

Traffic Impact Study/ Haul Route Assessment

Dufferin Aggregates Milton Quarry East Extension

FINAL ▪ OCTOBER 2021

REPORT PREPARED FOR



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EXECUTIVE SUMMARY

Dufferin Aggregates (a division of CRH Canada Group Inc.) operates the existing Milton Quarry located at 9410 Dublin Line, in the Town of Milton, which has an unlimited annual extraction license. Dufferin Aggregates is proposing to extend the quarry over a total area of 30.2 hectare, of which 15.9 hectares is proposed for extraction. This extension refers only to the extraction area, as the production capacity and access to the subject lands are proposed to remain as under existing conditions. The Municipal Infrastructure Group, a T.Y. Lin International Company (TMIG) was retained to complete a Traffic Impact Study and Haul Route Assessment for the proposed Milton Quarry East Extension.

Due to the on-going Covid-19 pandemic and the inability to derive accurate traffic volumes from up-to-date traffic surveys, TMIG derived 2021 existing traffic volumes based on historical survey data and the application of appropriate growth rates. The 2021 existing traffic volumes were derived for study intersections along the existing truck route in the vicinity of the subject lands. Similarly, the 2026 future traffic volumes were derived by applying appropriate growth rates to the survey data where applicable, and by using the traffic volumes projected as part of the MRC study for the new Tremaine Road interchange at Highway 401 considered as part of the future truck route.

As the existing traffic to/from the quarry is not projected to change following the extension, TMIG completed a conservative review of traffic operations under existing and future conditions by applying the highest recorded trip generation for the lands derived from the 2020 haulage records (which include limestone haulage, recycling haulage and soil importation haulage for rehabilitation). TMIG did so by removing the trips to/from the quarry surveyed as part of the intersection traffic data (70 trips during the AM peak hour and 8 trips during the PM peak hour) from the boundary road network intersections and replacing it with the highest trip generation recorded in the last year (336 trips during the AM peak hour and 112 trips during the PM peak hour). This trip substitution for the quarry was completed for both the 2021 existing and 2026 future conditions along the applicable study intersections.

Per the above, the analysis completed as part of this study represents a worse-case scenario assuming the highest trip generation for the quarry recorded in 2020. The review has been summarized below for both years:

- Review of 2021 existing traffic operations show that the conservative traffic volumes can be accommodated by boundary road network without modifications to the existing intersection configuration and signal timing plans (i.e., existing cycle lengths and phasing plan).

- Review of the 2026 future conditions show that the planned Tremaine Road interchange intersections are projected to operate below capacity with acceptable LOS. The roundabout intersection of Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road is projected to operate under good LOS B or better but with its southbound approach (Dublin Line) at LOS E during the PM peak hour (with an approach delay below 40 seconds per vehicle and under capacity). The projected operations are deemed acceptable, with no projected queuing concerns at the intersections. It should be noted that the review was completed under conservative assumptions (i.e., the roundabout was assessed at 90% capacity to account for drivers that are new to roundabouts and would proceed more slowly through the intersection, in addition to the conservative quarry trips, even though drivers would be accustomed to the roundabout by the 2026 horizon year as it is already existing). It is TMIG's opinion that the intersection would operate with even better LOS and reduced delay under future conditions with the quarry trips reduced to average volumes (and the roundabout operating in a standard way at 100% capacity).
- Overall, the boundary road network is projected to accommodate the most conservative quarry trip generation at the study intersections without requiring roadway improvements under 2026 future conditions. The use of a haul route via Dublin Line (as approved under existing conditions) shows no projected concerns and remains the preferred haul route compared to using Townline Road as an alternate route. Accordingly, traffic operations along the secondary haul route option via Townline Road was not assessed. A review of haul routes via other transport modes (i.e., shipping and rail) was not completed as these options are not available for this site.
- Finally, review of the site access intersection (with the conservative quarry trip generation) shows that no changes to the intersection configuration are required under existing or future conditions.

In addition to the traffic operations review, TMIG provided feedback to all JART and TOR comments for the proposed development application. The comments and associated responses have been included in **Appendix F**.

In conclusion, the proposed Milton Quarry Extension is deemed acceptable based on the findings of this study. We trust the enclosed is sufficient for your needs, but please do not hesitate to contact the undersigned should you require any additional assistance.



Sincerely,

**THE MUNICIPAL INFRASTRUCTURE GROUP LTD.
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1 INTRODUCTION

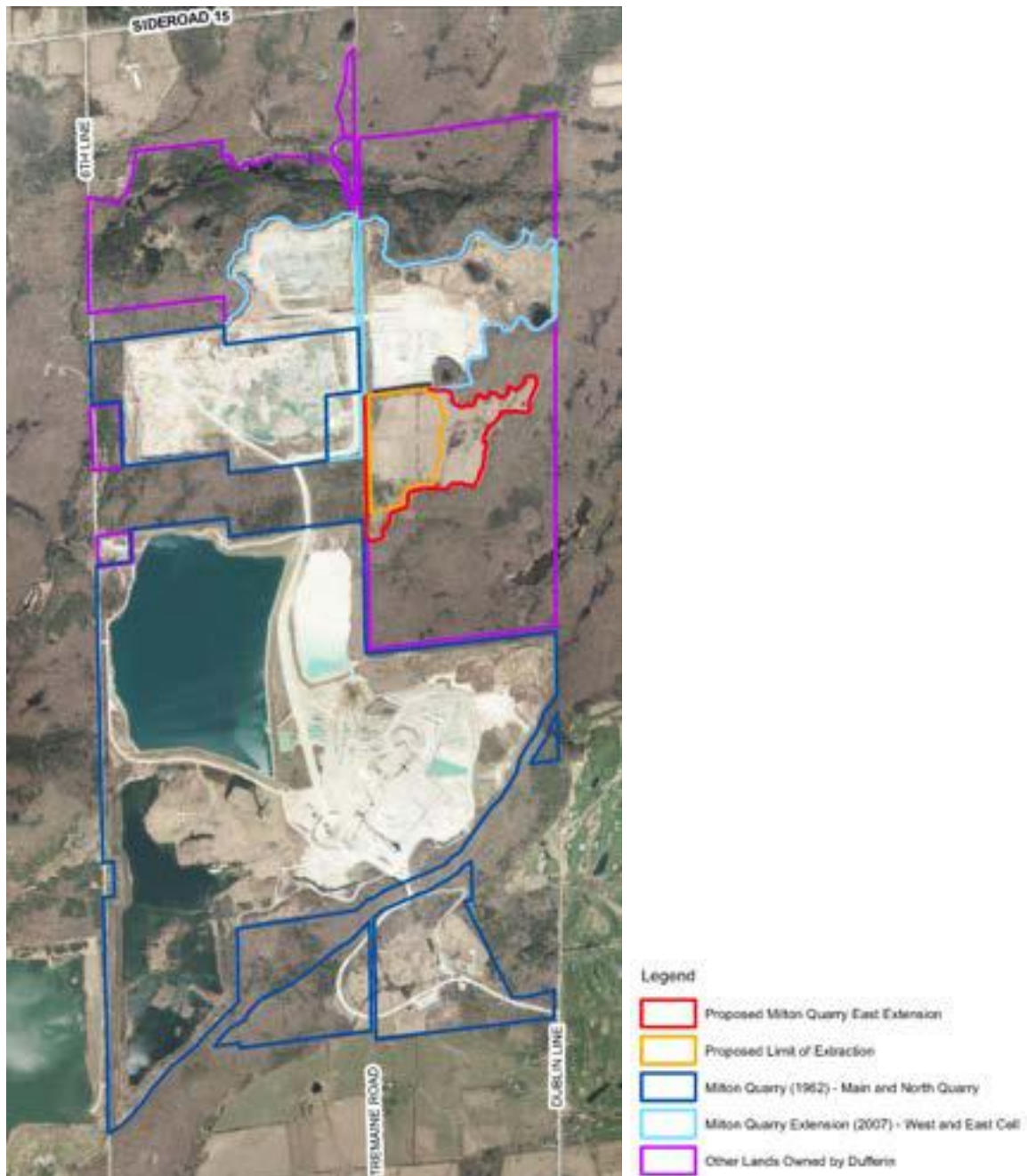
1.1 Development Proposal

Dufferin Aggregates (a division of CRH Canada Group Inc.) operates the existing Milton Quarry (or herein referred to as the 'Quarry') located at 9410 Dublin Line, in the Town of Milton along its border with the Town of Halton Hills. The existing approved Milton Quarry has been in operation since 1962 and consists of the Main Quarry and North Quarry (which are part of the original licence), as well as the Extension Quarry (referred to as the West Cell and East Cell) approved in 2007. The total licensed area for the Main Quarry, North Quarry, West Cell and East Cell is 552 hectares, with an unlimited annual extraction license. The Quarry is bounded by Campbellville Road to the south, Sixth Line to the west, Dublin Line to the east and 15 Sideroad to the north.

As part of this application, an extension to the Milton Quarry is proposed over a total area of 30.2 hectare, of which 15.9 hectares is proposed for extraction. The Milton Quarry East Extension is proposed immediately south of the Milton Quarry East Cell and is contained within the Town of Halton Hills lands. It should be noted that the proposed Milton Quarry East Extension refers only to the extraction area, as the production capacity and access to the subject lands are proposed to remain as under existing conditions. Please refer to **Figure 1-1** for the existing Milton Quarry lands and the proposed East Extension area, which is proposed to also include an unlimited annual extraction license.

It should be noted that reviewers of this development application could see the mention of a "Scenario 2" for the Quarry extension as part of other consultants' reports. This Scenario 2 refers to a possible configuration where processing would take place in the East Cell, leading to an overall reduced amount of tonnage hauled per year. As the total number of trips generated by the quarry would be reduced under this scenario compared to existing condition, it was not reviewed as part of this traffic impact study for the purpose of conservative analysis.

Figure 1-1 Milton Quarry Site



Source: MHBC

As part of the proposed Milton Quarry East Extension, the applicant will require a Regional Official Plan Amendment, a Halton Hills Official Plan Amendment, an amendment to the Niagara Escarpment Plan, a Niagara Escarpment Development Permit and approval under the Aggregate Resource Act for an aggregate license. This Traffic Impact Study was completed in support of these applications.

1.2 Study Objectives

The Traffic Impact Study (TIS) was completed to assess the extent of traffic-related impacts on the abutting roadway system generated by the proposed Milton Quarry East Extension. As the quarry production capacity is not projected to increase with the proposed extension, TMIG has completed a conservative analysis of quarry trips under existing and future conditions. The objectives of this study have been listed below:

- Establish a conservative trip generation for the existing quarry production based on historical haulage data;
- Review traffic operations along the existing haul route based on conservative existing traffic volumes;
- Review potential haul route options for the lands under future conditions;
- Review traffic operations under the future conditions along the preferred future haul route using the same conservative trip generation for the Quarry lands as under existing conditions (as the proposed extension will not increase production);
- Determine what, if any, remedial measures would be required along the haul route under future conditions; and
- Address comments put forth by the Joint Agency Review Team (JART) as part of the pre-consultation process. All JART comments and associated responses have been included in **Appendix F** of this study for review.

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2 BASELINE TRAFFIC VOLUMES

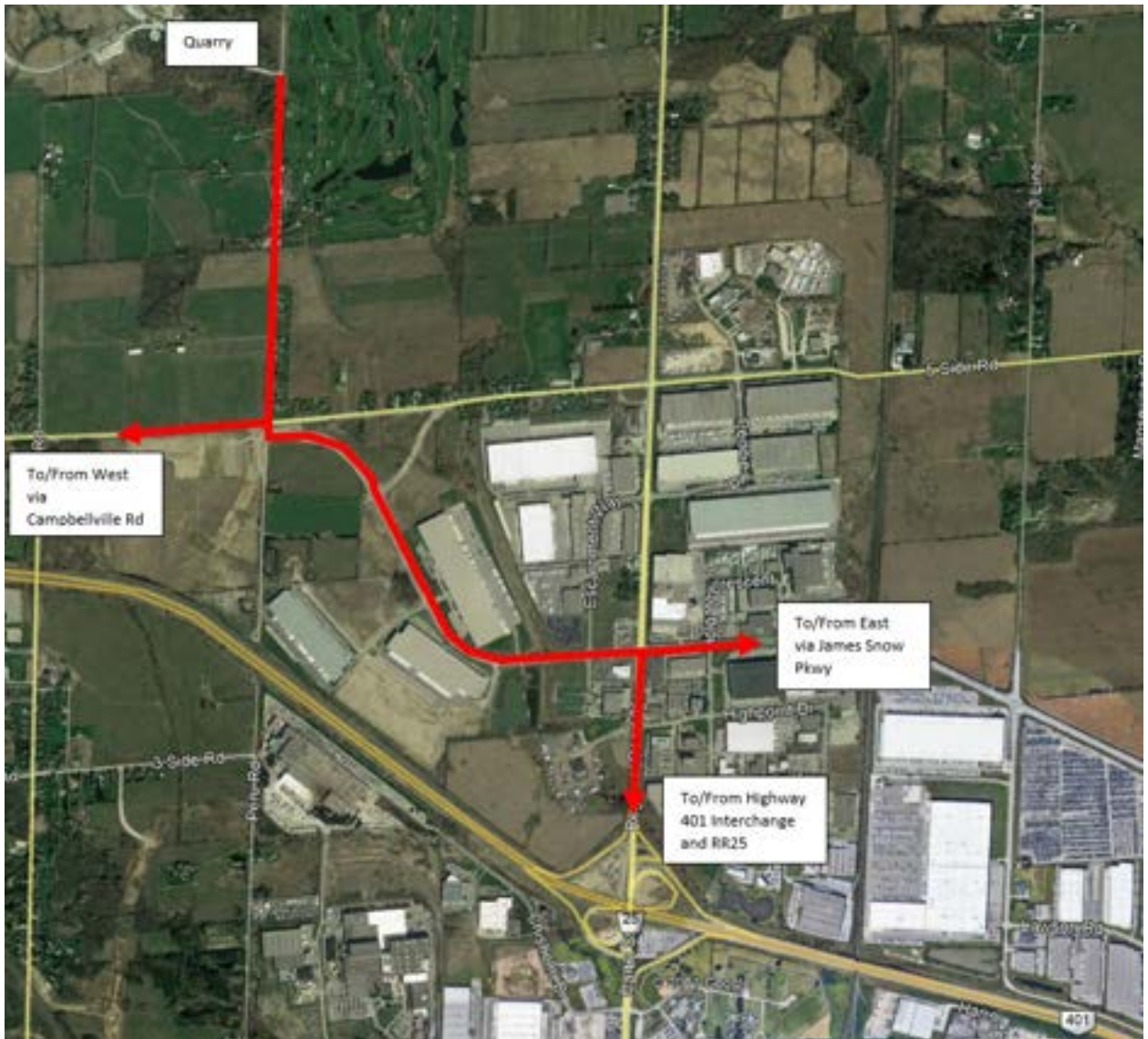
2.1 Existing Haul Route

Based on information provided by the project team, the existing haul route in the vicinity of the quarry consists of the following:

- **Dublin Line** is a north-south roadway classified as a local road under the jurisdiction of the Town of Halton Hills. The roadway has a two-lane rural cross-section within the study area with a posted speed limit of 60km/h.
- **James Snow Parkway** is an east-west roadway classified as a major arterial under the jurisdiction of the Region of Halton. The roadway has a four-lane urban cross-section within the study area with a posted speed limit of 60km/h.
- **Campbellville Road** is an east-west roadway classified as a minor arterial under the jurisdiction of the Town of Milton. The roadway has a two-lane rural cross-section within the study area with a posted speed limit of 60km/h.
- **Regional Road 25** is a north south roadway classified as a major arterial under the jurisdiction of the Region of Halton. The roadway has a five-lane urban cross-section (with a centre two-way-left-turn-lane) within the study area with a posted speed limit of 70km/h.
- **Highway 401** is an east-west provincial highway under the jurisdiction of the Ministry of Transportation of Ontario (MTO). The highway has a six-lane cross-section within the study area with a posted speed limit of 100km/h.

The existing Haul Route in the vicinity of the lands has been illustrated in **Figure 2-1** for reference.

Figure 2-1 Existing Haul Route



Source: Google Earth

2.2 Study Intersections

Based on the existing haul route, the following study intersections were assessed under existing conditions:

- Dublin Line at James Snow Parkway/Campbellville Road – roundabout;
- James Snow Parkway at Regional Road 25 – signalized;
- Regional Road 25 at Highway 401 WB Off-Ramp – signalized; and
- Regional Road 25 at Highway 401 EB Off-Ramp – signalized.

The study intersection of 5 Sideroad at James Snow Parkway was not assessed as part of this study as trucks are not to travel along 5 Sideroad (unless when making a local delivery, which would not occur west of Regional Road 25). Accordingly, all traffic generated by the quarry would be included as a through movement along James Snow Parkway at the 5 Sideroad intersection. Furthermore, as the majority of truck trips would be travelling to/from Highway 401 via the planned Tremaine Interchange under future conditions, the remaining through truck volumes travelling via the intersection would be minor. As such, the review was not deemed necessary.

2.3 Traffic Data

Due to the on-going Covid-19 pandemic at the time of this study, traffic patterns are not normalized and the completion of updated turning movement counts would not provide accurate traffic data. Accordingly, TMIG derived 2021 existing traffic volumes based on historical traffic data and adequate growth rates.

The historical traffic data used as a baseline within this study is based on surveys completed within the study area (either commissioned by TMIG in the past or provided by Halton Region). The survey date and associated peak hours for all study intersections has been detailed **Table 2-1**. All survey data has been included in **Appendix A**.

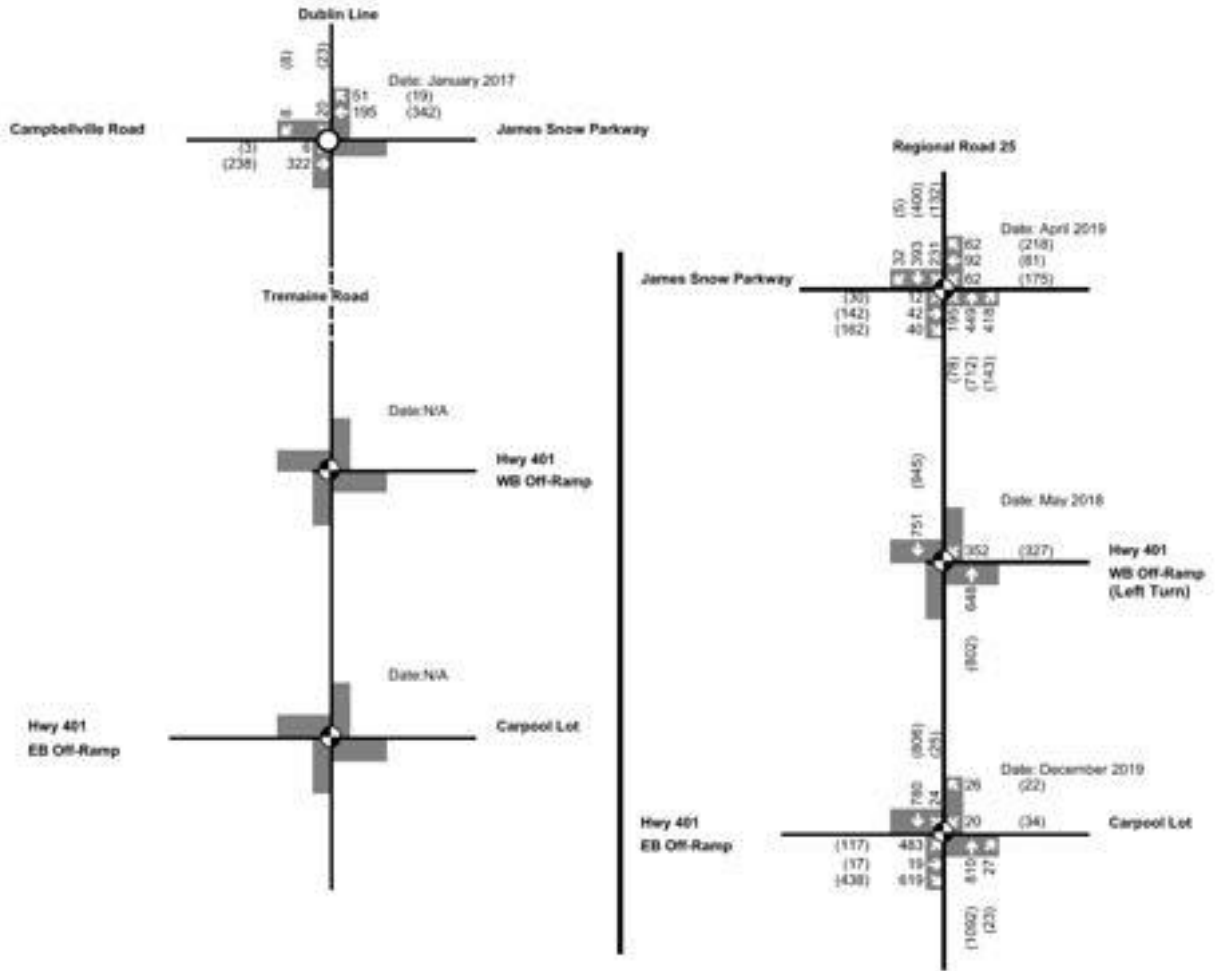
Table 2-1 Original TMC Data

Intersection	Survey Date	AM Peak Hour	PM Peak Hour
Dublin Line at James Snow Parkway/Campbellville Road*	January 25, 2017	7:30-8:30	16:00-17:00
James Snow Parkway at Regional Road 25	April 16, 2019	7:45-8:45	16:30-17:30
Regional Road 25 at Highway 401 WB Off-Ramp	May 24, 2018	8:00-9:00	16:30-17:30
Regional Road 25 at Highway 401 EB Off-Ramp	December 5, 2019	7:30-8:30	16:15-17:15

*For the study intersection of Dublin Line at James Snow Parkway/Campbellville Road, the survey data used as part of the study is based on the intersection of Dublin Line at 5 Sideroad/Campbellville Road. The intersection was recently modified to connect James Snow Parkway to Dublin Line and terminate 5 Sideroad as a cul-de-sac east of Dublin Line. Accordingly, TMIG has assumed that all traffic previously travelling along the east approach (5 Sideroad) would transfer to James Snow Parkway. This historical data set was used as the reviewing agencies were not able to provide more up-to-date TMC data for the study intersection, and the completion of up-to-date counts was not acceptable due to the Covid-19 pandemic impacts on traffic.

The surveyed traffic volumes and their associated survey year have been illustrated in **Figure 2-2**.

Figure 2-2 Surveyed Traffic Volumes



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3 CONSERVATIVE QUARRY TRIP GENERATION

The Milton Quarry East Extension is proposed to increase the aggregate extraction area by 15.9 hectares; however, the extension is not projected to increase production as per input from the project team. Accordingly, traffic to/from the quarry post extension is projected to remain as under existing conditions.

For the purpose of conservative analysis, TMIG utilized historical haulage data provided by the project team to derive the highest trip generation to/from the quarry during the AM and PM peak hours of 2020. This data includes truck trips related to Limestone extraction, aggregate Recycling as well as Soil Importation for rehabilitation. This trip generation will be used under the traffic operations review for existing and future conditions as opposed to the surveyed quarry traffic documented as part of the historical TMC data.

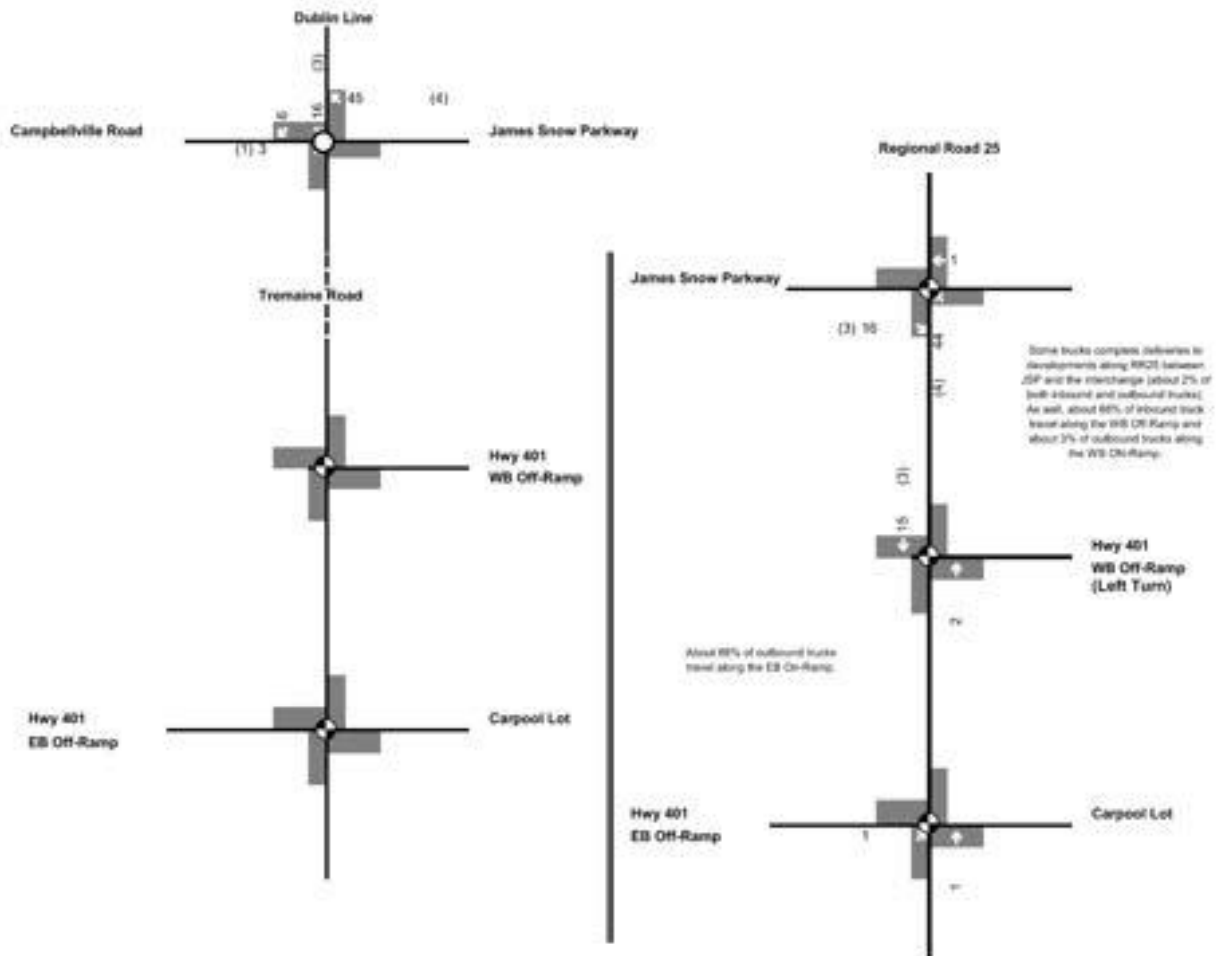
3.1 Removal of Surveyed Haulage Volume

TMIG derived the surveyed quarry haulage trips based on the surveyed volumes entering/exiting Dublin Line at its intersection with Campbellville Road and the surveyed heavy vehicle & truck percentages for the applicable turning movements. Based on a review of the 2017 TMC data, the surveyed haulage volume consists of 70 trips during the AM peak hour (48 inbound and 22 outbound) and 8 trips during the PM peak hour (5 inbound and 3 outbound).

The project team provided TMIG with the existing truck assignment along the haulage route, which has been included in **Appendix B**. Using this assignment data, TMIG assigned the surveyed truck trips to the boundary road network, as illustrated in **Figure 3-1**, in order to later remove them from the network.

It should be noted that though the truck trips were surveyed in 2017, the quarry production capacity at that time is assumed to be similar as under existing conditions and these trips would be applicable to all TMC survey years (i.e., 2017, 2018, 2019 and the 2021 existing conditions). Accordingly, the volume of trucks generated by the quarry was not grown to 2021 conditions before being removed from the boundary road network (applying a growth without basis would lead to a less conservative analysis).

Figure 3-1 Surveyed Quarry Trips (to be Removed)



3.2 Conservative Quarry Trip Generation

It is TMIG’s understanding that the haulage volumes that occurred in 2020 have been some of the highest on record since the opening of the Quarry, as all of the Acton Quarry sales were shifted to the Milton Quarry following its temporary closure. Accordingly, TMIG obtained the 2020 haulage records from the project team in order to identify the most conservative daily trips generated to/from the quarry to use as part of the study. The records contain confidential information and cannot be included in a public report. However, this information can be made available to agency reviewers subject to a Non-Disclosure Agreement (NDA).

Although the Quarry is permitted to ship 24 hours a day, haulage operations generally take place between 4AM and 4PM, and include the following:

- Limestone Haulage
- Recycling Haulage

- Soil Importation Haulage

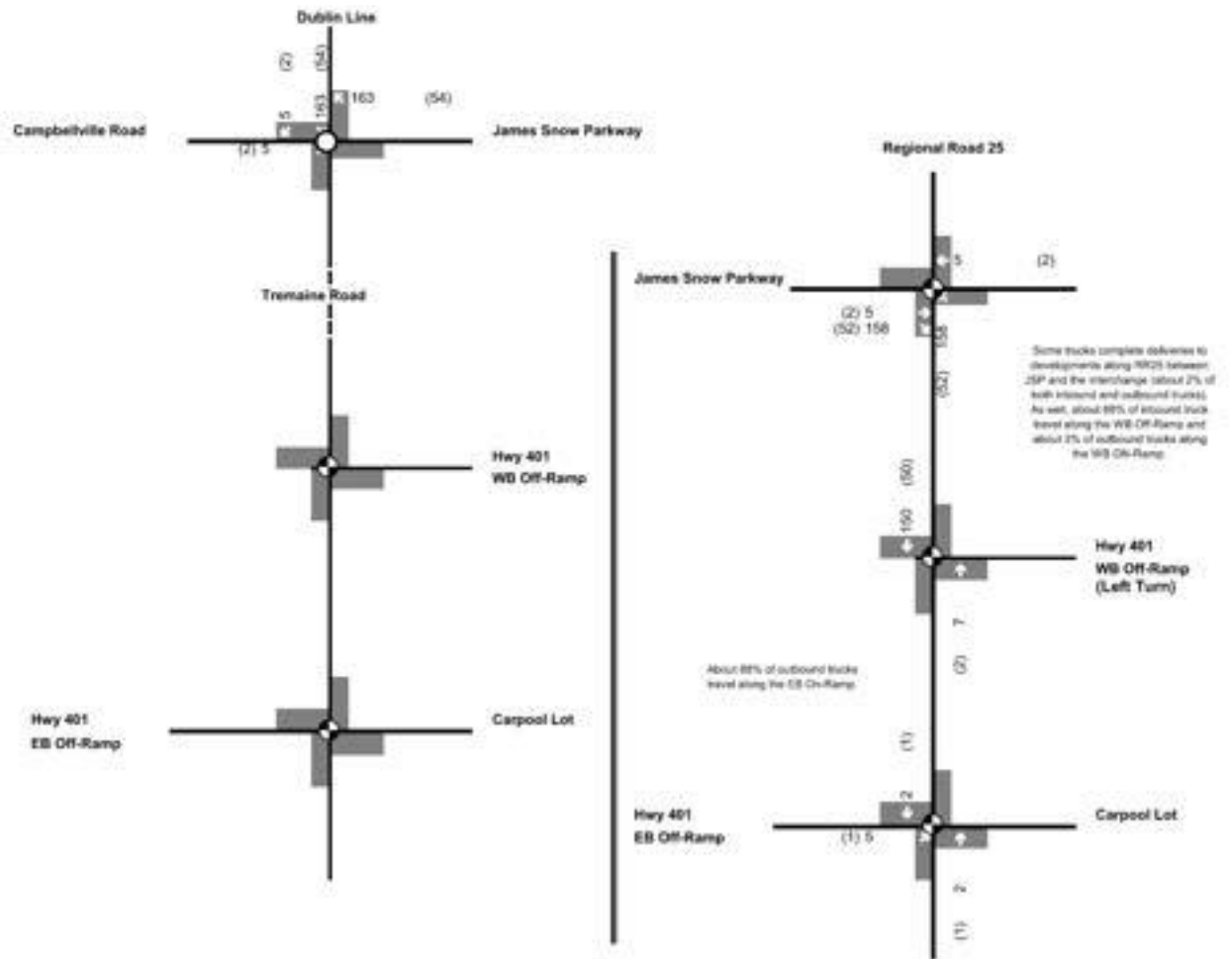
The sum of all trucks for all three haulage operations were reviewed for each hour on each haulage day of the year. As part of the data review, TMIG has identified that the day in 2020 where the maximum haulage occurred is November 17, 2020, when a total of 1,564 trucks were tared in between 4AM and 4PM.

As part of this study, TMIG is looking at traffic along the boundary road network during the AM and PM peak hours of the roadway. Accordingly, the Milton Quarry truck trips for the AM peak hour were derived based on the recorded volumes between 8AM-9AM on November 17 (the maximum hourly volume during the AM peak period), and truck trips for the PM peak hour were selected as the trucks recorded between 4PM-5PM on November 17. Based on the data received, a total of 168 trucks were tared in at 8AM and a total of 56 trucks were tared in at 4PM.

It should be noted that the trips used as part of the study represent the daily highest haulage recorded in 2020, and these volumes do not occur on a regular basis. On average the daily number of trucks tared in (not accounting for holidays and days where the Quarry is closed) is approximately 730 vehicles, which is less than half of the daily haulage used as part of the study. Accordingly, the analysis completed as part of this study is considered highly conservative.

As the average truck loading time is 15 minutes (as confirmed with the project team), TMIG has assumed that all trucks entering the subject lands within the one-hour time window would exit the lands within that same hour. Accordingly, the conservative trip generation assigned to the Quarry consist of 336 trips during the AM peak hour (168 inbound trips and 168 outbound trips) and 112 trips during the PM peak hour (56 inbound trips and 56 outbound trips). These trips were assigned to the study intersection in accordance with the truck route assignment provided by the project team, as illustrated in **Figure 3-2**.

Figure 3-2 Conservative Quarry Trips (to be Added)



4 EXISTING TRAFFIC CONDITIONS

4.1 2021 Conservative Existing Traffic Volumes

In order to derive the 2021 conservative existing traffic volumes, TMIG first subtracted the surveyed quarry trips (illustrated in **Figure 3-1**) from the surveyed traffic volumes (illustrated in **Figure 2-2**). The surveyed quarry trips were removed from the survey data even though the survey data is not based on the same year for each intersection, as the extent of the survey data is between 2017 and 2019.

