Appendix VIII

Regional Municipality of Niagara

# TRANSPORTATION ASSESSMENT

## Glendale Secondary Plan Update

## Future Conditions

November 2024

23065

# Disclaimer

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# 1 INTRODUCTION

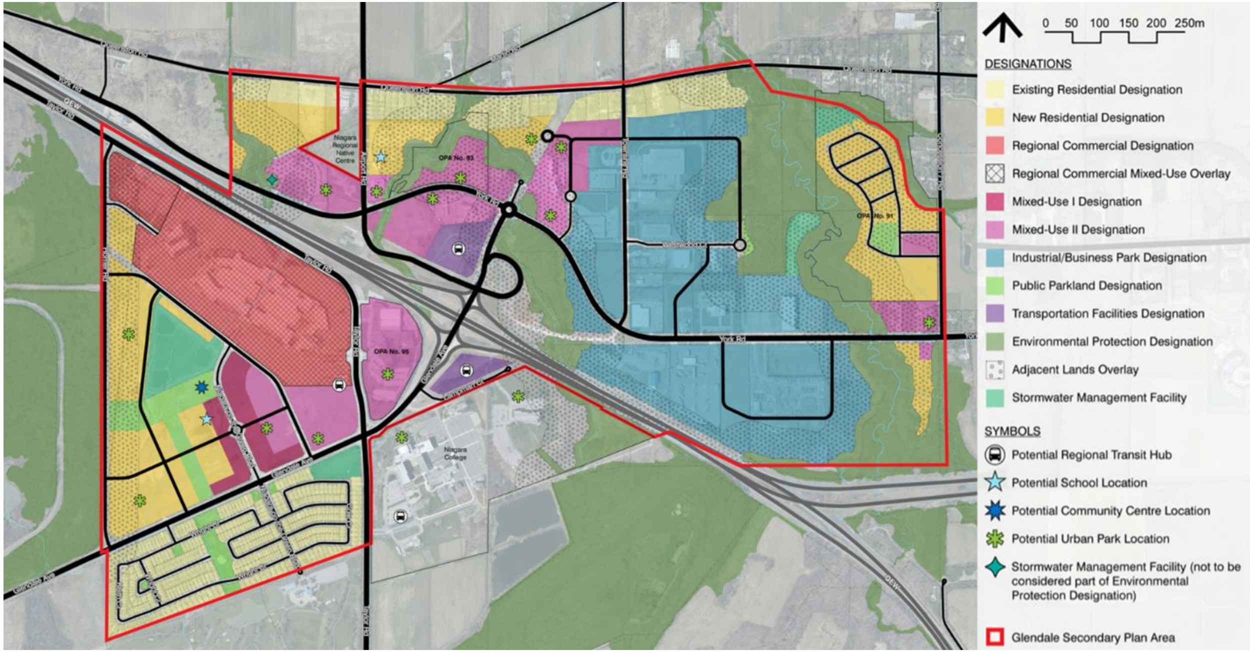
LEA Consulting Ltd. (LEA) has been retained by the Regional Municipality of Niagara to undertake a Transportation Assessment as part of the Glendale Secondary Plan Update in the Town of Niagara-on-the-Lake. The original Glendale Secondary Plan was adopted by the Town in 2010 with approval from the Region in 2011. In September 2020, the Glendale Niagara District Plan was endorsed by the Regional Council to develop the vision for growth, key strategies, appropriate land use designations, and associated policies to guide future development of the Glendale lands.

It is understood that Niagara Region, in partnership with Niagara-on-the-Lake is preparing an update to the Glendale Secondary Plan by assessing the Glendale Niagara District Plan land use concept and demonstration plan. A review of the existing transportation conditions was completed by LEA in November 2022 to identify the transportation deficiencies and potential opportunities to serve existing and future demand. The purpose of this Transportation Assessment is to review the future conditions of the Secondary Plan area to identify the transportation network needed to serve the proposed densities.

## 1.1 PREFERRED LAND USE CONCEPT

The preferred land use concept is illustrated in **Figure 1-1**. A mix of residential, commercial, employment, and institutional uses are proposed for the Glendale Secondary Plan area. Residential and mixed-use densities are generally centered around the Glendale Avenue & Taylor Road intersection at the western portion of the site while employment and institutional uses are proposed at the eastern and southern portion of the site.

**Figure 1-1: Preferred Land Use Concept**



*Source: The Planning Partnership, October 2024*

### 1.1.1 Population Projection Assumption

The transportation analysis presented in this report is based upon the preferred land use concept and population projections provided by The Planning Partnership (TPP).

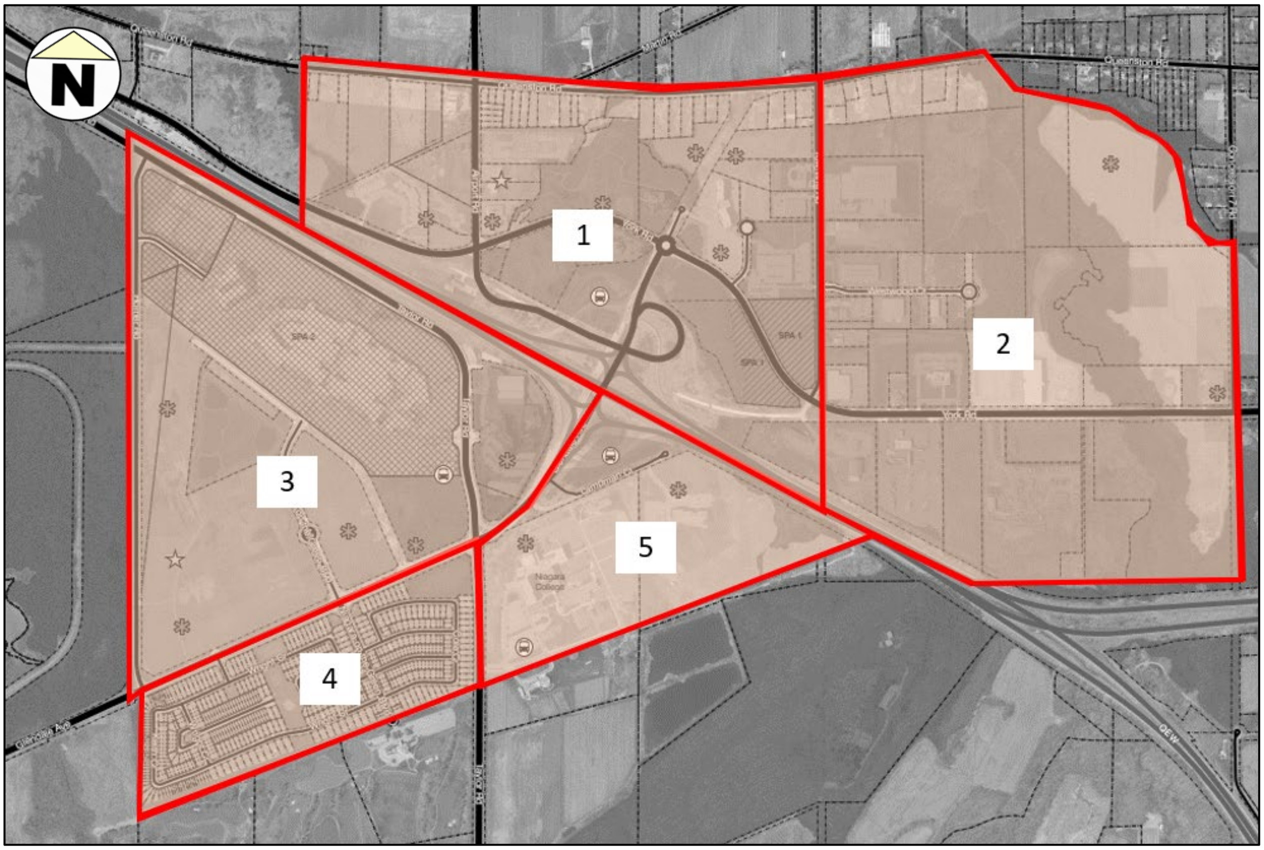
The proposed population projections for both scenarios were considered for input to this analysis and are summarized in **Table 1-1**. These projections were separated into five (5) zones based on the Region's EMME model as illustrated in **Figure 1-2**.

Table 1-1: Proposed Density for Study Area

| Zone | Proposed Land Use | Units | Employees |
|---|---|---|---|
| 1 | Residential (Low-Rise) | 30 | - |
| | Residential (Mid-Rise) | 2,059 | - |
| | Retail | - | 789 |
| | Office | - | 372 |
| | Institutional | - | 30 |
| 2 | Residential (Low-Rise) | 594 | - |
| | Residential (Mid-Rise) | 187 | - |
| | Retail | - | 114 |
| | Office | - | 2,740 |
| | Institutional (Proposed Schools) | - | 30 |
| 3 | Residential (Mid-Rise) | 2,364 | - |
| | Retail | - | 2,533 |
| 4 | Residential (Low-Rise) | 464 | - |
| 5 | Institutional | - | 3,165 |
| Total Proposed | | 5,698 | 9,773 |

The preferred land use concept contemplates 5,698 residential units and 9,773 employees.

Figure 1-2: EMME Zones



## 1.2 PROPOSED TRANSPORTATION NETWORK

### 1.2.1 Proposed Road Network

The preferred land use concept incorporates a network of new streets through the proposed employment and mixed-use areas. The proposed network forms a series of connections to facilitate new development and provide opportunities for multi-modal movement, new frontage, and site access. Combined with new active transportation connections, this network enhances the study area's connectivity and encourages greater opportunity for multi-modal travel. The proposed road network is illustrated in **Figure 1-3**.

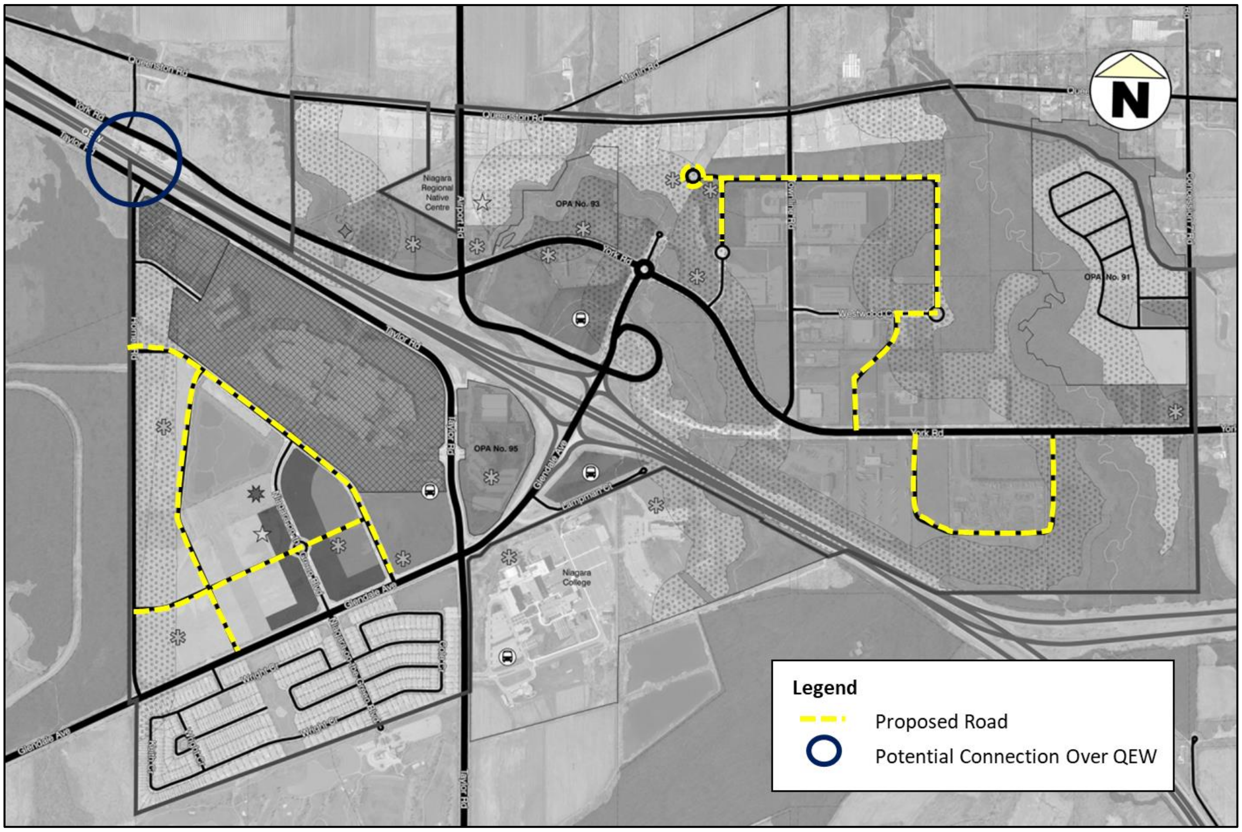
The review of existing conditions identified that the study area currently exhibits a lack of continuous east-west and north-south roadways. Specifically, there are no continuous north-south links primarily due to the QEW, which creates a significant physical barrier in connecting the north and south areas of Glendale. The only roadway within the study area that crosses the QEW is Glendale Avenue, which currently terminates at York Road.

While no connections are proposed across the QEW, there are opportunities to provide a continuous north-south connection if warranted. Three (3) potential locations were identified:

- (1) Homer Road,
- (2) Taylor Road/Airport Road, and
- (3) Lampman Court/Townline Road.

If warranted, it is recommended that the additional connection be provided at Homer Road as a connection at Lampman Court/Townline Road would increase traffic volumes and operational challenges at the Lampman Court & Glendale Road intersection and a connection at Taylor Road/Airport Road would be challenging due to grading requirements. Providing a connection across the QEW would produce redundancy within the network, allowing for people travelling to, from, and within the study area as an alternative to Glendale Avenue.

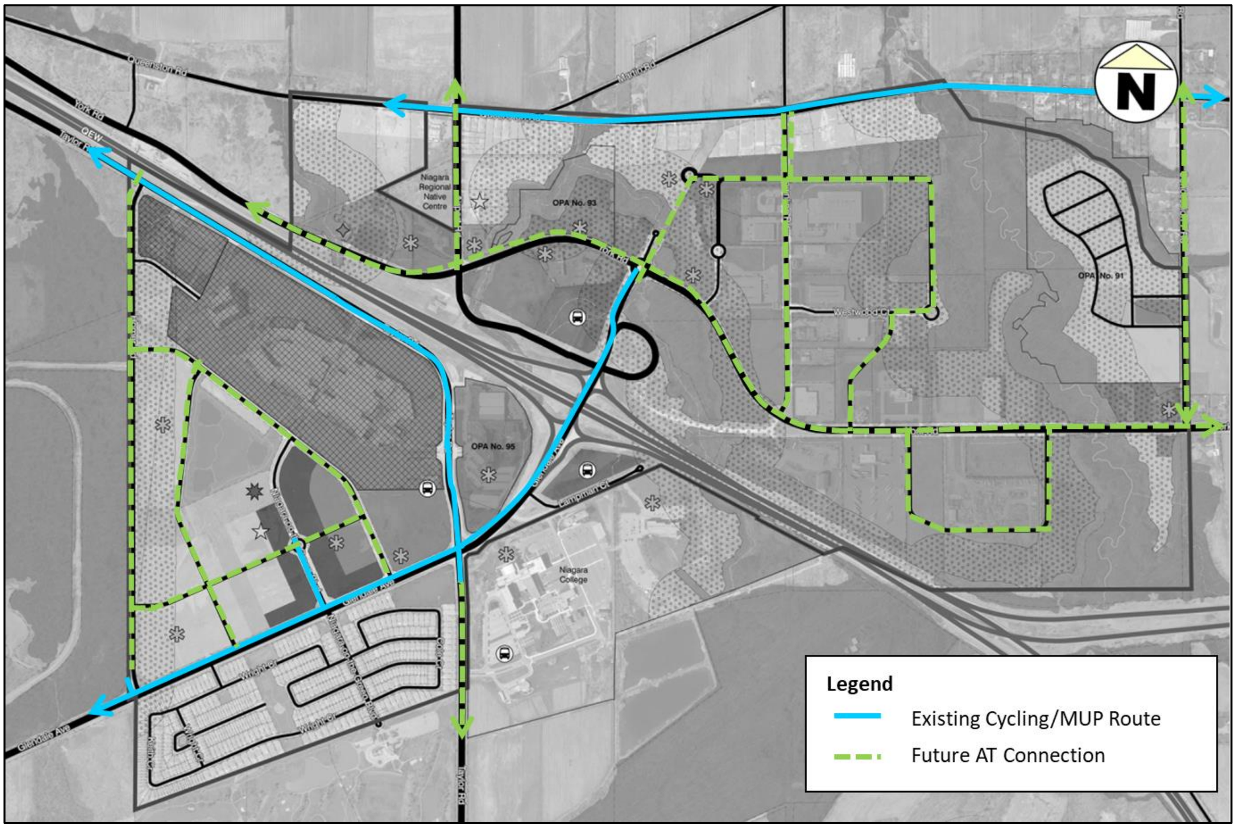
**Figure 1-3: Proposed Road Network**



## 1.2.2 Proposed Active Transportation Network

In addition to new road connections, the proposed active transportation network illustrated in **Figure 1-4** seeks to connect the existing Multi-Use Path (MUP) along Glendale Avenue with the existing on-road cycling route on Queenston Road. This active transportation connection will provide additional connectivity in the north-south direction within the study area. Additional active transportation connections are proposed along all arterial, collector, and industrial/business park streets within the study area.

Figure 1-4: Proposed Active Transportation Network



### 1.2.3 Recommended Transit Network

A key direction from the Glendale District Plan is to provide an accessible and connected transit system to serve the Glendale area, Niagara and beyond. As the Glendale community continues to grow, an increase in travel demand would provide an opportunity for a higher capacity form of transit to link Glendale with other major transit nodes. Further, given the exploration of a new transit hub within the study area, there are opportunities to explore higher-order transit in the Glendale Community.

Compared to typical bus services, higher-order transit would allow for fast, high-frequency, highway-capacity service while offering a reliable and convenient travel option for those living in or travelling to the Glendale community. It also has the potential to increase transit capacity and ridership, shorten travel times for commuters, reduce traffic congestion and traffic generated from the community, and better integrate public transit with urban development. In the long term, higher-order transit would introduce an attractive travel option, thereby influencing travel behaviour to support a shift in mode choice from auto driver to transit.

It is recommended that a corridor study is conducted to assess the feasibility of providing higher-order transit between the Glendale area and other adjacent communities in St Catharines and Niagara Falls.

# 2 FUTURE TRANSPORTATION ANALYSIS

A transportation analysis of future conditions was conducted to identify the high-level traffic impacts of the preferred land use concept and anticipated densities on the broader network. The following section outlines the anticipated trip generation and future screenline analysis results.

## 2.1 SECONDARY PLAN GENERATED TRAFFIC

The sections below discuss the calculation, distribution, and assignment of the secondary plan-generated vehicle trips.

### 2.1.1 Trip Generation

The 2041 and 2051 EMME models were used as a base to determine the number of future trips on the network. As the 2041 and 2051 EMME models initially factored in population and employment forecasts, trips were removed from the baseline scenario to avoid double counting.

The populations for each zone were split proportionally into the residential land uses based on the predicted units by zone. Population numbers were then converted to units using the population per unit values from the Region's EMME model land use table:

- 1.7 for high-rise residential
- 2.2 for mid-rise residential
- 2.6 for low rise residential

The employees for each zone were split proportionally into the retail and office land uses based on the predicted retail employees (mixed-use) and office employees (employment by zone). The number of units and employees in the 2041 and 2051 EMME models were then removed from the proposed units and employees to determine the number of trips generated. Details regarding the EMME model assumptions are provided in **Appendix A**. The resultant trip generation statistics used in the screenline analysis are summarized in **Table 2-1**.

It is noted that where a negative number is shown, this means that the proposed units/employment within the 2041/2051 EMME Model was greater than the proposed units/employment within the preferred Land Use Plan.

The net density for the study area results in 3,638 additional units and 4,855 employees for the future horizons.

Table 2-1: Net Density Proposed for Study Area

| Zone | Land Use | Units | Employees |
|---|---|---|---|
| 1 | Residential (Low-Rise) | 29 | - |
| | Residential (Mid-Rise) | 2,006 | - |
| | Retail | - | 213 |
| | Office | - | 79 |
| | Institutional | - | 30 |
| 2 | Residential (Low-Rise) | 144 | - |
| | Residential (Mid-Rise) | 19 | - |
| | Retail | - | 71 |
| | Office | - | 1,706 |
| | Institutional | - | 30 |
| 3 | Residential (Mid-Rise) | 1,218 | - |
| | Retail | - | 136 |
| 4 | Residential (Low-Rise) | 403 | - |
| | Retail | - | -125 |
| 5 | Residential (Low-Rise) | -182 | - |
| | Retail | - | -449 |
| | Institutional | - | 3,165 |
| | Total Proposed | 3,638 | 4,855 |

### 2.1.2 Modal Split

Data from the 2016 Transportation Tomorrow Survey (TTS) was extracted to identify the modal split of neighbourhood trips originating from the area for home-base work, home-base school, and home-based discretionary trips for residential and office, school, and retail trips, respectively. Trips were filtered for Traffic Analysis Zones (TAZ) 6048, 6049, 6052, 6112, 6113, 6118, 6119, 6146, 6148, 6149, and 6150 which contain and surround the study area.

It is anticipated that a slight reduction in auto driver trips will occur, due to the increasing density of the residential land uses and mixed-use land uses within the study area. To be conservative, in the 2041 Horizon, the mode split from the 2016 TTS was used with no modal split adjustments.

For the 2051 Horizon, it is assumed higher-order transit will be introduced to the study area, pending further studies. As a result, it is estimated that approximately 25% of auto driver trips for all land uses will become transit trips.

The modal splits summarized in **Table 2-2** and **Table 2-3** were used to forecast the trip generation in the section below for the 2041 and 2051 horizon, respectively. Detailed TTS data is provided in **Appendix B**.

Table 2-2: Mode Splits (2041)

| Mode | Residential | Retail | Work/School |
|---|---|---|---|
| Auto Driver | 82% | 82% | 91% |
| Passenger | 11% | 14% | 7% |
| Transit | 6% | 3% | 0% |
| Pedestrian | 0% | 0% | 1% |
| Cycling | 1% | 1% | 1% |
| Total | 100% | 100% | 100% |

Table 2-3: Mode Splits (2051)

| Mode | Residential | Retail | Work/School |
|---|---|---|---|
| Auto Driver | 57% | 57% | 66% |
| Passenger | 11% | 14% | 7% |
| Transit | 31% | 28% | 25% |
| Pedestrian | 0% | 0% | 1% |
| Cycling | 1% | 1% | 1% |
| Total | 100% | 100% | 100% |

### 2.1.3 Trip Generation

Baseline auto trips were estimated using trip rates for different land uses from the ITE Trip Generation Manual 11th Edition:

- **Residential (High-Rise)** – average rates for ITE LUC 222 (Multifamily Housing (High-Rise))
- **Residential (Mid-Rise)** – fitted curve formula for ITE LUC 221 (Multifamily Housing (Mid-Rise))
- **Residential (Low-Rise)** – average rates for ITE LUC 220 (Multifamily Housing (Low-Rise))
- **Retail** – average rates for ITE LUC 820 (Shopping Centre >150k)
- **Employment** – average rates for ITE LUC 750 (Office Park)
- **Institutional** – average rates for ITE LUC 520 (Elementary) and ITE LUC 552 (University/College)

Baseline auto trips were converted into person trips based on an assumed auto split of 95% and an average vehicle occupancy for ITE LUC 220, ITE LUC 820, and ITE LUC 720 as per ITE Trip Generation Handbook 3rd Edition for the proposed residential, retail, and employment use trips, respectively. The baseline auto trips for institutional uses were not converted into person trips as the ITE Trip Generation Handbook did not identify a rate for institutional land use codes.

Of note, conversion rates were not identified for Saturday peak hours. As such, the vehicle occupancy in the PM was applied for the Saturday analysis.

