



Premier Gateway Phase 2B Employment Area Integrated Planning Project

Transportation Study

Paradigm Transportation Solutions Limited

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Project Summary



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Client

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Premier Gateway Phase 2B Transportation Study

Final Report

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Executive Summary

Content and Overview

The Premier Gateway area is a highly desirable employment area with access and high visibility to/from 400 series highways. It is the main greenfield employment area within the Town of Halton Hills. The Town continues to see strong interest and demand for shovel-ready employment lands in the Premier Gateway Phase 2B Employment Area. The *Premier Gateway Phase 2B Secondary Plan* will help to establish the basis for new development to occur and contribute to achieving the Town's economic objectives.

The purpose of the *Premier Gateway Phase 2B Employment Area Integrated Planning Project* is to develop a detailed local development framework including land use designations and policies for a portion of the employment lands needed to accommodate the second phase of employment lands needed for the 2031 planning horizon. The project includes several technical components, including one for the transportation system.

The purpose of this *Transportation System Background Report* is to provide information on the study context, the policy environment, and existing conditions as they relate to the transportation system in and around the Study Area.

Study Area

Figure 1.2 illustrates the Study Area which is bounded by:

- ▶ **East:** Winston Churchill Boulevard;
- ▶ **South:** Steeles Avenue;
- ▶ **West:** Eighth Line;
- ▶ **North:** Property boundaries which follow a line parallel to, and approximately 1.2km north of, Steeles Avenue.

The Study Area is located within the Town of Halton Hills. Some roads along the boundary of the Study Area are the responsibility of adjacent municipalities.

The current Provincial and Regional planning policies along with the current and proposed Town planning policies provide a strong and consistent framework for future planning for the Premier Gateway Phase 2B Employment Area. Development in this area faces several potential transportation challenges including:



- ▶ limited arterial road capacity;
- ▶ lack of transit service;
- ▶ limited active transportation connectivity;
- ▶ closely spaced access locations along arterial roads with inadequate storage, contributing to road safety concerns and operational delays; and
- ▶ demand for access locations close to highway interchanges.

Assessing the cumulative effects of existing and proposed development on the transportation system and addressing these issues effectively through timely infrastructure improvements requires a coordinated approach from development proponents and responsible agencies.

Existing Conditions

Existing Transportation System

The Premier Gateway Employment Area lands are served by an external road network featuring arterial, collector and local roads. Halton Region is responsible for the Steeles Avenue arterial, the primary route serving the area. Current long-range plans to 2031 call for its expansion. Peel Region controls Winston Churchill Boulevard. The Town of Halton Hills manages the remaining roads in the Study Area.

The Ministry of Transportation (MTO) intends to widen Hwy 401 in the next 10 years and improve area interchanges. MTO's preferred route for Hwy 413 show it passing north-south through the study area to connect with the Hwy 401/Hwy 407 Interchange.

Currently the area is not well served by non-auto modes. A multi-use path exists along Steeles Avenue; no other road in the Study Area has active transportation facilities. Transit service is not available within the Study Area; Brampton Transit's routes 511 ZUM STEELES and 11 STEELES both pass through the intersection at the southeast corner of the Study Area (Steeles & Winston Churchill). The Town of Halton Hills plans for transit include a route along Steeles Avenue connecting the study area with Milton and Mississauga.

Existing Traffic Conditions

Overall, the Study Area intersections currently operate with satisfactory levels of service and within capacity ($v/c \leq 1.00$) for both peak hours analyzed, except for:



- ▶ Steeles Avenue and Trafalgar Road during the AM peak hour;
- ▶ Steeles Avenue and Ninth Line (South Segment) during the AM peak hour; and
- ▶ Steeles Avenue and Heritage Road during the PM peak hour.

A significant number of approaches experience less than satisfactory levels of service (LOS F) and delay.

Traffic Forecasts

Land Use Plan

The land use plan was developed by Macaulay Shiomi Howson Ltd. with input from various technical disciplines. It was then refined through discussions with stakeholders and input from the public. The majority of the land (182 hectares) is allocated to “Prestige Industrial”. Of this, one 3.7ha parcel has a “Supportive Commercial” overlay, and 11ha has a “Residential Specific Policy Area” overlay. The remainder is allocated to the Natural Heritage System, Hwy 413 Preferred Route, and the rights-of-way for existing roads.

Road Network Assumptions

The following documents identify several road improvement projects within the Study Area to serve future growth:

- ▶ **Halton Region Transportation Master Plan**
 - Widening Trafalgar Road from 4 to 6 lanes between Britannia Road to Steeles Avenue and 2 to 4 lanes between Steeles Avenue and 10 Side Road.
 - Widening of Steeles Avenue from 4 to 6 lanes between Regional Road 25 and Winston Churchill Boulevard;
 - Widening Ninth Line from 2 to 4 lanes from Steeles Avenue to 10 Side Road;
 - Widening Winston Churchill Boulevard 4 to 6 lanes between Hwy 401 and Steeles Avenue;
 - Widening Winston Churchill Boulevard 5 to 7 lanes between Steeles Avenue and 2 km south of Embleton Road; and
 - Widening Winston Churchill Boulevard 4 to 6 lanes between 2 km south of Embleton Road and Embleton Road.



- ▶ **Steeles Avenue from Winston Churchill Boulevard to Chinguacousy/Mavis Road EA Study** (Region of Peel)
 - Widening of Steeles Avenue from 4 to 6 lanes between from Winston Churchill Boulevard to Chinguacousy/Mavis Road;
- ▶ **Trafalgar Road Corridor Study**
 - Widening Trafalgar Road from 2 to 4 lanes between Steeles Avenue and 10 Side Road;
- ▶ **Ninth Line Corridor Study**
 - Widening Ninth Line from 2 to 4 lanes from Steeles Avenue to 10 Side Road;
 - Dedicated left-turn lanes for all approaches at Ninth Line at 5 Side Road;
- ▶ **Winston Churchill Boulevard EA Corridor Study**
 - Widening Winston Churchill Boulevard (Regional Road 19) from 4 to 6 lanes between Hwy 401 and 5 Side Road/Embleton (confirmed through discussions with Regional staff)
- ▶ **Eighth Line EA Corridor Study**
 - Widening Eighth Line between Steeles Avenue and 10 Side Road from 2 to 3 lanes

A new freeway in the Hwy 413 Corridor is being actively investigated by MTO. This would have a significant impact on how traffic would move in and around the study area. However, implementation yet to be approved or funded, and no timeline for delivery has been published. Consequently, the presence of Hwy 413 will be assessed as a sensitivity test.

Hwy 413 is assumed to connect from the Hwy 407 and Hwy 401 interchange to Hwy 400 north of Kirby Road. A Hwy 413 interchange is assumed at Winston Churchill Boulevard, approximately 600 m south of 5 Side Road.

The Hwy 401 westbound off-ramp at Winston Churchill was widened in the summer of 2021 from three to four westbound lanes (two left-turn lanes, two right-turn lanes). For the purpose of this study, the four-lane configuration is in place for the future background and future total networks.



Trip Generation, Mode Split, Distribution and Assignment.

Trip generation used the ITE Trip Generation Manual (for personal trips) and a proxy survey (for truck trips).

The mode split was estimated based on the distance from the study area to residential areas, the observed mode split for trips to similar nearby employment areas, and planned future transport infrastructure and services. In all cases, the assumptions were conservative in nature, erring on the side of higher traffic volumes. This produced a mode split of 88.9% auto driver, 8.1% auto passenger, 3.0% for transit, 0% for active modes.

The passenger vehicle trip distribution for the subject site was based on 2016 Transportation Tomorrow Survey (TTS) data for the zones containing the subject site and surrounding area including existing industrial lands west of the site.

Trip assignment was based on the expected shortest routes for traffic, given the planned and proposed road network, and the nearby freeway interchanges.

Traffic Impact Assessment

2031 Traffic Operations with Planned Improvements

In general, the critical movements in the background traffic operations consist of insufficient left-turn lane storage at intersections along Steeles Avenue intersections. In addition, the following issues were identified: The following critical movements were forecast at the Study Area intersections:

- ▶ Steeles Avenue and Trafalgar Road (signalized):
 - The eastbound through lane is forecast to operate at LOS E ($v/c > 0.95$) during the AM peak hour.
 - The eastbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.



The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.

- The northbound through lane is forecast to operate at LOS D or worse ($v/c > 0.90$) during the AM and PM peak hour.
- The northbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.
- The southbound shared through right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.
- Overall, the intersection is forecast to operate at LOS F ($v/c > 1.00$) in the AM and PM peak hours.

► Steeles Avenue and Toronto Premium Outlet (West) (signalized):

- The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- The northbound right-turn 95th percentile queue length is forecast to exceed available storage during the PM peak hour.

► Steeles Avenue and Eighth Line North/Toronto Premium Outlets (signalized):

- The eastbound left-turn lane is forecast to operate at LOS D ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hours.
- The eastbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the AM peak hour.
- The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- The westbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
- The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.



- ▶ Steeles Avenue and Ninth Line (North Segment) (signalized):
 - The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The eastbound through lane is forecast to operate at LOS D ($v/c > 0.85$) during the AM peak hour.
 - The westbound through lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- ▶ Steeles Avenue and Ninth Line (South Segment) / Road A (signalized):
 - The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The eastbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
 - The northbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- ▶ Steeles Avenue and Tenth Line (North Segment) (signalized):
 - The westbound through lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.



- The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- ▶ Steeles Avenue and Tenth Line (South Segment) / Road B (signalized):
 - The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
 - The westbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The southbound left-turn movement operates at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- ▶ Steeles Avenue and Winston Churchill Boulevard [Peel] (signalized):
 - The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the PM peak hour.
 - The eastbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the AM and PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The northbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound right turn-lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour.
 - The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour. The 95th



percentile queue length is forecast to exceed available storage during the AM peak hour.

- The southbound through lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM peak hour.
- The southbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.

► Steeles Avenue and Heritage Road [Peel] (signalized):

- The eastbound left turn-lane is forecast to operate at LOS E or worse ($v/c > 0.95$) during the AM peak hours.
- The westbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the AM peak hour.
- The westbound shared through/right lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM and PM peak hour.
- The southbound through lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM peak hour.

► 5 Side Road and Eighth Line North (signalized):

- The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- The westbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the PM peak hour.
- The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- The northbound through lane is forecast to operate at LOS D ($v/c > 1.00$) during the PM peak hour.
- The southbound through lane is forecast to operate at LOS D ($v/c > 1.00$) during the PM peak hour.

► 5 Side Road and Ninth Line (signalized):

- The northbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.



- ▶ 5 Side Road and Winston Churchill Boulevard [Peel] (signalized):
 - The westbound shared left/through/right movement operates at LOS E ($v/c > 1.00$) during the AM and PM peak hour.
 - The northbound left-turn lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- ▶ Trafalgar Road and Hwy 401 Westbound Off-Ramp (signalized):
 - The westbound left-turn lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.
 - The westbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound through lane is forecast to operate at LOS C ($v/c > 1.00$) during the PM peak hour.
- ▶ Trafalgar Road and Hwy 401 Eastbound Off-Ramp (signalized):
 - The northbound through lane is forecast to operate at LOS C ($v/c > 0.85$) during the AM peak hour.
- ▶ Winston Churchill Boulevard and Road B (signalized):
 - The northbound left-turn 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- ▶ Winston Churchill Boulevard and Hwy 401 Westbound Off-Ramp (signalized):
 - The westbound right-turn movement operates at LOS F ($v/c > 1.00$) during the AM and PM peak hour.
 - The southbound through lane is forecast to operate at LOS C ($v/c > 0.85$) during the PM peak hour.
- ▶ East-West Collector Road and Steeles Avenue (signalized):
 - The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.



- The westbound through lane is forecast to operate at LOS E ($v/c > 0.85$) during the PM peak hour.
- ▶ 5 Side Road and Tenth Line (unsignalized):
 - The eastbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.
 - The westbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The northbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.

2031 Traffic Operations with Mitigation Measures

To address the issues identified with 2031 total traffic operations, various potential mitigation measures were identified and tested. For all the issues, at least one mitigation measure that eliminated the issue with volumes exceeding capacity of excessive delays was found.

It was assumed that with the reconstruction and widening of roads within the study area such as Steeles Avenue and Winston Churchill Boulevard, exclusive turn lane storage will be extended to the appropriate amount to avoid queuing beyond available storage. Consequently, these were not specifically tested.

2031 Total Traffic Operations (with Highway 413)

With Hwy 413, it would be expected that traffic along Trafalgar Road and Winston Churchill Boulevard, south of Steeles Avenue, going to and from Hwy 401 would decrease. An increase in traffic along Winston Churchill Boulevard, north of Steeles, may also occur as a result of vehicles accessing the Hwy 413 ramp located south of 5 Side Road.

In the AM peak hour the movements impacted the most from these trips are the southbound right turns at Winston Churchill Boulevard and Steeles Avenue and westbound right-turns at Steeles Avenue and Ninth Line (North Segment). In the PM peak hour, the movements impacted the most will be southbound left turns at Steeles Avenue and Ninth Line (North Segment) and eastbound left-turns at Winston Churchill Boulevard and Steeles Avenue. As a result of Hwy 413,



additional capacity may need to be provided for the left and right turns along these routes.

Mitigation Measures for Discussion with Stakeholders

Based on the analysis, the recommended mitigation measures for discussion with stakeholders consist of:

- ▶ **Steeles Avenue, Winston Churchill Boulevard:** Appropriate extension of exclusive left-turn storage lanes when these roads are widened.
- ▶ **5 Side Road and Winston Churchill Boulevard:** Addition of westbound left-turn lane and eastbound right-turn lanes
- ▶ **5 Side Road and Tenth Line:** Signalization; Addition of eastbound right-turn lane, westbound right-turn lane, and southbound left-turn lane
- ▶ **Steeles Avenue and Tenth Line (South Segment) / Road B:** Addition of second southbound left-turn lane
- ▶ **Steeles Avenue and E/W Collector Road:** Implementation of eastbound left-turn phase
- ▶ **Steeles Avenue and Ninth Line (South Segment) / Road A:** Addition of second westbound left-turn lane; Northbound configured to be exclusive left-turn lane and shared-through/right turn lane. Northbound left-turn phase added in PM peak hour. Conversion to a three-lane roundabout should also be considered, taking into consideration the additional land required and need for suitable active transportation facilities.

While various mitigation measures are proposed for critical movements in the study area, general mitigation measures were not identified for movements along Steeles Avenue. Typical mitigation measures were not sufficient in addressing capacity issues along Steeles Avenue and the improvements are deemed to be outside the scope of this study.

The Region will be undertaking a future MCEA Study for improvements to Steeles Avenue from Trafalgar Road to Winston Churchill Boulevard. A range of multi-modal options for corridor improvements will be considered, such as widening of the roadway, cross-sectional requirements, active transportation, transit infrastructure improvements, intersection improvements, overall traffic operations.

The proposed lane configurations for roads that intersect with Regional roads can be constructed to the ultimate configuration prior to Regional road capital improvements. Local and collector road improvements are not dependent on regional road capital improvements.



Other Modes

There are opportunities to reduce vehicle trips to and from the Premier Gateway Phase 2B Employment Area lands using modes other than the single occupant vehicles and through Transportation Demand Management measures.

The Town of Halton Hills' *Transit Service Strategy* includes two routes that would serve the study area. These could provide effective local transit service, with the following additions:

- ▶ Refining the *Transit Service Strategy*'s recommendations on service and routing
- ▶ Providing bus stops with appropriate amenities in the correct locations
- ▶ Integrating fares with connecting local transit agencies.
- ▶ Providing good pedestrian facilities (including sidewalks and crossing points) throughout the employment lands.

The traffic analysis adopted a conservative 0% mode share for walking and cycling for trips to the study area. However, this should not preclude the implementation of active transportation facilities in the study area. Cycling use tends to follow the provision of dedicated facilities, and hence including them should encourage cycling usage. Development should be designed to facilitate (and not preclude) the use of active transportation modes.

Transportation Demand Management (TDM) uses policies, programs, services and products to influence whether, why, when, where and how people travel. There are a range of suitable TDM measures that would influence site design, offer travel choices and promote sustainable travel options.

Next Steps

The proposed mitigation measures will need to be reviewed by the Town of Halton Hills and other relevant road operators. Those road operators include (but are not limited to) Halton Region, Peel Region, and MTO. This will provide information on factors other than transportation operations that need to be considered. The feedback will be used to refine the mitigation measures before final recommendations are made.



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1 Introduction and Background

1.1 Study Background

The Town of Halton Hills' Premier Gateway Employment Area is intended to accommodate the majority of the Town's employment growth for the next 20 years. Regional Official Plan Amendment 38 (ROPA 38) which was the culmination of the Region of Halton's growth management exercise known as *Sustainable Halton* designated 340 gross hectares of lands for employment uses in the Town of Halton Hills on the north side of Steeles Avenue. This expanded Premier Gateway Employment Area will accommodate the Town's employment land needs for the 2021 to 2031 planning horizon.

The Town's Official Plan Amendment 10 (OPA 10) implemented ROPA 38, adding the land into the Town's Urban Area and designated the land as Employment Area. OPA 10 set out a framework to guide Secondary Planning exercises for the lands to determine specific land use designations and policies. The *Premier Gateway Phase 2B Secondary Plan* is an exercise to establish local development policies for a portion of the employment lands previously identified through OPA 10.

The Region of Halton adopted Regional Official Plan Amendment No. 43 (ROPA 43) in June 2014 to include corridor protection area plans and policies. These restrict development to allow for the completion of the Hwy 413 Corridor Environmental Assessment (EA) being undertaken by the Ministry of Transportation (MTO). The EA Study will create the preliminary design for a new multimodal transportation corridor that includes a 400 series highway, transitway and potential goods movement priority features.

In 2019, MTO presented the draft Technically Preferred Route (TPR) for the Hwy 413 Corridor. MTO have stated that they have reduced interest in areas outside the draft Focused Analysis Area (FAA), which indicates that those lands can be removed from corridor protection once the FAA is confirmed. On August 7, 2020, MTO revised the Focused Analysis Area.

Development cannot occur on the Premier Gateway Phase 2B lands until the Hwy 413 EA confirms its land requirements and the lands are released from corridor protection policies in ROPA 43. Based on the TPR and FAA, it is anticipated that a portion of the lands within the Study Area will be permanently precluded from development to accommodate the multi-modal corridor.



Halton Region Council has endorsed various motions relating to the Hwy 413 Transportation Corridor in November 2019 and March 2021. This includes a motion “That the Region of Halton Council opposes further investment by the Province in the Hwy 413 Transportation Study”.

1.2 Study Purpose

The Secondary Plan study is being undertaken as an Integrated Planning Project. The supporting Transportation Study will identify the system improvements required to serve planned growth. It will provide guidance regarding all forms of movement as input to the development of the recommended and preferred land use options and will ultimately assist in developing a transportation network plan and policies for the Secondary Plan.

Development of the Premier Gateway Employment Area along Steeles Avenue presents several known potential transportation challenges with respect to the existing conditions, including:

- ▶ limited arterial road capacity;
- ▶ lack of transit service;
- ▶ limited active transportation connectivity;
- ▶ widely-spaced access locations along arterial roads with inadequate storage; and
- ▶ demand for access locations close to highway interchanges.

Assessing the cumulative effects of existing and proposed development on the transportation system and addressing these issues effectively through timely infrastructure improvements requires a coordinated approach from development proponents and responsible agencies.

Figure 1.1 illustrates the land use and phasing planned for Premier Gateway Phase 2B Employment Area. This background report documents the study process and assumptions, and summarizes the transportation assessments.

1.3 Study Area

Figure 1.2 shows the Study Area. It is bounded by Steeles Avenue to the south, Heritage Road to the east, Trafalgar Road the west, and 5 Side Road/Embleton Road to the north. The Study Area is located within the town of Halton Hills; some roads along the boundary of the Study Area are the responsibility of adjacent municipalities.



1.4 Transportation Context

1.4.1 Halton Region Transportation Master Plan

“The Road to Change – Halton Region Transportation Master Plan” (TMP)¹, October 2011 identifies the transportation policies, programs and infrastructure improvements required to support planned growth in Halton Region to the year 2031. The plan defines a sustainable, integrated transportation system that considers all modes of travel (automobiles, transit, cycling, walking) and supports the policies and objectives arising out of the Halton Region Official Plan Review (ROPA 38).

Figure 1.3 illustrates the proposed transportation network improvements near the Study Area, along with the anticipated start of construction as shown on the Halton Region 2022 Budget and Business Plan², subject to Council approved financing. These included:

- ▶ Widening of Steeles Avenue from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (2027)
- ▶ Constructing a new 6-lane road, known as 5½ Line, from Britannia Road to Steeles Avenue (2031).
- ▶ Widening Ninth Line (Halton Regional Road 13) from 2 to 4 lanes between Steeles Avenue and 10 Sideroad (2026)
- ▶ Widening Steeles Avenue (Halton Regional Road 8) from 4 to 6 lanes between Trafalgar Road and Winston Churchill Boulevard (2028)
- ▶ Widening Winston Churchill Boulevard (Regional Road 19) from 4 to 6 lanes between Hwy 401 to Steeles Avenue (2026)
- ▶ Widening Winston Churchill Boulevard (Regional Road 19) from 5 to 7 lanes between Steeles Avenue to 2 km south of Embleton Road (beyond 2031)

1.4.2 Halton Region Active Transportation Master Plan

Halton Region’s Active Transportation Master Plan³ outlines the strategy, policies, infrastructure, programs and initiatives needed to achieve its active transportation targets for 2031. Specific infrastructure

¹ Dillon Consulting and GHD, *The Road to Change – Halton Region Transportation Master Plan*, October 2011

² Halton Region, *Halton Region Budget and Business Plan – Capital Report*, 2022

³ IBI Group, *Halton Region Active Transportation Master Plan*, May 2015

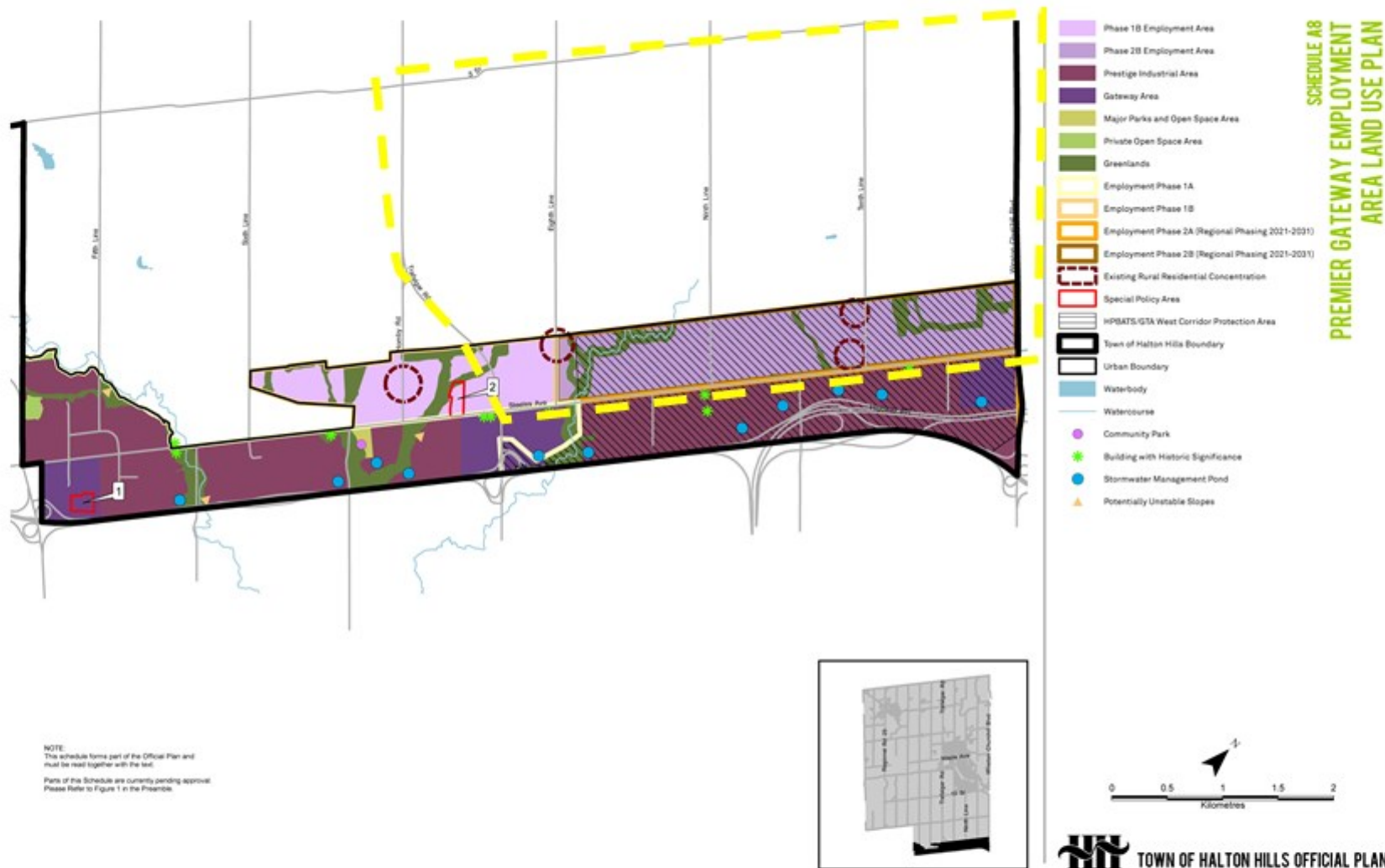


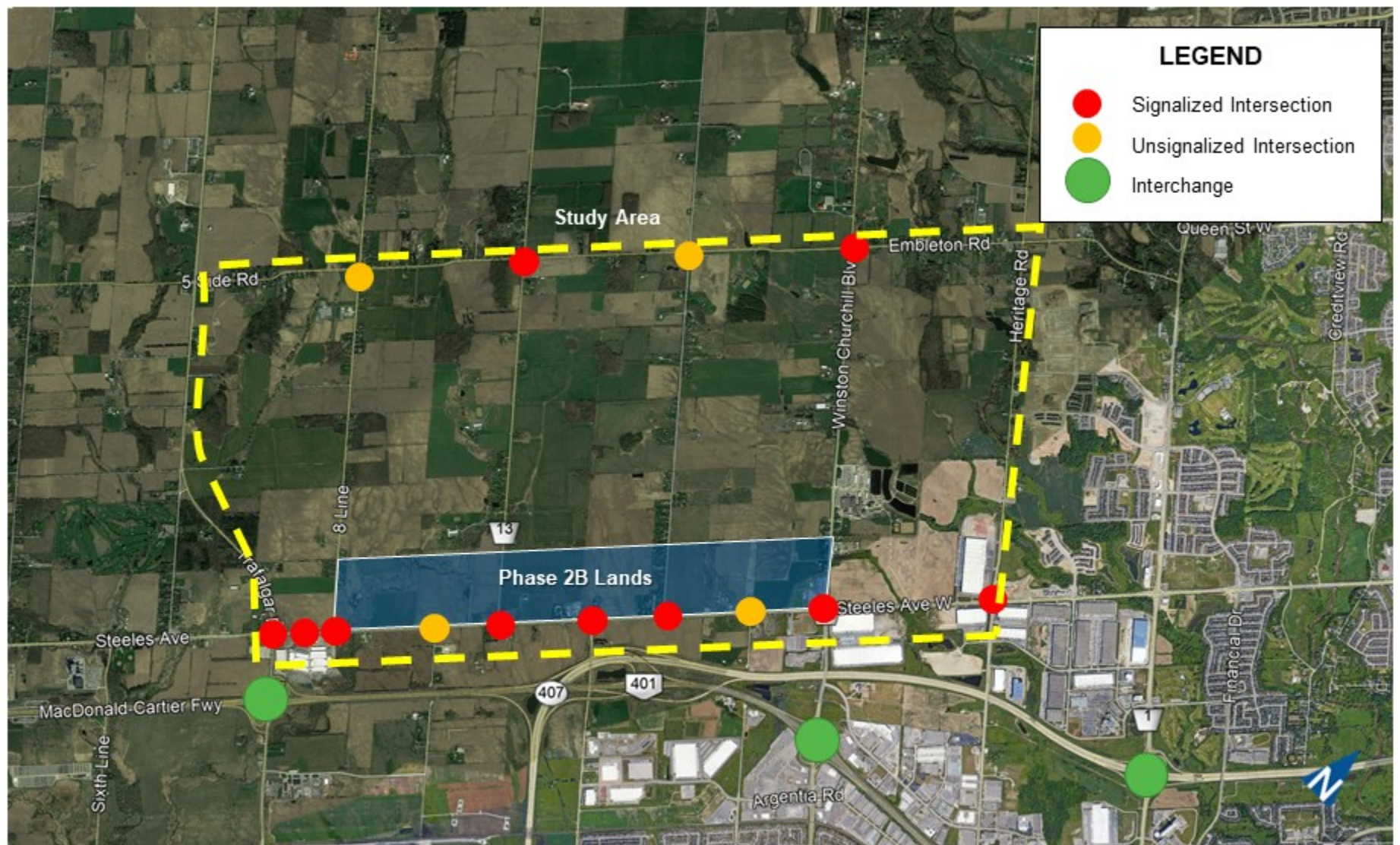
initiatives include the development of regional walking and cycling networks along major regional roads.