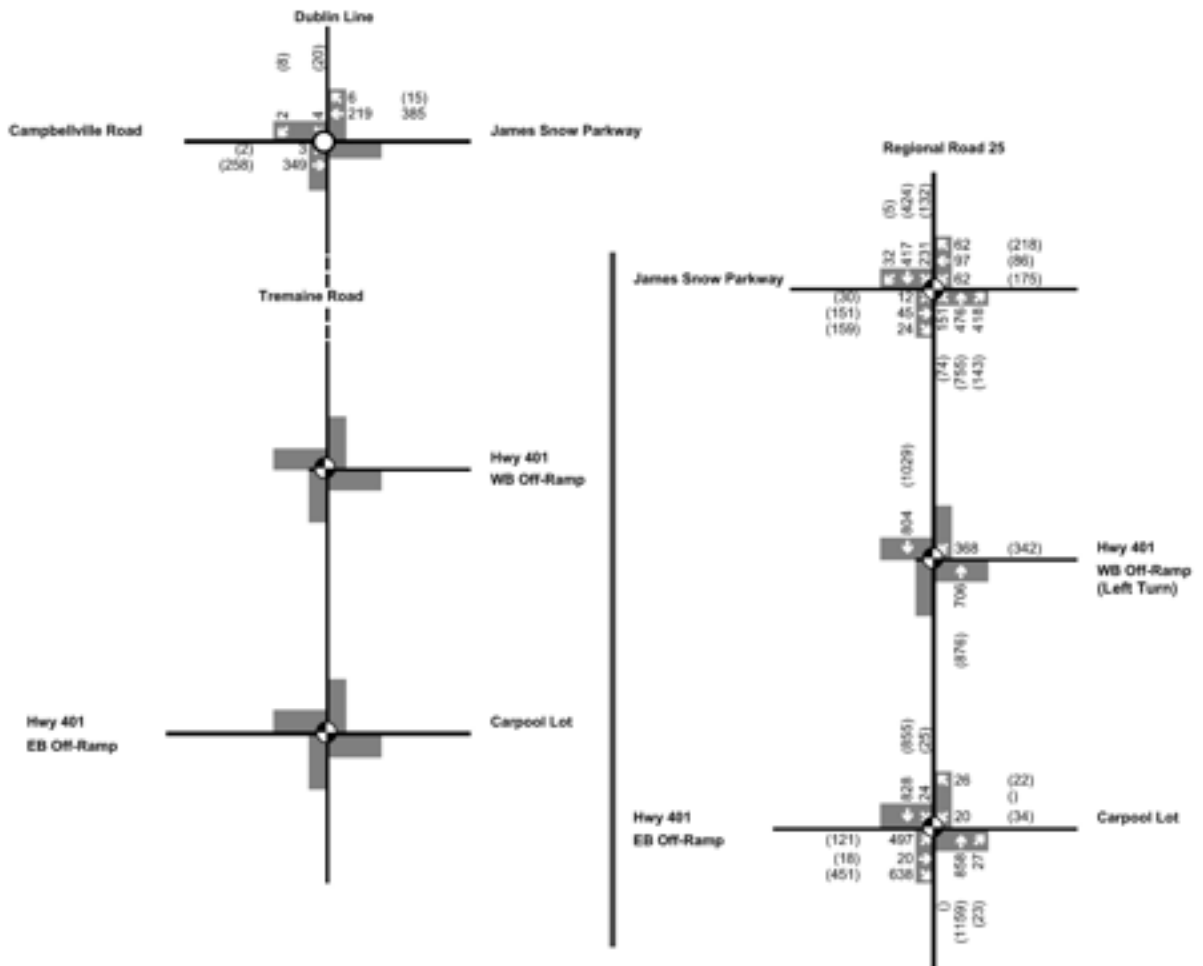
It can be assumed the quarry truck trips fluctuated between each study intersection; however, the existing quarry trips can be considered an average daily number of trucks when compared to the 2020 haulage data (see **Section 3.2**), resulting in a reasonable estimation of quarry truck removal from the existing traffic volumes without overestimating.

Following removal of the surveyed quarry trips, TMIG applied growth rates to the resulting traffic volumes in order to derive the 2021 baseline traffic volumes without quarry trips. The volumes were grown to 2021 existing conditions based on growth rates provided by reviewing agencies as part of previous studies within the area. These rates were classified based on the jurisdiction (municipal, regional, highway off-ramp) and have been detailed below:

- **Dublin Line** – 0%, as traffic along Dublin Line is travelling to/from the Quarry or Golf Course and is would not have grown.
- **Campbellville Road** – 2%
- **James Snow Parkway/ Regional Road 25** – 3%
- **Highway 401 Eastbound and Westbound Off-Ramps** – 1.5%

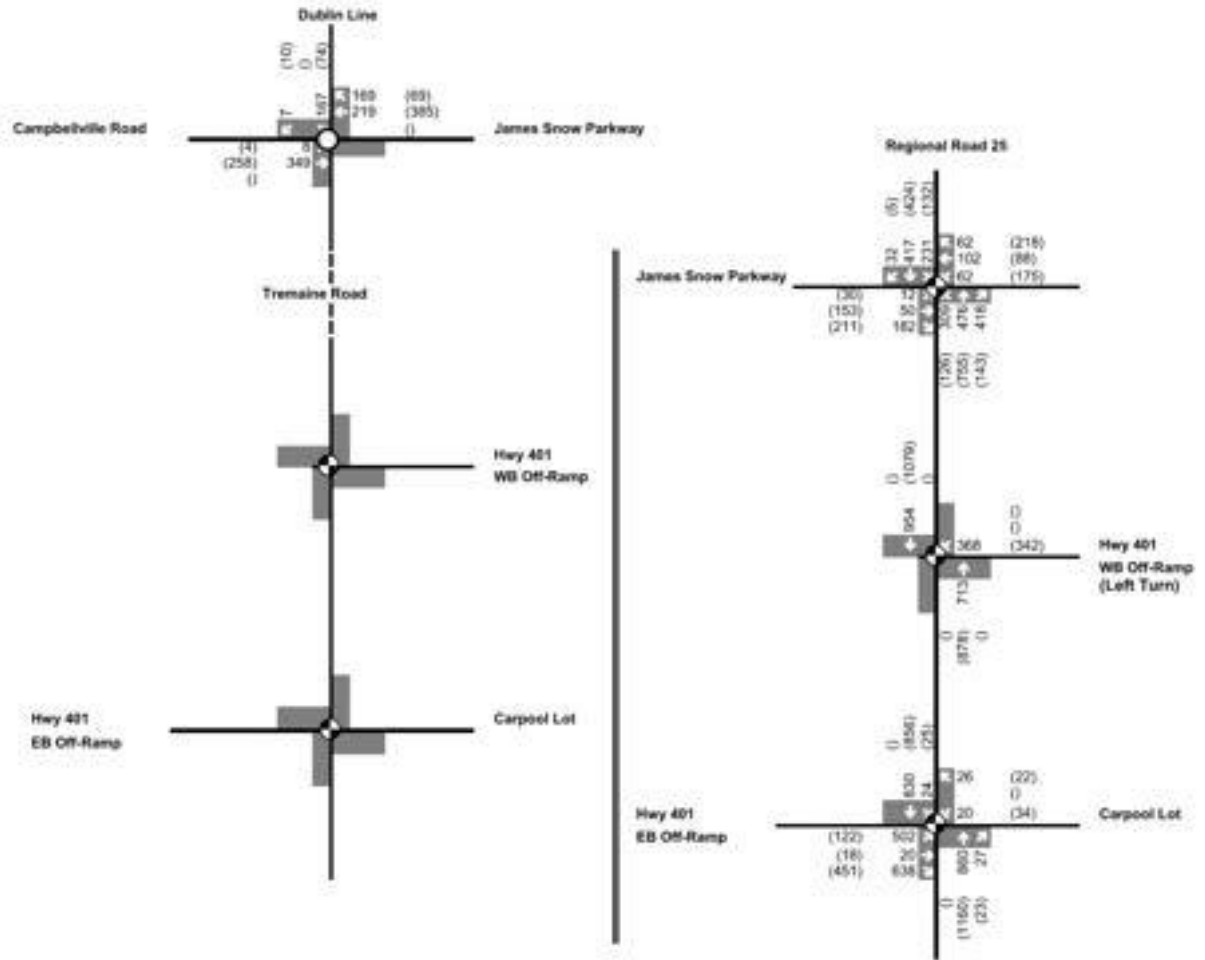
These compounded growth rates were applied to through movements along the study intersections (as well as movements along the highway off-ramps) in order to derive the 2021 baseline traffic volumes without the quarry trips. The 2021 baseline traffic without quarry trips have been illustrated in **Figure 4-1**.

Figure 4-1 2021 Baseline Traffic Volumes without any Quarry Trips



Finally, TMIG derived the 2021 conservative existing traffic volumes by adding the conservative quarry trips (illustrated in **Figure 3-2**) to the 2021 baseline traffic without quarry trips. The 2021 conservative existing traffic volumes have been illustrated in **Figure 4-2**.

Figure 4-2 2021 Conservative Existing Traffic Volumes



4.2 2021 Existing Traffic Operations

TMIG completed a review of the derived 2021 existing traffic conditions using Synchro for the signalized intersections and Arcady for the roundabout intersection. The capacity analysis identifies how well the intersections are operating. The analysis contained in 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 saturation volume for each turning movement, while the level-of-service (LOS) is a measure of the average delay for each turning movement. The peak hour factors used as part of this study were based on the survey data, similarly to the heavy vehicle percentages (with the exception of the movements to/from Dublin Line at its intersection with Campbellville Road / James Snow Parkway which have been updated based on the new conservative quarry trip generation).

As part of this report, traffic operations were detailed for all turning movements at the roundabout intersection and for critical turning movements at the signalized intersections. Critical turning movements are identified as detailed below:

- v/c ratios for overall intersection operations, through movements, or shared through/turning movements is 0.85 or above, or LOS E or F, and is 0.75 or above for the Highway 401 off-ramps.
- v/c ratios for exclusive movements is 0.95 or above and 0.75 or above for the Highway 401 off-ramps.

As per the previous studies completed within the study area, TMIG reviewed the roundabout operations assuming 90% capacity as an added conservative measure. This capacity adjustment is put in place to account for the fact that roundabouts are fairly new to the GTHA and unexperienced drivers may take longer to travel through the intersection.

The review of traffic operations under 2021 existing traffic conditions has been detailed in **Table 4-1** below. All results have been included in **Appendix C**.

Table 4-1 2021 Existing Traffic Operations

Intersection	Control Type	AM Peak Hour	AM Peak Hour	AM Peak Hour	PM Peak Hour	PM Peak Hour	PM Peak Hour
Turning Movement	-	V/C	Delay	LOS	V/C	Delay	LOS
Dublin Line at James Snow Parkway / Campbellville Road	Roundabout	-	3.45	A	-	2.39	A
James Snow Parkway (Westbound Approach)	-	0.22	2.36	A	0.20	1.77	A
Dublin Line (Southbound Approach)	-	0.27	6.67	A	0.12	5.07	A
Campbellville Road (Eastbound Approach)	-	0.20	2.26	A	0.16	2.26	A
Tremaine Road (Northbound Approach)	-	0.00	0.00	A	0.00	0.00	A
James Snow Parkway at Regional Road 25	Signal	0.57	21	C	0.58	30	C
Eastbound Through	-	-	-	-	0.41	56	E
Regional Road 25 at Highway 401 Westbound Off-Ramp	Signal	0.53	11	B	0.8	11	B
Regional Road 25 at Highway 401 Eastbound Off-Ramp	Signal	0.78	38	D	0.68	26	C
Eastbound Left	-	1.01	80	E	-	-	-

Based on the above table, the roundabout intersection operates with all approaches at LOS A during the study periods and all signalized intersections operate with overall LOS D or better, all with the applied conservative quarry trip generation under 2021 existing conditions.

All turning movements operate below critical conditions and under capacity at the study intersections with the following exceptions:

- Eastbound through at the intersection of James Snow Parkway at Regional Road 25 during the PM peak hour operating at LOS E, but with a v/c of 0.46 and delay of 56 seconds which is deemed acceptable.
- Eastbound left-turn at the intersection of Regional Road 25 at Highway 401 Eastbound Off-Ramp during the AM peak hour operating at LOS E and over capacity.

As the Eastbound left-turn at the intersection of Regional Road 25 at Highway 401 Eastbound Off-Ramp operates over capacity, TMIG completed a review of the intersection operations under optimized signal timing plans. It is TMIG’s understanding, based on input from Region staff, that the Region’s timings are often reviewed and optimized to account for the changes in traffic volumes. The traffic operations under optimized conditions have been detailed in **Table 4-2**.

Table 4-2 2021 Existing Traffic Operations – Optimized Splits

Intersection	Control Type	AM Peak Hour	AM Peak Hour	AM Peak Hour
Turning Movement	-	V/C	Delay	LOS
Regional Road 25 at Highway 401 Eastbound Off-Ramp	Signal	0.78	37	D
Eastbound Left	-	0.94	63	E

Under optimized signal timing plans, the intersection of Regional Road 25 at Highway 401 Eastbound Off-Ramp operates with all turning movements below capacity during the AM peak hour. Accordingly, this review confirms that the 2021 conservative traffic volumes can be accommodated by the existing intersection lane configuration, which is acceptable.

5 FUTURE TRAFFIC FORECAST

5.1 Horizon Year

A study horizon to 2026 (i.e., 5-year horizon) was selected to assess traffic operations under future conditions. The horizon year falls in line with the applicable guidelines. As the proposed quarry extension is not projected to change production capacity (i.e., no expected increase traffic generated by the quarry), the review of future conditions was simply for the purpose of conservative analysis in order to confirm that the conservative trip generation from the quarry detailed as part of **Section 3** can be accommodated by the future boundary road network.

5.2 Planned Roadway Improvements

The following roadway improvements are planned within the study area by the 2026 horizon year:

- **Tremaine Road** is currently under an on-going process of reconstruction, which consists of a road widening from two to four lanes and realignment from Main Street to Campbellville Road. This project includes a new interchange with Highway 401 and an ultimate connection to the intersection of Dublin Line at Campbellville Road/James Snow Parkway. Construction for this project is scheduled to be completed by 2023.
- **Dublin Line** south of Campbellville Road is currently closed and in the process of being realigned to be accessible via Tremaine Road (which will become the south leg of the roundabout).
- **Regional Road 25** is proposed to be widened from four lanes to six lanes between Steeles Avenue and 5 Sideroad, with construction scheduled to start in 2022. Additionally, Halton Region plans to widen Regional Road 25 from a two-lane cross-section to a four-lane cross-section between 5 Sideroad and 10 Sideroad, with construction scheduled to begin in 2024.

5.3 Review of Haul Route Options

As part of this study, TMIG considered the following two haul route options for future conditions:

- Option 1 – The Existing Haul Route: Maintain Quarry access via Dublin Line. Vehicles travelling via Campbellville Road (to/from the west), James Snow Parkway east of Regional Road 25 (to/from the east) and Regional Road 25 south of the interchange (to/from the south) are to remain using the same route as under existing conditions. All vehicles travelling via Highway 401 would now do so via the planned Tremaine Road interchange (i.e., no longer use the Regional Road 25 interchange). As part of this option, the haul route does not encroach onto the Niagara Escarpment Natural Area.
- Option 2 – Potential Alternative Haul Route: Provide the Quarry access via Nassagaweya Esquesing Townline (Townline Road) on the north end of the lands, with all truck traveling from Townline Road, west onto 15 Sideroad and south onto Nassagaweya Sixth Line to reach Campbellville Road. From Campbellville Road, the haul route would be similar to Option 1. Vehicles travelling via Campbellville Road (to/from the west), James Snow Parkway East of Regional Road 25 (to/from the east) and Regional Road 25 south of the interchange (to/from the south) would remain using the same path as under existing conditions (but via the intersection of Nassagaweya Sixth Line at Campbellville Road as opposed to Dublin Line at Campbellville Road). All vehicles travelling via Highway 401 would now do so via the planned Tremaine Road interchange (i.e., no longer use the Regional Road 25 interchange). As part of this option, the haul route partially encroaches onto the Niagara Escarpment Natural Area.

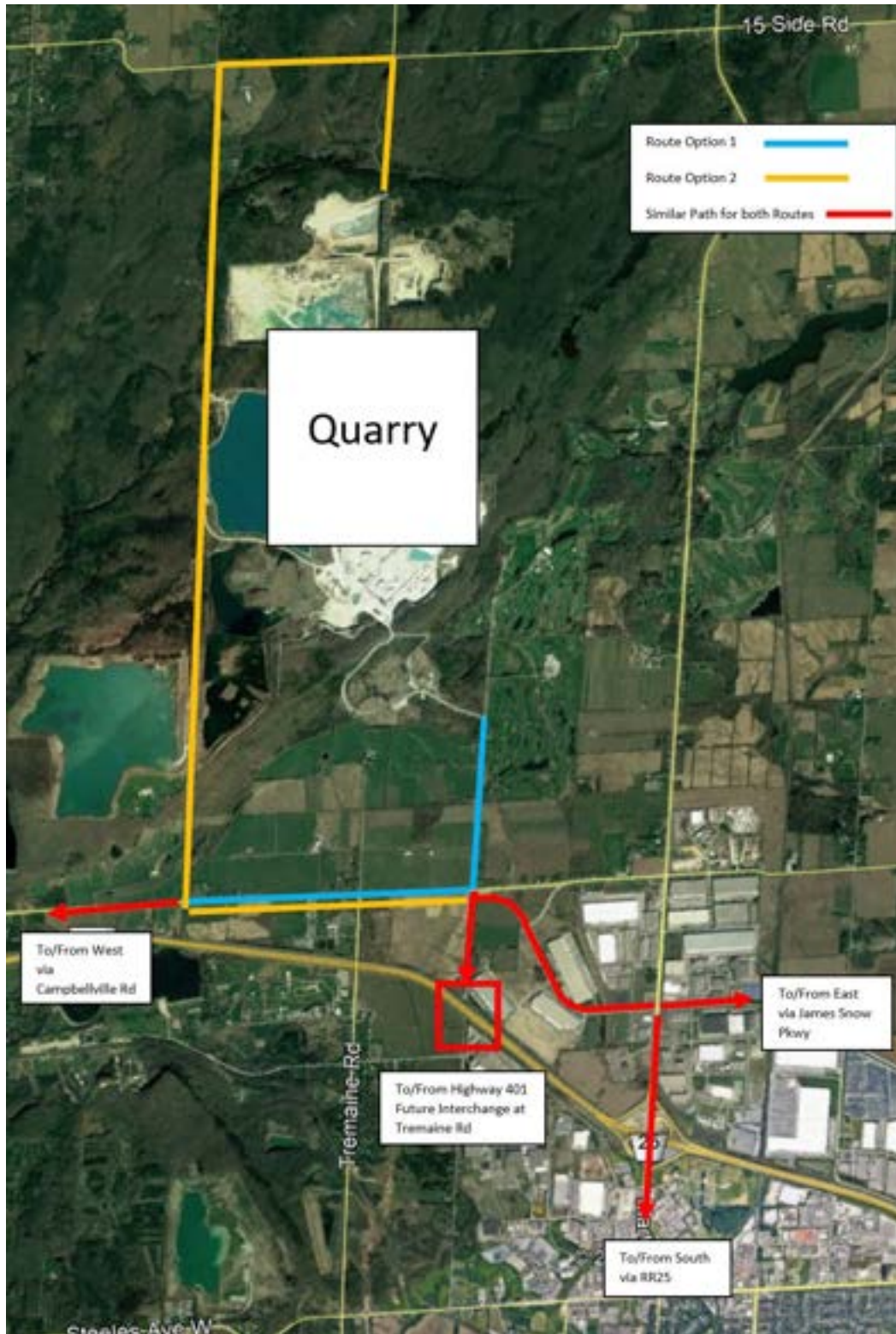
Both haul route options have been illustrated in **Figure 5-1**.

Under both options, the use of the planned Tremaine Road interchange is proposed as it is located closer to the Quarry than the existing interchange at Regional Road 25. Under Option 2, trucks would be travelling a greater distance along the municipal roadway system, which would increase noise pollution, fuel consumption (and associated emissions into the air) and would increase the truck's travel time onto the roadway. Furthermore, access to the Quarry via Dublin Line is in place and approved under existing conditions which would be in favor of choosing Option 1. Based on these factors and considering the fact that the haul route in Option 1 does not encroach onto the Niagara Escarpment Natural Area, TMIG has deemed Option 1 to be the preferred option.

TMIG reviewed projected traffic operations under Option 1 alone. As results of the analysis shows no projected conflicts along Option 1 (as detailed in Section 6.2), a review of Option 2 was not deemed necessary.

Finally, a review of haul routes via other transport modes (i.e., shipping and rail) was not completed as these options are not available for this site.

Figure 5-1 Future Haul Route Options



Source: Google Earth

5.4 Planned Tremaine Road Interchange Traffic

As part of this study, TMIG confirmed with Halton Region staff that the planned Highway 401 interchange to Tremaine Road is projected to be open by the year 2023. Accordingly, the new Tremaine interchange off-ramp intersections were included as part of the study intersections under future conditions. The planned Tremaine Road interchange configuration has been illustrated in **Appendix D**.

Traffic at the planned intersections was forecasted using a similar methodology to what was previously approved for traffic impact studies in the area. The source of the data is detailed below:

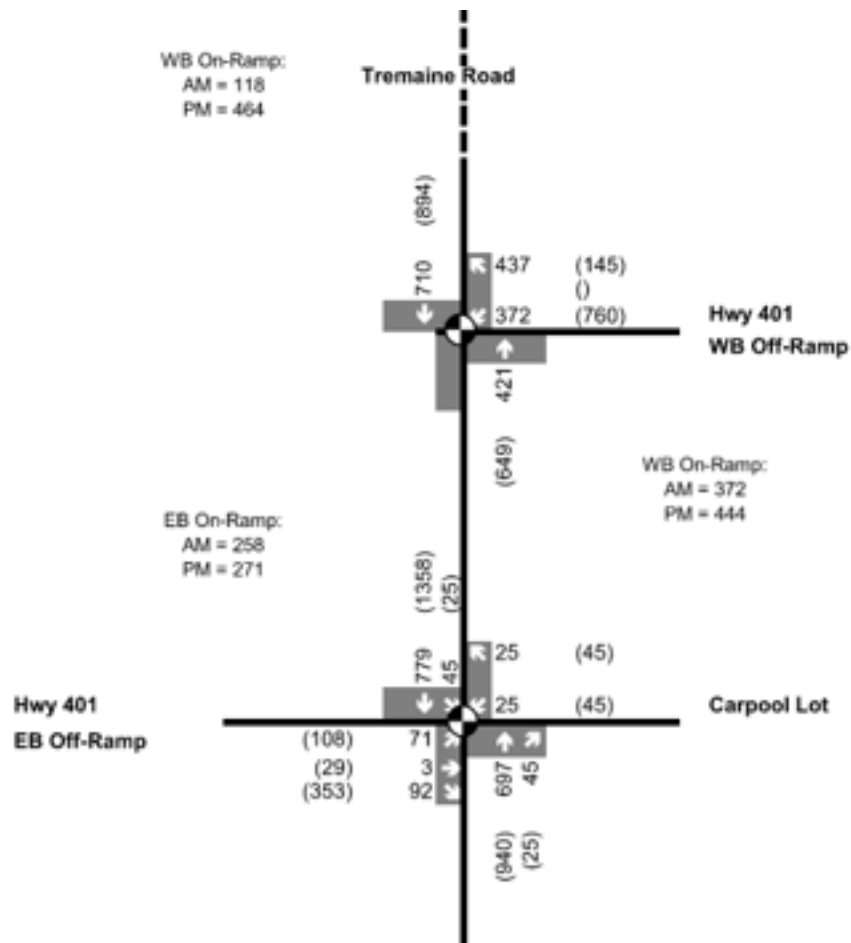
- Traffic volumes at the interchange off-ramp intersections were derived using the projected traffic volumes and growth rates from the MRC Report carried out by the Region for analysis of all scenarios post Tremaine Road interchange construction.
- At the time of the MRC study, the interchange was planned to be opened in 2021. The study contains the 2021 ramps volumes at the interchange during the AM and PM peak hours, as well as 2031 projected traffic volumes along Tremaine Road and at the ramps under the PM peak hour. The data has been illustrated in **Appendix D**.
- The directional distribution of traffic at the future interchange was based on the projected 2031 traffic volumes at the interchanges from the MRC study for the PM peak hour, while it was based on the historical traffic survey data at the Regional Road 25 interchange for the AM peak hour. The base for the AM counts is detailed below:
 - For the eastbound off-ramp intersection, the December 2019 count used as part of this study was selected to derive directional distribution.
 - For the westbound off-ramp intersection, as the May 2018 count used as part of this study does not include the westbound right-turning volumes (as they are channelized and merge with Regional Road 25), a historical count dated November 2017 provided by the MTO was used (included in **Appendix D**).
- As within the previous studies completed for the area, an annual compounded background traffic growth rate of 3% was used for the traffic forecast, which is based on a review of 2021 and 2031 traffic volumes at the interchange based on the MRC study.

Based on the data detailed above, TMIG derived the traffic volumes at the planned interchange as follows (consistent with the approved traffic impact studies completed in the area):

- The 2021 ramp volumes from the MRC study were distributed to Tremaine Road based on the directional distribution from the projected 2031 volumes in the PM peak hour (from the MRC study) and historical traffic data at the Regional Road 25 interchange during the AM peak hour, as detailed previously.
- Traffic along Tremaine Road was derived using the projected 2031 traffic volumes during the PM peak hour. Traffic along the corridor was reduced assuming a 3% growth compounded over 10-years to match the 2021 ramp volumes. The AM peak hour traffic along Tremaine Road was calculated by deriving the percentage represented by the AM volumes compared to the PM volumes based on the historical Regional Road 25 interchange traffic data used as part of this study (see **Appendix A**). Review of the survey data shows that the northbound through AM peak hour volume at the Highway 401 eastbound off-ramp to Regional Road 25 is approximately 74% of the PM peak hour volume, while the southbound through AM peak hour volume at the Highway 401 westbound off-ramp to Regional Road 25 is approximately 79% of the PM peak hour volume. Accordingly, these percentages were applied to the projected 2031 PM peak hour volumes along Tremaine Road from the MRC study to derive 2031 AM peak hour volumes along Tremaine Road, which were then also reduced assuming a 3% growth compounded over 10-years to match the 2021 ramp volumes. These 2021 volumes along Tremaine Road and at the ramps were then balanced along the corridor.
- The 2021 interchange volumes derived as detailed above represent the volumes at the opening year of the Tremaine Road interchange, as detailed in the MRC study. As the interchange opening year is now 2023, the 2021 volumes were used as 2023 to match the new timeline of construction. The 2023 volumes at the planned Tremaine interchange have been illustrated in **Figure 5-2**. It should be noted that, due to the on-going Covid-19 pandemic that began in March of 2020, travel demand along roadways within the GTHA have reduced as people are required to work and complete their education from home as much as possible. Accordingly, the traffic growth projections along the boundary road network are anticipated to be stunted, including post pandemic as a significant number of people will remain

working from home if given the option. Based on this factor, as well as the change in opening year, it is TMIG’s opinion that the previously forecasted 2021 volumes would be applicable for use as 2023 volumes per the new opening year of the Tremaine Road interchange.

Figure 5-2 2023 Baseline Traffic Volumes at the Planned Tremaine Interchange



5.5 2026 Traffic Forecast and Application of Conservative Quarry Trip Generation

As with existing conditions, TMIG has completed a review of future conditions assuming the most conservative trip generation for the Quarry as production capacity it is not projected to increase.

In order to do so, TMIG has assumed that the surveyed quarry trips derived as part of existing conditions (see **Section 3**) were included in the forecasted traffic volumes at the planned Tremaine Road interchange. Accordingly, TMIG has

proceeded to remove the surveyed trip generation from the planned interchange intersections. The surveyed trip removal has been illustrated in **Figure 5-3** for the planned interchange, and the 2023 baseline traffic volumes at the planned interchange without any quarry trips has been illustrated in **Figure 5-4**.

Figure 5-3 Surveeyed Quarry Trips (to be Removed) – Future Truck Route

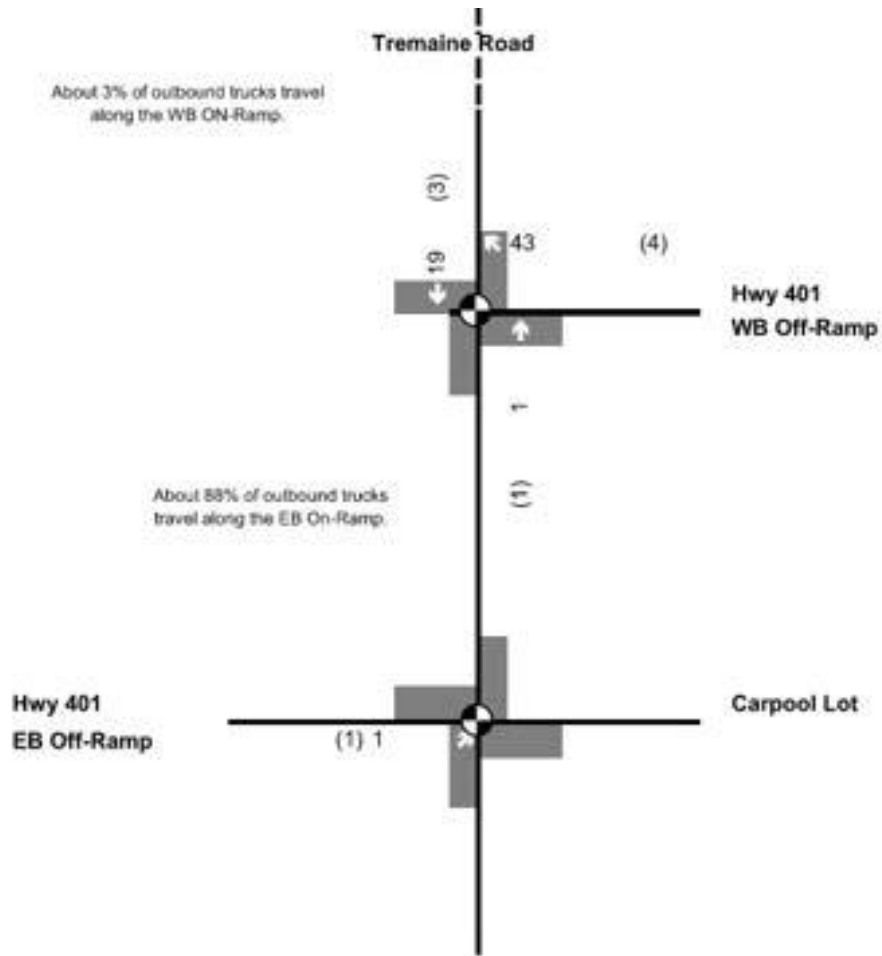
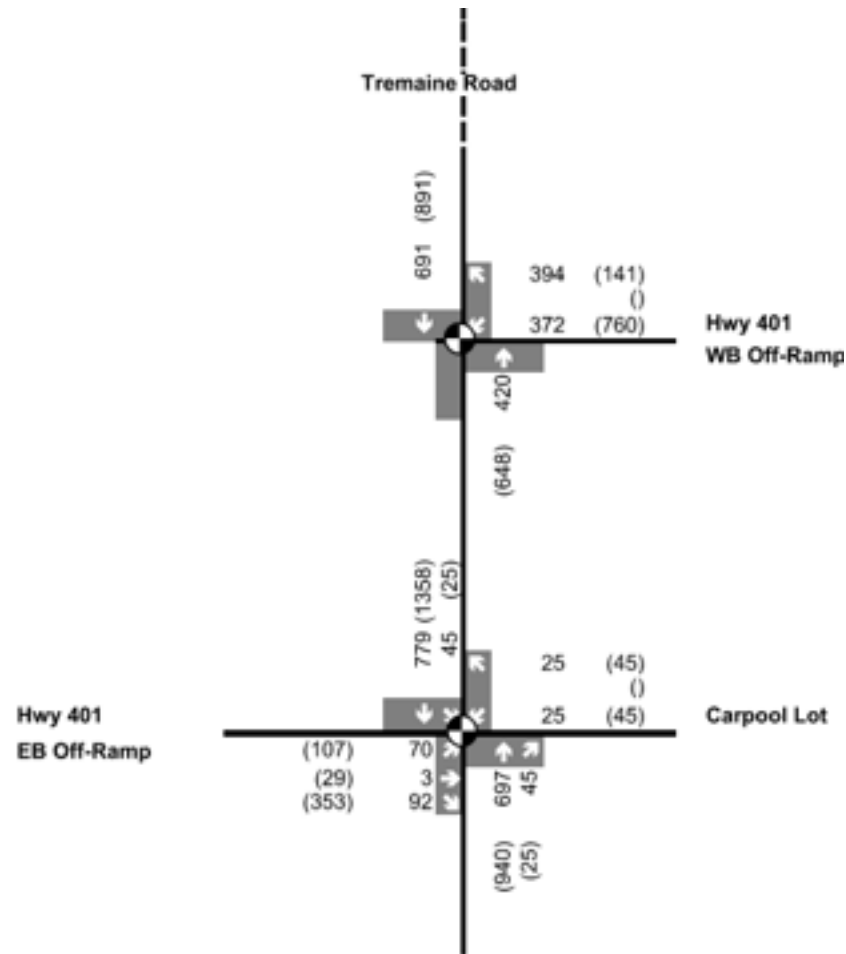
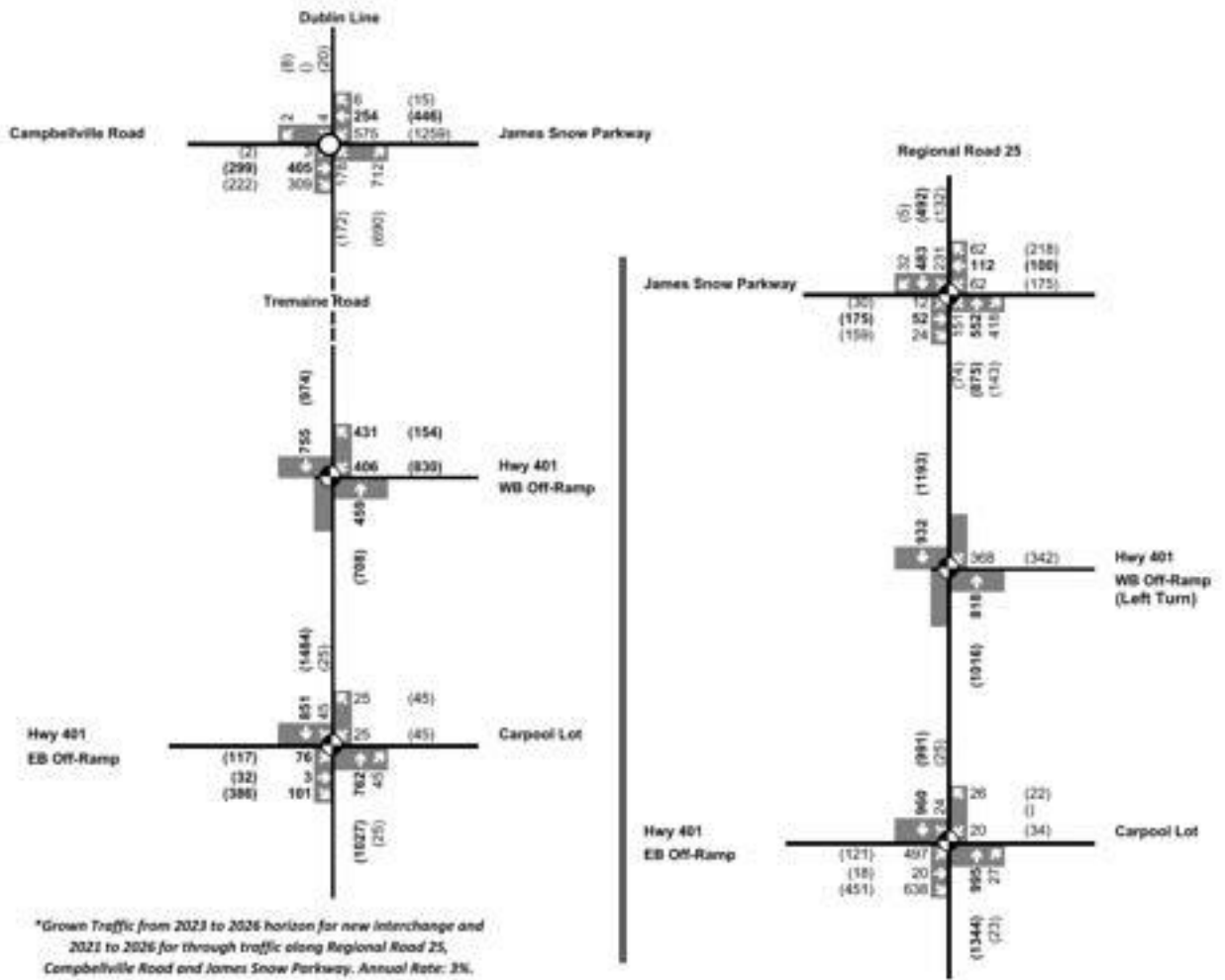


Figure 5-4 2023 Baseline Traffic Volumes at the Planned Tremaine Interchange without Surveyed Quarry Trips



Using the 2021 baseline traffic volumes without any quarry trips (illustrated in **Figure 4-1**), as well as the 2023 baseline traffic volumes at the planned interchange without any quarry trips (illustrated in **Figure 5-4**), TMIG applied the 3% compounded growth rate to all through movements along Campbellville Road, James Snow parkway, Regional Road 25, Tremaine Road, as well as all turning movements at the Highway 401 off-ramps to Tremaine Road in order to derive 2026 future traffic volumes without the quarry trips. Note that traffic along Tremaine to/from Campbellville Road/James Snow Parkway was distributed to the east and west based on the previously approved traffic forecasts derived as part of the studies for developments in the area. The derived 2026 future traffic volumes without the quarry trips have been illustrated in **Figure 5-5**.

