

Technical Appendices

Appendix A

Technical Memorandum: Proposed Methodology for Traffic Operational Analysis



Memo

Date: Tuesday, February 15, 2022

Project: Golden Mile Area Street Network Environmental Assessment Study

To: Asad Yousfani, P. Eng (City of Toronto)

Cc: Tara Erwin, P. Eng. Michelle Mascarenhas, P. Eng., Jonathan Chai, P. Eng. (HDR)

From: Keyur Shah, P. Eng. (HDR)

Subject: Traffic Operational Analysis Methodology (Final)

1 Introduction

HDR has been retained by the City of Toronto to undertake the Golden Mile Area Street Network (Schedule 'C') Municipal Class Environmental Assessment Study. The EA study will review the potential for new major street corridors and the reconfiguration and extension of the existing street network as identified in the Golden Mile Transportation Master Plan (GMTMP) and Golden Mile Secondary Plan (GMSP). The transportation network improvements identified in the GMTMP that are subject to this EA study are:

- O'Connor Drive potential re-alignment, reconfiguration and extension to Birchmount Road;
- Golden Mile Boulevard, potential new east-west public street from Victoria Park Avenue to Birchmount Road;
- Craigton Drive potential re-alignment, widening and reconfiguration;
- Thermos Road / Sinnott Road at Eglinton Avenue East intersection reconfiguration; and
- Jonesville Crescent / Craigton Drive / Ashtonbee Road from Eglinton Avenue East to Birchmount Road functional coordination, including a potential new traffic signal at Eglinton Avenue East

2 Study Objectives

The GMTMP addresses Phase 1 and 2 of the Municipal Class Environmental Assessment. The goal of the current EA study is to confirm the need and justification of the transportation network improvements identified in the GMTMP study, and refine the preferred solution(s) through data collection, study area assessment, and technical analysis. The EA study will develop alternative design concepts for the preferred solution and present viable design options to the public and stakeholders for assessment.

A preliminary design of the preferred alternative will be developed to a 30% design level of detail for the O'Connor Drive corridor, including the design of horizontal alignment and vertical profile taking into consideration multi modal traffic flow, vehicle speed, safety, sight distance and surface drainage. A functional design of the preferred alternative for each of the remaining corridors within the study area will be developed to a 10% design level of detail. The preliminary designs will include property impacts, existing utility impacts (relocations shown where known), and preliminary cost estimates.

The EA study will review the environmental impacts and propose mitigation strategies for the recommended designs, to obtain approval-in-principle from permitting agencies. The completion of the Golden Mile Area Street Network EA Study will allow the City to proceed with the detailed design and construction of the proposed improvements.

As part of the EA Study, a detailed traffic operational analysis will be conducted to analyze the current and future transportation conditions and evaluate problems and opportunities of various transportation network improvements considered in the EA Study. As per RFP requirements, the traffic operational analysis will be conducted using a hybrid mesoscopic and microscopic model. Considering the study objectives, we are proposing to conduct the traffic operational analysis using an Aimsun based hybrid model. Aimsun is capable of macro, meso, and micro demand loading and simulation as part its 3-tiered modelling capabilities. The hybrid model for this study will be developed, calibrated and validated using various traffic data, observed travel patterns and City's GTAV4 travel demand model. This technical memorandum:

- describes our proposed approach for developing the model;
- presents the study areas for the mesoscopic and microscopic analysis; and
- outlines the calibration/validation methodology.

The primary purpose of the Aimsun model is to review potential route changes between the City's major corridors and assess the transportation improvement alternatives required to meet future development and growth within the study area.

3 Study Area for Travel Demand Modelling and Traffic Operational Analysis

The study area boundaries for the microscopic and mesoscopic models, and the EA study area are presented in **Figure 1**. The microscopic study area is bounded by Ashtonbee Road to the north, Southmead Road/Civic Road to the south, Birchmount Road to the east, and O'Connor Drive/Victoria Park Avenue to the west. The microscopic study area boundary is also the Golden Mile Secondary Plan study area. The mesoscopic study area is bounded by Lawrence Avenue East to the north, St Clair Avenue East to the south, Midland Avenue to the east and the Don River to the west. Finally, the EA study area is bounded by the Hydro Corridor/Eglinton Avenue East to the north, Comstock Road to the south, Kennedy Road to the east, and Bermondsey Road to the west.

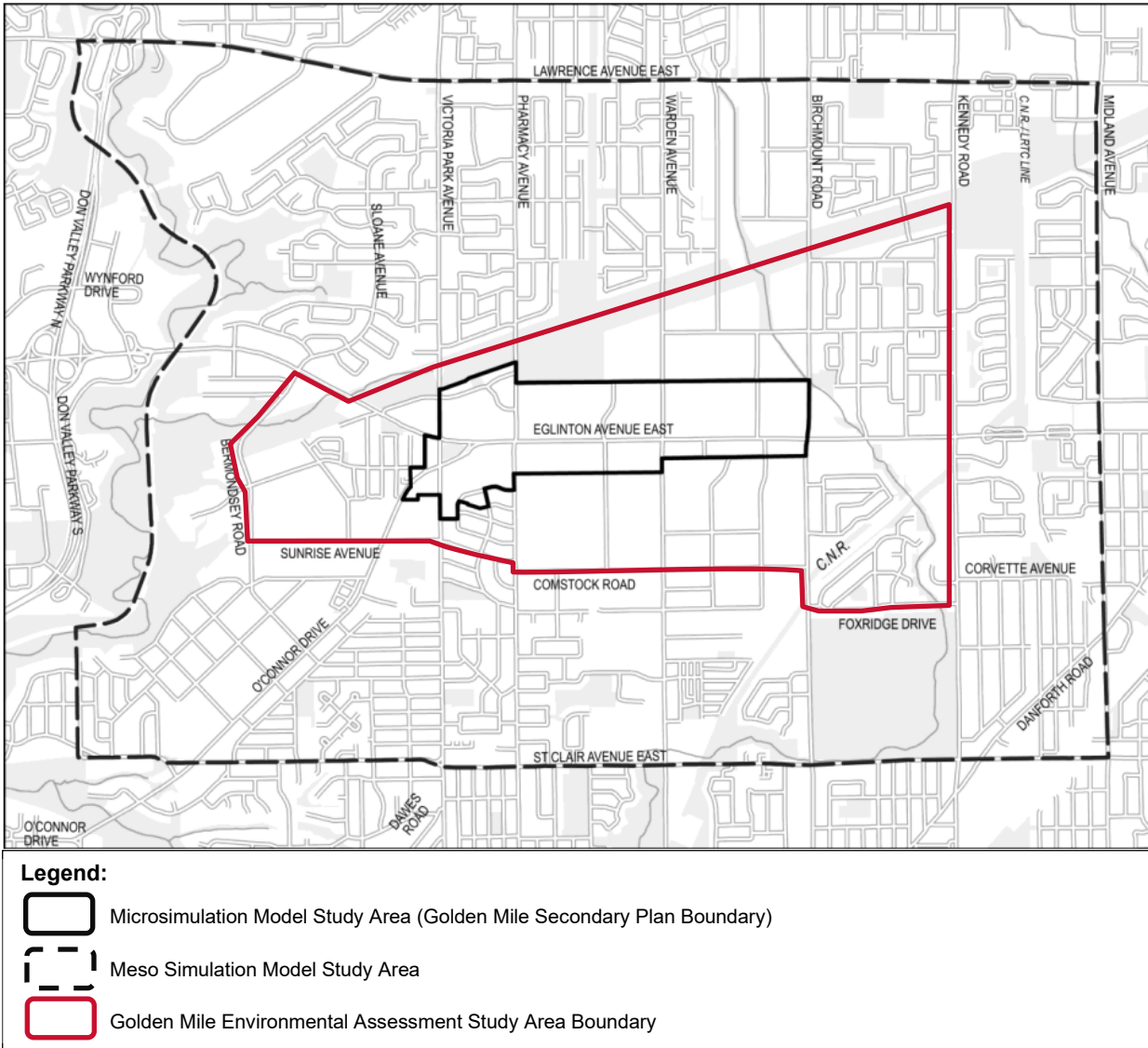


Figure 1: Study Area Boundaries for Aimsun Mesoscopic, Microscopic Hybrid Models and EA

4 Traffic Modelling Approach

Aimsun is an integrated traffic modelling software which can incorporate macro, meso and microscopic functionalities, and provide real dynamic simulation capability. Aimsun can optimize traffic assignment (or vehicle routing) according to network conditions dynamically. It also can facilitate detailed assessment of traffic operations along study area corridors with dynamic traffic route choice assignment with hybrid modelling capability (meso and microsimulation analyses are conducted simultaneously).

The identified study areas (meso and micro) will be analyzed using Aimsun software to capture traffic arriving patterns and potential future traffic diversion. The model will be built on origin-destination auto demand extracted from the City's Regional Demand Model (GTAModelv4.0). The subarea travel demand for the Weekday morning and afternoon peak hours, for existing (2011) and future planning horizon years (2031 and 2041), will be extracted from the City's GTAv4 travel demand model. The objective of the meso model is to refine demand routing using the origin-destination (OD) matrices derived from the GTAv4.0 macro model, as mesoscopic is an efficient "middle ground" between deterministic traffic assignment by macro and agent-based individual decisions by micro. Intersection queuing, traffic signal delays, and turning movement penalty are accounted for at this level for the larger study area.

The micro model area is then simulated in the microscopic simulation environment to provide refined traffic routing, vehicle interaction, and speed/delay analysis. A microscopic subarea within the meso model will then be refined for the micro model area bounded by Ashtonbee Road, Civic Road, Birchmount Road, and O'Connor Drive/Victoria Park Avenue.

In 2013, HDR prepared a VISSIM model for the Eglinton Crosstown LRT (ECLRT) project which was then utilized for the Golden Mile Secondary Plan (GMSP) and Transportation Master Plan (TMP) to assess the impacts of GMSP development on ECLRT operations, for the afternoon peak period for two main scenarios: pre-ECLRT construction conditions and 2041 future conditions. It is of note that the Vissim model was not calibrated for the GMSP TMP, therefore a new model for the EA study will need to be calibrated to present the base case scenario (representing 2013 – pre ECLRT construction conditions). The development of the micro/meso-simulation base model will require a wide range of input data (based on 2013 information/conditions), which is described in the following sections.

Review of Traffic Data

The traffic data [Traffic Movement Counts (TMCs), Automatic Traffic Recorder Counts (ATRs), and signal timing plans (STPs)] for the study area will be provided by the City of



Toronto. HDR has submitted a data request, specifying that the counts requested shall represent pre-ECLRT construction condition.

TMCs for AM weekday, PM weekday, and weekend afternoon peak periods will either be requested from the City or obtained from the City's OpenData source. Since the City's travel demand model does not include demand data for the weekend condition, HDR will take following steps to estimate the initial weekend traffic demands:

1. Review intersection TMCs which are available for both weekday and weekend peak hour conditions;
2. Estimate an overall conversion ratio between the weekday peak hour counts and weekend peak hour counts;
3. Consequently, apply this conversion ratio to the weekday peak hour traffic demands extracted from the City's demand model to generate the initial weekend travel demand matrices.

The initial weekend traffic demands will be calibrated using the weekend TMCs.

Commercial vehicles (i.e., trucks) are an important consideration in the traffic analysis as the commercial areas surrounding the study area generate and attract high volumes of truck traffic. As per the RFP, the City's GTAv4.0 model does not provide travel demand for commercial vehicles. Therefore, HDR will use truck percentages (derived from study area counts) for the peak periods, apply them to the total peak hour auto traffic demand and generate seed traversal matrices for developing and calibrating commercial vehicle demand. This seed traversal matrices will be reviewed, compared, and modified (if needed) based on the turning movement counts, and truck trips generated by the major generators.

Geometry – Road Network

The Aimsun model will include arterial and major collector roads within the study area. The geometric layout will be primarily based on a combination of existing VISSIM Models and mapping / digital aerial photographic. The key network attributes for the base model coding includes:

Link characteristics

- Number of lanes
- Lane width
- Storage lengths
- Link and turning speeds
- Transit Stops
- Speed profile

Traffic Controls

- Signals – TransSuite and TSP
- Stop signs
- Yield signs
- Turning restrictions
- Pedestrians
- Detectors

The base network capacity will mirror the speed and classification of the EMME GTAv4.0 model provided by the City. The speed coding of the network will follow posted

speeds on street during the year 2013 (the VISSIM model may be used to review the speeds). On-street parking restrictions within the study area will also be reviewed and taken into account when developing the model.

Transit Lines

The development of base case transit network will require details of transit routes, stops, and associated schedule. Information available from the City will be used to code the transit mode in the Aimsun model. Transit lines will be coded for each transit route and each direction.

As shown in Figure 2, there were approximately 15 TTC bus routes operating within the study area network. All transit stops will be coded according to their geo-locations and can generally be categorized as near-side or far-side with respect to their nearest intersection, and their curbside characteristics such as bus bays and curbside bus stops. All transit stations / stops will have assigned dwell times for each line / route based on the average demand expected for these stations/stops.

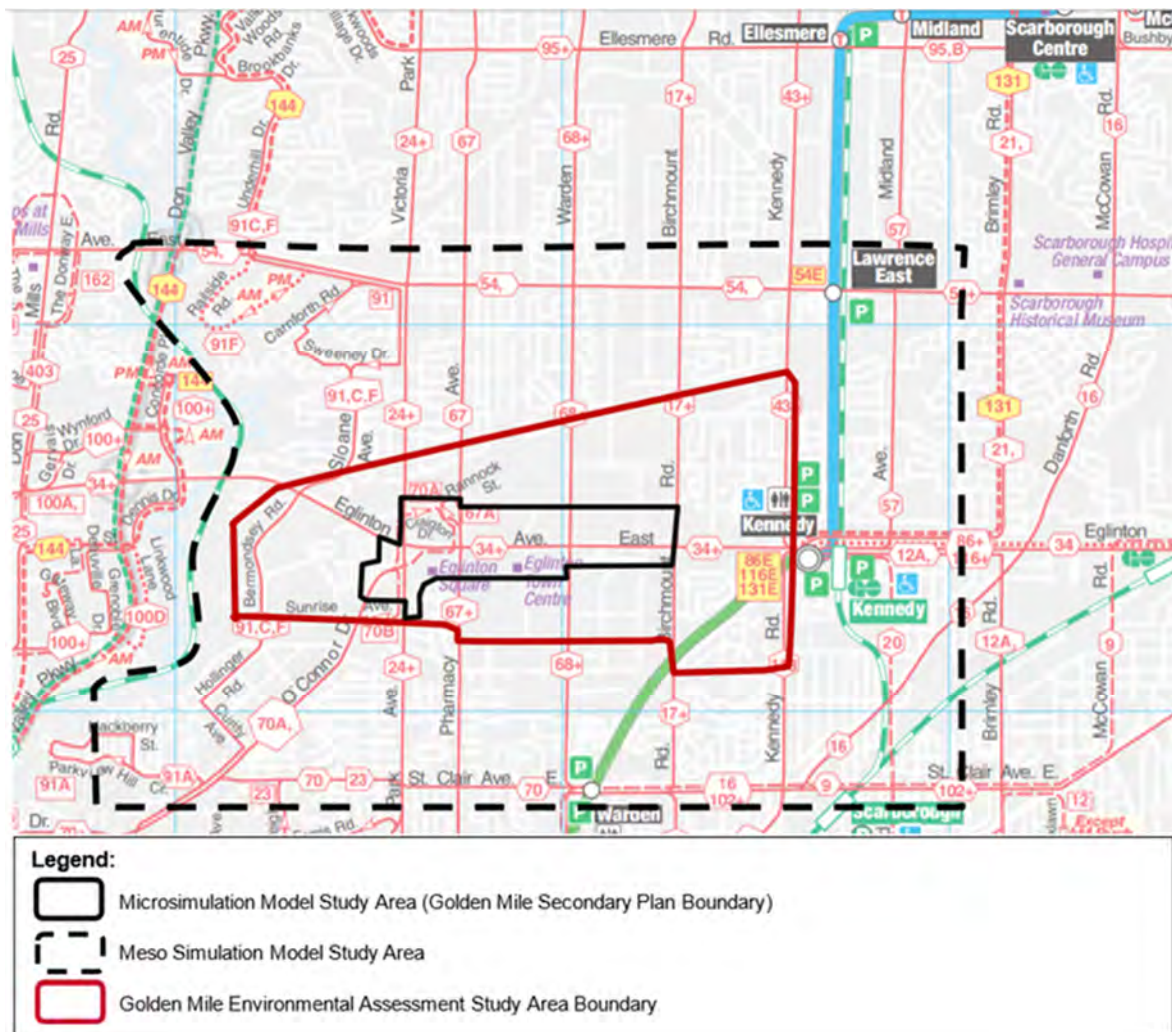


Figure 2: TTC Transit Network Within the Larger Study Area (2013 TTC Info)

Traffic Zone System

The traffic zone system inherited from the EMME model will be refined in the study area within the meso simulation study area, based on existing land use and connections to the roadway network. The general purpose of refining the traffic zone system is to prevent “shortcut” trips destined towards one portion of the zone, as well as to provide modelling control in terms of trip production/attraction locations, trip assignment, and demand adjustment. During this process, the road network will be modified and zones will be disaggregated to reflect a refined network. We will go through the demand adjustments with the City when carrying out the traffic zone disaggregation

Traffic Demand

As mentioned above, the Aimsun traffic demand will be developed based on weekday morning and afternoon origin-destination matrices derived from the GTAv4.0 EMME model. As mentioned above, the Aimsun software is capable of macro, meso, and micro demand loading and simulation as part its 3-tiered modelling capabilities. The following steps will be taken in the Aimsun model development:

1. **Initial Assignment:** Demand loading of EMME origin-destination matrices using Aimsun’s macroscopic model traffic assignment
2. **Demand Adjustment:** Demand adjustment of O-D matrices using observed traffic counts and travel patterns
3. **Shoulder Hour Demand:** Traffic demands for two adjacent shoulder hours will be developed using observed traffic counts (TMCs and ATR counts) to develop three-hour model
4. **Path File Generation:** Conduct static assignment using adjusted O-D demands to generate path file for the hybrid (meso and micro) simulation
5. **DUE / SRC Runs:** Dynamic traffic assignment based on Dynamic User Equilibrant (DUE) using the path file generated from the macro assignment. Following the DUE, we will conduct Stochastic Route Choice (SRC) assignment, which will be conducted using the path file generated from DUE (assuming 60% or higher traffic following path assignment and 40% or lower following dynamic route choice model).

The resulting demand will be a demand consisting of Auto, Trucks, and Pedestrian to reflect the demand profile reflected in the turning movement counts.

Aimsun TSP API

Aimsun has recently released a new software version - *Aimsun Next 22*. However, the City confirmed the most-recent software version *Aimsun 20.0.2* with Transit Signal

Priority (TSP) API module to be used for this study, in order to make sure that City of Toronto's Transit Signal Priority (TSP) module could function without any issues. The TSP module will be very essential for analyzing the future scenario with the planned LRT on Eglinton Avenue East.

Quality Control

As part of the project team's internal modelling quality control process, a detailed check and review will be carried out on all network elements before the calibration stage is initiated. Additionally, a series of diagnostic model runs will be completed to confirm the models represent field conditions. These diagnostic runs are not intended to produce simulation results, but rather to identify issues within the network (i.e., static demand routes incorrectly coded, demand profile, prolonged queuing, unrealistic speed profiles, queuing at the entry point in the model, signal timing plans incorrectly coded, transit signal priority errors, etc.).

The following is a list of network elements to be reviewed as part of the Quality Control process:

Supply Checks:

- Geometry and Network Connectivity
- Free-flow Speed Coding
- Speed Distributions
- Coding and Placement of Signal Controls
- Transit Signal Priority Actuations
- Turn Prohibitions, Conflict Areas

Demand Checks:

- Vehicle Compositions
- Link Demand Volumes
- Routing Decisions
- Artificial Bottlenecks
- Look Back Distances
- O-D Zone/Parking Lot Coding

General refinements will be made to the Aimsun model as part of the diagnostic runs, to avoid unusual vehicle conflicts and odd behaviour. Many of the default parameters in Aimsun are not reflective of a major arterial road in the City of Toronto. Therefore, some of the following calibration factors may be applied:

- **Turn Conflict Points** – Adjusted using the Advanced Node Editor to account for stopping/yielding behavior between turning vehicles, opposing through vehicles, and pedestrians. This parameter dictates where turning vehicles wait while road users with the right of way clears the path, to avoid box blockages.
- **Permissive Stop Lines** – similar to the turn conflict points, permissive stop lines indicate where left turn vehicles wait inside the intersection during permissive green
- **Yellow Box Speed** – a higher yellow box speed was set to avoid vehicle box blockage, an increase from 15km/h to 25km/h will be applied to match the speed of turning vehicles

- **Look Ahead Distance** – an increased Zone 2 lane changing distance will be applied (from 80m to 150m) to increase the distance where drivers adjust their speed to position themselves for an upcoming turning movement. This parameter helps to avoid turning vehicles blocking through lanes when the turn tapers are short.

The above adjustments will be applied where needed, to help reduce awkward and unrealistic driving behaviours such as merging activities immediately before the traffic signal. As described in the preceding text, the Aimsun model for this study will be developed to reflect 2013 pre-ECLRT construction existing intersection lane configurations - including, number of through/turning lanes, storage lengths for turning lanes, traffic controls, TTC transit corridor, etc., using aerial images and Google Streetview. If possible, the base model will be validated using 2013 travel time data. The future planning horizon years will include:

- 2026 (LRT assumed to be fully operational);
- 2031 (Interim conditions)
- 2041 (Full build-out)

The traffic modelling workflow is presented in **Figure 3**.

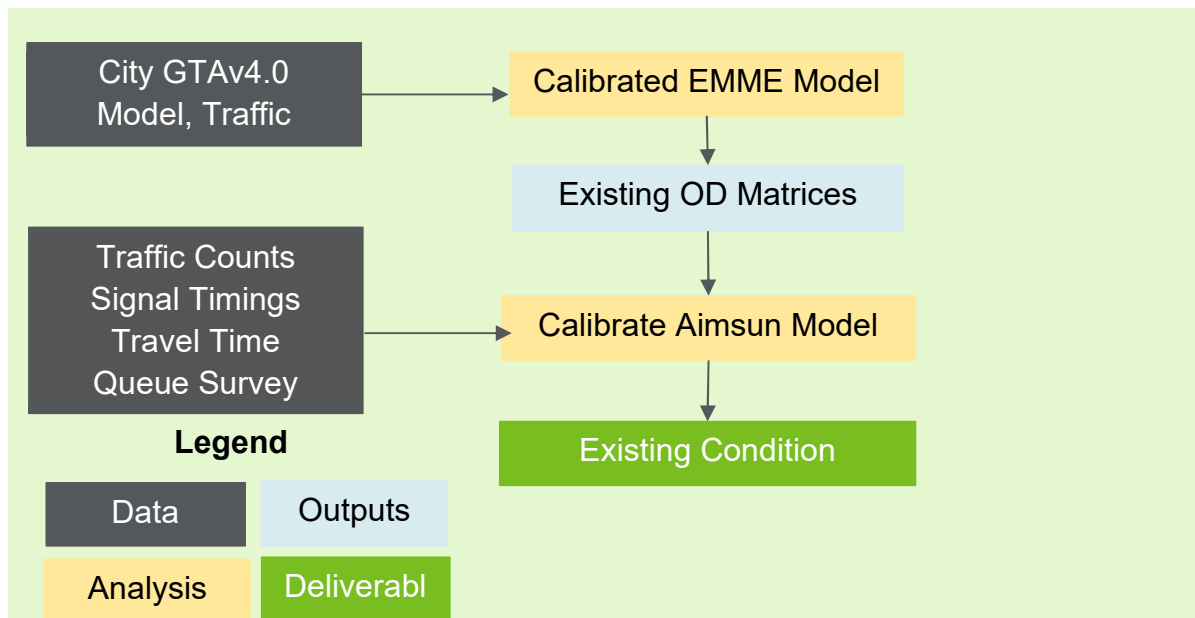


Figure 3: Traffic Modelling Workflow

5 Model Calibration and Validation Process

This Aimsun model will be calibrated to existing conditions (2013 pre-ECLRT construction) for the weekday morning, afternoon and weekend afternoon peak periods as per guidelines recommended in the City of Toronto Aimsun Model Guideline as well as Federal Highway Administration Microsimulation Guidelines. The key components for calibration and validation include:

1. Traffic Volumes – Turning Movement Counts (hourly volumes) will be used to assess whether simulated throughput and demand routing matches on-street patterns
2. Travel Time – General Traffic Travel Times (HERE Data) and TTC travel time will be used to validate simulated performance of auto and transit modes. It is important to note that since the base model conditions is based on year 2013, validation may only be possible if travel time data from that same year is available.

