Proposed Milton Quarry East Extension
JART COMMENT SUMMARY TABLE – Traffic

Please accept the following as feedback from the Milton Quarry Joint Agency Review Team (JART). Fully addressing each comment below will help expedite the potential for resolutions of the consolidated JART objections and individual agency objections. **Additional, new comments may be provided once a response has been prepared to the comments raised below and additional information provided**.

	JART Comments (August 2022)	Reference	Source of Comment	Applicant Response (December 2022)	JART Response
Report/Date: Traffic Impact Study/ Haul Route Assessment October 2021			**Author: The Municipality Infrastructure Group**		
1.	It is unclear if MTO or other jurisdictions were consulted prior to the preparation of the Traffic Study. If they were, consultation correspondence should be provided.		Town of Milton	Halton Region, Town of Milton, and Town of Halton Hills were consulted prior to the preparation of the Traffic Study. The subject lands are located beyond MTO's permit control area. TYLin will circulate MTO a copy of the Traffic Impact Assessment, but does not anticipate any response or comments since it is not within their permit control area.	
2.	The intersection of No. 5 Sideroad at James Snow Parkway should be analyzed.		Town of Milton	As noted in the TIS, 5 Side Road is not part of the haul route and therefore it is TYLin's opinion that this intersection does not warrant further assessment.	
3.	Future horizon/analysis should be reanalyzed with a peak hour factor of 1.00 for the Town of Milton owned Roads.		Town of Milton	Noted. However, it was decided to maintain the existing peak hour factors in order to maintain a more conservative analysis.	
4.	A figure should be provided showing the net increase in the quarry trips on the road network as a result of this expansion.		Town of Milton	There will be no net increase in the number of quarry trips due to the extension, therefore no figure is shown.	

5.	Has Dufferin reached out to MTO for feedback on the proposal and proposed haul routes?		Halton Region	No, the subject lands are located beyond MTO's permit control area. TYLin will circulate MTO a copy of the Traffic Impact Assessment, but does not anticipate any response or comments since it is not within their permit control area.	
6.	The TIS was to have reviewed 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. The Town has confirmed that the presence of heavy vehicles are cutting through the new 5 side road, to/from Trafalgar Road. Please identify mitigation measures, i.e.. Truck Monitoring Station, to eliminate cut through heavy trucks.		Town of Halton Hills	It is our understanding based on discussions with Dufferin, that this is an infrequent event and 5 Side Road permits truck traffic. Furthermore, Dufferin has a close working relationship with the Town of Halton Hills Public Works Department and if an issue is identified, Dufferin works closely with Town Staff to resolve the issue. Also, as mentioned in Item 13, it is suggested a traffic group be established to encourage ongoing liaison between the municipalities and Dufferin. Furthermore, Dufferin agrees to install a sign at the entrance/exit on Dublin Line instructing drivers not to use 5 Side Road except for local delivery. This issue is further discussed by the peer reviewer in Comment #26 and CIMA+ was satisfied that this has been addressed.	
7.	The TIS was to have reviewed ongoing queuing issues on Dublin Line and 5 Side Road during the A.M. quarry peak time. Field review of existing conditions should be incorporated into the report to describe the real-time operations.		Town of Halton Hills	Dufferin has existing protocols in place in the event of queueing, and will arrange a meeting with the Halton Hills Director of Public Works to discuss further and ensure the existing measures are sufficient. Also, as mentioned in Item 13, it is suggested a traffic group be established to encourage ongoing liaison between the municipalities and Dufferin. This issue is further discussed by the peer reviewer in Comment #27 and CIMA+ was satisfied that this has been addressed.	
8.	The TIS was to have reviewed mitigation measures to reduce Illegal parking on 5 Side Road. Additional discussions with The Town of Halton Hills and the applicant/owner and TIS consultant is required on this to remedy any parking issues.		Town of Halton Hills	Please also see response to Items 6 and 7 above.	

9.	The TIS was to have evaluated existing and/or proposed haul routes for the existing and future road network (i.e., Hwy 401/Tremaine interchange). The Town would like to have a Haul Route agreement, and options provided to mitigate 5 Side Road (not limiting a Truck Monitoring Station i.e., similar to Maple Avenue).		Town of Halton Hills	Future haul routes were discussed in Section 5.3 of the TIS. Regarding a haul route agreement, the situation at 5 Side Road is quite different than the situation at Maple Avenue. Furthermore, it is noted that 5 Side Road is a truck route and is already used by non-site related trucks due to the proximity of the Milton 401 Industrial Business Park. Please also see responses to Items 6 and 7 above.	
10.	Halton Hills is concerned with operational issues (i.e., dirt tracked on Dublin Line). Add the condition for sweeping and cleaning frequency into the ARA site plan/agreement.		Town of Halton Hills	Dufferin currently, and will continue to, operate with a Sweeping Plan in place. Additionally, monitoring of operations and establishment of the liaison team will assist with resolving these issues. This is not appropriate for inclusion on an ARA site plan as it deals with lands outside of the Licence boundary.	
11.	Update the TIS pertaining to the Dublin Line access pertaining to operational review (i.e., collisions, sightlines). Provide a figure with an aerial, confirming sightlines are met.		Town of Halton Hills	This was addressed in TYLin's Safety letter and Sightline Memo dated March, 2022, and July 2022 respectively (Attachments #1 & 2).	
12.	The proponent shall consult with Halton's Transportation Planning prior to preparing the revised version of the TIS in order to confirm methodologies and assumptions for existing traffic data use and future volume forecasts in the study area.		Halton Region	Halton Region was consulted during the pre-consultation / Terms of Reference stage where methodologies and assumptions for existing traffic data use and future volume forecasts in the study area were agreed upon.	
CIMA Original Recommendation					
13.	The following comment was made on the Impact of Haul Route on Multiple Municipalities about the impacts to the road network should be coordinated between the municipalities, due to the haul route crossing municipal boundaries. **This has not been addressed:** No mention in the report about how coordination between the various stakeholders will occur.		CIMA+	To address this comment, Dufferin commits to adding the following requirement to the ARA site plans for the proposed extension: "The Licencee shall invite the Region of Halton, the Town of Halton Hills, and Town of Milton to an annual meeting to discuss and address any truck traffic concerns including, but not limited to, the use of 5 Side Road, off-site queuing, and street sweeping on Dublin Line."	

14.	The following comment was made on the Study Area Intersections about how it should include No. 5 Sideroad at James Snow Parkway (signalized) intersection and the stop-controlled quarry site access on Dublin Line, and 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. **This has been partially addressed:** Section 2.2-Study Intersections discussed reason for the omission of No. 5 Sideroad at James Snow Parkway (signalized) intersection **This has been addressed:** Section 5.3 discussed future haul route option 1 and 2. Neither option used Sixth Line Nassagaweya access. • Pre-consultation response #7 states that 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.		CIMA+	As noted in the TIS and in the responses to Items 2 and 6 above, 5 Side Road is not part of the haul route and therefore it is TYLin's opinion that this intersection does not warrant further assessment.	
15.	The following comments were made on the future roadway network on how 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. Study scope includes 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. **This has been addressed:** Figure 5-1 illustrates both future haul route options. It includes the modified haul route along the Tremaine Road realignment and new Highway 401 interchange. Report does not mention circulating the report to the MTO for review.		CIMA+	Noted.	
16.	The following comments were made on Future Conditions on how it should include a comparative analysis of the existing and future haul routes, 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, and provide justification and demonstrate that the proposed modified haul route is feasible from a traffic operations perspective **This has not been addressed:** • Report does not conduct a comparative analysis of the existing and future haul routes. The existing haul was examined under 2021 existing conditions. • In Section 5.3 Future Haul Route Option 1 is the preferred option, as it does not encroach on the Niagara Escarpment Natural Area among other issues such as reduced distances and noise pollution; therefore, it was the only studied haul route in the future scenarios. **This has been addressed:** Future haul route option 1 is expected to operate well under 2026 future total conditions. Section 8.2 summaries intersection operational results.		CIMA+	TYLin has reviewed traffic operations analysis of the scenario in which the existing haul route is maintained under future conditions, as part of a comparative future analysis. The results of the analysis are presented in Tables 1 and 2 (Attachments #3 and #4), compared to operations using the future haul route; Arcady was used for roundabout analysis, and Synchro was used for all other intersections. Synchro and Arcady reports outputs are included in Attachment #5. Under both existing and future haul routes, all study area intersections are operating well within capacity and acceptable delays during the AM peak hour as shown in Table 1 (Attachment #3). Overall, intersections are operating with LOS D or better. Critical movements included the eastbound through movement at Regional Road 25 / Highway 401 Eastbound Off-Ramp with a LOS E. While this	

				movement experiences an LOS E, its v/c ratio is 0.94, indicating reserve capacity remains. It should be noted that additional lane improvements are expected at the Highway 401 off-ramps; both improvements are expected to improve the capacity issues and operations at this interchange in the future. Under both existing and future haul routes, all study area intersections are operating well within capacity and acceptable delays during the PM peak hour as shown in Table 2 (Attachment #4). Overall intersections are operating with LOS D or better. Critical movements include the eastbound through movement at Regional Road 25 / James Snow Parkway with an LOS E. While this movement experiences an LOS E, its maximum v/c ratio is 0.46, indicating reserve capacity. Additionally, the southbound approach of the Dublin Line is projected to operate at LOS E under both the existing and future haul routes. As noted in the TIS, 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 for both haul routes during the PM peak hour is below 40 seconds per vehicle, with operations below capacity, which is considered acceptable. When the existing and proposed future haul route operations are compared against each other under future conditions, operations including v/c ratios and LOS are largely similar in both the AM and PM peak hours. In both peak hours, the future haul route is expected to have minor increases in delay at the roundabout. In the AM peak hour, increased v/c ratios are noted at the 401 Westbound Tremaine Road offramp with corresponding increase in delay; however, the LOS remains the same. As well in the AM peak hour, the intersection of James Snow Parkway at Regional Road 25 is expected to improve from LOS C to LOS B in the AM peak hour, largely due to the reassignment of truck traffic from the intersection to the Tremaine Road interchange. Beyond these minor differences, future operations under either haul route are expected to be similar and acceptable. TYLin	

				continues to support the future proposed haul route, however, as the diversion of trucks to the Tremaine Road interchange will lessen the amount of truck traffic on regional/local roads, and also reduce the distance travelled on regional/local roads leading to reduced fuel consumption and travel times for drivers.	
17.	The following comments were made on Trip Distribution and Assignment on how it should indicate what are the intended trip distribution assumptions (e.g. truck routes data collected from Dufferin Aggregate - Milton Quarry) **This has been partially addressed:** No trip distribution assumptions were made. Section 3 states that TMIG utilized historical haulage data provided by the project team from 2020 as well as existing truck assignment along the haulage route. Section 5.4 discusses the use of the MRC study for directional distribution at the future Tremaine interchange.		CIMA+	No trip assumptions were made because of the use of historical haulage data to provide actual assignment. Explanation of the future haul route assumptions (from the MRC study) was provided in Section 5.4 of the TIS dated October 2021.	
18.	The following comments were made on Study Parameters: • Discusses a review of the projected queues at the turning movements impacted by the truck routes; • 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. **This has not been addressed:** • No review of the projected queues at the turning movements impacted by the truck routes (due to some study area intersection queue analysis not done). • Section 6.1 indicates that the trip assignment to JSP @ RR25 and RR25 @ HWY 401 are negligible; therefore no assessment was done. **This has been partially addressed:** • Study area intersections including RR25 @ JSP, RR25 @ HWY 401 WB off-ramp and RR25 @ HWY 401 EB off-ramps were not assessed. • Arcady is used for assessing the roundabout at Dublin Line / Tremaine Roadat James Snow Parkway / Campbellville Road and the longest reported 95th percentile queue is 36 m. • SimTraffic was used for assessing the queues at Tremaine Road at Highway 401 Eastbound and Westbound Off-Ramps. The 95th percentile queues are all less than available storage.		CIMA+	SimTraffic Queuing report outputs have been included in Attachment #5. Under the existing haul route, all movements operate with acceptable 95th percentile queues during the AM and PM peak hours as shown in Table 3 (Attachment #6), with the exception of the northbound left movement at Regional Road 25 / James Snow Parkway. Although the 95th percentile queue length for this movement exceeds the available storage by 34 metres, this is not anticipated to occur regularly and the majority of the queue will be accommodated within the effective taper. Notably, the 50th percentile queue is only expected to exceed the available storage by less than one car length, and is expected to be accommodated within the effective taper. Additionally, the 95th percentile queue for the westbound right movement at the same intersection is expected to exceed the available storage by 11 metres, but can be accommodated in the effective lane taper. Under the future haul route, the 95th percentile queue for the northbound left movement at Regional Road 25 / James Snow Parkway is expected to continue to exceed the available storage but significantly less than compared to the existing haul route (13 metres) as shown in Table 3 (Attachment #6). This is likely due to the reassignment of site traffic to the Tremaine Road intersection. The 50th percentile queue	

				is not expected to exceed the available storage under the future haul route scenario. As in the existing haul route, the 95th percentile queue for the westbound right movement is expected to exceed the available storage (by 14 metres) and accommodated in the effective lane taper. The eastbound left movement at the Regional Road 25 / Highway 401 Eastbound Off-ramp exceeds the available storage by 2 to 4 car lengths in the AM peak hour for both the existing and future haul routes. However, this is expected to be resolved with the extension of the left-turn lane to the mainline with the proposed Highway 401 improvements, effectively increasing the storage length from 130 to 470 metres and resulting in no queuing concern for this movement in the future. The above noted 95th percentile queues projected at the roundabout as shown in Table 4 (Attachment #7) do not encroach onto any adjacent intersection. Accordingly, TYLin does not foresee any queuing concerns at the roundabout and expects queues to be lower during a typical day when the quarry trip generation is reduced compared to this conservative site trip forecast scenario. Overall, it is projected neither the existing nor the future haul route are expected to result in significant 95th percentile queueing issues at any of the movements affected by either haul route, with the exception of the northbound left queue at Regional Road 25 / James Snow Parkway. However, the future haul route impacts to this movement are less significant than those resulting from employing the existing haul route under conditions. This provides further justification for the use of the future Option 1 haul route over the existing haul route.	
19.	The following comments were made on Safety Analysis: • Discuss potential safety or operational issues (per Region's TIS Guidelines, Section 3.6.2) in the study area. • Assess the heavy truck routing to and from the quarry and provide justification and demonstrate that the proposed modified haul route is feasible from a traffic safety perspective. **This has not been addressed:** A Safety Analysis was not discussed.		CIMA+	This was addressed in TYLin's Safety letter and Sightline Memo dated March, 2022, and July 2022 respectively (Attachments #1 & #2).	