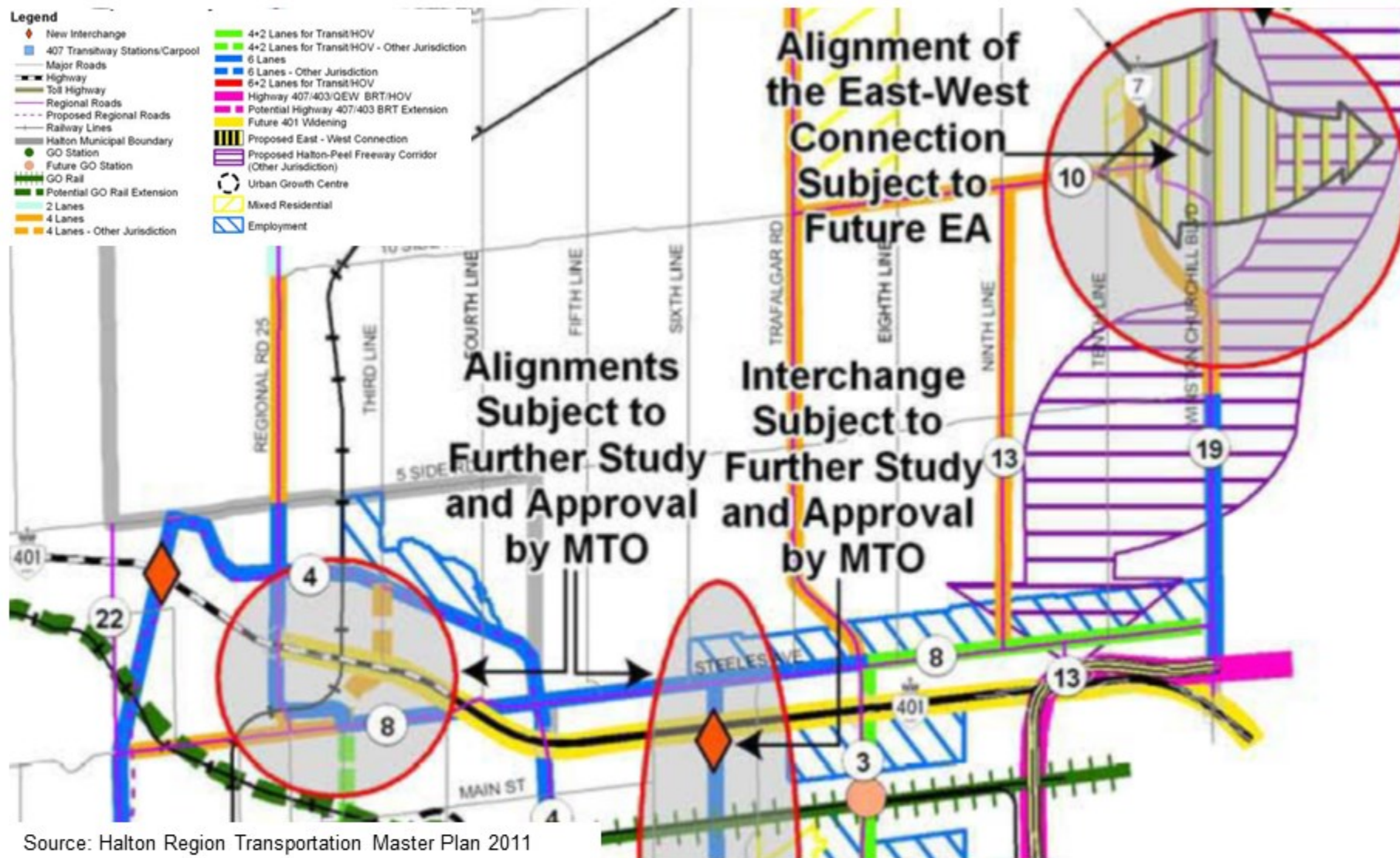
The Halton Region Active Transportation Master Plan recommends:

- ▶ Implementing a Regional Cycling Network of Bike Lanes and Boulevard Multi-Use Trails along Steeles Avenue and Sixth Line (south of Steeles Avenue), and a Multi-Use Trail on Trafalgar Road (north of Steeles Avenue), as depicted in **Figure 1.4**.
- ▶ Implementing a Regional Walking Network through sidewalks and Boulevard Multi-Use Trails along Steeles Avenue, as shown in **Figure 1.5**









Legend

Proposed Regional Bike Network

- ▬▬▬▬▬ Buffered Bike Lanes
- ▬▬▬▬▬ Bike Lanes
- ▬▬▬▬▬ Boulevard Multi-Use Trail
- ▬▬▬▬▬ Paved Shoulders
-  Interchange Improvement*

Existing Regional Bike Network

- ▬ Bike Lane
- ▬ Boulevard Trail
- ▬▬▬▬▬ Waterfront Trail





Source: Halton Region Active Transportation Master Plan 2015



Excerpt from Halton Region Active Transportation Master Plan – Cycling Network

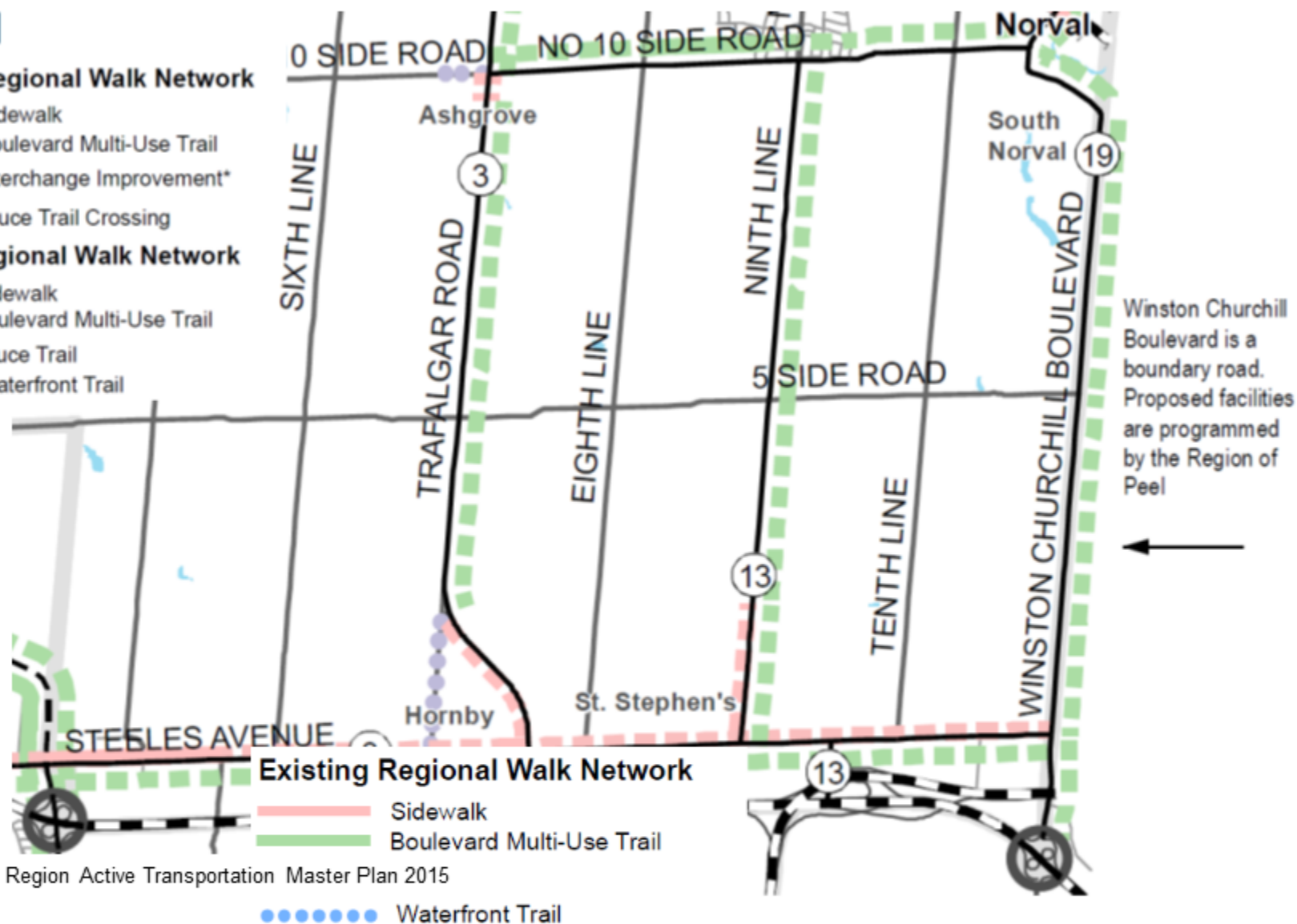
Legend

Proposed Regional Walk Network

- - - - - Sidewalk
- - - - - Boulevard Multi-Use Trail
-  Interchange Improvement*
-  Bruce Trail Crossing

Existing Regional Walk Network

- — — — — Sidewalk
- — — — — Boulevard Multi-Use Trail
- • • • • Bruce Trail
- • • • • Waterfront Trail



Source: Halton Region Active Transportation Master Plan 2015



Excerpt from Halton Region Active Transportation Master Plan – Pedestrian Network

1.4.3 Halton Region Mobility Management Strategy and Defining Major Transit Requirements

Halton Region and its Local Municipal partners developed the Mobility Management Strategy (MMS) for Halton. The “Mobility Management Strategy for Halton” (Report No. PW-03-17/LPS13-17), guides the evolution of a Region-wide transportation network over the next 25 years. It aligns with many supporting provincial, regional and local transportation initiatives. The MMS provides Halton Region with a network and key inputs that can be further positioned to influence and shape the development of other ongoing multi-modal initiatives.

“Mobility-as-a-Service” (MAAS) principles focus on an interconnected and multi-modal transportation system. The MMS’ Region-wide grid network provides approximately 156 kilometres of key transit priority corridors and approximately 36 kilometres of mobility links. It supports the MMS by internally connecting Halton Region and externally linking to the City of Mississauga, the City of Brampton and the City of Hamilton. These corridors generally build upon the Higher Order Transit Corridors identified in the Regional Official Plan and Transportation Master Plan. The network connects people to existing and planned Regional destinations including urban growth centres, mobility hubs, employment lands, major transit stations and abutting municipalities.

Within the Study Area there are plans for:

- ▶ the MMS-identified Transit Priority Corridors along Steeles Avenue and Trafalgar Road
- ▶ a proposed Transit Node at the intersection of the two corridors, and
- ▶ a Commuter Lot at the Hwy 401 and Trafalgar Road interchange

In addition, a Regional Transit Node with a Future GO Rail Station is denoted immediately south of the Study Area on Trafalgar Road where the Milton GO Rail service crosses the Transit Priority Corridor.

In 2019, Halton Region completed the *Defining Major Transit Requirements (DMTR) in Halton* study⁴ to:

- ▶ Evaluate existing and proposed major transit station areas and identify gaps, barriers, and opportunities for development;

⁴ HDR, Defining Major Transit Requirements in Halton Region, March 2019



- ▶ Define “type”, “form”, and “function” of transit priority corridors; and
- ▶ Identify transit infrastructure investments to address demand and improve connectivity and mobility.

The study identifies Steeles Avenue as a “mixed-traffic transit priority corridor” in 2031 to be enhanced to a “High Occupancy Vehicle (HOV) lane corridor” by 2041. Trafalgar Road is identified as a “mixed-traffic transit priority corridor with queue jump lanes and transit signal priority” in 2031 and 2041.

1.4.4 Town of Halton Hills Transportation Master Plan

The 2011 Town of Halton Hills Transportation Master Plan⁵ provides the strategies, policies and tools required to safely, effectively and cost efficiently meet the Town's transportation needs to the year 2031. The identified transportation system accommodates the transportation needs of existing and future development within the municipality, including policies to promote transit and TDM.

1.4.5 Town of Halton Hills Active Transportation Master Plan

The 2020 Town of Halton Hills Active Transportation Master Plan⁶ establishes short, mid and long-term improvements to the on-road and off-road active transportation network. It recommends actions for an improved level of active transportation facilities for residents and visitors within the Town.

Within the Study Area, Steeles Avenue, Ninth Line, and Winston Churchill Boulevard are long-term on-road components of the cycling network consistent with the Halton Region 2015 *Active Transportation Master Plan*. Eighth Line between Steeles Avenue and 10 Sideroad has a proposed off-road facility planned in the medium term (6-10 years).

1.4.6 Town of Halton Hills Transit Service Strategy

In 2019, the Town of Halton Hills completed a Transit Service Strategy⁷ to introduce transit service into the Town. Halton Hills operates only specialized transit services, providing curb-to-curb service for the elderly and people with disabilities through an in-house specialized system called ActiVan and a subsidized taxi program called Taxi Scrip, to serve as a backup to ActiVan. A subsidized Youth Taxi Scrip

⁵ Hatch Mott MacDonald and Halcrow, Town of Halton Hills Transportation Master Plan, November 2011

⁶ WSP, Town of Halton Hills Active Transportation Master Plan, 2019

⁷ WSP, Town of Halton Hills Transit Service Strategy, June 2019



program is also available for young Halton Hills residents between 13 and 19 years of age.

This study assessed the feasibility of introducing expand transit service in Halton Hills to address the community's transit needs and integrate existing transit services in the region to form a coherent network. Review of various local, regional, and Greater Toronto Hamilton Area (GTHA)-wide planning documents suggest an increasing need in for fixed-route transit service in Halton Hills.

Four additional levels of transit services have been developed to better meet the Town's transit needs through 2031. Each proposed level expands on the previous one with additional service:

- ▶ **Level 1:** ActiVan and Youth Taxi Scrip Program (Current Service);
- ▶ **Level 2:** ActiVan and universal access to subsidized taxi and transportation network company services (Universal Access Service);
- ▶ **Level 3:** ActiVan, universal access, and limited fixed-route bus service; and
- ▶ **Level 4:** Act ActiVan, universal access, expanded fixed-route bus service.

The Strategy recommends that in 2020 the Town initiate the planning and budgeting processes for the introduction of Level 2, Universal Access Service. The Strategy prioritized the following routes planned to serve the Study Area:

- ▶ **Milton GO – Toronto Premium Outlets (TPO) – Lisgar GO:** It was recommended that the Town partner with Milton Transit and possibly with MiWay and Brampton Transit to implement the Milton GO – TPO – Lisgar GO fixed route service that shared existing fleet vehicles. The route would operate between the Milton Go Station and Lisgar GO Station via Steeles Avenue and serve TPO in the middle.
- ▶ **Georgetown GO – TPO:** A route to operate between Georgetown GO Station and TPO via Ninth Line and Steeles Avenue West.

Ridership and operating cost estimates for 2020, 2024, 2028 for the routes' proposed service frequency have been developed but definitive timelines for these fixed routes have not been established.



1.4.7 Trafalgar Road Corridor Study

In 2016, Halton Region completed a Schedule C Municipal Class EA for the Trafalgar Road corridor from Steeles Avenue to Hwy 7⁸. The recommended undertaking between Steeles Avenue and north of 10 Sideroad includes:

- ▶ Widening Trafalgar Road from 2 to 4 lanes to adjoin the existing 4-lane section at Steeles Avenue, as well as the intersection at 5 Sideroad.
- ▶ Signalizing the Trafalgar Road and Hornby Road intersection and providing a northbound auxiliary left-turn lane and a southbound auxiliary right-turn lane.
- ▶ Providing either a 3.0m bi-directional multi-use path on the east side, or a 1.8m exclusive bike lane on the east side and a 1.5m paved shoulder on the west side on Trafalgar Road between Steeles Avenue and Hornby Road.
- ▶ Providing a 3.0m metre bi-directional multiuse path on the east side only and 1.5m paved shoulder in each direction from Hornby Road to north of 10 Sideroad.

1.4.8 Ninth Line Corridor Study

In 2014, the Halton Region undertook a Municipal Class EA for the Ninth Line corridor from Hwy 407 to 10 Sideroad⁹. The technically preferred design includes:

- ▶ Widening Ninth Line from 2 to 4 lanes, with auxiliary left-turn lanes at the intersection of 5 Sideroad on all approaches.
- ▶ Providing 1.5m on-road bicycle lanes on both sides, and a 3.0m multi-use path on one side of the road.

1.4.9 Winston Churchill Boulevard EA Corridor Study

The Region of Peel is currently undertaking a Schedule C Municipal Class EA for improvements to the Winston Churchill Boulevard corridor from Hwy 401 to Embleton Road. The study is currently assessing alternative solutions for the corridor improvements including Transportation Demand Management or widening with additional lanes, cycling lanes, sidewalks, and safety improvements¹⁰.

⁸ MMM Group, Trafalgar Road EA – Steeles Avenue to Highway 7, July 2016

⁹ UEM, Class 'C' EA – Ninth Line Transportation Corridor Improvements from Highway 407 to 10 Sideroad (Regional Road 10), May 2016

¹⁰ Region of Peel – Winston Churchill Boulevard Municipal Class Environmental Assessment Study – Highway 401 to Embleton Road/5 Sideroad – October 2015



For the study area, a recent project update letter notes the following planning changes to Winston Churchill Blvd:

- ▶ Between Hwy 401 to Steeles Ave, widening from four to six lanes by 2024, and adding a multi-use path on both sides of the roadway
- ▶ Between Steeles Ave and Maple Lodge Farms (at 8301 Winston Churchill Blvd), widening from four to six lanes by 2024, and adding a multi-use path on both sides of the roadway
- ▶ Between Maple Lodge Farms and 5 Side Road/Embleton Rd, widening from two to four lanes in 2025, widening from four to six lanes in 2030, and adding a multi-use path on both sides of the roadway

1.4.10 Eighth Line EA Corridor Study

The Town of Halton Hills is currently undertaking a Schedule C Municipal Class EA for improvements to the Eighth Line corridor from Steeles Avenue to Maple Avenue. The preliminary preferred design concept¹¹ includes widening Eighth Line:

- ▶ between Steeles Avenue and 5 Side Road from 2 to 3 lanes plus a multi-use path on both sides of the road.
- ▶ between 5 Side Road and 10 Side Road from 2 to 3 lanes plus a multi-use path on both sides of the road.
- ▶ between 10 Side Road and 15 Side Road from 3 to 5 lanes plus a multi-use path on the west side of the road.
- ▶ between 15 Side Road and Maple Avenue from 2 to 3 lanes plus a multi-use path on the west side of the road.

1.4.11 Provincial Highway Initiatives (Highway 401 and Highway 413)

The following widening is planned for Hwy 401:

- ▶ Widening Hwy 401 from 6 to 10 lanes between Winston Churchill Boulevard and the Hwy 407 ETR/Hwy 401 interchange, and from 6 to 12 lanes between the Hwy 407 ETR/Hwy 401 interchange and James Snow Parkway.

In addition to widening Hwy 401, a new highway, Hwy 413, is proposed in the vicinity of the subject site. The potential Hwy 413 corridor is proposed to include a four-to-six lane 400-series highway, separate

¹¹ Town of Halton Hills – Eighth Line Environmental Assessment – Public Information Centre 2 – June 2020

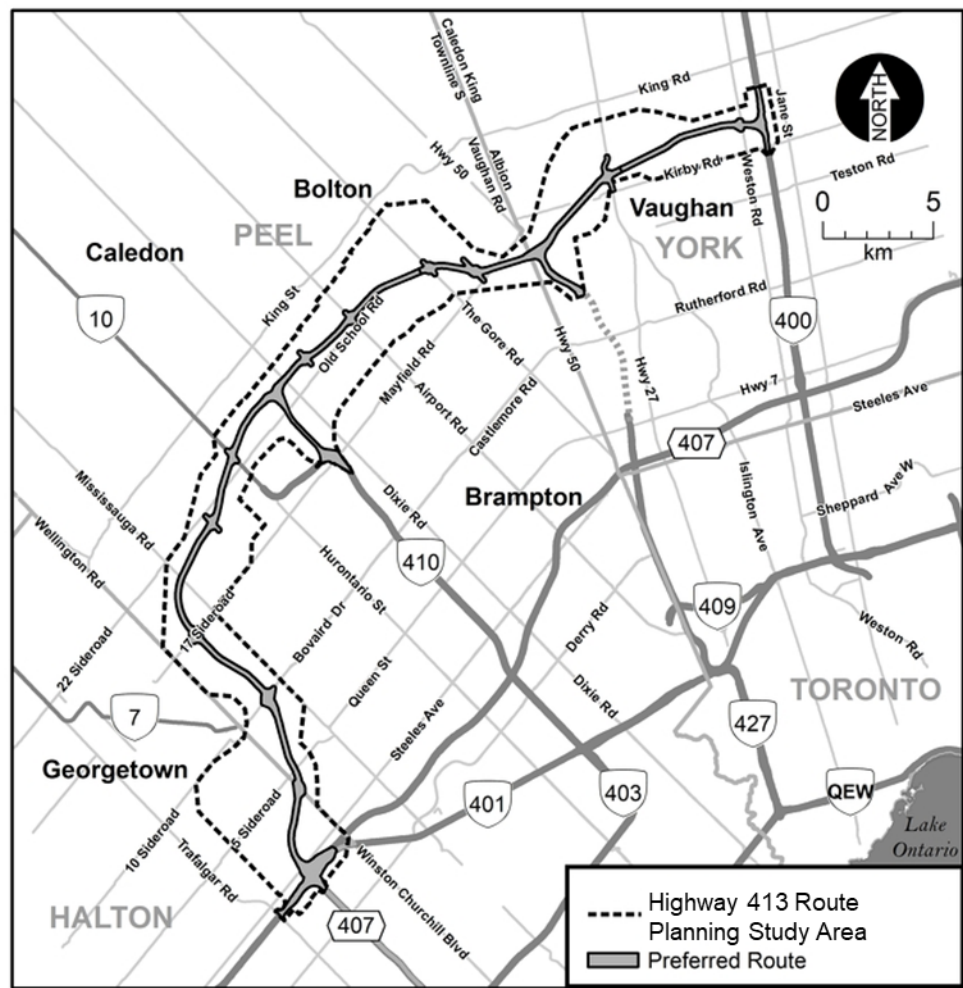


infrastructure dedicated for transit and passenger stations, as well as intelligent transportation features and truck parking.

In addition, a transit hub is identified along Steeles Avenue as well as a transit station at 5 Sideroad.

Figure 1.6 illustrates MTO's preferred route for Hwy 413, passing north-south through the study area to connect with the Hwy 401/Hwy 407 Interchange.

Figure 1.6: Preferred Route For Highway 413 Multimodal Transportation Corridor



The preferred route does not include any interchanges within the study area. However, it does include an interchange with Winston Churchill Blvd just north of the study area.

For the purpose of this study, Hwy 413 is assumed to not be constructed.



1.5 Technical Analysis Approach

The technical analyses for the study will be conducted following Halton Region's "Transportation Impact Study Guidelines" (January 2015). The Final Report will summarize the process used, key data sources, and traffic model development in this section.



2 Existing Transportation Conditions

This chapter summarizes existing transportation conditions within the Study Area, identifies existing deficiencies and provides the basis for the comparison of horizon year scenario impacts.

2.1 Transportation System

2.1.1 Roads

The main roadways in the Study Area include:

Steeles Avenue (Halton Regional Road 8), an east-west arterial road under Halton Region jurisdiction with two-lanes in each direction plus a two-way left turn lane through most of the Study Area. Steeles Avenue connects to Brampton in the east and Milton in the west. Within the Study Area, the posted speed limit ranges from 60 to 80 km/h. Key intersections along Steeles Avenue within the Study Area include Trafalgar Road, Eighth Line, and Winston Churchill Boulevard.

Eighth Line North and South, a north-south local road under Town of Halton Hills jurisdiction with a two-lane cross-section. Eighth Line jogs at Steeles Avenue by about 900m and provides access to local residential and agricultural properties and connects to Halton Hills in the north. The posted speed limit ranges from 50 to 70 km/h.

Ninth Line North and South (Halton Regional Road 13), a north-south arterial road under Halton Region jurisdiction with a two-lane cross-section. Ninth Line jogs at Steeles Avenue by about 850m and provides access to local residential and agricultural properties and connects to Halton Hills in the north. The posted speed limit is 80 km/h. Key intersections along Ninth Line within the Study Area include Steeles Avenue and 5 Sideroad.

Tenth Line North and South, a north-south local road under Town of Halton Hills jurisdiction with a two-lane cross-section. Tenth Line jogs at Steeles Avenue by about 750m and provides access to local residential and agricultural properties and connects to Halton Hills in the north. The posted speed limit is 70 km/h.

Winston Churchill Boulevard (Peel Regional Road 19), a north-south arterial road under Peel Region jurisdiction with a four-lane cross-section through the Study Area. The road has an interchange with Hwy 401 south of the Study Area. The posted speed limit ranges from 60 to 80 km/h. The road is a boundary road between Halton Region and Peel Region where operations and maintenance are managed through a boundary road agreement.



Figure 2.1 shows the lane configurations and traffic control provisions for the intersections within the Study Area for the 2021 base year.

Other roadways within broader analysis area include:

- ▶ **Trafalgar Road (Halton Regional Road 3)**, a north-south arterial road under Halton Region jurisdiction with a two-lane cross-section from 400m north of Steeles Avenue northwards, and a four-lane cross-section through the remainder of the Study Area. Trafalgar Road connects to Halton Hills in the north and Mississauga and Oakville in the south. The posted speed limit ranges from 60 to 80 km/h.
- ▶ **5 Sideroad**, an east-west local road under Town of Halton Hills jurisdiction with a two-lane cross-section. 5 Sideroad connects to northern Milton in the west and Brampton in the east. The posted speed limit ranges from 50 to 80 km/h.
- ▶ **Highway 401**, an east-west controlled-access freeway under MTO jurisdiction with a six-lane cross-section (and speed change lanes) through the Study Area. The highway has interchanges with James Snow Parkway, Trafalgar Road, Hwy 407 ETR and Winston Churchill Boulevard within the area. The posted speed limit is 100 km/hr.
- ▶ **Highway 407 ETR**, an east-west/north-south controlled-access, tolled freeway operated by 407 ETR Concession Company Limited with a six-lane cross-section (and speed change lanes) through the Study Area. The highway has an interchange with Hwy 401 within the area. The posted speed limit is 100 km/hr.

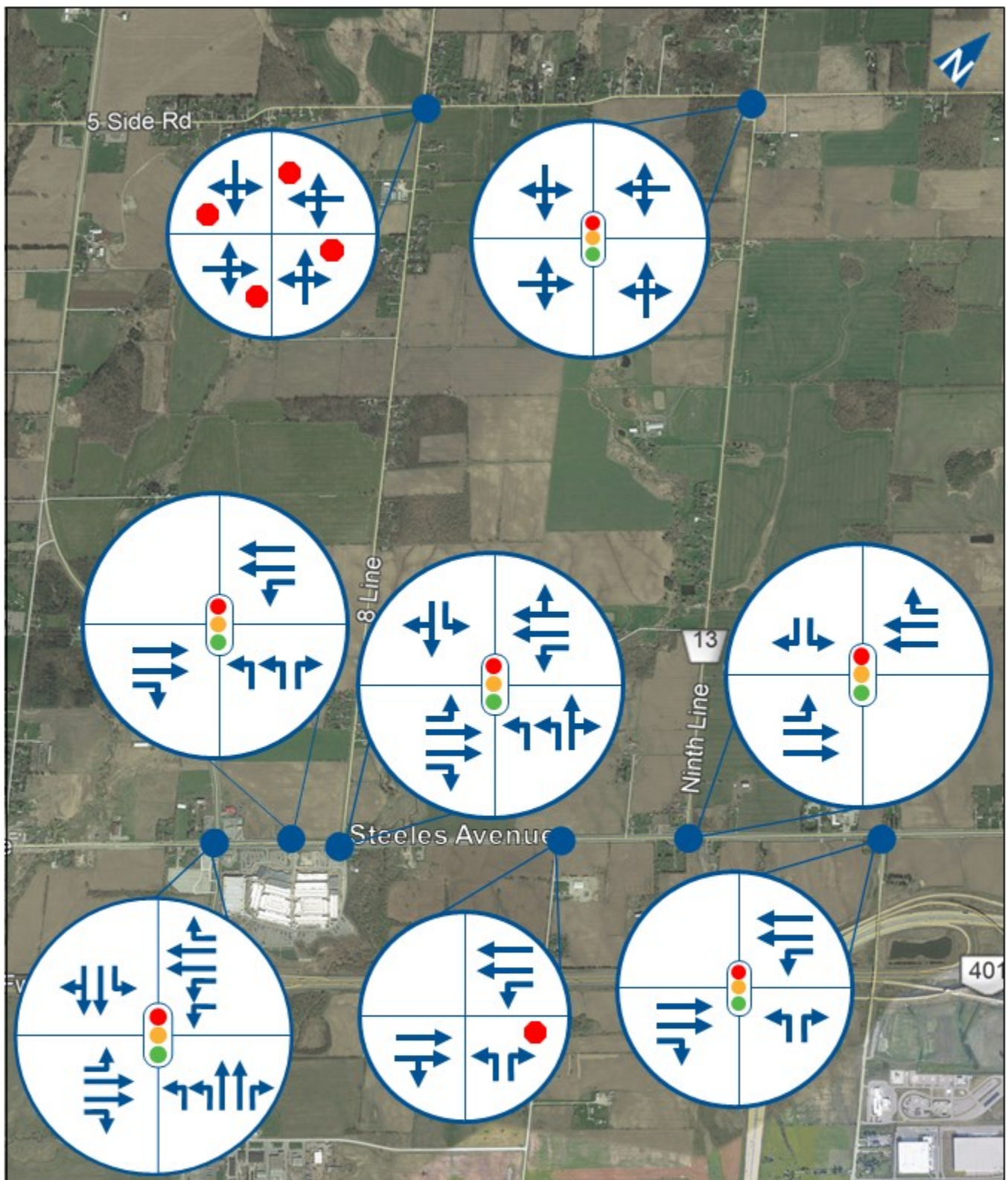
2.1.2 Transit

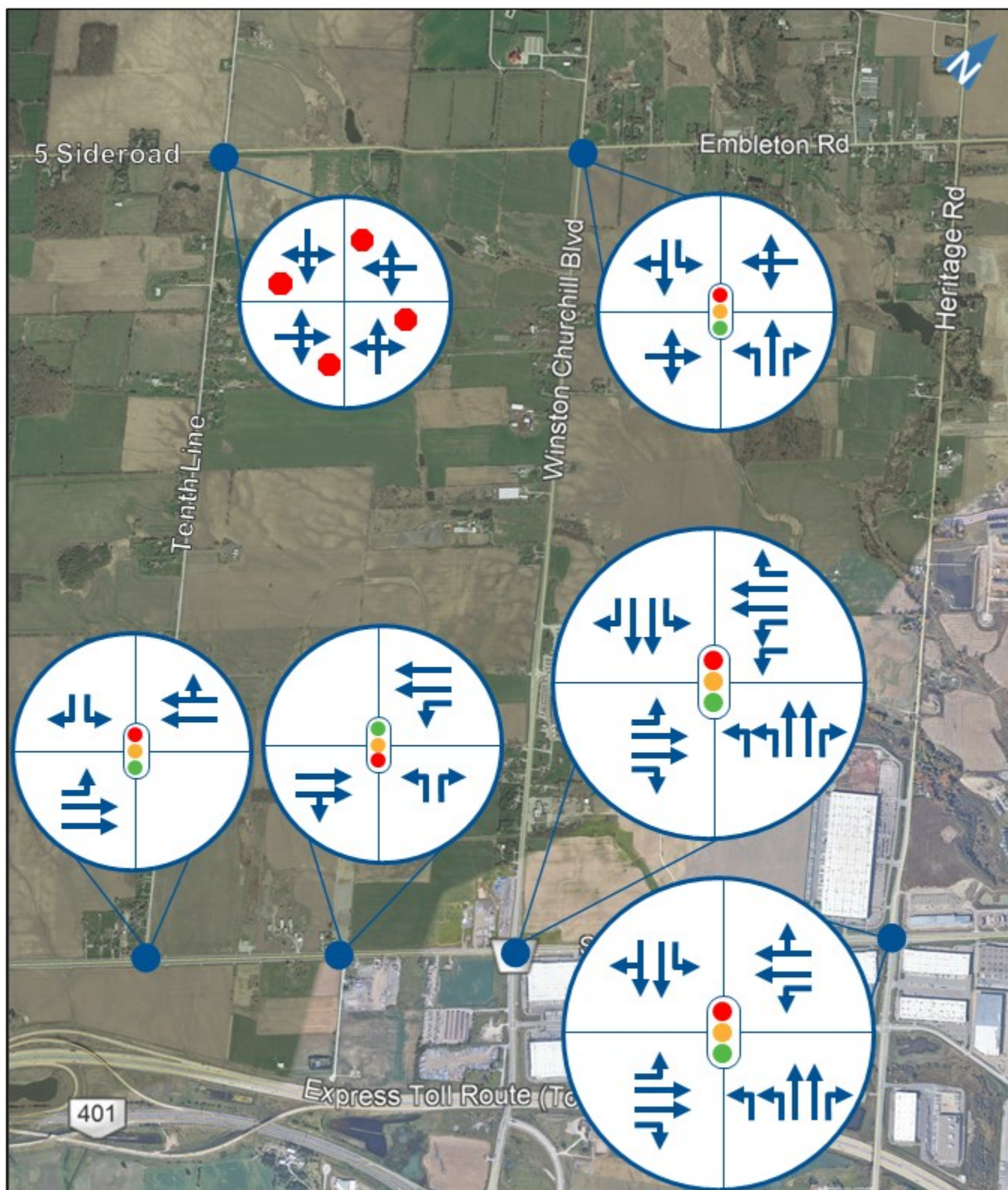
The Town of Halton Hills does not currently provide conventional transit services within the municipality. “ActiVan” Accessible Transit service is available for seniors (age 65 and older) and individuals with disabilities living within in Hills. The service operates Monday through Friday from 7:30 AM to 6:00 PM, and on Saturday and Sunday from 8:00 AM to 2:00 PM.

