM 2000 Level of Service		E	
HCM 2000 Volume to Capacity ratio	0.91				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
Intersection Capacity Utilization	93.5%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	114	673	117	44	711	117	142	95	118	183
Future Volume (vph)	114	673	117	44	711	117	142	95	118	183
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	85.7	85.7	85.7	85.7	85.7	21.3	21.3	21.3	21.3	21.3
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.41	0.57	0.11	0.12	0.65	0.66	0.66	0.77	0.41	0.46
Control Delay	13.9	13.5	4.5	7.6	13.3	61.1	51.7	79.8	46.3	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	13.5	4.5	7.6	13.3	61.1	51.7	79.8	46.3	8.8
LOS	B	B	A	A	B	E	D	E	D	A
Approach Delay		12.4			13.0		55.3		37.0	
Approach LOS		B			B		E		D	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
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: 0.77		
Intersection Signal Delay: 22.1	Intersection LOS: C	
Intersection Capacity Utilization 98.4%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	673	117	44	711	63	117	142	50	95	118	183
Future Volume (vph)	114	673	117	44	711	63	117	142	50	95	118	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		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)	1626	1827	1553	1752	1818		1687	1748		1736	1776	1524
Flt Permitted	0.25	1.00	1.00	0.31	1.00		0.62	1.00		0.42	1.00	1.00
Satd. Flow (perm)	430	1827	1553	569	1818		1102	1748		762	1776	1524
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	125	740	129	48	781	69	129	156	55	104	130	201
RTOR Reduction (vph)	0	0	15	0	2	0	0	12	0	0	0	165
Lane Group Flow (vph)	125	740	114	48	848	0	129	199	0	104	130	36
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	11%	4%	4%	3%	2%	15%	7%	6%	0%	4%	7%	6%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	85.7	85.7	85.7	85.7	85.7		21.3	21.3		21.3	21.3	21.3
Effective Green, g (s)	85.7	85.7	85.7	85.7	85.7		21.3	21.3		21.3	21.3	21.3
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	307	1304	1109	406	1298		195	310		135	315	270
v/s Ratio Prot		0.41			c0.47			0.11			0.07	
v/s Ratio Perm	0.29		0.07	0.08			0.12			c0.14		0.02
v/c Ratio	0.41	0.57	0.10	0.12	0.65		0.66	0.64		0.77	0.41	0.13
Uniform Delay, d1	6.9	8.2	5.3	5.4	9.2		46.0	45.8		47.0	43.8	41.6
Progression Factor	1.22	1.30	1.09	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	1.1	0.1	0.6	2.6		10.7	6.1		26.7	1.8	0.5
Delay (s)	11.0	11.8	5.9	5.9	11.8		56.6	52.0		73.7	45.6	42.0
Level of Service	B	B	A	A	B		E	D		E	D	D
Approach Delay (s)		11.0			11.4			53.7			50.7	
Approach LOS		B			B			D			D	

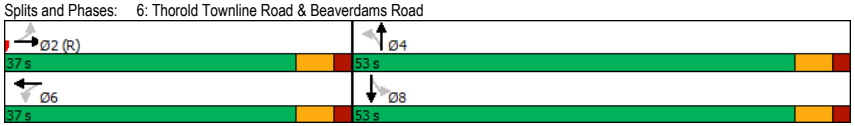
Intersection Summary					
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	98.4%	ICU Level of Service		F	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	27	205	124	178	32	538	20	317
Future Volume (vph)	27	205	124	178	32	538	20	317
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	32.0	32.0	32.0	32.0	35.0	35.0	35.0	35.0
Total Split (s)	37.0	37.0	37.0	37.0	53.0	53.0	53.0	53.0
Total Split (%)	41.1%	41.1%	41.1%	41.1%	58.9%	58.9%	58.9%	58.9%
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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None
Act Effct Green (s)		34.1		34.1		43.9		43.9
Actuated g/C Ratio		0.38		0.38		0.49		0.49
v/c Ratio		0.41		0.69		0.87		0.50
Control Delay		23.7		33.1		33.2		17.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		23.7		33.1		33.2		17.0
LOS		C		C		C		B
Approach Delay		23.7		33.1		33.2		17.0
Approach LOS		C		C		C		B

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.87		
Intersection Signal Delay: 27.9	Intersection LOS: C	
Intersection Capacity Utilization 96.3%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 6: Thorold Townline Road & Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	205	16	124	178	21	32	538	94	20	317	41
Future Volume (vph)	27	205	16	124	178	21	32	538	94	20	317	41
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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.98			0.99	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1830			1803			1710			1758	
Flt Permitted		0.93			0.73			0.97			0.95	
Satd. Flow (perm)		1720			1333			1656			1670	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	29	220	17	133	191	23	34	578	101	22	341	44
RTOR Reduction (vph)	0	2	0	0	2	0	0	7	0	0	5	0
Lane Group Flow (vph)	0	264	0	0	345	0	0	706	0	0	402	0
Confl. Peds. (#/hr)	1		5	5		1	8		3	3		8
Heavy Vehicles (%)	10%	1%	4%	4%	1%	0%	4%	10%	0%	2%	6%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		34.1			34.1			43.9			43.9	
Effective Green, g (s)		34.1			34.1			43.9			43.9	
Actuated g/C Ratio		0.38			0.38			0.49			0.49	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		651			505			807			814	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.26			c0.43			0.24	
v/c Ratio		0.40			0.68			0.87			0.49	
Uniform Delay, d1		20.5			23.4			20.6			15.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.9			7.3			11.2			1.0	
Delay (s)		22.4			30.7			31.8			16.5	
Level of Service		C			C			C			B	
Approach Delay (s)		22.4			30.7			31.8			16.5	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	513	0	0	468
Future Volume (Veh/h)	0	0	513	0	0	468
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	564	0	0	514
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	1078	564			564	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1078	564			564	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	244	529			1018	

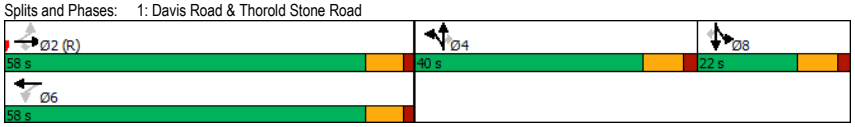
Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	564	0	514
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.33	0.00	0.30
Queue Length 95th (m)	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		30.3%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	21	1010	336	114	1122	649	15	257	1	2	18
Future Volume (vph)	21	1010	336	114	1122	649	15	257	1	2	18
Turn Type	Perm	NA	Perm	Perm	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	6	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	28.9	28.9	29.7	29.7	29.7	21.7	21.7	21.7
Total Split (s)	58.0	58.0	58.0	58.0	58.0	40.0	40.0	40.0	22.0	22.0	22.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	48.3%	33.3%	33.3%	33.3%	18.3%	18.3%	18.3%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	67.6	67.6	67.6	67.6	67.6	30.7	30.7	30.7	10.0	10.0	10.0
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56	0.26	0.26	0.26	0.08	0.08	0.08
v/c Ratio	0.15	0.55	0.38	0.68	0.63	0.86	0.87	0.47	0.01	0.01	0.09
Control Delay	20.4	20.0	7.1	47.1	27.7	64.3	65.3	7.0	51.0	51.0	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	20.0	7.1	47.1	27.7	64.3	65.3	7.0	51.0	51.0	0.9
LOS	C	B	A	D	C	E	E	A	D	D	A
Approach Delay		16.8			29.4		48.7			7.7	
Approach LOS		B			C		D			A	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 29.4		Intersection LOS: C	
Intersection Capacity Utilization 90.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	1010	336	114	1122	6	649	15	257	1	2	18
Future Volume (vph)	21	1010	336	114	1122	6	649	15	257	1	2	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1641	3374	1442	1530	3336		1559	1554	1475	1388	1624	1337
Flt Permitted	0.15	1.00	1.00	0.19	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	264	3374	1442	310	3336		1559	1554	1475	1388	1624	1337
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	1052	350	119	1169	6	676	16	268	1	2	19
RTOR Reduction (vph)	0	0	114	0	0	0	0	0	199	0	0	18
Lane Group Flow (vph)	22	1052	236	119	1175	0	345	347	69	1	2	1
Confl. Peds. (#/hr)	1					1	1		1	1		1
Heavy Vehicles (%)	10%	7%	12%	18%	8%	30%	10%	28%	8%	30%	17%	19%
Turn Type	Perm	NA	Perm	Perm	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	63.0	63.0	63.0	63.0	63.0		30.7	30.7	30.7	4.0	4.0	4.0
Effective Green, g (s)	63.0	63.0	63.0	63.0	63.0		30.7	30.7	30.7	4.0	4.0	4.0
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.26	0.26	0.26	0.03	0.03	0.03
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	138	1771	757	162	1751		398	397	377	46	54	44
v/s Ratio Prot		0.31			0.35		0.22	c0.22		0.00	c0.00	
v/s Ratio Perm	0.08		0.16	c0.38					0.05			0.00
v/c Ratio	0.16	0.59	0.31	0.73	0.67		0.87	0.87	0.18	0.02	0.04	0.01
Uniform Delay, d1	14.8	19.7	16.2	22.0	20.9		42.7	42.8	34.9	56.1	56.1	56.1
Progression Factor	1.00	1.00	1.00	1.44	1.34		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	1.5	1.1	14.9	1.1		18.7	19.7	0.4	0.3	0.5	0.2
Delay (s)	17.2	21.1	17.3	46.6	29.1		61.4	62.5	35.3	56.4	56.6	56.3
Level of Service	B	C	B	D	C		E	E	D	E	E	E
Approach Delay (s)		20.1			30.7			54.5			56.4	
Approach LOS		C			C			D			E	

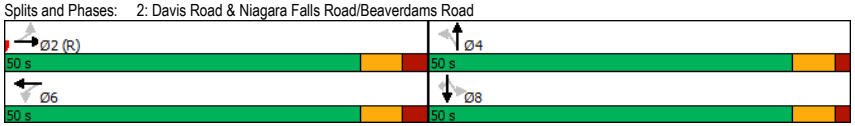
Intersection Summary					
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.75				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.3		
Intersection Capacity Utilization	90.8%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	110	31	29	17	25	626	82	329	44
Future Volume (vph)	110	31	29	17	25	626	82	329	44
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		53.1		53.1	31.8	31.8	31.8	31.8	31.8
Actuated g/C Ratio		0.53		0.53	0.32	0.32	0.32	0.32	0.32
v/c Ratio		0.27		0.25	0.11	0.71	0.57	0.37	0.10
Control Delay		15.1		6.3	22.8	33.4	42.9	26.7	4.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.1		6.3	22.8	33.4	42.9	26.7	4.8
LOS		B		A	C	C	D	C	A
Approach Delay		15.1		6.3		33.0		27.5	
Approach LOS		B		A		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 25.7		Intersection LOS: C	
Intersection Capacity Utilization 88.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



