APPENDIX A

Future Transportation Conditions Report

GANNETT FLEMING

Future Transportation Conditions Report

Stevenson Road North Environmental Assessment (EA) Study – Schedule 'C '

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Prepared for: City of Oshawa, 50 Centre Street South, Oshawa, ON, L1H 3Z7

Document Revision History

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R0	Draft Report	A. Sathya	R. Sooklall	T. Chow	09/14/2023
R1	Final Report	A. Sathya	R. Sooklall	T. Chow	08/29/2024
R2	Final Report	A. Sathya	R. Sooklall	T. Chow	03/20/2025

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1.0 Introduction

The City of Oshawa ("City") is currently conducting a Municipal Class 'Schedule C' Environmental Assessment ("EA") study for Stevenson Road North. The primary aim of this Class EA is to assess future needs and justifications based on projected land use changes and anticipated traffic demand. Additionally, the study aims to identify potential environmental impacts associated with geometric improvements, if deemed necessary, to meet future requirements.

Of note, an additional assessment was carried out as part of the Stevenson Road North EA for a proposed east-west midblock arterial road extending from Stevenson Road North to Thickson Road; past the Whitby-Oshawa border. The additional assessment evaluates the transportation, natural environment, and land-use and development constraints for the future east-west midblock Type 'C' Arterial Road to justify its deletion from the City's Official Plan (refer to Official Plan Schedule 'B', dated August 2019). The transportation assessment report for the removal of the east-west midblock arterial, was prepared by TraffMobility Engineering Inc. ("TraffMobility") as a subconsultant for Gannett Fleming and the City (available under a separate cover).

Figure 1: Study Corridor (Source: Gannett Fleming)

This report focuses on determining the future transportation needs for the Stevenson Road North study corridor based on planned developments and anticipated changes in land use and traffic demand. The following sections document the methodology, findings, and recommendations for the study corridor, based on the existing conditions analysis, as well as the transportation needs for future 2033 and 2051 horizon years.

1.1 Transportation Assessment Study Limits

The study limits or analysis areas for the transportation assessment are presented in **Figure 2**. The EMME modelling sub-area is bounded by Simcoe Street to the east, Highway 407 to the north, Taunton Road West to the south, and it was expanded to include Anderson Street in consultation with the Durham Region ("Region") to the west. The Synchro intersection capacity analysis area is bounded by Conlin Road to the north, Taunton Road to the south, Simcoe Street to the east, and Thickson Road to the west.