There are no transit services operated by other agencies that serve the Study Area. Brampton Transit routes 511 ZÜM STEELES and 11 STEELES both pass through the intersection at the southeast corner of the Study Area (Steeles & Winston Churchill).

A carpool lot operated by MTO is located on the east side of Trafalgar Road on the Toronto Premium Outlets property.







2.1.3 Active Transportation

Pedestrian and cycling infrastructure within the Study Area is located along Steeles Avenue between Trafalgar Road and about 400 metres east of Eighth Line. A multi-use path exists on the south side of the road along its length.

East of Eighth Line, a discontinuous sidewalk is in place on the north and/or south side of the road. The sidewalk is generally only exists in areas around signalized and unsignalized intersections.

2.2 Traffic Volumes

Table 2.1 summarizes the location and date of turning movement count (TMC) data collected for use in the analysis. **Appendix A** contains the turning movement data. These data were adjusted to base year (2021) traffic volumes using a generalized growth rate of 1.8% per annum consistent with the growth rate used in the Premier Gateway Phase 1B Transportation Study¹². The 1.8% growth was determined based on forecasted traffic growth between 2016 and 2031 in the Halton Model at the time of the Phase 1B study.

Halton Region's *Traffic Impact Study Guidelines* indicates the requirement for the collection of new data for counts two years or older. Acknowledging this requirement and the current situation related to COVID-19, the ability to conduct up-to-date data collection is impacted. Travel demands and patterns are currently not representative of typical conditions and there is uncertainty when traffic conditions will return to pre-pandemic levels. As such, the Region has agreed for the use of 2016 and 2017 traffic counts to be adjusted to establish base year traffic volumes.

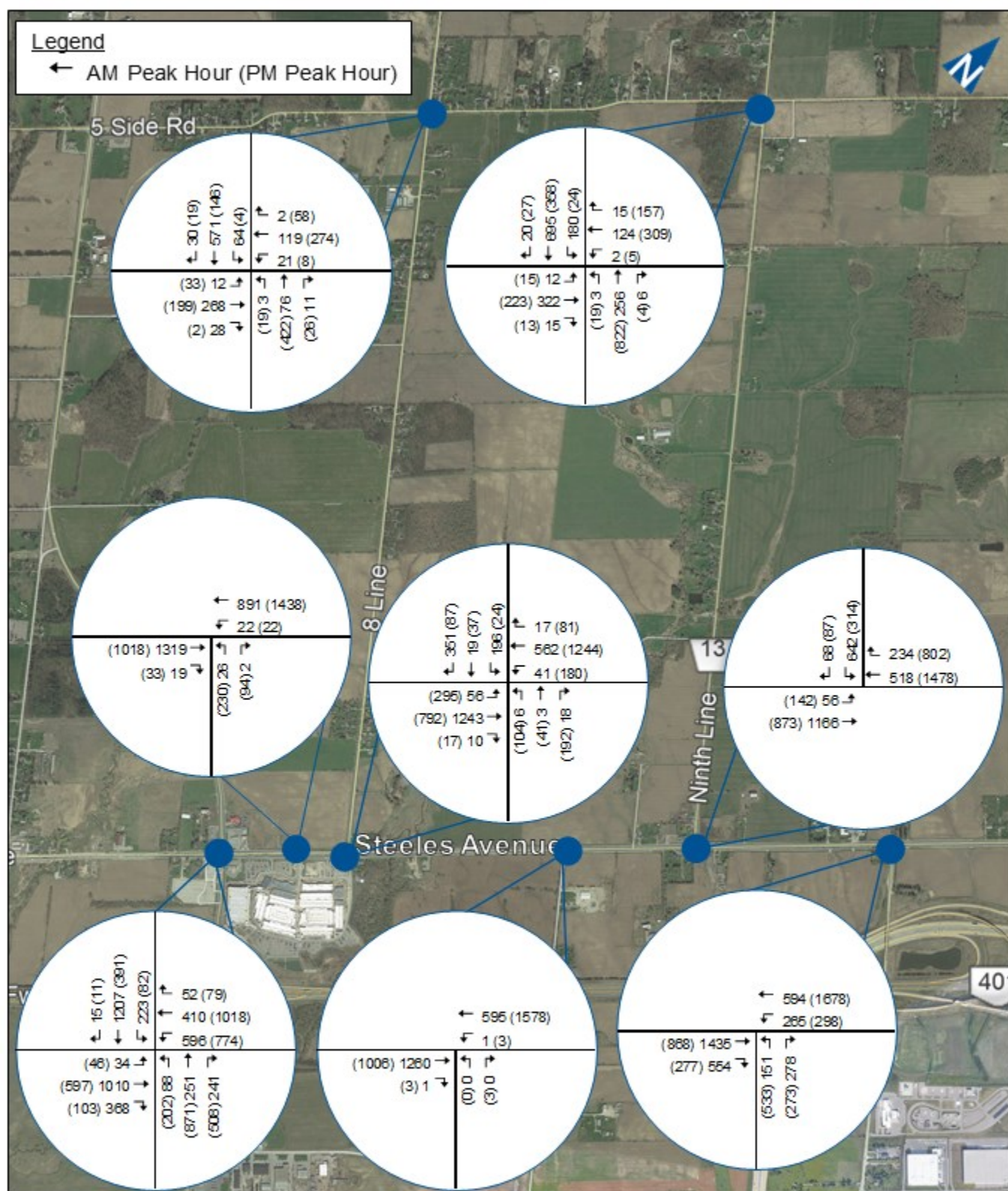
¹² Paradigm Transportation Solutions Limited, Premier Gateway West Scoped Area Transportation Study – Final Report, May 2019

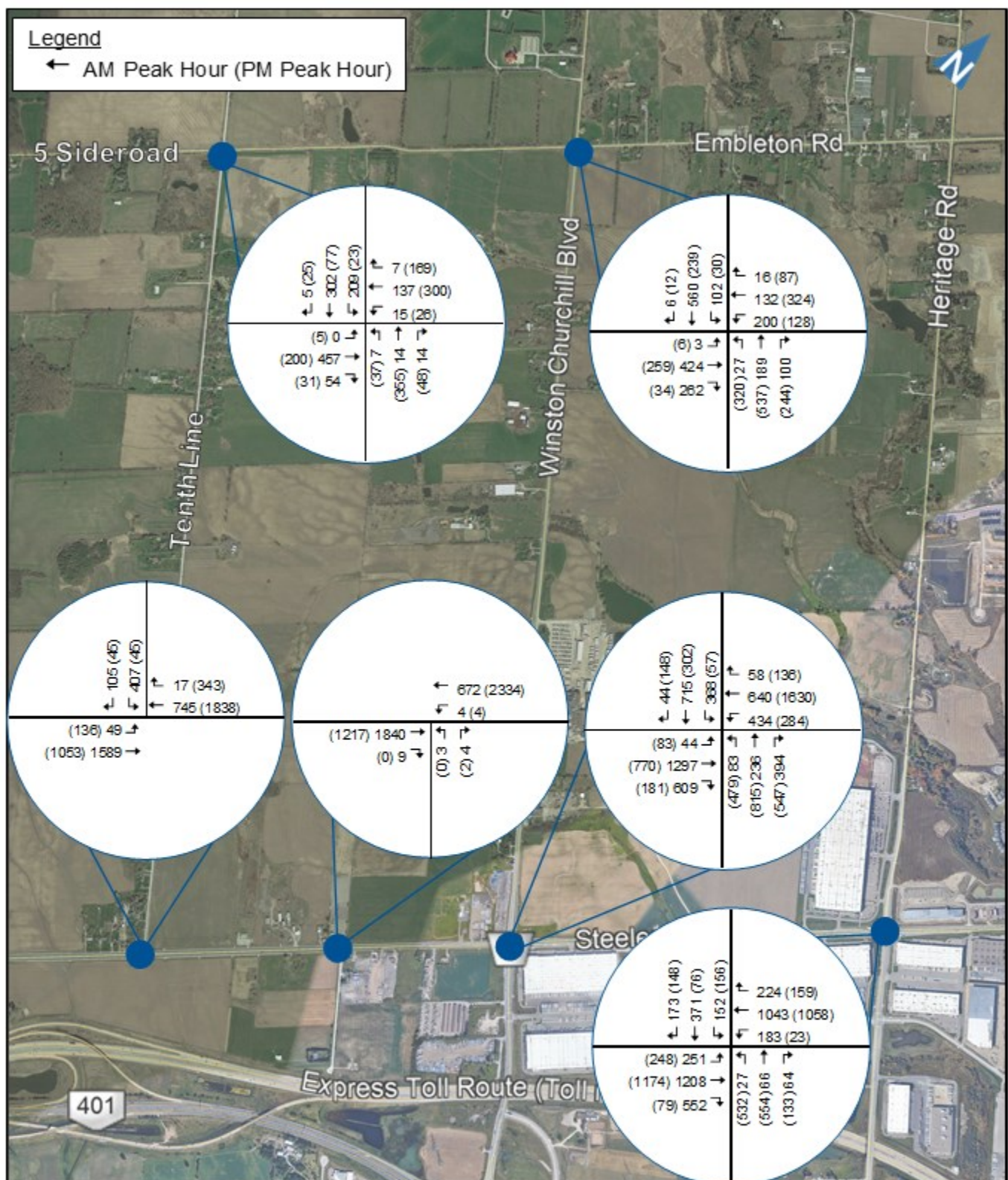


TABLE 2.1: TRAFFIC COUNT DATES

Intersection	Count Date
	Weekday
Steeles Avenue & Trafalgar Road	2019-10-29
Steeles Avenue & Toronto Premium Outlets	2019-11-07
Steeles Avenue & Eighth Line/Toronto Premium Outlets	2019-11-07
Steeles Avenue & Eighth Line South	2017-11-20
Steeles Avenue & Ninth Line	2017-05-15
Steeles Avenue & Ninth Line South	2019-11-07
Steeles Avenue & Tenth Line	2019-12-10
Steeles Avenue & Tenth Line South	2017-06-19
Steeles Avenue & Winston Churchill Boulevard	2019-11-07
Steeles Avenue & Heritage Road	2018-11-27
5 Sideroad & Eighth Line	2017-10-26
5 Sideroad & Ninth Line	2018-04-26
5 Sideroad & Tenth Line	2016-11-17
5 Sideroad & Winston Churchill Boulevard	2017-06-29







2.3 Intersection Traffic Operation

2.3.1 Methodology

Operational and capacity analyses were completed for signalized and unsignalized arterial road intersections within the Study Area to:

- ▶ Assess existing and future operating conditions;
- ▶ Identify potential traffic impacts due to the proposed Premier Gateway Phase 2B Employment Area and other development; and
- ▶ Confirm future infrastructure requirements.

The analyses were undertaken based on Highway Capacity Manual (HCM) methodologies and used Synchro 10 software.

Signalized Intersections

For signalized intersections, operation analysis focuses on performance measures such as level of service (LOS), volume-to-capacity ratios (v/c) and control delay (measured in seconds). LOS is a qualitative measure of operational performance based on control delay. LOS A is represented by a control delay of less than 10 seconds per vehicles (referred to as free-flow operating conditions), while LOS F is represented by a control delay greater than 80 seconds per vehicles (referred to as restricted flow operating conditions). In determining the LOS performance for signalized intersections, the average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the entire intersection. Capacity is evaluated in terms of the ratio of demand flow to capacity with an at capacity condition represented by a v/c ratio of 1.00 (i.e., volume demands equal capacity).

The LOS and v/c for each movement are related but calculated independently. For this reason, it is possible to have a poor intersection LOS and a low v/c ratio (or conversely a good LOS and a high v/c ratio). A LOS F does not automatically imply that the volume demands at an intersection or for a specific movement exceed the theoretical capacity, nor does a LOS better than E automatically imply that unused capacity is available.

Table 2.2 provides the criteria specified by the respective jurisdictions for determining acceptable signalized intersection operations. Individual movements experiencing a v/c ratio greater than the values specified in the table are deemed to be “critical” in terms of operation,



indicating that the movement may be considered for geometric or other improvement, such as signal optimization.

TABLE 2.2: CRITICAL MOVEMENT CRITERIA FOR INTERSECTIONS

Jurisdiction	Critical Movement Criteria	
	Signalized Intersection	Unsignalized Intersection
Halton Region ¹³	Through > 0.85	LOS on individual movements > D
	Shared through/turning > 0.85	95 th percentile queue > exceed storage
	Exclusive turn > 0.95	
	95 th percentile queue > exceed storage	
Town of Halton Hills ¹⁴	<i>Same as Halton Region</i>	<i>Same as Halton Region</i>
Peel Region ¹⁵	Shared through/turning > 0.90	Shared through/turning > 0.90
	Exclusive turn > 1.00	Exclusive turn > 1.00
	95 th percentile queue > exceed storage	95 th percentile queue > exceed storage

Unsignalized Intersections

For unsignalized intersections, LOS is determined by the computed or measured control delay and is defined for each minor (“critical”) movement. In determining the performance of unsignalized intersections, the average control delay per vehicle is estimated for each lane group and aggregated for each approach. Control delay includes the initial deceleration delay, queue move-up time, stopped delay and the final acceleration delay. The LOS criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections, primarily because different transportation facilities create different driver perceptions. The expectation is that a signalized intersection is designed to carry higher

¹³ Halton Region – Transportation Impact Study Guidelines 2015

¹⁴ Town of Halton Hills – Transportation Impact Study Guidelines 2015

¹⁵ Peel Region – Traffic Impact Study Guidelines 2021

<<https://www.peelregion.ca/pw/transportation/business/traffic-impact-study.asp>>



volumes of traffic and experience greater delay than that of an unsignalized intersection.

Table 2.2 also notes the criteria specified in the Halton Region guidelines for determining acceptable unsignalized intersection operations. LOS F occurs where there are not enough gaps of suitable size to allow the minor street demand to safely cross, turn into or through, traffic on the major street. This is evident from long control delays experienced by minor street traffic and by queuing on the minor street approaches. LOS E represents effective capacity of a movement.

Caution should be exercised when using the HCM methodology to assess unsignalized intersections. Even under low-volume traffic conditions, the HCM delay equation will often predict greater than 50 seconds of delay (LOS F) for unsignalized intersections that permit minor street left-turn movements. LOS F is commonly predicted regardless of the volume of minor street left-turning traffic. The HCM notes that “even with a LOS F estimate, most low volume minor-street approaches would not meet any of the Manual on Uniform Traffic Control Devices (MUTCD) volume or delay warrants for signalization. As a result, analysts that use the HCM level of service thresholds to determine the design adequacy of two-way stop controlled intersections should do so with caution.”

2.3.2 Analysis Results

Intersection capacity analyses were undertaken to assess existing peak hour traffic conditions for the Study Area intersections with current lane configurations. **Appendix B** summarizes the parameters used in the analysis, which included:

- ▶ Existing lane configurations.
- ▶ Calculated overall intersection peak hour factors (PHF) for the analysis time periods. The use of the PHF results in an analysis of the peak 15-minute period flow during each peak hour.
- ▶ Heavy vehicle percentages as derived from the collected traffic counts. The widening of Steeles Avenue east of the study area was in progress during some of the historical traffic counts. Due to the construction activity, a higher than average amount of truck and heavy vehicle traffic was captured in the volumes. This proportion of truck/heavy vehicles was carried forward for all horizon year analyses as it was reasoned that it would be representative of the proportion of trucks/heavy vehicles likely to access the Phase 2B Employment Area lands.



- ▶ Current timings for the signalized intersections as provided by Peel Region (for intersections on Winston Churchill Boulevard) and Halton Region (for all other signalized intersections).
- ▶ Lost time adjusted to four seconds. Lost time is the time when no vehicles are able to pass through a signalized intersection. It consists of the start-up lost time (time lost when light turns from red to green before vehicles start moving) and clearance lost time. When the road is busy, there may be vehicles eager to go when the light turn green (shortening the start-up lost time) and vehicles travelling through the intersection during yellow and red time (shortening the clearance lost time). These behaviours are captured with the total lost time and lost time adjustment.
- ▶ Synchro default values for all other inputs.

Table 2.3 and **Table 2.4** summarize the analysis results for the existing AM and PM peak hour traffic volumes, respectively. The tables denote LOS and delay for the intersection and by approach, with critical movements highlighted. **Appendix B** contains summary tables listing LOS, delay, v/c ratio, and 95th percentile queue for each movement. The appendix also provides the detailed Synchro output reports.



TABLE 2.3: EXISTING TRAFFIC OPERATIONS – AM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																Overall
		Eastbound				Westbound				Northbound				Southbound				
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
SIGNALIZED																		
Steeles & Trafalgar Rd	LOS	C	E	D	D	F	C	C	F	E	C	C	D	C	F	>	F	F
	Delay	27	57	36	51	346	24	21	205	56	33	32	36	32	165	>	144	115
	V/C	0.13	0.96	0.60		1.62	0.32	0.04		0.42	0.29	0.19		0.62	1.25	>		1.13
	Q	119	279	124		255	356	13		27	45	49		187	243	>		
	Ex Avail.	115	--	40		130	--	70		100	--	65		--	--	>		
Steeles & Toronto Premium Outlet (West)	LOS	C	B	C	C	B	B		B	C	C	C	C	C				B
	Delay		24	12	24	16	13		13	22		22	22					20
	V/C		0.81	0.01		0.19	0.49			0.02		0.00						0.51
	Q		145	9		115	247			21		3						
	Ex Avail.		--	130	121	45	--			--		40						
Steeles & Eighth Line N	LOS	C	D	C	D	B	>		B	E	B	>	C	C	C	>	C	D
	Delay	23	54	24	52	39	18	>	20	60	19	>	28	30	28	>	28	38
	V/C	0.20	0.95	0.01		0.30	0.45	>		0.05	0.02	>		0.38	0.25	>		0.62
	Q	25	158	19		104	577	>		9	11	>		84	570	>		
	Ex Avail.	105	--	55		30	--	>		--	--	>		20	--	>		
Steeles & Ninth Line (north segment)	LOS	A	A		A	C	F		D	E				C	C		F	D
	Delay	4	4		4	27	82		44					140	30		129	48
	V/C	0.14	0.62			0.34	0.17							1.18	0.10			0.84
	Q	18	55			81	43							130	624			
	Ex Avail.	65	--			75	--							90	--			
Steeles & Ninth Line (South Segment)	LOS	C	B	C	F	A			E	D		B	C					C
	Delay	26	17	23	215	2			67	40		15	24					35
	V/C	0.80	0.42		1.29	0.28				0.34		0.19						1.01
	Q	137	100		181	305				47		51						
	Ex Avail.	--	75		145	--				60		--						
Steeles & Tenth Line (north segment)	LOS	C	D		D	C	>		C					D		C	D	D
	Delay	25	48		48	21	>		21					46	29	42	40	0.81
	V/C	0.16	0.82			0.46	>							0.73	0.07			
	Q	60	134			82	>							112	22			
	Ex Avail.	100	--			--	>							50	--			
Steeles & Winston Churchill Blvd [Peel]	LOS	C	E	D	E	F	B	A	D	D	D	E	D	D	D	D	E	D
	Delay	29	64	53	60	94	12	2	43	39	45	55	50	80	51	39	60	55
	V/C	0.15	0.97	0.80		0.91	0.40	0.04		0.25	0.24	0.58		0.95	0.66	0.03		0.95
	Q	136	373	241		81	55	0		22	58	58		98	646	595		
	Ex Avail.	150	--	190		115	--	115		115	--	115		135	--	125		
Steeles & Heritage Rd [Peel]	LOS	E	C	B	C	D	F	>	F	E	E	E	E	D	E	>	E	E
	Delay	63	27	15	28	54	118	>	110	58	57	56	57	48	61	>	58	62
	V/C	0.65	0.83	0.60		0.77	1.13	>		0.36	0.13	0.05		0.48	0.75	>		0.90
	Q	80	556	88		61	162	>		11	24	9		24	88	>		
	Ex Avail.	160	--	105		250	--	>		120	--	90		155	--	>		
5 Side Rd & Ninth Line	LOS	<	C	>	C	<	B	>	B	<	A	>	A	<	D	>	D	D
	Delay	<	25	>	25	<	19	>	19	<	8	>	8	<	53	>	53	37
	V/C	<	0.67	>		<	0.26	>		<	0.28	>		<	1.03	>		0.90
	Q	<	70	>		<	25	>		<	44	>		<	399	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	C	>	C	<	F	>	F	C	C	C	C	B	D	>	D	D
	Delay	<	25	>	25	<	96	>	96	22	25	22	24	18	46	>	42	43
	V/C	<	0.79	>		<	1.08	>		0.19	0.32	0.06		0.24	0.90	>		0.97
	Q	<	114	>		<	545	>		16	54	24		48	176	>		
	Ex Avail.	<	--	>		<	--	>		110	--	85		30	--	>		
UNSIGNALIZED																		
Steeles & Eighth Line (south section)	LOS		A	>	A	B	A		A	A		A	A					
	Delay		0	>	0	12	0		0	0		0	0					
	V/C		0.53	>		0.00	0.19			0.00		0.00						
	Q		0	>		1	0			0		0						
	Ex Avail.		--	>		90	--			30		--						
Steeles & Tenth Line (south segment)*	LOS		A	>	A	C	A		A	F		C	F					
	Delay		0	>	0	21	0		0	118		22	63					
	V/C		0.74	>		0.02	0.20			0.09		0.02						
	Q		0	>		5	0			4		9						
	Ex Avail.		--	>		70	--			--		45						
5 Side Rd & Eighth Line N	LOS	<	C	>	C	<	B	>	B	<	B	>	B	<	F	>	F	
	Delay	<	21	>	21	<	14	>	14	<	12	>	12	<	164	>	164	
	V/C	<	0.66	>		<	0.33	>		<	0.21	>		<	1.29	>		
	Q	<	55	>		<	24	>		<	20	>		<	129	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
5 Side Rd & Tenth Line	LOS	<	F	>	F	<	B	>	B	<	B	>	B	<	F	>	F	
	Delay	<	79	>	79	<	14	>	14	<	12	>	12	<	89	>	89	
	V/C	<	1.06	>		<	0.37	>		<	0.09	>		<	1.09	>		
	Q	<	88	>		<	21	>		<	12	>		<	85	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



TABLE 2.4: EXISTING TRAFFIC OPERATIONS – PM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																
		Eastbound				Westbound				Northbound				Southbound				Overall
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
SIGNALIZED																		
Steeles & Trafalgar Rd	LOS	D	D	D	D	F	D	C	F	E	C	C	D	C	C	>	C	E
	Delay	40	55	39	52	237	46	27	125	59	34	30	36	29	32	>	31	73
	V/C	0.39	0.83	0.08		1.39	0.88	0.05		0.61	0.66	0.43		0.46	0.37	>		0.89
	Q	129	269	107		256	349	29		52	103	82		35	52	>		
	Ex Avail.	115 -14	-	40 -67		130 -126	-	70 41		100 48	-	65 -17		-	-	>		
Steeles & Toronto Premium Outlet (West)	LOS		C	B	C	B	C		C	C		C	C					C
	Delay		21	13	21	14	22		22	23		21	22					22
	V/C		0.66	0.02		0.12	0.82			0.21		0.07						0.61
	Q		102	11		104	232			99		25						
	Ex Avail.		-	130 119		45 -59	-			-	-	40 15						
Steeles & Eighth Line N	LOS	F	C	C	F	B	D	>	D	D	C	>	C	D	D	>	D	D
	Delay	225	33	24	84	18	41	>	38	54	24	>	33	35	36	>	36	54
	V/C	1.35	0.62	0.01		0.63	1.02	>		0.30	0.19	>		0.08	0.16	>		0.84
	Q	147	138	9		157	1041	>		57	50	>		25	64	>		
	Ex Avail.	105 -42	-	55 46		30 -127	-	>		-	-	>		20 -5	-	>		
Steeles & Ninth Line (north segment)	LOS	F	A		B	C	C		C					D	D	>	D	C
	Delay	86	6		17	28	32		30					52	36		49	28
	V/C	0.79	0.41			0.83	0.63							0.72	0.06			0.79
	Q	56	69			393	97							113	60			
	Ex Avail.	65 9	-	-		-	75 -22			-	-	>		90 -23	-	>		
Steeles & Ninth Line (South Segment)	LOS		B	B	B	C	A		A	F		B	F					C
	Delay		13	11	12	29	1		5	159		17	111					29
	V/C		0.52	0.18		0.78	0.75			1.21		0.18		0.69				0.91
	Q		91	60		78	68			68		--		--				
	Ex Avail.		--	75 16		145 67	--			60 -8		--		--				
Steeles & Tenth Line (north segment)	LOS	D	C		C	F	>		F					D		D	E	
	Delay	48	30		32	107	>		107					36		35	80	
	V/C	0.74	0.49			1.16	>							0.10	0.03		0.81	
	Q	54	117			244	>							25	13			
	Ex Avail.	100 47	--	-		--	>							50 26	--	-		
Steeles & Winston Churchill Blvd [Peel]	LOS	D	D	D	D	F	D		F	C	D	D	D	D	D	D	D	E
	Delay	50	47	36	45	39	136	48	117	28	38	39	36	37	40	37	39	68
	V/C	0.64	0.66	0.13		0.59	1.19	0.13		0.52	0.57	0.55		0.30	0.26	0.10		0.85
	Q	37	122	11		163	1258	166		150	141	161		32	49	31		
	Ex Avail.	150 113	--	190 179		115 -48	--	115		115 -35	--	115 -46		135 104	--	125 94		
Steeles & Heritage Rd [Peel]	LOS	D	B	A	C	C	E		E	F	E	D	F	E	E		E	E
	Delay	44	19	4	22	32	69		69	276	62	50	154	68	60		63	76
	V/C	0.69	0.65	0.07		0.18	0.98			1.47	0.74	0.10		0.77	0.24			1.08
	Q	110	590	15		112	451			96	96	48		54	52			
	Ex Avail.	160 50	--	105 90		250 138	--	--		120 24	--	90 42		155 101	--	--		
5 Side Rd & Ninth Line	LOS	<	B	>	B	<	C	>	C	<	C	>	C	<	B	>	B	C
	Delay	<	20	>	20	<	28	>	28	<	34	>	34	<	12	>	12	26
	V/C	<	0.43	>		<	0.77	>		<	0.94	>		<	0.49	>		0.88
	Q	<	74	>		<	74	>		<	148	>		<	110	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	C	>	C	<	E	>	E	B	C	B	C	C	C	>	C	D
	Delay	<	21	>	21	<	78	>	78	18	30	18	24	20	29	>	28	37
	V/C	<	0.44	>		<	1.05	>		0.67	0.76	0.17		0.14	0.49	>		0.90
	Q	<	60	>		<	332	>		49	79	31		23	55	>		
	Ex Avail.	<	--	>		<	--	>		110 62	--	85 54		30 7	--	>		
UNSIGNALIZED																		
Steeles & Eighth Line (south section)	LOS		A	>	A	B	A		A	A		B	B					
	Delay		0	>	0	10	0		0	0		14	14					
	V/C		0.41	>		0.00	0.48			0.00		0.01						
	Q		0	>		25	447			0		5						
	Ex Avail.		--	>		90 65	--			30 30		--						
Steeles & Tenth Line (south segment)*	LOS		A	>	A	C	A		A	C		A	C					
	Delay		0	>	0	16	0		0	17		0	17					
	V/C		0.51	>		0.01	0.73			0.01		0.00						
	Q		0	>		6	265			0		6						
	Ex Avail.		--	>		70 64	--			--		45 39						
5 Side Rd & Eighth Line N	LOS	<	D	>	D	<	F	>	F	<	F	>	F	<	C	>	C	
	Delay	<	29	>	29	<	60	>	60	<	189	>	189	<	21	>	21	
	V/C	<	0.71	>		<	0.96	>		<	1.34	>		<	0.53	>		
	Q	<	39	>		<	44	>		<	53	>		<	21	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
5 Side Rd & Tenth Line	LOS	<	D	>	D	<	F	>	F	<	F	>	F	<	C	>	C	
	Delay	<	29	>	29	<	208	>	208	<	156	>	156	<	18	>	18	
	V/C	<	0.72	>		<	1.39	>		<	1.26	>		<	0.42	>		
	Q	<	41	>		<	47	>		<	43	>		<	16	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



Overall, the Study Area intersections currently operate with satisfactory levels of service and within capacity ($v/c \leq 1.00$) for both peak hours analyzed, except for:

- ▶ Steeles Avenue and Trafalgar Road during the AM peak hour;
- ▶ Steeles Avenue and Ninth Line (South Segment) during the AM peak hour; and
- ▶ Steeles Avenue and Heritage Road during the PM peak hour.

A significant number of approaches experience less than satisfactory levels of service (LOS F) and delay.

The following critical movements were identified at the Study Area intersections:

- ▶ Steeles Avenue and Trafalgar Road (signalized):
 - The eastbound left-turn lane 95th percentile queue length exceeds available storage during the AM and PM peak hours.
 - The eastbound through movement operates at LOS E ($v/c > 0.95$) during the AM peak hour.
 - The eastbound right-turn lane 95th percentile queue length exceeds available storage during the AM and PM peak hours.
 - The westbound left-turn movement operates at LOS F ($v/c > 1.00$) during the AM and PM peak hours. The 95th percentile queue length exceeds available storage during the AM and PM peak hours.
 - The westbound through movement operates at LOS D ($v/c > 0.85$) during the PM peak hour.
 - The northbound right-turn lane 95th percentile queue length exceeds available storage during the PM peak hour.
 - The southbound through movement operates at LOS F ($v/c > 1.00$) during the AM peak hour.
 - The overall intersection operates with a LOS E or worse (v/c ratio > 0.85) during the AM and PM peak hours.
- ▶ Steeles Avenue and Toronto Premium Outlets (West) (signalized):
 - The westbound left-turn lane 95th percentile queue length exceeds available storage during the AM and PM peak hours.



