



paradigm
TRANSPORTATION SOLUTIONS LIMITED

**144 John Street East
Niagara-on-the-Lake, ON
Transportation Impact
Assessment**

Paradigm Transportation Solutions Limited

2026-04
260080



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Project Number
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144 John Street East, Niagara-on-the-Lake Transportation Impact Assessment

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Limitations: Development of traffic impact and transportation planning studies, and reporting recommendations for associated transportation system improvements. **2026-04-20**

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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Assessment for a proposed hotel and residential development in Niagara-on-the-Lake, Ontario. The report is an update to a previous TIS¹ completed for these lands.

This study includes an analysis of existing traffic conditions, a description of the proposed development, five-year traffic forecasts from the study date (2031), and any recommendations required to manage future traffic conditions.

Conclusions

Transportation Study

Based on the analysis completed as part of this Transportation Impact Assessment, the proposed mixed-use development can be accommodated within the existing and future transportation network.

The proposed development is forecast to generate approximately 138, 244, and 254 new vehicle trips during the weekday AM, weekday PM, and Saturday peak hours, respectively, after accounting for internal trip capture associated with the site's mixed-use nature. These volumes represent a moderate increase in traffic and are not anticipated to significantly impact the overall operation of the surrounding road network.

Under the 2031 total traffic scenario, the majority of study area intersections are expected to operate at acceptable levels of service (LOS A to C), with minimal increases in delay. While the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street is anticipated to experience ongoing operational constraints, these are reflective of existing and background conditions, with the proposed development contributing only a marginal additional impact.

From an access perspective, the proposed design of Ritz Carlton Lane as a private roadway connection to John Street East has been developed to address the intent of the Ontario Land Tribunal decision and to align with Niagara-on-the-Lake Municipal Engineering Standards and the Transportation Association of Canada Guidelines.

¹ 230116: 200 John St E/588 Charlotte Ave, Transportation Impact Study, Niagara-on-the-Lake, Paradigm, February 2024



The inclusion of 9.0 m curb radii, an approximate 7.0 m pavement width, and a driveway separation of approximately 14.8 m from the adjacent access are considered to satisfy the functional requirements for safe and efficient operations, including vehicle maneuverability and sightline protection.

In addition, the proposed access locations have been demonstrated to meet or exceed applicable stopping and intersection sight distance requirements. The provision of appropriate throat lengths and internal connectivity between the residential and hotel components further supports efficient on-site circulation and reduces the potential for queuing impacts on John Street East.

The development meets NOTL MES Section 3.14 by providing two public roadway access points, ensuring emergency access and network redundancy. The hotel and residential building will have a full sprinkler system, which reduces fire risk by controlling fires early and decreasing reliance on fire department intervention.

Subject to the implementation of targeted improvements, including the provision of pedestrian visibility measures at access points (visibility triangles) and consideration of enhanced pedestrian crossing opportunities in the vicinity of the site, the transportation impacts associated with the proposed development are considered acceptable.

Parking Study

The Town of Niagara-on-the-Lake Zoning By-law 4316-09 identifies a theoretical parking requirement of 488 spaces when standard rates are applied independently to each land use, representing a conservative, non-shared parking scenario. However, the subject lands are governed by site-specific zoning (GC-56), which establishes a minimum requirement of 250 parking spaces for the full build-out of the approved hotel, restaurant, and conference centre uses. The proposed development remains consistent with this framework, with only a minor increase of five hotel rooms (111 total compared to 106 previously approved), resulting in a negligible change in overall parking demand.

A shared parking analysis was carried out to better represent the mixed-use nature of the development. This method recognises the efficiency gained from complementary land uses with differing peak demand times and includes the “captive market” effect, where hotel guests are expected to utilise on-site amenities such as the restaurant, spa, and meeting spaces. The analysis also accounts for driving adjustment factors to reflect realistic travel behaviours, including active transportation and ride-sharing for specific uses. The results demonstrate that peak parking demands do not occur simultaneously



across all uses, allowing for more efficient use of the overall parking supply. Based on this methodology, the adjusted peak parking demand is estimated to be approximately 220 spaces, which can be accommodated within the proposed supply of 222 parking spaces.

This is further supported by secondary source data and industry benchmarks. Application of the Town of Blue Mountains parking rate yields a demand of about 145 spaces, reflecting a comprehensive approach to hotel and ancillary uses. Institute of Transportation Engineers (ITE) data indicates a demand of around 100 spaces based on hotel use alone, increasing to roughly 176 spaces when banquet facilities are included. A local proxy survey of a similar hotel in Niagara-on-the-Lake identified a demand rate of 0.96 spaces per room, equating to about 107 spaces, or around 183 spaces when banquet facilities are considered.

Overall, all analytical methods and comparative data sources show that the proposed parking supply of 222 spaces exceeds expected demand under normal operating conditions. The proposed parking provision aligns with the intent of the site-specific zoning, follows accepted shared parking principles, and is suitable and adequate to meet the anticipated parking needs of the development.

Recommendations

Based on the findings of this study, it is recommended that:

- ▶ A Municipal Class Environmental Assessment or streamlined EA process is recommended to be carried out to determine the preferred improvement option at the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street.
- ▶ Niagara Region review the feasibility of providing an all-way stop as an interim condition to address the current delays and skewed angle of the east leg at the Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street intersection.
- ▶ The Town review the feasibility of providing a pedestrian crossover at the intersection of John Street East and Charlotte Street.
- ▶ The Town approves the proposed parking supply of 222 parking spaces for the hotel component of the proposed development.



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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Assessment for a proposed hotel and residential development in Niagara-on-the-Lake, Ontario. **Figure 1.1** details the subject development location.

1.2 Purpose and Scope

The report is updated from a previous TIS² completed on these lands. This report aims to identify and assess the potential traffic impact of the proposed development and includes:

- ▶ Assessment of the current traffic and site conditions within the study area;
- ▶ Estimates of background traffic growth for five years from the date of the study (2031);
- ▶ Estimates of additional traffic generated by the subject site;
- ▶ Analyses of the impact of future traffic on the surrounding road network; and
- ▶ Recommendations necessary to mitigate the site-generated traffic satisfactorily.

The following intersections were evaluated as part of the study:

- ▶ John Street East at King Street;
- ▶ John Street East at Charlotte Street;
- ▶ Niagara River Parkway/Queen's Parade at John Street East/Ricardo Street; and
- ▶ Niagara Street at Charlotte Street.

² 230116: 200 John St E/588 Charlotte Ave, Transportation Impact Study, Niagara-on-the-Lake, Paradigm, February 2024



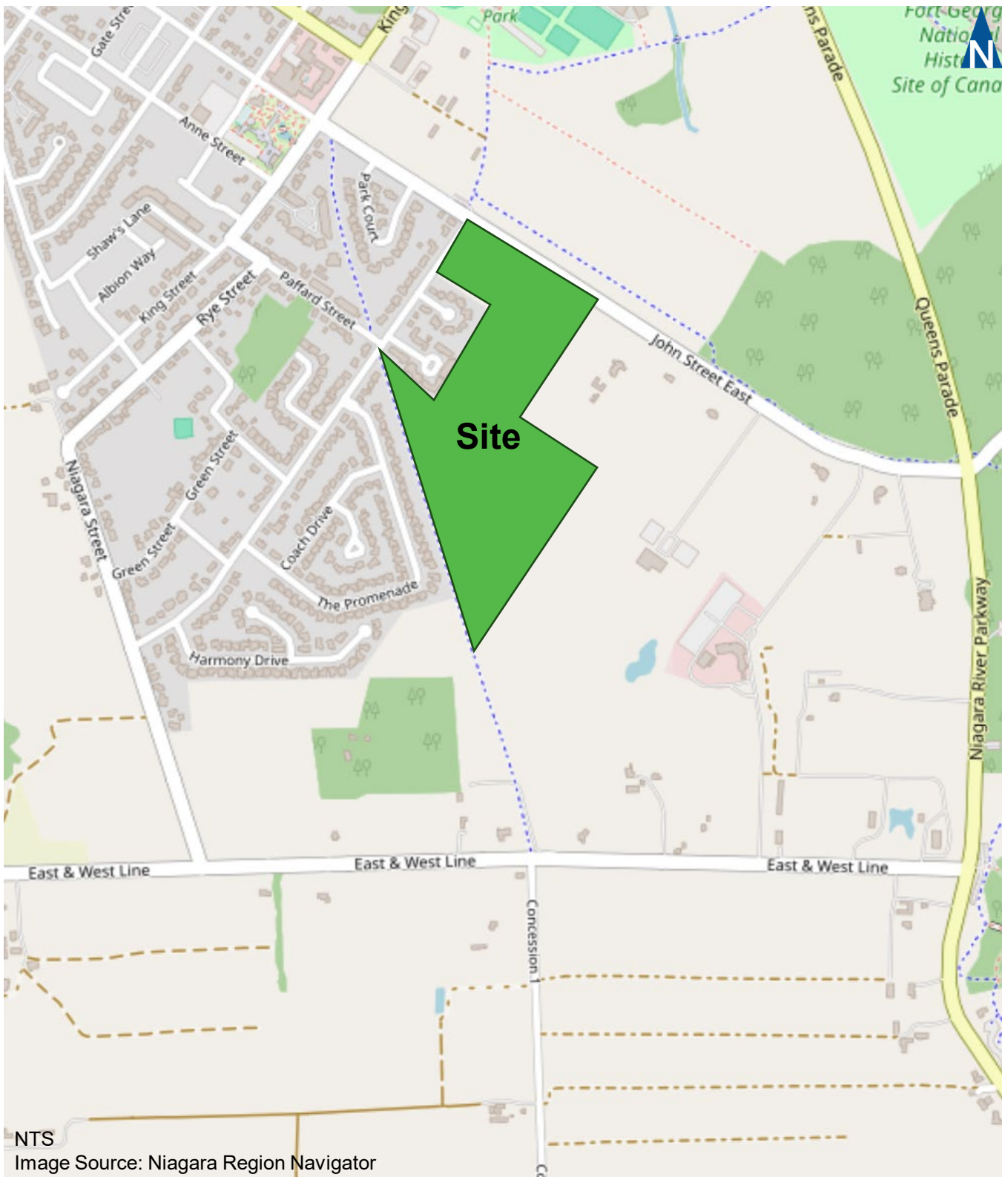


Image Source: Niagara Region Navigator



Subject Site Location

2 Existing Conditions

2.1 Existing Roadways

The main roadways near the subject site considered in assessing the traffic impacts of the proposed development include:

- ▶ Charlotte Street is a northeast-southwest two-lane urban road west of the subject lands, with an assumed speed limit of 50 km/h, as there are no posted speed limit signs. It begins south of John Street East and terminates at Niagara Street to the south. This report will refer to Charlotte Street as a north-south road.
- ▶ Niagara Street is an east-west two-lane rural road located southwest of the subject lands. It transitions from Rye Street to the north to Niagara Street to the south, beginning at Paffard Street and terminating at the East and West Line. A speed limit of 50 km/h is assumed within the study area.
- ▶ John Street East is a northwest-southeast two-lane rural road north of the subject lands. It transitions from John Street West at King Street, northwest of the subject lands and transitions to Ricardo Street at Queens Parade/Niagara Parkway, southeast of the subject lands. John Street East has a posted speed limit of 50 km/h within the study area. For this report, John Street East will be referred to as a west-east road.
- ▶ King Street is a two-lane north-south roadway with a rural cross-section north of John Street West and an urban cross-section south of John Street West. The speed limit is not posted within the study area; therefore, it is assumed to be 50 km/h.
- ▶ Queens Parade/Niagara Parkway is a north-south two-lane rural road east of the subject lands. It transitions from Picton Street to the northwest and terminates in Niagara Falls to the south. Queens Parade/Niagara Parkway has a posted speed limit of 60 km/h within the study area.
- ▶ Ricardo Street is a northwest-southeast two-lane rural road east of the subject lands, with a posted speed limit of 50 km/h. It begins east of Niagara River Parkway and transitions to Front Street at King Street in the north. This report will refer to Ricardo Street as an east-west road.



Figure 2.1 details the existing traffic control and lane configuration at the study area intersections.

2.2 Traffic Volumes

Turning Movement Counts (TMC) are used to quantify the movement of vehicles to assess intersection operations. Existing traffic counts at an intersection or road section form the foundation for analysis. The traffic counts are usually collected during peak periods at an intersection to complete the level of service analysis.

Historical turning movement count data were reviewed for the intersections of John Street East at Niagara River Parkway and John Street East at Charlotte Street, based on available counts collected in 2017 by LEA Consulting³, 2022 by Paradigm⁴, and 2023 by WSP Group⁵. Due to the current project timeline, updated summer-season traffic data could not be collected, which is typically preferred to capture peak seasonal demand in this area.

Notwithstanding, a comparison of the historical datasets indicates that traffic volumes have remained generally stable over approximately the past nine years, with only modest fluctuations observed across the weekday AM, PM, and Saturday peak periods. **Appendix A** contains the historical comparison.

At the Niagara River Parkway intersection, overall traffic volumes have remained relatively stable, particularly during the PM peak hour, with only minor declines observed during the weekday AM and Saturday periods. The intersection continues to experience the highest traffic volumes within the study area, with through movements on the northbound and southbound approaches forming the primary traffic flows. At the Charlotte Street intersection, lower overall traffic volumes are noted, with slight decreases across all peak periods; however, traffic patterns and turning movement distributions have remained generally consistent over time, showing no significant changes in travel behaviour or routing.

Based on this review, the 2022 traffic data collected as part of the previous TIS completed is considered representative of current conditions. It is also noted that, although 2023 data is available, only turning movement diagrams were provided instead of the raw count

³ 18145: 144 & 176 John St and 200 John St and 588 Charlotte St Hotel and Residential Subdivision Development, LEA, November 2017.

⁴ 230116: 200 John Street East and 588 Charlotte Street TIA, Paradigm, February 2024

⁵ WSP Analysis of 144 & 176 John Street, WSP, February 2024

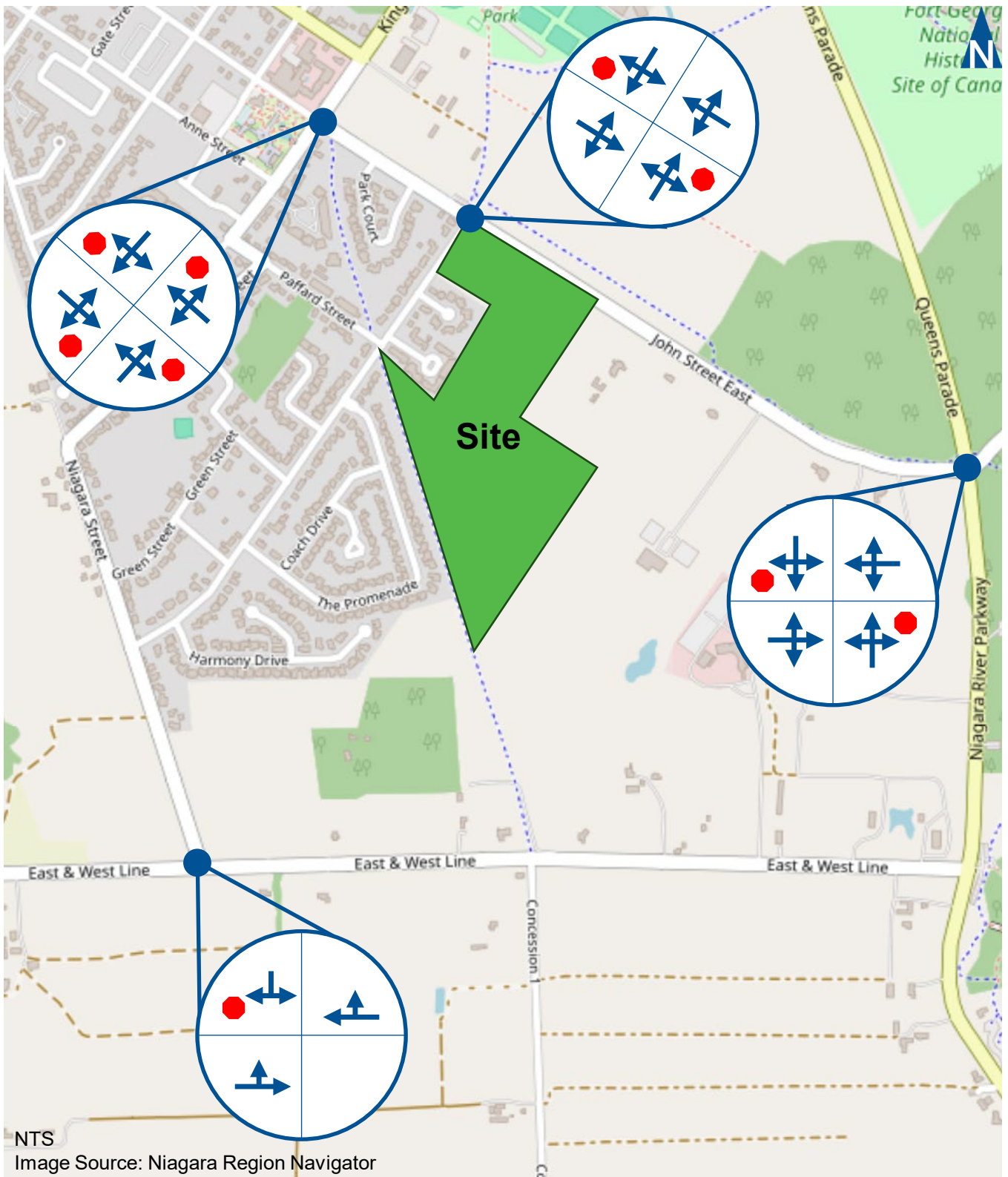


data; therefore, the 2022 dataset was relied upon for detailed analysis to ensure consistency and accuracy in the assessment.

To account for potential future increases in background traffic and to maintain a conservative assessment framework, an annual growth rate of 2% has been applied to traffic count data collected in 2022 to provide a conservative baseline for existing volumes expected in 2026.

Figure 2.2 displays the Weekday and Saturday peak hour turning movement traffic volumes. **Appendix A** contains the detailed traffic counts for study area intersections.

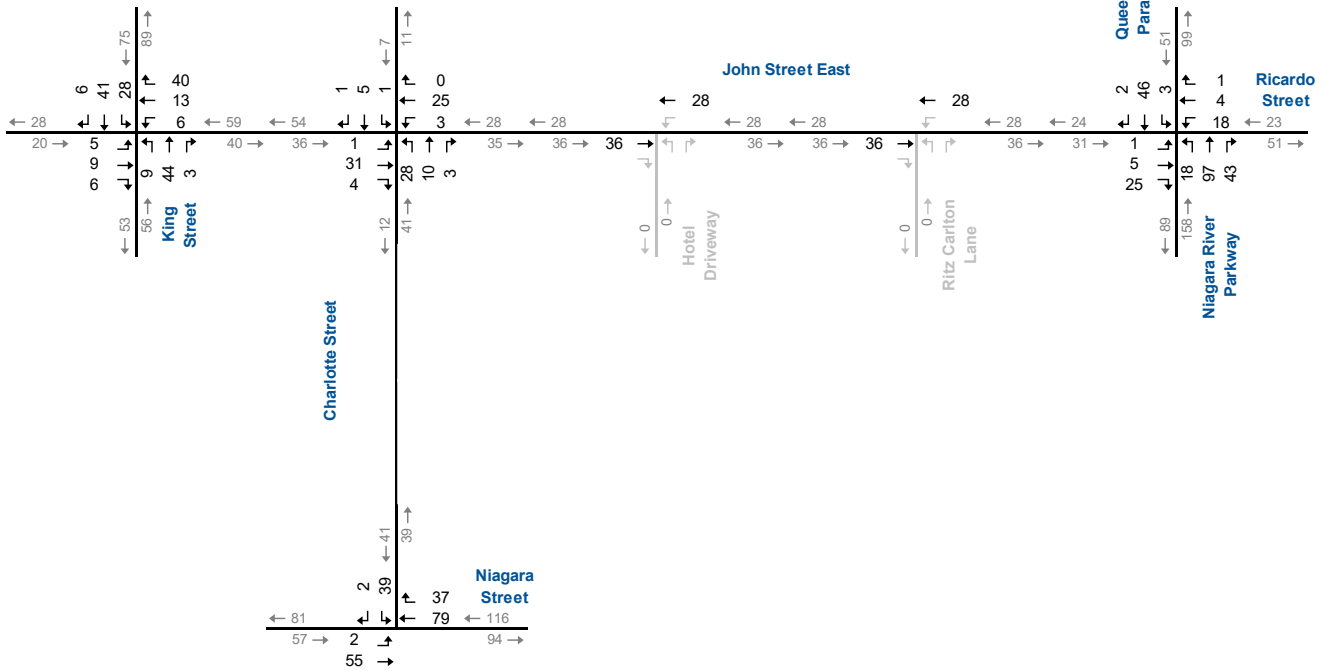




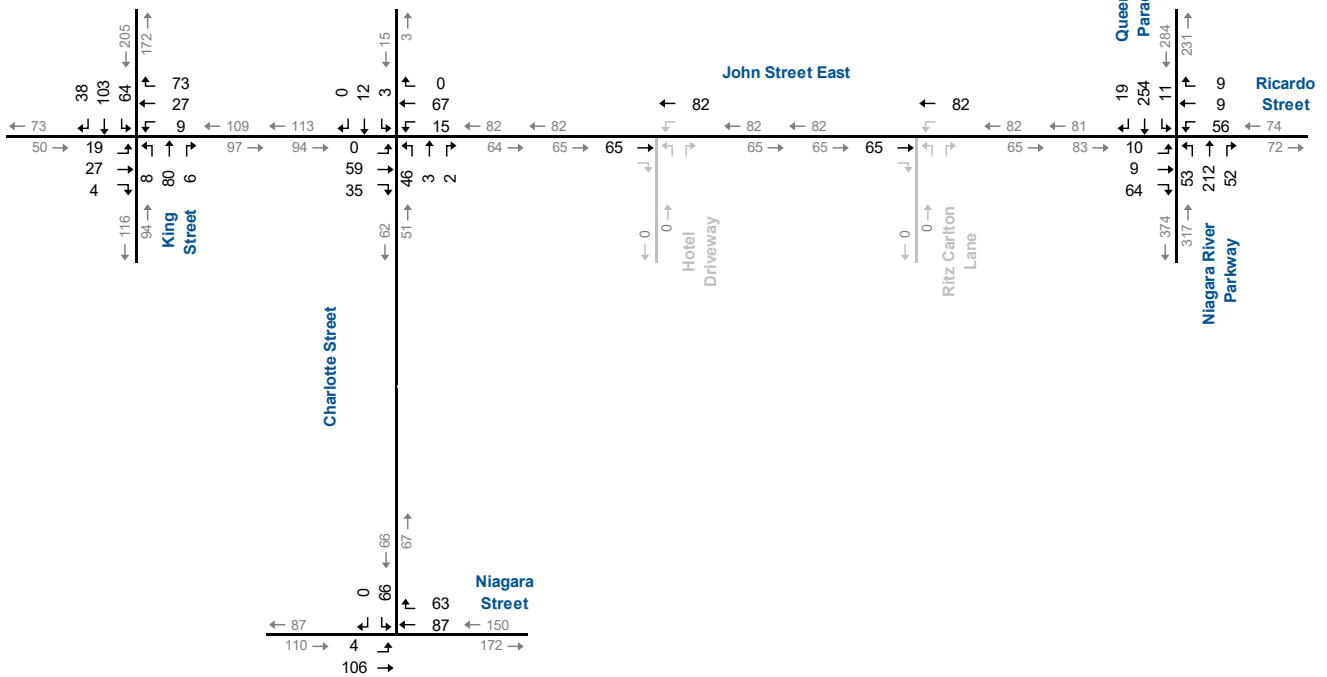
Existing Lane Configuration and Traffic Control



Summer - Weekday AM Peak Hour



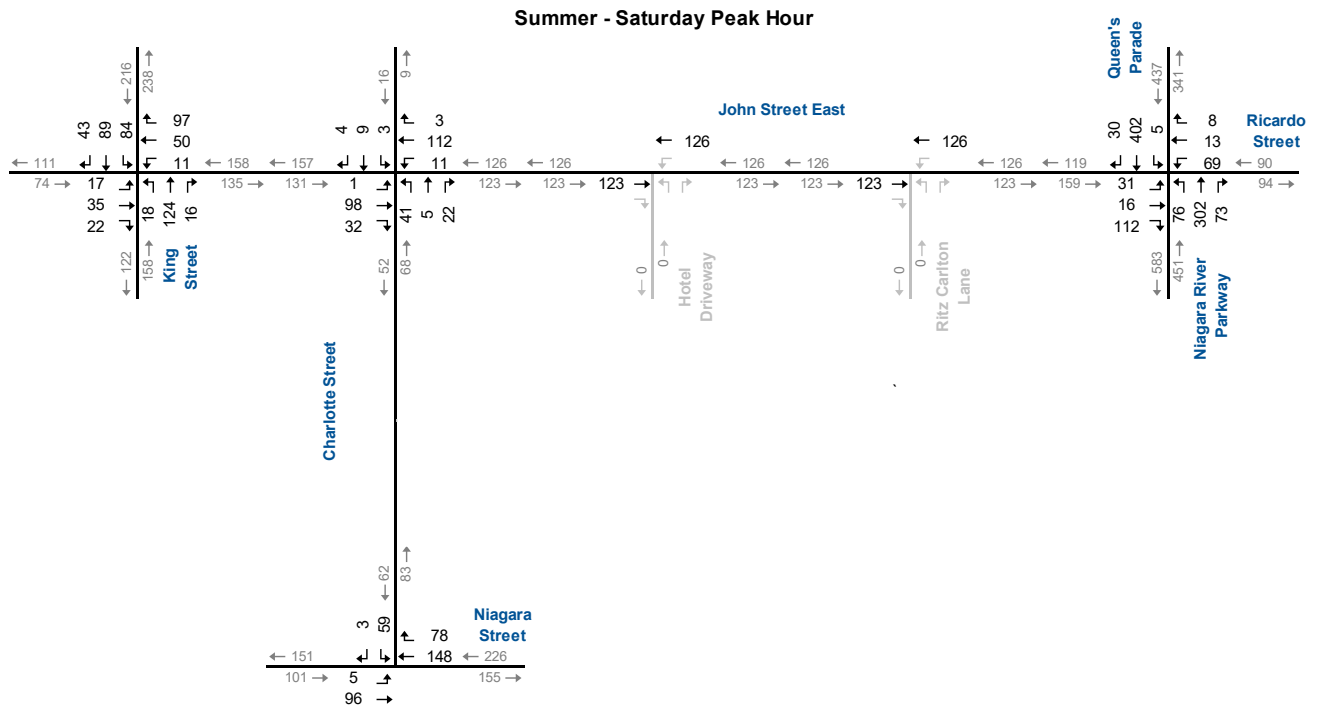
Summer - Weekday PM Peak Hour



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Base Year Traffic Volumes – Weekday Peak Hour



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Base Year Traffic Volumes – Saturday Peak Hour

2.3 Transit Network

Niagara Region Transit offers on-demand transit within Niagara-on-the-Lake. On-Demand Transit is a ridesharing service that allows residents to book a ride by selecting a pick-up and drop-off location within the service zone. Service is provided between 6:00 AM and 10:00 PM from Monday to Saturday.

There are no fixed-route bus stops close to the subject site.

2.4 Pedestrian and Cycling Network

2.4.1 Pedestrians

Pedestrian infrastructure typically consists of sidewalks or multi-use paths parallel to the roadway.

Pedestrian infrastructure within the study area consists of sidewalks on one side of the road along John Street East and Charlotte Street. King Street provides sidewalks on both sides of the road, south of John Street and one side of the road north of John Street East.

John Street East, within the study area, contains a substandard sidewalk (approximately 1 metre width) on the south side of the roadway. For clarification, the sidewalk on the south side of John Street East extends from Charlotte Street, to just east of the proposed driveway (Access 1) at 200 John Street East. A trail network is provided on John Street East's north side between King Street and Niagara River Parkway which forces pedestrians to cross John Street East at Charlotte Street.

The closest controlled crossings are at the intersection with Niagara River Parkway and the King Street East intersection. The spacing between these controlled crossings is 1.4 kilometres.

Because of the disparity in size and weight between vehicles and pedestrians, a unique safety concern is created for the latter user group. This causes concern over interactions between these user groups, mainly where children and school-aged road users are present. As pedestrians should be encouraged to cross at controlled crosswalks in most situations, this section of John Street East could provide added benefits for pedestrians by providing a pedestrian crossover.



The Ontario Traffic Manual (OTM) recommends the minimum distance between controlled crossings be 100 metres. Based on the current pedestrian accommodations in the area, the most logical location to provide a pedestrian crossover is along the east leg of the John Street East and Charlotte Street intersection. A pedestrian crossover would facilitate a controlled crossing between the sidewalk on the south side of John Street East with the trail system to the north while maintaining adequate separation between the controlled crossings.

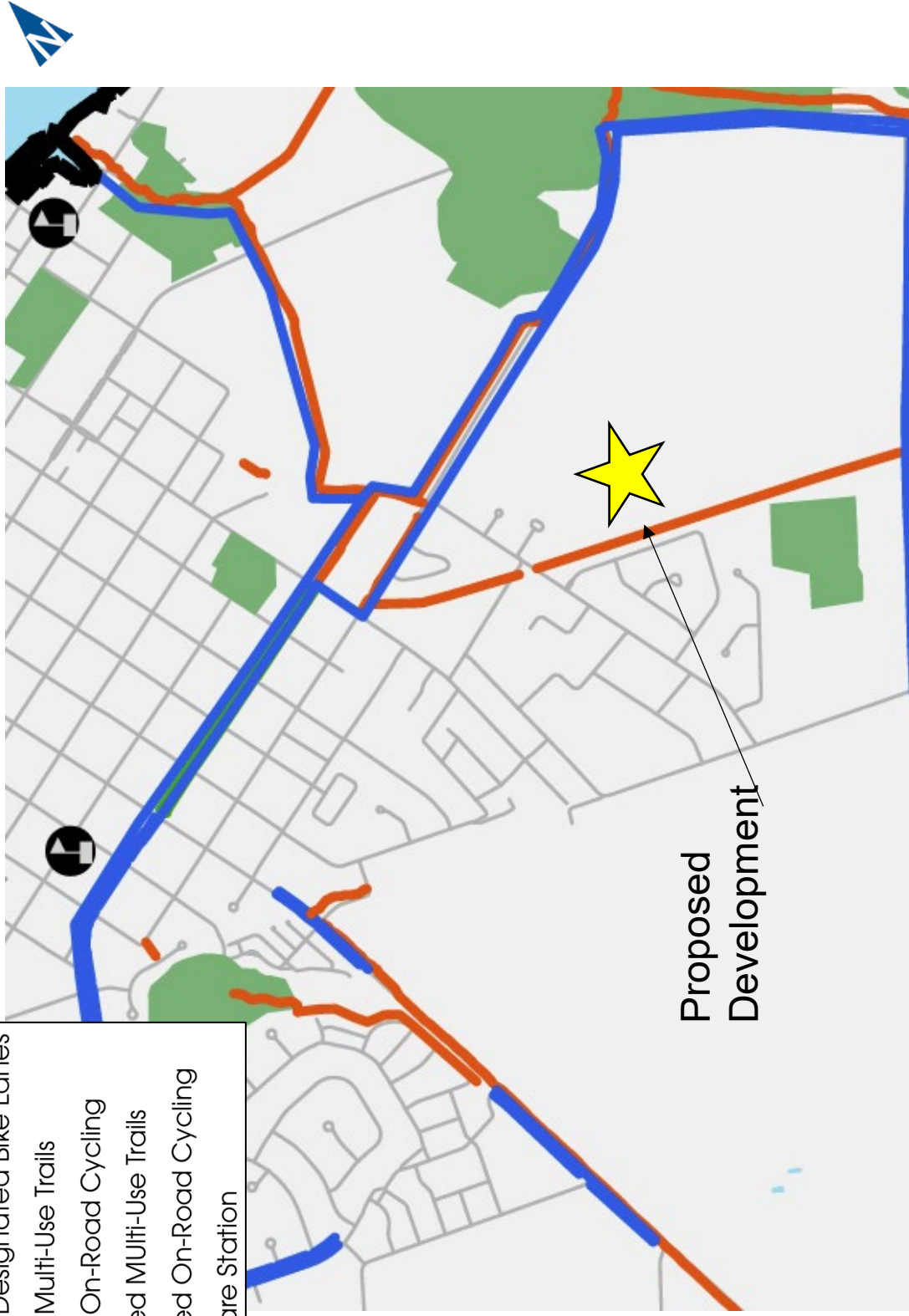
2.4.2 Cycling

Cycling infrastructure typically consists of on-street and off-street facilities. On-street facilities comprise cycling lanes, signed cycling routes, and paved shoulders. Off-street facilities are in the form of multi-use or informal trails.

Niagara-on-the-Lake's cycling network infrastructure mainly comprises on-road facilities with a few multi-use trails, primarily located along the waterfront and arterial and collector roadways. Multi-use trails in the study area consist of the Upper Canada Heritage Trail, Waterfront Trail, and the Niagara Parkway Recreational Trail. **Figure 2.3** illustrates the existing cycling network within the study area.



-  Existing Designated Bike Lanes
-  Existing Multi-Use Trails
-  Existing On-Road Cycling
-  Proposed MULTI-Use Trails
-  Proposed On-Road Cycling
-  Bike Share Station



3 Development Proposal

3.1 Development Description

The development proposal includes up to 270 residential units spread across five three-storey buildings, each equipped with sprinkler systems for fire safety. It also features a hotel with 111 rooms. On-site amenities include several restaurants, a 10,000-square-foot spa offering various health and relaxation services, and banquet and meeting facilities designed for different-sized events.

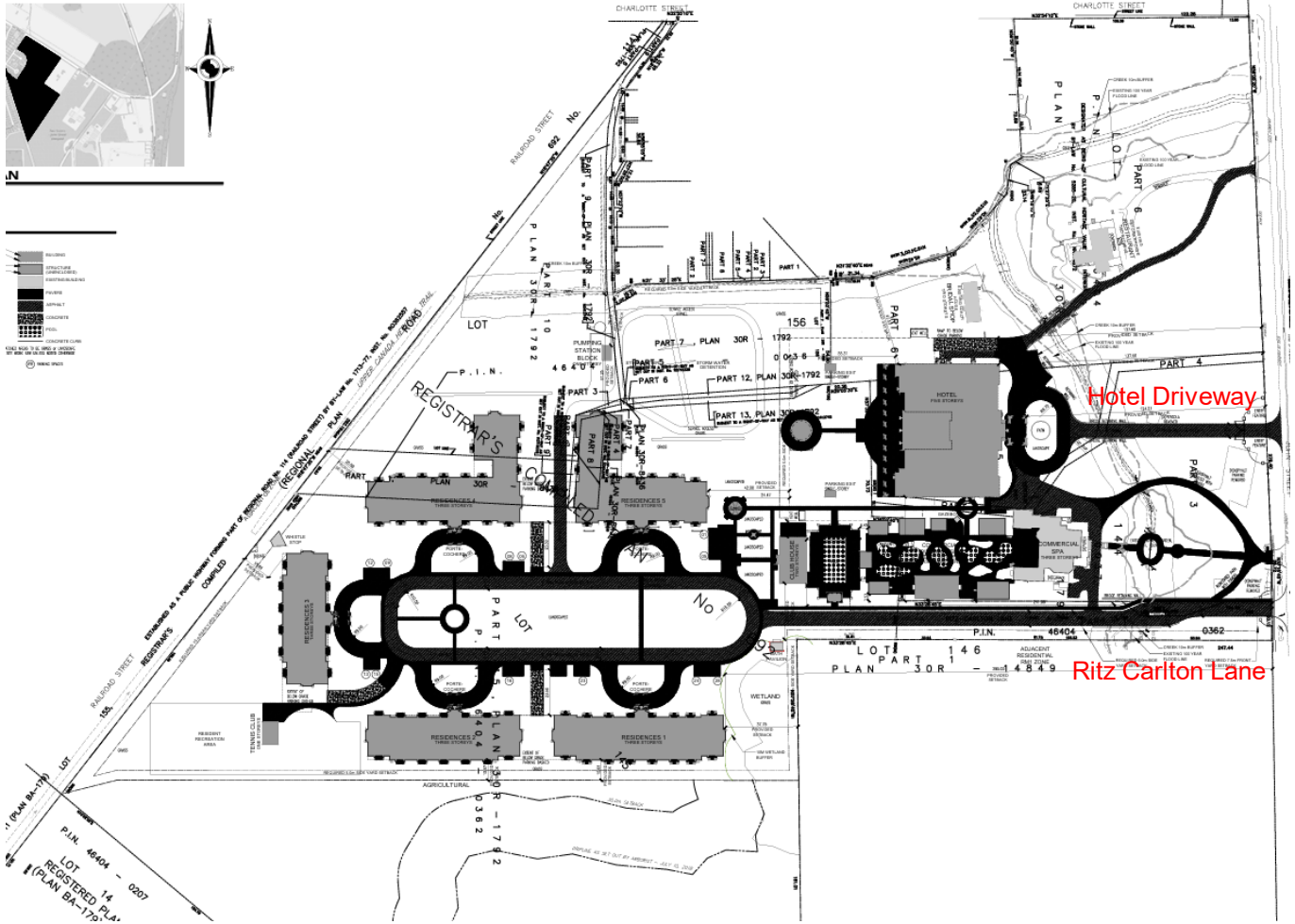
The residential component will be accessed via a private road that connects to John Street East (also known as Ritz Carlton Lane). This connection is located roughly 310 metres east of the intersection of John Street East and Charlotte Street, measured from curb-to-curb radii. To facilitate access, a portion of the existing stone wall and pillars will be removed to create a wider entrance measuring approximately 20 metres.

The hotel portion will be accessible from a dedicated driveway connecting directly to John Street East, designated as Hotel Driveway, approximately 215 metres east of the intersection with Charlotte Street. Similar to the residential entrance, a section of the existing stone wall and pillars will be removed to widen the entrance; however, the exact width of this widened entry has yet to be confirmed.

Furthermore, an internal roadway will connect the residential and hotel sections of the site, enabling integration and access between the two areas, thus supporting an overall cohesive development plan.

Figure 3.1 shows the proposed site plan.





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Proposed Site Plan

3.1.1 Ritz Carlton Lane (OLT Adherence)

In the October 11, 2024, Decision brought forth by the OLT, they identified a few issues related to access through what is now referred to as Ritz Carlton Lane. The following generally summarizes those issues:

- ▶ The Tribunal found that interpreting the access as simply a "driveway" was faulty, given that it would serve a proposed subdivision and function as a street.
- ▶ The Tribunal found a larger curb radius (9 metres) is required at the intersection with John Street East.
- ▶ The Decision also identified that a 15 metre separation between the near edge of the crossroad and the near edge of the adjacent driveway is required.
- ▶ The Tribunal considered the requirements of section 51(24)(e) of the Planning Act, which requires regard for the number, width, location, grades, elevations, and adequacy of highways linking the proposed subdivision with the established system, specifically concerning safety.

To address the OLT issues, the applicant proposes a private road with a 7-metre pavement width, shifted to the west limit of the 20.1-metre-wide strip of land. The 7-metre pavement width is consistent with the road cross-section as previously proposed and contained in the February 2024 TIS.

The proposed design includes 9 metres of radius on both the east and west sides of the private road and a 3.9 metres tangent section between the east-side radius and the existing west-side flare of the westerly driveway at 210 John Street East. The 9 metre radii are consistent with the Town's Municipal Engineering Standards. The larger radius will reduce the extent to which heavier trucks will have to encroach into the westbound lane on John Street East while making a right turn from the private roadway.

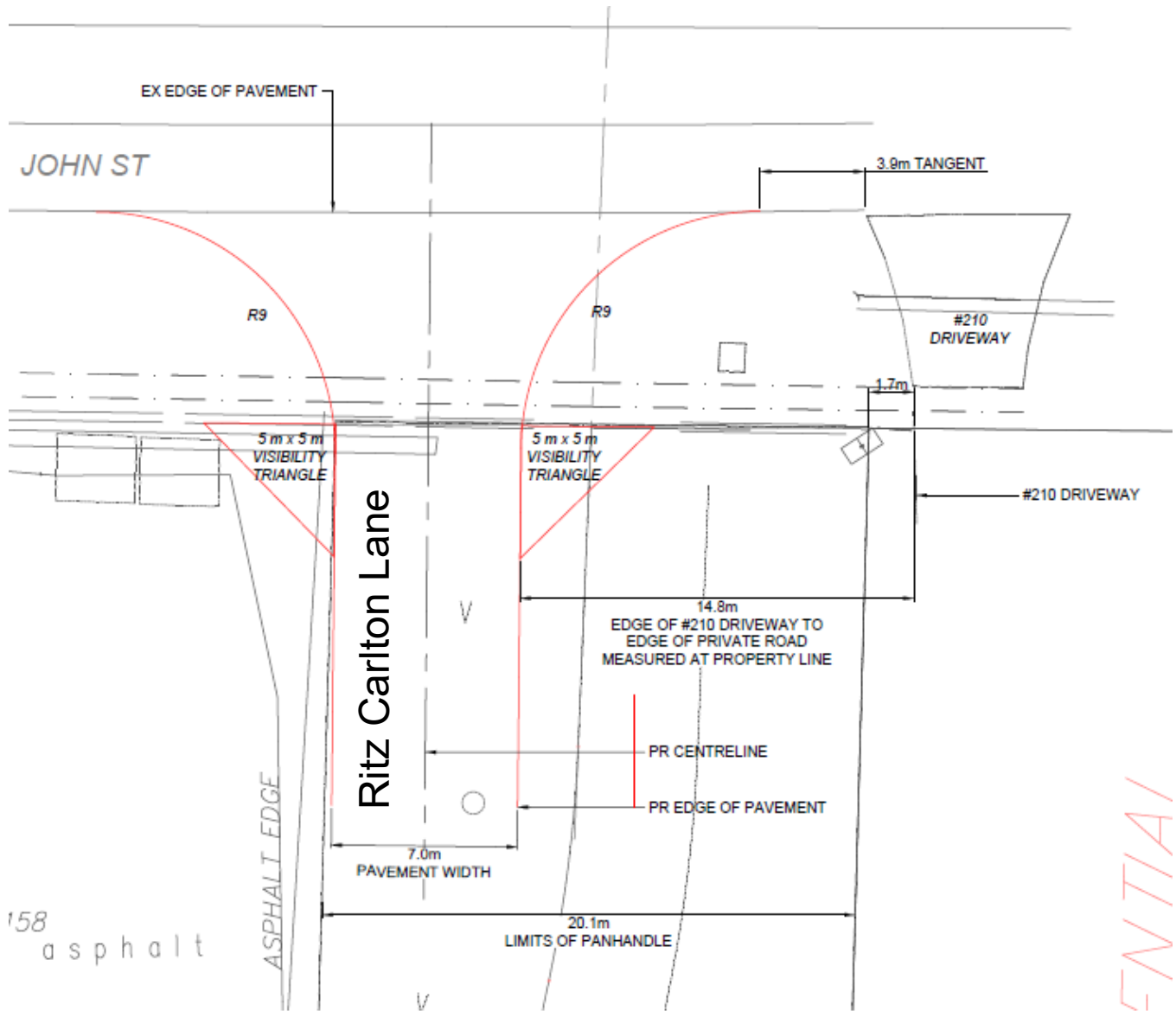
The shift of the roadway to the west property line of the panhandle would provide a separation of 14.8 metres between the east edge of the private driveway and the west edge of the westerly driveway at 210 John Street East. While the proposed corner clearance of 14.8 metres is 0.2 metres less than the OLT Decision of 15 metres, the design still meets the functional objectives of TAC's guidance, especially regarding sightline protection, operational safety, and vehicle manoeuvrability, and aligns with the intent of the requirement.



Overall, the proposed redesign of Ritz Carlton Lane generally addresses the issues identified by the OLT and satisfies the intent of section 51(24)(e).

Figure 3.2 illustrates a preliminary schematic of the Ritz Carlton Lane connecting to John Street, with relevant dimensions noted.





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Ritz Carlton Lane Layout

3.1.2 Access Review

To assist in determining the appropriateness of the access locations, the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR)⁶ was reviewed, as well as the Town of Niagara-On-The-Lake Municipal Engineering Standards (MES)⁷.

The specific design of the Private Street against the TAC GDGCR and MES guidelines as well as the OLT Decision criteria, is based on the following elements:

- ▶ Separation from municipal intersection (TAC GDGCR)
 - Corner clearance is the distance from an intersection to the nearest access upstream or downstream of it. Corner clearance is measured from the near curb of the cross roadway to the near edge of the access throat. It consists of three components: the curb return radius at the intersection, a length of tangent, and the curb return radius or flare dimension at the driveway. Inadequate corner clearance between accesses and intersections along a major road, such as a major arterial, can create operational issues. Based on TAC GDGCR guidelines a corner clearance of 20 metres is suggested.
- ▶ Separation from adjacent driveway (OLT Decision)
 - It is good design practice to provide a tangent separation between the curb return of the public roadway intersection and the first driveway. Even a short separation helps reduce the impact of overlapping conflict zones and promotes collision-free operation.

Short tangent separations are acceptable for residential land uses where driveway and roadway traffic volumes are generally low. Based on the OLT Decision, a separation distance of 15.0 m is suggested for the private street, located away from the west driveway to 210 John Street East.

⁶ Geometric Design Guide for Canadian Roads, Transportation Association of Canada, 2017

⁷ Niagara-on-the-Lake, Municipal Engineering Standards, January 2018



- ▶ Access width (MES/TAC GDGCR)
 - The width of a street is measured parallel to the road since turns are generally oriented at right angles. Lane widths are dependent on the design speed, the volume of traffic the roadway is intended to carry, and the number and types of heavy vehicles on the roadway. In urban situations, the need to accommodate pedestrians and cyclists also comes into play. The lane widths used by various agencies across the country vary substantially.
 - The MES identifies a roadway width of 8 metres (4 metres travel lanes) for a typical urban local residential street.
 - TAC GDGCR, however, provides a design domain guideline that is presented as values within a recommended range of values intended to represent the range of optimal design. The recommended lane width for an urban roadway with a speed limit of 60 km/h or less is 3.0m – 3.7m. This would equate to a roadway width of 6.0m – 7.4m

- ▶ Access clear throat length (TAC GDGCR)
 - For a major driveway to operate effectively, both from the roadside and internally, it is desirable to provide a non-conflicting storage zone within the driveway. Failure to provide sufficient throat distance results in frequent blocking on on-site circulation roads, which can, in turn, create queues of entering vehicles.
 - TAC GDGCR outlines a clear throat length of 25 metres should be provided before the first conflict point.

- ▶ Access curb radius (OLT Decision)
 - “The curb return style driveway incorporates curb-cuts and sidewalk ramps to accommodate the pedestrian crossing, alerting both drivers and pedestrians of the potential conflict zone. The higher vehicle speeds encouraged by the smooth turning radii defined by the curb return, however, may be a disadvantage to pedestrians wanting to cross the driveway. Based on the OLT Decisions, a curb radius of 9 metres should be included in the overall design of the Private Street.

Table 3.1 summarizes the TAC GDGCR access guidelines.



TABLE 3.1: ACCESS REVIEW SUMMARY

Criteria	Reference	Guidelines	Ritz Carlton Lane Values	Hotel Driveway Values
¹ Separation From Municipal Intersections	TAC GDGCR	20.0m	310m (west) -	215m (west) 85m (east)
² Separation From Adjacent Driveways	OLT Decision	15.0m	14.8m (east) 85m (west)	- -
^{3A} Access Width	MES	8.0m	7.0m	6.7m
^{3B} Access Width	TAC GDGCR	6.0m - 7.4m	7.0m	6.7m
⁴ Clear Throat Length	TAC GDGCR	25.0m	125m	95m
⁵ Access Curb Radius	OLT Decision	9.0 m	9.0m (east) 9.0m (west)	9.0m (east) 9.0m (west)

Notes

1. TAC Geometric Design Guide for Canadian Roads, June 2017, Figure 8.8.2
2. OLT-22-003603/23-00494 Decision, October 11, 2024 [Paragraph 103]
- 3A. Niagara-on-the-Lake MES, November 2020, Appendix 2-Cross Section 1
- 3B. TAC Geometric Design Guide for Canadian Roads, June 2017, Table 4.2.3
4. TAC Geometric Design Guide for Canadian Roads, June 2017, Table 8.9.3
5. OLT-22-003603/23-00494 Decision, October 11, 2024 [Paragraph 108]



3.2.3 Swept Path Analysis

The width of lanes provides the required space for vehicles to travel along the roadway. It has consistently been found that narrower lane widths are associated with a reduction in travel speed. Narrower lanes, in the 3.0 to 3.5 metres range, are preferred in most urban and suburban contexts. Wider lanes increase the roadway crossing distance for pedestrians. As Ritz Carlton Lane is proposed to be provided with a reduced speed limit (25 km/h), reducing lane width would help with speed limit compliance.

To further determine if the reduced width would have any implications for the design and control of vehicles, an AutoTURN analysis was completed. Design vehicles refer to “regular users”, reflecting the largest turning radius frequently required to manoeuvre a turn at intersections. Control vehicles reflect the largest vehicle that is occasionally required to manoeuvre a turn at an intersection corner but are relatively low in frequency and may have less space to manoeuvre.

Appropriate design and control vehicles should be selected so the roadway is not over-designed — for example, with wider lanes or curb radii than necessary. The following design and control vehicles were utilized in the assessment:

- ▶ Design Vehicles
 - Typical Passenger Vehicle
- ▶ Control Vehicles
 - Medium Single Unit (MSU)
 - Pumper Fire Truck
 - CAT 120M (Snowplough)

Appendix B contains the AutoTURN analysis. No conflicts with the site’s driveway entrance are noted.



3.2.4 Vehicle Sight Distance Review

The proposed access connection has been reviewed to determine the availability of sight distance and sight lines. The assessment was based on the methodology in the TAC-GDGCR. Sight distance requirements are considered for vehicles departing from the driveway (departure sight distance) and those approaching the driveway. The following object heights were utilized in the field measurements:

- ▶ Object Height (Vehicle tail or brake light) – 0.60 metres;
- ▶ Driver Eye Height – 1.08 metres; and
- ▶ Top of Car – 1.30 metres.

The sight distance review is based on a design speed of 60 km/h (10 km/h over the assumed speed limit of 50 km/h) and includes two sight distance criteria: stopping sight distance and intersection sight distance.

- ▶ Stopping sight distance is the sum of the distance a motorist travels during the perception and reaction time and the braking distance. Stopping sight distance is measured from the standard driver eye height of 1.08 metres to a fixed object 0.60 metres off the roadway's surface. The main measurements for approaching traffic (stopping sight distance) were taken from within the center of the travel lane on John Street East, assuming a vehicle position perpendicular to Access 1.

The minimum stopping sight distance for vehicles approaching driveways is the distance required for the approaching vehicle to stop safely and avoid a collision.

- ▶ Intersection sight distance represents the desirable distance required for a vehicle to safely enter the major roadway and complete a turning movement without significantly impeding traffic flow or providing the opportunity for conflict.

Intersection sight distance is measured from the standard driver eye height (1.08 metres) located on the proposed driveway, from a position located 5.4 metres back from the travelled portion of the intersection roadway (i.e., edge of pavement) to a target top of car height of 1.30 metres above the roadway surface.

Table 3.2 summarizes the sight distance guidelines. **Appendix C** contains the sight distance plots.



TABLE 3.2: SIGHT DISTANCE CRITERIA

Sight Distance Criteria	Sight Distance Requirement		
	Design Speed (60 km/h)	Design Speed (70 km/h)	Posted Speed (50 km/h)
Minimum Departure (Left Turn) Sight Distance ¹	130	150	-
Minimum Departure (Right Turn) Sight Distance ²	110	130	-
Minimum Stopping Sight Distance ^{3, 4}	85 ⁽³⁾	105 ⁽³⁾	120 ⁽⁴⁾
Notes: ¹ TAC Guide, June 2017, Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn from Stop ² TAC Guide, June 2017, Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop ³ TAC Guide, June 2017, Table 2.5.2: Stopping Sight Distance on Level Roadways for Automobiles ⁴ Town of Niagara-on-the-Lake Entrance Permit, Posted Speed Limit of 50km/h			

Based on the sight distance review conducted, Ritz Carlton Lane and the Hotel Driveway to John Street East meet and exceed the stopping and intersection sight distance guidelines for a 60 km/h design speed, as well as the Town's sight distance requirement of 120 metres for an entrance to a roadway with a posted speed limit of 50 km/h.

3.2.5 Pedestrian Sight Distance Review

To improve access via John Street East, a section of the existing stone wall will need to be removed to create a wider entrance, while retaining the stone wall and pillars outside the entranceway. Visibility triangles of at least 5 metres by 5 metres on each side Ritz Carlton Lane must be provided; however, beyond this, the stone pillar will be reconstructed, which could affect the line of sight, especially for pedestrians.