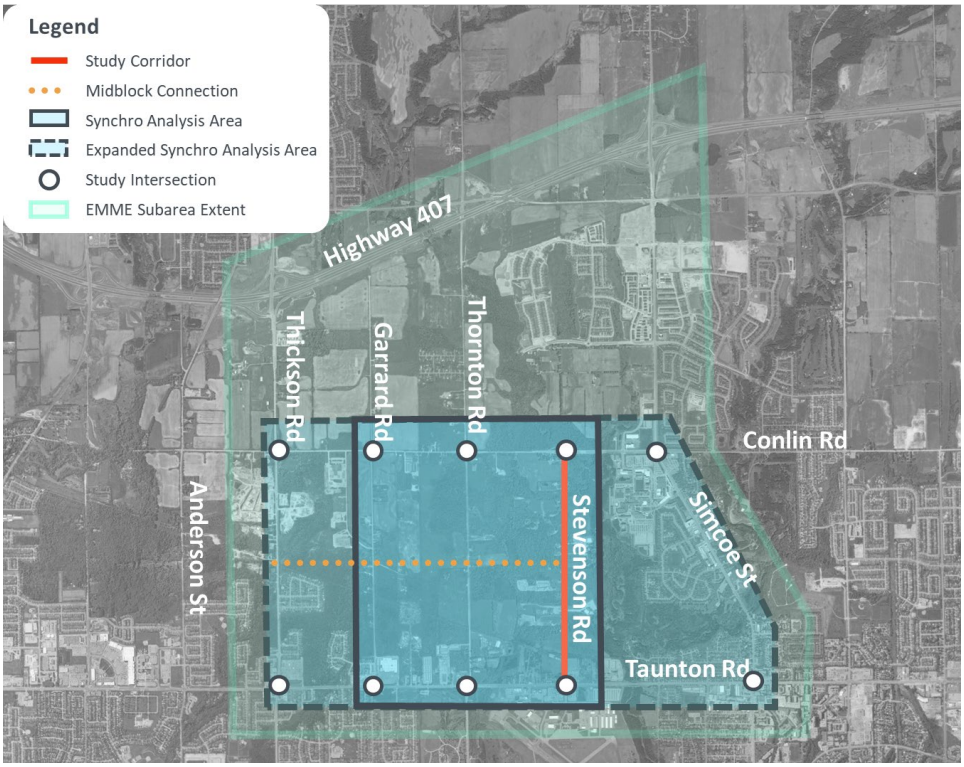


Figure 2: Transportation Assessment Study Limits

1.2 Transportation Assessment Approach

The approved transportation assessment methodology, as shown in **Figure 3,** comprises of two components:

1. EMME sub-area analysis that follows the traditional four-step transportation demand modelling process using the Durham Region Transportation Planning Model (DRTPM). Refer to **Section 2.0** for sub-area network modelling analysis details and results.
2. Intersection capacity analysis using Synchro for signalized and unsignalized study intersections, and ARCADY for roundabout analysis. Refer to **Section 3.0** for details on intersection and roundabout analyses and results.

The Region provided the sub-area EMME network files and associated traversal matrices (auto, light truck, medium truck, and heavy truck) for the weekday AM and PM peak hours from the DRTPM for the 2016 base year and 2033 horizon year, updated through the 2023 Region-Wide Development Charge Background Study initiative as part of the Regional Official Plan Review (adopted by Regional Council in May 2023). Network review and validation on the sub-area models were performed to ensure the

appropriate planned improvements (e.g., future road widening) within the study area are captured in the models.

Using the confirmed land use estimates and network assumptions, model scenarios were developed in consultation with the Region for the 2033 horizon year. The EMME link plots and travel patterns extracted for the future horizon years were used to inform the Synchro analysis.

It is worth nothing that the update to the Region's 2051 model was still under development at the time this study was conducted; therefore, it was agreed that the Region would run the DRTPM with the airport being closed for the 2033 horizon and provide the EMME sub-area models with 2033 demand matrices and trip assignments to TraffMobility. The methodology for developing the 2051 trip matrices, as approved by the Region, is described in detail in **Section 2.3**.

Intersection capacity analysis was carried out to evaluate traffic operations for the study intersections under existing (2022) baseline conditions and future (2033) conditions. Signalized and unsignalized intersection operations were assessed using the Synchro 11 software while roundabouts were analyzed using ARCADY.

For additional details, refer to the Transportation Assessment and Methodology Memo (available under separate cover), which was approved by the City, Town and Region in October 2022.