- ▶ Steeles Avenue and Eighth Line North/Toronto Premium Outlets (signalized):
 - The eastbound left-turn movement operates at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length exceeds available storage during the PM peak hour.
 - The eastbound through movement operates at LOS E ($v/c > 0.90$) during the AM peak hour.
 - The westbound left-turn lane 95th percentile queue length exceeds available storage during the AM and PM peak hours.
 - The westbound through movement operates at LOS D ($v/c > 1.00$) during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length exceeds available storage during the AM and PM peak hours.
- ▶ Steeles Avenue and Ninth Line (North Segment) (signalized):
 - The westbound right-turn lane 95th percentile queue length exceeds available storage during the PM peak hour.
 - The southbound left-turn movement operates at LOS F ($v/c > 1.00$) during the AM peak hour. The 95th percentile queue length exceeds available storage during the AM and PM peak hours.
- ▶ Steeles Avenue and Ninth Line (South Segment) (signalized):
 - The eastbound right-turn lane 95th percentile queue length exceeds available storage during the AM peak hour.
 - The westbound left-turn movement operates at LOS F ($v/c > 1.00$) during the AM peak hour. The 95th percentile queue length exceeds available storage during the AM peak hour.
 - The northbound left-turn movement operates at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length exceeds available storage during the PM peak hour.
- ▶ Steeles Avenue and Tenth Line (North Segment) (signalized):
 - The westbound through movement operates at LOS F ($v/c > 1.00$) during the PM peak hour.



- The southbound left-turn lane 95th percentile queue length exceeds available storage during the AM peak hour.
- ▶ Steeles Avenue and Winston Churchill Boulevard [Peel] (signalized):
 - The eastbound through movement operates at LOS E ($v/c > 0.95$) during the AM peak hour.
 - The eastbound right-turn lane 95th percentile queue length exceeds available storage during the AM peak hour.
 - The westbound left-turn lane operates at LOS F ($v/c > 0.90$) during the AM peak hour. The 95th percentile queue length exceeds available storage during the PM peak hour.
 - The westbound through movement operates at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The northbound left-turn lane 95th percentile queue length exceeds available storage during the PM peak hour.
 - The northbound right-turn lane 95th percentile queue length exceeds available storage during the PM peak hour.
 - The southbound left-turn lane operates at LOS E ($v/c > 0.95$) during the AM peak hour.
 - The southbound right-turn lane 95th percentile queue length exceeds available storage during the AM peak hour.
 - The overall intersection operates at a LOS D ($v/c > 0.95$) in the AM peak hour.
- ▶ Steeles Avenue and Heritage Road [Peel] (signalized):
 - The westbound through movement operates at a LOS E or worse ($v/c > 0.95$) during the AM and PM peak hours.
 - The northbound left-turn movement operates at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The overall intersection operates at a LOS E ($v/c > 1.00$) in the PM peak hour.
- ▶ 5 Side Road and Ninth Line (signalized):



- The northbound shared left/through/right movement operates at LOS C ($v/c > 0.90$) during the PM peak hour.
- The southbound shared left/through/right movement operates at LOS D ($v/c > 1.00$) during the AM peak hour.
- ▶ 5 Side Road and Winston Churchill Boulevard [Peel] (signalized):
 - The westbound shared left/through/right movement operates at LOS E ($v/c > 1.00$) during the AM and PM peak hours.
 - The southbound left-turn lane 95th percentile queue length exceeds available storage during the AM peak hour.
 - The southbound shared through/right movement operates at LOS D ($v/c > 0.90$) during the AM peak hour.
 - The overall intersection operates at a LOS E or worse ($v/c > 0.95$) in the AM peak hour.
- ▶ Steeles Avenue and Tenth Line (unsignalized):
 - The northbound left-turn movement operates at LOS F ($v/c > 0.05$) during the AM peak hour.
- ▶ 5 Side Road and Eighth Line North (unsignalized):
 - The westbound shared left/through/right movement operates at LOS F ($v/c > 0.95$) during the PM peak hour.
 - The northbound shared left/through/right movement operates at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound shared left/through/right movement operates at LOS F ($v/c > 1.00$) during the AM peak hour.
- ▶ 5 Side Road and Tenth Line (unsignalized):
 - The eastbound shared left/through/right movement operates at LOS F ($v/c > 1.00$) during the AM peak hour.
 - The westbound shared left/through/right movement operates at LOS F ($v/c > 1.00$) during the PM peak hour.



- The northbound shared left/through/right movement operates at LOS F ($v/c > 1.00$) during the PM peak hour.
- The southbound shared left/through/right movement operates at LOS F ($v/c > 1.00$) during the AM peak hour.



3 Traffic Forecasts

3.1 Land Use Plan

The land use plan was developed by Macaulay Shiomi Howson Ltd. with input from various technical disciplines. It was then refined through discussions with stakeholders and input from the public. It is shown in **Figure 3.1**. The total area of land with each designation is shown in **Table 3.1**.

TABLE 3.1: LAND USE DESIGNATIONS

Designation	Area (ha.)
Prestige Industrial	182
<i>with Residential SPA overlay</i>	11
<i>with Supportive Commercial overlay</i>	3.7
<i>without any overlay</i>	166
Natural Heritage System	45
Hwy 413 Preferred Route	58
Existing roads rights-of-way	5.9
Total	291

The map shows that most of the land in the study area is allocated to “prestige industrial” (shown in purple). This category includes warehousing and manufacturing uses.

Land in the northwest corner of Steeles Ave & Winston Churchill Blvd is allocated to “service commercial” (orange cross-hatching). This permits commercial uses orientated towards people who work in the study area. The supportive commercial designation is an overlay, so that prestige industrial uses are also permitted.

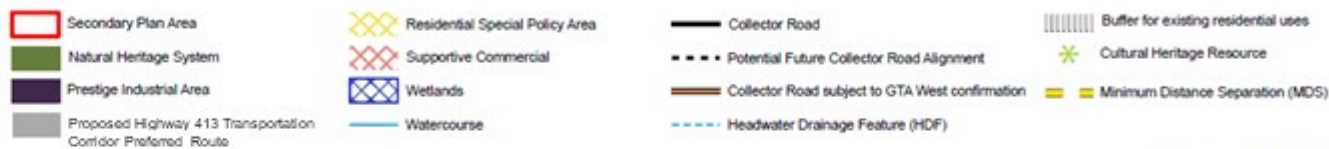
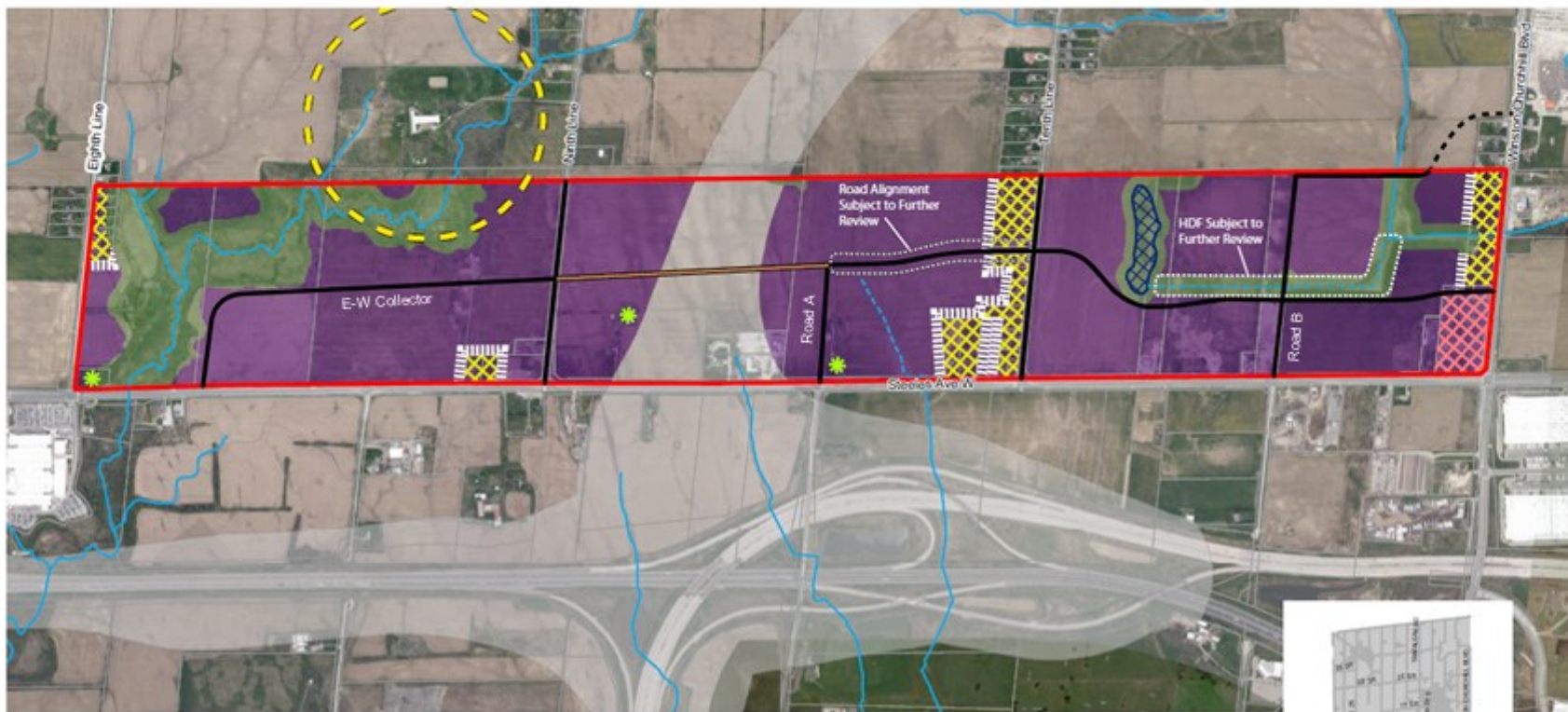
The land use plan also includes “Residential Special Policy Area” (yellow cross-hatching). These overlay parts of the prestige industrial lands. In these areas, existing residential uses are allowed (in addition to the uses permitted in the prestige industrial areas).

Areas that are part of the Natural Heritage System (shown in green) would not have any new development. Similarly, the area designated “Proposed Highway 413 Transportation Corridor Preferred Route” (shown in grey) would not have any development permitted unless MTO cancelled their plans for the freeway in this corridor.



The road network shown in the land use plan illustrates the broad functionality and approximate locations only. The analysis in this document will confirm whether this can adequately serve the transportation needs in the study area. Some land in the study area is already allocated to road rights of way; new roads would generally require additional land.





August 2021

Town of Halton Hills Official Plan



Premier Gateway Employment Area
Phase 2B
PREFERRED LAND USE CONCEPT



Preferred Land Use Concept

3.2 Road Network Assumptions

3.2.1 Planned and Recent Improvements

Section 1.4 summarized the various plans relating to the transportation system in and around the study area. Changes to the 2031 modelled road network were made in line with the following documents:

► **Halton Region Transportation Master Plan**

- Widening Trafalgar Road from 4 to 6 lanes between Britannia Road to Steeles Avenue and 2 to 4 lanes between Steeles Avenue and 10 Side Road.
- Widening of Steeles Avenue from 4 to 6 lanes between Regional Road 25 and Winston Churchill Boulevard;
- Widening Ninth Line from 2 to 4 lanes from Steeles Avenue to 10 Side Road;
- Widening Winston Churchill Boulevard 4 to 6 lanes between Hwy 401 and Steeles Avenue;
- Widening Winston Churchill Boulevard 5 to 7 lanes between Steeles Avenue and 2 km south of Embleton Road; and
- Widening Winston Churchill Boulevard 4 to 6 lanes between 2 km south of Embleton Road and Embleton Road.

► **Steeles Avenue from Winston Churchill Boulevard to Chinguacousy/Mavis Road EA Study (Region of Peel)**

- Widening of Steeles Avenue from 4 to 6 lanes between from Winston Churchill Boulevard to Chinguacousy/Mavis Road;

► **Trafalgar Road Corridor Study**

- Widening Trafalgar Road from 2 to 4 lanes between Steeles Avenue and 10 Side Road;

► **Ninth Line Corridor Study**

- Widening Ninth Line from 2 to 4 lanes from Steeles Avenue to 10 Side Road;
- Dedicated left-turn lanes for all approaches at Ninth Line at 5 Side Road;

► **Winston Churchill Boulevard EA Corridor Study**



- Widening Winston Churchill Boulevard (Regional Road 19) from 4 to 6 lanes between Hwy 401 and 5 Side Road/Embleton (confirmed through discussions with Regional staff)

► **Eighth Line EA Corridor Study**

- Widening Eighth Line between Steeles Avenue and 10 Side Road from 2 to 3 lanes

A new freeway in the Hwy 413 Corridor is being actively investigated by MTO. This would have a significant impact on how traffic would move in and around the study area. However, implementation yet to be approved or funded, and no timeline for delivery has been published. Consequently, the presence of Hwy 413 will be assessed as a sensitivity test.

Hwy 413 is assumed to connect from the Hwy 407 and Hwy 401 interchange to Hwy 400 north of Kirby Road. A Hwy 413 interchange is assumed at Winston Churchill Boulevard, approximately 600 m south of 5 Side Road.

The Hwy 401 westbound off-ramp at Winston Churchill was widened in the summer of 2021 from three to four westbound lanes (two left-turn lanes, two right-turn lanes). For the purpose of this study, the four-lane configuration is in place for the future background and future total networks.

3.2.2 Proposed Road Network within Phase 2B Lands

As shown in **Figure 3.1**, the study area would be served by the following existing roads:

- Steeles Ave
- Eighth Line (north of Steeles)
- Ninth Line (north of Steeles)
- Tenth Line (north of Steeles)
- Winston Churchill Blvd

The study area would also be served by the following new roads:

- A new collector road running through the study area from Steeles Avenue (at the western end of the study area) northwards, then generally eastwards to Winston Churchill Blvd (known as “**the East-West Collector Road**”)



- ▶ An extension of Ninth Line (south of Steeles) northwards to the East-West Collector Road (known as “**Road A**”)
- ▶ An extension of Tenth Line (south of Steeles) northwards past the East-West Collector Road to the north edge of the study area, then eastwards to Winston Churchill Blvd (known as “**Road B**”)

At the intersection of the new roads to Steeles Avenue exclusive left-turn lanes are assumed to be implemented. At the new connections to Winston Churchill Boulevard, shared left-right turn lanes are assumed. Prior to the planned regional road capital improvements, the new road connections to regional roads are assumed to have the configurations noted above. In addition, it is assumed the intersections of these existing roads with the new roads will be signalized.

Three other existing roads have intersections on the boundary of the study area:

- ▶ Eighth Line (south of Steeles)
- ▶ Ninth Line (south of Steeles), which provides access across Hwy 401 and Hwy 407 to Mississauga.
- ▶ Tenth Line (south of Steeles)

It is assumed that if Hwy 413 in place, the East-West Collector Road would not connect from Ninth Line to Road A (unless stated otherwise). Road A would be assumed to connect to Ninth Line South.

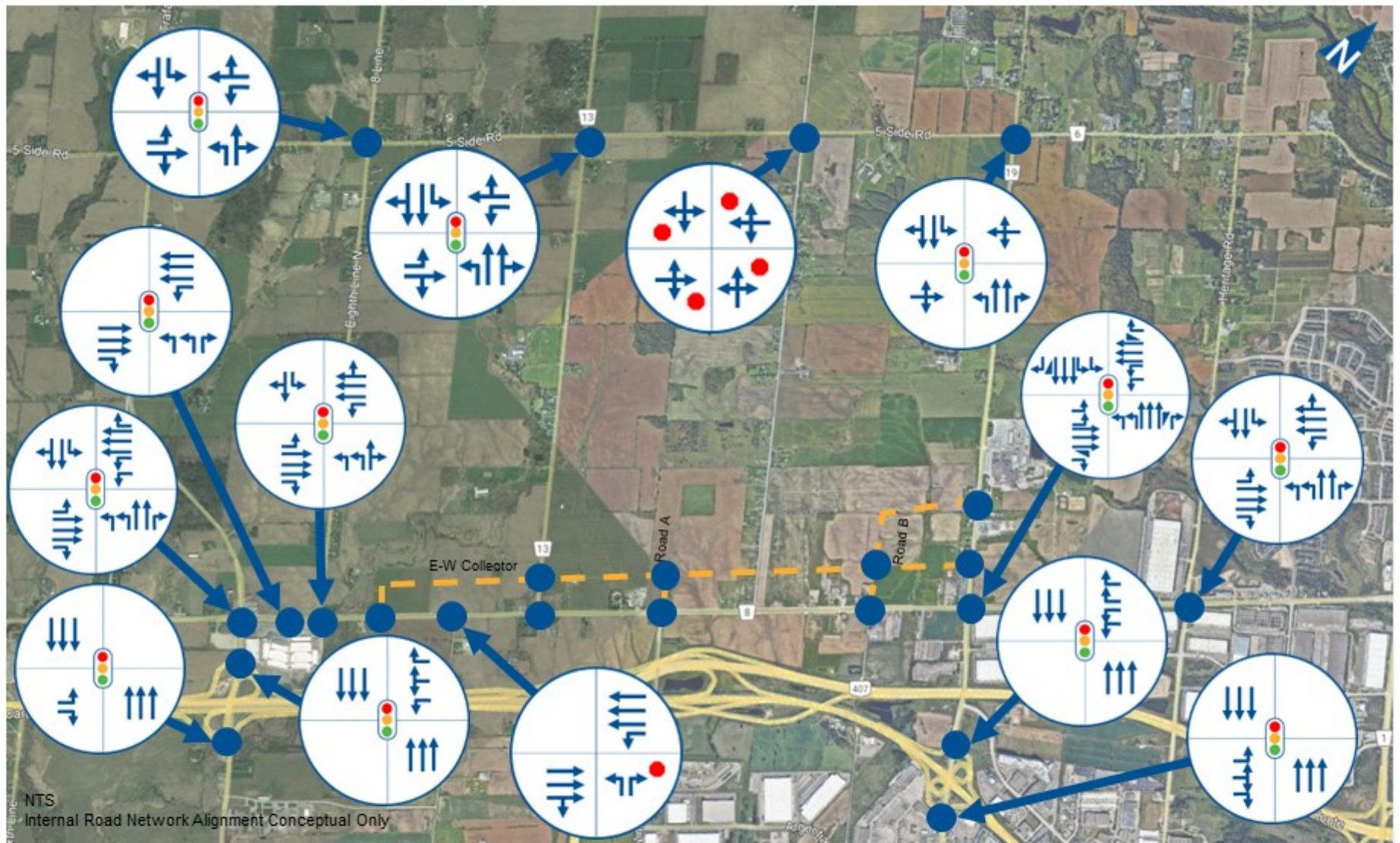
Road B's connection to Winston Churchill Blvd would be outside the study area, and hence would require additional assessment of its environmental impacts beyond this study. However, this study will assume a connection reasonably close to the northeast corner of the study area. If Road B does not connect to Winston Churchill, traffic using that connection are assumed to use the East-West Collector Road at Winston Churchill Blvd connection. The volume of vehicles estimated to be impacted by this diversion is low and not expected to significantly impact traffic operations.

For 2021 scenarios, all existing roads were initially modeled with the current configurations. The three new roads (the East-West Collector Road, Road A, and Road B) were initially modelled as two-lane collector roads. For 2031 scenarios, the configurations of existing roads were changed in line with section 3.2.1; all other roads were initially modelled in the same configuration as for 2021.

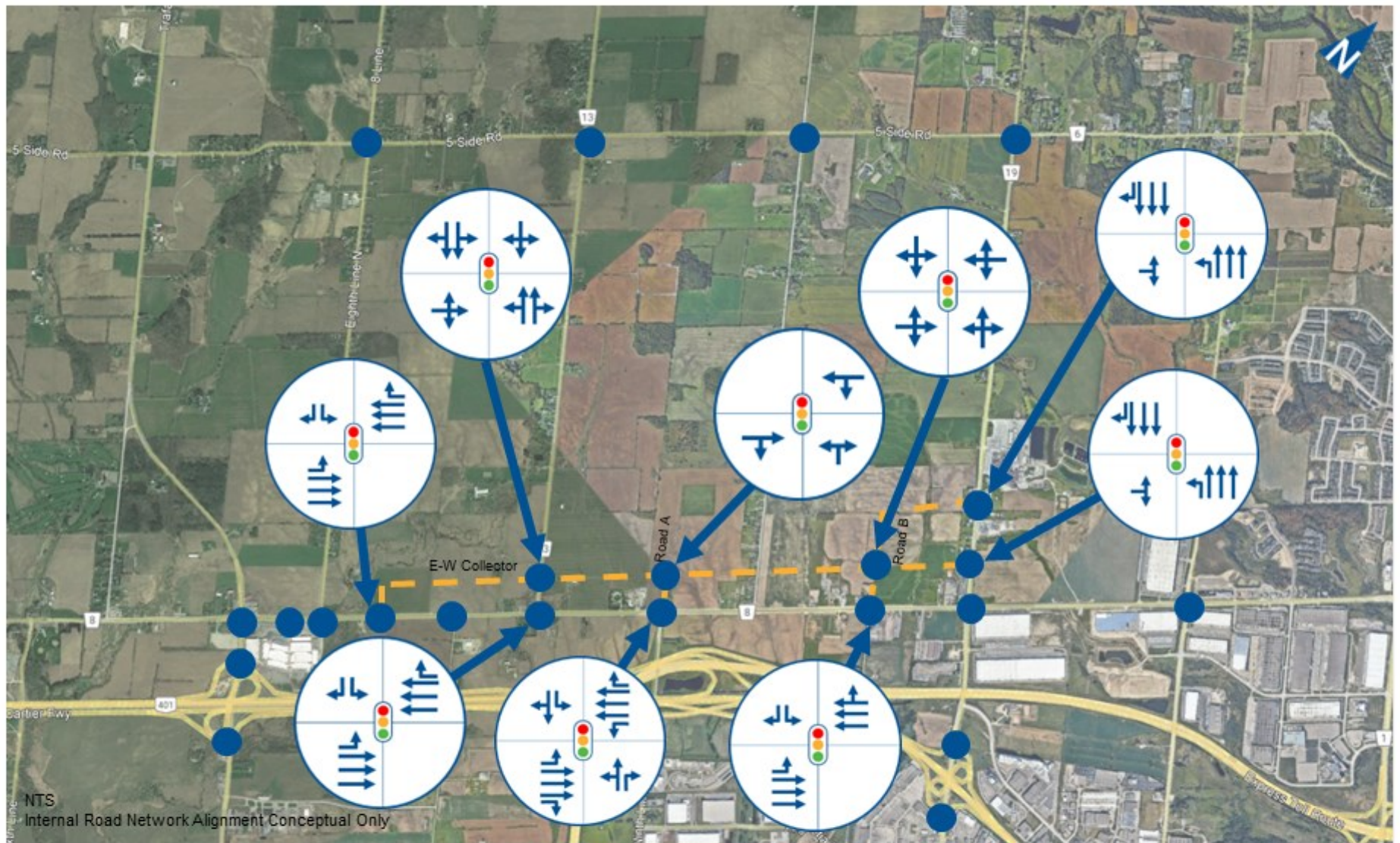
Figure 3.2 illustrates the proposed future road network with planned improvements.







Proposed Future Road Network with Planned Improvements (1/2)



Proposed Future Road Network with Planned Improvements (2/2)

3.3 Trip Generation

Road traffic generated by the study area falls into two groups:

- ▶ Personal trips to/from the study area; and
- ▶ Goods movement trips to/from the study area by trucks.

These two groups will be considered separately throughout the trip generation, distribution, and assignment process. For the purposes of this study, “trucks” includes both single-unit and articulated trucks.

3.3.1 Personal Vehicle Trips

Personal vehicle (PV) trips to the site includes employees of the subject lands travelling to/from the study area as well as non-employees of the site traveling to/from the study area.

Residential Trips

The residential portion of the subject lands as shown previously in **Figure 3.1**, already exists. It is assumed PV trips to these residential lands is already captured in existing traffic counts and thus, is excluded from the trip generation calculation.

Industrial Trips

The Institute of Transportation Engineers (ITE) Trip Generation¹⁶ methods are used to estimate the trip generation by the industrial lands. Land Use Code (LUC) 130 Industrial Park was used to estimate the industrial trip generation. “Industrial Park” land use is described by ITE as “manufacturing, service, and warehouse facilities with a wide variation in the proportion of each type of use from location to another”.

The ITE equation estimates the number of industrial trips generated per employee of the subject lands. The number of employees for the industrial lands was estimated based on a rate of 25 jobs per net hectare of land.¹⁷ Net hectare is defined as land area excluding environmental features and the Hwy 413 Corridor with an 80% net to gross ratio for developable land area. It is also assumed one job is equivalent to one employee.

Commercial Trips

¹⁶ Trip Generation Tenth Edition, Institute of Transportation Engineers, Washington D.C., 2017

¹⁷ This is lower employment density than was assumed for the Phase 1B lands, and reflects input from Phase 2B study area landowners on likely uses.



The commercial trip generation was estimated using the 2016 Transportation Tomorrow Survey¹⁸ (TTS) data for the commercial development at southwest corner of Hwy 401 and James Snow Parkway. This commercial development includes retail, banks, restaurants, and a grocery store. The TTS data provides information on the number of trips going to and from this commercial development during the AM and PM peak hours. With the trip information and parcel sizes measured from aerial images, a commercial trip generation rate per parcel size was determined. TTS data used to calculate commercial trip generation can be found in **Appendix C**.

3.3.2 Trucks

To estimate the truck traffic generated for the study, trip generation surveys were conducted for an existing development near the Phase 2B study area exhibiting a similar mix of land uses anticipated for the secondary plan area.

The surveyed site area was in Halton Hills on the north side of Steeles Avenue near the intersection of Fifth Line North. The area primarily features industrial and warehouse uses (like those planned for the Phase 2B Employment Area), with development configured in a cluster of eight buildings.

The survey was conducted in July 2021, collecting traffic count data over a 24-hour period on a weekday and a Saturday. Vehicles were classified into light-duty (cars and vans), buses, bicycles on road, single-unit trucks and articulated trucks. For this study, “trucks” includes both single-unit and articulated trucks.

Truck trip generation rates were calculated dividing the observed number of trucks entering and exiting by the size of the industrial parcel (in hectares). Truck trip generation rates were calculated by lot size to align with future development plans which only provide lot size for industrial developments.

Appendix D contains the detailed truck trip generation tables.

The rates that will be used for truck trip generation are shown in **Table 3.2**, along with the split between inbound and outbound truck traffic. The “peak hour” corresponds to the peaks for traffic of all classes, not just trucks.

¹⁸ Transportation Tomorrow Survey 2016, University of Toronto Data Management Group.



TABLE 3.2: TRUCK TRIP GENERATION RATES

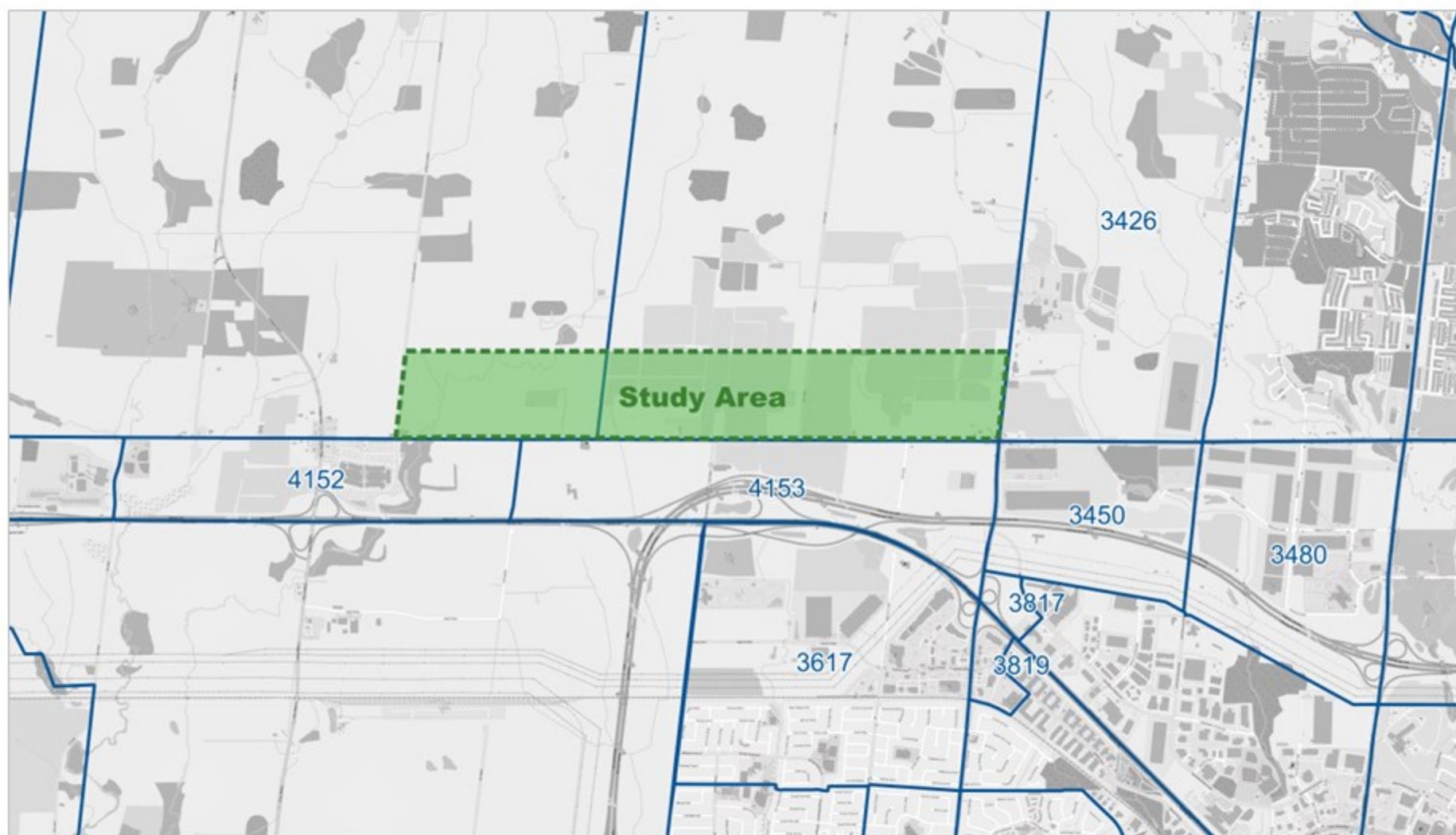
Time period	Trucks per hectare	Inbound	Outbound
Weekday AM peak hour	0.95	62%	38%
Weekday PM peak hour	1.33	62%	38%
Weekday 24-hour	18.97	50%	50%
Saturday midday peak hour	0.21	63%	38%
Saturday 24-hour	1.67	48%	525

3.4 Trip Mode Split

The mode split was estimated based on the distance from the study area to residential areas, the observed mode split for trips to similar nearby employment areas, and planned future transport infrastructure and services. In all cases, the assumptions were conservative in nature, erring on the side of higher traffic volumes.

The observed mode split was based on TTS zones 3426, 3450, 3480, 3617, 3817, 3819, 4152 and 4153. These zones are show in **Figure 3.3**. They were chosen because there are close to the study area and have general industrial / warehousing land uses that are similar to those expected for the study area.





TTS Zones Used For Trip Mode Split and Distribution

3.4.1 Walking

No part of the study area is within 1.8km of an existing or planned residential area. In general, the commute distance for employees in the study area will be higher than. Consequently, the walk mode share was assumed to be 0%.