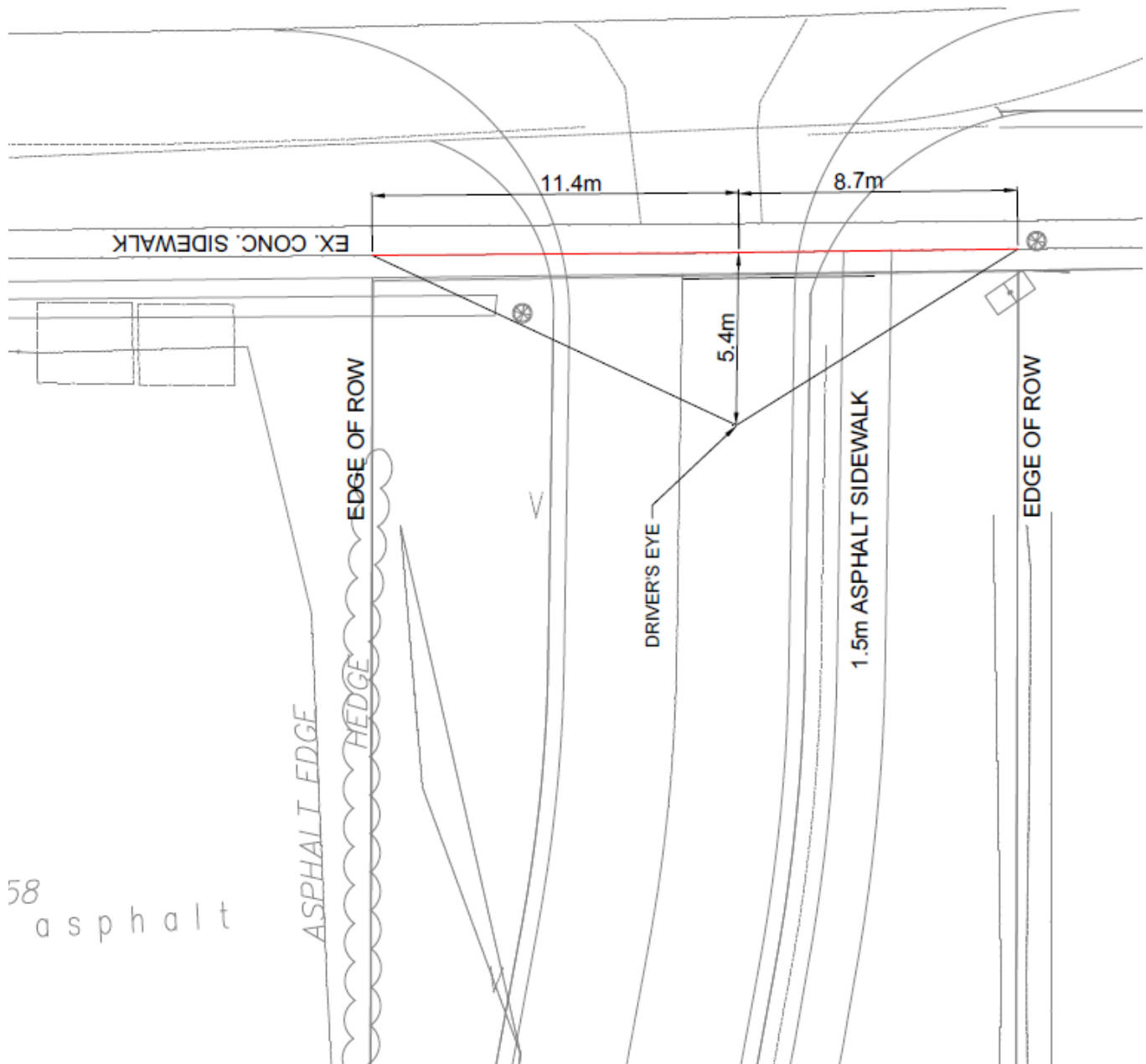
As pedestrians share multimodal travel environments, the design must also ensure pedestrians are visible to vehicles exiting the proposed accesses on John Street East. The intersection sight distance assessment should also consider the line of sight between a vehicle and a pedestrian, and vice versa. In this regard, the departure sight distance for pedestrians has been calculated separately.

The position of the driver's eye is assumed to be at the centre of the driveway, 5.4 metres behind the edge of the sidewalk, to represent the distance from the front of the vehicle to the driver's eye level.

To determine if there are any impacts with respect to the vehicle and pedestrian conflicts, the line of sight between vehicles stopped before the sidewalk to the east and west has been assessed.

Figure 3.3 illustrates the line-of-sight plots.





Based on the line-of-sight plots, vehicles exiting Ritz Carlton Lane can see a pedestrian approximately 8.7 metres to the east and 11.4 metres west of the driveway.

The perception-reaction time for a driver is often broken down into four components:

- ▶ Detection – The time to see or discern an object or event;
- ▶ Identification – The time to understand the implications of the object's presence or event;
- ▶ Decision – The time to decide how to react; and
- ▶ Response – The time to initiate the action, for example, the time to engage the brake.

TAC GDGCR identifies that for perception and reaction times, 2.5 seconds should be used for planning studies. Furthermore, when assessing vehicle-pedestrian conflicts, the walking speed of a pedestrian must be considered rather than the design speed of the roadway. The typical guideline for pedestrian walking speeds is 1.2 metres per second based on the Ontario Traffic Manual (OTM)⁸.

Utilizing a walking speed of 1.2 metres per second, approximately 7 seconds to the east and 9 seconds to the west, would be available for the vehicle driver to react and decide, i.e., to wait and let the pedestrian cross or proceed to exit. As the perception and reaction time is 2.5 seconds, the line of sight available is adequate to satisfy the safe movement of vehicles leaving Ritz Carlton Lane.

⁸ Ontario Traffic Manual (Book 15), 3.4.1 Aging Road Users, June 2016



3.3 Fire Route

The primary access to the external roadway network is provided through two connections to John Street East, a primary connection for the residential land as well as a primary connection for the hotel. The Town's MES Section 3.14 states the following concerning emergency access.

- ▶ All subdivisions shall have adequate emergency access and comply with the following items:
 - All subdivisions shall have adequate emergency access routes with direct access from public thoroughfares while also ensuring accessibility to all buildings.
 - Access routes shall be at least 6m wide with a centre line turning radius of no less than 12m.
 - All-access routes shall maintain an overhead clearance of 5m.
 - Unless not reasonably possible due to the topography of the land, maximum gradient changes of access routes within subdivisions shall be no more than 1:12.5 over 15m.
 - All-access route surfaces must be able to support loads imposed by firefighting equipment.
 - Subdivisions shall be provided with at least two access routes in and out. One required access route may be restricted or "closed to the public" access.
 - Any restricted access routes may be restricted by using bollards spaced 6m apart with a locked chain that can be cut by fire staff in the event of an emergency.
 - Any access routes containing a dead end longer than 90m shall have proper turnaround facilities installed.
 - Deviance from any of the above requirements shall be at the discretion of the Fire Chief.

The proposed plan provides two points of access to the external public roadway network, consistent with the intent of the Town's MES Section 3.14, which requires subdivisions to be served by at least two access routes. These access points ensure redundancy for emergency response and overall network resilience.

It is acknowledged that the internal roadway segment providing direct access to the residential units extends along a relatively lengthy section of road. In isolation, this condition could raise concerns about



emergency access efficiency, particularly regarding response times and maneuverability. However, the design of the internal road network has been developed to comply with the applicable MES requirements, including minimum access width, turning radii, overhead clearance, and structural capacity to accommodate firefighting equipment. Furthermore, where applicable, appropriate turnaround facilities are provided for any dead-end conditions exceeding 90 m in length.

Importantly, the proposed residential buildings will be equipped with a full sprinkler system. The inclusion of fire suppression systems significantly mitigates fire risk by controlling or extinguishing fires early, thereby reducing reliance on immediate fire department intervention. This is a widely recognized risk-reduction measure typically considered when evaluating alternative emergency access configurations.

Given the provision of two access points to the public road system, compliance with key geometric and structural MES requirements, and the incorporation of a building sprinkler system, the proposed configuration represents an acceptable solution from an emergency access perspective. In this context, the design aligns with the overall intent of MES Section 3.14, and any minor deviations are appropriate for consideration at the discretion of the Fire Chief, as permitted under the Town's guidelines

3.4 Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual⁹ was used to calculate the site trip generation. The following Land Use Code (LUC) is used to estimate the site's trip generation:

- ▶ **LUC 220 – Multifamily Housing** – Low-rise multifamily housing is a residential building with two or three floors (levels) of residences. Various configurations fit this description, including the following: Walk-up apartment or multiplex—access to the individual dwelling units is typically internal to the structure and provided through a shared entry, stairway, and hallway. Mansion apartment with several dwelling units within what appears from the outside to be a single-family dwelling unit. Stacked townhouse designed to match the external appearance of a townhouse, but which has dwelling units that share both floors and walls and with access through a central entry and stairway.
- ▶ **LUC 310 – Hotel** – A hotel is a place of lodging that provides overnight accommodation and supporting facilities such as a

⁹ Trip Generation Manual 12th Edition Institute of Transportation Engineers Washington DC 2025



full-service restaurant, concierge service, valet parking, cocktail lounge, meeting rooms, banquet room, and convention facilities. A hotel typically provides a swimming pool or another recreational facility such as a fitness room.

- ▶ **LUC 931 – Fine Dining Restaurant** – A fine dining restaurant is a full-service eating establishment with a typical duration of stay of at least 1 hour. A fine dining restaurant generally does not serve breakfast; some do not serve lunch; all serve dinner. This type of restaurant often requests and sometimes requires a reservation and is generally not part of a chain. A patron commonly waits to be seated, is served by wait staff, orders from a menu and pays after the meal. Some of the study sites have lounge or bar facilities (serving alcoholic beverages), but meal service is the primary draw to the restaurant.
- ▶ **LUC 492 – Health/Fitness Club** – A health/fitness club is a privately-owned facility primarily focused on individual fitness or training. It typically provides exercise classes, fitness equipment, a weight room, spa, lockers rooms, and a small restaurant or snack bar. This land use may also include ancillary facilities such as a swimming pool, whirlpool, sauna, limited retail, and tennis, pickleball, racquetball, or handball courts. These facilities are membership clubs that may allow access to the public for a fee.

It is further noted that ITE does not provide a separate land-use code for a conference centre. However, as the description of LUC 310 (Hotel) includes supporting facilities, such as a convention facility, the provided trip generate rates are expected to encompass the ancillary use of conference centres.

3.4.1 Internal Capture

The ITE Trip Generation Handbook describes a multi-use development as a single project that includes two or more ITE land-use classifications where trips can occur between land uses without using the off-site road network. This sharing of trips between compatible land uses, without travelling off-site, is known as internal capture. Based on this definition, the proposed development qualifies as a multi-use development, featuring compatible commercial land uses that are likely to share – or capture – trips that do not involve vehicular travel outside the site.

The ITE Trip Generation Handbook has been used to determine internal trips within the development. Detailed calculations are provided in **Appendix D**. ITE data indicate an internal capture rate of between 0% to 15% for the respective peak hours.



TABLE 3.4: RESIDENTIAL - TRIP DISTRIBUTION

Direction (To/From)	Travel Route	%
North	Queen's Parade	2%
	King Street	11%
South	Niagara River Parkway	45%
	King Street	2%
West	John Street	15%
East	Niagara Street	25%
Total		100%

As the distribution for the potential hotel and supporting uses is difficult to obtain from the TTS data, the distribution for this site is based upon the existing travel characteristics along John Street East, given there are multiple hotels within the study area which would resemble similar traffic patterns. **Table 3.5** summarizes the estimated trip distribution for hotel and supporting uses.

TABLE 3.5: HOTEL – TRIP DISTRIBUTION

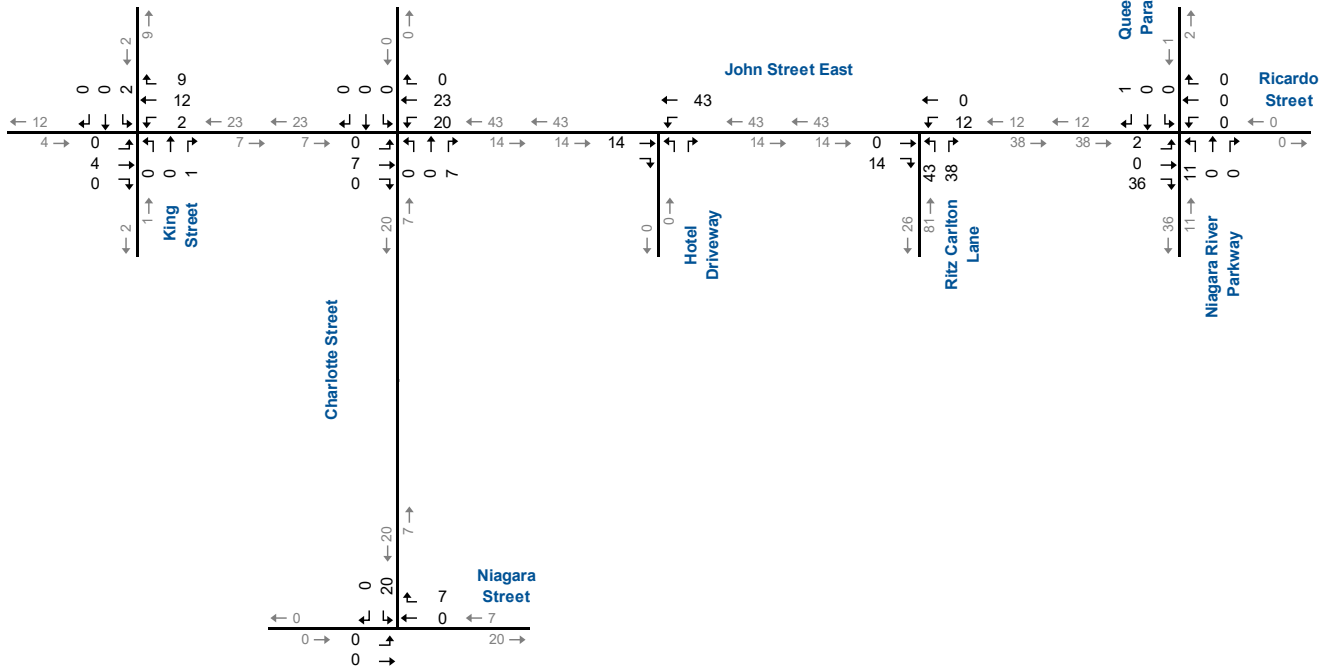
Direction (To/From)	Travel Route	%
North	Queen's Parade	5%
	King Street	31%
South	Niagara River Parkway	11%
	King Street	1%
West	John Street	32%
East	Niagara Street	20%
Total		100%

Using the trip generation data and the trip distribution, the site traffic was assigned to the adjacent road network. **Figures 3.7** illustrates the site traffic for full build-out.

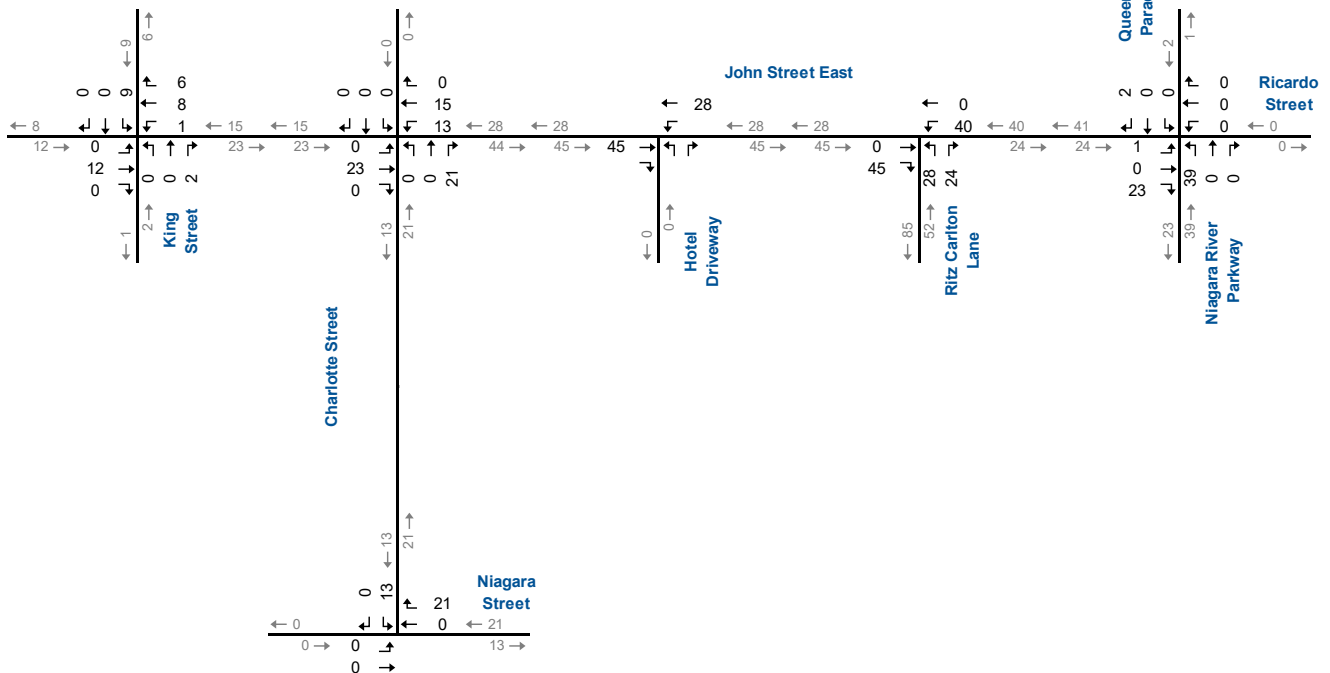




Summer - Weekday AM Peak Hour



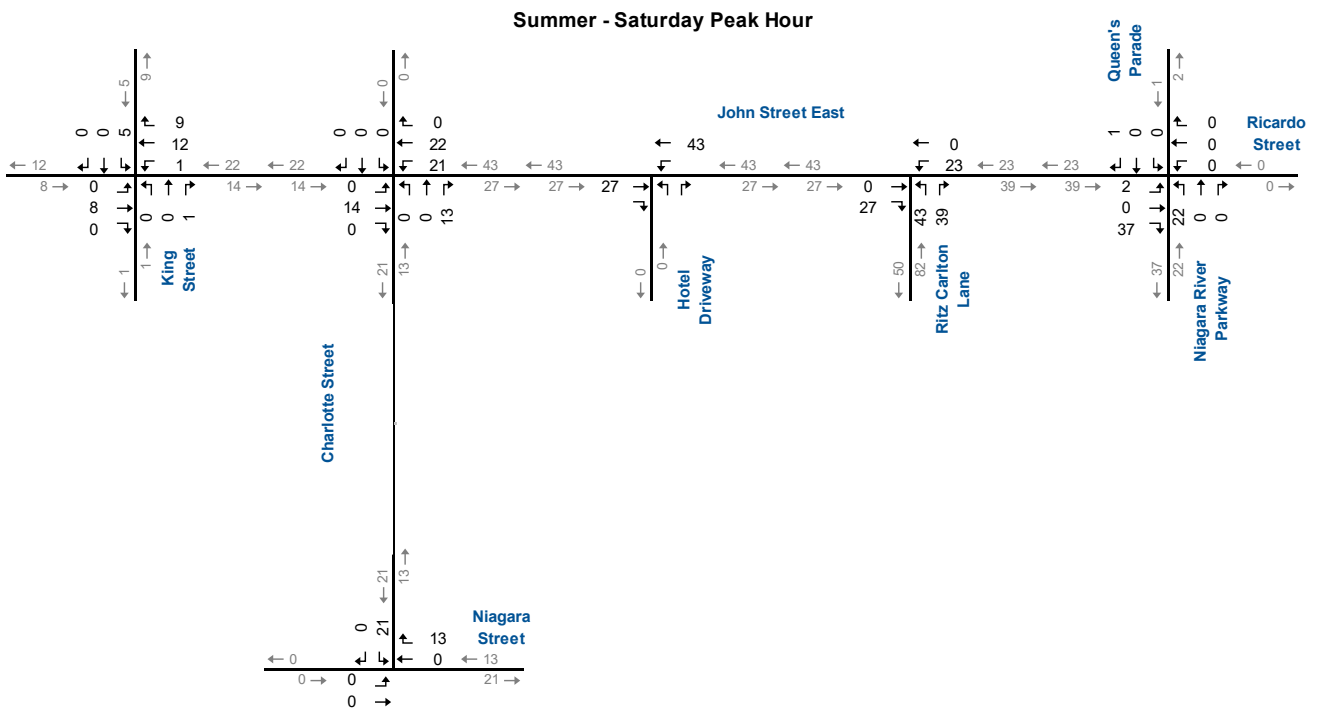
Summer - Weekday PM Peak Hour



NTS



Site-Generated (Residential) Weekday Peak Hour



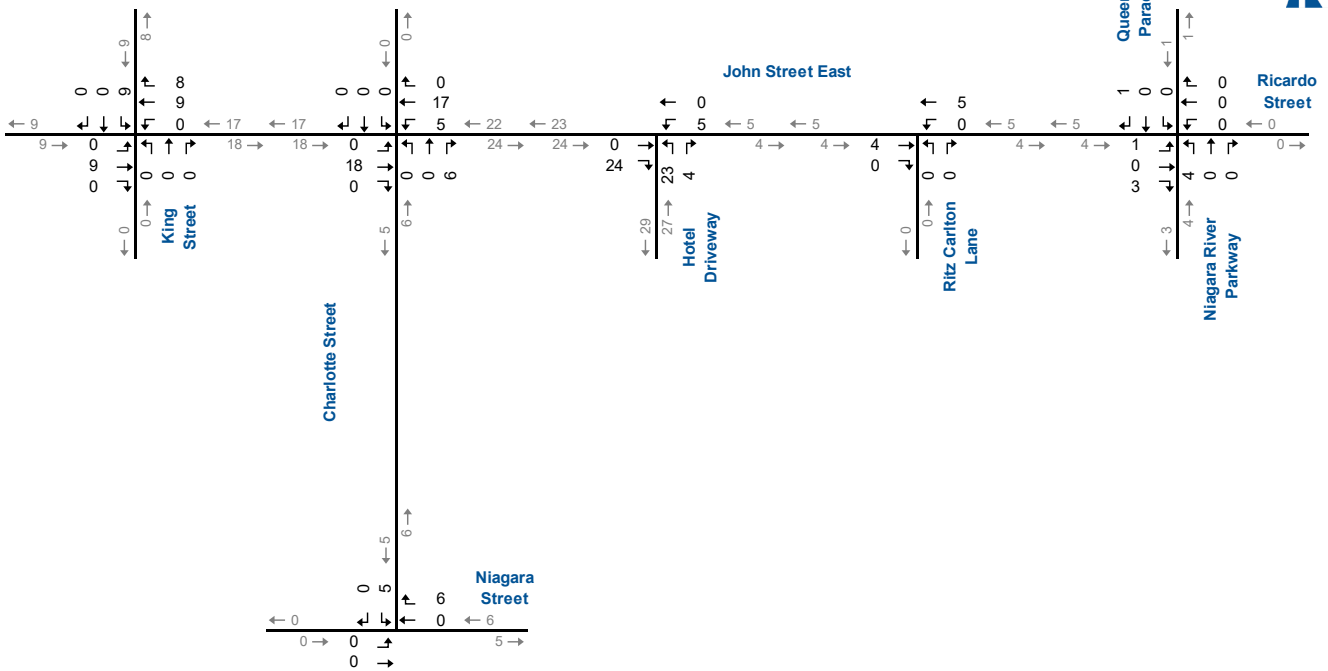
NTS



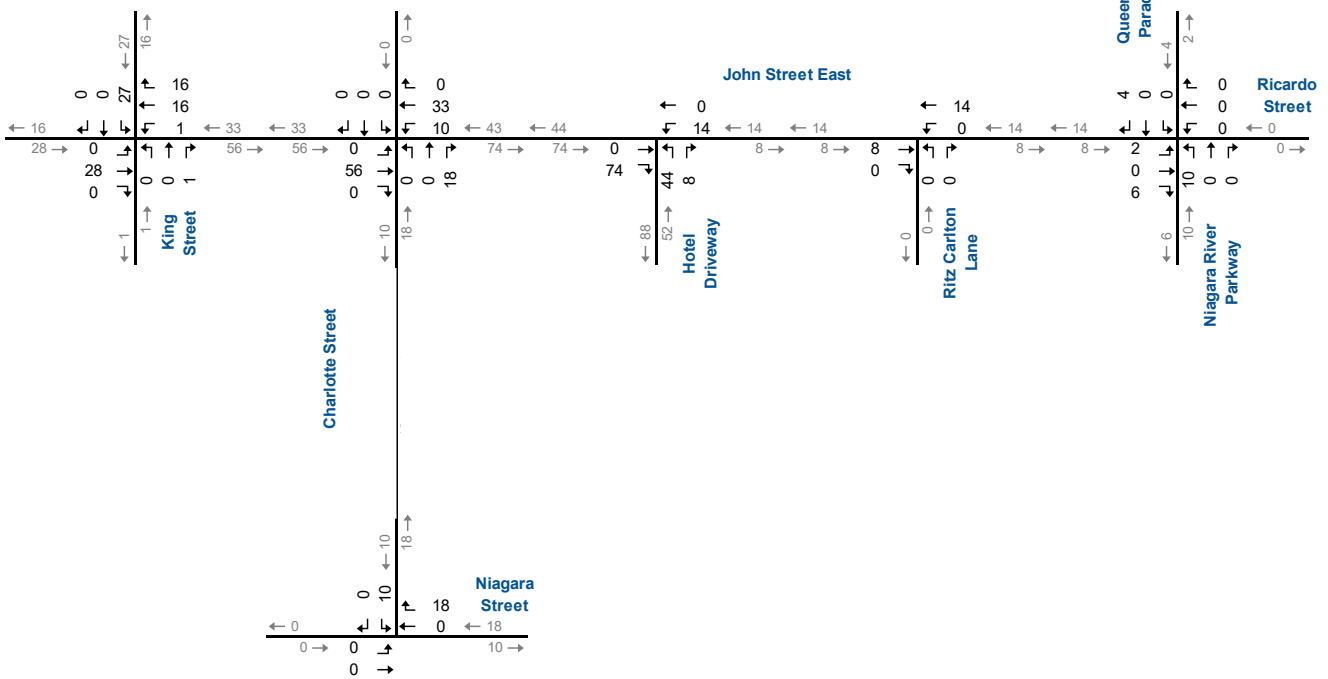
Site-Generated (Residential) Saturday Peak Hour



Summer - Weekday AM Peak Hour



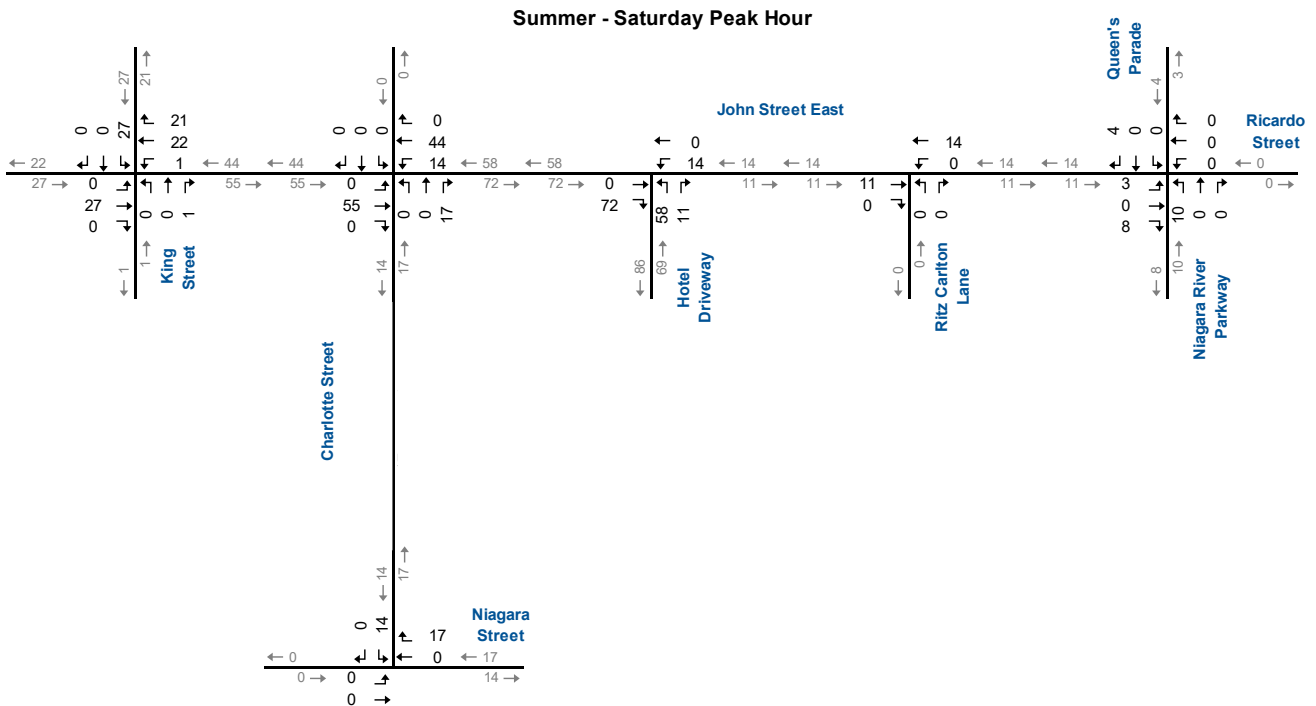
Summer - Weekday PM Peak Hour



NTS



Site-Generated (Hotel) Weekday Peak Hour



NTS



Site-Generated (Hotel) Saturday Peak Hour

4 Future Traffic Forecasts

This section's assessment of the future traffic conditions includes estimates and analysis of the future background and total traffic conditions corresponding to the 5-year future horizon year (2031).

4.1 Traffic Forecasts

4.1.1 General Growth Rate

To forecast the 2031 generalized background traffic volumes, a growth rate of 2.0% per annum was applied to the base year traffic volumes.

4.1.3 Background Projections (Without Development)

The background traffic projections for the 2031 horizon include a general growth rate applied to the base year traffic volumes and traffic associated with the potential development of 144 & 176 John Street East.

Figures 4.1A and 4.1B illustrate the 5-year future horizon background traffic volumes.

4.1.4 Total Projections (With Development)

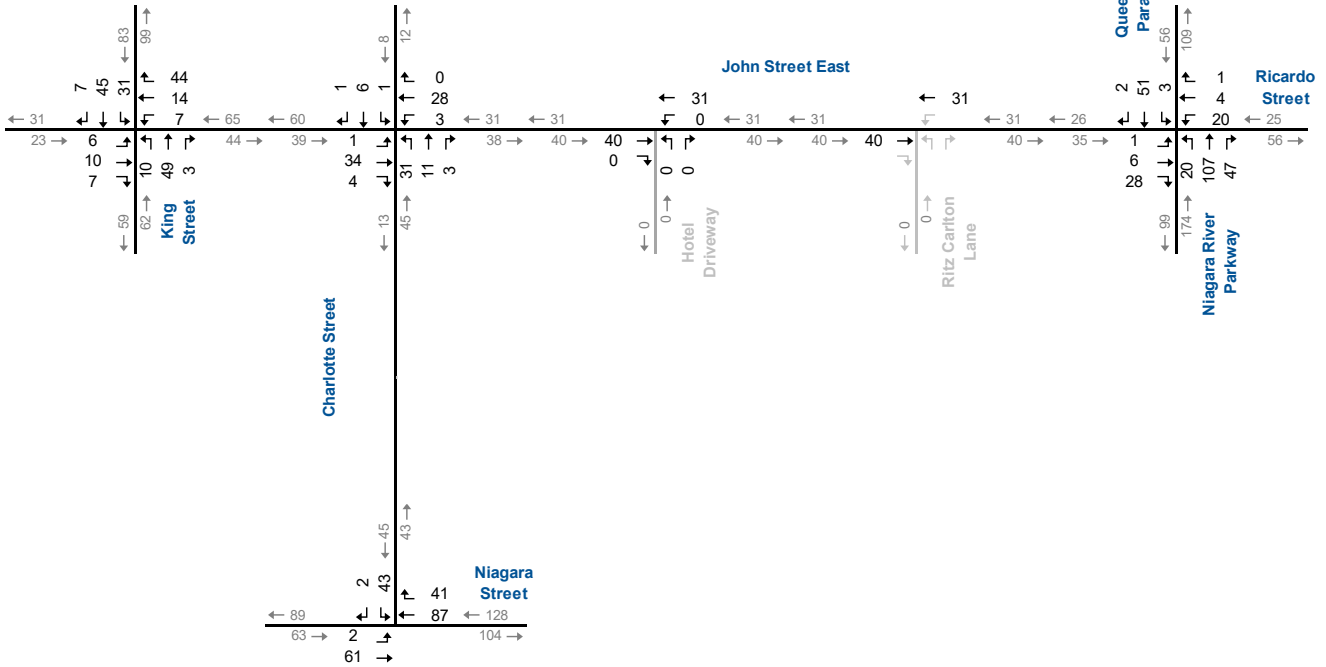
The total traffic projections for the 2031 horizon include a general growth rate applied to the base year traffic volumes, traffic associated with the potential development of 144 & 176 John Street East and traffic related to the build-out of the proposed residential development.

Figures 4.2A and 4.2B illustrate the 5-year future horizon total traffic volumes.

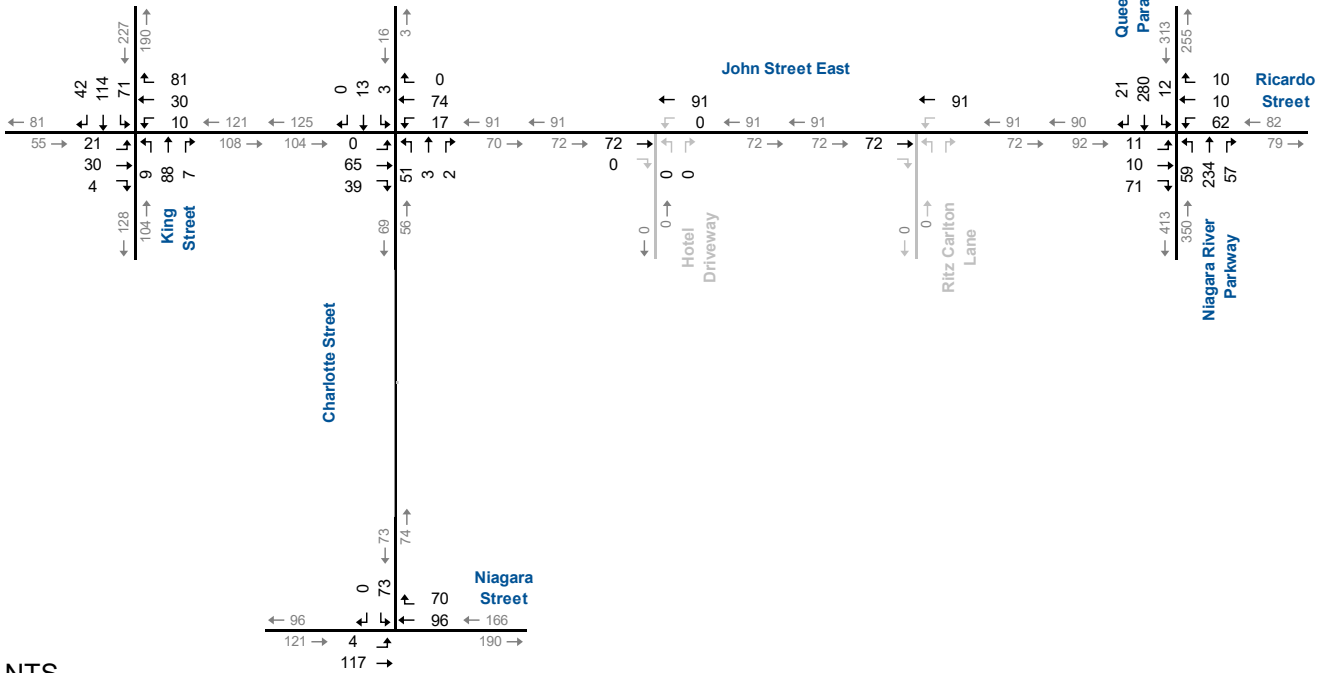




Summer - Weekday AM Peak Hour



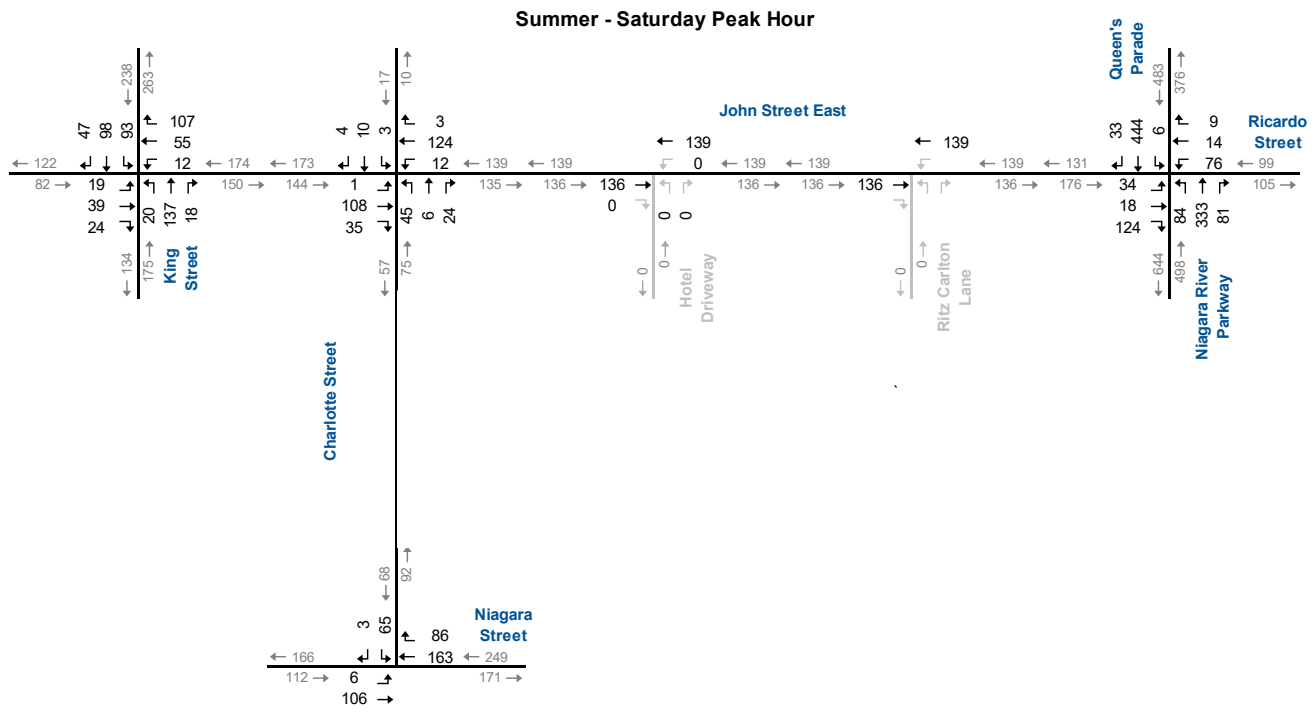
Summer - Weekday PM Peak Hour



NTS



2031 Background Volumes – Weekday Peak Hour



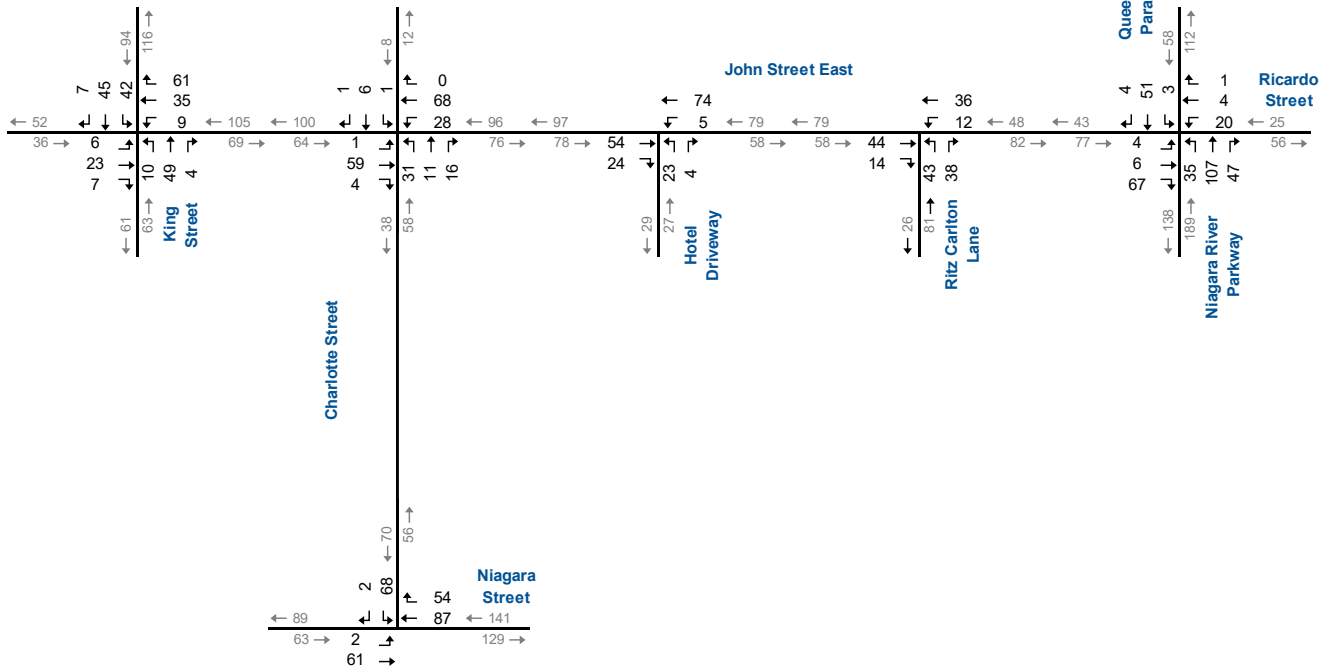
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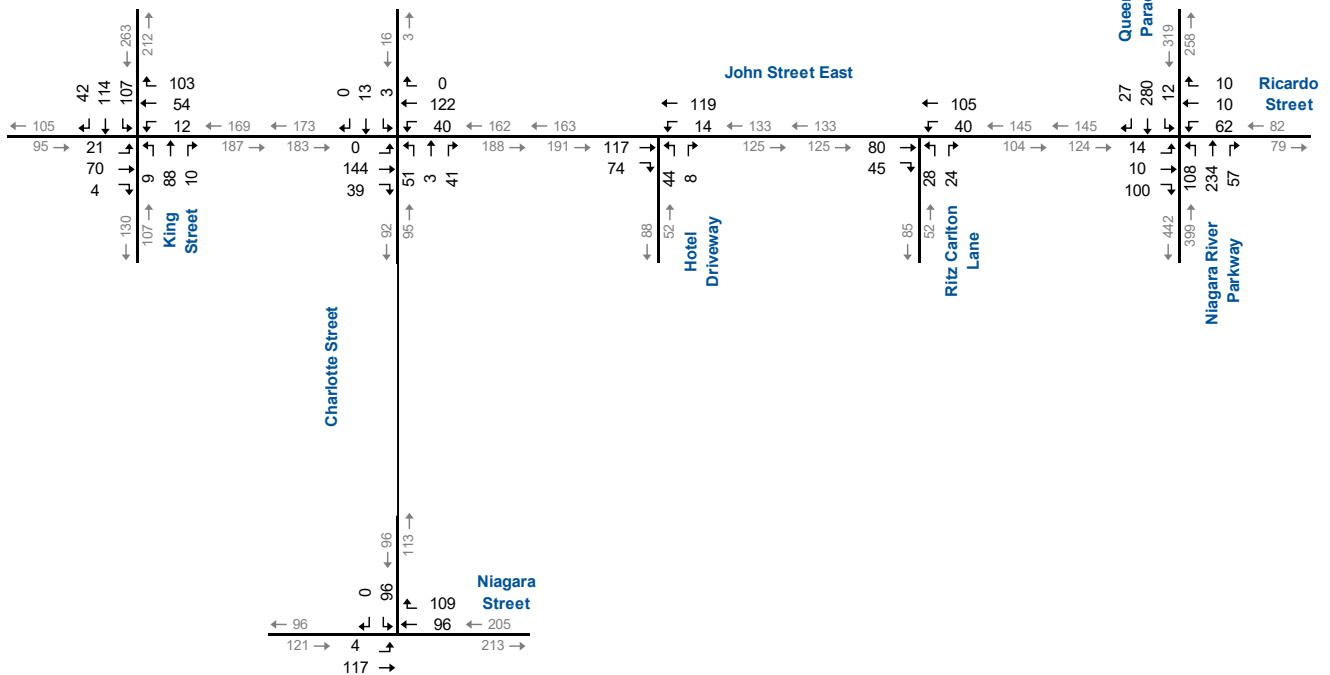
2031 Background Volumes – Saturday Peak Hour



Summer - Weekday AM Peak Hour



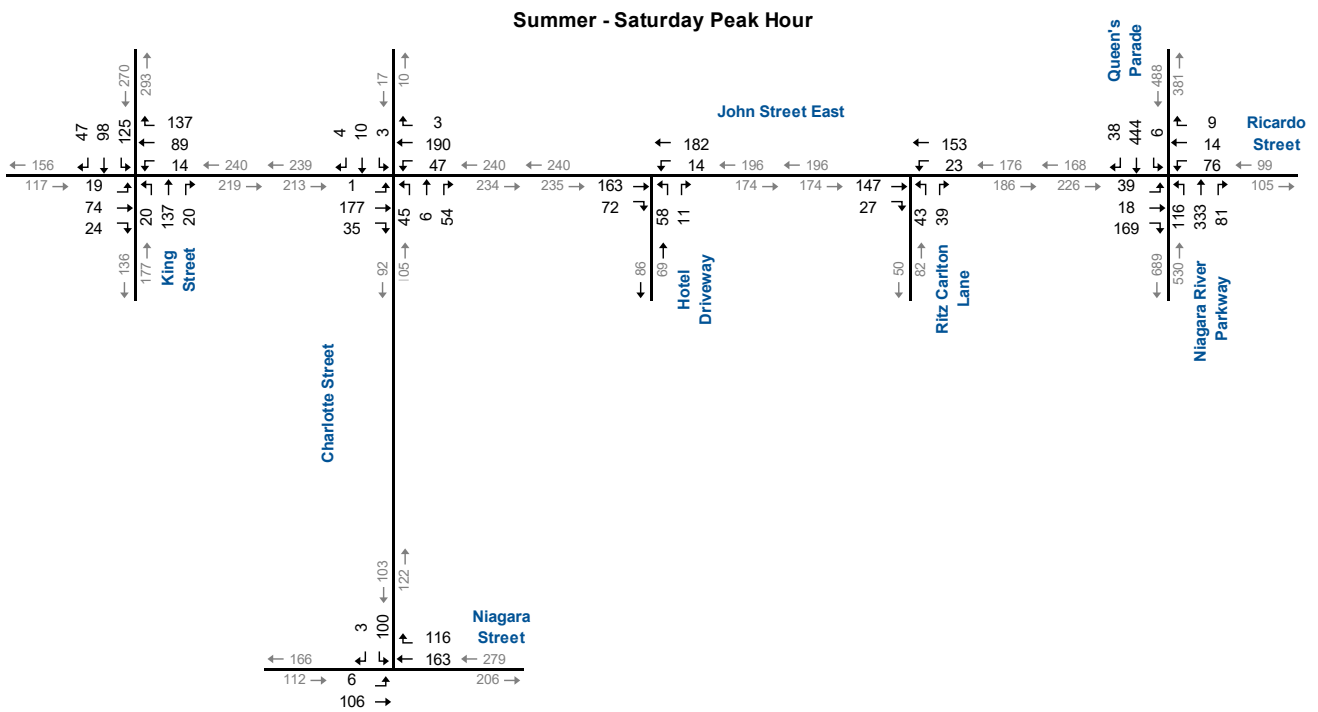
Summer - Weekday PM Peak Hour



NTS



2031 Total Volumes - Weekday Peak Hour



NTS



2031 Total Volumes – Saturday Peak Hour

5 Operational Assessment

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. Roadway capacity analysis was conducted for base year conditions and projected background and total conditions to assess the flow quality. The capacity analysis indicates how well the roadway facilities serve the traffic demands. Calculated levels of service classify roadway operating conditions.

5.1 Level of Service Criteria

Level of service (LOS) denotes the different operating conditions on a given roadway segment under various traffic volume loads. It is a qualitative measure that indexes the operational qualities of a roadway segment or an intersection with designations ranging from LOS A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

For this study, an overall LOS between A and C is classified as tolerable delays; overall, LOS D-E is classified as increased delays, and an overall LOS F is categorized as significant delays.

5.2 Intersection Capacity Analysis

The evaluation criteria for analyzing signalized and unsignalized intersections are based on the 2000 Highway Capacity Manual (HCM).¹¹ utilizing Synchro.

Tables 5.1 – 5.4 summarize the capacity analyses for the study area intersections for the base year and the 2031 future horizon years for the Weekday and Saturday peak hours, respectively. **Appendix F** includes the capacity analysis results.

¹¹ Transportation Research Board, Highway Capacity Manual, Washington, D.C. 2003.



5.2.1 Niagara River Parkway at John Street East

Base Year Operations	Significant Delays (Sat Only)	●
2031 Background Operations	Significant Delays (Sat Only)	●
2031 Total Operations	Significant Delays (Sat Only)	●

Niagara River Parkway and John Street East intersection currently operate at LOS C or better during weekday AM and PM peak hours in the summer under existing conditions. Delays during these times do not exceed 21 seconds. Critical movements are observed on the westbound approach during the Saturday peak hour, with operations in the LOS F range and a v/c ratio approaching 1.00. Similarly, the eastbound approach operates at LOS D with a v/c ratio below 0.60.

Under the 2031 background conditions, all movements at the intersection during the weekday AM peak hour are expected to operate at acceptable service levels. However, during the weekday PM peak hour, the westbound approach is forecast to operate at LOS D, with a v/c ratio of less than 0.40. During the Saturday peak hour, the eastbound approach will continue to operate at LOS D with a v/c ratio below 0.60, while the westbound approach is expected to continue at LOS F with a v/c ratio approaching 1.00.

With the addition of site-generated traffic, operations are expected to worsen further, with critical movements occurring during weekday PM and Saturday peak hours. During the weekday PM, the westbound approach is projected to continue operating at LOS D with a v/c ratio below 0.45. During Saturday's peak hour, the eastbound movement is expected to operate at LOS E with a v/c ratio below 0.75, while the westbound movement will operate at LOS F with a v/c ratio exceeding 1.00.



5.2.2 John Street East at Charlotte Street

Base Year Operations	Tolerable Delays	●
2031 Background Operations	Tolerable Delays	●
2031 Total Operations	Tolerable Delays	●

Intersection movements at John Street East at Charlotte Street presently operate at LOS B or better in the existing year conditions during the weekday and Saturday peak hours. Similar levels of operation are expected under the future background and total traffic conditions, with a minor increase in delay resulting from site-generated traffic volumes. Future traffic delays are forecast to exhibit fewer than 20 seconds of delay.



5.2.3 John Street East at King Street

Base Year Operations	Tolerable Delays	●
2031 Background Operations	Tolerable Delays	●
2031 Total Operations	Tolerable Delays	●

Intersection movements at John Street East at King Street currently operate at LOS A during weekday and Saturday peak hours, with delays of no more than 10 seconds. Similar levels of operation are anticipated under future background and total traffic conditions, with a slight increase in delay due to site-generated traffic. Future traffic delays are expected to be less than 15 seconds.



5.2.4 Niagara Street at Charlotte Street

Base Year Operations	Tolerable Delays	●
2031 Background Operations	Tolerable Delays	●
2031 Total Operations	Tolerable Delays	●

Intersection movements at Niagara Street and Charlotte Street currently operate at LOS A during weekday and Saturday peak hours, with delays of no more than 10 seconds. Similar levels of operation are expected under future background and total traffic conditions, remaining at LOS A with a minor increase in delay caused by site-generated traffic volumes. Future traffic delays are forecast to be similar to the current conditions (i.e., no more than 10 seconds of delay).



5.3 Left-Turn Lanes

The need for auxiliary left turn lanes at the study area intersections follows the requirements and procedures detailed in the Ministry of Transportation Geometric Design Manual¹². Warrants have been calculated for the 2031 total traffic conditions and the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street.

The warrant was calculated using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 10 km/h over the posted speed limit (70 km/h).

Table 5.6 summarizes the results of the left-turn lane warrant analyses. The following is noted:

- ▶ A separate turn lane along John Street is not warranted at Ritz Carlton Lane or the Hotel Driveway.
- ▶ A northbound left turn lane with 25 metres of storage is ultimately warranted at the Niagara River Parkway/Queen's Parade intersection and John Street East/Ricardo Street. The timing of storage per horizon year is noted:
 - As 15 metres of storage is currently warranted under existing conditions and a 25-metre turn lane is warranted under background conditions, the Town/Region should fund and implement this initial turn lane.
 - No additional storage is warranted with additional traffic generated from the proposed development.

Appendix G contains the warrant nomographs.

¹² Geometric Design Manual for Ontario Highways, Ministry of Transportation of Ontario, Queen's Printer for Ontario, 1986



6 Mitigation

6.1 Niagara River Parkway at John Street East

As discussed in the operational analysis section, Niagara River Parkway/Queen's Parade at John Street East/Ricardo Street is projected to operate with high levels of delay for the stop-controlled eastbound and westbound approaches under Summer Weekend conditions. Improvements are recommended at the intersection, given that the westbound approach will operate with significant delays with a volume-to-capacity ratio exceeding 1.00.

Additionally, the east leg of the intersection (Ricardo Street) is noted to intersect Niagara River Parkway/Queen's Parade at an oblique angle, reflecting a "skewed intersection." The angle of the east leg was measured as 47 degrees and less than the recommended guidelines for right angle intersections according to the Transportation Association of Canada (TAC) Geometric Design Guidelines for Canadian Roadways (GDGCR). TAC GDGCR identifies intersection angles of less than 70 degrees as typically affording poor visibility for drivers to judge the speed and distance of approaching vehicles on the main roadway.

6.1.1 Option A (Traffic Control Signals)

Given the poor operations noted under the Saturday peak hour, a signal warrant analysis has been undertaken based on the Ontario Traffic Manual (OTM) Justification 7. The warrant utilized traffic projections as noted under the 2031 Total Horizon. The signal warrant analysis is summarized in **Table 6.1**; detailed calculations are provided in **Appendix H**. The signal warrant analysis indicates traffic control signals are not warranted under the 2031 Total horizon.

Although the signal criteria have not been satisfied, installing unnecessary traffic control signals would enhance operations. Nevertheless, the approach alignment of Ricardo Street would still intersect Niagara River Parkway at an undesirable angle, but this would be less problematic since the traffic signal would manage the right of way for each approach.

If a signal is installed, the alignment of Ricardo Street should be adjusted to achieve an intersection angle as close to 90 degrees as possible. However, this may be challenging since a review of Ontario's natural heritage areas shows that the intersection of Niagara River Parkway and John Street East is bordered by extensive woodlands (Paradise Grove) on the east and north sides.



6.1.2 Option B (Roundabout)

The inscribed circle diameter (ICD) of a roundabout at this location would likely need to be at least 45 metres to accommodate various design vehicles expected to pass through, including agricultural equipment, buses, and trucks. To fit such a roundabout, mature trees near the intersection and along Paradise Grove would probably be affected. Additionally, moving the roundabout to the west would require extra land, which could impact an existing winery.