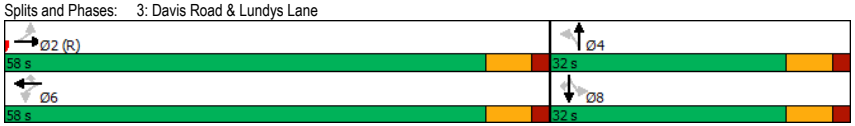
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	31	18	29	17	166	25	626	46	82	329	44
Future Volume (vph)	110	31	18	29	17	166	25	626	46	82	329	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.98			0.89		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1658			1631		1388	3122		1787	2983	1392
Flt Permitted		0.67			0.94		0.53	1.00		0.25	1.00	1.00
Satd. Flow (perm)		1150			1549		778	3122		476	2983	1392
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	33	19	31	18	175	26	659	48	86	346	46
RTOR Reduction (vph)	0	4	0	0	68	0	0	6	0	0	0	31
Lane Group Flow (vph)	0	164	0	0	156	0	26	701	0	86	346	15
Heavy Vehicles (%)	10%	7%	7%	7%	12%	2%	30%	15%	7%	1%	21%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		53.1			53.1		31.8	31.8		31.8	31.8	31.8
Effective Green, g (s)		53.1			53.1		31.8	31.8		31.8	31.8	31.8
Actuated g/C Ratio		0.53			0.53		0.32	0.32		0.32	0.32	0.32
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		610			822		247	992		151	948	442
v/s Ratio Prot								c0.22			0.12	
v/s Ratio Perm		c0.14			0.10		0.03			0.18		0.01
v/c Ratio		0.27			0.19		0.11	0.71		0.57	0.36	0.03
Uniform Delay, d1		12.8			12.2		24.1	30.0		28.4	26.3	23.5
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.1			0.5		0.4	2.9		7.9	0.5	0.1
Delay (s)		13.9			12.7		24.5	32.9		36.3	26.8	23.6
Level of Service		B			B		C	C		D	C	C
Approach Delay (s)		13.9			12.7			32.6			28.2	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.43				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.1		
Intersection Capacity Utilization	88.4%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	153	635	45	502	132	22	139	136	94	159
Future Volume (vph)	153	635	45	502	132	22	139	136	94	159
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		2		6			4		8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	2	2	6	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	22.0	22.0	22.0	22.0	22.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	58.0	58.0	58.0	58.0	58.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	64.4%	64.4%	64.4%	64.4%	64.4%	35.6%	35.6%	35.6%	35.6%	35.6%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	57.5	57.5	57.5	57.5	57.5	18.5	18.5	18.5	18.5	18.5
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.64	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.36	0.60	0.16	0.48	0.14	0.11	0.56	0.72	0.32	0.40
Control Delay	11.5	13.0	9.5	11.1	1.9	28.0	36.1	52.5	32.0	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	13.0	9.5	11.1	1.9	28.0	36.1	52.5	32.0	7.5
LOS	B	B	A	B	A	C	D	D	C	A
Approach Delay		12.7		9.2			35.2		29.2	
Approach LOS		B		A			D		C	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.72		
Intersection Signal Delay: 16.7	Intersection LOS: B	
Intersection Capacity Utilization 101.2%	ICU Level of Service G	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	635	18	45	502	132	22	139	30	136	94	159
Future Volume (vph)	153	635	18	45	502	132	22	139	30	136	94	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1656	1828		1467	1743	1442	1444	1519		1530	1532	1392
Flt Permitted	0.41	1.00		0.31	1.00	1.00	0.69	1.00		0.61	1.00	1.00
Satd. Flow (perm)	716	1828		474	1743	1442	1052	1519		984	1532	1392
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)	163	676	19	48	534	140	23	148	32	145	100	169
RTOR Reduction (vph)	0	1	0	0	0	51	0	10	0	0	0	134
Lane Group Flow (vph)	163	694	0	48	534	89	23	170	0	145	100	35
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	3%	19%	23%	9%	12%	25%	20%	30%	18%	24%	16%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	57.5	57.5		57.5	57.5	57.5	18.5	18.5		18.5	18.5	18.5
Effective Green, g (s)	57.5	57.5		57.5	57.5	57.5	18.5	18.5		18.5	18.5	18.5
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.21	0.21		0.21	0.21	0.21
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	457	1167		302	1113	921	216	312		202	314	286
v/s Ratio Prot		c0.38			0.31			0.11			0.07	
v/s Ratio Perm	0.23			0.10		0.06	0.02			c0.15		0.02
v/c Ratio	0.36	0.59		0.16	0.48	0.10	0.11	0.55		0.72	0.32	0.12
Uniform Delay, d1	7.6	9.5		6.5	8.5	6.3	29.0	32.0		33.3	30.4	29.1
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	2.2	2.2		1.1	1.5	0.2	0.1	1.1		9.7	0.2	0.1
Delay (s)	9.8	11.7		7.7	9.9	6.5	29.1	33.0		43.0	30.6	29.2
Level of Service	A	B		A	A	A	C	C		D	C	C
Approach Delay (s)		11.3			9.1			32.6			34.4	
Approach LOS		B			A			C			C	

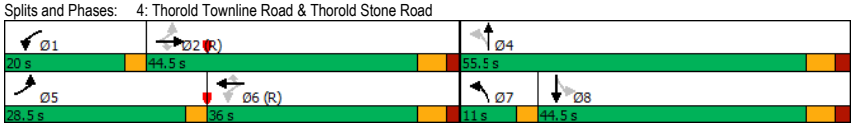
Intersection Summary					
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.62				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		14.0	
Intersection Capacity Utilization	101.2%	ICU Level of Service		G	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	323	767	178	217	854	73	133	180	52	222
Future Volume (vph)	323	767	178	217	854	73	133	180	52	222
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6		7	4		8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	8	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0	10.0	8.0	10.0	10.0	10.0
Minimum Split (s)	11.0	35.1	35.1	12.5	35.1	35.1	11.0	41.4	41.4	41.4
Total Split (s)	28.5	44.5	44.5	20.0	36.0	36.0	11.0	55.5	44.5	44.5
Total Split (%)	23.8%	37.1%	37.1%	16.7%	30.0%	30.0%	9.2%	46.3%	37.1%	37.1%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	4.1	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	63.6	42.3	42.3	53.9	35.6	35.6	50.4	47.0	36.0	36.0
Actuated g/C Ratio	0.53	0.35	0.35	0.45	0.30	0.30	0.42	0.39	0.30	0.30
v/c Ratio	0.93	0.65	0.34	0.77	0.86	0.15	0.75	0.51	0.18	0.95
Control Delay	73.6	49.4	25.7	38.2	50.7	2.8	49.0	28.1	31.8	67.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.6	49.4	25.7	38.2	50.7	2.8	49.0	28.1	31.8	67.7
LOS	E	D	C	D	D	A	D	C	C	E
Approach Delay		52.2			45.3			34.9		63.8
Approach LOS		D			D			C		E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.95			
Intersection Signal Delay: 49.3		Intersection LOS: D	
Intersection Capacity Utilization 90.7%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	323	767	178	217	854	73	133	180	100	52	222	205
Future Volume (vph)	323	767	178	217	854	73	133	180	100	52	222	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	3471	1292	1399	3505	1453	1347	1412		1641	1474	
Flt Permitted	0.10	1.00	1.00	0.24	1.00	1.00	0.19	1.00		0.58	1.00	
Satd. Flow (perm)	179	3471	1292	359	3505	1453	272	1412		1004	1474	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	336	799	185	226	890	76	139	188	104	54	231	214
RTOR Reduction (vph)	0	0	91	0	0	54	0	17	0	0	29	0
Lane Group Flow (vph)	336	799	94	226	890	22	139	275	0	54	416	0
Confl. Peds. (#/hr)	4					4						
Heavy Vehicles (%)	10%	4%	25%	29%	3%	8%	34%	22%	37%	10%	22%	17%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	60.5	42.3	42.3	50.7	35.5	35.5	47.0	47.0		36.0	36.0	
Effective Green, g (s)	60.5	42.3	42.3	50.7	35.5	35.5	47.0	47.0		36.0	36.0	
Actuated g/C Ratio	0.50	0.35	0.35	0.42	0.30	0.30	0.39	0.39		0.30	0.30	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		6.4	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	2.5	6.0	6.0	2.5	2.3		2.3	2.3	
Lane Grp Cap (vph)	358	1223	455	283	1036	429	178	553		301	442	
v/s Ratio Prot	c0.17	0.23		0.10	0.25		c0.05	0.19			c0.28	
v/s Ratio Perm	c0.30		0.07	0.24		0.02	0.25			0.05		
v/c Ratio	0.94	0.65	0.21	0.80	0.86	0.05	0.78	0.50		0.18	0.94	
Uniform Delay, d1	35.2	32.7	27.1	24.7	39.9	30.2	28.7	27.6		31.1	41.0	
Progression Factor	1.43	1.38	2.71	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	28.7	2.3	0.9	14.1	9.2	0.2	19.0	0.4		0.2	28.4	
Delay (s)	79.1	47.4	74.4	38.8	49.1	30.5	47.6	28.0		31.2	69.4	
Level of Service	E	D	E	D	D	C	D	C		C	E	
Approach Delay (s)		59.3			46.0			34.3			65.3	
Approach LOS		E			D			C			E	

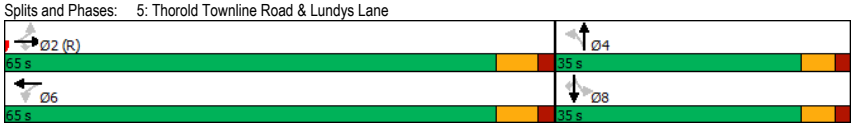
Intersection Summary					
HCM 2000 Control Delay	52.4	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
Intersection Capacity Utilization	90.7%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	205	607	107	38	422	77	140	45	85	84
Future Volume (vph)	205	607	107	38	422	77	140	45	85	84
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	65.0	65.0	65.0	65.0	65.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	68.8	68.8	68.8	68.8	68.8	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.46	0.52	0.11	0.09	0.44	0.39	0.63	0.30	0.31	0.30
Control Delay	12.1	10.4	4.0	7.1	8.9	39.8	43.8	38.3	36.6	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	10.4	4.0	7.1	8.9	39.8	43.8	38.3	36.6	9.6
LOS	B	B	A	A	A	D	D	D	D	A
Approach Delay		10.0			8.8		42.6		26.3	
Approach LOS		A			A		D		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 15.8		Intersection LOS: B	
Intersection Capacity Utilization 88.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	607	107	38	422	79	77	140	37	45	85	84
Future Volume (vph)	205	607	107	38	422	79	77	140	37	45	85	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		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)	1582	1810	1495	1752	1760		1612	1607		1671	1638	1252
Flt Permitted	0.42	1.00	1.00	0.35	1.00		0.70	1.00		0.51	1.00	1.00
Satd. Flow (perm)	700	1810	1495	648	1760		1184	1607		893	1638	1252
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	220	653	115	41	454	85	83	151	40	48	91	90
RTOR Reduction (vph)	0	0	17	0	5	0	0	11	0	0	0	74
Lane Group Flow (vph)	220	653	98	41	534	0	83	180	0	48	91	16
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	14%	5%	8%	3%	6%	0%	12%	17%	5%	8%	16%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Effective Green, g (s)	68.8	68.8	68.8	68.8	68.8		18.2	18.2		18.2	18.2	18.2
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	481	1245	1028	445	1210		215	292		162	298	227
v/s Ratio Prot		c0.36			0.30			c0.11			0.06	
v/s Ratio Perm	0.31		0.07	0.06			0.07			0.05		0.01
v/c Ratio	0.46	0.52	0.10	0.09	0.44		0.39	0.62		0.30	0.31	0.07
Uniform Delay, d1	7.1	7.6	5.2	5.2	7.0		36.0	37.7		35.4	35.4	33.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.1	1.6	0.2	0.4	1.2		2.4	5.5		2.1	1.2	0.3
Delay (s)	10.2	9.2	5.4	5.6	8.2		38.4	43.2		37.5	36.6	34.2
Level of Service	B	A	A	A	A		D	D		D	D	C
Approach Delay (s)		9.0			8.0			41.8			35.9	
Approach LOS		A			A			D			D	

Intersection Summary					
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.54				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0		
Intersection Capacity Utilization	88.2%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

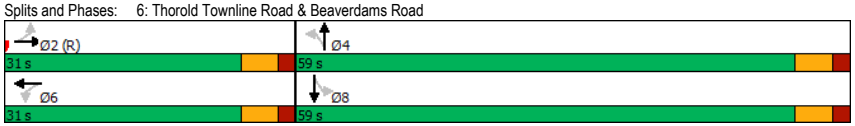
Timings <2035 Total - Thorold Townline> AM Peak Hour

6: Thorold Townline Road & Beaverdams Road 09-23-2021

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	126	52	170	24	383	11	584
Future Volume (vph)	19	126	52	170	24	383	11	584
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	30.5	30.5	30.5	30.5	34.0	34.0	30.5	30.5
Total Split (s)	31.0	31.0	31.0	31.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%
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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)		25.0		25.0		53.0		53.0
Actuated g/C Ratio		0.28		0.28		0.59		0.59
v/c Ratio		0.36		0.57		0.62		0.76
Control Delay		27.9		33.0		15.6		20.7
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		27.9		33.0		15.6		20.7
LOS		C		C		B		C
Approach Delay		27.9		33.0		15.6		20.7
Approach LOS		C		C		B		C

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 21.8		Intersection LOS: C	
Intersection Capacity Utilization 70.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Thorold Townline Road & Beaverdams Road



HCM Signalized Intersection Capacity Analysis<2035 Total - Thorold Townline> AM Peak Hour