A summary of the auto trip generation under the 2041 horizon year is summarized in **Table 2-4**. A detailed breakdown of the auto trip generation is provided in **Appendix C**.

Table 2-4: Auto Trip Generation Summary (2041)

| Land Use | | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | | Saturday Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total | In | Out | Total |
| Zone 1 | Residential | 197 | 636 | 833 | 480 | 321 | 801 | 414 | 415 | 829 |
| | Retail | 90 | 50 | 140 | 201 | 195 | 396 | 184 | 180 | 364 |
| | Office | 25 | 3 | 28 | 5 | 29 | 34 | 4 | 1 | 5 |
| | Institutional | 95 | 84 | 179 | 20 | 23 | 43 | 0 | 0 | 0 |
| | Total | 407 | 773 | 1180 | 706 | 568 | 1274 | 602 | 596 | 1198 |
| Zone 2 | Residential | 13 | 38 | 51 | 51 | 31 | 82 | 34 | 34 | 68 |
| | Retail | 30 | 17 | 47 | 67 | 65 | 132 | 61 | 60 | 121 |
| | Office | 530 | 59 | 589 | 122 | 616 | 738 | 70 | 19 | 89 |
| | Institutional | 95 | 84 | 179 | 20 | 23 | 43 | 0 | 0 | 0 |
| | Total | 668 | 198 | 866 | 260 | 735 | 995 | 165 | 113 | 278 |
| Zone 3 | Residential | 118 | 379 | 497 | 288 | 194 | 482 | 248 | 251 | 499 |
| | Retail | 57 | 32 | 89 | 129 | 125 | 254 | 118 | 114 | 232 |
| | Total | 175 | 411 | 586 | 417 | 319 | 736 | 366 | 365 | 731 |
| Zone 4 | Residential | 30 | 58 | 88 | 60 | 47 | 107 | 60 | 47 | 107 |
| | Retail | -52 | -29 | -81 | -118 | -114 | -232 | -107 | -105 | -212 |
| | Total | -22 | 29 | 7 | -58 | -67 | -125 | -47 | -58 | -105 |
| Zone 5 | Residential | -14 | -26 | -40 | -27 | -20 | -47 | -27 | -20 | -47 |
| | Retail | -189 | -105 | -294 | -423 | -412 | -835 | -388 | -378 | -766 |
| | Institutional | 1479 | 467 | 1946 | 676 | 1373 | 2049 | 0 | 0 | 0 |
| | Total | 1276 | 336 | 1612 | 226 | 941 | 1167 | -415 | -398 | -813 |
| Total | Residential | 344 | 1085 | 1429 | 852 | 573 | 1425 | 729 | 727 | 1456 |
| | Retail | -64 | -35 | -99 | -144 | -141 | -285 | -132 | -129 | -261 |
| | Office | 555 | 62 | 617 | 127 | 645 | 772 | 74 | 20 | 94 |
| | Institutional | 1669 | 635 | 2304 | 716 | 1419 | 2135 | 0 | 0 | 0 |
| | Total | 2504 | 1747 | 4251 | 1551 | 2496 | 4047 | 671 | 618 | 1289 |

The study area is anticipated to generate 4,251 two-way vehicle trips (2,504 inbound and 1,747 outbound) during the AM peak hour, 4,047 two-way vehicle trips (1,551 inbound and 2,496 outbound) during the PM peak hour, and 1,289 two-way vehicle trips (671 inbound and 618 outbound) during the Saturday peak hour in 2041.

A summary of the auto trip generation under the 2051 horizon year is summarized in **Table 2-5**. A detailed breakdown of the auto trip generation is provided in **Appendix C**.

Table 2-5: Auto Trip Generation Summary (2051)

| Land Use | | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | | Saturday Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total | In | Out | Total |
| Zone 1 | Residential | 136 | 439 | 575 | 331 | 222 | 553 | 285 | 288 | 573 |
| | Retail | 27 | 15 | 42 | 62 | 60 | 122 | 56 | 55 | 111 |
| | Office | -72 | -8 | -80 | -17 | -84 | -101 | -9 | -3 | -12 |
| | Institutional | 66 | 58 | 124 | 14 | 16 | 30 | 0 | 0 | 0 |
| | **Total** | **157** | **504** | **661** | **390** | **214** | **604** | **332** | **340** | **672** |
| Zone 2 | Residential | -2 | -7 | -9 | 3 | 0 | 3 | 6 | 6 | 12 |
| | Retail | 18 | 10 | 28 | 42 | 40 | 82 | 39 | 37 | 76 |
| | Office | 342 | 38 | 380 | 79 | 398 | 477 | 46 | 13 | 59 |
| | Institutional | 66 | 58 | 124 | 14 | 16 | 30 | 0 | 0 | 0 |
| | **Total** | **424** | **99** | **523** | **138** | **454** | **592** | **91** | **56** | **147** |
| Zone 3 | Residential | 39 | 124 | 163 | 96 | 66 | 162 | 83 | 84 | 167 |
| | Retail | -22 | -12 | -34 | -48 | -47 | -95 | -44 | -43 | -87 |
| | **Total** | **17** | **112** | **129** | **48** | **19** | **67** | **39** | **41** | **80** |
| Zone 4 | Residential | 19 | 37 | 56 | 38 | 30 | 68 | 38 | 30 | 68 |
| | Retail | -39 | -22 | -61 | -89 | -87 | -176 | -82 | -79 | -161 |
| | **Total** | **-20** | **15** | **-5** | **-51** | **-57** | **-108** | **-44** | **-49** | **-93** |
| Zone 5 | Residential | -14 | -28 | -42 | -29 | -22 | -51 | -29 | -22 | -51 |
| | Retail | -143 | -79 | -222 | -319 | -312 | -631 | -294 | -286 | -580 |
| | Institutional | 1028 | 325 | 1353 | 470 | 955 | 1425 | 0 | 0 | 0 |
| | **Total** | **871** | **218** | **1089** | **122** | **621** | **743** | **-323** | **-308** | **-631** |
| Total | Residential | 178 | 565 | 743 | 439 | 296 | 735 | 383 | 386 | 769 |
| | Retail | -159 | -88 | -247 | -352 | -346 | -698 | -325 | -316 | -641 |
| | Office | 270 | 30 | 300 | 62 | 314 | 376 | 37 | 10 | 47 |
| | Institutional | 1160 | 441 | 1601 | 498 | 987 | 1485 | 0 | 0 | 0 |
| | Total | 1449 | 948 | 2397 | 647 | 1251 | 1898 | 95 | 80 | 175 |

The study area is anticipated to generate 2,397 two-way vehicle trips (1,449 inbound and 948 outbound) during the AM peak hour, 1,898 two-way vehicle trips (647 inbound and 1,251 outbound) during the PM peak hour, and 175 two-way vehicle trips (95 inbound and 80 outbound) during the Saturday peak hour in 2051.

### 2.1.4 Trip Distribution and Assignment

The directional trip distribution for site traffic was derived using the 2016 TTS data filtered for trips originating in/destined to home, retail, and work for traffic zones 6048-6049, 6052, 6112-6113, 6118-6119, 6146, 6148-1649, and 6150. For residential, work, and school uses, in/out distribution was based on the results of the peak hour for the peak direction (i.e., inbound distribution based on PM in, outbound distribution based on AM out). For retail use, in/out distribution was based on the PM peak hour due to limited data in the AM.

Site traffic was assigned to the road network based on logical routing, turn restrictions, and the capacity of roads within the study area. The trip distribution for the secondary plan area is outlined in **Table 2-6** and **Table 2-7** for the 2041 and 2051 horizons, respectively. Detailed TTS data is provided in **Appendix C**.

Table 2-6: Trip Distribution and Assignment – Weekday AM and PM Peak Hours (2041)

| Origin/ Destination | Assigned Route | Residential | | Retail | | Work | | School | |
|---|---|---|---|---|---|---|---|---|---|
| | | In | Out | In | Out | In | Out | In | Out |
| North | Airport Road, Townline Road or Concession Road 7 | 3% | 3% | 13% | 5% | 6% | 5% | 6% | 5% |
| South | Glendale Avenue | 3% | 4% | 23% | 6% | 10% | 9% | 10% | 9% |
| | Taylor Road | 3% | 4% | 4% | 7% | 4% | 5% | 4% | 5% |
| | QEW | 10% | 10% | 15% | 18% | 28% | 28% | 28% | 28% |
| East | York Road | 1% | 1% | 6% | 2% | 2% | 2% | 2% | 2% |
| West | Glendale Avenue, Taylor Avenue or York Road | 22% | 22% | 13% | 14% | 13% | 13% | 13% | 13% |
| | QEW | 58% | 56% | 26% | 49% | 37% | 40% | 37% | 40% |
| | Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Table 2-7: Trip Distribution and Assignment – Weekday AM and PM Peak Hours (2051)

| Origin/ Destination | Assigned Route | Residential | | Retail | | Work | | School | |
|---|---|---|---|---|---|---|---|---|---|
| | | In | Out | In | Out | In | Out | In | Out |
| North | Airport Road, Townline Road or Concession Road 7 | 3% | 3% | 13% | 5% | 6% | 5% | 6% | 5% |
| South | Glendale Avenue | 3% | 4% | 23% | 6% | 10% | 9% | 10% | 9% |
| | Taylor Road | 3% | 4% | 4% | 7% | 4% | 5% | 4% | 5% |
| | QEW | 10% | 10% | 15% | 18% | 28% | 28% | 28% | 28% |
| East | York Road | 1% | 1% | 6% | 2% | 2% | 2% | 2% | 2% |
| West | Glendale Avenue, Taylor Avenue or York Road | 22% | 22% | 13% | 14% | 13% | 13% | 13% | 13% |
| | QEW | 58% | 56% | 26% | 49% | 37% | 40% | 37% | 40% |
| | Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

## 2.2 SCREENLINE ANALYSIS

A screenline analysis was conducted for the study area to consider the high-level traffic impacts of the expected future volumes on the broader network for weekday AM and PM peak hours under 2041 and 2051 horizon years. It is noted that a screenline analysis for the Saturday peak hour was not conducted, as there is no EMME Model data for Saturdays. Future population and employment data was provided by the Region. Unit numbers were used to generate trips for residential land uses, and employee numbers were used to generate trips for retail and work land uses. Generated trips were added to the future baseline scenarios. Similarly, trips (determined by population and employment numbers) assumed in the EMME model were removed.

The analysis considered the total inbound and outbound flows of traffic at the study area boundaries in each direction. It also considered two main destination points within the study area: The Outlet Collection at Niagara and Niagara College. The baseline analysis was conducted using EMME model volumes provided by the Region where 2016 EMME volumes were grown to the existing year, 2022. Furthermore, no lane configuration changes were identified under future scenarios.

The assumed capacity of each corridor was based on the road classification and lane capacity provide in the *Town of Niagara-on-the-Lake Transportation Master Plan* dated March 2022 and the *Glendale District Plan* dated June 2020 and is summarized in **Table 2-8**. The road classification and capacity of the corridors within the study area is summarized in **Table 2-9**. Excerpts of the road classification and lane capacity is provided in **Appendix D**.

Table 2-8: Lane Capacity by Road Classification

| Road Classification | Lane Capacity (vehicles per lane per hour) |
|---|---|
| Local | 300 |
| Collector | 500 |
| Arterial | 800 |
| Highway | 1800 |

Table 2-9: Road Classification and Capacity within the Study Area

| Corridor | Service Function | Road Classification | Division | Speed Limit (km/h) | Lanes (per direction) | Typical Capacity (veh/hr/ lane) | Capacity (veh/hr) |
|---|---|---|---|---|---|---|---|
| Homer Road | Rural | Collector | Undivided | 80 | 1 | 500 | 500 |
| Taylor Road | Urban | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Airport Road | Rural | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Townline Road | Rural | Local | Undivided | 50 | 1 | 300 | 300 |
| Concession Road 7 | Rural | Local | Undivided | 50 | 1 | 300 | 300 |
| Niagara-on-the-Green Boulevard | Urban | Local | Undivided | 50 | 1 | 300 | 300 |
| York Road | Rural | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Taylor Road | Urban | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Glendale Avenue | Urban | Arterial | Divided | 50 | 2 | 800 | 1600 |
| QEW (Western Boundary) | Urban | Highway | Divided | 100 | 3 | 1800 | 5400 |
| QEW (Future Western Boundary$^{(1)}$) | Urban | Highway | Divided | 100 | 4 | 1800 | 7200 |
| QEW (Eastern Boundary) | Urban | Highway | Divided | 100 | 5 | 1800 | 9000 |

Note: (1) – The QEW will be widened at the western screenline to four lanes in each direction as part of the Garden City Skyway Twinning Project.

The screenline analysis results under the 2041 horizon year are illustrated in **Figure 2-1**, while the screenline analysis results under the 2051 horizon year are illustrate in **Figure 2-2**.

### Figure 2-1: Screenline Analysis Results (2041)

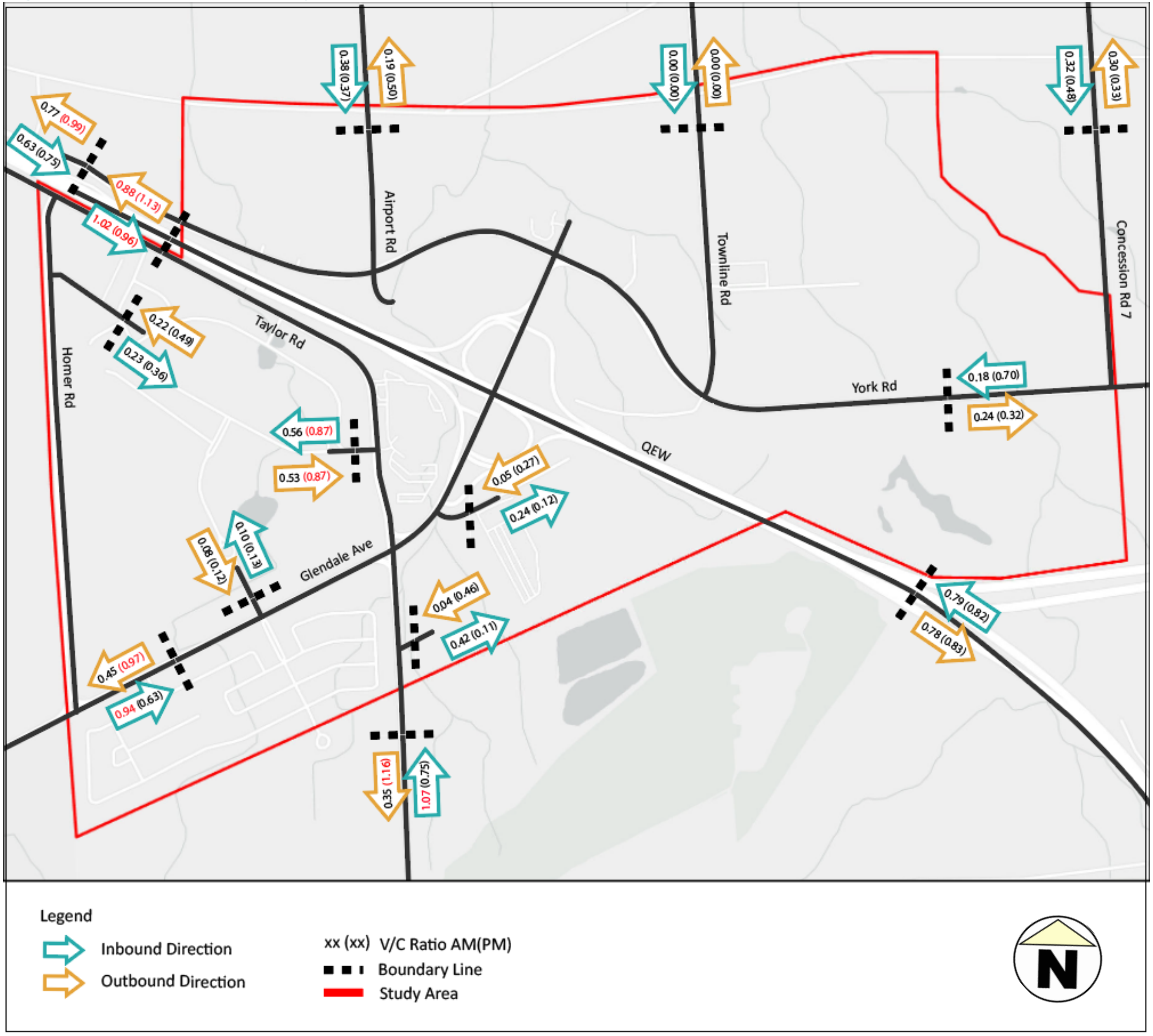
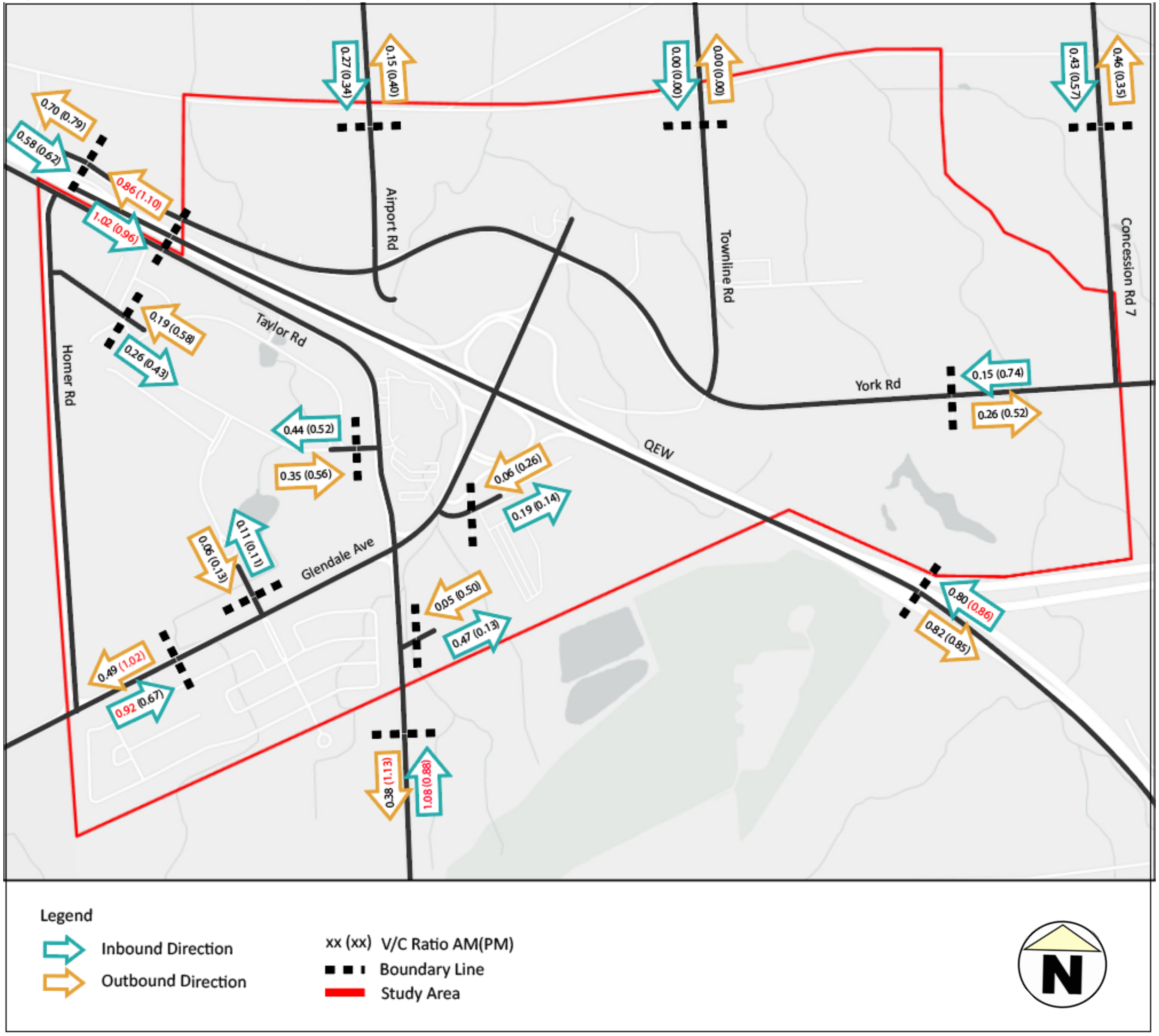


Figure 2-2: Screenline Analysis Results (2051)



The screenline analysis is summarized in **Table 2-10** for the 2041 horizon year and **Table 2-11** for the 2051 horizon year. Full detailed screenline analysis results are provided in **Appendix E**.