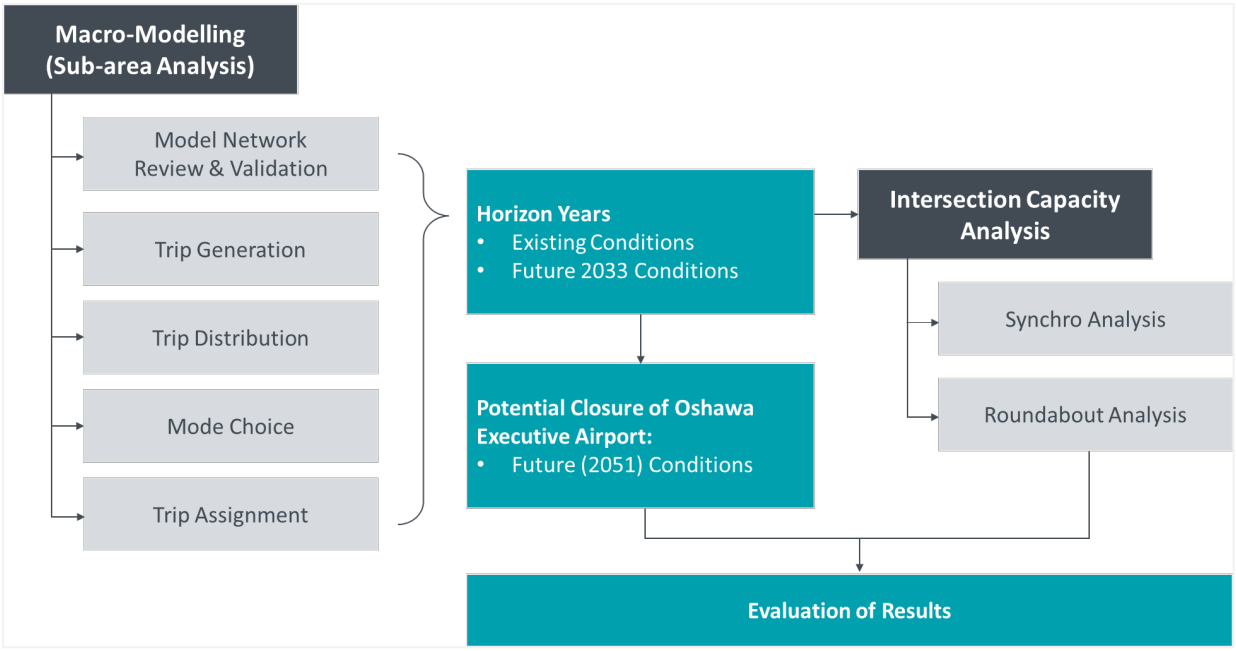


Figure 3: Transportation Assessment Methodology

2.0 Macro-Modelling Analysis

2.1 Sub-Area Existing (2016) Conditions

The 2016 sub-area model was reviewed and validated to confirm speed, lane capacities and volumes. Population and employment densities by traffic zone were provided by the Region, and the approved model network with centroid connectors and number of lanes, is presented in **Figure 4**.

Screenline analyses were conducted to compare modelled and observed link volumes, with results shown in **Figure 5** and **Figure 6** for the weekday AM and PM peak hours, respectively. The screenline analyses demonstrated that the weekday AM and PM models resulted in R^2 values greater than 0.90, indicating that the modelled volumes closely align with observed demands within the sub-area.

However, it was observed that the model significantly underestimated trips assigned to Stevenson Road compared to observed traffic counts. As a result, the link cost was adjusted along the study corridor to improve traffic assignment on Stevenson Road. The modelled volumes on Stevenson Road, after adjusting the link costs, are ≤ 88 vehicles during AM peak hour and ≤ 65 vehicles during PM Peak hour, which are closer to observed existing demand of 84 vehicles and 95 vehicles during the AM and PM peak hours, respectively. The link volume plots for the calibrated sub-area model are provided in **Figure 7**.

Existing 2016 weekday AM and PM peak hours volume to capacity (v/c) ratio plots in **Figure 8** show that Stevenson Road is operating within residual capacity (v/c ratio < 0.20) during both peak hours. Taunton Road and Conlin Road are also operating within capacity, with v/c ≤ 0.90 during both the AM and PM peak hours. South of Highway 407, Thickson Road and Simcoe Street have v/c ratios greater than 1.0 in the peak directions (northbound during AM and southbound during PM peak hours, respectively). Select link analyses (SLA) were conducted for Stevenson Road, and the results in **Figure 9** showed that most trips are distributed to/from Taunton Road and Ontario Tech University/Durham College campus.

The sub-area model was validated against the observed traffic counts, and a sensitivity analysis was carried out to determine if zone disaggregation is appropriate for the Stevenson Road study corridor. Based on the screenline analyses, it appeared that most of the trips along Stevenson Road are to/from Taunton Road and Ontario Tech University/Durham College campus. As such, it was determined that zone disaggregation is not required, as it will have little impact on the study corridor, given the observed trip patterns and lack of proposed developments along Stevenson Road.

The traffic assignment on the modelled road network from the validated 2016 sub-area model was considered to be representative of existing conditions. Therefore, it can be used to model expected operations for the 2033 and 2051 horizon years. Changes made to validate the existing 2016 sub-area model were carried forward to the future scenarios.