A summary of the calibration/validation process is shown in **Figure 4**.

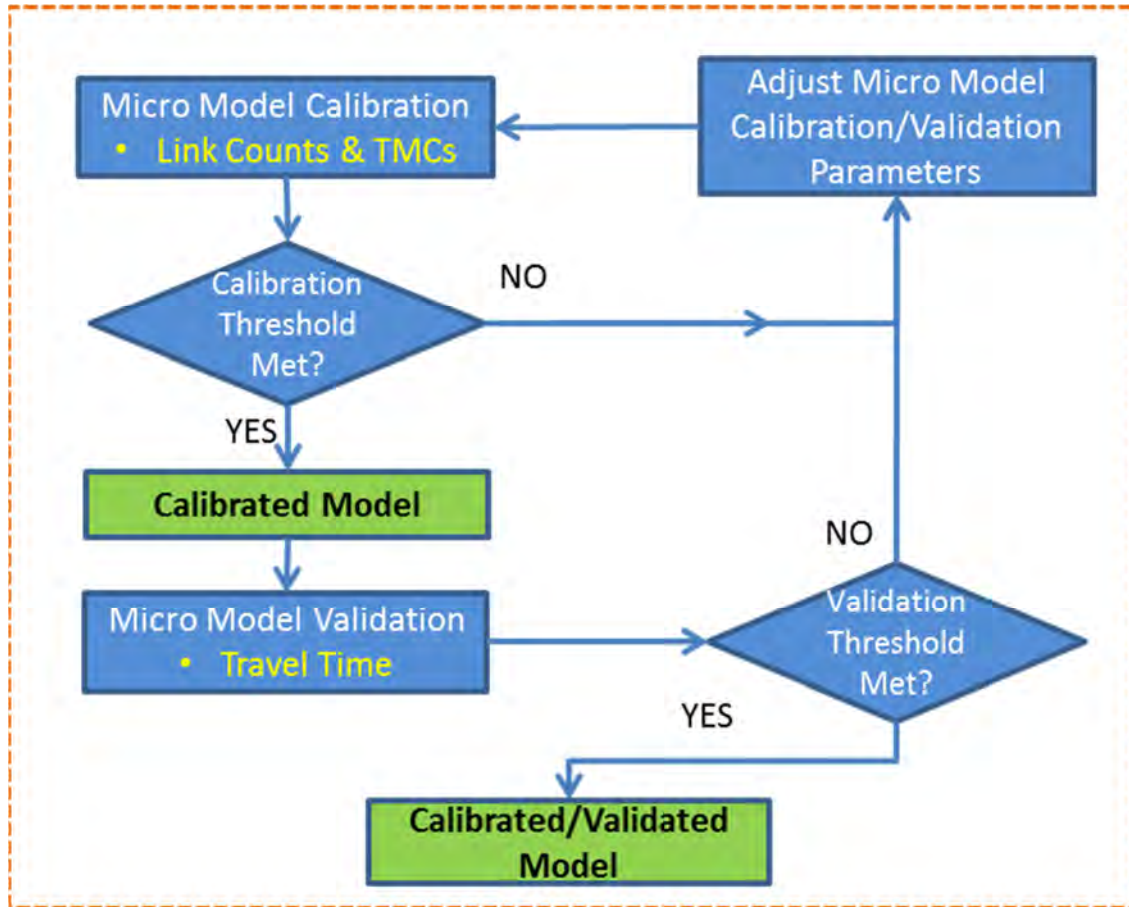


Figure 4: Model Calibration/Validation Workflow

The criteria to be used for the calibration and validation of the models for this specific study are summarized in **Table 1** and are based on microscopic simulation guidelines from FHWA and consideration of the size of the study area and other past City of Toronto projects.

Table 1: Calibration and Validation Thresholds

Criteria and Measures	Calibration and Validation Thresholds
Individual Links (include arterials and ramps) Hourly Flow Rates	GEH $\leq$ 5 for 85% of cases, $\leq$ 10 for 95% of cases
Individual Turning Movements Hourly Flow Rates	GEH $\leq$ 5 for 85% of cases, $\leq$ 10 for 95% of cases
Screenline Volumes	Within 15% (for peak periods)
Link Travel Times	Within 15% (for peak periods)
Speed Profiles / Bottlenecks/ Queuing	Modeler's Satisfaction
Root Mean Square Error, RMSE	RMSE < 30% for all samples
Regression	Slope and r^2 values > 0.9

Note:

$$GEH = \sqrt{\frac{(M-C)^2}{0.5(C+M)}} \text{ where GEH is the GEH statistics, 'C' is the observed flow and 'M' is the modelled flow}$$

Note that given the GEH < 5 threshold for 85% of turning movements were originally designed for static demand models. However, for a dynamic demand model this threshold is typically not feasible. Therefore, it is expected that a lower percentage of turning movements with GEH < 5 would be sought in the calibrated model.

6 Application of Aimsun Model

The Aimsun model will be utilized to assess and evaluate various traffic operational analysis and to identify a preferred transportation multi-modal network alternative and will provide input to inform associated implementation policies in the development of the EA study.

The scope of the traffic operational analysis will include the following:

- Satisfy MCEA requirements;
- Assess and evaluate proposed road network improvement options to support the future land use / growth to maximize connectivity and efficiency;
- Evaluate the impacts of new mobility options, and
- Develop a travel demand management strategy.

In order to plan for a transportation network and infrastructure needs that support both the GMTMP and GMSP, the scope of work for EA study includes detailed traffic operational analysis (using an Aimsun based micro-simulation modelling software) to evaluate the existing transportation conditions, and to identify multi-modal transportation improvements, as mentioned above. While the focus of the traffic operational analysis is on vehicular traffic demand, the EA study will take a multi-modal approach with prioritizing the active transportation and capitalizing on significant transit investments in the study area.

The following Measures of Effectiveness will be derived using Aimsun model.

- Intersection and movement delay
- Average travel time for vehicles and transit
- Queue length (95th percentile)
- Movement Level of Service
- Total network delays and vehicle kms (to evaluate different network improvements)

Based on the traffic operational analysis results, the traffic team will identify the list of potential improvements/recommendations such as new traffic signals, additional storage lengths and new turning lanes. However, these recommendations will need to be balanced against designing a street that is comfortable and safe for all road users.

7 Multi-Modal Analysis

HDR will assess the quality of service, comfort, safety and mobility efficiency for pedestrians and cyclists using the multi-modal level of service (MMLOS) methodology. The MMLOS analysis will be based on the Ottawa MMLOS Methodology, which was applied to the Golden Mile TMP (2019). Both Pedestrian Level of Service (PLOS) and Bicycling Level of Service (BLOS) are calculated at the intersection and mid-block in recognition that a PLOS and BLOS are determined by the conditions both between crossings and at the crossing itself.

7.1 Pedestrian Level of Service (PLOS)

The methodology for the evaluation of segment PLOS utilizes a look-up table approach based on cross-section and roadway characteristics (e.g., sidewalk and boulevard width, traffic volumes, presence of on-street parking, and operating speed). Intersection PLOS uses the Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) and assigns points based on a number of crossing characteristics (e.g., crossing distance, presence of a median, presence of a crossing refuge, turning restrictions, right hand turn characteristics, curb radii, etc.). The average score of each intersection approach is averaged to determine the overall intersection PLOS. Scoring ranges as follows:

PLOS	Description
A to C	Attractive to most pedestrians, including locations where lower speeds and volumes, wider sidewalks, and larger boulevards with ample separation from moving traffic are present. Crosswalks are provided on all four legs of the intersections and with shorter crossing distances at intersections.
D to E	Elements may not appeal to pedestrians due to narrow sidewalks, lack of separation from traffic, longer crossing distances, etc.
F	locations without any facility or where no buffer is provided adjacent to high speed and high volume traffic. No crosswalks provided and long crossing distances at intersections.

Higher segment scores are characterized by locations where lower vehicle speeds and volumes, wider sidewalks, and larger boulevards with ample separation from moving traffic are present. Lower segment scores are observed in locations where high vehicle speeds, narrow sidewalks, and minimal separation from traffic are present.

7.2 Bicycling Level of Service (BLOS)

The methodology for the evaluation of segment BLOS utilizes a look-up table approach based on roadway characteristics and facility type and quality. The methodology

measures each segment's and intersection's Level of Traffic Stress (LTS) experienced by the cyclist, established in the Mineta Transportation Institute report (no. 11-19). Each LTS score is associated with a category of cyclist (e.g. "all ages" to "very confident cyclists only") and score (A to F). Segment BLOS are calculated using a look-up table approach and considers facility type, street width, operating speed, and parking characteristics. At the intersection, the left and right turning conditions are evaluated with a look-up table approach as well as the average score of the approaches to determine the overall intersection BLOS.

Segment BLOS is the most sensitive to facility type, with physically separated bikeways such as cycle tracks, protected bike lanes and multi-use paths receiving a score of 'A' while cycling in mixed traffic conditions with varying operating speeds and street widths generally scoring lower of 'D' to 'F'. The scoring ranges as follows:

BLOS	Description
A to C	Physically separated facilities such as cycle tracks, protected bike lanes, and multi-use paths (MUPs) are attractive to most cyclists. At intersections, continuous cycling facilities are provided and separated from vehicles and pedestrians.
D to E	Designated bike lanes adjacent to high speed traffic lanes or shared facilities on low volume, low speed streets with wide curb lanes provide some comfort, but the majority of potential cyclists typically will not cycle. Greater conflicts at intersections with turning vehicles are experienced.
F	Non-separated, shared roadways with high traffic volumes and speeds, and no accommodations at intersections.

For the Golden Mile EA, HDR will conduct an existing conditions and future alternatives MMLOS for each study corridor and their design alternatives to understand the trade-offs between modes for each alternative. This will ultimately be used to determine which design alternative option will be chosen as the preferred design for each study corridor.

8 Milestone Meetings

Throughout the modelling process, HDR will meet with City staff to discuss, confirm and receive approval of the modelling approach undertaken. The list below outlines the proposed key points when these meetings will be taking place:

- Confirmation of data to use for developing base model
- Confirmation of data development for truck demand and weekend afternoon peak hour demand
- Review of calibrated base model and discussion of results

- Review of EA future horizon year (2041) modelling results
- Review of interim planning horizon year models and discussion of results

9 Conclusions

This memorandum described in detail the modelling approach and development of the hybrid (mesoscopic and microscopic) model, associated study areas for the Golden Mile Area – Street Network Environmental Assessment. This document also describes the proposed methods to review the traffic data, develop missing data (i.e., truck demand, weekend afternoon peak hour demand), prepare, and calibrate/ validate the Aimsun model.

Aimsun has recently released a new software version - *Aimsun Next 22*. We kindly request the City to confirm the most recent Aimsun software version, which is currently used by the City's modelling team, in order to make sure that City of Toronto's Transit Signal Priority (TSP) API module could function without any issues. The TSP module will be very essential for analyzing the future scenario with the planned LRT on Eglinton Avenue East.

The Aimsun base model (2013 pre-ECLRT construction) will be completed for the weekday morning and afternoon, and weekend afternoon peak periods. Future horizon years include 2026 (fully operational LRT assumed), 2031 – interim, and 2041 – full buildout. Travel demand information will be obtained from the City's EMME-based GTAv4.0 model. Truck demand and weekend afternoon peak demands will be developed by HDR and applied to the scenarios to be modelled. Validation of the base model will depend on the availability of travel time data received. Any corrections applied to the base model will be applied to future scenarios (i.e., traffic demand corrections).

Appendix B

Technical Memorandum Aimsun Model Development and Calibration



Memo

Date: Thursday, August 25, 2022

Project: Golden Mile Area Street Network Environmental Assessment Study

To: Niki Siabanis, Sonali Praharaj (City of Toronto)

Cc: Tara Erwin, Michelle Mascarenhas, Jonathan Chai, Patrick Yip (HDR)

From: Keyur Shah, Qingjie Zeng, Jacob Louie (HDR)

Subject: Calibration of an Aimsun-based Meso/Micro-Simulation Model for Traffic Operational Analysis (Final)

1 Introduction

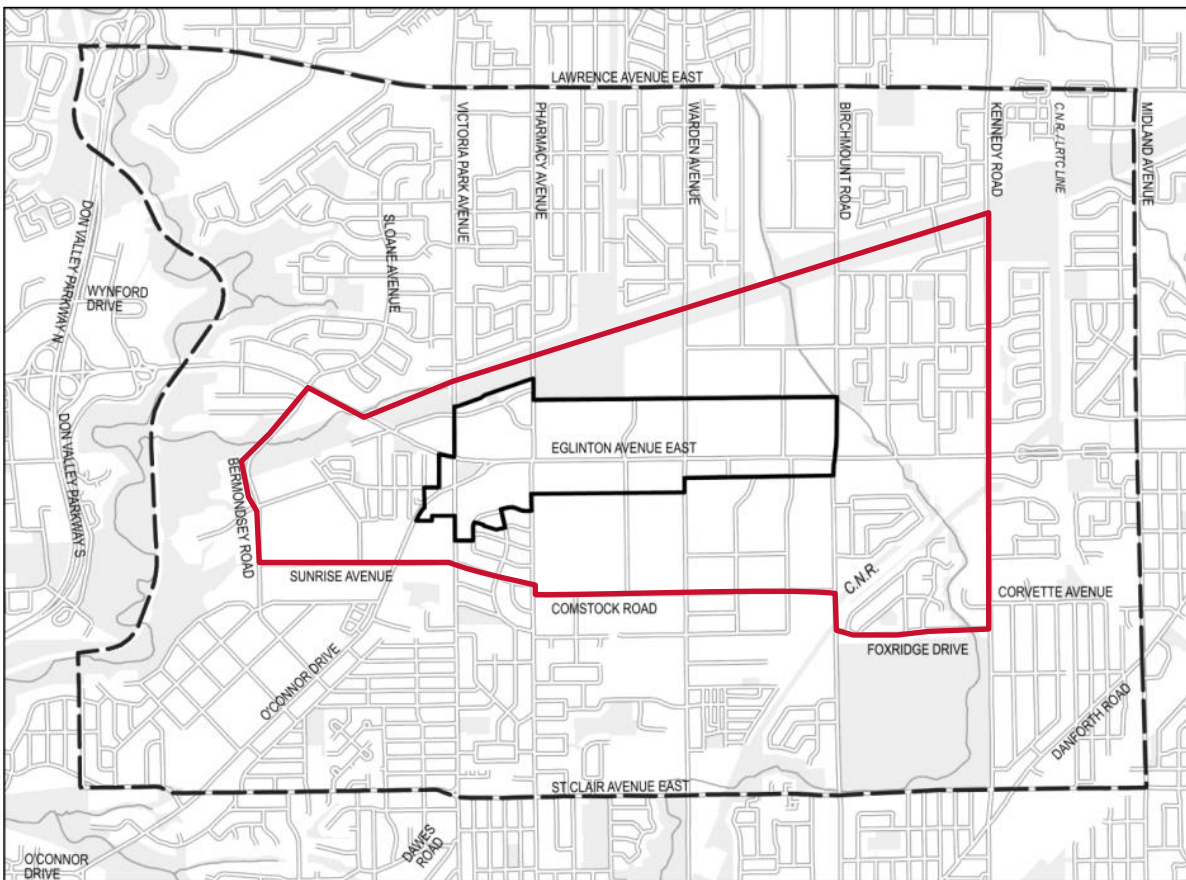
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A technical memorandum summarising HDR's proposed approach and methodology for the traffic operational analysis was submitted to the City on February 15, 2022 (revised on March 10, 2022). The methodology memorandum describes our proposed approach for developing the model, presents the study areas for the mesoscopic and microscopic analysis, and outlines the calibration/validation methodology.

As part of the study, an Aimsun-based hybrid mesoscopic and microscopic model was developed to analyze the current and future transportation conditions and evaluate problems and opportunities of various transportation network improvements considered in the EA Study. This technical memorandum documents assumptions considered for the hybrid model development, model demand calibration, and model validation results. A draft memo was submitted to the City on May 31, 2022. This version (August 8 update) addressed the City's comments received on June 20, and also considered the new traffic data received from the City on June 27.

2 Model Coverage Area

The study area boundaries for the microscopic and mesoscopic models, and the EA study area are presented in **Figure 1**. The microscopic study area is bounded by Ashtonbee Road to the north, Southmead Road/Civic Road to the south, Birchmount Road to the east, and O'Connor Drive/Victoria Park Avenue to the west. The microscopic study area boundary is also the Golden Mile Secondary Plan study area. The mesoscopic study area is bounded by Lawrence Avenue East to the north, St Clair Avenue East to the south, Midland Avenue to the east and the Don River to the west. Finally, the EA study area is bounded by the Hydro Corridor/Eglinton Avenue East to the north, Comstock Road to the south, Kennedy Road to the east, and Bermondsey Road to the west.



Legend:

- Microsimulation Model Study Area (Golden Mile Secondary Plan Boundary)
- Meso Simulation Model Study Area
- Golden Mile Environmental Assessment Study Area Boundary

Figure 1: Study Area Boundaries for Aimsun Mesoscopic, Microscopic Hybrid Models and EA

3 Model Development

Aimsun is an integrated traffic modelling program that incorporates macro-scopic functionalities with meso-scopic and micro-scopic traffic simulation. It facilitates detailed assessment of traffic operations for different road network configuration and intersections, combined with dynamic traffic route choice assignment options related to the local road network inclusive of the study area.

The Aimsun model for this study builds on information and data extracted from the City's travel demand forecasting model (Emme model) and Synchro models received. The following model components were incorporated in the model development.

3.1 Transportation Network

Since the year 2013, there have been significant changes to traffic signals as part of the City's Vision Zero program. These changes include increased vehicle and pedestrian clearances, along with lead pedestrian intervals (LPIs) across the city. Although these measures have a positive impact for active transportation, these measures reduce intersection capacities for vehicular demand, and thus reduces level of service. In order to avoid attributing these impacts to future horizon conditions, the existing year model assumes the optimized signal timing plans with Vision Zero safety measures implemented throughout the model, with the exception of intersections along Eglinton Avenue East. For intersections along Eglinton Avenue East, historic signal timings and lane configurations from 2013 were assumed for the existing conditions model.

The model was developed to include the City's entire arterial and collector network. A Synchro model representing the entire meso area was developed using the City's Synchro models for their signal optimization studies. The Synchro models provided by the City included:

- Lawrence Avenue East;
- St Clair Avenue East;
- O'Connor Drive;
- Victoria Park Avenue;
- Pharmacy Avenue;
- Warden Avenue;
- Birchmount Road, north of and including Anaconda Avenue only;
- Kennedy Road, north of and including Eglinton Avenue East only; and
- Midland Avenue, north of and including Eglinton Avenue East only.

The developed existing Synchro model was transferred into a .csv file using Universal Traffic Data Format (UTDF), and imported into the Aimsun model. This initial roadway

network imported from Synchro model was reviewed and modified to reflect existing lane configurations at intersections and along corridors (including number of lanes, dedicated turning lanes and storage length, posted speed limits, priority rules/ conflict area, etc.), which was verified using historic 2013 and most-recent satellite images available on the City's mapping tool website.

The roadway network was coded with different functional types and planning capacities. For each roadway type, a volume-delay function (VDF) was used to describe how travel time would increase as traffic volumes grow in model.

The function from the Traffic Assignment Manual of the United States Bureau of Public Roads (BPR) was applied, which is as follows:

$$t_c = t_0 (1 + \alpha (v/c)^\beta)$$

t_c – current travel time

t_0 – free-flow travel time

v/c – volume to capacity ratio

α, β – parameters derived based on City's Emme model

The following lane capacities were derived from the City's Emme model and used for each roadway type:

- Major Arterial: 800 passenger car units (PCU)/hr
- Minor Arterial: 700 PCU/hr
- Collector: 500 PCU/hr
- Local: 400 PCU/hr

The BPR volume-delay function is defined in Aimsun model to perform a single class auto user equilibrium assignment. The α and β values used in the VDF were extracted from the City's travel demand model. For roadway sections with v/c ratios do not exceed 1.0, the values for α and β were assumed to be 1 and 4; for roadway sections with assigned volumes exceed capacity, an adjustment factor ($4*v/c - 2$) was applied to the free-flow travel time (t_0) to estimate the current travel time (t_c).

While importing the Synchro modeling network into Aimsun model, existing signal timings were also imported, which were further reviewed and modified based on the associated signal timing plans received for the peak hour conditions.

An existing Aimsun model screenshot showing the roadway network and types is presented in Figure 2.



Figure 2: Aimsun Model Screenshot – Roadway Network

3.2 Zoning System

A Traffic Analysis Zone (TAZ) is the unit of geography used in the transportation planning models. The City's subarea Emme model was reviewed and integrated into the model development. The zoning system adopted in the Emme model, including zone numberings, zone boundaries, and connections to the City's roadway network, were considered and further refined in the study area within the meso simulation study area.

In the Traffic Operational Analysis Methodology memo, HDR proposed that traffic analysis zones derived from the Emme subarea model need to be refined/divided, to properly assign traffic reflecting the detailed road network and observed travel pattern.

For each traffic zone within the hybrid simulation area, land use types and their connections to the roadway network were reviewed. The general methodology for traffic zone disaggregation was discussed with and approved by the City, as described below:

- Case 1: TAZ with only one land use type (i.e., residential only/ employment only)
 - o Zone disaggregation considers the blocks within the zone and how this zone is divided by natural barriers (e.g., hydro corridor, railway, creek)
 - o The weightages for zone centroids are estimated based on the approximate area
 - o Traffic demands for zone centroids are factored using the estimated weightages
- Case 2: TAZ with mixed land use (includes both residential and employment); however, geographically it's not feasible to split the residential/employment land use
 - o Zone disaggregation considers the blocks within the zone and how does traffic access to/egress from the zone
 - o The weightages for zone centroids are estimated based on the approximate area and further reviewed using available traffic counts
 - o Traffic demands for zone centroids are factored using the estimated weightages
- Case 3: TAZ with mixed land use (includes both residential and employment), and geographically it's feasible to split the residential/employment land use
 - o Zone disaggregation will consider different land use types and the blocks within the zone
 - o For the residential zone centroids,
 - the weightages for zone centroids are estimated based on the approximate area
 - Traffic demands are estimated based on a trip rate derived from the Emme model (population-based trip rate)
 - o For the employment zone centroids,
 - the weightages for zone centroids are estimated based on the approximate area
 - Traffic demands for the residential zone centroids are firstly deducted from the original demands, and the remaining is further distributed to the employment zone centroids using the estimated weightages

It is noted that the zone and demand disaggregation process may require subjective judgements at high-level. The traffic demands for disaggregated zones were further calibrated based on traffic counts.

The existing Aimsun model includes a total of 156 zones, includes 134 internal zones (i.e., zones defined within model coverage area) and 22 external zones (i.e., zones created defining gateways at the City's boundary, e.g., Lawrence Avenue East, Victoria Park Avenue, etc.).

Generally, the refined TAZ's are reduced to a zone centroid in the traffic modelling analysis, where trips begin/ terminate. The centroid connectors provide a connection between zones and roadway network. The centroid connectors in Aimsun model were coded considering the City's Emme model, and further modified/ refined to reflect vehicular entering/ exiting locations in the roadway network. An existing Aimsun model screenshot showing the zone centroids is presented in Figure 3.



Figure 3: Aimsun Model Screenshot – Zone Centroids

3.3 Transit Network

The Toronto Transit Commission (TTC)'s 2013 transit network for the micro-simulation area was also incorporated into the model, including bus stops, transit lines/routes, and transit schedules during a typical weekday. Transit lines, bus routes, and stops were coded in the model based on the TTC's published service summary for the period from March 31st to May 11th, 2013. Historical Google Streetview imagery from 2013 was also reviewed to verify bus stop configurations.

A total of 11 bus lines were coded in the model in both travelling directions. Existing (2013 Spring) transit departure schedules for the weekday and weekend conditions were extracted from the aforementioned TTC 2013 service summary. The following dwell times were assumed:

- At major-major intersections with only one bus stop in a direction: 23s
- At all other locations: 11s

An existing Aimsun model screenshot showing the transit network is presented in Figure 4.



Figure 4: Aimsun Model Screenshot – Transit Network

3.4 Traffic Demands

The Aimsun model was developed to simulate passenger vehicle demands (autos) and commercial vehicles demands (trucks) via a dynamic traffic assignment for a 3-hour morning and afternoon peak periods, respectively. Based on the review of TMC counts received from the City for 102 locations, 8:00 a.m. to 9:00 a.m., and 4:30 p.m. to 5:30 p.m. were identified as the weekday morning and afternoon peak hour, respectively. The traffic demands for the shoulder hours were also considered in the micro-simulation analysis to represent the traffic conditions before and after each peak hour, and was derived using ATR counts provided along Eglinton Avenue East. Therefore, the existing year model represents the weekday morning peak period condition from 7:00 a.m. to 10:00 a.m., and the afternoon peak period condition from 3:30 p.m. to 6:30 p.m.