Figure 5-5 2026 Future Traffic Volumes without Quarry Trips



Finally, in order to finalize the 2026 future traffic forecast at the study intersections, TMIG added the conservative trip generation for the quarry derived in **Section 3** of this report. The conservative trip assignment based on the future truck route has been illustrated in **Figure 5-6**, and the 2026 future traffic volumes with the conservative quarry trips has been illustrated in **Figure 5-7**.

Figure 5-6 Conservative Quarry Trips (to be Added) – Future Truck Route

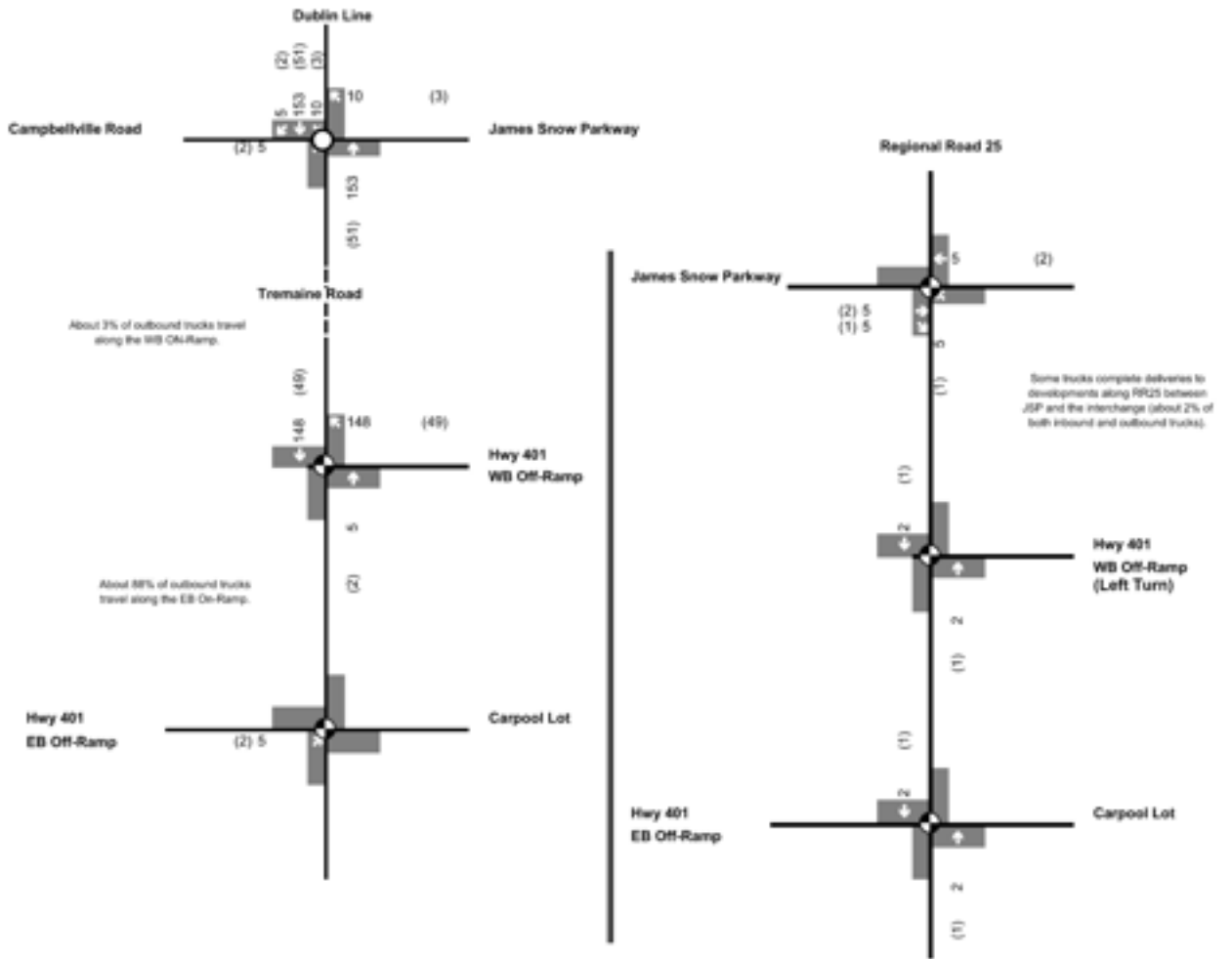
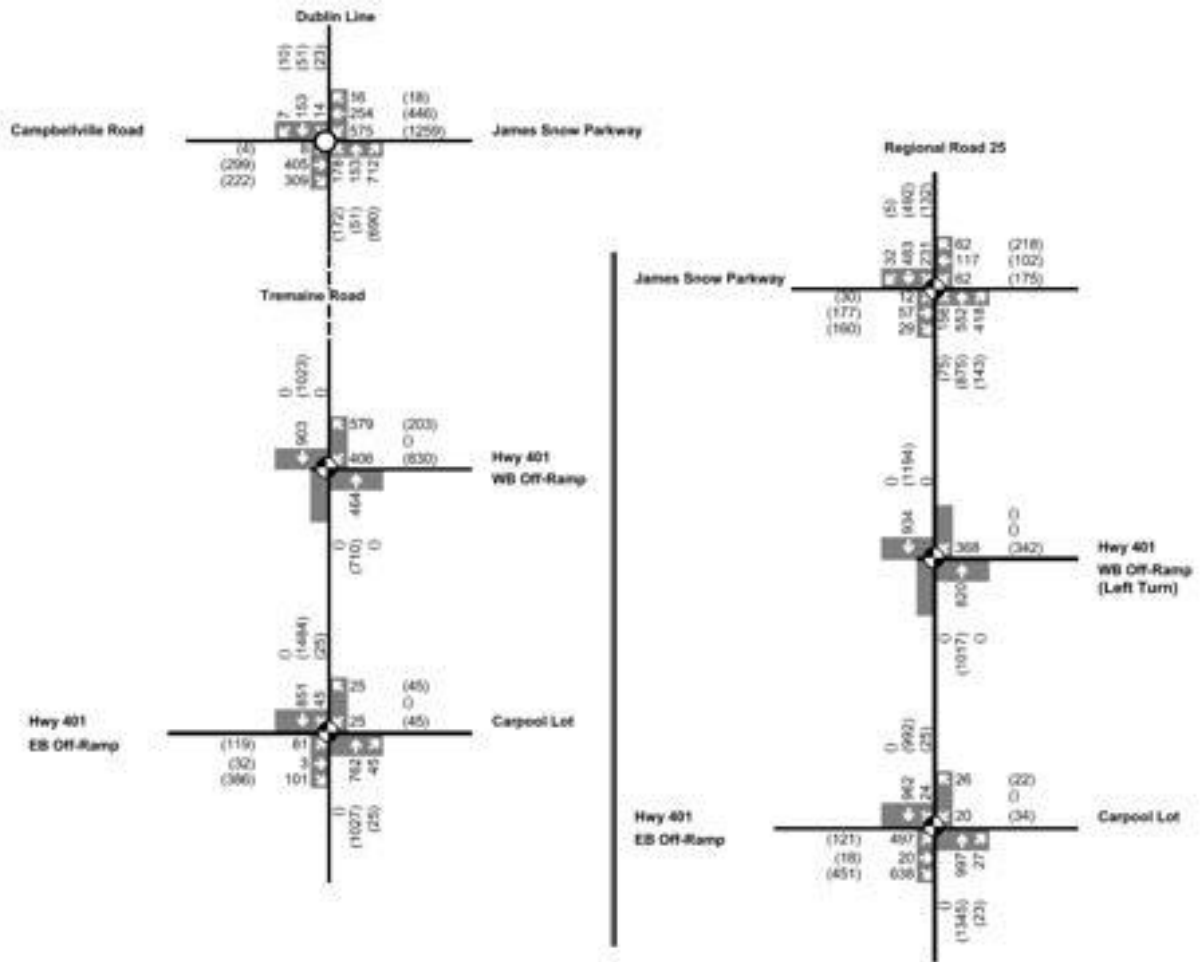


Figure 5-7 2026 Future Traffic Volumes with Conservative Quarry Trips



6 FUTURE TRAFFIC CONDITIONS

6.1 Study Intersections

As illustrated in **Figure 5-6**, the conservative quarry trip assignment is projected to be negligible at the intersections of James Snow Parkway at Regional Road 25 and Regional Road 25 at the Highway 401 interchanges.

Accordingly, it is expected that any trips generated by the Quarry would not have any impacts on the above noted intersections as the majority of the quarry trips would be relocated to the new Tremaine Road interchange. Based on the projected volumes, it is TMIG's opinion that the future traffic operations at the study intersections along Regional Road 25 would not be impacted by the quarry and as such have not been included as part of the review for 2026 future conditions.

Based on the above, the following intersections have been assessed under the 2026 future conditions:

- Dublin Line / Tremaine Road at Campbellville Road / James Snow Parkway
- Tremaine Road at the Highway 401 Westbound Off-Ramp
- Tremaine Road at the Highway 401 Eastbound Off-Ramp

6.2 2026 Future Traffic Operations

TMIG completed a review of the 2026 future traffic conditions using Synchro for the signalized intersections and Arcady for the roundabout intersection. The peak hour factors derived for the Highway 401 off-ramp intersections to Regional Road 25 were applied to the new Tremaine Road off-ramp intersections, similarly to the heavy vehicle percentages. The heavy vehicle percentages for turning movements to/from Dublin Line were derived based on the conservative quarry trip assignment, while an industry standard of 2% was applied to the remaining new turning movements at the roundabout intersection.

As part of this report, traffic operations were detailed for all turning movements at the roundabout intersection and for critical turning movements at the signalized intersections.

Note that the signal timing plans at the planned Tremaine Road off-ramp intersections are based on the signal timing plans provided by the Region for the Regional Road 25 off-ramp intersections (included in **Appendix A**). TMIG used

the same cycle length as provided by Halton Region along Regional Road 25 for each off-ramp intersection, with optimized splits where applicable to improve operations.

The review of traffic operations under 2026 future traffic conditions has been detailed in **Table 6-1** below. All results have been included in **Appendix C**.

Table 6-1 2026 Future Traffic Operations

Intersection	Control Type	AM Peak Hour	AM Peak Hour	AM Peak Hour	PM Peak Hour	PM Peak Hour	PM Peak Hour
Turning Movement	-	V/C	Delay	LOS	V/C	Delay	LOS
Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road	Roundabout	-	6.94	A	-	2.39	A
James Snow Parkway (Westbound Approach)	-	0.41	2.64	A	0.74	5.19	A
Dublin Line (Southbound Approach)	-	0.43	13.76	B	0.52	39.20	E
Campbellville Road (Eastbound Approach)	-	0.52	4.76	A	0.55	7.34	A
Tremaine Road (Northbound Approach)	-	0.50	9.60	A	0.27	5.40	A
Tremaine Road at Highway 401 Westbound Off-Ramp	Signal	0.71	19	B	0.74	18	B
Westbound Right	-	0.84	33	C	-	-	-
Tremaine Road at Highway 401 Eastbound Off-Ramp	Signal	0.45	15	B	0.80	27	C

Based on the above table, all approaches of the roundabout are projected to operate with LOS B or better, with the exception of Dublin Line projected at LOS E during the PM peak hour. This delay is projected at LOS E due to the high volume of westbound left-turning vehicles from James Snow Parkway to Tremaine Road accessing the planned interchange, reducing gaps for southbound vehicles to enter the roundabout. Nonetheless, the delay projected along Dublin Line during the PM peak hour is below 40 seconds per vehicle, with operations below capacity, which is considered acceptable. It should be noted that this study analysis was completed assuming the highest trip generation for the quarry as per the 2020 haulage record. Accordingly, traffic projected along Dublin Line as part of this study represents a worst-case scenario (in addition to the 90% capacity assigned to the roundabout as an added conservative measure). As such, it is TMIG's opinion that day to day operations at the intersection are expected to exhibit reduced delays and improved LOS for the southbound approach than detailed as part of the above table.

Traffic at the signalized study intersections is expected to operate with good LOS C or better during the study period under 2026 future conditions.

The above results are deemed acceptable for the study area and were derived assuming a worst-case scenario for the quarry trip generation. Accordingly, it is TMIG's opinion that the future boundary road network is adequate in supporting the projected traffic volumes at the study intersections with no requirement for any road improvement. Based on the above, a review of traffic operations along the haul route Option 2 was not completed under future conditions as the preferred option shows no projected concerns.

In addition to the traffic operations review, TMIG completed a review of the queues at the intersection of Dublin Line / Tremaine Road at Campbellville Road / James Snow Parkway during the peak hours under 2026 future conditions using the Arcady software. The projected queues have been detailed in **Table 6-2**. Note that, based on the Arcady software, a vehicle is measured at a conservative length of 5.75m (which was used to derive the queue lengths in metres). Similarly, TMIG completed a review of the projected queues at the new Tremaine Road interchange using Simtraffic, detailed in **Table 6-3** (note that only the largest queue for similar movements was detailed in the table). All analysis reports have been included in **Appendix C**.

Table 6-2 2026 Future Traffic Operations – Queues at Roundabout

Intersection	Control Type	AM Peak Hour	AM Peak Hour	PM Peak Hour	PM Peak Hour
Turning Movement	-	95th % Queue (veh)	95th % Queue (m)	95th % Queue (veh)	95th % Queue (m)
Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road	Roundabout	-	-	-	-
James Snow Parkway (Westbound Approach)	-	1.8	10	6.2	36
Dublin Line (Southbound Approach)	-	2.3	13	3.6	21
Campbellville Road (Eastbound Approach)	-	1.4	8	1.4	8
Tremaine Road (Northbound Approach)	-	1.4	8	1.2	7

The above noted 95th percentile queues projected at the roundabout do not encroach onto any adjacent intersection. Accordingly, TMIG does not foresee any queuing concerns at the roundabout and expects queues to be lower under a typical day when the quarry trip generation is reduced compared to this conservative scenario.

Table 6-3 2026 Future Traffic Operations – Queues at Interchange

Intersection	Control Type	Available Storage	AM Peak Hour	AM Peak Hour	PM Peak Hour	PM Peak Hour
Turning Movement	-		95 th % Queue (m)	50 th % Queue (m)	95 th % Queue (m)	50 th % Queue (m)
Tremaine Road at Highway 401 Westbound Off-Ramp	Signal	-	-	-	-	-
Westbound Left	-	970	45	28	68	48
Westbound Right	-	230	93	54	36	20
Northbound Through	-	300	49	27	72	42
Southbound Through		>300	78	51	86	57
Tremaine Road at Highway 401 Eastbound Off-Ramp	Signal	-	-	-	-	-
Eastbound Left	-	300	36	19	62	33
Eastbound Through / Right	-	975	20	11	56	37
Eastbound Right	-	165	13	5	53	31
Westbound Left	-	50	18	7	21	10
Westbound Right	-	20	13	5	20	8
Northbound Through	-	370	67	37	94	59
Northbound Through / Right	-	370	55	24	81	46
Southbound Left	-	120	21	8	15	5
Southbound Through	-	300	61	32	111	75

Based on the above table, queues at the Tremaine Road interchange are projected to be contained within the available storage.

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7 SITE ACCESS REVIEW

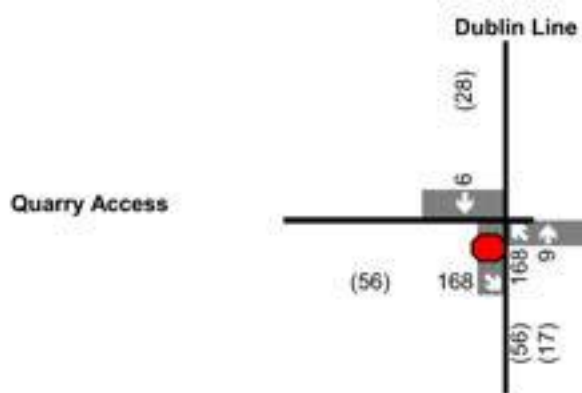
In addition to the traffic operations review along the existing and future haul routes, TMIG completed a review of the quarry access operations onto Dublin Line. The analysis has been detailed below.

7.1 Site Access Volumes

The site access operations review is applicable to both existing and future conditions assuming the most conservative trip generation for the quarry (as assumed when reviewing the existing and future haul routes). This is due to the fact that trips generated by the quarry are not projected to change between existing and future conditions, as well as the remaining traffic along Dublin Line (travelling to/from the existing dwellings and golf course).

The volumes along Dublin Line without the quarry traffic are constant and illustrated in **Figure 4-1** (for existing conditions) and **Figure 5-5** (for future conditions), and the conservative trips generated by the quarry are also constant and illustrated in **Figure 3-2** (for existing conditions) and **Figure 5-6** (for future conditions). For the purpose of conservative analysis, TMIG has assumed that all non-quarry traffic surveyed along Dublin Line would be travelling to the golf course located north of the quarry access, in order to increase the magnitude of conflicting traffic at the access intersection. The derived site access volumes have been illustrated in **Figure 7-1**.

Figure 7-1 Site Access Traffic Volumes



7.2 Site Access Configuration

TMIG completed a left-turn warrant analysis to confirm if a northbound left-turn lane would be warranted at the site access intersection. The warrant analysis is

based on the MTO’s geometric design guidelines and has been included in **Appendix E**.

Assuming a design speed of 80km/h based on the posted speed limit of 60km/h along the roadway, results show that a left-turn lane into the site is not warranted for the access. Accordingly, TMIG assessed traffic operations based on the existing shared lanes configuration at the intersection.

7.3 Site Access Operations

TMIG completed a review of the operations at the quarry access onto Dublin Line assuming existing control, i.e., with Dublin Line under free flow and the quarry access under stop control. The operations review was completed using Synchro and results have been detailed in **Table 7-1** (and included in **Appendix C**). A standard PHF of 0.92 was applied to the study intersection, while TMIG assumed 100% heavy vehicles for traffic travelling to/from the access and 2% for traffic along Dublin Line.

Table 7-1 Quarry Access Operations

Intersection	Control Type	AM Peak Hour	AM Peak Hour	AM Peak Hour	PM Peak Hour	PM Peak Hour	PM Peak Hour
Turning Movement	-	V/C	Delay	LOS	V/C	Delay	LOS
Site Access at Dublin Line	Stop Control	-	-	-	-	-	-
Eastbound Right	-	0.22	10	B	0.07	10	A
Northbound Through / Left	-	0.16	8	A	0.05	7	A
Southbound Through / Right	-	0.00	0	A	0.02	0	A

Based on the above table, when assuming the most conservative quarry trip generation, the quarry access to Dublin Line is projected to remain under acceptable operations with a maximum delay of 10 seconds and LOS B for vehicles exiting the quarry. This review confirms that no changes would be required to the access intersection under existing or future conditions.

8 SUMMARY AND CONCLUSIONS

Dufferin Aggregates (a division of CRH Canada Group Inc.) operates the existing Milton Quarry located at 9410 Dublin Line, in the Town of Milton, which has an unlimited annual extraction license. Dufferin Aggregates is proposing to extend the quarry over a total area of 30.2 hectare, of which 15.9 hectares is proposed for extraction. This Milton Quarry East Extension refers only to the extraction area, as the production capacity and access to the subject lands are proposed to remain as under existing conditions. The Municipal Infrastructure Group, a T.Y. Lin International Company (TMIG) was retained to complete a Traffic Impact Study and Haul Route Assessment in support of this proposed extension. The contents of this study and associated conclusions have been detailed below.

8.1 2021 Existing Conditions

Due to the on-going Covid-19 pandemic and the inability to derive accurate traffic volumes from up-to-date traffic surveys, TMIG derived 2021 existing traffic volumes based on historical survey data. The survey dates for all study intersections have been detailed in **Table 2-1**.

As the existing traffic to/from the quarry is not projected to change following the extension, TMIG completed a conservative review of traffic operations under existing and future conditions by applying the highest recorded trip generation for the lands derived from the 2020 haulage records. TMIG did so by removing the trips to/from the quarry surveyed as part of the intersection traffic data (70 trips during the AM peak hour and 8 trips during the PM peak hour) from the boundary road network intersections and replacing it with the highest trip generation recorded in the last year (336 trips during the AM peak hour and 112 trips during the PM peak hour). See Section 3 of this study for details.

As the quarry production has not changed between the intersection survey years and the 2021 existing conditions, the removal of the surveyed quarry trips was completed from the surveyed traffic data (detailed in **Table 2-1**). This data was then grown to 2021 conditions using the following growth rates (compounded):

- **Dublin Line** – 0%, as traffic along Dublin Line is travelling to/from the Quarry or Golf Course and is would not have grown.
- **Campbellville Road** – 2%
- **James Snow Parkway/ Regional Road 25** – 3%
- **Highway 401 Eastbound and Westbound Off-Ramps** – 1.5%

Once the 2021 baseline traffic volumes were derived (i.e., with the surveyed quarry trips removed), TMIG added the conservative quarry trip generation assigned to the boundary road network (derived from the 2020 haulage data) in order to derive 2021 conservative traffic volumes.

Review of the conservative traffic operations under 2021 existing conditions show that the boundary road network accommodates the conservative quarry traffic volumes with no conflicts. Signal timing plans are recommended to be optimized at the intersection of Regional Road 25 at Highway 401 Eastbound Off-Ramp during the AM peak hour.

8.2 2026 Future Conditions

The traffic forecast for the 2026 future conditions is based on the MRC Report carried out by the Region for analysis of all scenarios post Tremaine Road interchange construction. It should be noted that, as with existing conditions, TMIG assessed 2026 future conditions assuming the most conservative trip generation for the quarry.

Based on the MRC study, an annual growth rate of 3% was derived for traffic along the Highway 401 interchanges. Accordingly, a 3% compounded growth rate was applied to the 2021 baseline traffic volumes at the study intersections (i.e., volumes without the surveyed quarry trips), in order to derive 2026 volumes without quarry trips.

Traffic volumes at the planned Tremaine Road interchange were based on the volumes detailed as part of the MRC study (see Section 5 of this report for details). The opening year volume per the MRC study were assigned to the 2023 horizon year, which is the confirmed opening year of the interchange based on input from Region staff. Once 2023 traffic volumes were derived at the new interchange, TMIG removed the surveyed quarry trips from the intersections (as it is assumed that quarry trips would be included in the traffic forecast) and grew the data to a 2026 horizon year using the 3% compounded growth rate.

Using the 2026 traffic forecast at all study intersections, TMIG added the conservative quarry trips assigned to the future truck route (i.e., including the Tremaine Road interchange) in order to derive 2026 conservative future traffic volumes). It should be noted that, based on the future quarry trip assignment to Regional Road 25, the study intersections along the roadway would not be impacted by the quarry traffic and as such have not been included as part of the review for 2026 future conditions.

Review of the 2026 future conditions show that the planned Tremaine Road interchange intersections are projected to operate below capacity with acceptable LOS. The roundabout intersection of Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road is projected to operate under good LOS B or better with its southbound approach (Dublin Line) at LOS E during the PM peak hour (with an approach delay below 40 seconds per vehicle and under capacity). The projected operations are deemed acceptable, with no projected queueing concerns at the intersections. It should be noted that the review was completed under conservative assumptions (i.e., the roundabout was assessed at 90% capacity to account for drivers that are new to roundabouts and would proceed more slowly through the intersection, in addition to the conservative quarry trips, even though drivers would be accustomed to the roundabout by the 2026 horizon year as it is already existing). It is TMIG's opinion that the intersection would operate with even better LOS and reduced delay under future conditions with the quarry trips reduced to average volumes (and the roundabout operating in a standard way at 100% capacity).

A review of the haul route Option 2 traffic operations was not completed under future conditions as the existing haul route (Option 1) is the preferred option and shows no projected concerns. A review of haul routes via other transport modes (i.e., shipping and rail) was not completed as these options are not available for this site.

Finally, review of the site access intersection (with the conservative quarry trip generation) shows that no changes to the intersection configuration are required under existing or future conditions.

8.3 Conclusions

As detailed previously, the analysis completed as part of this study represents a worse-case scenario assuming the highest quarry trip generation surveyed in 2020, along with an assessment considering roundabout capacity reduced to 90%. With the aforementioned conservative measures, all study intersections are projected to operate with acceptable delay under future conditions with no roadway improvements required. Accordingly, the proposed quarry extension is deemed acceptable based on the findings of this study.

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APPENDIX A

TMC Data & STP

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:30:00

To: 8:30:00

Municipality: Milton
Site #: 1702800001
Intersection: Campbellville Rd & Dublin Line
TFR File #: 1
Count date: 25-Jan-17

Weather conditions:
Person(s) who counted:

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

Major Road: Campbellville Rd runs W/E

North Leg Total: 85

North Entering: 28

North Peds: 0

Peds Cross: \times

Heavys	0	0	0	0
Trucks	6	0	16	22
Cars	2	0	4	6
Totals	8	0	20	



Heavys 0

Trucks 48

Cars 9

Totals 57

East Leg Total: 588

East Entering: 246

East Peds: 0

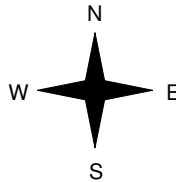
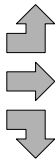
Peds Cross: \times

Heavys	0	Trucks	39	Cars	164	Totals	203
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Campbellville Rd

Heavys	0	Trucks	3	Cars	3	Totals	6
	0		19		303		322
	0		0		0		0
Totals	0	22	306				



Dublin Line

Dublin Line

Cars	6	Trucks	45	Heavys	0	Totals	51
	162		33		0		195
	0		0		0		0
Totals	168	78	0				

Campbellville Rd



Cars	307	Trucks	35	Heavys	0	Totals	342
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Peds Cross: \times

West Peds: 0

West Entering: 328

West Leg Total: 531

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



Peds Cross: \times

South Peds: 0

South Entering: 0

South Leg Total: 0

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Milton
Site #: 1702800001
Intersection: Campbellville Rd & Dublin Line
TFR File #: 1
Count date: 25-Jan-17

Weather conditions:

Person(s) who counted:

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

Major Road: Campbellville Rd runs W/E

North Leg Total: 53

North Entering: 31

North Peds: 0

Peds Cross: \times

Heavys	0	0	0	0
Trucks	0	0	3	3
Cars	8	0	20	28
Totals	8	0	23	



Heavys 0

Trucks 5

Cars 17

Totals 22

East Leg Total: 622

East Entering: 361

East Peds: 2

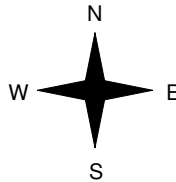
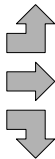
Peds Cross: \times

Heavys	0	Trucks	22	Cars	328	Totals	350
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Campbellville Rd

Heavys	0	Trucks	1	Cars	2	Totals	3
	0		52		186		238
	0		0		0		0
Totals	0	53	188				



Dublin Line

Dublin Line

Cars	15	Trucks	4	Heavys	0	Totals	19
	320		22		0		342
	0		0		0		0
Totals	335	26	0				

Campbellville Rd



Cars	206	Trucks	55	Heavys	0	Totals	261
------	-----	--------	----	--------	---	--------	-----

Peds Cross: \times

West Peds: 2

West Entering: 241

West Leg Total: 591

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



Peds Cross: \times

South Peds: 0

South Entering: 0

South Leg Total: 0

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00
To: 10:00:00

One Hour Peak

From: 7:45:00
To: 8:45:00

Municipality: Toronto
Site #: 1912000005
Intersection: RR 25 & James Snow Pkwy
TFR File #: 1
Count date: 16-Apr-19

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 25 runs N/S

North Leg Total: 1179
North Entering: 656
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	16	100	55	171
Cars	16	293	176	485
Totals	32	393	231	



Heavys 0
Trucks 146
Cars 377
Totals 523

East Leg Total: 907
East Entering: 216
East Peds: 1
Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	69	250	319

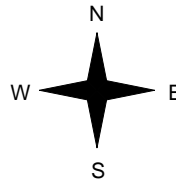


RR 25

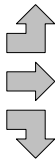
Cars	Trucks	Heavys	Totals
39	23	0	62
77	15	0	92
34	28	0	62
150	66	0	



James Snow Pkwy



Heavys	Trucks	Cars	Totals
0	6	6	12
0	15	27	42
0	19	21	40
0	40	54	



James Snow Pkwy



Cars	Trucks	Heavys	Totals
570	121	0	691

Peds Cross: \times
West Peds: 0
West Entering: 94
West Leg Total: 413

Cars	348
Trucks	147
Heavys	0
Totals	495



Cars	157	332	367	856
Trucks	38	117	51	206
Heavys	0	0	0	0
Totals	195	449	418	

Peds Cross: \times
South Peds: 0
South Entering: 1062
South Leg Total: 1557

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: Toronto
Site #: 1912000005
Intersection: RR 25 & James Snow Pkwy
TFR File #: 1
Count date: 16-Apr-19

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: RR 25 runs N/S

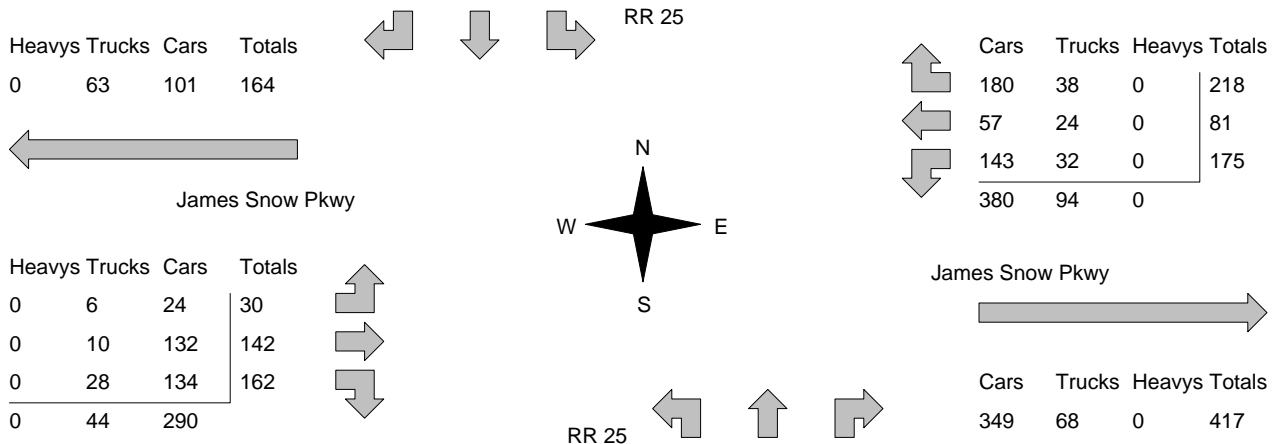
North Leg Total: 1497
 North Entering: 537
 North Peds: 0
 Peds Cross: \bowtie

Heavys	0	0	0	0
Trucks	3	82	31	116
Cars	2	318	101	421
Totals	5	400	132	



Heavys	0
Trucks	173
Cars	787
Totals	960

East Leg Total: 891
 East Entering: 474
 East Peds: 2
 Peds Cross: \bowtie



Peds Cross: \bowtie
 West Peds: 0
 West Entering: 334
 West Leg Total: 498

Cars	595	Cars	42	583	116	741
Trucks	142	Trucks	36	129	27	192
Heavys	0	Heavys	0	0	0	0
Totals	737	Totals	78	712	143	

Peds Cross: \bowtie
 South Peds: 0
 South Entering: 933
 South Leg Total: 1670

Comments

Martin St @ Hwy 401 WB Off Ramp

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Halton Region
Site #: 0000003189
Intersection: Martin St & Hwy 401 WB Off Ramp
TFR File #: 9
Count date: 24-May-2018

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Martin St runs N/S

North Leg Total: 1399
 North Entering: 751
 North Peds: 0
 Peds Cross: ∇

Heavys	94	0	94
Trucks	13	0	13
Cars	644	0	644
Totals	751	0	

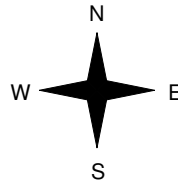


Heavys	47
Trucks	24
Cars	577
Totals	648

East Leg Total: 700
 East Entering: 352
 East Peds: 2
 Peds Cross: ∇



Martin St

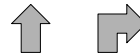


	Cars	Trucks	Heavys	Totals
	0	0	0	0
	322	11	19	352
	322	11	19	

Hwy 401 WB On/Off Ramp



Martin St



Cars	966	Cars	577	303	880
Trucks	24	Trucks	24	13	37
Heavys	113	Heavys	47	32	79
Totals	1103	Totals	648	348	



Cars	Trucks	Heavys	Totals
303	13	32	348

Peds Cross: ∇
 South Peds: 0
 South Entering: 996
 South Leg Total: 2099

Comments

Martin St @ Hwy 401 WB Off Ramp

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Halton Region
Site #: 0000003189
Intersection: Martin St & Hwy 401 WB Off Ramp
TFR File #: 9
Count date: 24-May-2018

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Signalized Intersection ****

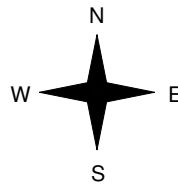
Major Road: Martin St runs N/S

North Leg Total: 1747
 North Entering: 945
 North Peds: 0
 Peds Cross: \times

Heavys	62	0	62
Trucks	14	0	14
Cars	869	0	869
Totals	945	0	

Heavys	76
Trucks	12
Cars	714
Totals	802

East Leg Total: 781
 East Entering: 327
 East Peds: 1
 Peds Cross: \times



	Cars	Trucks	Heavys	Totals
Upward Turn	0	0	0	0
Downward Turn	301	10	16	327
Totals	301	10	16	

Hwy 401 WB On/Off Ramp



Martin St

Cars	1170	Cars	714	417	1131
Trucks	24	Trucks	12	10	22
Heavys	78	Heavys	76	27	103
Totals	1272	Totals	802	454	