Table 2-10: Screenline Analysis Corridor Volume-to-Capacity Ratios (2041)

| Screenline Roads Included | Total Capacity (veh/hr) | Flow to/from Subject Site | 2022 | | 2041: Baseline | | 2041: SP | |
|---|---|---|---|---|---|---|---|---|
| | | | AM | PM | AM | PM | AM | PM |
| Outlet Collection at Niagara | | | | | | | | |
| Homer Road | 500 | Inbound | 0.22 | 0.16 | 0.20 | 0.28 | 0.23 | 0.36 |
| | | Outbound | 0.03 | 0.46 | 0.13 | 0.43 | 0.22 | 0.49 |
| Taylor Road | 800 | Inbound | 0.31 | 0.36 | 0.41 | 0.49 | 0.56 | 0.87 |
| | | Outbound | 0.04 | 0.35 | 0.15 | 0.56 | 0.53 | 0.87 |
| Glendale Avenue | 1600 | Inbound | 0.10 | 0.06 | 0.08 | 0.08 | 0.10 | 0.13 |
| | | Outbound | 0.01 | 0.13 | 0.04 | 0.09 | 0.08 | 0.12 |
| Niagara College | | | | | | | | |
| Taylor Road | 800 | Inbound | 0.52 | 0.11 | 0.42 | 0.11 | 0.42 | 0.11 |
| | | Outbound | 0.05 | 0.52 | 0.04 | 0.46 | 0.04 | 0.46 |
| Glendale Road | 1600 | Inbound | 0.29 | 0.12 | 0.24 | 0.12 | 0.24 | 0.12 |
| | | Outbound | 0.03 | 0.27 | 0.05 | 0.27 | 0.05 | 0.27 |
| Eastern Boundary | | | | | | | | |
| York Road | 800 | Inbound | 0.43 | 0.42 | 0.11 | 0.67 | 0.18 | 0.70 |
| | | Outbound | 0.41 | 0.51 | 0.21 | 0.26 | 0.24 | 0.32 |
| QEW | 9000 | Inbound | 0.51 | 0.68 | 0.71 | 0.79 | 0.79 | 0.82 |
| | | Outbound | 0.57 | 0.55 | 0.75 | 0.76 | 0.78 | 0.83 |
| Northern Boundary | | | | | | | | |
| Airport Road | 800 | Inbound | 0.21 | 0.20 | 0.27 | 0.32 | 0.38 | 0.37 |
| | | Outbound | 0.10 | 0.23 | 0.13 | 0.40 | 0.19 | 0.50 |
| Townline Road | 300 | Inbound | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | Outbound | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Concession 7 Road | 300 | Inbound | 0.22 | 0.20 | 0.19 | 0.43 | 0.32 | 0.48 |
| | | Outbound | 0.13 | 0.20 | 0.24 | 0.23 | 0.30 | 0.33 |
| Western Boundary | | | | | | | | |
| Glendale Avenue | 1600 | Inbound | 0.63 | 0.40 | 0.72 | 0.54 | 0.94 | 0.63 |
| | | Outbound | 0.25 | 0.72 | 0.37 | 0.78 | 0.45 | 0.97 |
| York Road | 800 | Inbound | 0.01 | 0.01 | 0.39 | 0.49 | 0.63 | 0.75 |
| | | Outbound | 0.01 | 0.02 | 0.32 | 0.52 | 0.77 | 0.99 |
| QEW | 5400 (Existing)<br>7200 (Future) | Inbound | 0.96 | 0.84 | 0.88 | 0.85 | **1.02** | 0.96 |
| | | Outbound | 0.75 | **1.06** | 0.76 | 0.98 | 0.88 | **1.13** |
| Southern Boundary | | | | | | | | |
| Taylor Road | 800 | Inbound | 0.67 | 0.39 | 0.94 | 0.69 | **1.07** | 0.75 |
| | | Outbound | 0.17 | 0.76 | 0.26 | **1.02** | 0.35 | **1.16** |

Table 2-11: Screenline Analysis Corridor Volume-to-Capacity Ratios (2051)

| Screenline Roads Included | Total Capacity (veh/hr) | Flow to/from Subject Site | 2022 | | 2051: Baseline | | 2051: SP | |
|---|---|---|---|---|---|---|---|---|
| | | | AM | PM | AM | PM | AM | PM |
| Outlet Collection at Niagara | | | | | | | | |
| Homer Road | 500 | Inbound | 0.22 | 0.16 | 0.25 | 0.41 | 0.26 | 0.43 |
| | | Outbound | 0.03 | 0.46 | 0.17 | 0.57 | 0.19 | 0.58 |
| Taylor Road | 800 | Inbound | 0.31 | 0.36 | 0.42 | 0.52 | 0.44 | 0.52 |
| | | Outbound | 0.04 | 0.35 | 0.25 | 0.56 | 0.35 | 0.56 |
| Glendale Avenue | 1600 | Inbound | 0.10 | 0.06 | 0.11 | 0.11 | 0.11 | 0.11 |
| | | Outbound | 0.01 | 0.13 | 0.05 | 0.13 | 0.06 | 0.13 |
| Niagara College | | | | | | | | |
| Taylor Road | 800 | Inbound | 0.52 | 0.11 | 0.47 | 0.13 | 0.47 | 0.13 |
| | | Outbound | 0.05 | 0.52 | 0.05 | 0.50 | 0.05 | 0.50 |
| Glendale Road | 1600 | Inbound | 0.29 | 0.12 | 0.19 | 0.14 | 0.19 | 0.14 |
| | | Outbound | 0.03 | 0.27 | 0.06 | 0.26 | 0.06 | 0.26 |
| Eastern Boundary | | | | | | | | |
| York Road | 800 | Inbound | 0.43 | 0.42 | 0.11 | 0.74 | 0.15 | 0.74 |
| | | Outbound | 0.41 | 0.51 | 0.24 | 0.49 | 0.26 | 0.52 |
| QEW | 7200 | Inbound | 0.51 | 0.68 | 0.75 | 0.84 | 0.80 | 0.86 |
| | | Outbound | 0.57 | 0.55 | 0.80 | 0.81 | 0.82 | 0.85 |
| Northern Boundary | | | | | | | | |
| Airport Road | 800 | Inbound | 0.21 | 0.20 | 0.22 | 0.34 | 0.27 | 0.34 |
| | | Outbound | 0.10 | 0.23 | 0.12 | 0.35 | 0.15 | 0.40 |
| Townline Road | 300 | Inbound | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | Outbound | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Concession 7 Road | 300 | Inbound | 0.22 | 0.20 | 0.37 | 0.57 | 0.43 | 0.57 |
| | | Outbound | 0.13 | 0.20 | 0.43 | 0.29 | 0.46 | 0.35 |
| Western Boundary | | | | | | | | |
| Glendale Avenue | 1600 | Inbound | 0.63 | 0.40 | 0.80 | 0.65 | 0.92 | 0.67 |
| | | Outbound | 0.25 | 0.72 | 0.44 | 0.91 | 0.49 | **1.02** |
| York Road | 800 | Inbound | 0.01 | 0.01 | 0.45 | 0.52 | 0.58 | 0.62 |
| | | Outbound | 0.01 | 0.02 | 0.46 | 0.57 | 0.70 | 0.79 |
| QEW | 5400 (Existing)<br>7200 (Future) | Inbound | 0.96 | 0.84 | 0.93 | 0.91 | **1.02** | 0.96 |
| | | Outbound | 0.75 | **1.06** | 0.80 | **1.03** | 0.86 | **1.10** |
| Southern Boundary | | | | | | | | |
| Taylor Road | 800 | Inbound | 0.67 | 0.39 | **1.01** | 0.85 | **1.08** | 0.88 |
| | | Outbound | 0.17 | 0.76 | 0.33 | **1.07** | 0.38 | **1.13** |

Based on the 2041 and 2051 screenline analyses, there is capacity overall for traffic to enter and exit the study area and key destinations under the weekday AM and PM peak hour conditions. Of note, while Glendale Avenue at the western boundary has a capacity of 1600 veh/hr, this capacity is limited further west at the Canal crossing to 800 veh/hr. It is recommended that the capacity along Glendale Avenue is reviewed as part of a future corridor study between the western edge of the study area and Merritt Street.

The QEW at the western boundary shows capacity constraints with the existing volumes. This is expected to continue under future conditions for 2041 and 2051, despite an addition of one lane in each direction. The same conditions are expected to occur for the QEW at the eastern boundary under future conditions.

Furthermore, inbound traffic coming from the south, and outbound traffic going to the south are expected to experience some constraints across all scenarios. It is assumed that the increase in volumes along Taylor

Road in the EMME model is due to the expectation that development will be happening to the south of the study area in the Niagara Falls Region. However, it should be noted that land surrounding Taylor Road south of the study area is currently undeveloped and could be considered for widening to accommodate additional traffic lanes.

Upon aerial examination of the area, Taylor Road is the only roadway that connects to the south without the need to travel far east to the QEW or far west, past the lake. Beyond 2051 as the areas south of the study area are developed, it is recommended that a study is conducted to assess the feasibility of widening Taylor Road to four lanes (two lanes per direction) from Glendale Avenue to Thorold Stone Road. This is anticipated to alleviate capacity constraints along Taylor Road and provide additional capacity for vehicles travelling south of the study area. Taylor Road acts as a connector between Niagara-on-the-Lake and Niagara Falls, as well as to St. Catharines via the Thorold Tunnel. Increasing the width of Taylor Road to four lanes (two lanes per direction) would facilitate these trips between the three municipalities.

Overall, it is expected that traffic can generally enter and exit the area surrounding the study area despite the preferred route being at capacity.

# 3 ROAD TYPOLOGY AND PRELIMINARY CROSS-SECTIONS

The following section presents conceptual cross-sections and design elements that draw from design criteria outlined in the Niagara Region Complete Streets Guidelines (2023), Regional Municipality of Niagara Model Urban Design Guidelines (2005), Niagara-on-the lake Engineering Standards (2018), Accessibility of Ontarians with Disabilities Act (AODA), and Ontario Traffic Manual (OTM) Book 18.

It should be noted that the following section is intended to guide the development of a balanced and attractive transportation network for all users. Cross-sections are conceptual and were developed to assist in achieving complete street principles. The width of street elements may be further revised at future planning stages.

## 3.1 TRANSPORTATION VISION & GUIDING PRINCIPLES

The study area currently exhibits a lack of continuous east-west and north-south roadways resulting in limited connectivity for vehicular travel. There is also poor connectivity in the pedestrian and cyclist networks which is attributed to the lack of collector/local streets, discontinuous sidewalks, and the presence of physical barriers.

Sidewalks are available along both sides of Niagara-on-the-Green Boulevard and within the area surrounding the Outlet Collection at Niagara. Sidewalks are only available along one side of Glendale Avenue and Taylor Road; however, these facilities are discontinuous and are only provided on a portion of the road segment.

The study area also lacks dedicated cycling infrastructure. Non-buffered bike lanes are provided along Taylor Road and Glendale Avenue, a paved shoulder bike lane is provided along Queenston Road, and a multi-use path is available along Glendale Avenue; however, there are no other dedicated cycling facilities throughout the Glendale community.

The preliminary cross-sections developed for the Glendale community aim to support a vibrant, transit-oriented, mixed-use complete community supportive of high pedestrian and cyclist traffic while meeting vehicular needs. The following guiding principles were considered for the development of recommended cross-sections.

### COMPLETE COMMUNITIES AND COMPLETE STREETS

- Support growth management from a capacity and options perspective
- Support opportunities for integrated mixed land uses and access to jobs, services, housing, and recreation
- Provide higher capacity vehicle, cyclist, and pedestrian infrastructure and facilities where growth is planned
- Provide an attractive, safe, and comfortable environment for street users by integrating the roadway with streetscape elements and adjacent land uses
- Support goods movement and employment-specific transportation needs in addition to supporting residential population growth

### PUBLIC REALM DESIGN

- Provide boulevard space within the right-of-way (ROW) to support an attractive and safe pedestrian environment

- Protect for green infrastructure where appropriate
- Consider street amenities including wide sidewalks, pedestrian-oriented lighting, street trees, transit amenities, and opportunities for public art
- Support active transportation and transit-supportive land uses
- Identify roadway types where more significant public realm considerations are appropriate (i.e., local and collector roads where higher levels of pedestrian activity and/or residential uses are planned vs. industrial roads primarily expected to move higher levels of traffic and/or accommodate significant employment activity)

### SUSTAINABLE TRANSPORTATION & HEALTHY COMMUNITIES

- Recognize the increasing importance of walking, cycling, and transit within Niagara-on-the-Lake
- Provide a well-connected, attractive, and functional multi-modal system
- Ensure the needs of all users are balanced
- Provide adequate facilities for active transportation to improve public health
- Consider sustainability from a health, affordability, and environmental standpoint

## 3.2 ROAD TYPOLOGY

The Niagara Region Transportation Master Plan (2017) and Niagara-on-the-Lake Transportation Master Plan (March 2022) identify several regional and municipal road classifications that have been developed to define the function of the street network and provide opportunities to incorporate appropriate design considerations for active transportation, transit, as well as motorized vehicles. As per the Niagara-on-the-Lake TMP, the two primary functions of roadways within the area are to support movement between places and the ability to access origins and destinations of travel.

The recommended cross-sections for the Glendale community build upon road classifications outlined in the Niagara Region Complete Streets Design Manual (2023). The relevant road classifications based on the specified right-of-way (ROW) width and function they serve within the transportation network are outlined below.

- **Arterial Street (36.6 m):** These roadways are found in urban areas to serve large format commercial retail and/or residential uses and are similar to Urban Thoroughfares within the Niagara Region Complete Streets Design Manual. The roadways should support active transportation to connect neighbourhoods within communities. Where appropriate, cyclists should be accommodated through separate facilities.

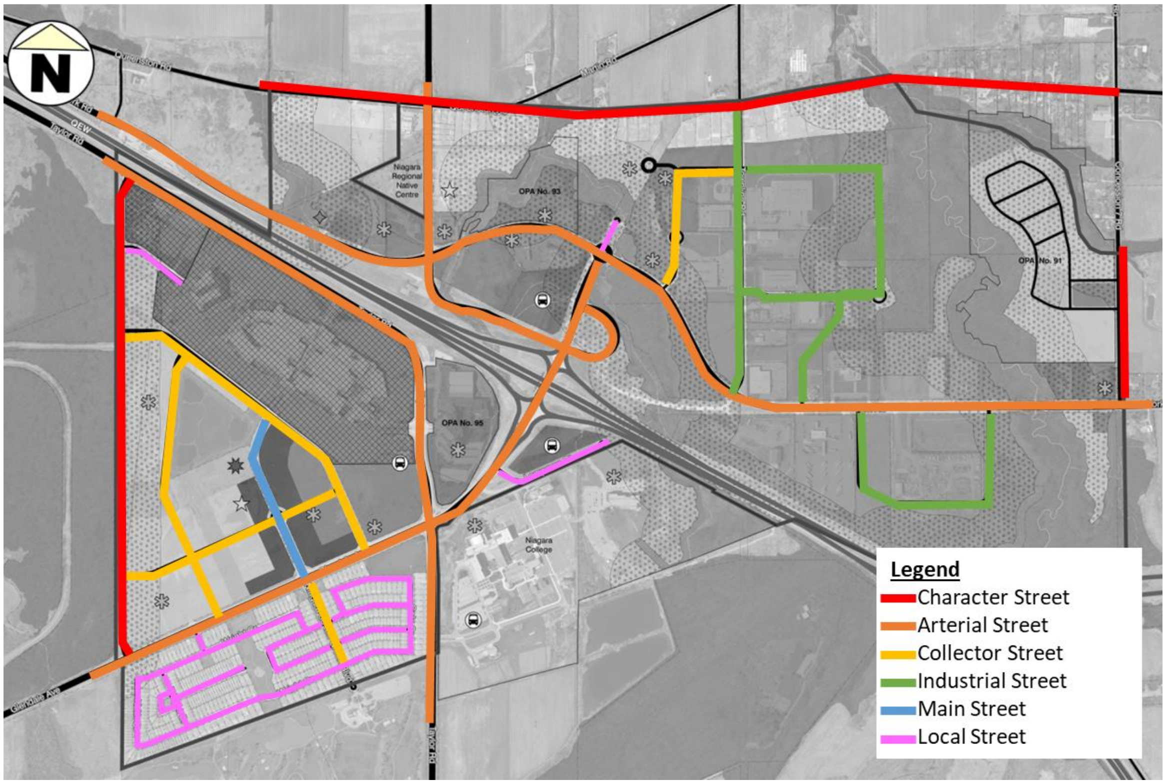
- **Collector Street (26 m):** These roadways are found within the Region's largest mixed-use urban centres and are similar to Urban General roads within the Niagara Region Complete Streets Design Manual. They often serve commercial retail and service businesses, connect through residential neighbourhoods within communities, and carry medium to large volumes of all modes.

- **Industrial/Business Park Streets (26.0 – 26.2 m):** These roadways are a type of collector street that provide direct access to industrial and commercial/employment areas. They carry medium to large volumes of all modes. Where appropriate, cyclists should be accommodated through separate facilities.

- **Character Streets (26.0 – 26.2 m):** These roadways are a type of collector street that perform a transition between urban and rural land uses through a modified rural cross-section.
- **Main Street (26 m):** These roadways are high pedestrian activity corridors that primarily serve a placemaking function. They support mixed-use development and vibrant pedestrian realms, with high volumes of pedestrians and cyclists. On-street parking may be considered on main streets supported by layby's framed with curb extensions. They can include bicycle lanes or shared streets.
- **Local Streets (18.0 – 20.0 m):** These roadways serve local residents and are similar to Hamlets within the Niagara Region Complete Streets Design Manual. Sidewalks should be provided on both sides of the streets. Cyclists can be accommodated on-street or through dedicated bicycle infrastructure if the street is along key active transportation corridors. On-street parking may be accommodated with layby's framed with curb extensions.

The road classifications for each roadway within the study area is illustrated in **Figure 3-1**.

Figure 3-1: Road Classification Within Study Area



## 3.3 CROSS-SECTION ELEMENTS

The following section details the elements used to develop the recommended cross-sections for the Glendale community. The actual width of cross-section elements shown in the conceptual designs may need to be revised during future planning stages. However, all cross-section elements within the public ROW must meet a series of minimum standards or guidelines set out in municipal/provincial guidelines or standards. These guidelines and standards, as they apply to the individual cross-section elements are outlined below.

standards. These guidelines and standards, as they apply to the individual cross-section elements are outlined below.

### 3.3.1 Sidewalks

Sidewalks are essential to any public ROW to ensure pedestrians are permitted a dedicated clearway, free from obstruction of infrastructure for any other modes of transportation. Sidewalks can vary significantly in width and separation from infrastructure for other modes of transportation. The AODA and Town Engineering Standards specify that at a minimum, sidewalks must maintain an unobstructed clearway width of 1.5 m. This means that streetscaping furniture, landscaping, lighting, and other infrastructure cannot encroach within this width of 1.5 m. According to Niagara Region's Complete Streets Guidelines, 2.0 m sidewalks are recommended but at a minimum should be designed to meet all AODA standards and be unobstructed both horizontally and vertically.

### 3.3.2 Planting and Furnishing

As for separation from other modes of transportation, Niagara Region's Complete Street Guideline recommends a Planting and Furnishing Zone width between 1.0 to 3.0 m and a minimum Edge Zone of 0.5 m for urban roadways. No elements located within the Planting and Furnishing Zone should impede travel within the adjacent sidewalks. These recommended separation areas are to permit the planting of trees, provision of raised planters, street furniture, transit shelters, and utilities. The Planting and Furnishing Zone and Edge Zones also provide an additional safety buffer between the roadway and pedestrians.

### 3.3.3 Cycling Facilities

Cycling facilities can take a range of forms that respond to the ROW or throughway in which they are being implemented. Typical cycling facilities include:

- **Shared Roadways:** Are shared between vehicles and bicycles and are primarily used with low traffic volumes and speeds and when there is not enough space within the ROW to accommodate both a bicycle lane and a travel lane for vehicles. Shared roadways often include on-street signed markings and/or sharrows. OTM Book 18 recommends for these facilities that a minimum lane width of 4.3 to 4.5 m be provided, though 4.0 m is acceptable according to Niagara Region's Complete Street Guideline.
- **Designated Cycling Operating Spaces:** Are typically on-street conventional bike lanes and buffered bike lanes. They can be implemented across Niagara Region on all road typologies depending on local conditions including speed and traffic volumes. The purpose of designated cycling space is to create separation between cyclists and vehicles by designating space on the road for cyclists using pavement markings and signage.

  OTM Book 18 and Niagara Region's Complete Street Guideline recommend on-street bike lanes to be a minimum of 1.5 m wide, with a desired width of 1.8 m. Buffers can be added to create additional horizontal separation between cyclists and vehicles. Buffers can take the form of painted markings on the roadways or through physical buffers including planters, bollards, or concrete curbs. OTM Book 18 suggests a minimum painted buffer width of 0.3 m, though a buffered bike lane width of 2.3 m (1.8 m bike lane plus 0.5 m buffer) is desired as per Niagara Region's Complete Street Guideline. Furthermore, for bike lanes adjacent to on-street parking, OTM Book 18 recommends a minimum and desired buffer zone of 0.6 m and 1.0 m, respectively.

- **Separated Facilities:** Follow the progression of separating cycling facilities from the vehicular travel area where the most separated form of cycling facility would be a cycling pathway or multi-use path. Multi-use paths can take the form of a shared space for pedestrians and cyclists, or a pathway distinguished between walking and cycling. OTM Book 18 and Niagara Region's Complete Street Guideline recommends a minimum width of 3.0 m and desired width of 4.0 to 4.5 m for a multi-use path.

### 3.3.4 Vehicle Travel Lanes

Vehicle travel lanes provide for the safe and efficient movement of vehicles. According to Niagara Region's Complete Street Guideline, the number and width of travel lanes should be reduced as much as possible to minimize the amount of road surface and crossing distances. Travel lanes should have an inside/passing lane of 3.3 m and an outside travel lane/shoulder lane of 3.5 m. Lanes are not recommended to exceed 3.5 m except in the case of shared travel lanes, which has a desired target width of 4.3 m. For turn lanes, a minimum of 3.0 m is recommended.

### 3.3.5 On-Street Parking

On-street parking provides space for vehicles to park and is usually located to the outside curb lane. On-street parking is not typically permitted on Regional Roads. The primary purpose of on-street parking is to provide access to commercial and employment uses to improve the safety and visibility of shops and slow vehicular traffic. According to Niagara Region's Complete Street Guideline, the ideal width for on-street parking is 2.5 m. On-street parking should not be considered for roads with operating speeds over 60 km/h.

## 3.4 RECOMMENDED TYPICAL CROSS-SECTIONS

The following section summarizes elements of a typical cross-section for each type of street. For images illustrating each cross section, please refer to the Glendale Secondary Plan Urban Design Guidelines.

### 3.4.1 Typical Arterial Street

Arterial streets prioritize mobility of people and goods. They provide access to large format retail and residential areas. Commercial buildings are typically set back from the roads and residential properties are flanking or backing on to the street. Pedestrians and cyclists are separated from motor and goods movement vehicles. These streets are similar to Urban Thoroughfares within the Niagara Region Complete Streets Design Manual. Typical arterial streets are recommended to have a 36.6 m ROW.

Technical considerations are displayed in **Table 3-1**. In general, these streets will include:

- 2-4 travel lanes (1-2 lanes in each direction)
- Sidewalks on one side of the roadway
- Multi-use Paths on one side of the roadway
- Planting and furnishing zone that supports a mature street tree canopy, pedestrian-scale lighting, and ample landscaping

Table 3-1: Typical Arterial Street Technical Considerations

| Typical Collector Street | |
|---|---|
| Purpose | Facilitate goods movement |
| Permitted Users | Vehicles, cyclists, and pedestrians |
| Right-of-Way | 36.6m |
| Number of Lanes | 2 - 4 lanes (1 - 2 lanes per direction) |
| Geometric Design | Sidewalk Width: 2.0m<br>Planting and Furnishing Zone Width: 2m - 3m<br>Edge Zone Width: 2.0m<br>Multiuse Path Width: 3.0 m<br>Travel Lane Width: 3.3m - 3.5m |

### 3.4.2 Typical Collector Street

Collector streets are found within the Region's largest mixed-use urban centres. They often serve commercial retail and service businesses, connect through residential neighbourhoods within communities, and carry medium to large volumes of all modes. The design typology of typical collector streets is similar to Urban General streets within the Niagara Region Complete Streets Design Manual. The typical collector streets have a ROW of 26 m.

Technical considerations are displayed in **Table 3-2**. In general, these streets will include:

- 2 travel lanes (1 lane in each direction)
- Sidewalks on both sides of the roadway
- Cycling facilities (protected bike lanes or cycle tracks on both sides of the roadway)
- On-street parking depending on the available space and need
- Planting and furnishing zone that supports a mature street tree canopy, pedestrian-scale lighting, and ample landscaping

Table 3-2: Typical Collector Street Technical Considerations

| Typical Collector Street | |
|---|---|
| Purpose | Facilitate mobility between major neighbourhood nodes and the major street network |
| Permitted Users | Vehicles, cyclists, and pedestrians |
| Right-of-Way | 26m |
| Number of Lanes | 2 lanes (1 lane per direction) |
| Geometric Design | Sidewalk Width: 2.0m<br>Planting and Furnishing Zone Width: 2.35m – 3.05m<br>Edge Zone Width: 0.6m<br>Cycling Facility Width: 1.8m bike lane with 1.0m buffer or 1.8 m cycle track<br>Travel Lane Width: 3.3m<br>On-street Parking Width: 2.2m-2.4m |

### 3.4.3 Typical Industrial or Business Park Street

Industrial and business park streets provide direct access to industrial and commercial/employment areas. These roadways are to be located within the Employment District of the Glendale community. Industrial and employment streets are recommended to have a 26-30 m ROW. Lane widths are to be appropriately sized for large trucks to support higher volumes of heavy vehicles. The typical industrial roadway will exhibit larger driveways with greater spacing to provide vehicular access to employment destinations and support goods movement and employment activity.

To enhance multi-modal travel, protected bus shelters and benches, dedicated cycling facilities separated from the roadway, street furniture and planting, and pedestrian-scale lighting should be considered**.** Technical considerations are displayed in **Table 3-3**. In general, these streets will include:

- Two travel lanes (one in each direction)
- Sidewalks on both sides of the roadway
- Cycling facilities (cycle tracks on both sides of the roadway or a multi-use path on one or both sides of the roadway)
- Green infrastructure/bioswales to improve community resiliency
- Planting and furnishing zone that supports transit shelters, street trees, and pedestrian-scale lighting
- Building and lots set back from the roadway with landscaping to separate industrial buildings from the street

Table 3-3: Typical Industrial or Business Park Street Technical Considerations

| Typical Industrial or Employment Street | |
|---|---|
| Purpose | Facilitate vehicular and truck access to industrial or employment destinations |
| Permitted Users | Vehicles (including trucks), cyclists, and pedestrians |
| Right-of-Way | 26m – 26.2m |
| Number of Lanes | 2 lanes (1 through lane per direction) |
| Geometric Design | Sidewalk Width: 1.8m - 2m<br>Planting and Furnishing Zone Width: 2m - 3m<br>Edge Zone Width: 0.5m - 1m<br>Cycling Facility Width: 1.8 cycle track or 4.0m multi-use path<br>Travel Lane Width: 3.5m |

### 3.4.4 Typical Character Street

Character streets are a type of collector street that performs a transition between urban and rural land uses through a modified rural cross-section. These roadways are typically located at the edge of the study area and are recommended to have a 26-26.2m ROW.