	Note that the future traffic operations analysis in Section 6 does not indicate any operational issues.				
20.	The following comments were made on the Region's Aggregate Resource Reference Manual: • Section 4.0 which identifies the purpose and objectives of each study • Section C identifies all policies in any Provincial, Regional or local planning document that deal with the subject matter of the report • Appendix A (specifically Section 8.0) - include and address the requirements identified by the most current versions of the PPS, Greenbelt Plan and Niagara Escarpment Plan • 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. **This has been addressed:** • Section 1.2 outlines the study objectives. • Section 1.1 outlines all the policy documents that apply to the TIS. • The preferred route option avoids the Niagara Escarpment Area; however, Section 1.1 indicates that an amendment to the Niagara Escarpment Plan and a Niagara Escarpment Development permit is needed. **This has not been addressed:** No traffic safety components, such as those listed, were included in the report.		CIMA+	As there are no increase in truck volumes, additional truck safety components were not considered. It is noted that the existing quarry has been in operation since 1962 and has utilized this haul route with no documented safety issues. Furthermore, Dublin Line is a straight road, with good visibility and no blind spots. Regarding the Dublin Line roundabout and the remainder of the haul route, which are major arterial roads (e.g. James Snow Parkway and future Tremaine Road), it is assumed that this infrastructure was designed by the Region to safely accommodate heavy trucks based on existing truck trips to/from the subject lands and background truck traffic originating and destined to the Milton 401 Industrial Business Park.	
Pre-Consultation Inquiries					
21.	The following comments were made on Operational Review about the Dublin Line and Main Access - operational review (i.e., collisions, sightlines). **This has not been addressed:** Response (shown below) was a review based on solely aerial and street imagery. Not site visit was conducted to confirm sightlines. A collision analysis or influence of heavy truck traffic on safety was not mentioned in the report. 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 CRH Canada Group Inc. Traffic Impact Study/ Haul Route Assessment Dufferin Aggregates Milton Quarry East Extension TMIG PROJECT NUMBER 10108 limit). Based on the vertical and horizontal curvature of the roadway (as reviewed based on aerial on		CIMA+	This was addressed in TYLin's Safety letter and Sightline Memo dated March, 2022, and July 2022 respectively (Attachments #1 & #2).	

	street imagery), it is TMIG's opinion that the stopping sight distance requirement is met at the existing quarry access intersection.				
22.	The following comments were made on Trip Distribution: Trip distribution is to be based on anticipated truck routes to/from the site, with detailed justification provided. **This has been partially addressed:** Trip distribution is based on the future planned truck route (Option 1). Justification for Option 1 is for short travel distances, preventing encroachment on Niagara Escarpment Plan. More detailed justification should be provided in Section 5.3.		CIMA+	It is TYLin's opinion that no further justification needed. Sufficient justification has been provided in Section 5.3 regarding the future planned truck route. Regarding trip distribution, sufficient justification has been provided since it is based on actual trip distribution data from the existing quarry operation.	
23.	The following comments were made on Electronic Synchro Analysis Submission to please provide the synchro analysis electronically as part of the submission.		CIMA+	Noted: Synchro files have been attached as a zip file.	
24.	The following comments were made on Processing Site to identify local aggregate processing sites (i.e., Armstrong Avenue, Georgetown plant). **(Not addressed)**		CIMA+	This was deemed outside the scope of work in the Terms of Reference. Furthermore, trip distribution has been provided for this operation based on actual conditions and the appropriate haul route analysis has been completed.	
25.	The following comments were made on Education for Truck Routes to identify the measures implemented by the Milton Quarry to educate truck drivers with regard to truck route. **(Not addressed)**		CIMA+	This was deemed outside the scope of work in the Terms of Reference. However, Dufferin will provide updated signage on-site to remind drivers of the haul route and to encourage drivers to use James Snow Parkway and Tremaine Road.	
26.	The following comments were made on heavy traffic: 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. **This has been addressed:** 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. (Confirmed in Google Street view that there is no longer access to 5 Sideroad.)		CIMA+	Noted.	
27.	The following comments were made on queuing issues: Review of ongoing queuing issues on Dublin Line and 5 Sideroad during the AM quarry peak time **This has been addressed:** 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.		CIMA+	Noted.	

28.	The following comments were made on mitigation measures: Mitigation measures to reduce Illegal parking on 5 Sideroad. **This has been addressed:** 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.		CIMA+	Noted.	
29.	The following comment was made on operational issues: Dirt tracked on Dublin Line. **This has been addressed:** 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.			Noted.	
30.	The following comment was made on safety review: Safety review at the Dublin Line roundabout to James Snow Parkway and overall haul route. **This has been addressed:** 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.		CIMA+	Noted.	
31.	The following comments were made on the use of existing access: Clarification on the use of the existing Sixth Line Nassagaweya access. **This has been addressed:** 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.		CIMA+	Noted.	
32.	The following comment was made on impacts to natural area on the Impacts on the Niagara Escarpment Natural Area. **This has been addressed:** 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.		CIMA+	Noted.	

33.	The following comments were made on reports: Note that traffic count data and Synchro analysis reports shall be appended to the TIS document. **This has been addressed:** Reports in Appendix C.		CIMA+	Noted.	
34.	The following comments were made on truck routes: Review and identify truck route(s) to/from the Milton Quarry. **This has been addressed:** Figures 2-1 and 5-1.		CIMA+	Noted.	
35.	The following comments were made on study periods: 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. **This has been addressed**		CIMA+	Noted.	
36.	The following comments were made on study intersection: • 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) • 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). **This has been addressed**		CIMA+	Noted.	
37.	The following comments were made on traffic data: 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. **This has been addressed** Due to the pandemic 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). TMIG derived 2021 existing traffic volumes based on historical traffic data and adequate growth rates.		CIMA+	Noted.	
38.	The following comments were made on Conservative Baseline Traffic Volumes: • 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. • derive trip generation rates for the development based on standard ‘first principles’ approach (applying a Passenger Car Equivalent (PCE)) and the existing Quarry operations.		CIMA+	Noted.	

	This has been addressed • Section 3.1 outlines the removal of the surveyed haulage volume followed by section 3.2 a conservative quarry trip generation. • Trip generation rates are based on daily highest haulage recorded in 2020, which represents the highest haulage day of the year.				
39.	The following comments were made on future conditions: 5-year study horizon to 2026 to assess the impact of the proposed expansion. **This has been addressed**		CIMA+	Noted.	
40.	The following comments were made on Traffic Data Model Alternative: Using a previous TIS report within the study area. Use Emery Milton Business Park TIS.		CIMA+	Noted.	
41.	The following comments were made on 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. **This has been addressed**		CIMA+	Noted.	
42.	The following comments were made on Study Parameters: Assess the following conditions: • 2021 Conservative Existing Conditions • 2026 Future Conditions Using Synchro 10 and review of projected queues at turning movements impacted by the truck routes. **This has been addressed**		CIMA+	Noted.	
TOR Comments					
43.	The following comments were made on Traffic Data Model Alternative about using a previous TIS report within the study area. Use Emery Milton Business Park TIS.		CIMA+	Noted.	

Attachment **1**

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PROJECT NUMBER 10108

March 22, 2022

Kevin Mitchell, Director of Property, Planning & Approvals
CRH Canada Group Inc.
2300 Steeles Avenue West, 4th Floor
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Dear Mr. Mitchell,

Re: Proposed Dufferin Aggregates Milton Quarry East Extension – Safety Analysis Letter

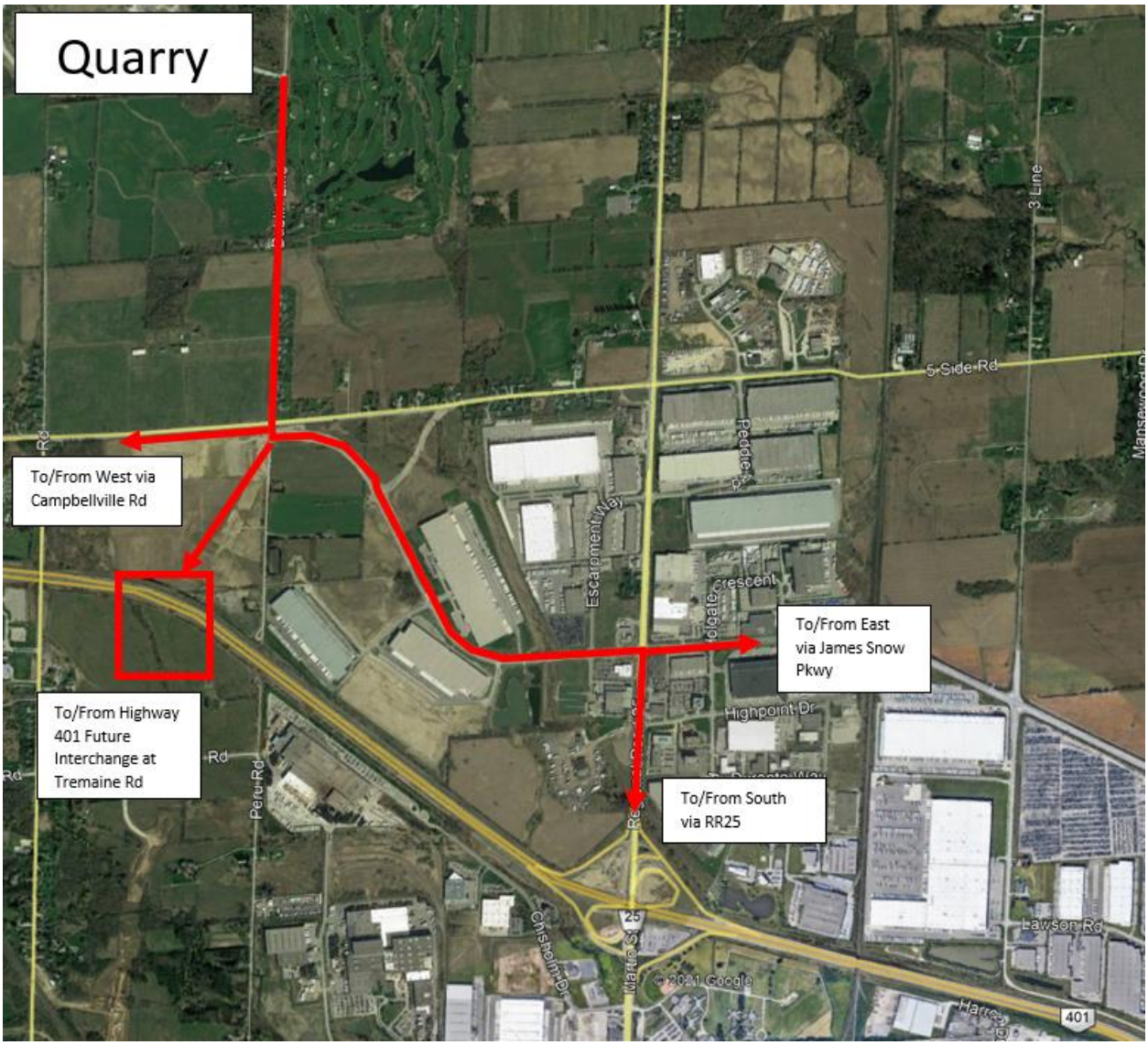
The Municipal Infrastructure Group Ltd. (TMIG), a T.Y. Lin International Company, was retained by Dufferin Aggregates (a division of CRH Canada Group Inc.) to prepare a Traffic Impact Study (TIS) and Haul Route Assessment in support of the proposed Milton Quarry East Extension, in the Town of Milton. The TIS report was prepared in October 2021. Subsequent to the study submission, Halton Region staff provided comments to the project team identifying that the Safety Analysis component of the study (required as per the 2015 Halton Region TIS guidelines) was incomplete. Accordingly, this letter was prepared as an additional component to the development application in order to address the Region's request for a safety analysis.

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. As per the TIS findings, the preferred haul route to/from the quarry would remain as under existing conditions with a direct access via Dublin Line. The only potential changes to the haul route under future conditions would be for vehicles travelling via Highway 401 as multiple vehicles may utilize the planned Tremaine Road interchange (i.e., no longer use the Regional Road 25 interchange) based on its proximity to the site.

As per the Region's request, TMIG completed a safety analysis for the proposed extension based on the 2015 Halton Region TIS guidelines. Each component required for review as part of the guidelines has been detailed below, along with the associated analysis findings in relations to the future haul route.

Please refer to **Figure 1** for an illustration of the future haul route assessed as part of this safety analysis.

Figure 1 Preferred Future Haul Route



Source: Google Earth

Weaving & Merging

Since the quarry opened in 1962, access has been located onto Dublin Line, which is classified as a local road with a rural two-lane cross-section. Dublin Line does not provide access to non-local traffic as it terminates in a cul-de-sac approximately 2.1km north of Campbellville Road, with one farm and two golf courses located north of the quarry, and two farms and fifteen residential dwellings south of the quarry, along the roadway. Accordingly, non-quarry related traffic along Dublin Line is minor in magnitude and is not projected to increase. Moreover, traffic generated by the quarry is not projected to change.

Based on the nominal volume of non-quarry related traffic crossing the quarry access, the access is expected to operate with an acceptable level of service allowing for ample gaps for vehicles attempting to enter Dublin Line. As a result, there are no concerns for trucks merging to/from the access and the roadway, with no need to weave along Dublin Line per its two-lane cross-section. Furthermore, along the haulage route, the majority of trucks will travel north-south through the roundabout to access Tremaine Road and the Highway 401 interchange, while select vehicles will travel onto James Snow Parkway and Campbellville Road as illustrated in **Figure 1**.

Outside of the site access intersection to Dublin Line, all traffic generated by the quarry will utilize the Town and Region roads, which have been designed and signed to accommodate the truck routes utilized by the development. Accordingly, as the study area roadways have been designed per the Town and Region standards (including intersection spacing, lane widths, curb radius, all standards to accommodate weaving and merging along the roadway), it is TMIG's opinion that there should be no concerns.

Transit operational conflicts

The previous Milton Transit Route 1, which travelled along Regional Road 25, James Snow Parkway and 5 Sideroad, has been put out of service and transit accessibility to the study area is now provided on an on-demand basis. Accordingly, there would be no transit operational conflicts within the study area.