Peds Cross: \times
 South Peds: 0
 South Entering: 1256
 South Leg Total: 2528

Comments

Martin St @ Hwy 401 EB Off Ramp

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:30:00

To: 8:30:00

Municipality: Halton Region
Site #: 0000003351
Intersection: Martin St & Hwy 401 EB Off Ramp
TFR File #: 9
Count date: 5-Dec-2019

Weather conditions:
Overcast/Wet
Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Martin St runs N/S

North Leg Total: 2123
 North Entering: 804
 North Peds: 0
 Peds Cross: \times

Heavys	0	93	4	97
Trucks	0	17	0	17
Cars	0	670	20	690
Totals	0	780	24	



Heavys	125
Trucks	26
Cars	1168
Totals	1319

East Leg Total: 116
 East Entering: 46
 East Peds: 2
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	0	0	0

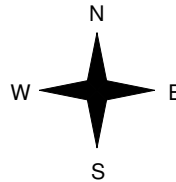


Martin St

Cars	Trucks	Heavys	Totals
23	0	3	26
0	0	0	0
17	1	2	20
40	1	5	



Hwy 401 EB Off Ramp



Heavys	Trucks	Cars	Totals
34	11	438	483
3	0	16	19
34	7	578	619
71	18	1032	



Hwy 401 EB On Ramp/Car Pool



Cars	Trucks	Heavys	Totals
62	0	8	70

Peds Cross: \times
 West Peds: 0
 West Entering: 1121
 West Leg Total: 1121

Cars	1265	Cars	0	707	26	733
Trucks	25	Trucks	0	15	0	15
Heavys	129	Heavys	0	88	1	89
Totals	1419	Totals	0	810	27	



Peds Cross: \times
 South Peds: 0
 South Entering: 837
 South Leg Total: 2256

Comments

Martin St @ Hwy 401 EB Off Ramp

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Halton Region
Site #: 0000003351
Intersection: Martin St & Hwy 401 EB Off Ramp
TFR File #: 9
Count date: 5-Dec-2019

Weather conditions:
Overcast/Wet
Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Martin St runs N/S

North Leg Total: 2062
 North Entering: 831
 North Peds: 0
 Peds Cross: \times

Heavys	0	40	4	44
Trucks	0	7	0	7
Cars	0	759	21	780
Totals	0	806	25	



Heavys	97
Trucks	11
Cars	1123
Totals	1231

East Leg Total: 121
 East Entering: 56
 East Peds: 0
 Peds Cross: \times

Heavys	0
Trucks	0
Cars	0
Totals	0



Martin St

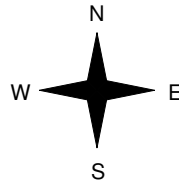
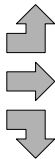
Cars	18	0	4	22
Trucks	0	0	0	0
Heavys	33	0	1	34
Totals	51	0	5	



Hwy 401 EB On Ramp/Car Pool



Heavys	36	1	80	117
Trucks	3	0	14	17
Cars	32	7	399	438
Totals	71	8	493	



Martin St



Cars	57	0	8	65
Trucks				
Heavys				
Totals				

Peds Cross: \times
 West Peds: 0
 West Entering: 572
 West Leg Total: 572

Cars	1191
Trucks	14
Heavys	73
Totals	1278



Cars	0	1025	22	1047
Trucks	0	10	0	10
Heavys	0	57	1	58
Totals	0	1092	23	

Peds Cross: \times
 South Peds: 1
 South Entering: 1115
 South Leg Total: 2393

Comments



Date: 21-Nov-19
 Intersection: Regional Road 25 @ JSP

8 Phase Basic Timing Sheet												
	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use	x	x		x	x	x		x				
Direction	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB				
Min Green	7	20	7	10	7	20	7	10				
Veh Ext.	3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0				
Yellow	3	4.2	3	3.7	3	4.2	3	3.7				
Red	1	2.7	1	2.9	1	2.7	1	2.9				
Walk		7		7		7		7				
Don't Walk		29		30		22		30				
Max 1	11	60	16	33	11	70	11	49				
Max 2												
Max 3												
Veh Recall		x				x						
Ped Recall												
Notes:	Local Zero Override Active Set Sync Reference to 3:15											



Date: 07-May-20
 Intersection: Regional Road 25 @ 401 WB Off Ramp

8 Phase Basic Timing Sheet								
	1	2	3	4	5	6	7	8
Phases in use		x				x		x
Direction		NB				SB		WB
Min Green		20				20		10
Veh Ext.		4.4				4.4		3.0
Yellow		4.5				4.5		4.1
Red		1.9				1.9		2.1
Walk								
Don't Walk								
Max 1		37				37		30
Max 2								
Max 3								
Veh Recall								
Ped Recall								
Notes:	Set Sync Reference to 3:15							



Date: 07-May-20
 Intersection: Regional Road 25 @ 401 EB Off Ramp/Carpool

8 Phase Basic Timing Sheet												
	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use	x	x		x		x		x				
Direction	SBLT	NB		EB		SB		WB				
Min Green	7	20		10		20		10				
Veh Ext.	3.0	3.0		3.0		3.0		3.0				
Yellow	3	4.5		4.2		4.5		3.4				
Red		2.1		2.4		2.1.		3.4				
Walk		15		16								
Don't Walk		5		7								
Max 1	12	32		33		32		16				
Max 2												
Max 3												
Veh Recall												
Ped Recall												
Notes:	Phase 4 & 8 Split Phased Set Sync Reference to 3:15											

APPENDIX B

Truck Route Assignment

737	REMINGTON MAYFIELD INC	737
734	PETRIE'S QUALITY TOPSOIL LTD	734
718	CITY OF OSHAWA	718
713	W ROBERT HUTCHESON SAND AND GRAVEL	713
690	ROCK CONCRETE FORMING LTD.	690
669	CRH CANADA GROUP INC.	669
632	WINDMILL GROUP CORPORATION	632
628	STONE LANDSCAPES INC.	628
612	RIZMI AGGREGATES INC	612
607	TRIPLE F PAVING CO LTD.	607
603	DEPCON CONTRACTING LIMITED	603
581	MELOSE PAVING CO LTD	581
556	COX CONSTRUCTION LTD	556
549	KENAUDAN CONTRACTING LIMITED	549
533	NEW-ALLIANCE LTD	533
530	CROWN ROAD PAVING	530
500	R MCGREGOR CONTRACTING	500
485	MARKSTONE LANDSCAPING LTD	485
470	CARDI CONSTRUCTION LIMITED	470
460	PYLON PAVING (1996) INC	460
452	NORTHGATE FARMS	452
447	CHUDLEIGH'S APPLE FARM	447
423	LANDSOURCE ORGANIX LIMITED	423
421	MAR-CO CLAY PRODUCTS INC	421
420	ACHIL RESTORATION LTD	420
380	EVERSTRONG CONSTRUCTION LTD.	380
367	SANDERSON CONSTRUCTION LIMITED	367
354	SUPER PAVING & CONSTRUCTION LTD	354
325	WM. GROVES LIMITED	325
322	ROCKY RIVER CONSTRUCTION LIMITED	322
310	RDI CONSTRUCTION LTD	310
305	GDN BUILDINGS	305
305	STONECAST CONTRACTING LTD.	305
299	GREENSPACE CONSTRUCTION INC	299
294	ARKELL RIDGE SAND & GRAVEL	294
287	ASHGROVE HOLDINGS	287
280	DUFFERIN CONCRETE	280
277	HALTON FORMING(1992)LTD	277
277	BESSELING MECHANICAL INC	277
276	ALLENS LANDSCAPE SUPPLY DEPOT INC.	276
269	TRI-PHASE ENVIRONMENTAL INC.	269
257	DAVID NORTHWOOD & ASSOCIATES LTD.	257
253	LINCOLN PAVING & CONTRACTING LTD.	253
252	A WESLEY PAVING LIMITED	252
252	BUILT BY ENGINEERS EXCAVATING INC.	252
250	GRADE CONTROL LIMITED	250
249	TAN-JEN LIMITED	249
248	EAGLE DEMOLITION &	248
233	MSO CONSTRUCTION LIMITED	233
229	UCC GROUP INC.	229
228	BRADFORD CONCRETE PLANT	228
226	AMICO INFRASTRUCTURES (OXFORD)	226
223	CAMBRIDGE LANDSCAPING INC.	223
215	ACADEMY STONE	215
213	WOODBINE ENTERTAINMENT GROUP	213
209	TECHNICORE UNDERGROUND INC	209
205	RITCHFIELD INC	205
204	DUCON UTILITIES LIMITED	204
182	A&A SKOK EXCAVATING	182
181	TOM SOVEREIGN MOBILE WELDING INC	181
179	METROPOLITAN BUILDING MATERIALS	179
176	TERRA NOVA ENVIRONMENTAL	176
171	CROSS CONSTRUCTION COMPANY LIMITED	171
170	HK UNITED TRUCKS LIMITED	170
163	GRASCAN CONSTRUCTION LTD.	163
163	IL DUCA CONTRACTING INC.	163
163	BOWMANVILLE CONCRETE PLANT	163
156	K-W CORNERSTONE PAVING LTD.	156
156	BONDFIELD CONSTRUCTION	156
151	GELDERMAN JAN LANDSCAPING	151
146	ALDRESHOT LANDSCAPE	146
143	DURA-LOCK INC	143
143	DESQ CONSTRUCTION LIMITED	143
141	ALTRA EXCAVATING &	141
141	WEINMANN LIMITED	141
141	DIXIE AND 407 ESSO	141
139	T&R PAVING	139
138	CLUBLINK CORPORATION	138
136	LAMOUNT CONTRACTING LTD	136

737	100%	0%	0%	737
734	100%	0%	0%	734
718	100%	0%	0%	718
713	100%	0%	0%	713
690	100%	0%	0%	690
669	100%	0%	0%	669
632	100%	0%	0%	632
628	100%	0%	0%	628
612	100%	0%	0%	612
607	100%	0%	0%	607
603	100%	0%	0%	603
581	100%	0%	0%	581
-	0%	0%	0%	-
549	100%	0%	0%	549
533	100%	0%	0%	533
530	100%	0%	0%	530
500	100%	0%	0%	500
485	100%	0%	0%	485
470	100%	0%	0%	470
460	100%	0%	0%	460
452	100%	0%	0%	452
447	100%	0%	0%	447
423	100%	0%	0%	423
421	100%	0%	0%	421
420	100%	0%	0%	420
380	100%	0%	0%	380
367	100%	0%	0%	367
354	100%	0%	0%	354
325	100%	0%	0%	325
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182	100%	0%	0%	182
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138	100%	0%	0%	138
136	100%	0%	0%	136

























737	0%	0%	0%	737
734	0%	0%	0%	734
718	0%	0%	0%	718
713	0%	0%	0%	713
690	0%	0%	0%	690
669	0%	0%	0%	669
632	0%	0%	0%	632
628	0%	0%	0%	628
612	0%	0%	0%	612
607	0%	0%	0%	607
603	0%	0%	0%	603
581	0%	0%	0%	581
-	0%	0%	0%	-
549	0%	0%	0%	549
533	0%	0%	0%	533
530	0%	0%	0%	530
500	0%	0%	0%	500
485	0%	0%	0%	485
470	0%	0%	0%	470
460	0%	0%	0%	460
452	0%	0%	0%	452
447	0%	0%	0%	447
423	0%	0%	0%	423
421	0%	0%	0%	421
420	0%	0%	0%	420
380	0%	0%	0%	380
367	0%	0%	0%	367
354	0%	0%	0%	354
325	0%	0%	0%	325
322	0%	0%	0%	322
310	0%	0%	0%	310
305	0%	0%	0%	305
305	0%	0%	0%	305
299	0%	0%	0%	299
294	0%	0%	0%	294
287	0%	0%	0%	287
280	0%	0%	0%	280
277	0%	0%	0%	277
277	0%	0%	0%	277
276	0%	0%	0%	276
269	0%	0%	0%	269
257	0%	0%	0%	257
253	0%	0%	0%	253
252	0%	0%	0%	252
252	0%	0%	0%	252
250	0%	0%	0%	250
249	0%	0%	0%	249
248	0%	0%	0%	248
233	0%	0%	0%	233
229	0%	0%	0%	229
228	0%	0%	0%	228
226	0%	0%	0%	226
223	0%	0%	0%	223
215	0%	0%	0%	215
213	0%	0%	0%	213
209	0%	0%	0%	209
205	0%	0%	0%	205
204	0%	0%	0%	204
182	0%	0%	0%	182
181	0%	0%	0%	181
179	0%	0%	0%	179
176	0%	0%	0%	176
171	0%	0%	0%	171
170	0%	0%	0%	170
163	0%	0%	0%	163
163	0%	0%	0%	163
163	0%	0%	0%	163
156	0%	0%	0%	156
156	0%	0%	0%	156
151	0%	0%	0%	151
146	0%	0%	0%	146
143	0%	0%	0%	143
143	0%	0%	0%	143
141	0%	0%	0%	141
141	0%	0%	0%	141
141	0%	0%	0%	141
139	0%	0%	0%	139
138	0%	0%	0%	138
136	0%	0%	0%	136

APPENDIX C

Traffic Operations Review Results











HCM Signalized Intersection Capacity Analysis
2: Regional Road 25 & James Snow Parkway

2021 Existing AM
04-06-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	50	182	62	102	62	309	476	418	231	417	32
Future Volume (vph)	12	50	182	62	102	62	309	476	418	231	417	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	6.6	6.6	4.0	6.6	6.6	4.0	6.9	6.9	4.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1190	2625	1079	1231	3077	1166	1416	2833	1407	1358	2786	
Flt Permitted	0.69	1.00	1.00	0.56	1.00	1.00	0.47	1.00	1.00	0.46	1.00	
Satd. Flow (perm)	859	2625	1079	728	3077	1166	698	2833	1407	660	2786	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	52	188	64	105	64	319	491	431	238	430	33
RTOR Reduction (vph)	0	0	167	0	0	54	0	0	188	0	3	0
Lane Group Flow (vph)	12	52	21	64	105	10	319	491	243	238	460	0
Confl. Peds. (#/hr)									1	1		
Heavy Vehicles (%)	50%	36%	48%	45%	16%	37%	19%	26%	12%	24%	25%	50%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	17.0	14.1	14.1	27.2	20.3	20.3	82.2	71.1	71.1	80.8	70.4	
Effective Green, g (s)	17.0	14.1	14.1	27.2	20.3	20.3	82.2	71.1	71.1	80.8	70.4	
Actuated g/C Ratio	0.13	0.11	0.11	0.22	0.16	0.16	0.65	0.56	0.56	0.64	0.56	
Clearance Time (s)	4.0	6.6	6.6	4.0	6.6	6.6	4.0	6.9	6.9	4.0	6.9	
Vehicle Extension (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	123	293	120	193	494	187	517	1596	792	480	1554	
v/s Ratio Prot	0.00	0.02		c0.02	0.03		c0.05	0.17		0.04	0.17	
v/s Ratio Perm	0.01		0.02	c0.05		0.01	c0.35		0.17	0.28		
v/c Ratio	0.10	0.18	0.18	0.33	0.21	0.06	0.62	0.31	0.31	0.50	0.30	
Uniform Delay, d1	47.7	50.8	50.8	41.0	46.0	44.8	10.2	14.6	14.5	9.9	14.8	
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	0.3	0.6	1.5	1.0	0.5	0.3	2.2	0.5	1.0	0.8	0.5	
Delay (s)	48.1	51.4	52.2	42.0	46.5	45.1	12.4	15.1	15.5	10.7	15.3	
Level of Service	D	D	D	D	D	D	B	B	B	B	B	
Approach Delay (s)		51.9			44.9			14.5			13.7	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			21.1				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			126.2				Sum of lost time (s)				21.5	
Intersection Capacity Utilization			67.5%				ICU Level of Service				C	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis
 3: Regional Road 25 & Hwy 401 Westbound Off-Ramp

2021 Existing AM
 04-06-2021

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	368	0	713	0	0	954
Future Volume (vph)	368	0	713	0	0	954
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.4	3.4	3.4	3.4
Total Lost time (s)	6.2		6.4			6.4
Lane Util. Factor	0.97		0.95			0.95
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3284		3180			3096
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3284		3180			3096
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	368	0	713	0	0	954
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	368	0	713	0	0	954
Heavy Vehicles (%)	9%	0%	11%	0%	0%	14%
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	12.3		37.0			37.0
Effective Green, g (s)	12.3		37.0			37.0
Actuated g/C Ratio	0.20		0.60			0.60
Clearance Time (s)	6.2		6.4			6.4
Vehicle Extension (s)	3.0		4.4			4.4
Lane Grp Cap (vph)	652		1900			1850
v/s Ratio Prot	c0.11		0.22			c0.31
v/s Ratio Perm						
v/c Ratio	0.56		0.38			0.52
Uniform Delay, d1	22.4		6.5			7.2
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.1		0.6			1.0
Delay (s)	23.5		7.0			8.3
Level of Service	C		A			A
Approach Delay (s)	23.5		7.0			8.3
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			61.9		Sum of lost time (s)	12.6
Intersection Capacity Utilization			47.4%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

























HCM Signalized Intersection Capacity Analysis
 4: Regional Road 25 & Hwy 401 Eastbound Off-Ramp/Carpool Lot

2021 Existing AM
 04-06-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	502	20	638	20	0	26	0	860	27	24	830	0	
Future Volume (vph)	502	20	638	20	0	26	0	860	27	24	830	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.8	3.8	3.8	3.2	3.7	3.5	3.4	3.4	3.4	3.0	3.4	3.4	
Total Lost time (s)	6.6	6.6	6.6		6.8			6.6		3.0	6.6		
Lane Util. Factor	1.00	0.95	0.95		1.00			0.95		1.00	0.95		
Frpb, ped/bikes	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		
Frt	1.00	0.86	0.85		0.92			1.00		1.00	1.00		
Flt Protected	0.95	1.00	1.00		0.98			1.00		0.95	1.00		
Satd. Flow (prot)	1693	1474	1466		1532			3114		1440	3096		
Flt Permitted	0.95	1.00	1.00		0.98			1.00		0.17	1.00		
Satd. Flow (perm)	1693	1474	1466		1532			3114		265	3096		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
Adj. Flow (vph)	512	20	651	20	0	27	0	878	28	24	847	0	
RTOR Reduction (vph)	0	203	203	0	44	0	0	2	0	0	0	0	
Lane Group Flow (vph)	512	136	129	0	3	0	0	904	0	24	847	0	
Confl. Peds. (#/hr)									3	3			
Heavy Vehicles (%)	9%	16%	7%	15%	0%	12%	0%	13%	4%	17%	14%	0%	
Turn Type	Split	NA	Perm	Split	NA			NA		pm+pt	NA		
Protected Phases	4	4		8	8			2		1	6		
Permitted Phases			4							6			
Actuated Green, G (s)	33.1	33.1	33.1		7.8			43.1		49.0	49.0		
Effective Green, g (s)	33.1	33.1	33.1		7.8			43.1		49.0	49.0		
Actuated g/C Ratio	0.30	0.30	0.30		0.07			0.39		0.45	0.45		
Clearance Time (s)	6.6	6.6	6.6		6.8			6.6		3.0	6.6		
Vehicle Extension (s)	3.0	3.0	3.0		3.0			3.0		3.0	3.0		
Lane Grp Cap (vph)	509	443	441		108			1221		149	1380		
v/s Ratio Prot	c0.30	0.09			c0.00			c0.29		0.00	c0.27		
v/s Ratio Perm			0.09							0.07			
v/c Ratio	1.01	0.31	0.29		0.03			0.74		0.16	0.61		
Uniform Delay, d1	38.4	29.6	29.4		47.5			28.6		19.2	23.2		
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00		
Incremental Delay, d2	41.4	0.4	0.4		0.1			4.1		0.5	2.0		
Delay (s)	79.8	30.0	29.8		47.6			32.7		19.7	25.3		
Level of Service	E	C	C		D			C		B	C		
Approach Delay (s)		51.5			47.6			32.7			25.1		
Approach LOS		D			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			38.1									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.78										
Actuated Cycle Length (s)			109.9									Sum of lost time (s)	23.0
Intersection Capacity Utilization			74.3%									ICU Level of Service	D
Analysis Period (min)			15										
c	Critical Lane Group												











HCM Signalized Intersection Capacity Analysis
2: Regional Road 25 & James Snow Parkway

2021 Existing PM
04-06-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	153	211	175	88	218	126	755	143	132	424	5
Future Volume (vph)	30	153	211	175	88	218	126	755	143	132	424	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Total Lost time (s)	4.0	6.6	6.6	4.0	6.6	6.6	4.0	6.9	6.9	4.0	6.9	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1487	3336	1365	1513	2746	1365	1154	3025	1499	1369	2933	
Flt Permitted	0.69	1.00	1.00	0.52	1.00	1.00	0.45	1.00	1.00	0.27	1.00	
Satd. Flow (perm)	1081	3336	1365	826	2746	1365	552	3025	1499	392	2933	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	33	170	234	194	98	242	140	839	159	147	471	6
RTOR Reduction (vph)	0	0	205	0	0	194	0	0	73	0	0	0
Lane Group Flow (vph)	33	170	29	194	98	48	140	839	86	147	477	0
Confl. Peds. (#/hr)									2	2		
Heavy Vehicles (%)	20%	7%	17%	18%	30%	17%	46%	18%	5%	23%	21%	60%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	21.6	16.5	16.5	35.8	26.7	26.7	80.6	70.4	70.4	80.2	70.2	
Effective Green, g (s)	21.6	16.5	16.5	35.8	26.7	26.7	80.6	70.4	70.4	80.2	70.2	
Actuated g/C Ratio	0.16	0.12	0.12	0.27	0.20	0.20	0.60	0.53	0.53	0.60	0.53	
Clearance Time (s)	4.0	6.6	6.6	4.0	6.6	6.6	4.0	6.9	6.9	4.0	6.9	
Vehicle Extension (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	
Lane Grp Cap (vph)	190	411	168	299	548	272	378	1592	789	308	1539	
v/s Ratio Prot	0.01	0.05		c0.07	0.04		0.03	c0.28		c0.04	0.16	
v/s Ratio Perm	0.02		0.02	c0.10		0.04	0.19		0.06	0.25		
v/c Ratio	0.17	0.41	0.17	0.65	0.18	0.18	0.37	0.53	0.11	0.48	0.31	
Uniform Delay, d1	48.1	54.1	52.5	41.2	44.4	44.4	12.1	20.7	15.9	13.0	18.0	
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	0.4	1.4	1.0	4.8	0.3	0.7	0.6	1.3	0.3	1.2	0.5	
Delay (s)	48.5	55.5	53.5	46.0	44.7	45.0	12.7	22.0	16.2	14.1	18.5	
Level of Service	D	E	D	D	D	D	B	C	B	B	B	
Approach Delay (s)		53.9			45.3			20.0			17.5	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			29.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			133.7			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			73.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Regional Road 25 & Hwy 401 Westbound Off-Ramp






















2021 Existing PM
 04-06-2021

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	342	0	878	0	0	1079
Future Volume (vph)	342	0	878	0	0	1079
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.4	3.4	3.4	3.4
Total Lost time (s)	6.2		6.4			6.4
Lane Util. Factor	0.97		0.95			0.95
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3314		3180			3268
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3314		3180			3268
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	364	0	934	0	0	1148
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	364	0	934	0	0	1148
Heavy Vehicles (%)	8%	0%	11%	0%	0%	8%
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	12.2		37.0			37.0
Effective Green, g (s)	12.2		37.0			37.0
Actuated g/C Ratio	0.20		0.60			0.60
Clearance Time (s)	6.2		6.4			6.4
Vehicle Extension (s)	3.0		4.4			4.4
Lane Grp Cap (vph)	654		1903			1956
v/s Ratio Prot	c0.11		0.29			c0.35
v/s Ratio Perm						
v/c Ratio	0.56		0.49			0.59
Uniform Delay, d1	22.4		7.0			7.7
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.0		0.9			1.3
Delay (s)	23.4		8.0			9.0
Level of Service	C		A			A
Approach Delay (s)	23.4		8.0			9.0
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			61.8		Sum of lost time (s)	12.6
Intersection Capacity Utilization			50.1%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group






















HCM Signalized Intersection Capacity Analysis
 4: Regional Road 25 & Hwy 401 Eastbound Off-Ramp/Carpool Lot

2021 Existing PM
 04-06-2021

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	122	18	451	34	0	22	0	1160	23	25	856	0		
Future Volume (vph)	122	18	451	34	0	22	0	1160	23	25	856	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	3.8	3.8	3.8	3.2	3.7	3.5	3.4	3.4	3.4	3.0	3.4	3.4		
Total Lost time (s)	6.6	6.6	6.6		6.8			6.6		3.0	6.6			
Lane Util. Factor	1.00	0.95	0.95		1.00			0.95		1.00	0.95			
Frbp, ped/bikes	1.00	0.99	0.99		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			
Frt	1.00	0.86	0.85		0.95			1.00		1.00	1.00			
Flt Protected	0.95	1.00	1.00		0.97			1.00		0.95	1.00			
Satd. Flow (prot)	1398	1432	1420		1624			3321		1452	3330			
Flt Permitted	0.95	1.00	1.00		0.97			1.00		0.09	1.00			
Satd. Flow (perm)	1398	1432	1420		1624			3321		133	3330			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		
Adj. Flow (vph)	136	20	501	38	0	24	0	1289	26	28	951	0		
RTOR Reduction (vph)	0	197	197	0	57	0	0	1	0	0	0	0		
Lane Group Flow (vph)	136	63	64	0	5	0	0	1314	0	28	951	0		
Confl. Peds. (#/hr)			1	1										
Heavy Vehicles (%)	32%	18%	9%	3%	0%	18%	0%	6%	4%	16%	6%	0%		
Turn Type	Split	NA	Perm	Split	NA			NA		pm+pt	NA			
Protected Phases	4	4		8	8			2		1	6			
Permitted Phases			4							6				
Actuated Green, G (s)	16.3	16.3	16.3		7.6			44.0		49.7	49.7			
Effective Green, g (s)	16.3	16.3	16.3		7.6			44.0		49.7	49.7			
Actuated g/C Ratio	0.17	0.17	0.17		0.08			0.47		0.53	0.53			
Clearance Time (s)	6.6	6.6	6.6		6.8			6.6		3.0	6.6			
Vehicle Extension (s)	3.0	3.0	3.0		3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	243	249	247		131			1561		108	1768			
v/s Ratio Prot	c0.10	0.04			c0.00			c0.40		0.01	c0.29			
v/s Ratio Perm			0.04							0.13				
v/c Ratio	0.56	0.25	0.26		0.04			0.84		0.26	0.54			
Uniform Delay, d1	35.4	33.4	33.4		39.6			21.7		14.9	14.4			
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00			
Incremental Delay, d2	2.8	0.5	0.6		0.1			5.7		1.3	1.2			
Delay (s)	38.2	33.9	34.0		39.8			27.4		16.2	15.6			
Level of Service	D	C	C		D			C		B	B			
Approach Delay (s)		34.8			39.8			27.4			15.6			
Approach LOS		C			D			C			B			
Intersection Summary														
HCM 2000 Control Delay			25.5									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.68											
Actuated Cycle Length (s)			93.6								23.0			
Intersection Capacity Utilization			68.4%										ICU Level of Service	C
Analysis Period (min)			15											
c	Critical Lane Group													











HCM Signalized Intersection Capacity Analysis
 4: Regional Road 25 & Hwy 401 Eastbound Off-Ramp/Carpool Lot

2021 Existing AM - Optimized
 04-06-2021

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	502	20	638	20	0	26	0	860	27	24	830	0		
Future Volume (vph)	502	20	638	20	0	26	0	860	27	24	830	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	3.8	3.8	3.8	3.2	3.7	3.5	3.4	3.4	3.4	3.0	3.4	3.4		
Total Lost time (s)	6.6	6.6	6.6		6.8			6.6		3.0	6.6			
Lane Util. Factor	1.00	0.95	0.95		1.00			0.95		1.00	0.95			
Frbp, ped/bikes	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			
Frt	1.00	0.86	0.85		0.92			1.00		1.00	1.00			
Flt Protected	0.95	1.00	1.00		0.98			1.00		0.95	1.00			
Satd. Flow (prot)	1693	1474	1466		1532			3114		1440	3096			
Flt Permitted	0.95	1.00	1.00		0.98			1.00		0.16	1.00			
Satd. Flow (perm)	1693	1474	1466		1532			3114		246	3096			
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98		
Adj. Flow (vph)	512	20	651	20	0	27	0	878	28	24	847	0		
RTOR Reduction (vph)	0	139	139	0	44	0	0	2	0	0	0	0		
Lane Group Flow (vph)	512	200	193	0	3	0	0	904	0	24	847	0		
Confl. Peds. (#/hr)									3	3				
Heavy Vehicles (%)	9%	16%	7%	15%	0%	12%	0%	13%	4%	17%	14%	0%		
Turn Type	Split	NA	Perm	Split	NA			NA		pm+pt	NA			
Protected Phases	4	4		8	8			2		1	6			
Permitted Phases			4							6				
Actuated Green, G (s)	36.4	36.4	36.4		7.6			42.4		49.4	49.4			
Effective Green, g (s)	36.4	36.4	36.4		7.6			42.4		49.4	49.4			
Actuated g/C Ratio	0.32	0.32	0.32		0.07			0.37		0.44	0.44			
Clearance Time (s)	6.6	6.6	6.6		6.8			6.6		3.0	6.6			
Vehicle Extension (s)	3.0	3.0	3.0		3.0			3.0		3.0	3.0			
Lane Grp Cap (vph)	543	473	470		102			1164		149	1348			
v/s Ratio Prot	c0.30	0.14			c0.00			c0.29		0.01	c0.27			
v/s Ratio Perm			0.13							0.06				
v/c Ratio	0.94	0.42	0.41		0.03			0.78		0.16	0.63			
Uniform Delay, d1	37.5	30.2	30.1		49.5			31.3		20.6	24.9			
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00			
Incremental Delay, d2	25.1	0.6	0.6		0.1			5.1		0.5	2.2			
Delay (s)	62.5	30.9	30.7		49.6			36.4		21.1	27.1			
Level of Service	E	C	C		D			D		C	C			
Approach Delay (s)		44.5			49.6			36.4			26.9			
Approach LOS		D			D			D			C			
Intersection Summary														
HCM 2000 Control Delay			37.1									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.78											
Actuated Cycle Length (s)			113.4								23.0			
Intersection Capacity Utilization			74.3%										ICU Level of Service	D
Analysis Period (min)			15											
c	Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
5: Tremaine Road & Hwy 401 Westbound Off-Ramp

2026 Future AM
04-07-2021

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	406	579	464	0	0	903
Future Volume (vph)	406	579	464	0	0	903
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.4	3.4	3.4	3.4
Total Lost time (s)	6.2	6.2	6.4			6.4
Lane Util. Factor	0.97	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3284	1448	3180			3096
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3284	1448	3180			3096
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	406	579	464	0	0	903
RTOR Reduction (vph)	0	160	0	0	0	0
Lane Group Flow (vph)	406	419	464	0	0	903
Heavy Vehicles (%)	9%	14%	11%	0%	0%	14%
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	23.9	23.9	32.7			32.7
Effective Green, g (s)	23.9	23.9	32.7			32.7
Actuated g/C Ratio	0.35	0.35	0.47			0.47
Clearance Time (s)	6.2	6.2	6.4			6.4
Vehicle Extension (s)	3.0	3.0	4.4			4.4
Lane Grp Cap (vph)	1134	500	1502			1462
v/s Ratio Prot	0.12		0.15			c0.29
v/s Ratio Perm		c0.29				
v/c Ratio	0.36	0.84	0.31			0.62
Uniform Delay, d1	16.9	20.9	11.3			13.6
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	0.2	11.6	0.5			2.0
Delay (s)	17.1	32.5	11.8			15.6
Level of Service	B	C	B			B
Approach Delay (s)	26.2		11.8			15.6
Approach LOS	C		B			B























Intersection Summary

HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	12.6
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 6: Tremaine Road & Hwy 401 Eastbound Off-Ramp/Carpool Lot











2026 Future AM
 04-07-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	3	101	25	0	25	0	762	45	45	851	0
Future Volume (vph)	81	3	101	25	0	25	0	762	45	45	851	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.8	3.2	3.7	3.5	3.4	3.4	3.4	3.0	3.4	3.4
Total Lost time (s)	6.6	6.6	6.6	6.8		6.8		6.6		3.0	6.6	
Lane Util. Factor	1.00	0.95	0.95	1.00		1.00		0.95		1.00	0.95	
Frt	1.00	0.86	0.85	1.00		0.85		0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1693	1473	1466	1500		1426		3111		1440	3096	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.29	1.00	
Satd. Flow (perm)	1693	1473	1466	1500		1426		3111		438	3096	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	83	3	103	26	0	26	0	778	46	46	868	0
RTOR Reduction (vph)	0	46	48	0	0	25	0	3	0	0	0	0
Lane Group Flow (vph)	83	7	5	26	0	1	0	821	0	46	868	0
Heavy Vehicles (%)	9%	16%	7%	15%	0%	12%	0%	13%	4%	17%	14%	0%
Turn Type	Split	NA	Perm	Prot		Perm		NA		pm+pt	NA	
Protected Phases	4	4		8				2		1	6	
Permitted Phases			4			8				6		
Actuated Green, G (s)	9.0	9.0	9.0	5.5		5.5		59.0		65.9	65.9	
Effective Green, g (s)	9.0	9.0	9.0	5.5		5.5		59.0		65.9	65.9	
Actuated g/C Ratio	0.09	0.09	0.09	0.05		0.05		0.59		0.66	0.66	
Clearance Time (s)	6.6	6.6	6.6	6.8		6.8		6.6		3.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	151	132	131	82		78		1828		326	2032	
v/s Ratio Prot	c0.05	0.01		c0.02				c0.26		0.01	c0.28	
v/s Ratio Perm			0.00			0.00				0.09		
v/c Ratio	0.55	0.06	0.04	0.32		0.02		0.45		0.14	0.43	
Uniform Delay, d1	43.8	41.8	41.7	45.6		44.9		11.6		6.6	8.2	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.2	0.1	2.2		0.1		0.8		0.2	0.7	
Delay (s)	47.8	42.0	41.9	47.9		45.0		12.4		6.8	8.9	
Level of Service	D	D	D	D		D		B		A	A	
Approach Delay (s)		44.5			46.4			12.4			8.8	
Approach LOS		D			D			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.7		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			100.4		Sum of lost time (s)					23.0		
Intersection Capacity Utilization			55.8%		ICU Level of Service					B		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Tremaine Road & Hwy 401 Westbound Off-Ramp

2026 Future PM
04-07-2021

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	830	203	710	0	0	1023
Future Volume (vph)	830	203	710	0	0	1023
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.4	3.4	3.4	3.4
Total Lost time (s)	6.2	6.2	6.4			6.4
Lane Util. Factor	0.97	1.00	0.95			0.95
Fr _t	1.00	0.85	1.00			1.00
Fl _t Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3314	1448	3180			3268
Fl _t Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3314	1448	3180			3268
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	883	216	755	0	0	1088
RTOR Reduction (vph)	0	42	0	0	0	0
Lane Group Flow (vph)	883	174	755	0	0	1088
Heavy Vehicles (%)	8%	14%	11%	0%	0%	8%
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	23.3	23.3	28.8			28.8
Effective Green, g (s)	23.3	23.3	28.8			28.8
Actuated g/C Ratio	0.36	0.36	0.45			0.45
Clearance Time (s)	6.2	6.2	6.4			6.4
Vehicle Extension (s)	3.0	3.0	4.4			4.4
Lane Grp Cap (vph)	1193	521	1415			1454
v/s Ratio Prot	c0.27		0.24			c0.33
v/s Ratio Perm		0.12				
v/c Ratio	0.74	0.33	0.53			0.75
Uniform Delay, d ₁	18.1	15.1	13.1			14.9
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d ₂	2.5	0.4	1.4			3.6
Delay (s)	20.6	15.4	14.5			18.5
Level of Service	C	B	B			B
Approach Delay (s)	19.6		14.5			18.5
Approach LOS	B		B			B
Intersection Summary						
HCM 2000 Control Delay			17.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			64.7		Sum of lost time (s)	12.6
Intersection Capacity Utilization			62.5%		ICU Level of Service	B
Analysis Period (min)			15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Tremaine Road & Hwy 401 Eastbound Off-Ramp/Carpool Lot