6: Thorold Townline Road & Beaverdams Road 09-23-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	126	16	52	170	22	24	383	83	11	584	19
Future Volume (vph)	19	126	16	52	170	22	24	383	83	11	584	19
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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.98			1.00	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1804			1838			1500			1509	
Flt Permitted		0.94			0.90			0.95			0.99	
Satd. Flow (perm)		1714			1669			1435			1494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	137	17	57	185	24	26	416	90	12	635	21
RTOR Reduction (vph)	0	4	0	0	4	0	0	8	0	0	1	0
Lane Group Flow (vph)	0	171	0	0	262	0	0	524	0	0	667	0
Confl. Peds. (#/hr)			5	5			6					6
Heavy Vehicles (%)	5%	2%	9%	0%	1%	2%	0%	30%	0%	9%	26%	9%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		25.0			25.0			53.0			53.0	
Effective Green, g (s)		25.0			25.0			53.0			53.0	
Actuated g/C Ratio		0.28			0.28			0.59			0.59	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		476			463			845			879	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.16			0.37			c0.45	
v/c Ratio		0.36			0.57			0.62			0.76	
Uniform Delay, d1		26.1			27.9			12.0			13.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.1			5.0			3.4			6.1	
Delay (s)		28.2			32.8			15.4			19.8	
Level of Service		C			C			B			B	
Approach Delay (s)		28.2			32.8			15.4			19.8	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	70.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	66	458	3	46	419
Future Volume (Veh/h)	3	66	458	3	46	419
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	3	71	492	3	49	451
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	1042	494			495	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1042	494			495	
tC, single (s)	6.4	7.1			4.9	
tC, 2 stage (s)						
tF (s)	3.5	4.1			2.9	
p0 queue free %	99	84			94	
cM capacity (veh/h)	240	436			754	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	74	495	49	451
Volume Left	3	0	49	0
Volume Right	71	3	0	0
cSH	422	1700	754	1700
Volume to Capacity	0.18	0.29	0.06	0.27
Queue Length 95th (m)	5.0	0.0	1.7	0.0
Control Delay (s)	15.3	0.0	10.1	0.0
Lane LOS	C		B	
Approach Delay (s)	15.3	0.0	1.0	
Approach LOS	C			

Intersection Summary				
Average Delay			1.5	
Intersection Capacity Utilization			41.9%	ICU Level of Service A
Analysis Period (min)			15	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	24	1274	736	211	1242	627	5	178	4	6	28
Future Volume (vph)	24	1274	736	211	1242	627	5	178	4	6	28
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6	4	4		8	8	
Permitted Phases	2		2	6				4			8
Detector Phase	2	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.9	28.9	28.9	8.0	28.9	29.7	29.7	29.7	17.7	17.7	17.7
Total Split (s)	55.0	55.0	55.0	14.0	69.0	33.3	33.3	33.3	17.7	17.7	17.7
Total Split (%)	45.8%	45.8%	45.8%	11.7%	57.5%	27.8%	27.8%	27.8%	14.8%	14.8%	14.8%
Yellow Time (s)	5.4	5.4	5.4	3.0	5.4	5.7	5.7	5.7	5.7	5.7	5.7
All-Red Time (s)	1.5	1.5	1.5	0.0	1.5	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	0.0
Total Lost Time (s)	6.9	6.9	6.9	3.0	6.9	7.7	7.7	7.7	7.7	7.7	7.7
Lead/Lag	Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	52.2	52.2	52.2	73.1	69.2	25.6	25.6	25.6	10.0	10.0	10.0
Actuated g/C Ratio	0.44	0.44	0.44	0.61	0.58	0.21	0.21	0.21	0.08	0.08	0.08
v/c Ratio	0.23	0.88	0.86	0.85	0.65	0.92	0.94	0.40	0.03	0.04	0.12
Control Delay	30.3	40.0	25.9	53.4	29.3	78.2	80.8	8.3	51.2	51.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.3	40.0	25.9	53.4	29.3	78.2	80.8	8.3	51.2	51.3	1.0
LOS	C	D	C	D	C	E	F	A	D	D	A
Approach Delay		34.8			32.8		63.9			13.9	
Approach LOS		C			C		E			B	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 39.3		Intersection LOS: D	
Intersection Capacity Utilization 93.1%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Davis Road & Thorold Stone Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1274	736	211	1242	1	627	5	178	4	6	28
Future Volume (vph)	24	1274	736	211	1242	1	627	5	178	4	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1433	3505	1568	1671	3505		1681	1680	1482	1805	1810	1525
Flt Permitted	0.17	1.00	1.00	0.08	1.00		0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	256	3505	1568	135	3505		1681	1680	1482	1805	1810	1525
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	1341	775	222	1307	1	660	5	187	4	6	29
RTOR Reduction (vph)	0	0	235	0	0	0	0	0	147	0	0	28
Lane Group Flow (vph)	25	1341	540	222	1308	0	330	335	40	4	6	1
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	26%	3%	3%	8%	3%	0%	2%	30%	9%	0%	5%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases		2		1	6		4	4		8	8	
Permitted Phases	2		2	6					4			8
Actuated Green, G (s)	49.1	49.1	49.1	66.1	66.1		25.6	25.6	25.6	6.0	6.0	6.0
Effective Green, g (s)	49.1	49.1	49.1	66.1	66.1		25.6	25.6	25.6	6.0	6.0	6.0
Actuated g/C Ratio	0.41	0.41	0.41	0.55	0.55		0.21	0.21	0.21	0.05	0.05	0.05
Clearance Time (s)	6.9	6.9	6.9	3.0	6.9		7.7	7.7	7.7	7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	104	1434	641	253	1930		358	358	316	90	90	76
v/s Ratio Prot		c0.38		c0.10	0.37		0.20	c0.20		0.00	c0.00	
v/s Ratio Perm	0.10		0.34	0.38					0.03			0.00
v/c Ratio	0.24	0.94	0.84	0.88	0.68		0.92	0.94	0.13	0.04	0.07	0.02
Uniform Delay, d1	23.2	33.9	32.0	34.7	19.3		46.2	46.4	38.2	54.3	54.3	54.2
Progression Factor	1.00	1.00	1.00	1.45	1.50		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	12.6	12.7	14.6	0.9		29.3	31.9	0.3	0.4	0.5	0.2
Delay (s)	28.6	46.6	44.7	65.1	30.0		75.5	78.3	38.5	54.6	54.9	54.4
Level of Service	C	D	D	E	C		E	E	D	D	D	D
Approach Delay (s)		45.7			35.1			68.5			54.5	
Approach LOS		D			D			E			D	

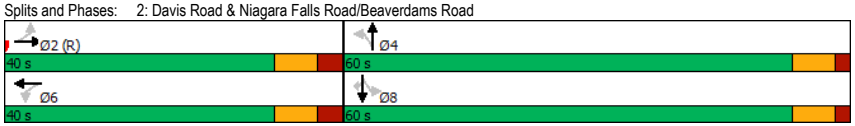
Intersection Summary					
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.87				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		25.3	
Intersection Capacity Utilization	93.1%	ICU Level of Service		F	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	90	32	60	44	26	582	170	691	105
Future Volume (vph)	90	32	60	44	26	582	170	691	105
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		4		8	
Permitted Phases	2		6		4		8		8
Detector Phase	2	2	6	6	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	38.1	38.1	38.1	38.1	32.0	32.0	32.0	32.0	32.0
Total Split (s)	40.0	40.0	40.0	40.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.1	3.1	3.1	3.1	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
Total Lost Time (s)		8.1		8.1	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None	None
Act Effct Green (s)		46.8		46.8	38.1	38.1	38.1	38.1	38.1
Actuated g/C Ratio		0.47		0.47	0.38	0.38	0.38	0.38	0.38
v/c Ratio		0.28		0.35	0.13	0.52	0.79	0.57	0.17
Control Delay		20.0		16.1	17.5	23.9	49.3	25.4	3.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		20.0		16.1	17.5	23.9	49.3	25.4	3.2
LOS		B		B	B	C	D	C	A
Approach Delay		20.0		16.1		23.7		27.2	
Approach LOS		B		B		C		C	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 24.1		Intersection LOS: C	
Intersection Capacity Utilization 78.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Davis Road & Niagara Falls Road/Beaverdams Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	32	31	60	44	147	26	582	41	170	691	105
Future Volume (vph)	90	32	31	60	44	147	26	582	41	170	691	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt		0.97			0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1667			1698		1805	3316		1770	3343	1583
Flt Permitted		0.70			0.88		0.28	1.00		0.32	1.00	1.00
Satd. Flow (perm)		1203			1520		531	3316		598	3343	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	34	33	63	46	155	27	613	43	179	727	111
RTOR Reduction (vph)	0	7	0	0	40	0	0	7	0	0	0	69
Lane Group Flow (vph)	0	155	0	0	224	0	27	649	0	179	727	42
Heavy Vehicles (%)	2%	2%	30%	2%	1%	2%	0%	8%	5%	2%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)		46.8			46.8		38.1	38.1		38.1	38.1	38.1
Effective Green, g (s)		46.8			46.8		38.1	38.1		38.1	38.1	38.1
Actuated g/C Ratio		0.47			0.47		0.38	0.38		0.38	0.38	0.38
Clearance Time (s)		8.1			8.1		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0		5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)		563			711		202	1263		227	1273	603
v/s Ratio Prot								0.20			0.22	
v/s Ratio Perm		0.13			c0.15		0.05			c0.30		0.03
v/c Ratio		0.27			0.32		0.13	0.51		0.79	0.57	0.07
Uniform Delay, d1		16.2			16.6		20.2	23.8		27.4	24.5	19.7
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.2			1.2		0.6	0.7		18.8	1.0	0.1
Delay (s)		17.4			17.8		20.8	24.5		46.2	25.5	19.8
Level of Service		B			B		C	C		D	C	B
Approach Delay (s)		17.4			17.8			24.4			28.5	
Approach LOS		B			B			C			C	

Intersection Summary					
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.53				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		15.1	
Intersection Capacity Utilization	78.5%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	208	719	42	720	216	46	141	239	125	184
Future Volume (vph)	208	719	42	720	216	46	141	239	125	184
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	5	2		6			4	3	8	
Permitted Phases	2		6		6	4		8		8
Detector Phase	5	2	6	6	6	4	4	3	8	8
Switch Phase										
Minimum Initial (s)	5.0	22.0	22.0	22.0	22.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	8.0	36.0	36.0	36.0	36.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	14.0	78.0	64.0	64.0	64.0	32.0	32.0	10.0	42.0	42.0
Total Split (%)	11.7%	65.0%	53.3%	53.3%	53.3%	26.7%	26.7%	8.3%	35.0%	35.0%
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	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)	3.0	7.0	7.0	7.0	7.0	7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max	Max	Max	Max	Max	Max	None	Max	Max
Act Effct Green (s)	75.0	71.0	57.0	57.0	57.0	25.0	25.0	39.0	35.0	35.0
Actuated g/C Ratio	0.62	0.59	0.48	0.48	0.48	0.21	0.21	0.32	0.29	0.29
v/c Ratio	0.88	0.75	0.23	0.88	0.29	0.19	0.58	0.83	0.26	0.33
Control Delay	52.6	23.3	23.4	43.3	8.7	41.6	47.3	58.5	34.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	23.3	23.4	43.3	8.7	41.6	47.3	58.5	34.4	6.0
LOS	D	C	C	D	A	D	D	E	C	A
Approach Delay		29.7		34.8			46.2		35.3	
Approach LOS		C		C			D		D	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green		
Natural Cycle: 95		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.88		
Intersection Signal Delay: 34.1	Intersection LOS: C	
Intersection Capacity Utilization 112.8%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 3: Davis Road & Lundys Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	208	719	28	42	720	216	46	141	51	239	125	184
Future Volume (vph)	208	719	28	42	720	216	46	141	51	239	125	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1818		1611	1863	1473	1736	1652		1702	1743	1553
Flt Permitted	0.10	1.00		0.24	1.00	1.00	0.67	1.00		0.44	1.00	1.00
Satd. Flow (perm)	185	1818		415	1863	1473	1226	1652		790	1743	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	224	773	30	45	774	232	49	152	55	257	134	198
RTOR Reduction (vph)	0	1	0	0	0	99	0	11	0	0	0	140
Lane Group Flow (vph)	224	802	0	45	774	133	49	196	0	257	134	58
Confl. Peds. (#/hr)	2		1	1		2			1	1		
Heavy Vehicles (%)	5%	3%	26%	12%	2%	7%	4%	9%	12%	6%	9%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	71.0	71.0		57.0	57.0	57.0	25.0	25.0		35.0	35.0	35.0
Effective Green, g (s)	71.0	71.0		57.0	57.0	57.0	25.0	25.0		35.0	35.0	35.0
Actuated g/C Ratio	0.59	0.59		0.48	0.48	0.48	0.21	0.21		0.29	0.29	0.29
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	4.0		4.0	4.0	4.0	2.0	2.0		3.0	2.0	2.0
Lane Grp Cap (vph)	250	1075		197	884	699	255	344		283	508	452
v/s Ratio Prot	c0.08	0.44			0.42			0.12		c0.05	0.08	
v/s Ratio Perm	c0.45			0.11		0.09	0.04			c0.21		0.04
v/c Ratio	0.90	0.75		0.23	0.88	0.19	0.19	0.57		0.91	0.26	0.13
Uniform Delay, d1	28.1	17.9		18.6	28.3	18.2	39.2	42.7		41.0	32.6	31.3
Progression Factor	1.00	1.00		1.07	1.15	1.80	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.8	4.7		2.2	9.9	0.5	1.7	6.7		30.4	1.3	0.6
Delay (s)	58.9	22.6		22.0	42.5	33.2	40.8	49.4		71.4	33.9	31.9
Level of Service	E	C		C	D	C	D	D		E	C	C
Approach Delay (s)		30.5			39.6			47.7			49.6	
Approach LOS		C			D			D			D	