Figure 6.1 illustrates a functional roundabout design at the Niagara River Parkway/Queen's Parade intersection and John Street East/Ricardo Street.

The feasibility of a roundabout has also been assessed using Niagara Region's roundabout screening form. This screening tool intends to provide a relatively quick assessment of the feasibility of a modern roundabout at an intersection compared to other appropriate forms of traffic control. The intended outcome of this tool is to provide enough information to assist in deciding whether to proceed with an Intersection Control Study (ICS) to investigate the feasibility of a roundabout further. **Appendix I** includes the roundabout screening worksheet.

One of the main variables in the screening tool is environmentally sensitive lands or properties that could be difficult to acquire. For this location, the screening worksheet recommends that the process should not move forward towards an ICS, as the intersection is bordered by significant woodlands (Paradise Grove) on the east and north sides. Following the Region's screening tool, the feasibility of a roundabout at this site would not qualify for an ICS.



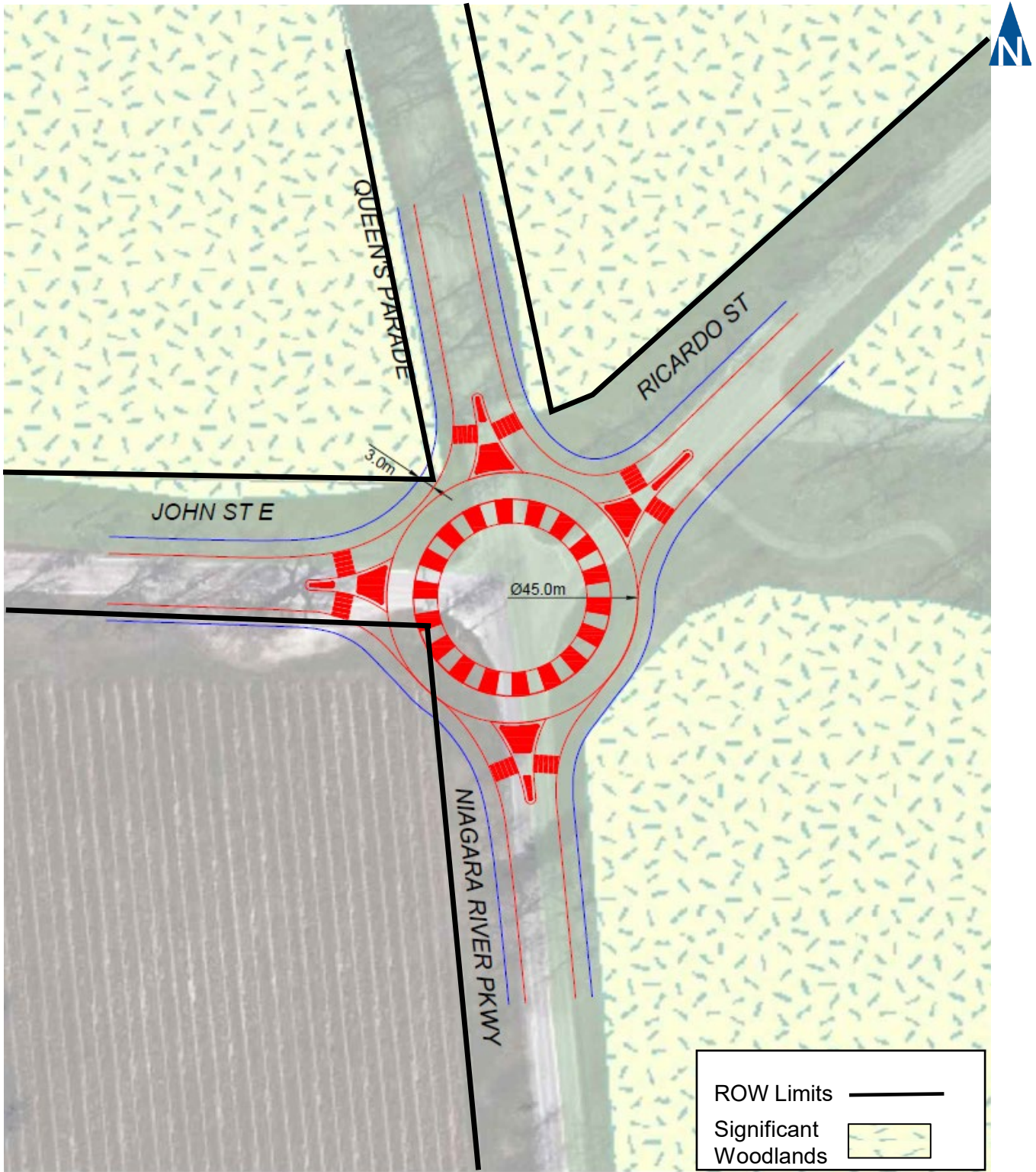


Image Source: Ontario – Natural Heritage Area



Roundabout Functional Design Niagara River Parkway at John

6.1.3 Option C (All-Way Stop)

To mitigate the poor operations and provide a mitigation solution for the skewed angle of the east leg of the intersection, an all-way stop warrant has been undertaken and is based on the Ontario Traffic Manual (OTM) Book 5 warrant for all-way stop control along a rural arterial roadway. The assessment for all-way stop control consists of three criteria that must be satisfied for the warrant to be met:

- ▶ The total vehicle volume on all intersection approaches exceeds 375 vehicles per hour for each of the highest eight hours of the day, and
- ▶ The combined vehicle and pedestrian volume on the minor street exceeds 150 units per hour (all vehicles plus pedestrians wishing to enter the intersection) for each of the same eight hours as the total volume OR the combined vehicle and pedestrian volume on the minor street exceeds 120 units per hour (all vehicles plus pedestrians wishing to enter the intersection) for each of the same eight hours as the total volume, with an average delay to all minor street traffic (vehicles and pedestrians) of greater than 30 seconds for the entire eight hour period; and
- ▶ The volume split does not exceed 70/30 (the minor street must not be less than 30% of the total volume entering the intersection) as measured over the entire eight-hour count period. Volume on the major street is defined as vehicles only. Volume on the minor street includes all vehicles and pedestrians wishing to cross the major roadway. For three-legged intersections, a volume split of 75/25 is permissible.

The volumes projected at this intersection under the 2031 Total horizon (Saturday) would warrant installing an all-way stop. The All-way Stop Warrant is provided in **Appendix J**.



6.1.5 Sensitivity Analysis

The proposed mitigation measures, as noted above, have been assessed for the 2031 Total horizon to determine the operations of the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street.

Table 6.1 summarizes the results of the sensitivity analysis. **Appendix K** contains the detailed Synchro reports. Overall, the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street is expected to operate with considerable improvements under the traffic control signal.

Concerning the all-way stop configuration, the intersection operates reasonably well during the weekday peak hours; however, it encounters delay during the summer Saturday peak hour, where the northbound approach is projected to operate at LOS F with a degree utilization exceeding 1.00.

The single-lane roundabout option was not assessed as Synchro does not yield approach delays for roundabouts. Instead, an Arcady analysis completed as part of a previous study¹³ is better suited for this type of assessment. The roundabout assessment previously completed utilized similar volumes as projected at the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street and identified a single-lane roundabout would operate well.

6.1.6 Preferred Option

The initial assessment indicates that all proposed options would support acceptable operations during the weekday peak hours. Concerning the Saturday peak hour (summer conditions), all options except the all-way stop would ensure adequate operations.

Since all options would likely require further evaluation from an environmental standpoint and input from various stakeholders, a more detailed technical investigation would be necessary to confirm the preferred option. This assessment would typically be conducted through a Municipal Class Environmental Assessment, or a new streamlined environmental assessment process outlined in the Municipal Project Assessment Process (MPAP) Regulation could be used.

¹³ 144 & 176 John St. E. and 200 John St. E. & 588 Charlotte St. Hotel and Residential Subdivision Development, Transportation Impact Study, LEA, November 2017.



7 Parking Review

As with any equilibrium system, a minimum of two components are required to be in balance and reach the equilibrium point. With parking systems, this involves the balance of parking supply and demand.

7.1 Zoning Requirements

The general parking requirements for hotel developments in this area are outlined in the Town of Niagara-on-the-Lake’s Zoning By-law 4316-09 Section 6. The following rates are noted:

- ▶ 1.00 parking spaces per guest room;
- ▶ 1.00 parking space per 9 m² of dining GFA
- ▶ 1.00 parking pace per 30 m² of outdoor patio GFA;
- ▶ 1.00 parking space per 18.5 m² of multi-use GFA;
- ▶ 1.00 parking space for 15 m² of Personal Service Establishment (Spa) GFA
- ▶ 1.00 parking space per 28 m² of office space.

Table 7.1 summarizes the calculations for the minimum parking standards of 488 parking spaces. The proposal, however, provides 222 parking spaces.

TABLE 7.1: ZONING BY-LAW REQUIREMENTS

By-Law	Units/GFA	Town By-Law	
		Parking Rate	Parking Spaces Required
Hotel	111 rooms	1 space per room	111 (111)
Restauraunt	764 m ²	1 space per 9 m ²	84.9 (85)
Restauraunt Patio	603 m ²	1 space per 30 m ²	20.1 (20)
Banquet	686 m ²	1 space per 9 m ²	76.2 (76)
Multi-Use	326 m ²	1 space per 18.5 m ²	17.6 (18)
Office	470 m ²	1 space per 28 m ²	16.8 (17)
Retail	199 m ²	1 space per 18.5 m ²	10.8 (11)
Spa	2242 m ²	1 space per 15 m ²	149.5 (150)
Total			488



7.1.2 NOTL Functional Parking Study

As a percentage of customers of the restaurant will be guests of the proposed hotel and nearby hotels, these customers would primarily access the restaurant by foot as opposed to a vehicle, thus a reduced rate for the restaurant use should be applicable.

The Town undertook a Functional Parking Study in 2011 that discussed the impact of the "captive market." The study noted the following with respect to parking rates for the Queen Picton Area:

"The current parking requirements in the Town's Zoning By-law are reasonable for Town-wide use. However, their application within the Queen-Picton commercial core area may overstate the required parking demand..."

The Queen-Picton Heritage District commercial area is similar to a mixed-use development and shared parking has become important in encouraging mixed-use development and greater efficiency in land use. Shared parking is defined as "parking space that can be used to serve two or more individual land uses without conflict or encroachment". A shared parking model shows not only how many cars are generated by each land use at the peak hour, but also how the demand patterns change over the course of the day, week and year.

The term "captive market" was initially adopted from market researchers who use it to describe people who are already present in the immediate vicinity at specific times of the day. In shared parking assessments, it is used to reflect adjustments in parking requirements and vehicular trip generation rates resulting from interactions among land uses within a designated area. A vehicle trip is not generated when a customer is already on site or nearby, and therefore already counted as being parked.

Research based on guest surveys shows a strong connection between hotel guests and nearby retail and restaurant land uses. It reported that 73-100 percent of hotel guests also patronize nearby retail and restaurant establishments. The results were consistent for both downtown and suburban hotels. Therefore, it is reasonable to consider the synergy created among complementary land uses when deciding on parking requirements.



7.1.2 Site Specific Zoning

The subject lands are governed by the site-specific provisions of the General Commercial – Randwood Estate (GC-56) Zone, which explicitly permits a hotel, conference centre, and restaurant uses. As outlined in the in-force zoning by-law, a minimum of 250 parking spaces is required for the full build-out of these uses, notwithstanding the standard parking provisions of the parent by-law.

The original zoning framework contemplated a development consisting of 106 hotel rooms, a restaurant (up to 200 seats), conference facilities, and up to 8 guest rooms within the Devonian House. The current proposal remains consistent with this approved land use framework, with only a minor increase of five (5) additional hotel rooms, resulting in a total of 111 hotel rooms.

The site-specific by-law establishes a fixed minimum parking requirement of 250 spaces, which was intended to accommodate the full range of permitted uses at the site, including the hotel, restaurant, and conference centre. The proposed development continues to operate within this established framework and does not introduce new uses or intensities beyond what was contemplated in the zoning, aside from the minor increase in rooms.

From a parking demand perspective, this modest increase represents a negligible change in overall parking needs. The addition of five hotel rooms corresponds to a very small incremental increase in peak parking demand relative to the scale of the overall development. Based on the above, the proposed development is consistent with the intent of the site-specific zoning.



7.2. Shared Parking

Consideration of shared parking opportunities is common within mixed-use facilities. The concept of shared and/or managed parking reflects the variations in usage levels of different land uses by the time of day, day of the week and seasonal factors to derive efficiencies in overall parking supply requirements through a permissive sharing of a common pool of parking that supports the range of planned uses at different times.

Each land use does not require its own dedicated parking supply, but that is exactly what standard analysis and zoning suggest is necessary. In reality, different uses have varying peak demands throughout the day: for example, an office may have high demand until 5 PM, while a restaurant open for dinner may only have high demand after 5 PM.

For the base demand, general parking rates outlined in By-Law 4316-09 Section 6 are used as a conservative estimate for parking, which stipulates that if all uses on site required a separate pool of parking, 488 spaces would be required.

7.2.1 Non-Captive Market

In the shared parking analysis, the term “captive market” describes how parking needs and vehicle trip generation rates change because of interactions among different uses in an area. “Captive market” is borrowed from market researchers to refer to people already present nearby at certain times of the day. Usually, the non-captive adjustment helps to refine the parking needs of people already counted as being parked for the day. For example, an apartment resident who eats at a restaurant only contributes to parking demand for one space instead of two.

Paradigm has used the inverse or non-captive ratio in designing a shared-use analysis, which is the percentage of parkers not already counted as parked. There is usually a primary land use, in this case, the hotel, which accounts for the longest parking durations of a vehicle.

It is reasonable to assume that hotel guests will dine at the restaurant, use the multi-use spaces, or visit the Spa. As a result, the following captive percentages are considered per the Urban Land Institute’s Shared Parking methodology (ULI)¹⁴. No specific captive rate is provided for the Spa; however, it is perceived to be used almost

¹⁴ Shared Parking 3rd Edition, Urban Land Institute



exclusively by guests of the hotel and is reflected in the non-captive assumption:

- ▶ Restaurant: 90% weekday / 70% weekend
- ▶ Banquet: 25% weekday / 25% weekend
- ▶ Multi-use/Meeting Room: 25% weekday / 25% weekend
- ▶ Spa: 25% weekday / 25% weekend

Overall, the estimated non-captive ratios are based on what reasonable shared parking expectations are. A portion of the parking available to the hotel can be assumed to be shared with the restaurant, multi-use space, and spa, as guests will likely choose the hotel for these amenities.

7.2.2 Driving Adjustment Factor

The shared parking analysis incorporates a driving adjustment factor to account for variations in travel behaviour and vehicle usage among different land uses. These factors have been derived from industry-standard guidance published by ULI, which reflects observed parking demand characteristics across a range of development contexts.

ULI provides specific driving adjustment factors for various hotel types, including resort hotels, where a lower reliance on personal vehicles may be expected due to the availability of on-site amenities and alternative transportation options. However, given the subject site's location and context, it is anticipated that the majority of hotel patrons will arrive and depart using personal vehicles. As such, a driving adjustment factor for hotel guests have not been incorporated.

Regarding the uses of the on-site restaurant, data from the Town's functional parking study indicates a strong link between hotel guests and nearby retail and dining options, which encourages significant interaction between the hotel and the wider community. It is likely that a substantial portion of restaurant patrons will come from the local neighbourhood and travel to the site using active transportation methods such as walking and cycling, rather than driving. This dispersed, multi-modal travel pattern reduces the need for on-site parking and helps keep the restaurant's parking demand moderate.

Regarding the banquet facilities, the driving adjustment factor also considers the expected use of alternative transportation methods. It is reasonable to assume that some banquet attendees will take car or ride-sharing services to attend events, especially when alcohol is involved.



As a result, the following driving adjustment factors have been applied, consistent with ULI guidance:

- ▶ Restaurant: 50% weekday / 50% weekend
- ▶ Banquet: 50% weekday / 50% weekend

7.2.3 Shared Parking Demand

Paradigm used and adapted a shared parking model using inputs from the ULI to model this activity. Shared parking accommodates peak parking demand but shares a supply among different uses. If each land use built enough parking to accommodate its peak demand, the supply of spaces would be grossly underutilized.

This analysis is vital because it reflects that specific user groups can share the same parking spaces without requiring additional parking. In the case of the proposed development, the restaurant and spa parking are excellent candidates for shared parking, as they peak at different times of the day. When the projected demands overlap temporally, the following is noted:

- ▶ There is no hour in the day when all user groups peak at the same time (contrary to the assumption of superposition);
- ▶ When hotel demands rise towards their peak for the overnight, the multi-use spaces, restaurant, and Spa demands fall;
- ▶ As multi-use spaces, restaurant, and spa parking demands rise in the day and evening, the hotel parking demands fall; and
- ▶ Spa time of day parking demands is not available within the ULI dataset. However, “Health Club” parking demands are available were utilized as comparable land use. The health club land use includes exercise facilities, recreational community centres, and athletic centres. Health clubs show parking demands similar to what is expected at a spa or personal service establishment: moderate use during the morning, rising demand in the afternoon, and peak demand generally between 4:00 PM and 7:00 PM.

Additionally, to stay conservative with the approach, it is assumed that the hotel spaces will be reserved exclusively for guests, and therefore, they will be removed from the shared parking pool.

The model started with a baseline demand of 488 spaces calculated in **Section 7.1**. After adjusting for shared parking and non-captive and driving ratios, the peak demand is approximately 220 spaces. If each



land use were to build enough parking to accommodate its peak demand, then the supply of spaces would be grossly underutilized.

Table 7.2 outlines the peak shared parking requirement.

TABLE 7.2: SHARED PARKING CALCULATIONS

Weekend

Land Use	Unadjusted Demand	Peak Adjustment 1:00 PM	Non-Captive Adjustment	Driving Adjustment	Shared Parking Demand
Hotel	111	100%	100%	100%	111.0
Dining	105	100%	90%	50%	47.3
Banquet	76	65%	25%	50%	6.2
Multi-Use	18	65%	25%	100%	2.9
Office	17	85%	100%	100%	14.5
Retail	11	100%	100%	100%	11.0
Spa	150	70%	25%	100%	26.3
Total	488				219.1

Weekday

Land Use	Unadjusted Demand	Peak Adjustment 1:00 PM	Non-Captive	Driving Adjustment	Shared Parking Demand
Hotel	111	100%	100%	100%	111.0
Dining	105	100%	70%	50%	36.8
Banquet	76	65%	25%	50%	6.2
Multi-Use	18	65%	25%	100%	2.9
Office	17	90%	100%	100%	15.3
Retail	11	95%	100%	100%	10.5
Spa	150	50%	25%	100%	18.8
Total	488				201.4



7.3 Secondary Source Data

7.3.1 Town of Blue Mountains

Both the Town of Niagara-on-the-Lake and the Town of Blue Mountains show a relatively high dependence on single-occupancy vehicles. According to the 2016 Transportation Tomorrow Survey (TTS), the proportion of trips arriving by single-occupant vehicles was 79% for Niagara-on-the-Lake and 75% for Blue Mountains. For residents (i.e., trips originating within the municipality), the shares were 79% and 78%, respectively, for NOTL and Blue Mountains.

The parking by-law requirements for the tourist area of the Town of Blue Mountains require the following with respect to hotels:

- ▶ 1.30 spaces per room, which included parking provisions for on-site office space, food supply, convention facilities, dining areas and recreational facilities.

The main difference with respect to how the Town of Blue Mountains calculates parking requirements for hotel uses is the rate includes ancillary uses that will be used by a significant portion of hotel guests. This is similar to the application of the “captive market” with respect to what was noted in the Town’s Functional Parking Study.

An all-in-one inclusive parking rate more accurately reflects the proposed development, as it adopts a shared parking approach and recognizes that many of the amenity spaces will be used by hotel guests already accommodated by the 222 general hotel parking spaces. By applying the 1.30 spaces per hotel room, a total of 145 parking spaces is projected, using the Town of Blue Mountains parking rate.

7.3.2 Institute of Transportation Engineers (ITE)

Numerous industry associations and institutions are dedicated to surveying and reviewing parking requirements related to various land uses. These associations, such as the Institute of Transportation Engineers (ITE), collect, review and disseminate information about parking demand, supply, and appropriate design standards. This data helps establish a typical range of requirements.

The most recent parking generation manual available is the 6th edition¹⁵, a comparative starting point to determine baseline assumptions.

¹⁵ ITE Parking Generation 6th Edition, Washington DC, 2023.



This study includes ITE peak period parking demand rates as guidelines to benchmark how the proposed supply compares to industry standards based on collected data at various proxy sites. The following ITE Land Use Code (LUC) was reviewed:

- ▶ LUC 310 (Hotel) represents A hotel is a place of lodging that provides sleeping accommodations and supporting facilities such as a full-service restaurant, concierge service, valet parking, cocktail lounge, meeting rooms, banquet room, and convention facilities. A hotel typically provides a swimming pool or another recreational facility such as a fitness room. The ITE parking rates stipulate that the average parking demand is 0.65 spaces per room for a Saturday.
- ▶ LUC 311 (All Suites Hotel) represents a place of lodging that provides sleeping accommodations, a small restaurant/breakfast buffet and lounge, and small amounts of meeting space. Each suite includes a sitting room and separate bedroom. An in-room kitchen is often provided. An all-suites hotel may provide a swimming pool or another recreational facility such as a fitness room. The ITE parking rates stipulate that the average parking demand is 0.90 spaces per room for a Saturday.

Using the higher of the two ITE rates for hotels, 0.90 spaces per hotel room and applying it to the proposed development results in a parking demand of 100 spaces.

It is recognized that the all-suites hotel does not identify banquet facilities in the parking rate. To address this, including the Zoning By-law requirement of 76 parking spaces for the banquet facility would raise the total parking demand to 176 spaces. Since the site offers 222 parking spaces, the supply is expected to satisfy the projected demand.

7.3.3 Proxy Survey

Paradigm has reviewed parking demand data collected at the 124 on Queen Hotel in Niagara-on-the-Lake in November 2024. The hotel has 76 hotel units, restaurants, and a spa, and provides private on-site parking. All on-site parking is reserved for the hotel and amenities, with no on-site public parking available.

The benefits of reviewing this data are that surveys captured continuous parking demand activity using Miovision Scout Units from Thursday at midnight till Sunday at midnight, for a total of 72 continuous hours, providing a robust profile of parking demand data. The surveys observed a peak parking demand of 73 spaces for the 76-



room hotel, which was fully occupied throughout. This equates to a peak parking demand of 0.96 spaces per hotel room, inclusive of supporting ancillary uses (spa and restaurants). **Appendix L** includes the hotel's proxy survey data.

Using the observed proxy survey rate of 0.96 spaces per hotel room for the proposed development results in a parking demand of 107 spaces. It is important to note that the local proxy survey closely resembles the ITE rate for an all-suites hotel.

It is recognized that the proxy site at 124 on Queen does not offer any banquet facilities. To address this, including the Zoning By-law requirement of 76 parking spaces for the banquet facility would raise the total parking demand to 183 spaces. Since the site offers 222 parking spaces, the supply is expected to satisfy the projected demand.

7.4 Parking Summary

The Town of Niagara-on-the-Lake Zoning By-law indicates a theoretical parking requirement of 488 spaces when standard rates are calculated separately for each land use. However, this method does not account for the mixed-use character of the development or the interaction between on-site uses. Instead, the subject lands are regulated by a site-specific zoning (GC-56), which sets a minimum parking requirement of 250 spaces for the full development of the approved hotel, restaurant, and conference facilities.

The proposed development remains consistent with this approved framework, with only a minor increase of five additional hotel rooms compared to the original approval. This increase represents a negligible change in overall parking demand and does not alter the fundamental assumptions of the site-specific zoning.

A shared parking analysis was conducted to better reflect real-world conditions, using the Urban Land Institute methodology. This analysis considers the “captive market” effect, where hotel guests utilise on-site amenities such as the restaurant, spa, and meeting spaces, thereby decreasing the need for additional parking. It also acknowledges that peak parking demands for different land uses happen at various times of day and includes adjustments to account for realistic travel behaviours, including some trips made by active transportation and ride-sharing.

Based on these considerations, the adjusted peak parking demand is estimated to be approximately 220 spaces. This is effectively accommodated within the proposed supply of 222 parking spaces.



This is further supported by industry data and comparable sources, including parking rates from the Town of Blue Mountains, Institute of Transportation Engineers (ITE) data, and a local proxy survey from a comparable hotel in Niagara-on-the-Lake, all of which indicate that the proposed supply of 222 parking spaces is sufficient to meet anticipated demand.

Overall, the proposed parking supply aligns with the intent of the site-specific zoning, reflects accepted shared parking principles, and is appropriate to accommodate the development's expected peak parking demand.



7 Conclusions and Recommendations

7.1 Conclusions

7.1.1 Transportation Study

Based on the analysis completed as part of this Transportation Impact Assessment, the proposed mixed-use development can be accommodated within the existing and future transportation network.

The proposed development is forecast to generate approximately 138, 244, and 254 new vehicle trips during the weekday AM, weekday PM, and Saturday peak hours, respectively, after accounting for internal trip capture associated with the site's mixed-use nature. These volumes represent a moderate increase in traffic and are not anticipated to significantly impact the overall operation of the surrounding road network.

Under the 2031 total traffic scenario, the majority of study area intersections are expected to operate at acceptable levels of service (LOS A to C), with minimal increases in delay. While the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street is anticipated to experience ongoing operational constraints, these are reflective of existing and background conditions, with the proposed development contributing only a marginal additional impact.

From an access perspective, the proposed design of Ritz Carlton Lane as a private roadway connection to John Street East has been developed to address the intent of the Ontario Land Tribunal decision and to align with Niagara-on-the-Lake Municipal Engineering Standards and the Transportation Association of Canada Guidelines. The inclusion of 9.0 m curb radii, an approximate 7.0 m pavement width, and a driveway separation of approximately 14.8 m from the adjacent access are considered to satisfy the functional requirements for safe and efficient operations, including vehicle maneuverability and sightline protection.

In addition, the proposed access locations have been demonstrated to meet or exceed applicable stopping and intersection sight distance requirements. The provision of appropriate throat lengths and internal connectivity between the residential and hotel components further supports efficient on-site circulation and reduces the potential for queuing impacts on John Street East.

The development meets NOTL MES Section 3.14 by providing two public roadway access points, ensuring emergency access and network redundancy. The hotel and residential buildings will have a full



sprinkler system, which reduces fire risk by controlling fires early and decreasing reliance on fire department intervention.

Subject to the implementation of targeted improvements, including the provision of pedestrian visibility measures at access points (visibility triangles) and consideration of enhanced pedestrian crossing opportunities in the vicinity of the site, the transportation impacts associated with the proposed development are considered acceptable.

7.1.2 Parking Study

The Town of Niagara-on-the-Lake Zoning By-law 4316-09 identifies a theoretical parking requirement of 488 spaces when standard rates are applied independently to each land use, representing a conservative, non-shared parking scenario. However, the subject lands are governed by site-specific zoning (GC-56), which establishes a minimum requirement of 250 parking spaces for the full build-out of the approved hotel, restaurant, and conference centre uses. The proposed development remains consistent with this framework, with only a minor increase of five hotel rooms (111 total compared to 106 previously approved), resulting in a negligible change in overall parking demand.

A shared parking analysis was carried out to better represent the mixed-use nature of the development. This method recognises the efficiency gained from complementary land uses with differing peak demand times and includes the “captive market” effect, where hotel guests are expected to utilise on-site amenities such as the restaurant, spa, and meeting spaces. The analysis also accounts for driving adjustment factors to reflect realistic travel behaviours, including active transportation and ride-sharing for specific uses. The results demonstrate that peak parking demands do not occur simultaneously across all uses, allowing for more efficient use of the overall parking supply. Based on this methodology, the adjusted peak parking demand is estimated to be approximately 220 spaces, which can be accommodated within the proposed supply of 222 parking spaces.

This is further supported by secondary source data and industry benchmarks. Application of the Town of Blue Mountains parking rate yields a demand of about 145 spaces, reflecting a comprehensive approach to hotel and ancillary uses. Institute of Transportation Engineers (ITE) data indicates a demand of around 100 spaces based on hotel use alone, increasing to roughly 176 spaces when banquet facilities are included. A local proxy survey of a similar hotel in Niagara-on-the-Lake identified a demand rate of 0.96 spaces per room, equating to about 107 spaces, or around 183 spaces when banquet facilities are considered.



Overall, all analytical methods and comparative data sources show that the proposed parking supply of 222 spaces exceeds expected demand under normal operating conditions. The proposed parking provision aligns with the intent of the site-specific zoning, follows accepted shared parking principles, and is suitable and adequate to meet the anticipated parking needs of the development.

7.2 Recommendations

Based on the findings of this study, it is recommended that:

- ▶ A Municipal Class Environmental Assessment or streamlined EA process is recommended to be carried out to determine the preferred improvement option at the intersection of Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street.
- ▶ Niagara Region review the feasibility of providing an all-way stop as an interim condition to address the current delays and skewed angle of the east leg at the Niagara River Parkway/Queen's Parade and John Street East/Ricardo Street intersection.
- ▶ The Town review the feasibility of providing a pedestrian crossover at the intersection of John Street East and Charlotte Street.
- ▶ The Town approves the proposed parking supply of 222 parking spaces for the hotel component of the proposed development.



Appendix A

Traffic Data

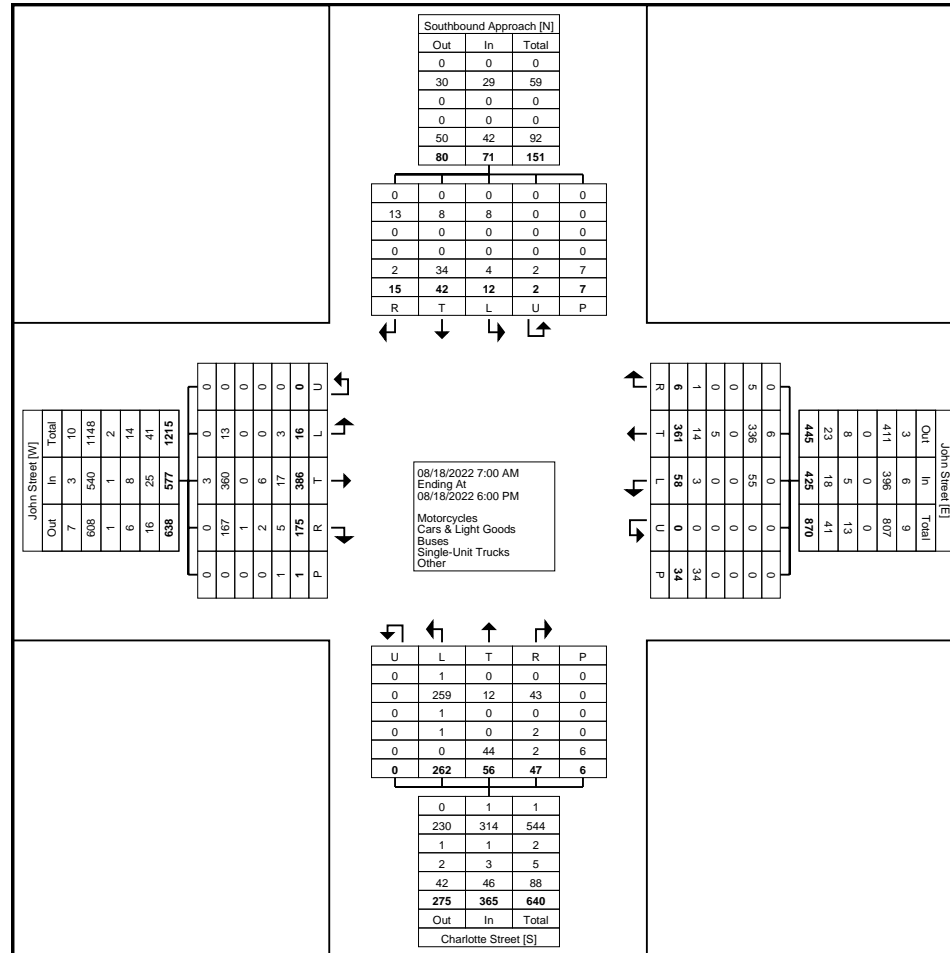




Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Charlotte Street & John Street E -
Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 3



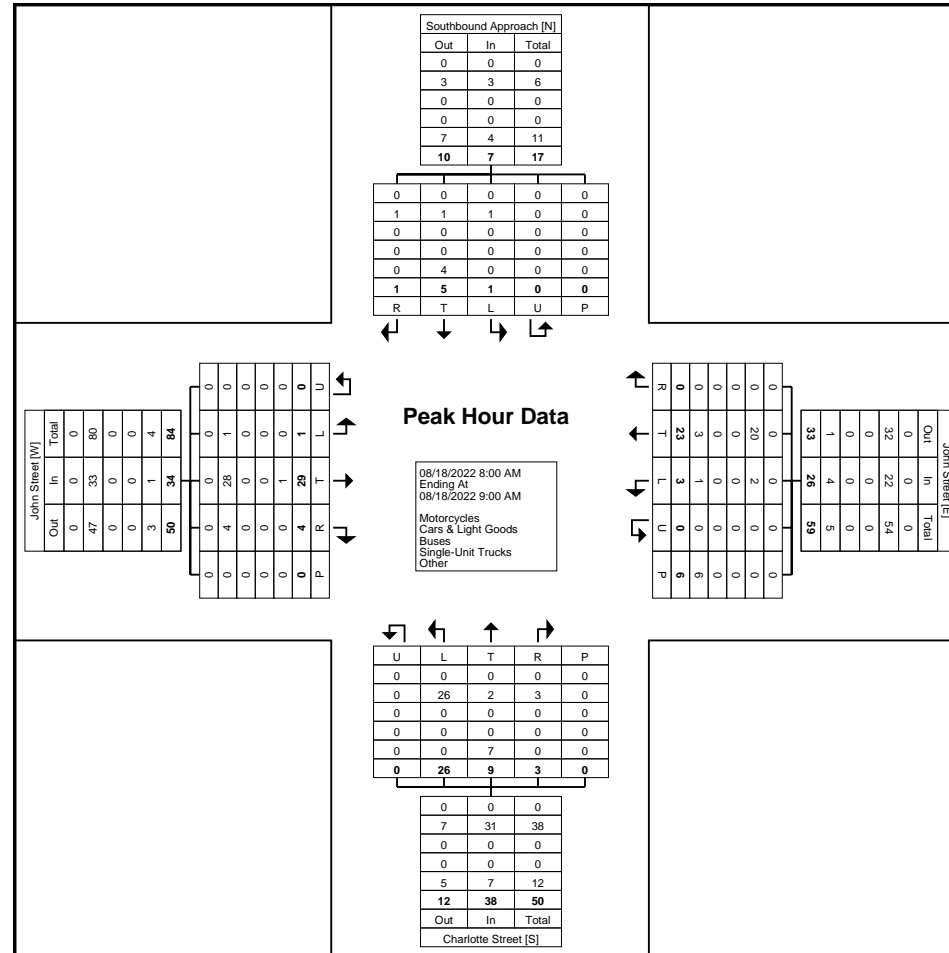
Turning Movement Data Plot



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Count Name: Charlotte Street & John Street E -
Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 5



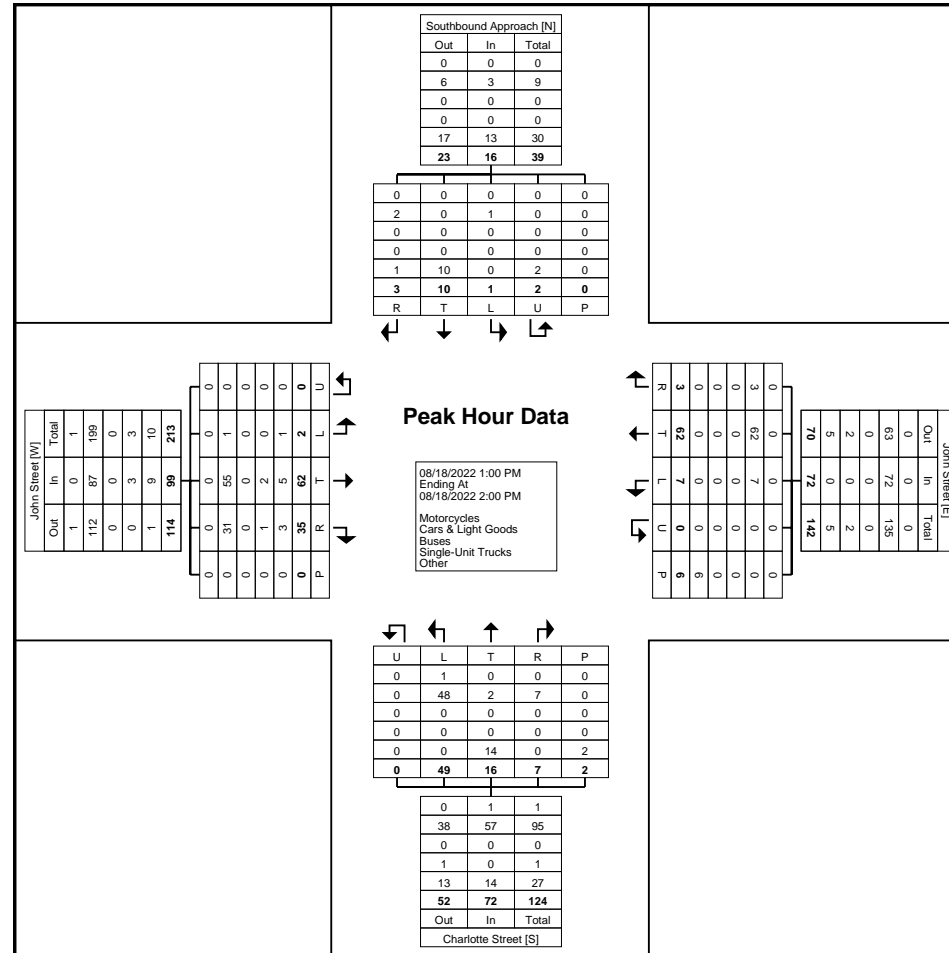
Turning Movement Peak Hour Data Plot (8:00 AM)



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Count Name: Charlotte Street & John Street E -
Weekday
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Page No: 7



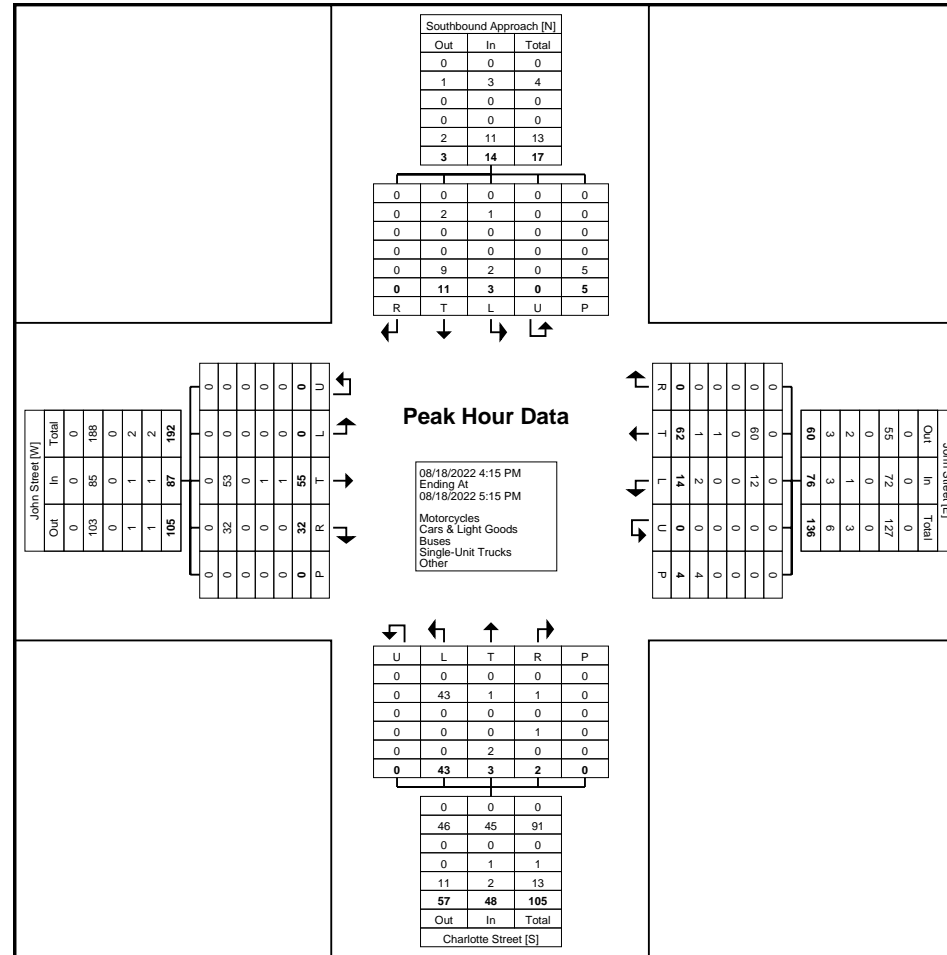
Turning Movement Peak Hour Data Plot (1:00 PM)



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Count Name: Charlotte Street & John Street E -
Weekday
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Start Date: 08/18/2022
Page No: 9



Turning Movement Peak Hour Data Plot (4:15 PM)

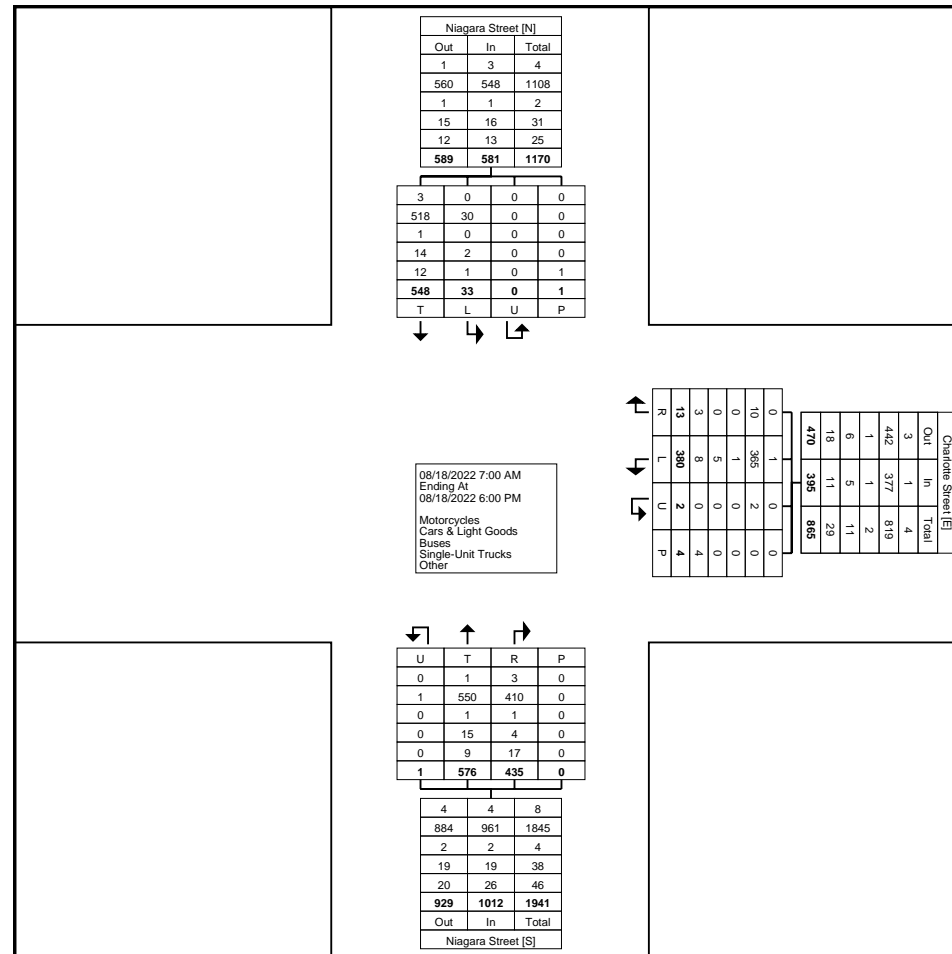
Hourly Total	61	0	0	2	61	81	58	0	0	139	4	98	0	0	102	302
5:00 PM	15	0	0	0	15	22	22	0	0	44	3	25	0	0	28	87
5:15 PM	11	0	0	0	11	10	15	0	0	25	1	20	0	0	21	57
5:30 PM	16	1	0	0	17	9	19	0	0	28	2	16	0	0	18	63
5:45 PM	13	0	0	0	13	15	14	0	0	29	2	15	0	0	17	59
Hourly Total	55	1	0	0	56	56	70	0	0	126	8	76	0	0	84	266
Grand Total	380	13	2	4	395	576	435	1	0	1012	33	548	0	1	581	1988
Approach %	96.2	3.3	0.5	-	-	56.9	43.0	0.1	-	-	5.7	94.3	0.0	-	-	-
Total %	19.1	0.7	0.1	-	19.9	29.0	21.9	0.1	-	50.9	1.7	27.6	0.0	-	29.2	-
Motorcycles	1	0	0	-	1	1	3	0	-	4	0	3	0	-	3	8
% Motorcycles	0.3	0.0	0.0	-	0.3	0.2	0.7	0.0	-	0.4	0.0	0.5	-	-	0.5	0.4
Cars & Light Goods	365	10	2	-	377	550	410	1	-	961	30	518	0	-	548	1886
% Cars & Light Goods	96.1	76.9	100.0	-	95.4	95.5	94.3	100.0	-	95.0	90.9	94.5	-	-	94.3	94.9
Buses	1	0	0	-	1	1	1	0	-	2	0	1	0	-	1	4
% Buses	0.3	0.0	0.0	-	0.3	0.2	0.2	0.0	-	0.2	0.0	0.2	-	-	0.2	0.2
Single-Unit Trucks	5	0	0	-	5	15	4	0	-	19	2	14	0	-	16	40
% Single-Unit Trucks	1.3	0.0	0.0	-	1.3	2.6	0.9	0.0	-	1.9	6.1	2.6	-	-	2.8	2.0
Articulated Trucks	0	0	0	-	0	1	0	0	-	1	0	1	0	-	1	2
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.2	0.0	0.0	-	0.1	0.0	0.2	-	-	0.2	0.1
Bicycles on Road	8	3	0	-	11	8	17	0	-	25	1	11	0	-	12	48
% Bicycles on Road	2.1	23.1	0.0	-	2.8	1.4	3.9	0.0	-	2.5	3.0	2.0	-	-	2.1	2.4
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	4	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-



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Count Name: Charlotte Street & Niagara Street -
Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Charlotte Street & Niagara Street - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

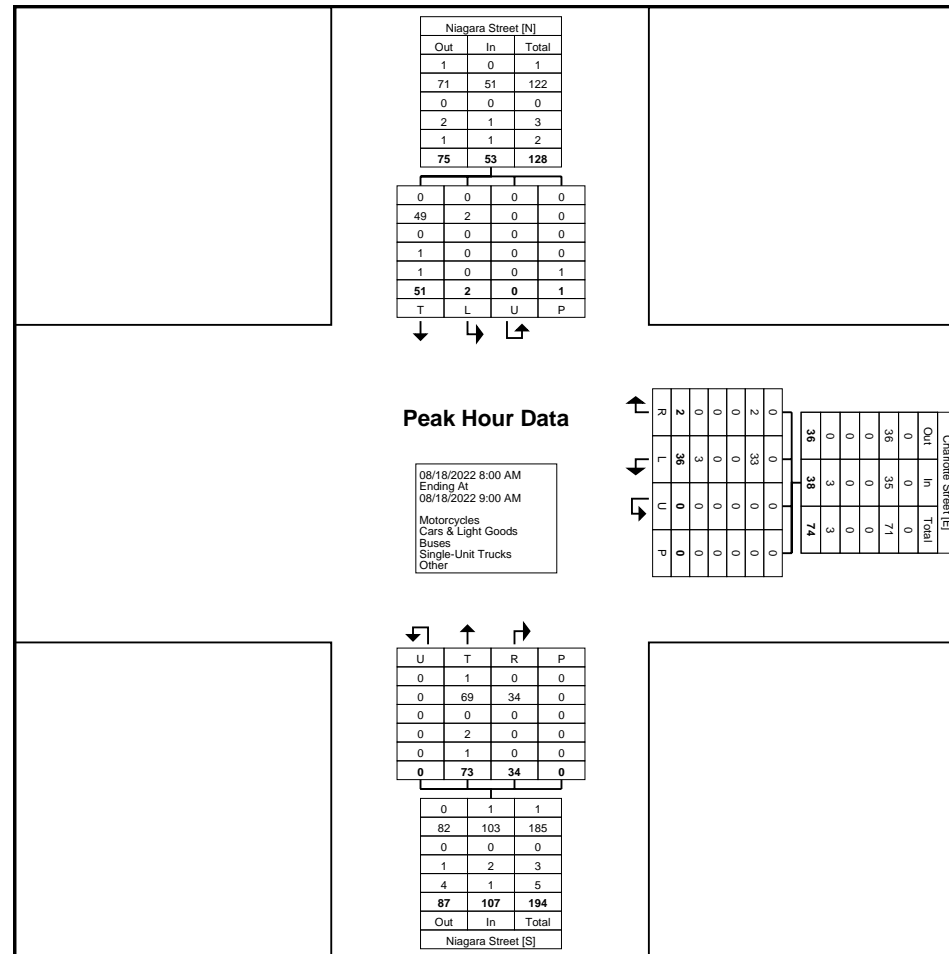
Start Time	Charlotte Street Westbound					Niagara Street Northbound					Niagara Street Southbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	
8:00 AM	7	0	0	0	7	21	6	0	0	27	0	14	0	1	14	48
8:15 AM	11	0	0	0	11	11	9	0	0	20	1	14	0	0	15	46
8:30 AM	9	0	0	0	9	19	9	0	0	28	1	13	0	0	14	51
8:45 AM	9	2	0	0	11	22	10	0	0	32	0	10	0	0	10	53
Total	36	2	0	0	38	73	34	0	0	107	2	51	0	1	53	198
Approach %	94.7	5.3	0.0	-	-	68.2	31.8	0.0	-	-	3.8	96.2	0.0	-	-	-
Total %	18.2	1.0	0.0	-	19.2	36.9	17.2	0.0	-	54.0	1.0	25.8	0.0	-	26.8	-
PHF	0.818	0.250	0.000	-	0.864	0.830	0.850	0.000	-	0.836	0.500	0.911	0.000	-	0.883	0.934
Motorcycles	0	0	0	-	0	1	0	0	-	1	0	0	0	-	0	1
% Motorcycles	0.0	0.0	-	-	0.0	1.4	0.0	-	-	0.9	0.0	0.0	-	-	0.0	0.5
Cars & Light Goods	33	2	0	-	35	69	34	0	-	103	2	49	0	-	51	189
% Cars & Light Goods	91.7	100.0	-	-	92.1	94.5	100.0	-	-	96.3	100.0	96.1	-	-	96.2	95.5
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	0	0	-	0	2	0	0	-	2	0	1	0	-	1	3
% Single-Unit Trucks	0.0	0.0	-	-	0.0	2.7	0.0	-	-	1.9	0.0	2.0	-	-	1.9	1.5
Articulated Trucks	0	0	0	-	0	1	0	0	-	1	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	-	-	0.0	1.4	0.0	-	-	0.9	0.0	0.0	-	-	0.0	0.5
Bicycles on Road	3	0	0	-	3	0	0	0	-	0	0	1	0	-	1	4
% Bicycles on Road	8.3	0.0	-	-	7.9	0.0	0.0	-	-	0.0	0.0	2.0	-	-	1.9	2.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Charlotte Street & Niagara Street -
Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 5



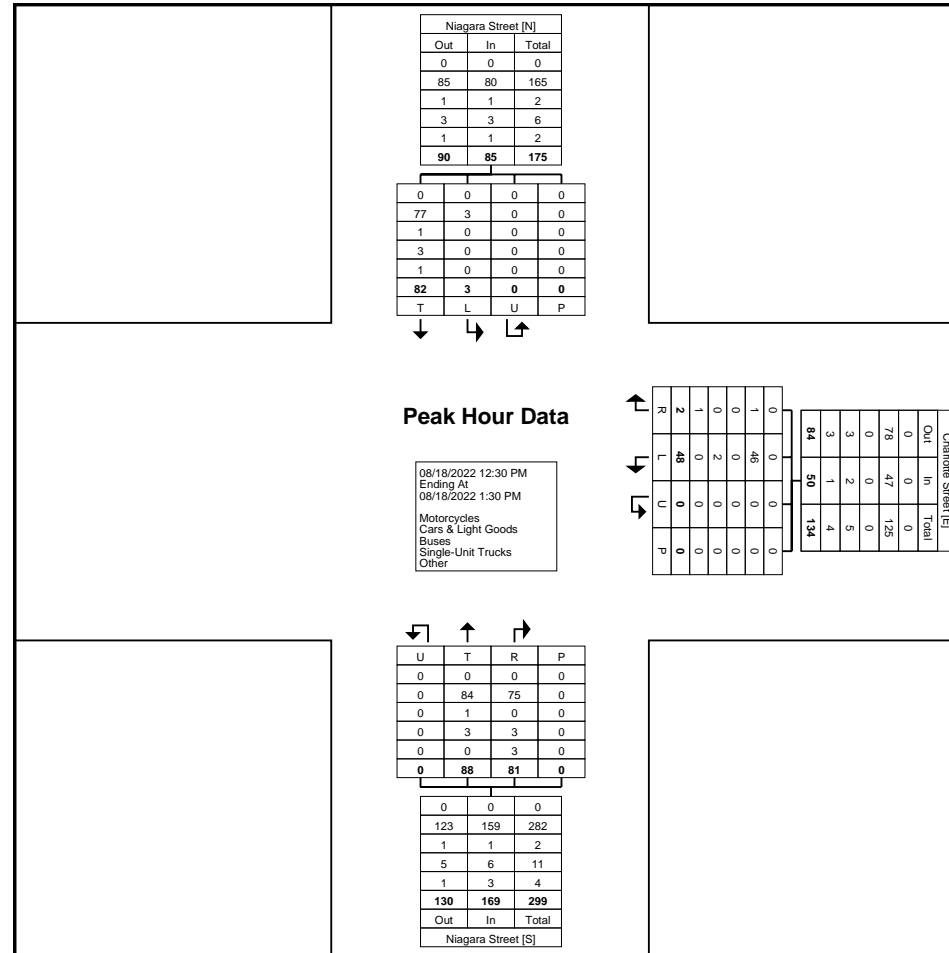
Turning Movement Peak Hour Data Plot (8:00 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Charlotte Street & Niagara Street -
Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 7