The initial traffic demands for both morning and afternoon peak hours were extracted from the City's subarea Emme model. However, peak-hour traffic demands obtained from the Emme model reflects auto trips only. An initial daily truck demand matrix was also received from the City. To derive the peak hour truck demand matrices, the daily-to-peak hour factors were estimated using ATR counts at key locations across the meso area, for both peak hour conditions. It was determined that the morning and afternoon peak hour volumes each account for roughly 8% of daily traffic. This percentage was then applied to the daily truck matrix to derive the peak hour initial truck seed traversal matrices for developing and calibrating commercial vehicle demand.

The initial traffic demands for autos and trucks were calibrated based on existing traffic counts received from the City, as described in next section.

3.5 OD Routings

While it is generally not preferred to dictate OD routing in a dynamic simulation environment, some routes were necessary to direct traffic for reasonable trip assignment in the network. The key issues that may require OD routings include:

- The TAZ are aggregated against the number of accesses possible in the study area. Even after zone splitting as described in the Zoning System section, some zones continue to serve many entrance/exits which is difficult to dictate trips according to observed patterns.
- A series of through movements clearly provides a direct path for certain OD pairs (e.g., traversal trips along major corridors), however some trips may take unnecessary diversion due to short-period congestion.

The OD routes defined in the model and their rationale are described below:

- OD routes from **TAZ 525** to Eglinton east, Lawrence east, and Kennedy north - TAZ 525 locates west of Thermos Road between Eglinton Avenue E and Ashtonbee Road. It is mainly occupied by commercial and office land use and has at least 8 exits. During the hybrid simulation, many vehicles were observed to use the southbound approach at Eglinton Avenue E and Thermos Road intersection (stop-sign controlled), causing heavy delay and blocking the upstream intersections. Egress trips from TAZ 525 to the above-mentioned destinations were directed via OD routes to avoid over-usage of the southbound approach at Eglinton Avenue E and Thermos Road intersection.
- OD routes from Birchmount Road north to **TAZ 1073 and 1074** - TAZ 1073 and 1074 locate south of Civic Road between Warden Avenue and Sinnott Road. They are is mainly occupied by office and industrial land use and has traversal roadways. Traffic from Birchmount Road north intends to access these two zones via the north side (e.g., via Eglinton Avenue E, Sinnott Road, Civic Road) rather than via the south side (e.g., via Birchmount Road, Comstock Road). Trips to these two zones were directed via OD routes to reflect a more equal distribution, and also could potentially void some short-cut traffic using the southbound approach at Eglinton Avenue E and Thermos Road intersection.
- OD routes from Warden Avenue north to **TAZ 1073 and 1074** – same rationale as described above for OD routes from Birchmount Road north to these two zones.
- OD routes between Eglinton Avenue E east and west ends – During the simulation, some vehicles were observed to divert to parallel roadways (e.g., Ashtonbee Road, Civic Road) due to short-period congestion along Eglinton Avenue E. Traversal trips along Eglinton Avenue E were directed via OD routes to void unnecessary diversions.

4 Model Calibration and Validation

The traffic demands were extracted from the City's travel demand forecasting model (Emme model) for weekday morning and afternoon peak hour conditions and calibrated to the observed 2013 conditions within the Aimsun model. Existing turning movement counts (TMCs) and midblock ATR counts were received from the City and used in the demand adjustment, which was conducted using the demand adjustment module available in Aimsun software. The adjustment was performed for two vehicle classes: passenger vehicles and commercial vehicles (i.e., autos and trucks).

The model validation sought to ensure consistency between simulated travel time and observed travel time on Eglinton Avenue East, for both morning and afternoon peak periods.

In 2013, there was a HOV lane along Eglinton Avenue East in both directions, which served buses, motorcycles, bicycles, taxis, and private vehicles with passengers. In order to avoid artificially reducing the capacity for general traffic along Eglinton Avenue East, it was necessary to differentiate between vehicles eligible to use the HOV lane versus ineligible vehicles (i.e., single-occupancy-vehicle). This was done in the following manner:

1. A percentage of vehicles that are eligible to use the HOV lanes was estimated by analyzing 2011 Transportation Tomorrow Survey (TTS) data. The data includes all trips that either start or end in Planning District 11 (PD11), which is a region that is slightly larger than the mesoscopic area.
2. The number of trips that was conducted in a single-occupant vehicle was compared with the number of trips that was either conducted in a taxi, motorcycle, or a private vehicle with passengers. It was found that this ratio was 71% that could use the HOV lane to 29% that could not use the HOV lane.
3. The adjusted car matrix was split into a SOV matrix and a HOV matrix in a 71% to 29% ratio, respectively, before hybrid meso-micro simulation is conducted.

4.1 Traffic Volumes

The existing adjusted/balanced traffic volumes used for traffic demand adjustment consist of 149 turning movements for 13 intersections in the microsimulation area and 132 midblock counts (i.e., link counts on intersection legs) for City's arterial and collectors throughout the meso-simulation area, as presented in Figure 5 and Figure 6.

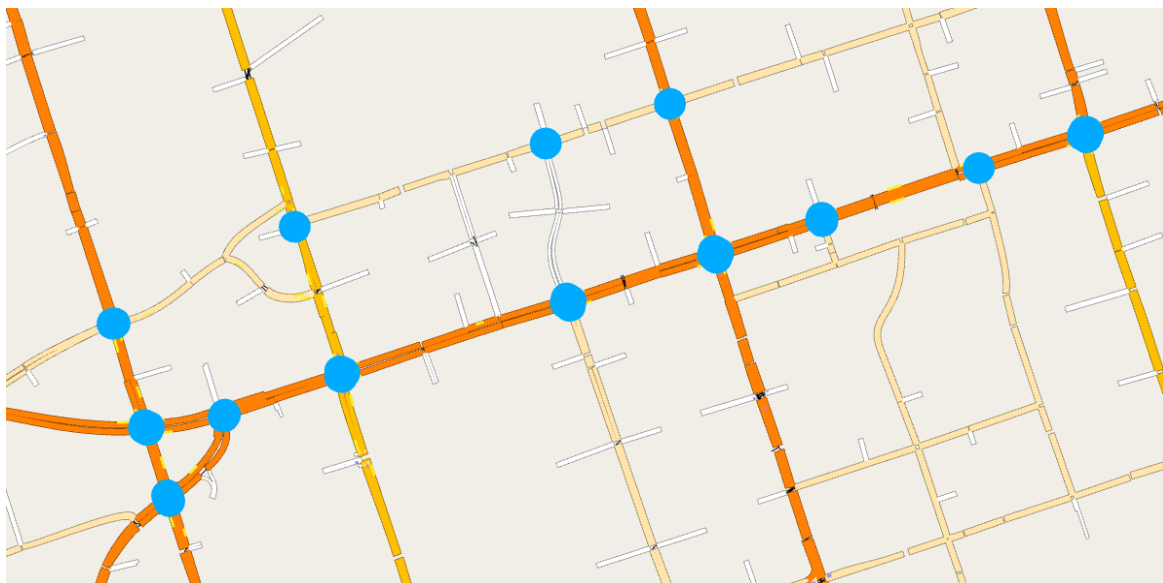


Figure 5: Intersection Turning Movements Considered for Demand Calibration

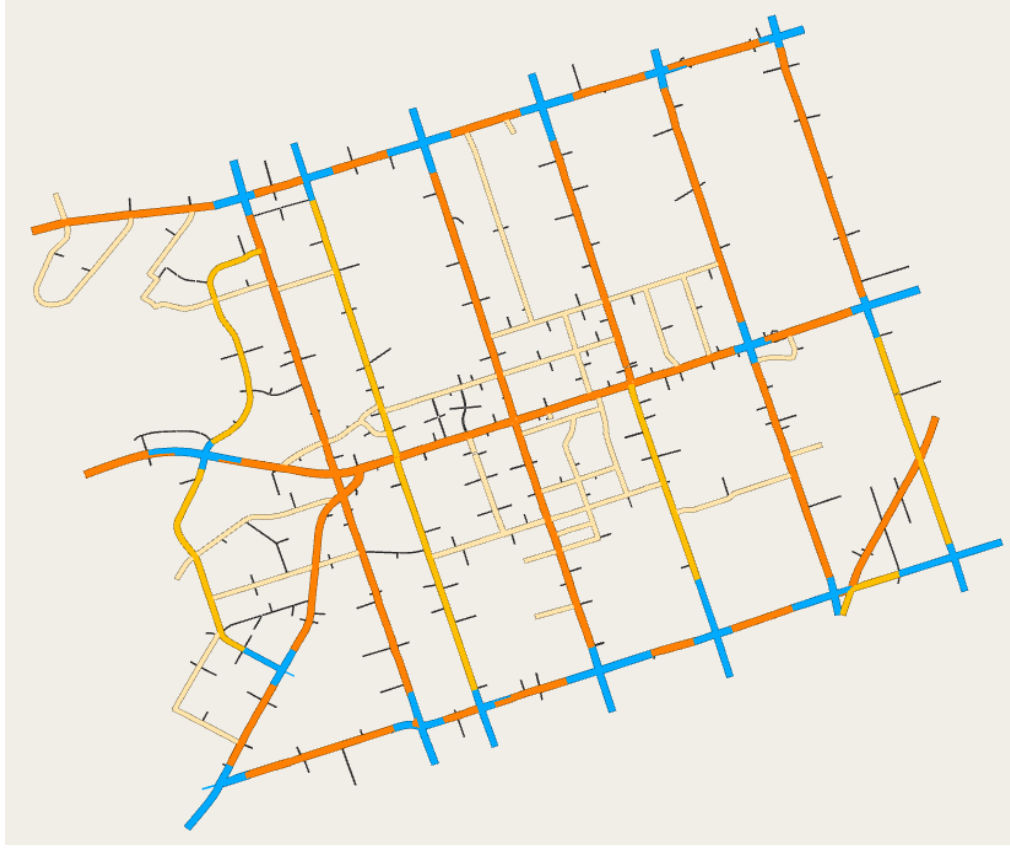


Figure 6: Midblock Locations (Links) Considered for Demand Calibration

The demand calibration results for hybrid traffic simulation were reviewed based on GEH statistic. The GEH statistic was evaluated for each control volume flow in both the peak hours to assess differences between simulated and observed volumes. It is an industry-standard validation measure for simulation models which measures the agreement between simulated and observed traffic volumes

The formula is expressed as:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}} \quad \text{where } M \text{ is the simulated volume and } C \text{ is the observed count.}$$

Lower GEH values represent more reliable simulated traffic volumes. The criteria to be used for the calibration and validation of the models for this specific study are summarized in Table 1 and are based on microscopic simulation guidelines from FHWA and consideration of the size of the study area and other past City of Toronto projects.

Table 1: Calibration and Validation Thresholds

Criteria and Measures	Calibration and Validation Thresholds
Individual Links (include arterials and ramps) Hourly Flow Rates	GEH ≤ 5 for 85% of cases, ≤ 10 for 95% of cases
Individual Turning Movements Hourly Flow Rates	GEH ≤ 5 for 85% of cases, ≤ 10 for 95% of cases
Screenline Volumes	Within 15% (for peak periods)
Link Travel Times	Within 15% (for peak periods)
Speed Profiles / Bottlenecks/ Queuing	Modeler's Satisfaction
Root Mean Square Error, RMSE	RMSE < 30% for all samples
Regression	Slope and r^2 values > 0.9

The hybrid traffic simulation was conducted using two alternative approaches – i). traffic demands calibrated using mesoscopic Dynamic-User-Equilibrant (DUE) OD adjustment and path file generated from meso DUE assignment, and ii). traffic demands calibrated using macroscopic OD adjustment and path file generated from macro assignment. For both alternative approaches, the hybrid simulation assigns traffic by considering 60% traffic following path assignment and 40% following dynamic route choice model. The demand calibration results are presented in Table 2.

Table 2: Demand Calibration Results for Link and Turning Movement Volumes

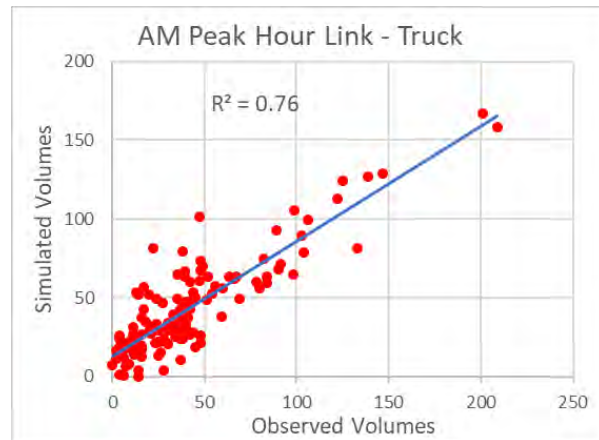
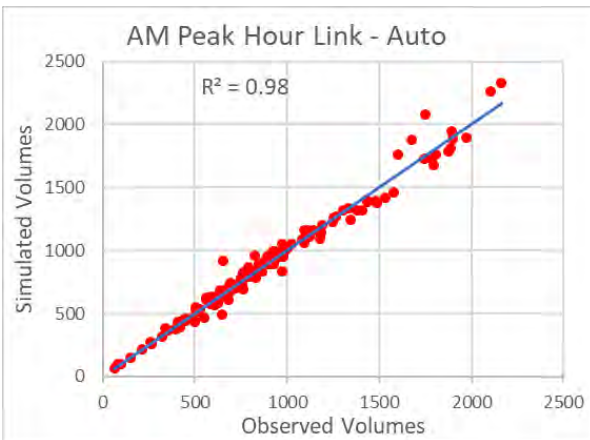
Criteria	DUE Path				Macro Path			
	Link Vol		Turn Vol		Link Vol		Turn Vol	
	Auto	Truck	Auto	Truck	Auto	Truck	Auto	Truck
AM Peak Hour								
GEH <5	98%	92%	72%	96%	98%	91%	78%	100%
GEH <10	100%	100%	96%	100%	100%	100%	100%	100%
R ²	0.99	0.77	0.96	0.75	0.98	0.76	0.98	0.87
PM Peak Hour								
GEH <5	98%	93%	66%	93%	93%	89%	78%	94%
GEH <10	100%	100%	91%	100%	99%	100%	96%	100%
R ²	0.98	0.83	0.94	0.74	0.96	0.76	0.96	0.76

The calibration results indicate that GEH values and R² derived using the approach ii (i.e., traffic demands calibrated using macro OD adjustment and path file generated from macro assignment) show improved results as compared with approach i, for both

morning and afternoon peak hours. The calibration results using macro path indicate 78-100% links/movements with GEH < 5 and 100% links/movements with GEH < 10 during morning peak hour, and 78-94% links/movements with GEH < 5 and 96-100% links/movements with GEH < 10 during afternoon peak hour. The R^2 values for trucks are less than 0.9, since the observed truck volumes are generally not very high (most are less than 50) and the demand adjustment module may not over-calibrate the truck demand once the GEH values are less than 5.

Note that given the GEH < 5 threshold for 85% of link and turning movement volumes were originally designed for static demand models. However, for a dynamic demand model this threshold is typically not feasible. Therefore, the calibration results with a relatively lower percentage (over 75%) of links and turning movements with GEH < 5 are considered to be acceptable for this study.

Figure 7 and Figure 8 illustrate the relationship between the simulated and observed volumes, based on calibration results derived using macro assignment path. In data comparison cases, the R-square value greater than 0.9 indicates a close fit between observed and simulated traffic volumes where 1.0 is a perfect match. Detailed comparison between observed and simulated traffic volumes are presented in **Appendix I**. Link sections and turns with GEH over 5 are presented in **Appendix II**. Road network density plots (veh/km) are presented in **Appendix III**.



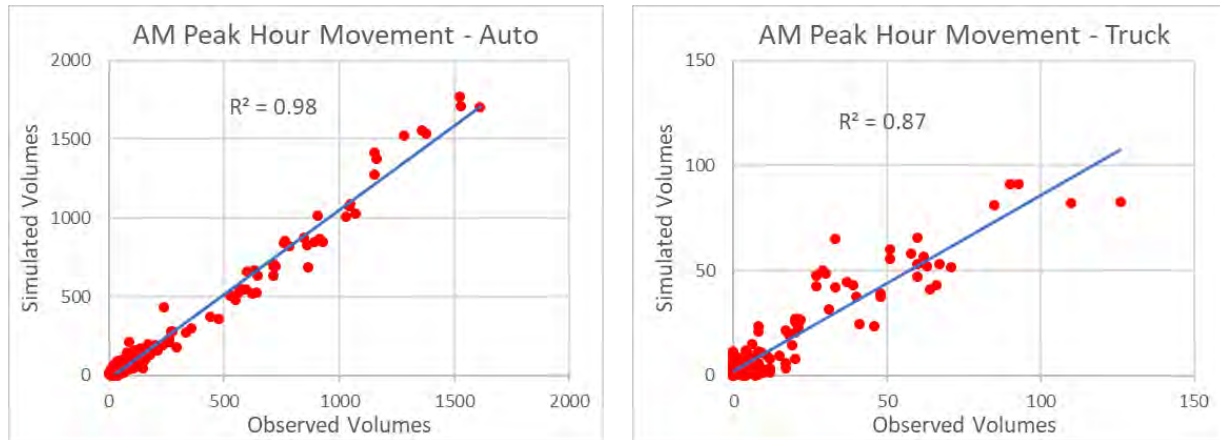


Figure 7: Simulated vs. Observed Volumes (AM Peak Hour)

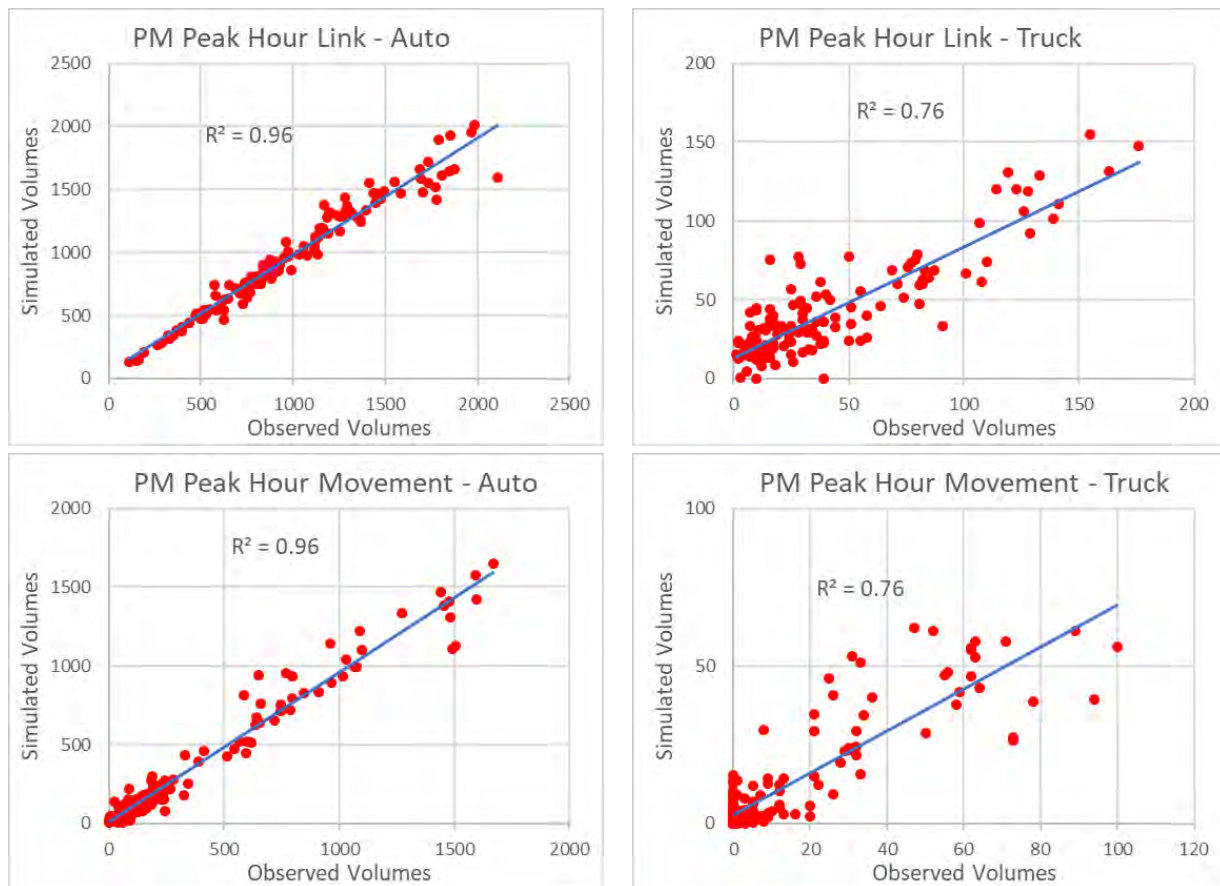


Figure 8: Simulated vs. Observed Volumes (PM Peak Hour)

4.2 Travel Time Validation

The observed travel time and traffic operating speed data for Eglinton Avenue East was received from the City. The travel time and speed data were collected during morning and afternoon peak periods for the year 2013, which represents the pre-construction conditions on Eglinton Avenue East.

The comparison of observed vs. simulated travel time for Eglinton Avenue East is presented in Table 3 and Table 4, for morning and afternoon peak periods, respectively.

Table 3: Travel Time Review (AM Peak Period)

Segment	Travel time (s)					
	Observed Ave	Observed Min	Observed Max	Simulated Ave	Difference	Difference in %
Victoria Park Ave to Pharmacy Ave	67	45	114	57	-10	-16%
Pharmacy Ave to Warden Ave	117	79	162	117	0	0%
Warden Ave to Birchmount Rd	96	62	187	130	34	35%
Eastbound Overall	280	186	463	303	23	8%
Pharmacy Ave to Victoria Park Ave	58	33	148	64	6	10%
Warden Ave to Pharmacy Ave	117	76	221	125	7	6%
Birchmount Rd to Warden Ave	106	54	155	164	58	55%
Westbound Overall	281	164	524	352	71	25%

During morning peak period, the Eglinton segment between Warden Avenue and Birchmount Road was simulated with slightly higher travel time than the observed average travel time in both directions. The discrepancies may be due to the exact locations of the travel time sensors are not known (i.e., far-side or near-side of the intersection). In addition, the simulated traffic arriving patterns may be different at intersections: the traffic platoon might be metered either at the upstream or downstream intersections and affect the travel time between roadway segments. However, the overall travel time for Eglinton Avenue East between Victoria Park Avenue and Birchmount Road (for approximately 2 km of length) confirms that the simulated travel time for the eastbound direction is within +10% compared to the observed travel time; the simulated travel time for the westbound direction is slightly higher (25%) than the observed travel time, but still within the min-max band.

Table 4: Travel Time Review (PM Peak Period)

Segment	Travel time (s)					
	Observed Ave	Observed Min	Observed Max	Simulated Ave	Difference	% Difference
Victoria Park Ave to Pharmacy Ave	89	57	162	263	173	194%
Pharmacy Ave to Warden Ave	137	81	251	177	40	29%
Warden Ave to Birchmount Rd	118	59	554	185	67	57%
Eastbound Overall	344	196	968	625	281	82%
Pharmacy Ave to Victoria Park Ave	66	30	207	88	22	33%
Warden Ave to Pharmacy Ave	142	82	279	208	66	46%
Birchmount Rd to Warden Ave	123	68	345	184	61	50%
Westbound Overall	331	180	830	480	149	45%

During afternoon peak period, the simulated travel time on Eglinton Avenue East segments is higher than the observed average, but still within the min-max band, except for the eastbound direction from Victoria Park Avenue to Pharmacy Avenue. Heavy congestion was observed during the simulation on this segment, causing high delays and longer travel time than the observed condition. One potential reason is that SOVs simulated in the model are not allowed to use the HOV lanes, which may cause **low lane utilization** and reduce the number of vehicles that can be processed at intersections; while in reality, vehicles could be more aggressive to use all the available capacity during congestion, especially for the commercial area where vehicles need to use the curb lane (HOV lane) to access to or egress from the plaza/ properties.

It should also be noted that the majority of the intersections along Eglinton Avenue East are SCOOT. SCOOT operates by dynamically adjusting the splits, offsets, and cycle lengths according to real-time traffic demand and provides coordination to improve both traffic capacity and progression. Due to the limitations of Aimsun, SCOOT intersections were coded with fixed cycle-lengths, with only typical values for splits and cycle lengths were coded. Therefore, the modelled capacity and the quality of traffic progression along Eglinton Avenue East is expected to be underestimated in the Aimsun model than what was experienced in 2013.