2026 Future PM
04-07-2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	→	↘	↙	←	↘		↑	↘	↘	↑	↘
Traffic Volume (vph)	119	32	386	45	0	45	0	1027	25	25	1484	0
Future Volume (vph)	119	32	386	45	0	45	0	1027	25	25	1484	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.8	3.2	3.7	3.5	3.4	3.4	3.4	3.0	3.4	3.4
Total Lost time (s)	6.6	6.6	6.6	6.8		6.8		6.6		3.0	6.6	
Lane Util. Factor	1.00	0.95	0.95	1.00		1.00		0.95		1.00	0.95	
Flt	1.00	0.87	0.85	1.00		0.85		1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1398	1459	1439	1675		1353		3320		1452	3330	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.15	1.00	
Satd. Flow (perm)	1398	1459	1439	1675		1353		3320		227	3330	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	132	36	429	50	0	50	0	1141	28	28	1649	0
RTOR Reduction (vph)	0	75	106	0	0	47	0	1	0	0	0	0
Lane Group Flow (vph)	132	158	126	50	0	3	0	1168	0	28	1649	0
Heavy Vehicles (%)	32%	18%	9%	3%	0%	18%	0%	6%	4%	16%	6%	0%
Turn Type	Split	NA	Perm	Prot		Perm		NA		pm+pt	NA	
Protected Phases	4	4		8				2		1	6	
Permitted Phases			4			8				6		
Actuated Green, G (s)	17.6	17.6	17.6	7.6		7.6		57.6		64.5	64.5	
Effective Green, g (s)	17.6	17.6	17.6	7.6		7.6		57.6		64.5	64.5	
Actuated g/C Ratio	0.16	0.16	0.16	0.07		0.07		0.53		0.59	0.59	
Clearance Time (s)	6.6	6.6	6.6	6.8		6.8		6.6		3.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	224	234	230	116		93		1743		177	1957	
v/s Ratio Prot	0.09	c0.11		c0.03				0.35		0.01	c0.50	
v/s Ratio Perm			0.09			0.00				0.09		
v/c Ratio	0.59	0.68	0.55	0.43		0.04		0.67		0.16	0.84	
Uniform Delay, d1	42.7	43.4	42.4	49.0		47.6		19.1		12.2	18.5	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2	3.9	7.5	2.7	2.6		0.2		2.1		0.4	4.6	
Delay (s)	46.6	50.9	45.1	51.5		47.8		21.2		12.6	23.1	
Level of Service	D	D	D	D		D		C		B	C	
Approach Delay (s)		47.7			49.7			21.2			22.9	
Approach LOS		D			D			C			C	

Intersection Summary

HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	109.7	Sum of lost time (s)	23.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 5: Tremaine Road & Hwy 401 Westbound Off-Ramp

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (m)	51.6	46.8	107.8	54.7	53.3	86.2	76.8
Average Queue (m)	27.7	20.7	54.1	27.3	23.0	51.0	41.1
95th Queue (m)	45.1	38.8	92.9	49.2	45.0	78.8	70.2
Link Distance (m)	387.2	387.2		301.3	301.3	383.8	383.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)			230.0				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Tremaine Road & Hwy 401 Eastbound Off-Ramp/Carpool Lot

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	R	L	R	T	TR	L	T	T
Maximum Queue (m)	44.9	23.8	18.1	23.2	18.6	75.2	63.4	28.7	75.5	74.7
Average Queue (m)	18.5	11.2	4.7	6.5	5.3	36.9	24.4	8.2	28.2	31.6
95th Queue (m)	35.7	20.1	13.2	18.0	13.4	66.7	54.6	20.6	58.1	60.5
Link Distance (m)		455.1		125.3		250.9	250.9		301.3	301.3
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	300.0		165.0		20.0			120.0		
Storage Blk Time (%)				2	0					
Queuing Penalty (veh)				1	0					

Network Summary

Network wide Queuing Penalty: 1

Intersection: 5: Tremaine Road & Hwy 401 Westbound Off-Ramp

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (m)	76.2	69.6	43.5	80.2	83.4	94.8	90.0
Average Queue (m)	48.2	41.7	19.9	41.3	42.4	56.9	49.7
95th Queue (m)	67.9	62.2	36.2	71.7	72.3	86.0	81.9
Link Distance (m)	387.2	387.2		301.3	301.3	383.8	383.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)			230.0				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Tremaine Road & Hwy 401 Eastbound Off-Ramp/Carpool Lot

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	R	L	R	T	TR	L	T	T
Maximum Queue (m)	71.4	65.6	58.1	24.3	28.6	104.3	88.8	20.9	118.8	120.8
Average Queue (m)	33.3	36.9	31.3	10.0	7.8	59.3	46.1	5.3	67.9	75.0
95th Queue (m)	62.4	56.0	52.5	20.8	19.7	94.1	80.9	14.8	105.3	111.2
Link Distance (m)		455.1		125.3		250.9	250.9		301.3	301.3
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	300.0		165.0		20.0			120.0		
Storage Blk Time (%)				2	1				0	
Queuing Penalty (veh)				1	0				0	

Network Summary

Network wide Queuing Penalty: 1

Junctions 9
ARCADY 9 - Roundabout Module
Version: 9.5.1.7462 © Copyright TRL Limited, 2019
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Filename: 10108_Milton Quarry_v3_90percent.j9
 Path: C:\10108 - Milton Quarry
 Report generation date: 2021-04-09 3:13:25 PM

- »90% Intercept Adjustment - 2021 Existing, AM
- »90% Intercept Adjustment - 2021 Existing, PM
- »90% Intercept Adjustment - 2026 Total, AM
- »90% Intercept Adjustment - 2026 Total, PM

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	2019-02-20
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	HQTMIG\krodgers
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2021 Existing	AM	PHF	08:00	09:00	15	✓
D2	2021 Existing	PM	PHF	17:00	18:00	15	✓
D3	2026 Total	AM	PHF	08:00	09:00	15	✓
D4	2026 Total	PM	PHF	17:00	18:00	15	✓

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	90% Intercept Adjustment	✓	100.000	100.000

90% Intercept Adjustment - 2021 Existing, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	3.45	A

Intersection Network Options

Driving side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Name	Description
1	James Snow Parkway	
2	Dublin Line	
3	Campbellville Road	
4	Tremaine Road	

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - James Snow Parkway	9.80	10.15	7.5	25.0	57.0	9.0	
2 - Dublin Line	3.90	7.00	11.7	32.0	57.0	16.0	
3 - Campbellville Road	7.30	9.94	8.6	25.0	57.0	25.0	
4 - Tremaine Road	3.40	6.00	12.4	31.0	57.0	28.0	

Bypass

Leg	Leg has bypass	Bypass utilisation (%)
1 - James Snow Parkway		
2 - Dublin Line		
3 - Campbellville Road		
4 - Tremaine Road	✓	100

Unsignalled Pedestrian Crossing Crossings

Leg	Space between crossing and intersection entry (Unsignalled Pedestrian Crossing) (PCE)	Vehicles queueing on exit (Unsignalled Pedestrian Crossing) (PCE)	Central Refuge	Crossing data type	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1 - James Snow Parkway	1.00	1.00	✓	Distance	0.00	0.00	0.00	0.00
2 - Dublin Line	1.00	1.00	✓	Distance	0.00	0.00	0.00	0.00
3 - Campbellville Road	1.00	1.00	✓	Distance	0.00	0.00	0.00	0.00
4 - Tremaine Road	1.00	1.00	✓	Distance	0.00	0.00	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - James Snow Parkway	Percentage		90.00
2 - Dublin Line	Percentage		90.00
3 - Campbellville Road	Percentage		90.00
4 - Tremaine Road	Percentage		90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - James Snow Parkway	0.884	2983
2 - Dublin Line	0.610	1622
3 - Campbellville Road	0.757	2418
4 - Tremaine Road	0.551	1384

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

Leg Capacity Adjustments

Leg	Type	Reason	Percentage capacity adjustment (%)
4 - Tremaine Road	Percentage		100.00

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2021 Existing	AM	PHF	08:00	09:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - James Snow Parkway		PHF	✓	388	100.000
2 - Dublin Line		PHF	✓	174	100.000
3 - Campbellville Road		PHF	✓	357	100.000
4 - Tremaine Road		PHF	✓	0	100.000

Peak Hour Factor Data (Traffic)

Leg	Hourly volume (Veh/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	388	0.89	SecondQuarter
2 - Dublin Line	174	0.89	SecondQuarter
3 - Campbellville Road	357	0.89	SecondQuarter
4 - Tremaine Road	0	0.89	SecondQuarter

Demand overview (Pedestrians)

Leg	Profile type	Average pedestrian flow (Ped/hr)
1 - James Snow Parkway	[PHF]	0.00
2 - Dublin Line	[PHF]	0.00
3 - Campbellville Road	[PHF]	0.00
4 - Tremaine Road	[PHF]	0.00

Peak Hour Factor Data (Pedestrians)

Leg	Hourly volume (Ped/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	0.00	1.00	SecondQuarter
2 - Dublin Line	0.00	1.00	SecondQuarter
3 - Campbellville Road	0.00	1.00	SecondQuarter
4 - Tremaine Road	0.00	1.00	SecondQuarter

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	169	219	0
	2 - Dublin Line	167	0	7	0
	3 - Campbellville Road	349	8	0	0
	4 - Tremaine Road	0	0	0	0

Vehicle Mix

Truck Percentages

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	96	17	0
	2 - Dublin Line	98	0	71	0
	3 - Campbellville Road	6	63	0	0
	4 - Tremaine Road	0	0	0	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (Veh)	Max 95th percentile Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Intersection Arrivals (Veh)
1 - James Snow Parkway	0.22	2.36	0.3	1.1	A	388	388
2 - Dublin Line	0.27	6.67	0.4	1.1	A	174	174
3 - Campbellville Road	0.20	2.26	0.3	0.5	A	357	357
4 - Tremaine Road	0.00	0.00	0.0	~1	A	0	0

90% Intercept Adjustment - 2021 Existing, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	2.39	A

Intersection Network Options

Driving side	Lighting
Right	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2021 Existing	PM	PHF	17:00	18:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - James Snow Parkway		PHF	✓	454	100.000
2 - Dublin Line		PHF	✓	84	100.000
3 - Campbellville Road		PHF	✓	262	100.000
4 - Tremaine Road		PHF	✓	0	100.000

Peak Hour Factor Data (Traffic)

Leg	Hourly volume (Veh/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	454	0.89	SecondQuarter
2 - Dublin Line	84	0.89	SecondQuarter
3 - Campbellville Road	262	0.89	SecondQuarter
4 - Tremaine Road	0	0.89	SecondQuarter

Demand overview (Pedestrians)

Leg	Profile type	Average pedestrian flow (Ped/hr)
1 - James Snow Parkway	[PHF]	0.00
2 - Dublin Line	[PHF]	0.00
3 - Campbellville Road	[PHF]	0.00
4 - Tremaine Road	[PHF]	0.00

Peak Hour Factor Data (Pedestrians)

Leg	Hourly volume (Ped/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	0.00	1.00	SecondQuarter
2 - Dublin Line	0.00	1.00	SecondQuarter
3 - Campbellville Road	0.00	1.00	SecondQuarter
4 - Tremaine Road	0.00	1.00	SecondQuarter

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	69	385	0
	2 - Dublin Line	74	0	10	0
	3 - Campbellville Road	258	4	0	0
	4 - Tremaine Road	0	0	0	0

Vehicle Mix

Truck Percentages

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	78	6	0
	2 - Dublin Line	73	0	20	0
	3 - Campbellville Road	22	50	0	0
	4 - Tremaine Road	0	0	0	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (Veh)	Max 95th percentile Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Intersection Arrivals (Veh)
1 - James Snow Parkway	0.20	1.77	0.2	0.5	A	454	454
2 - Dublin Line	0.12	5.07	0.1	0.5	A	84	84
3 - Campbellville Road	0.16	2.26	0.2	0.5	A	262	262
4 - Tremaine Road	0.00	0.00	0.0	~1	A	0	0

90% Intercept Adjustment - 2026 Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.94	A

Intersection Network Options

Driving side	Lighting
Right	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2026 Total	AM	PHF	08:00	09:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - James Snow Parkway		PHF	✓	845	100.000
2 - Dublin Line		PHF	✓	174	100.000
3 - Campbellville Road		PHF	✓	722	100.000
4 - Tremaine Road		PHF	✓	1043	100.000

Peak Hour Factor Data (Traffic)

Leg	Hourly volume (Veh/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	845	0.89	SecondQuarter
2 - Dublin Line	174	0.89	SecondQuarter
3 - Campbellville Road	722	0.89	SecondQuarter
4 - Tremaine Road	1043	0.89	SecondQuarter

Demand overview (Pedestrians)

Leg	Profile type	Average pedestrian flow (Ped/hr)
1 - James Snow Parkway	[PHF]	0.00
2 - Dublin Line	[PHF]	0.00
3 - Campbellville Road	[PHF]	0.00
4 - Tremaine Road	[PHF]	0.00

Peak Hour Factor Data (Pedestrians)

Leg	Hourly volume (Ped/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	0.00	1.00	SecondQuarter
2 - Dublin Line	0.00	1.00	SecondQuarter
3 - Campbellville Road	0.00	1.00	SecondQuarter
4 - Tremaine Road	0.00	1.00	SecondQuarter

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	16	254	575
	2 - Dublin Line	14	0	7	153
	3 - Campbellville Road	405	8	0	309
	4 - Tremaine Road	712	153	178	0

Vehicle Mix

Truck Percentages

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	63	17	2
	2 - Dublin Line	71	0	71	100
	3 - Campbellville Road	6	63	0	2
	4 - Tremaine Road	2	100	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (Veh)	Max 95th percentile Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Intersection Arrivals (Veh)
1 - James Snow Parkway	0.41	2.64	0.7	1.8	A	845	845
2 - Dublin Line	0.43	13.76	0.7	2.3	B	174	174
3 - Campbellville Road	0.52	4.76	1.1	1.4	A	722	722
4 - Tremaine Road	0.50	9.60	1.0	1.4	A	824	331

90% Intercept Adjustment - 2026 Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	1 - James Snow Parkway - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	2 - Dublin Line - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	3 - Campbellville Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	4 - Tremaine Road - Pedestrian crossing	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.97	A

Intersection Network Options

Driving side	Lighting
Right	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2026 Total	PM	PHF	17:00	18:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - James Snow Parkway		PHF	✓	1723	100.000
2 - Dublin Line		PHF	✓	83	100.000
3 - Campbellville Road		PHF	✓	525	100.000
4 - Tremaine Road		PHF	✓	913	100.000

Peak Hour Factor Data (Traffic)

Leg	Hourly volume (Veh/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	1723	0.89	SecondQuarter
2 - Dublin Line	83	0.89	SecondQuarter
3 - Campbellville Road	525	0.89	SecondQuarter
4 - Tremaine Road	913	0.89	SecondQuarter

Demand overview (Pedestrians)

Leg	Profile type	Average pedestrian flow (Ped/hr)
1 - James Snow Parkway	[PHF]	0.00
2 - Dublin Line	[PHF]	0.00
3 - Campbellville Road	[PHF]	0.00
4 - Tremaine Road	[PHF]	0.00

Peak Hour Factor Data (Pedestrians)

Leg	Hourly volume (Ped/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	0.00	1.00	SecondQuarter
2 - Dublin Line	0.00	1.00	SecondQuarter
3 - Campbellville Road	0.00	1.00	SecondQuarter
4 - Tremaine Road	0.00	1.00	SecondQuarter

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	18	446	1259
	2 - Dublin Line	23	0	10	51
	3 - Campbellville Road	299	4	0	222
	4 - Tremaine Road	690	51	172	0

Vehicle Mix

Truck Percentages

		To			
		1 - James Snow Parkway	2 - Dublin Line	3 - Campbellville Road	4 - Tremaine Road
From	1 - James Snow Parkway	0	17	6	2
	2 - Dublin Line	13	0	20	100
	3 - Campbellville Road	22	50	0	2
	4 - Tremaine Road	2	100	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (Veh)	Max 95th percentile Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Intersection Arrivals (Veh)
1 - James Snow Parkway	0.74	5.19	2.8	6.2	A	1723	1723
2 - Dublin Line	0.52	39.20	1.0	3.6	E	83	83
3 - Campbellville Road	0.55	7.34	1.2	1.4	A	525	525
4 - Tremaine Road	0.27	5.40	0.4	1.2	A	789	223



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	168	168	9	6	0
Future Volume (Veh/h)	0	168	168	9	6	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	183	183	10	7	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	383	7	7			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	383	7	7			
tC, single (s)	7.4	7.2	5.1			
tC, 2 stage (s)						
tF (s)	4.4	4.2	3.1			
p0 queue free %	100	78	84			
cM capacity (veh/h)	392	849	1153			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	183	193	7			
Volume Left	0	183	0			
Volume Right	183	0	0			
cSH	849	1153	1700			
Volume to Capacity	0.22	0.16	0.00			
Queue Length 95th (m)	6.2	4.3	0.0			
Control Delay (s)	10.4	8.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.4	8.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			9.2			
Intersection Capacity Utilization			33.5%	ICU Level of Service	A	
Analysis Period (min)			15			



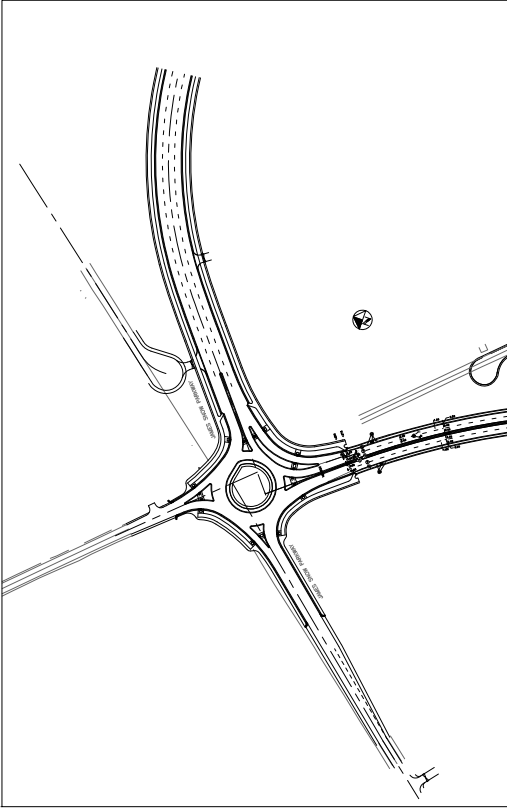
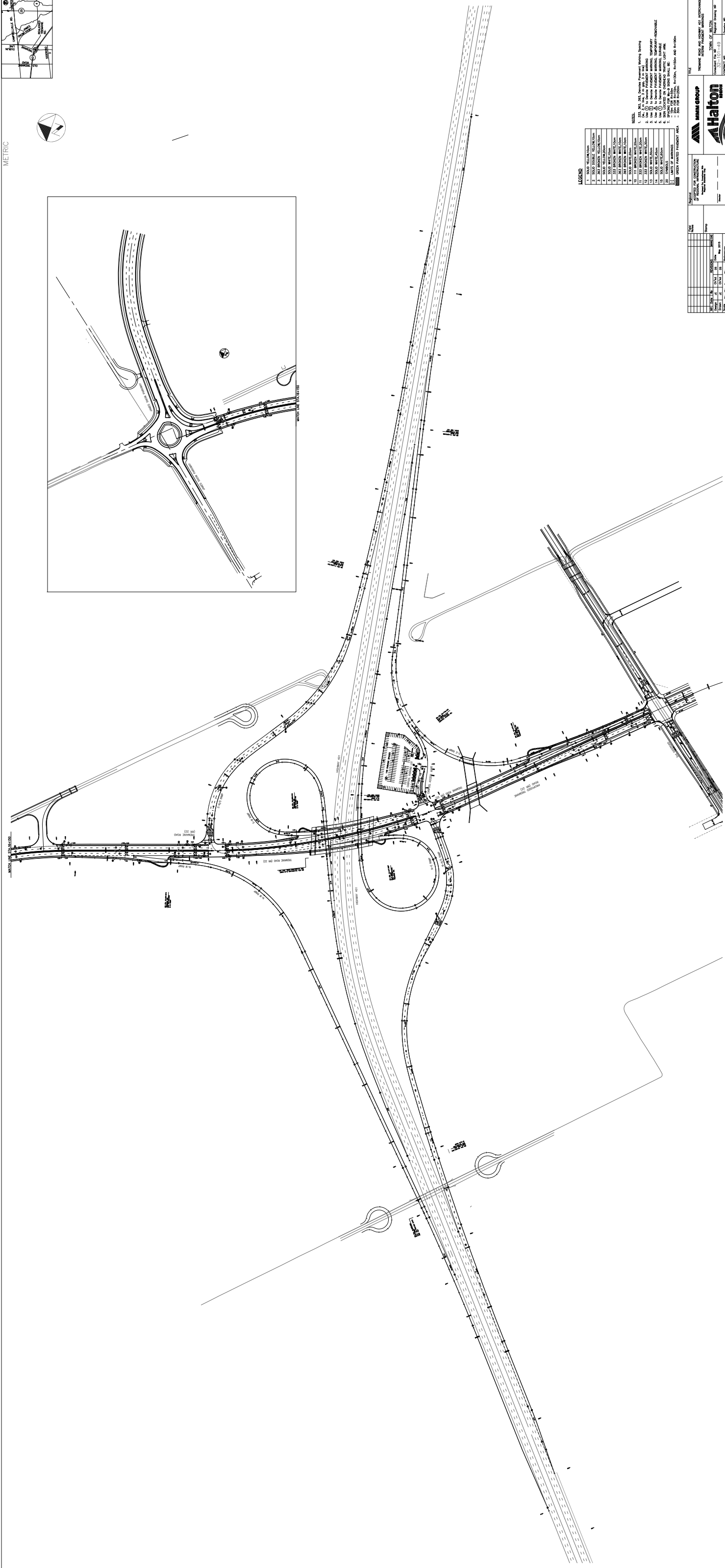
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	56	56	17	28	0
Future Volume (Veh/h)	0	56	56	17	28	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	61	61	18	30	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	170	30	30			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	170	30	30			
tC, single (s)	7.4	7.2	5.1			
tC, 2 stage (s)						
tF (s)	4.4	4.2	3.1			
p0 queue free %	100	93	95			
cM capacity (veh/h)	604	821	1127			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	61	79	30			
Volume Left	0	61	0			
Volume Right	61	0	0			
cSH	821	1127	1700			
Volume to Capacity	0.07	0.05	0.02			
Queue Length 95th (m)	1.8	1.3	0.0			
Control Delay (s)	9.7	6.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.7	6.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	6.5					
Intersection Capacity Utilization	20.8%			ICU Level of Service	A	
Analysis Period (min)	15					

APPENDIX D

Tremaine Road Interchange Data



METRIC



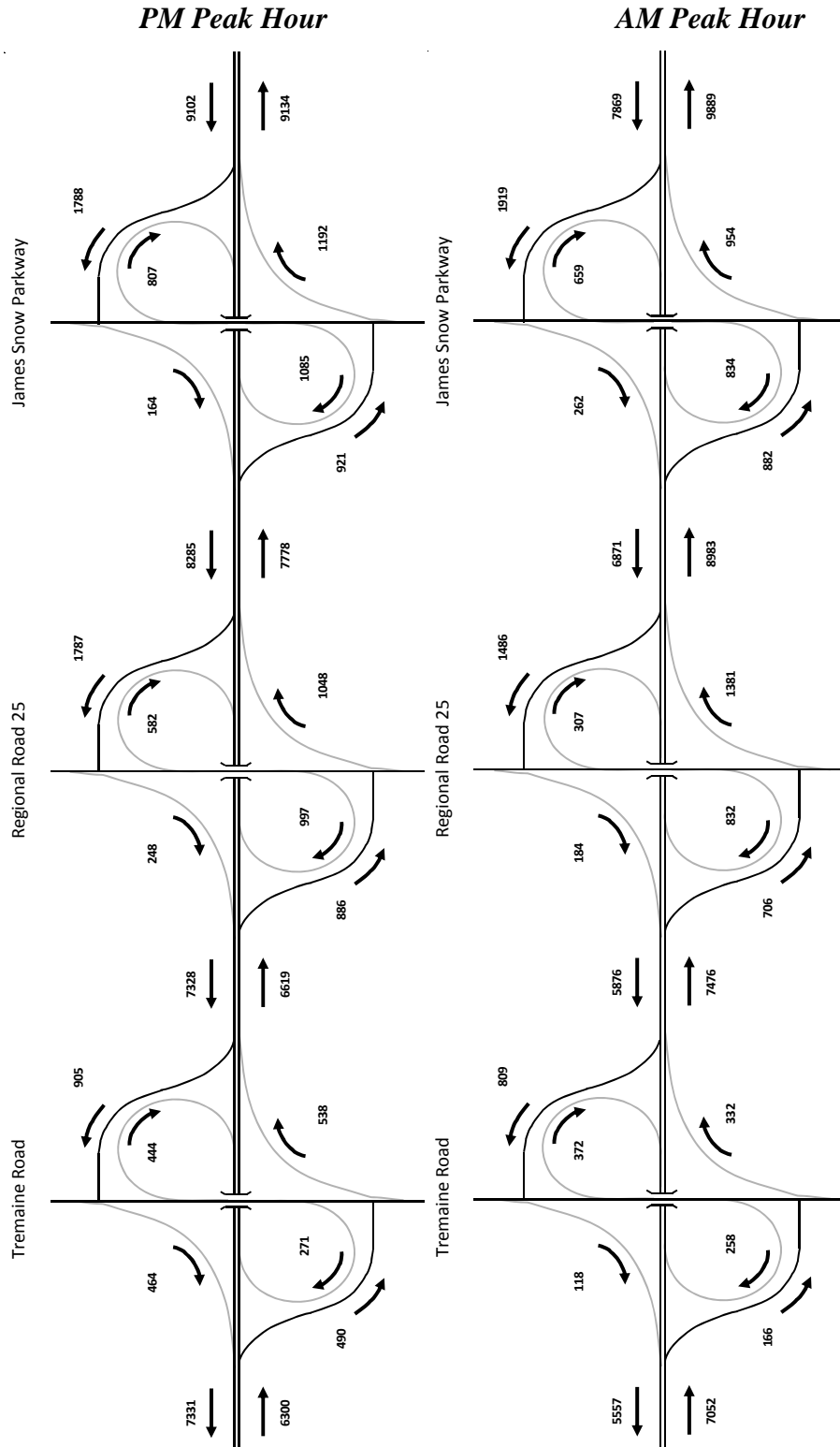
LEGEND

- 1. 200' WETLANDS
- 2. 200' DOUBLE YELLOW
- 3. 200' DOUBLE YELLOW
- 4. 200' DOUBLE YELLOW
- 5. 200' WETLANDS
- 6. 200' WETLANDS
- 7. 200' WETLANDS
- 8. 200' WETLANDS
- 9. 200' WETLANDS
- 10. 200' WETLANDS
- 11. 200' WETLANDS
- 12. 200' WETLANDS
- 13. 200' WETLANDS
- 14. 200' WETLANDS
- 15. 200' WETLANDS
- 16. 200' WETLANDS
- 17. 200' WETLANDS
- 18. 200' WETLANDS
- 19. 200' WETLANDS
- 20. 200' WETLANDS
- 21. 200' WETLANDS
- 22. 200' WETLANDS
- 23. 200' WETLANDS
- 24. 200' WETLANDS
- 25. 200' WETLANDS
- 26. 200' WETLANDS
- 27. 200' WETLANDS
- 28. 200' WETLANDS
- 29. 200' WETLANDS
- 30. 200' WETLANDS
- 31. 200' WETLANDS
- 32. 200' WETLANDS
- 33. 200' WETLANDS
- 34. 200' WETLANDS
- 35. 200' WETLANDS
- 36. 200' WETLANDS
- 37. 200' WETLANDS
- 38. 200' WETLANDS
- 39. 200' WETLANDS
- 40. 200' WETLANDS
- 41. 200' WETLANDS
- 42. 200' WETLANDS
- 43. 200' WETLANDS
- 44. 200' WETLANDS
- 45. 200' WETLANDS
- 46. 200' WETLANDS
- 47. 200' WETLANDS
- 48. 200' WETLANDS
- 49. 200' WETLANDS
- 50. 200' WETLANDS

WMA GROUP
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 WWW: WWW.HALTONGROUP.COM

The preferred or rationalized 2021 morning and afternoon peak hour demand forecasts are summarized below in **Figure 15**.

Figure 15 2021 Peak Hour Rationalized Traffic Volume Forecasts

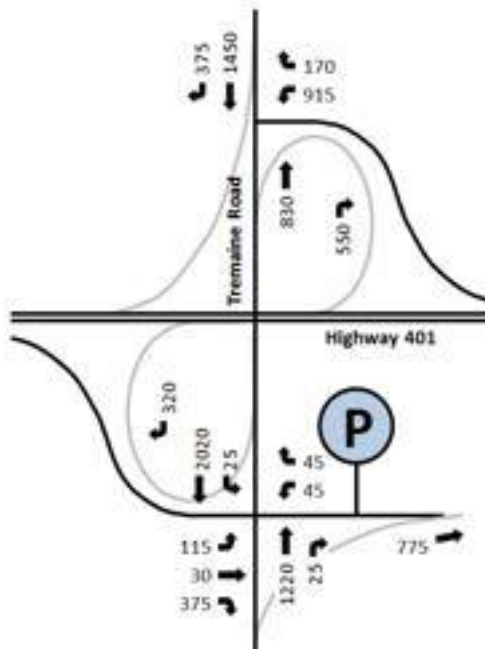


7. INTERCHANGE TRAFFIC OPERATIONS

The focus of the traffic analysis has been on mainline operations and, in particular, on the operations between Tremaine Road and Regional Road 25. However, intersection capacity and level of service analysis was also carried out separately for the new Tremaine Road ramp terminal intersections.

The only available ramp terminal intersection traffic volume projections are provided by the Region of Halton's afternoon peak hour travel demand forecasting model and the demand forecasts to 2031 are summarized below in **Figure 50**. Traffic generation related to the planned commuter parking lot at the Tremaine Road interchange was estimated on the basis of the surveyed demand at the similar facility at the Regional Road 25 interchange and prorated on the basis of the relative number of planned parking spaces.

Figure 50 2031 PM Peak Hour Tremaine Road Ramp Terminal Volumes



Intersection capacity and level of service analysis was undertaken using Synchro and levels of service and queuing impacts reflect micro-simulation analysis output from SimTraffic. The analysis reflects the detail design lane geometry and assumes that traffic signal control will be in place to accommodate projected travel demand. The corresponding operating performance is summarized in **Table 6**.