Assuming the Milton Transit Route 1 is brought back into service following the on-going Covid-19 pandemic, it is TMIG's opinion that the proposed Dufferin Quarry East Extension would not generate any transit operational conflicts along the haul route based on the following:

- Under future conditions, multiple trucks will utilize the new Highway 401 interchange to Tremaine Road, thus reducing the magnitude of trucks sharing the road with transit services compared to previous conditions and reducing the possibility of transit operational conflicts.
- The minor number of trucks projected to continue travelling along Regional Road 25 and James Snow Parkway are not anticipated to create conflicts with transit services as the roadways have been designed to accommodate both heavy vehicles and transit. In the past, the development was operating with the same trip generation as is projected under future conditions and trucks were sharing the roadway network with the previously existing Transit Route 1 without any concern, which is presumed to continue under future conditions.

Corner clearances

Based on The Transportation Association of Canada (TAC) Geometric Design Guidelines (2017) Figure 8.8.2, the minimum corner clearance required between the Dufferin Quarry access and Campbellville Road along Dublin Line (which is classified as a local road) is 15m.

The quarry access is proposed to remain as under existing conditions as part of the planned extension and is located approximately 1.2km north of Campbellville Road along

Dublin Line. Per the above, the location of the quarry access exceeds the minimum corner clearance requirements set by TAC, which is acceptable.

Similarly, the site access is located over 180m from either adjacent access along Dublin Line, exceeding the access spacing requirement of 3m for commercial and industrial developments per TAC Figure 8.9.2. The spacing between accesses allows enough space for trucks to accelerate to the posted speed limit without impacting traffic along Dublin Line.

Sight distances

The review of sight distances has been provided in the responses to JART comments provided in Appendix F of the October 2021 TIS, which has been copied below for reference.

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.

The satisfaction of the stopping sight distance along Dublin Line provides drivers traveling along the roadway with ample time to identify trucks entering the roadway and react accordingly.

Vehicle-pedestrian conflicts & Cycling Movements

The quarry access is located onto Dublin Line, which is a local road with a rural two-lane cross-section. Per the absence of sidewalks or cycling facilities along the roadway, it is presumed that there is negligible to no volumes of pedestrians or cyclists travelling along the corridor. Accordingly, the probability of conflicts between vehicles and pedestrians/cyclists at the access is minimal.

The remainder of the haul route is composed of municipal and regional roadways that have been designed to account for pedestrian and cyclists safety at each intersection and midblock. Accordingly, it is TMIG's opinion that there would not be any emphasized possibility of vehicle-pedestrian/cyclist conflicts for the specific quarry trucks compared to any other vehicles travelling along the roadway within the study area. As the roadways are presumed to be designed appropriately as per the Town and Region standards, it is TMIG's opinion that vehicle-pedestrian/cyclist conflicts would not be of concern regarding the proposed quarry extension.

Notwithstanding the above, TMIG understands that the implementation of the roundabout at the intersection of Dublin Line at James Snow Parkway has now provided pedestrian facilities with priority to pedestrian users. Accordingly, TMIG recommends that the applicant provides informational material to their drivers (in the form of pamphlets/informational boards located within the site) that would identify all potential

conflict locations between their vehicles and active transportation users. This information would be provided for the portion of the haul route located adjacent to the lands (i.e., north of Highway 401 along Dublin Line/Tremaine Road/Regional Road 25) to further assure that drivers are aware of the need to yield to active transportation users where applicable.

Traffic infiltration

The quarry access is located onto Dublin Line, which terminates in a cul-de-sac approximately 2.1km north of Campbellville Road.

There is a total of twenty developments located north of Campbellville Road along Dublin Line, which consist of three farms, fifteen residential dwellings and two golf courses. Accordingly, all traffic travelling along Dublin Line is local to the area. Except for non-local drivers unfamiliar with area, there is a nominal chance of traffic infiltration along Dublin Line. This is projected to remain the case under future conditions as Dublin Line is not planned to be extended further north of its current terminal point.

Finally, as the access is proposed to remain as under existing conditions, it is TMIG's opinion that there would be no changes to the existing operations at the access and along the roadway thus eliminating the concern related to quarry traffic infiltration to the neighbouring driveways along Dublin Line.

Access conflicts

As stated previously, all traffic travelling along Dublin Line at the site access intersection is local to the study area, minor in magnitude, and is not anticipated to create any congestion at the access as per the traffic operations review completed as part of the TIS.

Additionally, based on a desktop review of the roadway curvature using aerial imagery, there are no anticipated vertical or horizontal sightline concerns at the site access intersection.

Finally, per the absence of pedestrian and cycling facilities along Dublin Line, it is presumed that the volume of active transportation users is very minor in magnitude thus removing any significant concern for conflict between trucks and active transportation users.

Per the above, it is TMIG's opinion that there would be no concern for conflict at the site access between traffic travelling to/form the quarry and traffic along Dublin Line or with active transportation users.

Heavy truck movement conflicts

The existing quarry access to Dublin Line has been designed to accommodate heavy truck movements to/from the roadway when the quarry was first implemented and is projected to remain the principal access post extension.

As previously stated, Dublin Line only provides access to local traffic. Accordingly, the large majority of trucks travelling along the roadway will be to/from the quarry, thus limiting the number of conflicts between heavy vehicles on Dublin Line. Operations are projected

to remain as under existing conditions, with no anticipated concerns for heavy vehicle movements.

Finally, outside of the site access intersection to Dublin Line, all traffic generated by the quarry will utilize the Town and Region roads, which have been designed to accommodate the truck routes utilized by the development. Accordingly, as the study area roadways have been designed per the Town and Region standards, it is TMIG's opinion that there should also be no concerns related to heavy truck movement. As per the Region's Transportation Master Plan, Tremaine Road, James Snow Parkway and Regional Road 25 are classified as C4 Urban roadway, while Campbellville Road is classified as a Town minor arterial, which are designed to accommodate heavy trucks. Furthermore, the roundabout at Dublin Line allows for reduced conflict points compared to a standard 4-legged intersection, which further improves circulation as opposed to previous conditions.

Queuing

As previously stated, the trip generation associated with the quarry is projected to remain as under existing conditions post extension, with the multiple trucks projected to be re-routed from the Highway 401 interchange at Regional Road 25 to the planned interchange at Tremaine Road.

As detailed in the October 2021 TIS completed for the proposed development, queues at the roundabout and future Highway 401 interchange to Tremaine Road are projected to be acceptable. Furthermore, as the site traffic volume is projected to be reduced along Regional Road 25, queues associated with the site traffic are projected to remain as under existing conditions or improve at the Regional Road 25 intersections along the haul route.

Per the above, it is TMIG's opinion that there would be no queuing concerns associated with the development application.

Overall, the analysis detailed within this letter confirms that there would be no safety concerns associated with the proposed development application. Please do not hesitate to contact the undersigned should you require any additional assistance.

Sincerely,

TMIG | THE MUNICIPAL INFRASTRUCTURE GROUP LTD.

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Project Manager | nkammah@tmig.ca

Michael Dowdall C.E.T., MITE
Director, Traffic | mdowdall@tmig.ca

Attachment **2**

TYLin

PROJECT No. 10108

To:	**Kevin Mitchell, Director of Property, Planning & Approvals**	**From:**	**Michael Dowdall, TYLin**
Address:	**CRH Canada Group Inc. 2300 Steeles Avenue West, 4th Fl Concord, ON, L4K5X6**	**Date:**	July 22, 2022
		CC:	**Brian Zeman, MHBC Ellen Ferris, MHBC**
Re:	**Proposed Dufferin Aggregates Milton Quarry East Extension – Sightline Analysis**		

MEMORANDUM

TYLin (formerly, the Municipal Infrastructure Group Ltd. (TMIG), a T.Y. Lin International Company), was retained by Dufferin Aggregates (a division of CRH Canada Group Inc.) to prepare a Traffic Impact Study (TIS) and Haul Route Assessment in support of the proposed Milton Quarry East Extension in the Town of Milton. The TIS report was prepared in October 2021, which included an initial response to pre-consultation comments detailing a desktop review of quarry access stopping sight distance sightlines based on aerial and street imagery. Subsequent to the study submission, Halton Region staff provided comments to the project team identifying that the Safety Analysis component of the study (required as per the 2015 Halton Region TIS guidelines) was incomplete. Accordingly, a letter was prepared as an additional component to the development application in order to address the Region's request for a safety analysis.

Further comments were received from the review agencies stating that the review of quarry access sightlines was based solely on aerial and street imagery, and should be informed by a site visit to confirm sightlines. Accordingly, TYLin conducted a site visit to confirm sightlines in the field, with the results summarized in the memo below. The visit was conducted on Thursday, July 21, 2022.

The sightline review was undertaken based on values from the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, 2017. From the posted speed limit of 60 km/h, a conservative design speed of 80 km/h was determined (typically taken to be 20 km/h over the posted speed limit). Based on the design speed, the desired design values for both stopping sight distance (SSD), intersection sight distance (ISD) and the more conservative minimum decision sight distance (DSD) are provided in **Table 1** in accordance with TAC Tables 9.9.4 and 9.9.6., and Figure 9.10.1. Excerpts from the TAC Manual are supplied in **Attachment 1.**

Table 1 Minimum Sight Distances for Passenger Cars from TAC 2017

Design Speed (km/hr)	Left-Turn from Stop		Right-Turn from Stop		Minimum Decision Sight Distance (m)
	SSD (m)	ISD (m)	SSD (m)	ISD (m)	
80	130	170	130	145	230

Based on the values above, the SSD and DSD were reviewed in the field for the quarry access at 9410 Dublin Line, Milton, Ontario.

As per the TAC manual, sight distances were observed considering the following key variables:

- Driver's eye vertical height of 1.08 metres from the ground;
- Height to the top of car bumper of 0.6 metres (conservative approach) and height to the top of the car of 1.3 metres from the ground.

The field observation confirmed that both the minimum SSD of 130 metres as well as the DSD of 230 metres were met on Dublin Line both north and south of the quarry access. As the DSD was met, it was inferred that the ISD requirement was also satisfied. TYLin staff members were able to observe both the 0.6-metre and 1.3-metre-high object approaching from the north, while from the south the 1.3 metre-high object was visible at both distances. Although the 0.6 metre-high object was not visible from the south, the sightline was still deemed acceptable given that the 1.3-metre high object was observed, indicating that vehicles entering Dublin Line from the quarry access will be able to see a vehicle approaching from the south at the desired distance. Photos documenting the sight distances are included in **Attachment 2,** in which photos from the SSD and DSD both south and north of the quarry access were taken at the driver's eye height.

In conclusion, the applicable SSD and DSD requirements for the Milton Quarry access were deemed to be met based on field observation by TYLin staff (thereby also meeting ISD requirements).

Attachments:
Attachment 1 – Excerpts from TAC 2017
Attachment 2 – Site Visit Photos (2022-07-21)

Attachment 1: Excerpts from TAC 2017

Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn From Stop

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	41.7	45
30	35	62.6	65
40	50	83.4	85
50	65	104.3	105
60	85	125.1	130
70	105	146.0	150
80	130	166.8	170
90	160	187.7	190
100	185	208.5	210
110	220	229.4	230
120	250	250.2	255
130	285	271.1	275

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right turns (case B2) will provide sufficient sight distance for a passenger car to cross the near roadway to reach the median. Possible exceptions are addressed in the discussion of case B3.

Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	36.1	40
30	35	54.2	55
40	50	72.3	75
50	65	90.4	95
60	85	108.4	110
70	105	126.5	130
80	130	144.6	145
90	160	162.6	165
100	185	180.7	185
110	220	198.8	200
120	250	216.8	220
130	285	234.9	235

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane highway with no median and with grades of 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

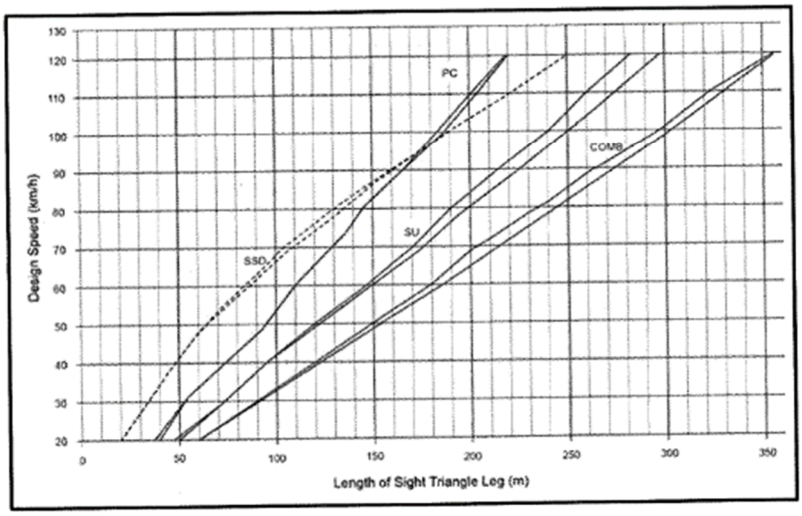


Figure 9.9.5: Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver (Calculated and Design Values Plotted)

Maneuver time is the time to accomplish a vehicle maneuver. For design purposes, the calculated values are rounded. For guidance on selecting decision sight distance, refer to **Chapter 2**.