4.3 Traffic Operating Speed

The review of traffic operating speed represents a similar condition as the travel time, where the longer and shorter travel time observed/simulated was replicated by lower and higher operating speed.

Traffic operating speed review for Eglinton Avenue East segments within the micro-simulation area are presented in Figure 9 and Figure 10, for morning and afternoon peak periods, respectively. The simulated operating speeds generally aligned with the observed average speeds. The discrepancies between the observed and simulated speed for some roadway segments/directions can be explained as discussed previously in the travel time review.

Figure 9: Traffic Operating Speed Review (AM Peak Period)

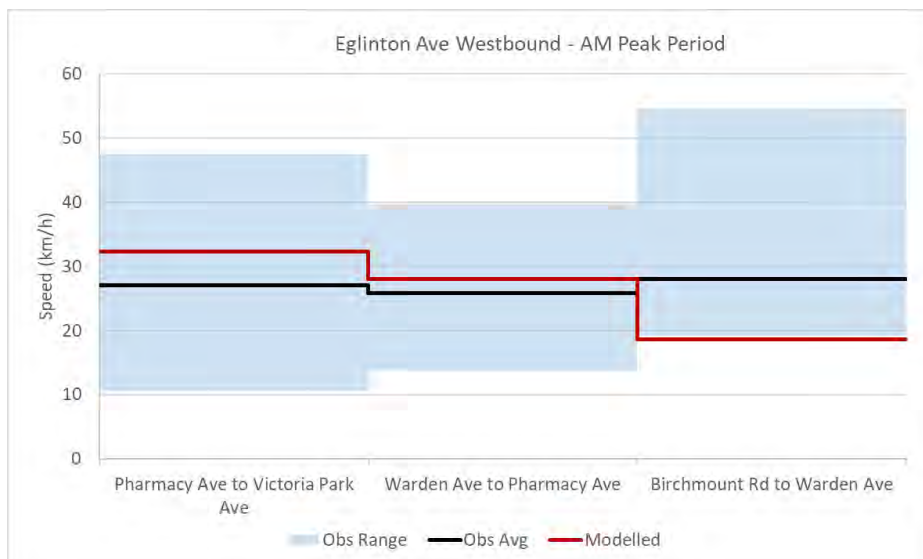
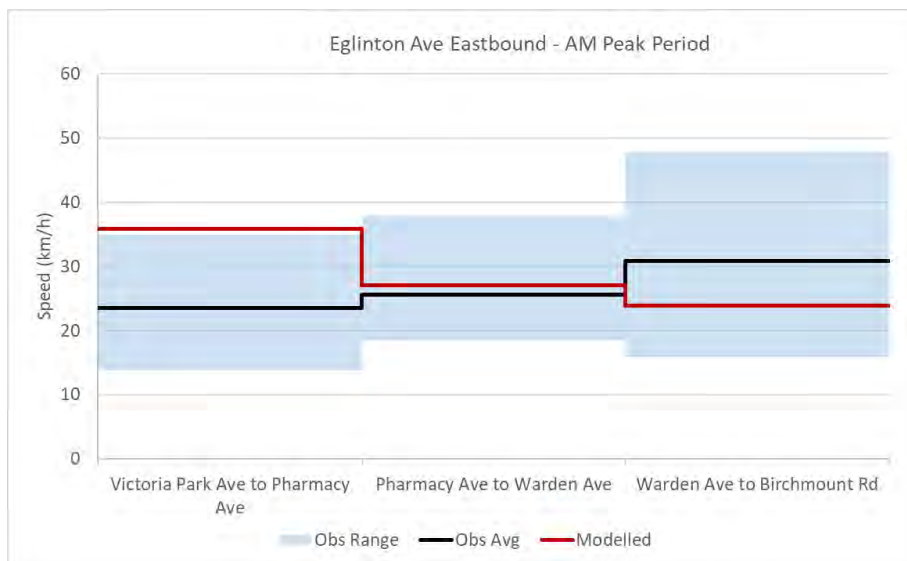


Figure 10: Traffic Operating Speed Review (PM Peak Period)



5 Conclusions

Based on the results summarized in this memorandum, the micro-simulation (Aimsun) model developed for the study area network concluded to closely represent observed traffic conditions and can be used as a calibrated/validated model for the future traffic analysis. The trip correction matrices derived from the existing traffic modelling (i.e., the differences between the initial trip matrices derived from City's subarea Emme model and the trip matrices after demand adjustment) will be used for the future traffic operational analysis.



Tech Memo Appendix I

Detailed Comparison between Observed and Simulated Traffic Volumes

AM Peak Hour – Link Volume

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
37366: Warden Avenue (409_327)	1181	778	314	1092	-89	92%	2.6	42	26.8	-15	64%	2.6
37463: Bermondsey Road (448_11)	519	368	150	518	-1	100%	0.0	84	59.2	-25	70%	2.9
36622: Midland Avenue (46_413)	916	632	264	896	-20	98%	0.7	16	12.6	-3	79%	0.9
37803: Eglinton Avenue East (591_461)	861	597	274	871	10	101%	0.3	30	29	-1	97%	0.2
36684: Warden Avenue (72_409)	1264	905	365	1270	6	100%	0.2	44	49.4	5	112%	0.8
36586: Warden Avenue (24_473)	788	584	223	807	19	102%	0.7	33	39.4	6	119%	1.1
36637: Kennedy Road (55_475)	214	152	65	217	3	101%	0.2	4	1.4	-3	35%	1.6
38570: Midland Avenue (461_479)	551	333	135	468	-83	85%	3.7	9	21.6	13	240%	3.2
37550: St Clair Avenue East (474_623)	1438	993	397	1391	-47	97%	1.3	17	42.8	26	252%	4.7
37537: St Clair Avenue East (471_34)	937	668	268	936	-1	100%	0.0	122	112.8	-9	92%	0.8
47590: Kennedy Road (412_89)	962	691	285	976	14	101%	0.5	41	37.6	-3	92%	0.5
48948: Pharmacy Avenue (472_683)	666	471	206	677	11	102%	0.4	10	17.4	7	174%	2.0
48650: St Clair Avenue East (476_4)	445	314	125	439	-6	99%	0.3	48	21.4	-27	45%	4.5
38526: St Clair Avenue East (2407_473)	1434	992	395	1387	-47	97%	1.3	39	66.4	27	170%	3.8
37922: O'Connor Drive (642_448)	717	495	209	705	-12	98%	0.5	89	92.6	4	104%	0.4
37455: O'Connor Drive (447_634)	929	630	272	901	-28	97%	0.9	18	34.8	17	193%	3.3
37874: St Clair Avenue East (623_474)	875	643	243	886	11	101%	0.4	15	19.8	5	132%	1.2
37311: St Clair Avenue East (392_475)	1344	887	357	1244	-100	93%	2.8	17	57	40	335%	6.6
36607: St Clair Avenue East (34_471)	635	498	187	685	50	108%	2.0	80	55.8	-24	70%	2.9
37384: Midland Avenue (413_436)	848	628	263	891	43	105%	1.5	9	7.6	-1	84%	0.5
37865: St Clair Avenue East (618_473)	1000	734	287	1021	21	102%	0.7	40	47.4	7	119%	1.1
38565: Eglinton Avenue East (460_590)	720	480	224	704	-16	98%	0.6	35	29.2	-6	83%	1.0
37358: Victoria Park Avenue (407_280)	1142	855	301	1156	14	101%	0.4	47	61	14	130%	1.9
37453: O'Connor Drive (447_1836)	1784	1224	506	1730	-54	97%	1.3	28	24.2	-4	86%	0.7
48611: Birchmount Road (410_84)	431	310	132	442	11	102%	0.5	45	18.4	-27	41%	4.7
37368: Lawrence Avenue East (410_537)	562	451	172	623	61	111%	2.5	103	89.4	-14	87%	1.4
36624: Midland Avenue (48_476)	394	272	98	370	-24	94%	1.2	37	24	-13	65%	2.4
48593: Pharmacy Avenue (408_94)	815	562	237	799	-16	98%	0.6	2	16.8	15	840%	4.8
37858: St Clair Avenue East (615_472)	1334	954	380	1334	0	100%	0.0	22	81.4	59	370%	8.3
37383: Lawrence Avenue East (413_550)	1878	1269	519	1788	-90	95%	2.1	38	45.8	8	121%	1.2
37362: Pharmacy Avenue (408_309)	1090	760	300	1060	-30	97%	0.9	11	31.4	20	285%	4.4
47594: St Clair Avenue East (472_615)	1023	752	296	1047	24	102%	0.8	27	46.8	20	173%	3.3
37425: Kennedy Road (433_475)	450	329	127	456	6	101%	0.3	12	19.4	7	162%	1.9
36826: Bermondsey Road (150_455)	647	353	138	490	-157	76%	6.6	52	63.2	11	122%	1.5
36563: Bermondsey Road (11_448)	148	102	42	145	-3	98%	0.3	37	42.4	5	115%	0.9
37558: Midland Avenue (476_64)	354	267	96	363	9	103%	0.5	30	20.6	-9	69%	1.9
37800: Eglinton Avenue East (590_460)	1674	1321	558	1879	205	112%	4.9	43	47.8	5	111%	0.7
37069: Victoria Park Avenue (280_407)	1090	822	340	1163	73	107%	2.2	35	49.6	15	142%	2.2
37555: Kennedy Road (475_433)	406	311	123	434	28	107%	1.4	6	11.6	6	193%	1.9
37493: Sloane Avenue (455_266)	339	284	101	385	46	114%	2.4	6	20.6	15	343%	4.0
37877: St Clair Avenue East (624_474)	1381	943	373	1317	-64	95%	1.8	14	52.2	38	373%	6.6
37365: Lawrence Avenue East (409_521)	1887	1320	495	1815	-72	96%	1.7	48	67.2	19	140%	2.5
37698: Lawrence Avenue East (541_412)	695	531	214	746	51	107%	1.9	35	64.6	30	185%	4.2
37320: Kennedy Road (393_412)	886	645	267	912	26	103%	0.9	30	34.2	4	114%	0.7
37379: Kennedy Road (412_393)	970	720	328	1047	77	108%	2.4	25	22.2	-3	89%	0.6
37462: Yardley Avenue (448_12)	79	66	30	96	17	122%	1.8	14	4.2	-10	30%	3.2
36616: St Clair Avenue East (40_471)	1182	817	329	1145	-37	97%	1.1	147	128.6	-18	87%	1.6
37494: Bermondsey Road (455_150)	592	460	177	637	45	108%	1.8	38	32.2	-6	85%	1.0
37608: Lawrence Avenue East (499_407)	783	569	219	788	5	101%	0.2	34	28	-6	82%	1.1
47612: Midland Avenue (476_48)	396	269	115	384	-12	97%	0.6	44	27.8	-16	63%	2.7
36580: Victoria Park Avenue (18_471)	811	599	234	833	22	103%	0.8	66	62	-4	94%	0.5
36546: Victoria Park Avenue (2_407)	1187	857	347	1204	17	101%	0.5	54	52.8	-1	98%	0.2
37491: Eglinton Avenue East (455_554)	1116	820	336	1156	40	104%	1.2	51	48.4	-3	95%	0.4
37219: Birchmount Road (351_410)	501	298	134	433	-68	86%	3.2	67	63.2	-4	94%	0.5
36582: St Clair Avenue East (20_447)	101	71	27	99	-2	98%	0.2	2	11.4	9	570%	3.6
38571: Midland Avenue (461_477)	677	448	176	624	-53	92%	2.1	13	22.8	10	175%	2.3
37659: Lawrence Avenue East (521_409)	880	661	255	916	36	104%	1.2	20	28.6	9	143%	1.7
37549: St Clair Avenue East (474_624)	751	567	219	785	34	105%	1.2	9	18.8	10	209%	2.6
37725: Eglinton Avenue East (551_455)	1251	892	364	1256	5	100%	0.1	49	70	21	143%	2.7
37043: Sloane Avenue (266_455)	653	639	281	920	267	141%	9.5	21	27.4	6	130%	1.3
36565: Yardley Avenue (12_448)	256	195	81	276	20	108%	1.3	37	10.8	-26	29%	5.4
36576: Eglinton Avenue East (16_461)	1896	1347	543	1890	-6	100%	0.1	29	22	-7	76%	1.4
37215: Warden Avenue (349_473)	645	472	199	671	26	104%	1.0	25	21.8	-3	87%	0.7
48626: Warden Avenue (473_24)	587	403	173	576	-11	98%	0.4	25	29.4	4	118%	0.8
37166: Pharmacy Avenue (683_472)	657	484	200	684	27	104%	1.0	13	53	40	408%	7.0
37134: Pharmacy Avenue (309_408)	931	706	286	992	61	107%	2.0	5	16	11	320%	3.4
36548: St Clair Avenue East (4_476)	983	694	301	995	12	101%	0.4	90	68	-22	76%	2.5

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
37377: Lawrence Avenue East (412_541)	1533	1037	385	1422	-111	93%	2.9	47	101.2	54	215%	6.3
37553: St Clair Avenue East (475_629)	762	492	199	691	-71	91%	2.6	4	26	22	650%	5.7
49247: Kennedy Road (460_679)	693	537	187	724	31	104%	1.1	23	21.4	-2	93%	0.3
37554: St Clair Avenue East (475_626)	1406	944	372	1316	-90	94%	2.4	20	52.2	32	261%	5.4
37461: O'Connor Drive (448_642)	652	455	194	649	-3	100%	0.1	139	126.8	-12	91%	1.1
36670: Midland Avenue (64_476)	319	224	91	314	-5	99%	0.3	38	24	-14	63%	2.5
37631: Lawrence Avenue East (510_408)	1974	1377	518	1895	-79	96%	1.8	39	63.6	25	163%	3.4
37544: Pharmacy Avenue (472_95)	618	424	171	596	-22	96%	0.9	14	0	-14	0%	5.3
37535: St Clair Avenue East (471_40)	759	588	241	829	70	109%	2.5	78	59.8	-18	77%	2.2
37561: Midland Avenue (477_461)	690	513	216	729	39	106%	1.5	25	30.8	6	123%	1.1
37680: Lawrence Avenue East (531_410)	505	401	148	549	44	109%	1.9	104	79	-25	76%	2.6
37369: Lawrence Avenue East (410_531)	1484	995	385	1379	-105	93%	2.8	209	158.4	-51	76%	3.7
38371: St Clair Avenue East (1283_476)	475	323	135	458	-17	96%	0.8	48	25.8	-22	54%	3.7
37664: Lawrence Avenue East (523_409)	1795	1207	470	1677	-118	93%	2.8	48	73.2	25	153%	3.2
37905: O'Connor Drive (634_447)	687	470	198	668	-19	97%	0.7	16	37.6	22	235%	4.2
37705: Lawrence Avenue East (542_412)	1480	986	406	1392	-88	94%	2.3	45	50.2	5	112%	0.8
36699: Birchmount Road (85_474)	527	374	161	535	8	101%	0.3	13	14.4	1	111%	0.4
38453: O'Connor Drive (1836_447)	1303	926	388	1314	11	101%	0.3	28	3.8	-24	14%	6.1
48605: Warden Avenue (409_72)	743	528	221	749	6	101%	0.2	42	60.2	18	143%	2.5
37547: Warden Avenue (473_349)	893	676	273	948	55	106%	1.8	34	32.8	-1	96%	0.2
37545: St Clair Avenue East (473_2407)	960	695	259	954	-6	99%	0.2	40	32.8	-7	82%	1.2
37400: Kennedy Road (679_460)	792	620	251	871	79	110%	2.7	21	30	9	143%	1.8
37125: Victoria Park Avenue (307_471)	502	377	145	522	20	104%	0.9	82	74.6	-7	91%	0.8
37360: Lawrence Avenue East (408_510)	881	663	256	918	37	104%	1.2	11	26.6	16	242%	3.6
48668: Lawrence Avenue East (413_8)	600	430	171	601	1	100%	0.0	25	13.2	-12	53%	2.7
37370: Birchmount Road (410_351)	970	613	222	835	-135	86%	4.5	99	105.2	6	106%	0.6
47603: Kennedy Road (475_55)	263	185	74	259	-4	98%	0.3	7	6.6	0	94%	0.2
48587: Victoria Park Avenue (407_2)	1079	772	313	1085	6	101%	0.2	37	35.4	-2	96%	0.3
37300: Birchmount Road (387_474)	416	276	112	388	-28	93%	1.4	16	19.2	3	120%	0.8
37492: Eglinton Avenue East (455_551)	2106	1552	712	2264	158	107%	3.4	125	124.2	-1	99%	0.1
36701: Kennedy Road (89_412)	1121	797	309	1106	-15	99%	0.4	42	42.6	1	101%	0.1
37356: Lawrence Avenue East (407_502)	753	524	207	731	-22	97%	0.8	36	26	-10	72%	1.8
48632: Birchmount Road (474_85)	400	276	108	384	-16	96%	0.8	16	17	1	106%	0.2
37881: St Clair Avenue East (626_475)	829	567	218	784	-45	95%	1.6	4	18.8	15	470%	4.4
37459: St Clair Avenue East (447_20)	63	47	16	63	0	100%	0.0	0	7	7	0%	3.7
37546: St Clair Avenue East (473_618)	1427	1004	397	1401	-26	98%	0.7	38	79.4	41	209%	5.4
37460: O'Connor Drive (448_644)	496	308	136	444	-52	89%	2.4	59	38	-21	64%	3.0
47593: Midland Avenue (413_46)	893	632	260	892	-1	100%	0.0	39	34.2	-5	88%	0.8
37690: Lawrence Avenue East (537_410)	1579	1065	398	1463	-116	93%	3.0	201	166.8	-34	83%	2.5
38569: Eglinton Avenue East (461_591)	2162	1647	683	2330	168	108%	3.5	40	46	6	115%	0.9
37458: St Clair Avenue East (447_594)	560	434	171	605	45	108%	1.9	12	13.8	2	115%	0.5
48656: Eglinton Avenue East (461_16)	694	479	216	695	1	100%	0.0	26	15.4	-11	59%	2.3
36706: Pharmacy Avenue (94_408)	924	633	259	892	-32	97%	1.1	5	20.8	16	416%	4.4
37357: Lawrence Avenue East (407_499)	1892	1372	572	1944	52	103%	1.2	63	63.6	1	101%	0.1
37735: Eglinton Avenue East (557_455)	1602	1227	536	1763	161	110%	3.9	98	65	-33	66%	3.7
37364: Lawrence Avenue East (409_523)	921	712	282	994	73	108%	2.4	24	49.6	26	207%	4.2
48620: Victoria Park Avenue (471_18)	614	446	171	617	3	101%	0.1	106	99.6	-6	94%	0.6
38568: Kennedy Road (460_419)	808	580	233	812	4	101%	0.2	24	33.4	9	139%	1.8
37723: Lawrence Avenue East (550_413)	635	468	186	654	19	103%	0.7	21	31.8	11	151%	2.1
38566: Eglinton Avenue East (460_587)	1748	1386	689	2075	327	119%	7.5	56	57.4	1	103%	0.2
36707: Pharmacy Avenue (95_472)	590	412	165	576	-14	98%	0.6	6	0.6	-5	10%	3.0
37706: Lawrence Avenue East (412_61)	717	516	202	718	1	100%	0.1	39	30.8	-8	79%	1.4
37613: Lawrence Avenue East (502_407)	1806	1273	486	1759	-47	97%	1.1	60	55.8	-4	93%	0.6
36698: Birchmount Road (84_410)	862	607	229	837	-25	97%	0.9	84	63.2	-21	75%	2.4
37795: Eglinton Avenue East (587_460)	680	413	196	609	-71	90%	2.8	40	38	-2	95%	0.3
37925: O'Connor Drive (644_448)	625	403	177	580	-45	93%	1.8	133	81.6	-51	61%	5.0
36558: Lawrence Avenue East (8_413)	1743	1219	509	1728	-15	99%	0.4	37	23.6	-13	64%	2.4
37810: St Clair Avenue East (594_447)	1245	875	352	1228	-17	99%	0.5	12	26.4	14	220%	3.3
37534: Victoria Park Avenue (471_307)	820	599	219	818	-2	100%	0.1	69	49.2	-20	71%	2.6
37171: Warden Avenue (327_409)	793	570	223	793	0	100%	0.0	44	53.6	10	122%	1.4
37565: Midland Avenue (479_461)	637	451	176	627	-10	98%	0.4	4	24	20	600%	5.3
37551: Birchmount Road (474_387)	610	402	165	566	-44	93%	1.8	16	26.8	11	168%	2.3
37432: Midland Avenue (436_413)	925	641	254	895	-30	97%	1.0	37	33	-4	89%	0.7
37396: Kennedy Road (419_460)	823	630	329	958	135	116%	4.5	34	25.2	-9	74%	1.6
37557: St Clair Avenue East (476_1283)	976	663	289	952	-24	98%	0.8	91	71.6	-19	79%	2.2

AM Peak Hour – Turn Volume

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
45397: TCS1996 EBL	69	24	7	31	-38	45%	5.4	8	5.8	-2	73%	0.8
44961: TCS1295 SBL	133	89	30	119	-14	89%	1.2	0	3	3	0%	2.4
47038: TCS450 WBL	625	348	173	521	-104	83%	4.3	21	26.2	5	125%	1.1
45836: TCS452 SBR	212	121	38	158	-54	75%	3.9	20	7.8	-12	39%	3.3
41859: TCS457 NBL	42	26	7	32	-10	77%	1.6	11	2.6	-8	24%	3.2
44978: TCS1377 NBR	51	9	6	15	-36	29%	6.4	1	0.2	-1	20%	1.0
45089: TCS1617 SBT	568	397	156	553	-15	97%	0.6	21	22.8	2	109%	0.4
45361: TCS1872 EBR	74	71	29	100	26	135%	2.8	1	1.6	1	160%	0.5
45838: TCS452 SBT	529	370	138	508	-21	96%	0.9	17	21.4	4	126%	1.0
45365: TCS1872 NBL	13	10	5	15	2	114%	0.5	4	0.2	-4	5%	2.6
39789: TCS202 SBR	294	146	31	178	-116	60%	7.6	1	0.4	-1	40%	0.7
45867: TCS456 WBR	123	66	9	76	-47	62%	4.7	1	2.2	1	220%	0.9
47033: TCS450 SBT	6	2	1	3	-3	57%	1.2	0	1.2	1	0%	1.5
45319: TCS1791 NBT	97	50	17	67	-30	69%	3.3	2	3.4	1	170%	0.9
45819: TCS451 WBT	1153	965	448	1412	259	122%	7.2	51	55.6	5	109%	0.6
44984: TCS1377 SBR	337	204	72	276	-61	82%	3.5	7	8.4	1	120%	0.5
45441: TCS2069 NBL	24	4	1	5	-19	22%	4.9	2	1	-1	50%	0.8
45830: TCS452 NBR	46	28	14	42	-4	92%	0.6	5	1.6	-3	32%	1.9
45872: TCS458 EBL	153	62	32	94	-59	61%	5.3	0	8.8	9	0%	4.2
45085: TCS1617 NBT	759	617	223	840	81	111%	2.9	20	25.6	6	128%	1.2
45824: TCS452 EBR	69	46	22	68	-1	99%	0.1	8	3.2	-5	40%	2.0
45309: TCS1791 EBL	16	27	23	50	34	313%	5.9	1	3.6	3	360%	1.7
44980: TCS1377 NBT	891	603	246	849	-42	95%	1.4	39	43	4	110%	0.6
39795: TCS202 WBR	73	50	14	64	-9	88%	1.0	0	0.8	1	0%	1.3
37484: TCS449 WBR	15	1	0	1	-14	8%	4.8	0	0.2	0	0%	0.6
44959: TCS1295 NBT	716	502	200	702	-14	98%	0.5	9	10.8	2	120%	0.6
45892: TCS458 WBR	116	80	36	116	0	100%	0.0	0	2.8	3	0%	2.4
45886: TCS458 SBR	234	122	73	195	-39	83%	2.7	1	8.8	8	880%	3.5
45399: TCS1996 EBR	43	40	13	53	10	124%	1.5	5	4.2	-1	84%	0.4
45367: TCS1872 NBR	15	15	4	19	4	127%	1.0	3	4.4	1	147%	0.7
45857: TCS456 NBT	630	477	187	664	34	105%	1.3	40	37.4	-3	94%	0.4
45451: TCS2069 SBT	3	11	6	17	14	560%	4.4	0	1.4	1	0%	1.7
45809: TCS451 NBT	905	741	273	1015	110	112%	3.5	29	50.2	21	173%	3.4
45403: TCS1996 NBT	713	442	190	632	-81	89%	3.1	60	46.8	-13	78%	1.8
41777: TCS450 WBT	1279	1013	511	1524	245	119%	6.5	51	60	9	118%	1.2
45369: TCS1872 NBT	8	7	2	10	2	123%	0.6	1	0.4	-1	40%	0.7
36801: TCS449 EBR	46	31	12	44	-2	95%	0.4	0	5.8	6	0%	3.4
45861: TCS456 SBR	169	132	68	200	31	118%	2.3	11	9.2	-2	84%	0.6
45828: TCS452 NBL	88	148	64	212	124	241%	10.1	19	14.4	-5	76%	1.1
41857: TCS457 EBT	724	467	229	696	-28	96%	1.0	67	53.2	-14	79%	1.8
45847: TCS456 EBL	181	112	52	164	-17	91%	1.3	4	5.6	2	140%	0.7
45869: TCS456 WBT	1163	863	510	1373	210	118%	5.9	110	82.2	-28	75%	2.8
45313: TCS1791 EBT	1029	688	321	1008	-21	98%	0.7	60	53	-7	88%	0.9
39781: TCS202 NBL	269	206	75	281	12	104%	0.7	3	1.2	-2	40%	1.2
45081: TCS1617 EBR	31	16	9	25	-6	80%	1.2	4	0	-4	0%	2.8
41762: TCS449 WBT	549	327	156	482	-67	88%	2.9	21	27	6	129%	1.2
44982: TCS1377 SBL	83	28	9	37	-46	45%	5.9	5	0.8	-4	16%	2.5
45323: TCS1791 SBR	46	46	14	60	14	130%	1.9	0	1.8	2	0%	1.9
45457: TCS2069 WBT	441	299	73	372	-69	84%	3.4	8	23.6	16	295%	3.9
45375: TCS1872 SBT	13	1	0	1	-12	11%	4.3	2	0.2	-2	10%	1.7
39793: TCS202 WBL	92	94	12	106	14	116%	1.4	0	10.2	10	0%	4.5
45844: TCS452 WBT	1611	1112	593	1705	94	106%	2.3	33	65	32	197%	4.6
45822: TCS452 EBL	161	89	25	114	-47	71%	4.0	17	5.8	-11	34%	3.3
39779: TCS202 EBT	41	10	3	13	-28	31%	5.4	0	0	0	0%	#DIV/0!
45832: TCS452 NBT	602	495	168	663	61	110%	2.4	5	9.8	5	196%	1.8
45317: TCS1791 NBR	55	67	33	100	45	182%	5.1	7	9.6	3	137%	0.9
45851: TCS456 EBT	860	566	263	829	-31	96%	1.1	63	52	-11	83%	1.5
45894: TCS458 WBT	1527	1104	602	1706	179	112%	4.5	85	81	-4	95%	0.4
45405: TCS1996 SBR	264	177	37	215	-49	81%	3.2	18	19.2	1	107%	0.3
45817: TCS451 WBR	107	17	30	48	-59	44%	6.8	0	0.6	1	0%	1.1
44988: TCS1377 WBL	47	60	14	74	27	157%	3.5	8	21.2	13	265%	3.5
39787: TCS202 SBL	73	32	10	42	-31	57%	4.1	0	0.2	0	0%	0.6
44992: TCS1377 WBT	262	188	43	232	-30	88%	1.9	20	20.4	0	102%	0.1
45315: TCS1791 NBL	127	82	60	142	15	112%	1.3	8	2.8	-5	35%	2.2
45859: TCS456 SBL	165	88	40	129	-36	78%	3.0	10	1.6	-8	16%	3.5
39783: TCS202 NBR	80	33	8	42	-38	52%	4.9	0	4	4	0%	2.8
39797: TCS202 WBT	61	30	7	38	-23	62%	3.3	0	3.8	4	0%	2.8