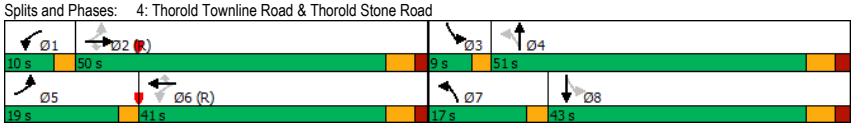
Intersection Summary				
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	112.8%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	231	1128	97	111	954	35	203	211	48	211
Future Volume (vph)	231	1128	97	111	954	35	203	211	48	211
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6		7	4	3	8
Permitted Phases	2		2	6		6	4		8	
Detector Phase	5	2	2	1	6	6	7	4	3	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.0	35.1	35.1	8.0	35.1	35.1	8.0	41.4	8.0	41.4
Total Split (s)	19.0	50.0	50.0	10.0	41.0	41.0	17.0	51.0	9.0	43.0
Total Split (%)	15.8%	41.7%	41.7%	8.3%	34.2%	34.2%	14.2%	42.5%	7.5%	35.8%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	3.0	4.1	3.0	4.1
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.3	0.0	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4	3.0	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	58.2	44.9	44.9	47.4	37.1	37.1	55.8	45.2	44.9	35.6
Actuated g/C Ratio	0.48	0.37	0.37	0.40	0.31	0.31	0.46	0.38	0.37	0.30
v/c Ratio	0.89	0.88	0.17	0.76	0.91	0.06	0.81	0.72	0.16	0.96
Control Delay	67.6	66.7	24.5	53.9	53.3	0.2	47.5	36.8	19.0	68.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.6	66.7	24.5	53.9	53.3	0.2	47.5	36.8	19.0	68.5
LOS	E	E	C	D	D	A	D	D	B	E
Approach Delay		64.0			51.7			40.3		64.0
Approach LOS		E			D			D		E

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.96			
Intersection Signal Delay: 56.4		Intersection LOS: E	
Intersection Capacity Utilization 95.3%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 4: Thorold Townline Road & Thorold Stone Road



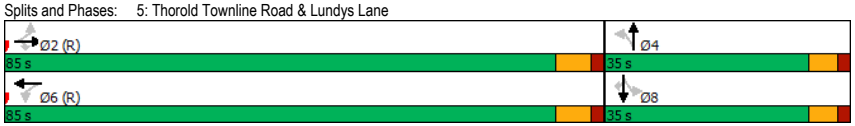
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	1128	97	111	954	35	203	211	201	48	211	272
Future Volume (vph)	231	1128	97	111	954	35	203	211	201	48	211	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3574	1357	1543	3539	1538	1626	1506		1671	1630	
Flt Permitted	0.10	1.00	1.00	0.11	1.00	1.00	0.12	1.00		0.40	1.00	
Satd. Flow (perm)	178	3574	1357	178	3539	1538	211	1506		702	1630	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	241	1175	101	116	994	36	211	220	209	50	220	283
RTOR Reduction (vph)	0	0	64	0	0	25	0	28	0	0	39	0
Lane Group Flow (vph)	241	1175	37	116	994	11	211	401	0	50	464	0
Heavy Vehicles (%)	8%	1%	19%	17%	2%	5%	11%	15%	19%	8%	9%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4			8		
Actuated Green, G (s)	54.5	44.3	44.3	43.7	36.5	36.5	53.0	45.2		41.0	36.2	
Effective Green, g (s)	54.5	44.3	44.3	43.7	36.5	36.5	53.0	45.2		41.0	36.2	
Actuated g/C Ratio	0.45	0.37	0.37	0.36	0.30	0.30	0.44	0.38		0.34	0.30	
Clearance Time (s)	3.0	6.1	6.1	3.0	6.1	6.1	3.0	6.4		3.0	6.4	
Vehicle Extension (s)	2.5	6.0	6.0	3.0	6.0	6.0	3.0	2.3		3.0	2.3	
Lane Grp Cap (vph)	267	1319	500	146	1076	467	255	567		278	491	
v/s Ratio Prot	c0.11	0.33		0.05	0.28		c0.09	0.27		0.01	c0.28	
v/s Ratio Perm	c0.30		0.03	0.24		0.01	0.27			0.05		
v/c Ratio	0.90	0.89	0.07	0.79	0.92	0.02	0.83	0.71		0.18	0.94	
Uniform Delay, d1	33.0	35.6	24.6	29.6	40.4	29.3	26.2	31.8		27.1	40.9	
Progression Factor	1.70	1.75	6.38	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.7	5.5	0.2	25.0	14.3	0.1	19.3	3.6		0.3	27.0	
Delay (s)	76.0	67.7	156.8	54.6	54.7	29.4	45.5	35.3		27.4	67.9	
Level of Service	E	E	F	D	D	C	D	D		C	E	
Approach Delay (s)		75.0			53.9			38.7			64.3	
Approach LOS		E			D			D			E	

Intersection Summary					
HCM 2000 Control Delay	61.2	HCM 2000 Level of Service		E	
HCM 2000 Volume to Capacity ratio	0.93				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		18.5	
Intersection Capacity Utilization	95.3%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	116	673	117	44	711	117	142	96	118	185
Future Volume (vph)	116	673	117	44	711	117	142	96	118	185
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6		4		8	
Permitted Phases	2		2	6		4		8		8
Detector Phase	2	2	2	6	6	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	85.0	85.0	85.0	85.0	85.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	70.8%	70.8%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	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	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)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	85.6	85.6	85.6	85.6	85.6	21.4	21.4	21.4	21.4	21.4
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.42	0.57	0.11	0.12	0.66	0.66	0.65	0.77	0.41	0.46
Control Delay	14.2	13.6	4.5	7.7	13.3	60.7	51.5	80.1	46.2	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	13.6	4.5	7.7	13.3	60.7	51.5	80.1	46.2	8.7
LOS	B	B	A	A	B	E	D	F	D	A
Approach Delay		12.5			13.0		55.0		37.0	
Approach LOS		B			B		E		D	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
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: 0.77			
Intersection Signal Delay: 22.1		Intersection LOS: C	
Intersection Capacity Utilization 98.5%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 5: Thorold Townline Road & Lundys Lane



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	673	117	44	711	64	117	142	50	96	118	185
Future Volume (vph)	116	673	117	44	711	64	117	142	50	96	118	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		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)	1626	1827	1553	1752	1817		1687	1748		1736	1776	1524
Flt Permitted	0.25	1.00	1.00	0.31	1.00		0.62	1.00		0.42	1.00	1.00
Satd. Flow (perm)	428	1827	1553	568	1817		1103	1748		764	1776	1524
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	127	740	129	48	781	70	129	156	55	105	130	203
RTOR Reduction (vph)	0	0	15	0	2	0	0	12	0	0	0	167
Lane Group Flow (vph)	127	740	114	48	849	0	129	199	0	105	130	36
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	11%	4%	4%	3%	2%	15%	7%	6%	0%	4%	7%	6%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	85.6	85.6	85.6	85.6	85.6		21.4	21.4		21.4	21.4	21.4
Effective Green, g (s)	85.6	85.6	85.6	85.6	85.6		21.4	21.4		21.4	21.4	21.4
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.71		0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
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)	305	1303	1107	405	1296		196	311		136	316	271
v/s Ratio Prot		0.41			c0.47			0.11			0.07	
v/s Ratio Perm	0.30		0.07	0.08			0.12			c0.14		0.02
v/c Ratio	0.42	0.57	0.10	0.12	0.65		0.66	0.64		0.77	0.41	0.13
Uniform Delay, d1	7.0	8.3	5.3	5.4	9.3		45.9	45.7		47.0	43.7	41.5
Progression Factor	1.23	1.30	1.08	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	1.1	0.1	0.6	2.6		10.3	6.1		26.7	1.8	0.5
Delay (s)	11.2	11.9	5.9	6.0	11.8		56.2	51.8		73.7	45.5	42.0
Level of Service	B	B	A	A	B		E	D		E	D	D
Approach Delay (s)		11.0			11.5			53.5			50.6	
Approach LOS		B			B			D			D	

Intersection Summary					
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	98.5%	ICU Level of Service		F	
Analysis Period (min)	15				

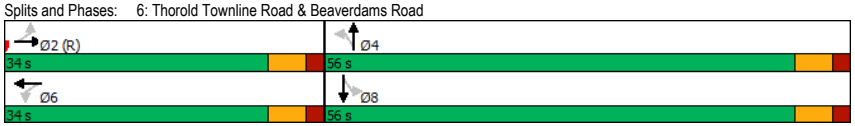
c Critical Lane Group

Timings <2035 Total - Thorold Townline> PM Peak Hour
6: Thorold Townline Road & Beaverdams Road 09-23-2021

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	27	205	124	178	32	584	20	363
Future Volume (vph)	27	205	124	178	32	584	20	363
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	32.0	32.0	32.0	32.0	35.0	35.0	35.0	35.0
Total Split (s)	34.0	34.0	34.0	34.0	56.0	56.0	56.0	56.0
Total Split (%)	37.8%	37.8%	37.8%	37.8%	62.2%	62.2%	62.2%	62.2%
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
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	Max	Max	None	None	None	None
Act Effct Green (s)		30.2		30.2		47.8		47.8
Actuated g/C Ratio		0.34		0.34		0.53		0.53
v/c Ratio		0.46		0.79		0.90		0.55
Control Delay		27.1		43.4		33.9		16.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		27.1		43.4		33.9		16.2
LOS		C		D		C		B
Approach Delay		27.1		43.4		33.9		16.2
Approach LOS		C		D		C		B

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 30.3		Intersection LOS: C	
Intersection Capacity Utilization 99.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 6: Thorold Townline Road & Beaverdams Road



HCM Signalized Intersection Capacity Analysis<2035 Total - Thorold Townline> PM Peak Hour
6: Thorold Townline Road & Beaverdams Road 09-23-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	205	16	124	178	21	32	584	94	20	363	41
Future Volume (vph)	27	205	16	124	178	21	32	584	94	20	363	41
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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.98			0.99	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1830			1803			1636			1630	
Flt Permitted		0.94			0.71			0.97			0.95	
Satd. Flow (perm)		1727			1296			1585			1553	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	29	220	17	133	191	23	34	628	101	22	390	44
RTOR Reduction (vph)	0	3	0	0	3	0	0	7	0	0	5	0
Lane Group Flow (vph)	0	263	0	0	344	0	0	756	0	0	451	0
Confl. Peds. (#/hr)	1		5	5		1	8		3	3		8
Heavy Vehicles (%)	10%	1%	4%	4%	1%	0%	4%	16%	0%	2%	16%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		30.2			30.2			47.8			47.8	
Effective Green, g (s)		30.2			30.2			47.8			47.8	
Actuated g/C Ratio		0.34			0.34			0.53			0.53	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		579			434			841			824	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.27			c0.48			0.29	
v/c Ratio		0.45			0.79			0.90			0.55	
Uniform Delay, d1		23.4			27.1			18.9			14.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.6			13.9			13.2			1.3	
Delay (s)		26.0			40.9			32.1			15.3	
Level of Service		C			D			C			B	
Approach Delay (s)		26.0			40.9			32.1			15.3	
Approach LOS		C			D			C			B	

Intersection Summary					
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.86				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	99.4%	ICU Level of Service	F		
Analysis Period (min)	15				

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	46	513	3	46	468
Future Volume (Veh/h)	3	46	513	3	46	468
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	51	564	3	51	514
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	1182	566			567	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1182	566			567	
tC, single (s)	6.4	7.0			4.9	
tC, 2 stage (s)						
tF (s)	3.5	4.0			2.9	
p0 queue free %	98	87			93	
cM capacity (veh/h)	196	398			702	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	54	567	51	514
Volume Left	3	0	51	0
Volume Right	51	3	0	0
cSH	377	1700	702	1700
Volume to Capacity	0.14	0.33	0.07	0.30
Queue Length 95th (m)	4.0	0.0	1.9	0.0
Control Delay (s)	16.1	0.0	10.5	0.0
Lane LOS	C		B	
Approach Delay (s)	16.1	0.0	1.0	
Approach LOS	C			

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	43.8%	ICU Level of Service	A	
Analysis Period (min)	15			