Technical considerations are displayed in **Table 3-4**. In general, these streets will include:

- Two travel lanes (one in each direction)
- Multiuse path on one side of the roadway

- Green infrastructure/bioswales to improve community resiliency
- Planting and furnishing zone that supports transit shelters, street trees, and pedestrian-scale lighting

Table 3-4: Typical Character Street Technical Considerations

| Typical Character Street | |
|---|---|
| Purpose | Facilitate mobility between major neighbourhood nodes and the major street network |
| Permitted Users | Vehicles, cyclists, and pedestrians |
| Right-of-Way | 26m |
| Number of Lanes | 2 lanes (1 lane per direction) |
| Geometric Design | Planting and Furnishing Zone Width: 2.35m – 3.05m<br>Edge Zone Width: 0.6m<br>Multiuse Path Width: 4.0m<br>Travel Lane Width: 3.3m |

### 3.4.5 Typical Main Street

Main streets are high pedestrian activity corridors that primarily serve a placemaking function. These roadways generally have moderate traffic volumes and support mixed-use development and vibrant pedestrian realms. High volumes of pedestrians and cyclists are anticipated for these streets.

As a traffic calming measure, curbside on-street parking can be accommodated within the roadway in areas with high demand. In areas with less parking demand, additional boulevard space should be provided. Driveways should be consolidated where possible to accommodate mobility-focused streets. Instead, access should be provided via side streets or at controlled intersections.

Technical considerations are displayed in **Table 3-5**. In general, these streets will include:

- 2 travel lanes (1 lane in each direction)
- Sidewalks on both sides of the roadway
- Cycling facilities (protected bike lanes or cycle tracks on both sides of the roadway)
- On-street parking depending on the available space and need
- Planting and furnishing zone that supports a mature street tree canopy, pedestrian-scale lighting, and ample landscaping

Table 3-5: Typical Main Street Technical Considerations

| Typical Main Street | |
|---|---|
| Purpose | Support mixed-use development and vibrant pedestrian realms |
| Permitted Users | Vehicles, cyclists, and pedestrians |
| Right-of-Way | 26.0 m |
| Number of Lanes | 2 lanes (1 lane per direction) |
| Geometric Design | Sidewalk Width: 1.8m<br>Planting and Furnishing Zone Width: 1.8m<br>Edge Zone Width: 0.8m<br>Cycling Facility Width: 1.5m-1.8m cycle track<br>Travel Lane Width: 3.3m<br>On-street Parking Width: 2.5m |

### 3.4.6 Typical Local Street

Local streets facilitate access to communities and residential neighbourhoods. These roadways generally have low traffic volumes and are to be located within the residential and community service areas in the Glendale community. Consistent with the policy direction outlined in the Niagara-on-the-Lake Transportation Master Plan, a typical local street is recommended to have a 14-18 m ROW.

Local streets are to provide a safe and comfortable environment for pedestrian and cyclist movement. Given low traffic volumes, local streets can accommodate pedestrian sidewalks on one or both sides of the roadway. Traffic calming measures, street trees and planting, mid-block crossing, cycling facilities (i.e., painted bike lanes or signed bicycle routes), and pedestrian-scale lighting should be considered to improve the pedestrian and cycling experience. As a traffic calming measure, curbside on-street parking can be accommodated within the roadway in areas with high demand. Roads with parking on one side are recommended to have a 6-7 m curb-to-curb width.

Technical considerations are displayed in **Table 3-6**. In general, these streets will include:

- 1-2 travel lanes (one in each direction)
- Sidewalks on one or both sides of the street
- Cycling facilities (painted bike lanes or signed bicycle routes on both sides of the roadway)
- On-street parking depending on the available space and need
- Planting and furnishing zone that supports a mature street tree canopy and pedestrian-scale lighting

Table 3-6: Typical Local Street Technical Considerations

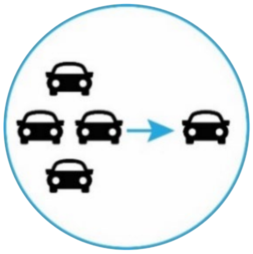
| Typical Local Street | |
|---|---|
| Purpose | Facilitate access to residential neighbourhoods and community service areas |
| Permitted Users | Vehicles, cyclists, and pedestrians |
| Right-of-Way | 14m - 18m |
| Number of Lanes | 1 - 2 lanes (one lane per direction) |
| Geometric Design | Sidewalk Width: 1.8m - 2m<br>Planting and Furnishing Zone Width: 2m - 2.5m<br>Edge Zone Width: 0.5m<br>Shared Travel Lane Width: 4.0m-4.5m<br>Cycling Facility Width: 1.8m bike lane with 0.5m buffer<br>Travel Lane Width: 3.3m – 3.5m<br>On-Street Parking Width: 2.2m-2.4m |

# 4 TRANSPORTATION DEMAND MANAGEMENT

A Transportation Demand Management (TDM) Strategy is necessary to ensure the successful implementation of initiatives that act to reduce automobile use and increase the use of active and sustainable modes of transportation. The following section provides an overview of what Transportation Demand Management is and how it can be applied to reduce dependency on single occupancy vehicles (SOV) and encourage other methods of travel throughout the study area.

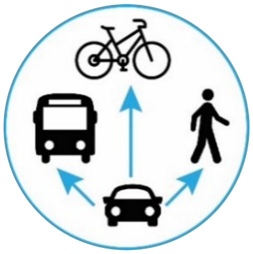
## 4.1 WHAT IS TDM?

Transportation Demand Management seeks to apply behaviour change tools and incentives to align transport demand with supply. TDM is a toolkit of strategies that facilitates a more efficient transportation network by influencing travel behaviour. Effective implementation of TDM strategies may improve the supply or reduce the demand on a transportation network, resulting in reduced congestion. These strategies provide methods to reduce, re-mode, re-time, and/or re-route trips, also known as the 4 R's of TDM. Some examples of the issues and associated strategies of the 4 R's of TDM are shown below.



***Reduce***

Segregated land uses and poor network connectivity increase the distance required to make a trip. This adds pressure to the transportation network by increasing the amount of time a trip takes in the network. TDM strategies aim to reduce or eliminate trips through improved land-use integration, compressed work weeks, improved network connectivity, or tele-working.



***Re-mode***

Some transportation modes are inherently more efficient at moving people in a limited right-of-way than others. Applying the concept of person capacity on a corridor as opposed to vehicle capacity provides an alternative perspective to transportation within a corridor. Providing for modes that are more efficient at moving people improves the performance of a network. These modes may include walking, cycling, ridesharing, and transit.

***Re-time***

Travel demand during typical weekdays generally exhibits significant peaks in demand corresponding with the 9:00 a.m. to 5:00 p.m. workday. The transportation network may have residual capacity during the "shoulder" periods immediately prior to or following the peak. Thus, re-time TDM strategies aim to shift the travel demand during peak periods to shoulder periods to reduce delay and congestion during the peaks.

***Re-route***

A well-connected network with parallel corridors is assumed to have evenly distributed demand, where trips are organically re-routed as drivers search for the fastest route. However, demand is not evenly distributed throughout the network and some streets experience more traffic congestion than others. Re-route TDM strategies aim to influence an individual's routing decision to make use of the residual capacity of alternative routes.

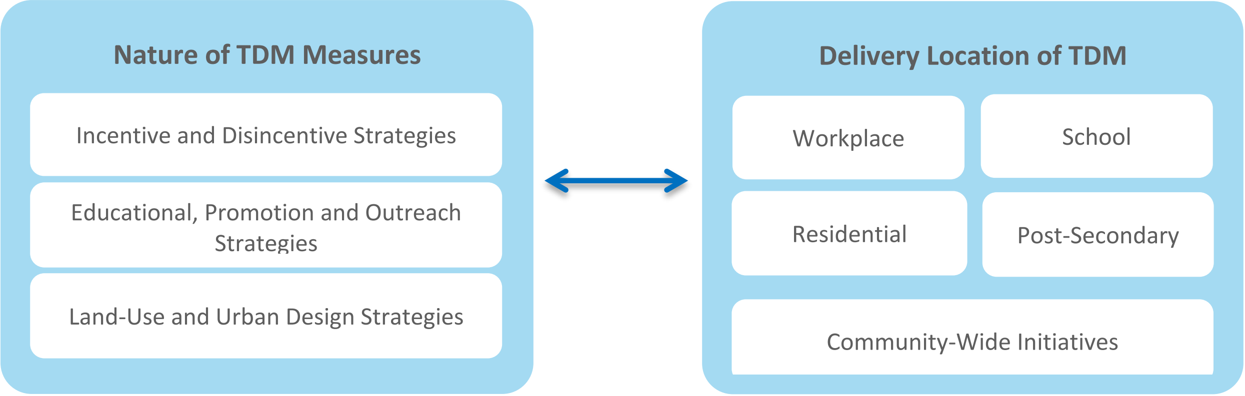
## 4.2 HOW ARE TDM GOALS ACHIEVED?

TDM strategies generally fall into three categories:

1. **Land Use and Urban Design Strategies:** Utilizing the streetscape and land use development to support a more efficient transport network by prioritizing efficient modes such as walking, cycling, transit, or carpooling.
2. **Incentive and Disincentive Strategies:** A “carrot and stick” approach to TDM that influences travel choices by making a particular mode or travel choice more attractive (incentive) and/or another mode less attractive (disincentive).
3. **Educational, Promotional, and Outreach Strategies:** Utilizing information and events to improve understanding, raise awareness, and raise positive sentiment to sustainable travel.

The most effective TDM strategy is well-planned, customized, and coordinated, utilizing a comprehensive suite of TDM strategies to target the workplace, households, and schools within the study area. **Figure 4-1** illustrates the nature of TDM measures and potential delivery locations.

**Figure 4-1: TDM Summary**



*Source: Transport Canada*

## 4.3 TDM BENEFITS

Transportation studies generally have an overall vision for their transportation network in which certain TDM benefits are prioritized and TDM strategies are selected to complement the area vision to the greatest extent possible. Some TDM benefits are as follows:

- Congestion reduction for all users by managing travel demand thus improving the experience for all modes;
- Energy/emission reduction through fewer or more efficient vehicle trips;
- Improving health and fitness by increasing active transportation trips and improving air quality;
- Improving the livability of an area by providing more attractive streetscaping, encouraging livable urban design, and increasing street animation;
- Parking management solutions that reduce the overall developable space dedicated to parking; and,
- Improving safety for all users through the design and prioritization of alternative modes.

## 4.4 POLICY CONTEXT

Currently, the Town of Niagara-on-the-Lake's Official Plan does not have its own defined Transportation Demand Management policies. However, the Niagara Region Official Plan, Niagara-on-the-Lake Transportation Master Plan, and the Glendale District Plan provide guiding principles to promote alternative forms of transportation and increase the modal share of alternatives to the automobile.

### 4.4.1 Niagara Region Official Plan, 2022

The Niagara Region Official Plan 2022 provides the strategic policy planning framework for managing growth coming to Niagara Region. Chapter 5 of the Regional Official Plan outlines the guiding principles to achieve a multi-modal transportation system. This includes working with Local Area Municipalities to provide a transportation system that allows all users to travel in a safe, accessible, convenient, and affordable manner while reducing dependence on the automobile.

Furthermore, *Section 3.5.3* of the regional Official Plan includes policies related to net zero communities through TDM strategies. These policies indicate that the Region will support built form and land use patterns that reduce transportation emissions by:

- Policy 3.5.3.1 aii - *promoting a mix of land uses to shorten commute journeys and support the creation of complete communities*
- Policy 3.5.3.1 avi - *prioritizing transit and supporting active transportation to reduce single-occupant vehicle trips*
- Policy 3.5.3.1 avii - *supporting transportation demand management measures to influence travel behaviour*

In order to assist in good planning, Niagara Region's Official Plan also recommends developing guidelines and technical studies to assist with the implementation of the Official Plan including a Transportation Demand Management Study/Program.

### 4.4.2 Glendale District Plan

The Glendale District Plan is a proactive development strategy that sets out the framework for land use planning, design, and development of a complete community for the Glendale Secondary Plan area. The plan provides nine key directions to guide the transformation of the area and outlines strategies to achieve an efficient and connected multi-modal system for a vibrant, compact, complete mixed-use urban community. This includes integrating transportation demand management objectives into development plans, investigating opportunities for shared parking facilities between new and existing developments, and investigating opportunities for carshare or bikeshare at transit hubs or integration into higher-density development proposals.

### 4.4.3 Niagara-on-the-Lake Transportation Master Plan, 2022

The Niagara-on-the-Lake Transportation Master Plan *Section 5.6.8* outlines several development-based and parking-based measures to influence travel behaviour for all residents, employees, and visitors. The outcome is for the Town to achieve more attractive streetscapes that are inclusive for all road users, preserve streets and public space for a more balanced transportation system, and promote public health and active lifestyles. Recommended measures that can be used for inspiration during site plan development or secondary planning applications include multi-modal information packages, transit fare incentives, alternative transportation amenities, private transit service, carsharing/bikesharing, shared parking, and priced parking.

## 4.5 TDM GOALS

Potential TDM goals for the Region and Town are as follows:

- Establish a complete community that has a variety of reliable and connected transportation options
- Encourage mixed-use transit-oriented development
- Support active modes of transportation
- Develop TDM programs (programming/marketing)
- Enhance the safety, comfort, and accessibility for pedestrians and cyclists

## 4.6 PROPOSED TDM STRATEGIES

It is recommended that developments be required to submit and implement a comprehensive Transportation Demand Management Strategy that demonstrates how the proposed development will support a shift to more sustainable travel modes. The following provides a list of TDM strategies to consider.

**Land Use & Development Strategies**

Form and land use strategy are crucial elements that directly affect the amount of travel, the length of trips, and the choice of travel mode. Providing a mix of land uses can encourage walking trips between various uses that residents/visitors may otherwise drive to. Having varying land uses is expected to attract a number of internal trips, thereby encouraging active transportation and reducing vehicular traffic on the road network. Strategies to complement a mixed-use land use strategy include:

- Locate higher-density buildings close to transit stops to increase pedestrian activity and transit ridership
- Avoid long stretches of blank walls, berms, or high fences adjacent to the street
- Encourage mixed-use developments to facilitate walking trips

- Provide shared loading spaces to minimize loading point accesses along the road network and make active transportation travel easier and more comfortable

**Pedestrian-Based Strategies**

Development within the Glendale community should ensure safe, comfortable, and convenient pedestrian connections to key destinations within the surrounding area. Pedestrian strategies to encourage walking as a mode of travel include:

- Orient building entrances close to the street with direction connections to pedestrian pathways
- Provide landscaping and pedestrian amenities such as trees, sidewalks, benches, and marked crossings to create an attractive public realm and encourage walking
- Provide park space and outdoor amenities that are within convenient walking distance

**Cycling-Based Strategies**

Development within the Glendale community should promote cycling as a convenient travel option. Cycling strategies to encourage biking as a mode of travel include:

- Avoid barriers to cyclists such as curbs or stairs, where possible. Where they exist, stairways leading to and from station areas should be outfitted with bike ramps or elevators
- Provide cycling infrastructure and end-of-trip infrastructure such as secure bicycle racks, bicycle storage, and shower and change room facilities
- Provide bike rental or bike share facilities within future mobility hubs or key transit locations
- Provide cyclists with sheltered and secure bicycle storage facilities

**Transit-Based Strategies**

Development within the Glendale community should prioritize connections and access to transit while encouraging transit as a desirable mode choice. Transit strategies to encourage transit trips include:

- Prioritize bus traffic over motorized vehicles in the vicinity of the proposed bus terminal
- Provide weather-protected transit stops
- Provide real-time information displays at major transfer points or within building lobbies to minimize waiting uncertainty
- Subsidize transit passes or pre-loaded transit cards for new residents and/or employees
- Enhance the comfort of outdoor pedestrian waiting areas by using year-round planting that provide shelter from the wind in the winter months and shade during the summer months

**Travel and Parking Management Strategies**

Development within the Glendale community should increase awareness of sustainable transportation opportunities and avoid an oversupply of parking. Travel and parking strategies to reduce private vehicle trips include:

- Post signage along major streets directing cyclists to bike-friendly routes, pedestrian facilities, and leading to transit stops or station areas

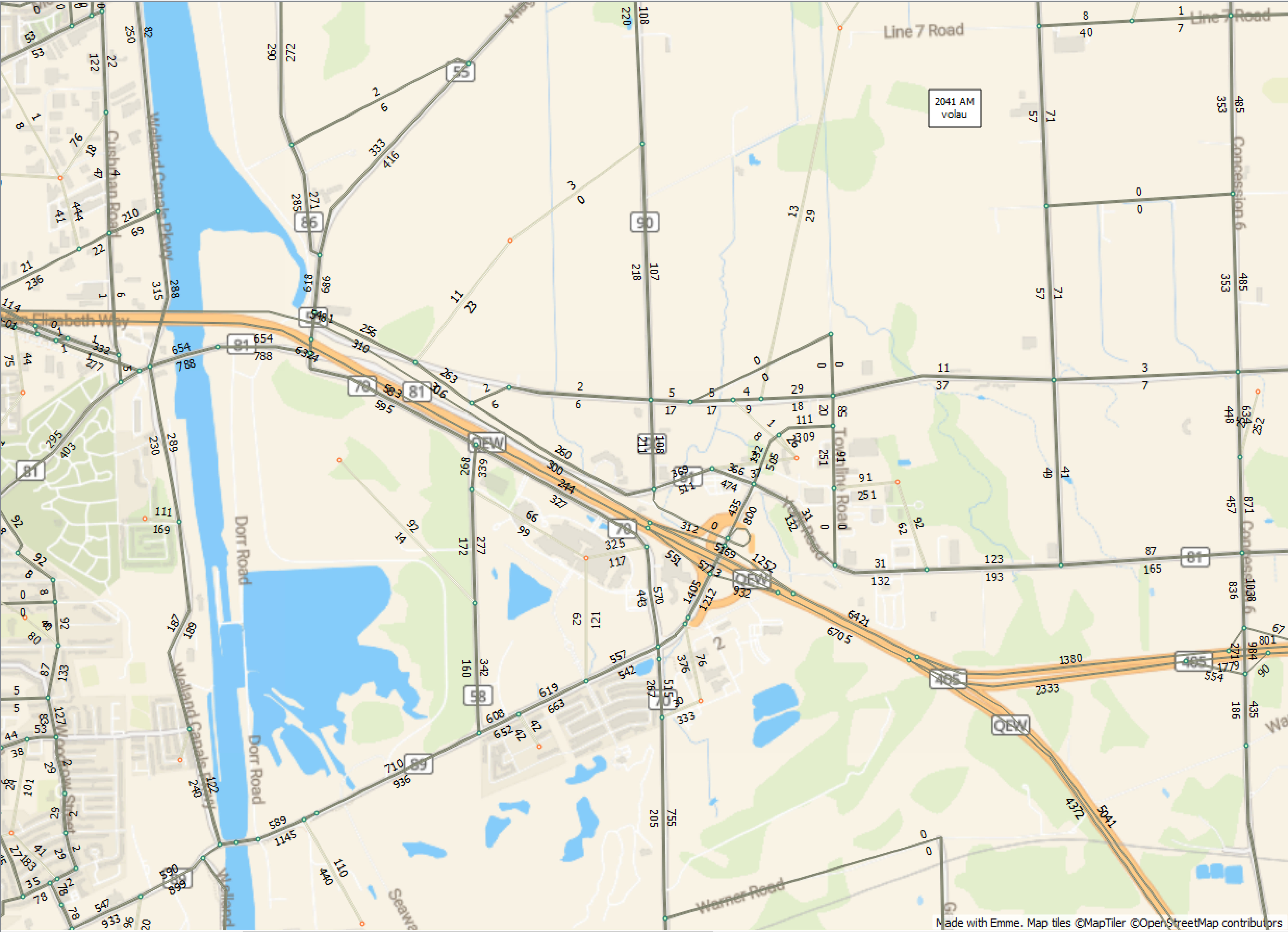
- Locate wayfinding maps at all major entrances indicating where the user is within the station area and the location of major station destinations. Supplement these signs with a wider context directing pedestrians to important local destinations
- Encourage participation in Smart Commute Workplace programs to expand travel opportunities for employees in sustainable ways
- Permit reductions in maximum and minimum parking requirements once TDM measures are adopted as part of a development approval
- Reduce or eliminate minimum parking standards for small-scale retail uses and ground-floor commercial uses near transit routes
- Encourage shared parking arrangements between uses to reduce the need for parking spaces within a development
- Unbundle parking from the cost of a residential unit
- Provide dedicated and/or preferential, publicly accessible car-share or carpooling parking spaces
- Encourage paid, on-street parking to minimize the need for dedicated parking spaces, provide space for short-stay visitors, and help to support main street retail uses

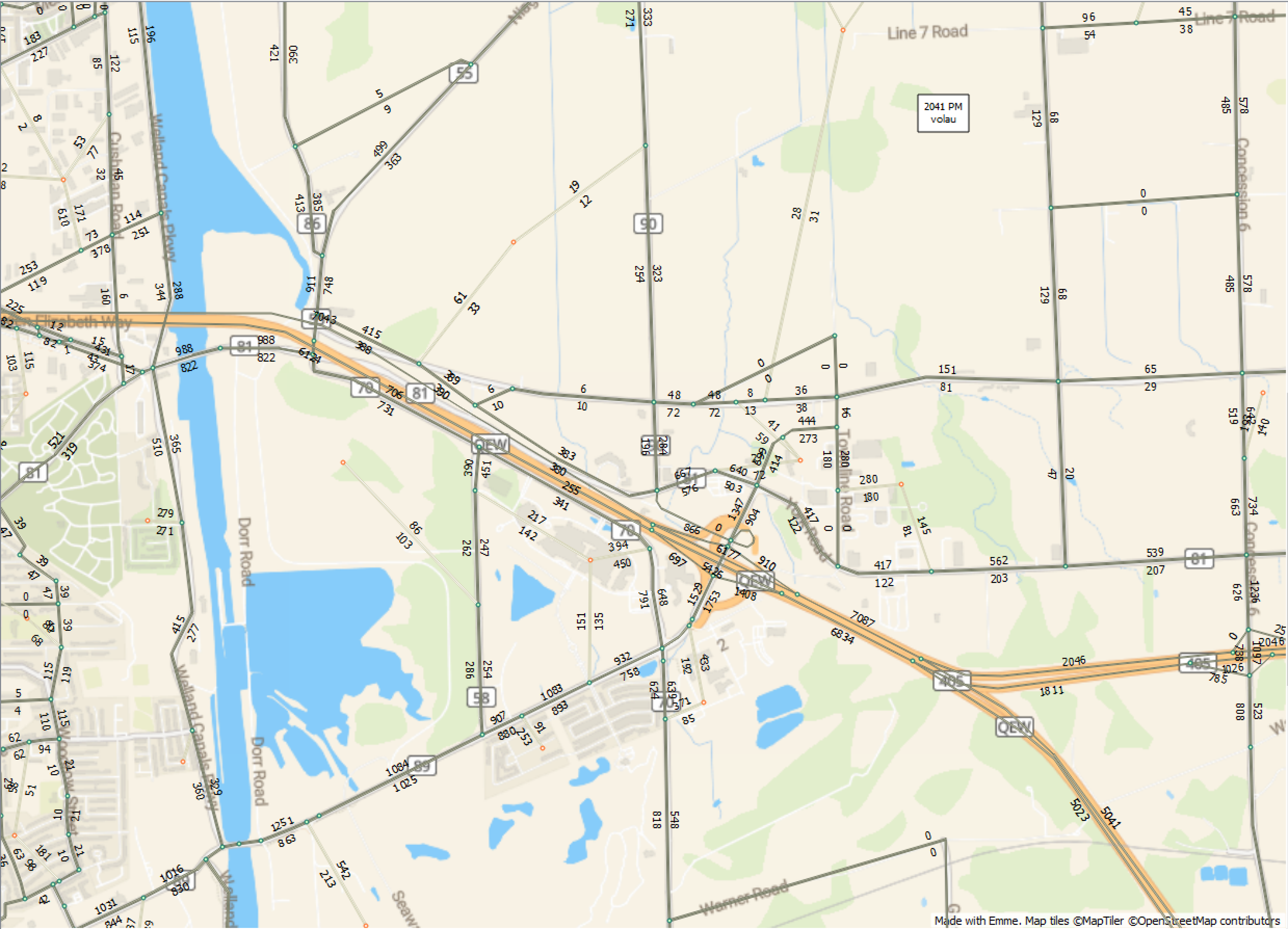
# 5 CONCLUSION

- LEA has undertaken a Transportation Assessment to review the future conditions of the Glendale Secondary Plan area to identify the transportation network needed to serve the proposed densities.
- The preferred land use concept includes a mix of residential, commercial, employment, and institutional uses, with 5,698 residential units and 9,773 employees.
- The preferred land use concept incorporates a network of new streets through the proposed employment and mixed-use areas. The proposed network forms a series of connections to facilitate new development and provide opportunities for multi-modal movement, new frontage, and site access. Combined with new active transportation connections and a higher-order transit under the 2051 horizon, this network enhances the study area's connectivity and encourages greater opportunity for multi-modal travel.
- While no connections are proposed over the QEW, there are opportunities to provide a continuous north-south connection at Homer Road, if warranted.
- A screenline analysis was conducted for the study area to consider the high-level traffic impacts of the expected future volumes on the broader network for the weekday AM and PM peak hours under the 2041 and 2051 horizon years. The analysis considered the total inbound and outbound flows of traffic at the study area boundaries in each direction. It also considered two main destination points within the study area: The Outlet Collection at Niagara and Niagara College.
- The QEW at the western boundary shows capacity constraints with the existing volumes which is expected to continue under future conditions. Furthermore, the southern boundary is expected to experience some constraints given that Taylor Road is the only roadway that connects to the south without the need to travel far east to the QEW or far west, past the lake. Two lanes in each direction along Taylor Road (south of Glendale Avenue) would relieve capacity constraints. However, overall, it is expected that traffic can generally enter and exit the study area.
- A review of various Niagara Region Complete Streets Design Manual and Niagara-on-the-Lake urban design and engineering guidelines was undertaken to develop recommended cross-sections for the Glendale community.
- A Transportation Demand Management Strategy was developed to ensure the successful implementation of initiatives that act to reduce automobile use and increase the use of active and sustainable modes of transportation. Various land use, pedestrian, cycling, transit, and parking management strategies are recommended to support a shift to more sustainable travel modes.