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
39785: TCS202 NBT	785	576	244	820	35	105%	1.2	37	44.4	7	120%	1.2
44963: TCS1295 SBT	716	504	206	710	-6	99%	0.2	41	24.4	-17	60%	2.9
45079: TCS1617 EBL	50	48	22	70	20	140%	2.6	8	0.2	-8	3%	3.9
45826: TCS452 EBT	1152	884	390	1274	122	111%	3.5	62	56.6	-5	91%	0.7
45381: TCS1872 WBT	1376	968	569	1537	161	112%	4.2	126	82.4	-44	65%	4.3
45377: TCS1872 WBL	26	47	24	71	45	273%	6.5	0	7	7	0%	3.7
45811: TCS451 SBR	112	102	60	162	50	145%	4.3	0	3.8	4	0%	2.8
38316: TCS449 NBR	70	43	22	65	-5	93%	0.6	0	0	0	0%	#DIV/0!
41767: TCS450 NBR	475	241	116	356	-119	75%	5.8	22	26.6	5	121%	0.9
45834: TCS452 SBL	40	58	35	94	54	234%	6.6	7	6.2	-1	89%	0.3
41775: TCS450 WBR	7	20	10	30	23	429%	5.3	0	1	1	0%	1.4
45863: TCS456 SBT	715	504	192	696	-19	97%	0.7	31	31.4	0	101%	0.1
45842: TCS452 WBR	27	27	31	58	31	215%	4.8	6	3.6	-2	60%	1.1
45373: TCS1872 SBR	32	6	3	9	-23	28%	5.1	7	1.4	-6	20%	2.7
41740: TCS449 EBL	138	124	51	175	37	127%	2.9	2	8.4	6	420%	2.8
41855: TCS457 EBR	149	35	14	48	-101	32%	10.2	3	2	-1	67%	0.6
41865: TCS457 WBT	1523	1123	645	1768	245	116%	6.0	90	91	1	101%	0.1
45379: TCS1872 WBR	64	25	9	34	-30	53%	4.3	7	0	-7	0%	3.7
44957: TCS1295 NBR	132	54	8	62	-70	47%	7.1	12	3.2	-9	27%	3.2
41752: TCS449 SBL	89	26	14	40	-49	44%	6.2	0	0.2	0	0%	0.6
45884: TCS458 SBL	86	35	13	48	-38	56%	4.6	0	2.2	2	0%	2.1
45407: TCS1996 SBT	866	495	189	685	-181	79%	6.5	60	65.6	6	109%	0.7
39791: TCS202 SBT	849	610	262	872	23	103%	0.8	33	42	9	127%	1.5
45325: TCS1791 SBT	82	57	12	69	-13	85%	1.4	9	3.4	-6	38%	2.2
41863: TCS457 WBL	204	138	51	189	-15	93%	1.1	4	11.8	8	295%	2.8
45803: TCS451 EBR	53	29	13	42	-11	79%	1.6	8	11.6	4	145%	1.1
45359: TCS1872 EBL	51	36	13	49	-2	96%	0.3	12	1.2	-11	10%	4.2
45435: TCS2069 EBL	15	17	4	21	6	140%	1.4	0	0.8	1	0%	1.3
45087: TCS1617 SBR	32	38	13	51	19	158%	2.9	5	8.8	4	176%	1.4
45437: TCS2069 EBR	32	28	7	35	3	109%	0.5	3	0.4	-3	13%	2.0
45878: TCS458 NBL	146	55	29	84	-62	57%	5.8	2	6.8	5	340%	2.3
41750: TCS449 NBT	763	628	227	855	92	112%	3.2	27	42.6	16	158%	2.6
45371: TCS1872 SBL	39	1	0	1	-38	3%	8.5	3	0	-3	0%	2.4
44970: TCS1377 EBL	81	87	34	121	40	150%	4.0	5	9.8	5	196%	1.8
44986: TCS1377 SBT	1069	720	308	1028	-41	96%	1.3	46	23.6	-22	51%	3.8
44976: TCS1377 NBL	41	8	5	13	-28	32%	5.4	1	0.2	-1	20%	1.0
45329: TCS1791 WBR	45	18	9	27	-18	60%	3.0	1	0.8	0	80%	0.2
39777: TCS202 EBR	60	34	12	46	-14	77%	1.9	0	0.6	1	0%	1.1
44972: TCS1377 EBR	24	16	7	23	-1	94%	0.3	2	1	-1	50%	0.8
45813: TCS451 SBT	930	626	220	846	-84	91%	2.8	30	48.4	18	161%	2.9
45447: TCS2069 SBL	7	10	5	16	9	226%	2.6	2	2.2	0	110%	0.1
45327: TCS1791 WBL	54	38	41	79	25	147%	3.1	2	4.8	3	240%	1.5
41756: TCS449 SBT	647	462	172	634	-13	98%	0.5	27	47.6	21	176%	3.4
45445: TCS2069 NBT	4	10	10	20	16	490%	4.5	0	0	0	0%	#DIV/0!
45807: TCS451 NBR	6	11	5	16	10	273%	3.1	0	1	1	0%	1.4
45801: TCS451 EBL	75	57	22	79	4	105%	0.5	9	1.6	-7	18%	3.2
45311: TCS1791 EBR	80	102	46	148	68	185%	6.3	0	9.6	10	0%	4.4
44990: TCS1377 WBR	25	7	3	11	-14	43%	3.4	7	2.8	-4	40%	1.9
45876: TCS458 EBT	564	361	168	529	-35	94%	1.5	64	40.8	-23	64%	3.2
45331: TCS1791 WBT	1358	1006	552	1558	200	115%	5.2	93	91	-2	98%	0.2
44967: TCS1295 WBR	130	115	26	141	11	108%	0.9	0	11.2	11	0%	4.7
41758: TCS449 WBL	67	22	16	38	-29	57%	4.0	0	1.2	1	0%	1.5
41754: TCS449 SBR	277	199	83	282	5	102%	0.3	6	15	9	250%	2.8
45439: TCS2069 EBT	163	128	33	161	-2	99%	0.2	15	9.2	-6	61%	1.7
45888: TCS458 SBT	642	392	133	525	-117	82%	4.8	58	58.2	0	100%	0.0
45853: TCS456 NBL	116	103	53	156	40	134%	3.4	4	4.6	1	115%	0.3
45449: TCS2069 SBR	2	2	0	2	0	120%	0.3	1	1.2	0	120%	0.2
41765: TCS450 EBT	1050	771	320	1091	41	104%	1.3	48	38.8	-9	81%	1.4
45455: TCS2069 WBR	24	38	18	55	31	231%	5.0	3	1.6	-1	53%	0.9
45890: TCS458 WBL	240	321	110	431	191	180%	10.4	1	5.6	5	560%	2.5
45815: TCS451 WBL	30	33	36	69	39	231%	5.6	0	3	3	0%	2.4
45321: TCS1791 SBL	41	10	8	18	-23	44%	4.2	2	0.4	-2	20%	1.5
45855: TCS456 NBR	118	41	18	59	-59	50%	6.2	4	1.4	-3	35%	1.6
41861: TCS457 NBR	35	8	3	11	-24	30%	5.1	3	1	-2	33%	1.4
44974: TCS1377 EBT	178	104	30	134	-44	75%	3.5	3	6.4	3	213%	1.6

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
45874: TCS458 EBR	93	58	35	93	0	100%	0.0	0	3.8	4	0%	2.8
41746: TCS449 NBL	67	11	4	15	-52	23%	8.0	0	1.6	2	0%	1.8
45453: TCS2069 WBL	84	52	22	74	-10	88%	1.1	17	3.6	-13	21%	4.2
45363: TCS1872 EBT	915	587	281	868	-47	95%	1.6	71	51.6	-19	73%	2.5
45882: TCS458 NBT	595	385	164	549	-46	92%	1.9	66	43.2	-23	65%	3.1
45805: TCS451 EBT	1042	759	315	1075	33	103%	1.0	48	37.6	-10	78%	1.6
45083: TCS1617 NBL	48	31	13	44	-4	92%	0.6	5	1.6	-3	32%	1.9
44965: TCS1295 WBL	151	97	13	110	-41	73%	3.6	0	6.8	7	0%	3.7
45865: TCS456 WBL	114	63	62	124	10	109%	1.0	0	0.8	1	0%	1.3
45880: TCS458 NBR	132	73	33	105	-27	80%	2.5	0	2.6	3	0%	2.3
45443: TCS2069 NBR	46	54	28	81	35	177%	4.4	2	6	4	300%	2.0
39775: TCS202 EBL	77	46	18	64	-13	83%	1.5	0	0	0	0%	#DIV/0!
45849: TCS456 EBR	105	79	39	119	14	113%	1.3	8	4.6	-3	58%	1.4
45840: TCS452 WBL	45	14	8	22	-23	49%	4.0	6	6.8	1	113%	0.3
41769: TCS450 SBR	11	5	3	8	-3	73%	1.0	0	0	0	0%	#DIV/0!
45401: TCS1996 NBL	72	74	33	107	35	149%	3.7	12	8	-4	67%	1.3
41744: TCS449 EBT	356	203	95	298	-58	84%	3.2	20	27	7	135%	1.4

PM Peak Hour – Link Volume

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
37366: Warden Avenue (409_327)	1134	699	281	981	-153	86%	4.7	24	24.2	0	101%	0.0
37463: Bermondsey Road (448_11)	286	197	85	281	-5	98%	0.3	55	55.2	0	100%	0.0
36622: Midland Avenue (46_413)	740	524	223	746	6	101%	0.2	16	13.2	-3	83%	0.7
37803: Eglinton Avenue East (591_461)	1983	1324	686	2010	27	101%	0.6	32	29.4	-3	92%	0.5
36684: Warden Avenue (72_409)	1140	800	330	1130	-10	99%	0.3	30	41.4	11	138%	1.9
36586: Warden Avenue (24_473)	746	545	215	760	14	102%	0.5	10	20	10	200%	2.6
36637: Kennedy Road (55_475)	327	230	89	319	-8	97%	0.5	6	4.6	-1	77%	0.6
38570: Midland Avenue (461_479)	536	375	163	538	2	100%	0.1	10	24.4	14	244%	3.5
37550: St Clair Avenue East (474_623)	990	620	239	859	-131	87%	4.3	14	21.2	7	151%	1.7
37537: St Clair Avenue East (471_34)	612	441	165	606	-6	99%	0.3	71	60.2	-11	85%	1.3
47590: Kennedy Road (412_89)	1284	934	358	1292	8	101%	0.2	44	38.8	-5	88%	0.8
48948: Pharmacy Avenue (472_683)	475	376	142	519	44	109%	2.0	7	42.2	35	603%	7.1
48650: St Clair Avenue East (476_4)	878	607	271	878	0	100%	0.0	110	73.8	-36	67%	3.8
38526: St Clair Avenue East (2407_473)	915	614	236	849	-66	93%	2.2	29	30.2	1	104%	0.2
37922: O'Connor Drive (642_448)	802	519	228	748	-54	93%	2.0	155	155.2	0	100%	0.0
37455: O'Connor Drive (447_634)	822	520	228	748	-74	91%	2.6	69	68.8	0	100%	0.0
37874: St Clair Avenue East (623_474)	1395	955	382	1338	-57	96%	1.6	17	35.8	19	211%	3.7
37311: St Clair Avenue East (392_475)	712	481	195	676	-36	95%	1.4	7	22.8	16	326%	4.1
36607: St Clair Avenue East (34_471)	974	713	293	1006	32	103%	1.0	126	105.8	-20	84%	1.9
37384: Midland Avenue (413_436)	751	455	185	640	-111	85%	4.2	16	17.4	1	109%	0.3
37865: St Clair Avenue East (618_473)	1287	945	390	1335	48	104%	1.3	29	72.4	43	250%	6.1
38565: Eglinton Avenue East (460_590)	1852	1250	681	1931	79	104%	1.8	33	29.4	-4	89%	0.6
37358: Victoria Park Avenue (407_280)	1168	1021	353	1374	206	118%	5.8	40	53	13	133%	1.9
37453: O'Connor Drive (447_1836)	1315	946	376	1322	7	101%	0.2	38	22	-16	58%	2.9
48611: Birchmount Road (410_84)	836	592	246	839	3	100%	0.1	101	66.8	-34	66%	3.7
37368: Lawrence Avenue East (410_537)	1703	1082	391	1473	-230	87%	5.8	176	147.6	-28	84%	2.2
36624: Midland Avenue (48_476)	396	284	120	404	8	102%	0.4	51	34.8	-16	68%	2.5
48593: Pharmacy Avenue (408_94)	974	695	276	971	-3	100%	0.1	8	15.6	8	195%	2.2
37858: St Clair Avenue East (615_472)	948	690	269	959	11	101%	0.4	42	50	8	119%	1.2
37383: Lawrence Avenue East (413_550)	850	590	217	808	-42	95%	1.5	30	37.2	7	124%	1.2
37362: Pharmacy Avenue (408_309)	701	525	184	709	8	101%	0.3	2	22.6	21	1130%	5.9
47594: St Clair Avenue East (472_615)	1250	907	379	1286	36	103%	1.0	28	77.4	49	276%	6.8
37425: Kennedy Road (433_475)	499	370	146	516	17	103%	0.7	5	18.6	14	372%	4.0
36826: Bermondsey Road (150_455)	549	400	148	548	-1	100%	0.0	77	73.6	-3	96%	0.4
36563: Bermondsey Road (11_448)	395	269	109	378	-17	96%	0.9	50	23.8	-26	48%	4.3
37558: Midland Avenue (476_64)	325	224	90	314	-11	97%	0.6	44	32.6	-11	74%	1.8
37800: Eglinton Avenue East (590_460)	1207	923	386	1309	102	108%	2.9	17	19.4	2	114%	0.6
37069: Victoria Park Avenue (280_407)	1444	1051	422	1473	29	102%	0.8	16	34.4	18	215%	3.7
37555: Kennedy Road (475_433)	470	358	138	495	25	105%	1.2	5	21	16	420%	4.4
37493: Sloane Avenue (455_266)	578	513	142	655	77	113%	3.1	10	44.6	35	446%	6.6
37877: St Clair Avenue East (624_474)	881	573	218	791	-90	90%	3.1	12	14.2	2	118%	0.6
37365: Lawrence Avenue East (409_521)	1474	1042	383	1425	-49	97%	1.3	17	40.2	23	236%	4.3
37698: Lawrence Avenue East (541_412)	1770	1122	399	1521	-249	86%	6.1	50	77.6	28	155%	3.5
37320: Kennedy Road (393_412)	1283	1017	416	1433	150	112%	4.1	36	52	16	144%	2.4
37379: Kennedy Road (412_393)	651	525	218	743	92	114%	3.5	14	30.8	17	220%	3.5
37462: Yardley Avenue (448_12)	190	147	63	209	19	110%	1.4	34	17.6	-16	52%	3.2
36616: St Clair Avenue East (40_471)	802	586	227	813	11	101%	0.4	83	68.4	-15	82%	1.7
37494: Bermondsey Road (455_150)	624	324	140	464	-160	74%	6.9	25	15.4	-10	62%	2.1
37608: Lawrence Avenue East (499_407)	1966	1394	560	1954	-12	99%	0.3	36	36	0	100%	0.0
47612: Midland Avenue (476_48)	370	273	109	382	12	103%	0.6	30	16.4	-14	55%	2.8
36580: Victoria Park Avenue (18_471)	730	520	210	729	-1	100%	0.0	107	99	-8	93%	0.8
36546: Victoria Park Avenue (2_407)	1057	739	311	1050	-7	99%	0.2	39	35.8	-3	92%	0.5
37491: Eglinton Avenue East (455_554)	1777	783	635	1418	-359	80%	9.0	91	33.4	-58	37%	7.3
37219: Birchmount Road (351_410)	1075	706	271	977	-98	91%	3.1	119	131	12	110%	1.1
36582: St Clair Avenue East (20_447)	148	97	45	143	-5	96%	0.4	4	14.8	11	370%	3.5
38571: Midland Avenue (461_477)	737	535	222	757	20	103%	0.7	24	29.6	6	123%	1.1
37659: Lawrence Avenue East (521_409)	1586	1071	401	1473	-113	93%	2.9	19	32.8	14	173%	2.7
37549: St Clair Avenue East (474_624)	1363	910	361	1271	-92	93%	2.5	16	33.2	17	208%	3.5
37725: Eglinton Avenue East (551_455)	2109	952	644	1596	-513	76%	11.9	82	62.8	-19	77%	2.3
37043: Sloane Avenue (266_455)	573	539	207	746	173	130%	6.7	19	27.8	9	146%	1.8
36565: Yardley Avenue (12_448)	109	90	41	130	21	119%	1.9	18	8.8	-9	49%	2.5
36576: Eglinton Avenue East (16_461)	1151	811	335	1146	-5	100%	0.1	12	8	-4	67%	1.3
37215: Warden Avenue (349_473)	860	640	252	892	32	104%	1.1	24	28	4	117%	0.8
48626: Warden Avenue (473_24)	817	568	231	799	-18	98%	0.6	25	33.2	8	133%	1.5
37166: Pharmacy Avenue (683_472)	916	635	267	903	-13	99%	0.4	39	23.6	-15	61%	2.8
37134: Pharmacy Avenue (309_408)	1144	887	304	1190	46	104%	1.4	7	23	16	329%	4.1
36548: St Clair Avenue East (4_476)	434	315	130	445	11	102%	0.5	55	23.6	-31	43%	5.0