3.4.2 Cycling

The observed cycling mode share for commute trips by people working in the selected zones is 0.08%. Only one zone (3817) has a non-zero cycling mode share. This zone is located closer to residential areas than any part of the study area. Consequently, the walk mode share for commutes to the study area was assumed to be 0%.

3.4.3 Transit

As mentioned in section 1.4.6, the *Town of Halton Hills Transit Service Strategy* report recommended the implementation of two routes that would serve the study area:

- ▶ Between Milton GO station and Lisgar GO station via Steeles Avenue, running every 30 minutes all day Monday-Saturday. This would provide transit connections for study area employees living in Milton, Mississauga and Brampton. The report provided a ridership estimate of 2,800 daily passenger trips.
- ▶ Between the Toronto Premium Outlets Mall and Georgetown via Ninth Line, running every 60 minutes all day Monday-Saturday. This provide transit connections for study area employees living in Georgetown. The report provided a ridership estimate of 500 daily passenger trips.

However, the report did provide any data that could indicate how many of those riders would come from study employees (as opposed to people traveling between places outside the study area). Consequently, a transit mode split of 3% was chosen based on that observed with similar transit service levels and land uses, both near the study area and elsewhere in the GTHA.

3.4.4 Auto Passenger

The 97% of trips not done by active transportation or transit were assigned to auto-based modes. The key differentiation is between auto-based modes that do and do not result in vehicle trips. Trips by taxi or paid rideshare generate vehicle trips, as do auto driver trips. On the other hand, auto passenger trips do not result in a vehicle trips.



It was found that 8.3% of all auto-based trips were auto passenger trips. Consequently, 8.3% of 97% of commute trips (that is, 8.1%) to the study area were assumed to be auto passenger trips.

3.4.5 Auto Driver

Any trips not allocated to other modes were allocated to auto driver. This meant that 88.9% of commute trips to the study area were assumed to be auto driver trips. (Equivalently, the number of vehicle trips is 88.9% of all trips for commute purposes.)

3.4.6 Summary

The mode shares and rationale for commute trips for the study area summarized in **Table 3.3**.

TABLE 3.3: STUDY AREA COMMUTE MODE SPLIT

Mode	Share	Rationale
Walk	0.0%	Distance from residential areas
Cycle	0.0%	Observed mode share; distance from residential areas
Transit	3.0%	Mode share at locations with similar transit service levels and land use patterns.
Auto passenger	8.1%	Observed mode share as a proportion of all auto-based trips
Auto driver	88.9%	Remainder of trips

In the Phase 1B study, no adjustments to trip generation were assumed due to mode split. After the Phase 1B report was completed, the Town of Halton Hills adopted a transit plan for the study area. Traffic forecasts for the Region have also been updated with the latest population and employment forecast. Consequently, the mode split assumptions have been updated to fit with the Town's and the Region's visions and goals for the future horizon.

3.5 Net Vehicle Trip Generation

Table 3.4 summarizes the net trip generation for the subject lands including PV trip generation from industrial and commercial developments, truck trip generation from industrial lanes, and mode split assumptions.



The industrial land total differs slightly from **Table 3.1** due to some industrial lands being inaccessible due to the Natural Heritage System Lands.

TABLE 3.4: NET TRIP GENERATION

Zone	Land Use	Area (ha)	Trip Type	Period	Trips Generated	Mode Split	New Trips	Trips In	Trips Out
Total	Industrial	153.9	Employment	AM	2,033	89%	1,807	1,555	252
				PM	2,217	89%	1,970	395	1,575
				Sat	--	89%	--	--	--
			Truck	AM	146	--	146	90	57
				PM	205	--	205	128	78
				Sat	32	--	32	22	9
	Residential	11	Existing						
	Commercial	3.7	Employment	AM	155	89%	138	89	49
				PM	273	89%	243	99	144
				Sat	--	89%	--	--	--

Industrial Employment - LUC 130 Eqn. per employee AM: $\ln(T) = 0.82 \ln(X) + 0.39$ | PM: $\ln(T) = 0.74 \ln(X) + 0.93$

Industrial Trucks - Surveyed Rate per lot size (ha) AM: 0.95 | PM: 1.33

Commercial - Calculated Rate per lot size (ha) AM: 44.2 | PM: 77.9



3.6 Trip Distribution and Assignment

The passenger vehicle (“PV”) trip distribution for the subject site is based on 2016 TTS data for the zones containing the subject site and surrounding area including existing industrial lands west of the site (as shown in **Figure 3.3**). For PVs using Hwy 401, it is assumed vehicles will choose whichever ramp is closest to the parcel (that is, Trafalgar Road or Winston Churchill Blvd). For example, Hwy 401-bound trips generated by parcels west of Ninth Line South will take Trafalgar Road, while parcels east of Ninth Line South will take Winston Churchill Boulevard.

Truck trips generated by the site are all assumed to use Hwy 401 to produce conservative estimates for ramp capacity. Similar to PVs, trucks are assumed to use the closest highway ramp. An equal distribution between east and westbound trips is assumed based on existing truck volumes at Hwy 401 ramps.

Trips are assigned to the network based on a zone and gate system. Parcels were divided into subareas (“zones”) for assignment into the network. Trips were assigned based on shortest distance from subzone to network end points (“gates”). Subzone map and distribution between zones and end points can be found in **Appendix E**.

Figure 3.4 and **Figure 3.5** illustrate the site generated PV and truck trips, respectively.

With Highway 413

In the Hwy 413 scenario, it is assumed that trips traveling east along Hwy 401 towards Caledon, Bolton, Vaughan, etc will use Hwy 413. These trips are assumed to use the Winston Churchill Boulevard interchange. While this interchange is not explicitly modelled in the network, the interchange is assumed to be located roughly 600 m south of 5 Side Road and is treated as a “gate” for trips to enter/exit the network.

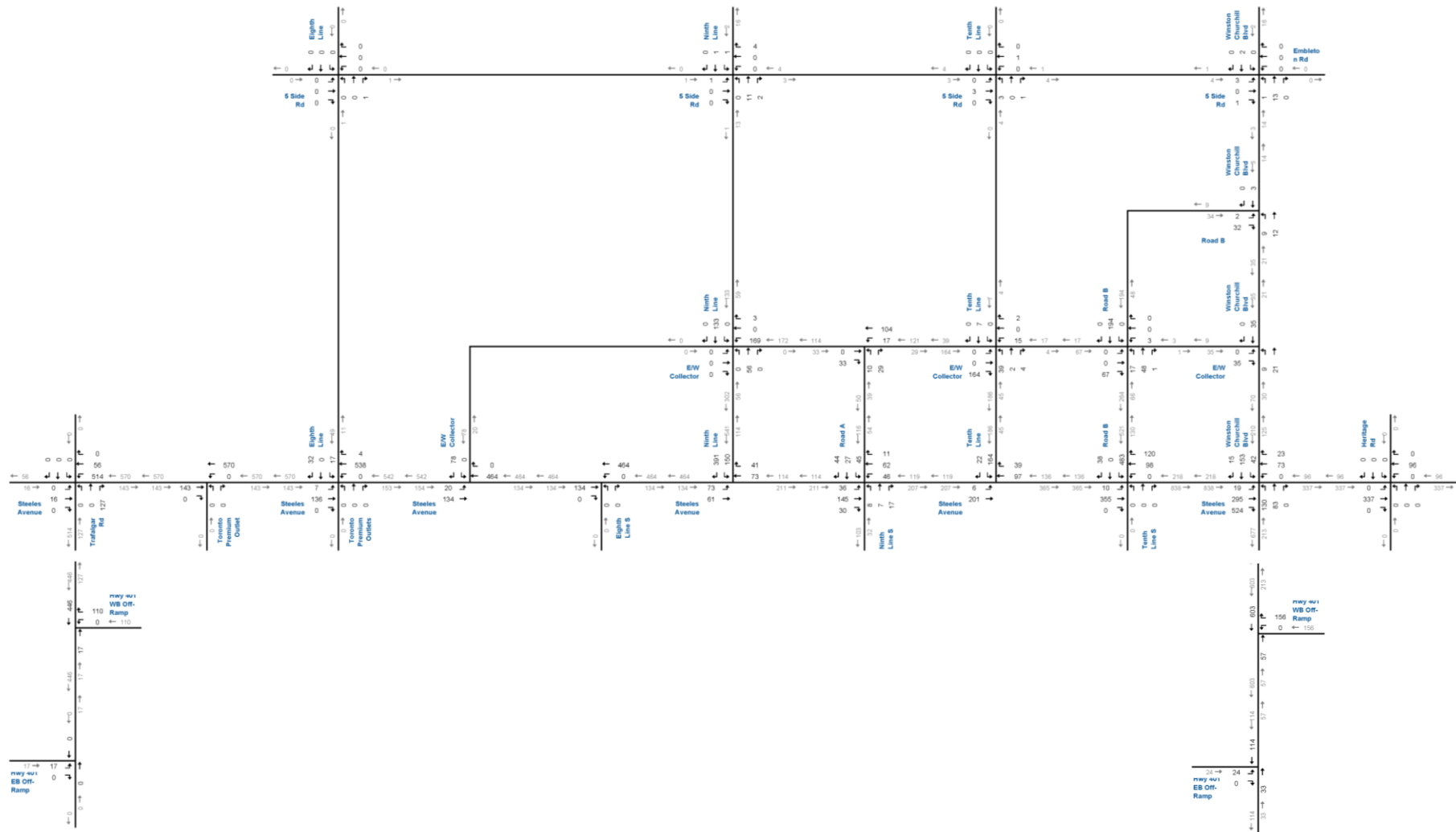
Based on the TTS data, it is assumed approximately 14% of PV trips generated by the site will use Hwy 413. Similarly, it is assumed 15% of eastbound truck trips generated by the site will use Hwy 413 while the remaining 35% of eastbound truck trips will continue to use Hwy 401. **Table 3.5** summarizes the site generated trips estimated to use Hwy 413. **Figure 3.6** and **Figure 3.7** illustrate the site generated PV and truck trips with Hwy 413, respectively.

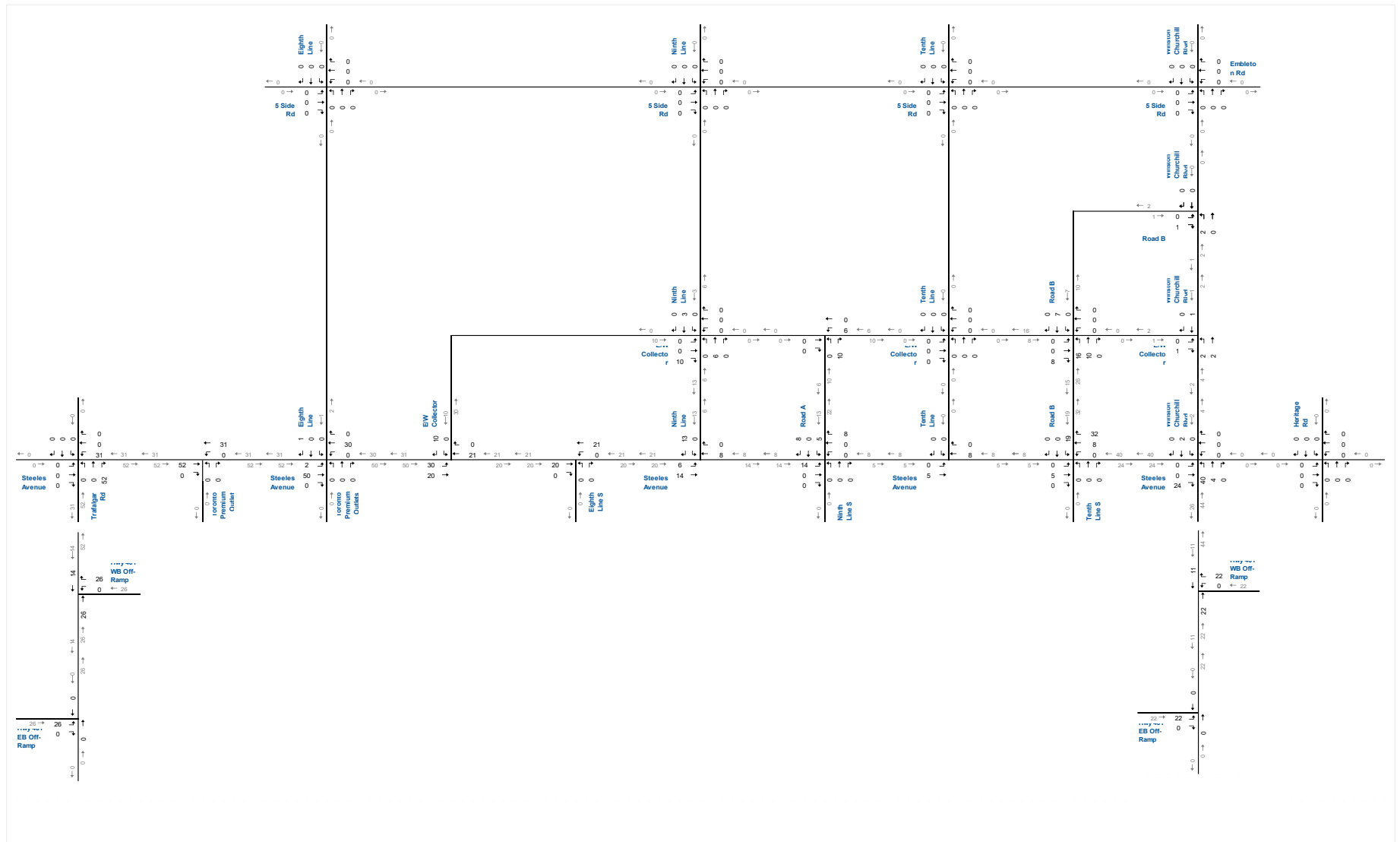


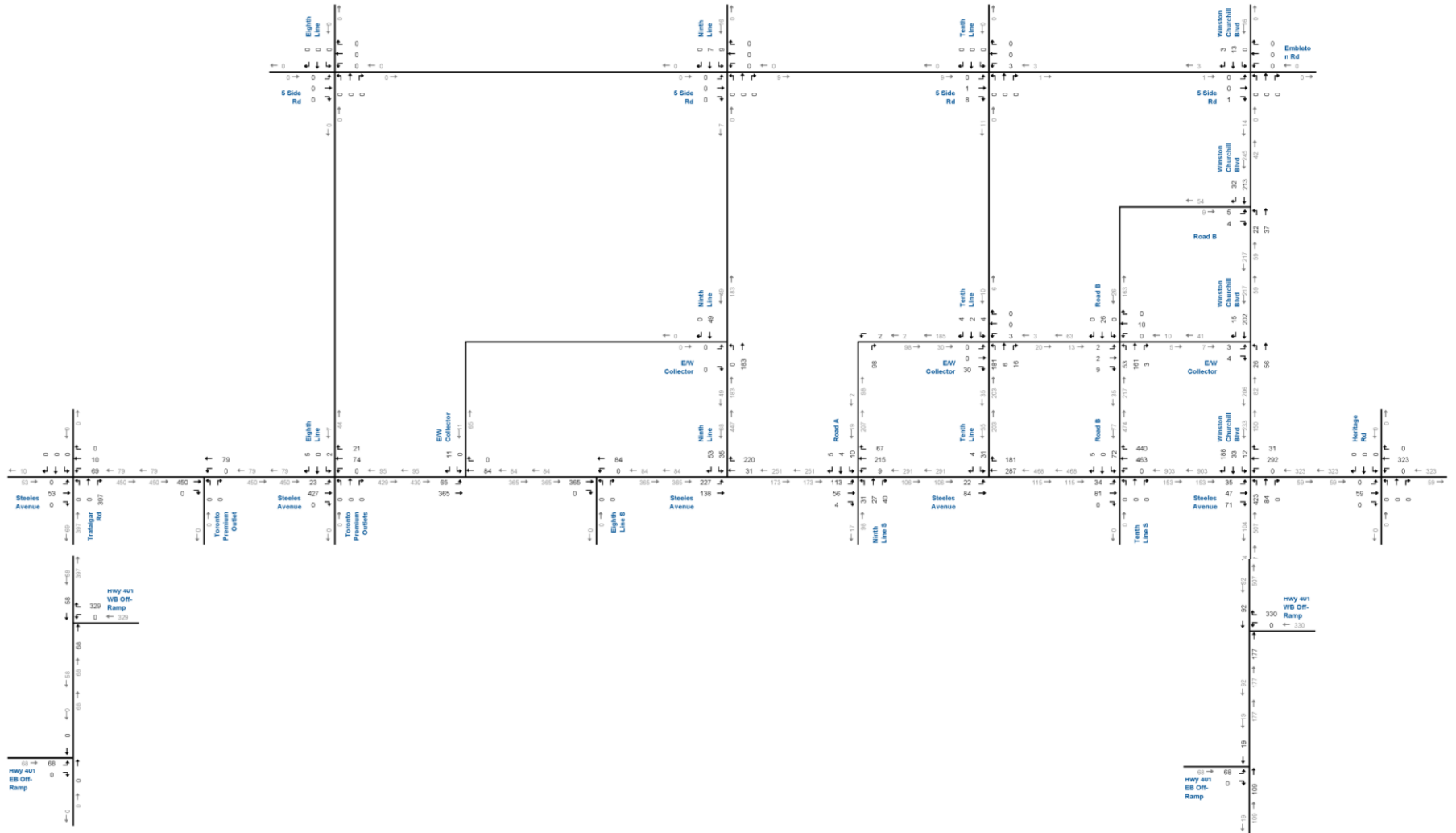
TABLE 3.5: HIGHWAY 413-BOUND SITE GENERATED TRIPS

Period	Personal Vehicles		Trucks	
	Inbound	Outbound	Inbound	Outbound
AM Peak Hour	231	42	13	8
PM Peak Hour	70	240	19	10

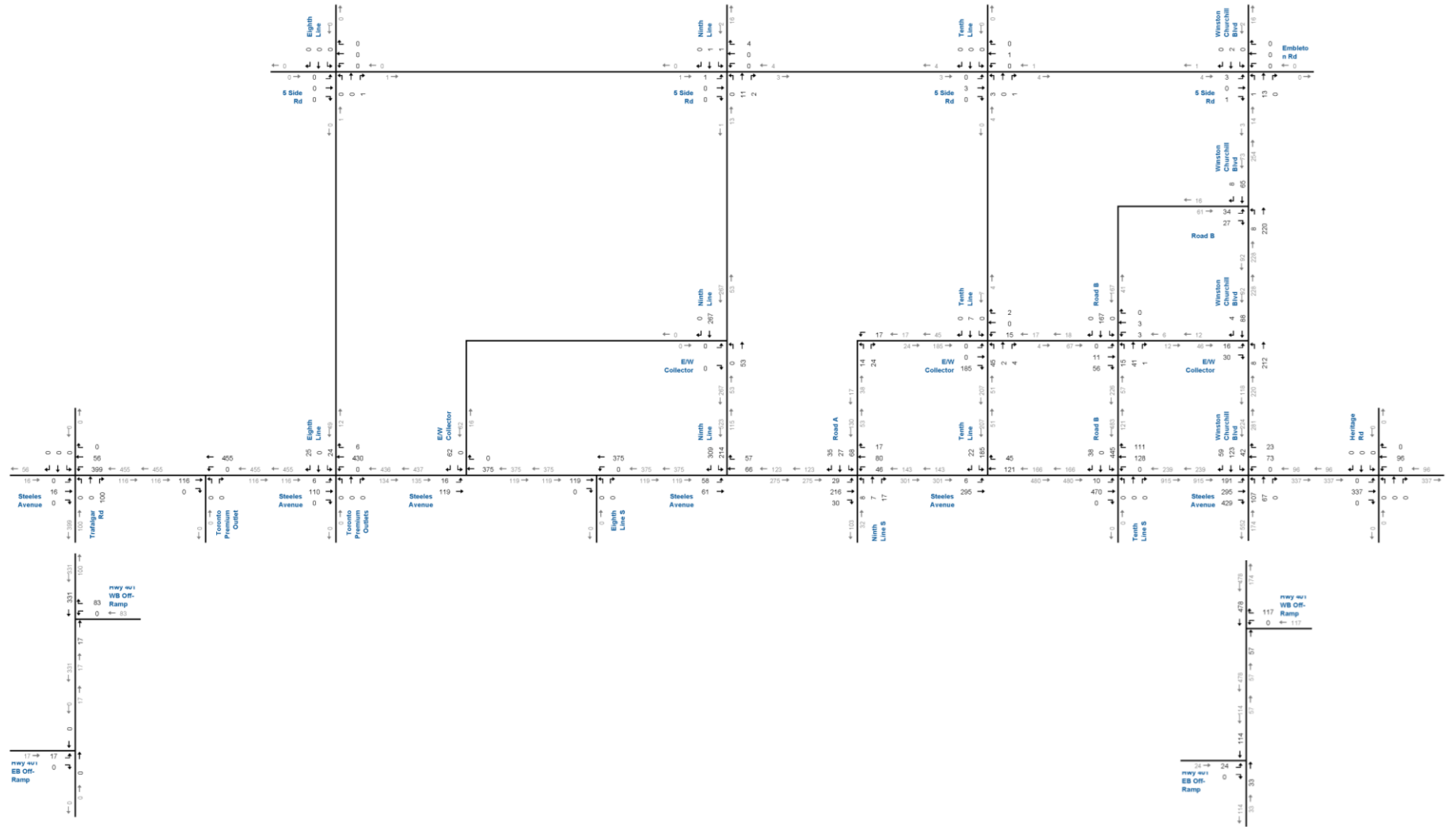








Site Generated Passenger Vehicle Volumes (with Highway 413) – AM Peak Hour



3.7 Background Traffic Growth

The Halton Region Transportation Demand Forecasting Model (Halton Region Model) is a modelling tool used to forecast horizon year travel demand patterns based on population and employment forecasts. The model considers population and employment growth and distributions, network improvements, when forecasting travel demand. The Halton Region Model models a 2016 base year as well as 2021 and 2031 horizon year traffic volumes for the PM peak hour.

For the purpose of this study, the Halton Region Model was used to determine traffic growth rates in the study area. Traffic growth for the study area is calculated using Halton Region Model 2021 and 2031 traffic forecasts along the study area road network. **Table 3.6** summarizes the 2021 and 2031 traffic volumes and the calculated compound annual growth rates. **Appendix F** contains the full details by road segment and direction.

On aggregate, east-west traffic is forecast to grow at a rate of 2.00% per annum between 2021 and 2031. North-south traffic in the study area is forecast to grow at a rate of 1.20% per annum between 2021 and 2031. Overall, traffic growth in the study area is forecast to be 1.76% per annum between 2021 and 2031.



TABLE 3.6: HALTON REGION MODEL TRAFFIC GROWTH

Segment	2021 Modelled Two-way Traffic	2031 Modelled Two-way Traffic	Percent Change	Annual Percent Change
North/South	6,611	7,463	12.90%	1.22%
East/West	16,542	20,112	21.58%	1.97%
Total	23,153	27,575	19.10%	1.76%

* Traffic growth based on 2021 and 2031 horizon year forecasts from Halton Region Model

For the purpose of this study, a ten-year horizon year (2031) has been assessed. The likely future background traffic volumes near the subject site are estimated to consist of increased non-site traffic (generalized background traffic growth). A growth rate of 1.76% per annum was applied to the movements on in the study area, based on discussion with Halton Region of the model outputs. This growth rate was determined using the Halton Region Model 2021 horizon year and 2031 horizon year traffic forecasts.

The Phase 1B development located to the west of the subject site is not included in the Halton Region Model. Traffic generated by the Phase 1B site is added to this forecast as part of the in-stream background developments. Traffic volumes generated by this development are based on the 2031 forecasts from the Phase 1B report.

Other than the Phase 1B development, no other in-stream background developments were included in the background development. Traffic generated by other in-stream developments would be captured by population and employment forecast growth in the model.

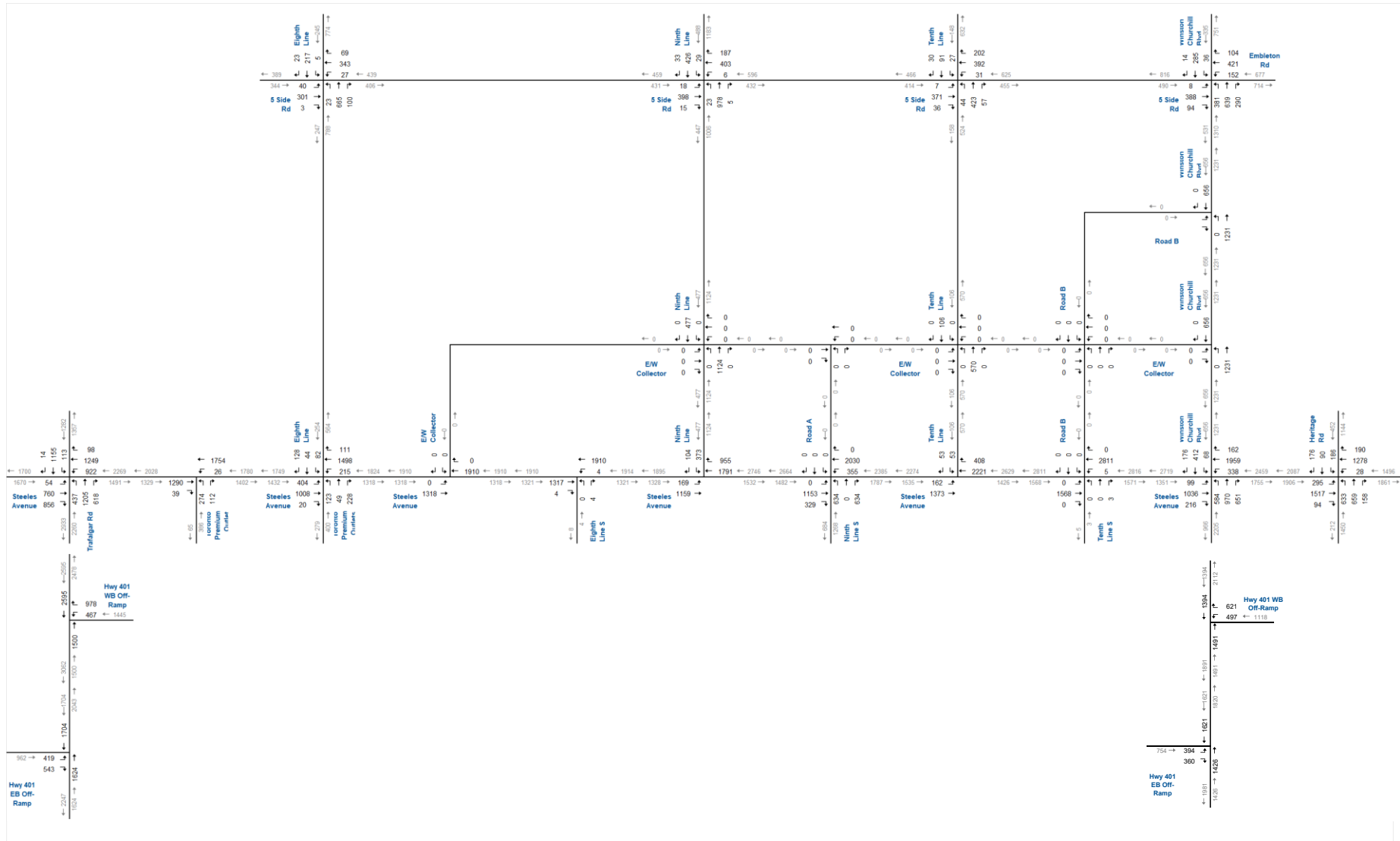
3.8 Future Traffic Volumes

The assessment of future conditions in this section includes the following components necessary to assess the site traffic implications on the study area road network:

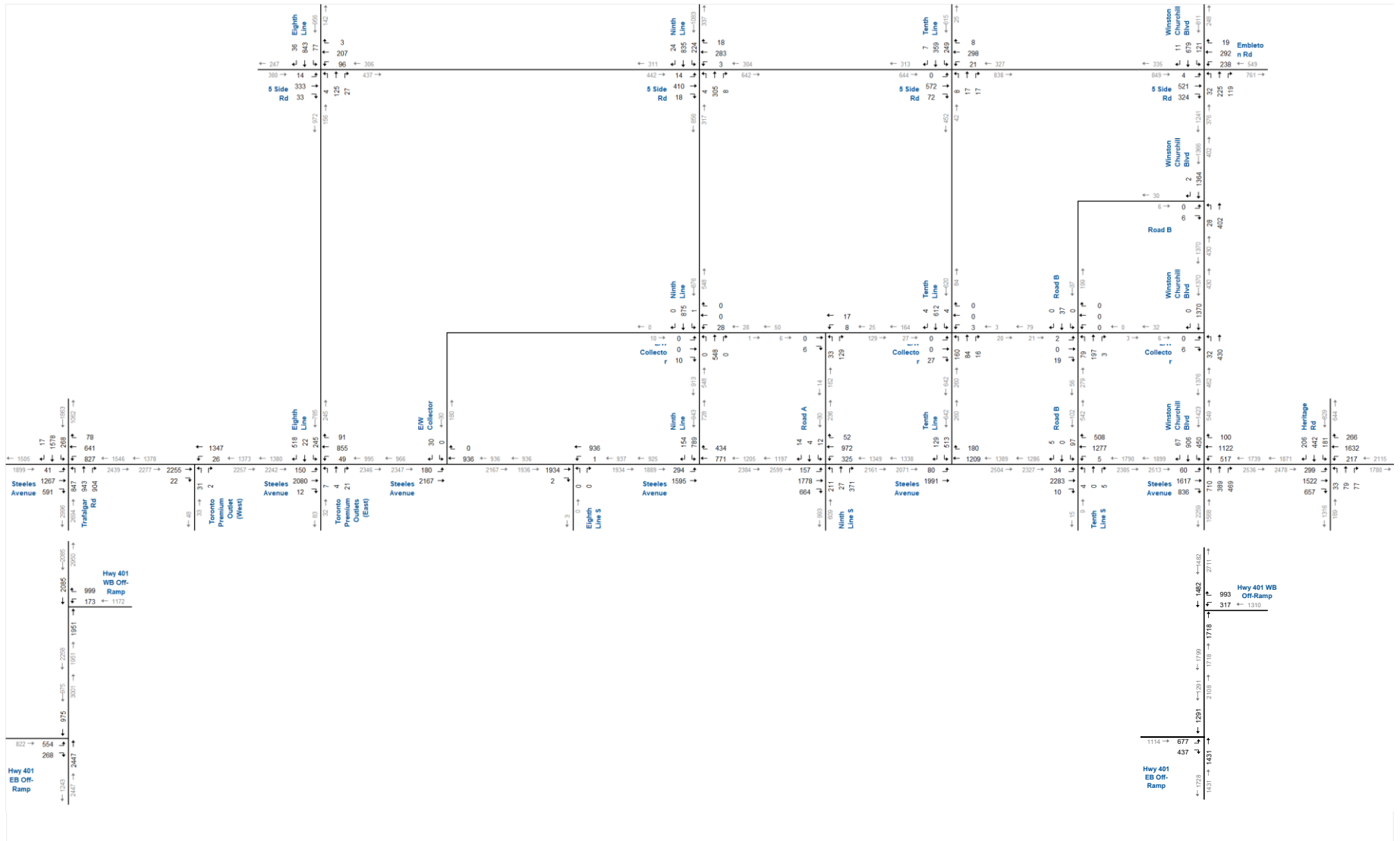
- ▶ Future background traffic estimates; and
- ▶ Future total traffic estimates including site generated traffic.