APPENDIX D

Queueing Analysis

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	T	TR	L	LT	R	T
Maximum Queue (m)	20.2	77.9	71.5	39.1	101.0	105.9	57.3	65.4	9.1	6.2
Average Queue (m)	3.5	35.6	19.8	13.7	35.5	39.9	34.2	37.1	0.3	0.4
95th Queue (m)	12.0	62.1	49.6	29.6	73.1	81.6	54.6	58.1	6.4	3.3
Link Distance (m)		367.0	367.0		315.3	315.3	1000.6	1000.6		265.6
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	105.0			70.0					80.0	
Storage Blk Time (%)			0		1			0		
Queuing Penalty (veh)			0		1			0		

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	34.2	35.7	8.5	46.7	61.4	32.3	55.3	41.7
Average Queue (m)	13.1	12.0	0.8	21.4	25.1	13.5	23.0	7.3
95th Queue (m)	27.2	24.8	4.6	40.3	47.3	26.5	43.1	25.7
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	31.8	46.1	22.2	58.4	15.5	26.7	69.2	41.0	57.0	31.6
Average Queue (m)	12.8	20.6	6.0	19.5	3.1	6.1	32.2	15.8	19.0	8.3
95th Queue (m)	26.6	39.4	17.4	44.6	10.6	18.5	57.7	32.9	42.6	21.4
Link Distance (m)		266.3		1923.8			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)				0			2		0	
Queuing Penalty (veh)				0			0		0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (m)	97.9	57.2	58.9	19.9	19.2	91.7	81.7	20.9	40.5	74.9	32.7	97.7
Average Queue (m)	49.6	18.2	23.2	2.8	4.6	55.6	45.3	7.5	14.7	26.4	10.8	47.3
95th Queue (m)	81.8	42.4	47.2	11.7	14.7	82.7	74.6	17.7	33.7	52.7	26.1	86.5
Link Distance (m)		279.0	279.0			338.6	338.6			1028.0		311.8
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	100.0			50.0	85.0			90.0	80.0		75.0	
Storage Blk Time (%)	0		1			0	0			0		3
Queuing Penalty (veh)	1		0			0	0			0		2

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	24.3	66.5	24.8	14.1	51.9	35.5	70.2	16.1	52.3
Average Queue (m)	8.0	25.0	6.6	4.2	19.8	13.5	30.3	3.3	21.4
95th Queue (m)	18.9	51.7	17.9	12.1	42.1	29.9	58.6	11.7	43.3
Link Distance (m)		1923.8			479.5		741.7		1500.1
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0	
Storage Blk Time (%)		9	0		0	4	17	0	9
Queuing Penalty (veh)		13	2		0	7	11	0	1

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	25.4	17.6	45.1	29.7
Average Queue (m)	12.2	9.8	20.8	14.7
95th Queue (m)	20.6	16.3	35.5	24.9
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement	WB
Directions Served	LR
Maximum Queue (m)	1.4
Average Queue (m)	0.1
95th Queue (m)	1.6
Link Distance (m)	1027.2
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 39

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	LT	L	T
Maximum Queue (m)	26.4	111.1	100.0	36.5	54.0	89.4	94.7	59.4	65.0	8.1	9.3
Average Queue (m)	5.0	55.4	42.3	1.2	21.1	39.7	42.5	34.6	37.6	0.8	1.8
95th Queue (m)	16.4	93.4	82.9	18.3	45.6	75.5	80.1	54.1	59.3	4.4	7.1
Link Distance (m)		367.0	367.0			315.3	315.3	1000.6	1000.6		265.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	105.0			50.0	70.0					30.0	
Storage Blk Time (%)		0	4		0	2					
Queuing Penalty (veh)		0	18		1	1					

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	28.3	50.6	8.6	41.1	53.2	58.1	51.4	34.1
Average Queue (m)	13.0	17.5	0.9	19.2	24.3	28.2	26.5	12.0
95th Queue (m)	25.0	35.4	4.9	35.4	44.0	47.0	45.6	30.2
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	41.0	88.8	21.4	92.8	20.0	26.1	43.8	28.7	45.0	31.2
Average Queue (m)	17.6	43.0	6.1	44.1	5.8	7.9	18.7	10.8	12.6	6.8
95th Queue (m)	33.9	73.7	16.8	77.5	14.1	19.8	36.4	23.3	30.8	19.0
Link Distance (m)		266.3		1923.8			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)		0		2			0			
Queuing Penalty (veh)		0		2			0			

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	T	L	T	T	R	L	TR	L
Maximum Queue (m)	87.1	83.3	90.0	9.2	66.2	19.4	88.4	78.1	14.4	30.0	51.3	35.6
Average Queue (m)	37.1	37.3	42.7	2.4	2.2	5.9	53.4	40.2	3.4	12.6	18.4	9.8
95th Queue (m)	67.1	75.6	83.1	8.3	46.6	15.4	80.9	70.1	10.7	27.0	41.3	24.6
Link Distance (m)		279.0	279.0		315.3		338.6	338.6			1028.0	
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					1							
Storage Bay Dist (m)	100.0			50.0		85.0			90.0	80.0		75.0
Storage Blk Time (%)	0	0	5				0	0				
Queuing Penalty (veh)	1	0	2				0	0				

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB
Directions Served	TR
Maximum Queue (m)	142.5
Average Queue (m)	68.0
95th Queue (m)	121.3
Link Distance (m)	311.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	9
Queuing Penalty (veh)	4

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	27.3	79.7	40.6	21.2	63.8	57.0	67.2	17.2	54.9
Average Queue (m)	7.3	31.3	7.2	6.2	26.6	19.6	28.0	4.9	22.1
95th Queue (m)	19.8	65.8	22.9	15.7	49.5	42.3	52.5	13.7	44.6
Link Distance (m)		1923.8			479.5		741.7		1500.1
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0	
Storage Blk Time (%)		12	0		0	8	14	0	10
Queuing Penalty (veh)		16	1		0	15	14	0	2

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	51.1	23.6	41.4	31.0
Average Queue (m)	19.6	10.5	18.5	15.4
95th Queue (m)	35.2	18.8	32.2	25.9
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement	WB
Directions Served	LR
Maximum Queue (m)	3.9
Average Queue (m)	0.2
95th Queue (m)	1.8
Link Distance (m)	1027.2
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 78

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	13.7	93.5	128.0	37.0	108.8	115.9	96.5	100.8	42.6	3.4	7.4
Average Queue (m)	2.8	52.7	42.4	15.8	62.4	64.1	53.9	58.9	1.7	0.2	0.8
95th Queue (m)	9.7	84.7	92.0	29.8	101.3	104.0	85.2	90.5	17.1	1.6	4.6
Link Distance (m)		367.0	367.0		315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	105.0			70.0					80.0	30.0	
Storage Blk Time (%)		0	3		6			2			
Queuing Penalty (veh)		0	7		5			4			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	45.6	38.0	21.7	69.8	79.9	31.4	61.0	43.7
Average Queue (m)	17.6	14.2	3.4	35.8	42.6	15.8	30.0	13.8
95th Queue (m)	35.4	28.0	13.5	58.6	69.2	28.3	52.0	36.1
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)				0				
Queuing Penalty (veh)				0				

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	58.7	87.9	34.6	80.2	34.8	25.2	69.0	93.8	56.5	34.1
Average Queue (m)	24.1	40.3	9.7	35.9	15.1	4.4	28.7	40.8	17.1	12.8
95th Queue (m)	49.2	73.0	23.9	68.0	28.6	15.1	54.6	75.2	42.1	26.0
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)		0		1			1	0		
Queuing Penalty (veh)		0		3			0	1		

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	T	L	T	T	R	L	TR	L
Maximum Queue (m)	101.8	84.4	86.3	38.6	64.0	38.9	106.9	96.9	25.2	51.1	73.2	31.8
Average Queue (m)	62.6	47.7	51.4	14.9	2.1	18.1	68.4	59.3	9.1	18.3	27.0	11.0
95th Queue (m)	96.3	72.9	75.6	30.8	45.1	34.2	103.5	93.4	20.7	40.5	57.4	26.2
Link Distance (m)		279.0	279.0		315.3		338.6	338.6			1028.0	
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					0							
Storage Bay Dist (m)	100.0			50.0		85.0			90.0	80.0		75.0
Storage Blk Time (%)	1		12	0			4	1			0	
Queuing Penalty (veh)	2		12	0			5	1			0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB
Directions Served	TR
Maximum Queue (m)	142.4
Average Queue (m)	78.7
95th Queue (m)	136.5
Link Distance (m)	311.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	13
Queuing Penalty (veh)	7

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	43.1	66.4	41.2	17.2	58.1	54.9	80.3	16.9	43.0	21.7
Average Queue (m)	19.5	29.3	6.2	5.6	21.9	15.5	31.0	4.7	16.2	7.6
95th Queue (m)	35.9	58.6	21.9	14.5	44.9	36.6	60.9	13.3	34.9	18.8
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)		10	0		0	5	16	0	5	0
Queuing Penalty (veh)		26	1		0	9	11	0	4	0

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	34.0	23.1	52.0	69.8
Average Queue (m)	15.9	11.4	25.4	31.5
95th Queue (m)	26.9	20.1	41.5	58.2
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 99

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	LT	L	T
Maximum Queue (m)	22.7	121.4	118.5	66.4	67.1	104.2	112.2	92.6	89.2	7.6	14.8
Average Queue (m)	5.0	77.0	64.7	3.7	26.0	48.5	50.4	52.7	54.9	0.8	2.5
95th Queue (m)	15.3	118.8	110.0	30.4	51.2	87.9	93.4	78.0	80.7	4.2	9.5
Link Distance (m)		367.0	367.0			315.3	315.3	1000.6	1000.6		265.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	105.0			50.0	70.0					30.0	
Storage Blk Time (%)		2	11	0	1	3			1		
Queuing Penalty (veh)		0	64	0	4	4			2		

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T	R
Maximum Queue (m)	41.9	59.9	13.6	55.7	61.5	64.0	79.1	257.8	7.8
Average Queue (m)	16.1	24.1	3.1	26.5	33.2	29.6	42.6	32.9	0.3
95th Queue (m)	33.9	46.8	9.6	48.4	56.0	52.0	68.9	169.0	4.0
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)			80.0			140.0			180.0
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	86.8	121.0	53.8	140.7	68.0	32.9	76.4	115.7	70.1	43.4
Average Queue (m)	37.0	61.0	8.1	86.2	20.9	11.9	37.0	57.8	24.1	16.9
95th Queue (m)	72.7	103.7	32.6	129.5	51.5	25.7	64.9	94.4	52.4	36.7
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)	2	3		18			4	2	0	
Queuing Penalty (veh)	14	5		48			2	5	0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	B24	WB	WB	WB	WB	NB	NB
Directions Served	L	T	T	R	T	T	L	T	T	R	L	TR
Maximum Queue (m)	76.9	123.9	129.9	16.9	62.7	62.8	29.6	109.0	92.6	14.4	45.4	85.4
Average Queue (m)	38.8	55.4	59.1	5.4	2.1	2.1	11.8	65.5	55.0	3.5	19.8	38.6
95th Queue (m)	64.6	108.6	111.8	13.5	44.2	44.3	24.9	95.8	85.6	10.4	38.8	74.3
Link Distance (m)		279.0	279.0		315.3	315.3		338.6	338.6			1028.0
Upstream Blk Time (%)					0	0						
Queuing Penalty (veh)					0	0						
Storage Bay Dist (m)	100.0			50.0			85.0			90.0	80.0	
Storage Blk Time (%)		2	15					2	0			0
Queuing Penalty (veh)		4	8					1	0			1

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB	SB
Directions Served	L	TR
Maximum Queue (m)	86.6	169.6
Average Queue (m)	10.4	90.4
95th Queue (m)	44.6	153.0
Link Distance (m)		311.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	75.0	
Storage Blk Time (%)		19
Queuing Penalty (veh)		9

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	38.4	59.7	28.3	19.4	80.5	53.4	57.4	30.7	54.0	28.1
Average Queue (m)	13.4	25.9	4.2	5.6	36.7	25.1	31.4	14.7	24.4	14.6
95th Queue (m)	30.5	50.5	16.0	15.2	67.1	43.9	54.1	27.3	43.1	24.2
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)		9	0		2	15	19	3	11	0
Queuing Penalty (veh)		16	0		1	27	21	7	20	0

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	48.3	29.6	71.0	49.9
Average Queue (m)	23.8	14.0	33.2	23.2
95th Queue (m)	40.5	24.0	56.9	38.4
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 264