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
37377: Lawrence Avenue East (412_541)	1190	830	324	1154	-36	97%	1.0	16	75.6	60	473%	8.8
37553: St Clair Avenue East (475_629)	1253	826	339	1166	-87	93%	2.5	10	43.6	34	436%	6.5
49247: Kennedy Road (460_679)	781	554	222	777	-4	99%	0.2	13	17	4	131%	1.0
37554: St Clair Avenue East (475_626)	812	568	217	785	-27	97%	0.9	7	14	7	200%	2.2
37461: O'Connor Drive (448_642)	686	509	204	713	27	104%	1.0	79	75.6	-3	96%	0.4
36670: Midland Avenue (64_476)	319	237	100	338	19	106%	1.0	28	29	1	104%	0.2
37631: Lawrence Avenue East (510_408)	1449	1022	372	1394	-55	96%	1.5	16	37.8	22	236%	4.2
37544: Pharmacy Avenue (472_95)	886	610	259	869	-17	98%	0.6	39	0	-39	0%	8.8
37535: St Clair Avenue East (471_40)	1196	931	385	1316	120	110%	3.4	163	131.6	-31	81%	2.6
37561: Midland Avenue (477_461)	765	495	184	679	-86	89%	3.2	12	19.2	7	160%	1.8
37680: Lawrence Avenue East (531_410)	1367	915	330	1245	-122	91%	3.4	141	111	-30	79%	2.7
37369: Lawrence Avenue East (410_531)	1127	815	295	1110	-17	98%	0.5	128	119	-9	93%	0.8
38371: St Clair Avenue East (1283_476)	920	597	260	857	-63	93%	2.1	108	61.4	-47	57%	5.1
37664: Lawrence Avenue East (523_409)	1437	1070	397	1467	30	102%	0.8	114	120.2	6	105%	0.6
37905: O'Connor Drive (634_447)	1120	785	324	1109	-11	99%	0.3	38	61.4	23	162%	3.3
37705: Lawrence Avenue East (542_412)	1030	713	268	981	-49	95%	1.6	23	30.4	7	132%	1.4
36699: Birchmount Road (85_474)	495	354	156	510	15	103%	0.7	15	13.2	-2	88%	0.5
38453: O'Connor Drive (1836_474)	1735	1214	509	1723	-12	99%	0.3	81	47	-34	58%	4.3
48605: Warden Avenue (409_72)	1122	799	329	1128	6	100%	0.2	123	120.4	-3	98%	0.2
37547: Warden Avenue (473_349)	771	577	235	812	41	105%	1.5	9	21.2	12	236%	3.1
37545: St Clair Avenue East (473_2407)	1266	923	363	1286	20	102%	0.5	29	47.6	19	164%	3.0
37400: Kennedy Road (679_460)	876	685	258	942	66	108%	2.2	8	26.8	19	335%	4.5
37125: Victoria Park Avenue (307_471)	834	636	262	898	64	108%	2.2	85	64	-21	75%	2.4
37360: Lawrence Avenue East (408_510)	1691	1153	435	1588	-103	94%	2.5	13	32.2	19	248%	4.0
48668: Lawrence Avenue East (413_8)	1687	1180	478	1657	-30	98%	0.7	33	18.8	-14	57%	2.8
37370: Birchmount Road (410_351)	758	506	223	729	-29	96%	1.1	76	70.8	-5	93%	0.6
47603: Kennedy Road (475_55)	351	247	95	341	-10	97%	0.5	3	0.8	-2	27%	1.6
48587: Victoria Park Avenue (407_2)	1490	1053	433	1486	-4	100%	0.1	22	20.6	-1	94%	0.3
37300: Birchmount Road (387_474)	625	394	151	545	-80	87%	3.3	10	16.6	7	166%	1.8
37492: Eglinton Avenue East (455_551)	1414	1126	427	1553	139	110%	3.6	133	129	-4	97%	0.3
36701: Kennedy Road (89_412)	775	555	240	795	20	103%	0.7	29	30.8	2	106%	0.3
37356: Lawrence Avenue East (407_502)	1877	1158	502	1660	-217	88%	5.2	36	27.2	-9	76%	1.6
48632: Birchmount Road (474_85)	528	362	149	511	-17	97%	0.7	10	12	2	120%	0.6
37881: St Clair Avenue East (626_475)	1348	918	361	1280	-68	95%	1.9	7	33.4	26	477%	5.9
37459: St Clair Avenue East (447_20)	163	107	45	152	-11	93%	0.9	2	12.8	11	640%	4.0
37546: St Clair Avenue East (473_618)	954	691	265	956	2	100%	0.1	29	49.6	21	171%	3.3
37460: O'Connor Drive (448_644)	726	406	184	591	-135	81%	5.3	129	92	-37	71%	3.5
47593: Midland Avenue (413_46)	867	598	241	839	-28	97%	1.0	33	31	-2	94%	0.4
37690: Lawrence Avenue East (537_410)	1116	763	299	1062	-54	95%	1.6	139	101.6	-37	73%	3.4
38569: Eglinton Avenue East (461_591)	1291	962	409	1371	80	106%	2.2	13	14.8	2	114%	0.5
37458: St Clair Avenue East (447_594)	1243	914	376	1290	47	104%	1.3	16	44.2	28	276%	5.1
48656: Eglinton Avenue East (461_16)	1847	1110	536	1645	-202	89%	4.8	26	10.6	-15	41%	3.6
36706: Pharmacy Avenue (94_408)	622	443	178	621	-1	100%	0.0	1	15.4	14	1540%	5.0
37357: Lawrence Avenue East (407_499)	857	606	255	861	4	100%	0.1	51	45.4	-6	89%	0.8
37735: Eglinton Avenue East (557_455)	1162	847	345	1191	29	103%	0.9	81	59.6	-21	74%	2.6
37364: Lawrence Avenue East (409_523)	1551	1134	430	1564	13	101%	0.3	25	56.4	31	226%	4.9
48620: Victoria Park Avenue (471_18)	887	635	261	896	9	101%	0.3	80	78.6	-1	98%	0.2
38568: Kennedy Road (460_419)	959	755	331	1086	127	113%	4.0	11	30.8	20	280%	4.3
37723: Lawrence Avenue East (550_413)	1805	1168	441	1609	-196	89%	4.7	32	44.6	13	139%	2.0
38566: Eglinton Avenue East (460_587)	1185	888	387	1275	90	108%	2.6	21	33.6	13	160%	2.4
36707: Pharmacy Avenue (95_472)	265	194	75	269	4	102%	0.3	10	0	-10	0%	4.5
37706: Lawrence Avenue East (412_61)	1733	1126	428	1554	-179	90%	4.4	64	45.8	-18	72%	2.5
37613: Lawrence Avenue East (502_407)	925	655	249	903	-22	98%	0.7	58	40.2	-18	69%	2.5
36698: Birchmount Road (84_410)	866	613	254	867	1	100%	0.0	82	60	-22	73%	2.6
37795: Eglinton Avenue East (587_460)	1791	1179	714	1893	102	106%	2.4	34	31.2	-3	92%	0.5
37925: O'Connor Drive (644_448)	582	379	158	537	-45	92%	1.9	74	51.6	-22	70%	2.8
36558: Lawrence Avenue East (8_413)	799	558	224	781	-18	98%	0.6	39	22.8	-16	58%	2.9
37810: St Clair Avenue East (594_447)	540	389	148	538	-2	100%	0.1	2	24.2	22	1210%	6.1
37534: Victoria Park Avenue (471_307)	645	449	182	631	-14	98%	0.6	87	68.4	-19	79%	2.1
37171: Warden Avenue (327_409)	1118	734	296	1029	-89	92%	2.7	26	46.8	21	180%	3.4
37565: Midland Avenue (479_461)	512	351	125	476	-36	93%	1.6	17	22.8	6	134%	1.3
37551: Birchmount Road (474_387)	515	383	158	540	25	105%	1.1	14	13.4	-1	96%	0.2
37432: Midland Avenue (436_413)	811	572	233	805	-6	99%	0.2	25	23.4	-2	94%	0.3
37396: Kennedy Road (419_460)	903	661	264	925	22	102%	0.7	19	33.2	14	175%	2.8
37557: St Clair Avenue East (476_1283)	496	334	142	476	-20	96%	0.9	58	26	-32	45%	4.9

PM Peak Hour – Turn Volume

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
45397: TCS1996 EBL	328	141	41	182	-146	56%	9.1	20	5.6	-14	28%	4.0
44961: TCS1295 SBL	174	151	25	177	3	102%	0.2	0	5.6	6	0%	3.3
47038: TCS450 WBL	598	361	156	517	-81	86%	3.4	30	24	-6	80%	1.2
45836: TCS452 SBR	214	131	26	157	-57	73%	4.2	12	10.4	-2	87%	0.5
41859: TCS457 NBL	240	118	38	155	-85	65%	6.0	9	2	-7	22%	3.0
44978: TCS1377 NBR	68	57	22	78	10	115%	1.2	0	1	1	0%	1.4
45089: TCS1617 SBT	719	453	200	653	-66	91%	2.5	28	19.4	-9	69%	1.8
45361: TCS1872 EBR	11	32	15	46	35	422%	6.6	1	2.8	2	280%	1.3
45838: TCS452 SBT	568	379	138	518	-50	91%	2.2	12	12.4	0	103%	0.1
45365: TCS1872 NBL	72	37	22	60	-12	83%	1.5	4	2	-2	50%	1.2
39789: TCS202 SBR	216	159	50	209	-7	97%	0.5	0	0	0	0%	#DIV/0!
45867: TCS456 WBR	118	82	31	113	-5	96%	0.5	0	10.4	10	0%	4.6
47033: TCS450 SBT	123	46	23	69	-54	56%	5.5	0	1.4	1	0%	1.7
45319: TCS1791 NBT	237	163	38	201	-36	85%	2.4	2	2	0	100%	0.0
45819: TCS451 WBT	960	780	361	1141	181	119%	5.6	62	55.2	-7	89%	0.9
44984: TCS1377 SBR	243	167	42	209	-34	86%	2.2	3	7.8	5	260%	2.1
45441: TCS2069 NBL	95	15	5	20	-75	21%	9.9	4	0.8	-3	20%	2.1
45830: TCS452 NBR	83	114	40	154	71	185%	6.5	12	5.2	-7	43%	2.3
45872: TCS458 EBL	204	100	81	181	-23	89%	1.7	0	4	4	0%	2.8
45085: TCS1617 NBT	648	676	263	940	292	145%	10.3	8	29.6	22	370%	5.0
45824: TCS452 EBR	116	47	39	86	-30	74%	2.9	16	2.8	-13	18%	4.3
45309: TCS1791 EBL	51	38	13	52	1	101%	0.1	0	3	3	0%	2.4
44980: TCS1377 NBT	967	627	268	895	-72	93%	2.4	36	40	4	111%	0.6
39795: TCS202 WBR	80	40	14	54	-26	68%	3.1	0	4.4	4	0%	3.0
37484: TCS449 WBR	37	2	2	4	-33	11%	7.3	0	0	0	0%	#DIV/0!
44959: TCS1295 NBT	746	503	210	713	-33	96%	1.2	26	9.4	-17	36%	3.9
45892: TCS458 WBR	182	145	51	196	14	108%	1.0	0	5.8	6	0%	3.4
45886: TCS458 SBR	154	85	52	137	-17	89%	1.4	0	15.2	15	0%	5.5
45399: TCS1996 EBR	138	125	38	163	25	118%	2.0	10	3.8	-6	38%	2.4
45367: TCS1872 NBR	23	88	54	142	119	617%	13.1	0	5.4	5	0%	3.3
45857: TCS456 NBT	655	459	179	638	-17	97%	0.7	50	28.8	-21	58%	3.4
45451: TCS2069 SBT	2	18	9	28	26	1390%	6.7	0	0.4	0	0%	0.9
45809: TCS451 NBT	1014	679	254	933	-81	92%	2.6	26	40.8	15	157%	2.6
45403: TCS1996 NBT	787	504	216	720	-67	92%	2.4	63	57.6	-5	91%	0.7
41777: TCS450 WBT	1088	819	402	1221	133	112%	3.9	62	55.8	-6	90%	0.8
45369: TCS1872 NBT	35	21	3	24	-11	70%	1.9	1	0.4	-1	40%	0.7
36801: TCS449 EBR	85	57	21	78	-7	92%	0.8	0	6.4	6	0%	3.6
45861: TCS456 SBR	238	115	93	209	-29	88%	2.0	5	2	-3	40%	1.6
45828: TCS452 NBL	89	161	60	221	132	248%	10.6	9	12.6	4	140%	1.1
41857: TCS457 EBT	1668	940	710	1650	-18	99%	0.4	59	41.6	-17	71%	2.5
45847: TCS456 EBL	210	112	58	170	-40	81%	2.9	3	2.2	-1	73%	0.5
45869: TCS456 WBT	1073	646	349	995	-78	93%	2.4	55	47	-8	85%	1.1
45313: TCS1791 EBT	1483	735	573	1309	-174	88%	4.7	62	46.6	-15	75%	2.1
39781: TCS202 NBL	227	100	55	155	-72	68%	5.2	0	0.8	1	0%	1.3
45081: TCS1617 EBR	98	64	23	87	-11	89%	1.1	1	0.8	0	80%	0.2
41762: TCS449 WBT	515	299	128	428	-87	83%	4.0	30	23.4	-7	78%	1.3
44982: TCS1377 SBL	67	35	11	46	-21	69%	2.8	1	1	0	100%	0.0
45323: TCS1791 SBR	55	30	13	43	-12	78%	1.7	0	0.2	0	0%	0.6
45457: TCS2069 WBT	392	321	70	391	-1	100%	0.0	21	15	-6	71%	1.4
45375: TCS1872 SBT	11	11	3	13	2	122%	0.7	0	0.4	0	0%	0.9
39793: TCS202 WBL	85	74	13	87	2	102%	0.2	0	4.2	4	0%	2.9
45844: TCS452 WBT	1479	915	492	1407	-72	95%	1.9	71	57.6	-13	81%	1.7
45822: TCS452 EBL	211	104	69	174	-37	82%	2.7	20	2.4	-18	12%	5.3
39779: TCS202 EBT	60	28	10	38	-22	63%	3.2	0	0	0	0%	#DIV/0!
45832: TCS452 NBT	661	571	189	760	99	115%	3.7	13	14.2	1	109%	0.3
45317: TCS1791 NBR	189	120	76	196	7	104%	0.5	4	2	-2	50%	1.2
45851: TCS456 EBT	1453	773	606	1379	-74	95%	2.0	64	43	-21	67%	2.9
45894: TCS458 WBT	845	555	275	830	-15	98%	0.5	32	29.4	-3	92%	0.5
45405: TCS1996 SBR	182	91	28	119	-63	65%	5.2	8	2.4	-6	30%	2.5
45817: TCS451 WBR	151	92	43	135	-16	89%	1.4	0	0	0	0%	#DIV/0!
44988: TCS1377 WBL	44	35	29	64	20	145%	2.7	0	1	1	0%	1.4
39787: TCS202 SBL	102	96	9	105	3	103%	0.3	0	2.4	2	0%	2.2
44992: TCS1377 WBT	282	224	55	280	-2	99%	0.1	1	8.8	8	880%	3.5
45315: TCS1791 NBL	265	150	70	221	-44	83%	2.8	7	2.4	-5	34%	2.1
45859: TCS456 SBL	108	74	44	119	11	110%	1.0	5	0.4	-5	8%	2.8
39783: TCS202 NBR	109	115	24	140	31	128%	2.8	0	13.6	14	0%	5.2
39797: TCS202 WBT	193	146	41	187	-6	97%	0.5	0	3.4	3	0%	2.6

Object	Car							Truck				
	Observed	Simulated			Diff.		GEH	Observed	Simulated	Diff.		GEH
		SOV	HOV	Total	Abs.	%				Abs.	%	
39785: TCS202 NBT	1098	785	316	1101	3	100%	0.1	29	23	-6	79%	1.2
44963: TCS1295 SBT	638	445	180	625	-13	98%	0.5	33	15.8	-17	48%	3.5
45079: TCS1617 EBL	235	165	23	188	-47	80%	3.2	4	2.6	-1	65%	0.8
45826: TCS452 EBT	1596	788	634	1421	-175	89%	4.5	100	56	-44	56%	5.0
45381: TCS1872 WBT	1066	658	340	997	-69	94%	2.1	89	61	-28	69%	3.2
45377: TCS1872 WBL	10	25	10	35	25	346%	5.2	2	0.6	-1	30%	1.2
45811: TCS451 SBR	148	67	15	82	-66	55%	6.2	0	2	2	0%	2.0
38316: TCS449 NBR	121	52	23	74	-47	61%	4.7	0	0.2	0	0%	0.6
41767: TCS450 NBR	618	328	184	513	-105	83%	4.4	34	34.4	0	101%	0.1
45834: TCS452 SBL	166	124	59	183	17	110%	1.3	13	3	-10	23%	3.5
41775: TCS450 WBR	96	31	22	53	-43	56%	4.9	0	0.6	1	0%	1.1
45863: TCS456 SBT	748	546	205	751	3	100%	0.1	32	21.6	-10	68%	2.0
45842: TCS452 WBR	78	63	56	119	41	153%	4.1	8	0.6	-7	8%	3.6
45373: TCS1872 SBR	126	87	39	126	0	100%	0.0	5	3.6	-1	72%	0.7
41740: TCS449 EBL	190	106	42	148	-42	78%	3.3	5	11.8	7	236%	2.3
41855: TCS457 EBR	27	14	6	19	-8	71%	1.6	0	0.4	0	0%	0.9
41865: TCS457 WBT	1029	692	352	1044	15	101%	0.5	47	62	15	132%	2.0
45379: TCS1872 WBR	60	4	3	7	-53	11%	9.3	3	0	-3	0%	2.4
44957: TCS1295 NBR	228	189	63	251	23	110%	1.5	12	6	-6	50%	2.0
41752: TCS449 SBL	155	92	40	131	-24	85%	2.0	0	0	0	0%	#DIV/0!
45884: TCS458 SBL	181	131	64	194	13	107%	1.0	0	2.6	3	0%	2.3
45407: TCS1996 SBT	639	466	206	672	33	105%	1.3	52	61	9	117%	1.2
39791: TCS202 SBT	797	684	253	937	140	118%	4.7	33	51.2	18	155%	2.8
45325: TCS1791 SBT	238	153	47	199	-39	84%	2.6	0	1.2	1	0%	1.5
41863: TCS457 WBL	51	21	10	31	-20	60%	3.2	3	4.2	1	140%	0.6
45803: TCS451 EBR	148	100	80	180	32	122%	2.5	5	6.2	1	124%	0.5
45359: TCS1872 EBL	98	44	27	70	-28	72%	3.0	6	1.6	-4	27%	2.3
45435: TCS2069 EBL	0	5	2	7	7	0%	3.8	0	0	0	0%	#DIV/0!
45087: TCS1617 SBR	78	63	21	84	6	107%	0.6	1	0.6	0	60%	0.4
45437: TCS2069 EBR	68	50	18	68	0	99%	0.0	5	1	-4	20%	2.3
45878: TCS458 NBL	163	75	38	113	-50	69%	4.3	1	13.6	13	1360%	4.7
41750: TCS449 NBT	795	575	221	796	1	100%	0.0	21	29.2	8	139%	1.6
45371: TCS1872 SBL	67	82	35	117	50	174%	5.2	2	1	-1	50%	0.8
44970: TCS1377 EBL	242	219	55	274	32	113%	2.0	7	8.8	2	126%	0.6
44986: TCS1377 SBT	910	575	263	837	-73	92%	2.5	32	24.2	-8	76%	1.5
44976: TCS1377 NBL	45	20	6	25	-20	56%	3.3	1	0.6	0	60%	0.4
45329: TCS1791 WBR	65	36	20	56	-9	86%	1.2	1	1.6	1	160%	0.5
39777: TCS202 EBR	70	37	13	50	-20	71%	2.6	0	0	0	0%	#DIV/0!
44972: TCS1377 EBR	44	74	29	103	59	235%	6.9	0	0.8	1	0%	1.3
45813: TCS451 SBT	771	697	255	951	180	123%	6.1	31	53.2	22	172%	3.4
45447: TCS2069 SBL	10	23	14	36	26	364%	5.5	0	0.8	1	0%	1.3
45327: TCS1791 WBL	166	105	50	155	-11	93%	0.9	3	0.8	-2	27%	1.6
41756: TCS449 SBT	586	575	241	816	230	139%	8.7	25	46	21	184%	3.5
45445: TCS2069 NBT	0	12	4	16	16	0%	5.7	0	1	1	0%	1.4
45807: TCS451 NBR	6	2	11	13	7	213%	2.2	0	0	0	0%	#DIV/0!
45801: TCS451 EBL	166	57	39	96	-70	58%	6.1	5	0.8	-4	16%	2.5
45311: TCS1791 EBR	115	100	53	152	37	133%	3.2	1	4.4	3	440%	2.1
44990: TCS1377 WBR	116	64	29	93	-23	80%	2.3	3	1.6	-1	53%	0.9
45876: TCS458 EBT	1593	910	663	1573	-20	99%	0.5	78	38.8	-39	50%	5.1
45331: TCS1791 WBT	1271	859	479	1338	67	105%	1.9	63	52.6	-10	83%	1.4
44967: TCS1295 WBR	188	243	59	302	114	161%	7.3	0	8.6	9	0%	4.1
41758: TCS449 WBL	169	107	51	157	-12	93%	0.9	0	1.6	2	0%	1.8
41754: TCS449 SBR	200	157	80	237	37	118%	2.5	9	14.2	5	158%	1.5
45439: TCS2069 EBT	330	344	89	432	102	131%	5.2	22	12.4	-10	56%	2.3
45888: TCS458 SBT	411	338	124	462	51	112%	2.4	56	48.2	-8	86%	1.1
45853: TCS456 NBL	192	158	79	237	45	124%	3.1	0	3.4	3	0%	2.6
45449: TCS2069 SBR	4	7	4	11	7	285%	2.7	0	0.4	0	0%	0.9
41765: TCS450 EBT	1504	615	513	1129	-375	75%	10.3	73	27.4	-46	38%	6.4
45455: TCS2069 WBR	5	33	13	47	42	932%	8.2	0	1.2	1	0%	1.5
45890: TCS458 WBL	150	109	34	143	-7	95%	0.6	0	5	5	0%	3.2
45815: TCS451 WBL	85	27	26	53	-32	62%	3.9	0	1	1	0%	1.4
45321: TCS1791 SBL	91	55	37	92	1	101%	0.1	0	0	0	0%	#DIV/0!
45855: TCS456 NBR	242	38	43	81	-161	33%	12.7	0	0.4	0	0%	0.9
41861: TCS457 NBR	171	120	66	185	14	108%	1.1	4	4.2	0	105%	0.1
44974: TCS1377 EBT	343	207	43	251	-92	73%	5.4	5	7	2	140%	0.8

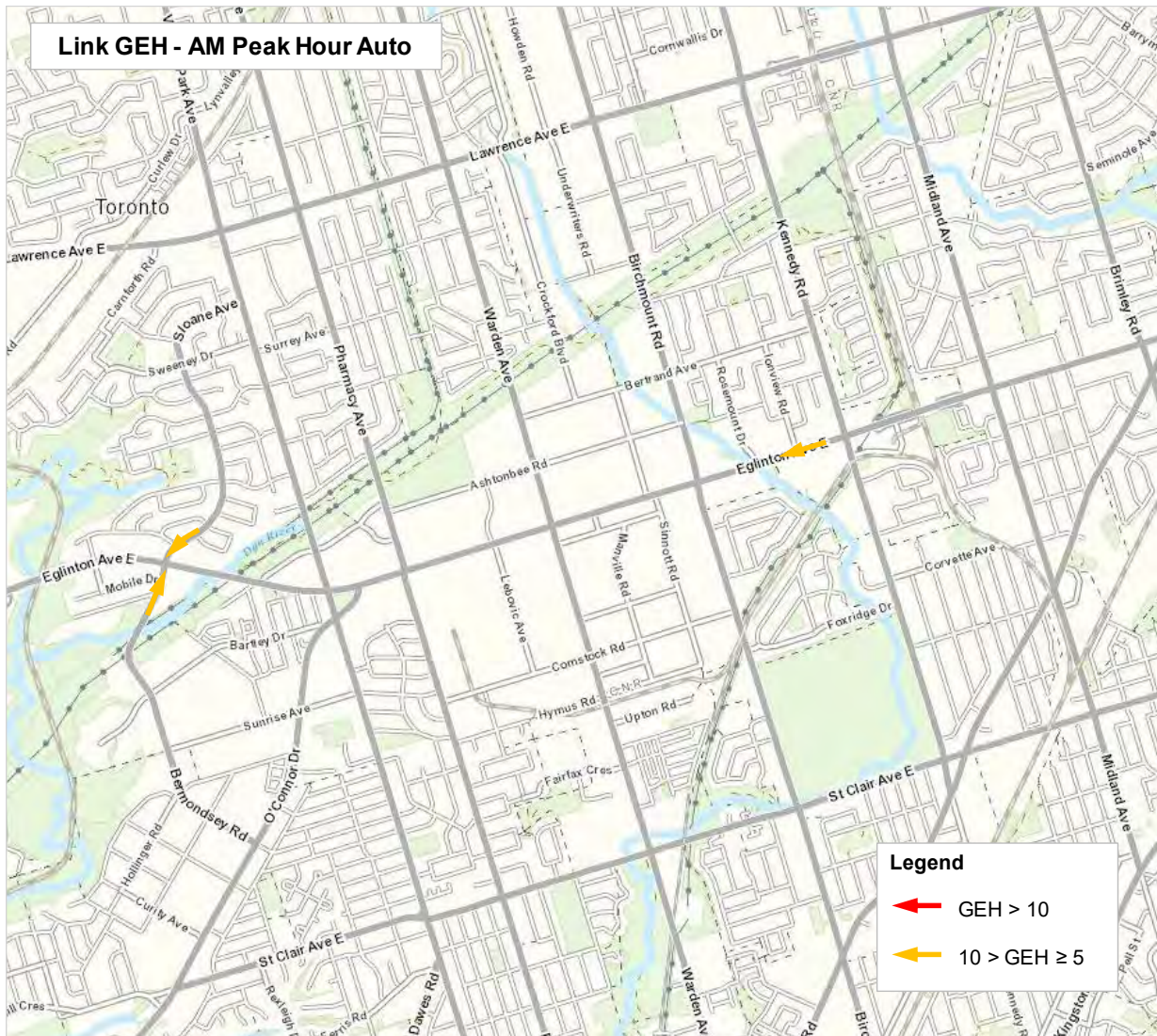
45874: TCS458 EBR	126	55	31	86	-40	68%	3.9	0	1.8	2	0%	1.9
41746: TCS449 NBL	113	64	22	85	-28	76%	2.8	0	1.6	2	0%	1.8
45453: TCS2069 WBL	106	63	20	84	-22	79%	2.3	5	1	-4	20%	2.3
45363: TCS1872 EBT	1439	815	652	1467	28	102%	0.7	94	39.2	-55	42%	6.7
45882: TCS458 NBT	544	354	118	473	-71	87%	3.2	58	37.6	-20	65%	3.0
45805: TCS451 EBT	1493	609	501	1109	-384	74%	10.6	73	26.4	-47	36%	6.6
45083: TCS1617 NBL	90	75	20	95	5	106%	0.5	1	0	-1	0%	1.4
44965: TCS1295 WBL	188	113	18	131	-57	70%	4.5	0	7.6	8	0%	3.9
45865: TCS456 WBL	112	56	24	80	-32	71%	3.3	0	9.2	9	0%	4.3
45880: TCS458 NBR	184	206	70	276	92	150%	6.0	0	12.6	13	0%	5.0
45443: TCS2069 NBR	141	127	26	153	12	109%	1.0	9	3.4	-6	38%	2.2
39775: TCS202 EBL	86	41	17	58	-28	68%	3.3	0	0	0	0%	#DIV/0!
45849: TCS456 EBR	164	90	53	142	-22	87%	1.7	7	1.2	-6	17%	2.9
45840: TCS452 WBL	128	95	45	140	12	109%	1.0	12	5	-7	42%	2.4
41769: TCS450 SBR	108	81	32	113	5	105%	0.5	0	1	1	0%	1.4
45401: TCS1996 NBL	47	64	22	87	40	184%	4.8	5	3.8	-1	76%	0.6
41744: TCS449 EBT	597	282	162	444	-153	74%	6.7	21	34.6	14	165%	2.6