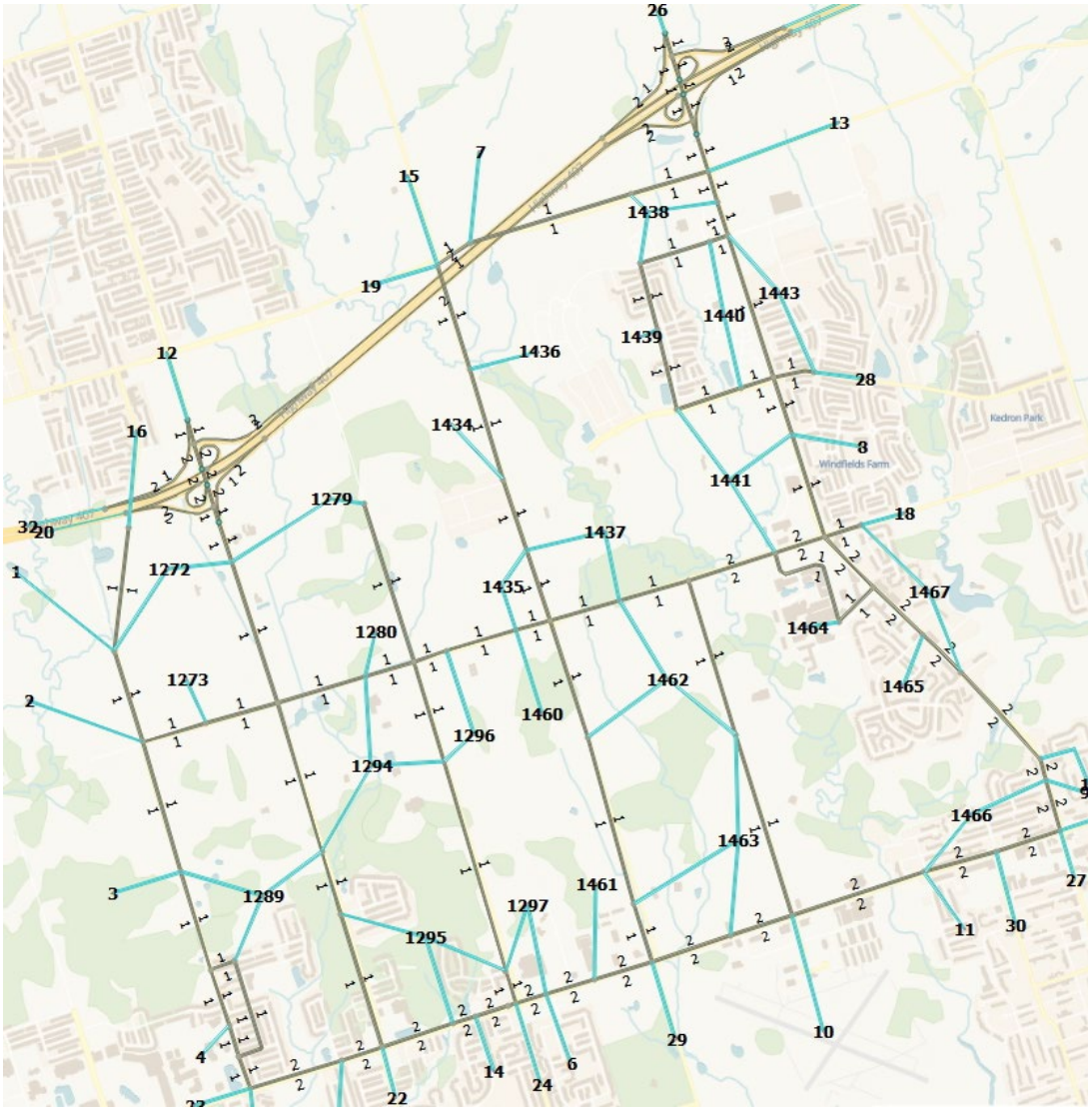


Figure 4: 2016 Sub-Area EMME Model Network