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	16.2	73.6	68.6	50.1	93.7	104.7	92.0	90.5	26.7	1.9	4.5
Average Queue (m)	3.3	43.0	29.3	19.8	58.3	61.7	58.1	60.5	1.2	0.1	0.3
95th Queue (m)	10.6	69.2	59.4	40.6	93.0	95.2	83.4	85.7	14.0	1.0	2.4
Link Distance (m)		367.0	367.0		315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	105.0			70.0					80.0	30.0	
Storage Blk Time (%)			1		5			2			
Queuing Penalty (veh)			3		4			4			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	42.7	53.2	21.9	67.7	82.0	39.0	65.4	38.1
Average Queue (m)	16.5	19.2	4.0	37.4	44.5	16.3	27.3	11.7
95th Queue (m)	34.3	40.2	14.3	63.3	73.5	32.4	48.6	31.1
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)				0				
Queuing Penalty (veh)				0				

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	58.0	89.4	30.1	80.2	33.4	24.7	63.7	102.6	78.3	36.2
Average Queue (m)	23.4	39.8	8.6	33.2	15.6	6.7	28.6	47.4	20.2	12.9
95th Queue (m)	45.8	72.2	22.3	66.7	28.9	18.4	53.2	95.1	59.4	28.7
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)		0		1			1	4		
Queuing Penalty (veh)		0		2			0	9		

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (m)	123.3	89.7	95.5	40.6	62.4	120.8	114.2	28.0	62.6	97.5	36.4	147.8
Average Queue (m)	65.8	52.4	57.5	16.9	26.1	76.9	67.8	8.9	24.2	35.6	11.0	80.0
95th Queue (m)	101.6	80.8	86.0	32.1	51.0	113.0	104.4	20.1	50.2	72.1	27.4	134.4
Link Distance (m)		279.0	279.0			338.6	338.6			1028.0		311.8
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	100.0			50.0	85.0			90.0	80.0		75.0	
Storage Blk Time (%)	1	0	16	0	0	7	2			1		12
Queuing Penalty (veh)	4	0	19	0	1	9	2			1		6

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	50.2	69.5	26.9	16.6	58.3	47.4	70.4	28.6	38.9	23.2
Average Queue (m)	21.7	32.3	4.6	5.4	25.2	14.8	29.4	6.5	16.2	8.4
95th Queue (m)	41.2	61.8	16.3	13.5	49.8	34.4	56.5	19.6	33.4	19.6
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)		13	0		0	6	14	1	5	0
Queuing Penalty (veh)		33	0		0	10	10	1	4	0

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	52.9	54.4	84.8	80.1
Average Queue (m)	23.8	24.9	39.9	37.9
95th Queue (m)	45.5	45.4	74.2	67.8
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (m)	40.0	32.0
Average Queue (m)	15.6	7.1
95th Queue (m)	28.6	22.6
Link Distance (m)	1027.2	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		2
Queuing Penalty (veh)		6

Network Summary

Network wide Queuing Penalty: 129

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	19.9	138.6	131.1	79.5	47.0	106.2	112.4	76.4	79.7	14.7	6.0	13.2
Average Queue (m)	4.8	73.0	62.8	5.7	22.7	60.6	64.1	48.8	52.8	0.9	1.0	2.2
95th Queue (m)	15.0	116.5	108.9	45.6	41.8	96.5	101.1	68.7	72.3	10.0	4.1	8.3
Link Distance (m)		367.0	367.0			315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	105.0			50.0	70.0					80.0	30.0	
Storage Blk Time (%)		2	12	0		5			0			
Queuing Penalty (veh)		0	70	0		7			0			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T	R
Maximum Queue (m)	33.3	61.1	13.8	51.4	59.5	55.2	74.9	55.5	6.7
Average Queue (m)	15.8	23.2	2.7	25.0	31.4	27.1	43.1	25.0	0.2
95th Queue (m)	30.6	47.5	9.3	46.4	53.8	47.6	66.6	50.8	3.4
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)			80.0			140.0			180.0
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	69.8	119.3	20.8	156.5	65.6	28.4	73.3	118.4	66.7	45.6
Average Queue (m)	30.0	63.4	6.0	85.6	19.2	11.3	36.2	64.9	22.3	15.7
95th Queue (m)	56.6	104.9	16.6	133.8	42.9	23.1	63.0	103.9	48.9	34.2
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)	0	3		17			3	3	0	
Queuing Penalty (veh)	2	5		45			1	9	0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	B24	WB	WB	WB	WB	NB	NB
Directions Served	L	T	T	R	T	T	L	T	T	R	L	TR
Maximum Queue (m)	91.7	134.1	132.0	24.7	128.9	129.8	37.8	118.1	107.4	19.8	72.0	104.0
Average Queue (m)	45.9	87.5	90.0	11.1	6.4	4.3	15.3	69.2	59.0	5.4	27.8	46.9
95th Queue (m)	79.3	125.7	126.2	23.5	80.6	65.8	31.0	103.7	93.8	14.0	56.7	90.1
Link Distance (m)		279.0	279.0		315.3	315.3		338.6	338.6			1028.0
Upstream Blk Time (%)					0	0						
Queuing Penalty (veh)					0	2						
Storage Bay Dist (m)	100.0			50.0			85.0			90.0	80.0	
Storage Blk Time (%)	0	6	32					4	1		0	2
Queuing Penalty (veh)	2	13	23					3	0		1	2

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB	SB
Directions Served	L	TR
Maximum Queue (m)	54.7	152.9
Average Queue (m)	8.5	94.7
95th Queue (m)	33.0	146.4
Link Distance (m)		311.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	75.0	
Storage Blk Time (%)		21
Queuing Penalty (veh)		10

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	42.6	71.4	51.6	21.7	92.9	55.8	71.0	40.1	56.4	37.0
Average Queue (m)	15.5	27.4	5.8	6.3	43.8	23.9	32.3	15.2	24.9	15.1
95th Queue (m)	32.8	60.1	25.7	15.6	78.1	44.3	58.8	31.1	46.9	30.0
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)		10	0		4	14	17	4	10	1
Queuing Penalty (veh)		18	1		2	26	19	11	18	1

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	71.7	59.1	146.5	110.1
Average Queue (m)	27.2	24.0	63.3	49.2
95th Queue (m)	57.5	49.0	113.0	90.9
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (m)	26.3	1.3	25.3
Average Queue (m)	12.1	0.0	4.7
95th Queue (m)	22.9	0.9	18.6
Link Distance (m)	1027.2	1500.2	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			15.0
Storage Blk Time (%)			1
Queuing Penalty (veh)			3

Network Summary

Network wide Queuing Penalty: 296

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	16.4	94.8	144.2	36.2	46.9	115.2	118.0	120.3	123.3	75.4	1.0	6.0
Average Queue (m)	4.1	59.6	51.6	1.2	21.1	75.5	79.6	71.2	76.0	5.9	0.0	0.7
95th Queue (m)	11.8	87.3	118.8	19.1	38.8	106.8	109.5	112.7	116.9	42.6	0.8	4.1
Link Distance (m)		367.0	367.0			315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)			0									
Queuing Penalty (veh)			0									
Storage Bay Dist (m)	105.0			50.0	70.0					80.0	30.0	
Storage Blk Time (%)		0	5	0		9			8			
Queuing Penalty (veh)		0	15	0		10			21			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	45.1	55.7	24.8	81.7	82.4	33.2	63.8	51.5
Average Queue (m)	19.3	21.1	6.5	43.9	47.6	15.8	32.3	17.6
95th Queue (m)	38.5	44.4	18.2	72.4	75.3	29.6	54.1	42.1
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)				0				
Queuing Penalty (veh)				0				

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	58.7	90.3	31.3	85.3	26.0	26.3	65.4	68.4	61.2	46.0
Average Queue (m)	25.3	43.8	12.2	38.1	9.3	6.7	29.9	29.9	17.3	16.8
95th Queue (m)	49.1	75.9	26.7	68.8	20.6	19.0	54.9	56.9	41.6	35.1
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)		0		1			1	0	0	
Queuing Penalty (veh)		0		2			0	1	0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	B24	WB	WB	WB	WB	NB	NB
Directions Served	L	T	T	R	T	T	L	T	T	R	L	TR
Maximum Queue (m)	125.9	105.8	109.0	45.6	65.6	325.7	113.2	154.1	144.6	26.6	61.6	86.1
Average Queue (m)	72.8	62.0	64.8	20.9	2.2	12.9	51.5	81.1	70.8	9.3	23.4	32.2
95th Queue (m)	116.8	92.6	94.7	37.8	46.2	117.6	106.0	136.6	118.0	19.7	47.8	66.1
Link Distance (m)		279.0	279.0		315.3	315.3		338.6	338.6			1028.0
Upstream Blk Time (%)					0	0						
Queuing Penalty (veh)					0	2						
Storage Bay Dist (m)	100.0			50.0			85.0			90.0	80.0	
Storage Blk Time (%)	4	1	26	0			5	6	1		0	0
Queuing Penalty (veh)	15	2	41	0			23	11	1		1	1

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB	SB
Directions Served	L	TR
Maximum Queue (m)	89.2	197.2
Average Queue (m)	13.3	119.1
95th Queue (m)	54.1	192.3
Link Distance (m)		311.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	75.0	
Storage Blk Time (%)		33
Queuing Penalty (veh)		17

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	75.3	86.3	50.4	19.5	77.5	59.1	78.7	37.8	50.6	35.8
Average Queue (m)	31.6	37.8	6.6	5.4	34.8	16.6	25.9	10.9	17.9	11.4
95th Queue (m)	59.6	72.4	24.2	14.0	66.1	36.5	54.1	26.6	37.6	27.4
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)	0	14	0		2	6	14	2	6	1
Queuing Penalty (veh)	0	43	1		1	10	11	4	7	1

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	54.0	72.8	102.5	119.0
Average Queue (m)	24.5	34.3	43.5	56.4
95th Queue (m)	44.8	59.6	84.6	99.1
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 242

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	24.7	146.4	150.1	111.5	72.5	111.3	112.8	114.9	116.3	87.8	3.9	11.8
Average Queue (m)	4.8	85.3	75.6	17.7	34.7	70.6	73.8	78.0	80.3	5.9	0.5	2.3
95th Queue (m)	15.3	130.8	128.5	72.7	60.8	98.6	101.3	109.9	112.3	39.9	2.8	8.2
Link Distance (m)		367.0	367.0			315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	105.0			50.0	70.0					80.0	30.0	
Storage Blk Time (%)		4	17	1	0	7			12			
Queuing Penalty (veh)		1	122	7	3	14			22			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	50.9	62.2	19.3	65.8	71.4	60.2	88.2	80.5
Average Queue (m)	19.1	29.5	6.0	31.0	36.2	26.7	52.0	35.9
95th Queue (m)	38.5	55.6	15.4	56.8	62.9	47.7	79.1	69.7
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)				0				
Queuing Penalty (veh)				0				

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B9	B27
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (m)	119.8	170.0	113.5	239.1	107.4	37.0	84.6	169.3	301.6	127.4	30.4	54.3
Average Queue (m)	66.9	81.2	20.1	121.2	33.4	12.2	41.5	131.7	136.3	32.7	10.8	10.2
95th Queue (m)	140.2	143.4	78.6	219.8	111.5	26.9	71.5	211.1	438.3	80.7	72.3	80.2
Link Distance (m)		266.3		1920.7			458.7		610.8		119.0	466.3
Upstream Blk Time (%)									5		4	
Queuing Penalty (veh)									42		34	
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0		
Storage Blk Time (%)	25	5		26		0	5	60		0		
Queuing Penalty (veh)	187	10		67		0	2	186		0		

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	B24	WB	WB	WB	WB	NB	NB
Directions Served	L	T	T	R	T	T	L	T	T	R	L	TR
Maximum Queue (m)	83.9	144.4	147.4	50.2	187.9	261.7	42.2	131.8	125.5	18.0	91.9	142.3
Average Queue (m)	46.8	105.5	109.2	11.2	8.3	13.1	19.8	89.0	79.7	4.8	35.6	72.4
95th Queue (m)	78.6	139.6	143.1	32.3	91.4	118.7	36.0	126.2	117.5	13.3	75.9	130.0
Link Distance (m)		279.0	279.0		315.3	315.3		338.6	338.6			1028.0
Upstream Blk Time (%)					0	0						
Queuing Penalty (veh)					0	3						
Storage Bay Dist (m)	100.0			50.0			85.0			90.0	80.0	
Storage Blk Time (%)	0	13	38					13	4		0	7
Queuing Penalty (veh)	0	30	30					13	2		1	14

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB	SB
Directions Served	L	TR
Maximum Queue (m)	114.0	277.2
Average Queue (m)	34.4	167.8
95th Queue (m)	135.9	290.4
Link Distance (m)		311.8
Upstream Blk Time (%)		2
Queuing Penalty (veh)		0
Storage Bay Dist (m)	75.0	
Storage Blk Time (%)		54
Queuing Penalty (veh)		26