The level of service analysis indicates that all movements will operate with volume-to-capacity ratios no greater than 0.85 and levels of service D or better. While there are no available morning peak hour ramp terminal intersection turning movement forecasts, the rationalized travel demand forecasts generated as part of the mainline analysis reflect afternoon peak hour ramp demand projections that are greater than the corresponding morning peak hour ramp volumes in all cases at the Tremaine Road interchange. Comparison of available peak hour



Ministry of Transportation

Ministère des Transports

2017

Version: 1.0 Feb 1, 2016

Intersection Layout Sheet

Contract # 9015-E-0008

Work Order # 594

Date: November 2 Day: Th Hrs: 6 - 10 + 15 - 19 + -

Location: HWY 401 @ HWY 25 IC-320 Ramps: North / 63

Reg/Mun: CR Town/City: Milton Area: _____

File Name: 1477000000 Device: Gretch / Jamar Unit # 16 Interval 1: (AM) NN / PM

Observer: Alena Mariyskaya Weather: Rain / Cloudy Road Condition: Dry / Dry

LHRS & O/S: 47700 0 Comments: _____

GPS: G-Star IV

Datum: WGS 84 (Y) / N

Lat: 43.52858

Long: -75.50726

SIGNALIZED (Y) / N

If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: _____ cm x _____ cm

Sign Condition:

NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's including all Signs (Y) / N

(km/hr) _____ (sign) _____

Hwy / Street Name

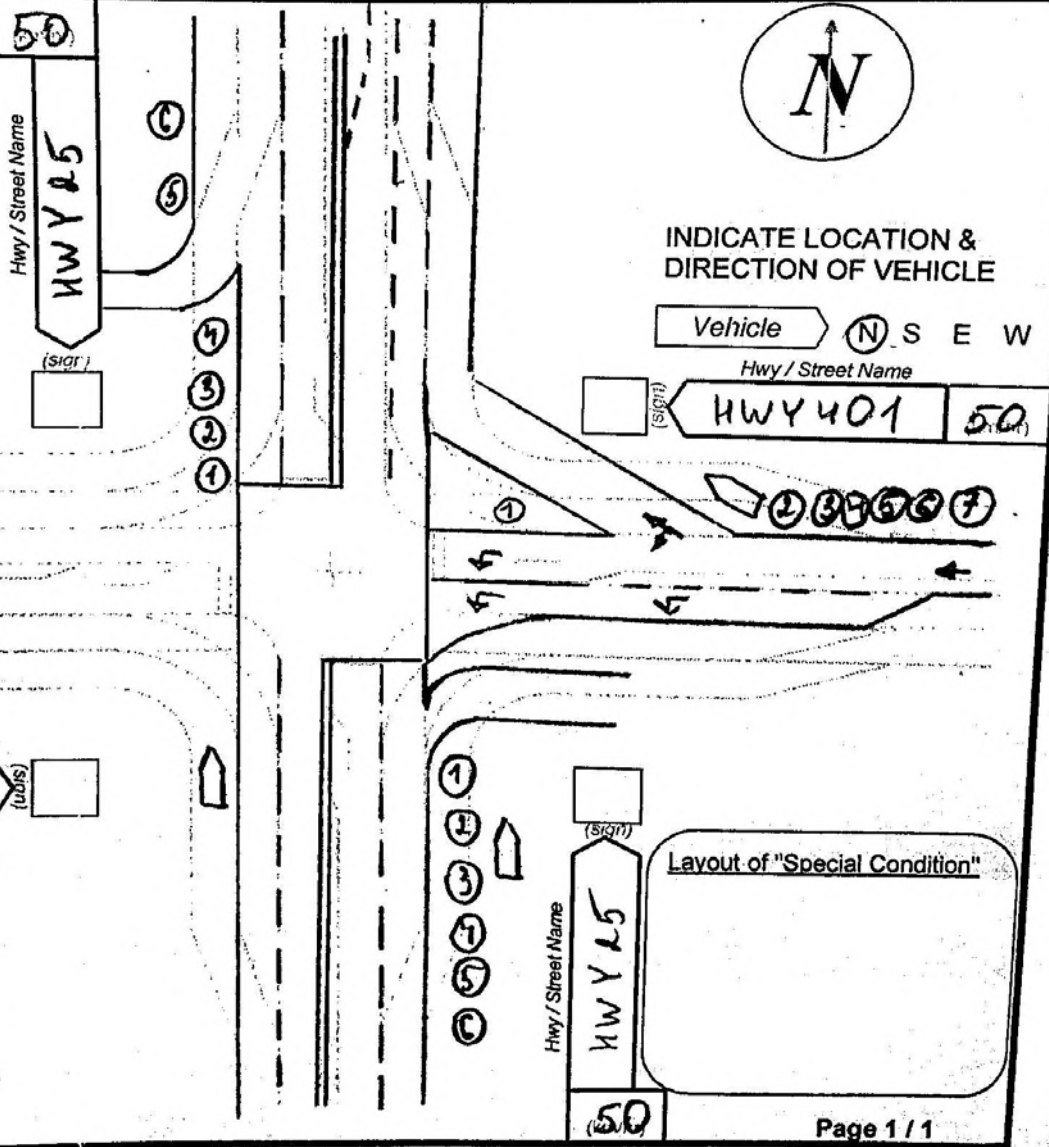
Note:

Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks





Ministry of Transportation

TVIS II - Traffic Volume Information System

AdHoc Turning Movement Total Count and Peak Summary Report

Description: **HWY 401 @ HALTON RD 25 (NRT)**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **401**

Start Date: **02-Nov-2017 (Thu)**

I/C Side: **N**

LHRS: **47700**

End Date: **02-Nov-2017 (Thu)**

Int. Type: **T - E**

Offset: **0**

Schedule Summary: **TUES-THURS, 06:00-10:00, 15:00-19:00**

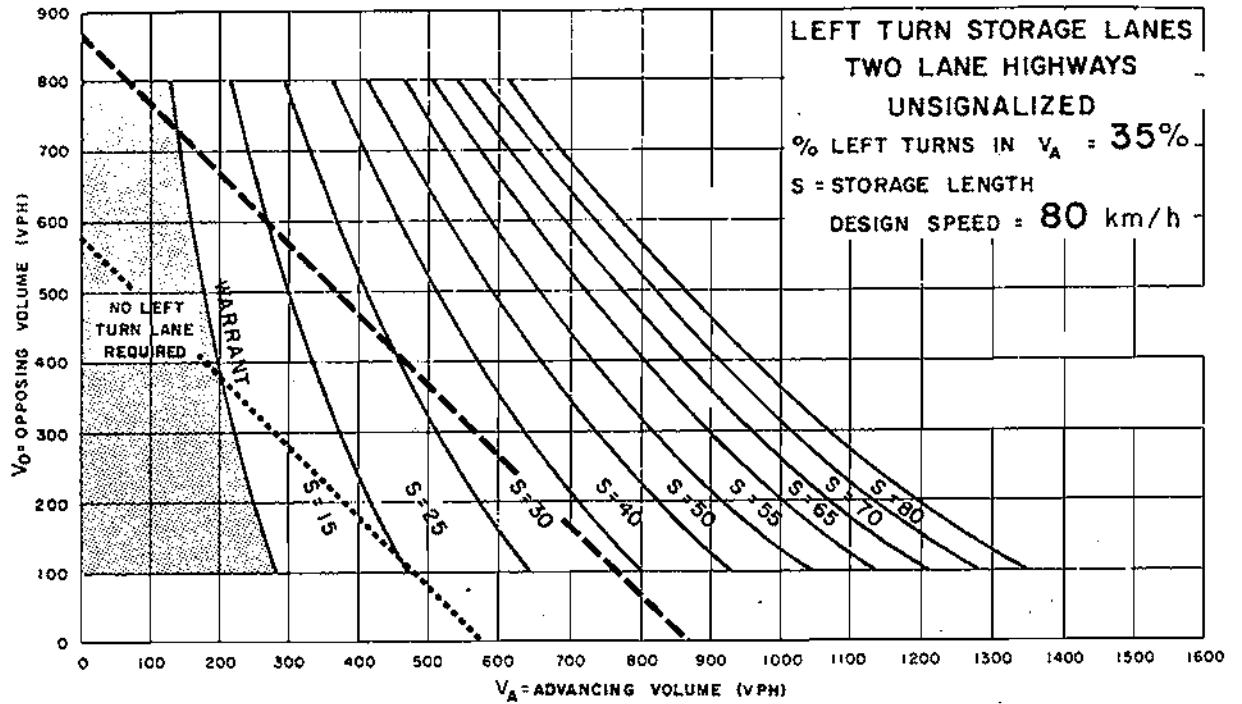
Total Count		Number of hours: 8	
HALTON RD 25			
Ped. 0	Total Vehicles	0% (T +LT)	11% (T +LT)
	0	4991	0
			↑
			Ped. 0
			HWY 401 RAMP; 61
←	0	↙	↓
			↘
			↑
			2677
			16% (T +LT)
0% (T +LT)	0	↗	←
			0
			0% (T +LT)
0% (T +LT)	0	→	↘
			2635
			7% (T+LT)
0% (T +LT)	0	↙	↑
			↘
			↗
			0
			→
Not Configured	7626	0	4961
			0
			↑
			Total Vehicles
			Ped. 0
Ped. 0	↓	0% (T +LT)	11% (T +LT)
			0% (T +LT)
			HALTON RD 25

AM Peak Hour Report		Start Time: 07:45	
HALTON RD 25			
Ped. 0	Total Vehicles	0% (T +LT)	12% (T +LT)
	0	532	0
			↑
			Ped. 0
			HWY 401 RAMP; 61
←	0	↙	↓
			↘
			↑
			377
			14% (T +LT)
0% (T +LT)	0	↗	←
			0
			0% (T +LT)
0% (T +LT)	0	→	↘
			320
			8% (T+LT)
0% (T +LT)	0	↙	↑
			↘
			↗
			0
			→
Not Configured	852	0	811
			0
			↑
			Total Vehicles
			Ped. 0
Ped. 0	↓	0% (T +LT)	8% (T +LT)
			0% (T +LT)
			HALTON RD 25

PM Peak Hour Report		Start Time: 15:00	
HALTON RD 25			
Ped. 0	Total Vehicles	0% (T +LT)	11% (T +LT)
	0	713	0
			↑
			Ped. 0
			HWY 401 RAMP; 61
←	0	↙	↓
			↘
			↑
			667
			14% (T +LT)
0% (T +LT)	0	↗	←
			0
			0% (T +LT)
0% (T +LT)	0	→	↘
			342
			8% (T+LT)
0% (T +LT)	0	↙	↑
			↘
			↗
			0
			→
Not Configured	1055	0	778
			0
			↑
			Total Vehicles
			Ped. 0
Ped. 0	↓	0% (T +LT)	11% (T +LT)
			0% (T +LT)
			HALTON RD 25

APPENDIX E

Left-Turn Lane Warrant Analysis



--- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
 TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

AM Peak Hour
 $V_a=177$
 $V_L=168$ (95%)
 $V_o=6$

PM Peak Hour
 $V_a=73$
 $V_L=56$ (77%)
 $V_o=28$

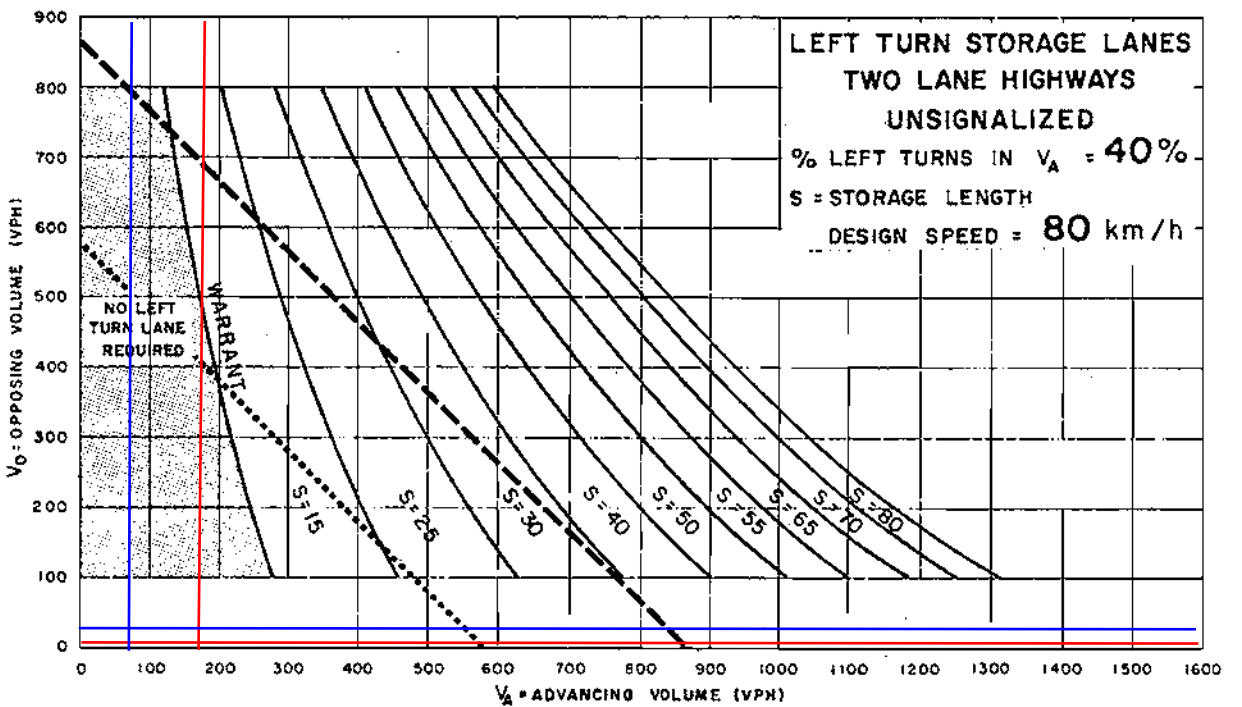


Figure EA-17

APPENDIX F

JART / TOR comments and Responses



PRE-CONSULTATION / DEVELOPMENT REVIEW COMMITTEE MEETING NOTES

NOVEMBER 12, 2020

D00ENQ20.035 MILTON QUARRY (Part of Lot 12 Concession 1) ARN:2415070004279

How to read these notes

The studies, reports and documentation listed in these pre-consultation notes form the basis for a complete submission necessary for processing any associated development applications. As review of an application proceeds, the need for additional information or studies may arise. Where additional technical information is needed about any of the requirements listed in these notes, please speak with the key contact in each Department or the JART Chair. The Agencies reserves the right to request additional information as required.

Where to find applications for the required planning approvals

Applicants can obtain copies of all required development applications by visiting the following:

NEC – [NEPA form](#) and [DPA form](#) (.pdf for both)

Halton Region – [Aggregate Resources Reference Manual \(.pdf\)](#)

Halton Hills - <http://www.haltonhills.ca/planning/developmentReview.php>

Disclaimer

These notes:

- should be interpreted with regard to the specific details of the given proposal and the prevailing legislation, infrastructure planning and policy in place at the time when it was filed;
- are provided in response to an inquiry/proposal;
- are technical in nature, and do not confer approval in whole or in part;
- are to determine the basis for a complete application; and
- are subject to public disclosure upon request.

Pre-consultation notes need to be updated or the update requirement waived by the JART Chair if they are older than 6 months, in the event of property ownership change, in the event of a revised or different proposal or in any other case where so warranted.

The Town of Halton Hills has a Pre-Consultation By-Law #2008-0092 by way of Staff Report No. PD-2008-0021.

PROPOSAL/APPLICATION	OWNER/APPLICANT
<input checked="" type="checkbox"/> Niagara Escarpment Plan Amendment	Owner/Applicant: Dufferin Aggregates (CRH Canada Group Inc.) (MHBC Planning Urban Design & Landscape Architecture)
<input checked="" type="checkbox"/> Regional Official Plan Amendment	
<input checked="" type="checkbox"/> Halton Hills Official Plan Amendment	
<input type="checkbox"/> Conservation Halton Permit	Proposed Site: Part of Lot 12, Concession 1
<input type="checkbox"/> Severance (Consent)	
<input type="checkbox"/> Site Plan	Proposal: Milton Quarry Expansion
<input checked="" type="checkbox"/> NEC Permit	
<input type="checkbox"/> Other	



JOINT AGENCY REVIEW TEAM (JART) COMMENTS

A Joint Agency Review Team (JART) approach will be used for reviewing this application. The function of a JART is to review, analyze and comment on the completeness of the submissions supporting a proposal for new or expanded mineral aggregate extraction operations, and to comment and analyze the proposal on its technical merits. The JART will provide coordinated technical comments that will inform decision-making of the parties. JART is not a decision-making body, nor does it make recommendations on whether or not the proposal should be approved. It is instead a review process and team that ensures the agencies participating are working together from the same information and analyzing the proposal through all applicable planning policies, guidelines, and by-laws.

The Halton Consolidated Streamlined Mineral Aggregate Review Protocol (Joint Agency Review Team Protocol) followed by JART is [available on the Region's website](#).

Documents submitted with the application need to be compliant with *Accessibility for Ontarians with Disabilities Act (AODA)* requirements as they will be posted on the municipality websites.

Each agency shall receive the same versions/copies of applicable studies and submissions.

Applicant will need to maintain a comprehensive public website that includes a document library updated with information shared with JART members (e.g., addendum reports, letters of clarification). The municipalities want to point inquirers to Dufferin's project website as a source of data and information.

Users to be able to access, download, and search within any documents posted to the proponent's website, and print information that is part of the public record without registering on the site.

Each JART agency will report on the merits of the applications to their respective Council, Board or Commission. The applicant and all JART agencies will be made aware of the staff reports and dates of Council, Board or Commission consideration. All attempts will be made to produce a consolidated set of comments from all agencies (acknowledging that all agencies may not share all comments and/or have different issues).

NIAGARA ESCARPMENT COMMISSION – Lisa Grbinicek lisa.grbinicek@ontario.ca

PLANS AND REPORTS:

- Planning Justification Report
- Agricultural Impact Assessment (scoped)
- Natural Heritage Level 1 & Level 2 Technical
- Reports and Environmental Impact Assessment
- Visual Impact Assessment
- Cultural Heritage Impact Assessment
- Archaeological Assessment
- Hydrogeological and Hydrologic Resources Assessment
- Karst Assessment
- Blasting Impact Assessment
- Air Quality Assessment
- Noise Impact Study
- Transportation/Haul Route Impact Assessment
- Adaptive Management Plan
- Rehabilitation and Monitoring Plan

The subject lands proposed for the aggregate expansion are 66.5 ha in size and are located within the Niagara Escarpment Plan (NEP) Rural Area designation and subject to Development Control as established by Ontario Regulation 826/90, Designation of Area of Development Control. It is staff's understanding that the licensed area boundary being proposed is approximately 29.9 ha in size of which 16 ha is to be proposed for extraction.

Part 1.2.2.1 of the NEP (2017) provides the following policy with regards to proposals for Mineral Resource Extraction Area:

Mineral aggregate operations within a new Mineral Extraction Area producing more than 20,000 tonnes annually may be considered on lands within the Escarpment Rural Area land use designation through an amendment to the Niagara Escarpment Plan. Such an amendment will be to effect the change from Escarpment Rural Area to Mineral Resource Extraction Area.

OTHER DOCUMENTS:



<input checked="" type="checkbox"/> USB with a set of all drawings to scale and reports in PDF format	<p>Pursuant to the above-noted policy, a Niagara Escarpment Plan Amendment (NEPA) application will be required for consideration by the Commission. The NEPA Guidelines can be found on the NEC website: NEPA Guidelines. Subject to the approval of an Amendment application, a subsequent Development Permit Application (DPA) will also be required to facilitate development on the subject lands.</p> <p>Niagara Escarpment Plan (2017) Part 1.5 of the NEP (2017) provides the Objectives, Criteria for Designation, and Permitted Uses for lands within the Escarpment Rural Area designation. The NEPA application will be required to propose a change in designation from Escarpment Rural Area to Mineral Resource Extraction Area (MREA). Part 1.9 of the NEP (2017) provides the Objectives, Criterion for Designation and Permitted Uses for lands within the MREA designation. The applicant will be required to address the Objectives and applicable policies contained under Parts 1.5 and 1.9 when preparing the supporting planning documentation and technical studies.</p> <p>The NEPA and Development Permit applications will be further subject to demonstrating compliance with all applicable NEP (2017) Part 2 Development Criteria. NEC Staff has identified the following characteristics of the subject lands, based on a desk-top exercise:</p> <ul style="list-style-type: none"> • The subject lands are currently largely vacant lands, comprised of open field and pasture, formally used as hayfields. • Key Natural Heritage Features are situated adjacent to the subject lands, including Significant Woodlands, Life Science Significant Area of Natural and Scientific Interest (Halton Forest North ANSI), Environmentally Sensitive Area (Hilton Falls Complex) and three (unevaluated) wetlands situated to the north, east and south. • The subject lands are identified as containing the regulated habitat of an endangered species under the <i>Endangered Species Act</i> (ESA). • The subject lands are contiguous with the existing Milton Quarry, bounded by the existing Milton Quarry East Cell to the north, the existing North Quarry to the west, and the existing Main Quarry at some distance to the southwest and south. • Niagara Escarpment Parks and Open Space System (NEPOSS) lands are situated immediately to the east (Tirion Tract Resource Management Area) and west of the subject lands (Cox Tract). • The Bruce Trail and Hilton-Falls Side Trail is situated in proximity (to the east) of the subject lands. • The lands are ranked as “Attractive” by the Landscape Evaluation Study (NEC, 1976). • The subject lands appear to be within a known karst area.
<input type="checkbox"/> Other	

- There do not appear to be private residential lands or water supply wells within close proximity to the subject lands.
- The subject lands are not considered to be prime agricultural area, although they have been identified as previously having been under agricultural production.
- There are known archaeological sites within proximity of the subject lands.

Based on the above preliminary desk-top analysis of the subject lands, the following Part 2 NEP (2017) objectives and policies must be considered and addressed in the applicable supporting planning and technical submissions:

- Part 2.5 (Development Affecting Steep Slopes and Ravines)
- Part 2.6 (Development Affecting Water Resources)
- Part 2.7 (Development Affecting Natural Heritage)
- Part 2.8 (Agriculture)
- Part 2.9 (Mineral Aggregate Resources)
- Part 2.10 (Cultural Heritage)
- Part 2.12 (Infrastructure)
- Part 2.13 (Scenic Resources and Landform Conservation)
- Part 2.11 Recreation (with respect to the proposed rehabilitation plans)

Requested Studies

The following studies are being requested by NEC Staff to accompany the NEPA application in order to properly assess the proposal against the relevant policies of the NEP (2017):

- Planning Justification Report
- Agricultural Impact Assessment (scoped)
- Natural Heritage Level 1 & Level 2 Technical Reports and Environmental Impact Assessment
- Visual Impact Assessment
- Cultural Heritage Impact Assessment
- Archaeological Assessment
- Hydrogeological and Hydrologic Resources Assessment
- Karst Assessment
- Blasting Impact Assessment
- Air Quality Assessment
- Noise Impact Study
- Transportation/Haul Route Impact Assessment
- Adaptive Management Plan
- Rehabilitation and Monitoring Plan

NEC staff have received and reviewed the draft Terms of Reference (TOR) (October 29, 2020) for the following studies:

- Natural Heritage Level 1 & Level 2 Technical Reports

- and Environmental Impact Assessment
- Geology and Water Resources Assessment (including Karst and Hazard Lands)
 - Adaptive Environmental Management and Protection Plan (AMP)
 - Progressive and Final Rehabilitation / Monitoring Study

Staff provide the following comments on the above noted draft TOR:

Natural Heritage Level 1 & Level 2 Technical Reports and Environmental Impact Assessment (October 29, 2020):

- A minor point of clarification is identified in Part 2.4 Niagara Escarpment Plan (pg.4), as follows: The Niagara Escarpment Plan was first approved in 1985 and was last amended in 2017.
- NEP Policy Framework – the Natural Heritage Level 1 & 2 Technical Study places an emphasis on the NEP policies of Part 2.7 Development Affecting Natural Heritage. Staff notes that Part 2.6 Development Affecting Water Resources must also be considered in all applicable technical studies.
- The NH Levels 1 & 2 studies refer to the comprehensive understanding of the area that already exists as a result of the previous approval of the Milton Quarry. While this background information will be useful to the application, the TOR should include a comprehensive characterization of the present-day baseline conditions. This includes sections respecting Landscape Setting, Physiography and surficial geology and soils, and topography and drainage.
- With respect to the adjacent unevaluated wetlands, staff requests that additional (present-day) characterization of these wetlands be provided, including the delineation and evaluation of the wetland boundaries (specifically for the U1 wetland). This should inform buffer widths.
- Cumulative Impacts of the existing and proposed developments on the escarpment environment should be addressed.
- Additional detailed studies with respect to Significant Wildlife Habitat (SWH) should be identified, both on and adjacent to the subject lands, consistent with the Natural Heritage Reference Manual and SWH Ecoregion Criteria Schedules (2015).
- The NEP includes several relevant objectives and policies supporting a landscape systems approach. Considering the lands adjacent to the proposed aggregate operation include the sensitive Escarpment Natural Area which supports Significant Woodlands and ANSI, greater consideration is requested with respect to the assessment of the proposed expansion on landscape connectivity and wildlife corridors and the identification of any potential impacts to existing

corridors as well as opportunities for enhancements through the Rehabilitation/Ecological Enhancement Plan.

- A minimum 10m buffer to Significant Woodlands has been identified with the rationale that this is the same approach that was taken for the Acton Quarry expansion. Proposed buffers to key natural heritage features will be required to demonstrate how the feature and its functions will be maintained and where possible, enhanced. In some cases, it may be necessary for the width of buffers to be increased.
- With respect to Species at Risk (SAR), a more comprehensive evaluation of the potential for SAR habitat (including additional surveys where appropriate), both on and adjacent to the subject lands is requested, or alternatively justification provided for the limits of the studies undertaken. Including but not limited to, the potential impacts to bats. Staff notes that Conservation Halton maintains data for SAR which should be consulted.

Geology and Water Resources Assessment (including Karst and Hazard Lands) and Adaptive Management Plan

- The NEC defers in part to Conservation Halton and Halton Region with respect to technical considerations respecting Geology and Water Resources Assessment.
- Consistent with the above noted comment regarding the Natural Heritage TOR, the TOR for the Water Resources Assessment does not include consideration of the NEP Part 2.6 Development Affecting Water Resources.
- The report should provide details regarding the methodologies used to evaluate any alterations in surface water drainage to inform potential negative impacts on wetlands and required mitigation measures.
- Regarding the requirement for pumping in perpetuity, the NEP Part 2.9. Mineral Aggregate Resources requires that in areas with below-water table extraction, mineral aggregate operations requiring perpetual water management after rehabilitation is complete should be avoided unless it can be demonstrated that such would support other public water management needs. The Water Resources Assessment and AMP/Rehabilitation Plan will be required to provide adequate justification for perpetual pumping.

Progressive and Final Rehabilitation and Monitoring Study

- The analysis of the NEP objectives and provisions respecting rehabilitation and after use policies should include Part 2.8 Development Affecting Water Resources and Part 2.11 Recreation and Part 2.13 Scenic Resources and Landform Conservation.

	<ul style="list-style-type: none"> • Consideration should be given to the development and implementation of a Tree Preservation Plan and Edge Management Plan as part of the comprehensive rehabilitation and enhancement plans. <p>General Comments Overall, greater integration between the disciplines subject of the technical studies and reports is required in order to provide for a comprehensive understanding of the potential impacts and proposed mitigation measures.</p> <p>The licensed area proposed is substantively larger than the area proposed for extraction, justification for the extent of the licensed area boundary will be required.</p> <p>Copies of Materials Requested: Please provide the following copies of all technical studies/reports in the formats identified:</p> <ul style="list-style-type: none"> • One Digital Copy on a Memory Stick • Two hard copies of all the Technical • Reports/Studies requested above (pg.3) <p>To facilitate the continuation of the review and planning process, submission of the NEPA application to the NEC, together with the requested studies, will be required. The approval of an Amendment application (ultimately by the Minister), and subsequent approval and issuance of a Development Permit is required prior to any decisions being rendered on related <i>Planning Act</i> applications pursuant to Sec. 24(3) of the <i>Niagara Escarpment Planning and Development Act</i> (NEPDA).</p>
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HALTON REGION – Joe Nethery Joe.Nethery@halton.ca, Gena Ali Gena.Ali@halton.ca, Janice Hogg Janice.Hogg@halton.ca, Alina Korniluk

PLANS AND REPORTS	Background/Description of the Proposal:
<input checked="" type="checkbox"/> Application Form	<ul style="list-style-type: none"> • The proposed Milton Quarry East Expansion (MQEE) consists of expanding the existing Milton Quarry eastward including an expanded licenced area of 66.5 ha of which 16.0 ha is proposed for extraction. • The subject lands are located between Sixth Line Nassagaweya and Regional Road 25 and are predominantly surrounded by the existing quarry lands, the Regional Natural Heritage System which includes the Regional Forest Cox Tract. The Cox Tract Haul Route, leased by the Region to Dufferin Aggregates, is located immediately to the west of the subject site. • The current proposal will require a Regional Official Plan Amendment, a Halton Hills Official Plan Amendment, an amendment to the Niagara Escarpment Plan, a Niagara Escarpment Development Permit, and approval under the Aggregate Resources Act for an aggregate licence. <p>Comments:</p>
<input checked="" type="checkbox"/> Regional Review Fee(s)	
<input checked="" type="checkbox"/> Agricultural Impact Assessment	
<input checked="" type="checkbox"/> Cultural Heritage Study (built and landscape)	
<input checked="" type="checkbox"/> Archaeological Study	
<input checked="" type="checkbox"/> Financial Impact Study	
<input checked="" type="checkbox"/> Air Quality Assessment	
<input checked="" type="checkbox"/> Environmental Impact Study	
<input checked="" type="checkbox"/> Planning Justification Report	
<input checked="" type="checkbox"/> Progressive and Final Rehabilitation and Monitoring Study	
<input checked="" type="checkbox"/> Haul Route Study, Transportation Impact Study (TIS) including Safety Analysis	
<input checked="" type="checkbox"/> Water Resources Report (including hazard land assessment and karst)	
<input checked="" type="checkbox"/> Adaptive Management Plan	
<input checked="" type="checkbox"/> Noise and Vibration Study	
<input checked="" type="checkbox"/> Blasting Impact Assessment	



<input checked="" type="checkbox"/> Aggregate Resources Act Site Plans and Summary Statement	<ul style="list-style-type: none"> • A Public Information Session will be required as part of the ARA Licence application process to ensure a forum for active verbal exchange between the public and the applicant <ul style="list-style-type: none"> ○ The Region can leverage tools to support and help facilitate virtual information sessions • Assessment of the impact to the Cox Tract (Leased Lands to Dufferin) needs to be conducted, including protection, monitoring and mitigation measures. • Under the 2009 Regional Official Plan (ROP): <ul style="list-style-type: none"> ○ The subject lands (proposed expansion area) are designated as Regional Natural Heritage System and Agricultural Area on Map 1; ○ The subject lands are designated Escarpment Rural Area and Escarpment Natural Area on Map 1A; ○ A portion of the subject lands are identified as being in the Agricultural System outside Prime Agricultural Areas on Map 1E; ○ A portion of the subject lands are Identified Mineral Resource Area on Map 1F; and, ○ The subject lands are identified as having Key Features on map 1G. • The objectives of the Mineral Resource Extraction Areas under the ROP are intended to ensure the protection of Mineral Resource Extraction Areas and that mineral extraction operations occur in a manner that minimizes social, environmental and human health impacts and ensures the functions and features of the Region’s Natural Heritage System are maintained or, where possible, enhanced; and to ensure the progressive and final rehabilitation of these operations to the appropriate after use. • The ROP is intended to be read in its entirety but the following relevant policies have been highlighted. The Planning Justification Report shall comprehensively address the full range of provincial, regional and local policies: <ul style="list-style-type: none"> ○ ROP Section 110(7.2) a) requires where the proposal has the potential to negatively affect Key Features of the Regional Natural Heritage System, as identified in Section 115.3(1), requires the proponent to demonstrate through an EIA that the proposal will result in no negative impact on the Key Features or their ecological functions for which the area is identified. ○ ROP Section 110(7.2) b) requires in addition to Section 110(7.2)a), where the proposal has the potential to negatively affect the Regional Natural Heritage System, require the proponent to demonstrate through an EIA that the proposal will maintain, restore or where possible enhance the diversity and connectivity of natural heritage features in an area, and the long term ecological functions and biodiversity of natural heritage
<input checked="" type="checkbox"/> USB with a set of all drawings to scale and reports in PDF format	

	<p>systems, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.</p> <ul style="list-style-type: none">○ ROP Section 110(11) requires the proponent of a new or expanded Mineral Resource Extraction Area to demonstrate to the satisfaction of the Region that the transportation of aggregate and related products associated with the proposed extractive operation can be adequately accommodated by the transportation system in Halton. Any improvements to the Regional and Local transportation infrastructure to accommodate the transportation of aggregate shall be at the expense of the proponent. If applicable, alternative routes and alternative modes for transporting the products shall be considered and evaluated. Proximity to and use of the Cox Tract Haul Route must be considered.○ ROP Section 116.1c) allows the boundaries of the Regional Natural Heritage System to be refined, with addition, deletions and/or boundary adjustments, through similar studies such as a Sub-watershed Study or Environmental Impact Assessment based on terms of references accepted by the Region.<ul style="list-style-type: none">• Based on Section 116.1c) additional scoping of the Terms of Reference for the Environmental Impact Assessment has been included in the Study Requirements section below. The submitted Terms of Reference for the Level 1 and 2 Natural Environment Technical Report (NETR) and Environmental Impact Assessment (EIS), "Dufferin Aggregates Milton Quarry East Extension", prepared by Goodban Ecological Consulting Inc. (GEC) and dated Oct. 29, 2020 shall be revised with a cover letter explaining how this additional scoping has been addressed.• A portion of the potential Significant Woodlands to the north of the extension area has been removed as part of the current ARA licence approval. However, our comments on the Terms of Reference for the NETR/EIS below still stand that GEC must assess the remaining woodland features for significance per ROP policies and determine the appropriate buffers to the extraction area and water management system infrastructure.• Key Features of the Regional Natural Heritage System that are not mapped and may be present on the subject site are Significant Wildlife Habitat and Significant Habitat of Endangered and Threatened Species, which must also be addressed within the NETR/EIS (please see further comments below).• Agricultural Impact Assessment will be required, scoping to follow.• Wellhead mapping in the ROP is being updated,
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	<p>Regional Source Water Protection staff have updated mapping.</p> <ul style="list-style-type: none"> The site is located within a Significant Groundwater Recharge Area and within a Highly Vulnerable Aquifer. The Region will be looking to see how these matters are addressed. Data requests for mapping can be discussed, and a data sharing agreement will be required where data can be shared. <p>Terms of Reference Comments:</p> <p>1) <u>Re: Terms of Reference for Geology and Water Resources (G&WR) Assessment Report, Including Karst and Hazard Lands Consideration, Proposed Dufferin Aggregates Milton Quarry East Extension Region of Halton, Ontario, prepared by GHD, dated October 29, 2020:</u></p> <p>Dufferin’s detailed (hydro)geologic work plans shall ensure that all items listed in Section 4.10 of HR’s ROP-related <i>Aggregate Resource Reference Manual</i> (Guideline) are considered during the course of the assessment, and that the following <u>additional comments</u> are taken into account:</p> <ul style="list-style-type: none"> Results and analysis of pumping test(s) and other advanced testing (e.g. geophysical, packer, tracer, etc.) conducted at the proposed MQEE lands shall be described in detail in the G&WR Assessment Report (i.e. in addition to any data consideration as part of a numerical model). Current status and relevance of the former (i.e., 1980s/1990s) monitoring stations, shown in the T of R maps, shall be clarified (i.e., which stations remain in existence?) Any anticipated changes to groundwater divides/groundwater contribution zones (relative to on-site and off-site ecological features), would need to be presented in the assessment report. Despite the statement in the T of R that no additional water quality sampling is warranted for the MQEE lands, baseline water quality in the area shall be part of the assessment report. The anticipated site-specific water management system (WMS) components would need to be described according to their intended purpose and inter-relationship with the existing WMS components (i.e., water diversion routes and related infrastructure; water storage, treatment and testing; mitigation-related triggers; and methods for ensuring WMS effectiveness long-term). This information shall be displayed on maps and profiles in the assessment reports and AMP addendum document. Contingencies concerning any unanticipated major karst features would need to be addressed as part
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	<p>the assessment reports and AMP-related implementation plans.</p> <ul style="list-style-type: none">• Any post-rehabilitation mitigation measures, if required, would need to be defined in the assessment report and AMP, including whether pumping in perpetuity would be required for mitigation purposes.• Relevant baseline monitoring stations, applicable to the MQEE area, would need to be established to serve as a reference in the long-term assessment of water-dependent features in this area.• All relevant results arising from (hydro) geologic and natural environment assessments would need to be interlinked as part of the AMP addendum.• ROP Section 166.1c) allows for refinements to the RNHS through similar studies based on terms of reference accepted by the Region. The T of R concerning Geology and Water Resources (G&WR) Assessment Report shall be revised with a cover letter explaining how the comments from the JART partners have been addressed and incorporated into the Terms of Reference. <p>2) <u>Re: Terms of Reference for Adaptive Environmental Management and Protection Plan (AMP), Proposed Dufferin Aggregates Milton Quarry East Extension Region of Halton, Ontario, prepared by GHD and GEC Inc., dated October 29, 2020:</u></p> <p>In addition to items listed in Section 4.11 of the HR's Guideline and AMP-related comments identified above, <u>the following shall be taken into account</u> in terms of the AMP addendum concerning the MQEE site:</p> <ul style="list-style-type: none">• The AMP-related addendum shall be sufficiently detailed to serve as a one-step reference and a key implementation document, if the proposed quarry expansion is approved.• The addendum shall consolidate information from (hydro)geologic and natural-environment studies regarding sensitive water-dependent receptors, summarize their current conditions/functions, define methodologies for establishing/refining applicable targets, include adequate monitoring program, define WMS components, identify mitigation and contingency scenarios, and describe rehabilitation and post-rehabilitation mitigation and monitoring needs. The AMP-related document shall be supported by clear maps, graphs, decision-making charts, tables, sections, profiles and current-conditions photographs.• The AMP addendum shall identify anticipated pre-extraction and verification tasks and applicable reporting associated with these tasks. All on-going reporting and notification structure shall also be defined.
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- Rehabilitation plan components (as proposed and depicted on Site Plans) shall be described in greater detail in the AMP, including any needs for long-term WMS operations and maintenance, if required. This may involve amendment to the existing Milton Quarry agreements and revision to the AMP- and WMS-related securities.
- Any environmental enhancements/restoration plans shall also be described in the AMP.
- The site plan for the MQEE shall incorporate reference to the site-specific studies and the AMP addendum as the key water-related implementation document for the proposed site.

3) **Re: Terms of Reference Progressive and Final Rehabilitation Monitoring Study, Dufferin Aggregates – Proposed Milton Quarry East Extension, prepared by MHBC, dated October 29, 2020:**

In addition to rehabilitation-related items in Section 4.8 of the HR's Guideline, the following shall be taken into account in regards to the MQEE-specific rehabilitation plans:

- Any anticipated Ecological Enhancement Plan (EEP) shall be provided under a separate cover with all enhancement/restoration plans and schedules clearly defined. This document shall be referenced on Site Plans as it would serve as the primary implementation reference for rehabilitation-related plantings and other restoration needs.