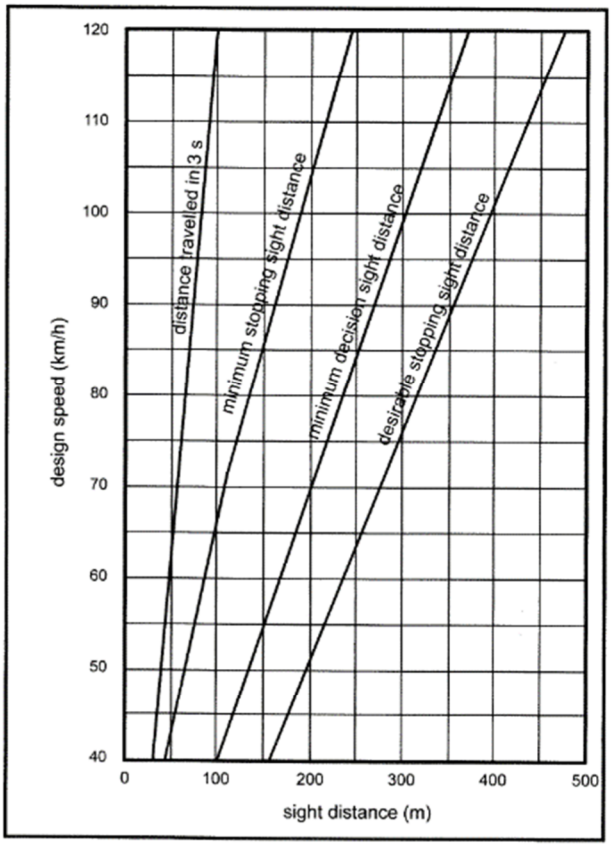


Figure 9.10.1: Decision Sight Distance[72]

9.11 SIGHT DISTANCE AT BRIDGE STRUCTURES

Where a bridge is close to an at-grade intersection, such as at the intersection of an interchange ramp with a cross road adjacent to an overpass, particular attention is required to ensure adequate sight distance is provided. This is due to the potential visual obstruction created by the bridge railing or other structural components. The typical critical factor, at a ramp intersection, is the sight distance required for the left-turning vehicle departing from the ramp to clear the traffic approaching from the left on the cross road. If the intersection is signalized, the minimum critical sight distance is then the distance needed for vehicles turning right, off the ramp, to clear vehicles approaching from the left. However, it

Photo 1: Position of object marker at Milton Quarry Access, looking north (9410 Dublin Line, Milton, Ontario)

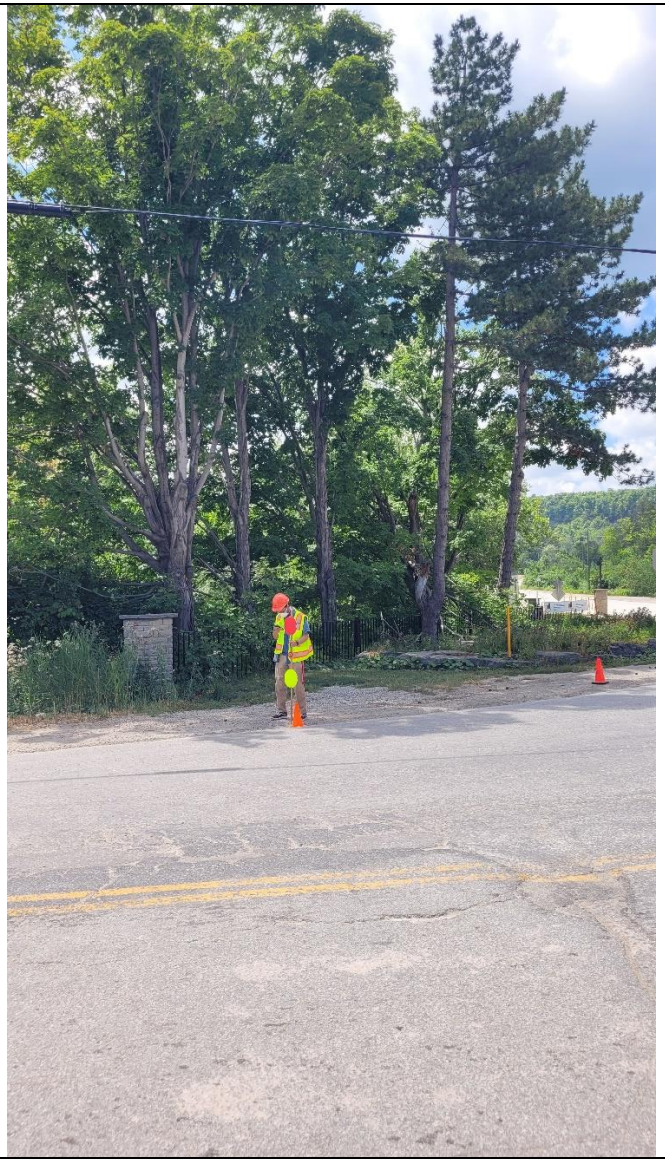


Photo 2: Position of object marker at Milton Quarry Access, looking west (9410 Dublin Line, Milton, Ontario)