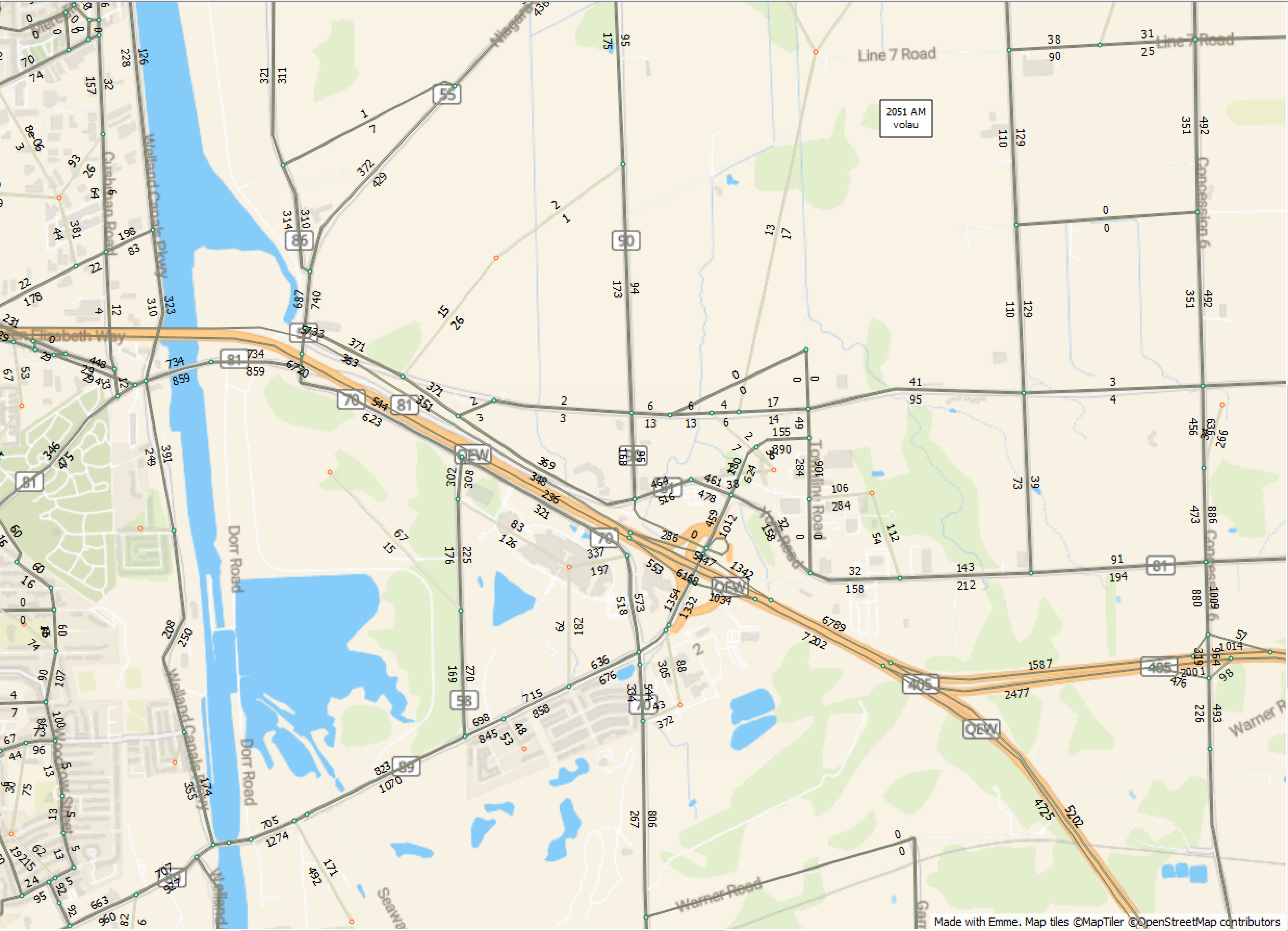
# APPENDIX A

## EMME Model Assumptions


2041 AM
volau
Line 7 Road
Concession 6
Welland Canals Pkwy
Queen Elizabeth Way
Dorr Road
Townline Road
Warner Road
55
86
90
81
70
QEW
58
89
405
Made with Emme. Map tiles ©MapTiler ©OpenStreetMap contributors

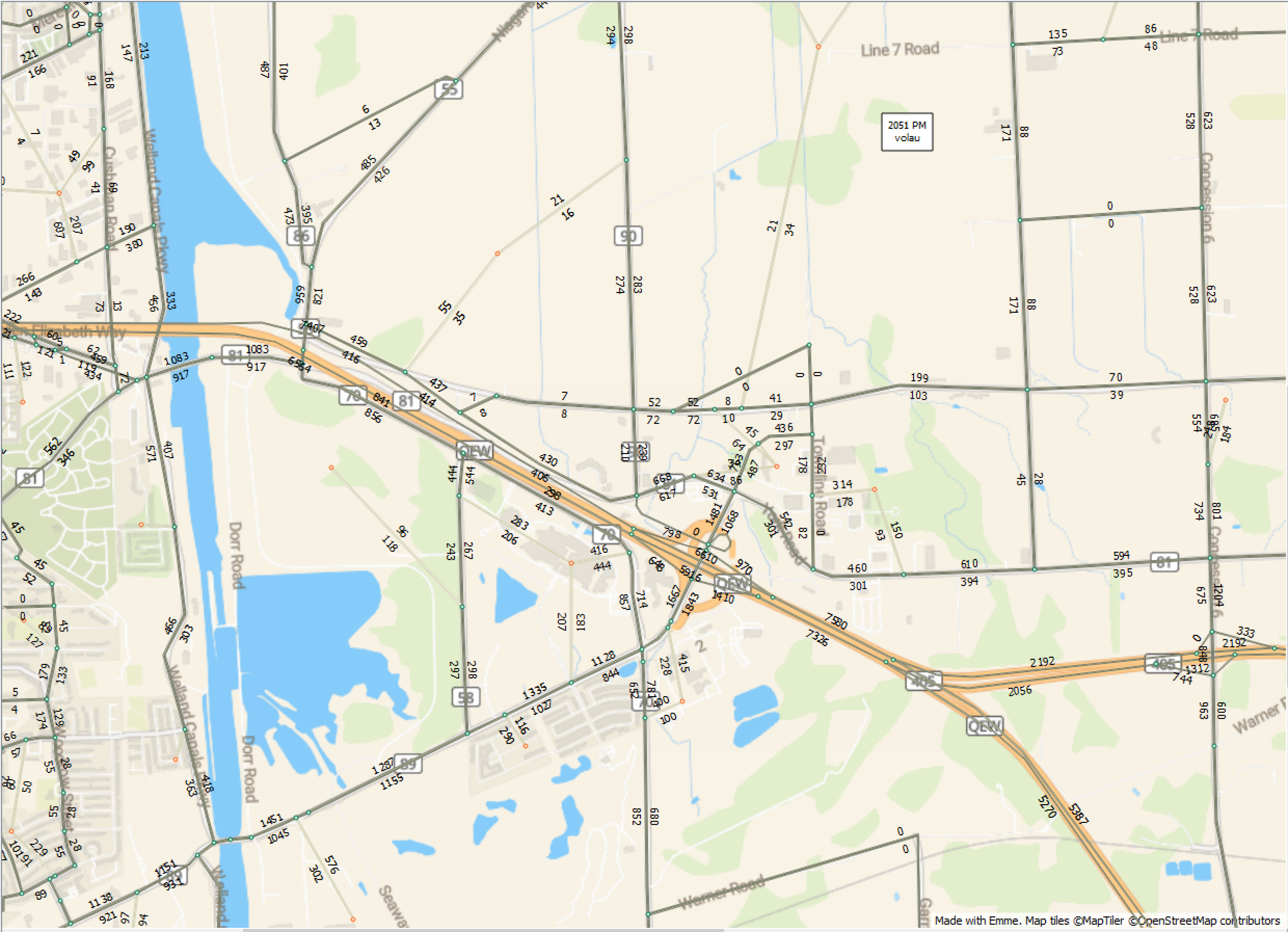


Made with Emme. Map tiles ©MapTiler ©OpenStreetMap contributors



2051 AM
volau

Made with Emme. Map tiles ©MapTiler ©OpenStreetMap contributors



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# APPENDIX B

## TTS Data

## Mode Split for Residential Trips

Fri Jun 02 2023 13:04:19 GMT-0400 (Eastern Daylight Time) - Run Time: 2485ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Type of dwelling unit - dwell_type
Column: Primary travel mode of trip - mode_prime

Filters:
(2006 GTA zone of household - gta06_hhld In 6048-6049,6052, 6112-6113, 6118-6119, 6146,6148-6149,6150
and
Trip purpose - trip_purp In 1

Trip 2016
Table:

| | Transit excluding GO rail | Cycle | Auto driver | Auto passenger | Paid rideshare | Walk |
|---|---|---|---|---|---|---|
| House | 400 | 73 | 6015 | 862 | 53 | 34 |
| Apartment | 93 | 0 | 1339 | 83 | 0 | 0 |
| Townhouse | 0 | 0 | 618 | 82 | 0 | 0 |
| Townhouse | 493 | 73 | 7354 | 945 | 53 | 34 |
| | | | | | GRAND SUM | 8952 |

| Mode | % |
|---|---|
| Auto Driver | 82% |
| Passenger | 11% |
| Transit | 6% |
| Pedestrian | 0% |
| Cycling | 1% |
| Total | 100% |

## Mode Split for Retail Trips

Fri Jun 02 2023 13:07:17 GMT-0400 (Eastern Daylight Time) - Run Time: 3224ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Type of dwelling unit - dwell_type
Column: Primary travel mode of trip - mode_prime

Filters:
(2006 GTA zone of household - gta06_hhld In 6048-6049,6052, 6112-6113, 6118-6119, 6146,6148-6149,6150
and
Trip purpose - trip_purp In 1,3

Trip 2016
Table:

| | Transit excluding GO rail | Cycle | Auto driver | Auto passenger | Taxi passenger | Paid rideshare | Walk |
|---|---|---|---|---|---|---|---|
| House | 479 | 168 | 16711 | 2867 | 0 | 53 | 44 |
| Apartment | 342 | 88 | 4329 | 742 | 49 | 0 | 64 |
| Townhouse | 0 | 0 | 1730 | 273 | 0 | 0 | 4 |
| SUM | 821 | 256 | 21040 | 3609 | 49 | 53 | 108 |
| | | | | | | GRAND SUM | 25936 |

| Mode | % |
|---|---|
| Auto Driver | 82% |
| Passenger | 14% |
| Transit | 3% |
| Pedestrian | 0% |
| Cycling | 1% |
| Total | 100% |

## Mode Split for Work Trips

Fri Jun 02 2023 13:12:50 GMT-0400 (Eastern Daylight Time) - Run Time: 3552ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Type of dwelling unit - dwell_type
Column: Primary travel mode of trip - mode_prime

Filters:
(2006 GTA zone of employment - gta06_emp In 6048-6049,6052, 6112-6113, 6118-6119, 6146,6148-6149,6150
and
Trip purpose - trip_purp In 1,3

Trip 2016
Table:

| | Cycle | Auto driver | Auto passenger | Paid rideshare | Walk |
|---|---|---|---|---|---|
| House | 145 | 15715 | 1193 | 53 | 98 |
| Apartment | 0 | 2633 | 246 | 0 | 95 |
| Townhouse | 93 | 1067 | 38 | 0 | 0 |
| SUM | 145 | 18348 | 1439 | 53 | 193 |
| | | | | GRAND SUM | 20178 |

| Mode | % |
|---|---|
| Auto Driver | 91% |
| Passenger | 7% |
| Transit | 0% |
| Pedestrian | 1% |
| Cycling | 1% |
| Total | 100% |

# APPENDIX C

## Detailed Trip Generation

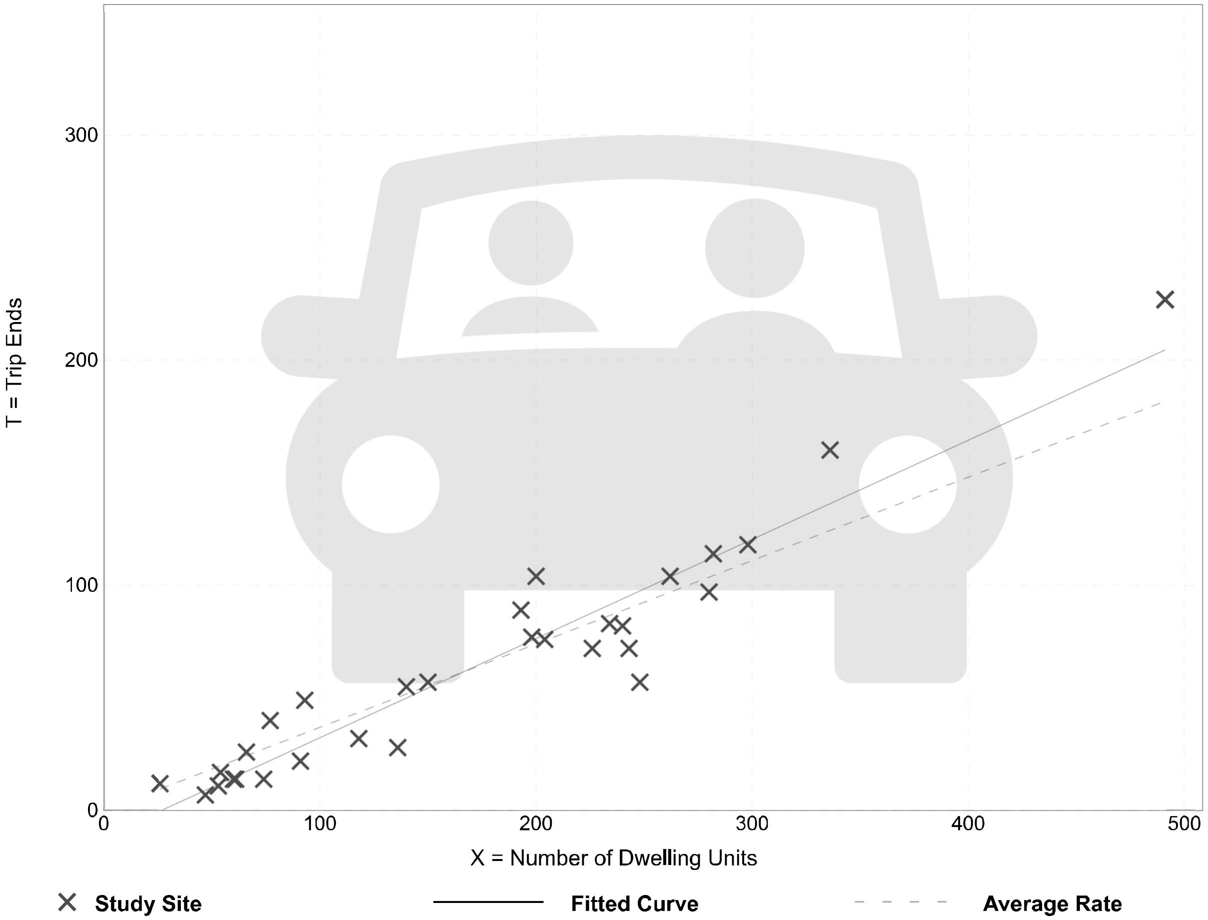
# Multifamily Housing (Mid-Rise)
## Not Close to Rail Transit (221)

**Vehicle Trip Ends vs:** **Dwelling Units**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 7 and 9 a.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 30
Avg. Num. of Dwelling Units: 173
Directional Distribution: 23% entering, 77% exiting

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.37 | 0.15 - 0.53 | 0.09 |

## Data Plot and Equation



**Fitted Curve Equation: $T = 0.44(X) - 11.61$** **$R^2 = 0.91$**

# Multifamily Housing (Mid-Rise)

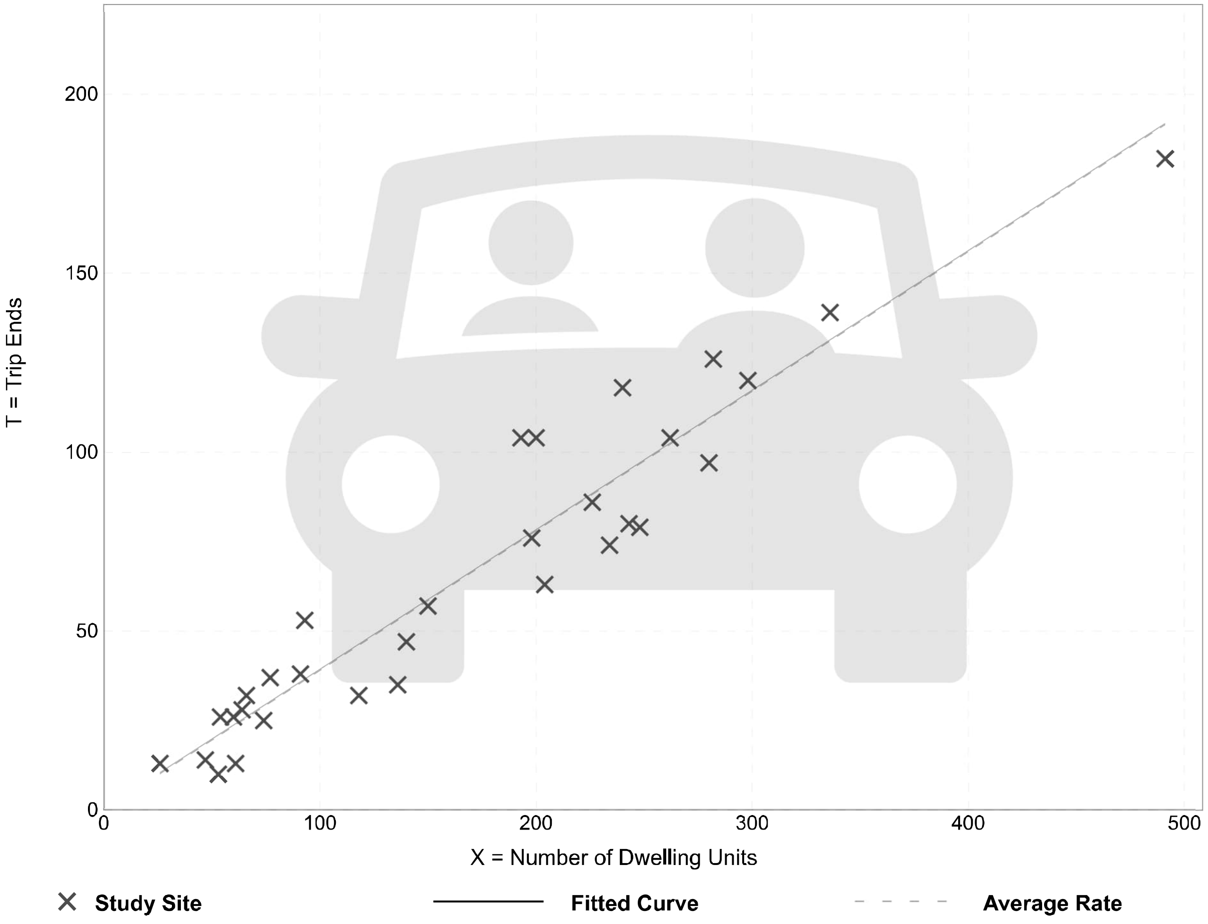
## Not Close to Rail Transit (221)

**Vehicle Trip Ends vs:** **Dwelling Units**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 4 and 6 p.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 31
Avg. Num. of Dwelling Units: 169
Directional Distribution: 61% entering, 39% exiting