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	73.4	87.0	49.6	24.7	110.3	61.2	93.1	59.0	67.8	57.2
Average Queue (m)	29.5	43.2	5.9	6.7	60.3	29.8	39.2	24.4	26.2	27.3
95th Queue (m)	60.3	73.8	23.4	17.3	101.3	52.3	67.9	46.4	53.1	50.1
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)	0	15	0		9	29	24	16	10	8
Queuing Penalty (veh)	2	35	0		4	56	28	49	26	17

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	70.8	118.0	244.0	165.9
Average Queue (m)	33.5	49.5	121.0	66.4
95th Queue (m)	64.7	94.3	219.0	132.8
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1034

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	18.4	84.8	73.3	89.9	122.7	107.3	101.0	106.7	49.8	1.9	7.6
Average Queue (m)	3.7	47.1	33.0	43.9	74.0	74.8	67.8	70.9	3.6	0.1	0.6
95th Queue (m)	12.5	75.9	63.6	103.5	104.7	102.0	95.5	97.6	23.8	1.3	4.4
Link Distance (m)		367.0	367.0		315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	105.0			70.0					80.0	30.0	
Storage Blk Time (%)			2	13	9			3			
Queuing Penalty (veh)			6	75	11			9			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T
Maximum Queue (m)	41.9	54.6	30.4	78.2	85.3	36.7	82.0	66.4
Average Queue (m)	19.5	19.5	7.0	43.7	47.1	16.0	36.9	19.8
95th Queue (m)	36.6	41.8	21.4	68.7	75.7	31.3	65.4	47.6
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0			140.0		
Storage Blk Time (%)				0				
Queuing Penalty (veh)				0				

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	50.4	86.7	33.7	79.4	25.0	26.2	65.6	84.2	69.5	62.4
Average Queue (m)	23.1	40.3	11.4	38.2	9.6	5.8	28.6	36.3	20.4	18.3
95th Queue (m)	42.3	74.5	26.1	71.1	20.8	17.7	54.3	69.7	49.5	41.4
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)		0		1			2	1	0	
Queuing Penalty (veh)		0		2			0	2	0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	B24	WB	WB	WB	WB	NB	NB
Directions Served	L	T	T	R	T	T	L	T	T	R	L	TR
Maximum Queue (m)	149.6	110.0	110.2	76.5	62.4	64.6	126.0	151.1	140.4	20.8	76.6	101.2
Average Queue (m)	73.8	67.8	70.9	27.2	2.1	2.2	56.8	102.1	95.3	8.6	33.0	44.7
95th Queue (m)	116.7	98.3	100.9	53.6	44.0	45.5	103.8	145.3	138.0	17.9	66.1	88.7
Link Distance (m)		279.0	279.0		315.3	315.3		338.6	338.6			1028.0
Upstream Blk Time (%)						0						
Queuing Penalty (veh)						1						
Storage Bay Dist (m)	100.0			50.0			85.0			90.0	80.0	
Storage Blk Time (%)	3	1	31	1			5	27	16		0	2
Queuing Penalty (veh)	13	2	55	5			20	58	11		0	3

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB	SB
Directions Served	L	TR
Maximum Queue (m)	146.5	276.7
Average Queue (m)	32.7	147.4
95th Queue (m)	123.0	270.7
Link Distance (m)		311.8
Upstream Blk Time (%)		2
Queuing Penalty (veh)		0
Storage Bay Dist (m)	75.0	
Storage Blk Time (%)		43
Queuing Penalty (veh)		22

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	68.9	98.4	51.3	21.6	77.7	51.2	60.1	26.6	39.3	36.5
Average Queue (m)	33.6	36.0	8.7	6.3	36.3	14.7	28.6	10.0	16.4	12.8
95th Queue (m)	61.1	73.1	34.1	16.0	65.8	34.2	50.7	21.8	35.5	27.3
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)	0	14	0		1	4	16	1	5	1
Queuing Penalty (veh)	0	44	1		1	7	12	2	6	1

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	51.3	65.6	188.7	149.3
Average Queue (m)	25.0	32.8	68.5	68.7
95th Queue (m)	44.4	58.3	148.1	121.6
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (m)	29.2	4.3	31.2
Average Queue (m)	14.7	0.1	8.4
95th Queue (m)	25.3	2.3	23.1
Link Distance (m)	1027.2	1500.2	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			15.0
Storage Blk Time (%)			3
Queuing Penalty (veh)			11

Network Summary

Network wide Queuing Penalty: 382

Intersection: 1: Davis Road & Thorold Stone Road

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	LT	R	L	T
Maximum Queue (m)	19.4	194.8	191.0	103.4	68.8	116.8	115.4	157.8	168.8	122.0	10.0	10.3
Average Queue (m)	4.7	92.0	80.5	16.4	36.2	75.7	77.7	94.7	97.9	18.3	1.2	2.0
95th Queue (m)	14.5	161.4	143.6	71.5	61.6	102.2	103.8	141.5	146.4	86.4	5.9	7.3
Link Distance (m)		367.0	367.0			315.3	315.3	1000.6	1000.6			265.6
Upstream Blk Time (%)		0	0									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (m)	105.0			50.0	70.0					80.0	30.0	
Storage Blk Time (%)		5	20	1	0	9			28			
Queuing Penalty (veh)		1	146	7	3	19			51			

Intersection: 2: Davis Road & Niagara Falls Road/Beaverdams Road

Movement	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T	R
Maximum Queue (m)	52.2	67.3	18.7	66.7	76.4	62.4	93.7	83.5	6.7
Average Queue (m)	20.3	28.9	6.1	32.6	38.2	29.9	51.3	33.8	0.2
95th Queue (m)	40.2	57.6	15.0	58.1	65.1	53.2	79.2	66.8	3.4
Link Distance (m)	244.6	305.1		296.6	296.6		1000.6	1000.6	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)			80.0			140.0			180.0
Storage Blk Time (%)				0					
Queuing Penalty (veh)				0					

Intersection: 3: Davis Road & Lundys Lane

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	82.6	143.3	82.6	191.2	86.9	27.8	81.9	173.1	248.3	81.8
Average Queue (m)	40.8	67.8	13.4	109.6	27.0	12.1	39.5	108.8	75.5	28.7
95th Queue (m)	71.9	115.4	51.7	196.5	90.1	23.2	69.2	190.9	265.3	60.5
Link Distance (m)		266.3		1920.7			458.7		610.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	85.0		65.0		80.0	55.0		90.0		100.0
Storage Blk Time (%)	1	4		23			4	45	0	
Queuing Penalty (veh)	7	8		59			2	138	0	

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	EB	EB	EB	EB	B24	B24	WB	WB	WB	WB	NB	NB
Directions Served	L	T	T	R	T	T	L	T	T	R	L	TR
Maximum Queue (m)	93.2	147.9	158.6	125.3	63.9	64.2	92.1	157.7	148.1	20.6	69.2	119.9
Average Queue (m)	51.7	113.6	116.7	21.1	4.2	6.3	26.9	100.5	91.3	4.9	35.1	68.9
95th Queue (m)	83.2	146.9	150.0	72.3	63.7	79.0	60.1	143.8	135.1	13.9	62.4	113.2
Link Distance (m)		279.0	279.0		315.3	315.3		338.6	338.6			1028.0
Upstream Blk Time (%)					0	0						
Queuing Penalty (veh)					0	0						
Storage Bay Dist (m)	100.0			50.0			85.0			90.0	80.0	
Storage Blk Time (%)	0	20	43				0	21	10		0	6
Queuing Penalty (veh)	0	47	42				0	24	4		0	12

Intersection: 4: Thorold Townline Road & Thorold Stone Road

Movement	SB	SB
Directions Served	L	TR
Maximum Queue (m)	174.9	304.0
Average Queue (m)	56.7	202.6
95th Queue (m)	182.7	346.1
Link Distance (m)		311.8
Upstream Blk Time (%)		13
Queuing Penalty (veh)		0
Storage Bay Dist (m)	75.0	
Storage Blk Time (%)		61
Queuing Penalty (veh)		29

Intersection: 5: Thorold Townline Road & Lundys Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	T	R
Maximum Queue (m)	90.0	86.4	40.5	23.0	125.6	60.9	82.2	66.0	80.4	61.0
Average Queue (m)	36.2	46.5	6.9	7.0	66.8	31.0	36.8	24.3	29.1	25.9
95th Queue (m)	76.0	79.6	27.4	17.4	109.9	55.0	66.4	48.1	61.9	51.6
Link Distance (m)		1920.7			479.5		741.7		1500.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		20.0	55.0		25.0		25.0		30.0
Storage Blk Time (%)	2	16	0		11	29	23	16	11	7
Queuing Penalty (veh)	13	38	1		5	56	26	49	30	15

Intersection: 6: Thorold Townline Road & Beaverdams Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	71.1	112.1	309.2	234.7
Average Queue (m)	34.8	54.9	133.7	100.0
95th Queue (m)	65.3	98.2	253.9	215.5
Link Distance (m)	192.4	256.5	1091.4	1028.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Thorold Townline Road & Uppers Lane

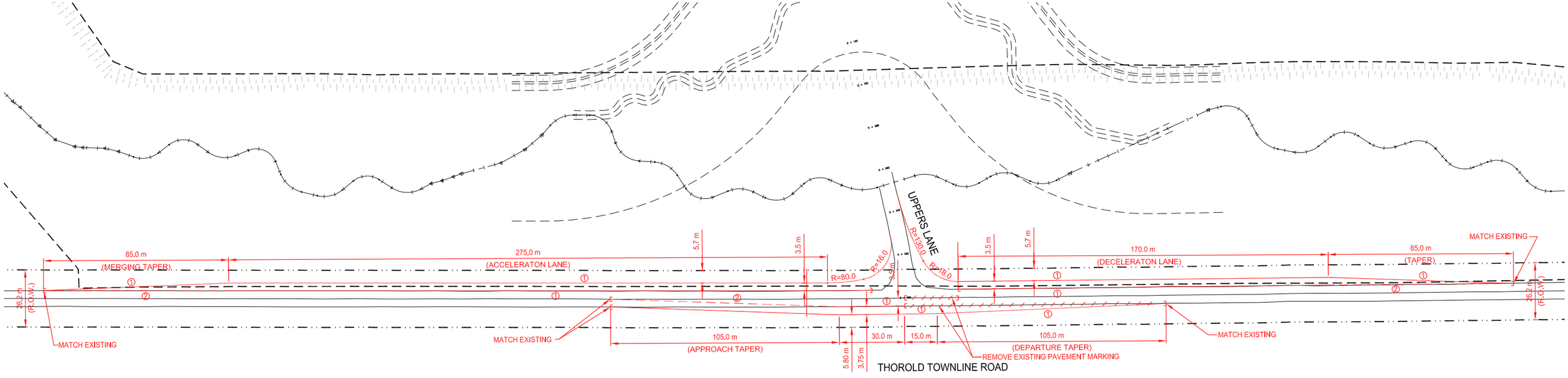
Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (m)	31.2	3.1	24.3
Average Queue (m)	12.0	0.1	7.3
95th Queue (m)	26.2	2.2	20.6
Link Distance (m)	1027.2	1500.2	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			15.0
Storage Blk Time (%)			2
Queuing Penalty (veh)			11

Network Summary

Network wide Queuing Penalty: 843

APPENDIX E

Conceptual Site Access Design and Operations



PAVEMENT MARKING LEGEND			
IDENTIFICATION	TYPE	COLOUR	WIDTH (cm)
1	SOLID	WHITE	10
2	3-3-3 BROKEN	WHITE	10

PAVEMENT MARKING DENOTATION:

Ⓧ PERMANENT

NOTES:

1) MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.

2) THIS DRAWING REPRESENTS A CONCEPTUAL DESIGN ONLY AND DOES NOT CONSIDER DETAILED TOPOGRAPHIC INFORMATION INCLUDING GRADING AND UTILITY LOCATIONS.

3) LANE DIMENSIONS AS SHOWN REPRESENT THE MINIMUM CRITERIA AS PER THE 2017 TRANSPORTATION OF CANADA (TAC) GEOMETRIC DESIGN GUIDELING FOR CANADIAN ROADS. FINAL DIMENSIONS AND LAYOUT / LOCATION OF AUXILIARY LANES TO BE DETERMINED THROUGH DETAILED DESIGN AND CONSULTATION WITH MUNICIPAL STAFF.