Photo 3: Stopping sight distance of 130 m, south of access

Photo 4: View of object marker from 130 m SSD, south of access

Photo 5: View from object marker from 130 m SSD, south of access

Photo 6: Decision sight distance of 230 m, south of access

Photo 7: View of access from 230 m DSD, south of access

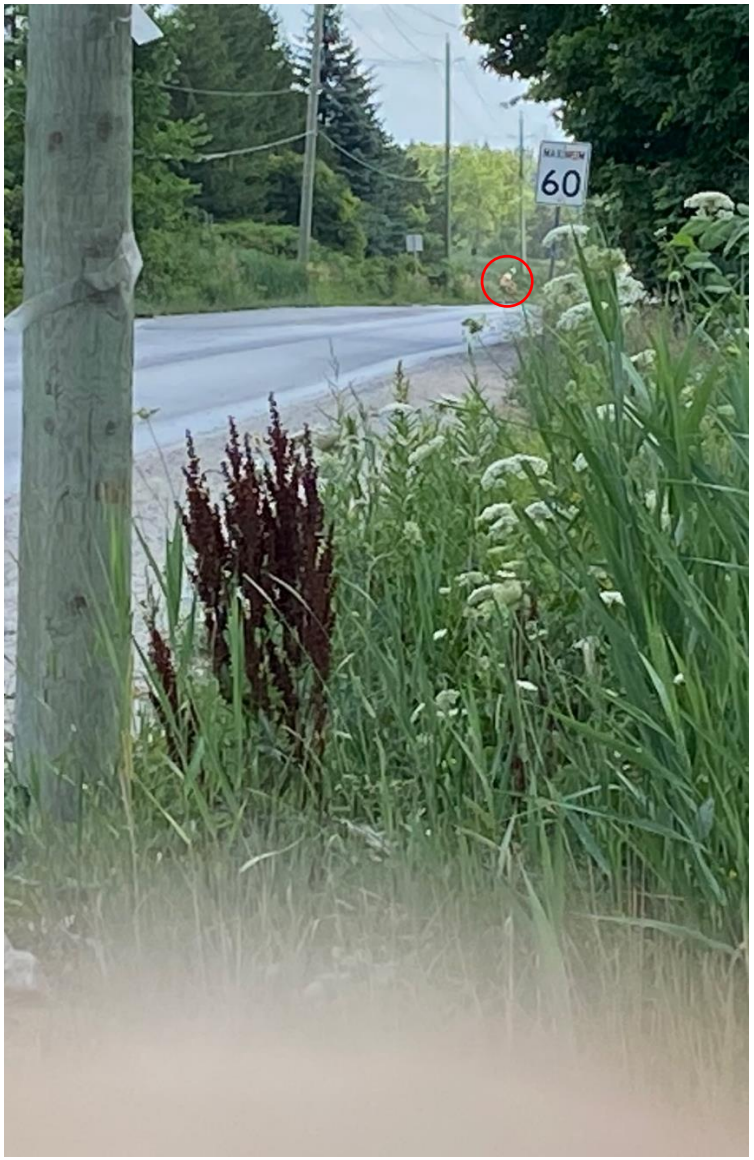


Photo 8: View from object marker from 230 m DSD, south of access

Photo 9: Stopping sight distance of 130 m, north of access

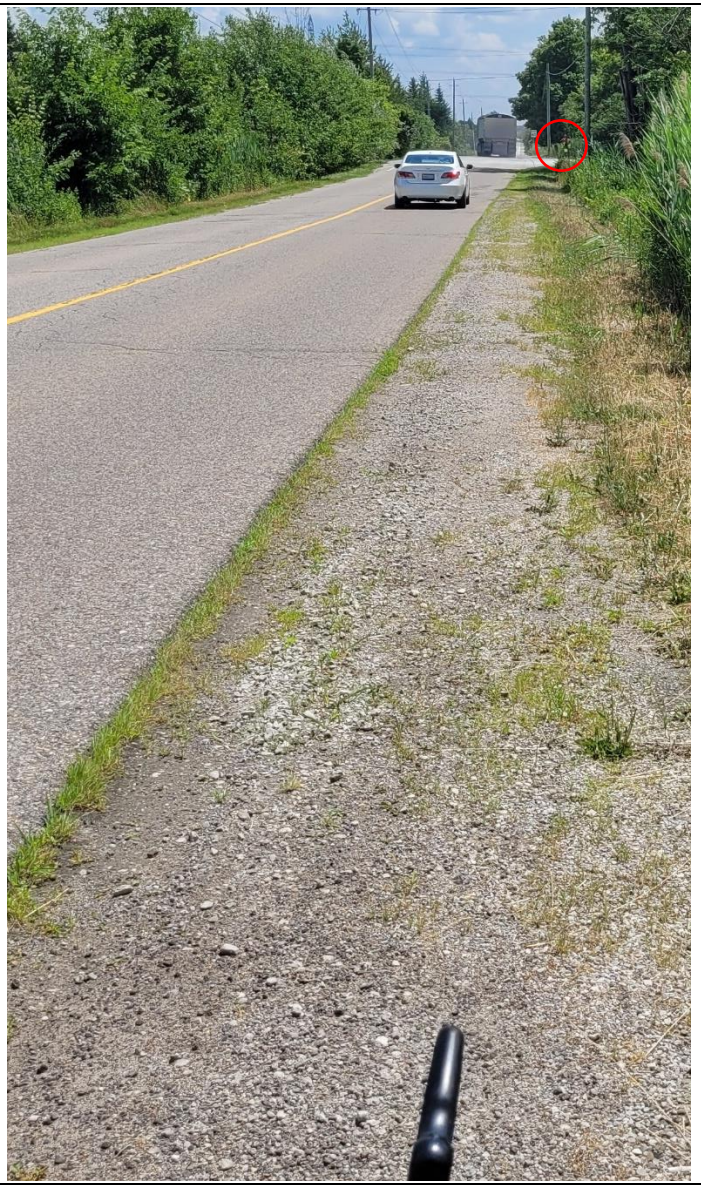


Photo 10: View of object marker from 130 m SSD, north of access

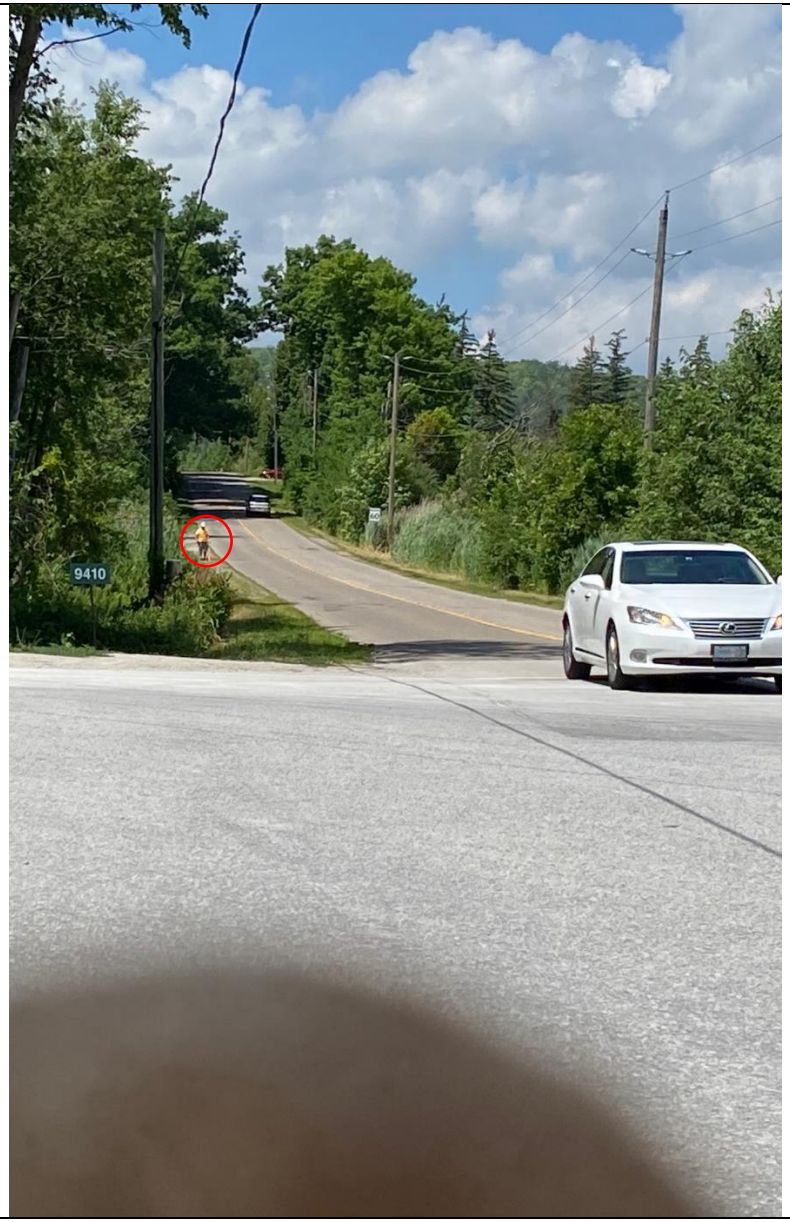


Photo 11: View from object marker from 130 m SSD, north of access

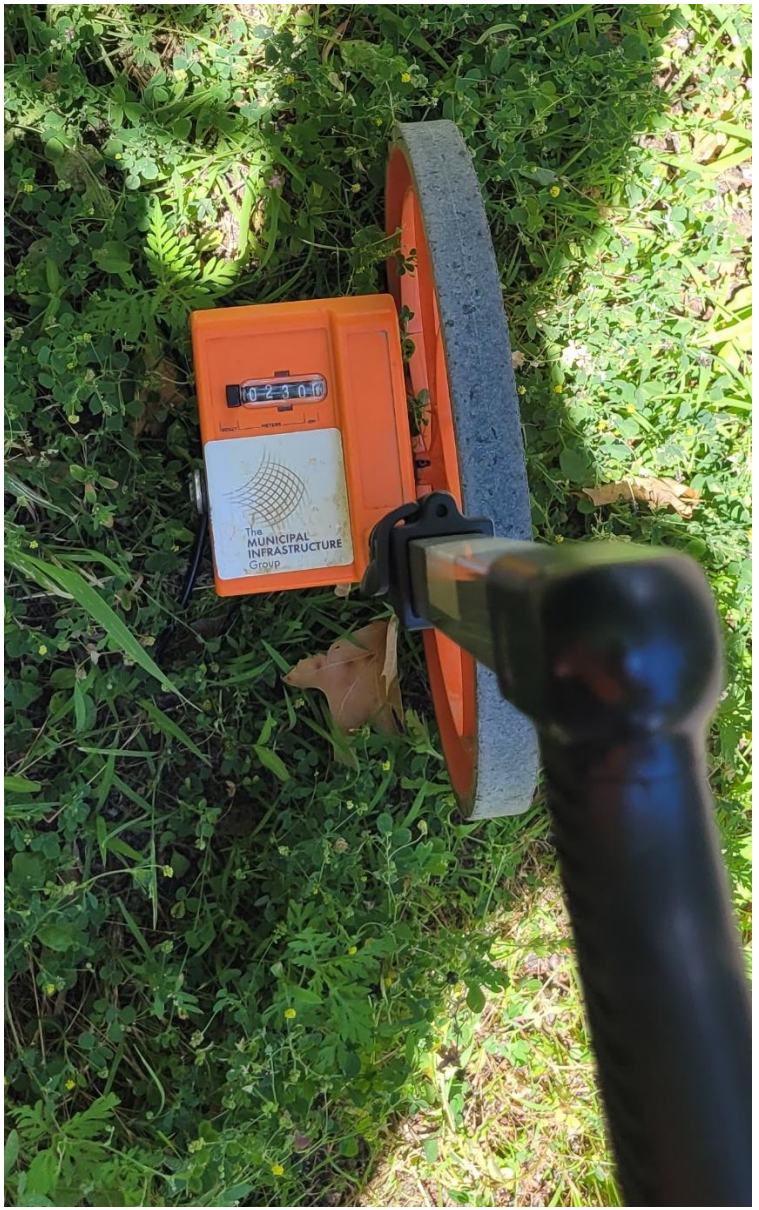


Photo 12: Decision sight distance of 230 m, north of access

Photo 13: View of object marker from 230 m DSD, north of access

Photo 14: View from object marker from 230 m DSD, north of access

Attachment **3**

TYLin

Table 1 2026 Future AM Traffic Synchro and Arcady Results

Intersection	Control Type	Existing Haul Route			Future Haul Route		
		AM Peak Hour					
Turning Movement	**-**	**V/C**	**Delay**	**LOS**	**V/C**	**Delay**	**LOS**
Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road	**Round-about**	**-**	**5.22**	**A**	**-**	**6.94**	**A**
James Snow Parkway (Westbound Approach)	-	0.49	3.07	A	0.41	2.64	A
Dublin Line (Southbound Approach)	-	0.43	13.82	B	0.43	13.76	B
Campbellville Road (Eastbound Approach)	-	0.52	4.77	A	0.52	4.76	A
Tremaine Road (Northbound Approach)	-	0.22	5.22	A	0.50	9.60	A
Tremaine Road at Highway 401 Westbound Off-Ramp	**Signal**	**0.52**	**14**	**B**	**0.71**	**19**	**B**
Westbound Right	-	0.65	24	C	0.84	33	C
Tremaine Road at Highway 401 Eastbound Off-Ramp	**Signal**	**0.45**	**15**	**B**	**0.45**	**15**	**B**
Regional Road 25 / James Snow Parkway	**Signal**	**0.59**	**21**	**C**	**0.50**	**18**	**B**
Northbound Left	-	0.65	13	B	0.33	9	A
Eastbound Through	-	0.20	52	D	0.23	52	D
Eastbound Right	-	0.18	52	D	0.03	51	D
Westbound Through	-	0.24	47	D	0.26	47	D
Regional Road 25 / Highway 401 Westbound Off-Ramp	**Signal**	**0.45**	**10**	**A**	**0.40**	**10**	**A**
Northbound Through	-	0.30	6	A	0.30	6	A
Westbound Left	-	0.56	24	C	0.56	24	C
Southbound Through	-	0.41	7	A	0.35	7	A
Regional Road 25 / Highway 401 Eastbound Off-Ramp	**Signal**	**0.70**	**34**	**C**	**0.70**	**34**	**C**
Northbound Through-Right	-	0.62	31	C	0.62	31	C
Eastbound Left	-	0.94	63	E	0.94	61	E
Southbound Through	-	0.51	24	C	0.51	24	C

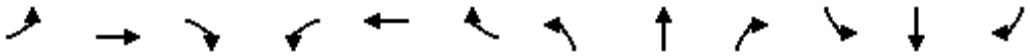
Attachment **4**

TYLin

Table 2 2026 Future PM Traffic Synchro and Arcady Results

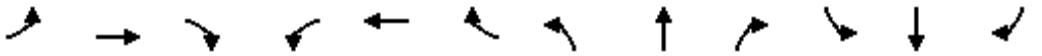
Intersection	Control Type	Existing Haul Route			Future Haul Route		
		PM Peak Hour					
Turning Movement	**-**	**V/C**	**Delay**	**LOS**	**V/C**	**Delay**	**LOS**
Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road	**Round-about**	**-**	**6.79**	**A**	**-**	**6.97**	**A**
James Snow Parkway (Westbound Approach)	-	0.75	5.42	A	0.74	5.19	A
Dublin Line (Southbound Approach)	-	0.52	39.25	E	0.52	39.20	E
Campbellville Road (Eastbound Approach)	-	0.55	7.35	A	0.55	7.34	A
Tremaine Road (Northbound Approach)	-	0.18	4.16	A	0.27	5.40	A
Tremaine Road at Highway 401 Westbound Off-Ramp	**Signal**	**0.73**	**17**	**B**	**0.74**	**18**	**B**
Westbound Right	-	0.24	15	B	0.33	15	B
Tremaine Road at Highway 401 Eastbound Off-Ramp	**Signal**	**0.80**	**27**	**C**	**0.80**	**27**	**C**
Regional Road 25 / James Snow Parkway	**Signal**	**0.57**	**29**	**C**	**0.58**	**29**	**C**
Northbound Left	-	0.39	13	B	0.24	13	B
Eastbound Through	-	0.45	56	E	0.46	56	E
Eastbound Right	-	0.17	53	D	0.13	53	D
Westbound Through	-	0.20	45	D	0.20	45	D
Regional Road 25 / Highway 401 Westbound Off-Ramp	**Signal**	**0.49**	**9**	**A**	**0.48**	**9**	**A**
Northbound Through	-	0.40	7	A	0.40	7	A
Westbound Left	-	0.56	23	C	0.56	23	C
Southbound Through	-	0.47	8	A	0.45	7	A
Regional Road 25 / Highway 401 Eastbound Off-Ramp	**Signal**	**0.57**	**22**	**C**	**0.57**	**22**	**C**
Northbound Through-Right	-	0.68	21	C	0.68	21	C
Eastbound Left	-	0.56	38	D	0.55	38	D
Southbound Through	-	0.43	14	B	0.43	14	B

Attachment **5**



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	8	405	309	575	254	169	178	0	712	167	0	7
Future Volume (veh/h)	8	405	309	575	254	169	178	0	712	167	0	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	440	336	625	276	184	193	0	774	182	0	8
Approach Volume (veh/h)		785			1085			967			190	
Crossing Volume (veh/h)		807			202			631			1094	
High Capacity (veh/h)		729			1182			840			576	
High v/c (veh/h)		1.08			0.92			1.15			0.33	
Low Capacity (veh/h)		575			977			672			443	
Low v/c (veh/h)		1.37			1.11			1.44			0.43	

Intersection Summary				
Maximum v/c High	1.15			
Maximum v/c Low	1.44			
Intersection Capacity Utilization	104.4%	ICU Level of Service	G	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	57	182	62	117	62	309	552	418	231	483	32
Future Volume (vph)	12	57	182	62	117	62	309	552	418	231	483	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	0.91	1.00	1.00	0.91	
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	4071	1426	1359	4015	
Flt Permitted	0.68	1.00	1.00	0.56	1.00	1.00	0.44	1.00	1.00	0.43	1.00	
Satd. Flow (perm)	846	2625	1079	723	3077	1166	656	4071	1426	612	4015	
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	59	188	64	121	64	319	569	431	238	498	33
RTOR Reduction (vph)	0	0	167	0	0	54	0	0	188	0	4	0
Lane Group Flow (vph)	12	59	21	64	121	10	319	569	243	238	527	0
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)	121	293	120	192	494	187	494	2293	803	453	2239	
v/s Ratio Prot	0.00	0.02		c0.02	0.04		c0.06	0.14		0.04	0.13	
v/s Ratio Perm	0.01		0.02	c0.05		0.01	c0.36		0.17	0.29		
v/c Ratio	0.10	0.20	0.18	0.33	0.24	0.06	0.65	0.25	0.30	0.53	0.24	
Uniform Delay, d1	47.7	50.9	50.8	41.0	46.3	44.8	10.1	14.0	14.5	9.9	14.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.7	1.5	1.0	0.5	0.3	2.9	0.3	1.0	1.1	0.2	
Delay (s)	48.1	51.6	52.2	42.1	46.8	45.1	13.0	14.2	15.5	11.0	14.5	
Level of Service	D	D	D	D	D	D	B	B	B	B	B	
Approach Delay (s)		51.9			45.1			14.3			13.4	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	126.2	Sum of lost time (s)	21.5
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	368	0	825	0	0	1082
Future Volume (vph)	368	0	825	0	0	1082
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		0.91			0.91
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3284		4569			4449
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3284		4569			4449
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	368	0	825	0	0	1082
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	368	0	825	0	0	1082
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		2731			2659
v/s Ratio Prot	c0.11		0.18			c0.24
v/s Ratio Perm						
v/c Ratio	0.56		0.30			0.41
Uniform Delay, d1	22.4		6.1			6.6
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.1		0.3			0.5
Delay (s)	23.5		6.4			7.1
Level of Service	C		A			A
Approach Delay (s)	23.5		6.4			7.1
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	12.6
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	502	20	638	20	0	26	0	997	27	24	962	0
Future Volume (vph)	502	20	638	20	0	26	0	997	27	24	962	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			0.91		1.00	0.91	
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			4480		1440	4449	
Flt Permitted	0.95	1.00	1.00		0.98			1.00		0.17	1.00	
Satd. Flow (perm)	1693	1474	1466		1532			4480		261	4449	
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	1017	28	24	982	0
RTOR Reduction (vph)	0	125	125	0	44	0	0	3	0	0	0	0
Lane Group Flow (vph)	512	214	207	0	3	0	0	1042	0	24	982	0
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			1675		155	1938	
v/s Ratio Prot	c0.30	0.15			c0.00			c0.23		0.01	c0.22	
v/s Ratio Perm			0.14							0.06		
v/c Ratio	0.94	0.45	0.44		0.03			0.62		0.15	0.51	
Uniform Delay, d1	37.5	30.6	30.4		49.5			29.0		19.5	23.2	
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00	
Incremental Delay, d2	25.1	0.7	0.7		0.1			1.8		0.5	0.9	
Delay (s)	62.5	31.3	31.1		49.6			30.7		20.0	24.1	
Level of Service	E	C	C		D			C		B	C	
Approach Delay (s)		44.8			49.6			30.7			24.0	
Approach LOS		D			D			C			C	

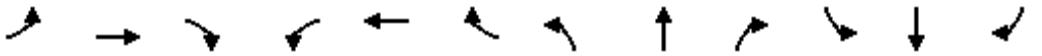
Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	113.4	Sum of lost time (s)	23.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	406	431	459	0	0	755
Future Volume (vph)	406	431	459	0	0	755
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	431	459	0	0	755
RTOR Reduction (vph)	0	183	0	0	0	0
Lane Group Flow (vph)	406	248	459	0	0	755
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)	16.1	16.1	32.5			32.5
Effective Green, g (s)	16.1	16.1	32.5			32.5
Actuated g/C Ratio	0.26	0.26	0.53			0.53
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)	863	380	1688			1644
v/s Ratio Prot	0.12		0.14			c0.24
v/s Ratio Perm		c0.17				
v/c Ratio	0.47	0.65	0.27			0.46
Uniform Delay, d1	19.0	20.1	7.9			8.9
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	0.4	4.0	0.4			0.9
Delay (s)	19.4	24.0	8.3			9.8
Level of Service	B	C	A			A
Approach Delay (s)	21.8		8.3			9.8
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	61.2	Sum of lost time (s)	12.6
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	3	101	25	0	25	0	762	45	45	851	0
Future Volume (vph)	76	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)	78	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)	78	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)	8.8	8.8	8.8	5.5		5.5		59.0		65.9	65.9	
Effective Green, g (s)	8.8	8.8	8.8	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)	148	129	128	82		78		1831		327	2036	
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	0.53	0.06	0.04	0.32		0.02		0.45		0.14	0.43	
Uniform Delay, d1	43.7	41.9	41.8	45.5		44.8		11.5		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	3.4	0.2	0.1	2.2		0.1		0.8		0.2	0.7	
Delay (s)	47.1	42.1	41.9	47.8		44.9		12.3		6.8	8.8	
Level of Service	D	D	D	D		D		B		A	A	
Approach Delay (s)		44.2			46.3			12.3			8.7	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.2	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

Intersection: 1: Tremaine Road/Dublin Line & Campbellville Road /James Snow Parkway

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	R	LT	R	LT	R	LTR
Maximum Queue (m)	82.6	48.5	1012.0	999.7	324.1	482.1	89.6
Average Queue (m)	39.3	21.0	733.5	713.0	84.5	236.8	54.7
95th Queue (m)	75.0	37.1	1183.5	1190.0	276.1	477.2	98.3
Link Distance (m)	622.3	622.3	1788.0	1788.0	764.7	764.7	71.8
Upstream Blk Time (%)							26
Queuing Penalty (veh)							0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	T
Maximum Queue (m)	19.5	26.2	25.2	46.6	51.1	38.5	36.5	31.3	84.4	55.7	50.9	45.9
Average Queue (m)	3.1	7.6	8.5	23.1	20.3	17.0	12.9	11.7	38.9	21.9	21.5	17.4
95th Queue (m)	12.6	19.8	20.7	38.5	43.4	32.0	28.1	24.8	69.3	45.0	42.0	38.3
Link Distance (m)		1788.0	1788.0			728.6	728.6			744.3	744.3	744.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	80.0			115.0	85.0			35.0	35.0			
Storage Blk Time (%)							1	0	12	2		
Queuing Penalty (veh)							0	0	22	7		

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	TR
Maximum Queue (m)	85.7	76.0	49.1	53.1	46.2
Average Queue (m)	22.9	33.5	21.0	22.2	15.2
95th Queue (m)	62.3	61.7	40.3	42.7	35.1
Link Distance (m)	744.3		994.0	994.0	994.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		75.0			
Storage Blk Time (%)		0			
Queuing Penalty (veh)		1			