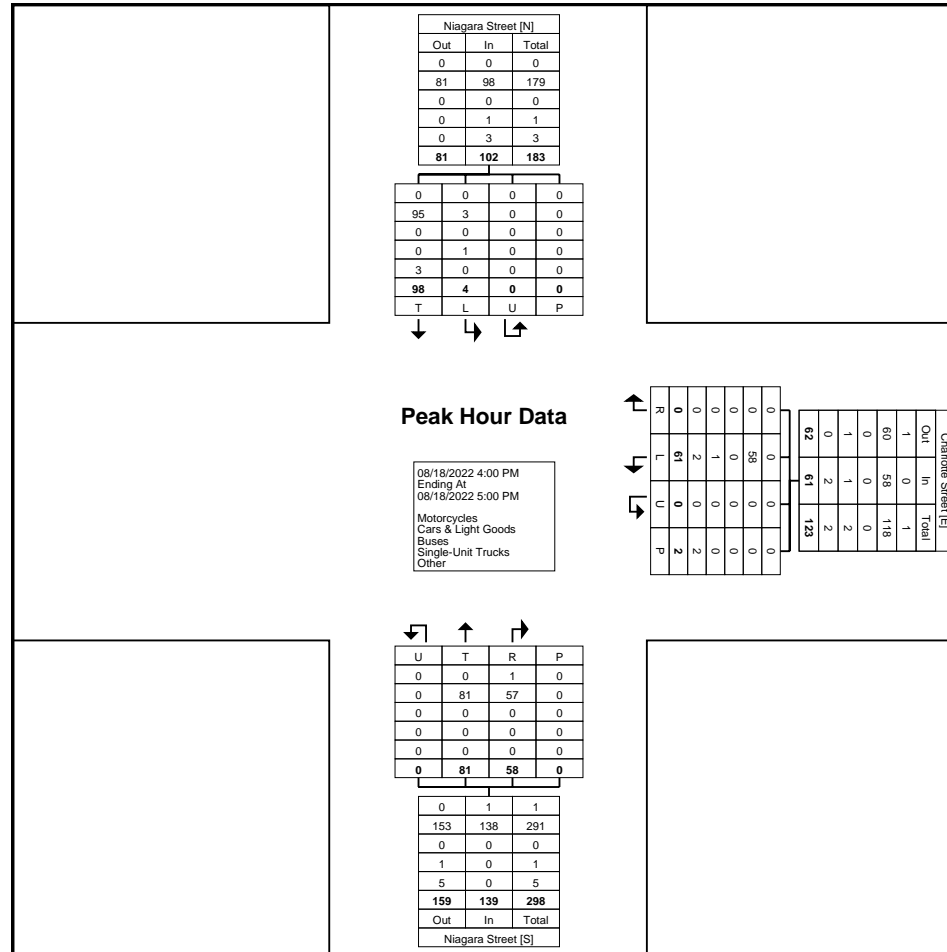
Turning Movement Peak Hour Data Plot (12:30 PM)



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Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Charlotte Street & Niagara Street - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 9



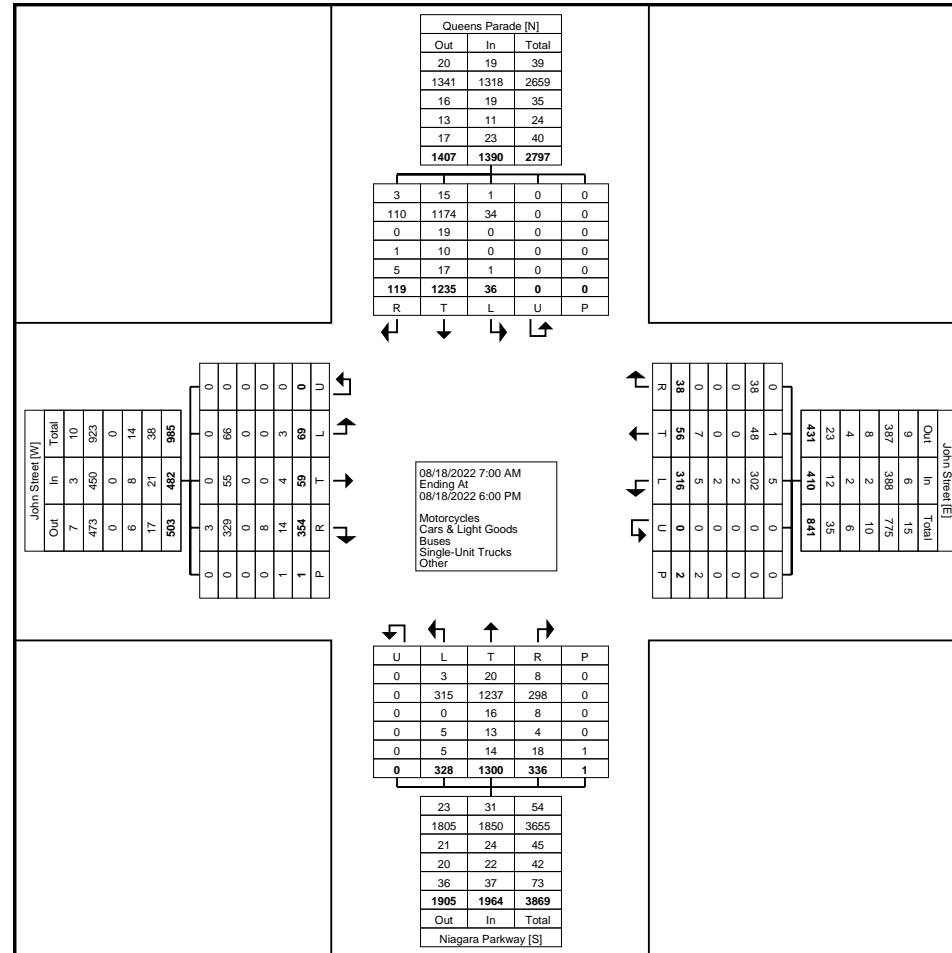
Turning Movement Peak Hour Data Plot (4:00 PM)



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Count Name: John Street & Queens
Parade/Niagara Parkway - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 3



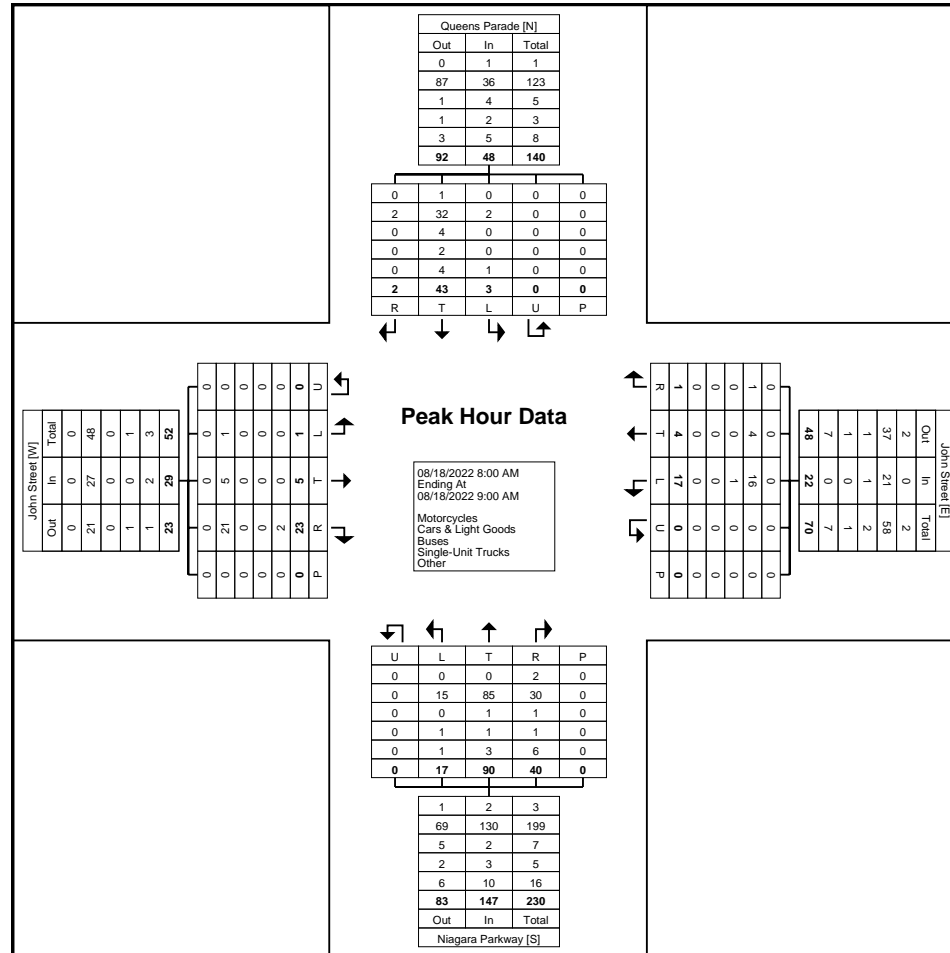
Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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519-896-3163 cbowness@ptsl.com

Count Name: John Street & Queens
Parade/Niagara Parkway - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 5



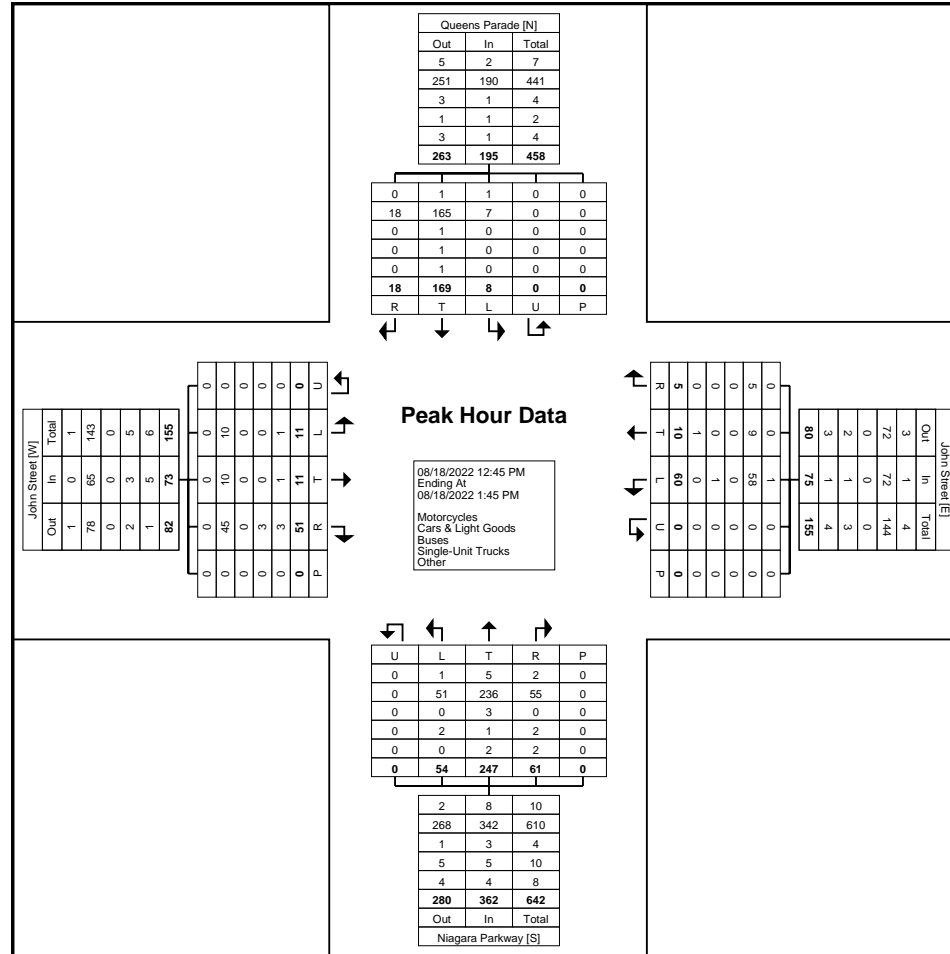
Turning Movement Peak Hour Data Plot (8:00 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: John Street & Queens
Parade/Niagara Parkway - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 7



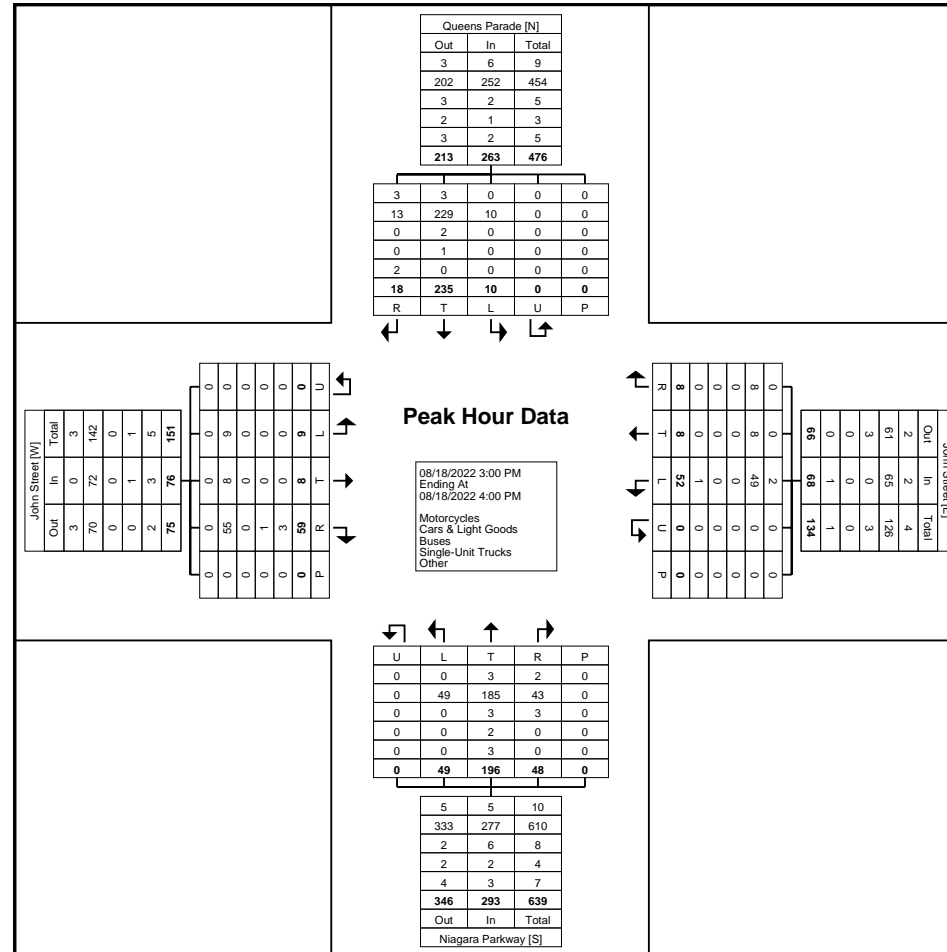
Turning Movement Peak Hour Data Plot (12:45 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: John Street & Queens
Parade/Niagara Parkway - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 9



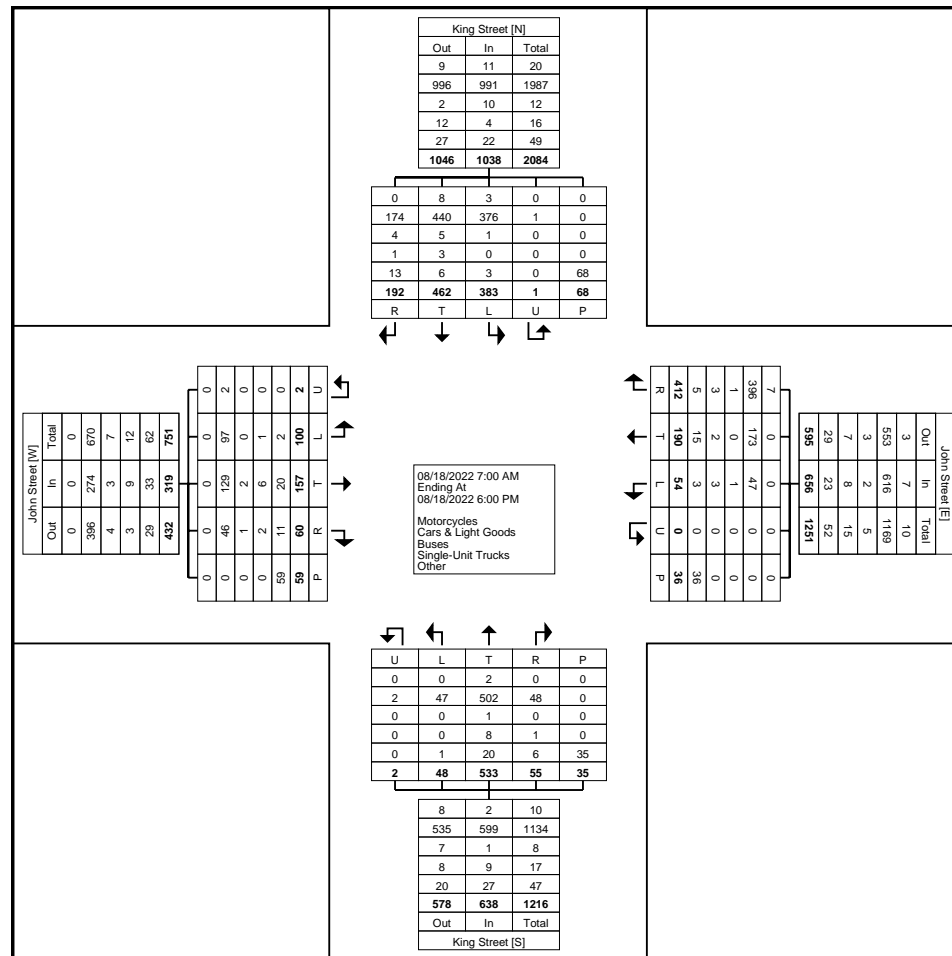
Turning Movement Peak Hour Data Plot (3:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: John Street W/John Street E &
King Street - Weekday
Site Code: 220385
Start Date: 08/18/2022
Page No: 3



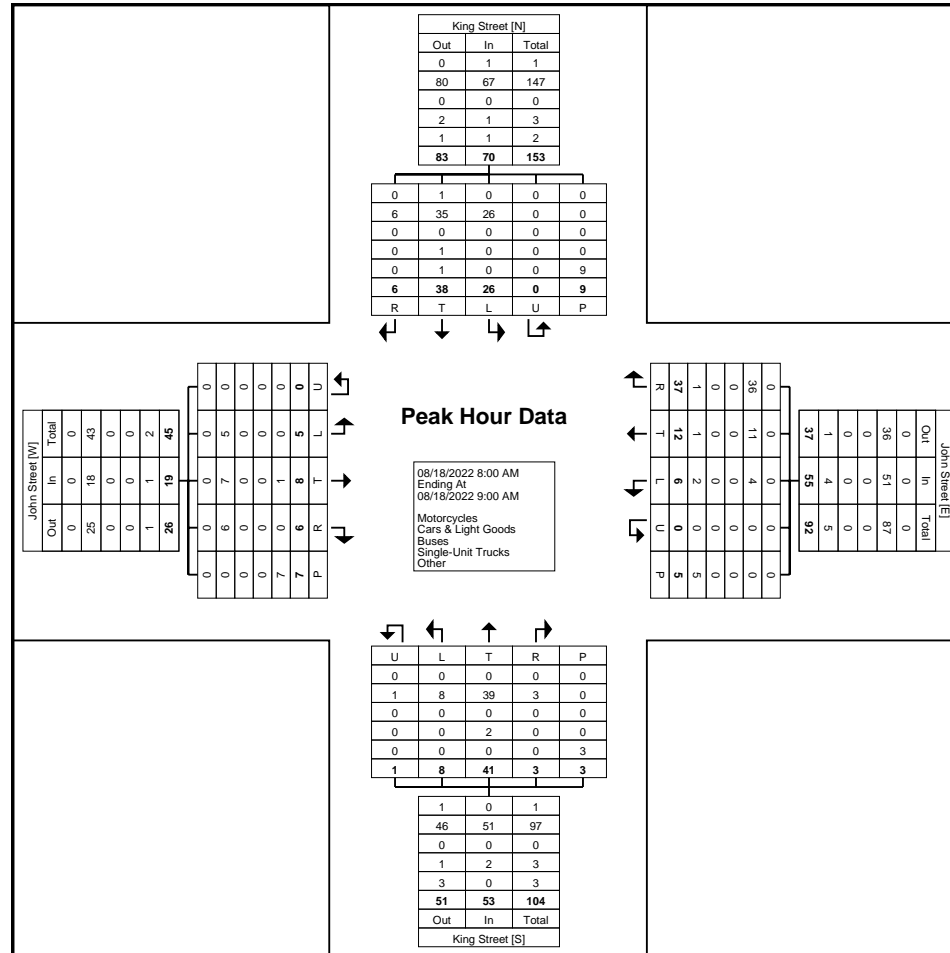
Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: John Street W/John Street E &
King Street - Weekday
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Page No: 5



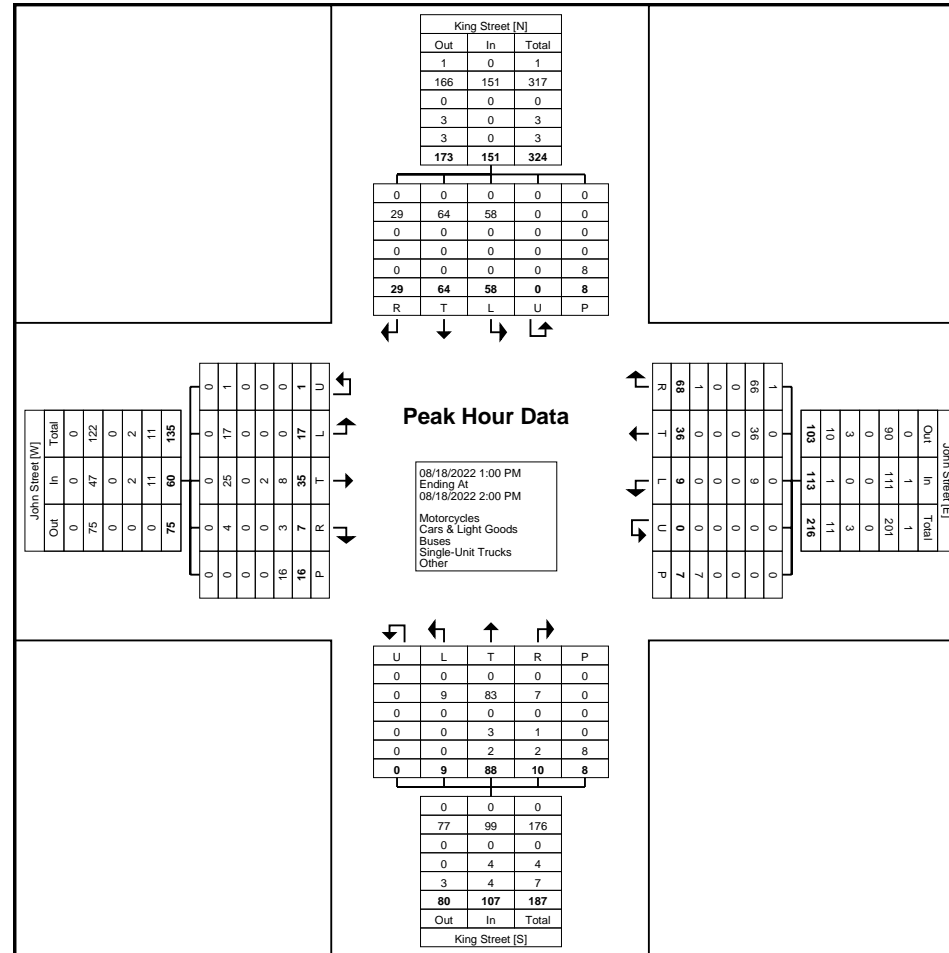
Turning Movement Peak Hour Data Plot (8:00 AM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsll.com

Count Name: John Street W/John Street E &
King Street - Weekday
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Page No: 7



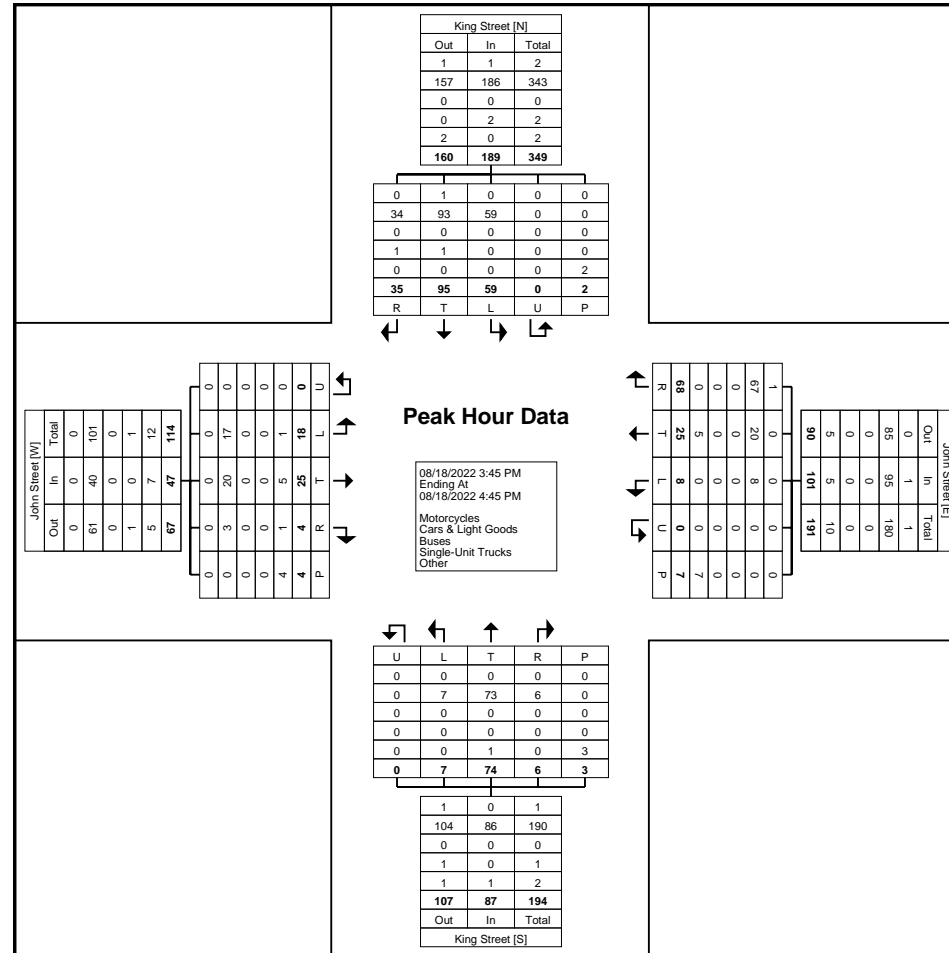
Turning Movement Peak Hour Data Plot (1:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: John Street W/John Street E &
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Page No: 9



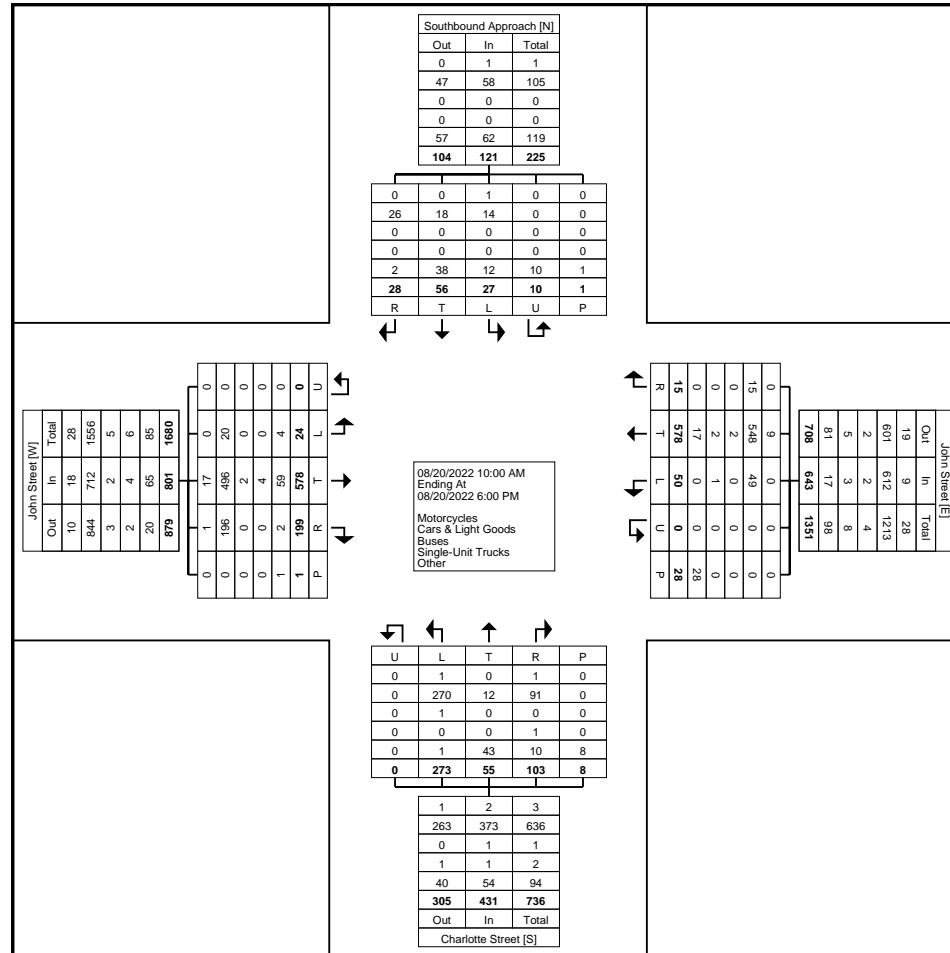
Turning Movement Peak Hour Data Plot (3:45 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Charlotte Street & John Street E -
Saturday
Site Code: 220385
Start Date: 08/20/2022
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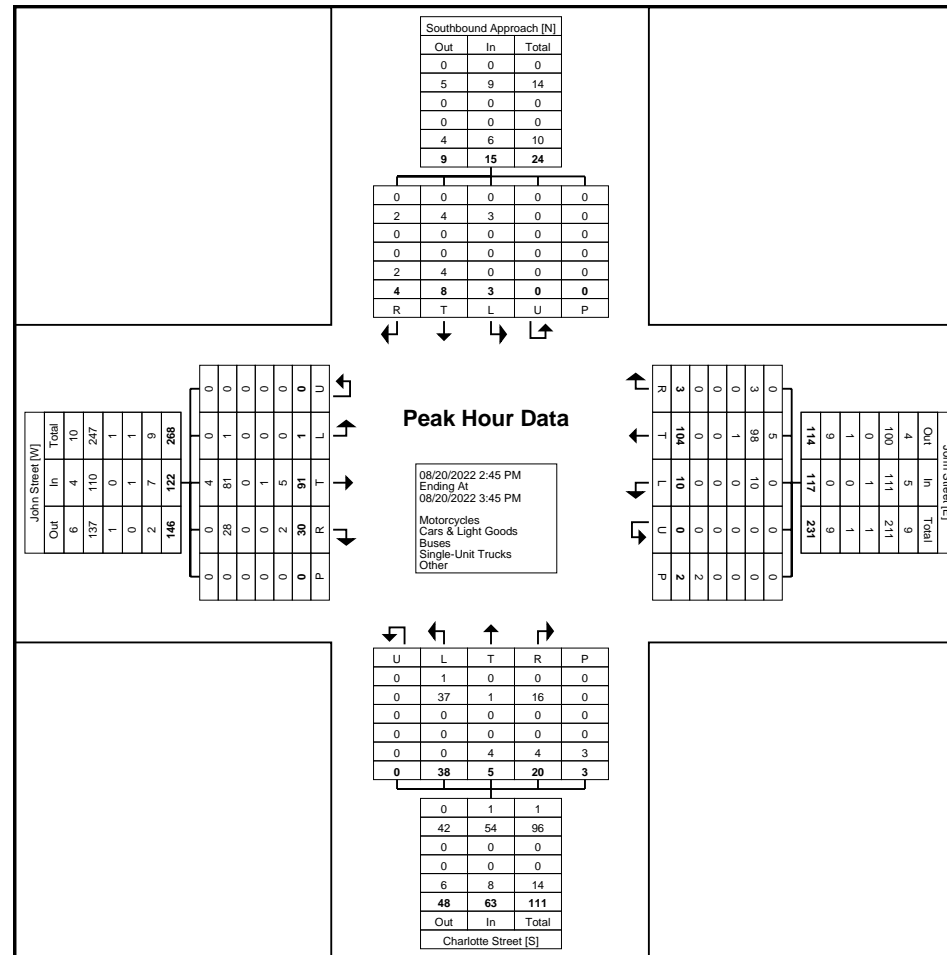
Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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519-896-3163 cbowness@ptsll.com

Count Name: Charlotte Street & John Street E - Saturday
Site Code: 220385
Start Date: 08/20/2022
Page No: 5



Turning Movement Peak Hour Data Plot (2:45 PM)

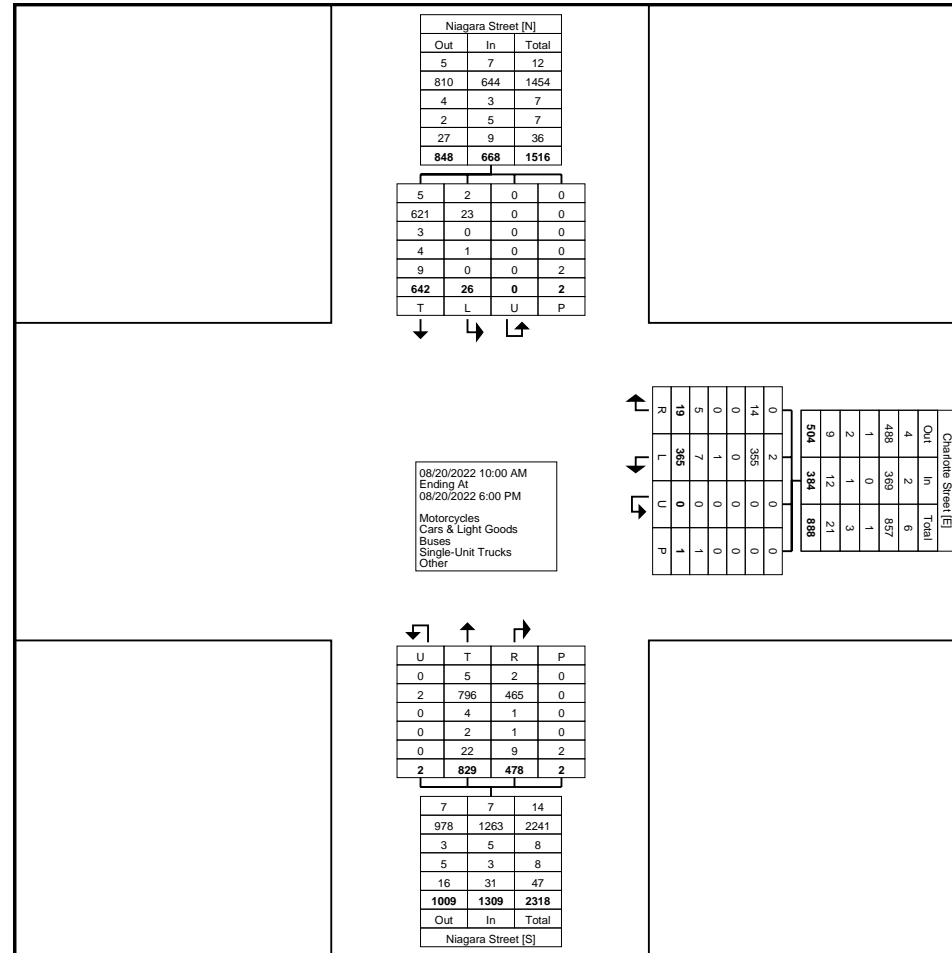
5:15 PM	12	0	0	0	12	20	13	0	0	33	0	26	0	0	26	71
5:30 PM	8	0	0	0	8	27	16	0	0	43	1	24	0	0	25	76
5:45 PM	7	0	0	0	7	22	13	0	0	35	0	24	0	0	24	66
Hourly Total	31	1	0	0	32	90	51	0	0	141	2	102	0	0	104	277
Grand Total	365	19	0	1	384	829	478	2	2	1309	26	642	0	2	668	2361
Approach %	95.1	4.9	0.0	-	-	63.3	36.5	0.2	-	-	3.9	96.1	0.0	-	-	-
Total %	15.5	0.8	0.0	-	16.3	35.1	20.2	0.1	-	55.4	1.1	27.2	0.0	-	28.3	-
Motorcycles	2	0	0	-	2	5	2	0	-	7	2	5	0	-	7	16
% Motorcycles	0.5	0.0	-	-	0.5	0.6	0.4	0.0	-	0.5	7.7	0.8	-	-	1.0	0.7
Cars & Light Goods	355	14	0	-	369	796	465	2	-	1263	23	621	0	-	644	2276
% Cars & Light Goods	97.3	73.7	-	-	96.1	96.0	97.3	100.0	-	96.5	88.5	96.7	-	-	96.4	96.4
Buses	0	0	0	-	0	4	1	0	-	5	0	3	0	-	3	8
% Buses	0.0	0.0	-	-	0.0	0.5	0.2	0.0	-	0.4	0.0	0.5	-	-	0.4	0.3
Single-Unit Trucks	1	0	0	-	1	2	1	0	-	3	1	4	0	-	5	9
% Single-Unit Trucks	0.3	0.0	-	-	0.3	0.2	0.2	0.0	-	0.2	3.8	0.6	-	-	0.7	0.4
Articulated Trucks	1	0	0	-	1	0	1	0	-	1	0	1	0	-	1	3
% Articulated Trucks	0.3	0.0	-	-	0.3	0.0	0.2	0.0	-	0.1	0.0	0.2	-	-	0.1	0.1
Bicycles on Road	6	5	0	-	11	22	8	0	-	30	0	8	0	-	8	49
% Bicycles on Road	1.6	26.3	-	-	2.9	2.7	1.7	0.0	-	2.3	0.0	1.2	-	-	1.2	2.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	100.0	-	-
Pedestrians	-	-	-	1	-	-	-	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	0.0	-	-



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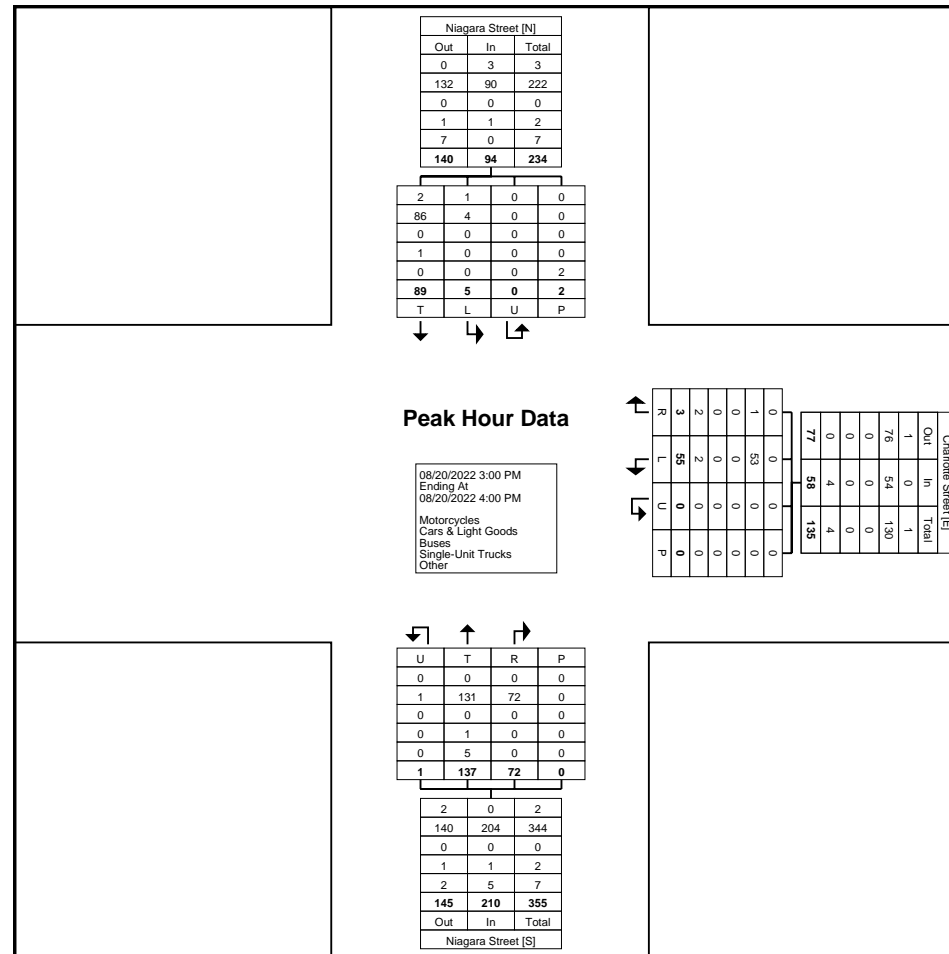
Turning Movement Data Plot



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Count Name: Charlotte Street & Niagara Street -
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Page No: 5



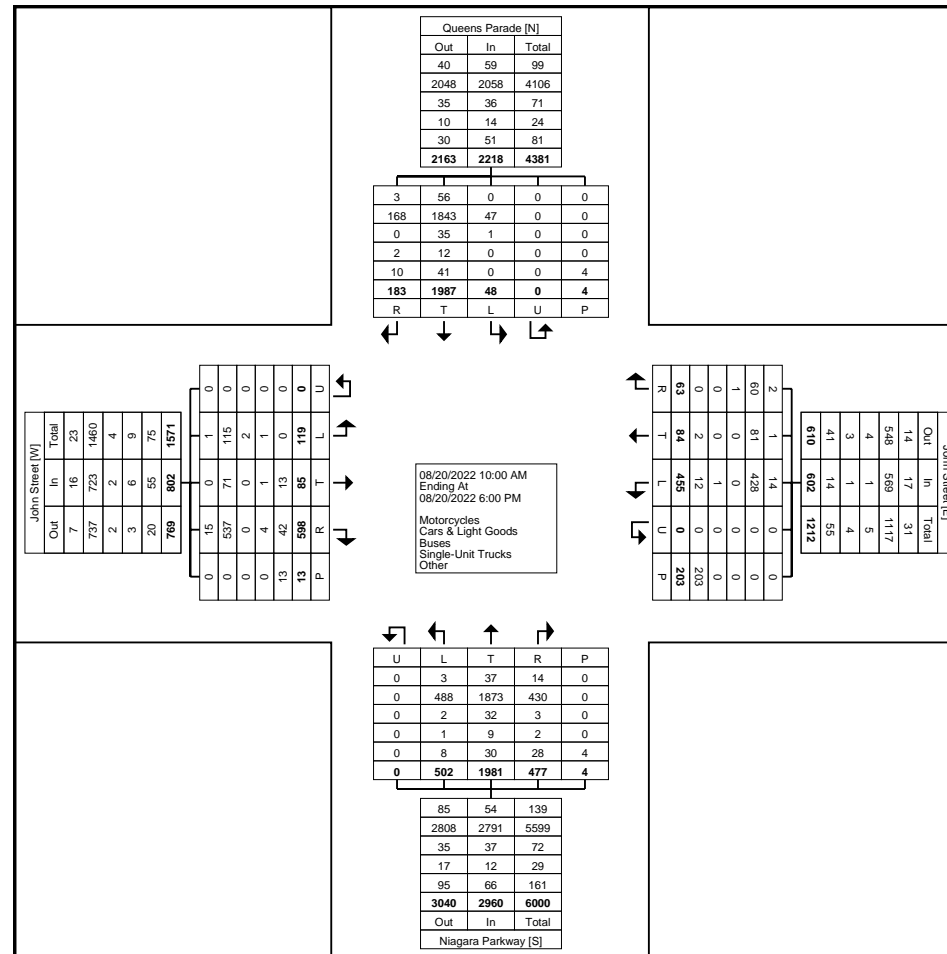
Turning Movement Peak Hour Data Plot (3:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsf.com

Count Name: John Street & Queens
Parade/Niagara Parkway - Saturday
Site Code: 220385
Start Date: 08/20/2022
Page No: 3



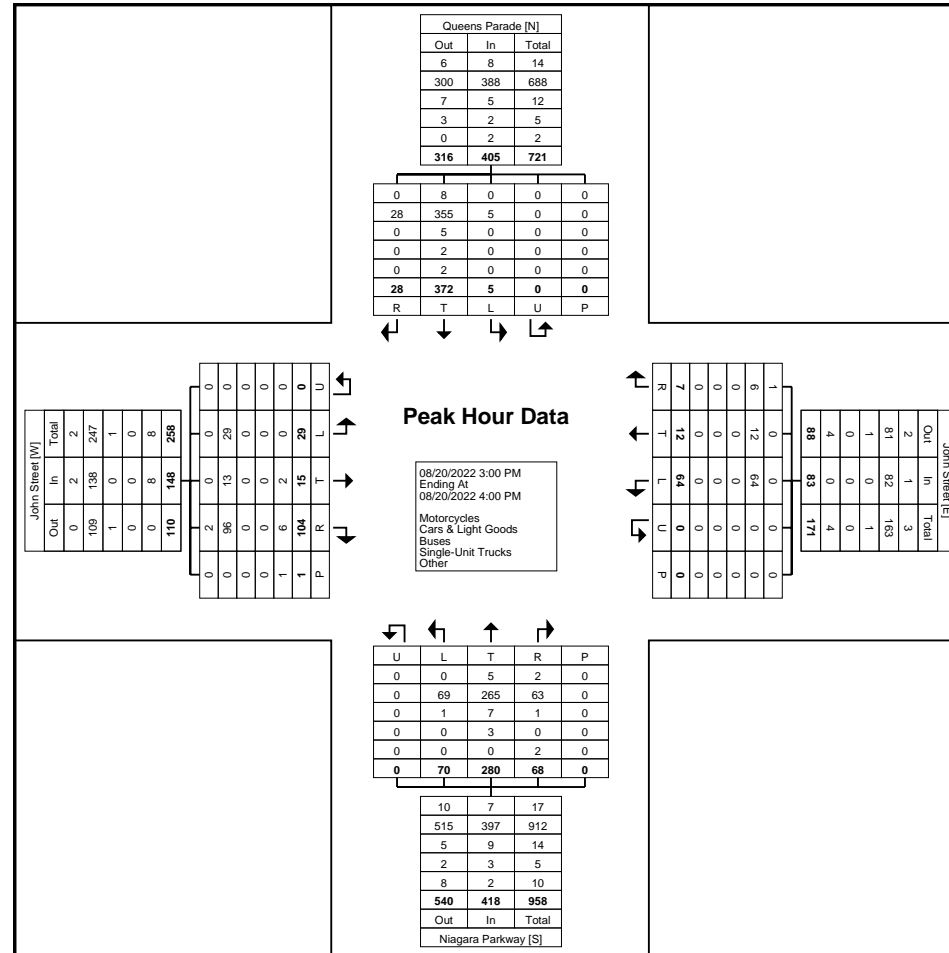
Turning Movement Data Plot



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519-896-3163 cbowness@ptsl.com

Count Name: John Street & Queens
Parade/Niagara Parkway - Saturday
Site Code: 220385
Start Date: 08/20/2022
Page No: 5



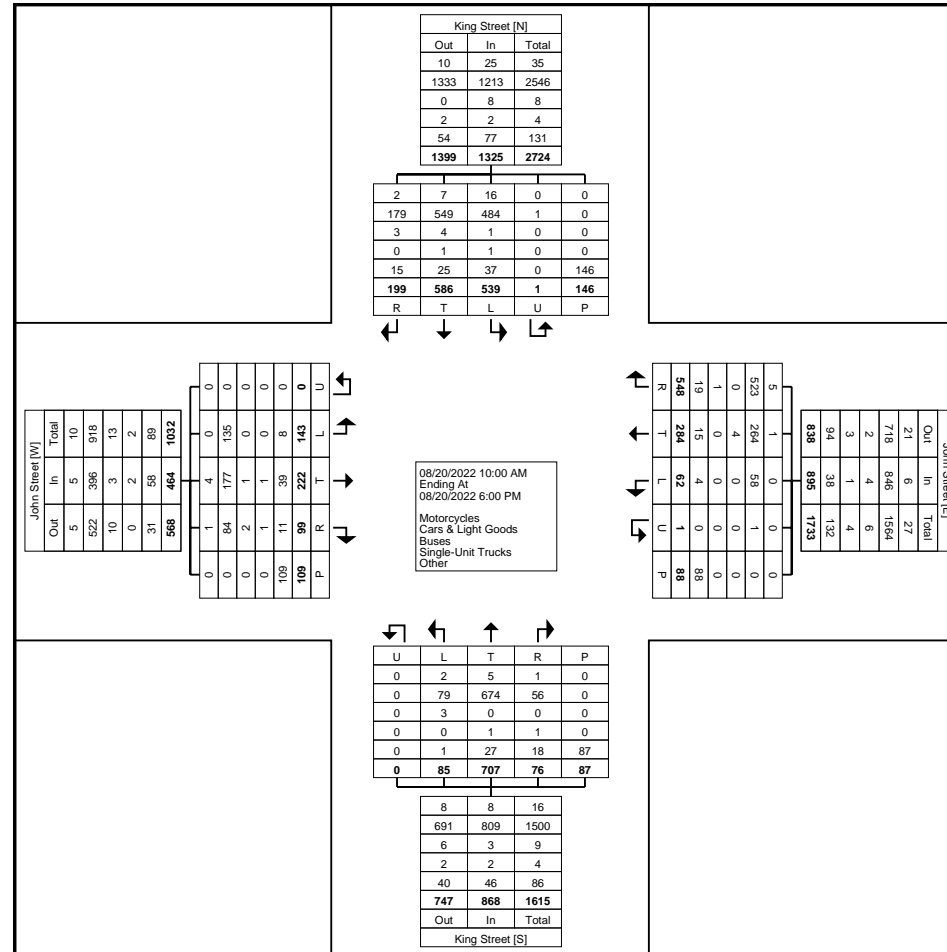
Turning Movement Peak Hour Data Plot (3:00 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: John Street W/John Street E &
King Street - Saturday
Site Code: 220385
Start Date: 08/20/2022
Page No: 3



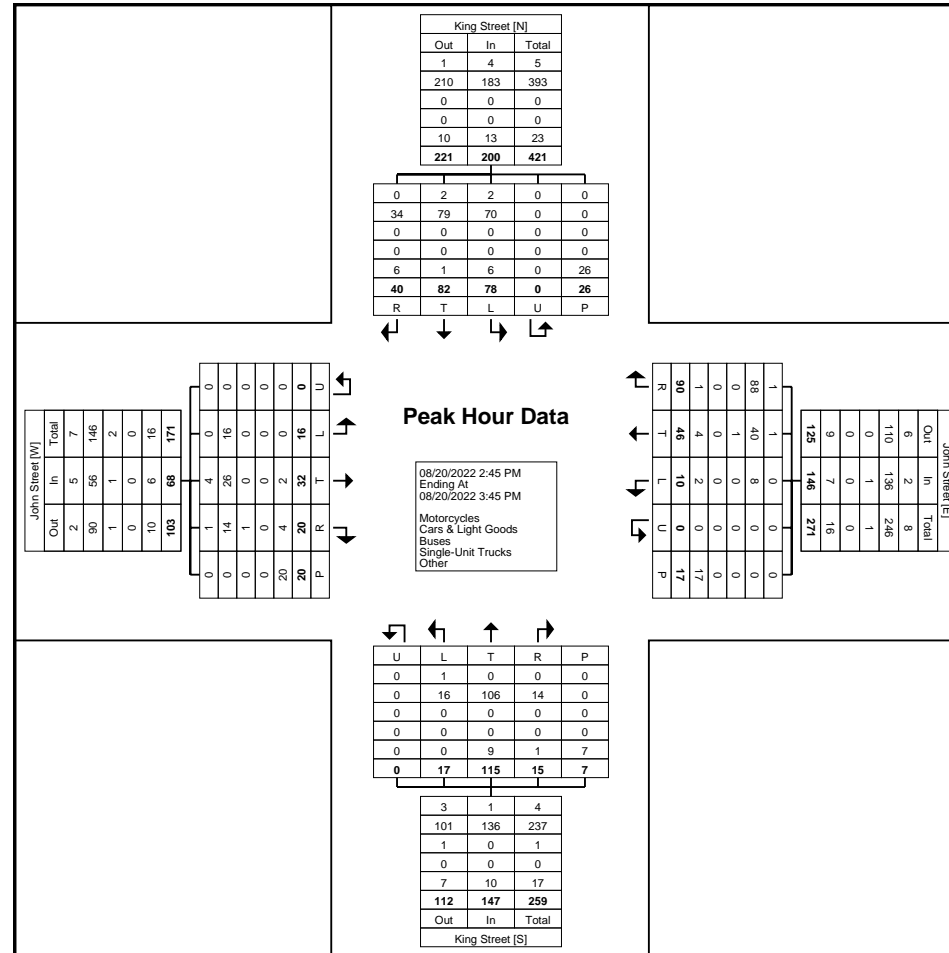
Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: John Street W/John Street E &
King Street - Saturday
Site Code: 220385
Start Date: 08/20/2022
Page No: 5



Turning Movement Peak Hour Data Plot (2:45 PM)