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.39 | 0.19 - 0.57 | 0.08 |

## Data Plot and Equation



**Fitted Curve Equation: $T = 0.39(X) + 0.34$**

**$R^2 = 0.91$**

# Multifamily Housing (Mid-Rise)
## Not Close to Rail Transit (221)

**Vehicle Trip Ends vs:** **Dwelling Units**
**On a:** **Saturday, Peak Hour of Generator**

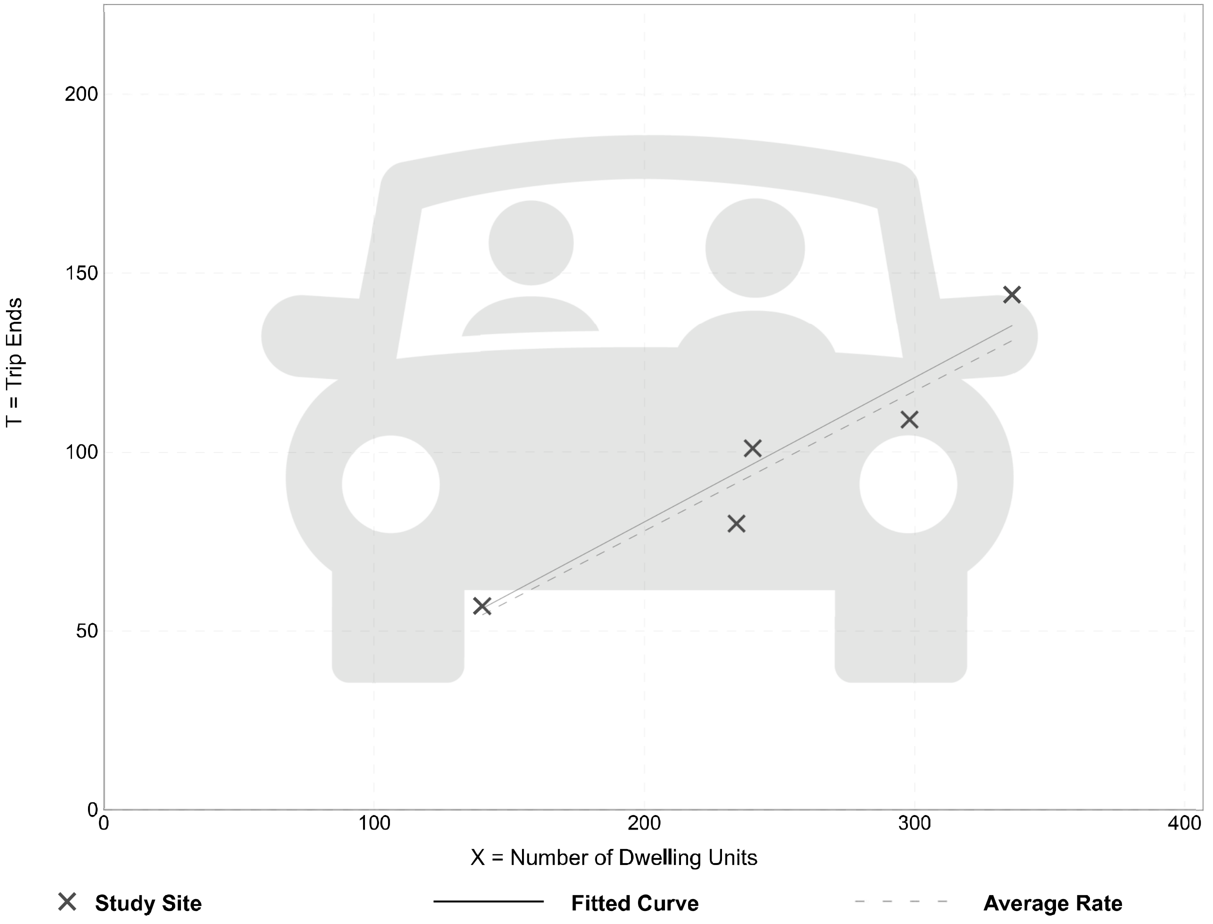
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 5
Avg. Num. of Dwelling Units: 250
Directional Distribution: 51% entering, 49% exiting

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.39 | 0.34 - 0.43 | 0.04 |

## Data Plot and Equation

***Caution – Small Sample Size***



**Fitted Curve Equation: Ln(T) = 1.00 Ln(X) - 0.91**

**R²= 0.92**

# Multifamily Housing (High-Rise)

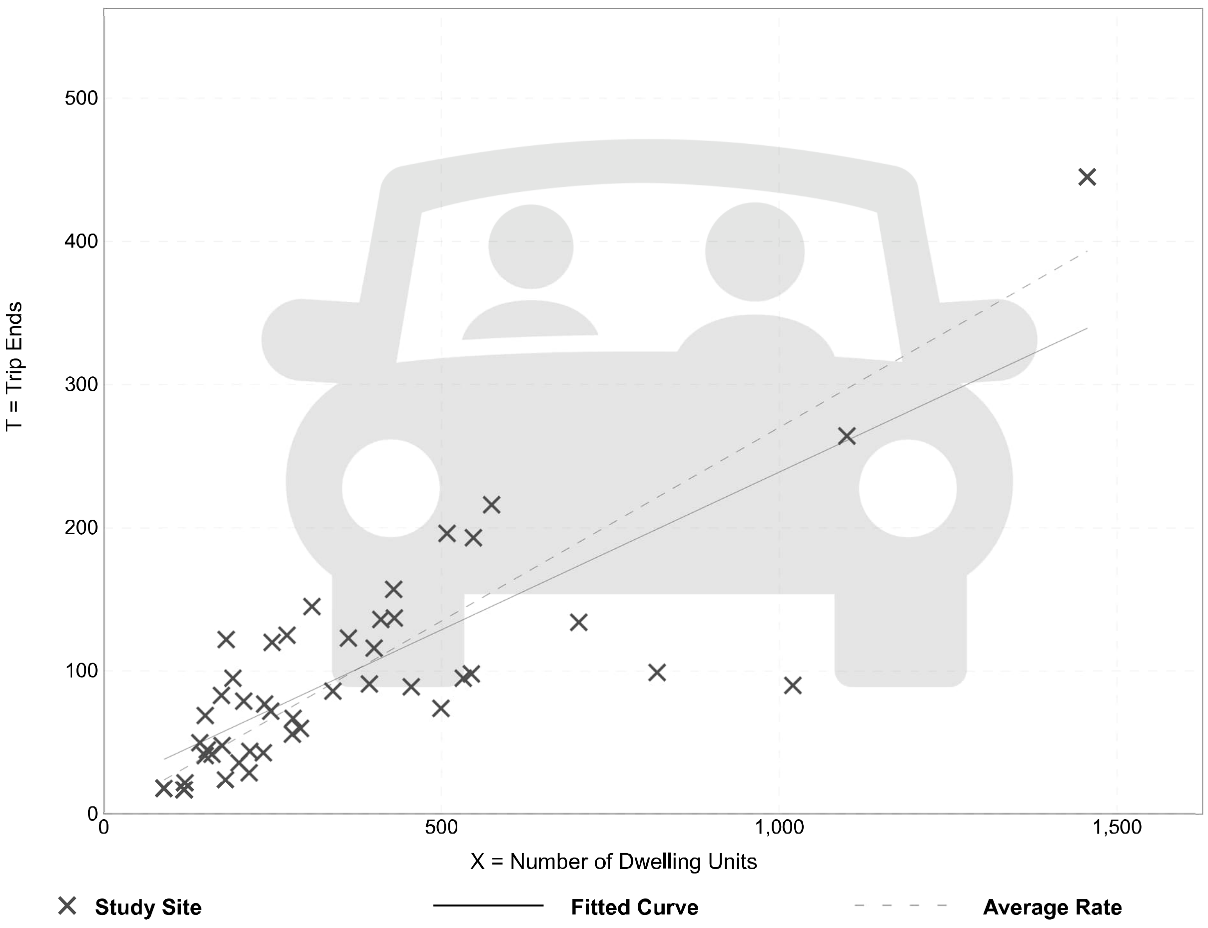
## Not Close to Rail Transit (222)

| | |
|---|---|
| **Vehicle Trip Ends vs:** | **Dwelling Units** |
| **On a:** | **Weekday,**<br>**Peak Hour of Adjacent Street Traffic,**<br>**One Hour Between 7 and 9 a.m.** |
| **Setting/Location:** | **General Urban/Suburban** |
| Number of Studies: | 45 |
| Avg. Num. of Dwelling Units: | 372 |
| Directional Distribution: | 26% entering, 74% exiting |

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.27 | 0.09 - 0.67 | 0.11 |

## Data Plot and Equation



**Fitted Curve Equation: T = 0.22(X) + 18.85**

**R²= 0.64**

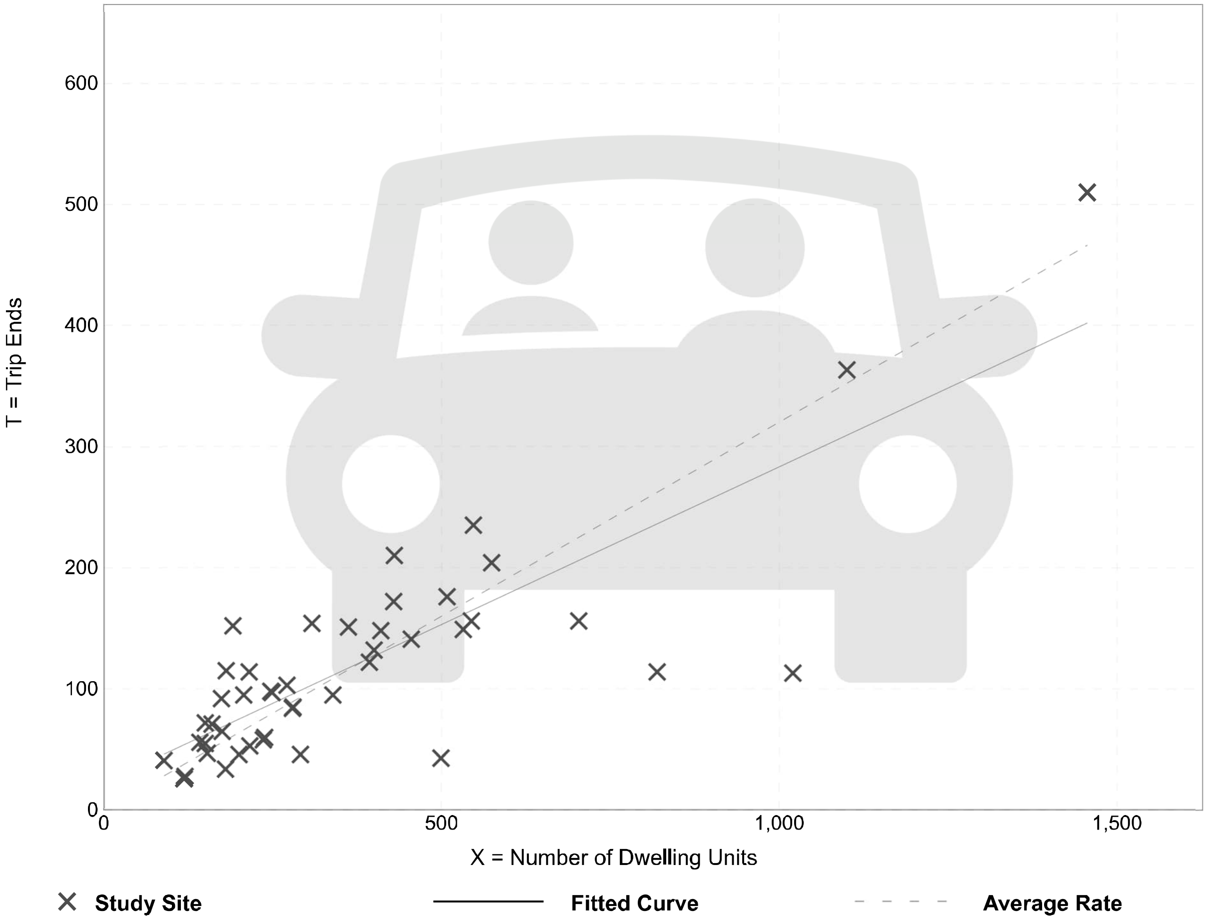
# Multifamily Housing (High-Rise)
## Not Close to Rail Transit (222)

**Vehicle Trip Ends vs:** **Dwelling Units**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 4 and 6 p.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 45
Avg. Num. of Dwelling Units: 372
Directional Distribution: 62% entering, 38% exiting

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.32 | 0.09 - 0.80 | 0.13 |

## Data Plot and Equation



**Fitted Curve Equation: T = 0.26(X) + 23.12**

**R²= 0.67**

# Multifamily Housing (High-Rise)

## Not Close to Rail Transit (222)

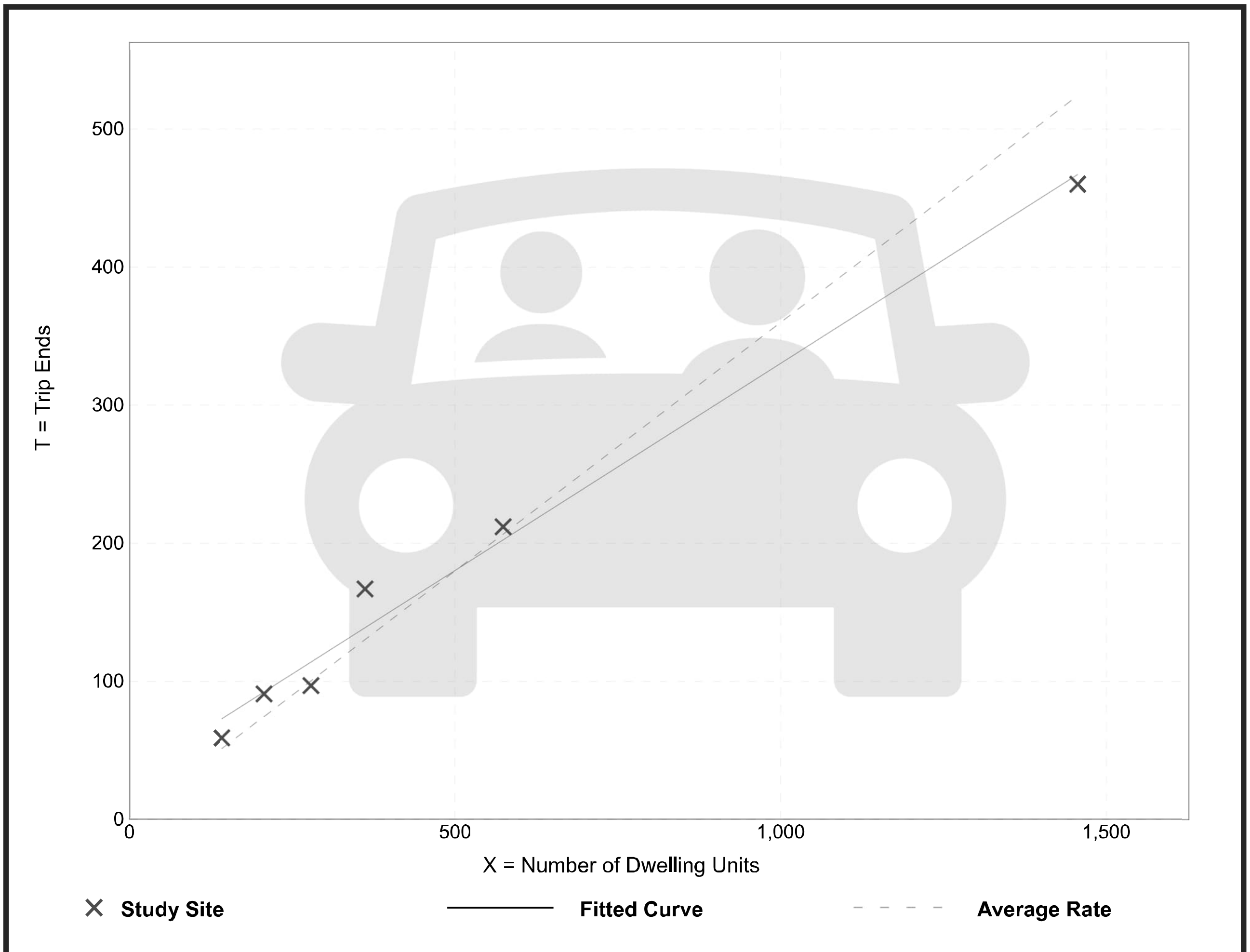
| | |
|---|---|
| **Vehicle Trip Ends vs:** | **Dwelling Units** |
| **On a:** | **Saturday, Peak Hour of Generator** |

| | |
|---|---|
| **Setting/Location:** | **General Urban/Suburban** |
| Number of Studies: | 6 |
| Avg. Num. of Dwelling Units: | 503 |
| Directional Distribution: | 57% entering, 43% exiting |

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.36 | 0.32 - 0.46 | 0.06 |

## Data Plot and Equation



**Fitted Curve Equation: $T = 0.30(X) + 30.34$**

**$R^2 = 0.99$**

# Office Park

## (750)

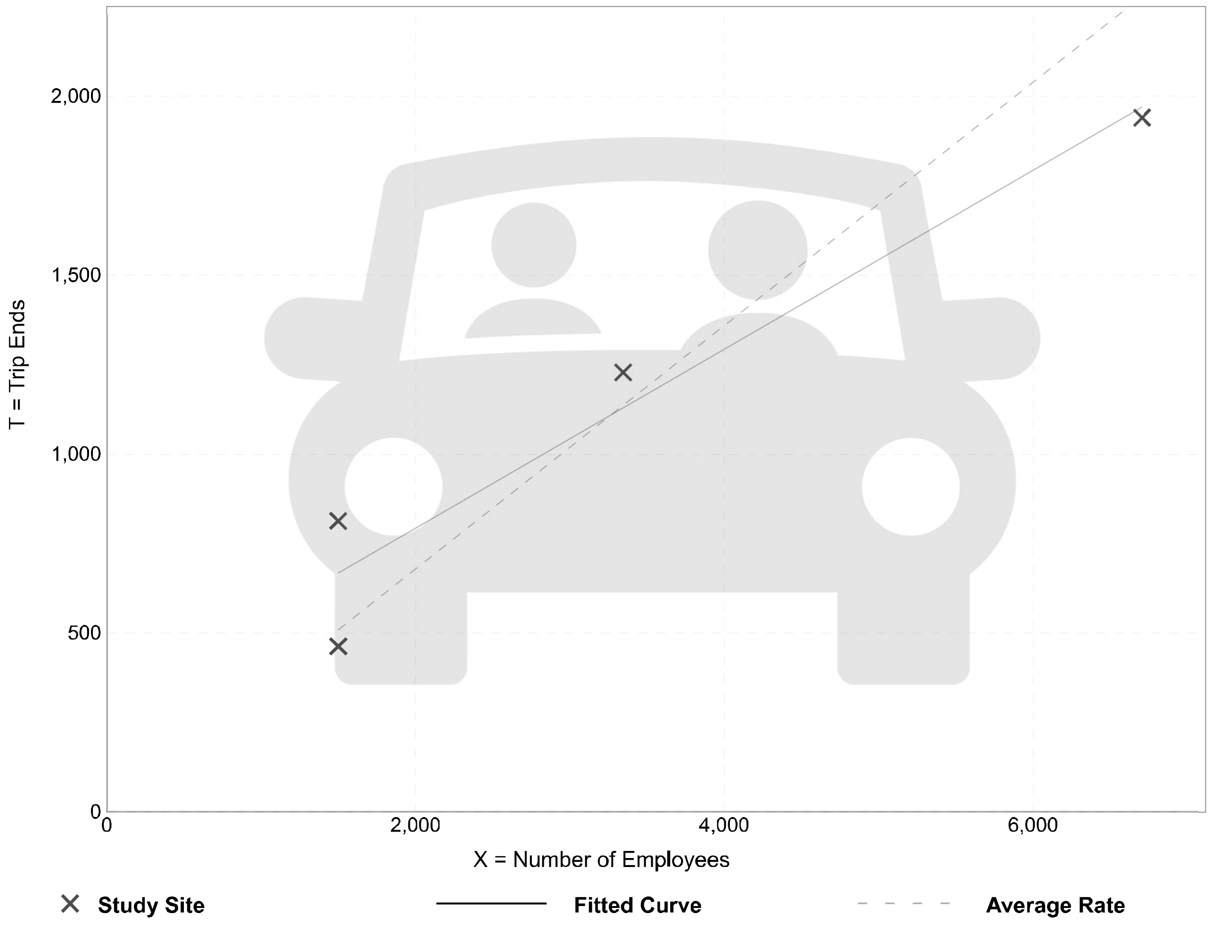
**Vehicle Trip Ends vs:** **Employees**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 7 and 9 a.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 4
Avg. Num. of Employees: 3263
Directional Distribution: 90% entering, 10% exiting

## Vehicle Trip Generation per Employee

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.34 | 0.29 - 0.54 | 0.09 |

## Data Plot and Equation

***Caution – Small Sample Size***



**Fitted Curve Equation: T = 0.25(X) + 293.79**

**R²= 0.94**

# Office Park

## (750)

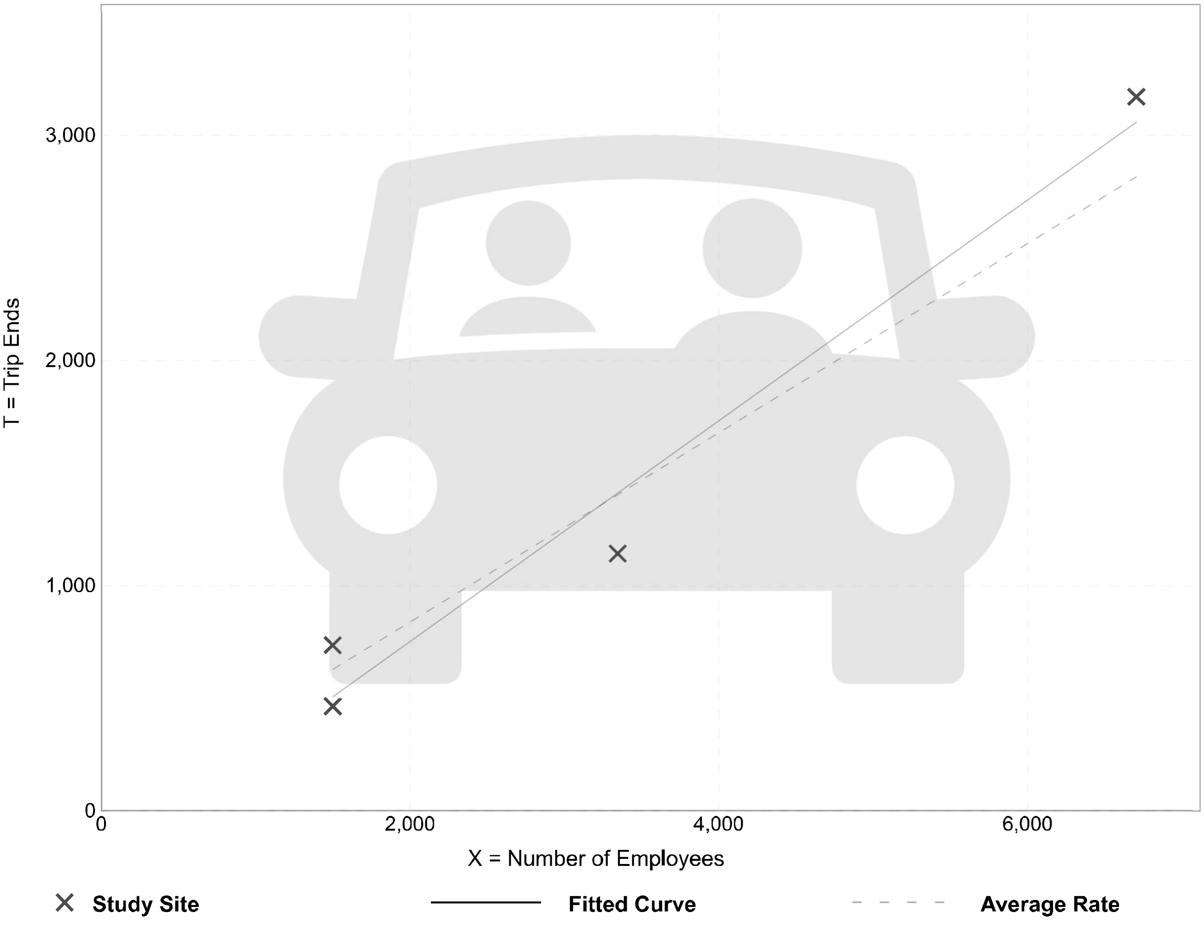
**Vehicle Trip Ends vs:** **Employees**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 4 and 6 p.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 4
Avg. Num. of Employees: 3263
Directional Distribution: 16% entering, 84% exiting