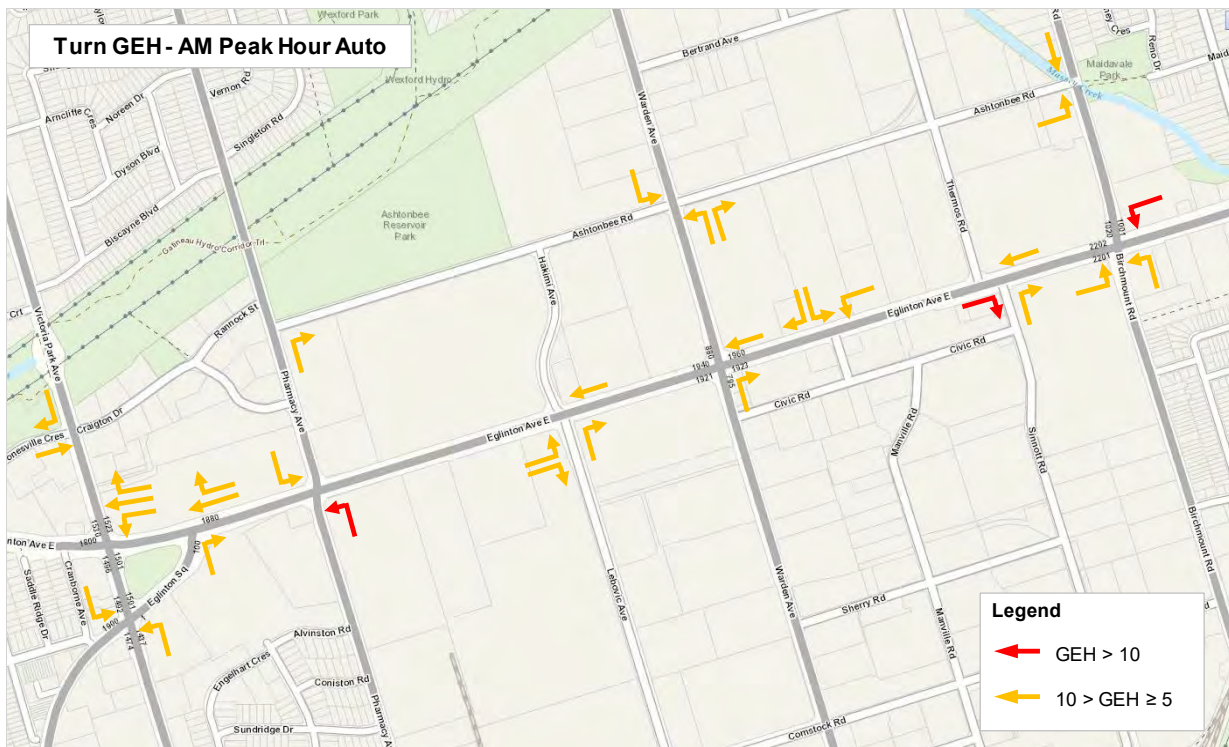
Tech Memo Appendix II

Link Sections and Turning Movements with GEH over 5

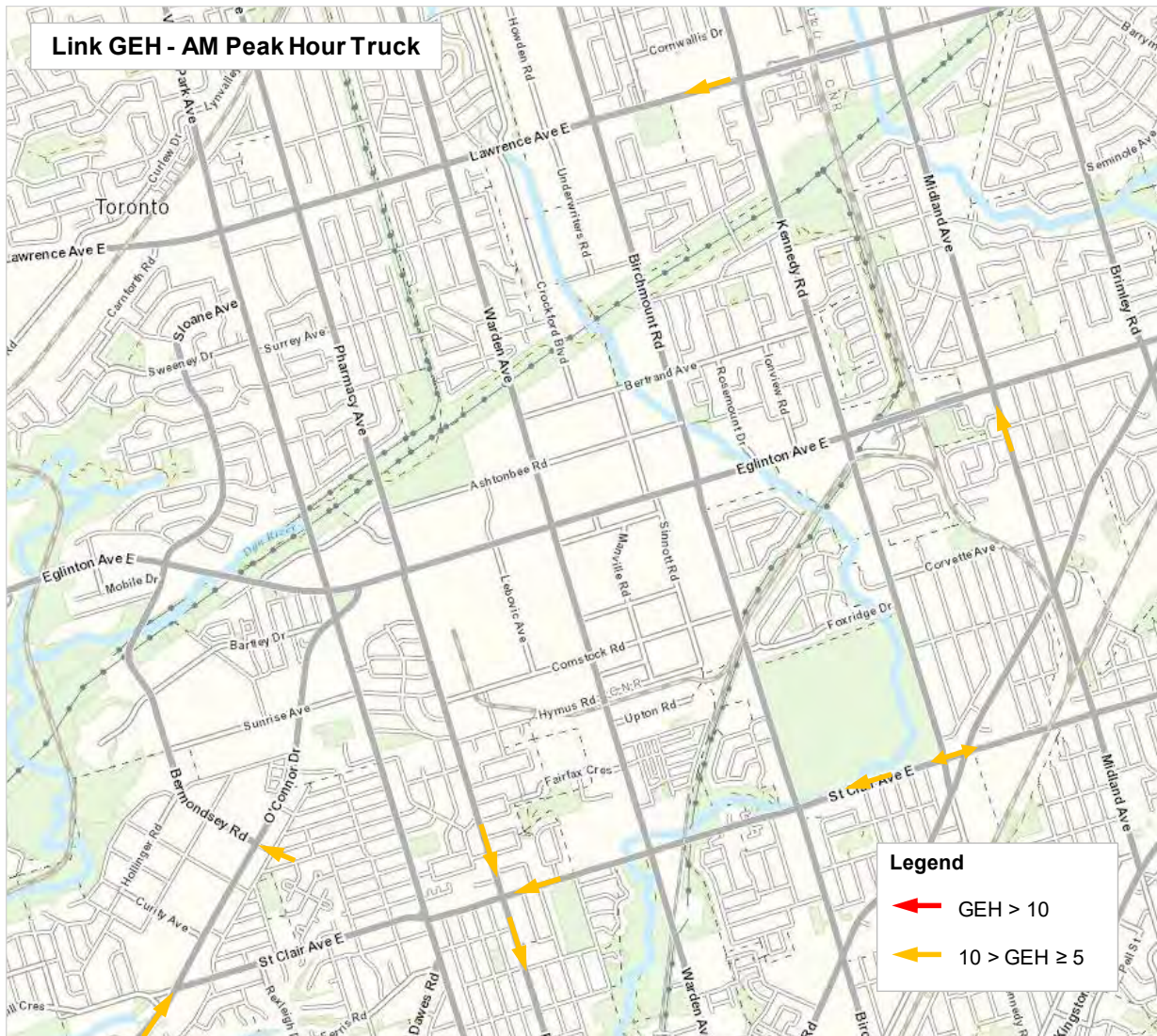
Link GEH - AM Peak Hour Auto



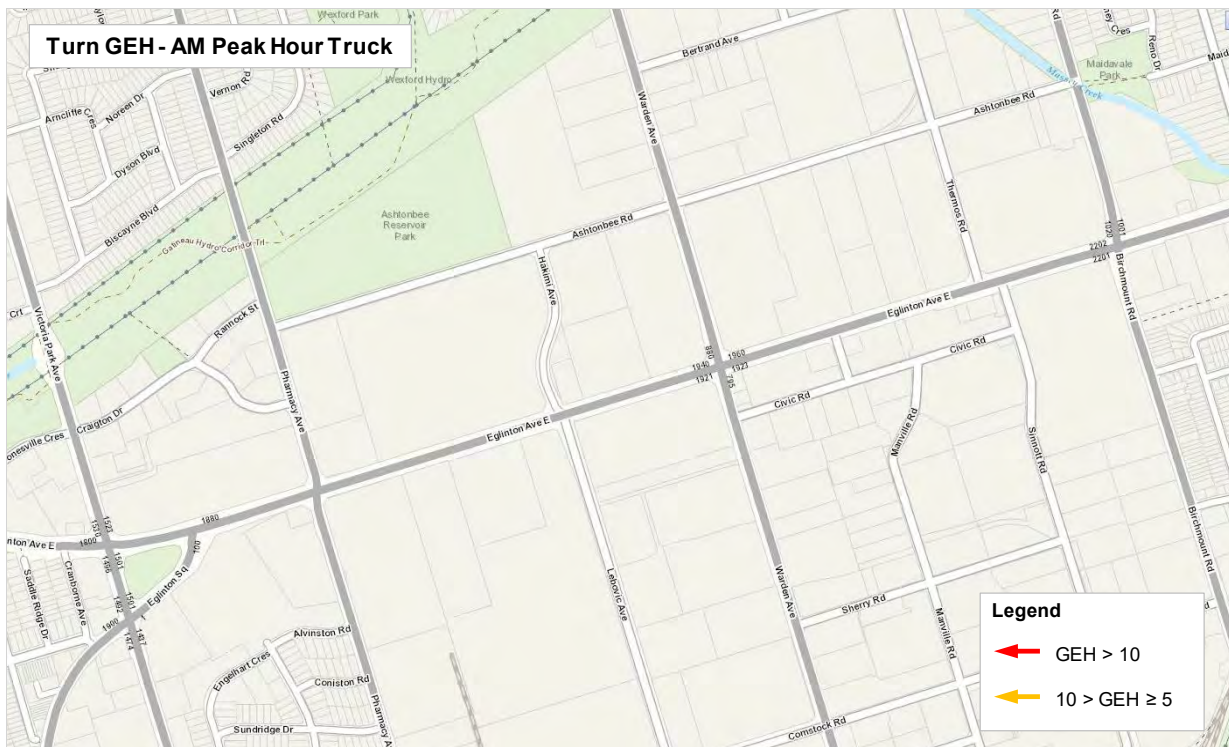
Turn GEH - AM Peak Hour Auto



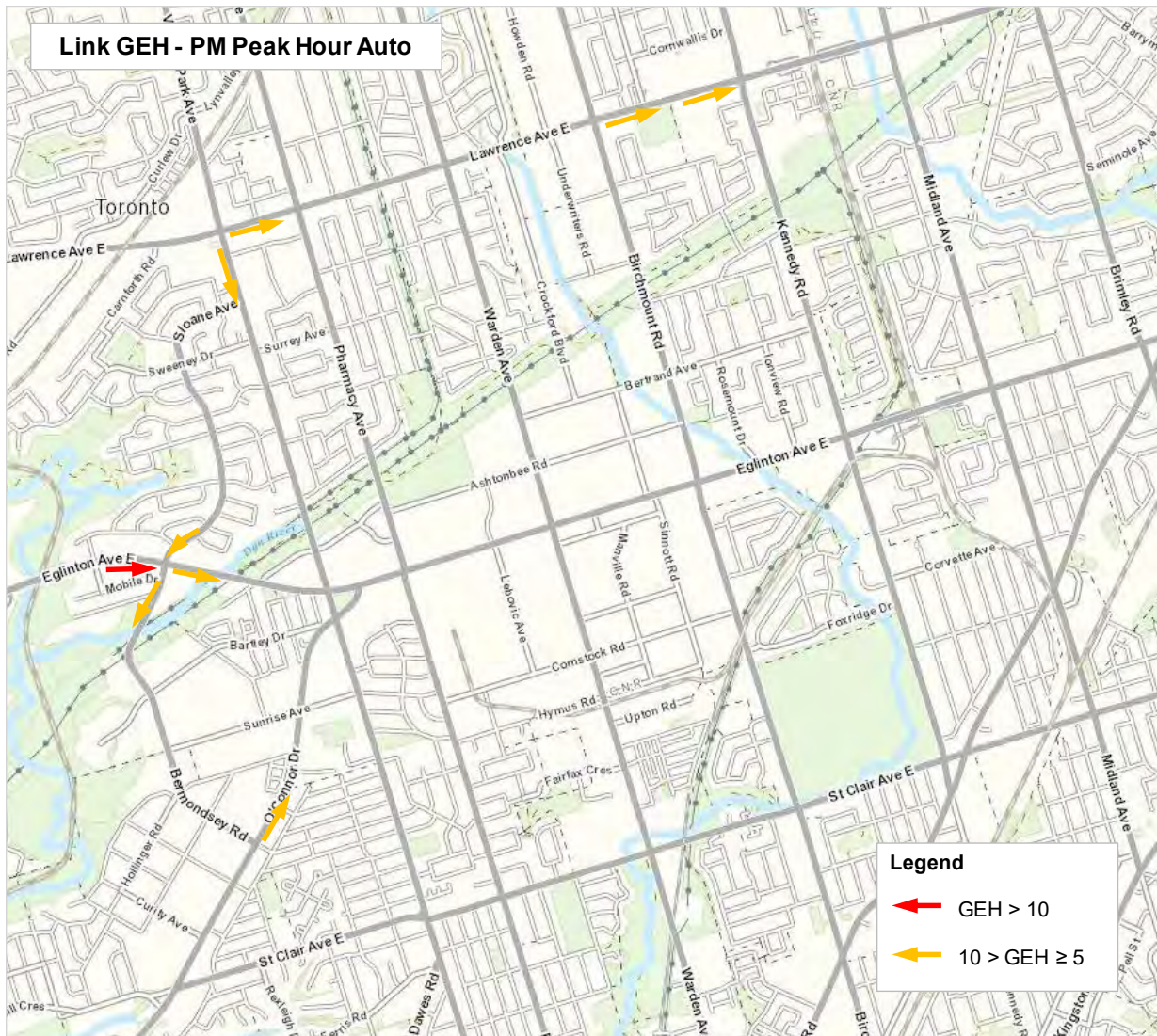
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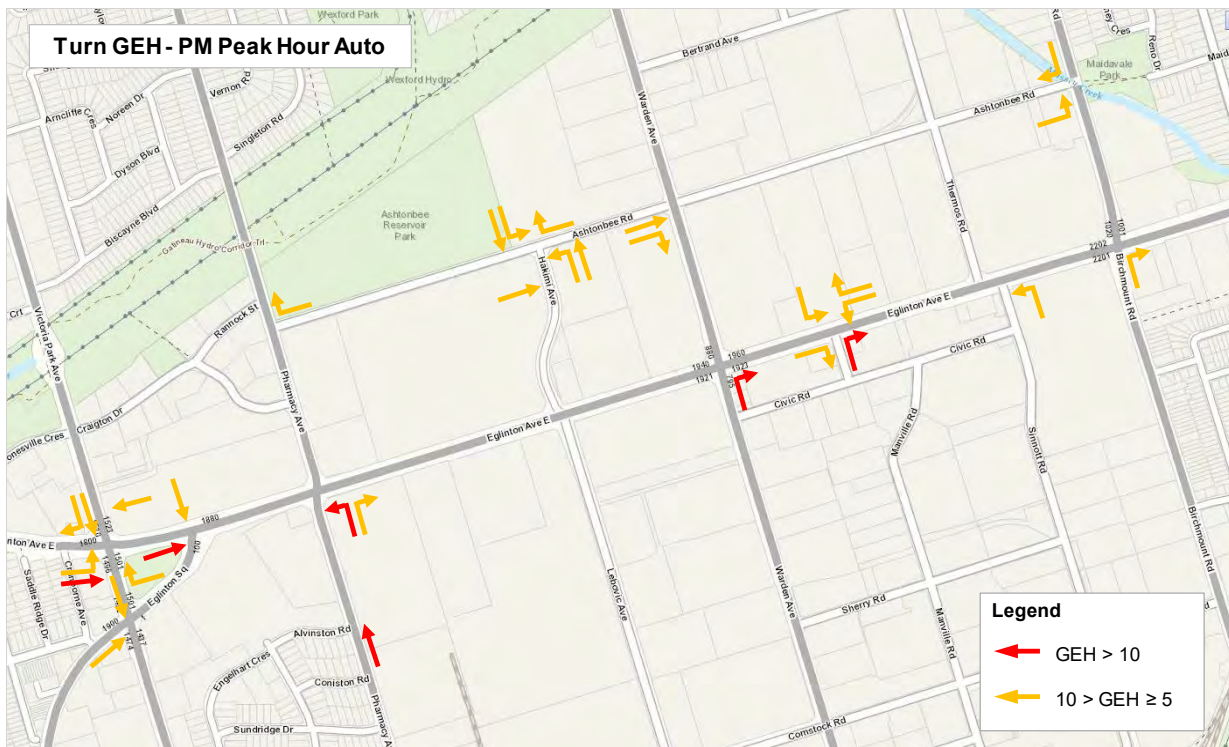
Turn GEH - AM Peak Hour Truck

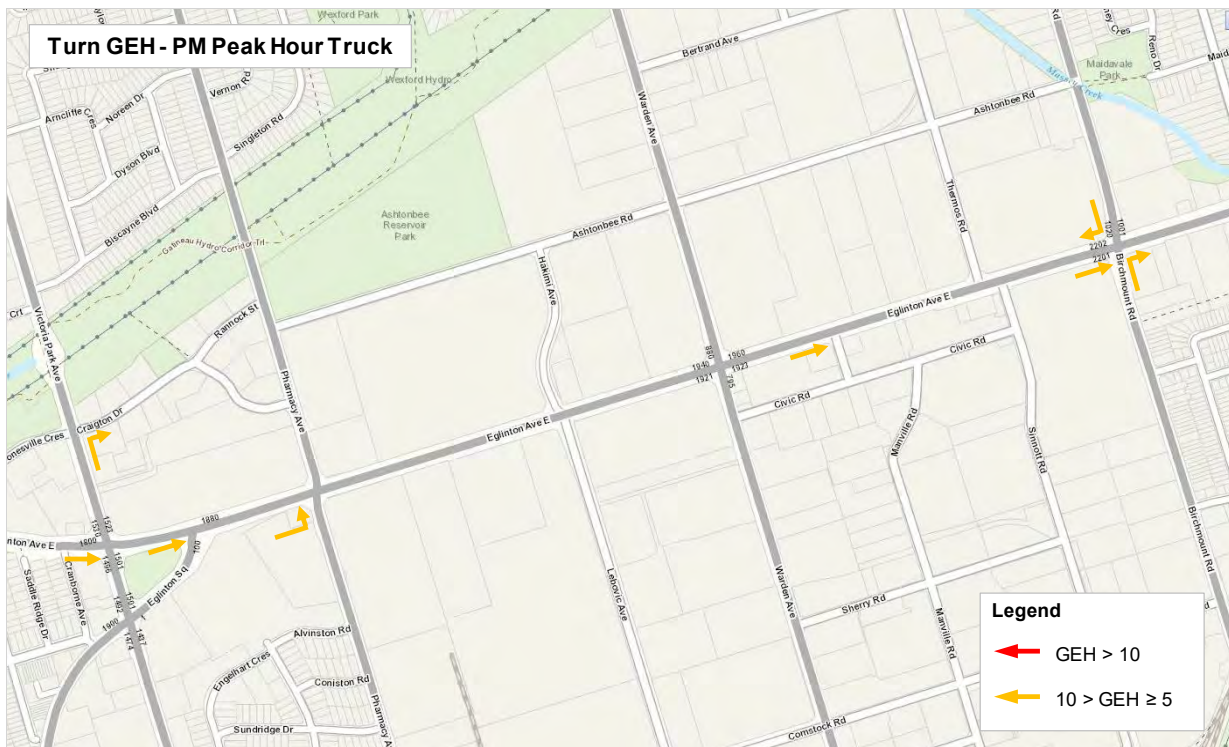
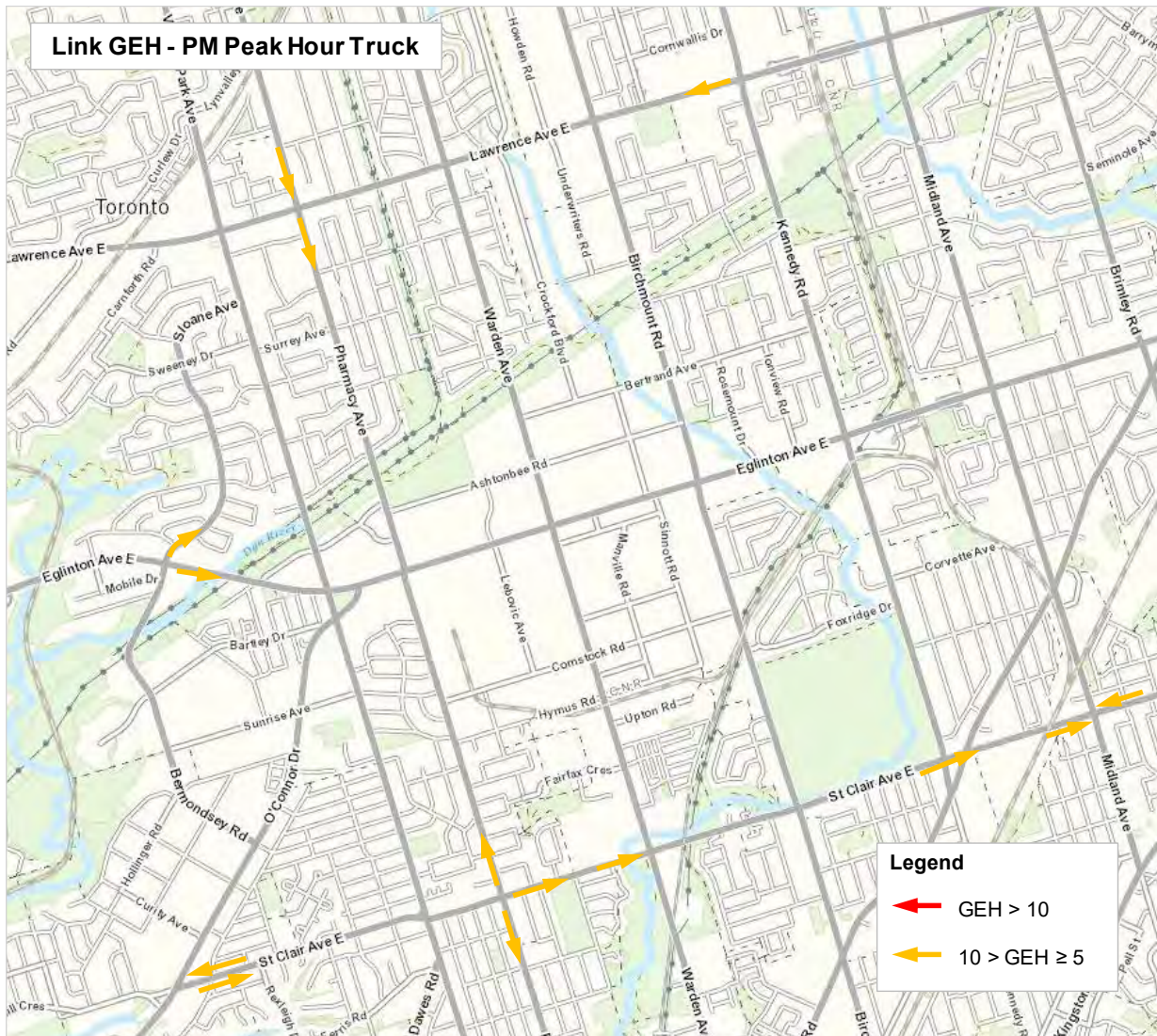