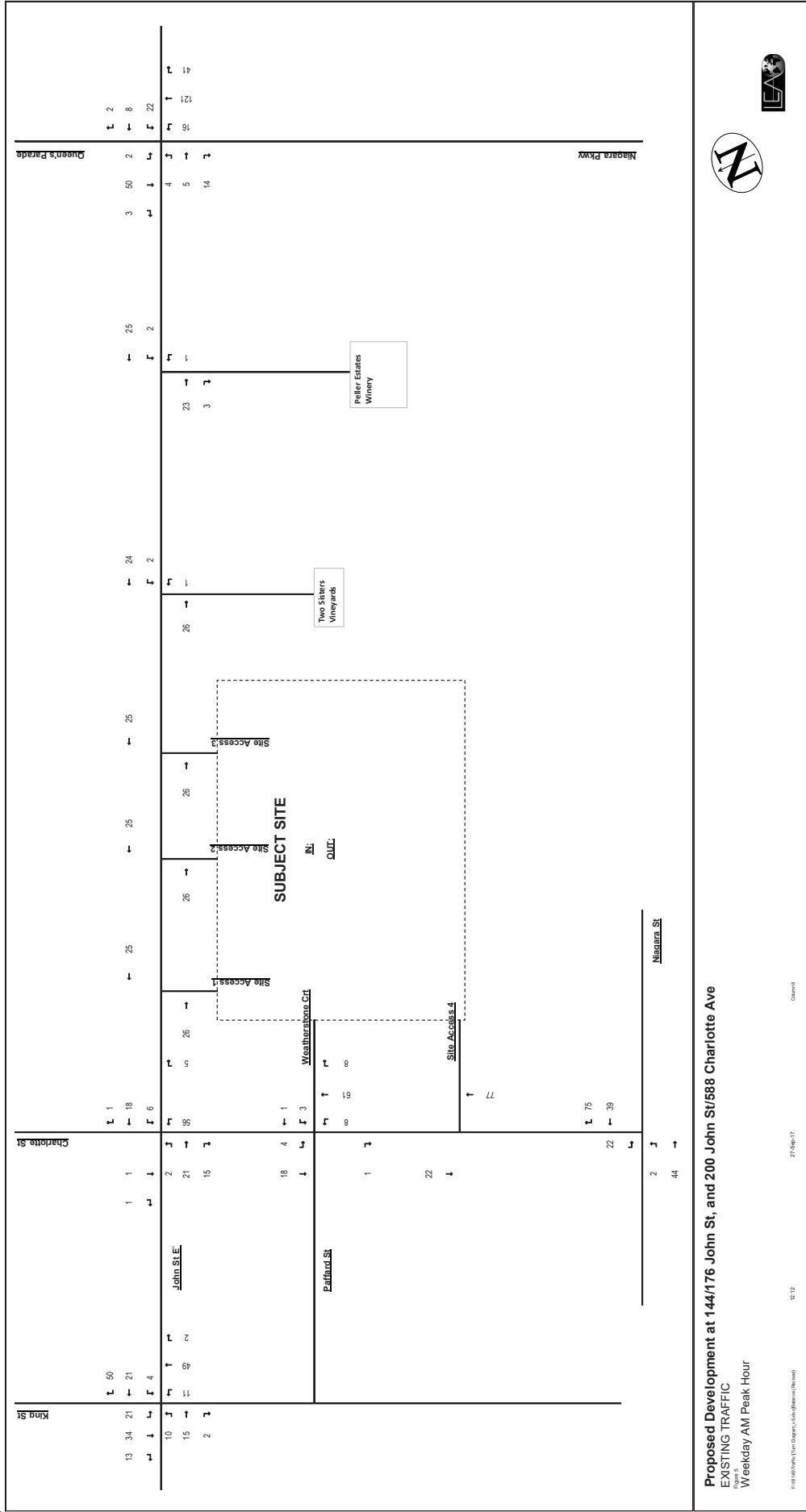
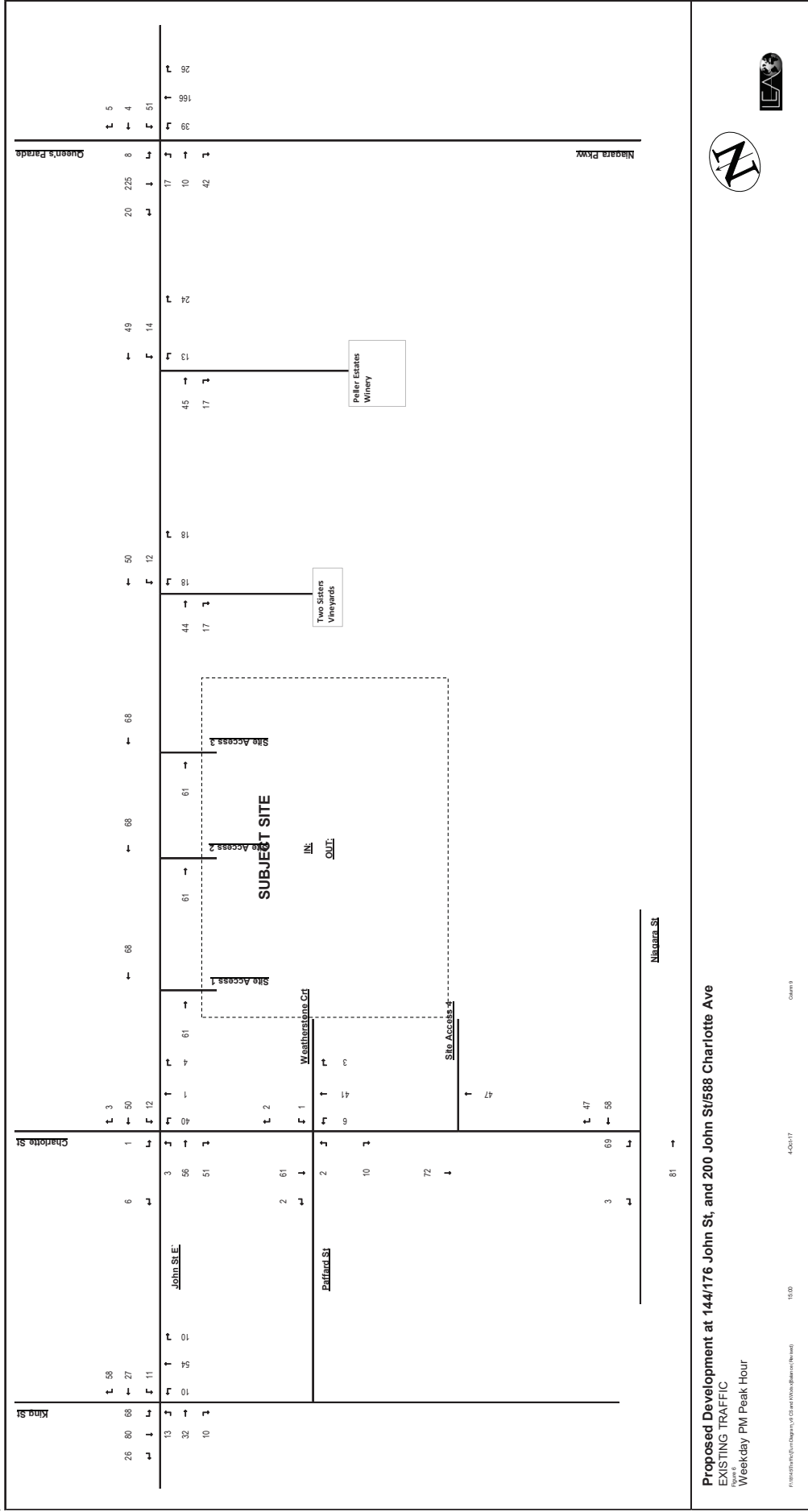


Figure 6: Existing Traffic - Weekday AM Peak Hour



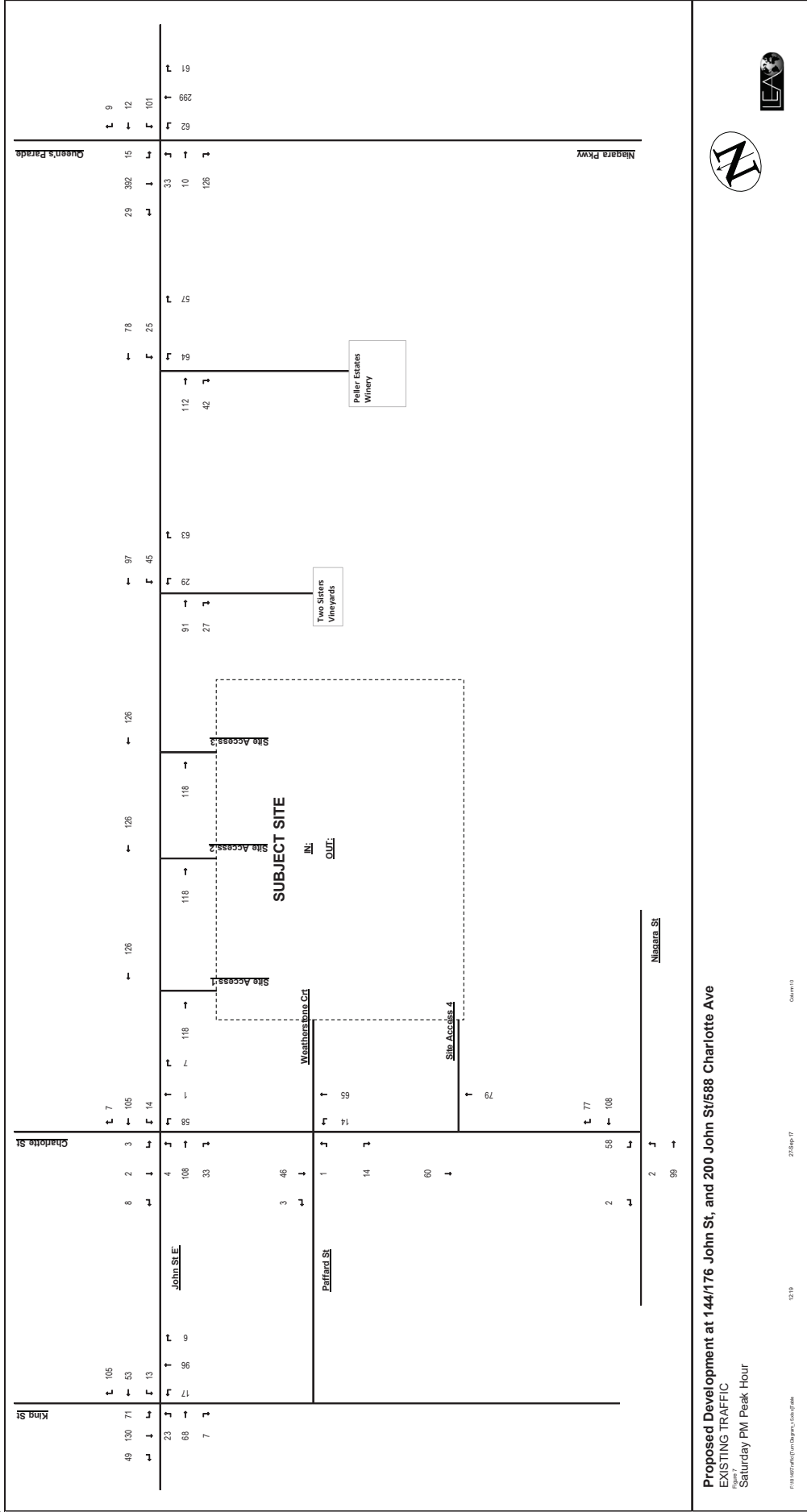


Figure 8: Existing Traffic - Saturday Peak Hour



MEMO

TO: Kate Lyons
FROM: Greig Bumstead, WSP
SUBJECT: WSP Analysis (Privileged)
DATE: February 29, 2024

Below please find a summary table showing the results of our analysis of the road network in order to test results:

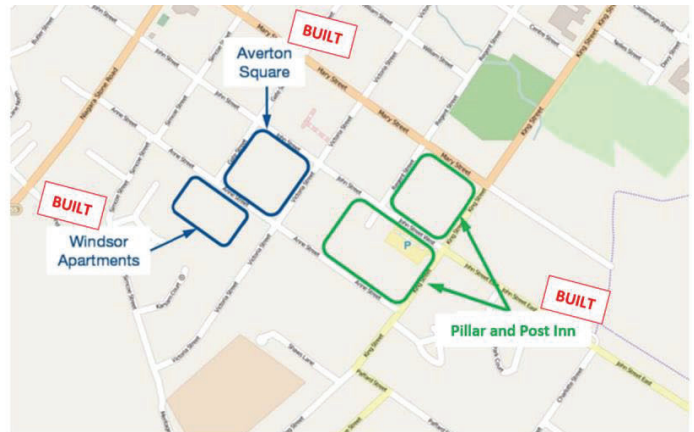
We looked at the Background condition and the Total condition to understand not only what the overall impact would be to the road network with the development included but what the cumulative impact would be of the development from a future 'before' the development and then 'after' the inclusion of the site's traffic.

In undertaking this analysis, we assumed the following;

- Updated background development assumptions from the LEA analysis which is summarized below (developments that are built would have their traffic volumes inclusive of the 2023 TMC's we collected),
- Our 2023 turning movement data,
- Site stats consistent with the LEA Report (191 units)
- 2% background growth through the forecast horizon years
- Peak Hour Factors (PHF) were based on observed volumes and not from previous calcs/assumptions (since calculated PHF would be most representative).

Table 4-1: List of Background Developments

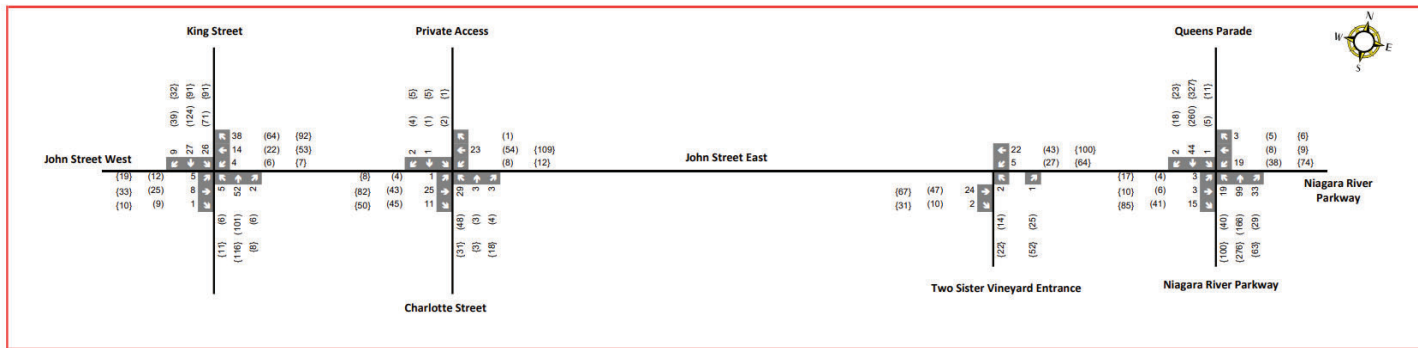
Development	Location	Type of Development	Application Status	Source
BUILT Averton Square	120 John St W	20 single-family detached units and 94 apartment units	Site Plan Approved	Pillar and Post Transportation Impact Study (03 June 2016)
BUILT Windsor Apartments	128, 134 and 174 Anne St	120 apartment units	Site Plan Approved	Pillar and Post Transportation Impact Study (03 June 2016)
Included Randwood Hotel	144 and 176 John Street	Hotel and Convention Centre	Draft Plan under Review	Solmar and LEA Consulting Report



The existing traffic volumes were based on the turning movement counts (TMC) conducted on July 6, 2023, at the study intersections during the weekday a.m. and p.m. peak periods, as shown below.

100 Commerce Valley Drive West
 Thornhill, ON
 Canada L3T 0A1

T: +1 905 882-1100
 F: +1 905 882-0055
 wsp.com



Legend

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

Existing Traffic Volumes

The site trips generated by the proposed development during the weekday a.m. and p.m. peak hours were estimated using the trip generation rates outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. Land Use code 210 (Single Detached) was used to estimate the number of auto trips generated during the weekday a.m. and p.m. peak hours (see below for the site-generated trips estimated from ITE).

It should be noted that the site-generated trips for the proposed development are only based on the residential component of the site. The site trips associated with the hotel development were included as part of background development.

ITE Land Use (Code)	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekend SAT Peak Hour					
	In	Out	Total	In	Out	Total	In	Out	Total			
Single Detached	Equation (x = residential units) $\ln(T) = 0.91 \ln(X) + 0.12$			$\ln(T) = 0.94 \ln(X) + 0.27$			$T = 0.86 X + 9.72$					
	Directional Splits			25%	75%	100%	63%	37%	100%	54%	46%	100%
	Trips 191 units			34	101	135	115	68	183	94	80	174
Total Vehicle Trips			34	101	135	115	68	183	94	80	174	

The site-generated traffic assignments were developed based on the existing traffic pattern and the most logical paths for vehicles to travel to minimize travel time and distance.

Results of the analysis show as follows:

Future Background

Results suggest that there are some issues at the Queen's Parade intersection during the Saturday Peak in the future even without the proposed site development. LOS is poor (F), delay is long (204 seconds) and v/c is over capacity (1.12).

Total Traffic

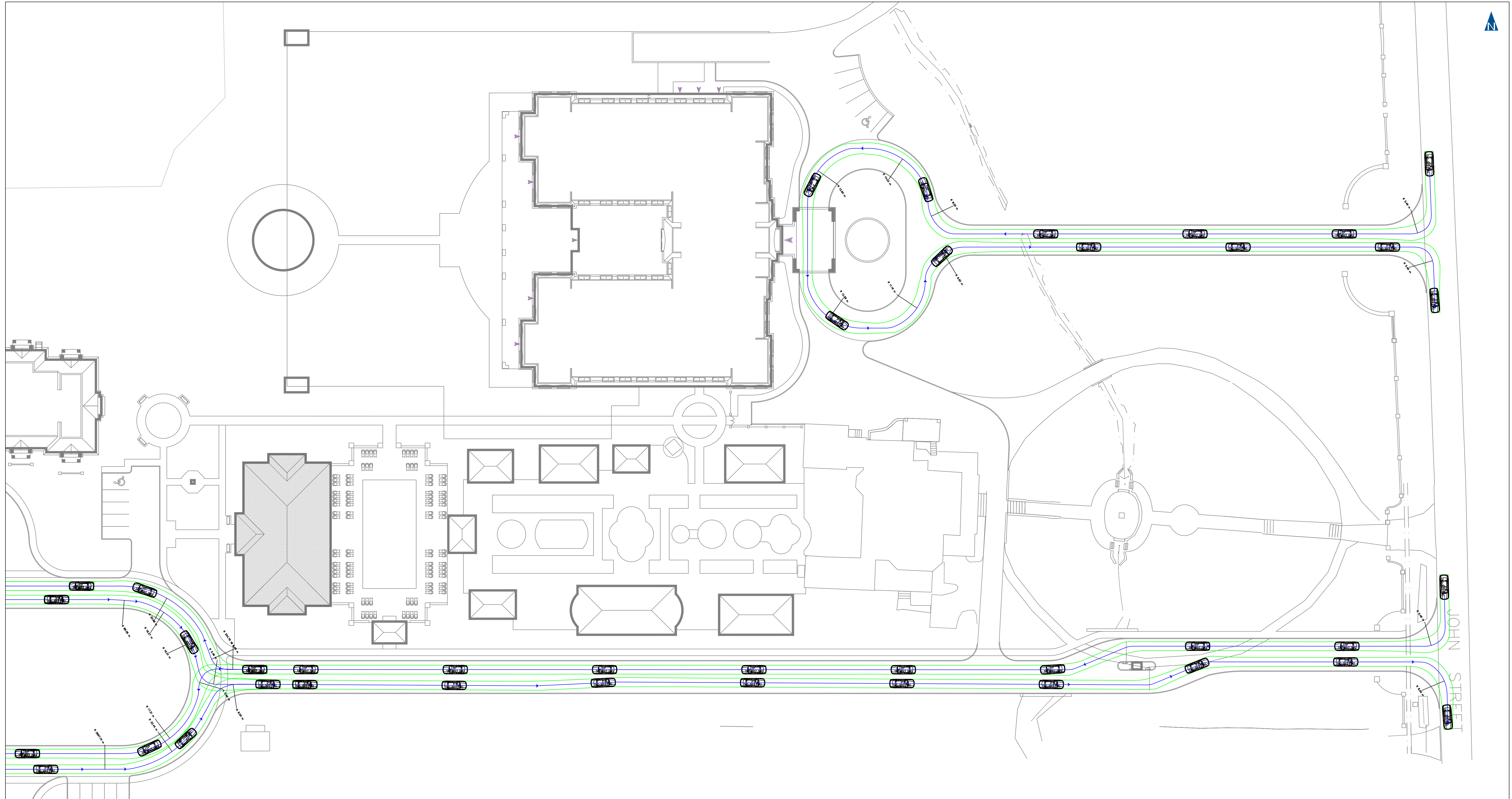
Similar to the Background condition, operationally everything works except for the Niagara River Parkway/John/Queen's Parade intersection. It should be noted that the LOS is still (F), there is an increase in delay (up to 379 seconds) and the v/c increases to (1.51). Though the future background operations are high, if no improvement was done by the Town, the intersection would require improvements.

Period	Intersection	Count Data	Weekday AM Peak Hour													Weekday PM Peak Hour													Weekday Saturday Peak Hour																								
			Direction / Movement													Direction / Movement													Direction / Movement																								
			EB			WB			NB			SB			Overall	EB			WB			NB			SB			Overall	EB			WB			NB			SB			Overall												
Left	Through	Right	Total	Left	Through	Right	Total	Left	Through	Right	Total	Left	Through	Right		Total	Left	Through	Right	Total	Left	Through	Right	Total	Left	Through	Right		Total	Left	Through	Right	Total																				
2017-2023	1 - John Street East at Niagara River Parkway	September 2017	4	5	14	23	22	8	2	32	16	121	41	178	2	50	3	55	288	17	10	42	69	51	4	5	60	39	166	26	231	8	225	20	253	613	33	10	126	169	101	12	9	122	62	299	61	422	15	392	29	436	1149
		August 2022	1	5	23	29	17	4	1	22	17	90	40	147	3	43	2	48	246	9	8	59	76	52	8	8	68	49	196	48	293	10	235	18	263	700	29	15	104	148	64	12	7	83	70	280	68	418	5	372	28	405	1054
		July 2023	3	3	15	21	19	0	3	22	19	99	33	151	1	44	2	47	241	4	6	41	51	38	8	5	51	40	166	29	235	5	260	18	283	620	17	10	85	112	74	9	6	89	100	276	63	439	11	327	23	361	1001
		Change in traffic volumes between 2017-2023 (%)			-16%										Change in traffic volumes between 2017-2023 (%)			1%			-13%																																
2017-2023	2 - John Street East at Charlotte Street	August 2017	2	21	15	38	6	18	1	25	56	0	0	56	0	1	1	2	121	3	56	51	110	12	50	3	65	40	1	4	45	1	0	6	7	227	4	108	33	145	14	105	7	126	58	1	7	66	3	2	8	13	350
		August 2022	1	29	4	34	3	23	0	26	26	9	3	38	1	5	1	7	105	0	55	32	87	14	62	0	76	43	3	2	48	3	11	0	14	225	1	91	30	122	10	104	3	117	38	5	20	63	3	8	4	15	317
		July 2023	1	25	11	37	0	23	0	23	29	3	3	35	0	1	2	3	98	4	43	45	92	8	54	1	63	48	3	4	55	2	1	4	7	217	8	82	50	140	31	3	18	52	12	109	0	121	1	5	5	11	324
		Change in traffic volumes between 2017-2023 (%)			-19%										Change in traffic volumes between 2017-2023 (%)			-4%			-7%																																

Appendix B

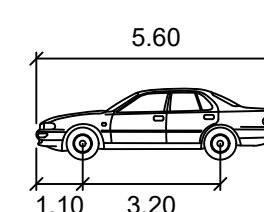
AutoTURN





NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



P
 Width : 2.00 meters
 Track : 2.00
 Lock to Lock Time : 6.0
 Steering Angle : 35.9

NO.	DATE	INITIAL	REVISION DETAIL

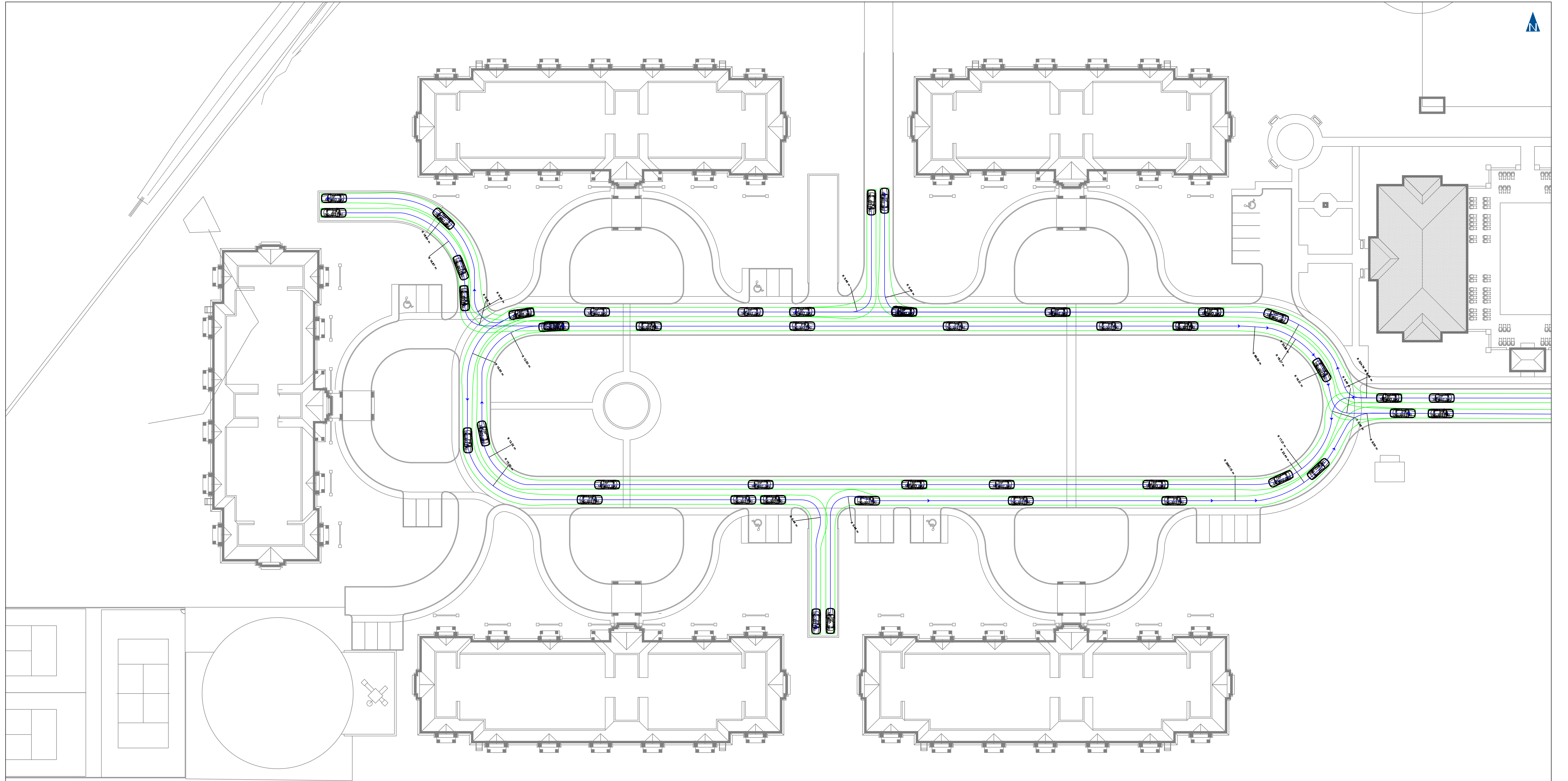
DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____

SIGNATURE _____



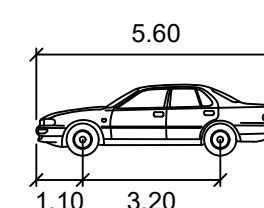
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: AMa	01



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



P
 Width : 2.00 meters
 Track : 2.00
 Lock to Lock Time : 6.0
 Steering Angle : 35.9

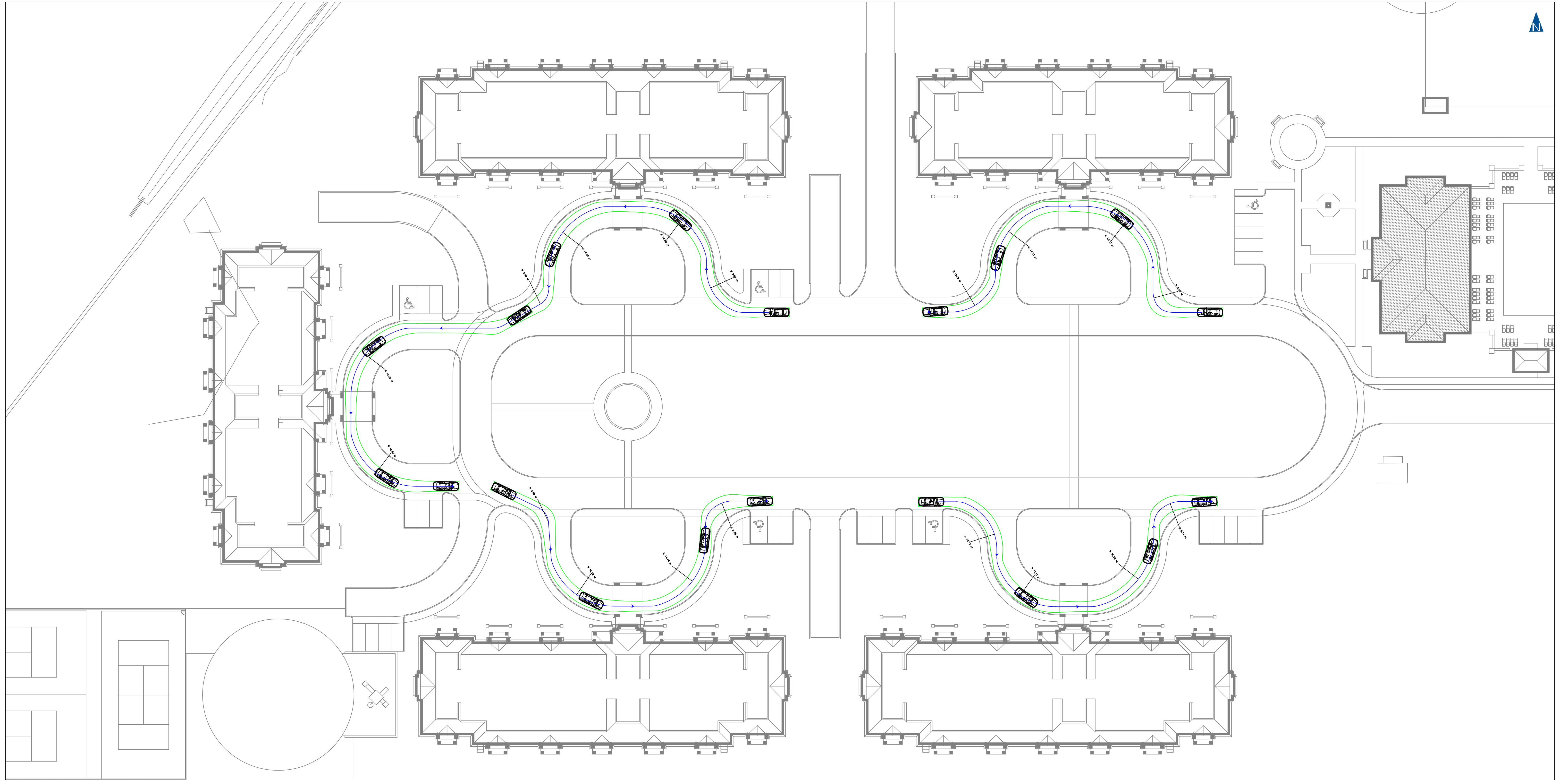
NO.	DATE	INITIAL	REVISION DETAIL

DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____
 SIGNATURE _____



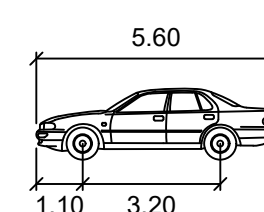
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	02



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



P
 Width : 2.00 meters
 Track : 2.00
 Lock to Lock Time : 6.0
 Steering Angle : 35.9

NO.	DATE	INITIAL	REVISION DETAIL

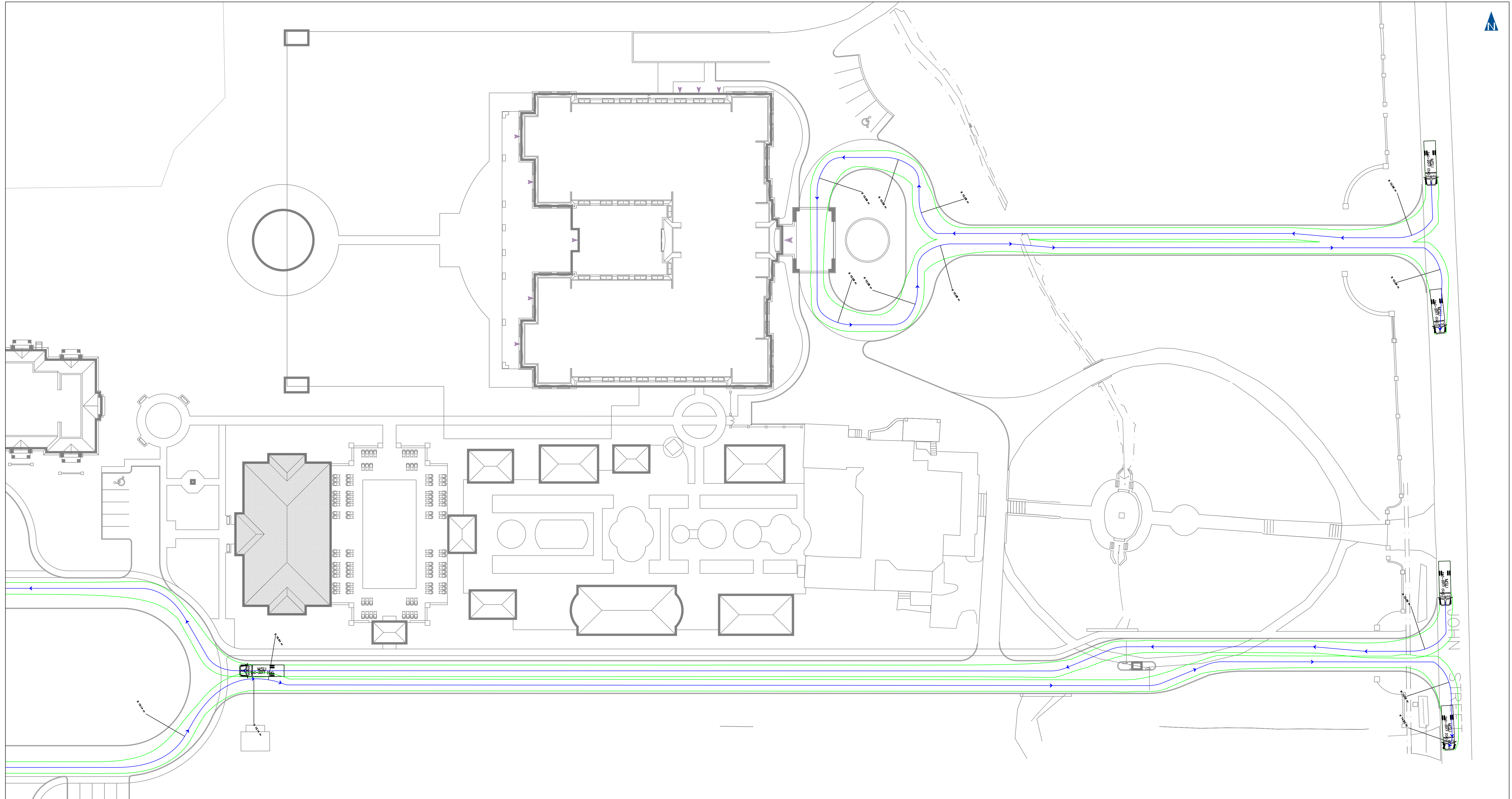
DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____

SIGNATURE _____



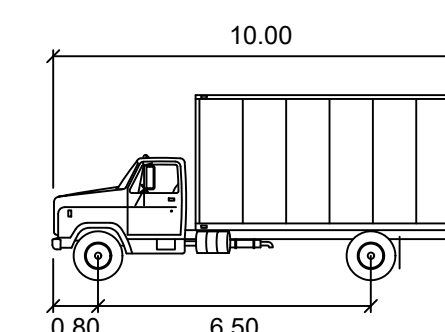
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	03



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2

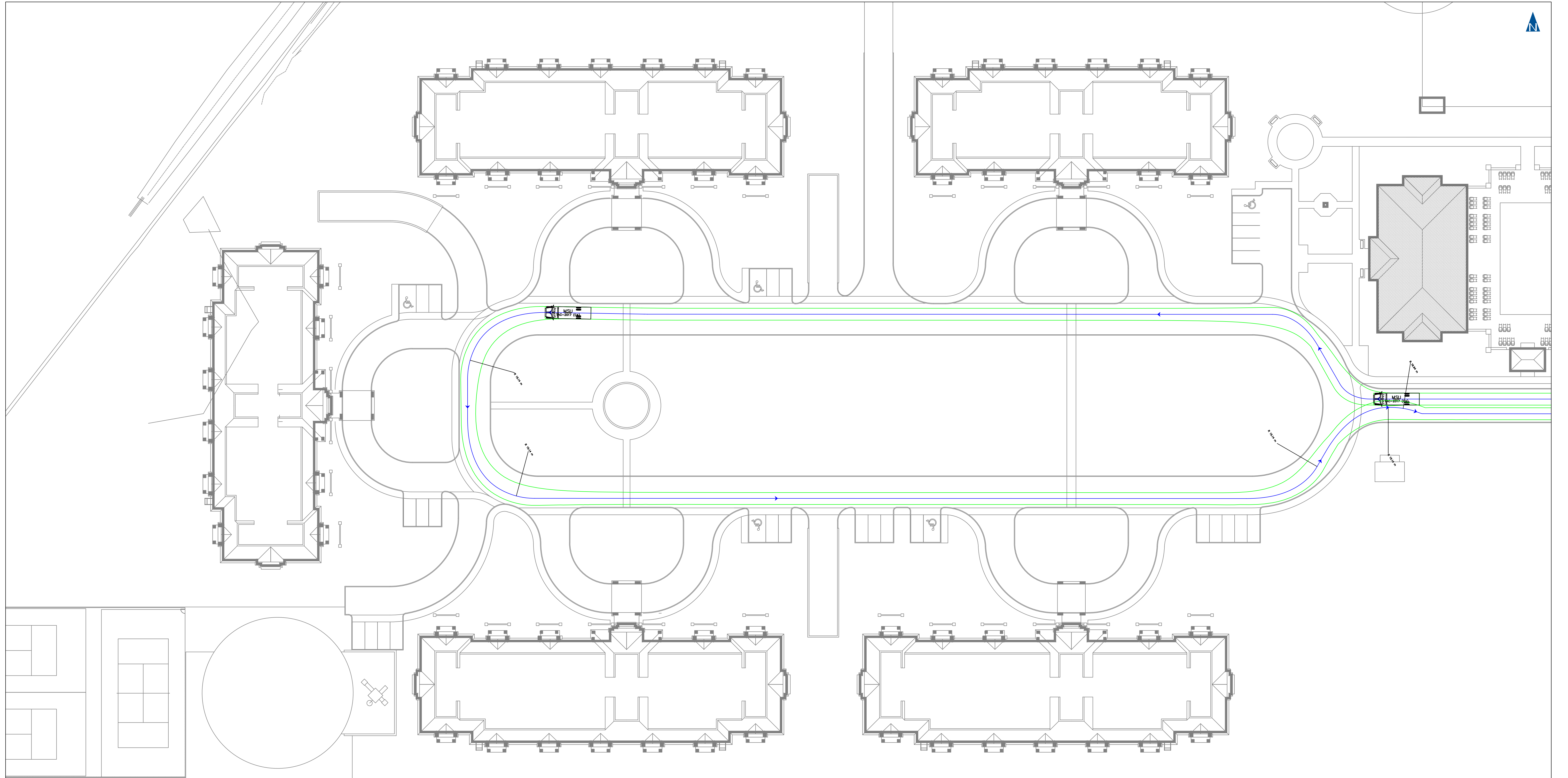
NO.	DATE	INITIAL	REVISION DETAIL

DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____
 SIGNATURE _____



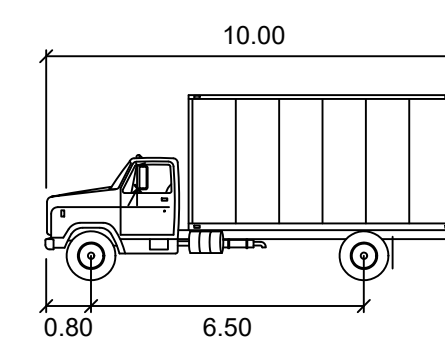
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	04



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



MSU

Width : 2.60 meters
 Track : 2.60
 Lock to Lock Time : 6.0
 Steering Angle : 40.2

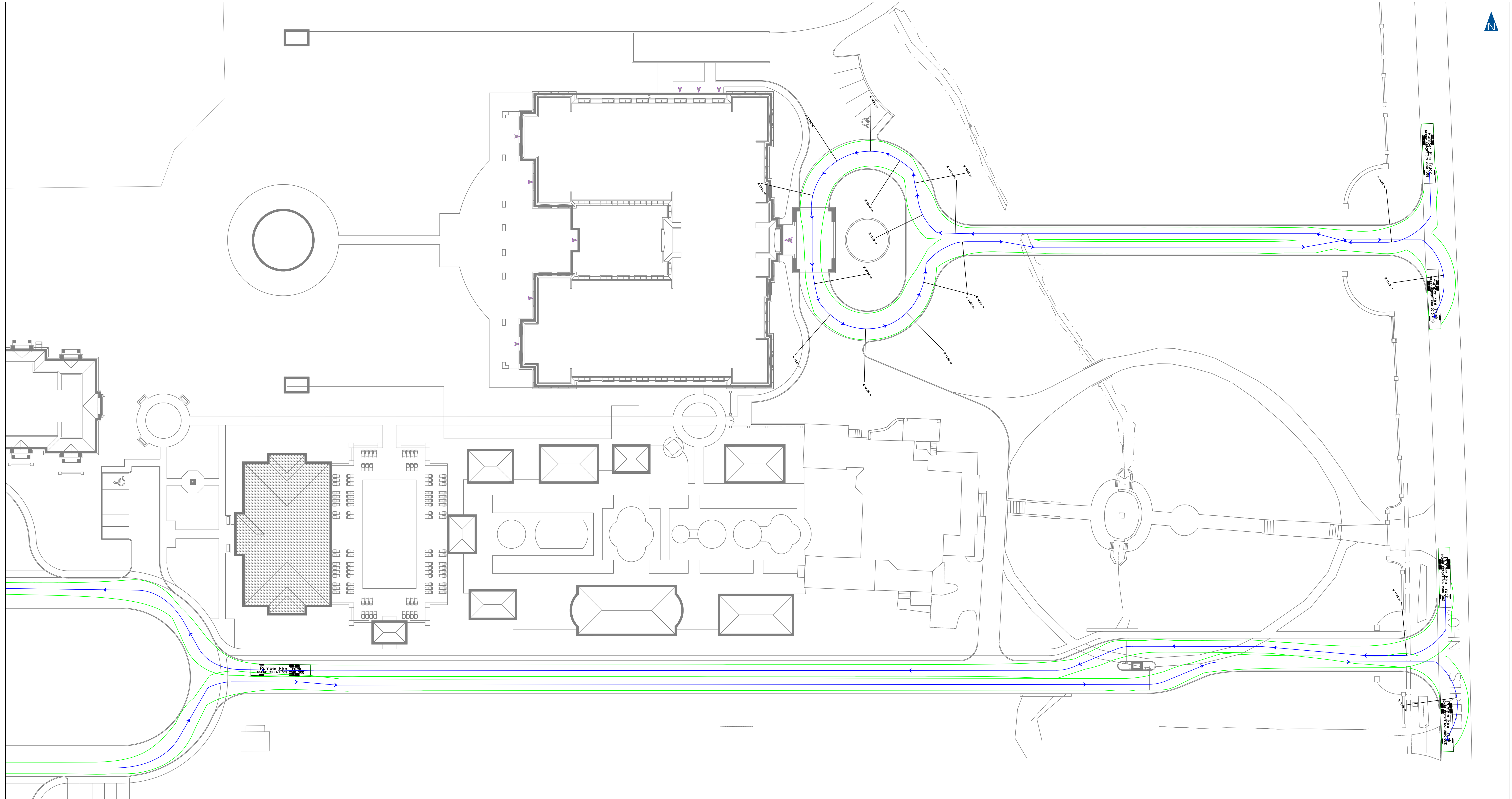
NO.	DATE	INITIAL	REVISION DETAIL

DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____
 SIGNATURE _____



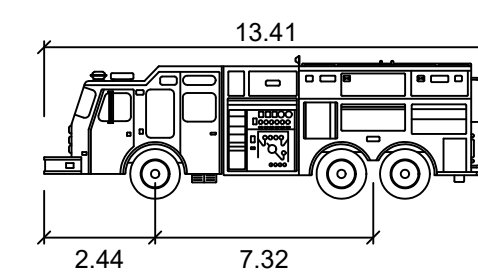
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	05



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



Pumper Fire Truck

Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

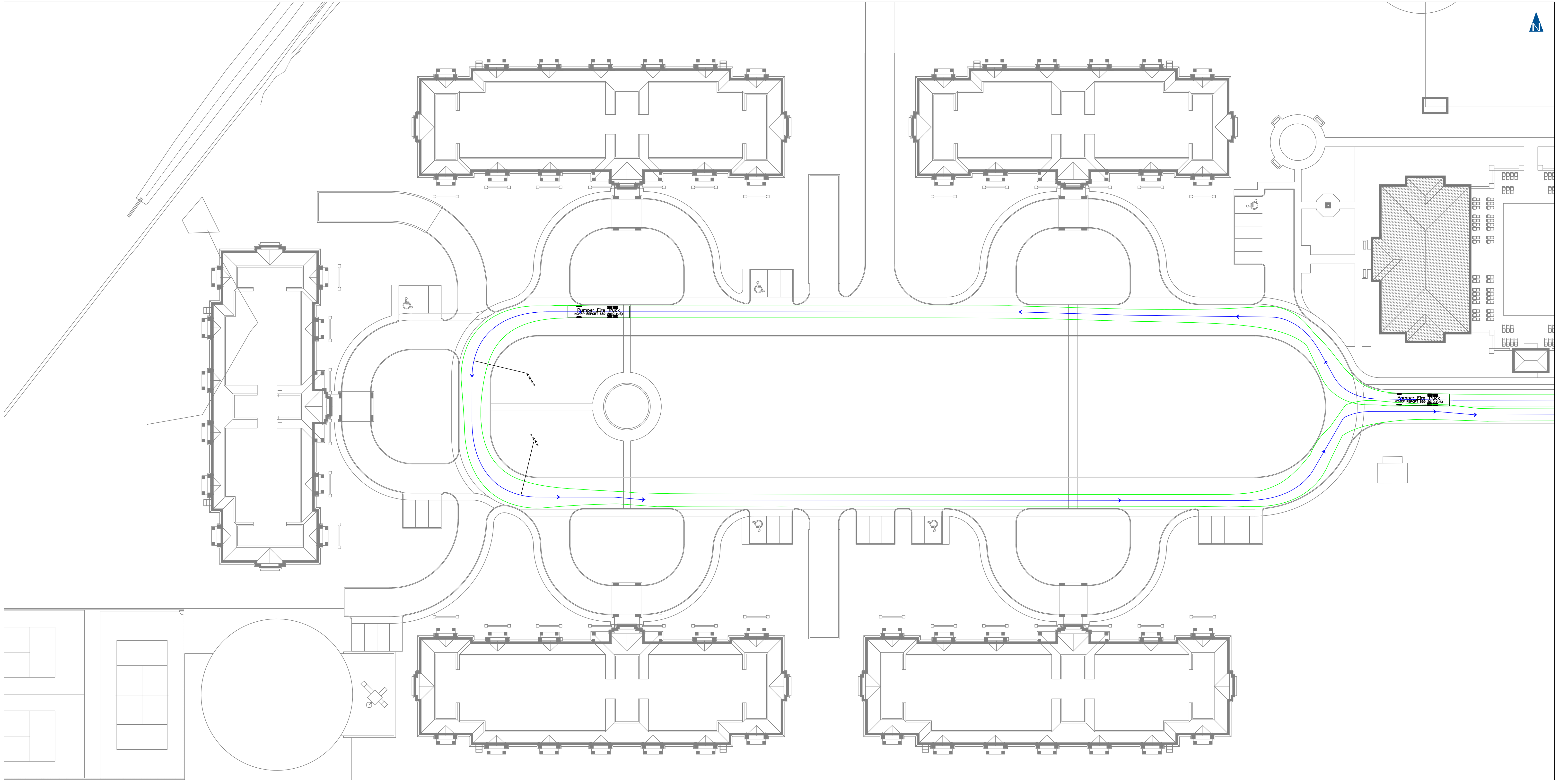
NO.	DATE	INITIAL	REVISION DETAIL

DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____
 SIGNATURE _____



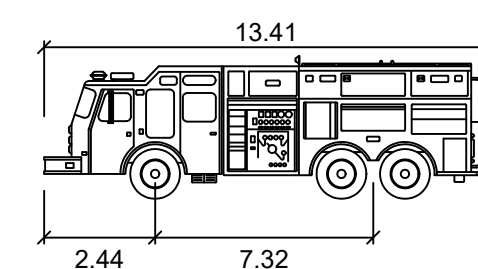
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	06



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



Pumper Fire Truck

Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

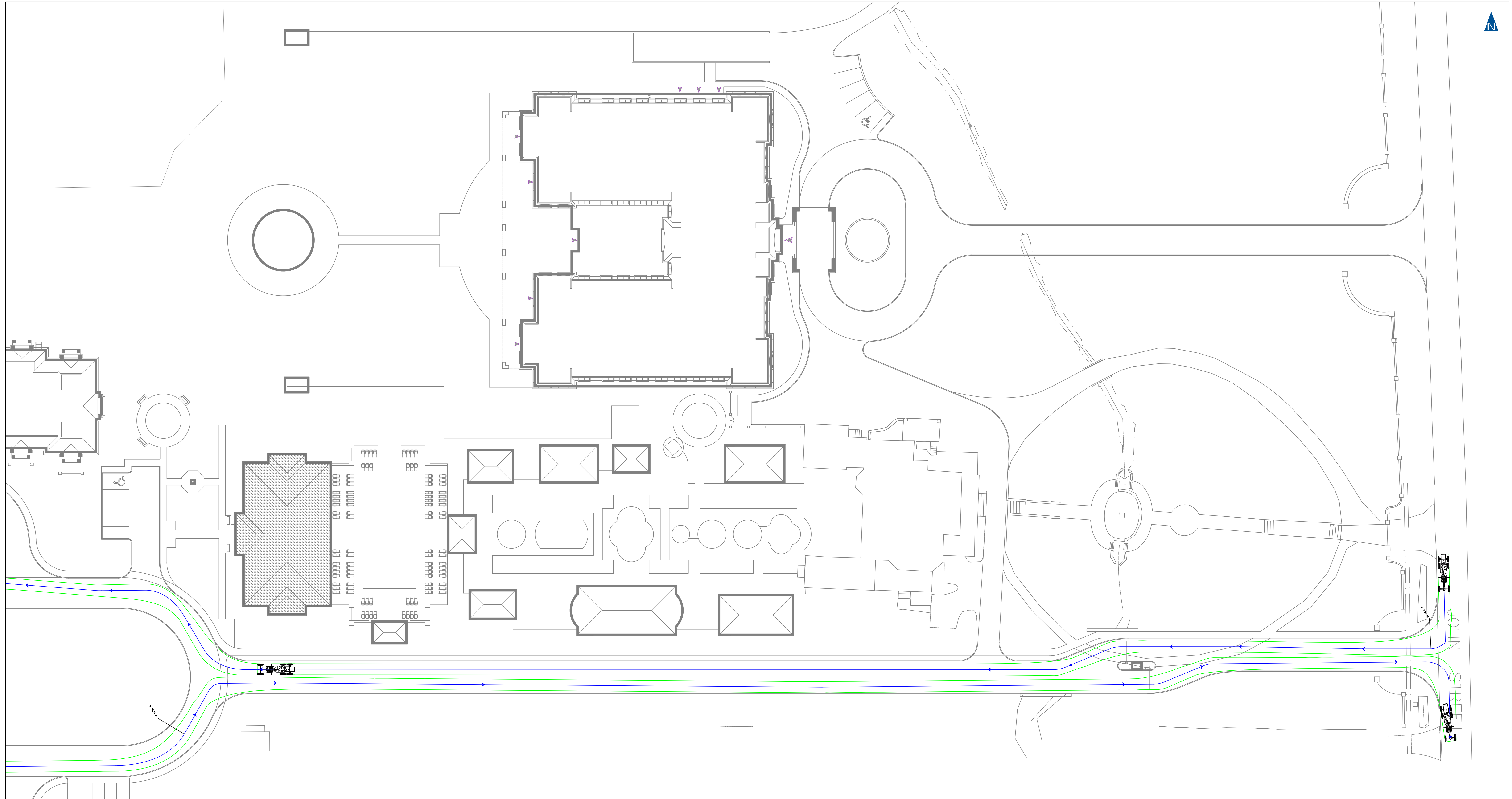
NO.	DATE	INITIAL	REVISION DETAIL

DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____
 SIGNATURE _____



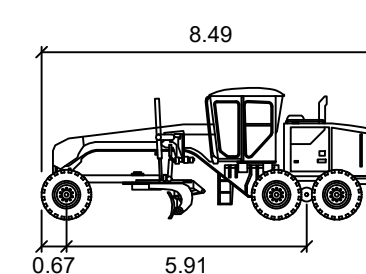
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	07



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



CAT 120M
 meters
 Width : 8.49
 Track : 2.48
 Lock to Lock Time : 6.0
 Steering Angle : 60.3