## Vehicle Trip Generation per Employee

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.42 | 0.31 - 0.49 | 0.08 |

## Data Plot and Equation

***Caution – Small Sample Size***



**Fitted Curve Equation: T = 0.49(X) - 226.72**

**$R^2$= 0.97**

# Office Park

## (750)

**Vehicle Trip Ends vs:** **Employees**
**On a:** **Saturday, Peak Hour of Generator**

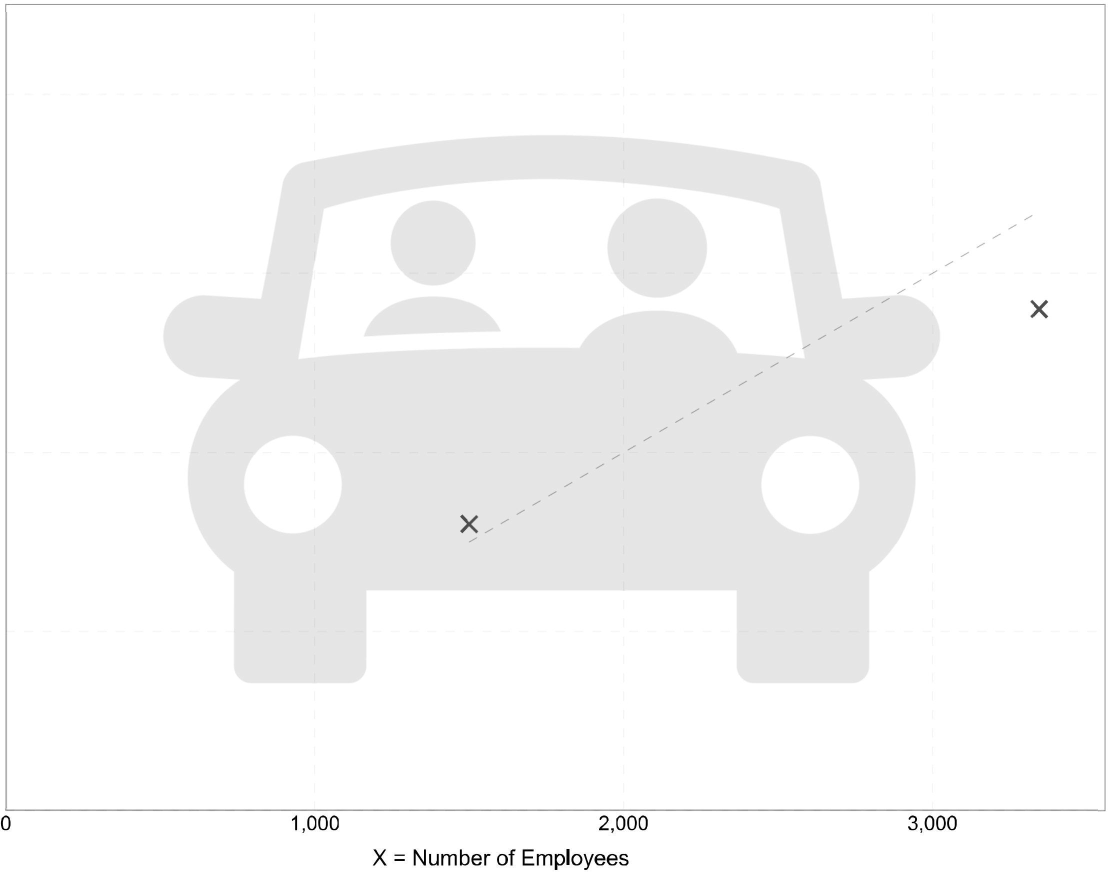
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 2
Avg. Num. of Employees: 2423
Directional Distribution: 78% entering, 22% exiting

## Vehicle Trip Generation per Employee

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.05 | 0.04 - 0.05 | * |

## Data Plot and Equation

***Caution – Small Sample Size***



× **Study Site**

- - - - **Average Rate**

**Fitted Curve Equation: Not Given**

**R²= ******

# Shopping Center (>150k)

(820)

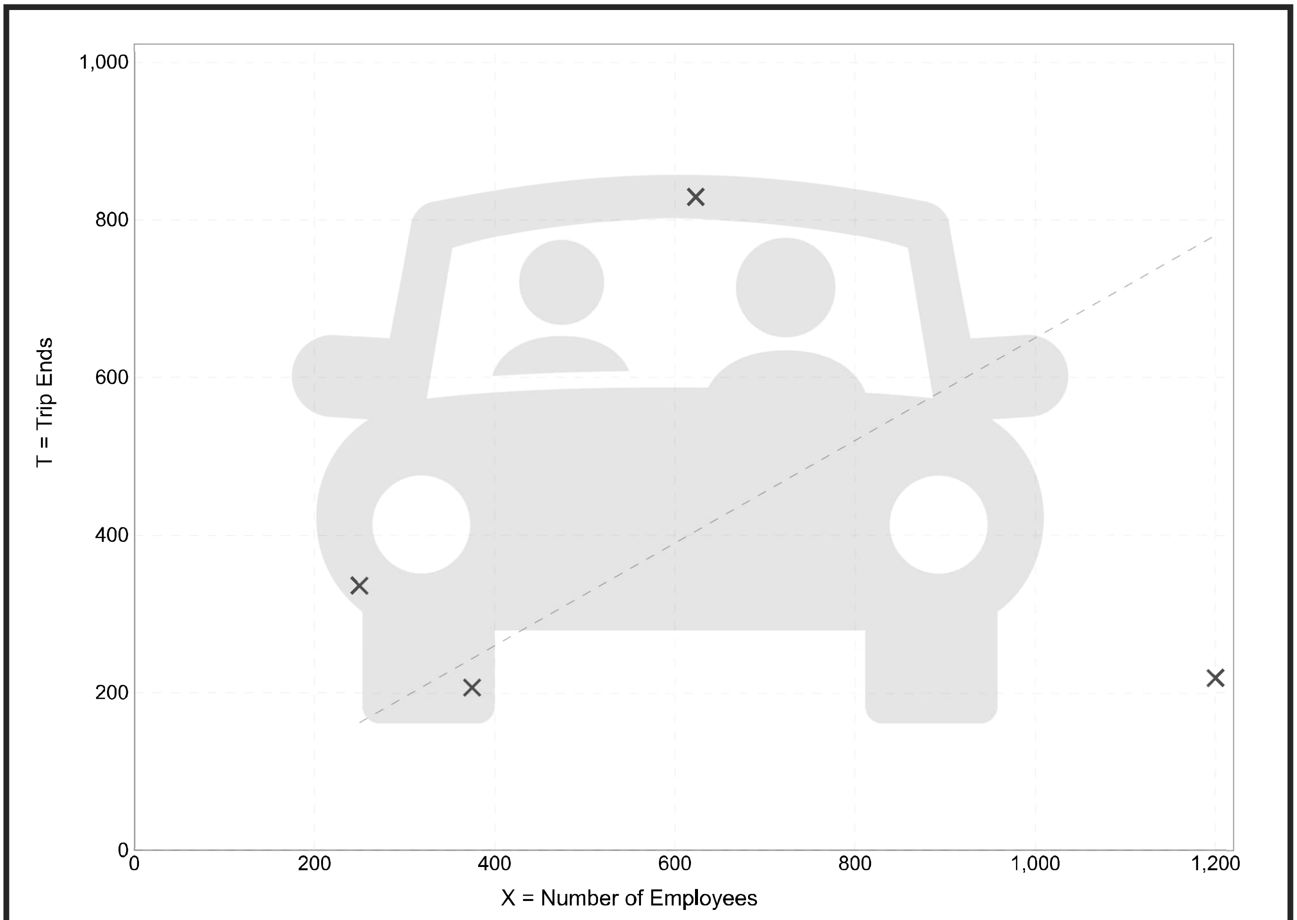
| | |
|---|---|
| **Vehicle Trip Ends vs:** | **Employees** |
| **On a:** | **Weekday,<br>Peak Hour of Adjacent Street Traffic,<br>One Hour Between 7 and 9 a.m.** |
| **Setting/Location:** | **General Urban/Suburban** |
| Number of Studies: | 4 |
| Avg. Num. of Employees: | 612 |
| Directional Distribution: | 64% entering, 36% exiting |

## Vehicle Trip Generation per Employee

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.65 | 0.18 - 1.34 | 0.61 |

## Data Plot and Equation

***Caution – Small Sample Size***



× **Study Site**

- - - - **Average Rate**

**Fitted Curve Equation: Not Given**

**R²= ******

# Shopping Center (>150k)

## (820)

---

**Vehicle Trip Ends vs:** **Employees**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 4 and 6 p.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 5
Avg. Num. of Employees: 730
Directional Distribution: 50% entering, 50% exiting

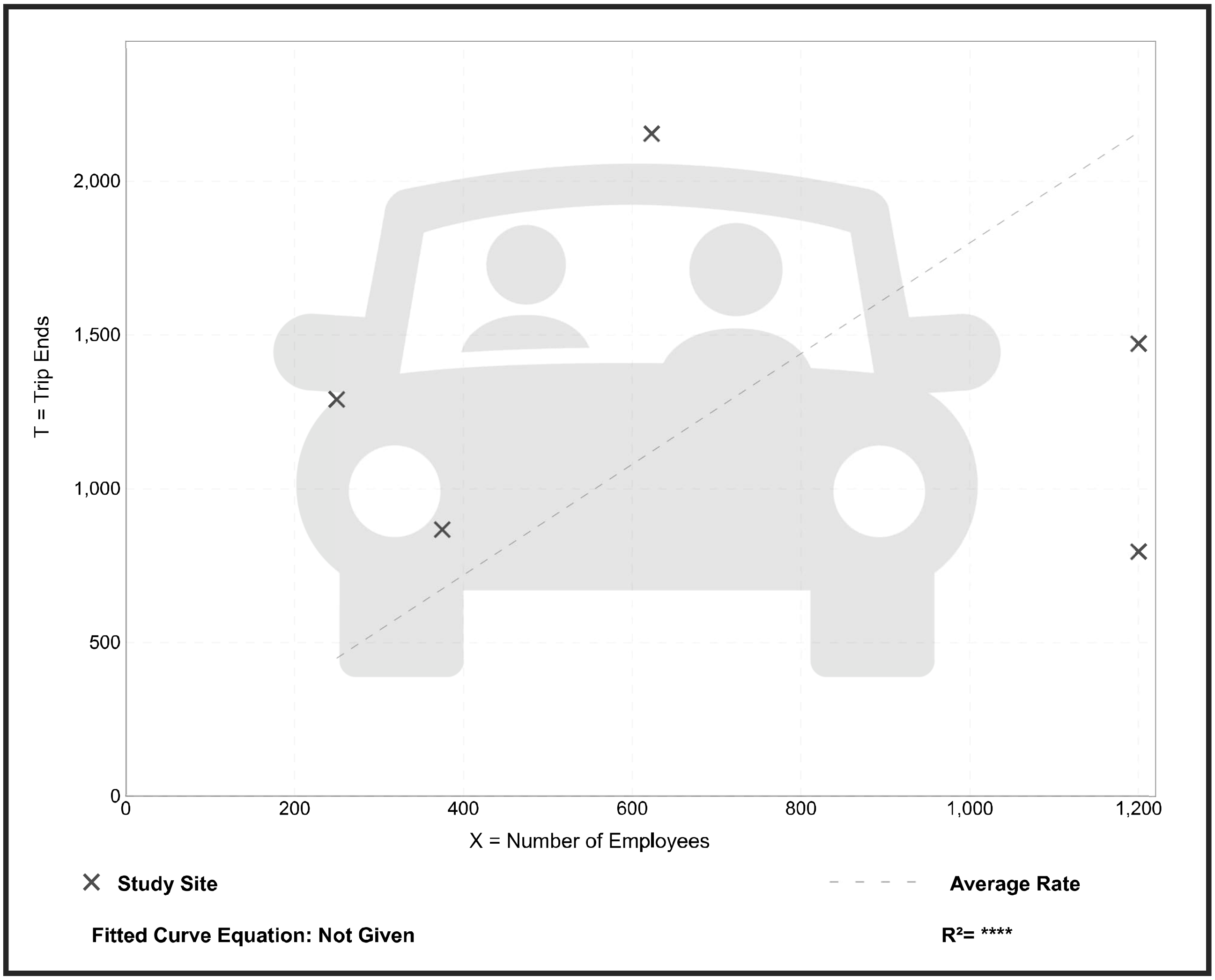
---

## Vehicle Trip Generation per Employee

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 1.80 | 0.66 - 5.16 | 1.50 |

## Data Plot and Equation

***Caution – Small Sample Size***



**Fitted Curve Equation: Not Given**

**R²= ****

# Shopping Center (>150k)
## (820)

**Vehicle Trip Ends vs:** **Employees**
**On a:** **Saturday, Peak Hour of Generator**

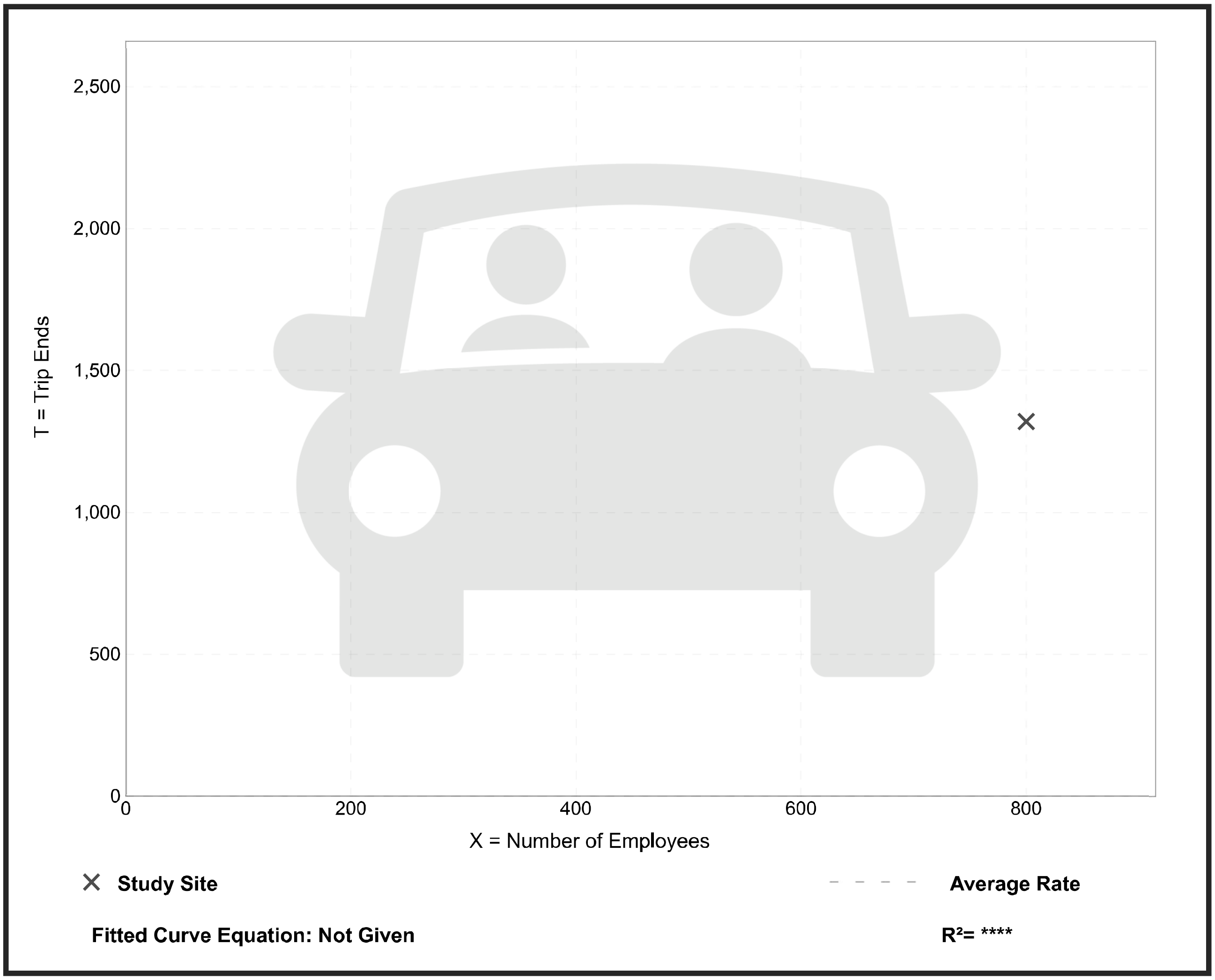
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 1
Avg. Num. of Employees: 800
Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Employee

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 1.65 | 1.65 - 1.65 | * |

## Data Plot and Equation

***Caution – Small Sample Size***



**Fitted Curve Equation: Not Given**

**R²= ****

*Trip Gen Manual,* 11th Edition ● Institute of Transportation Engineers

# Multifamily Housing (Low-Rise)

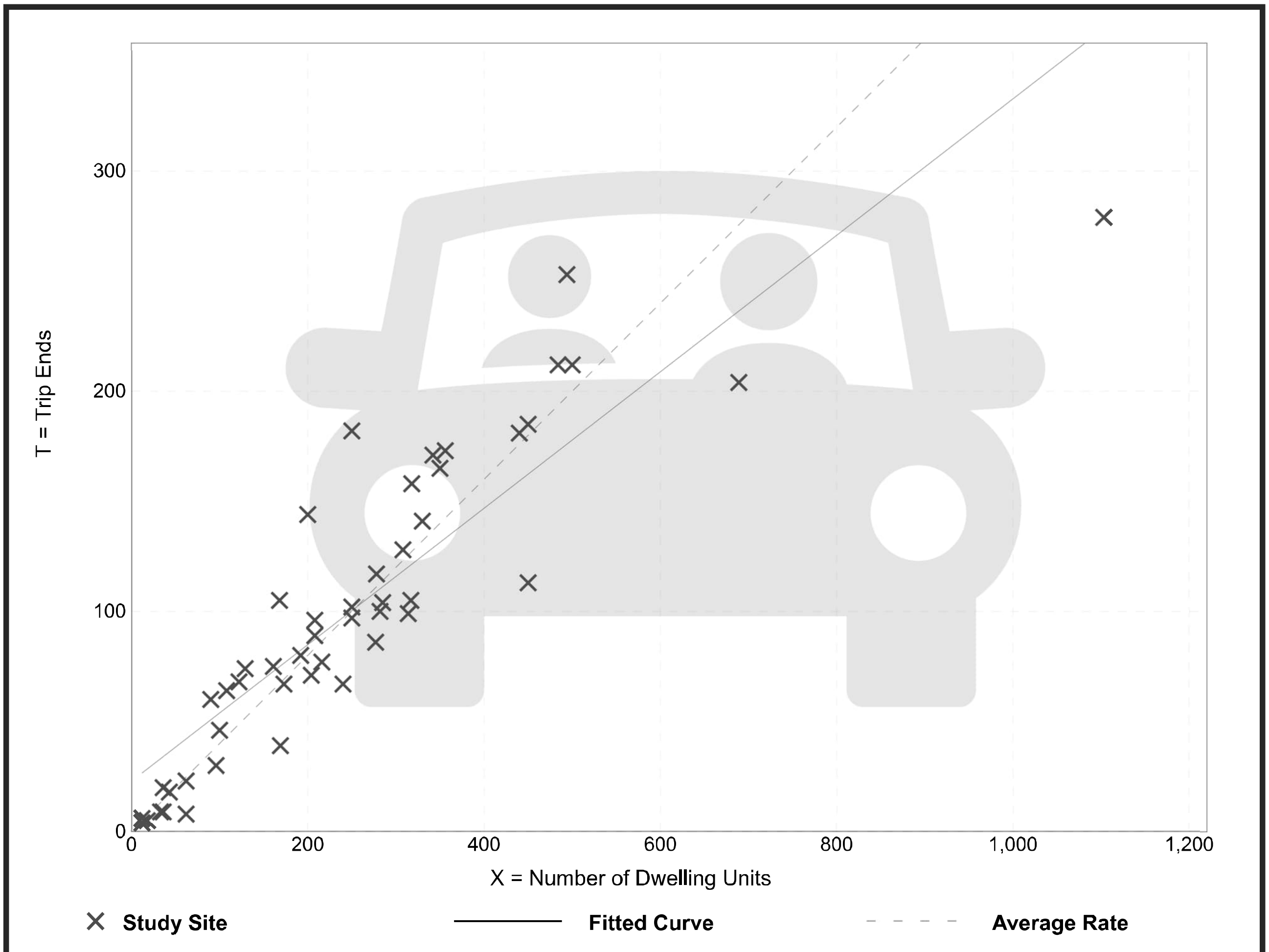
## Not Close to Rail Transit (220)

**Vehicle Trip Ends vs:** **Dwelling Units**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 7 and 9 a.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 49
Avg. Num. of Dwelling Units: 249
Directional Distribution: 24% entering, 76% exiting

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.40 | 0.13 - 0.73 | 0.12 |

## Data Plot and Equation



**Fitted Curve Equation: $T = 0.31(X) + 22.85$**

**$R^2 = 0.79$**

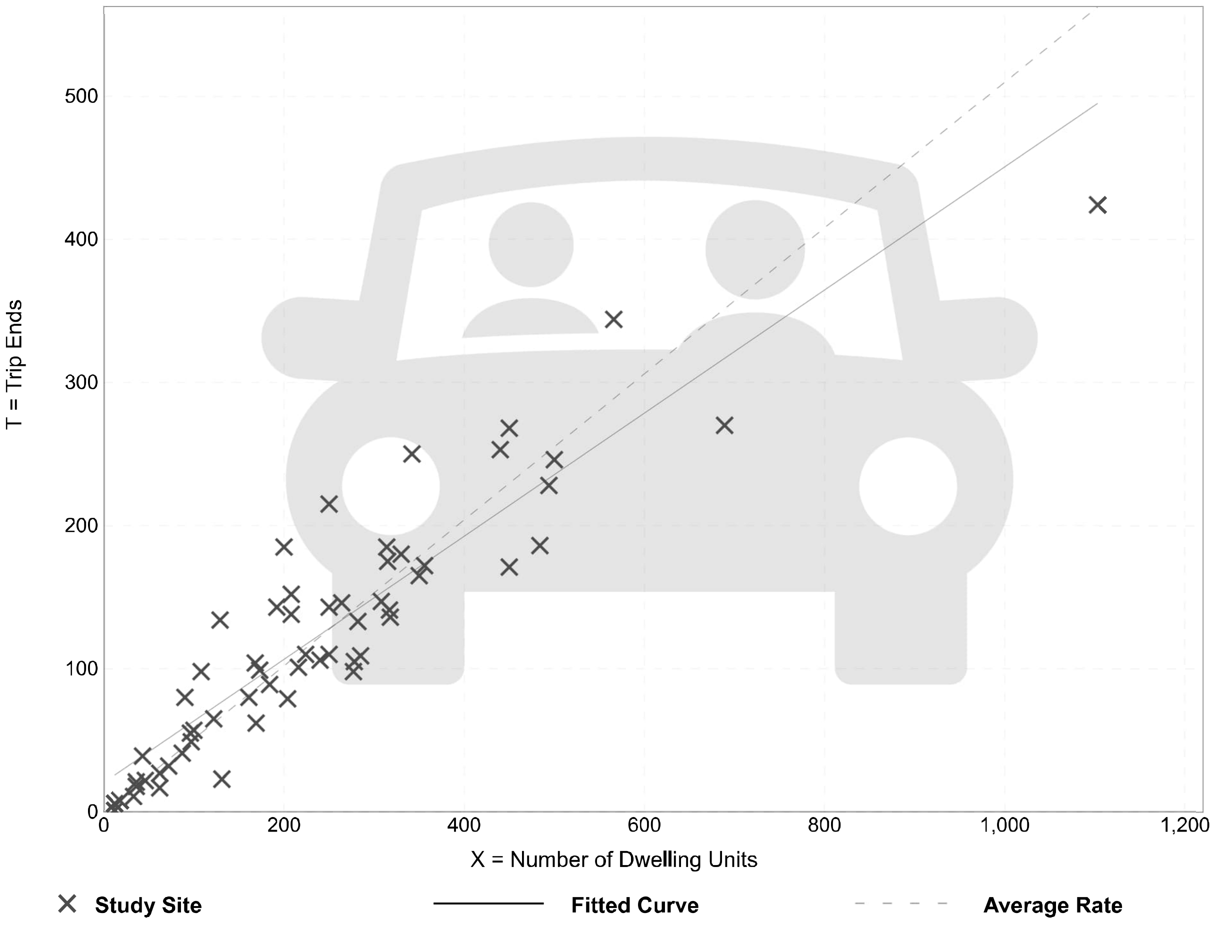
# Multifamily Housing (Low-Rise)
## Not Close to Rail Transit (220)