Intersection: 3: Regional Road 25 & Hwy 401 Westbound Off-Ramp

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	T	T	T	T	T	T
Maximum Queue (m)	51.1	57.8	46.4	41.9	49.9	50.3	52.4	49.3
Average Queue (m)	19.8	32.7	20.4	16.0	21.0	24.2	24.2	21.6
95th Queue (m)	40.5	50.5	38.5	34.3	41.0	41.7	43.5	42.1
Link Distance (m)			339.1	339.1	339.1	744.3	744.3	744.3
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	80.0	80.0						
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

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

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	R	LTR	T	T	TR	L	T	T	T
Maximum Queue (m)	147.3	134.2	70.0	33.6	106.4	96.8	65.9	28.0	70.1	78.2	84.7
Average Queue (m)	93.8	42.6	33.0	12.3	64.5	50.4	28.2	6.5	38.0	42.0	45.5
95th Queue (m)	141.4	99.8	58.6	26.1	97.5	88.1	55.2	18.5	60.8	67.8	72.6
Link Distance (m)		434.1		85.8	183.3	183.3	183.3		339.1	339.1	339.1
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	130.0		130.0					30.0			
Storage Blk Time (%)	3	0						0	14		
Queuing Penalty (veh)	17	0						0	3		

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

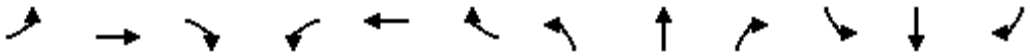
Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (m)	53.6	48.8	67.8	50.9	46.3	54.7	48.2
Average Queue (m)	29.9	21.0	32.9	23.5	20.1	26.9	25.7
95th Queue (m)	46.9	39.7	55.5	42.9	39.1	46.4	41.7
Link Distance (m)	387.2	387.2		301.3	301.3	764.7	764.7
Upstream Blk Time (%)							
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)	41.7	22.2	15.6	23.4	20.2	76.6	67.8	25.9	64.3	64.2
Average Queue (m)	17.6	10.5	4.9	7.1	5.3	36.4	23.1	7.0	22.6	27.9
95th Queue (m)	34.3	18.8	13.0	18.8	14.9	64.7	52.6	18.3	47.8	51.7
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: 51



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	8	405	309	575	254	16	178	153	712	14	153	7
Future Volume (veh/h)	8	405	309	575	254	16	178	153	712	14	153	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	440	336	625	276	17	193	166	774	15	166	8
Approach Volume (veh/h)		785			918			1133			189	
Crossing Volume (veh/h)		806			368			464			1094	
High Capacity (veh/h)		729			1037			961			576	
High v/c (veh/h)		1.08			0.89			1.18			0.33	
Low Capacity (veh/h)		575			847			779			443	
Low v/c (veh/h)		1.37			1.08			1.46			0.43	

Intersection Summary					
Maximum v/c High	1.18				
Maximum v/c Low	1.46				
Intersection Capacity Utilization	108.2%	ICU Level of Service		G	

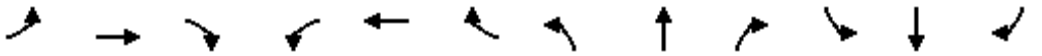
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	57	29	62	117	62	156	552	418	231	483	32
Future Volume (vph)	12	57	29	62	117	62	156	552	418	231	483	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	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	0.91	1.00	1.00	0.91	
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	4071	1407	1358	4015	
Flt Permitted	0.68	1.00	1.00	0.54	1.00	1.00	0.44	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	846	2625	1079	701	3077	1166	662	4071	1407	604	4015	
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	59	30	64	121	64	161	569	431	238	498	33
RTOR Reduction (vph)	0	0	27	0	0	54	0	0	186	0	3	0
Lane Group Flow (vph)	12	59	3	64	121	10	161	569	245	238	528	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)	15.2	12.3	12.3	25.4	18.5	18.5	79.9	70.4	70.4	81.5	71.2	
Effective Green, g (s)	15.2	12.3	12.3	25.4	18.5	18.5	79.9	70.4	70.4	81.5	71.2	
Actuated g/C Ratio	0.12	0.10	0.10	0.21	0.15	0.15	0.65	0.57	0.57	0.66	0.58	
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)	112	261	107	183	460	174	485	2318	801	461	2312	
v/s Ratio Prot	0.00	0.02		c0.03	0.04		0.03	0.14		c0.04	0.13	
v/s Ratio Perm	0.01		0.00	c0.05		0.01	0.19		0.17	c0.30		
v/c Ratio	0.11	0.23	0.03	0.35	0.26	0.06	0.33	0.25	0.31	0.52	0.23	
Uniform Delay, d1	48.0	51.3	50.3	41.2	46.5	45.1	8.7	13.3	13.9	8.7	12.8	
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	0.4	0.9	0.2	1.2	0.6	0.3	0.4	0.3	1.0	1.0	0.2	
Delay (s)	48.4	52.2	50.5	42.4	47.2	45.3	9.1	13.6	14.9	9.7	13.0	
Level of Service	D	D	D	D	D	D	A	B	B	A	B	
Approach Delay (s)		51.2			45.5			13.4			12.0	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	123.6	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			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	368	0	820	0	0	934
Future Volume (vph)	368	0	820	0	0	934
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		0.91			0.91
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3284		4569			4449
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3284		4569			4449
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	368	0	820	0	0	934
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	368	0	820	0	0	934
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		2731			2659
v/s Ratio Prot	c0.11		0.18			c0.21
v/s Ratio Perm						
v/c Ratio	0.56		0.30			0.35
Uniform Delay, d1	22.4		6.1			6.3
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.1		0.3			0.4
Delay (s)	23.5		6.4			6.7
Level of Service	C		A			A
Approach Delay (s)	23.5		6.4			6.7
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	12.6
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



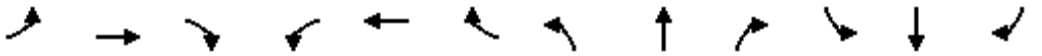
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	497	20	638	20	0	26	0	997	27	24	962	0
Future Volume (vph)	497	20	638	20	0	26	0	997	27	24	962	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	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			0.91		1.00	0.91	
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			4476		1440	4449	
Flt Permitted	0.95	1.00	1.00		0.98			1.00		0.17	1.00	
Satd. Flow (perm)	1693	1474	1466		1532			4476		261	4449	
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)	507	20	651	20	0	27	0	1017	28	24	982	0
RTOR Reduction (vph)	0	125	125	0	44	0	0	3	0	0	0	0
Lane Group Flow (vph)	507	214	207	0	3	0	0	1042	0	24	982	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)	36.3	36.3	36.3		7.6			42.4		49.4	49.4	
Effective Green, g (s)	36.3	36.3	36.3		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)	542	472	469		102			1675		155	1939	
v/s Ratio Prot	c0.30	0.15			c0.00			c0.23		0.01	c0.22	
v/s Ratio Perm			0.14							0.06		
v/c Ratio	0.94	0.45	0.44		0.03			0.62		0.15	0.51	
Uniform Delay, d1	37.4	30.6	30.5		49.4			28.9		19.5	23.1	
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00	
Incremental Delay, d2	23.6	0.7	0.7		0.1			1.8		0.5	0.9	
Delay (s)	60.9	31.3	31.1		49.5			30.7		19.9	24.1	
Level of Service	E	C	C		D			C		B	C	
Approach Delay (s)		44.0			49.5			30.7			24.0	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	113.3	Sum of lost time (s)	23.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

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



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

Intersection: 1: Tremaine Road/Dublin Line & Campbellville Road /James Snow Parkway

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	R	LT	R	LT	R	LTR
Maximum Queue (m)	81.8	39.7	740.9	475.1	139.9	228.2	41.6
Average Queue (m)	31.9	19.8	457.2	172.0	32.3	102.8	14.9
95th Queue (m)	60.7	33.4	875.7	455.5	106.5	226.2	30.0
Link Distance (m)	622.3	622.3	1788.0	1788.0	764.7	764.7	71.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	T
Maximum Queue (m)	21.5	27.6	25.6	21.8	48.0	37.1	37.1	24.4	48.4	55.2	46.2	43.1
Average Queue (m)	4.6	8.2	9.4	7.1	19.3	17.1	14.5	11.4	17.9	22.6	19.9	16.0
95th Queue (m)	15.2	21.0	21.1	18.5	39.6	31.0	29.2	23.5	36.6	45.5	41.1	37.0
Link Distance (m)		1788.0	1788.0			728.6	728.6			744.3	744.3	744.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	80.0			115.0	85.0			35.0	35.0			
Storage Blk Time (%)							1		1	3		
Queuing Penalty (veh)							0		2	4		

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	TR
Maximum Queue (m)	65.9	73.1	44.9	49.9	44.6
Average Queue (m)	22.0	28.9	17.7	19.6	12.1
95th Queue (m)	47.7	55.4	36.1	40.5	32.1
Link Distance (m)	744.3		994.0	994.0	994.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		75.0			
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Intersection: 3: Regional Road 25 & Hwy 401 Westbound Off-Ramp

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	T	T	T	T	T	T
Maximum Queue (m)	51.3	58.9	44.7	43.9	55.2	46.7	51.8	48.4
Average Queue (m)	20.9	34.1	16.6	15.3	24.1	22.1	20.7	17.9
95th Queue (m)	43.0	51.7	34.3	33.5	45.8	37.0	40.2	38.0
Link Distance (m)			339.1	339.1	339.1	744.3	744.3	744.3
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	80.0	80.0						
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

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

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	R	LTR	T	T	TR	L	T	T	T
Maximum Queue (m)	160.6	222.2	127.0	28.2	108.8	94.1	58.3	23.1	68.1	74.7	78.8
Average Queue (m)	99.2	56.8	37.8	11.5	62.1	47.6	29.5	6.1	39.4	42.5	45.5
95th Queue (m)	154.1	166.5	81.8	24.0	93.8	81.3	54.2	16.8	62.4	67.2	71.4
Link Distance (m)		434.1		85.8	183.3	183.3	183.3		339.1	339.1	339.1
Upstream Blk Time (%)		0									
Queuing Penalty (veh)		0									
Storage Bay Dist (m)	130.0		130.0					30.0			
Storage Blk Time (%)	6	0	0					0	15		
Queuing Penalty (veh)	37	2	0					0	4		

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

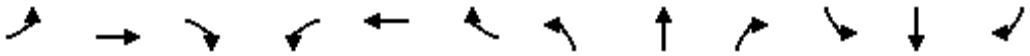
Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (m)	53.2	44.8	99.7	60.1	59.8	75.0	71.4
Average Queue (m)	29.3	20.0	49.9	27.1	23.1	41.2	40.8
95th Queue (m)	47.5	38.4	83.1	47.5	45.3	65.7	62.3
Link Distance (m)	387.2	387.2		301.3	301.3	764.7	764.7
Upstream Blk Time (%)							
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)	41.6	24.5	15.6	23.0	20.6	85.2	73.7	24.9	64.4	66.8
Average Queue (m)	17.1	10.7	4.7	7.3	5.1	35.6	23.4	8.2	27.1	30.5
95th Queue (m)	34.2	19.6	13.1	19.0	14.8	67.3	55.6	19.5	56.2	58.3
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 (%)				3	0					
Queuing Penalty (veh)				1	0					

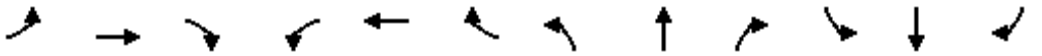
Network Summary

Network wide Queuing Penalty: 50



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	4	299	222	1259	446	69	172	0	690	74	0	10
Future Volume (veh/h)	4	299	222	1259	446	69	172	0	690	74	0	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	325	241	1368	485	75	187	0	750	80	0	11
Approach Volume (veh/h)		570			1928			937			91	
Crossing Volume (veh/h)		1448#			191			409			2040#	
High Capacity (veh/h)		429			1193			1004			259	
High v/c (veh/h)		1.33			1.62			0.93			0.35	
Low Capacity (veh/h)		319			987			817			182	
Low v/c (veh/h)		1.78			1.95			1.15			0.50	

Intersection Summary				
Maximum v/c High	1.62			
Maximum v/c Low	1.95			
Intersection Capacity Utilization	130.6%	ICU Level of Service	H	
# Crossing flow exceeds 1200, method is not applicable				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	177	211	175	102	218	126	875	143	132	492	5
Future Volume (vph)	30	177	211	175	102	218	126	875	143	132	492	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	0.91	1.00	1.00	0.91	
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	4347	1521	1370	4217	
Flt Permitted	0.68	1.00	1.00	0.50	1.00	1.00	0.42	1.00	1.00	0.25	1.00	
Satd. Flow (perm)	1066	3336	1365	791	2746	1365	516	4347	1521	356	4217	
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	197	234	194	113	242	140	972	159	147	547	6
RTOR Reduction (vph)	0	0	203	0	0	192	0	0	76	0	0	0
Lane Group Flow (vph)	33	197	31	194	113	50	140	972	83	147	553	0
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)	22.9	17.8	17.8	37.1	28.0	28.0	80.7	70.4	70.4	80.1	70.1	
Effective Green, g (s)	22.9	17.8	17.8	37.1	28.0	28.0	80.7	70.4	70.4	80.1	70.1	
Actuated g/C Ratio	0.17	0.13	0.13	0.27	0.21	0.21	0.60	0.52	0.52	0.59	0.52	
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)	196	439	179	299	569	283	357	2266	793	286	2189	
v/s Ratio Prot	0.01	0.06		c0.07	0.04		0.03	0.22		c0.04	0.13	
v/s Ratio Perm	0.02		0.02	c0.10		0.04	0.20		0.05	c0.27		
v/c Ratio	0.17	0.45	0.17	0.65	0.20	0.18	0.39	0.43	0.10	0.51	0.25	
Uniform Delay, d1	47.6	54.1	52.1	40.8	44.2	44.0	12.4	19.9	16.3	12.9	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	1.5	1.0	4.8	0.4	0.6	0.7	0.6	0.3	1.6	0.3	
Delay (s)	48.0	55.6	53.0	45.6	44.6	44.7	13.2	20.5	16.6	14.5	18.2	
Level of Service	D	E	D	D	D	D	B	C	B	B	B	
Approach Delay (s)		53.8			45.0			19.2			17.4	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	342	0	1018	0	0	1243
Future Volume (vph)	342	0	1018	0	0	1243
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		0.91			0.91
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3314		4569			4696
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3314		4569			4696
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	364	0	1083	0	0	1322
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	364	0	1083	0	0	1322
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		2735			2811
v/s Ratio Prot	c0.11		0.24			c0.28
v/s Ratio Perm						
v/c Ratio	0.56		0.40			0.47
Uniform Delay, d1	22.4		6.5			6.9
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.0		0.4			0.6
Delay (s)	23.4		7.0			7.5
Level of Service	C		A			A
Approach Delay (s)	23.4		7.0			7.5
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	12.6
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	18	451	34	0	22	0	1345	23	25	992	0
Future Volume (vph)	122	18	451	34	0	22	0	1345	23	25	992	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			0.91		1.00	0.91	
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	1449	1439		1624			4774		1452	4785	
Flt Permitted	0.95	1.00	1.00		0.97			1.00		0.10	1.00	
Satd. Flow (perm)	1398	1449	1439		1624			4774		147	4785	
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	1494	26	28	1102	0
RTOR Reduction (vph)	0	186	186	0	57	0	0	1	0	0	0	0
Lane Group Flow (vph)	136	74	75	0	5	0	0	1519	0	28	1102	0
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	252	250		131			2244		115	2540	
v/s Ratio Prot	c0.10	0.05			c0.00			c0.32		0.01	c0.23	
v/s Ratio Perm			0.05							0.12		
v/c Ratio	0.56	0.29	0.30		0.04			0.68		0.24	0.43	
Uniform Delay, d1	35.4	33.6	33.7		39.6			19.3		12.6	13.4	
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.7	0.7		0.1			1.7		1.1	0.5	
Delay (s)	38.2	34.3	34.4		39.8			20.9		13.7	13.9	
Level of Service	D	C	C		D			C		B	B	
Approach Delay (s)		35.1			39.8			20.9			13.9	
Approach LOS		D			D			C			B	