NO.	DATE	INITIAL	REVISION DETAIL

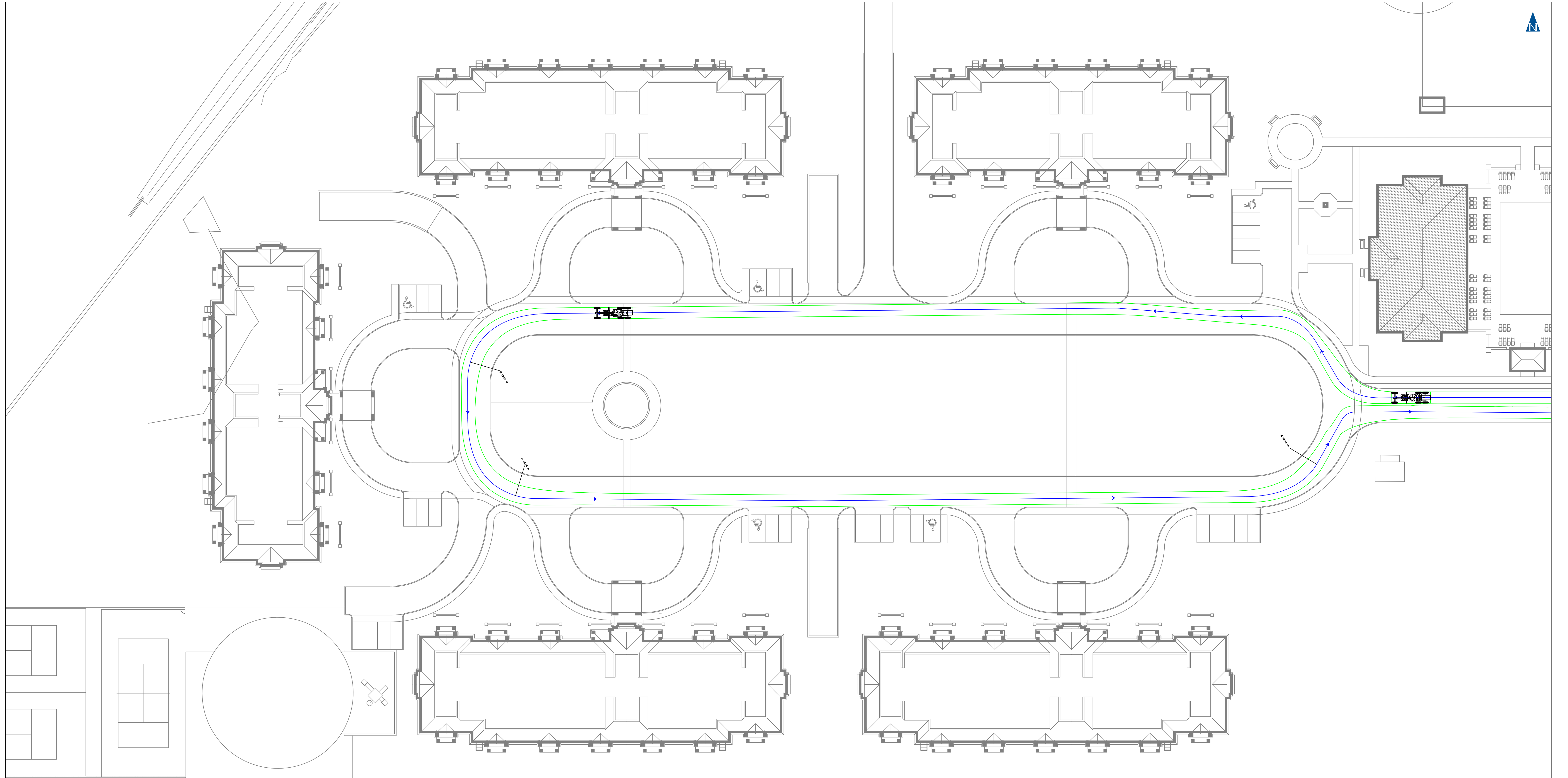
DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____

SIGNATURE _____



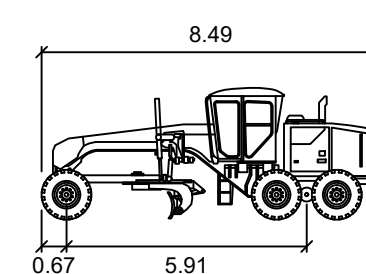
AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	08



NOTES
 1. THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

DESIGN VEHICLE:



CAT 120M
 Width : 2.48 meters
 Track : 2.48
 Lock to Lock Time : 6.0
 Steering Angle : 60.3

NO.	DATE	INITIAL	REVISION DETAIL

DRAWING STATUS
 ISSUED FOR REVIEW
 APPROVED DATE: _____
 SIGNATURE _____



AUTOTURN ASSESSMENT
 144 JOHN STREET
 TOWN OF NIAGARA-ON-THE-LAKE

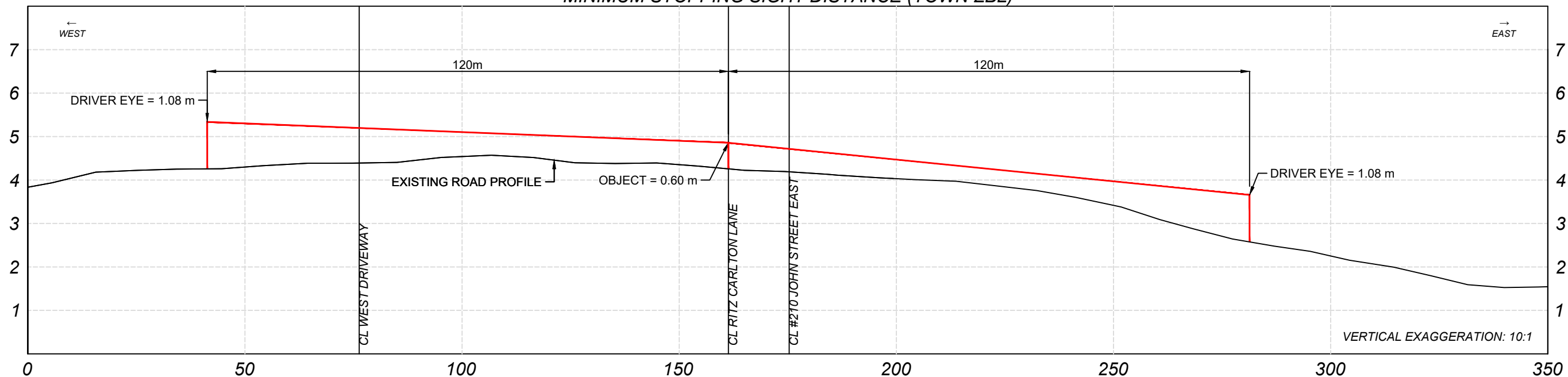
PROJECT NO.: 260080	DATE: MAR 2026	SCALE: 1:400	DRAWING NO.:
DESIGN: DC	DRAWN: DC	CHECK: Ama	09

Appendix C

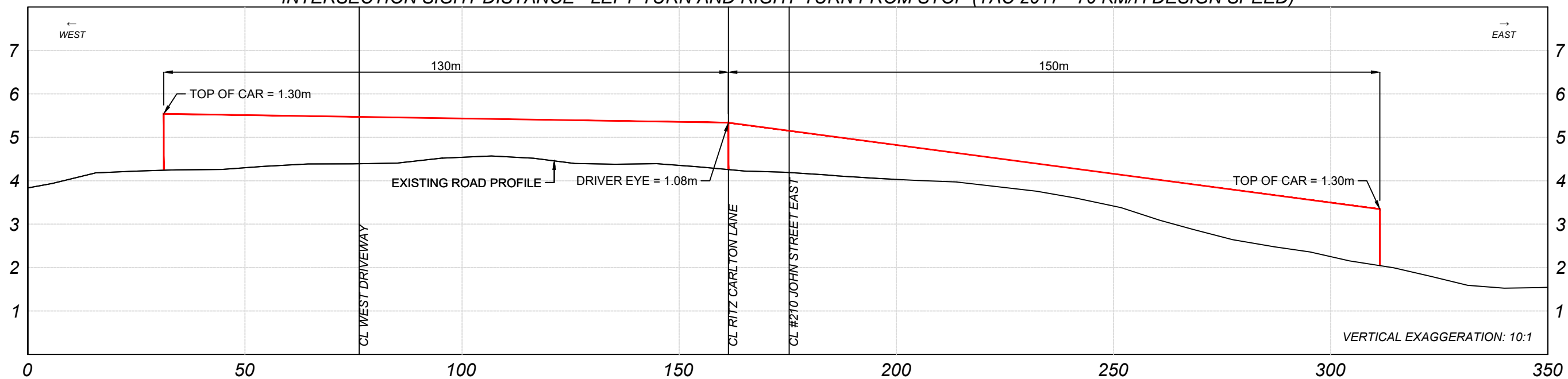
Sight Distance Plots



RITZ CARLETON LANE
MINIMUM STOPPING SIGHT DISTANCE (TOWN ZBL)



INTERSECTION SIGHT DISTANCE - LEFT-TURN AND RIGHT-TURN FROM STOP (TAC 2017 - 70 KM/H DESIGN SPEED)



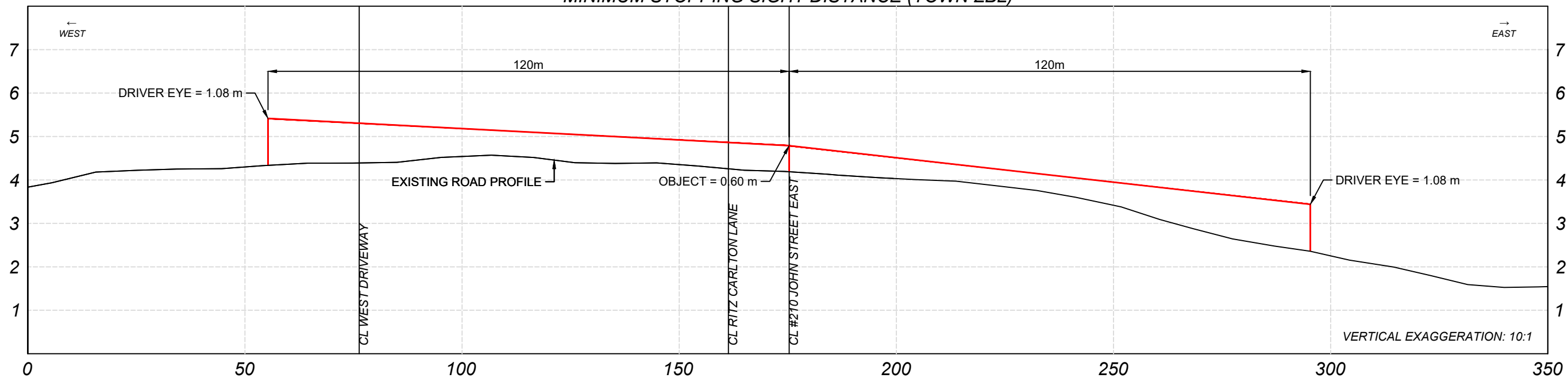
VERTICAL SIGHT DISTANCE REVIEW
200 JOHN STREET EAST
TOWN OF NIAGARA-ON-THE-LAKE

NO.	DATE	INITIAL	REVISION DETAIL

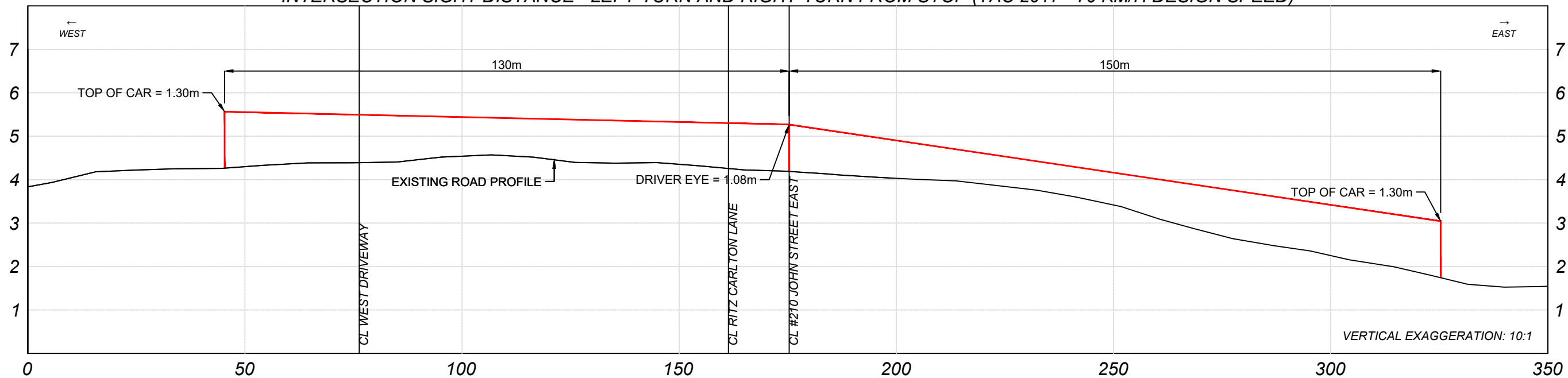


PROJECT NO.: 230116	DATE: FEB 2024	SCALE: 1:1000	DRAWING NO.: 01
DRAWN: SC	DESIGN: SC	CHECK: AMa	

#210 JOHN STREET DRIVEWAY
MINIMUM STOPPING SIGHT DISTANCE (TOWN ZBL)



INTERSECTION SIGHT DISTANCE - LEFT-TURN AND RIGHT-TURN FROM STOP (TAC 2017 - 70 KM/H DESIGN SPEED)



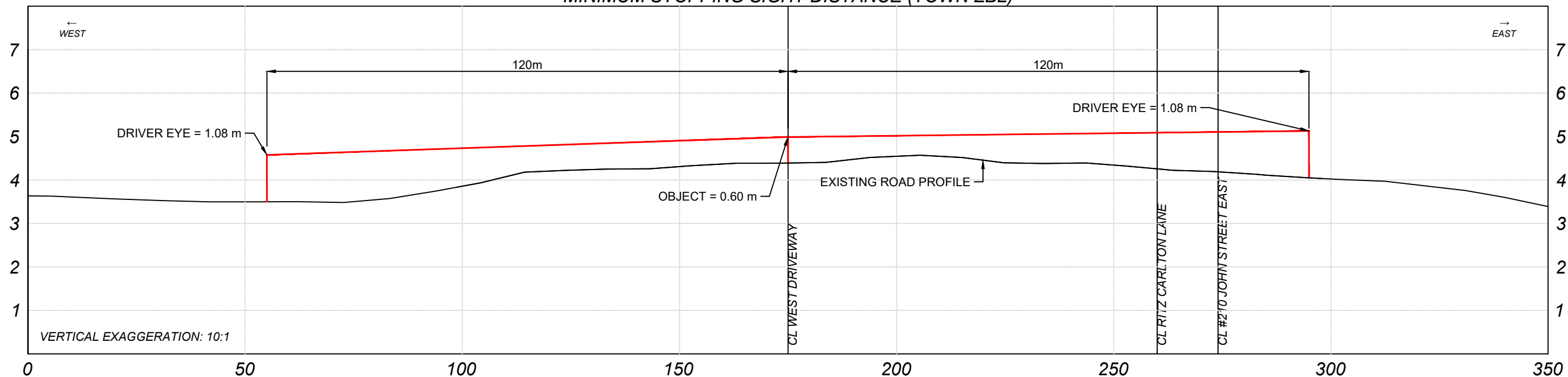
VERTICAL SIGHT DISTANCE REVIEW
200 JOHN STREET EAST
TOWN OF NIAGARA-ON-THE-LAKE

NO.	DATE	INITIAL	REVISION DETAIL

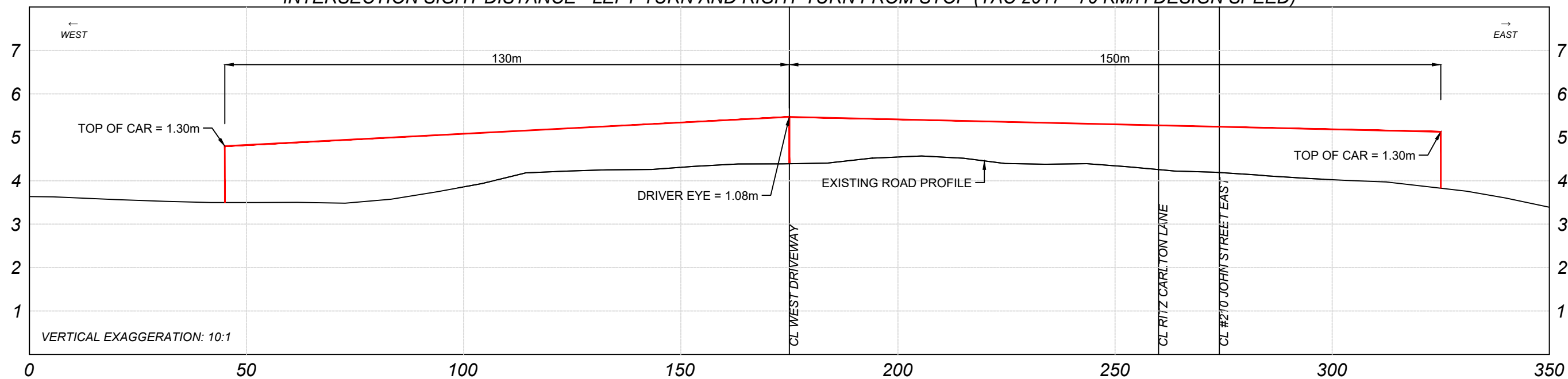


PROJECT NO.: 230116	DATE: FEB 2024	SCALE: 1:1000	DRAWING NO.: 02
DRAWN: SC	DESIGN: SC	CHECK: AMa	

WEST DRIVEWAY
MINIMUM STOPPING SIGHT DISTANCE (TOWN ZBL)



INTERSECTION SIGHT DISTANCE - LEFT-TURN AND RIGHT-TURN FROM STOP (TAC 2017 - 70 KM/H DESIGN SPEED)



VERTICAL SIGHT DISTANCE REVIEW
200 JOHN STREET EAST
TOWN OF NIAGARA-ON-THE-LAKE

NO.	DATE	INITIAL	REVISION DETAIL



PROJECT NO.: 230116

DATE: FEB 2024

SCALE: 1:1000

DRAWING NO.:

DRAWN: SC

DESIGN: SC

CHECK: AMa

03

Appendix D

Internal Trips



NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	144 John Street	Organization:	PTSL
Project Location:	NOTL	Performed By:	
Scenario Description:		Date:	
Analysis Year:		Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant	931	272	Seats	0	0	0
Cinema/Entertainment				0		
Residential	220	270	Units	107	26	81
Hotel	310	111	Rooms	38	20	18
All Other Land Uses ²	492	10,000	GFA	18	9	9
Total				163	55	108

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail	0					
Restaurant	0	0				
Cinema/Entertainment	0	0	0			
Residential	0	0	0	0		
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	163	55	108
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips ³	163	55	108
External Transit-Trips ⁴	0	0	0
External Non-Motorized Trips ⁴	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	N/A	N/A
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	0%
Hotel	0%	0%

¹Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

⁴Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	144 John Street
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	26	26	1.00	81	81
Hotel	1.00	20	20	1.00	18	18

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	16	0		0
Hotel	14	3	2	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	0		0	1	1
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	26	26	26	0	0
Hotel	0	20	20	20	0	0
All Other Land Uses ³	0	9	9	9	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	81	81	81	0	0
Hotel	0	18	18	18	0	0
All Other Land Uses ³	0	9	9	9	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
²Person-Trips
³Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	144 John Street	Organization:	PTSL
Project Location:	NOTL	Performed By:	
Scenario Description:		Date:	
Analysis Year:		Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant	931	272	Seats	90	60	30
Cinema/Entertainment				0		
Residential	220	270	Units	137	85	52
Hotel	310	111	Rooms	52	27	25
All Other Land Uses ²	492	10,000	GFA	38	21	17
Total				317	193	124

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					0	
Restaurant						
Cinema/Entertainment						
Residential		0				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	5	2
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	8	0		2
Hotel	0	0	3	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	317	193	124
Internal Capture Percentage	13%	10%	16%
External Vehicle-Trips ³	277	173	104
External Transit-Trips ⁴	0	0	0
External Non-Motorized Trips ⁴	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	N/A	N/A
Restaurant	18%	23%
Cinema/Entertainment	N/A	N/A
Residential	6%	19%
Hotel	15%	12%

¹Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

⁴Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	144 John Street
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	60	60	1.00	30	30
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	85	85	1.00	52	52
Hotel	1.00	27	27	1.00	25	25

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	1	12		2	5	2
Cinema/Entertainment	0	0	0		0	0
Residential	2	22	11	0		2
Hotel	0	4	17	0	1	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	3	0
Retail	0		17	0	39	5
Restaurant	0	0		0	14	19
Cinema/Entertainment	0	0	2		3	0
Residential	0	0	8	0		3
Hotel	0	0	3	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	11	49	60	49	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	5	80	85	80	0	0
Hotel	4	23	27	23	0	0
All Other Land Uses ³	0	21	21	21	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	7	23	30	23	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	10	42	52	42	0	0
Hotel	3	22	25	22	0	0
All Other Land Uses ³	0	17	17	17	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	144 John Street	Organization:	PTSL
Project Location:	NOTL	Performed By:	
Scenario Description:		Date:	
Analysis Year:		Checked By:	
Analysis Period:	Sat Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant	931	272	Seats	98	58	40
Cinema/Entertainment				0		
Residential	220	270	Units	132	50	82
Hotel	310	111	Rooms	52	27	25
All Other Land Uses ²	492	10,000	GFA	51	24	27
Total				333	159	174

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					0	
Restaurant						
Cinema/Entertainment						
Residential		0				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	7	3
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	8	0		2
Hotel	0	0	3	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	333	159	174
Internal Capture Percentage	14%	14%	13%
External Vehicle-Trips ³	287	136	151
External Transit-Trips ⁴	0	0	0
External Non-Motorized Trips ⁴	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	N/A	N/A
Restaurant	19%	25%
Cinema/Entertainment	N/A	N/A
Residential	14%	12%
Hotel	19%	12%

¹Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

⁴Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	144 John Street
Analysis Period:	Sat Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	58	58	1.00	40	40
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	50	50	1.00	82	82
Hotel	1.00	27	27	1.00	25	25

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	1	16		3	7	3
Cinema/Entertainment	0	0	0		0	0
Residential	3	34	17	0		2
Hotel	0	4	17	0	1	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	2	0
Retail	0		17	0	23	5
Restaurant	0	0		0	8	19
Cinema/Entertainment	0	0	2		2	0
Residential	0	0	8	0		3
Hotel	0	0	3	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	11	47	58	47	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	7	43	50	43	0	0
Hotel	5	22	27	22	0	0
All Other Land Uses ³	0	24	24	24	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	10	30	40	30	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	10	72	82	72	0	0
Hotel	3	22	25	22	0	0
All Other Land Uses ³	0	27	27	27	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Appendix E

TTS Data



















Dest	Auto driver	%	Niagara Street (East)	Niagara River Parkway (South)	John Street (West)	Queen's Parade (North)	King Street (North)	King Street (South)	Likely Travel Routes
PD 1 of Toronto	101	1.1%	0.3%	0.9%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 2 of Toronto	74	0.8%	0.2%	0.5%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 4 of Toronto	25	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 6 of Toronto	18	0.2%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 8 of Toronto	35	0.4%	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 9 of Toronto	13	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 11 of Toronto	13	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 13 of Toronto	16	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
PD 14 of Toronto	16	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Pickering	16	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Markham	25	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Vaughan	36	0.4%	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Brampton	9	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Mississauga	61	0.7%	0.2%	0.5%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Milton	13	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Oakville	133	1.5%	0.4%	1.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Burlington	143	1.6%	0.4%	1.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Stoney Creek	27	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Hamilton	83	0.9%	0.2%	0.7%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Waterloo	25	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
City of Guelph	27	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Brant	13	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Peiham	27	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Niagara-on-the-Lake	5096	62.1%	14.1%	30.3%	7.4%	2.0%	10.7%	2.0%	Existing Link Volumes
St. Catharines	1361	15.5%	7.7%	0.0%	7.7%	0.0%	0.0%	0.0%	Niagara Street or John Street
Thorold	37	0.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	Niagara Street
Niagara Falls	493	5.9%	0.0%	3.6%	0.0%	0.0%	0.0%	0.0%	Niagara River Parkway
Welland	29	0.3%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street or Niagara River Parkway
Fort Erie	19	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	Niagara Street
Total	8784	100.0%	25.0%	45.1%	15.1%	2.0%	10.7%	2.0%	100.0%

NOTL Existing Link Volumes					
AM Peak Hour					
		Inbound	Outbound	Total	%
North	Queen's Parade	48	96	144	17%
North	King Street	70	83	153	18%
South	Niagara River Parkway	147	83	230	26%
South	King Street	52	50	102	12%
West	John Street	19	28	45	5%
East	Niagara Street	87	107	194	22%
Total	-	423	445	868	100%
PM Peak Hour					
North	Queen's Parade	263	213	476	23%
North	King Street	189	160	349	17%
South	Niagara River Parkway	293	346	639	31%
South	King Street	87	107	194	9%
West	John Street	47	67	114	6%
East	Niagara Street	139	159	298	14%
Total	-	1016	1052	2070	100%
Sat. Peak Hour					
North	Queen's Parade	405	316	721	25%
North	King Street	200	221	421	15%
South	Niagara River Parkway	418	540	958	33%
South	King Street	147	112	259	9%
West	John Street	68	103	171	6%
East	Niagara Street	209	144	353	12%
Total	-	1447	1436	2883	100%
Total (AM, PM, Sat. Peak Hours)					
North	Queen's Parade	716	625	1341	23%
North	King Street	459	464	923	16%
South	Niagara River Parkway	858	899	1757	31%
South	King Street	286	269	555	10%
West	John Street	134	196	330	6%
East	Niagara Street	435	410	845	15%
Total	-	2888	2833	5821	100%
Local Residential Distribution Adjustments					
North	Queen's Parade	-	23%	-20%	3%
North	King Street	-	16%	0%	16%
South	Niagara River Parkway	-	31%	15%	46%
South	King Street	-	10%	-7%	3%
West	John Street	-	6%	5%	11%
East	Niagara Street	-	15%	6%	21%
Total	-	-	100%	-	100%

Appendix F

Synchro Operational Reports



















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	5	25	18	4	1	18	97	43	3	46
Future Volume (vph)	2	1	5	25	18	4	1	18	97	43	3	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.916			0.989			0.887			0.932	
Flt Protected		0.988			0.974						0.977	
Satd. Flow (prot)	0	1628	0	0	1774	0	0	1383	0	0	1488	0
Flt Permitted		0.988			0.974						0.977	
Satd. Flow (perm)	0	1628	0	0	1774	0	0	1383	0	0	1488	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	9%	6%	0%	0%	12%	6%	25%	33%	26%	0%
Adj. Flow (vph)	2	1	5	27	20	4	1	20	105	47	3	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	51	0	0	126	0	0	100	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.7%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street

Base Year AM
 04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	5	25	18	4	1	18	97	43	3	46
Future Volume (Veh/h)	2	1	5	25	18	4	1	18	97	43	3	46
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	5	27	20	4	1	20	105	47	3	50
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	211	249	28	202	222	73	53			125		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	211	249	28	202	222	73	53			125		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.2			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.3			2.5		
p0 queue free %	100	100	100	96	97	100	100			96		
cM capacity (veh/h)	710	633	1027	722	655	995	1491			1291		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	8	51	126	100								
Volume Left	2	27	1	47								
Volume Right	5	4	105	50								
cSH	864	709	1491	1291								
Volume to Capacity	0.00*	0.07	0.00*	0.04								
Queue Length 95th (m)	0.2	1.9	0.0	0.9								
Control Delay (s/veh)	9.2	10.5	0.1	3.9								
Lane LOS	A	B	A	A								
Approach Delay (s/veh)	9.2	10.5	0.1	3.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay			3.5									
Intersection Capacity Utilization			23.7%		ICU Level of Service		A					
Analysis Period (min)			15									

* Value less than 0.01.

















Lanes, Volumes, Timings
 2: Charlotte Street & John Street East

Base Year AM
 04/20/2026

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	31	4	3	25	2	28	10	3	1	5
Future Volume (vph)	1	1	31	4	3	25	2	28	10	3	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.872			0.893			0.965			0.925	
Flt Protected		0.999			0.994			0.998			0.984	
Satd. Flow (prot)	0	1654	0	0	1606	0	0	1185	0	0	1588	0
Flt Permitted		0.999			0.994			0.998			0.984	
Satd. Flow (perm)	0	1654	0	0	1606	0	0	1185	0	0	1588	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		374.9			152.0			953.8			132.9	
Travel Time (s)		27.0			10.9			68.7			9.6	
Confl. Peds. (#/hr)									6	6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	0%	33%	13%	0%	0%	78%	0%	0%	80%	0%
Adj. Flow (vph)	1	1	34	4	3	27	2	30	11	3	1	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	34	0	0	43	0	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	15.6%					ICU Level of Service A						
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
2: Charlotte Street & John Street East

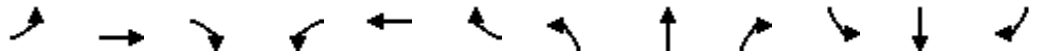
Base Year AM
04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	31	4	3	25	2	28	10	3	1	5
Future Volume (Veh/h)	1	1	31	4	3	25	2	28	10	3	1	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	1	34	4	3	27	2	30	11	3	1	5
Pedestrians					6							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	30			35			50	58	24	77	62	17
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	30			35			50	58	24	77	62	17
tC, single (s)	4.1			4.4			7.1	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.7	3.3	3.5	4.7	3.3
p0 queue free %	100			100			100	96	99	100	100	100
cM capacity (veh/h)	1596			1398			947	705	1053	872	698	1068
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	36	34	43	9								
Volume Left	1	4	2	3								
Volume Right	34	27	11	5								
cSH	1596	1398	780	942								
Volume to Capacity	0.00*	0.00*	0.06	0.00*								
Queue Length 95th (m)	0.0	0.1	1.4	0.2								
Control Delay (s/veh)	0.2	0.9	9.9	8.9								
Lane LOS	A	A	A	A								
Approach Delay (s/veh)	0.2	0.9	9.9	8.9								
Approach LOS			A	A								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			15.6%		ICU Level of Service				A			
Analysis Period (min)			15									

* Value less than 0.01.

Lanes, Volumes, Timings
3: King Street & John Street East

Base Year AM
04/20/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	6	5	9	6	6	13	3	9	44	3	28	41
Future Volume (vph)	6	5	9	6	6	13	3	9	44	3	28	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.939			0.932			0.894			0.922	
Flt Protected		0.984			0.988			0.998			0.998	
Satd. Flow (prot)	0	1709	0	0	1566	0	0	1681	0	0	1696	0
Flt Permitted		0.984			0.988			0.998			0.998	
Satd. Flow (perm)	0	1709	0	0	1566	0	0	1681	0	0	1696	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	9					9	7		5	5		7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	12%	0%	33%	8%	3%	0%	5%	0%	0%	8%	0%
Adj. Flow (vph)	7	5	10	7	7	14	3	10	48	3	30	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	28	0	0	61	0	0	78	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

















Intersection Capacity Utilization 19.7%










ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East










Base Year AM
 04/20/2026

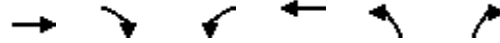
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	5	9	6	6	13	3	9	44	3	28	41
Future Volume (vph)	6	5	9	6	6	13	3	9	44	3	28	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	10	7	7	14	3	10	48	3	30	45
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	28	61	78								
Volume Left (vph)	7	7	3	3								
Volume Right (vph)	10	14	48	45								
Hadj (s)	-0.16	-0.05	-0.45	-0.29								
Departure Headway (s)	4.0	4.1	3.6	3.8								
Degree Utilization, x	0.02	0.03	0.06	0.08								
Capacity (veh/h)	856	836	963	934								
Control Delay (s/veh)	7.1	7.3	6.9	7.1								
Approach Delay (s/veh)	7.1	7.3	6.9	7.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.1									
Level of Service			A									
Intersection Capacity Utilization			19.7%	ICU Level of Service	A							
Analysis Period (min)			15									

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	79	0	0	0	39
Future Volume (vph)	0	79	0	0	0	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						
Satd. Flow (prot)	1644	0	1810	0	0	1827
Flt Permitted						
Satd. Flow (perm)	1644	0	1810	0	0	1827
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	0%	5%	0%	0%	4%
Adj. Flow (vph)	0	86	0	0	0	42
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	0	0	0	0	42
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	15.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 4: Niagara Street & Charlotte Street











Base Year AM
 04/20/2026

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	79	0	0	0	39
Future Volume (vph)	0	79	0	0	0	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	86	0	0	0	42
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	86	0	42			
Volume Left (vph)	0	0	0			
Volume Right (vph)	86	0	0			
Hadj (s)	-0.60	0.00	0.07			
Departure Headway (s)	3.4	4.1	4.1			
Degree Utilization, x	0.08	0.00	0.05			
Capacity (veh/h)	1042	868	851			
Control Delay (s/veh)	6.7	7.1	7.3			
Approach Delay (s/veh)	6.7	0.0	7.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			15.3%	ICU Level of Service		A
Analysis Period (min)			15			






















Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↑	↓
Traffic Volume (vph)	0	36	0	0	5	0
Future Volume (vph)	0	36	0	0	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.865					
Fl _t Protected					0.950	
Satd. Flow (prot)	1611	0	0	1863	1770	0
Fl _t Permitted					0.950	
Satd. Flow (perm)	1611	0	0	1863	1770	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	39	0	0	5	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	0	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3% ICU Level of Service A
Analysis Period (min)	15

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	0	36	0	0	5	0
Future Volume (Veh/h)	0	36	0	0	5	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	39	0	0	5	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			39		20	20
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			39		20	20
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1571		998	1058
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	39	0	5			
Volume Left	0	0	5			
Volume Right	39	0	0			
cSH	1700	1700	998			
Volume to Capacity	0.02	0.00	0.00*			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s/veh)	0.0	0.0	8.6			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	8.6			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

* Value less than 0.01.

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	0	36	0	0	6	0
Future Volume (vph)	0	36	0	0	6	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.865					
Fl _t Protected					0.950	
Satd. Flow (prot)	1611	0	0	1863	1770	0
Fl _t Permitted					0.950	
Satd. Flow (perm)	1611	0	0	1863	1770	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	39	0	0	7	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	0	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	0	36	0	0	6	0
Future Volume (Veh/h)	0	36	0	0	6	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	39	0	0	7	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			39		20	20
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			39		20	20
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1571		998	1058
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	39	0	7			
Volume Left	0	0	7			
Volume Right	39	0	0			
cSH	1700	1700	998			
Volume to Capacity	0.02	0.00	0.00*			
Queue Length 95th (m)	0.0	0.0	0.2			
Control Delay (s/veh)	0.0	0.0	8.6			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	8.6			
Approach LOS			A			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

* Value less than 0.01.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	9	64	56	9	9	53	212	52	11	254	19
Future Volume (vph)	10	9	64	56	9	9	53	212	52	11	254	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.896			0.983			0.978			0.991	
Fl _t Protected		0.994			0.964			0.992			0.998	
Satd. Flow (prot)	0	1606	0	0	1723	0	0	1745	0	0	1797	0
Fl _t Permitted		0.994			0.964			0.992			0.998	
Satd. Flow (perm)	0	1606	0	0	1723	0	0	1745	0	0	1797	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	6%	0%	0%	0%	6%	10%	0%	3%	28%
Adj. Flow (vph)	11	10	70	61	10	10	58	230	57	12	276	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	91	0	0	81	0	0	345	0	0	309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

















Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	53.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

















Base Year PM

















1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street

04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	9	64	56	9	9	53	212	52	11	254	19
Future Volume (Veh/h)	10	9	64	56	9	9	53	212	52	11	254	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	70	61	10	10	58	230	57	12	276	21
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	700	714	287	760	696	259	297			287		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	700	714	287	760	696	259	297			287		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	97	97	91	77	97	99	95			99		
cM capacity (veh/h)	330	340	741	270	348	785	1276			1287		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	91	81	345	309								
Volume Left	11	61	58	12								
Volume Right	70	10	57	21								
cSH	579	302	1276	1287								
Volume to Capacity	0.16	0.27	0.05	0.00*								
Queue Length 95th (m)	4.4	8.5	1.1	0.2								
Control Delay (s/veh)	12.4	21.2	1.7	0.4								
Lane LOS	B	C	A	A								
Approach Delay (s/veh)	12.4	21.2	1.7	0.4								
Approach LOS	B	C										
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			53.2%	ICU Level of Service	A							
Analysis Period (min)			15									

* Value less than 0.01.

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	0	59	35	15	67	0	46	3	2	3	12	0		
Future Volume (vph)	0	59	35	15	67	0	46	3	2	3	12	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Ped Bike Factor														
Frt	0.950						0.995							
Flt Protected					0.991						0.957		0.991	
Satd. Flow (prot)	0	1761	0	0	1794	0	0	1715	0	0	1051	0		
Flt Permitted					0.991						0.957		0.991	
Satd. Flow (perm)	0	1761	0	0	1794	0	0	1715	0	0	1051	0		
Link Speed (k/h)					50						50		50	
Link Distance (m)					374.9						152.0		953.8	
Travel Time (s)					27.0						10.9		68.7	
Confl. Peds. (#/hr)	5				5				4		4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Heavy Vehicles (%)	0%	4%	0%	14%	3%	0%	0%	67%	50%	67%	82%	2%		
Adj. Flow (vph)	0	64	38	16	73	0	50	3	2	3	13	0		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	102	0	0	89	0	0	55	0	0	16	0		
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No		
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right		
Median Width(m)	0.0				0.0				0.0		0.0			
Link Offset(m)	0.0				0.0				0.0		0.0			
Crosswalk Width(m)	4.8				4.8				4.8		4.8			
Two way Left Turn Lane														
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Turning Speed (k/h)	25		15		25		15		25		15			
Sign Control	Free				Free				Stop					
Intersection Summary														
Area Type:	Other													
Control Type:	Unsignalized													
Intersection Capacity Utilization	27.7%						ICU Level of Service A							
Analysis Period (min)	15													

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	59	35	15	67	0	46	3	2	3	12	0
Future Volume (Veh/h)	0	59	35	15	67	0	46	3	2	3	12	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	64	38	16	73	0	50	3	2	3	13	0
Pedestrians					4			5			5	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	78			107			200	198	92	201	217	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			107			200	198	92	201	217	78
tC, single (s)	4.1			4.2			7.1	7.2	6.7	7.8	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.6	3.8	4.1	4.7	3.3
p0 queue free %	100			99			93	99	100	100	98	100
cM capacity (veh/h)	1527			1406			735	585	842	619	551	979
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	102	89	55	16								
Volume Left	0	16	50	3								
Volume Right	38	0	2	0								
cSH	1527	1406	729	562								
Volume to Capacity	0.00	0.01	0.08	0.03								
Queue Length 95th (m)	0.0	0.3	2.0	0.7								
Control Delay (s/veh)	0.0	1.4	10.3	11.6								
Lane LOS		A	B	B								
Approach Delay (s/veh)	0.0	1.4	10.3	11.6								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			27.7%		ICU Level of Service				A			
Analysis Period (min)			15									

















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	27	4	9	27	73	8	80	6	64	103	38
Future Volume (vph)	19	27	4	9	27	73	8	80	6	64	103	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.910			0.991			0.975	
Flt Protected		0.981			0.996			0.996			0.985	
Satd. Flow (prot)	0	1606	0	0	1621	0	0	1844	0	0	1800	0
Flt Permitted		0.981			0.996			0.996			0.985	
Satd. Flow (perm)	0	1606	0	0	1621	0	0	1844	0	0	1800	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	2		3	3		2	4		7	7		4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	20%	25%	0%	20%	2%	0%	2%	0%	0%	2%	2%
Adj. Flow (vph)	21	29	4	10	29	79	9	87	7	70	112	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	54	0	0	118	0	0	103	0	0	223	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	










Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.0%
	ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East










Base Year PM
 04/20/2026

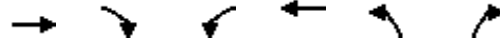
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	27	4	9	27	73	8	80	6	64	103	38
Future Volume (vph)	19	27	4	9	27	73	8	80	6	64	103	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	29	4	10	29	79	9	87	7	70	112	41
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	54	118	103	223								
Volume Left (vph)	21	10	9	70								
Volume Right (vph)	4	79	7	41								
Hadj (s)	0.29	-0.28	0.01	-0.02								
Departure Headway (s)	5.1	4.5	4.6	4.4								
Degree Utilization, x	0.08	0.15	0.13	0.27								
Capacity (veh/h)	649	745	743	776								
Control Delay (s/veh)	8.5	8.2	8.3	9.1								
Approach Delay (s/veh)	8.5	8.2	8.3	9.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.6									
Level of Service			A									
Intersection Capacity Utilization			33.0%	ICU Level of Service	A							
Analysis Period (min)			15									

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	63	0	0	66	0
Future Volume (vph)	0	63	0	0	66	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	1644	0	1900	0	0	1444
Flt Permitted						0.950
Satd. Flow (perm)	1644	0	1900	0	0	1444
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	0%	2%	25%	3%
Adj. Flow (vph)	0	68	0	0	72	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	68	0	0	0	0	72
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 4: Niagara Street & Charlotte Street

Base Year PM
 04/20/2026

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	63	0	0	66	0
Future Volume (vph)	0	63	0	0	66	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	68	0	0	72	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	68	0	72			
Volume Left (vph)	0	0	72			
Volume Right (vph)	68	0	0			
Hadj (s)	-0.60	0.00	0.63			
Departure Headway (s)	3.5	4.1	4.7			
Degree Utilization, x	0.07	0.00	0.09			
Capacity (veh/h)	1008	869	760			
Control Delay (s/veh)	6.7	7.1	8.1			
Approach Delay (s/veh)	6.7	0.0	8.1			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.4			
Level of Service			A			
Intersection Capacity Utilization			17.0%	ICU Level of Service	A	
Analysis Period (min)			15			



















Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	65	0	0	82	0	0
Future Volume (vph)	65	0	0	82	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	0	0	89	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	0	0	89	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	7.6%			ICU Level of Service A		
Analysis Period (min)	15					

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	T			T	T	
Traffic Volume (veh/h)	65	0	0	82	0	0
Future Volume (Veh/h)	65	0	0	82	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	0	0	89	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			71		160	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			71		160	71
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1529		831	991
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	71	89	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1529	1700			
Volume to Capacity	0.04	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			7.6%	ICU Level of Service	A	
Analysis Period (min)			15			

















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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↑	↓
Traffic Volume (vph)	65	0	0	82	0	0
Future Volume (vph)	65	0	0	82	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	0	0	89	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	0	0	89	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	7.6%			ICU Level of Service A		
Analysis Period (min)	15					

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	T			T	T	
Traffic Volume (veh/h)	65	0	0	82	0	0
Future Volume (Veh/h)	65	0	0	82	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	0	0	89	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			71		160	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			71		160	71
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1529		831	991
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	71	89	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1529	1700			
Volume to Capacity	0.04	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			7.6%	ICU Level of Service	A	
Analysis Period (min)			15			

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	18	124	76	14	9	84	333	81	6	444	33
Future Volume (vph)	34	18	124	76	14	9	84	333	81	6	444	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.905			0.987			0.978			0.991	
Flt Protected		0.990			0.963			0.992			0.999	
Satd. Flow (prot)	0	1591	0	0	1783	0	0	1759	0	0	1798	0
Flt Permitted		0.990			0.963			0.992			0.999	
Satd. Flow (perm)	0	1591	0	0	1783	0	0	1759	0	0	1798	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	8%	0%	0%	14%	2%	5%	7%	0%	5%	0%
Adj. Flow (vph)	37	20	135	83	15	10	91	362	88	7	483	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	192	0	0	108	0	0	541	0	0	526	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

















Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	79.8%
ICU Level of Service	D
Analysis Period (min)	15

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	18	124	76	14	9	84	333	81	6	444	33
Future Volume (Veh/h)	34	18	124	76	14	9	84	333	81	6	444	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	20	135	83	15	10	91	362	88	7	483	36
Pedestrians		1										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1122	1148	502	1248	1122	406	520			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1122	1148	502	1248	1122	406	520			450		
tC, single (s)	7.1	6.6	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	77	88	76	15	92	98	91			99		
cM capacity (veh/h)	159	172	557	97	188	620	1045			1121		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	192	108	541	526								
Volume Left	37	83	91	7								
Volume Right	135	10	88	36								
cSH	324	114	1045	1121								
Volume to Capacity	0.59	0.95	0.09	0.00*								
Queue Length 95th (m)	28.6	48.1	2.3	0.2								
Control Delay (s/veh)	31.0	142.2	2.3	0.2								
Lane LOS	D	F	A	A								
Approach Delay (s/veh)	31.0	142.2	2.3	0.2								
Approach LOS	D	F										
Intersection Summary												
Average Delay			16.6									
Intersection Capacity Utilization			79.8%	ICU Level of Service	D							
Analysis Period (min)			15									

* Value less than 0.01.

















Lanes, Volumes, Timings
 2: Charlotte Street & John Street East

Base Year Saturday
 04/20/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	108	35	12	124	3	45	6	24	3	10	4
Future Volume (vph)	1	108	35	12	124	3	45	6	24	3	10	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.967			0.997			0.957			0.970	
Flt Protected					0.996			0.971			0.992	
Satd. Flow (prot)	0	1671	0	0	1791	0	0	1536	0	0	1291	0
Flt Permitted					0.996			0.971			0.992	
Satd. Flow (perm)	0	1671	0	0	1791	0	0	1536	0	0	1291	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		374.9			152.0			953.8			132.9	
Travel Time (s)		27.0			10.9			68.7			9.6	
Confl. Peds. (#/hr)			3	3					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	11%	7%	0%	6%	0%	3%	80%	20%	0%	50%	50%
Adj. Flow (vph)	1	117	38	13	135	3	49	7	26	3	11	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	156	0	0	151	0	0	82	0	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	32.9%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 2: Charlotte Street & John Street East

















Base Year Saturday
 04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	108	35	12	124	3	45	6	24	3	10	4
Future Volume (Veh/h)	1	108	35	12	124	3	45	6	24	3	10	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	117	38	13	135	3	49	7	26	3	11	4
Pedestrians					2			3				
Lane Width (m)					3.6			3.6				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	138			158			313	305	141	332	323	137
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	138			158			313	305	141	332	323	137
tC, single (s)	4.1			4.1			7.1	7.3	6.4	7.1	7.0	6.7
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.7	3.5	3.5	4.4	3.8
p0 queue free %	100			99			92	99	97	99	98	99
cM capacity (veh/h)	1458			1430			617	492	858	593	518	799
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	156	151	82	18								
Volume Left	1	13	49	3								
Volume Right	38	3	26	4								
cSH	1458	1430	661	575								
Volume to Capacity	0.00*	0.00*	0.12	0.03								
Queue Length 95th (m)	0.0	0.2	3.4	0.8								
Control Delay (s/veh)	0.1	0.7	11.2	11.5								
Lane LOS	A	A	B	B								
Approach Delay (s/veh)	0.1	0.7	11.2	11.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			32.9%		ICU Level of Service				A			
Analysis Period (min)			15									

* Value less than 0.01.

















Lanes, Volumes, Timings
3: King Street & John Street East










Base Year Saturday
04/20/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Future Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.961			0.917			0.986			0.973	
Flt Protected		0.988			0.997			0.994			0.981	
Satd. Flow (prot)	0	1532	0	0	1628	0	0	1730	0	0	1671	0
Flt Permitted		0.988			0.997			0.994			0.981	
Satd. Flow (perm)	0	1532	0	0	1628	0	0	1730	0	0	1671	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	26		7	7		26	20		17	17		20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	19%	30%	20%	13%	2%	6%	8%	7%	10%	4%	15%
Adj. Flow (vph)	21	42	26	13	60	116	22	149	20	101	107	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	89	0	0	189	0	0	191	0	0	259	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	47.7%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East










Base Year Saturday
 04/20/2026

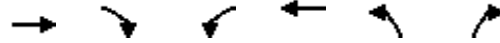
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Future Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	42	26	13	60	116	22	149	20	101	107	51
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	89	189	191	259								
Volume Left (vph)	21	13	22	101								
Volume Right (vph)	26	116	20	51								
Hadj (s)	0.17	-0.24	0.09	0.10								
Departure Headway (s)	5.5	5.0	5.1	5.0								
Degree Utilization, x	0.14	0.26	0.27	0.36								
Capacity (veh/h)	582	661	659	676								
Control Delay (s/veh)	9.4	9.7	10.0	10.8								
Approach Delay (s/veh)	9.4	9.7	10.0	10.8								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			10.1									
Level of Service			B									
Intersection Capacity Utilization			47.7%	ICU Level of Service	A							
Analysis Period (min)			15									

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	86	0	0	65	0
Future Volume (vph)	0	86	0	0	65	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	984	0	1827	0	0	1504
Flt Permitted						0.950
Satd. Flow (perm)	984	0	1827	0	0	1504
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)	2					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	67%	4%	0%	20%	3%
Adj. Flow (vph)	0	93	0	0	71	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	0	0	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	16.3%			ICU Level of Service A		
Analysis Period (min)	15					










HCM Unsignalized Intersection Capacity Analysis
 4: Niagara Street & Charlotte Street

Base Year Saturday
 04/20/2026










						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	86	0	0	65	0
Future Volume (vph)	0	86	0	0	65	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	93	0	0	71	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	93	0	71			
Volume Left (vph)	0	0	71			
Volume Right (vph)	93	0	0			
Hadj (s)	0.54	0.00	0.54			
Departure Headway (s)	4.6	4.2	4.7			
Degree Utilization, x	0.12	0.00	0.09			
Capacity (veh/h)	764	836	753			
Control Delay (s/veh)	8.2	7.2	8.1			
Approach Delay (s/veh)	8.2	0.0	8.1			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.2			
Level of Service			A			
Intersection Capacity Utilization			16.3%	ICU Level of Service	A	
Analysis Period (min)			15			



















Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	136	0	0	139	0	0
Future Volume (vph)	136	0	0	139	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	0	0	151	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	148	0	0	151	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	10.6%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	136	0	0	139	0	0
Future Volume (Veh/h)	136	0	0	139	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	0	0	151	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			148		299	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		299	148
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1434		692	899
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	148	151	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1434	1700			
Volume to Capacity	0.09	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			10.6%	ICU Level of Service	A	
Analysis Period (min)			15			

















	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↖	↗	
Traffic Volume (vph)	136	0	0	139	0	0
Future Volume (vph)	136	0	0	139	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	0	0	151	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	148	0	0	151	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	10.6%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	136	0	0	139	0	0
Future Volume (Veh/h)	136	0	0	139	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	0	0	151	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			148		299	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		299	148
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1434		692	899
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	148	151	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1434	1700			
Volume to Capacity	0.09	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			10.6%	ICU Level of Service	A	
Analysis Period (min)			15			

















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	6	28	20	4	1	20	107	47	3	51	2
Future Volume (vph)	1	6	28	20	4	1	20	107	47	3	51	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.893			0.995			0.964			0.995	
Flt Protected		0.999			0.961			0.994			0.998	
Satd. Flow (prot)	0	1583	0	0	1732	0	0	1628	0	0	1504	0
Flt Permitted		0.999			0.961			0.994			0.998	
Satd. Flow (perm)	0	1583	0	0	1732	0	0	1628	0	0	1504	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	9%	6%	0%	0%	12%	6%	25%	33%	26%	0%
Adj. Flow (vph)	1	7	30	22	4	1	22	116	51	3	55	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	27	0	0	189	0	0	60	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

















Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	30.4%
ICU Level of Service	A
Analysis Period (min)	15

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	6	28	20	4	1	20	107	47	3	51	2
Future Volume (Veh/h)	1	6	28	20	4	1	20	107	47	3	51	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	7	30	22	4	1	22	116	51	3	55	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	251	273	56	281	249	142	57			167		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	251	273	56	281	249	142	57			167		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.2			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.3			2.5		
p0 queue free %	100	99	97	97	99	100	99			100		
cM capacity (veh/h)	694	626	991	629	646	912	1486			1243		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	38	27	189	60								
Volume Left	1	22	22	3								
Volume Right	30	1	51	2								
cSH	886	639	1486	1243								
Volume to Capacity	0.04	0.04	0.01	0.00*								
Queue Length 95th (m)	1.1	1.1	0.4	0.1								
Control Delay (s/veh)	9.2	10.9	1.0	0.4								
Lane LOS	A	B	A	A								
Approach Delay (s/veh)	9.2	10.9	1.0	0.4								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			30.4%		ICU Level of Service					A		
Analysis Period (min)			15									

* Value less than 0.01.

















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	34	4	3	28	0	31	11	3	1	6	1
Future Volume (vph)	1	34	4	3	28	0	31	11	3	1	6	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987						0.992			0.985	
Flt Protected		0.999			0.995			0.966			0.994	
Satd. Flow (prot)	0	1825	0	0	1647	0	0	1529	0	0	1147	0
Flt Permitted		0.999			0.995			0.966			0.994	
Satd. Flow (perm)	0	1825	0	0	1647	0	0	1529	0	0	1147	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		374.9			152.0			953.8			132.9	
Travel Time (s)		27.0			10.9			68.7			9.6	
Confl. Peds. (#/hr)									6	6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	0%	33%	13%	0%	0%	78%	0%	0%	80%	0%
Adj. Flow (vph)	1	37	4	3	30	0	34	12	3	1	7	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	42	0	0	33	0	0	49	0	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	19.9%					ICU Level of Service A						
Analysis Period (min)	15											










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	34	4	3	28	0	31	11	3	1	6	1
Future Volume (Veh/h)	1	34	4	3	28	0	31	11	3	1	6	1
Sign Control	Free		Free		Free		Stop		Stop		Stop	
Grade	0%		0%		0%		0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	37	4	3	30	0	34	12	3	1	7	1
Pedestrians	6											
Lane Width (m)	3.6											
Walking Speed (m/s)	1.2											
Percent Blockage	1											
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	30			41			82	77	45	92	79	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	30			41			82	77	45	92	79	30
tC, single (s)	4.1			4.4			7.1	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.7	3.3	3.5	4.7	3.3
p0 queue free %	100			100			96	98	100	100	99	100
cM capacity (veh/h)	1596			1390			901	687	1025	876	682	1050
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	42	33	49	9								
Volume Left	1	3	34	1								
Volume Right	4	0	3	1								
cSH	1596	1390	843	728								
Volume to Capacity	0.00*	0.00*	0.06	0.01								
Queue Length 95th (m)	0.0	0.1	1.5	0.3								
Control Delay (s/veh)	0.2	0.7	9.5	10.0								
Lane LOS	A	A	A	B								
Approach Delay (s/veh)	0.2	0.7	9.5	10.0								
Approach LOS	A			B								
Intersection Summary												
Average Delay	4.4											
Intersection Capacity Utilization	19.9%		ICU Level of Service	A								
Analysis Period (min)	15											
* Value less than 0.01.												