Figures 3.8 and **Figure 3.9** illustrate the forecast 2031 Background Traffic volumes and 2031 Total Traffic volumes (base case).

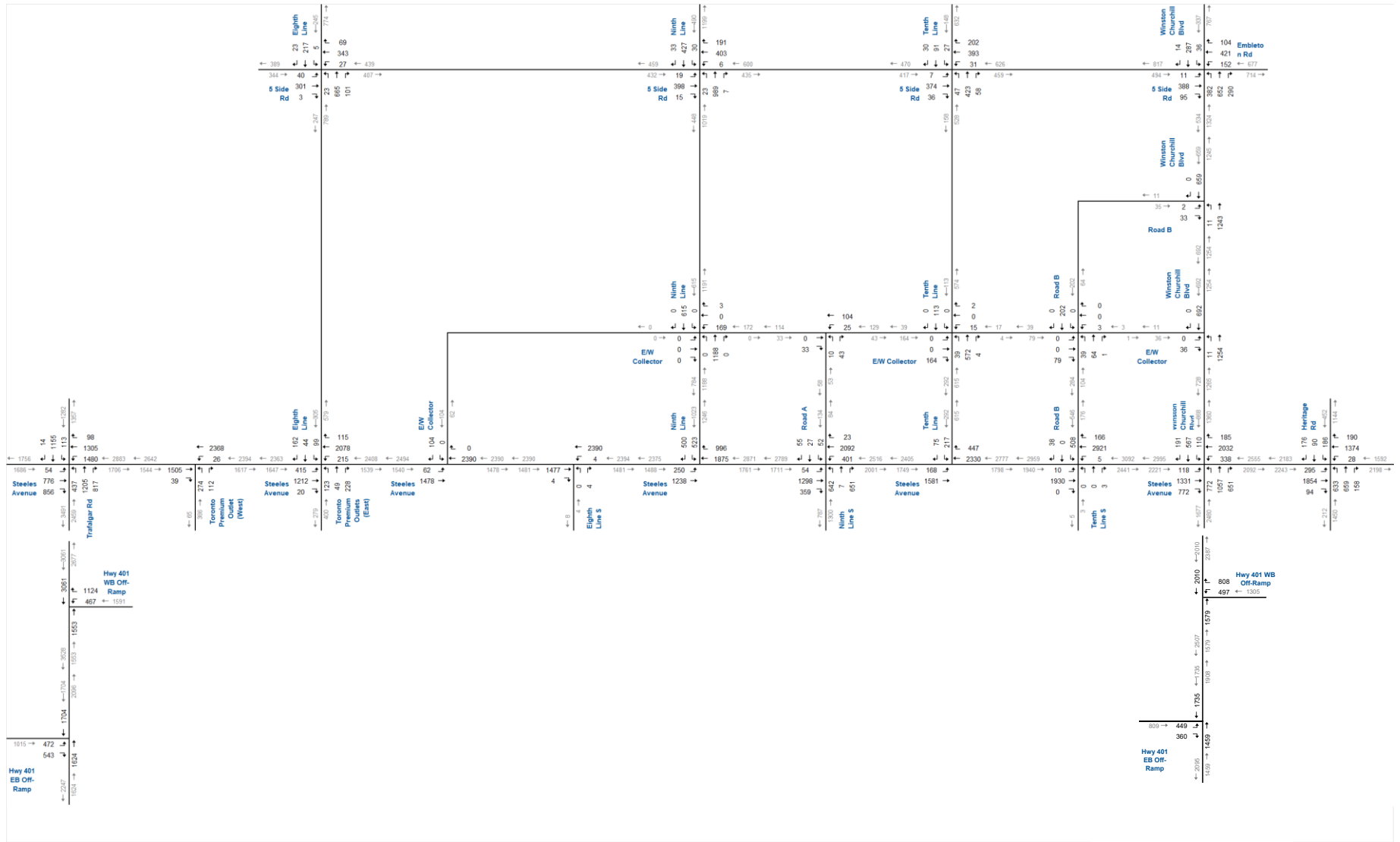




2031 Future Background Traffic Volumes - PM Peak Hour



2031 Future Total Traffic Volumes - AM Peak Hour



2031 Future Total Traffic Volumes - PM Peak Hour

4 Traffic Impact Assessment

The study area intersection operations analyses followed the same methodology used for existing conditions. Existing signal timings in the study area were optimized to reduce intersection delay.

4.1 2031 Background Traffic Operations

Table 4.1 and **Table 4.2** summarize the analysis results for the background AM and PM peak hour traffic volumes, respectively.

The 2031 horizon year background traffic growth assumes moderate growth in auto traffic. As a result, many of the capacity concerns in the base year continue with additional congested movements forecasted by 2031. Along Steeles Avenue East, the eastbound/westbound traffic is forecast to result in congestion in through movements at certain intersections throughout the corridor. The other critical movements in the background traffic operations generally consist of insufficient left-turn capacity along Steeles Avenue intersections and delays at the all-way stop controlled intersection of 5 Side Road and Tenth Line.

The following critical movements were forecast at the Study Area intersections:

- ▶ Steeles Avenue and Trafalgar Road (signalized):
 - The eastbound through lane is forecast to operate at LOS D ($v/c > 0.90$) during the AM peak hour.
 - The eastbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound through lane is forecast to operate at LOS E or worse ($v/c > 1.00$) during the AM and PM peak hours.



- The northbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hours.
 - The southbound shared through right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.
 - Overall, the intersection is forecast to operate at LOS F ($v/c > 1.00$) in the AM and PM peak hours.
- Steeles Avenue and Toronto Premium Outlet (West) (signalized):
- The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- Steeles Avenue and Eighth Line North/Toronto Premium Outlets (signalized):
- The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The eastbound through lane is forecast to operate at LOS D ($v/c > 0.85$) during the AM peak hour.
 - The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound through lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- Steeles Avenue and Ninth Line (North Segment) (signalized):
- The eastbound through lane is forecast to operate at LOS D ($v/c > 0.85$) during the AM peak hour.



- The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- ▶ Steeles Avenue and Ninth Line (South Segment) (signalized):
 - The eastbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The northbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
- ▶ Steeles Avenue and Tenth Line (North Segment) (signalized):
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- ▶ Steeles Avenue and Tenth Line (South Segment) (signalized):
 - The eastbound through lane is forecast to operate at LOS B ($v/c > 0.85$) during the AM peak hour.
 - The westbound through lane is forecast to operate at LOS C ($v/c > 0.95$) during the PM peak hour.
- ▶ Steeles Avenue and Winston Churchill Boulevard [Peel] (signalized):
 - The eastbound right turn-lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.



- The northbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- The northbound right turn-lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.
- The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- ▶ Steeles Avenue and Heritage Road [Peel] (signalized):
 - The eastbound left turn-lane is forecast to operate at LOS E or worse ($v/c > 0.95$) during the AM and PM peak hours.
 - The southbound through lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM peak hour.
- ▶ 5 Side Road and Eighth Line North (signalized):
 - The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound through lane is forecast to operate at LOS D ($v/c > 0.90$) during the PM peak hour.
 - The northbound through lane is forecast to operate at LOS C ($v/c > 0.95$) during the PM peak hour.
- ▶ 5 Side Road and Ninth Line (signalized):
 - The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- ▶ 5 Side Road and Winston Churchill Boulevard [Peel] (signalized):
 - The eastbound shared left/through/right movement is forecast to operate at LOS C ($v/c > 0.85$) during the AM peak hour.



- The westbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour.
- The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- ▶ Trafalgar Road and Hwy 401 Eastbound Off-Ramp (signalized):
 - The northbound through lane is forecast to operate at LOS C ($v/c > 0.85$) during the AM peak hour.
- ▶ East-West Collector Road and Steeles Avenue (signalized):
 - The westbound through lane is forecast to operate at LOS C ($v/c > 0.90$) during the PM peak hour.
- ▶ Steeles Avenue and Eighth Line (South Segment) (unsignalized):
 - The northbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- ▶ 5 Side Road and Tenth Line (unsignalized):
 - The eastbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.
 - The westbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The northbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.

Appendix G contains detailed Synchro analysis reports for the Future Background analysis.



TABLE 4.1A: BACKGROUND TRAFFIC OPERATIONS – AM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																	Overall
		Eastbound				Westbound				Northbound				Southbound					
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
SIGNALIZED																			
Steeles & Trafalgar Rd	LOS	C	D	F	E	F	C	C	F	F	E	D	F	F	146	388	>	F	F
	Delay	31	53	117	73	483	29	25	255	617	79	37	286	146	388	>	353	243	
	V/C	0.22	0.93	1.10		1.93	0.39	0.06		2.24	1.03	0.47		1.17	1.76	>		1.6	
	Q	40	216	121		245	338	18		181	770	939		323	292	>			
	Ex Avail.	115	--	40		130	--	70		100	--	65		--	--	>			
Steeles & Toronto Premium Outlet (West)	LOS		A	A	A	A	A		A	D		D	D					A	
	Delay		8	5	8	5	4		4	37		37	37					6	
	V/C		0.52	0.02		0.14	0.35			0.07		0.00						0.44	
	Q		69	6		115	244			29		2							
	Ex Avail.		--	130		45	--			--		40							
Steeles & Eighth Line N	LOS	C	D	C	D	C	D	>	D	E	B	>	C	C	C	>	C	D	
	Delay	28	46	27	44	33	37	>	36	61	16	>	26	28	29	>	29	38	
	V/C	0.53	0.88	0.01		0.38	0.53	>		0.05	0.02	>		0.42	0.51	>		0.65	
	Q	39	113	7		93	495	>		13	10	>		87	586	>			
	Ex Avail.	105	--	55		30	--	>		--	--	>		20	--	>			
Steeles & Ninth Line (north segment)	LOS	C	D		D		D	D	D					C		B	C	D	
	Delay	31	43		42		43	36	41					31		13	29	39	
	V/C	0.38	0.85				0.62	0.20						0.82		0.08		0.86	
	Q	27	109				102	66						177		21			
	Ex Avail.	65	--				75	--						90		--			
Steeles & Ninth Line (South Segment) / Road A	LOS	A	C	B	C	D	A	A	B	<	D	D	D	A	A	>	A	C	
	Delay	0	24	20	23	51	5	0	18	<	50	37	42	0	0	>	0	24	
	V/C	0.00	0.74	0.48		0.88	0.25	0.00		<	0.65	0.22		0.00	0.00	>		0.82	
	Q	0	117	96		95	57	0		<	57	57		0	0	>			
	Ex Avail.	--	--	75		145	--	15		<	--	--		15	--	>			
Steeles & Tenth Line (north segment)	LOS	B	C		C		C	>	C					D		C	C	C	
	Delay	20	29		29		27	>	27					36		23	33	29	
	V/C	0.29	0.80				0.51	>						0.70		0.09		0.78	
	Q	31	132				80	>						107		21			
	Ex Avail.	100	--				--	>						50		--			
Steeles & Tenth Line (south segment) / Road B	LOS	A	B	>	B	B	A	A	A	B	B	>	B	A	A	>	A	B	
	Delay	0	20	>	20	11	7	7	7	18	18	>	18	0	0	>	0	16	
	V/C	0.00	0.90	>		0.04	0.35	0.00		0.01	0.00	>		0.00	0.00	>		0.60	
	Q	0	98	>		7	39	0		7	9	>		0	0	>			
	Ex Avail.	15	--	>		70	--	15		15	--	>		15	--	>			
Steeles & Winston Churchill Blvd [Peel]	LOS	C	D	F	E	F	B	D	E	D	D	F	F	F	D	D	E	E	
	Delay	28	43	88	56	168	20	42	75	48	53	133	94	111	49	40	68	69	
	V/C	0.22	0.78	1.02		1.16	0.35	0.05		0.48	0.27	1.07		1.07	0.57	0.04		1.14	
	Q	44	139	136		117	113	0		60	75	114		166	340	4			
	Ex Avail.	150	--	190		115	--	115		115	--	115		135	--	125			
Steeles & Heritage Rd [Peel]	LOS	F	C	D	D	E	D	>	D	D	D	D	D	D	E	>	E	D	
	Delay	87	28	36	37	76	43	>	47	52	51	51	51	54	72	>	68	46	
	V/C	0.97	0.69	0.83		0.91	0.85	>		0.25	0.13	0.06		0.62	0.90	>		0.94	
	Q	107	587	89		76	130	>		20	27	23		77	127	>			
	Ex Avail.	160	--	105		250	--	>		120	--	90		155	--	>			
5 Side Rd & Eighth Line N	LOS	B	C	>	C	E	B	>	C	A	A	>	A	A	>	>	D	D	
	Delay	15	27	>	27	72	18	>	35	6	6	>	6	51	1	>	48	37	
	V/C	0.06	0.80	>		0.90	0.46	>		0.04	0.16	>		0.12	1.04	>		0.99	
	Q	14	90	>		27	71	>		5	23	>		0	416	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Ninth Line	LOS	B	C	>	C	B	B	>	B	A	A	>	A	B	B	>	B	B	
	Delay	15	23	>	22	14	18	>	18	8	9	>	9	12	11	>	11	14	
	V/C	0.06	0.70	>		0.02	0.48	>		0.02	0.19	>		0.41	0.50	>		0.58	
	Q	11	77	>		6	45	>		6	25	>		27	71	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	C	>	C	<	F	>	F	C	C	C	C	C	D	>	C	E	
	Delay	<	25	>	25	<	192	>	192	25	29	27	28	22	36	>	34	64	
	V/C	<	0.85	>		<	1.35	>		0.19	0.27	0.08		0.32	0.73	>		1.1	
	Q	<	96	>		<	530	>		16	39	28		46	93	>			
	Ex Avail.	<	--	>		<	--	>		110	--	85		30	--	>			

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



TABLE 4.1B: BACKGROUND TRAFFIC OPERATIONS – AM PEAK HOUR (CONT'D)

Intersection	MOE	Direction / Movement / Approach																Overall
		Eastbound				Westbound				Northbound				Southbound				
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
SIGNALIZED																		
Trafalgar Rd & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					C 33 0.61 487 --		D 48 0.81 487 --	D 39		B 14 0.66 427 --		B 14		B 15 0.69 96 --		B 15	B 18 0.73
Trafalgar Rd & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	D 54 0.90 271 --		C 29 0.39 271 --	D 45						C 25 0.88 1526 --		C 25		B 13 0.36 65 --		B 13	C 26 0.89
Winston Churchill Boulevard & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					E 44 0.43 69 --		F 57 0.81 78 --	F 52		B 13 0.66 119 --		B 13		B 12 0.59 106 --		B 12	C 21 0.7
Winston Churchill Boulevard & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	E 45 0.75 120 --		E 47 0.71 108 --	E 46						B 12 0.43 90 --		B 12		B 12 0.42 76 --		B 12	C 21 0.53
Ninth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.05 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.13 < 0 < --	A 0 > > > >	A 0	A 0 0.16	
Road A & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	A 0	A 0 0	
Tenth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.02 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.17 < 0 < --	A 0 > > > >	A 0	A 0 0.22	
Road B & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A 0 > > > >	A 0	A 0 0	
Winston Churchill Boulevard & E/W Collector Road	LOS Delay V/C Q Ex Avail.	A 0 0.00 -- --		> 0 > > > >	A 0					A 0 0.04 0 -- --			A 0		A 0 0.14 308 -- --		A 0	A 0 0.18
Winston Churchill Boulevard & Road B	LOS Delay V/C Q Ex Avail.	A 0 0.00 -- --		> 0 > > > >	A 0					A 0 0.10 28 15 --			A 8		A 10 0.34 49 15 --		A 10	A 9 0.17
E/W Collector Road & Steeles Avenue East	LOS Delay V/C Q Ex Avail.	A 0 0.00 15 15	B 10 0.45 82 --		B 10	A 9 0.24 398 --	A 0 0.00 15 15		A 9					A 0 0.00 15 15		A 0 0.00 15 15		A 10 0.22
UNSIGNALIZED																		
Steeles & Eighth Line (south section)	LOS Delay V/C Q Ex Avail.		A 0 0.38 0 --	> 0 > > > >	A 0	B 14 0.00 0 90 90	A 0 0.17 0 --		A 0	A 0 0.00 0 30 30		A 0 0.00 0 --	A 0					
5 Side Rd & Tenth Line	LOS Delay V/C Q Ex Avail.	< 228 < 1.44 < 747 < --	> 228 > 1.44 > 747 > --	> 228 > 1.44 > 747 > --	F 228	< 31 < 0.77 < 40 < --	> 31 > 0.77 > 40 > --		D 31	< 13 < 0.12 < 14 < --	> 13 > 0.12 > 14 > --		B 13	< 219 < 1.42 < 601 < --	> 219 > 1.42 > 601 > --	> 219 > 1.42 > 601 > --	F 219	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex. - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



TABLE 4.2A: BACKGROUND TRAFFIC OPERATIONS – PM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																	Overall
		Eastbound				Westbound				Northbound				Southbound					
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
SIGNALIZED																			
Steeles & Trafalgar Rd	LOS	C	C	F	F	F	C	B	F	F	F	F	F	F	84	240	>	F	F
	Delay	0.36	30	311	174	535	24	18	231	1.68	160	89	183	0.89	1.42	>	226	203	
	V/C	0.26	0.45	1.58		2.05	0.57	0.07		1.24	1.01			351	329	>		1.6	
	Q	24	293	100		232	300	45		181	886	986		--	--	>			
	Ex Avail.	115	--	40		130	--	70		100	--	65		--	--	>			
Steeles & Toronto Premium Outlet (West)	LOS		A	A	A	A	A		A	D		C	C					B	
	Delay		10	7	10	6	7		7	35		32	34					11	
	V/C		0.44	0.03		0.11	0.51			0.39		0.07						0.5	
	Q		52	7		89	245			123		41							
	Ex Avail.		--	130		45	--			--		40							
Steeles & Eighth Line N	LOS	F	C	C	D	C	E	>	E	E	C	>	D	D	D	>	D	D	
	Delay	90	28	21	45	31	69	>	64	56	29	>	37	44	42	>	43	53	
	V/C	1.02	0.50	0.02		0.69	1.01	>		0.38	0.27	>		0.33	0.25	>		0.76	
	Q	109	63	10		158	510	>		220	165	>		61	229	>			
	Ex Avail.	105	--	55		30	--	>		--	--	>		20	--	>			
Steeles & Ninth Line (north segment)	LOS	E	B		B	C	C	>	C					C		C	D	C	
	Delay	63	13		19	30	35	>	32					48		32	44	30	
	V/C	0.85	0.41			0.79	0.77	>						0.73		0.07		0.8	
	Q	52	50			907	116	>						111		96			
	Ex Avail.	65	--			--	75	>						90	--	--			
Steeles & Ninth Line (South Segment) / Road A	LOS	A	C	C	C	F	C	A	D	<	C	C	E	A	A	>	A	D	
	Delay	0	33	26	31	181	25	0	48	<	116	34	75	0	0	>	0	50	
	V/C	0.00	0.72	0.22		1.28	0.82	0.00		<	1.15	0.74		0.00	0.00	>		1.22	
	Q	0	88	60		188	573	0		<	530	573		0	0	>			
	Ex Avail.	0	--	75		145	--	15		<	--	--		15	--	>			
Steeles & Tenth Line (north segment)	LOS	E	A		B	D	D	>	D					D		D	D	C	
	Delay	70	10		16	36	>	>	36					38		36	37	29	
	V/C	0.85	0.43			0.96	>	>						0.13		0.03		0.71	
	Q	52	73			517	>	>						22		40			
	Ex Avail.	100	--			--	>	>						50		--			
Steeles & Tenth Line (south segment) / Road B	LOS	A	B	>	B	A	C	C	C	A	B	>	B	A	A	>	A	C	
	Delay	0	13	>	13	7	26	26	26	0	18	>	18	0	0	>	0	22	
	V/C	0.00	0.67	>		0.05	0.99	0.00		0.00	0.00	>		0.00	0.00	>		0.73	
	Q	0	70	>		30	386	0		0	5	>		0	0	>			
	Ex Avail.	15	--	>		70	--	15		15	--	>		15	--	>			
Steeles & Winston Churchill Blvd [Peel]	LOS	E	D	C	D	D	D	E	D	C	D	E	D	D	D	D	D	D	
	Delay	65	40	33	41	49	51	62	52	34	38	72	47	44	46	45	45	47	
	V/C	0.78	0.57	0.15		0.71	0.92	0.13		0.70	0.50	0.93		0.41	0.29	0.19		0.92	
	Q	42	94	92		161	299	170		120	112	99		26	45	38			
	Ex Avail.	150	--	190		115	--	115		115	--	115		135	--	125			
Steeles & Heritage Rd [Peel]	LOS	E	C	B	C	C	D	>	D	E	E	D	E	E	D	>	E	D	
	Delay	65	24	13	30	32	46	>	46	62	64	50	62	77	54	>	63	46	
	V/C	0.95	0.61	0.07		0.30	0.81	>		0.91	0.82	0.20		0.87	0.21	>		0.92	
	Q	101	499	16		23	156	>		117	114	77		72	59	>			
	Ex Avail.	160	--	105		250	--	>		120	--	90		155	--	>			
5 Side Rd & Eighth Line N	LOS	B	C	>	C	B	D	>	D	A	C	>	C	A	A	>	A	C	
	Delay	19	22	>	21	16	41	>	40	6	33	>	33	7	8	>	8	29	
	V/C	0.43	0.68	>		0.20	0.93	>		0.05	0.96	>		0.05	0.34	>		0.95	
	Q	24	78	>		20	71	>		14	75	>		0	29	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Ninth Line	LOS	B	B	>	B	B	C	>	C	B	B	>	B	B	B	>	B	B	
	Delay	15	17	>	17	14	25	>	25	12	17	>	17	16	13	>	13	18	
	V/C	0.17	0.56	>		0.02	0.80	>		0.07	0.67	>		0.23	0.32	>		0.73	
	Q	16	71	>		8	74	>		14	61	>		16	48	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	B	>	B	<	F	>	F	E	C	C	D	C	C	>	C	D	
	Delay	<	17	>	17	<	94	>	94	71	30	25	41	24	31	>	30	48	
	V/C	<	0.58	>		<	1.12	>		1.01	0.64	0.20		0.19	0.38	>		1.11	
	Q	<	91	>		<	521	>		138	224	49		33	57	>			
	Ex Avail.	<	--	>		<	--	>		110	--	85		30	--	>			

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex. - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



TABLE 4.2B: BACKGROUND TRAFFIC OPERATIONS – PM PEAK HOUR (CONT'D)

Intersection	MOE	Direction / Movement / Approach																	Overall
		Eastbound				Westbound				Northbound				Southbound					
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
SIGNALIZED																			
Trafalgar Rd & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					D 38 0.71 504 --		D 41 0.68 496 --	D 39		A 8 0.32 424 --		A 8		B 11 0.60 130 --		B 11	B 16 0.63	
Trafalgar Rd & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	C 28 0.68 247 --		D 40 0.87 240 --	D 35						C 21 0.67 602 --		C 21		C 23 0.73 103 --		C 23	C 25 0.79	
Winston Churchill Boulevard & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					E 46 0.61 89 --		F 63 0.89 91 --	F 56		B 15 0.67 101 --		B 15		B 14 0.62 120 --		B 14	D 26 0.73	
Winston Churchill Boulevard & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	E 47 0.67 87 --		F 50 0.67 81 --	E 48						A 9 0.42 79 --		A 9		A 9 0.49 79 --		A 9	C 17 0.53	
Ninth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.32 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.13 < 0 < --	A > > > >	A 0	A 0 0.4		
Road A & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	A 0	A 0 0		
Tenth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.31 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.06 < 0 < --	A > > > >	A 0	A 0 0.39		
Road B & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	> 0 > > > >	A 0	< 0 < 0.00 < 0 < --	A > > > >	A 0	A 0 0		
Winston Churchill Boulevard & E/W Collector Road	LOS Delay V/C Q Ex Avail.	A 0 0.00 --		> 0 > > >	A 0					A 0 0.24 0 --			A 0	A 0 0.13 0.00 --			A 0	A 0 0.31	
Winston Churchill Boulevard & Road B	LOS Delay V/C Q Ex Avail.	A 0 0.00 --		> 0 > > >	A 0					A 0 0.11 0.69 15 --			B 11	A 9 0.31 0.00 15 15			A 9	B 10 0.29	
E/W Collector Road & Steeles Avenue East	LOS Delay V/C Q Ex Avail.	A 0 0.00 15 15	B 12 0.63 52 --		B 12	C 20 0.91 595 --	A 0 0.00 15 15		C 20					A 0 0.00 15 15		A 0 0.00 15 15		A 0	C 17 0.46
UNSIGNALIZED																			
Steeles & Eighth Line (south section)	LOS Delay V/C Q Ex Avail.		A 0.32 0 --	> 0 > > >	A 0	B 12 0.01 20 90 70	A 0 0.39 704 --		A 0	A 0 0.00 703 30 -673		B 13 0.01 0 --	A 0						
5 Side Rd & Tenth Line	LOS Delay V/C Q Ex Avail.	< 181 < 1.31 < 86 < --	F > > > >	F 181	< 453 < 1.95 < 175 < --	F > > > >	F 453	< 326 < 1.66 < 145 < --	F > > > >	F 326	< 23 < 0.53 < 18 < --	C > > > >	C 23						

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn



4.2 2031 Total Traffic Operations (base case)

4.2.1 Total Traffic Operations with Planned Improvements

Table 4.3 and **Table 4.4** summarize the analysis results for the Total Traffic Base Scenario AM and PM peak hour traffic volumes, respectively.

The Total Traffic operations are similar to the background operations. In general, the critical movements in the background traffic operations consist of high volumes of eastbound/westbound traffic along Steeles Avenue and insufficient left-turn capacity at Steeles Avenue intersections. The addition of the site traffic causes some movements at major intersections to fall into critical levels such as the westbound left and northbound right turn movements at Steeles Avenue and Trafalgar Road and westbound movements at the Hwy 401 westbound off-ramp at Winston Churchill Boulevard. As a result of the additional site traffic, certain movements are forecast to experience approximately 40-50 seconds of additional delay.

Under MTO Traffic Impact Study Guideline¹⁹, signalized ramp approaches have a critical v/c threshold of 0.75. While the Winston Churchill Boulevard westbound and eastbound Hwy 401 off-ramps are forecast to exceed this threshold, the delays and queuing are not expected to impact highway operations.

Left-turn movements are forecast to exceed available storage at the intersection of the East-West Collector Road and Winston Churchill Boulevard as well as the intersection of Winston Churchill Boulevard and Road B. For the purpose of this study, a general storage length of 15 metres was assumed. In the design and installation of these new intersections it is assumed that the appropriate storage length will be implemented.

The following critical movements were forecast at the Study Area intersections:

- ▶ Steeles Avenue and Trafalgar Road (signalized):
 - The eastbound through lane is forecast to operate at LOS E ($v/c > 0.95$) during the AM peak hour.
 - The eastbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.

¹⁹ MTO, *General Guidelines for the Preparation of Traffic Impact Studies*, 2008



- The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound through lane is forecast to operate at LOS D or worse ($v/c > 0.90$) during the AM and PM peak hour.
 - The northbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.
 - The southbound shared through right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.
 - Overall, the intersection is forecast to operate at LOS F ($v/c > 1.00$) in the AM and PM peak hours.
- Steeles Avenue and Toronto Premium Outlet (West) (signalized):
- The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The northbound right-turn 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
- Steeles Avenue and Eighth Line North/Toronto Premium Outlets (signalized):
- The eastbound left-turn lane is forecast to operate at LOS D ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hours.
 - The eastbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the AM peak hour.



- The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The westbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- Steeles Avenue and Ninth Line (North Segment) (signalized):
- The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The eastbound through lane is forecast to operate at LOS D ($v/c > 0.85$) during the AM peak hour.
 - The westbound through lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- Steeles Avenue and Ninth Line (South Segment) / Road A (signalized):
- The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The eastbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.



- The northbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
- The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- ▶ Steeles Avenue and Tenth Line (North Segment) (signalized):
 - The westbound through lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
- ▶ Steeles Avenue and Tenth Line (South Segment) / Road B (signalized):
 - The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
 - The westbound through lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
 - The southbound left-turn movement operates at LOS F ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- ▶ Steeles Avenue and Winston Churchill Boulevard [Peel] (signalized):
 - The eastbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the PM peak hour.
 - The eastbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the AM and PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the PM peak hour.



- The westbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The northbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound right turn-lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hour.
 - The southbound left-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour. The 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
 - The southbound through lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM peak hour.
 - The southbound right-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- Steeles Avenue and Heritage Road [Peel] (signalized):
- The eastbound left turn-lane is forecast to operate at LOS E or worse ($v/c > 0.95$) during the AM peak hours.
 - The westbound left-turn lane is forecast to operate at LOS F ($v/c > 0.95$) during the AM peak hour.
 - The westbound shared through/right lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM and PM peak hour.
 - The southbound through lane is forecast to operate at LOS E ($v/c > 0.90$) during the AM peak hour.
- 5 Side Road and Eighth Line North (signalized):
- The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The westbound through lane is forecast to operate at LOS D ($v/c > 0.95$) during the PM peak hour.
 - The westbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The northbound through lane is forecast to operate at LOS D ($v/c > 1.00$) during the PM peak hour.



- The southbound through lane is forecast to operate at LOS D ($v/c > 1.00$) during the PM peak hour.
- ▶ 5 Side Road and Ninth Line (signalized):
 - The northbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hour.
- ▶ 5 Side Road and Winston Churchill Boulevard [Peel] (signalized):
 - The westbound shared left/through/right movement operates at LOS E ($v/c > 1.00$) during the AM and PM peak hour.
 - The northbound left-turn lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour. The 95th percentile queue length is forecast to exceed available storage during the PM peak hour.
 - The southbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- ▶ Trafalgar Road and Hwy 401 Westbound Off-Ramp (signalized):
 - The westbound left-turn lane is forecast to operate at LOS E ($v/c > 1.00$) during the PM peak hour.
 - The westbound right-turn lane is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound through lane is forecast to operate at LOS C ($v/c > 1.00$) during the PM peak hour.
- ▶ Trafalgar Road and Hwy 401 Eastbound Off-Ramp (signalized):
 - The northbound through lane is forecast to operate at LOS C ($v/c > 0.85$) during the AM peak hour.
- ▶ Winston Churchill Boulevard and Road B (signalized):
 - The northbound left-turn 95th percentile queue length is forecast to exceed available storage during the AM peak hour.
- ▶ Winston Churchill Boulevard and Hwy 401 Westbound Off-Ramp (signalized):



- The westbound right-turn movement operates at LOS F ($v/c > 1.00$) during the AM and PM peak hour.
- The southbound through lane is forecast to operate at LOS C ($v/c > 0.85$) during the PM peak hour.
- ▶ East-West Collector Road and Steeles Avenue (signalized):
 - The eastbound left-turn lane 95th percentile queue length is forecast to exceed available storage during the AM and PM peak hours.
 - The westbound through lane is forecast to operate at LOS E ($v/c > 0.85$) during the PM peak hour.
- ▶ 5 Side Road and Tenth Line (unsignalized):
 - The eastbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM and PM peak hours.
 - The westbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The northbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the PM peak hour.
 - The southbound shared left/through/right movement is forecast to operate at LOS F ($v/c > 1.00$) during the AM peak hour.