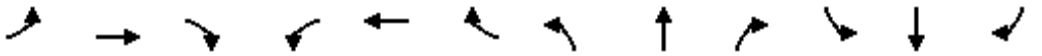
Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	93.6	Sum of lost time (s)	23.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	830	154	708	0	0	974
Future Volume (vph)	830	154	708	0	0	974
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)	3314	1448	3180			3268
Flt 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	164	753	0	0	1036
RTOR Reduction (vph)	0	42	0	0	0	0
Lane Group Flow (vph)	883	122	753	0	0	1036
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)	22.9	22.9	28.8			28.8
Effective Green, g (s)	22.9	22.9	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)	1180	515	1424			1463
v/s Ratio Prot	c0.27		0.24			c0.32
v/s Ratio Perm		0.08				
v/c Ratio	0.75	0.24	0.53			0.71
Uniform Delay, d1	18.2	14.6	12.8			14.4
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	2.6	0.2	1.4			2.9
Delay (s)	20.8	14.8	14.3			17.3
Level of Service	C	B	B			B
Approach Delay (s)	19.9		14.3			17.3
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	64.3	Sum of lost time (s)	12.6
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	32	386	45	0	45	0	1027	25	25	1484	0
Future Volume (vph)	117	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	
Frt	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)	130	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)	130	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	0.58	0.68	0.55	0.43		0.04		0.67		0.16	0.84	
Uniform Delay, d1	42.6	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	3.8	7.5	2.7	2.6		0.2		2.1		0.4	4.6	
Delay (s)	46.4	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)		47.6			49.7			21.2			22.9	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.2	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: 1: Tremaine Road/Dublin Line & Campbellville Road /James Snow Parkway

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	R	LT	R	LT	R	LTR
Maximum Queue (m)	71.6	29.5	940.3	935.3	89.6	160.7	70.5
Average Queue (m)	27.1	14.1	917.2	898.8	19.8	79.3	23.5
95th Queue (m)	52.0	24.0	933.2	1032.6	79.2	168.3	53.1
Link Distance (m)	622.3	622.3	1788.0	1788.0	764.7	764.7	71.8
Upstream Blk Time (%)							3
Queuing Penalty (veh)							0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	T
Maximum Queue (m)	26.2	39.5	41.2	40.4	84.4	38.5	40.4	58.3	63.5	104.4	69.8	73.3
Average Queue (m)	6.6	19.0	22.5	20.6	45.2	14.8	13.0	25.5	23.8	38.8	39.1	38.0
95th Queue (m)	18.5	35.7	35.6	34.5	74.9	30.3	29.9	46.4	48.0	81.3	65.6	67.5
Link Distance (m)		1788.0	1788.0			728.6	728.6			744.3	744.3	744.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	80.0			115.0	85.0			35.0	35.0			
Storage Blk Time (%)					0		1	4	3	9		
Queuing Penalty (veh)					0		2	2	10	11		

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	TR
Maximum Queue (m)	29.2	55.6	49.0	51.2	45.4
Average Queue (m)	7.5	21.2	23.6	25.2	13.5
95th Queue (m)	19.9	41.7	42.3	44.1	33.0
Link Distance (m)	744.3		994.0	994.0	994.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		75.0			
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Intersection: 3: Regional Road 25 & Hwy 401 Westbound Off-Ramp

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	T	T	T	T	T	T
Maximum Queue (m)	44.8	54.0	57.7	56.2	57.0	50.5	55.8	51.5
Average Queue (m)	18.5	32.0	26.7	23.9	22.5	24.2	25.5	23.0
95th Queue (m)	37.8	48.3	48.7	45.6	45.9	41.9	46.3	42.2
Link Distance (m)			339.1	339.1	339.1	744.3	744.3	744.3
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	80.0	80.0						
Storage Blk Time (%)								
Queuing Penalty (veh)								

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

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	R	LTR	T	T	TR	L	T	T	T
Maximum Queue (m)	74.9	58.0	54.8	34.0	122.4	106.8	68.6	20.1	53.9	64.1	62.9
Average Queue (m)	30.8	30.0	24.1	12.2	65.0	51.0	27.6	6.2	28.5	31.4	35.4
95th Queue (m)	58.2	49.0	44.1	25.3	104.7	90.3	57.9	16.1	48.6	54.7	56.6
Link Distance (m)		434.1		85.8	183.3	183.3	183.3		339.1	339.1	339.1
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	130.0		130.0					30.0			
Storage Blk Time (%)								0	6		
Queuing Penalty (veh)								0	1		

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

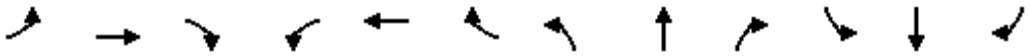
Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (m)	84.4	74.6	37.7	71.2	78.3	52.4	51.4
Average Queue (m)	50.1	43.9	15.9	38.2	39.1	27.3	27.1
95th Queue (m)	73.7	66.9	30.7	64.8	66.9	45.6	44.0
Link Distance (m)	387.2	387.2		301.3	301.3	764.7	764.7
Upstream Blk Time (%)							
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)	65.0	60.6	58.8	30.7	28.5	95.8	86.7	18.9	98.0	101.0
Average Queue (m)	30.7	33.3	29.0	11.9	8.8	56.7	43.1	4.8	52.5	57.5
95th Queue (m)	57.0	53.7	50.8	24.5	20.3	87.4	77.8	14.3	86.7	90.3
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 (%)				5	1				0	
Queuing Penalty (veh)				2	0				0	

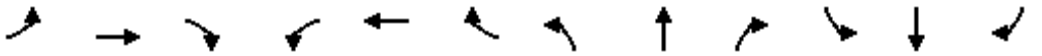
Network Summary

Network wide Queuing Penalty: 30



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	4	299	222	1259	446	18	172	51	690	23	51	10
Future Volume (veh/h)	4	299	222	1259	446	18	172	51	690	23	51	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	325	241	1368	485	20	187	55	750	25	55	11
Approach Volume (veh/h)		570			1873			992			91	
Crossing Volume (veh/h)		1448#			246			354			2040#	
High Capacity (veh/h)		429			1142			1049			259	
High v/c (veh/h)		1.33			1.64			0.95			0.35	
Low Capacity (veh/h)		319			941			857			182	
Low v/c (veh/h)		1.78			1.99			1.16			0.50	

Intersection Summary				
Maximum v/c High	1.64			
Maximum v/c Low	1.99			
Intersection Capacity Utilization	127.2%	ICU Level of Service	H	
# Crossing flow exceeds 1200, method is not applicable				



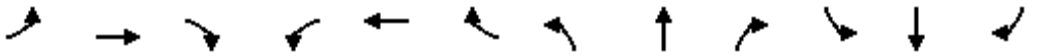
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	177	160	175	102	218	75	875	143	132	492	5
Future Volume (vph)	30	177	160	175	102	218	75	875	143	132	492	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane 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	0.91	1.00	1.00	0.91	
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	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	4347	1499	1370	4217	
Flt Permitted	0.68	1.00	1.00	0.49	1.00	1.00	0.43	1.00	1.00	0.24	1.00	
Satd. Flow (perm)	1066	3336	1365	788	2746	1365	527	4347	1499	350	4217	
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	197	178	194	113	242	83	972	159	147	547	6
RTOR Reduction (vph)	0	0	155	0	0	192	0	0	76	0	0	0
Lane Group Flow (vph)	33	197	23	194	113	50	83	972	83	147	553	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)	22.5	17.4	17.4	36.7	27.6	27.6	79.1	70.1	70.1	81.1	71.1	
Effective Green, g (s)	22.5	17.4	17.4	36.7	27.6	27.6	79.1	70.1	70.1	81.1	71.1	
Actuated g/C Ratio	0.17	0.13	0.13	0.27	0.21	0.21	0.59	0.52	0.52	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)	194	432	176	297	564	280	352	2268	782	287	2232	
v/s Ratio Prot	0.01	0.06		c0.07	0.04		0.02	0.22		c0.04	0.13	
v/s Ratio Perm	0.02		0.02	c0.10		0.04	0.12		0.06	c0.27		
v/c Ratio	0.17	0.46	0.13	0.65	0.20	0.18	0.24	0.43	0.11	0.51	0.25	
Uniform Delay, d1	47.6	54.1	51.8	40.8	44.2	44.0	12.2	19.8	16.2	12.4	17.1	
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	1.6	0.7	5.1	0.4	0.6	0.3	0.6	0.3	1.5	0.3	
Delay (s)	48.0	55.7	52.5	45.9	44.6	44.6	12.6	20.4	16.5	13.9	17.4	
Level of Service	D	E	D	D	D	D	B	C	B	B	B	
Approach Delay (s)		53.7			45.1			19.3			16.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	134.3	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			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	342	0	1017	0	0	1194
Future Volume (vph)	342	0	1017	0	0	1194
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		0.91			0.91
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3314		4569			4696
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3314		4569			4696
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	364	0	1082	0	0	1270
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	364	0	1082	0	0	1270
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		2735			2811
v/s Ratio Prot	c0.11		0.24			c0.27
v/s Ratio Perm						
v/c Ratio	0.56		0.40			0.45
Uniform Delay, d1	22.4		6.5			6.8
Progression Factor	1.00		1.00			1.00
Incremental Delay, d2	1.0		0.4			0.5
Delay (s)	23.4		7.0			7.3
Level of Service	C		A			A
Approach Delay (s)	23.4		7.0			7.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	12.6
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



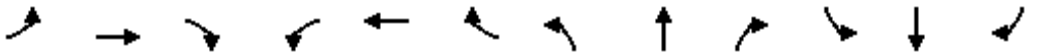
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	18	451	34	0	22	0	1345	23	25	992	0
Future Volume (vph)	121	18	451	34	0	22	0	1345	23	25	992	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	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			0.91		1.00	0.91	
Frpb, 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			4774		1452	4785	
Flt Permitted	0.95	1.00	1.00		0.97			1.00		0.10	1.00	
Satd. Flow (perm)	1398	1432	1420		1624			4774		147	4785	
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)	134	20	501	38	0	24	0	1494	26	28	1102	0
RTOR Reduction (vph)	0	186	186	0	57	0	0	1	0	0	0	0
Lane Group Flow (vph)	134	74	75	0	5	0	0	1519	0	28	1102	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)	16.2	16.2	16.2		7.6			44.0		49.7	49.7	
Effective Green, g (s)	16.2	16.2	16.2		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)	242	248	246		132			2246		115	2543	
v/s Ratio Prot	c0.10	0.05			c0.00			c0.32		0.01	c0.23	
v/s Ratio Perm			0.05							0.12		
v/c Ratio	0.55	0.30	0.30		0.04			0.68		0.24	0.43	
Uniform Delay, d1	35.3	33.7	33.7		39.6			19.2		12.5	13.3	
Progression Factor	1.00	1.00	1.00		1.00			1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.7	0.7		0.1			1.7		1.1	0.5	
Delay (s)	38.1	34.4	34.4		39.7			20.9		13.6	13.9	
Level of Service	D	C	C		D			C		B	B	
Approach Delay (s)		35.2			39.7			20.9			13.9	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	93.5	Sum of lost time (s)	23.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (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
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3314	1448	3180			3268
Flt 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, d1	18.1	15.1	13.1			14.9
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	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



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	
Frt	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: 1: Tremaine Road/Dublin Line & Campbellville Road /James Snow Parkway

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	R	LT	R	LT	R	LTR
Maximum Queue (m)	60.4	29.9	952.6	928.4	71.0	151.1	26.4
Average Queue (m)	26.4	14.2	920.8	888.0	18.2	67.1	8.8
95th Queue (m)	47.1	24.4	940.8	1040.0	50.1	135.5	20.5
Link Distance (m)	622.3	622.3	1788.0	1788.0	764.7	764.7	71.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	T
Maximum Queue (m)	29.1	39.0	38.5	32.3	83.0	37.8	48.9	66.9	46.8	82.0	80.5	77.2
Average Queue (m)	6.6	19.5	22.1	16.6	41.3	16.1	14.1	26.0	14.1	36.9	37.7	35.5
95th Queue (m)	18.9	35.2	35.1	27.7	72.9	32.0	34.2	49.3	33.3	67.3	68.4	67.6
Link Distance (m)		1788.0	1788.0			728.6	728.6			744.3	744.3	744.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	80.0			115.0	85.0			35.0	35.0			
Storage Blk Time (%)					0		1	4	1	9		
Queuing Penalty (veh)					0		2	2	3	7		