4) **Re: Terms of Reference for Level 1 and 2 Natural Environment Technical Report (NETR) and Environmental Impact Assessment (EIS), Dufferin Aggregates Milton Quarry East Extension”, prepared by Goodban Ecological Consulting Inc. (GEC), dated Oct. 29, 2020**

- 5) The Terms of Reference were reviewed in comparison to the Halton Aggregate Resources Reference Manual, Version 1.0, dated June 18, 2014, and in accordance with applicable Regional Official Plan (ROP) policies.
1. Section 2.5.1 – Halton Region Official Plan (2015):
 - a) Please note that the current Halton Region Official Plan (ROP) office consolidation is dated June 19, 2018.
 - b) Reference shall be made to the following Mineral Resource Extraction Areas policies of the ROP, including Sections 107(3), 107(3.1), 107(5), 110(2), 110(6), 110(7.1), 110(7.2), 110(8), 110(8.1).
 - c) Portions of the subject lands are within the Regional Natural Heritage System land use designation. According to Figure #3 of the Terms of Reference, the proposed limits of

extraction appear to encroach into a potential Significant Woodland feature and the associated buffer located at the north-west portion of the extraction area. The NETR/EIS will need to assess the significance of the woodland in accordance with s.277 of the ROP. If the woodland is significant, the NETR/EIS will need to demonstrate that there will be no negative impact on the Significant Woodland feature and its ecological functions in accordance with the ROP and in accordance with the applicable policies of the Niagara Escarpment Plan.

- d) The proposed buffers range from 0 m from the limit of potential Significant Woodlands to 50 m in width from candidate Significant Wetlands. It is standard practice for the Region to require a minimum 30 m width for buffers from Key Features of the Regional Natural Heritage System. The NETR/EIS will need to provide justification for the proposed buffers that are less than 30 m in accordance with the definition of buffer within the ROP (i.e., s.220.1.1). Buffers are components of the Regional Natural Heritage System. Therefore the proposed limits of the Mineral Resource Extraction Area designation shall not extend into the Key Features and their associated buffers.

2. Section 4.1.5 – Significant Woodland Boundary Delineation and Staking:

- a) Staking of the Significant Woodland edge is proposed where the woodland edge is in proximity to the proposed water management system footprint. Given that the limit of the Significant Woodland and associated buffer are informing the limit of the extraction area, the Significant Woodland is to be staked along the northern and southern limits of the proposed extraction area as well as where the proposed watermain and other groundwater mitigation infrastructure is proposed within 30 m of the candidate Significant Woodland features. As noted in the Terms of Reference, the staked limits of the Significant Woodlands are to be confirmed by the Regional Forester.

3. As noted in Comment 1d), it appears that a 50 m buffer is proposed from two candidate Significant Wetlands. These particular wetlands have not been evaluated by the Ministry of Natural Resources and Forestry (MNRF); however, they have been identified within MNRF and Conservation Halton wetland mapping. It is recommended that the NETR/EIS assess the

significance of these wetlands in accordance with s.276.5(1) of the Regional Official Plan and in consultation with Conservation Halton and MNRF staff, and the appropriate buffer width be determined in accordance with s.220.1.1 of the ROP.

4. Section 4.0 – Ecological Field Survey Program:
 - a) Regional environmental planning staff defer to CH as the Region’s environmental technical advisors (and the Region’s NETR/EIS peer reviewer shall one be retained) to provide comments on whether the proposed field survey program satisfactorily identifies the Key Features and other components of the Regional Natural Heritage System in accordance with s.115.3 and s.155.4 of the ROP.
5. Section 4.2.3 – Other Wildlife Groups:
 - a) Were other significant habitats of endangered and threatened species or significant wildlife habitat confirmed based on field observations? For example, bats?
6. It is staff’s understanding that as part of the proposed groundwater impacts mitigation, the applicant is proposing to evaluate and design additional recharge wells, diffuse discharge(s), watermain and related equipment as necessary to achieve the mitigation and enhancement objectives for the proposed quarry extension project. It appears that a watermain is proposed within the buffer/linkage/enhancement areas of the Regional Natural Heritage System. Any impacts on the Regional Natural Heritage System as a result of the proposed infrastructure required for the groundwater mitigation must be included in the NETR/EIS in accordance with s.110(7.2) of the ROP.
7. In accordance with section 4.4 of the Halton Aggregate Resources Reference Manual, specifically Objective #2, the NETR/EIS must assess the linkages between the Regional Natural Heritage System Key Features and surface and groundwater resources. It is recommended that GEC and GHD coordinate their study findings to comprehensively demonstrate the ecological functions of the Key Features, the cumulative impacts, appropriate mitigation measures and ecological net gain to the Regional Natural Heritage System.
8. Section 5.0 – Mitigation Measures, Ecological Enhancements, Quarry Rehabilitation and Impact

Assessment:

- a) A minimum 10 m buffer from the Significant Woodlands is proposed, which will be enhanced through tree planting. While this approach may have been accepted for the Action Quarry Extension, a reduction to the typical 30 m buffer must be justified as noted in Comment 1d).
- b) Please confirm the location of the proposed tree clearing (also related to Comments 1c), 1d) and 2).
- c) Quarry Rehabilitation – Regional environmental planning staff defer to Conservation Halton as the Region's environmental technical advisors (and the Region's NETR/EIS peer reviewer if retained) to provide technical comments and advise on the conceptual rehabilitation plan shown on Figure 4 of the Terms of Reference.

In addition to the guidelines in the Aggregate Resources Reference Manual, the required Environmental Impact Assessment shall address the following:

- Flagging the Key Features: woodlands, wetlands, watercourse and areas Provincially Significant wildlife potential, buffers
- Significant woodland assessment: Regional Forrester shall be consulted for staking
- CH to advise on scoping in relation to wetlands, wildlife and endangered species

Note that the Region's EIA Guidelines were updated in 2020.

Study Requirements:

All materials submitted shall be provided in AODA compliant format for the purposes of posting on municipal websites.

The Aggregate Resources Reference Manual provides guidance to decision-makers and development proponents regarding *Planning Act* applications for a new or expanded mineral resource extraction use:

<https://www.halton.ca/getmedia/fbc3a3c7-a584-4872-b0f7-4f6f6ebe5609/LPS-rop-guidelines-aggregate-resources-reference-manual.aspx>

The Regional Official Plan has Guidelines for implementing its policies. A full set of the Guidelines can be found at: [https://www.halton.ca/The-Region/Regional-Planning/Regional-Official-Plan-\(ROP\)-\(1\)/Regional-Official-Plan-Guidelines](https://www.halton.ca/The-Region/Regional-Planning/Regional-Official-Plan-(ROP)-(1)/Regional-Official-Plan-Guidelines)

The following Guidelines have been highlighted by the Public Works Department, Infrastructure Planning and

Policy Division regarding the preparation of the Haul Route Study, Transportation Impact Study (TIS) including Safety Analysis:

- TIS Guidelines:
<https://www.halton.ca/Repository/Transportation-Impact-Study-Guidelines>
- Noise Abatement Guidelines:
<https://www.halton.ca/Repository/Noise-Abatement-Guidelines>
- Access Management Guidelines:
<https://www.halton.ca/Repository/Access-Management-Guideline>

List of Required Studies:

- Application Form
- Regional Review Fee(s)
- Agricultural Impact Assessment (scoped)
 - The lands appear to have been under agricultural production and are part of Halton's agricultural system. Please provide a proposed scope for discussion with JART in January/February.
 - NEC is similarly requesting a study.
- Archaeological Study
- Cultural Heritage Study (built and landscape)
- Environmental Impact Assessment
- Financial Impact Study
- Air Quality Assessment
- Planning Justification Report
- Progressive and Final Rehabilitation and Monitoring Study
- Haul Route Study, Transportation Impact Study (TIS) including Safety Analysis
- Water Resources Report (including hazard land assessment and karst)
- Adaptive Management Plan
- Noise and Vibration Study
- Blasting Impact Assessment
- Aggregate Resources Act Site Plans and Summary Statement

Application Fees

The application fee for a Regional Official Plan Amendment for mineral aggregate extraction (pits and quarries) is anticipated to be \$145,315.59 (\$128,597.87, plus HST) per Fees By-law 68-20. Costs associated with peer reviews of development applications studies are billed to proponents on a cost recovery basis, and Halton Region will not release any objections to a mineral aggregate application proposal under the Aggregate Resources Act without all peer review fees having been paid in full. The above is in accordance with Fees By-law 68-20.



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<p>REPORTS:</p>	<p>General</p>
<p><input checked="" type="checkbox"/> Level 1 and Level 2 Natural Environmental Technical Report and Environmental Impact Assessment</p>	<p>1. All studies should be coordinated and integrated. In particular, the findings of the Hydrogeologic and Hydrologic Impact Assessment, Surface Water Assessment and Level 1 and 2 Natural Environment Technical Report should inform each other, and be presented in a coordinated manner.</p> <p>2. All reports (in particular, the Natural Environment Report, Planning Justification Report) should reference the relevant Conservation Halton policies that apply to the site.</p> <p>3. CH staff may have additional feedback on the water resources report once we have completed a review of the 5 year AMP.</p> <p>Level 1 and Level 2 Natural Environmental Technical Report and Environmental Impact Assessment Terms of Reference (TOR)</p> <p><u>Key Comments</u></p> <p>1. The TOR should indicate the following to be included within the Natural Environment Technical Report (NETR):</p> <p style="margin-left: 20px;">a. The NETR should correspond with the Geology and Water Resources Assessment Report, to ensure the impact assessment is comprehensive. Surface and groundwater evaluation should be discussed in both reports, and the NETR/EIA report should discuss the ecological impacts of any proposed modifications.</p> <p style="margin-left: 20px;">b. Determine the significance of CH identified wetlands to confirm the appropriate buffer width to ensure no negative impact on hydrological/ecological function. Wetland U1 boundary will need to be confirmed by CH during the appropriate season (June – September).</p> <p><u>Technical Comments</u></p> <p>2. The TOR should note that the NETR will undertake the following:</p> <p style="margin-left: 20px;">a. Include mapping that clearly identifies all of the Natural Heritage Features on current air photos.</p> <p style="margin-left: 20px;">b. Obtain a data-share agreement with CH for relevant natural heritage data.</p> <p style="margin-left: 20px;">c. Incorporate full details on surveys including methodologies used for field studies and a table outlining purpose of the study, date, time of visits, weather during the surveys and information about the qualified professional carrying out the surveys, the protocols used.</p> <p style="margin-left: 20px;">d. Identify native plant species based on their</p>
<p><input checked="" type="checkbox"/> Progressive and Final Rehabilitation Monitoring Study</p>	
<p><input checked="" type="checkbox"/> Geology and Water Resources Assessment Report, Including Karst and Hazard Lands</p>	
<p><input checked="" type="checkbox"/> Adaptive Environmental Management and Protection Plan (AMP)</p>	
<p><input type="checkbox"/> Other:</p>	

coefficient of conservatism to help determine potential impacts based on the tolerances of disturbance.

- e. Incorporate additional surveys to determine if significant wildlife habitat (SWH) is present in accordance with the 2015 SWH Ecoregion Criteria Schedules. Include a screening table to indicate if there are candidate habitats present and how these habitats will be confirmed.
- f. Include the identification of the connections and linkages between Regions NH features, surface water and groundwater resources, as per Halton Region Aggregate Resource Manual.
- g. Recommend correspondence with the MECP regarding Endangered or Threatened species to ensure adequate surveys have been completed and effort is supported.
- h. Confirm adequate surveys are undertaken (i.e. SWH, SAR) to determine the appropriate buffer width to maintain Significant Woodland ecological form and function and ensure no negative impact from proposed quarry extraction works.
- i. Undertake additional targeted turtle habitat surveys within suitable habitats following the accepted survey protocols within study area and adjacent lands. Incorporate amphibian egg mass surveys within suitable habitats both within study area and adjacent lands.
- j. Include how the identification of diversity and connectivity of the natural features within the study area and adjacent lands will be conducted, to ensure long-term ecological function can be maintained or enhanced where appropriate.
- k. Recommend correspondence with DFO regarding potential impacts on fish and fish habitat to determine survey extent and direction.
- l. Confirm the zone of influence to identify any potential impacts regarding drawdown for both ground and surface water implications and direct appropriate mitigation measures.
- m. Discuss how net gain will be achieved both short term and longer term within the study area and adjacent lands, as per Halton Region Aggregate Resource Manual.
- n. Discuss all potential cumulative impacts on natural environment within the NEP area and provide appropriate mitigation measures to ensure natural features ecological/hydrological functions are maintained. As stated within Halton Region Aggregate Resource Manual

Progressive and Final Rehabilitation Monitoring Study TOR

- 1. Considering additional surveys have been recommended to be included within the NETR, the

proposed rehabilitation plan and landforms may need to be modified to ensure they are appropriate to achieve overall net gain.

Geology and Water Resources Assessment Report, Including Karst and Hazard Lands

1. The ToFR should outline in greater detail the proposed methodology to evaluate changes in surface water drainage to the area's wetlands and outlet points.
2. The ToFR states ground water conditions will be compared to the existing approved interim extraction condition (for full extraction condition with mitigation) but does not outline what surface water conditions will be compared to. Conservation Halton staff will provide further comment on the baseline/point of reference for surface water conditions once we have had an opportunity to review the current 5-year AMP and other relevant background documents.
3. The ToFR should indicate the study will evaluate the potential requirements to adapt the existing water management system to maintain or enhance surface water conditions (in addition to groundwater conditions).
4. To ensure impacts on water resources and natural features relying on groundwater and surface water are not exacerbated during and post extraction, threshold for mitigation measures should account for potential impacts from the existing quarry operation.
5. The final rehabilitation plan must show that any natural features and water resources around the MQEE which require groundwater and/or surface water mitigation during extraction will function post extraction (feedback also applies to the Progressive and Final Rehabilitation Monitoring Study).
6. The report should provide methodologies used to evaluate any alterations in surface water drainage to help determine if there are any expected impacts on wetland as well as provide requirements to adapt, maintain or enhance existing wetlands.
7. The Geology and Water Resources Assessment Report should be more explicit with respect to proposed surface water analysis and potential mitigation. The report should provide methodologies used to evaluate any alterations in surface water drainage and how it informs any proposed mitigation.
8. Recommend that the baseline/point of reference for comparison of the surface water conditions to the Tributaries and wetlands be maintained as per the existing approved interim extraction condition (for full extraction condition with mitigation).
9. Based on the site plan, the subwatershed boundary overlaps the north east corner of the License Boundary. Recommend that the ToFR include methodology to confirm the subwatershed boundary and to evaluate if there are any changes in surface water drainage across



	<p>subwatershed line.</p> <p>Adaptive Environmental Management and Protection Plan (AMP)</p> <ol style="list-style-type: none"> 1. The expanded AMP (or another mechanism) should identify any additional financial securities required to ensure the public and agencies will not be put at financial risk and how they will be provided. 2. The report should provide methodologies used to evaluate any surface water changes, to identify potential impacts on wetlands so that they can be mitigated appropriately. 3. Ecological monitoring should be undertaken to ensure quarry expansion will not impact the NHS and to ensure mitigation measures and rehabilitation works are functioning as proposed. <p>Fees</p> <p>Aggregate Extraction Technical Review: \$80,000 + HST = \$90,400 Niagara Escarpment Plan Amendment: \$16,482.30 + HST = \$18,625 = \$109,025 in 2020 (NOTE: fees should be confirmed using 2021 fee schedule)</p> <p>Copies</p> <ul style="list-style-type: none"> • One Digital Copy on a Memory Stick • 5 hard copies of the natural environment report, water resources/hazard report, rehab and monitoring report, adaptive management report, and site plans. • 1 hard copy of all other reports
<p>TOWN OF HALTON HILLS - Greg Macdonald ext 2979 gmacdonald@haltonhills.ca,</p>	
<p>PLANS:</p>	<p>Planning:</p>
<p><input checked="" type="checkbox"/> ARA Site Plan</p>	<p>The portion of the subject lands proposed for extraction are designated as "Escarpment Rural Area" under the Town of Halton Hills Official Plan. The remainder of the subject</p>
<p><input checked="" type="checkbox"/> Survey Plan</p>	<p>lands not proposed for extraction (some of which though may be covered by the quarry license limits) are designated as "Escarpment Natural Area" and Greenlands A.</p>
<p>REPORTS:</p>	<p>Section B4 of the Halton Hills Official Plan contains the policy frameworks for lands within the Niagara Escarpment Plan Area; more specifically, Policy B.4.2.3 pertains to the Escarpment Rural Area designation. One of the objectives of this designation (B4.2.3.1(d)) is to provide for designation of new Mineral Resource Extraction Areas which can be accommodated in accordance with the policies of this Plan and by amendment to the Niagara Escarpment Plan, the Region of Halton Official Plan and the Town's Plan.</p>
<p><input checked="" type="checkbox"/> Cultural Heritage Resource Assessment</p>	<p>Mineral Resource Extraction is not a permitted use within the Escarpment Rural Area designation. Therefore, an Official Plan Amendment is required in order to change the designation to "Mineral Resource Extraction Area".</p>
<p><input checked="" type="checkbox"/> Transportation Impact Study</p>	
<p><input checked="" type="checkbox"/> Noise Impact Study</p>	
<p><input checked="" type="checkbox"/> Planning Justification Report</p>	
<p><input checked="" type="checkbox"/> Public Consultation Strategy</p>	
<p>OTHER DOCUMENTS:</p>	
<p><input checked="" type="checkbox"/> USB with a set of all drawings to scale and reports in PDF format</p>	
<p><input checked="" type="checkbox"/> Other:</p> <ul style="list-style-type: none"> • Haul Route Agreement • Draft Official Plan Amendment 	

Section E.6 of the Halton Hills Official Plan contains the policies applicable to Mineral Resource Extraction Areas. The policy framework includes a number of objectives (Policy E6.1) pertaining to ensuring that extraction activities are done in a proper, sustainable manner. The designation only applies to licensed operations under the Aggregate Resources Act (Policy E6.2). Policy E.6.4.3 sets out the policies that must be considered when evaluating new mineral aggregate operations or expansions to existing operations. The locational criteria (Policy E6.4.3.2) do note that it is the policy of this Plan to direct new or expanded mineral aggregate operations to locate in the Escarpment Rural Area.

Policy E6.4.3.4 contain the application requirements. The range of information and reports required for a complete application are consistent with those identified in Halton Region's Aggregate Resources Reference Manual.

The primary Criteria for Approval for the proposal is contained within Policy E6.4.4. This policy notes that the applicant shall demonstrate that water features shall be protected, improved or restored; that the quantity of water available for other uses and base flow is protected, improved or restored; that there is no negative impact on significant natural heritage features; that as much of the site as possible is rehabilitated; and, that other environmental and social impacts are minimized.

Engineering:

Halton Hills Engineering will primarily be reviewing storm water management from the perspective of where Dufferin may propose to redirect flows and will be reviewing the noise and vibration, dust mitigation, and blasting reports.

A license agreement may be required for any proposed crossings of open and/or closed road allowances. It may be that existing crossings that are lacking this license would be corrected at this time. This is subject to confirmation of who has jurisdiction of the road allowances (Milton and/or Halton Hills).

Recreation and Parks

Halton Hills Recreation & Parks will be reviewing reports pertaining to quarry rehabilitation and post-excavation uses in order to encourage environmental restoration, to explore future recreational opportunities including trails.

Subject to comments from the NEC, Recreation and Parks also have interest in reviewing the Visual Impact Assessment.

Submission Requirement Details:

Planning Justification Report: must contain an analysis of the above noted policy framework from the Town of Halton

Hills Official Plan.

Cultural Heritage Resource Assessment: this report shall build on the heritage inventory work completed by Heritage Halton Hills and the Town's Heritage Register. It will review and inventory heritage resources in the area within Halton Hills, identify potential cultural heritage resources, and will develop a strategy to conserve those resources where appropriate in accordance with Section F5 of the Official Plan.

Transportation Impact Study: must include the following Halton Hills specific analysis:

- Review of the issue of heavy vehicles travelling on 5 Side Road from Milton quarry to Brampton and what mitigation measures can be implemented to avoid this.
- Review of ongoing queuing issues on Dublin Line and 5 Side Road during the A.M. quarry peak time
- Mitigation measures to reduce Illegal parking on 5 Side Road
- Evaluation of existing and/or proposed haul routes for the existing and future road network (i.e., Hwy 401/Tremaine interchange)
- Operational issues (i.e., dirt tracked on Dublin Line and noise issues)
- Dublin Line and Main Access - operational review (i.e., collisions, sightlines).

It is requested that a Terms of Reference (ToR) be submitted to the Town of Halton Hills for review prior to initiating the TIS.

A Truck Haul Route Agreement will also be sought that identifies current hauling operations and the future proposed hauling operations.

Fees:

Please note that the Town has adopted new Planning & Development Fees. The new fees can be found on the Town's website: <https://www.haltonhills.ca/userfees/>. The fees noted below will be for 2021. Should the application be submitted in 2020 please contact the Planning Department for the 2020 fees.

The fee for the Official Plan Amendment will be calculated as follows:

- Base Fee + Variable Fee for non-residential hectare.
- The variable fee is calculated using the number of hectares contained within the licensed area, NOT the extraction area or the total property size.
- The license boundary on the ARA Site Plan is 29.9 ha. Should these limits change as of the time of submission the variable fee would be different.



	<p>Based on a license area of 29.9 ha, the 2021 fee is expected to be:</p> <ul style="list-style-type: none"> • Base Fee (\$23,769) + Variable Fee (\$57,663) = Total Fee (\$81,432.00) <p>Additionally, the Town will require the following fee to review the MNR License/Permit application - \$5,733.00</p> <p>Please contact the Planning Department prior to submission to confirm the change should the license limits changed.</p>
<p>TOWN OF MILTON - Mollie Kuchma – Mollie.Kuchma@milton.ca</p>	
<p>REPORTS:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Transportation Impact Study <input checked="" type="checkbox"/> Water Resources Assessment: Hydrogeology and Hydrology <input checked="" type="checkbox"/> Natural Resources Assessment/Environmental Impact Assessment reviewing the Natural Heritage System, Woodlands, Watercourses, etc. <input checked="" type="checkbox"/> Noise Impact Study <input checked="" type="checkbox"/> Blasting Impact Study <input checked="" type="checkbox"/> Air Quality Assessment <input checked="" type="checkbox"/> Cultural Resources Impact Assessment <input checked="" type="checkbox"/> Adaptive Environmental Management Plan <input checked="" type="checkbox"/> Rehabilitation and Monitoring Plan <input checked="" type="checkbox"/> Aggregate Resources Act Site Plans and Notes <input checked="" type="checkbox"/> Visual Impact Assessment <input checked="" type="checkbox"/> Planning Justification Report <input checked="" type="checkbox"/> Archaeological Assessment <input checked="" type="checkbox"/> Financial Impact Assessment 	<p>A portion of the existing Dufferin Aggregates Milton Quarry is located within the municipal boundaries of the Town of Milton. It is noted that the proposed extension is however located wholly within the Municipal boundaries of the Town of Halton Hills. The Town of Milton will participate in the review of the proposed applications as a commenting agency. We will be monitoring the potential for impacts from the proposed quarry extension on Milton residents within close proximity to the site, as well as matters of interest to the Town of Milton including but not limited to impacts to roads under the Town's jurisdiction and rural private wells. The Town appreciates the opportunity to comment on and review the proposed applications and provide the following comments for your consideration.</p> <p>The Town requests that the following studies and documents be submitted as part of a complete application:</p> <ul style="list-style-type: none"> • Transportation Impact Study • Water Resources Assessment: Hydrogeology and Hydrology • Natural Resources Assessment/Environmental Impact Assessment reviewing the Natural Heritage System, Woodlands, Watercourses, etc. • Noise Impact Study • Blasting Impact Study • Air Quality Assessment • Cultural Resources Impact Assessment • Adaptive Environmental Management Plan • Rehabilitation and Monitoring Plan • Aggregate Resources Act Site Plans and Notes • Visual Impact Assessment • Planning Justification Report • Archaeological Assessment • Financial Impact Assessment <p>A Transportation Impact Study (TIS) is required to be submitted and reviewed by the Town. A Terms of Reference (TOR) is required and should be based on the guidelines available from Halton Region. The Terms of Reference shall be submitted to the Town for review and comment prior to undertaking the study. Please clarify and articulate where the proposed haul route is located both</p>

internal and external to the site, how Dufferin regulates the operators leaving the quarry and provide a copy of the existing haul route agreement with the Town of Halton Hills and/or the Ministry of Transportation, should they exist. Consideration should be given to adjusting the proposed haul route once the proposed Tremaine Road interchange with the 401 is constructed and operational, and any proposed use of this interchange once completed, should be identified and discussed in the TIS.

The following impacts of the proposed quarry extension, in particular, are of interest to the Town of Milton and will be reviewed accordingly:

- Noise, blasting and air quality impacts to existing adjacent Milton residents.
- Current groundwater and surface water flows and how they may impact Milton Residents, the Milton water supply at Kelso and natural heritage features and functions in the area.
- The sequence of extraction as it relates to the existing quarry operations and timelines for a continuous and progressive rehabilitation prior to any new extraction taking place through an additional new Licence.
- We understand that there may be long term environmental management measures currently in place for perpetual pumping to maintain water flows in perpetuity. Please provide more detail on this, how it is working, and that the appropriate protections are in place to ensure Dufferin is capable of maintaining these systems in perpetuity such that the Town is not negatively impacted over time.

Town of Milton Review Fees:

- Regional Official Plan Amendment: \$19,589.00
- MOE/MNRF Permit Applications (Bordering Municipality): \$22,988.00
- NEP Plan Amendment: \$0.00
- Total: \$42,577.00

The Town will review all applications submitted through the Region, Niagara Escarpment Commission and the Town of Halton Hills. Please note all submission documents must be AODA compliant.

Please further note that all submission documents should be available on the project website, in AODA compliant form, with the ability to download all documents, not just review in webpage form. Should you have any questions, please do not hesitate to contact:

Mollie Kuchma, MSc, MPA, MCIP, RPP
Planner, Development Review

Mollie.Kuchma@milton.ca



MEMO

TO : Janice Hogg, MCIP, RPP - Senior Planner, Halton Region

COPY TO : David Germain – Thomson Rogers

FROM : Jaime Garcia, Senior Project Manager, CIMA Canada Inc.

DATE : May 11, 2021

SUBJECT : Milton Aggregate Quarry Extension Traffic Impact Study – Terms of Reference Peer Review (CIMA+ File: B001331) -

Dear Janice,

As per your request, CIMA Canada Inc. (CIMA+) hereby provides the Region of Halton (the Region) our comments with respect to the proposed Terms of Reference (ToR) for the Transportation Impact Study (TIS) in support of the proposed extensions of the Dufferin Aggregate Quarry in the Town of Milton prepared by The Municipal Infrastructure Group Limited, a T.Y. Lin International Company (TMIG). The proposed ToR is attached as Appendix A to this memo.

The focus of this peer review is to ensure that the proposed ToR includes a proper level of analysis and a proper study area, and that it follows the Halton Region's Transportation Impact Study Guidelines and the requirements identified by the Region's Aggregate Resources Reference Manual for the preparation of a Transportation/Haul Route Study.

After our review of the proposed ToR, we offer the following comments:

1. The introduction indicates that the expansion is located on the western portion of the site and falls within the Town of Halton Hills. Additionally, Dublin Line is a municipal road located within Halton Hills.
 - Section 1.2.1 of the Provincial Policy Statement (PPS), which is included in the Region's Aggregate Resources Reference Manual, indicates that due to the haul route crossing municipal boundaries, the impacts to the road network should be coordinated between the municipalities. The ToR should include a section that discusses the coordination between the affected municipalities regarding the impacts of the haul route;
2. Section 2 (Study Intersections) should include No. 5 Sideroad at James Snow Parkway (signalized) intersection and the stop-controlled quarry site access on Dublin Line. Additionally, provide clarification for the current and future use of the existing quarry site access on Sixth Line Nassagaweya located approximately 2.85 km east of 15 Side Road;
3. Section 2 should include a map showing the future roadway network and modified haul route along the Tremaine Road realignment and new Highway 401 interchange as part of the ToR. The map will facilitate the ToR review and discussion prior to preparation of the TIS. The proposed study scope includes the existing Highway 401 ramp terminals on

Regional Road 25 and the future Highway 401 ramp terminals on new Tremaine Road. As these ramp terminals are MTO jurisdiction, the Town of Milton should ensure that the study is circulated to the MTO for their review.

4. Section 5 (Future Conditions) should include a comparative analysis of the existing and future haul routes. The net increase in haulage volumes should be clearly presented so the Region can understand the impacts of the quarry expansion. The study should analyze and compare future traffic operations for both the existing haul route and modified haul route to determine the impacts to traffic operations of modifying the haul route vs. maintaining the existing haul route.
 - o The study must provide justification and demonstrate that the proposed modified haul route is feasible from a traffic operations perspective.
5. Section 7 (Trip Distribution and Assignment) should indicate what are the intended trip distribution assumptions (e.g. truck routes data collected from Dufferin Aggregate - Milton Quarry);
6. Section 8 (Study Parameters) discusses a review of the projected queues at the turning movements impacted by the truck routes. However, traffic operation analysis for the surrounding roadways should include existing and projected queue lengths (per Region's TIS Guidelines, Section 3.6.1) at all study area intersections as well as mitigation measures for queues that are expected to exceed available storage. The use of SimTraffic is recommended for the queuing analysis;
7. It is suggested for the ToR to indicate that a 'Safety Analysis' section will be included in the report to discuss potential safety or operational issues (per Region's TIS Guidelines, Section 3.6.2) in the study area. Even if there are no safety issues, a review should be completed and documented in the TIS report.
 - o A critical component of the Safety Analysis and of the study as a whole will be to assess the heavy truck routing to and from the quarry; more specifically, the proposed modified route that includes new Tremaine Road and the future Highway 401 interchange. The study must provide justification and demonstrate that the proposed modified haul route is feasible from a traffic safety perspective.
8. It is suggested for the ToR to indicate the need of follow the Region's Aggregate Resources Reference Manual for the preparation of a Transportation/Haul Route Study.
 - o Section 4.0 of the Region's Aggregate Resources Reference Manual outlines what format each study should follow (Sections A to H on Page 27-28) and identifies the purpose and objectives of each study.
 - o Section C identifies all policies in any Provincial, Regional or local planning document that deal with the subject matter of the report and which may have an impact on the consideration of the application.
 - o Appendix A (specifically Section 8.0) to this Manual should be considered in this regard. The ToR should include and address the requirements identified by the most current versions of the PPS, Greenbelt Plan and Niagara Escarpment Plan. For example, the existing quarry is adjacent to a designated Niagara Escarpment Natural Area. The ToR should discuss how the proposed quarry extension avoids the Escarpment Natural Area.
 - o Consideration should be given to traffic safety components including (but not limited to) heavy truck maneuverability at the Dublin Road and James Snow Parkway roundabout

and the impacts of increased truck volumes on both the existing and modified haul routes.

Aside of the aforementioned comments it is recommended that the consultant's proponent discuss with the Region of Halton the availability of historical traffic data as well as the traffic volume forecasts identified as part of other Traffic Impact Studies.

Sincerely,

CIM

A handwritten signature in black ink, appearing to read "Jaime Garcia", written over a light blue horizontal line.

Jaime

Associate Partner, Senior Project Manager, Transportation
jaime.garcia@cima.ca



Appendix A: Terms of Reference



March 1, 2021

PROJECT NUMBER 10108

CRH Canada Group Inc.

ATTN: Kevin Mitchell, Director Property, Planning & Approvals

2300 Steeles Avenue West, 4th Floor

Concord, ON

L4K 5X6

Dear Mr. Mitchell,

Re: Proposed Milton Quarry Expansion Traffic Impact Study – Terms of Reference

The Municipal Infrastructure Group Ltd., a T.Y. Lin International Company (TMIG) has been retained to complete a Traffic Impact Study (TIS) for the proposed expansion of the Dufferin Aggregates Quarry, located in the Town of Milton. The expansion, consisting of 16 ha of land, is located on the western portion of the site and falls within the Town of Halton Hills. This expansion refers only to the extraction area, as the production capacity and access to the subject lands are proposed to remain as under existing conditions. We understand that the existing Milton Quarry has an unlimited annual extraction license, which we assume would incorporate the proposed expansion area. Please find below a detailed Terms of Reference describing our proposed work plan for your review and input.

1. Study Periods

TMIG proposes to assess traffic operations under the weekday AM and PM peak hours of the roadway to quantify the impacts of the expansion on the boundary road network.

2. Study Intersections

As part of this TIS, TMIG proposes to assess the existing haul route under existing conditions consisting of the following intersections:

- Dublin Line at James Snow Parkway (roundabout);
- Regional Road 25 at James Snow Parkway (signalized);
- Regional Road 25 at Highway 401 WB Off-Ramp (signalized); and
- Regional Road 25 at Highway 401 EB Off-Ramp (signalized).

It is TMIG's understanding that the quarry operations are not projected to change following the expansion. As such under future conditions, as the Tremaine Road realignment and new interchange to the Highway 401 are planned to be completed by 2023, TMIG proposes to assess a modified haul route that would include the study intersections detailed above plus the following:

- New south leg (New Tremaine Road) at Dublin Line and James Snow Parkway (roundabout); and
- The new intersections of New Tremaine Road at the Highway 401 WB Off-Ramp & EB Off-Ramp (signalized).

3. Traffic Data

Due to the on-going Covid-19 pandemic, traffic patterns are not normalized, and the completion of up-to-date survey data would not be deemed applicable for use in traffic operations review. Accordingly, TMIG proposes to acquire historical traffic data at the existing study intersections listed above from the municipalities, along with Average Annual Daily Traffic Data (AADT) along the study roadways.

The AADT is proposed to be used to derive annual historical growth rates along the study roadways to be applied to the historical traffic volumes in order to derive 2021 existing traffic volumes.

For the interchange intersections at Regional Road 25, TMIG proposes to acquire various historical TMC surveys to derive an average annual growth for the ramps should AADT not be available. Should historical TMC data sets not be available, TMIG proposes to apply the AADT derived for Regional Road 25 to the Highway 401 ramps as applicable.

4. Conservative Baseline Traffic Volumes

The truck haulage to/from the quarry is not projected to change under future conditions. However, in order to derive a conservative analysis, TMIG proposes to remove the surveyed haulage volumes (based on the historical traffic data) from the derived 2021 volumes and replace them with conservative haulage volumes derived based on the operations of the quarry as detailed below.

TMIG proposes to derive trip generation rates for the development based on standard 'first principles' approach (applying a Passenger Car Equivalent (PCE)) and the existing Quarry operations. As part of this exercise, TMIG will take into consideration the existing license for the Quarry, haulage time and days, extraction activities but also any internal haulage that might 'cross' any public roadway (as it would impact the boundary road network), material delivery to the quarry for processing/recycling and any regular passenger vehicle trips (e.g. employee trips). This information will be confirmed with the project team at the start of the study.

- As the Quarry has an unlimited extraction license, TMIG will consider the highest historical truck movements in and out of the site as part of the calculations for trip generation. TMIG will use historical data for the above operations characteristics and derive an appropriate trip generation based on peak activity to analyze a worst case scenario.