Link GEH - PM Peak Hour Auto



Turn GEH - PM Peak Hour Auto



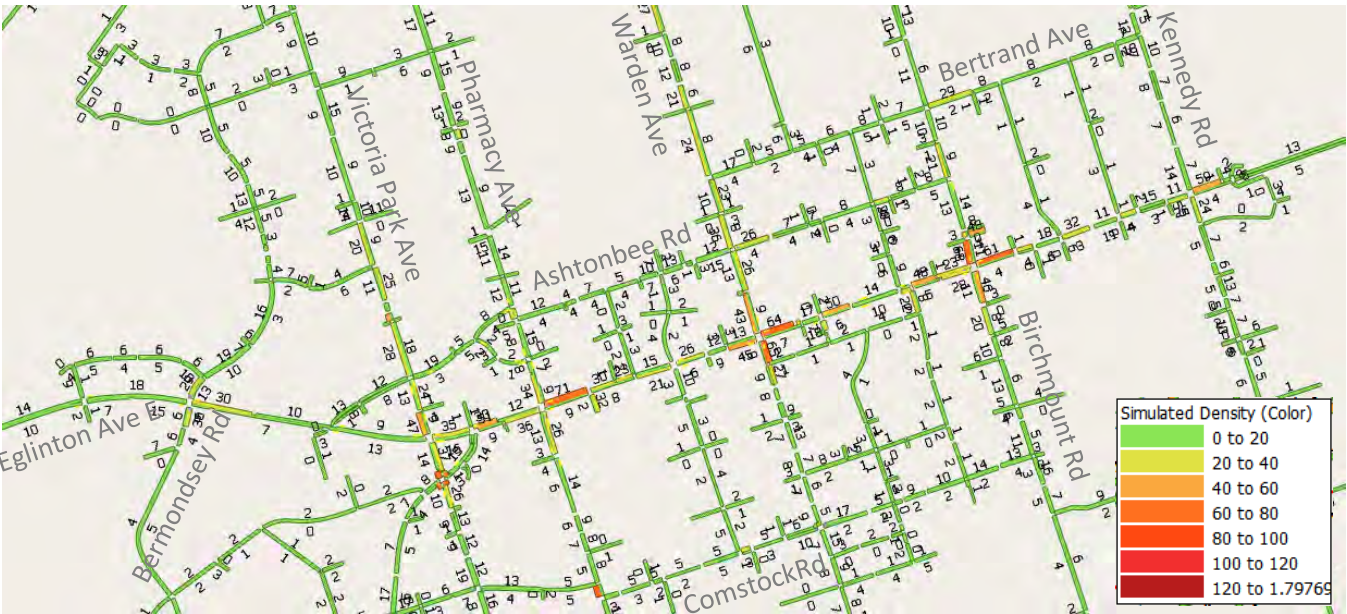
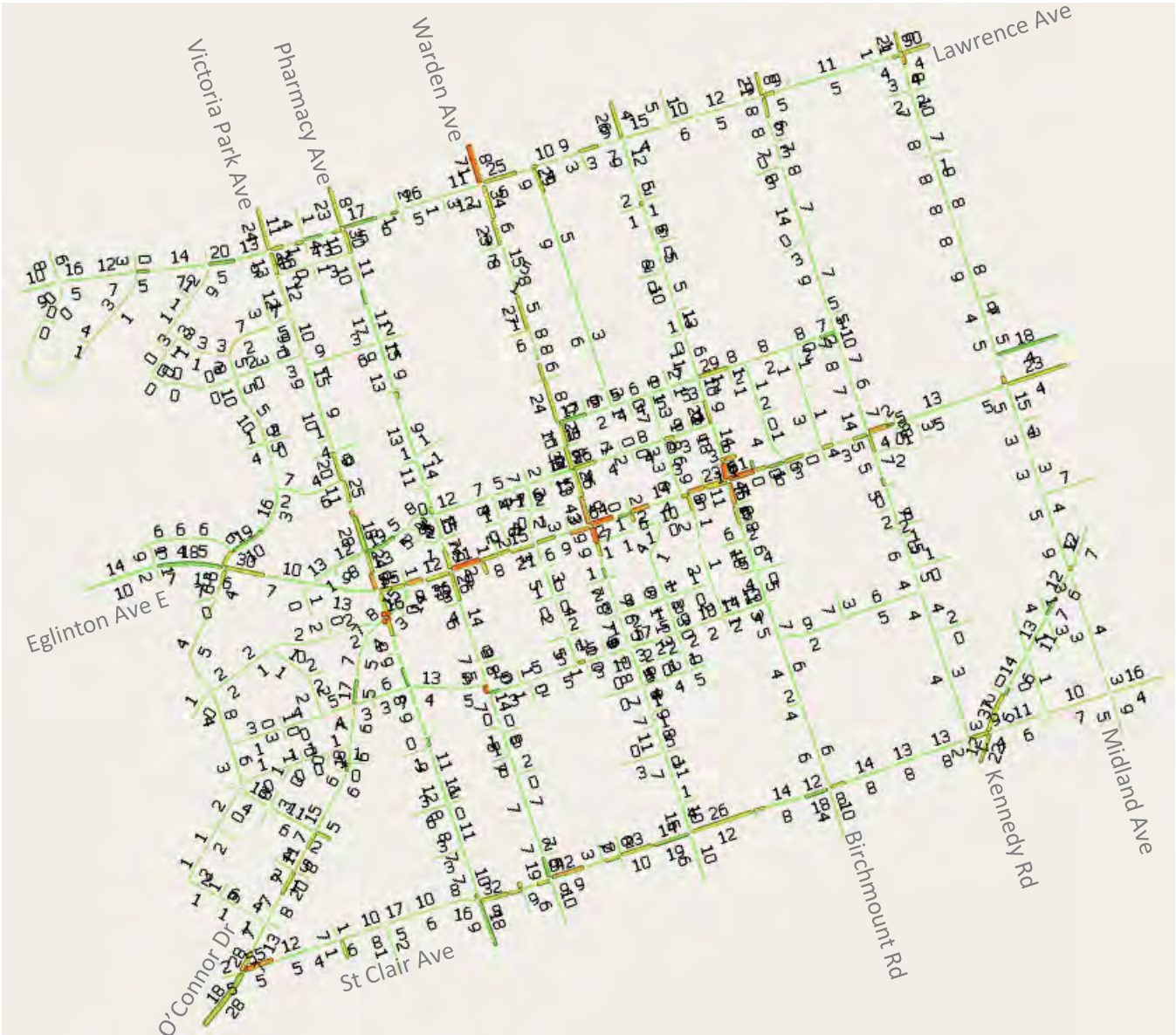




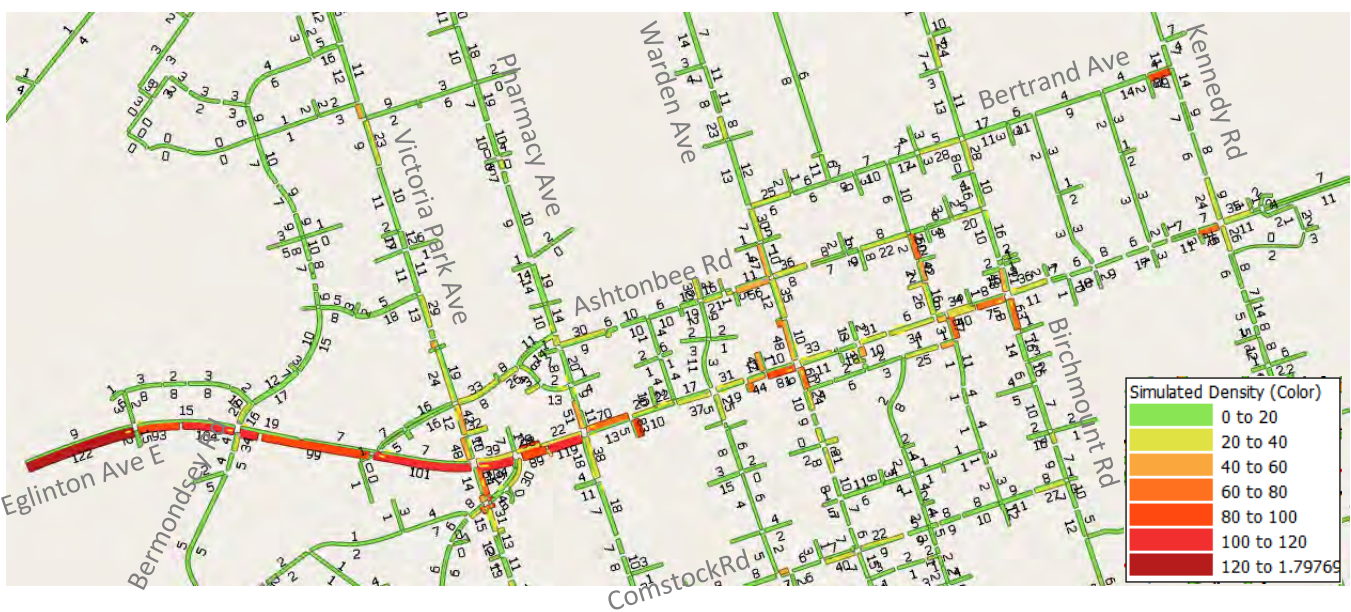
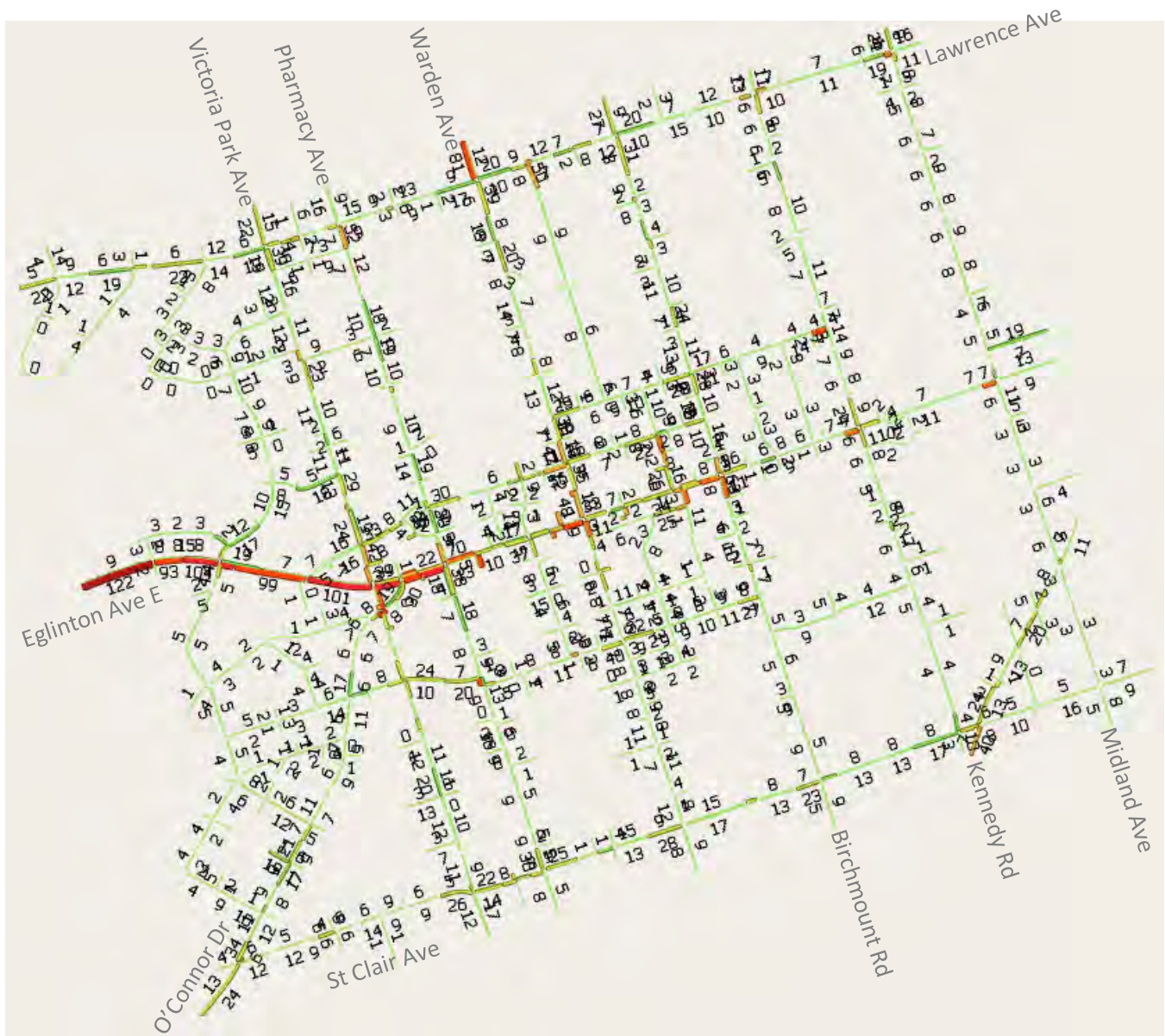
Tech Memo Appendix III

Road Network Density Plots

Road Network Density (veh/km) - Existing AM Peak Hour



Road Network Density (veh/km) - Existing PM Peak Hour



Appendix C

Population and Employment Estimates for Future (2041) Full Build-Out Conditions

Golden Mile Secondary Plan Area: Population and Employment Estimates

Prepared by: Planning Research and Analytics, Toronto City Planning

Date: February 23, 2021

Data Source: Base permissions from Golden Mile Secondary Plan; Proposed projects from Development Pipeline 2020 Q2, Land Use System II, City of Toronto

Notes: Population and employment estimates are based on the maximum density

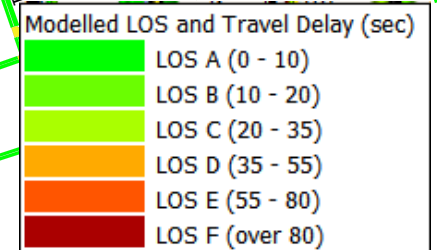


High Estimate (With Proposed Projects)		
Potential		
Block ID	Population	Potential Jobs
1	422	0
2	625	0
3	3,264	66
4		
5	7,163	1,626
6	3,447	2,433
7	213	50
8	3,515	446
9	724	169
10	1,277	299
11	10,505	1,970
12	0	5,220
13	0	4,626
14	8,090	1,347
15	4,836	3,112
16	6,815	1,594
17	0	5,342
18	0	1,924
19	5,521	1,291
Total	57,310	31,515

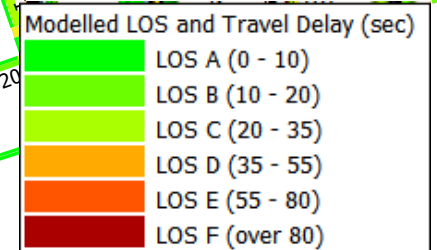
Appendix D

Aimsun Model Screenshots for EA-Preferred Roadway Network

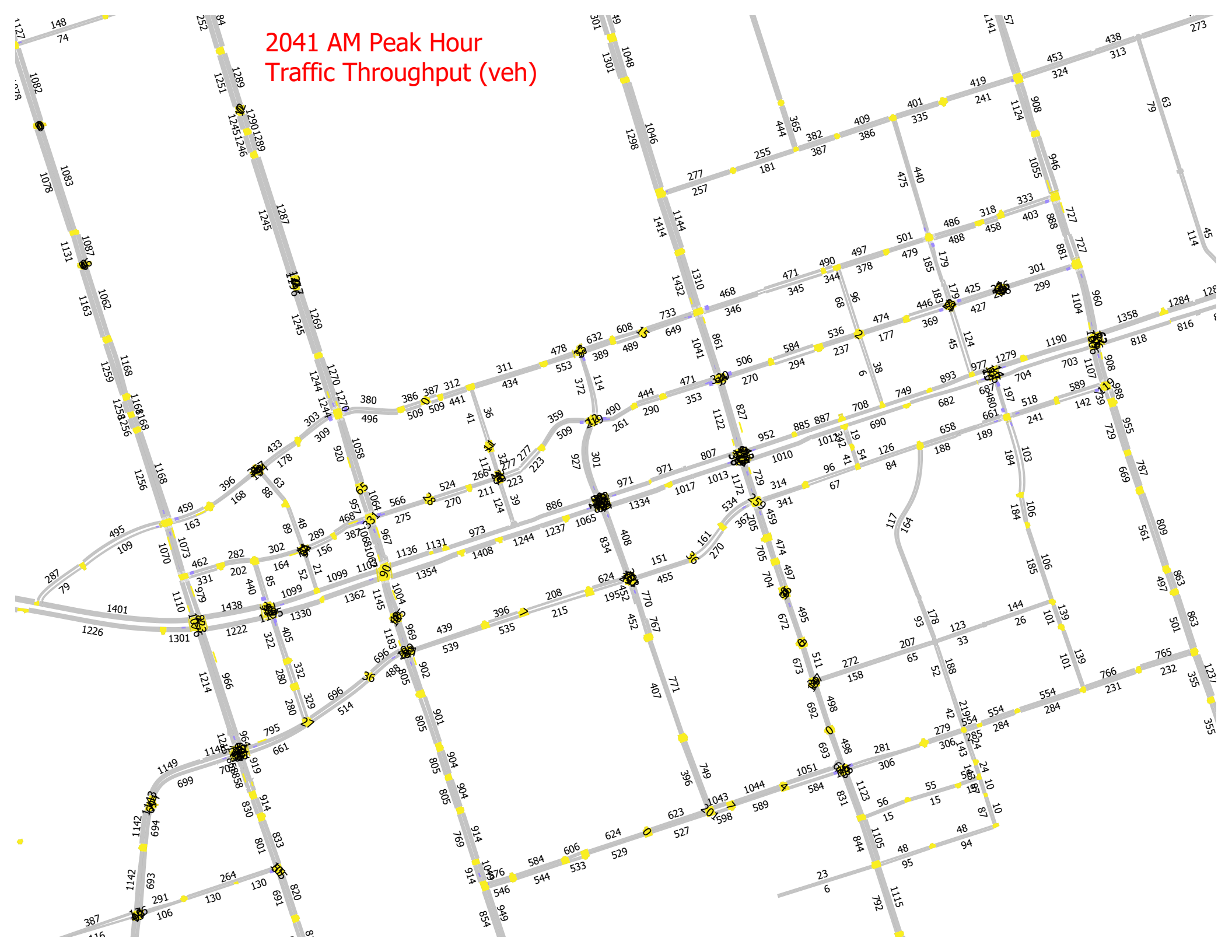
2041 AM Peak Hour
Segment Delay (sec)



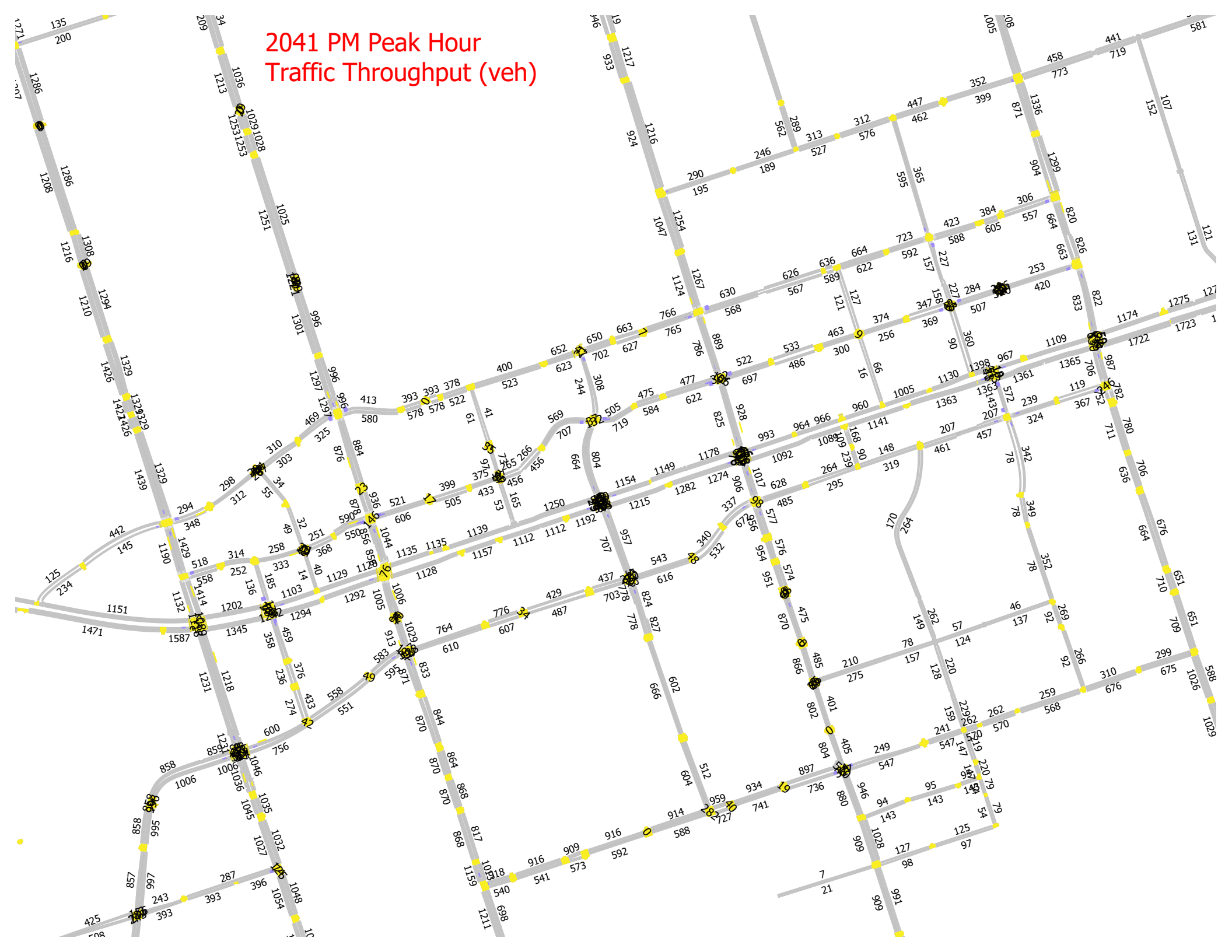
2041 PM Peak Hour Segment Delay (sec)



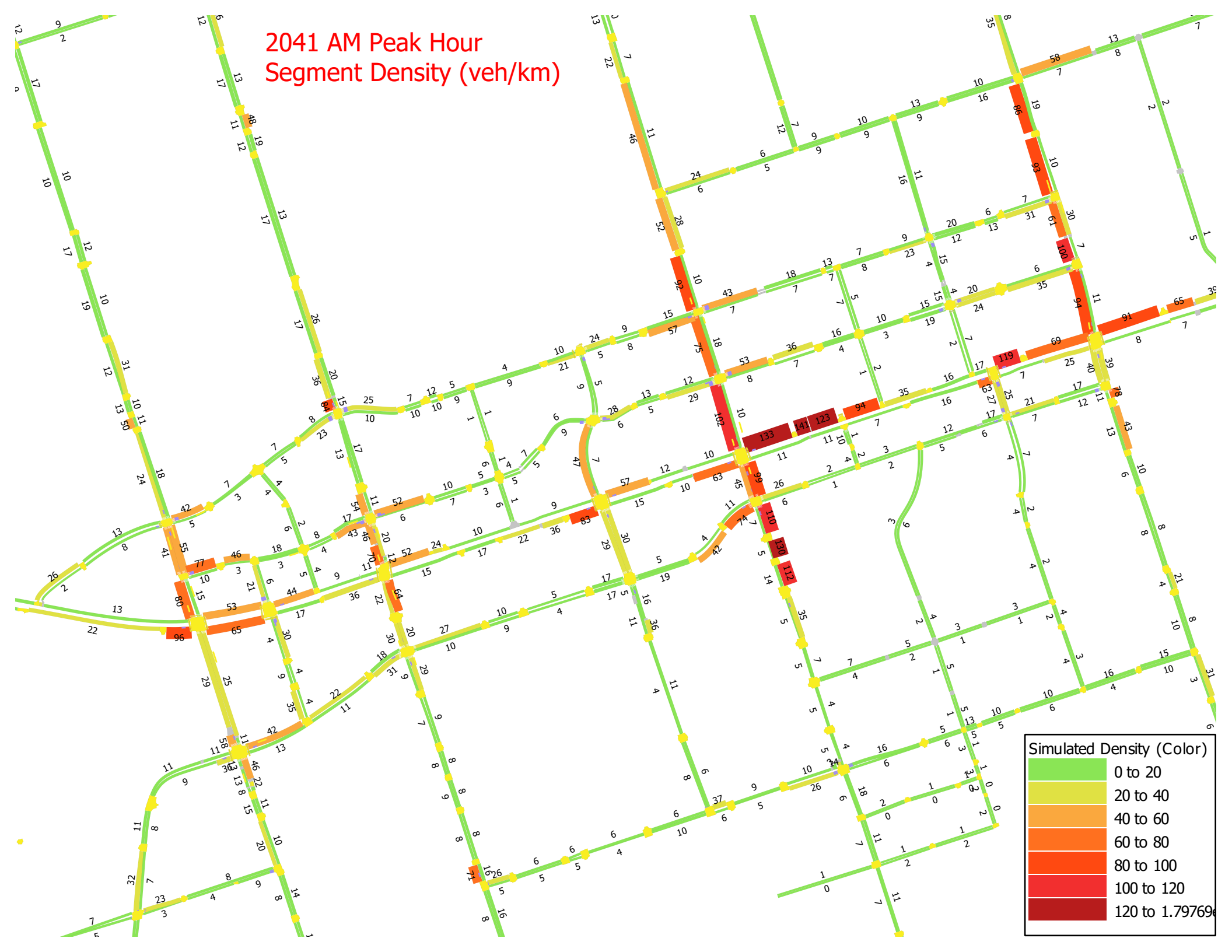
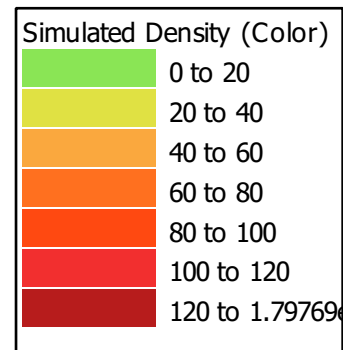
Traffic Throughput (veh)



2041 PM Peak Hour Traffic Throughput (veh)



2041 AM Peak Hour
Segment Density (veh/km)



2041 PM Peak Hour
Segment Density (veh/km)