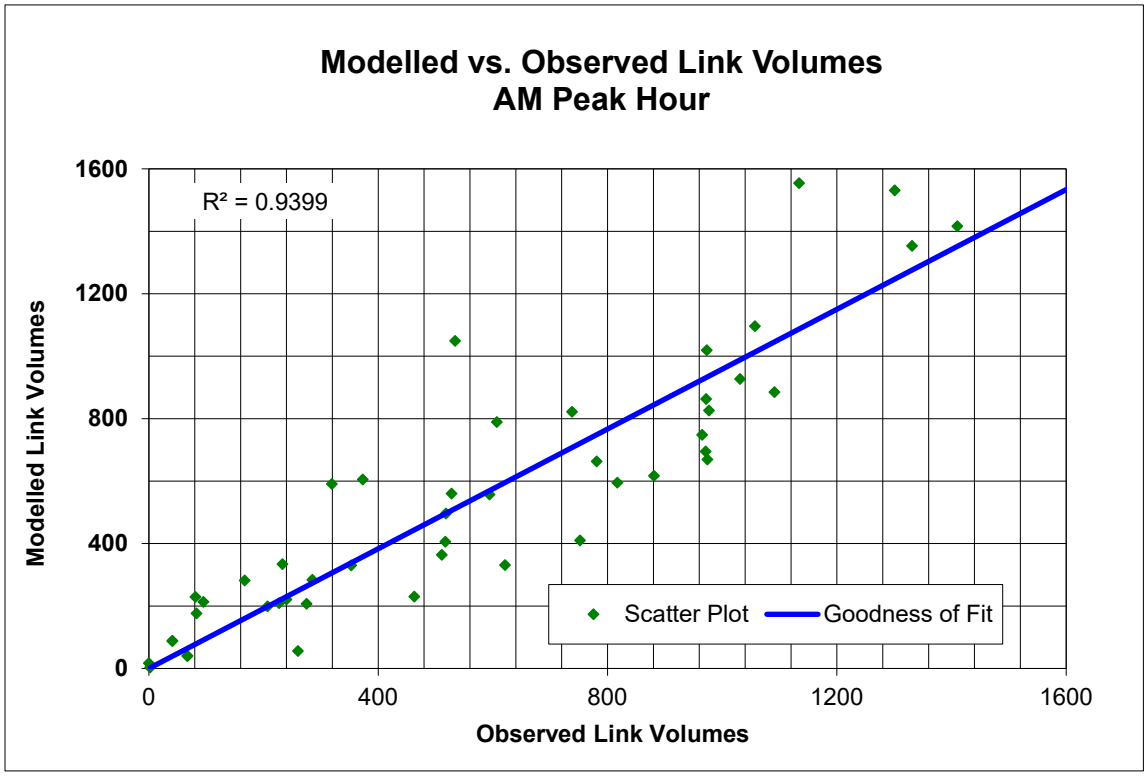


Figure 5: Existing (2016) AM Peak