Intersection: 2: Regional Road 25 & James Snow Parkway

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	TR
Maximum Queue (m)	25.7	49.9	46.8	47.2	42.1
Average Queue (m)	7.2	21.4	22.0	23.8	12.6
95th Queue (m)	18.6	42.3	39.4	42.1	31.6
Link Distance (m)	744.3		994.0	994.0	994.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		75.0			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Regional Road 25 & Hwy 401 Westbound Off-Ramp

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	T	T	T	T	T	T
Maximum Queue (m)	47.9	55.4	51.5	54.0	55.5	47.1	49.8	46.0
Average Queue (m)	18.1	32.2	23.3	24.4	22.3	24.1	25.0	21.9
95th Queue (m)	38.2	49.3	44.3	46.9	47.0	40.2	43.0	40.0
Link Distance (m)			339.1	339.1	339.1	744.3	744.3	744.3
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	80.0	80.0						
Storage Blk Time (%)								
Queuing Penalty (veh)								

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

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	R	LTR	T	T	TR	L	T	T	T
Maximum Queue (m)	72.2	55.3	53.4	30.9	112.0	99.2	67.7	23.8	59.6	63.6	69.0
Average Queue (m)	28.9	28.2	22.8	13.2	62.9	50.0	26.1	6.6	28.3	31.1	35.1
95th Queue (m)	56.9	45.9	41.6	27.4	100.2	87.8	57.9	16.9	49.8	54.3	59.4
Link Distance (m)		434.1		85.8	183.3	183.3	183.3		339.1	339.1	339.1
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	130.0		130.0					30.0			
Storage Blk Time (%)								0	6		
Queuing Penalty (veh)								0	2		

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)	78.6	73.0	49.1	71.7	74.8	61.2	52.6
Average Queue (m)	49.3	43.9	20.4	37.9	39.4	30.9	30.2
95th Queue (m)	69.6	66.3	37.8	65.3	66.9	51.9	47.4
Link Distance (m)	387.2	387.2		301.3	301.3	764.7	764.7
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)	71.7	61.6	57.3	32.3	31.0	94.6	84.1	22.4	94.3	96.9
Average Queue (m)	31.9	33.0	26.8	11.8	8.6	54.8	42.6	5.0	49.7	55.5
95th Queue (m)	60.6	53.8	49.9	25.5	20.2	86.0	75.1	15.0	82.5	87.5
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 (%)				5	1					
Queuing Penalty (veh)				2	0					

Network Summary

Network wide Queuing Penalty: 18

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

Filename: 10108_Milton Quarry_v3_20221216_90percent.j9
Path: G:\Projects\2021\10108 - Milton Quarry Expansion TIS\03 Analysis\04 ARCADY\01 RTC Volume Update
Report generation date: 2022-12-16 4:34:34 PM

Summary of intersection performance

	AM						PM					
	95% Queue (Veh)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	95% Queue (Veh)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	90% Intercept Adjustment - 2021 Existing											
1 - James Snow Parkway	1.1	2.36	0.22	A	3.45	A	0.5	1.77	0.20	A	2.39	A
2 - Dublin Line	1.1	6.67	0.27	A			0.5	5.07	0.12	A		
3 - Campbellville Road	0.5	2.26	0.20	A			0.5	2.26	0.16	A		
4 - Tremaine Road	~1	0.00	0.00	A			~1	0.00	0.00	A		
	90% Intercept Adjustment - 2026 Total											
1 - James Snow Parkway	1.5	3.07	0.49	A	5.22	A	6.9	5.42	0.75	A	6.79	A
2 - Dublin Line	2.3	13.82	0.43	B			3.6	39.25	0.52	E		
3 - Campbellville Road	1.4	4.77	0.52	A			1.4	7.35	0.55	A		
4 - Tremaine Road	1.2	5.22	0.22	A			0.5	4.16	0.18	A		

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

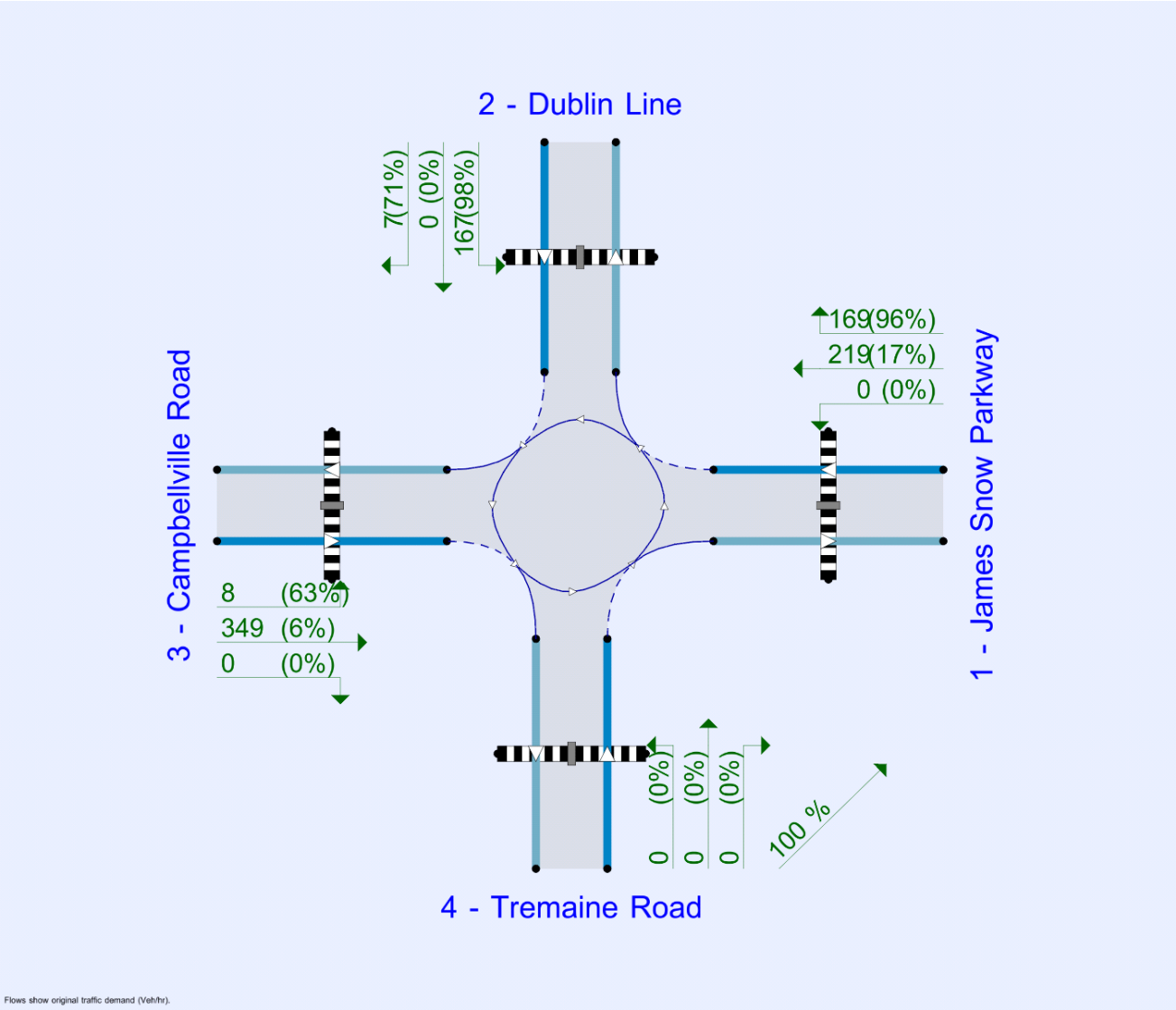
File summary

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



The intersection diagram reflects the last run of Intersections.

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)	I' - 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	5.22	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	✓	998	100.000
2 - Dublin Line		PHF	✓	174	100.000
3 - Campbellville Road		PHF	✓	722	100.000
4 - Tremaine Road		PHF	✓	890	100.000

Peak Hour Factor Data (Traffic)

Leg	Hourly volume (Veh/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	998	0.89	SecondQuarter
2 - Dublin Line	174	0.89	SecondQuarter
3 - Campbellville Road	722	0.89	SecondQuarter
4 - Tremaine Road	890	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	254	575
	2 - Dublin Line	167	0	7	0
	3 - Campbellville Road	405	8	0	309
	4 - Tremaine Road	712	0	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	96	17	2
	2 - Dublin Line	98	0	71	0
	3 - Campbellville Road	6	63	0	2
	4 - Tremaine Road	2	0	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	0.49	3.07	1.0	1.5	A	998	998
2 - Dublin Line	0.43	13.82	0.7	2.3	B	174	174
3 - Campbellville Road	0.52	4.77	1.1	1.4	A	722	722
4 - Tremaine Road	0.22	5.22	0.3	1.2	A	890	178

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	6.79	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	✓	1774	100.000
2 - Dublin Line		PHF	✓	84	100.000
3 - Campbellville Road		PHF	✓	525	100.000
4 - Tremaine Road		PHF	✓	862	100.000

Peak Hour Factor Data (Traffic)

Leg	Hourly volume (Veh/hr)	Peak hour factor	Peak time segment
1 - James Snow Parkway	1774	0.89	SecondQuarter
2 - Dublin Line	84	0.89	SecondQuarter
3 - Campbellville Road	525	0.89	SecondQuarter
4 - Tremaine Road	862	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	446	1259
	2 - Dublin Line	74	0	10	0
	3 - Campbellville Road	299	4	0	222
	4 - Tremaine Road	690	0	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	78	6	2
	2 - Dublin Line	73	0	20	0
	3 - Campbellville Road	22	50	0	2
	4 - Tremaine Road	2	0	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	0.75	5.42	3.0	6.9	A	1774	1774
2 - Dublin Line	0.52	39.25	1.0	3.6	E	84	84
3 - Campbellville Road	0.55	7.35	1.2	1.4	A	525	525
4 - Tremaine Road	0.18	4.16	0.2	0.5	A	862	172

Attachment **6**

TYLin

Table 3 2026 Future Traffic Operations – Queues

Intersection	Control Type	Available Storage (m)	Existing Haul Route				Future Haul Route			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Turning Movement	**-**	**-**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**
Tremaine Road at Highway 401 Westbound Off-Ramp	**Signal**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Westbound Left	-	970	47	30	74	50	58	29	70	49
Westbound Right	-	230	56	33	31	16	83	50	38	20
Northbound Through	-	300	46	27	67	39	48	27	67	39
Southbound Through		>300	42	26	46	27	66	41	52	31
Tremaine Road at Highway 401 Eastbound Off-Ramp	**Signal**	-	-	-	-	-	-	-	-	-
Eastbound Left	-	300	34	18	57	31	34	17	61	32
Eastbound Through / Right	-	975	19	11	54	33	20	11	54	33
Eastbound Right	-	165	13	5	51	29	13	5	50	27
Westbound Left	-	50	19	7	25	12	19	7	26	12
Westbound Right	-	20	15	5	20	8	15	5	20	9
Northbound Through	-	370	65	36	87	57	67	36	86	55
Northbound Through / Right	-	370	53	23	78	43	56	23	75	43
Southbound Left	-	120	18	7	14	5	20	8	15	5
Southbound Through	-	300	52	28	90	58	58	31	88	56
Regional Road 25 / James Snow Parkway	**Signal**	-	-	-	-	-	-	-	-	-
Eastbound Left	-	80	13	3	19	7	15	5	19	7
Eastbound Through	-		21	9	36	23	21	9	35	22
Eastbound Right	-	115	39	23	35	21	19	7	28	17

TYLin

Intersection	Control Type	Available Storage (m)	Existing Haul Route				Future Haul Route			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Turning Movement	**-**	**-**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**
Westbound Left	-	85	43	20	75	45	40	19	73	41
Westbound Through	-	-	32	17	30	15	31	17	34	16
Westbound Right	-	35	25	12	**46**	26	24	11	**49**	26
Northbound Left	-	35	**69**	**39**	**48**	24	**37**	18	33	14
Northbound Through	-	-	45	22	81	39	46	23	68	38
Northbound Right	-	-	62	23	20	8	48	22	19	7
Southbound Left	-	75	62	34	42	21	55	29	42	21
Southbound Through	-	-	43	22	44	25	41	20	42	24
Southbound Through / Right	-	-	35	15	33	14	32	12	32	13
Regional Road 25 / Highway 401 Westbound Off-Ramp	**Signal**	-	-	-	-	-	-	-	-	-
Westbound Left	-	80 (390)	51	33	48	32	52	34	49	32
Northbound Through	-	-	41	21	49	27	46	24	47	24
Southbound Through	-	-	44	24	46	26	40	22	43	25
Regional Road 25 / Highway 401 Eastbound Off-Ramp	**Signal**	-	-	-	-	-	-	-	-	-
Eastbound Left	-	130 (470)	**141**	94	58	31	**154**	99	57	29
Eastbound Through / Right	-	- (470)	100	43	49	30	167	57	46	28
Eastbound Right	-	130 (240)	59	33	44	24	82	38	42	23
Westbound Left / Through / Right	-	-	26	12	25	12	24	12	27	13
Northbound Through	-	-	98	65	105	65	94	62	100	63
Northbound Through / Right	-	-	55	28	58	28	54	30	58	26

TYLin

Intersection	Control Type	Available Storage (m)	Existing Haul Route				Future Haul Route			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Turning Movement	**-**	**-**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**	**95th % Queue (m)**	**50th % Queue (m)**
Southbound Left	-	30	19	7	16	6	17	6	17	7
Southbound Through	-	-	73	46	57	35	71	46	59	35

Attachment **7**

TYLin

Table 4 2026 Future Traffic Operations – Roundabout Queues

Intersection	Control Type	Available Storage (m)	Existing Haul Route				Future Haul Route			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Turning Movement	**-**	**-**	**95th % Queue (veh)**	**95th % Queue (m)**	**95th % Queue (veh)**	**95th % Queue (m)**	**95th % Queue (veh)**	**95th % Queue (m)**	**95th % Queue (veh)**	**95th % Queue (m)**
Dublin Line / Tremaine Road at James Snow Parkway / Campbellville Road	**Round-about**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
James Snow Parkway (Westbound Approach)	-	-	1.5	9	6.9	40	1.8	10	6.2	36
Dublin Line (Southbound Approach)	-	-	2.3	13	3.6	21	2.3	13	3.6	21
Campbellville Road (Eastbound Approach)	-	-	1.4	8	1.4	8	1.4	8	1.4	8
Tremaine Road (Northbound Approach)		-	1.2	7	0.5	3	1.4	8	1.2	7