Appendix H contains detailed Synchro analysis reports for the Future Total analysis.



TABLE 4.3A: TOTAL TRAFFIC OPERATIONS – AM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																	Overall
		Eastbound				Westbound				Northbound				Southbound					
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
SIGNALIZED																			
Steeles & Trafalgar Rd	LOS	C	E	F	E	F	C	C	F	F	D	F	F	F	F	>	F	F	
	Delay	31	60	125	80	592	28	24	329	617	51	314	317	375	410	>	405	284	
	V/C	0.22	0.97	1.12		2.18	0.39	0.06		2.24	0.92	1.59		1.70	1.80	>		1.71	
	Q	133	285	110		232	301	15		180	831	921		331	294	>			
	Ex Avail.	115	--	40		130	--	70		100	--	65		--	--	>			
Steeles & Toronto Premium Outlet (West)	LOS		A	A	A	A	A		A	D		D	D					A	
	Delay		9	4	9	8	4		4	38		38	38					8	
	V/C		0.69	0.02		0.20	0.37			0.07		0.00						0.59	
	Q		67	7		90	245			33		2							
	Ex Avail.		--	130		45	--			--		40							
Steeles & Eighth Line N	LOS	C	D	B	D	C	C	>	C	E	C	>	C	D	D	>	D	D	
	Delay	22	50	20	48	31	30	>	30	61	23	>	31	39	41	>	40	42	
	V/C	0.57	0.98	0.01		0.38	0.50	>		0.05	0.02	>		0.54	0.61	>		0.78	
	Q	37	114	5		104	508	>		12	11	>		92	597	>			
	Ex Avail.	105	--	55		30	--	>		--	--	>		20	--	>			
Steeles & Ninth Line (north segment)	LOS	E	D		D	E	F	F	F					D		B	D	E	
	Delay	71	39		44	73	202		119					46		17	41	66	
	V/C	0.94	0.85			0.83	0.30							0.93		0.15		0.93	
	Q	90	124			117	89							267		127			
	Ex Avail.	65	--			--	75			--				90		--			
Steeles & Ninth Line (South Segment) / Road A	LOS	D	D	F	D	E	B	C	C	<	E	D	A	D	D	>	D	D	
	Delay	43	40	89	53	76	11	21	27	<	67	46	0	41	40	>	40	45	
	V/C	0.67	0.76	0.51		0.94	0.30	0.04		<	0.80	0.39		0.11	0.03	>		0.9	
	Q	26	170	103		111	91	22		<	80	81		12	17	>			
	Ex Avail.	15	--	75		145	--	15		<	--	--		15	--	>			
Steeles & Tenth Line (north segment)	LOS	D	C		C	C	>	>	C					D		C	D	C	
	Delay	48	21		22	34	>	>	34					38		23	35	28	
	V/C	0.49	0.83			0.72	>	>						0.74		0.09		0.82	
	Q	46	134			121	>	>						116		25			
	Ex Avail.	100	--			--	>	>						50		--			
Steeles & Tenth Line (south segment) / Road B	LOS	A	B	>	B	A	A	A	A	D	D	>	D	E	D	>	E	B	
	Delay	0	12	>	12	9	6	6	6	45	45	>	45	56	45	>	55	10	
	V/C	0.13	0.69	>		0.08	0.38	0.37		0.02	0.00	>		0.45	0.00	>		0.64	
	Q	16	132	>		6	213	28		4	4	>		26	47	>			
	Ex Avail.	15	--	>		70	--	15		15	--	>		15	--	>			
Steeles & Winston Churchill Blvd [Peel]	LOS	C	D	F	E	F	C	D	E	F	D	F	F	F	E	D	F	E	
	Delay	30	48	87	61	162	27	42	68	114	55	136	106	120	79	53	91	78	
	V/C	0.35	0.84	1.01		1.16	0.49	0.07		1.09	0.37	1.08		1.09	0.93	0.05		1.15	
	Q	55	158	158		139	564	25		123	212	95		151	311	177			
	Ex Avail.	150	--	190		115	--	115		115	--	115		135	--	125			
Steeles & Heritage Rd [Peel]	LOS	F	C	C	D	F	E	>	E	D	D	D	D	E	E	>	E	D	
	Delay	91	28	35	37	90	62	>	65	52	50	50	50	57	75	>	71	53	
	V/C	0.98	0.71	0.83		0.95	1.00	>		0.25	0.12	0.06		0.64	0.92	>		0.97	
	Q	100	496	66		76	158	>		23	29	24		78	116	>			
	Ex Avail.	160	--	105		250	--	>		120	--	90		155	--	>			
5 Side Rd & Eighth Line N	LOS	B	C	>	C	E	B	>	C	A	A	>	A	A	>	>	D	C	
	Delay	15	27	>	27	72	18	>	35	6	6	>	6	6	>	>	43	35	
	V/C	0.06	0.80	>		0.90	0.46	>		0.04	0.16	>		0.12	1.02	>		0.98	
	Q	16	82	>		27	79	>		4	22	>		0	393	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Ninth Line	LOS	B	C	>	C	B	B	>	B	A	A	>	A	B	B	>	B	B	
	Delay	16	24	>	24	15	19	>	19	8	9	>	9	12	11	>	11	15	
	V/C	0.06	0.71	>		0.02	0.49	>		0.02	0.19	>		0.42	0.49	>		0.58	
	Q	12	74	>		5	50	>		7	24	>		27	73	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	C	>	C	<	F	>	F	C	C	C	C	C	D	>	C	E	
	Delay	<	25	>	25	<	193	>	193	25	29	27	28	22	37	>	35	64	
	V/C	<	0.86	>		<	1.35	>		0.19	0.27	0.08		0.32	0.75	>		1.11	
	Q	<	94	>		<	520	>		16	36	24		47	111	>			
	Ex Avail.	<	--	>		<	--	>		110	--	85		30	--	>			

MOE - Measure of Effectiveness
 LOS - Level of Service
 Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
 Ex. - Existing Available Storage
 Avail. - Available Storage

TCS - Traffic Control Signal
 TWSC - Two-Way Stop Control
 AWSC - All-Way Stop Control

RBT - Roundabout
 < - Shared Left-turn
 > - Shared Right-turn



TABLE 4.3B: TOTAL TRAFFIC OPERATIONS – AM PEAK HOUR (CONT'D)

Intersection	MOE	Direction / Movement / Approach																	Overall
		Eastbound				Westbound				Northbound				Southbound					
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
SIGNALIZED																			
Trafalgar Rd & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					C 26 0.54 425 --		D 46 0.88 425 --	C 35		C 23 0.76 425 --		C 23		C 25 0.81 96 --		C 25	C 27 0.84	
Trafalgar Rd & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	E 58 0.93 264 --		C 29 0.38 283 --	D 48						C 28 0.89 1088 --		C 28		B 15 0.36 55 --		B 15	C 29 0.91	
Winston Churchill Boulevard & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					D 41 0.35 62 --		F 210 1.33 159 --	F 169		B 18 0.76 126 --		B 18		B 15 0.66 118 --		B 15	F 61 0.93	
Winston Churchill Boulevard & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	D 46 0.77 120 --		D 47 0.73 114 --	D 46						B 13 0.46 96 --		B 13		B 13 0.42 74 --		B 13	C 23 0.56	
Ninth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 19 < 0.01 13 < -- < --	B > > > >	> > > >	B 19	< 21 < 0.31 13 < -- < --	> > > >	> > > >	C 21	< 2 < 0.20 17 < -- < --	> > > >	> > > >	A 2	< 2 < 0.33 35 < -- < --	> > > >	A 2	A 2 0.33		
Road A & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 8 < 0.00 5 < -- < --	A > > > >	> > > >	A 8	< 8 < 0.04 18 < -- < --	> > > >	> > > >	A 8	< 0 < 0.00 23 < -- < --	> > > >	> > > >	A 0	< 0 < 0.00 0 < -- < --	> > > >	A 0	A 9 0.09		
Tenth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 20 < 0.02 12 < -- < --	B > > > >	> > > >	B 20	< 20 < 0.04 4 < -- < --	> > > >	> > > >	C 20	< 2 < 0.30 27 < -- < --	> > > >	> > > >	A 2	< 3 < 0.42 30 < -- < --	> > > >	A 3	A 3 0.4		
Road B & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 20 < 0.02 17 < -- < --	C > > > >	> > > >	C 20	< 0 < 0.00 0 < -- < --	> > > >	> > > >	A 0	< 2 < 0.22 14 < -- < --	> > > >	> > > >	A 2	< 1 < 0.03 4 < -- < --	> > > >	A 1	A 3 0.21		
Winston Churchill Boulevard & E/W Collector Road	LOS Delay V/C Q Ex Avail.	C 20 0.00 10 -- --	> > > >	> > > >	A 0					A 2 0.12 14 15 1 --	A 1 0.11 14 -- --		A 1	A 2 0.34 357 0 -- --	A 0 0.00 0 -- --	A 2	A 2 0.32		
Winston Churchill Boulevard & Road B	LOS Delay V/C Q Ex Avail.	A 8 0.00 5 -- --	> > > >	> > > >	A 0					A 9 0.18 17 15 -- -2	A 9 0.19 31 -- --		A 9	B 12 0.64 49 -- 15 12	A 8 0.00 3 15 12	B 12	B 11 0.32		
E/W Collector Road & Steeles Avenue East	LOS Delay V/C Q Ex Avail.	B 16 0.67 28 15 -- -13	B 11 0.70 114 -- --	> > > >	B 11	A 7 0.30 501 -- --	A 0 0.00 0 15 -- --	> > > >	A 7					A 0 0.00 0 15 -- --	B 19 0.02 83 -- --	A 0	A 10 0.48		
UNSIGNALIZED																			
Steeles & Eighth Line (south section)	LOS Delay V/C Q Ex Avail.		A 0 0.48 0 -- --	> > > >	A 0	C 18 0.00 1 90 89	A 0 0.20 0 -- --	> > > >	A 0	A 0 0.00 0 30 30		A 0 0.00 0 -- --	A 0						
5 Side Rd & Tenth Line	LOS Delay V/C Q Ex Avail.	< 237 < 1.46 728 < -- < --	F > > > >	> > > >	F 237	< 32 < 0.78 48 < -- < --	> > > >	> > > >	D 32	< 13 < 0.12 15 < -- < --	> > > >	> > > >	B 13	< 220 < 1.42 526 < -- < --	> > > >	F 220			

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn



TABLE 4.4A: TOTAL TRAFFIC OPERATIONS – PM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																	Overall
		Eastbound				Westbound				Northbound				Southbound					
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
SIGNALIZED																			
Steeles & Trafalgar Rd	LOS	C	C	F	F	F	C	B	F	F	F	F	F	E	64	258	>	F	F
	Delay	28	33	341	189	760	23	17	402	471	259	302	311	64	258	>	241	307	
	V/C	0.39	0.48	1.64		2.57	0.60	0.07		1.89	1.46	1.54		0.80	1.45	>		1.85	
	Q	21	286	100		231	285	14		191	861	932		357	324	>			
	Ex Avail.	115	--	40		130	--	70		100	--	65		--	--	>			
Steeles & Toronto Premium Outlet (West)	LOS		A	A	A	A	A		A	D		D	D					B	
	Delay		9	6	9	5	7		7	40		35	39					11	
	V/C		0.50	0.03		0.12	0.66			0.49		0.07						0.66	
	Q		55	9		78	246			135		49							
	Ex Avail.	--	--	130		45	--	--		--		40		--	--	>			
Steeles & Eighth Line N	LOS	F	C	C	F	C	F	>	F	E	C	>	D	D	D	>	D	F	
	Delay	231	32	22	82	32	182	>	169	56	29	>	37	47	42	>	44	120	
	V/C	1.38	0.66	0.01		0.74	1.30	>		0.38	0.27	>		0.41	0.29	>		1.01	
	Q	141	114	8		157	500	>		246	209	>		81	407	>			
	Ex Avail.	105	--	55		30	--	>		--	--	>		20	--	>			
Steeles & Ninth Line (north segment)	LOS	F	B		D	E	E	E	E					E		D	E	D	
	Delay	134	15		35	57	56		57					66		47	57	51	
	V/C	1.11	0.46			1.00	0.93							0.93		0.74		1.04	
	Q	76	58			1067	116							361		376			
	Ex Avail.	65	--			--	75		-41					90		--			
Steeles & Ninth Line (South Segment) / Road A	LOS	F	D		D	F	D	D	E	<	D	D	A	F	C	>	F	F	
	Delay	263	38	69	51	265	40	37	76	<	269	54	0	191	28	>	91	88	
	V/C	1.30	0.68	0.25		1.48	0.82	0.02		<	1.48	0.87		1.08	0.15	>		1.48	
	Q	26	107	84		208	740	13		<	646	727		20	243	>			
	Ex Avail.	15	--	75		145	--	15		<	--	--		15	--	>			
Steeles & Tenth Line (north segment)	LOS	F	A		B	E	>	E	E					D		D	D	D	
	Delay	105	7		16	68	>		68					45		36	43	48	
	V/C	0.94	0.49			1.07	>							0.50		0.05		0.9	
	Q	47	51			870	>							64		85			
	Ex Avail.	100	--			--	>							50		--			
Steeles & Tenth Line (south segment) / Road B	LOS	A	C	>	C	B	F	F	F	A	C	>	C	F	C	>	F	E	
	Delay	0	23	>	23	17	91	87	87	0	31	>	31	166	31	>	157	71	
	V/C	0.19	0.73	>		0.08	1.13	0.21		0.00	0.00	>		1.23	0.02	>		1.20	
	Q	12	118	>		12	728	28		0	4	>		29	229	>			
	Ex Avail.	15	--	>		70	--	15		15	--	>		15	--	>			
Steeles & Winston Churchill Blvd [Peel]	LOS	F	D	D	D	F	D	D	D	F	D	F	E	F	E	E	E	E	
	Delay	109	37	48	45	85	50	40	54	104	43	109	79	88	63	61	66	60	
	V/C	0.95	0.64	0.78		0.96	0.98	0.17		1.09	0.59	1.07		0.82	0.61	0.39		1.06	
	Q	75	102	99		164	1423	157		131	264	105		77	179	128			
	Ex Avail.	150	--	190		115	--	115		115	--	115		135	--	125			
Steeles & Heritage Rd [Peel]	LOS	E	C	B	C	D	E	>	E	F	E	D	F	F	E	>	E	E	
	Delay	56	30	10	33	38	56	>	55	129	61	48	89	81	56	>	67	56	
	V/C	0.91	0.75	0.07		0.39	0.92	>		1.14	0.79	0.23		0.88	0.23	>		0.99	
	Q	100	500	24		106	510	>		145	339	78		79	149	>			
	Ex Avail.	160	--	105		250	--	>		120	--	90		155	--	>			
5 Side Rd & Eighth Line N	LOS	B	C	>	C	B	D	>	D	A	D	>	D	A	A	>	A	C	
	Delay	20	22	>	22	16	50	>	48	6	42	>	41	7	8	>	8	35	
	V/C	0.47	0.70	>		0.22	0.96	>		0.05	1.00	>		0.05	0.34	>		0.99	
	Q	26	70	>		20	69	>		14	101	>		0	33	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Ninth Line	LOS	B	B	>	B	B	C	>	C	B	B	>	B	B	B	>	B	B	
	Delay	15	18	>	18	13	28	>	28	11	17	>	17	14	12	>	12	19	
	V/C	0.19	0.59	>		0.02	0.83	>		0.08	0.68	>		0.21	0.30	>		0.75	
	Q	16	74	>		7	77	>		16	50	>		16	39	>			
	Ex Avail.	15	--	>		15	--	>		15	--	>		15	--	>			
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	B	>	B	<	F	>	F	E	C	C	D	C	C	>	C	D	
	Delay	<	18	>	18	<	114	>	114	71	30	24	40	24	31	>	30	53	
	V/C	<	0.59	>		<	1.17	>		1.01	0.63	0.20		0.18	0.39	>		1.14	
	Q	<	90	>		<	520	>		123	124	38		28	55	>			
	Ex Avail.	<	--	>		<	--	>		110	--	85		30	--	>			

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



TABLE 4.4B: TOTAL TRAFFIC OPERATIONS – PM PEAK HOUR (CONT'D)

Intersection	MOE	Direction / Movement / Approach																Overall
		Eastbound				Westbound				Northbound				Southbound				
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
SIGNALIZED																		
Trafalgar Rd & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					E 59 1.08 477 --		F 143 1.19 477 --	F 89		B 17 0.56 306 --		B 17		E 75 1.10 113 --		E 75 1.13	
Trafalgar Rd & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	C 32 0.74 136 --		D 44 0.89 86 --	D 39						C 21 0.65 229 --		C 21		C 22 0.68 81 --		C 22 0.77	
Winston Churchill Boulevard & Highway 401 WB Off-Ramp	LOS Delay V/C Q Ex Avail.					D 45 0.56 84 --		F 108 1.08 91 --	F 84		B 16 0.71 127 --		C 16		C 24 0.88 260 --		C 24 0.94	
Winston Churchill Boulevard & Highway 401 EB Off-Ramp	LOS Delay V/C Q Ex Avail.	E 48 0.70 102 --		E 50 0.68 92 --	E 48						A 9 0.43 84 --		A 9		B 10 0.52 78 --		C 18 0.57	
Ninth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 0 < 0.00 < 0 < --	A 0 > 0 > 0 > --	> 0 > 0 > 0 > --	A 0	< 15 < 0.49 < 247 < --	> 15 > 0.49 > 247 > --	> 15 > 0.49 > 247 > --	C 15	< 6 < 0.56 < 34 < --	> 6 > 0.56 > 34 > --	> 6 > 0.56 > 34 > --	A 6 < 4 < 0.29 < 698 < --	> 4 > 0.29 > 698 > --	> 4 > 0.29 > 698 > --	A 4 < 6 < 0.54		
Road A & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 8 < 0.02 < 16 < --	A 8 > 0 > 16 > --	> 8 > 0 > 16 > --	A 8	< 9 < 0.18 < 26 < --	> 9 > 0.18 > 26 > --	> 9 > 0.18 > 26 > --	A 9	< 0 < 0.00 < 17 < --	> 0 > 0.00 > 17 > --	> 0 > 0.00 > 17 > --	A 0 < 0 < 0.00 < 0 < --	> 0 > 0.00 > 0 > --	> 0 > 0.00 > 0 > --	A 0 < 9 < 0.12		
Tenth Line & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 14 < 0.10 < 19 < --	B 14 > 0 > 19 > --	> 14 > 0 > 19 > --	B 14	< 14 < 0.01 < 9 < --	> 14 > 0.01 > 9 > --	> 14 > 0.01 > 9 > --	B 14	< 5 < 0.51 < 34 < --	> 5 > 0.51 > 34 > --	> 5 > 0.51 > 34 > --	A 5 < 3 < 0.09 < 16 < --	> 3 > 0.09 > 16 > --	> 3 > 0.09 > 16 > --	A 3 < 7 < 0.44		
Road B & E/W Collector Road	LOS Delay V/C Q Ex Avail.	< 17 < 0.06 < 30 < --	B 17 > 0 > 30 > --	> 17 > 0 > 30 > --	C 17	< 17 < 0.02 < 3 < --	> 17 > 0.02 > 3 > --	> 17 > 0.02 > 3 > --	C 17	< 2 < 0.12 < 15 < --	> 2 > 0.12 > 15 > --	> 2 > 0.12 > 15 > --	A 2 < 2 < 0.16 < 59 < --	> 2 > 0.16 > 59 > --	> 2 > 0.16 > 59 > --	A 2 < 5 < 0.14		
Winston Churchill Boulevard & E/W Collector Road	LOS Delay V/C Q Ex Avail.	C 20 0.02 11 --		> 20 > 0.02 > 11 > --	A 0					A 1 0.02 6 15 9		A 2 0.31 57 --	A 2	A 1 0.17 24 0 --	A 0 0.00 0 --	A 1 0.00 0 --	A 2 0.3	
Winston Churchill Boulevard & Road B	LOS Delay V/C Q Ex Avail.	A 8 0.02 10 --		> 8 > 0.02 > 10 > --	A 0					A 8 0.04 10 15 6		B 11 0.58 61 --	B 11	A 9 0.31 29 0 15 15	A 0 0.00 0 15 15	A 9 0.00 0 15 15	B 10 0.3	
E/W Collector Road & Steeles Avenue East	LOS Delay V/C Q Ex Avail.	E 61 0.83 26 15 -11	A 9 0.54 121 --	> 9 > 0.54 > 121 > --	B 12	B 16 0.87 561 0 15 --	A 0 0.00 0 15 --	> 0 > 0.00 > 0 > 15 > --	C 16					A 0 0.00 0 15 --	B 16 0.24 213 --	A 0 0.00 0 15 --	B 14 0.63	
UNSIGNALIZED																		
Steeles & Eighth Line (south section)	LOS Delay V/C Q Ex Avail.		A 0 0.36 0 --	> 0 > 0.36 > 0 > --	A 0	B 13 0.01 14 90 76	A 0 0.49 730 --	> 0 > 0.49 > 730 > --	A 0	A 0 0.00 0 30 30		B 12 0.01 5 --	A 0					
5 Side Rd & Tenth Line	LOS Delay V/C Q Ex Avail.	< 185 < 1.32 < 64 < --	F 185 > 1.32 > 64 > --	> 185 > 1.32 > 64 > --	F 185	< 454 < 1.95 < 124 < --	> 454 > 1.95 > 124 > --	> 454 > 1.95 > 124 > --	F 454	< 334 < 1.67 < 64 < --	> 334 > 1.67 > 64 > --	> 334 > 1.67 > 64 > --	F 334	< 23 < 0.53 < 17 < --	> 23 > 0.53 > 17 > --	> 23 > 0.53 > 17 > --	C 23	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



4.2.2 Total Traffic Operations with Mitigation Measures

Based on the analysis, congestion is currently and/or forecast to occur at certain movements and intersections the study area.

It is assumed that with the reconstruction and widening of roads within the study area such as Steeles Avenue and Winston Churchill Boulevard, exclusive turn lane storage will be extended to the appropriate amount to avoid queuing beyond available storage.

The mitigation measures analyzed in a sensitivity test include the following improvements:

- ▶ 5 Side Road and Winston Churchill Boulevard:
 - Westbound left-turn lane and eastbound right-turn lane added.
- ▶ 5 Side Road and Tenth Line:
 - Signalized²⁰
 - Westbound right-turn lane added.
 - Eastbound right-turn lane added.
 - Southbound left-turn lane added.
- ▶ Steeles Avenue and Tenth Line (South Segment) / Road B (signalized):
 - Southbound changed to dual left-turn lanes.
- ▶ Steeles Avenue and Trafalgar Road:
 - Tested as a three-lane roundabout.
- ▶ Steeles Avenue and E/W Collector
 - Eastbound left-turn phase added.
- ▶ Steeles Avenue and Ninth Line (South Segment)
 - Second westbound left-turn lane added with Ninth Line (South Segment) widened to three-lane cross-section (two southbound lanes and one northbound lane) between Steeles Avenue and the Hwy 407 overpass to accept double westbound left-turns.
 - Alternative northbound configuration with exclusive left-turn lane and shared-through/right turn lane. Northbound left-turn phase added in PM peak hour.

²⁰ Appendix I – Signal Warrant for 5 Side Road and Tenth Line



- Tested as three-lane roundabout
 - ▶ Steeles Avenue and Winston Churchill Boulevard
- Tested as a three-lane roundabout
 - ▶ Steeles Avenue and Heritage Road
- Tested as a three-lane roundabout

Table 4.5 and **Table 4.6** summarize the analysis results for the Total Traffic Sensitivity Scenario AM and PM peak hour traffic volumes, respectively. **Appendix J** contains detailed Synchro analysis reports for the Future Total Sensitivity analysis.

At 5 Side Road and Winston Churchill Boulevard, the addition of the exclusive westbound left-turn and eastbound right-turn lane frees capacity for eastbound/westbound through movements to the point where v/c ratios are no longer at critical levels.

Signalization of 5 Side Road and Tenth Line and the addition of exclusive eastbound right, westbound right, and southbound left-turn lanes significantly improves the operations of the intersection. Delays at the congested approaches decrease from over 100 seconds unsignalized to less than 45 seconds with signalization.

Adding an additional southbound left turn lane at Steeles Avenue and Tenth line provides the sufficient capacity for southbound traffic flow. In the PM peak hour, southbound left delays decrease from over 160 seconds to under 30 seconds.

Steeles Avenue and Trafalgar Road intersection is forecast to operate at LOS F in the AM and PM peak hour as a 3-lane roundabout. In the AM peak hour, eastbound, northbound and southbound approaches are forecast to operate with v/c ratios above 1.00. In the PM peak hour, the eastbound, westbound, and northbound approaches are forecast to operate with v/c ratios above 1.00.

At the intersection of Steeles Avenue and the E/W Collector Road, an eastbound left turn phase should be included in the signal cycle.

The additional westbound left turn lane northbound left-turn phase at Steeles Avenue and Ninth Line South significantly improve operations at the intersection. Left-turn movements are no longer forecast to operate at critical levels. In the Total Base scenario, the northbound lane configuration was assumed to be a shared left/through lane and an exclusive right-turn lane. However, the exclusive left-turn lane and shared-through/right turn lane configuration with northbound left-turn phase is recommended.



As a three-lane roundabout, Steeles Avenue and Ninth Line South is generally forecast to operate at an acceptable level of service in the AM and PM peak hours. In the AM peak hour, the eastbound approach is forecast to operate with a v/c ratio above 0.90. In the PM peak hour, the westbound approach is forecast to operate with a v/c ratio above 1.00.

Steeles Avenue and Winston Churchill Boulevard is forecast to operate at LOS F in the AM and PM peak hour as a 3-lane roundabout. In the AM peak hour, eastbound and southbound approaches are forecast to operate with v/c ratios above 1.00. In the PM peak hour, the westbound and northbound approaches are forecast to operate with v/c ratios above 1.00.

Steeles Avenue and Heritage Road is forecast to operate at LOS B in the AM peak hour and LOS F PM peak hour as a 3-lane roundabout. In the AM peak hour, the eastbound approach is forecast to operate at LOS F with a v/c ratio greater than 1.00. In the PM peak hour, the northbound approach is forecast to operate at LOS F with a v/c ratio greater than 1.00.