												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	10	7	7	14	44	10	49	3	31	45	7
Future Volume (vph)	6	10	7	7	14	44	10	49	3	31	45	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.958			0.909			0.994			0.988	
Flt Protected		0.987			0.994			0.992			0.982	
Satd. Flow (prot)	0	1710	0	0	1598	0	0	1802	0	0	1767	0
Flt Permitted		0.987			0.994			0.992			0.982	
Satd. Flow (perm)	0	1710	0	0	1598	0	0	1802	0	0	1767	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	9					9	7		5	5		7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	12%	0%	33%	8%	3%	0%	5%	0%	0%	8%	0%
Adj. Flow (vph)	7	11	8	8	15	48	11	53	3	34	49	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	26	0	0	71	0	0	67	0	0	91	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	23.7%						ICU Level of Service A					
Analysis Period (min)	15											

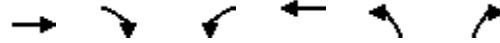
HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East

2031 Background AM
 04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	10	7	7	14	44	10	49	3	31	45	7
Future Volume (vph)	6	10	7	7	14	44	10	49	3	31	45	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)	7	11	8	8	15	48	11	53	3	34	49	8
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	26	71	67	91								
Volume Left (vph)	7	8	11	34								
Volume Right (vph)	8	48	3	8								
Hadj (s)	-0.04	-0.26	0.07	0.10								
Departure Headway (s)	4.3	4.0	4.3	4.3								
Degree Utilization, x	0.03	0.08	0.08	0.11								
Capacity (veh/h)	802	856	811	819								
Control Delay (s/veh)	7.4	7.4	7.6	7.8								
Approach Delay (s/veh)	7.4	7.4	7.6	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			23.7%		ICU Level of Service	A						
Analysis Period (min)			15									

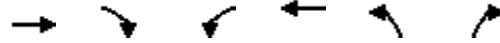
						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	41	0	0	43	0
Future Volume (vph)	0	41	0	0	43	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	1644	0	1810	0	0	1805
Flt Permitted						0.950
Satd. Flow (perm)	1644	0	1810	0	0	1805
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	0%	5%	0%	0%	4%
Adj. Flow (vph)	0	45	0	0	47	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	45	0	0	0	0	47
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.7%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	41	0	0	43	0
Future Volume (vph)	0	41	0	0	43	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	0	0	47	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	45	0	47			
Volume Left (vph)	0	0	47			
Volume Right (vph)	45	0	0			
Hadj (s)	-0.60	0.00	0.20			
Departure Headway (s)	3.4	4.0	4.2			
Degree Utilization, x	0.04	0.00	0.05			
Capacity (veh/h)	1036	886	847			
Control Delay (s/veh)	6.6	7.0	7.4			
Approach Delay (s/veh)	6.6	0.0	7.4			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.0			
Level of Service			A			
Intersection Capacity Utilization			13.7%	ICU Level of Service	A	
Analysis Period (min)			15			












Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	40	0	0	31	0	0
Future Volume (vph)	40	0	0	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	0	0	34	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	0	34	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	6.7%			ICU Level of Service A		
Analysis Period (min)	15					

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	40	0	0	31	0	0
Future Volume (Veh/h)	40	0	0	31	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	0	0	34	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			43		77	43
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			43		77	43
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1566		926	1027
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	43	34	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1566	1700			
Volume to Capacity	0.03	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			6.7%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↓	
Traffic Volume (vph)	40	0	0	31	0	0
Future Volume (vph)	40	0	0	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	0	0	34	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	0	34	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	6.7%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	40	0	0	31	0	0
Future Volume (Veh/h)	40	0	0	31	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	0	0	34	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			43		77	43
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			43		77	43
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1566		926	1027
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	43	34	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1566	1700			
Volume to Capacity	0.03	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			6.7%	ICU Level of Service		A
Analysis Period (min)			15			

















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	10	71	62	10	10	59	234	57	12	280	21
Future Volume (vph)	11	10	71	62	10	10	59	234	57	12	280	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.896			0.983			0.978			0.991	
Fl _t Protected		0.994			0.964			0.992			0.998	
Satd. Flow (prot)	0	1606	0	0	1723	0	0	1745	0	0	1797	0
Fl _t Permitted		0.994			0.964			0.992			0.998	
Satd. Flow (perm)	0	1606	0	0	1723	0	0	1745	0	0	1797	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	6%	0%	0%	0%	6%	10%	0%	3%	28%
Adj. Flow (vph)	12	11	77	67	11	11	64	254	62	13	304	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	100	0	0	89	0	0	380	0	0	340	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

















Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.0%
ICU Level of Service	B
Analysis Period (min)	15

















HCM Unsignalized Intersection Capacity Analysis
 1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street

















2031 Background PM
 04/20/2026










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	10	71	62	10	10	59	234	57	12	280	21
Future Volume (Veh/h)	11	10	71	62	10	10	59	234	57	12	280	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	11	77	67	11	11	64	254	62	13	304	23
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
None												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	771	786	316	837	766	285	327			316		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	771	786	316	837	766	285	327			316		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	96	96	89	71	97	99	95			99		
cM capacity (veh/h)	292	307	713	233	315	759	1244			1256		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	100	89	380	340								
Volume Left	12	67	64	13								
Volume Right	77	11	62	23								
cSH	541	264	1244	1256								
Volume to Capacity	0.18	0.34	0.05	0.01								
Queue Length 95th (m)	5.4	11.4	1.3	0.3								
Control Delay (s/veh)	13.2	25.4	1.8	0.4								
Lane LOS	B	D	A	A								
Approach Delay (s/veh)	13.2	25.4	1.8	0.4								
Approach LOS	B	D										
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization			57.0%		ICU Level of Service					B		
Analysis Period (min)			15									










												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	65	39	17	74	0	51	3	2	3	13	0
Future Volume (vph)	0	65	39	17	74	0	51	3	2	3	13	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.950						0.995					
Flt Protected					0.991						0.991	
Satd. Flow (prot)	0	1761	0	0	1793	0	0	1721	0	0	1050	0
Flt Permitted					0.991						0.991	
Satd. Flow (perm)	0	1761	0	0	1793	0	0	1721	0	0	1050	0
Link Speed (k/h)					50						50	
Link Distance (m)	374.9				152.0		953.8				132.9	
Travel Time (s)	27.0				10.9		68.7				9.6	
Confl. Peds. (#/hr)	5			5			4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	14%	3%	0%	0%	67%	50%	67%	82%	2%
Adj. Flow (vph)	0	71	42	18	80	0	55	3	2	3	14	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	113	0	0	98	0	0	60	0	0	17	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	0.0				0.0		0.0				0.0	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	4.8				4.8		4.8				4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15		25		15		25		15	
Sign Control	Free				Free				Stop			
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	28.4%						ICU Level of Service A					
Analysis Period (min)	15											

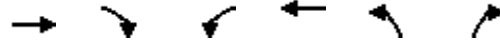
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	65	39	17	74	0	51	3	2	3	13	0
Future Volume (Veh/h)	0	65	39	17	74	0	51	3	2	3	13	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	71	42	18	80	0	55	3	2	3	14	0
Pedestrians					4			5			5	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	85			118			220	218	101	221	239	85
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	85			118			220	218	101	221	239	85
tC, single (s)	4.1			4.2			7.1	7.2	6.7	7.8	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.6	3.8	4.1	4.7	3.3
p0 queue free %	100			99			92	99	100	99	97	100
cM capacity (veh/h)	1518			1393			711	568	832	598	533	970
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	113	98	60	17								
Volume Left	0	18	55	3								
Volume Right	42	0	2	0								
cSH	1518	1393	705	544								
Volume to Capacity	0.00	0.01	0.09	0.03								
Queue Length 95th (m)	0.0	0.3	2.2	0.8								
Control Delay (s/veh)	0.0	1.5	10.6	11.8								
Lane LOS		A	B	B								
Approach Delay (s/veh)	0.0	1.5	10.6	11.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			28.4%		ICU Level of Service					A		
Analysis Period (min)			15									

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	30	4	10	30	81	9	88	7	71	114	42
Future Volume (vph)	21	30	4	10	30	81	9	88	7	71	114	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.910			0.991			0.975	
Flt Protected		0.981			0.996			0.996			0.985	
Satd. Flow (prot)	0	1607	0	0	1620	0	0	1844	0	0	1800	0
Flt Permitted		0.981			0.996			0.996			0.985	
Satd. Flow (perm)	0	1607	0	0	1620	0	0	1844	0	0	1800	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	2		3	3		2	4		7	7		4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	20%	25%	0%	20%	2%	0%	2%	0%	0%	2%	2%
Adj. Flow (vph)	23	33	4	11	33	88	10	96	8	77	124	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	132	0	0	114	0	0	247	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	35.0%					ICU Level of Service A						
Analysis Period (min)	15											










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	30	4	10	30	81	9	88	7	71	114	42
Future Volume (vph)	21	30	4	10	30	81	9	88	7	71	114	42
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)	23	33	4	11	33	88	10	96	8	77	124	46
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	60	132	114	247								
Volume Left (vph)	23	11	10	77								
Volume Right (vph)	4	88	8	46								
Hadj (s)	0.29	-0.28	0.00	-0.03								
Departure Headway (s)	5.2	4.6	4.7	4.5								
Degree Utilization, x	0.09	0.17	0.15	0.31								
Capacity (veh/h)	629	725	726	762								
Control Delay (s/veh)	8.7	8.5	8.5	9.5								
Approach Delay (s/veh)	8.7	8.5	8.5	9.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			9.0									
Level of Service			A									
Intersection Capacity Utilization			35.0%	ICU Level of Service	A							
Analysis Period (min)			15									










						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	70	0	0	73	0
Future Volume (vph)	0	70	0	0	73	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	1644	0	1900	0	0	1444
Flt Permitted						0.950
Satd. Flow (perm)	1644	0	1900	0	0	1444
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	0%	2%	25%	3%
Adj. Flow (vph)	0	76	0	0	79	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	0	0	0	0	79
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	18.1%			ICU Level of Service A		
Analysis Period (min)	15					










						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	70	0	0	73	0
Future Volume (vph)	0	70	0	0	73	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	76	0	0	79	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	76	0	79			
Volume Left (vph)	0	0	79			
Volume Right (vph)	76	0	0			
Hadj (s)	-0.60	0.00	0.63			
Departure Headway (s)	3.5	4.1	4.7			
Degree Utilization, x	0.07	0.00	0.10			
Capacity (veh/h)	1002	864	756			
Control Delay (s/veh)	6.8	7.1	8.2			
Approach Delay (s/veh)	6.8	0.0	8.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.5			
Level of Service			A			
Intersection Capacity Utilization			18.1%	ICU Level of Service		A
Analysis Period (min)			15			



















Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↔	↔	
Traffic Volume (vph)	72	0	0	91	0	0
Future Volume (vph)	72	0	0	91	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	0	0	99	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	0	0	99	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	8.1%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	72	0	0	91	0	0
Future Volume (Veh/h)	72	0	0	91	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	78	0	0	99	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			78		177	78
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			78		177	78
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1520		813	983
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	78	99	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1520	1700			
Volume to Capacity	0.05	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.1%	ICU Level of Service	A	
Analysis Period (min)			15			

















						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	72	0	0	91	0	0
Future Volume (vph)	72	0	0	91	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	0	0	99	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	0	0	99	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	8.1%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	72	0	0	91	0	0
Future Volume (Veh/h)	72	0	0	91	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	78	0	0	99	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			78		177	78
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			78		177	78
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1520		813	983
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	78	99	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1520	1700			
Volume to Capacity	0.05	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.1%	ICU Level of Service	A	
Analysis Period (min)			15			

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	18	124	76	14	9	84	333	81	6	444	33
Future Volume (vph)	34	18	124	76	14	9	84	333	81	6	444	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.905			0.987			0.978			0.991	
Flt Protected		0.990			0.963			0.992			0.999	
Satd. Flow (prot)	0	1591	0	0	1783	0	0	1759	0	0	1798	0
Flt Permitted		0.990			0.963			0.992			0.999	
Satd. Flow (perm)	0	1591	0	0	1783	0	0	1759	0	0	1798	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	8%	0%	0%	14%	2%	5%	7%	0%	5%	0%
Adj. Flow (vph)	37	20	135	83	15	10	91	362	88	7	483	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	192	0	0	108	0	0	541	0	0	526	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 79.8% ICU Level of Service D
 Analysis Period (min) 15

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	18	124	76	14	9	84	333	81	6	444	33
Future Volume (Veh/h)	34	18	124	76	14	9	84	333	81	6	444	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	20	135	83	15	10	91	362	88	7	483	36
Pedestrians		1										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1122	1148	502	1248	1122	406	520			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1122	1148	502	1248	1122	406	520			450		
tC, single (s)	7.1	6.6	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	77	88	76	15	92	98	91			99		
cM capacity (veh/h)	159	172	557	97	188	620	1045			1121		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	192	108	541	526								
Volume Left	37	83	91	7								
Volume Right	135	10	88	36								
cSH	324	114	1045	1121								
Volume to Capacity	0.59	0.95	0.09	0.00*								
Queue Length 95th (m)	28.6	48.1	2.3	0.2								
Control Delay (s/veh)	31.0	142.2	2.3	0.2								
Lane LOS	D	F	A	A								
Approach Delay (s/veh)	31.0	142.2	2.3	0.2								
Approach LOS	D	F										
Intersection Summary												
Average Delay			16.6									
Intersection Capacity Utilization			79.8%		ICU Level of Service				D			
Analysis Period (min)			15									

* Value less than 0.01.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	108	35	12	124	3	45	6	24	3	10	4
Future Volume (vph)	1	108	35	12	124	3	45	6	24	3	10	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.967			0.997			0.957			0.970	
Flt Protected					0.996			0.971			0.992	
Satd. Flow (prot)	0	1671	0	0	1791	0	0	1536	0	0	1291	0
Flt Permitted					0.996			0.971			0.992	
Satd. Flow (perm)	0	1671	0	0	1791	0	0	1536	0	0	1291	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		374.9			152.0			953.8			132.9	
Travel Time (s)		27.0			10.9			68.7			9.6	
Confl. Peds. (#/hr)			3	3					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	11%	7%	0%	6%	0%	3%	80%	20%	0%	50%	50%
Adj. Flow (vph)	1	117	38	13	135	3	49	7	26	3	11	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	156	0	0	151	0	0	82	0	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	32.9%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
2: Charlotte Street & John Street East

















2031 Background Saturday
04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	108	35	12	124	3	45	6	24	3	10	4
Future Volume (Veh/h)	1	108	35	12	124	3	45	6	24	3	10	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	117	38	13	135	3	49	7	26	3	11	4
Pedestrians					2			3				
Lane Width (m)					3.6			3.6				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	138			158			313	305	141	332	323	137
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	138			158			313	305	141	332	323	137
tC, single (s)	4.1			4.1			7.1	7.3	6.4	7.1	7.0	6.7
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.7	3.5	3.5	4.4	3.8
p0 queue free %	100			99			92	99	97	99	98	99
cM capacity (veh/h)	1458			1430			617	492	858	593	518	799
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	156	151	82	18								
Volume Left	1	13	49	3								
Volume Right	38	3	26	4								
cSH	1458	1430	661	575								
Volume to Capacity	0.00*	0.00*	0.12	0.03								
Queue Length 95th (m)	0.0	0.2	3.4	0.8								
Control Delay (s/veh)	0.1	0.7	11.2	11.5								
Lane LOS	A	A	B	B								
Approach Delay (s/veh)	0.1	0.7	11.2	11.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			32.9%		ICU Level of Service				A			
Analysis Period (min)			15									

* Value less than 0.01.

Lanes, Volumes, Timings
3: King Street & John Street East

2031 Background Saturday
04/20/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Future Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.961			0.917			0.986			0.973	
Flt Protected		0.988			0.997			0.994			0.981	
Satd. Flow (prot)	0	1532	0	0	1628	0	0	1730	0	0	1671	0
Flt Permitted		0.988			0.997			0.994			0.981	
Satd. Flow (perm)	0	1532	0	0	1628	0	0	1730	0	0	1671	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	26		7	7		26	20		17	17		20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	19%	30%	20%	13%	2%	6%	8%	7%	10%	4%	15%
Adj. Flow (vph)	21	42	26	13	60	116	22	149	20	101	107	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	89	0	0	189	0	0	191	0	0	259	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

















Area Type: Other










Control Type: Unsignalized










Intersection Capacity Utilization 47.7%

ICU Level of Service A

Analysis Period (min) 15










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Future Volume (vph)	19	39	24	12	55	107	20	137	18	93	98	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	42	26	13	60	116	22	149	20	101	107	51
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	89	189	191	259								
Volume Left (vph)	21	13	22	101								
Volume Right (vph)	26	116	20	51								
Hadj (s)	0.17	-0.24	0.09	0.10								
Departure Headway (s)	5.5	5.0	5.1	5.0								
Degree Utilization, x	0.14	0.26	0.27	0.36								
Capacity (veh/h)	582	661	659	676								
Control Delay (s/veh)	9.4	9.7	10.0	10.8								
Approach Delay (s/veh)	9.4	9.7	10.0	10.8								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			10.1									
Level of Service			B									
Intersection Capacity Utilization			47.7%	ICU Level of Service	A							
Analysis Period (min)			15									










						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	86	0	0	65	0
Future Volume (vph)	0	86	0	0	65	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	984	0	1827	0	0	1504
Flt Permitted						0.950
Satd. Flow (perm)	984	0	1827	0	0	1504
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)	2					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	67%	4%	0%	20%	3%
Adj. Flow (vph)	0	93	0	0	71	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	0	0	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	16.3%			ICU Level of Service A		
Analysis Period (min)	15					










						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	86	0	0	65	0
Future Volume (vph)	0	86	0	0	65	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	93	0	0	71	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	93	0	71			
Volume Left (vph)	0	0	71			
Volume Right (vph)	93	0	0			
Hadj (s)	0.54	0.00	0.54			
Departure Headway (s)	4.6	4.2	4.7			
Degree Utilization, x	0.12	0.00	0.09			
Capacity (veh/h)	764	836	753			
Control Delay (s/veh)	8.2	7.2	8.1			
Approach Delay (s/veh)	8.2	0.0	8.1			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.2			
Level of Service			A			
Intersection Capacity Utilization			16.3%	ICU Level of Service	A	
Analysis Period (min)			15			



















Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	136	0	0	139	0	0
Future Volume (vph)	136	0	0	139	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	0	0	151	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	148	0	0	151	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	10.6%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	136	0	0	139	0	0
Future Volume (Veh/h)	136	0	0	139	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	0	0	151	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			148		299	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		299	148
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1434		692	899
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	148	151	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1434	1700			
Volume to Capacity	0.09	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			10.6%	ICU Level of Service	A	
Analysis Period (min)			15			

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	136	0	0	139	0	0
Future Volume (vph)	136	0	0	139	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frnt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	0	0	151	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	148	0	0	151	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	10.6%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	136	0	0	139	0	0
Future Volume (Veh/h)	136	0	0	139	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	0	0	151	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			148		299	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		299	148
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1434		692	899
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	148	151	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1434	1700			
Volume to Capacity	0.09	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s/veh)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s/veh)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			10.6%	ICU Level of Service	A	
Analysis Period (min)			15			

















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Future Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.883			0.995			0.966			0.991	
Fl _t Protected		0.998			0.961			0.991			0.998	
Satd. Flow (prot)	0	1553	0	0	1732	0	0	1626	0	0	1507	0
Fl _t Permitted		0.998			0.961			0.991			0.998	
Satd. Flow (perm)	0	1553	0	0	1732	0	0	1626	0	0	1507	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	9%	6%	0%	0%	12%	6%	25%	33%	26%	0%
Adj. Flow (vph)	4	7	73	22	4	1	38	116	51	3	55	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	84	0	0	27	0	0	205	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.8%
ICU Level of Service	A
Analysis Period (min)	15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	6	67	20	4	1	35	107	47	3	51	4
Future Volume (Veh/h)	4	6	67	20	4	1	35	107	47	3	51	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	7	73	22	4	1	38	116	51	3	55	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	284	306	57	357	283	142	59			167		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	284	306	57	357	283	142	59			167		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.2			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.3			2.5		
p0 queue free %	99	99	93	96	99	100	97			100		
cM capacity (veh/h)	654	594	990	531	612	912	1483			1243		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	84	27	205	62								
Volume Left	4	22	38	3								
Volume Right	73	1	51	4								
cSH	917	550	1483	1243								
Volume to Capacity	0.09	0.05	0.03	0.00*								
Queue Length 95th (m)	2.4	1.2	0.6	0.1								
Control Delay (s/veh)	9.3	11.9	1.6	0.4								
Lane LOS	A	B	A	A								
Approach Delay (s/veh)	9.3	11.9	1.6	0.4								
Approach LOS	A	B										
Intersection Summary												
Average Delay			3.8									
Intersection Capacity Utilization			31.8%		ICU Level of Service				A			
Analysis Period (min)			15									

* Value less than 0.01.

















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	59	4	28	68	0	31	11	16	1	6	1
Future Volume (vph)	1	59	4	28	68	0	31	11	16	1	6	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992						0.964			0.985	
Flt Protected		0.999			0.986			0.974			0.994	
Satd. Flow (prot)	0	1832	0	0	1577	0	0	1553	0	0	1147	0
Flt Permitted		0.999			0.986			0.974			0.994	
Satd. Flow (perm)	0	1832	0	0	1577	0	0	1553	0	0	1147	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		374.9			152.0			953.8			132.9	
Travel Time (s)		27.0			10.9			68.7			9.6	
Confl. Peds. (#/hr)									6	6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	0%	33%	13%	0%	0%	78%	0%	0%	80%	0%
Adj. Flow (vph)	1	64	4	30	74	0	34	12	17	1	7	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	69	0	0	104	0	0	63	0	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	29.1%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
2: Charlotte Street & John Street East

2031 Total AM
04/20/2026

















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	59	4	28	68	0	31	11	16	1	6	1
Future Volume (Veh/h)	1	59	4	28	68	0	31	11	16	1	6	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	64	4	30	74	0	34	12	17	1	7	1
Pedestrians					6							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	74			68			207	202	72	231	204	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74			68			207	202	72	231	204	74
tC, single (s)	4.1			4.4			7.1	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.7	3.3	3.5	4.7	3.3
p0 queue free %	100			98			95	98	98	100	99	100
cM capacity (veh/h)	1538			1358			735	566	991	688	562	993
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	69	104	63	9								
Volume Left	1	30	34	1								
Volume Right	4	0	17	1								
cSH	1538	1358	744	603								
Volume to Capacity	0.00*	0.02	0.08	0.01								
Queue Length 95th (m)	0.0	0.5	2.2	0.4								
Control Delay (s/veh)	0.1	2.4	10.3	11.1								
Lane LOS	A	A	B	B								
Approach Delay (s/veh)	0.1	2.4	10.3	11.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			4.1									
Intersection Capacity Utilization			29.1%		ICU Level of Service				A			
Analysis Period (min)			15									










* Value less than 0.01.










												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	23	7	9	35	61	10	49	4	42	45	7
Future Volume (vph)	6	23	7	9	35	61	10	49	4	42	45	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.922			0.992			0.990	
Flt Protected		0.991			0.996			0.992			0.978	
Satd. Flow (prot)	0	1704	0	0	1626	0	0	1800	0	0	1772	0
Flt Permitted		0.991			0.996			0.992			0.978	
Satd. Flow (perm)	0	1704	0	0	1626	0	0	1800	0	0	1772	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	9					9	7		5	5		7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	12%	0%	33%	8%	3%	0%	5%	0%	0%	8%	0%
Adj. Flow (vph)	7	25	8	10	38	66	11	53	4	46	49	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	114	0	0	68	0	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	27.8%						ICU Level of Service A					
Analysis Period (min)	15											

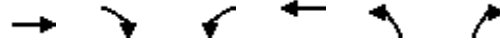
HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East

2031 Total AM
 04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	23	7	9	35	61	10	49	4	42	45	7
Future Volume (vph)	6	23	7	9	35	61	10	49	4	42	45	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)	7	25	8	10	38	66	11	53	4	46	49	8
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	40	114	68	103								
Volume Left (vph)	7	10	11	46								
Volume Right (vph)	8	66	4	8								
Hadj (s)	0.04	-0.21	0.06	0.11								
Departure Headway (s)	4.5	4.1	4.4	4.4								
Degree Utilization, x	0.05	0.13	0.08	0.13								
Capacity (veh/h)	768	833	775	772								
Control Delay (s/veh)	7.7	7.8	7.8	8.1								
Approach Delay (s/veh)	7.7	7.8	7.8	8.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.9									
Level of Service			A									
Intersection Capacity Utilization			27.8%		ICU Level of Service	A						
Analysis Period (min)			15									

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	54	0	0	68	0
Future Volume (vph)	0	54	0	0	68	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	1644	0	1810	0	0	1805
Flt Permitted						0.950
Satd. Flow (perm)	1644	0	1810	0	0	1805
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	0%	5%	0%	0%	4%
Adj. Flow (vph)	0	59	0	0	74	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	59	0	0	0	0	74
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	14.2%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	54	0	0	68	0
Future Volume (vph)	0	54	0	0	68	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	59	0	0	74	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	59	0	74			
Volume Left (vph)	0	0	74			
Volume Right (vph)	59	0	0			
Hadj (s)	-0.60	0.00	0.20			
Departure Headway (s)	3.5	4.1	4.2			
Degree Utilization, x	0.06	0.00	0.09			
Capacity (veh/h)	1011	874	840			
Control Delay (s/veh)	6.7	7.1	7.6			
Approach Delay (s/veh)	6.7	0.0	7.6			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.2			
Level of Service			A			
Intersection Capacity Utilization			14.2%	ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	44	14	12	36	43	38
Future Volume (vph)	44	14	12	36	43	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.968			0.937		
Fl _t Protected				0.988	0.974	
Satd. Flow (prot)	1803	0	0	1840	1700	0
Fl _t Permitted				0.988	0.974	
Satd. Flow (perm)	1803	0	0	1840	1700	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	15	13	39	47	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	0	0	52	88	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

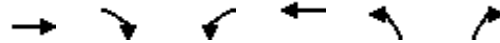
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.6%
Analysis Period (min)	15
	ICU Level of Service A

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	T			T	T	
Traffic Volume (veh/h)	44	14	12	36	43	38
Future Volume (Veh/h)	44	14	12	36	43	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	15	13	39	47	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			63			56
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			63			56
tC, single (s)			4.1			6.2
tC, 2 stage (s)						
tF (s)			2.2			3.3
p0 queue free %			99			96
cM capacity (veh/h)			1540			1011
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	63	52	88			
Volume Left	0	13	47			
Volume Right	15	0	41			
cSH	1700	1540	929			
Volume to Capacity	0.04	0.00*	0.09			
Queue Length 95th (m)	0.0	0.2	2.5			
Control Delay (s/veh)	0.0	1.9	9.3			
Lane LOS			A			
Approach Delay (s/veh)	0.0	1.9	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			20.6%	ICU Level of Service	A	
Analysis Period (min)			15			

















* Value less than 0.01.

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↖	↗	
Traffic Volume (vph)	54	24	5	74	23	4
Future Volume (vph)	54	24	5	74	23	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.959			0.981		
Fl _t Protected				0.997	0.959	
Satd. Flow (prot)	1786	0	0	1857	1752	0
Fl _t Permitted				0.997	0.959	
Satd. Flow (perm)	1786	0	0	1857	1752	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	26	5	80	25	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	85	0	0	85	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	18.0%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↓	
Traffic Volume (veh/h)	54	24	5	74	23	4
Future Volume (Veh/h)	54	24	5	74	23	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	26	5	80	25	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			85		162	72
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			85		162	72
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1512		826	990
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	85	85	29			
Volume Left	0	5	25			
Volume Right	26	0	4			
cSH	1700	1512	845			
Volume to Capacity	0.05	0.00*	0.03			
Queue Length 95th (m)	0.0	0.1	0.9			
Control Delay (s/veh)	0.0	0.5	9.4			
Lane LOS		A	A			
Approach Delay (s/veh)	0.0	0.5	9.4			
Approach LOS			A			
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			18.0%	ICU Level of Service	A	
Analysis Period (min)			15			

* Value less than 0.01.

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Future Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.891			0.983			0.981			0.989	
Fl _t Protected		0.994			0.964			0.987			0.998	
Satd. Flow (prot)	0	1593	0	0	1723	0	0	1753	0	0	1786	0
Fl _t Permitted		0.994			0.964			0.987			0.998	
Satd. Flow (perm)	0	1593	0	0	1723	0	0	1753	0	0	1786	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	6%	0%	0%	0%	6%	10%	0%	3%	28%
Adj. Flow (vph)	15	11	109	67	11	11	117	254	62	13	304	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	89	0	0	433	0	0	346	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

















Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.0%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2031 Total PM

















1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street

04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	10	100	62	10	10	108	234	57	12	280	27
Future Volume (Veh/h)	14	10	100	62	10	10	108	234	57	12	280	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	11	109	67	11	11	117	254	62	13	304	29
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	880	895	319	978	878	285	333			316		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	880	895	319	978	878	285	333			316		
tC, single (s)	7.1	6.5	6.3	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	94	96	85	61	96	99	91			99		
cM capacity (veh/h)	237	253	711	170	259	759	1238			1256		
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	135	89	433	346								
Volume Left	15	67	117	13								
Volume Right	109	11	62	29								
cSH	519	198	1238	1256								
Volume to Capacity	0.26	0.45	0.09	0.01								
Queue Length 95th (m)	8.3	17.0	2.5	0.3								
Control Delay (s/veh)	14.4	37.4	2.9	0.4								
Lane LOS	B	E	A	A								
Approach Delay (s/veh)	14.4	37.4	2.9	0.4								
Approach LOS	B	E										
Intersection Summary												
Average Delay			6.6									
Intersection Capacity Utilization			60.0%		ICU Level of Service				B			
Analysis Period (min)			15									

Lanes, Volumes, Timings
 2: Charlotte Street & John Street East

2031 Total PM
 04/20/2026

															
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Traffic Volume (vph)	0	144	39	40	122	0	51	3	41	3	13	0			
Future Volume (vph)	0	144	39	40	122	0	51	3	41	3	13	0			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Ped Bike Factor															
Frt	0.972						0.941								
Flt Protected					0.988						0.974		0.991		
Satd. Flow (prot)	0	1790	0	0	1776	0	0	1407	0	0	1050	0			
Flt Permitted					0.988						0.974		0.991		
Satd. Flow (perm)	0	1790	0	0	1776	0	0	1407	0	0	1050	0			
Link Speed (k/h)					50						50		50		
Link Distance (m)					374.9						152.0		953.8		
Travel Time (s)					27.0						10.9		68.7		
Confl. Peds. (#/hr)	5			5						4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Heavy Vehicles (%)	0%	4%	0%	14%	3%	0%	0%	67%	50%	67%	82%	2%			
Adj. Flow (vph)	0	157	42	43	133	0	55	3	45	3	14	0			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	199	0	0	176	0	0	103	0	0	17	0			
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No			
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right			
Median Width(m)					0.0						0.0		0.0		
Link Offset(m)					0.0						0.0		0.0		
Crosswalk Width(m)					4.8						4.8		4.8		
Two way Left Turn Lane															
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Turning Speed (k/h)	25		15		25		15		25		15				
Sign Control	Free				Free				Stop						

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 41.1% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
 2: Charlotte Street & John Street East

















2031 Total PM
 04/20/2026










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	144	39	40	122	0	51	3	41	3	13	0
Future Volume (Veh/h)	0	144	39	40	122	0	51	3	41	3	13	0
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	157	42	43	133	0	55	3	45	3	14	0
Pedestrians				4			5			5		
Lane Width (m)				3.6			3.6			3.6		
Walking Speed (m/s)				1.2			1.2			1.2		
Percent Blockage				0			0			0		
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	138			204			409	407	187	453	428	138
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	138			204			409	407	187	453	428	138
tC, single (s)	4.1			4.2			7.1	7.2	6.7	7.8	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.6	3.8	4.1	4.7	3.3
p0 queue free %	100			97			89	99	94	99	96	100
cM capacity (veh/h)	1452			1294			522	428	740	380	399	907
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	199	176	103	17								
Volume Left	0	43	55	3								
Volume Right	42	0	45	0								
cSH	1452	1294	595	396								
Volume to Capacity	0.00	0.03	0.17	0.04								
Queue Length 95th (m)	0.0	0.8	5.0	1.1								
Control Delay (s/veh)	0.0	2.1	12.3	14.5								
Lane LOS	A		B	B								
Approach Delay (s/veh)	0.0	2.1	12.3	14.5								
Approach LOS	B		B									
Intersection Summary												
Average Delay			3.8									
Intersection Capacity Utilization			41.1%	ICU Level of Service	A							
Analysis Period (min)			15									










Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	70	4	12	54	103	9	88	10	107	114	42
Future Volume (vph)	21	70	4	12	54	103	9	88	10	107	114	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.995			0.918			0.987			0.978	
Flt Protected		0.989			0.996			0.996			0.980	
Satd. Flow (prot)	0	1597	0	0	1614	0	0	1838	0	0	1800	0
Flt Permitted		0.989			0.996			0.996			0.980	
Satd. Flow (perm)	0	1597	0	0	1614	0	0	1838	0	0	1800	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	2		3	3		2	4		7	7		4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	20%	25%	0%	20%	2%	0%	2%	0%	0%	2%	2%
Adj. Flow (vph)	23	76	4	13	59	112	10	96	11	116	124	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	103	0	0	184	0	0	117	0	0	286	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	38.8%						ICU Level of Service A					
Analysis Period (min)	15											

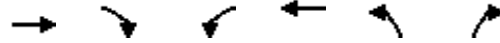
HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East

2031 Total PM
 04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	70	4	12	54	103	9	88	10	107	114	42
Future Volume (vph)	21	70	4	12	54	103	9	88	10	107	114	42
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)	23	76	4	13	59	112	10	96	11	116	124	46
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	103	184	117	286								
Volume Left (vph)	23	13	10	116								
Volume Right (vph)	4	112	11	46								
Hadj (s)	0.31	-0.22	-0.01	0.00								
Departure Headway (s)	5.5	4.9	5.0	4.8								
Degree Utilization, x	0.16	0.25	0.16	0.38								
Capacity (veh/h)	595	679	658	705								
Control Delay (s/veh)	9.5	9.4	9.0	10.8								
Approach Delay (s/veh)	9.5	9.4	9.0	10.8								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay			9.9									
Level of Service			A									
Intersection Capacity Utilization			38.8%	ICU Level of Service	A							
Analysis Period (min)			15									

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	109	0	0	96	0
Future Volume (vph)	0	109	0	0	96	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	1644	0	1900	0	0	1444
Flt Permitted						0.950
Satd. Flow (perm)	1644	0	1900	0	0	1444
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	0%	2%	25%	3%
Adj. Flow (vph)	0	118	0	0	104	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	118	0	0	0	0	104
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	22.8%			ICU Level of Service A		
Analysis Period (min)	15					

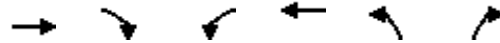
						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	109	0	0	96	0
Future Volume (vph)	0	109	0	0	96	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	118	0	0	104	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	118	0	104			
Volume Left (vph)	0	0	104			
Volume Right (vph)	118	0	0			
Hadj (s)	-0.60	0.00	0.63			
Departure Headway (s)	3.6	4.2	4.7			
Degree Utilization, x	0.12	0.00	0.14			
Capacity (veh/h)	979	824	738			
Control Delay (s/veh)	7.0	7.2	8.5			
Approach Delay (s/veh)	7.0	0.0	8.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.7			
Level of Service			A			
Intersection Capacity Utilization			22.8%	ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↑	↓
Traffic Volume (vph)	80	45	40	105	28	24
Future Volume (vph)	80	45	40	105	28	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.951			0.937		
Fl _t Protected				0.986	0.974	
Satd. Flow (prot)	1771	0	0	1837	1700	0
Fl _t Permitted				0.986	0.974	
Satd. Flow (perm)	1771	0	0	1837	1700	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	49	43	114	30	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	136	0	0	157	56	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	28.0%
Analysis Period (min)	15
	ICU Level of Service A












Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			←	↑	
Traffic Volume (veh/h)	80	45	40	105	28	24
Future Volume (Veh/h)	80	45	40	105	28	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	49	43	114	30	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			136		312	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			136		312	112
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		95	97
cM capacity (veh/h)			1448		661	942
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	136	157	56			
Volume Left	0	43	30			
Volume Right	49	0	26			
cSH	1700	1448	767			
Volume to Capacity	0.08	0.03	0.07			
Queue Length 95th (m)	0.0	0.7	1.9			
Control Delay (s/veh)	0.0	2.2	10.1			
Lane LOS		A	B			
Approach Delay (s/veh)	0.0	2.2	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			28.0%	ICU Level of Service	A	
Analysis Period (min)			15			



















Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↑	↑
Traffic Volume (vph)	117	74	14	119	44	8
Future Volume (vph)	117	74	14	119	44	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.948			0.979		
Flt Protected				0.995	0.960	
Satd. Flow (prot)	1766	0	0	1853	1751	0
Flt Permitted				0.995	0.960	
Satd. Flow (perm)	1766	0	0	1853	1751	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	80	15	129	48	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	207	0	0	144	57	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	28.0%
Analysis Period (min)	15
	ICU Level of Service A

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	117	74	14	119	44	8
Future Volume (Veh/h)	117	74	14	119	44	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	127	80	15	129	48	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			207		326	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			207		326	167
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		93	99
cM capacity (veh/h)			1364		661	877
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	207	144	57			
Volume Left	0	15	48			
Volume Right	80	0	9			
cSH	1700	1364	688			
Volume to Capacity	0.12	0.01	0.08			
Queue Length 95th (m)	0.0	0.3	2.2			
Control Delay (s/veh)	0.0	0.9	10.7			
Lane LOS		A	B			
Approach Delay (s/veh)	0.0	0.9	10.7			
Approach LOS			B			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			28.0%	ICU Level of Service	A	
Analysis Period (min)			15			

















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Future Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.899			0.987			0.979			0.990	
Flt Protected		0.992			0.963			0.989			0.999	
Satd. Flow (prot)	0	1583	0	0	1783	0	0	1758	0	0	1797	0
Flt Permitted		0.992			0.963			0.989			0.999	
Satd. Flow (perm)	0	1583	0	0	1783	0	0	1758	0	0	1797	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	8%	0%	0%	14%	2%	5%	7%	0%	5%	0%
Adj. Flow (vph)	42	20	184	83	15	10	126	362	88	7	483	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	0	0	108	0	0	576	0	0	531	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	83.2%						ICU Level of Service E					
Analysis Period (min)	15											

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	18	169	76	14	9	116	333	81	6	444	38
Future Volume (Veh/h)	39	18	169	76	14	9	116	333	81	6	444	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	20	184	83	15	10	126	362	88	7	483	41
Pedestrians		1										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1194	1221	505	1370	1197	406	525			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1194	1221	505	1370	1197	406	525			450		
tC, single (s)	7.1	6.6	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	69	87	67	0	91	98	88			99		
cM capacity (veh/h)	136	150	555	68	164	620	1041			1121		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	246	108	576	531								
Volume Left	42	83	126	7								
Volume Right	184	10	88	41								
cSH	318	81	1041	1121								
Volume to Capacity	0.77	1.33	0.12	0.00*								
Queue Length 95th (m)	48.8	66.1	3.3	0.2								
Control Delay (s/veh)	46.2	303.4	3.1	0.2								
Lane LOS	E	F	A	A								
Approach Delay (s/veh)	46.2	303.4	3.1	0.2								
Approach LOS	E	F										
Intersection Summary												
Average Delay			31.5									
Intersection Capacity Utilization			83.2%		ICU Level of Service				E			
Analysis Period (min)			15									

* Value less than 0.01.

















Lanes, Volumes, Timings
 2: Charlotte Street & John Street East

2031 Total Saturday
 04/20/2026

















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	177	35	47	190	3	45	6	54	3	10	4
Future Volume (vph)	1	177	35	47	190	3	45	6	54	3	10	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.978			0.998			0.931			0.970	
Flt Protected					0.990			0.979			0.992	
Satd. Flow (prot)	0	1685	0	0	1792	0	0	1488	0	0	1291	0
Flt Permitted					0.990			0.979			0.992	
Satd. Flow (perm)	0	1685	0	0	1792	0	0	1488	0	0	1291	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		374.9			152.0			953.8			132.9	
Travel Time (s)		27.0			10.9			68.7			9.6	
Confl. Peds. (#/hr)			3	3					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	11%	7%	0%	6%	0%	3%	80%	20%	0%	50%	50%
Adj. Flow (vph)	1	192	38	51	207	3	49	7	59	3	11	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	231	0	0	261	0	0	115	0	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	47.4%						ICU Level of Service A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 2: Charlotte Street & John Street East

2031 Total Saturday
 04/20/2026

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	177	35	47	190	3	45	6	54	3	10	4
Future Volume (Veh/h)	1	177	35	47	190	3	45	6	54	3	10	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	192	38	51	207	3	49	7	59	3	11	4
Pedestrians					2			3				
Lane Width (m)					3.6			3.6				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	210			233			536	528	216	588	546	209
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	210			233			536	528	216	588	546	209
tC, single (s)	4.1			4.1			7.1	7.3	6.4	7.1	7.0	6.7
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.7	3.5	3.5	4.4	3.8
p0 queue free %	100			96			89	98	92	99	97	99
cM capacity (veh/h)	1373			1343			426	347	777	373	369	725
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	231	261	115	18								
Volume Left	1	51	49	3								
Volume Right	38	3	59	4								
cSH	1373	1343	545	415								
Volume to Capacity	0.00*	0.04	0.21	0.04								
Queue Length 95th (m)	0.0	0.9	6.3	1.1								
Control Delay (s/veh)	0.0	1.8	13.4	14.1								
Lane LOS	A	A	B	B								
Approach Delay (s/veh)	0.0	1.8	13.4	14.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.6									
Intersection Capacity Utilization			47.4%		ICU Level of Service				A			
Analysis Period (min)			15									










* Value less than 0.01.










												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	74	24	14	89	137	20	137	20	125	98	47
Future Volume (vph)	19	74	24	14	89	137	20	137	20	125	98	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.972			0.923			0.985			0.977	
Flt Protected		0.992			0.997			0.994			0.977	
Satd. Flow (prot)	0	1551	0	0	1632	0	0	1728	0	0	1669	0
Flt Permitted		0.992			0.997			0.994			0.977	
Satd. Flow (perm)	0	1551	0	0	1632	0	0	1728	0	0	1669	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		482.3			374.9			534.1			362.3	
Travel Time (s)		34.7			27.0			38.5			26.1	
Confl. Peds. (#/hr)	26		7	7		26	20		17	17		20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	19%	30%	20%	13%	2%	6%	8%	7%	10%	4%	15%
Adj. Flow (vph)	21	80	26	15	97	149	22	149	22	136	107	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	127	0	0	261	0	0	193	0	0	294	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	53.2%						ICU Level of Service A					
Analysis Period (min)	15											

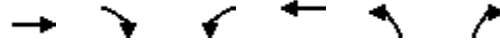
HCM Unsignalized Intersection Capacity Analysis
 3: King Street & John Street East

2031 Total Saturday
 04/20/2026

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	74	24	14	89	137	20	137	20	125	98	47
Future Volume (vph)	19	74	24	14	89	137	20	137	20	125	98	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	80	26	15	97	149	22	149	22	136	107	51
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	127	261	193	294								
Volume Left (vph)	21	15	22	136								
Volume Right (vph)	26	149	22	51								
Hadj (s)	0.22	-0.21	0.08	0.14								
Departure Headway (s)	6.0	5.3	5.6	5.5								
Degree Utilization, x	0.21	0.38	0.30	0.45								
Capacity (veh/h)	536	624	583	616								
Control Delay (s/veh)	10.5	11.6	11.0	12.8								
Approach Delay (s/veh)	10.5	11.6	11.0	12.8								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay			11.7									
Level of Service			B									
Intersection Capacity Utilization			53.2%		ICU Level of Service	A						
Analysis Period (min)			15									










						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	116	0	0	100	0
Future Volume (vph)	0	116	0	0	100	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.950
Satd. Flow (prot)	984	0	1827	0	0	1504
Flt Permitted						0.950
Satd. Flow (perm)	984	0	1827	0	0	1504
Link Speed (k/h)	50		50		50	
Link Distance (m)	174.6		370.1		492.9	
Travel Time (s)	12.6		26.6		35.5	
Confl. Peds. (#/hr)	2					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	67%	4%	0%	20%	3%
Adj. Flow (vph)	0	126	0	0	109	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	126	0	0	0	0	109
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
Link Offset(m)	0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.0%			ICU Level of Service A		
Analysis Period (min)	15					

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	116	0	0	100	0
Future Volume (vph)	0	116	0	0	100	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	0	0	109	0
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	126	0	109			
Volume Left (vph)	0	0	109			
Volume Right (vph)	126	0	0			
Hadj (s)	0.54	0.00	0.54			
Departure Headway (s)	4.7	4.4	4.8			
Degree Utilization, x	0.17	0.00	0.14			
Capacity (veh/h)	744	805	726			
Control Delay (s/veh)	8.7	7.4	8.6			
Approach Delay (s/veh)	8.7	0.0	8.6			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.6			
Level of Service			A			
Intersection Capacity Utilization			20.0%	ICU Level of Service	A	
Analysis Period (min)			15			












Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↑	↓
Traffic Volume (vph)	147	27	23	153	43	39
Future Volume (vph)	147	27	23	153	43	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.979			0.936		
Fl _t Protected				0.993	0.974	
Satd. Flow (prot)	1824	0	0	1850	1698	0
Fl _t Permitted				0.993	0.974	
Satd. Flow (perm)	1824	0	0	1850	1698	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	166.1			540.6	168.6	
Travel Time (s)	12.0			38.9	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	29	25	166	47	42
Shared Lane Traffic (%)						
Lane Group Flow (vph)	189	0	0	191	89	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.5% ICU Level of Service A
Analysis Period (min)	15

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	147	27	23	153	43	39
Future Volume (Veh/h)	147	27	23	153	43	39
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	160	29	25	166	47	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			189		391	175
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			189		391	175
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	95
cM capacity (veh/h)			1385		602	869
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	189	191	89			
Volume Left	0	25	47			
Volume Right	29	0	42			
cSH	1700	1385	704			
Volume to Capacity	0.11	0.02	0.13			
Queue Length 95th (m)	0.0	0.4	3.5			
Control Delay (s/veh)	0.0	1.1	10.8			
Lane LOS			A	B		
Approach Delay (s/veh)	0.0	1.1	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			33.5%	ICU Level of Service		A
Analysis Period (min)	15					

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↓	↑	↓
Traffic Volume (vph)	163	72	14	182	58	11
Future Volume (vph)	163	72	14	182	58	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.959			0.978		
Fl _t Protected				0.996	0.960	
Satd. Flow (prot)	1786	0	0	1855	1749	0
Fl _t Permitted				0.996	0.960	
Satd. Flow (perm)	1786	0	0	1855	1749	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	152.0			166.1	132.2	
Travel Time (s)	10.9			12.0	9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	78	15	198	63	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	255	0	0	213	75	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	31.7%			ICU Level of Service A		
Analysis Period (min)	15					

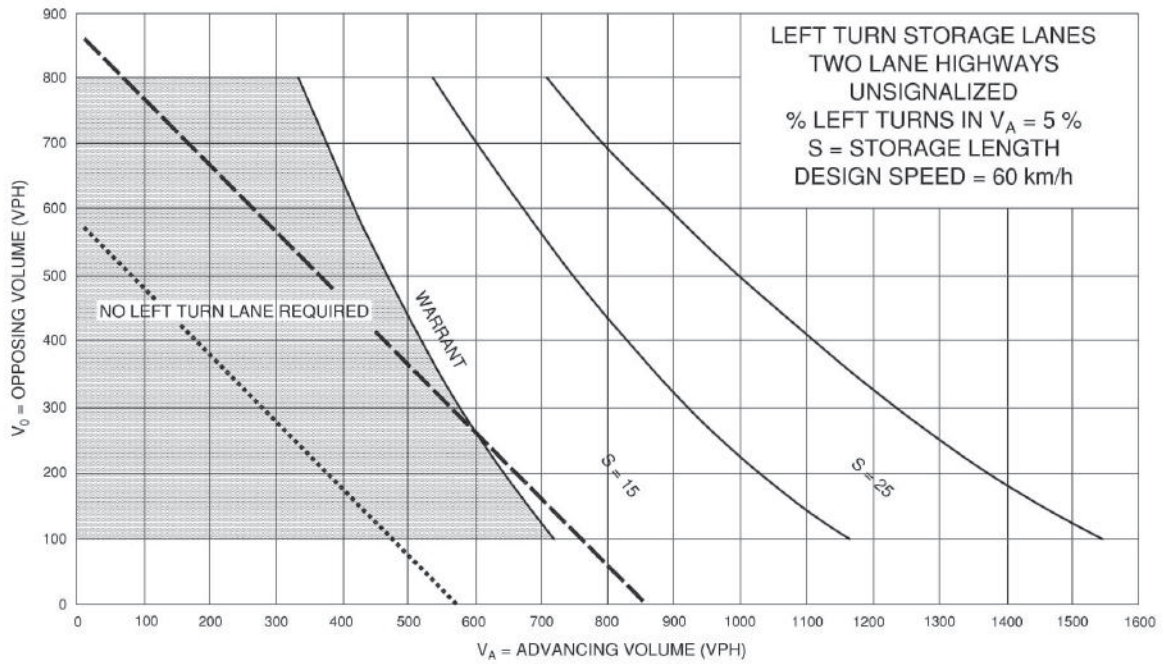
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	163	72	14	182	58	11
Future Volume (Veh/h)	163	72	14	182	58	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	78	15	198	63	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			255		444	216
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			255		444	216
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		89	99
cM capacity (veh/h)			1310		565	824
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	255	213	75			
Volume Left	0	15	63			
Volume Right	78	0	12			
cSH	1700	1310	595			
Volume to Capacity	0.15	0.01	0.13			
Queue Length 95th (m)	0.0	0.3	3.4			
Control Delay (s/veh)	0.0	0.6	11.9			
Lane LOS		A	B			
Approach Delay (s/veh)	0.0	0.6	11.9			
Approach LOS			B			
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			31.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix G

Left-Turn Lane Warrants



Exhibit-9A-7



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

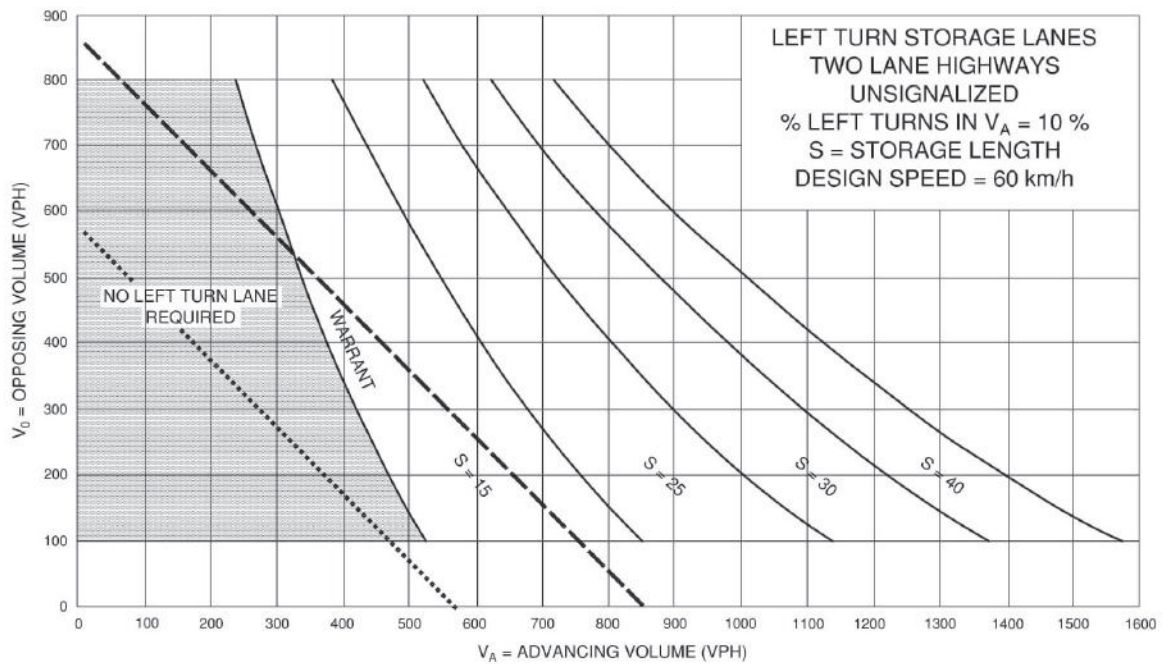


Exhibit-9A-8

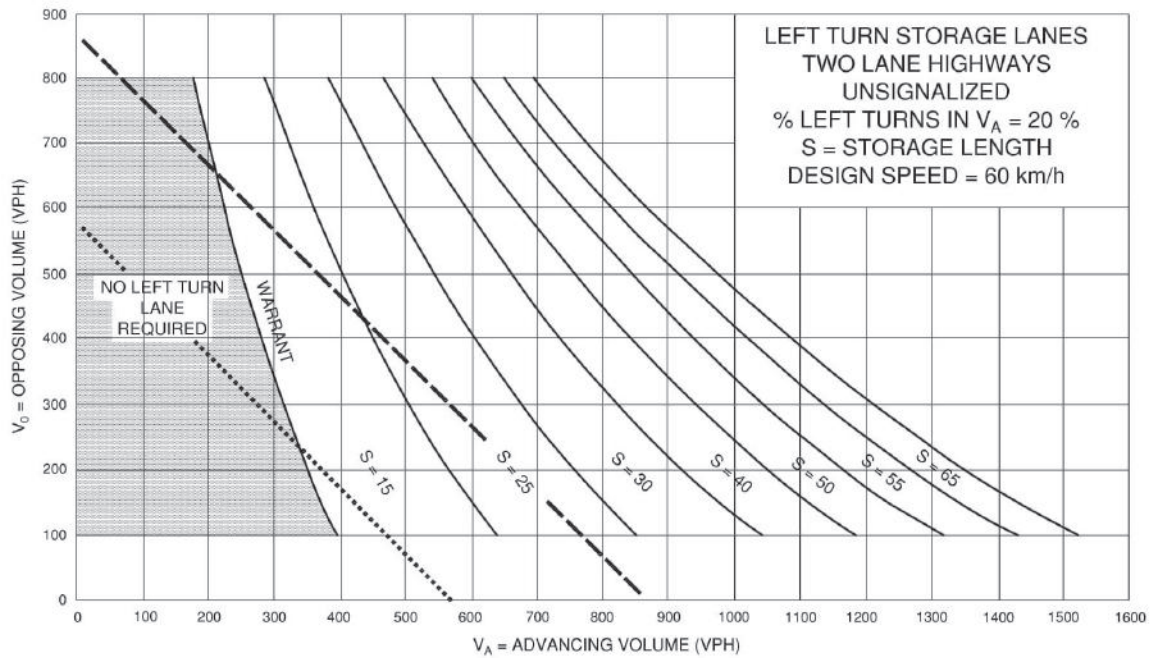
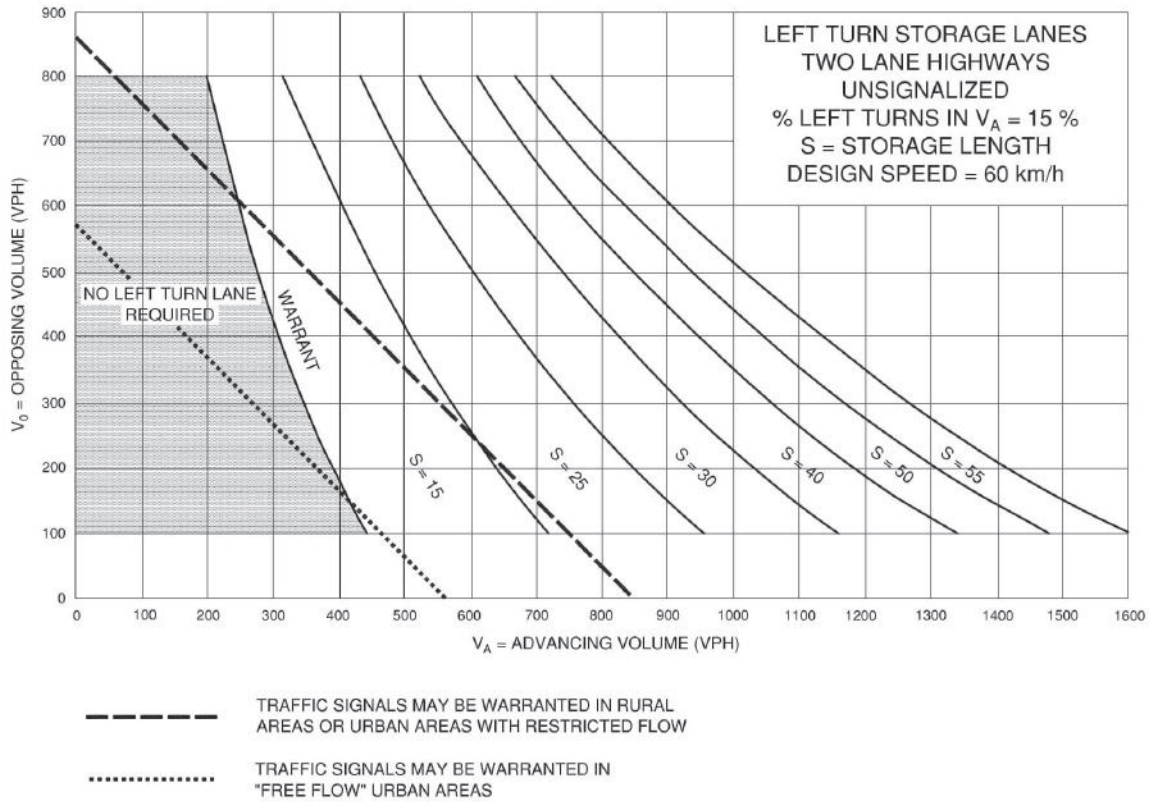