TMIG
A TYLIN INTERNATIONAL COMPANY

UPPERS QUARRY - THOROLD TOWNLINE ROAD
UPPERS LANE CONCEPTUAL INTERSECTION DESIGN
OPTION 1: SOUTHBOUND SLIP AROUND LANE

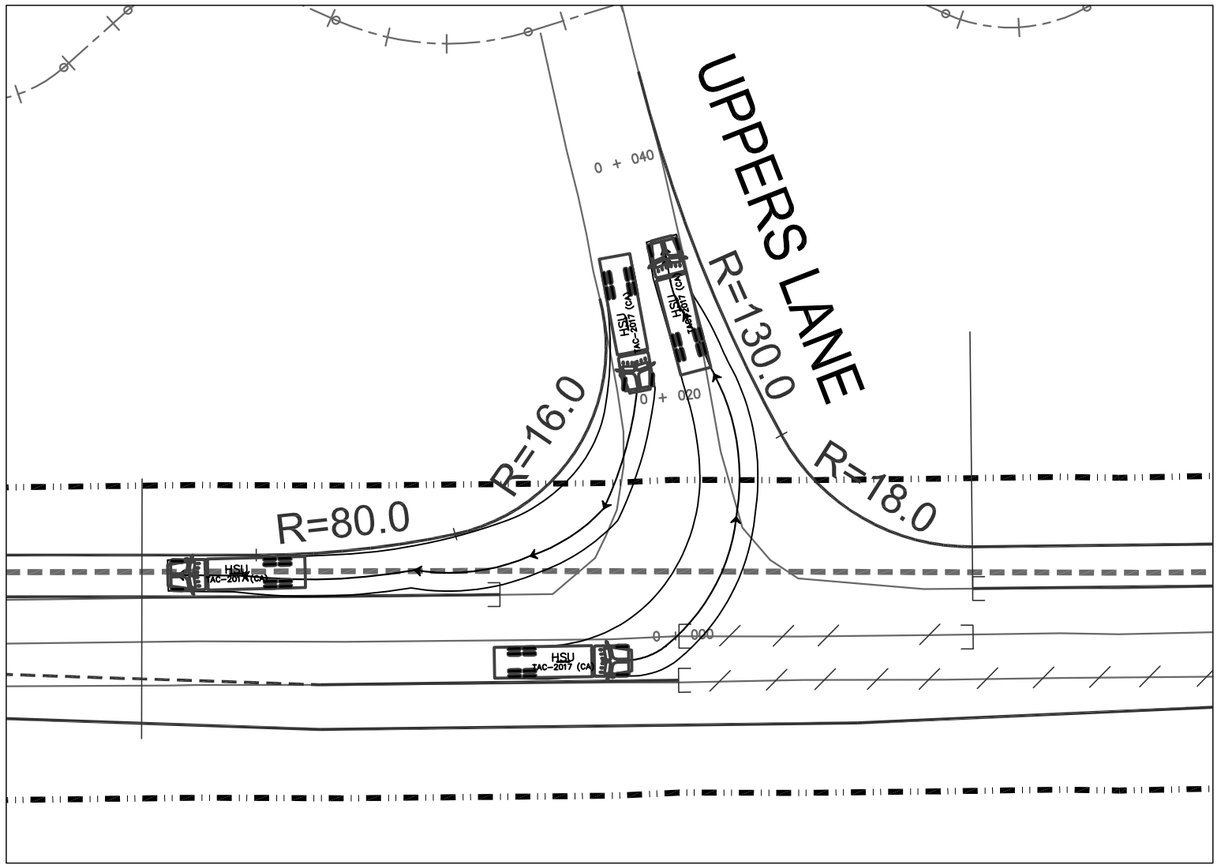
N

PROJECT No: 16137

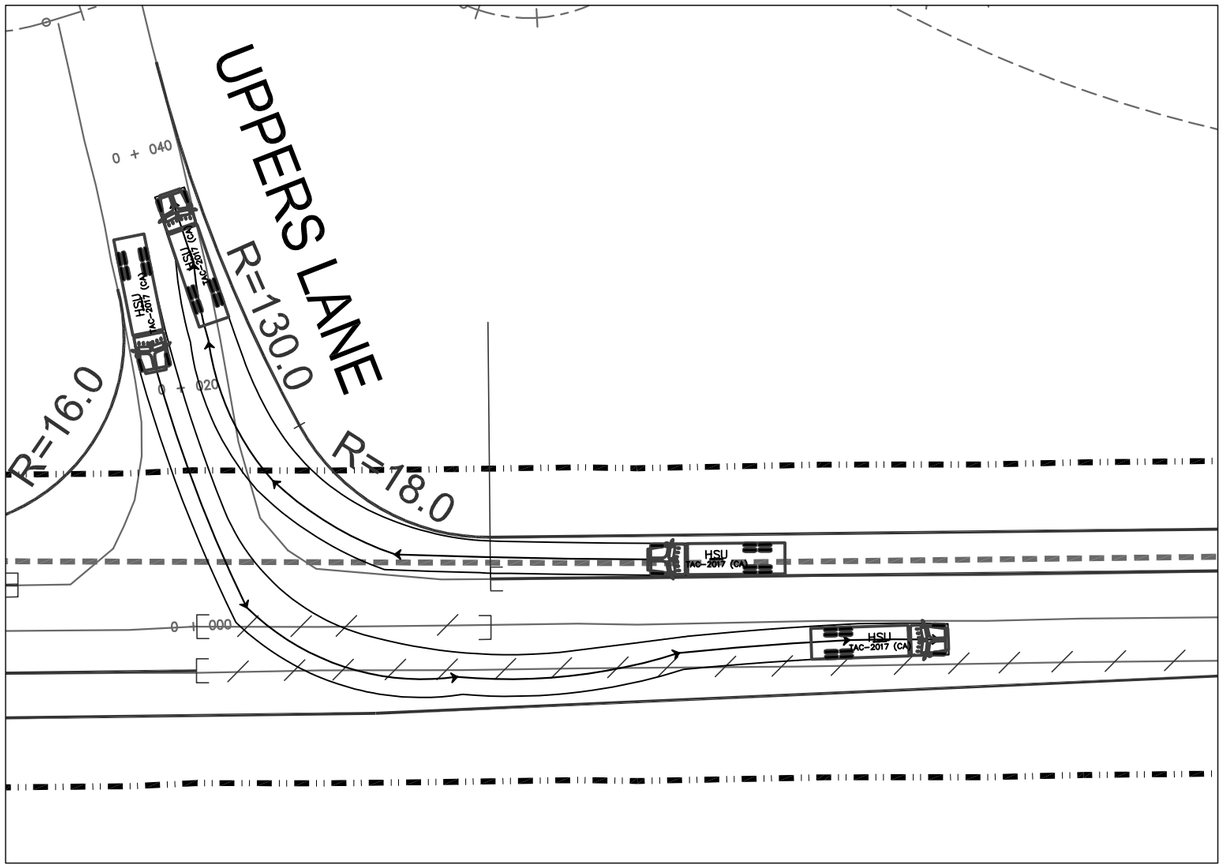
DATE: SEPT. 2021

SCALE: N.T.S.

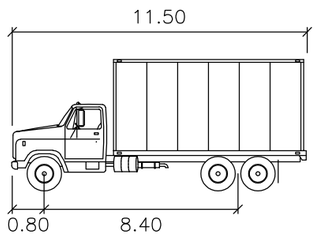
FIGURE CD1



INBOUND LEFT TURN - OUTBOUND RIGHT TURN



INBOUND LEFT TURN - OUTBOUND RIGHT TURN



HSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

NOTES:

1) MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.

2) THIS DRAWING REPRESENTS A CONCEPTUAL DESIGN ONLY AND DOES NOT CONSIDER DETAILED TOPOGRAPHIC INFORMATION INCLUDING GRADING AND UTILITY LOCATIONS.

3) WHILE THE PREFERRED AGGREGATE HAUL ROUTE IS TO THE NORTH VIA THOROLD TOWNLINE (THUS THE PROVISION OF A NORTHBOUND ACCELERATION LANE AND SOUTHBOUND LEFT-TURN LANE IN THE CONCEPTUAL DESIGN), OTHER FORMS OF SITE TRAFFIC MAY ACCESS THE QUARRY FROM THE SOUTH. A DEDICATED NORTHBOUND RIGHT TURN LANE HAS BEEN INCLUDED IN THE CONCEPTUAL DESIGN TO ACCOMMODATE NON-AGGREGATE SITE TRAFFIC WITHOUT IMPEDING NORTHBOUND THROUGH TRAFFIC.

TMIG
A TY·LIN INTERNATIONAL COMPANY

UPPERS QUARRY - THOROLD TOWNLINE ROAD
UPPERS LANE VEHICLE MOVEMENT DIAGRAM
QUARRY TRUCK INBOUND AND OUTBOUND MANOEUVRES

N

PROJECT No: 16137

DATE: SEPT. 2021

SCALE: 1:500

FIGURE VMD1

APPENDIX F

Sightline Assessment

Stopping sight distance is the sum of the distance travelled during the perception and reaction time and the braking distance.

$$SSD = 0.278Vt + 0.039 \frac{V^2}{a} \quad (2.5.2)$$

Where:

SSD = Stopping sight distance (m)
t = Brake reaction time, 2.5 s
V = Design speed (km/h)
a = Deceleration rate (m/s^2)

Table 2.5.2 gives the minimum stopping sight distances on level grade, on wet pavement, for a range of design speeds. These values are used for vertical curve design, intersection geometry and the placement of traffic control devices. The stopping sight distances quoted in **Table 2.5.2** may need to be increased for a variety of reasons related to grade and vehicle type as noted below.

Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles[54]

Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance	
			Calculated (m)	Design (m)
20	13.9	4.6	18.5	20
30	20.9	10.3	31.2	35
40	27.8	18.4	46.2	50
50	34.8	28.7	63.5	65
60	41.7	41.3	83.0	85
70	48.7	56.2	104.9	105
80	55.6	73.4	129.0	130
90	62.6	92.9	155.5	160
100	69.5	114.7	184.2	185
110	76.5	138.8	215.3	220
120	83.4	165.2	248.6	250
130	90.4	193.8	284.2	285

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s^2 used to determine calculated sight distance.

The Effect of Grade

Braking distances will increase on downgrades and decrease on upgrades. When the roadway is on a grade, formula 2.5.1 for braking distance is modified as follows:

$$d_b = \frac{V^2}{254\,[(a/9.81) + G]} \qquad (2.5.3)$$

Where:

d_b = Braking distance (m)
V = Design speed (km/h)
a = Deceleration rate (m/s^2)
G = Grade (m/m) (G is positive if vehicles uphill and negative if downhill)

It has been noted that many drivers, particularly those in automobiles, do not compensate completely (i.e., by acceleration or deceleration) for the changes in speed caused by grade. It should also be noted that in many cases the sight distance available on downgrades is greater than on upgrades, which can help to provide the necessary corrections for grade. The following **Table 2.5.3** summarizes the stopping sight distances on grades for a variety of design speeds.

Table 2.5.3: Stopping Sight Distance on Grades[55]

Design Speed (km/h)	Stopping Sight Distance (m)					
	Downgrades (%)			Upgrades (%)		
	3	6	9	3	6	9
20	20	20	20	19	18	18
30	32	35	35	31	30	29
40	50	50	53	45	44	43
50	66	70	74	61	59	58
60	87	92	97	80	77	75
70	110	116	124	100	97	93
80	136	144	154	123	118	114
90	164	174	187	148	141	136
100	194	207	223	174	167	160
110	227	243	262	203	194	186
120	263	281	304	234	223	214
130	302	323	350	267	254	243

Limiting the sight distance to the stopping sight distance may preclude drivers from performing unusual, evasive maneuvers. Similarly, stopping sight distance may not provide drivers with enough visibility to allow them to piece together warning signals and decide on a course of action. Because decision sight distance allows drivers to maneuver their vehicles or vary their operating speed rather than stop, decision sight distance is much greater than stopping sight distance for a given design speed.

Designers should use decision sight distance wherever information may be perceived incorrectly, decisions are required, or control actions are required. Examples of situations where it could be desirable to provide decision sight distance include:

- Complex interchanges and intersections
- Locations where unusual or unexpected maneuvers occur
- Locations where significant changes to the roadway cross section are made
- Areas where there are multiple demands on the driver's decision-making capabilities from road elements, traffic control devices, advertising, traffic, etc.
- Construction zones

Table 2.5.6 shows the range of values for decision sight distance. The decision sight distance increases with the complexity of the evasive action that is taken by the driver and with the complexity of the surroundings. The values for decision sight distance given in the table were developed from empirical data. When using these sight distances, the designer should consider eye and object heights appropriate for specific applications. Refer to **Section 2.4.3.3** Driver Eye Height and **Section 2.5.2.1** Object Height for additional information.

Table 2.5.6: Decision Sight Distance[68]

Design Speed (km/h)	Decision Sight Distance for Avoidance Maneuver (m)				
	A	B	C	D	E
50	75	160	145	160	200
60	95	205	175	205	235
70	125	250	200	240	275
80	155	300	230	275	315
90	185	360	275	320	360
100	225	415	315	365	405
110	265	455	335	390	435
120+	305	505	375	415	470