Per the above TMIG will derive a conservative trip generation rate to estimate the most conservative haulage volume for the quarry. These volumes will be added into the derived 2021 existing traffic volumes, from which we will subtract the haulage volumes surveyed on the day of the traffic counts, in order to derive conservative 2021 baseline traffic volumes. This ensures that the review of existing conditions (and subsequent future conditions) is the most conservative analysis with regards to the haulage volume.

5. Future Conditions

TMIG proposes a 5-year study horizon to 2026 to assess the impact of the proposed expansion.

As per the study horizon year, TMIG asks that the Region and Towns confirm the following:

- All planned roadways improvements to be implemented within the study area by 2026
- All background developments to be included as part of future conditions

The growth rates used to derive existing traffic volumes are proposed to be used to derive the baseline traffic growth to future conditions (to which we will add background development traffic). TMIG will consider truck rerouting as part of the new haulage route reviewed under future conditions.

6. Traffic Data Model Alternative:

In the absence of reliable traffic data and as an alternative to Tasks 3 and 5 above, TMIG proposes preparing a baseline future traffic model building upon previous TIS reports prepared for other developments within the study area. Specifically, TMIG suggests utilizing traffic data analyzed as part of the TIS prepared for the 'Emery' Milton Business Park located on the southwest corner of Dublin Line/James Snow Parkway at 5 Sideroad (roundabout). The 'Emery' TIS includes 2021 and 2026 future total traffic volumes at the proposed study intersections. TMIG will apply the same methodology detailed in Task 4 in order to substitute the haulage volume included in the 'Emery' TIS forecast to include the most conservative haulage volumes as per the Quarry operations. Following the substitution, the future total traffic volumes from the report would be used as part of the traffic operations review.

7. Trip Distribution and Assignment

The Trip Distribution and assignment for the haulage volume substitution and rerouting to the modified route under future conditions will be based on input from the project team.

8. Study Parameters

As part of this study, TMIG will assess traffic operations for the following conditions:

- 2021 Conservative Existing Conditions – which will include a conservative review of the haulage along the existing truck route
- 2026 Future Conditions – which will include the same conservative haulage (as it is not projected to change based on the proposed expansion) along the future truck route

TMIG will complete the traffic operations review using Synchro 10.0 and will complete a review of the projected queues at the turning movements impacted by the truck routes.

As part of the above noted methodology, TMIG also confirmed following in accordance with the JART comments provided for the proposed development:

- TMIG has confirmed with the project team that there are limited trucks registered as travelling from Milton to Brampton along 5 Sideroad. TMIG will consider mitigation measures to prevent this occurrence as applicable.
- TMIG will investigate the queuing issue on Dublin Line and 5 Sideroad during the AM quarry peak time. Based on correspondence with the project team we understand that these issues are very rare (approximately once per year) but do create operational constraint when they occur. As part of the TIS TMIG will derive remedial measures to prevent the queueing as applicable.
- Based on correspondence with the project team, TMIG understands that illegal parking does occur along 5 Sideroad on few instances throughout the year. It should be noted that queuing along the roadway has significantly reduced since the opening of the roundabout and the transition of the truck route to James Snow Parkway. However, Dufferin Aggregates is aware of this issue and does alert the applicable authorities to come and patrol the area when it occurs. Additionally, Dufferin Aggregates is in communication with trucking companies/truckers to prevent this illegal parking occurrence. As part of the study TMIG will detail all measures undertaken by Dufferin Aggregate to resolve the issue, which are deemed adequate. Additional measures will be recommended as part of the study as applicable.
- In addition to the traffic operations review, TMIG will complete a review of the truck site access design to confirm that all applicable sightline requirements and intersection design standards are met.

We hope that the above provided a detailed review of our proposed study methodology. We look forward the municipalities' review and feedback, as well as applicable information that we will require from them (i.e. historical traffic data, AADT data, planned roadway improvements and background developments).

Should you have any questions, please do not hesitate to contact us.
Thank you,

THE MUNICIPAL INFRASTRUCTURE GROUP LTD.
A T.Y. LIN INTERNATIONAL COMPANY



Nawfal Kammah, B.Eng., P.Eng.
Project Manager
nkammah@tmig.ca



Michael Dowdall, C.E.T., MITE
Team Lead
mdowdall@tmig.ca



RESPONSE TO PRE-CONSULTATION INQUIRIES

In addition to the traffic operations review completed as part of this study, TMIG completed a review of the JART inquiries put forth as part of the pre-consultation meeting dated November 12, 2020, and Terms of Reference Comments dated May 11, 2021. All inquiries have been listed below, along with an associated response.

Inquiry #1:

Review of the issue of heavy vehicles travelling on 5 Side Road from Milton quarry to Brampton and what mitigation measures can be implemented to avoid this.

Response:

Under existing conditions, 5 Sideroad terminates in a cul-de-sac east of Dublin Line and no longer intersects with Dublin Line / Campbellville Road. Accordingly, traffic to/from the quarry no longer has direct access to 5 Sideroad via Dublin Line.

Based on the haulage route provided by the project team (included in **Appendix B** of the study), truck traffic generated by the quarry has not been recorded travelling to 5 Sideroad. As such, it is TMIG's opinion that trucks are no longer travelling along 5 Sideroad since the changes to the Dublin Line intersection to Campbellville Road were implemented. As a further remedial measure, TMIG recommends that Dufferin Aggregates communicate with trucking companies/truckers to confirm that travel along 5 Sideroad should be prevented (unless when making a local delivery which does not represent the majority of trips generated by the Quarry).

Inquiry #2:

Review of ongoing queuing issues on Dublin Line and 5 Sideroad during the AM quarry peak time.

Response:

Since implementation of the roundabout, Dublin Line no longer has a direct connection to 5 Sideroad and any concerns regarding queuing on 5 Sideroad would no longer apply. Furthermore, queues projected at the Dublin Line intersection to James Snow Parkway during the 2026 future conditions are projected to be acceptable and would not encroach onto any adjacent intersection. This review was completed using the highest trip generation from the quarry. Accordingly, queues are projected to be further reduced from the projected length

derived as part of this study and are not projected to create concerns along James Snow Parkway.

Inquiry #3:

Mitigation measures to reduce illegal parking on 5 Sideroad.

Response:

As stated previously, trucks no longer travel along 5 Sideroad and would no longer park along the roadway.

Based on input from the project team, TMIG understands that illegal parking did occur along 5 Sideroad on few instances throughout the year. It should be noted that queuing along the boundary roadway has significantly reduced since the opening of the roundabout and the transition of the truck route to James Snow Parkway.

Dufferin Aggregates is aware of this issue and does alert the applicable authorities to come and patrol the area when it occurs. Additionally, Dufferin Aggregates is in communication with trucking companies/truckers to prevent this illegal parking occurrence. As “No Stopping” signs are already in place along James Snow Parkway east of the roundabout, TMIG is of the opinion that the measures implemented by Dufferin Aggregates are acceptable.

Inquiry #4:

Operational issues (i.e., dirt tracked on Dublin Line).

Response:

Based on input from the project team, TMIG understands that Dublin Line is being swept as required to remove any dirt from the pavement.

As the cleanliness of the roadway remains an issue, TMIG recommends that Dufferin Aggregates continue to organize street sweeps on an “as-needed” basis in order to keep the roadway clean, with sweeping frequency as often as daily should it be required to keep the roadway clear.

Inquiry #5:

Dublin Line and Main Access - operational review (i.e., collisions, sightlines).

Response:

Dublin Line is a relatively flat and straight roadway, with a posted speed limit of 60km/h. Based on the Transportation Association of Canada (TAC) Geometric Design Standards (2017), a stopping sight distance requirement of 130m is applicable to a design speed of 80km/h (assuming 20km/h over the posted speed

limit). Based on the vertical and horizontal curvature of the roadway (as reviewed based on aerial on street imagery), it is TMIG's opinion that the stopping sight distance requirement is met at the existing quarry access intersection.

Inquiry #6:

Safety review at the Dublin Line roundabout to James Snow Parkway and overall haul route.

Response:

The existing roundabout at Dublin Line and James Snow Parkway, as well as the roadway included within the existing and planned haul routes, have been designed and approved by Halton Region and its consultants to accommodate heavy truck movement along the roadway segments and intersections. For this reason, it is TMIG's understanding that no safety issues related to heavy truck movement would occur from a design standpoint.

It should be noted that under future conditions the haul route will be modified to include the planned Tremaine Road interchange. This interchange is located closer to the quarry lands compared to the Region Road 25 interchange currently utilized by trucks. Accordingly, the volume of heavy trucks travelling along the municipal roadway will reduce under future conditions which is anticipated to further reduce safety concerns along the roadways in question (i.e., James Snow Parkway and Regional Road 25) within the study area.

Inquiry #7:

Clarification on the use of the existing Sixth Line Nassagaweya access.

Response:

As confirmed with the project team, the Sixth Line Nassagaweya quarry access is currently being utilized by staff to enter and exit the premises. The access is projected to remain exclusive to staff use under future conditions, with staff trips not projected to change. Accordingly, operations at the existing staff access were not reviewed as no changes are projected to the traffic volume or distribution/assignment as part of the proposed quarry extension.

Inquiry #8:

Impacts on the Niagara Escarpment Natural Area.

Response:

The preferred haul route reviewed as part of the study does not encroach onto the Niagara Escarpment Natural Area, whereas haul route Option 2 partially would. Accordingly, the choice of Option 1 as the preferred alternative is further solidified.

APPENDIX G

Authors CV

Nawfal Kammah, B.Eng., P.Eng.

Project Manager

E nkammah@tmig.ca

EDUCATION

B.A.Sc., Civil Engineering, McGill
University, 2016

EMPLOYMENT HISTORY

2020 to Present, TMIG
2017 to 2020, WSP
2016 to 2017, C.F. Crozier &
Associates Inc.

Nawfal Kammah, P.Eng., is a Transportation Engineer with over 4 years of experience in the industry. He started his career after graduating from McGill University in 2016.

Nawfal has experience working on projects of all scales for the private and public sector. He gained most of his experience conducting Transportation Impact Studies, Site Plan Design and Circulation Reviews, Parking Studies, Internal Functional Design Studies and Transportation Demand Management (TDM) Plans. Nawfal is also involved in projects of larger scale including Transportation Master Plans, Corridor Studies and Integrated Multi-Modal Transportation Studies.

His typical project responsibilities include technical analysis, as well as project management tasks (i.e. proposals, client correspondence, budget tracking, meetings). Nawfal is experienced in Synchro, SimTraffic, AutoCAD, AutoTURN, and has some experience in Arcady.

Professional Experience

Transportation Studies

BALLYMORE HOMES

Tottenham Residential Subdivision Speed Review

As part of this project, TMIG provided advisory services to assess the adequacy of existing speed display sign placement and traffic control within a section of the existing subdivision and recommended remedial measures as applicable. Nawfal was the Principal Analyst for this project and he was responsible for the analysis and documentation of all findings for the study. He assessed adequacy of existing speed display signage based on a preliminary review of sightlines, recommended a relocation for the sign and confirmed the appropriate traffic control along the roadway based on traffic volumes.

ARCOVIT HOLDINGS INC. & FED PROPERTY MANAGEMENT LTD.

Westburne Drive GO Station Intersection Impacts

As part of this project, TMIG provided advisory services to identify the potential impacts of the planned GO Station signalized intersection to Westburne Drive on the traffic operations of the adjacent lands and provided remedial measures as applicable. Nawfal was the Principal Analyst and he was responsible for the review of all analysis completed for the proposed GO Station expansion, the identification of the potential impacts to the adjacent site operations and the provision of remedial measures to Metrolinx in order to reduce said impacts.

QUEENSVILLE PROPERTIES DEVELOPMENT CORPORATION

Queensville Phase 4 Development

Nawfal was the Project Manager and analyst for this project. TMIG completed a Transportation Study for the proposed Queensville Phase 4 Residential Subdivision located within the Town of East Gwillimbury. Nawfal was responsible for all project management items, including communication with the client and municipalities, managing the allocated budget and supervising staff input to each task. He was also responsible for the traffic operations review, road design review and deriving the associated remedial measures for the project.

LORMEL HOMES

Lormel Homes TIS – Vision Georgetown Lands

Nawfal was the Project Manager and Analyst for this project. TMIG completed a Transportation Study for the proposed Lormel Homes Mixed-Use Subdivision located within the Vision Georgetown Lands in Halton Hills. He was responsible for all project management items, including communication with the client and municipalities, managing the allocated budget and supervising staff input to each task. Also responsible for the traffic operations review, road design review and deriving the associated remedial measures for the project, as well as establishing Transportation Demand Management initiatives for the lands.

COUNTRY HOMES

Country Homes TIS – Vision Georgetown Lands

TMIG completed a Transportation Study for the proposed Country Homes Mixed-Use Subdivision located within the Vision Georgetown Lands in Halton Hills. Nawfal was the Project manager and Analyst for this project. He was responsible for all project management items, including communication with the client and municipalities, managing the allocated budget and supervising staff input to each task. Also responsible for the traffic operations review, road design review and deriving the associated remedial measures for the project, as well as establishing Transportation Demand Management initiatives for the lands.

ZZEN GROUP OF COMPANIES

Adidas Lands Rezoning Application, Vaughan

TMIG completed a traffic brief in support of the proposed mixed-use rezoning expansion to the Adidas Sports Complex lands, in the City of Vaughan. As the Project Manager & Analyst, Nawfal was responsible for managing the project as well as completing the technical analysis and associated traffic brief. Provided support to the rezoning application by reviewing the previously proposed uses to the site and completing a comparative analysis to the proposed uses.

PRINCE EDWARD SQUARE INC

Tim Horton's Development at 5503 Highway 62

Nawfal was the Traffic Analyst for this project. He was responsible for the completion of the Traffic Impact Study for the proposed development.

DANCOR CONSTRUCTION

21 Coventry Road

As the Traffic Analyst for this project, Nawfal was responsible for the completion of the Traffic Impact Study for the proposed school development.

SUN LIFE ASSURANCE COMPANY OF CANADA

209 King Street South

Nawfal was the Traffic Analyst for this project. He was responsible for the completion of the Traffic Impact Study for a proposed residential development located along the new LRT line.

OLIVE GROVE SCHOOL

2270 Speakman Drive

Nawfal was the Traffic Analyst for this project and he was responsible for the completion of the Traffic Impact Study for the proposed school development.

VALOUR MANAGEMENT INC

110 Bronte Street South

Nawfal was the Traffic Analyst for this project and he was responsible for the completion of the Traffic Impact Study for a proposed residential development.

H&W DEVELOPMENTS CORPORATION

New World Development-Hwy 7 at Warden Avenue

Nawfal was responsible for the completion of a Transportation Study (including traffic operations assessment, parking supply review, site plan review, TDM plan and multi-modal level of service analysis) for a proposed mixed-use residential and commercial development. He was the Traffic Analyst on this project.

THE REMINGTON GROUP

Downtown Markham Building HS2

Nawfal was the Traffic Analyst. He was responsible for the completion of a Transportation Study (including traffic operations assessment, parking supply review, site plan review, TDM plan and multi-modal level of service analysis) for a proposed mixed-use residential and commercial development.

2353662 ONTARIO LIMITED

250 Rossland Road

Traffic Analyst for this project. Responsible for the completion of a Transportation Study (including traffic operations assessment, parking supply review, site plan review and TDM plan) for a proposed commercial development.

2353662 ONTARIO LIMITED

650 Beck Crescent

As the Traffic Analyst, he was responsible for the completion of a Transportation Study (including traffic operations assessment, parking supply review, site plan

Professional Experience

review and TDM plan) for a proposed commercial development.

YORK REGION DISTRICT SCHOOL BOARD

E. J. Sand Public School

Nawfal was the Traffic Analyst for this project. He was responsible for the completion of a Transportation Study including traffic operations assessment (for both roadway and school peak hours), parking supply review (including Pick-up/Drop-Off activities), site plan review and recommendation of TDM initiatives for a proposed school development.

BROOKFIELD HOMES

1846 & 1900 Brock Street

Nawfal was the traffic Analyst. He was responsible for the completion of the Response to Regional and Municipal comments related to the proposed mixed-use development Traffic Impact Study (including traffic, parking, TDM plan and sightline analyses).

BENTALL KENNEDY LP

Lazy Pat Farm

Nawfal was the Traffic Analyst responsible for completing the updated Transportation Study for the Lazy Pat Farm development, included within the 407 Employment lands in North Oakville. The tasks completed as part of this project included traffic operations analysis and recommendations for internal intersection configuration

ICON ARCHITECTS INC.

35 Kings Crescent Salvation Army

As the Traffic Analyst, Nawfal was responsible for completing the transportation study for the proposed development (including traffic operations assessment, parking supply review, site plan review and TDM plan).

PYXIS REAL ESTATE EQUITIES INC.

2577-2579-2581 Yonge Street

Traffic Analyst for this project. He was responsible for completing the transportation study for the proposed residential development, (including traffic operations assessment, parking supply review, site plan review and TDM plan).

1042710 ONTARIO LIMITED

3300 Highway 7

Nawfal was the project coordinator and Traffic Analyst for this project. He was responsible for completing the transportation study for the proposed mixed-use development, which included a traffic operations analysis along the planned roadway network, a detailed parking justification tailored to the Vaughan Metropolitan Centre area, and a site plan review

MON SHEONG FOUNDATION

162 & 176 Sandiford Drive

Traffic Analyst. Responsible for the completion of a Transportation Impact Study (including traffic operations review, site plan review, parking justification, multi-modal analysis and TDM plan) for the proposed development.

MASONGSONG ASSOCIATED ENGINEERING LIMITED

10288- 12724 Tenth Line

Nawfal was the Traffic Analyst. He was responsible for the completion of a Transportation Impact Study (including traffic operations review, site plan review, parking justification, multi-modal analysis and TDM plan) for both proposed parcels of the residential development

VERMILLION DEVELOPMENTS INC

15516 Leslie Street

Traffic Analyst. Responsible for the completion of a Transportation Impact Study (including traffic operations review, site plan review, parking justification, multi-modal analysis and TDM plan) for the proposed residential.

METROPIA (ENTERPRISE) LIMITED PARTNERSHIP

Metropia Development

Nawfal was the Traffic Analyst. He was responsible for the traffic forecasted along the study intersections for three horizon years based on corridor growth and extensive background development traffic.

EMPIRE COMMUNITIES

401 Canal Bank Street Draft Plan of Subdivision

Traffic Analyst and responsible for the transportation study for two proposed subdivisions considering two roadway scenarios based on federal funding, as well as a review of the proposed subdivision roadway design.

MATTAMY HOMES HIGH RISE

26-38 Hounslow Avenue

Nawfal was the Traffic Analyst. He was responsible for the completion of the transportation study for the proposed residential development (including traffic assessment, parking supply review, site plan design review, TDM plan, as well as review of potential improvements to the public realm).

LOYALIST TOWNSHIP

Loyalist East Business Park

Traffic Analyst. Responsible for the preliminary review of traffic at the internal business park intersection to derive traffic control measures.

EMPIRE COMMUNITIES

Dain City Draft plan of Subdivision

Traffic Analyst. Responsible for the completion of the traffic operations review, as well as site plan review, for the proposed draft plan of subdivision. Analysis completed for two scenarios over 3 horizon years.

Environmental Assessments and Area-wide Transportation Studies

TOWN OF LINCOLN

Town of Lincoln TMP

Traffic Analyst. Assisted with data review, traffic operations analysis, transit review, existing and future deficiencies and recommendation of geometric improvements.

CITY OF WATERLOO

Integrated Multi-Modal Transportation Study

Traffic Analyst. Assisted with data review, future traffic forecasts using EMME modelling output, traffic operations analysis, existing and future deficiencies and recommendation of geometric improvements.

CITY OF WATERLOO

Erbville South Block Plan

Traffic Analyst. Completed a review of the existing and projected traffic within the study area based on potential block density and access points in order to derive the impacts of the proposed block plan and all applicable remedial measures.

Professional Experience

Public and City input were considered when deriving the proposed development components.

CITY OF MARKHAM

Yorktech Drive Extension EA

Traffic Analyst. Completed a review of the projected traffic operations along the Highway 407 off-ramp intersections to Warden Avenue in order to quantify the impacts of the proposed Yorktech Drive extension within the study area. Traffic volumes were derived based on the Region's EMME traffic model.

TOWN OF NEWMARKET

Cane Parkway Environmental Assessment

Traffic Analyst. This project involved the completion of a traffic operations review along the corridor for existing and future conditions in order to derive a potential change to the roadway cross-section and identify any impacts associated with the Town Hall site access relocation.

COUNTY OF ESSEX

County Road 22 Alternatives and Strategies Study

Nawfal was the project coordinator for this project. He was in charge of assisting with coordination for the corridor study for a section of County Road 22 within the County of Essex, aimed at deriving a preferred cross-section for the roadway as a more complete and vibrant street supporting growth within the area.

ONTARIO POWER GENERATION

OPG Darlington New Nuclear Plant

As the traffic analyst, he was responsible for the completion of a transportation study forecasting traffic over a 20-year horizon in order to maintain licensing for the new nuclear facility. Four horizon years were assessed, accounting for the planned Clarington Energy Campus, the existing plant refurbishment as well as the proposed plant implementation. The analysis encompassed a network of 26 intersections and included a review of local growth as well as the Region's model.

TOWN OF MILTON

Milton Education Village Secondary Plan

Traffic Analyst. Responsible for the completion of a transportation study for the Milton Education Village, which includes the proposed Laurier University Campus and surrounding mixed-use developments, using the Region's EMME model

Internal Functional Traffic Design Study

FOREST BAY HOMES

Fair Tree Developments Block 150 & 153

Traffic Analyst. Responsible for the completion of an IFTDS including traffic operations assessment of future conditions, as well as a detailed site plan review of the proposed residential subdivision roadway design and the provision of a signage plan.

Stand Alone Parking Studies

ZION ALLIANCE CHURCH

Zion Church Expansion

As the Analyst, he was responsible for the completion of a Parking Study to justify a parking reduction associated with a proposed church expansion.

VALOUR MANAGEMENT INC.

70 Pine Street

As the Analyst, he was responsible for the completion of a Parking Justification Study for a proposed low-rise residential building.

SUN LIFE ASSURANCE COMPANY OF CANADA

209 King Street South

As the Analyst he was responsible for the completion of a Parking Justification Study for a proposed residential development located along the future LRT line.

GENESIS HOMES

Dougall Avenue at Kennedy Road Development

As the Analyst, he was responsible for the site plan and parking supply review for the proposed mixed-use development, which included the use of the shared parking analysis.

GARDEN COMMERCIAL (NEWMARKET) INC.

Mixed-Use Commercial Plaza at Bayview Avenue and Stonehaven Avenue

As the Analyst, Nawfal reviewed parking supply requirement for approved land uses within the plaza, and completed an updated review of the proposed parking supply for various development alternatives.

Stand Alone Site Circulation Review

ELLIS DON

OPP Modernization Phase 2

As the Analyst, he was responsible for the completion of a site circulation review based on municipal design standards, as well as AutoTURN simulations using passenger vehicles and other specialized vehicles for the proposed OPP sites..

SZETO ARCHITECTS

15385-15395 Bayview Avenue

As the Analyst, he was responsible for the review of the proposed site access design, review of vehicle circulation and the provision of a pavement marking and signage plan submitted as part of a traffic entrance analysis addendum. This study also included a review of the proposed parking supply and the recommendations of appropriate TDM initiatives.

YORK REGION DISTRICT SCHOOL BOARD

Bill Crothers Secondary School

As the Analyst, Nawfal was responsible for the review of existing site circulation operations using Pick-up/Drop-off (PUDO), queueing and parking surveys. Provide recommendations to improve the existing school PUDO operations, as well as geometric design changes to the existing driving aisles and parking area. Additionally, TDM initiatives were recommended to reduce the traffic volume within the site.

Stand Alone Transportation Demand Management Plan

PANTHEON GROUP & ELGIN MILLS CONSTRUCTION INC.

Cathedral Town Residential Developments

As the Analyst, Nawfal was responsible for the completion of a TDM Plan for a proposed residential development, including the detail of existing and planned active transportation and transit facilities as well as recommendations for the site.

Professional Experience

Affiliations

- Professional Engineers of Ontario

Training

- AODA Customer Service Training, 2020
- Workplace Violence and Harassment Training (Bills 168 and 132), 2020
- COVID-19 Training, 2020
- AODA Understanding Human Rights, 2020
- WHMIS, 2020
- Worker Health and Safety in 4 Steps, 2020
- Confined Space Awareness, 2011



Michael Dowdall, C.E.T., MITE

Project Manager

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EDUCATION

Advanced Diploma in Transportation
Engineering Technology, Mohawk
College, 2010

EMPLOYMENT HISTORY

2016 to Present, TMIG
2012 to 2016, GHD Inc.
2007 to 2012, Transtech (The Sernas
Group Inc.)

Michael is a Project Manager at TMIG with extensive experience in all aspects of the transportation planning field at the municipal, regional, and provincial level. He has significant experience using AutoCAD and Microstation for the functional design of roadways and site accesses, traffic management implementation plans, and construction management plans. Michael's project experience includes the identification and mitigation of traffic impacts for land development, preparation of conceptual roadway / highway layouts, site access schemes, internal circulation systems, queuing studies, and parking needs reviews. His key public sector experience includes traffic calming, secondary plan road network assessments, and urban / suburban parking studies. This experience enables Michael to prepare thorough and informed transportation studies in support of development applications.

Professional Experience

Transportation Planning

TOWN OF EAST GWILLIMBURY

Green Lane MESP

Examined and assessed the operational impacts of trips generated by the Green Lane Secondary Plan area in the context of the broader area transportation demands. Created a micro-analysis traffic operations model using Synchro and tested the major intersections for Level (Quality) of Service, volume to capacity ratios, delay, and queuing. Tested the reasonableness and ability of the planned internal and external road system to accommodate future traffic. In concert with the traffic operations assessment, developed a series of transportation system plans in coordination with the Region's Transportation Master Plan and other relevant documents. Developed a comprehensive strategy to highlight the features and opportunities of the GLSP study area in efforts to encourage a shift away from SOV travel.

MILTON PHASE II LANDOWNERS GROUP

Sherwood Survey

Traffic Analyst for this urban expansion, which is predominately on the west side of Milton, and is under construction with a planned future population of 45,000.

MILTON PHASE III LANDOWNERS GROUP

Boyne Survey Roads Needs Assessment

The Boyne Survey Secondary Plan Area is located in the Milton Urban Expansion Area, south of the existing Bristol Survey and Sherwood Survey Secondary Plan Areas. This urban expansion is under construction with a planned future population of 50,000. Michael analyzed the traffic conditions for full build-out and identified the interim and ultimate intersection improvements required to accommodate development based on the scheduled capital works phasing. The Town adopted this study as a basis for all future development within the Boyne Secondary Plan.

MILTON PHASE IIII LANDOWNERS GROUP

South Milton Urban Expansion Area

Provide advisory transportation planning / engineering services for the Landowners Group of the South Milton Urban Expansion Area (established through the passing of Regional Official Plan Amendment 38), and of the ongoing and future Transportation Planning assignments and Capital Works projects that will directly affect these lands and the broader development of Milton.

CITY OF TORONTO

Crosslinx Eglinton LRT Traffic and Transit Management Plan

Provided traffic analysis and traffic management plans for Segment 2 of the Eglinton LRT project, consisting of five separate Eglinton LRT stations each requiring the use of Synchro analysis software and OTM Book 7 to prepare traffic management plans for each stage of construction and recommend measures to maintain existing capacity along Eglinton Avenue during construction.

TOWN OF RICHMOND HILL

North Leslie West Residential Subdivisions

Michael completed a traffic impact study for the Raki Holdings Inc., Richview 19 Holdings Inc., and Autumnhill Investment Ltd. Draft Plans within the North Leslie West Secondary Plan consistent with their conditions of approval and the North Leslie MESP. Michael calculated trip generation of the three proposed subdivisions and documented the internal road network elements and external arterial access points to ensure the traffic generated by the three subject subdivisions can be accommodated by the network. Traffic Management Implementation Plans

and Transportation Demand Management components were included to accommodate other modes of transportation.

TOWNSHIP OF RAMARA

Fowler Construction Fleming Quarry

Project Manager for the traffic impact study assessing the extent of traffic-related impacts on the abutting roadway system generated by Fowler's proposed application for an extraction area boundary increase at Fleming Quarry, located in the northeast quadrant of Switch Road and Rama Road in the Township of Ramara, County of Simcoe. 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 and analyze future operating conditions for the study intersections at a future 2022 and 2027 planning horizon, and determine what, if any, traffic impacts there are on the study area haul route from the proposed quarry extension.

CITY OF BRAMPTON

Chinquacousy Farm Residential Subdivision

Transportation Analyst responsible for the preparation of a traffic impact study and completion of an extensive analysis of future traffic conditions for the development of a 540-unit residential subdivision that satisfied MTO's requirements at the ramp terminals.

TOWN OF OAKVILLE

Green Ginger Residential Subdivision

Completed a traffic impact study for Draft Plan approval of a 2,000-unit residential subdivision. Examined the future capacity and operations of the adjacent regional road network and prepared a Transit Facilities Plan consistent with the Town's transit plan.

CITY OF TORONTO

1100 Caledonia Road Commercial Redevelopment

Analyzed the existing and future traffic volumes on the adjacent road network for the redevelopment of an existing commercial building. Recommended roadway improvements and completed functional design drawings for the sections of roadway to be improved.

TOWN OF MILTON

Traffic Control Plans

Prepared traffic control plans for a variety of residential subdivisions within the Sherwood and Boyne Survey Secondary Plans. The subdivisions included Mattamy Church Lands Neighbourhood, Willmott Neighbourhood Phase 1 & 2, Capozzi Neighbourhood Phase 2A, and Milton Main Street Homes.

TOWN OF BOWMANVILLE

Brookhill Neighbourhood Residential Subdivision

Completed a traffic impact study for Draft Plan approval of a 1,500-unit residential subdivision in the Municipality of Clarington. Analysis included extensive redistribution of traffic, multiple road and development phasing, and intersection functional design.

Environmental Assessments

PEEL REGION

Burnhamthorpe Road Watermain Twinning EA and Preliminary Design

Analyzed the existing and future traffic volumes on the adjacent road network along the new Burnhamthorpe Road watermain route, including Webb Drive. Also

Professional Experience

provided a preliminary summary of the traffic impact at key intersections based on the conceptual construction staging in compliance with OTM Book 7.

CITY OF KITCHENER

Huron Road Environmental Assessment

Traffic Analyst who evaluated the existing conditions along the Huron Road Corridor by adhering to the phasing requirements of the Class EA process. Transportation analysis defined problems / opportunities and a preferred road improvement alternative solution. Michael built upon these requirements to meet the needs of the City by developing a system integrating all modes of travel while providing a safe and efficient road network for the movement of both people and goods within and through this area of the City. The transportation planning approach to this study will be multidimensional and recognize the current and projected functions of Huron Road.

PEEL REGION

Cawthra Road Watermain Installation

Designer for the construction staging of the proposed 1,500mm Mississauga City Centre (MCC) watermain. Prepared detailed design traffic management plans involving lane closures that were required for the installation of MCC and local watermain on Cawthra Road between Rathburn Road and Burnhamthorpe Road.

NAC CONSTRUCTORS LTD.

Britannia Road Watermain Installation

Designer for the construction staging of the proposed watermain. Prepared detailed design traffic plans, involving partial lane shifts required for the installation of MH2 and MH2A shaft sites on Britannia Road.

Urban Redevelopment

CITY OF TORONTO

Build Toronto Kingston-Dale Residential Development

Examined the traffic impacts from the proposed development and considered the City's Traffic Demand Management Strategies and parking requirements for the site. The study included a loading study as per City guidelines confirming the site's internal circulation system's ability to accommodate the manoeuvrability of passenger cars and expected delivery / emergency vehicles. Prepared a functional / conceptual design of Dale Avenue based on traffic analysis results including lane geometry, pavement markings, traffic control measures, and signage.

CITY OF TORONTO

871-899 College Street Condominium

Assessed the traffic impacts of an eight-storey condominium building, including ground floor commercial. The consolidated deliverables included loading, parking, and traffic operations studies required for the application. Provided a Transportation Demand Management plan for the site to reduce the dependency on single occupant vehicle trips and promote a shift to Transit and/or Active Transportation modes. Investigated the appropriateness of the proposed parking supply to accommodate the future demands of the development.

CITY OF TORONTO

Laird and Wicksteed Commercial Redevelopment

Developed a detailed traffic model for a commercial redevelopment in the Leaside Community of Toronto. Synchro traffic model confirmed the future development can be accommodated on the adjacent road network and subsequently approved by the City of Toronto.

CITY OF TORONTO

Sheppard Avenue Condominiums

Assessed traffic impacts of two nine-storey condos, including ground floor commercial, and prepared traffic impact studies satisfying City requirements.

TOWN OF OAKVILLE

70 Old Mill Road Mixed-Use Development

Developed a pedestrian circulation plan and assessed the traffic impact of a proposed mixed-use development. The traffic model included existing and future traffic generated from the new Oakville GO parking lot expansion and reviewed the operational and capacity restraints in the Cornwall Road corridor.

CITY OF MISSISSAUGA

6789 Airport Road Restaurant Development

Analyzed the future traffic volumes on the adjacent road network for the redevelopment of an existing warehouse building. Derived an appropriate parking demand for the build-out site and provided an opinion as to the suitability of the proposed parking supply in comparison to the minimum parking requirement. Prepared a functional design of the right-in / right-out access on Airport Road based on Peel Region engineering standards.

CITY OF MISSISSAUGA

Dixie Crossing Commercial Development

Examined the future traffic volumes generated by the commercial development and prepared a traffic impact study. With Peel Region's cooperation, a design was agreed upon for the site access onto Dixie Road. The study concluded that traffic generated by the proposed 53,693 sq ft of retail and restaurant GFA can be accommodated by the adjacent street system with the implementation of recommended access improvements.

Functional Design

- Highway 9 and First Line Localized Widening Design, Town of Mono
- Derry / Scott Commercial Access Design, Town of Milton
- William Allen Road Commercial Access Design, City of Toronto
- Caledon-King Townline Residential, Town of Caledon
- Intersection Design, Town of Caledon
- 7150 Edwards Boulevard Parking Lot Layout, City of Mississauga
- Richmond Hill GO Access Design, City of Vaughan
- Rotherglen School Parking Layout, Town of Oakville
- Steeles and Financial Drive Access Design, City of Brampton

Parking Studies

- Shingar Banquet Hall, City of Brampton
- Woodland Court Commercial, Town of Richmond Hill
- Oakville Entertainment Centre, Town of Oakville
- Meadowvale Christian Academy, City of Mississauga
- Trafalgar Sports Park, Town of Milton
- Rotherglen School, Town of Oakville
- Chinguacousy Road Commercial, City of Brampton
- 2441 Finch Residential, City of Toronto

Professional Experience

- Eitz Chaim Synagogue, City of Toronto
- Faith of Life Place of Worship, City of Mississauga
- Oakleaf Academy, Town of Oakville
- Orchard Gardens Market, City of Mississauga
- Four Seasons Garden Condominium, Town of Richmond Hill
- Electric Building Condominiums, City of Toronto

Affiliations

- Ontario Association of Certified Technicians and Technologists (OACETT)
- Institute of Transportation Engineers (ITE)
- Transportation Association of Canada

Training

- WHMIS 2015 Training, 2016
- AODA Understanding Human Rights, 2016
- AODA Customer Service Training, 2016
- Supervisor Health and Safety Awareness in 5 Steps, 2016
- Workplace Violence and Harassment Training (Bills 168 and 132), 2016