Hour – Modelled vs. Observed Link Volumes

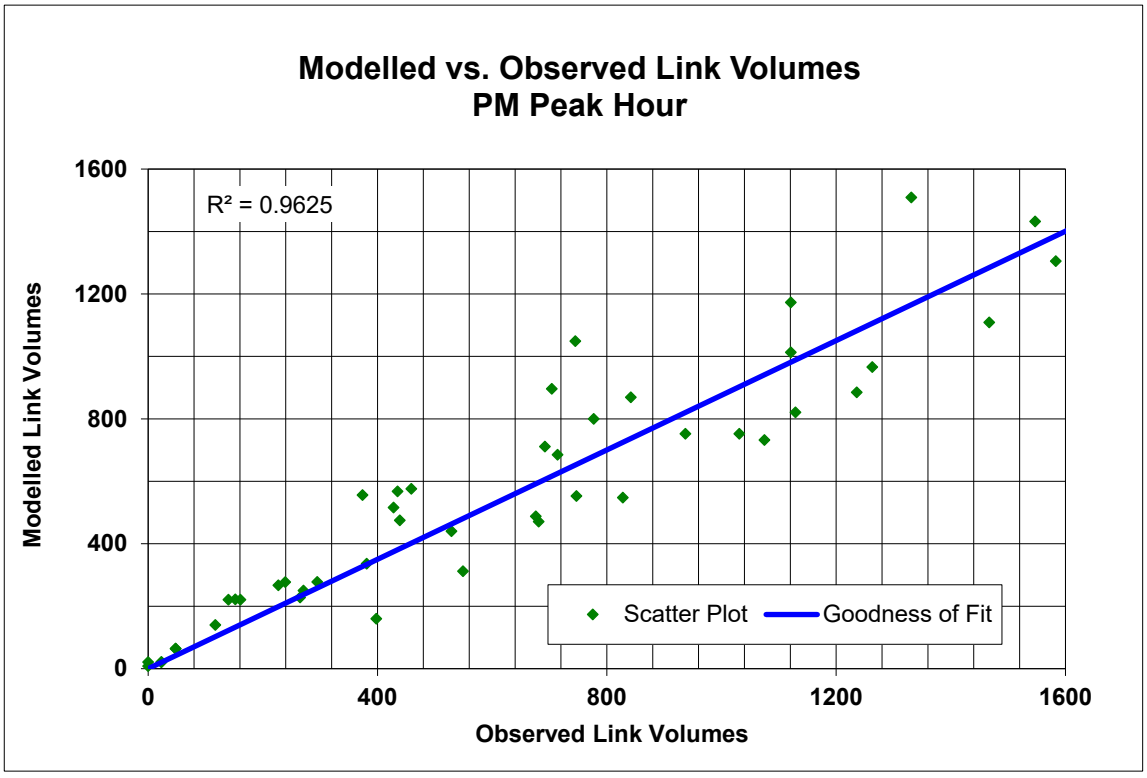