**Vehicle Trip Ends vs:** **Dwelling Units**
**On a:** **Weekday,**
**Peak Hour of Adjacent Street Traffic,**
**One Hour Between 4 and 6 p.m.**
**Setting/Location:** **General Urban/Suburban**
Number of Studies: 59
Avg. Num. of Dwelling Units: 241
Directional Distribution: 63% entering, 37% exiting

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.51 | 0.08 - 1.04 | 0.15 |

## Data Plot and Equation



**Fitted Curve Equation: T = 0.43(X) + 20.55**

**R²= 0.84**

# Multifamily Housing (Low-Rise)
## Not Close to Rail Transit (220)

**Vehicle Trip Ends vs: Dwelling Units**
**On a: Saturday, Peak Hour of Generator**

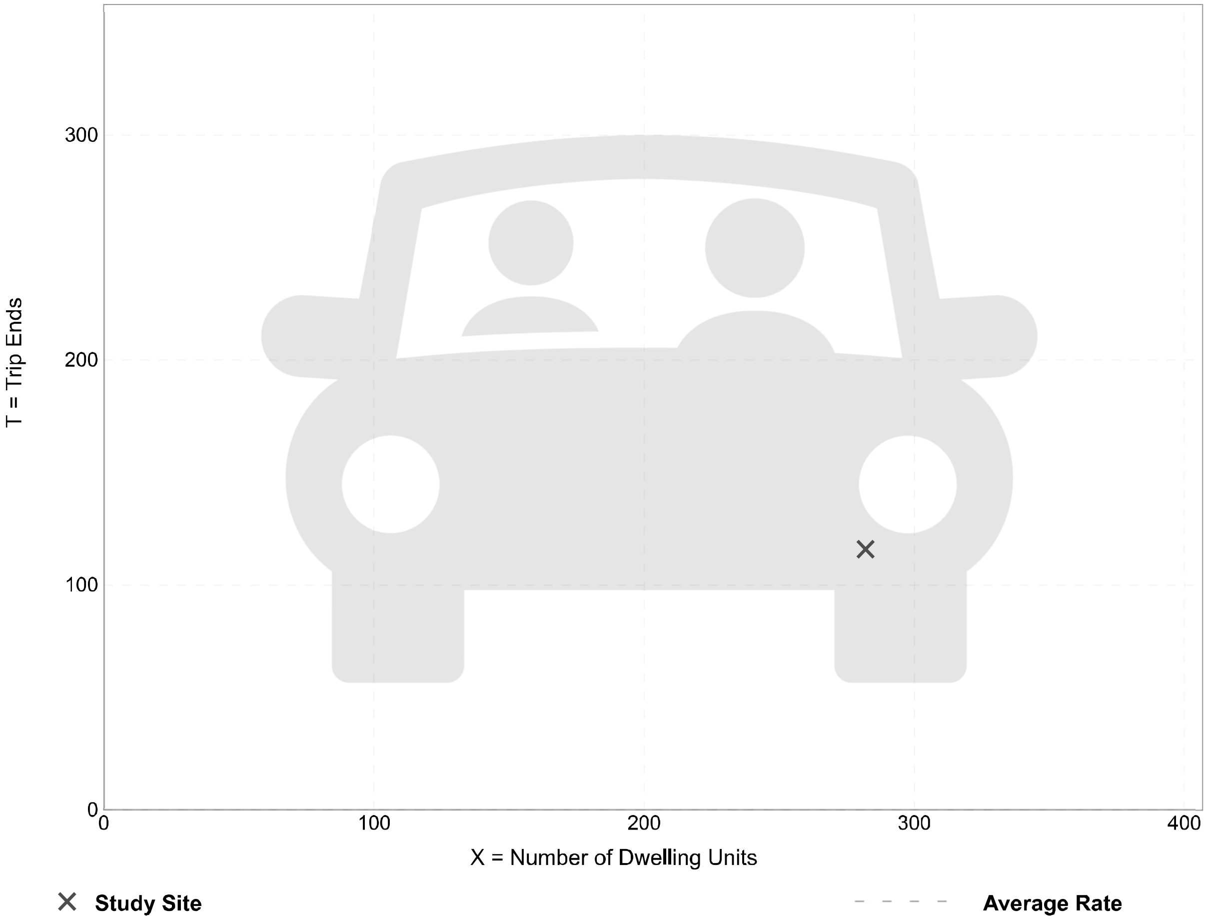
**Setting/Location: General Urban/Suburban**
Number of Studies: 1
Avg. Num. of Dwelling Units: 282
Directional Distribution: Not Available

## Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|---|---|---|
| 0.41 | 0.41 - 0.41 | * |

## Data Plot and Equation

***Caution – Small Sample Size***



**Fitted Curve Equation: Not Given**

**R²= ******

# APPENDIX D

## Road Classification and Lane Capacity Excerpts

### 3.4.2 FUTURE CORRIDOR CONSTRAINTS

A future network operations analysis was completed to understand the capacity impacts if the Town continues to grow with no changes to the transportation network, known as a “Do Nothing” scenario.

The primary metric with which we assess network capacity constraints is through evaluating the volume-to-capacity (v/c) ratio which represents the amount of volume that travels along a roadway within the peak hour divided by the capacity of the roadway. The following lane capacities by road classification were assumed:

- Local: 300 vehicles per lane per hour
- Collector: 500 vehicles per lane per hour
- Arterial: 800 vehicles per lane per hour
- County: 800 vehicles per lane per hour
- Highway: 1,800 vehicles per lane per hour

The lane capacities above are based on the 2016 GTHA Emme Network Standards (2017), established by the University of Toronto Transportation Research Institute (UTTRI), and adopted by Niagara Region and other jurisdictions across the Greater Golden Horseshoes Area.

A screenline analysis was conducted to evaluate the road network performance through parallel roadway corridors locations that forms a screenline. This analysis is facilitated by comparing the sum of traffic volumes with the sum of the planning-level roadway capacity across a screenline, and then computing the associated volume-to-capacity (v/c) ratios. For the purpose of the analysis, 8 screenlines were setup to capture all major trip directions, illustrated in **Figure 3.7**.

A 10% to 28% increase in roadway volumes was noted across the screenlines between the transportation analysis base year (2019) and the 2041 horizon, which corresponds to an average increase of 0.4% to 1.1% per year. The associated existing and forecasted volume-to-capacity (v/c) ratios are provided in **Table 3.11**. A further breakdown is provided in the same table for select screenlines where one or more of the underlying locations exhibit volume-to-capacity ratios above 0.95.

At a high level, the analysis reveals that all screenlines remain within capacity in the future 2041 horizon, indicating potential to redistribute demand from busy corridors onto less busy ones. The highest volume-to-capacity ratio recorded is 0.62

**Figure 3.7:** Screenlines for Network Performance Analysis

## Existing Road Network Table

| Roadway | Jurisdiction | Region's Transportation Master Plan, (2017) | Service Function | Divided/ Undivided | Regulatory Speed Limit (km/h) (may vary) | Number of Thru-Lanes | Estimated Roadway Carrying Capacity (veh/day) | Average Annual Daily Traffic (AADT) (veh/day) |
|---|---|---|---|---|---|---|---|---|
| Queen Elizabeth Way (QEW) | Provincial | Urban | Freeway | Divided | 100 | 6 | 132,000 | 95,000 |
| Regional Road 58 (Homer Road) | Regional | Rural | Collector | Undivided | 80 | 2 | 8,750 | 2,700 |
| Regional Road 70 (Taylor Road) | Regional | Urban | Arterial | Undivided | 60 | 2 | 17,500 | 9,300 |
| Regional Road 81 (York Road) | Regional | Rural | Arterial | Undivided | 60 | 2 | 17,500 | 10,100 |
| Regional Road 89 (Glendale Avenue) | Regional | Urban | Arterial | Divided | 50 | 4 | 35,000 | 13,000 |
| Regional Road 90 (Airport Road) | Regional | Rural | Arterial | Undivided | 60 | 2 | 8,750 | 5,800 |
| Queenston Road | Municipal | Rural | Collector | Undivided | 70 | 2 | 8,750 | - |
| Townline Road | Municipal | Rural | Local | Undivided | 50 | 2 | 8,750 | - |
| Niagara-on -the-Green (Main Street) | Municipal | Urban | Local | Undivided | 50 | 2 | 8,750 | - |
| Concession 7 Road | Municipal | Rural | Local | Undivided | 50 | 2 | 8750 | - |

# APPENDIX E

## Screenline Analysis

Lane Capacities (vehicles per lane per hour)

| | |
|---|---|
| Local | 300 |
| Collector | 500 |
| Arterial | 800 |
| County | 800 |
| Highway | 1800 |

TMP TNOTL (March 2022)

| | |
|---|---|
| Years | 6 |

| Corridor | Annual Growth Rate | Growth |
|---|---|---|
| Taylor Road | 1.50% | 1.093 |
| Airport Road | 1.10% | 1.068 |
| Townline Road | - | 1.000 |
| Concession 7 Road | 1.70% | 1.106 |
| Glendale Avenue | 1.10% | 1.068 |
| York Road* | 0.00% | 1.000 |
| Homer Road | 1.40% | 1.087 |

*Assumed 0% to be conservative since calculations indicated negative growth rates.

Study Area Roadways

| NS Corridors | | Service Function | Division | Speed Limit | Lanes (per direction) | Typical Capacity (veh/hr/lane) | Capacity (veh/hr) |
|---|---|---|---|---|---|---|---|
| Homer Road (Regional Road 58) | Rural | Collector | Undivided | 80 | 1 | 500 | 500 |
| Taylor Road (Regional Road 70) | Urban | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Airport Road (Regional Road 90) | Rural | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Townline Road | Rural | Local | Undivided | 50 | 1 | 300 | 300 |
| Concession Road 7 | Rural | Local | Undivided | 50 | 1 | 300 | 300 |
| Niagara-on-the-Green Boulevard | Urban | Local | Undivided | 50 | 1 | 300 | 300 |
| EW Corridors | | | | | | | |
| York Road (Regional Road 81) | Rural | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Taylor Road (Regional Road 70) | Urban | Arterial | Undivided | 60 | 1 | 800 | 800 |
| Glendale Avenue (Regional Road 89) | Urban | Arterial | Divided | 50 | 2 | 800 | 1600 |
| QEW (Western Boundary) | Urban | Highway | Divided | 100 | 3 | 1800 | 5400 |
| QEW (Eastern Boundary and Future Western Boundary*) | Urban | Highway | Divided | 100 | 4 | 1800 | 7200 |

* QEW will be widened at the western screenline to 4 lanes in either direction as part of the Garden City Skyway twinning project

| MTO AADT GLENDALE TO NIAGARA | |
|---|---|
| AADT | 94000 |
| PEAK HOURS | 9400 |
| PM SPLIT | 58% |
| VOLUME | 5498 |
| EMME VOLUME | 5716 |

| Screenline Boundary | Screenline Roads | Total Capacity (veh/hr) | Flow to/from Subject Site | 2016 | | 2022 | | 2041: Baseline | | 2041: High-Density Scenario | | 2041: Low-Density Scenario | | 2051: Baseline | | 2051: High-Density Scenario | | 2051: Low-Density Scenario | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes | AM Total Volumes | PM Total Volumes |
| Outlet Collection at Niagara | Homer Road | 500 | Inbound | 99 | 75 | 108 | 82 | 99 | 142 | 151 | 314 | 94 | 315 | 126 | 206 | 144 | 293 | 86 | 38 |
| | | | Outbound | 12 | 212 | 13 | 230 | 66 | 217 | 406 | 286 | 142 | 242 | 83 | 283 | 361 | 285 | 96 | 106 |
| | Taylor Road | 800 | Inbound | 223 | 264 | 244 | 289 | 325 | 394 | 315 | 436 | 286 | 362 | 337 | 416 | 272 | 326 | 241 | 208 |
| | | | Outbound | 32 | 257 | 35 | 281 | 117 | 450 | 410 | 222 | 457 | 49 | 197 | 444 | 407 | 74 | 155 | 133 |
| | Glendale Avenue | 1600 | Inbound | 155 | 88 | 166 | 94 | 121 | 135 | 101 | 154 | 57 | 69 | 182 | 183 | 105 | 66 | 80 | 48 |
| | | | Outbound | 12 | 192 | 13 | 205 | 62 | 151 | 436 | 180 | 516 | 155 | 79 | 207 | 379 | 151 | 84 | 161 |
| Niagara College | Taylor Road | 800 | Inbound | 383 | 79 | 419 | 86 | 333 | 85 | 333 | 85 | 333 | 85 | 372 | 100 | 372 | 100 | 372 | 100 |
| | | | Outbound | 34 | 383 | 37 | 419 | 30 | 371 | 30 | 371 | 30 | 371 | 43 | 400 | 43 | 400 | 43 | 400 |
| | Glendale Road | 1600 | Inbound | 431 | 173 | 460 | 185 | 376 | 192 | 376 | 192 | 376 | 192 | 305 | 228 | 305 | 228 | 305 | 228 |
| | | | Outbound | 51 | 398 | 54 | 425 | 76 | 433 | 76 | 433 | 76 | 433 | 88 | 415 | 88 | 415 | 88 | 415 |
| Eastern Boundary | York Road | 800 | Inbound | 345 | 334 | 345 | 334 | 87 | 539 | 74 | 510 | 70 | 510 | 91 | 594 | 68 | 545 | 62 | 544 |
| | | | Outbound | 330 | 407 | 330 | 407 | 165 | 207 | 187 | 206 | 172 | 196 | 194 | 395 | 212 | 384 | 195 | 373 |
| | QEW | 7200 | Inbound | 4583 | 6076 | 4583 | 6076 | 6421 | 7087 | 6452 | 7148 | 6360 | 7054 | 6789 | 7580 | 6768 | 7569 | 6676 | 7473 |
| | | | Outbound | 5136 | 4924 | 5136 | 4924 | 6705 | 6834 | 6867 | 6815 | 6748 | 6714 | 7202 | 7326 | 7326 | 7214 | 7206 | 7112 |
| Northern Boundary | Airport Road | 800 | Inbound | 156 | 153 | 167 | 163 | 218 | 254 | 197 | 208 | 191 | 207 | 173 | 274 | 134 | 195 | 127 | 193 |
| | | | Outbound | 74 | 172 | 79 | 184 | 107 | 323 | 143 | 321 | 118 | 305 | 94 | 283 | 122 | 264 | 97 | 249 |
| | Townline Road | 300 | Inbound | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Outbound | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Concession 7 Road | 300 | Inbound | 61 | 54 | 67 | 60 | 57 | 129 | 48 | 109 | 45 | 109 | 110 | 171 | 93 | 137 | 90 | 136 |
| | | | Outbound | 34 | 54 | 38 | 60 | 71 | 68 | 86 | 67 | 76 | 60 | 129 | 88 | 141 | 80 | 142 | 73 |
| Western Boundary | Glendale Avenue | 1600 | Inbound | 948 | 604 | 1012 | 645 | 1145 | 863 | 1232 | 1116 | 1060 | 822 | 1274 | 1045 | 1252 | 1095 | 1059 | 797 |
| | | | Outbound | 379 | 1080 | 405 | 1153 | 589 | 1251 | 1244 | 1461 | 813 | 1186 | 705 | 1461 | 1258 | 1514 | 1379 | 1242 |
| | York Road | 800 | Inbound | 7 | 10 | 7 | 10 | 310 | 388 | 450 | 771 | 307 | 470 | 363 | 416 | 442 | 675 | 378 | 373 |
| | | | Outbound | 6 | 15 | 6 | 15 | 256 | 415 | 844 | 635 | 464 | 409 | 371 | 459 | 873 | 567 | 994 | 341 |
| | QEW | 5400<br>7200 | Inbound | 5181 | 4560 | 5181 | 4560 | 6324 | 6124 | 6445 | 6432 | 6345 | 6231 | 6720 | 6564 | 6816 | 6829 | 6812 | 6628 |
| | | | Outbound | 4057 | 5716 | 4057 | 5716 | 5481 | 7043 | 5743 | 7029 | 5560 | 6936 | 5733 | 7407 | 5941 | 7288 | 5965 | 7195 |
| Southern Boundary | Taylor Road | 800 | Inbound | 489 | 286 | 535 | 313 | 755 | 548 | 758 | 557 | 743 | 537 | 806 | 680 | 798 | 669 | 774 | 650 |
| | | | Outbound | 123 | 552 | 134 | 604 | 205 | 818 | 272 | 811 | 224 | 785 | 267 | 852 | 320 | 815 | 325 | 790 |
| | | | | 23341 | 27118 | 23631 | 27520 | 30501 | 35461 | 33676 | 36869 | 31663 | 34804 | 32833 | 38477 | 35040 | 38178 | 33831 | 36006 |

| Screenline Boundary | Screenline Roads Included | Total Capacity (veh/hr) | Flow to/from Subject Site | 2016 | | 2022 | | 2041: Baseline | | 2041: High-Density Scenario | | 2041: Low-Density Scenario | | 2051: Baseline | | 2051: High-Density Scenario | | 2051: Low-Density Scenario | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM |
| Outlet Collection at Niagara | Homer Road | 500 | Inbound | 0.20 | 0.15 | 0.22 | 0.16 | 0.20 | 0.28 | 0.30 | 0.63 | 0.19 | 0.63 | 0.25 | 0.41 | 0.29 | 0.59 | 0.17 | 0.08 |
| | | | Outbound | 0.02 | 0.42 | 0.03 | 0.46 | 0.13 | 0.43 | 0.81 | 0.57 | 0.28 | 0.48 | 0.17 | 0.57 | 0.72 | 0.57 | 0.19 | 0.21 |
| | Taylor Road | 800 | Inbound | 0.28 | 0.33 | 0.31 | 0.36 | 0.41 | 0.49 | 0.39 | 0.55 | 0.36 | 0.45 | 0.42 | 0.52 | 0.34 | 0.41 | 0.30 | 0.26 |
| | | | Outbound | 0.04 | 0.32 | 0.04 | 0.35 | 0.15 | 0.56 | 0.51 | 0.28 | 0.57 | 0.06 | 0.25 | 0.56 | 0.51 | 0.09 | 0.19 | 0.17 |
| | Glendale Avenue | 1600 | Inbound | 0.10 | 0.06 | 0.10 | 0.06 | 0.08 | 0.08 | 0.06 | 0.10 | 0.04 | 0.04 | 0.11 | 0.11 | 0.07 | 0.04 | 0.05 | 0.03 |
| | | | Outbound | 0.01 | 0.12 | 0.01 | 0.13 | 0.04 | 0.09 | 0.27 | 0.11 | 0.32 | 0.10 | 0.05 | 0.13 | 0.24 | 0.09 | 0.05 | 0.10 |
| Niagara College | Taylor Road | 800 | Inbound | 0.48 | 0.10 | 0.52 | 0.11 | 0.42 | 0.11 | 0.42 | 0.11 | 0.42 | 0.11 | 0.47 | 0.13 | 0.47 | 0.13 | 0.47 | 0.13 |
| | | | Outbound | 0.04 | 0.48 | 0.05 | 0.52 | 0.04 | 0.46 | 0.04 | 0.46 | 0.04 | 0.46 | 0.05 | 0.50 | 0.05 | 0.50 | 0.05 | 0.50 |
| | Glendale Road | 1600 | Inbound | 0.27 | 0.11 | 0.29 | 0.12 | 0.24 | 0.12 | 0.24 | 0.12 | 0.24 | 0.12 | 0.19 | 0.14 | 0.19 | 0.14 | 0.19 | 0.14 |
| | | | Outbound | 0.03 | 0.25 | 0.03 | 0.27 | 0.05 | 0.27 | 0.05 | 0.27 | 0.05 | 0.27 | 0.06 | 0.26 | 0.06 | 0.26 | 0.06 | 0.26 |
| Eastern Boundary | York Road | 800 | Inbound | 0.43 | 0.42 | 0.43 | 0.42 | 0.11 | 0.67 | 0.09 | 0.64 | 0.09 | 0.64 | 0.11 | 0.74 | 0.09 | 0.68 | 0.08 | 0.68 |
| | | | Outbound | 0.41 | 0.51 | 0.41 | 0.51 | 0.21 | 0.26 | 0.23 | 0.26 | 0.22 | 0.25 | 0.24 | 0.49 | 0.27 | 0.48 | 0.24 | 0.47 |
| | QEW | 7200 | Inbound | 0.64 | 0.84 | 0.64 | 0.84 | 0.89 | 0.98 | 0.90 | 0.99 | 0.88 | 0.98 | 0.94 | 1.05 | 0.94 | 1.05 | 0.93 | 1.04 |
| | | | Outbound | 0.71 | 0.68 | 0.71 | 0.68 | 0.93 | 0.95 | 0.95 | 0.95 | 0.94 | 0.93 | 1.00 | 1.02 | 1.02 | 1.00 | 1.00 | 0.99 |
| Northern Boundary | Airport Road | 800 | Inbound | 0.20 | 0.19 | 0.21 | 0.20 | 0.27 | 0.32 | 0.25 | 0.26 | 0.24 | 0.26 | 0.22 | 0.34 | 0.17 | 0.24 | 0.16 | 0.24 |
| | | | Outbound | 0.09 | 0.22 | 0.10 | 0.23 | 0.13 | 0.40 | 0.18 | 0.40 | 0.15 | 0.38 | 0.12 | 0.35 | 0.15 | 0.33 | 0.12 | 0.31 |
| | Townline Road | 300 | Inbound | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | Outbound | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Concession 7 Road | 300 | Inbound | 0.20 | 0.18 | 0.22 | 0.20 | 0.19 | 0.43 | 0.16 | 0.36 | 0.15 | 0.36 | 0.37 | 0.57 | 0.31 | 0.46 | 0.30 | 0.45 |
| | | | Outbound | 0.11 | 0.18 | 0.13 | 0.20 | 0.24 | 0.23 | 0.29 | 0.22 | 0.25 | 0.20 | 0.43 | 0.29 | 0.47 | 0.27 | 0.47 | 0.24 |
| Western Boundary | Glendale Avenue | 1600 | Inbound | 0.59 | 0.38 | 0.63 | 0.40 | 0.72 | 0.54 | 0.77 | 0.70 | 0.66 | 0.51 | 0.80 | 0.65 | 0.78 | 0.68 | 0.66 | 0.50 |
| | | | Outbound | 0.24 | 0.68 | 0.25 | 0.72 | 0.37 | 0.78 | 0.78 | 0.91 | 0.51 | 0.74 | 0.44 | 0.91 | 0.79 | 0.95 | 0.86 | 0.78 |
| | York Road | 800 | Inbound | 0.01 | 0.01 | 0.01 | 0.01 | 0.39 | 0.49 | 0.56 | 0.96 | 0.38 | 0.59 | 0.45 | 0.52 | 0.55 | 0.84 | 0.47 | 0.47 |
| | | | Outbound | 0.01 | 0.02 | 0.01 | 0.02 | 0.32 | 0.52 | 1.06 | 0.79 | 0.58 | 0.51 | 0.46 | 0.57 | 1.09 | 0.71 | 1.24 | 0.43 |
| | QEW | 5400<br>7200 | Inbound | 0.96 | 0.84 | 0.96 | 0.84 | 0.88 | 0.85 | 0.90 | 0.89 | 0.88 | 0.87 | 0.93 | 0.91 | 0.95 | 0.95 | 0.95 | 0.92 |
| | | | Outbound | 0.75 | 1.06 | 0.75 | 1.06 | 0.76 | 0.98 | 0.80 | 0.98 | 0.77 | 0.96 | 0.80 | 1.03 | 0.83 | 1.01 | 0.83 | 1.00 |
| Southern Boundary | Taylor Road | 800 | Inbound | 0.61 | 0.36 | 0.67 | 0.39 | 0.94 | 0.69 | 0.95 | 0.70 | 0.93 | 0.67 | 1.01 | 0.85 | 1.00 | 0.84 | 0.97 | 0.81 |
| | | | Outbound | 0.15 | 0.69 | 0.17 | 0.76 | 0.26 | 1.02 | 0.34 | 1.01 | 0.28 | 0.98 | 0.33 | 1.07 | 0.40 | 1.02 | 0.41 | 0.99 |


LEA