Exhibit-9A-9

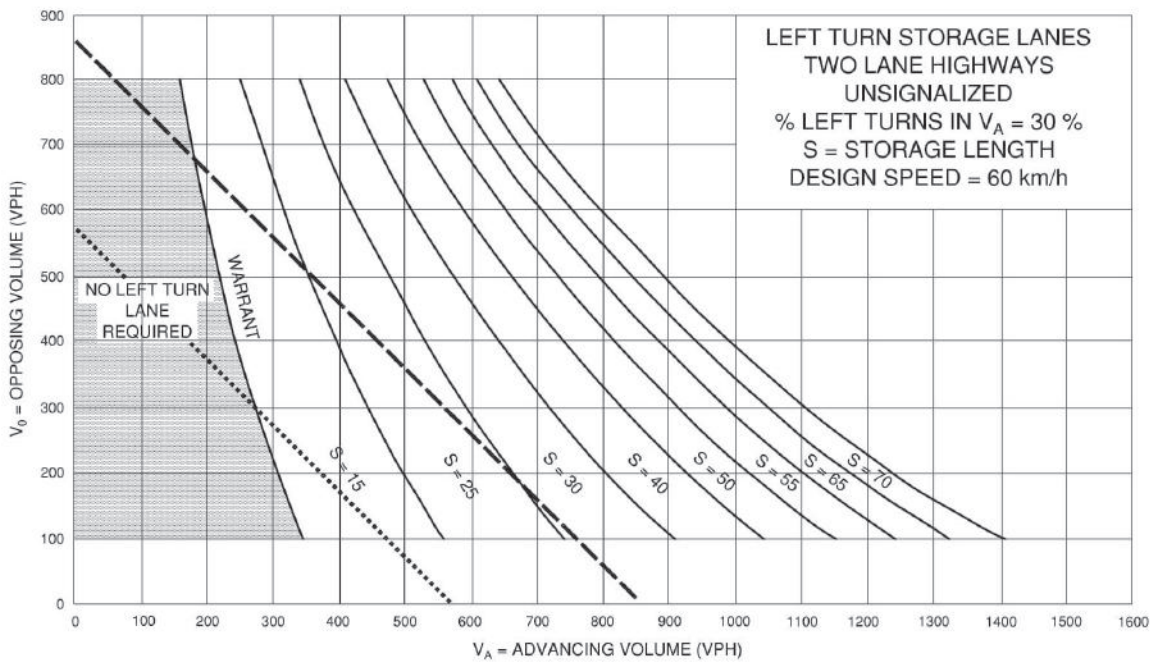
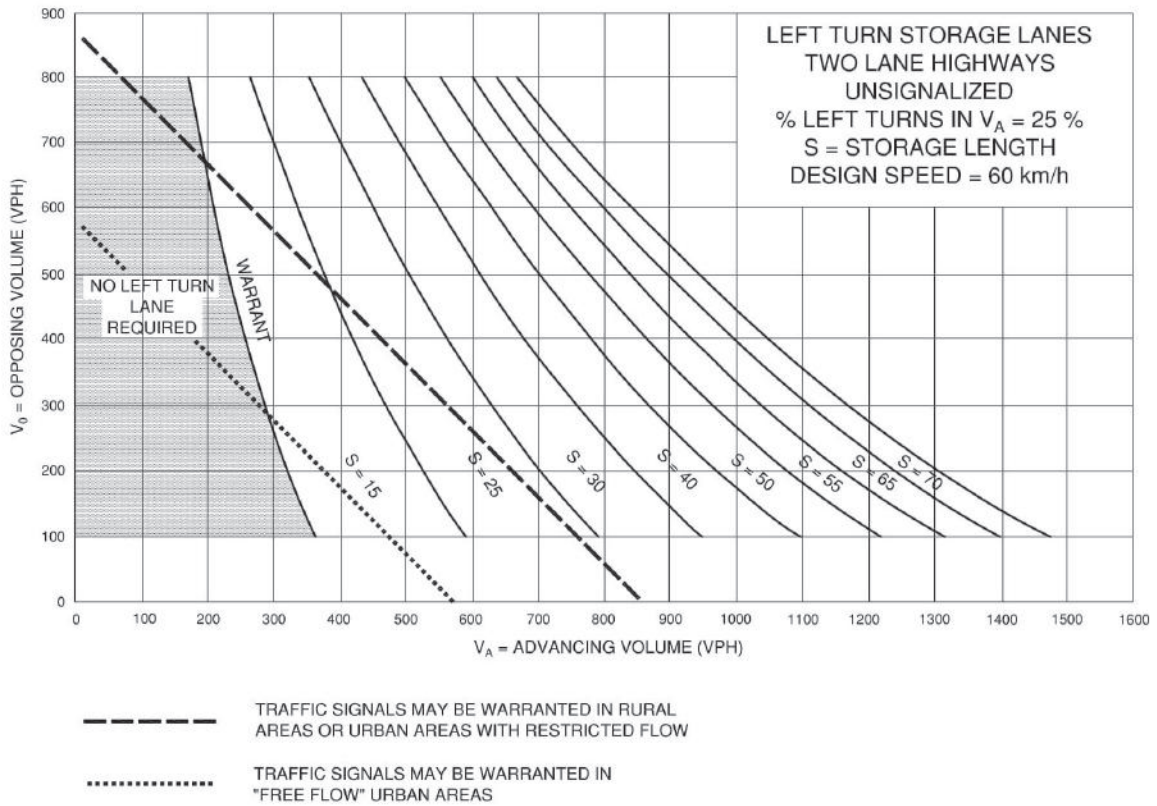
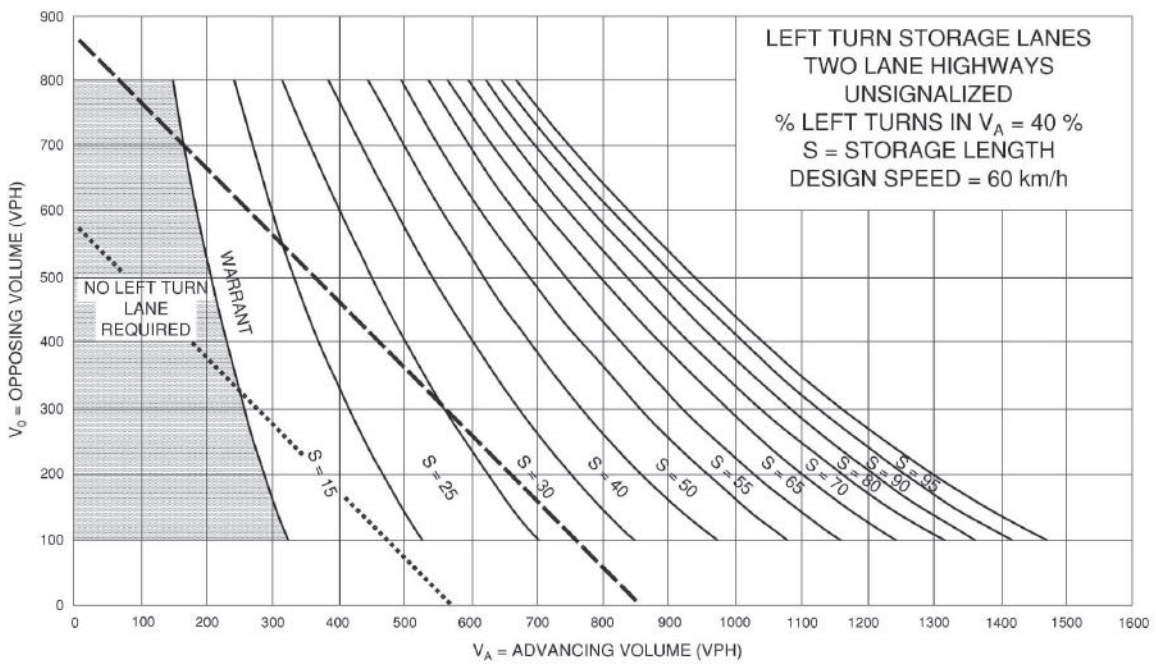
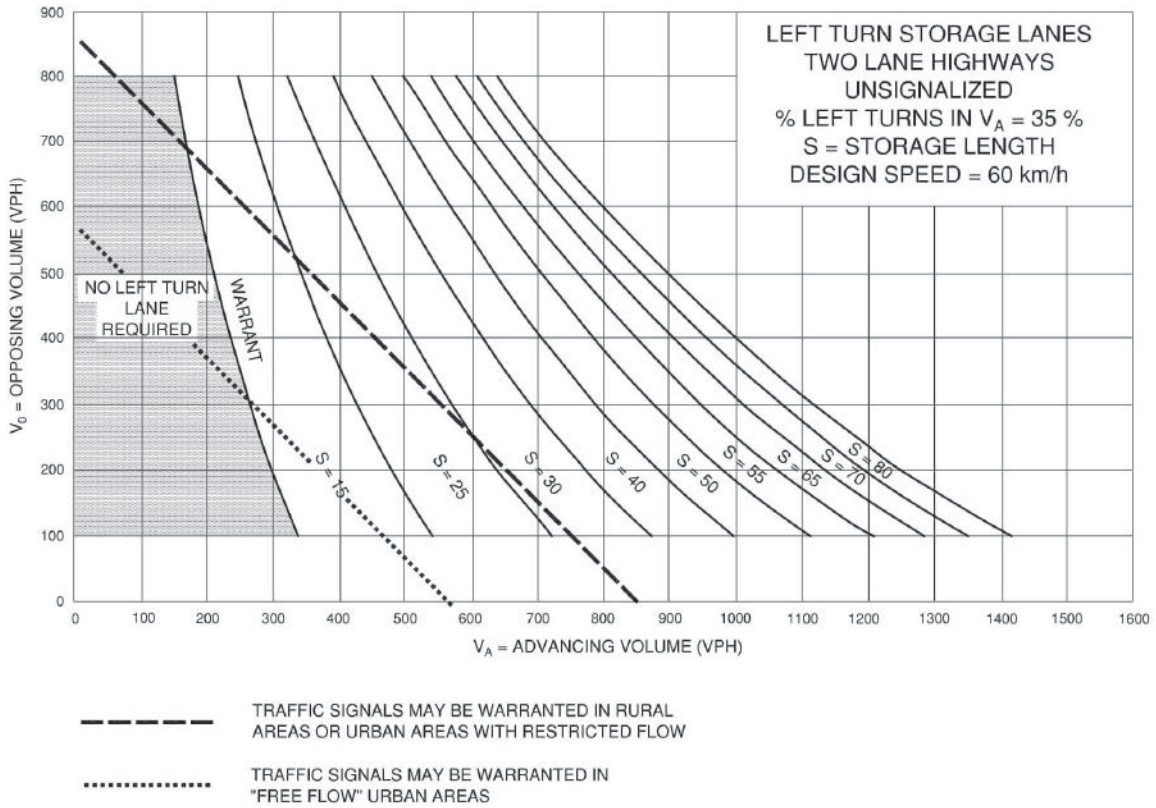


Exhibit-9A-10



Appendix H

Traffic Control Signal Warrant



Signal Justification Calculation for Forecast Volumes (OTM Book 12 - Justification 7)



Horizon Year: 2031 Total
 Region/City/Township: NOTL

Major Street: Niagara River Parkway North/South?: Y
 Minor Street: John Street/Ricardo Street

Number of Approach Lanes: 1
 Tee Intersection?: N
 Flow Conditions: Restricted
 PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street Niagara River Parkway						Minor Street John Street/Ricardo Street						Peds Crossing
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	35	107	47	3	51	4	4	6	67	20	4	1	
PM Peak Hour	108	234	57	12	280	27	14	10	100	62	10	10	
Average Hourly Volume	36	85	26	4	83	8	5	4	42	21	4	3	0

Warrant	AHV
1A - All	318
1B - Minor	77
2A - Major	241
2B - Cross	29

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	All Approaches	480	720	600	900	

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	Minor Street Approaches	120	170	120	170	

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	Major Street Approaches	480	720	600	900	

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	Traffic Crossing Major Street	50	75	50	75	

Signal Justification Calculation for Forecast Volumes (OTM Book 12 - Justification 7)



Horizon Year: 2031 Total
Region/City/Township: NOTL

Major Street: Niagara River Parkway North/South?: Y
Minor Street: John Street/Ricardo Street

Number of Approach Lanes: 1
Tee Intersection?: N
Flow Conditions: Restricted

Sat Forecast Only? Y

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street Niagara River Parkway						Minor Street John Street/Ricardo Street						Peds Crossing
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Sat Peak Hour	116	333	81	6	444	38	39	18	169	76	14	9	
Average Hourly Volume	58	167	41	3	222	19	20	9	85	38	7	5	0

Warrant	AHV
1A - All	672
1B - Minor	163
2A - Major	509
2B - Cross	67

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	All Approaches	480	720	600	900	

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	Minor Street Approaches	120	170	120	170	

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	Major Street Approaches	480	720	600	900	

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
	Traffic Crossing Major Street	50	75	50	75	

Appendix I

Roundabout Screening Worksheet



Roundabout Screening Form

Version dated May 21, 2021



Date 2024-02-12
 Name(s) of Analyst(s) AJM
 Short Name of Intersection NRP at John

Part A Preliminary Information

A1 Full name of intersection (all legs and Regional Road numbers)
Niagara River Parkway/Queen's Parade at John Street East/Ricardo Street

A2 Intersection location (local municipality, town, distance from major intersection, etc.)
Niagara-On-The-Lake

A3 Background information (i.e. rationale for conducting roundabout screening)
Operational Improvement

A4 Site description (number of legs, lanes per approach) Currently under signal control?
Four legs, single lane approach No

A5 Major street road classification	AADT		Posted & 85th percentile speeds	
<u>Arterial Road</u>	<u>8500</u>	vpd	<u>60</u>	km/h
A6 Minor street road classification	AADT		Posted & 85th percentile speeds	
<u>Collector</u>	<u>2980</u>	vpd	<u>50</u>	km/h

A7 Forecast peak hour entering flow, total on all legs
 (greater than 2,500 vph may indicate need for two-lane roundabout) 1336 vph

A8 Current operational issues (i.e. high delays, queuing, etc.)
High Delays

A9 Planned work on either road within next 10 years (Capital or Rehab programs)
N/A

Part B Site-Specific Considerations

B1 Property Impacts

B1.1 Are existing property constraints (i.e. historical buildings, cemetery, etc.) within 10 m of the edge of the intersecting roadways?

B1.2 Is there opportunity to shift the roundabout to avoid this conflict?

B1.3 Are there environmentally sensitive lands or property on any corner that may be difficult to acquire?

Meets threshold for a roundabout being suitable?

The threshold is met ("Yes") if "No" is indicated, meaning that there should be no undue property impacts with a roundabout.

Roundabout Screening Form

Version dated May 21, 2021



Date 2024-02-12
Name(s) of Analyst(s) AJM
Short Name of Intersection NRP at John

B2 Precluding Factors

B2.1	Are bridges or culverts within 100 m of the intersection?	No
B2.2	Are high-volume driveways within 100 m of the intersection?	No
B2.3	Are railway tracks or traffic control devices within 200 m of the intersection?	No
B2.4	Are existing or planned schools or significant pedestrian generators within 300 m?	No
B2.5	Are any approaches on a problematic vertical alignment that can't be corrected?	No
B2.6	Are there major utilities (i.e. Trans Canada pipeline, hydro towers) within or very close to the ROW?	No
Meets threshold for a roundabout being suitable?		Yes

The threshold is met if "Yes" is indicated for at most 1 of the precluding factors. If there is more than 1 precluding factor then the threshold is not met and the indication is "No", which means that a roundabout may be problematic at the subject intersection. This is not to say that a roundabout is not possible, just that there may be difficulties or higher costs.

B3 Suitability Factors

B3.1	Are capacity problems currently being experienced, or expected in the future?	Yes
B3.2	Is there a high proportion of turning movements at the intersection?	No
B3.3	Are any traffic signal justifications met or projected to be met in the next 2 to 5 years?	No
B3.4	Does the intersection have an unusual geometry (i.e. offset, skew, 5-legs)?	Yes
B3.5	Is the intersection at a town border or transition between rural and urban areas?	No
Meets threshold for a roundabout being suitable?		Yes

The threshold is met if "Yes" is indicated for 2 or more of the suitability factors. This means a roundabout should be technically feasible and possibly even preferred at the subject intersection.

Part C Safety Considerations

C1 Fatal Collisions

C1.1	In the past <u>10</u> years, how many fatal crashes have occurred at the subject intersection?	<input type="text"/>
Meets threshold for a roundabout being suitable?		No

The threshold is met if there has been 1 or more fatalities.

C2 Injury Collisions

C2.1	In the past <u>5</u> years, how many non-fatal injury crashes have occurred?	<input type="text"/>
------	--	----------------------

Roundabout Screening Form

Version dated May 21, 2021



Date 2024-02-12
Name(s) of Analyst(s) AJM
Short Name of Intersection NRP at John

Meets threshold for a roundabout being suitable?

The threshold is met if there have been 2 or more collisions resulting in injury.

C3 Collisions by Type

C3.1 In the past 5 years, how many crashes have been head-on?	<input type="text"/>
C3.2 In the past 5 years, how many crashes have been right angle?	<input type="text"/>
C3.3 In the past 5 years, how many crashes have been turning movement?	<input type="text"/>
C3.4 In the past 5 years, how many crashes have been from U-turns?	<input type="text"/>

Meets threshold for a roundabout being suitable?

The threshold is met if the total number of these types of collisions is 5 or more.

Should this location proceed to an Intersection Control Study?

A "Yes" will be returned, indicating the subject intersection should proceed to an Intersection Control Study, when the Property Impacts threshold is met and 1 of the following 3 thresholds is also met:

- 1. A "Yes" is returned under either the Precluding Factors or Suitability Factors*
- 2. A "Yes" is returned under the Fatal Collisions*
- 3. A "Yes" is returned under either the Injury Collisions or Collisions by Type*

Part D Comments

Appendix J

All-Way Stop Warrant



ALL-WAY STOP INTERSECTION ANALYSIS

Niagara River Parkway at John Street East

Existing Weekday Volumes

Arterial/Major Collector Warrant Analysis

Hour Ending	7:00 AM	8:00 AM	11:00 AM	12:00 PM	1:00 PM	3:00 PM	4:00 PM	5:00 PM	TOTAL	AVERAGE
Approaching: All Legs Vol all legs >375/h	169 NO	246 NO	543 YES	677 YES	688 YES	700 YES	647 YES	576 YES	4246	
Minor Ped/Veh X-ing Vol Minor Leg>150/h	33 NO	51 NO	126 NO	118 NO	151 YES	144 NO	144 NO	125 NO	892	
Approaching: Major	136	195	417	559	537	556	503	451	3354	419
%Tot Appr on Minor	24%	26%	30%	21%	28%	26%	29%	28%		27%
% Split on Minor>30?	NO	NO	YES	NO	NO	NO	NO	NO		NO

An ALL WAY STOP condition WOULD NOT BE recommended for this location under the Arterial/Major Collector Warrants.

ALL-WAY STOP INTERSECTION ANALYSIS

Niagara River Parkway at John Street East

Existing Weekday Volumes

Arterial/Major Collector Warrant Analysis

Hour Ending	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	TOTAL	AVERAGE
Approaching: All Legs Vol all legs >375/h	535 YES	758 YES	772 YES	931 YES	993 YES	1138 YES	1032 YES	949 YES	7108	
Minor Ped/Veh X-ing Vol Minor Leg>150/h	110 NO	154 YES	154 YES	202 YES	213 YES	249 YES	218 YES	215 YES	1515	
Approaching: Major	425	604	618	729	780	889	814	734	5593	699
%Tot Appr on Minor	26%	25%	25%	28%	27%	28%	27%	29%		27%
% Split on Minor>30?	NO	NO	NO	NO	NO	NO	NO	NO		NO

An ALL WAY STOP condition WOULD NOT BE recommended for this location under the Arterial/Major Collector Warrants.

ALL-WAY STOP INTERSECTION ANALYSIS

Niagara River Parkway at John Street East

2031 Total Saturday

Arterial/Major Collector Warrant Analysis

Hour Ending	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	TOTAL	AVERAGE
Approaching: All Legs Vol all legs >375/h	633 YES	878 YES	900 YES	1060 YES	1141 YES	1294 YES	1188 YES	1102 YES	8196	
Minor Ped/Veh X-ing Vol Minor Leg>150/h	146 NO	188 YES	198 YES	244 YES	258 YES	297 YES	263 YES	261 YES	1855	
Approaching: Major	487	690	702	816	883	997	925	841	6341	793
%Tot Appr on Minor	30%	27%	28%	30%	29%	30%	28%	31%		29%
% Split on Minor>30?	NO	NO	NO	NO	NO	NO	NO	YES		NO

















An ALL WAY STOP condition WOULD BE recommended for this location under the Arterial/Major Collector Warrants.

All Approaches 2029 Projections												
	Raw	Existing	Growth Rate	Hotel Traffic Inbound	Hotel Traffic Outbound	Restaurant Traffic Inbound	Restaurant Traffic Outbound	SPA Traffic Inbound	SPA Traffic Outbound	Residential Traffic Inbound	Residential Traffic Outbound	2029 Total
10:00	495	535	51	4	4	9	6	2	5	7	9	633
11:00	702	758	73	5	3	7	5	3	1	14	9	878
12:00	715	772	74	4	5	5	5	2	6	12	14	900
13:00	862	931	90	4	4	2	3	2	4	9	11	1060
14:00	919	993	96	7	5	2	2	4	4	16	13	1141
15:00	1054	1138	110	4	5	1	1	2	6	16	11	1294
16:00	956	1032	99	3	3	1	1	3	4	24	16	1188
17:00	879	949	91	3	2	1	1	3	4	29	19	1102

Appendix K

















Synchro Operational Reports – Sensitivity



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Future Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.883			0.995			0.966			0.991	
Fl _t Protected		0.998			0.961			0.991			0.998	
Satd. Flow (prot)	0	1553	0	0	1732	0	0	1626	0	0	1507	0
Fl _t Permitted		0.998			0.961			0.991			0.998	
Satd. Flow (perm)	0	1553	0	0	1732	0	0	1626	0	0	1507	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	9%	6%	0%	0%	12%	6%	25%	33%	26%	0%
Adj. Flow (vph)	4	7	73	22	4	1	38	116	51	3	55	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	84	0	0	27	0	0	205	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

















Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.8%
ICU Level of Service	A
Analysis Period (min)	15

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Future Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
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	7	73	22	4	1	38	116	51	3	55	4
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	84	27	205	62								
Volume Left (vph)	4	22	38	3								
Volume Right (vph)	73	1	51	4								
Hadj (s)	-0.38	0.22	0.09	0.39								
Departure Headway (s)	4.2	4.8	4.3	4.8								
Degree Utilization, x	0.10	0.04	0.25	0.08								
Capacity (veh/h)	809	690	809	720								
Control Delay (s/veh)	7.6	8.0	8.7	8.2								
Approach Delay (s/veh)	7.6	8.0	8.7	8.2								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			31.8%	ICU Level of Service	A							
Analysis Period (min)			15									

















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Future Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.891			0.983			0.981			0.989	
Flt Protected		0.994			0.964			0.987			0.998	
Satd. Flow (prot)	0	1593	0	0	1723	0	0	1753	0	0	1786	0
Flt Permitted		0.994			0.964			0.987			0.998	
Satd. Flow (perm)	0	1593	0	0	1723	0	0	1753	0	0	1786	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	6%	0%	0%	0%	6%	10%	0%	3%	28%
Adj. Flow (vph)	15	11	109	67	11	11	117	254	62	13	304	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	89	0	0	433	0	0	346	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

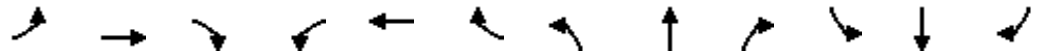
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.0%
ICU Level of Service	B
Analysis Period (min)	15

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Future Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	11	109	67	11	11	117	254	62	13	304	29
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	135	89	433	346								
Volume Left (vph)	15	67	117	13								
Volume Right (vph)	109	11	62	29								
Hadj (s)	-0.37	0.15	0.05	0.04								
Departure Headway (s)	5.7	6.4	5.2	5.3								
Degree Utilization, x	0.22	0.16	0.62	0.51								
Capacity (veh/h)	532	469	668	651								
Control Delay (s/veh)	10.3	10.6	16.2	13.5								
Approach Delay (s/veh)	10.3	10.6	16.2	13.5								
Approach LOS	B	B	C	B								
Intersection Summary												
Delay			14.0									
Level of Service			B									
Intersection Capacity Utilization			60.0%	ICU Level of Service	B							
Analysis Period (min)			15									

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Future Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.899			0.987			0.979			0.990	
Flt Protected		0.992			0.963			0.989			0.999	
Satd. Flow (prot)	0	1583	0	0	1783	0	0	1758	0	0	1797	0
Flt Permitted		0.992			0.963			0.989			0.999	
Satd. Flow (perm)	0	1583	0	0	1783	0	0	1758	0	0	1797	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	8%	0%	0%	14%	2%	5%	7%	0%	5%	0%
Adj. Flow (vph)	42	20	184	83	15	10	126	362	88	7	483	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	0	0	108	0	0	576	0	0	531	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	83.2%						ICU Level of Service E					
Analysis Period (min)	15											

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Future Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
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)	42	20	184	83	15	10	126	362	88	7	483	41
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	246	108	576	531								
Volume Left (vph)	42	83	126	7								
Volume Right (vph)	184	10	88	41								
Hadj (s)	-0.29	0.12	0.03	0.03								
Departure Headway (s)	7.3	8.3	6.5	6.5								
Degree Utilization, x	0.50	0.25	1.05	0.96								
Capacity (veh/h)	472	408	557	549								
Control Delay (s/veh)	17.2	14.1	76.1	53.5								
Approach Delay (s/veh)	17.2	14.1	76.1	53.5								
Approach LOS	C	B	F	F								
Intersection Summary												
Delay			53.4									
Level of Service			F									
Intersection Capacity Utilization			83.2%		ICU Level of Service	E						
Analysis Period (min)			15									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Future Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.883			0.995			0.966			0.991	
Fl _t Protected		0.998			0.961			0.991			0.998	
Satd. Flow (prot)	0	1553	0	0	1732	0	0	1626	0	0	1507	0
Fl _t Permitted		0.981			0.981			0.952			0.989	
Satd. Flow (perm)	0	1526	0	0	1768	0	0	1562	0	0	1494	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		73			1			29			4	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	9%	6%	0%	0%	12%	6%	25%	33%	26%	0%
Adj. Flow (vph)	4	7	73	22	4	1	38	116	51	3	55	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	84	0	0	27	0	0	205	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors		2			2			2			2	
Detector Template		Thru			Thru			Thru			Thru	
Leading Detector (m)		10.0			10.0			10.0			10.0	
Trailing Detector (m)		0.0			0.0			0.0			0.0	
Detector 1 Position(m)		0.0			0.0			0.0			0.0	
Detector 1 Size(m)		0.6			0.6			0.6			0.6	
Detector 1 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0			0.0			0.0	
Detector 1 Queue (s)		0.0			0.0			0.0			0.0	
Detector 1 Delay (s)		0.0			0.0			0.0			0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	36.0	36.0		36.0	36.0		54.0	54.0		54.0	54.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	
Maximum Green (s)	31.5	31.5		31.5	31.5		49.5	49.5		49.5	49.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	

Lead/Lag

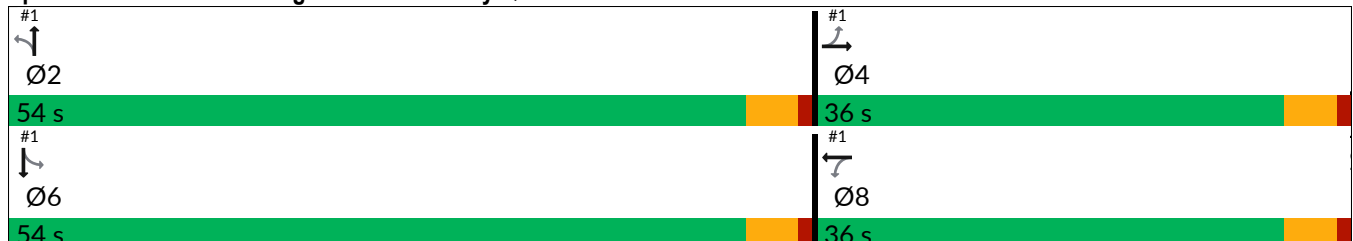
Lead-Lag Optimize?

















Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		6.2			6.2			19.8			19.8	
Actuated g/C Ratio		0.22			0.22			0.69			0.69	
v/c Ratio		0.22			0.07			0.19			0.06	
Control Delay (s/veh)		5.0			9.1			4.3			4.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay (s/veh)		5.0			9.1			4.3			4.3	
LOS		A			A			A			A	
Approach Delay (s/veh)		5.0			9.1			4.3			4.3	
Approach LOS		A			A			A			A	
Queue Length 50th (m)		0.6			1.4			4.2			1.5	
Queue Length 95th (m)		4.5			3.2			10.9			4.9	
Internal Link Dist (m)		67.6			96.5			336.4			168.2	
Turn Bay Length (m)												
Base Capacity (vph)		1497			1733			1562			1494	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.06			0.02			0.13			0.04	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	28.7
Natural Cycle:	45
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.22
Intersection Signal Delay (s/veh):	4.8
Intersection LOS:	A
Intersection Capacity Utilization:	32.6%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street



													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4	
Future Volume (vph)	4	6	67	20	4	1	35	107	47	3	51	4	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.5			4.5			4.5			4.5		
Lane Util. Factor		1.00			1.00			1.00			1.00		
Frt		0.88			1.00			0.97			0.99		
Flt Protected		1.00			0.96			0.99			1.00		
Satd. Flow (prot)		1552			1732			1627			1507		
Flt Permitted		0.98			0.98			0.95			0.99		
Satd. Flow (perm)		1525			1768			1563			1494		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	4	7	73	22	4	1	38	116	51	3	55	4	
RTOR Reduction (vph)	0	64	0	0	1	0	0	12	0	0	2	0	
Lane Group Flow (vph)	0	20	0	0	26	0	0	193	0	0	60	0	
Heavy Vehicles (%)	0%	0%	9%	6%	0%	0%	12%	6%	25%	33%	26%	0%	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)		3.7			3.7			17.9			17.9		
Effective Green, g (s)		3.7			3.7			17.9			17.9		
Actuated g/C Ratio		0.12			0.12			0.58			0.58		
Clearance Time (s)		4.5			4.5			4.5			4.5		
Vehicle Extension (s)		3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)		184			213			914			873		
v/s Ratio Prot													
v/s Ratio Perm		0.01			0.01			0.12			0.04		
v/c Ratio		0.11			0.12			0.21			0.07		
Uniform Delay, d1		12.0			12.0			3.0			2.7		
Progression Factor		1.00			1.00			1.00			1.00		
Incremental Delay, d2		0.3			0.3			0.1			0.0		
Delay (s)		12.2			12.3			3.1			2.8		
Level of Service		B			B			A			A		
Approach Delay (s/veh)		12.2			12.3			3.1			2.8		
Approach LOS		B			B			A			A		
Intersection Summary													
HCM 2000 Control Delay (s/veh)			5.7									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.20										
Actuated Cycle Length (s)			30.6									Sum of lost time (s)	9.0
Intersection Capacity Utilization			32.6%									ICU Level of Service	A
Analysis Period (min)			15										
c Critical Lane Group													

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Future Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.891			0.983			0.981			0.989	
Fl _t Protected		0.994			0.964			0.987			0.998	
Satd. Flow (prot)	0	1593	0	0	1723	0	0	1753	0	0	1786	0
Fl _t Permitted		0.950			0.807			0.826			0.982	
Satd. Flow (perm)	0	1522	0	0	1442	0	0	1467	0	0	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109			8			18			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	6%	0%	0%	0%	6%	10%	0%	3%	28%
Adj. Flow (vph)	15	11	109	67	11	11	117	254	62	13	304	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	89	0	0	433	0	0	346	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors		2			2			2			2	
Detector Template		Thru			Thru			Thru			Thru	
Leading Detector (m)		10.0			10.0			10.0			10.0	
Trailing Detector (m)		0.0			0.0			0.0			0.0	
Detector 1 Position(m)		0.0			0.0			0.0			0.0	
Detector 1 Size(m)		0.6			0.6			0.6			0.6	
Detector 1 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0			0.0			0.0	
Detector 1 Queue (s)		0.0			0.0			0.0			0.0	
Detector 1 Delay (s)		0.0			0.0			0.0			0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	29.0	29.0		29.0	29.0		61.0	61.0		61.0	61.0	
Total Split (%)	32.2%	32.2%		32.2%	32.2%		67.8%	67.8%		67.8%	67.8%	
Maximum Green (s)	24.5	24.5		24.5	24.5		56.5	56.5		56.5	56.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		7.8			7.8			20.8			20.8	
Actuated g/C Ratio		0.23			0.23			0.61			0.61	
v/c Ratio		0.31			0.27			0.48			0.32	
Control Delay (s/veh)		6.9			13.1			7.9			6.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay (s/veh)		6.9			13.1			7.9			6.1	
LOS		A			B			A			A	
Approach Delay (s/veh)		6.9			13.1			7.9			6.1	
Approach LOS		A			B			A			A	
Queue Length 50th (m)		1.1			3.4			14.2			10.0	
Queue Length 95th (m)		11.2			13.6			38.4			25.6	
Internal Link Dist (m)		67.6			96.5			336.4			168.2	
Turn Bay Length (m)												
Base Capacity (vph)		1137			1051			1467			1758	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.12			0.08			0.30			0.20	

















Intersection Summary

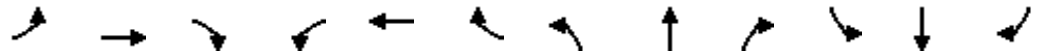
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	34.3
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.48
Intersection Signal Delay (s/veh):	7.6
Intersection LOS:	A
Intersection Capacity Utilization:	61.3%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street

#1 	#1
Ø2	Ø4
61 s	29 s
#1 	#1
Ø6	Ø8
61 s	29 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Future Volume (vph)	14	10	100	62	10	10	108	234	57	12	280	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5			4.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.89			0.98			0.98			0.99	
Flt Protected		0.99			0.96			0.99			1.00	
Satd. Flow (prot)		1593			1723			1752			1786	
Flt Permitted		0.95			0.81			0.83			0.98	
Satd. Flow (perm)		1523			1442			1467			1757	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	11	109	67	11	11	117	254	62	13	304	29
RTOR Reduction (vph)	0	89	0	0	7	0	0	8	0	0	4	0
Lane Group Flow (vph)	0	46	0	0	82	0	0	425	0	0	342	0
Heavy Vehicles (%)	0%	0%	7%	6%	0%	0%	0%	6%	10%	0%	3%	28%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		6.5			6.5			19.8			19.8	
Effective Green, g (s)		6.5			6.5			19.8			19.8	
Actuated g/C Ratio		0.18			0.18			0.56			0.56	
Clearance Time (s)		4.5			4.5			4.5			4.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		280			265			822			985	
v/s Ratio Prot												
v/s Ratio Perm		0.03			0.06			0.29			0.19	
v/c Ratio		0.16			0.31			0.52			0.35	
Uniform Delay, d1		12.1			12.5			4.8			4.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.6			0.2	
Delay (s)		12.4			13.1			5.3			4.4	
Level of Service		B			B			A			A	
Approach Delay (s/veh)		12.4			13.1			5.3			4.4	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			6.7				HCM 2000 Level of Service		A			
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			35.3				Sum of lost time (s)		9.0			
Intersection Capacity Utilization			61.3%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Future Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								1.00				1.00
Frt		0.899			0.987			0.979			0.990	
Flt Protected		0.992			0.963			0.989			0.999	
Satd. Flow (prot)	0	1583	0	0	1783	0	0	1758	0	0	1797	0
Flt Permitted		0.928			0.606			0.812			0.993	
Satd. Flow (perm)	0	1481	0	0	1122	0	0	1443	0	0	1786	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		156			5			21			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		91.6			120.5			360.4			192.2	
Travel Time (s)		6.6			8.7			25.9			13.8	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	13%	8%	0%	0%	14%	2%	5%	7%	0%	5%	0%
Adj. Flow (vph)	42	20	184	83	15	10	126	362	88	7	483	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	0	0	108	0	0	576	0	0	531	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors		2			2			2			2	
Detector Template		Thru			Thru			Thru			Thru	
Leading Detector (m)		10.0			10.0			10.0			10.0	
Trailing Detector (m)		0.0			0.0			0.0			0.0	
Detector 1 Position(m)		0.0			0.0			0.0			0.0	
Detector 1 Size(m)		0.6			0.6			0.6			0.6	
Detector 1 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0			0.0			0.0	
Detector 1 Queue (s)		0.0			0.0			0.0			0.0	
Detector 1 Delay (s)		0.0			0.0			0.0			0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		



















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	26.0	26.0		26.0	26.0		64.0	64.0		64.0	64.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%		71.1%	71.1%		71.1%	71.1%	
Maximum Green (s)	21.5	21.5		21.5	21.5		59.5	59.5		59.5	59.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		10.9			10.9			26.0			26.0	
Actuated g/C Ratio		0.23			0.23			0.56			0.56	
v/c Ratio		0.53			0.41			0.71			0.53	
Control Delay (s/veh)		12.3			22.0			13.3			8.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay (s/veh)		12.3			22.0			13.3			8.8	
LOS		B			C			B			A	
Approach Delay (s/veh)		12.3			22.0			13.3			8.8	
Approach LOS		B			C			B			A	
Queue Length 50th (m)		5.9			6.4			27.5			22.2	
Queue Length 95th (m)		32.9			26.0			80.2			59.4	
Internal Link Dist (m)		67.6			96.5			336.4			168.2	
Turn Bay Length (m)												
Base Capacity (vph)		817			562			1391			1721	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.30			0.19			0.41			0.31	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	46.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.71
Intersection Signal Delay (s/veh):	12.1
Intersection LOS:	B
Intersection Capacity Utilization:	84.5%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 1: Niagara River Parkway/Queen's Parade & John Street East/Ricardo Street

#1 ↕ Ø2 64 s	#1 ↘ Ø4 26 s
#1 ↕ Ø6 64 s	#1 ↙ Ø8 26 s

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Future Volume (vph)	39	18	169	76	14	9	116	333	81	6	444	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5			4.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.90			0.99			0.98			0.99	
Flt Protected		0.99			0.96			0.99			1.00	
Satd. Flow (prot)		1582			1784			1759			1797	
Flt Permitted		0.93			0.61			0.81			0.99	
Satd. Flow (perm)		1481			1122			1443			1786	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	20	184	83	15	10	126	362	88	7	483	41
RTOR Reduction (vph)	0	119	0	0	4	0	0	9	0	0	4	0
Lane Group Flow (vph)	0	127	0	0	104	0	0	567	0	0	527	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	13%	8%	0%	0%	14%	2%	5%	7%	0%	5%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.0			11.0			26.0			26.0	
Effective Green, g (s)		11.0			11.0			26.0			26.0	
Actuated g/C Ratio		0.24			0.24			0.57			0.57	
Clearance Time (s)		4.5			4.5			4.5			4.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		354			268			815			1009	
v/s Ratio Prot												
v/s Ratio Perm		0.09			c0.09			c0.39			0.29	
v/c Ratio		0.36			0.39			0.70			0.52	
Uniform Delay, d1		14.6			14.7			7.2			6.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			0.9			2.6			0.5	
Delay (s)		15.2			15.6			9.8			6.7	
Level of Service		B			B			A			A	
Approach Delay (s/veh)		15.2			15.6			9.8			6.7	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			10.0									A
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			46.0								9.0	
Intersection Capacity Utilization			84.5%									E
Analysis Period (min)			15									

c Critical Lane Group

Appendix L

Proxy Survey Parking Data





118-126 Queen Street (NOTL) - Parking Utilization Surveys

81 Room Hotel + SPA (12,000 B2) + Two Restaurants			81			Hotel Rooms			81			Hotel Rooms			81			
Project Number: 230488			Hotel Rooms Occupied: 51			Hotel Rooms Occupied: 51			Hotel Rooms Occupied: 51			Hotel Rooms Occupied: 51			Hotel Rooms Occupied: 51			
			Total Number of Spaces: 78			Total Number of Spaces: 78			Total Number of Spaces: 78			Total Number of Spaces: 78			Total Number of Spaces: 78			
			Week Score: 82			Week Score: 82			Week Score: 82			Week Score: 82			Week Score: 82			
			Transit Score: 0			Transit Score: 0			Transit Score: 0			Transit Score: 0			Transit Score: 0			
			Bike Score: 66			Bike Score: 66			Bike Score: 66			Bike Score: 66			Bike Score: 66			
2024-11-07	Utilization		2024-11-08	Utilization		2024-11-09	Utilization											
	Occupied	Unoccupied		Occupied	Unoccupied		Occupied	Unoccupied										
0:00																		
0:15	31	40%	47	60%	0:00	40	51%	38	49%	0:00	66	85%	12	15%				
0:30	31	40%	47	60%	0:15	40	51%	38	49%	0:15	66	85%	12	15%				
0:45	31	40%	47	60%	0:30	40	51%	38	49%	0:30	67	86%	11	14%				
1:00	31	40%	47	60%	0:45	40	51%	38	49%	0:45	67	86%	11	14%				
1:15	31	40%	47	60%	1:00	40	51%	38	49%	1:00	67	86%	11	14%				
1:30	31	40%	47	60%	1:15	40	51%	38	49%	1:15	67	86%	11	14%				
1:45	31	40%	47	60%	1:30	40	51%	38	49%	1:30	67	86%	11	14%				
2:00	31	40%	47	60%	1:45	40	51%	38	49%	1:45	67	86%	11	14%				
2:15	31	40%	47	60%	2:00	40	51%	38	49%	2:00	67	86%	11	14%				
2:30	31	40%	47	60%	2:15	40	51%	38	49%	2:15	67	86%	11	14%				
2:45	31	40%	47	60%	2:30	40	51%	38	49%	2:30	67	86%	11	14%				
3:00	32	41%	46	59%	2:45	40	51%	38	49%	2:45	67	86%	11	14%				
3:15	32	41%	46	59%	3:00	40	51%	38	49%	3:00	67	86%	11	14%				
3:30	32	41%	46	59%	3:15	40	51%	38	49%	3:15	67	86%	11	14%				
3:45	32	41%	46	59%	3:30	40	51%	38	49%	3:30	67	86%	11	14%				
4:00	32	41%	46	59%	3:45	40	51%	38	49%	3:45	67	86%	11	14%				
4:15	32	41%	46	59%	4:00	40	51%	38	49%	4:00	67	86%	11	14%				
4:30	32	41%	46	59%	4:15	40	51%	38	49%	4:15	67	86%	11	14%				
4:45	32	41%	46	59%	4:30	40	51%	38	49%	4:30	67	86%	11	14%				
5:00	32	41%	46	59%	4:45	40	51%	38	49%	4:45	67	86%	11	14%				
5:15	32	41%	46	59%	5:00	40	51%	38	49%	5:00	67	86%	11	14%				
5:30	32	41%	46	59%	5:15	40	51%	38	49%	5:15	67	86%	11	14%				
5:45	32	41%	46	59%	5:30	40	51%	38	49%	5:30	66	85%	12	15%				
6:00	33	42%	45	58%	5:45	40	51%	38	49%	5:45	67	86%	11	14%				
6:15	33	42%	45	58%	6:00	40	51%	38	49%	6:00	66	85%	12	15%				
6:30	33	42%	45	58%	6:15	40	51%	38	49%	6:15	65	83%	13	17%				
6:45	32	41%	46	59%	6:30	39	50%	39	50%	6:30	65	83%	13	17%				
7:00	31	40%	47	60%	6:45	38	49%	42	54%	6:45	65	83%	13	17%				
7:15	31	40%	47	60%	7:00	38	49%	42	54%	7:00	65	83%	13	17%				
7:30	31	40%	47	60%	7:15	35	45%	43	55%	7:15	65	83%	13	17%				
7:45	31	40%	47	60%	7:30	35	45%	43	55%	7:30	65	83%	13	17%				
8:00	31	40%	47	60%	7:45	35	45%	43	55%	7:45	65	83%	13	17%				
8:15	31	40%	47	60%	8:00	36	46%	42	54%	8:00	64	82%	14	16%				
8:30	32	41%	46	59%	8:15	34	44%	44	56%	8:15	63	81%	15	19%				
8:45	33	42%	45	58%	8:30	35	45%	43	55%	8:30	61	78%	17	22%				
9:00	33	42%	45	58%	8:45	35	45%	43	55%	8:45	63	81%	15	19%				
9:15	34	44%	44	56%	9:00	36	46%	42	54%	9:00	63	81%	15	19%				
9:30	34	44%	44	56%	9:15	35	45%	43	55%	9:15	61	78%	17	22%				
9:45	34	44%	44	56%	9:30	34	44%	42	54%	9:30	61	78%	17	22%				
10:00	34	44%	44	56%	9:45	36	46%	42	54%	9:45	60	77%	18	23%				
10:15	34	44%	44	56%	10:00	34	44%	44	56%	10:00	58	74%	20	26%				
10:30	38	49%	40	51%	10:15	34	44%	44	56%	10:15	56	72%	22	28%				
10:45	38	49%	40	51%	10:30	36	46%	42	54%	10:30	56	72%	22	28%				
11:00	39	50%	43	55%	10:45	36	46%	42	54%	10:45	58	74%	20	26%				
11:15	33	42%	45	58%	11:00	34	44%	44	56%	11:00	58	74%	20	26%				
11:30	33	42%	45	58%	11:15	32	41%	46	59%	11:15	57	73%	20	26%				
11:45	36	46%	42	54%	11:30	33	42%	45	58%	11:30	60	77%	18	23%				
12:00	34	44%	44	56%	11:45	32	41%	46	59%	11:45	60	77%	18	23%				
12:15	34	44%	44	56%	12:00	33	42%	45	58%	12:00	55	71%	23	29%				
12:30	34	44%	44	56%	12:15	32	41%	46	59%	12:15	50	64%	28	36%				
12:45	35	45%	43	55%	12:30	31	40%	47	60%	12:30	44	56%	34	44%				
13:00	33	42%	45	58%	12:45	29	37%	49	63%	12:45	42	54%	36	45%				
13:15	25	32%	53	68%	13:00	28	36%	50	64%	13:00	43	55%	35	45%				
13:30	22	28%	56	72%	13:15	28	36%	50	64%	13:15	45	58%	33	42%				
13:45	20	26%	58	74%	13:30	27	35%	51	65%	13:30	45	58%	33	42%				
14:00	17	22%	61	78%	13:45	28	36%	50	64%	13:45	48	62%	30	38%				
14:15	20	26%	56	72%	14:00	27	35%	51	65%	14:00	52	67%	26	33%				
14:30	20	26%	56	72%	14:15	29	37%	49	63%	14:15	54	69%	24	31%				
14:45	25	32%	53	68%	14:30	32	41%	46	59%	14:30	59	76%	19	24%				
15:00	28	36%	50	64%	14:45	35	45%	43	55%	14:45	59	76%	19	24%				
15:15	28	36%	50	64%	15:00	36	46%	42	54%	15:00	66	85%	12	15%				
15:30	34	44%	44	56%	15:15	41	53%	37	47%	15:15	69	88%	9	12%				
15:45	34	44%	44	56%	15:30	42	54%	36	46%	15:30	70	90%	8	10%				
16:00	36	46%	42	54%	15:45	45	58%	33	42%	15:45	68	87%	10	12%				
16:15	35	45%	43	55%	16:00	46	59%	32	41%	16:00	70	90%	8	10%				
16:30	40	51%	38	49%	16:15	49	63%	29	37%	16:15	70	90%	8	10%				
16:45	39	50%	39	50%	16:30	52	67%	26	33%	16:30	71	91%	7	9%				
17:00	40	51%	38	49%	16:45	54	69%	24	31%	16:45	73	94%	5	6%				
17:15	39	50%	39	50%	17:00	55	71%	23	29%	17:00	69	88%	9	12%				
17:30	39	50%	39	50%	17:15	57	73%	21	27%	17:15	69	88%	9	12%				
17:45	38	49%	40	51%	17:30	58	74%	20	26%	17:30	66	85%	12	15%				
18:00	38	49%	40	51%	17:45	59	76%	19	24%	17:45	63	81%	15	19%				
18:15	37	47%	41	53%	18:00	57	73%	21	27%	18:00	63	81%	15	19%				
18:30	36	46%	42	54%	18:15	59	76%	19	24%	18:15	65	83%	13	17%				
18:45	37	47%	41	53%	18:30	61	78%	17	22%	18:30	65	83%	13	17%				
19:00	37	47%	41	53%	18:45	60	77%	18	23%	18:45	64	82%	14	16%				
19:15	37	47%	41	53%	19:00	62	79%	16	21%	19:00	64	82%	14	16%				
19:30	36	46%	42	54%	19:15	63	81%	15	19%	19:15	65	83%	13	17%				
19:45	36	46%	42	54%	19:30	62	79%	16	21%	19:30	65	83%	13	17%				
20:00	36	46%	42	54%	19:45	63	81%	15	19%	19:45	67	86%	11	14%				
20:15	36	46%	42	54%	20:00	63	81%	15	19%	20:00	68	87%	10	13%				
20:30	37	47%	41	53%	20:15	63	81%	15	19%	20:15	67	86%	11	14%				
20:45	36	46%	42	54%	20:30	64	82%	14	18%	20:30	67	86%	11	14%				
21:00	37	47%	41	53%	20:45	64	82%	14	18%	20:45	67	86%	11	14%				
21:15	36	46%	42	54%	21:00	64	82%	14	18%	21:00	67	86%	11	14%				
21:30	38	49%	40	51%	21:15	64	82%	14	18%	21:15	69	88%	9	12%				
21:45	38	49%	40	51%	21:30	64	82%	14	18%	21:30	70	90%	8	10%				
22:00	38	49%	40	51%	21:45	64	82%	14	18%	21:45	70	90%	8	10%				
22:15	39	50%	39	50%	22:00	66	85%	12	15%	22:00	69	89%	9	12%				
22:30	39	50%	39	50%	22:15	67	86%	11	14%	22:15	68	87%	10	13%				
22:45	39	50%	39	50%	22:30	66	85%	12	15%	22:30	68	87%	10	13%				
23:00	39	50%	39	50%	22:45	66	85%	12	15%	22:45	68	87%	10	13%				
23:15	39	50%	39	50%	23:00	66	85%	12	15%	23:00	68	87%	10	13%				
23:30	40	51%	38	49%	23:15	66	85%	12	15%	23:15	68	87%	10	13%				
23:45	40	51%	38	49%	23:30	66	85%	12	15%	23:30	68	87%	10	13%				
					23:45	66	85%	12	15%	23:45	69	88%	9	12%				