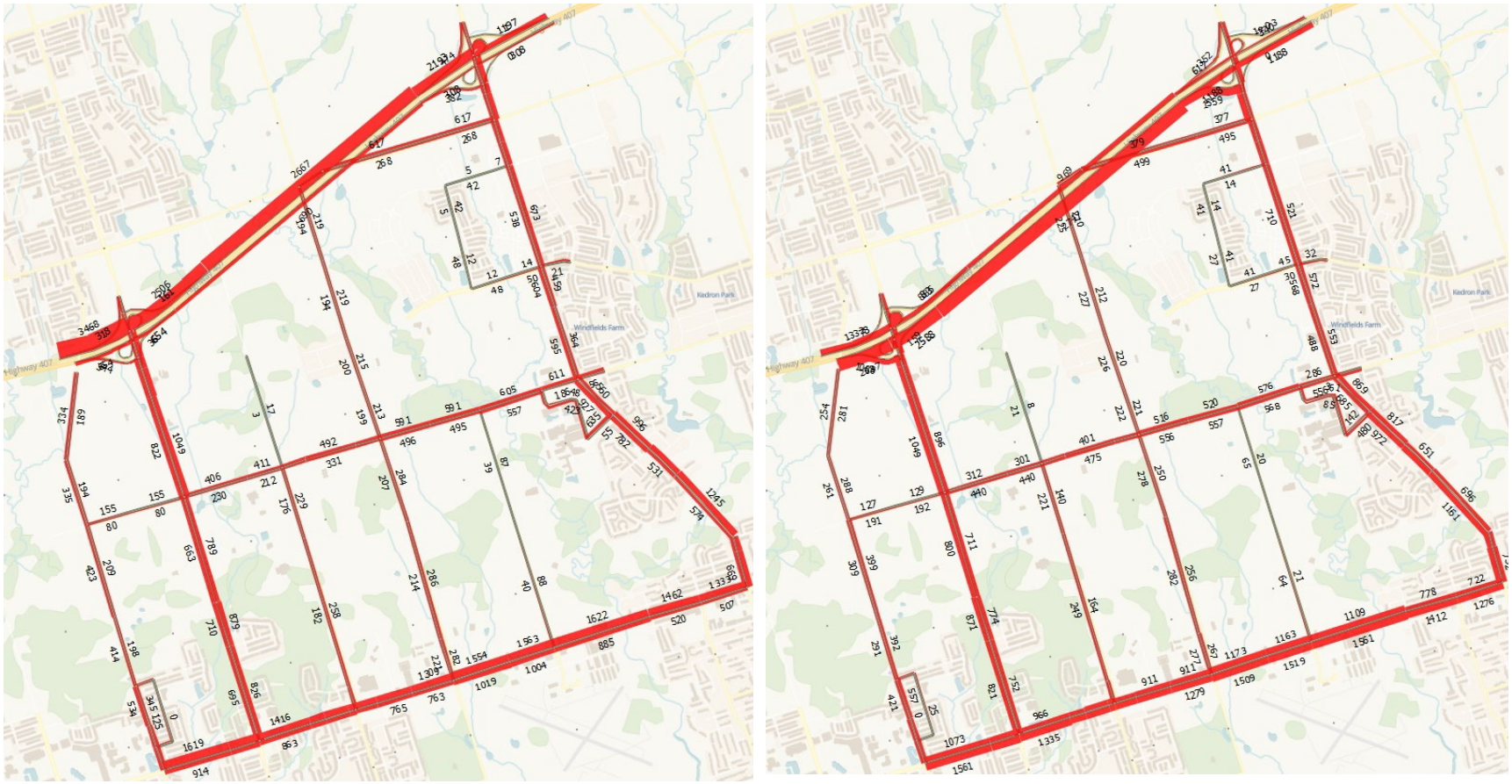
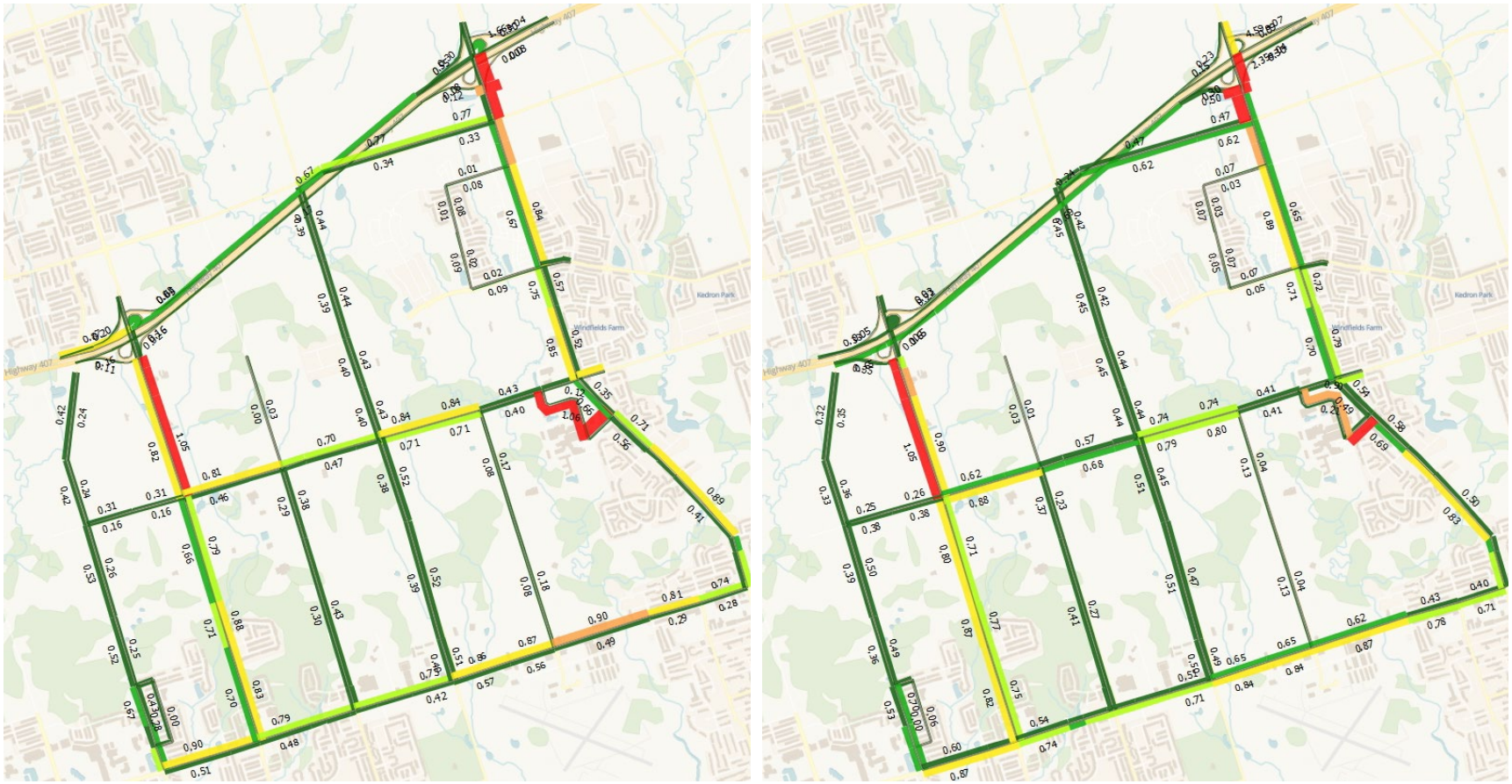