TABLE 4.5: TOTAL TRAFFIC OPERATIONS SENSITIVITY – AM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																Overall
		Eastbound				Westbound				Northbound				Southbound				
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
SIGNALIZED																		
Steeles & Trafalgar Rd (3-Lane Roundabout)	LOS	<	F	>	F	<	A	>	A	<	F	>	F	<	F	>	F	F
	Delay	<	1052	>	1052	<	10	>	10	<	464	>	464	<	503	>	503	525
	V/C	<	1.40	>		<	0.80	>		<	1.23	>		<	1.33	>		
	Q	<	1863	>		<	20	>		<	1400	>		<	1184	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
Steeles & Ninth Line (South Segment) / Road A	LOS	C	C	B	B	B	A	A	A	C	C	>	C	C	B	>	C	B
	Delay	34	20	15	20	17	8	7	10	30	29	>	29	21	20	>	20	18
	V/C	0.71	0.81	0.44		0.70	0.35	0.04		0.58	0.60	>		0.15	0.02	>		0.73
	Q	28	104	77		44	81	23		58	80	>		11	12	>		
	Ex Avail.	15	--	75		145	--	15		--	--	>		15	--	>		
Steeles & Ninth Line (South Segment) / Road A (3-Lane Roundabout)	LOS	<	C	>	C	<	A	>	A	<	A	>	A	<	A	>	A	B
	Delay	<	16	>	16	<	2	>	2	<	4	>	4	<	3	>	3	10
	V/C	<	0.93	>		<	0.49	>		<	0.45	>		<	0.02	>		
	Q	<	53	>		<	5	>		<	4	>		<	0	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
Steeles & Tenth Line (south segment) / Road B	LOS	A	B	>	B	B	A	A	A	C	C	>	C	C	C	>	C	B
	Delay	0	16	>	16	10	7	7	7	23	23	>	23	25	23	>	25	12
	V/C	0.15	0.83	>		0.05	0.43	0.37		0.01	0.00	>		0.18	0.00	>		0.65
	Q	18	100	>		5	211	27		4	7	>		24	26	>		
	Ex Avail.	15	--	>		70	--	15		15	--	>		15	--	>		
Steeles & Winston Churchill Blvd [Peel] (3-Lane Roundabout)	LOS	<	F	>	F	<	A	>	A	<	B	>	B	<	F	>	F	F
	Delay	<	1034	>	1034	<	8	>	8	<	12	>	12	<	196	>	196	401
	V/C	<	1.44	>		<	0.79	>		<	0.84	>		<	1.13	>		
	Q	<	2655	>		<	18	>		<	25	>		<	441	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
Steeles & Heritage Rd [Peel] (3-Lane Roundabout)	LOS	<	F	>	F	<	A	>	A	<	A	>	A	<	A	>	A	D
	Delay	<	69	>	69	<	5	>	5	<	3	>	3	<	4	>	4	33
	V/C	<	1.02	>		<	0.77	>		<	0.12	>		<	0.51	>		
	Q	<	252	>		<	15	>		<	1	>		<	5	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
5 Side Rd & Tenth Line	LOS	<	B	A	B	<	B	A	B	<	A	>	A	B	B	>	B	B
	Delay	<	20	9	19	<	12	8	12	<	10	>	10	16	15	>	16	16
	V/C	<	0.83	0.09		<	0.57	0.01		<	0.06	>		0.55	0.58	>		0.71
	Q	<	77	25		<	68	10		<	14	>		27	78	>		
	Ex Avail.	<	--	15		<	--	15		<	--	>		15	--	>		
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	D	C	D	D	B	>	C	C	C	C	C	B	C	>	C	C
	Delay	<	42	26	35	<	41	15	27	<	21	25	24	19	29	>	28	30
	V/C	<	0.86	0.41		<	0.84	0.34		<	0.15	0.21	0.08	0.27	0.59	>		0.72
	Q	<	593	48		<	43	89		<	13	32	22	45	84	>		
	Ex Avail.	<	--	30		<	30	--		<	110	--	85	30	--	>		
E/W Collector Road & Steeles Avenue East	LOS	B	B		B	C	A		C					A			A	B
	Delay	11	12		12	16	0		16					0			0	13
	V/C	0.57	0.78			0.53	0.00							0.00			0.02	0.54
	Q	27	82			521	0							0			46	
	Ex Avail.	15	--			--	15							15	--		--	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



TABLE 4.6: TOTAL TRAFFIC OPERATIONS SENSITIVITY – PM PEAK HOUR

Intersection	MOE	Direction / Movement / Approach																Overall
		Eastbound				Westbound				Northbound				Southbound				
		Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
SIGNALIZED																		
Steeles & Trafalgar Rd (3-Lane Roundabout)	LOS	<	F	>	F	<	F	>	F	<	F	>	F	<	D	>	D	F
	Delay	<	362	>	362	<	1248	>	1248	<	52	>	52	<	27	>	27	526
	V/C	<	1.22	>		<	1.61	>		<	1.00	>		<	0.92	>		
	Q	<	801	>		<	3681	>		<	176	>		<	45	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
Steeles & Ninth Line (South Segment) / Road A	LOS	F	C	C	C	F	D	B	D	E	C	>	D	D	D	>	D	D
	Delay	132	30	22	32	93	40	15	48	76	35	>	55	50	36	>	41	45
	V/C	0.95	0.77	0.24		1.09	0.98	0.02		1.05	0.83	>		0.62	0.26	>		1.11
	Q	26	99	64		171	765	15		69	595	>		26	163	>		
	Ex Avail.	15	--	75		145	--	15		--	--	>		15	--	>		
Steeles & Ninth Line (South Segment) / Road A (3-Lane Roundabout)	LOS	<	A	>	A	<	E	>	E	<	A	>	A	<	A	>	A	C
	Delay	<	3	>	3	<	46	>	46	<	8	>	8	<	10	>	10	23
	V/C	<	0.63	>		<	1.00	>		<	0.75	>		<	0.26	>		
	Q	<	8	>		<	158	>		<	13	>		<	2	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
Steeles & Tenth Line (south segment) / Road B	LOS	A	B	>	B	A	C	C	C	A	C	>	C	E	C	>	E	C
	Delay	0	12	>	12	8	32	30	30	0	31	>	31	61	32	>	59	27
	V/C	0.15	0.65	>		0.06	1.00	0.18		0.00	0.00	>		0.92	0.02	>		1.02
	Q	9	75	>		17	716	29		0	5	>		30	212	>		
	Ex Avail.	15	--	>		70	--	15		15	--	>		15	--	>		
Steeles & Winston Churchill Blvd [Peel] (3-Lane Roundabout)	LOS	<	C	>	C	<	F	>	F	<	F	>	F	<	A	>	A	F
	Delay	<	23	>	23	<	946	>	946	<	535	>	535	<	9	>	9	468
	V/C	<	0.94	>		<	1.34	>		<	1.33	>		<	0.70	>		
	Q	<	66	>		<	1805	>		<	1575	>		<	10	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
Steeles & Heritage Rd [Peel] (3-Lane Roundabout)	LOS	<	A	>	A	<	A	>	A	<	F	>	F	<	A	>	A	F
	Delay	<	6	>	6	<	9	>	9	<	216	>	216	<	3	>	3	60
	V/C	<	0.79	>		<	0.81	>		<	1.15	>		<	0.29	>		
	Q	<	18	>		<	19	>		<	491	>		<	2	>		
	Ex Avail.	<	--	>		<	--	>		<	--	>		<	--	>		
5 Side Rd & Tenth Line	LOS	<	B	B	B	<	D	B	C	<	C	>	C	A	A	>	A	C
	Delay	<	17	10	17	<	38	12	29	<	26	>	26	10	9	>	9	24
	V/C	<	0.72	0.05		<	0.94	0.29		<	0.87	>		0.14	0.17	>		0.90
	Q	<	74	20		<	99	28		<	61	>		11	19	>		
	Ex Avail.	<	--	15		<	--	15		<	--	>		15	--	>		
5 Side Rd & Winston Churchill Blvd [Peel]	LOS	<	D	C	D	D	C	>	C	C	C	B	C	C	C	>	C	C
	Delay	<	43	26	39	<	42	30	33	<	20	21	18	<	24	31	>	30
	V/C	<	0.83	0.07		<	0.80	0.77		<	0.72	0.47	0.20	<	0.15	0.37	>	0.81
	Q	<	147	45		<	44	126		<	87	61	35	<	23	53	>	
	Ex Avail.	<	--	30		<	30	--		<	110	--	85	<	30	--	>	
E/W Collector Road & Steeles Avenue East	LOS	C	A		A	C	A	C	C					A	C		A	C
	Delay	18	7		8	<	22	0	22					0	19		0	17
	V/C	0.53	0.48			<	0.93	0.00						0.00	0.08			0.63
	Q	24	61			<	563	0						0	221			
	Ex Avail.	15	--			<	--	15						15	--			

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length

Ex - Existing Available Storage

Avail. - Available Storage

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout

< - Shared Left-turn

> - Shared Right-turn



4.3 2031 Total Traffic Operations (with Highway 413)

This section provides only a qualitative assessment of the impacts of the subject site traffic in a scenario where the Hwy 413 freeway is in place, based on professional judgement of the author, not technical analysis. It is anticipated that Hwy 413 can be expected to significantly change travel patterns; however, detailed modelling has not been available to date from the Ministry of Transportation.

4.3.1 Shift in Background Traffic Patterns

With Hwy 413, it would be expected that traffic along Trafalgar Road and Winston Churchill Boulevard, south of Steeles Avenue, going to and from Hwy 401 would decrease. An increase in traffic along Winston Churchill Boulevard, north of Steeles, may also occur as a result of vehicles accessing the Hwy 413 ramp located south of 5 Side Road.

The impact to traffic along Steeles Avenue is difficult to determine. It is expected that most of this traffic would be short/medium distance trips to Milton or Brampton. It is also possible a portion of these trips are using Steeles Avenue to avoid congestion along Hwy 401. However, in the future horizon, Hwy 401 is planned to be widened which may alleviate congestion on Hwy 401 and draw a portion of traffic from Steeles Avenue.

The diverted traffic from Trafalgar Road may help to reduce congestion at critical movements such as eastbound right, westbound left, and northbound right-turns at the intersection of Trafalgar Road and Steeles Avenue. Similarly, the northbound left-turn movements at the intersection of Winston Churchill Boulevard and Steeles Avenue.

4.3.2 Site Traffic Impact

As shown previously in **Table 3.5**, roughly 250 inbound/outbound vehicles are expected to travel between the subject site and Hwy 413 in the AM and PM peak hours. The majority of the site traffic flow between the site and Hwy 413 is expected to travel uses Ninth Line (North Segment), Steeles Avenue, and Winston Churchill Boulevard.

In the AM peak hour, the movements most affected from these trips are the southbound right turns at Winston Churchill Boulevard and Steeles Avenue and westbound right-turns at Steeles Avenue and Ninth Line (North Segment). In the PM peak hour, the movements impacted the most will be southbound left turns at Steeles Avenue and Ninth Line (North Segment) and eastbound left turns at Winston Churchill Boulevard and Steeles Avenue.



Without Hwy 413, these trips would travel south along Trafalgar Road and Winston Churchill Boulevard to Hwy 401. As a result of Hwy 413, additional capacity may need to be provided for the left and right turns along the routes noted above.

4.4 Impact Assessment Summary

4.4.1 2031 Background Traffic Conditions

The 2031 horizon year background traffic growth assumes moderate growth in auto traffic. As a result, many of the capacity concerns in the base year continue with additional congested movements forecasted by 2031.

Along Steeles Avenue, operational issues and critical movements are particularly apparent at Trafalgar Road and Winston Churchill Boulevard.

General traffic growth also results in critical movements occurring along 5 Side Road at Eighth Line and at Winston Churchill Boulevard.

Overall, the critical movements in the background traffic operations consist of insufficient left-turn lane storage along Steeles Avenue intersections, delays at the all-way stop controlled intersection of 5 Side Road and Tenth Line, and congestion for through movements along Steeles Avenue, Trafalgar Avenue, and Winston Churchill Boulevard.

4.4.2 2031 Traffic Conditions (base case)

The Total Traffic operations are similar to the background operations. In general, the critical movements in the background traffic operations consist of insufficient left-turn lane storage along Steeles Avenue intersections. In general, the majority of the critical operations in the total conditions scenario are a result of background traffic growth. However, the addition of the site traffic causes some movements at major intersections to fall into critical levels. As a result of the additional site traffic, delays for certain movements are forecast to experience approximately 40-60 seconds of additional delay. Some movements are forecast to experience more significant increases in delay due to congestion and delays under background traffic conditions.

Due to the background growth, intersections along major roadways, such as Steeles Avenue and Winston Churchill Boulevard, are forecast to operate near or at capacity in the background scenario. As a result, the addition of side street traffic or traffic accessing side streets is



forecast to result in increased delays. At signalized intersections increased delays stem from cycle time needing to be allocated for side street traffic. At unsignalized traffic, delays on side streets appear as side street traffic grows.

The following mitigation measures were analyzed to improve operations of the critical intersections:

- ▶ 5 Side Road and Winston Churchill Boulevard: Westbound left-turn lane and eastbound right-turn lane added
- ▶ 5 Side Road and Tenth Line: Signalization; westbound right-turn lane and southbound left-turn added
- ▶ Steeles Avenue and Tenth Line (South Segment) / Road B (signalized): Dual southbound left-turn lanes
- ▶ Steeles Avenue and Trafalgar Road: Tested as three-lane roundabout; no improvement found.
- ▶ Steeles Avenue and E/W Collector: Eastbound left-turn phase added.
- ▶ Steeles Avenue and Ninth Line (South Segment): Second westbound left-turn lane added; Northbound configuration with exclusive left-turn lane and shared-through/right turn lane. Northbound left-turn phase added in PM peak hour; Tested as three-lane roundabout
- ▶ Steeles Avenue and Winston Churchill Boulevard: Tested as three-lane roundabout; no improvement found.
- ▶ Steeles Avenue and Heritage Road: Tested as three-lane roundabout; no improvement found.

It is assumed that with the reconstruction and widening of roads within the study area such as Steeles Avenue and Winston Churchill Boulevard, exclusive turn lane storage will be extended to the appropriate amount to avoid queuing beyond available storage.

A portion of critical movements are forecast to include eastbound and westbound through movements along Steeles Avenue. Conventional mitigation measures were not able to address the capacity issues along Steeles Avenue. As such, mitigation measures were not identified for these movements and improvements are deemed to be outside the scope of this study. The Region will be undertaking a future MCEA Study for improvements to Steeles Avenue from Trafalgar Road to Winston Churchill Boulevard. A range of multi-modal options for corridor improvements will be considered, such as widening of the roadway, cross-sectional requirements, active transportation, transit infrastructure improvements, intersection improvements, overall



traffic operations

Aside from capacity issues along Steeles Avenue, the proposed mitigation measures are forecast to address operational issues in the study area.

4.4.3 2031 Traffic Conditions (with Highway 413)

With Hwy 413, it would be expected that traffic along Trafalgar Road and Winston Churchill Boulevard, south of Steeles Avenue, going to and from Hwy 401 would decrease. An increase in traffic along Winston Churchill Boulevard, north of Steeles, may also occur as a result of vehicles accessing the Hwy 413 ramp located south of 5 Side Road.

The diverted traffic from Trafalgar Road may help to reduce congestion at critical movements such as eastbound right, westbound left, and northbound right-turns at the intersection of Trafalgar Road and Steeles Avenue. Similarly, the northbound left-turn movements at the intersection of Winston Churchill Boulevard and Steeles Avenue.

Roughly 250 inbound and outbound vehicles are expected to travel between the subject site and Hwy 413 in the AM and PM peak hours. The majority of the traffic flow is expected to travel down Ninth Line (North Segment), across Steeles Avenue, and along Winston Churchill Boulevard.

In the AM peak hour, the movements impacted the most from these trips are the southbound right turns at Winston Churchill Boulevard and Steeles Avenue and westbound right-turns at Steeles Avenue and Ninth Line (North Segment). In the PM peak hour, the movements impacted the most will be southbound left turns at Steeles Avenue and Ninth Line (North Segment) and eastbound left-turns at Winston Churchill Boulevard and Steeles Avenue. As a result of Hwy 413, additional capacity may need to be provided for the left and right turns along these routes.

4.4.4 Mitigation Measures for Discussion with Stakeholders

Based on the analysis, the recommended mitigation measures for discussion with stakeholders consist of:

- ▶ **Steeles Avenue, Winston Churchill Boulevard:** Appropriate extension of exclusive left-turn storage lanes when these roads are widened.



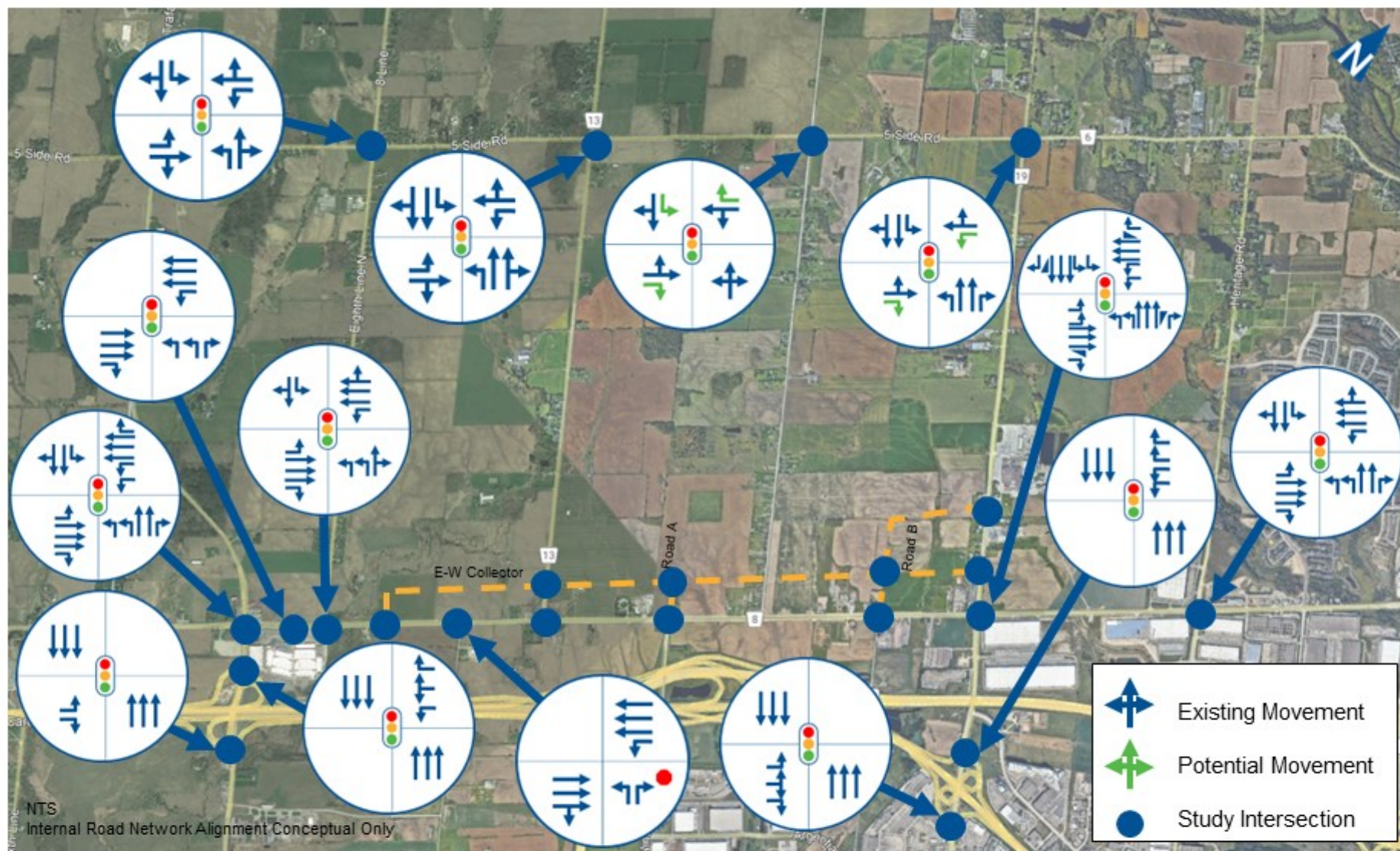
- ▶ **5 Side Road and Winston Churchill Boulevard:** Addition of westbound left-turn lane and eastbound right-turn lanes
- ▶ **5 Side Road and Tenth Line:** Signalization; Addition of eastbound right-turn lane, westbound right-turn lane, and southbound left-turn lane
- ▶ **Steeles Avenue and Tenth Line (South Segment) / Road B:** Addition of second southbound left-turn lane
- ▶ **Steeles Avenue and E/W Collector Road:** Implementation of eastbound left-turn phase
- ▶ **Steeles Avenue and Ninth Line (South Segment) / Road A:** Addition of second westbound left-turn lane; Northbound configured to be exclusive left-turn lane and shared-through/right turn lane. Northbound left-turn phase added in PM peak hour. Conversion to a three-lane roundabout should also be considered, taking into consideration the additional land required and need for suitable active transportation facilities.

While various mitigation measures are proposed for critical movements in the study area, general mitigation measures were not identified for movements along Steeles Avenue. Typical mitigation measures were not sufficient in addressing capacity issues and the improvements are deemed to be outside the scope of this study. The Region will be undertaking a future MCEA Study for improvements to Steeles Avenue from Trafalgar Road to Winston Churchill Boulevard. A range of multi-modal options for corridor improvements will be considered, such as widening of the roadway, cross-sectional requirements, active transportation, transit infrastructure improvements, intersection improvements, overall traffic operations.

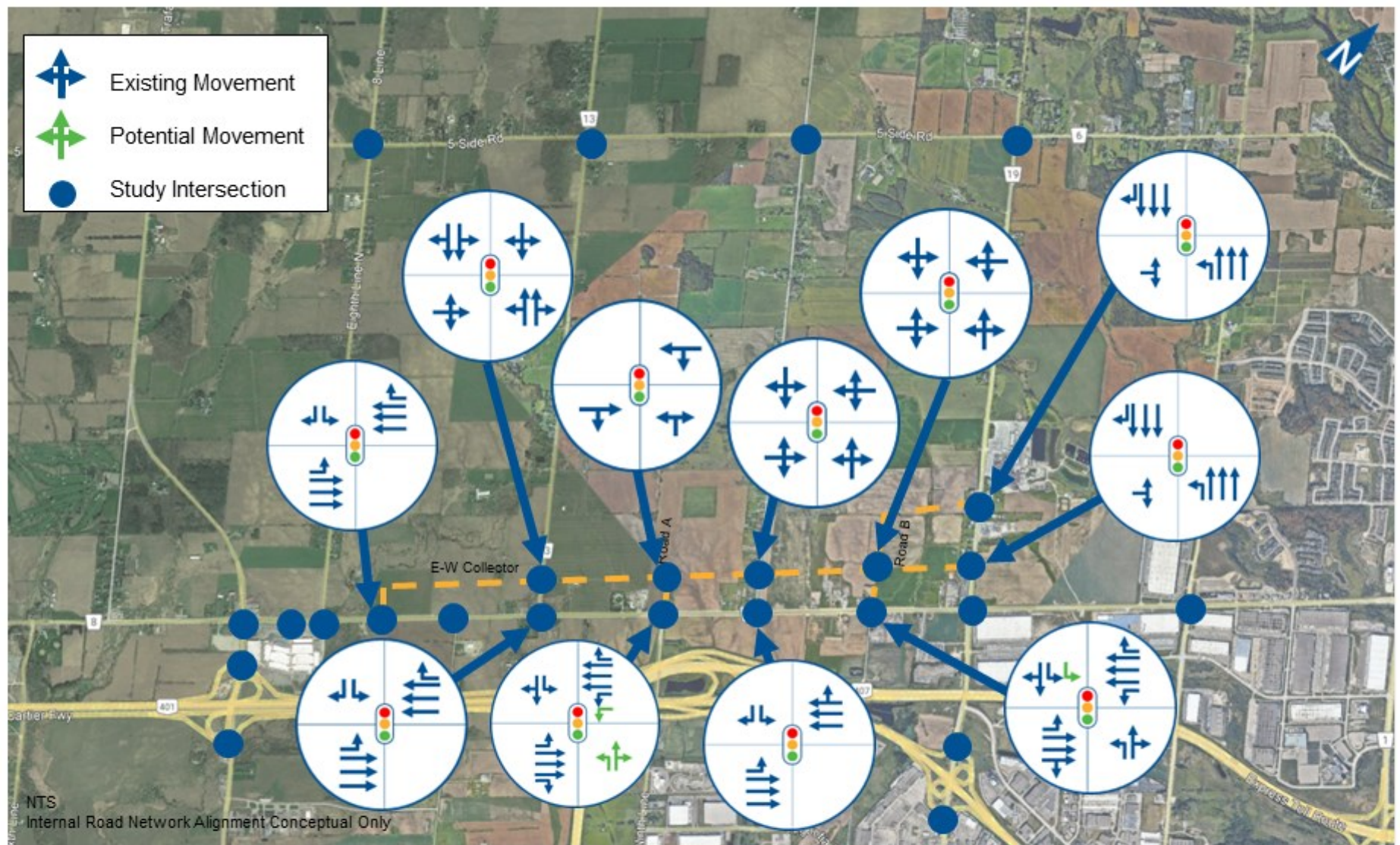
Figure 4.1 illustrates the future road network with the recommended mitigation measures.

The proposed lane configurations for roads that intersect with Regional roads can be constructed to the ultimate configuration prior to the regional road capital improvements. Local and collector road improvements are not dependent on regional road capital improvements.





Future Road Network with Recommended Mitigation Measures (1/2)



Future Road Network with Recommended Mitigation Measures (2/2)

5 Other Travel Modes

This chapter examines opportunities to reduce vehicle trips to and from the Premier Gateway Phase 2B Employment Area lands using modes other than the single occupant vehicles and through Transportation Demand Management measures.

5.1 Transit

As discussed in section 2.1.2, there is currently no transit service in the Study Area, with the exception of the southeast corner. As it develops into a major employment area, the Premier Gateway Phase 2B Employment Area lands have the potential to generate significant transit ridership. The secondary plan should include policies supporting transit service in the Study Area.

However, as discussed in section 1.4.6, the Town of Halton Hills' *Transit Service Strategy* includes two routes that would serve the study area: Milton GO–Lisgar GO (via Steeles Avenue) and Georgetown GO–Toronto Premium Outlets (TPO) (via Ninth Line and Steeles Avenue). These two routes would connect the study area with the primary origins for people working in the study – either directly, or through connections with Milton Transit, Brampton Transit, and MiWay.

The purpose of the *Transit Service Strategy* was to provide a high-level plan; the purpose of this study is to provide detailed planning for the transportation system in the Study Area. Building on the recommendations in the *Transit Service Strategy*, the following changes and additional details should be incorporated into the Town's implementation of transit services:

- ▶ **Service span:** The *Transit Service Strategy* showed the routes as operating weekdays 06:30-20:30 and Saturdays 0900-1800, with no service on Sundays. However, the hours and days that transit service is provided should reflect the shift patterns at employment sites in the study area. Anticipated uses include warehouses that are likely to operate 24/7. This doesn't mean transit need to operate 24/7, but does mean it needs to serve the start and end times of overnight shifts. Routes should operate on Sundays if businesses in the study area do.
- ▶ **Milton-Lisgar route:** The Study Area's detailed road network was not known at time of *Transit Service Strategy*, so the only option for this route was to use Steeles Avenue. However, this routing places significant parts of the study area outside walking distance (over 400m) from the route.



This route should use the east-west collector road rather than Steeles Ave. This would result in a small increase in length/operational costs, but almost all study area would then be within walking distance of this route.

- ▶ **Georgetown–TPO route:** The *Transit Service Strategy* also shows this route using Steeles Avenue. For the same reasons as the Milton-Lisgar route, this route should also use the east-west collector road rather than Steeles Ave. The change in route length and operating costs would be negligible, and it would place more of the study area within walking distance of this route.
- ▶ **Bus stop placement / amenities:**
 - Study area bus stops should be located close to crossing points (signalized intersections or dedicated crosswalks), and spaced to avoid excessive walking distance.
 - Stop placement and amenities at the intersection of Ninth Line & the east west collector road should reflect that it will be an interchange point between the Milton-Lisgar route and Georgetown-TPO route (and hence connecting Georgetown with the eastern part of the Study Area).
 - Stop placement and amenities at the intersection of Winston Churchill Blvd & Steeles Avenue reflect that it will be an interchange point between the Milton-Lisgar route and Brampton routes 511 ZÜM STEELES and 11 STEELES. The westbound Milton-Lisgar service could use the existing Züm stop on west side of Winston Churchill (south of Steeles).
- ▶ **Fares:** most local transit systems in the GTHA have agreements with their neighbours to allow free transfers. Given that most people using the Milton-Lisgar route are likely to need to use other local transit services, any transit service operated by Halton Hills should also have free transfers.

With these additional details in place, the routes recommended in the *Transit Service Strategy* would provide an effective local transit service for the Study Area. Further, there are no local transit services currently operated by Brampton Transit or MiWay that could sensibly be extended to serve the study area.

GO Transit operates various regional bus routes along Hwy 401. Using one or more of these routes to serve the major employment node in



the study area would be consistent with GO Transit's overall aims as a regional transit provider.

In general, development in the area should be designed to allow for well-connected, efficient transit to the area once service is available, offering individuals more choice in transportation modes and helping to reduce dependence on personal vehicle travel. This includes designing the development to minimize walking distances and enhance conditions for pedestrians and cyclists to access the service.

Further guidance on transit-supportive land use design for office parks and industrial/employment areas is provided in several references, including the Ministry of Transportation *Transit-Supportive Guidelines*²¹.

5.2 Active Transportation

As discussed in section 1.4, Halton Region plans to add multi-use trails on Trafalgar Road (north of Steeles Avenue), Ninth Line (north of Steeles Avenue) and Steeles Avenue. The Region also plans to bike lanes on Steeles Avenue, and sidewalks on all Regional roads in the study area. The Town of Halton Hills plans to add an off-road facility along Eighth Line between Steeles Avenue and 10 Sideroad. These facilities will form the backbone for the active transportation network serving the Premier Gateway Phase 2B Employment Area lands.

The traffic analysis adopted a conservative 0% mode share for walking and cycling for trips to the study area. However, this should not preclude the implementation of active transportation facilities in the study area. Cycling use tends to follow the provision of dedicated facilities, and hence including them should encourage cycling usage.

Although it is unlikely that people will use walking as the sole mode when accessing development in the study area, every transit trip to the study area results in someone walking from the bus stop to/from their destination in the study area. Consequently, pedestrian facilities are required for transit to be a viable option for people travelling to the study area.

Development should be designed to facilitate (and not preclude) the use of active transportation modes. New roads within the Study Area secondary plan area should include sidewalks on both sides as a standard feature. The number and width of site driveways should be minimized to improve pedestrian safety. (This also helps with traffic

²¹ Queen's Printer for Ontario, Transit-Supportive Guidelines, 2012



flow). The likely high volume of trucks exacerbates the need for high quality pedestrian facilities.

Individual developments should provide bicycle parking, building entrances along street-frontages and additional amenities further described in the following section,

5.3 Transportation Demand Management

Transportation Demand Management (TDM) uses policies, programs, services and products to influence whether, why, when, where and how people travel. TDM measures help shape the economic and social factors behind personal travel decisions. These actions are intended to encourage the use of more sustainable modes of transportation and minimize single-occupant vehicle trips as part of an overall transportation management strategy.

Table 5.1 outlines a range of TDM measures intended to influence site design, offer travel choices and promote sustainable travel options. These measures should be pursued through future development within the Premier Gateway Phase 2B Employment Area lands as applicable. With the area comprising mostly new development, an opportunity exists to incorporate site design features and encourage travel behaviour that can reduce single-occupant vehicle trips and minimize vehicular traffic generation.

TABLE 5.1: POTENTIAL TRANSPORTATION DEMAND MANAGEMENT MEASURES

TDM Measure	Employment areas	Commercial areas
Design		
Provide a clearly visible "wayfinding system" suitable for all users. Features may include textured surfaces, coloured lines and patterns, lights, raised letters, large lettering and other clearly understandable directional cues.	✓	✓
Locate signs indicating entrances, amenities such as showers, lockers, transit stations/stops and transportation information kiosk strategically throughout the site	✓	✓
Provide signs indicating clear direction from transit to public facilities and service centres	✓	✓
Provide adequate wayfinding signs at main entrances to all facilities or amenities such as showers, lockers, information/transit ticket purchase service	✓	
Provide a permanent TDM booth at main entrances of all buildings and facilities to display transportation information	✓	



TDM Measure	Employment areas	Commercial areas
including a monitor with transit schedules for the nearest transit station/stop		
Provide direct access to transit facilities from the lobby of major buildings located along a transit route	✓	✓
Ridesharing		
Promote carpooling initiatives and investigate partnerships with private ride matching services	✓	
Provide ample carpool stalls to meet or exceed requirements	✓	
Locate carpool parking stalls near the main entrance of the building	✓	
Clearly mark carpool parking stalls as reserved for carpool vehicles	✓	
Direct carpoolers to reserved areas with clear and intuitive signage	✓	
Promote participation in Smart Commute Halton	✓	✓
Active Transportation		
Provide the most direct, convenient and shortest connections from buildings to public sidewalks, to off-site pedestrian paths, and to transit stops as well as direct connections between buildings on-site. Ensure sidewalks are paved and maintained in winter.	✓	✓
Ensure main entrances of new buildings front directly onto and are clearly visible from the public street	✓	✓
Ensure pedestrian circulation is well-defined with safe and convenient connections to parking areas (both auto and bike parking) and off-site pedestrian facilities, and that pedestrian specific lighting is provided on sidewalks and pathways	✓	✓
Ensure continuous and barrier-free sidewalks 2.0 metres wide to accommodate simultaneous passage of a pedestrian and a wheelchair	✓	✓
Construct multi-use pathways 3.0 to 4.5 metres in width with 1.0 metre "clear zones" on either side	✓	✓
Design sidewalks and pathways to ensure personal security and safety through adequate lighting, unobstructed sign lines and provision of at-grade facilities	✓	✓



TDM Measure	Employment areas	Commercial areas
Provide bicycle parking facilities in public and/or private locations close to building entrances	✓	✓
Provide bicycle repair stations, including air pump, basic tools, and links to instructional online videos	✓	✓
Transit		
Provide as-planned transit services at early stage of development in study area, with support from developer funding	✓	✓
Promote available transit services to employees	✓	✓
Develop and encourage the use of employer transit pass programs	✓	✓
Provide covered shelters at transit stations and key bus stop locations with adequate seating and lighting	✓	✓



6 Next Steps

The proposed mitigation measures will need to be reviewed by the Town of Halton Hills and other relevant road operators. Those road operators include (but are not limited to) Halton Region, Peel Region, and MTO. This will provide information on factors other than transportation operations that need to be considered. The feedback will be used to refine the mitigation measures before final recommendations are made.



Appendix A: Existing Traffic Data

(See separate file)



Appendix B: Existing Traffic Conditions

(See separate file)



Appendix C: Commercial Trip TTS Data

(See separate file)



Appendix D: Truck Trip Generation Tables

(See separate file)



Appendix E: Study Area Subzone Map

(See separate file)



Appendix F: Halton Region Traffic Growth

(See separate file)



Appendix G: Future Background Conditions

(See separate file)



Appendix H: Future Total Conditions

(See separate file)



Appendix I: Signal Warrant

(See separate file)



Appendix J: Future Total Sensitivity Conditions

(See separate file)