Figure 6: Existing (2016) PM Peak Hour – Modelled vs. Observed Link Volumes



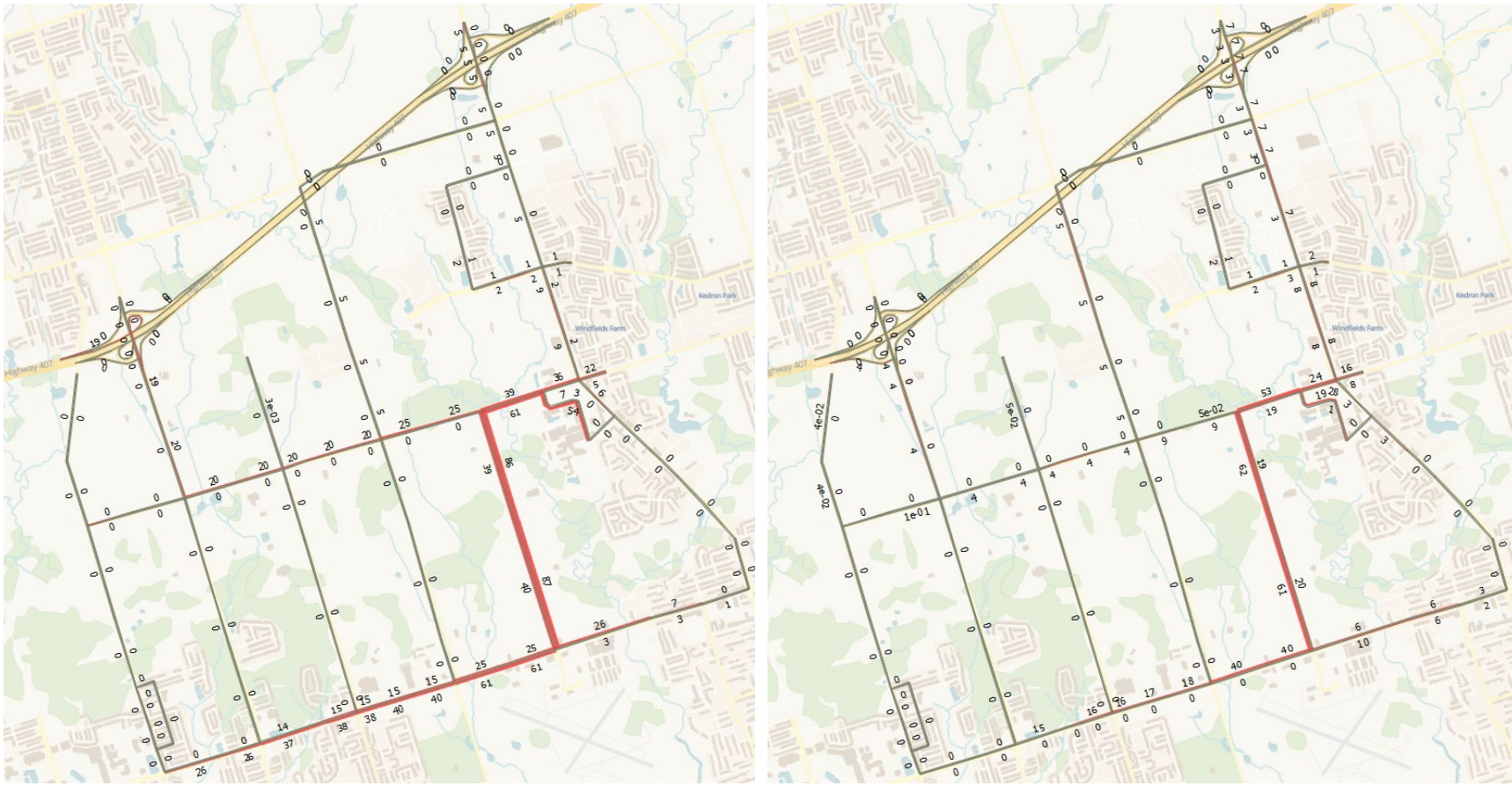
AM Peak Hour **PM Peak Hour**

Figure 7: 2016 Calibrated Model Link Volume Plots



AM Peak Hour **PM Peak Hour**

Figure 8: 2016 Calibrated Model Volume to Capacity Ratio Plots



AM Peak Hour **PM Peak Hour**

Figure 9: 2016 Calibrated Model Select Link Analysis for Stevenson Road

2.2 Sub-Area Future (2033) Conditions

This section documents the sub-area EMME modelling assumptions and results for the 2033 horizon year. The updated DRTPM being used for the sub-area model includes the 2031 preferred network based on the Durham Transportation Master Plan, 2017 (TMP) with the 2033 Region-Wide Development Charge (DC) Background Study's population and employment forecasts. This formed the key input in developing the 2033 network.

The following 2033 scenarios were modelled for both the weekday AM and PM hours to assess the transportation needs for Stevenson Road North:

- Scenario 1: Future 2033 network with planned widening of Taunton Road
- Scenario 1A: Scenario 1 with no widening of Taunton Road (sensitivity test)

2.2.1 2033 Sub-Area Trip Generation

The Region provided the sub-area model files for 2033 developed from the updated DRTPM, which included the latest trip matrices for 2033. As such, no trip generation rates were developed.

2.2.2 2033 Sub-Area Road Network

The planned infrastructure improvements by 2033 are listed in **Table 1**. It is worth noting that Taunton Road is coded with HOV lanes, which added an additional 30% of the general lane capacity per direction, consistent with the Durham TMP and other EA studies. The model also assumed bus rapid transit (BRT) along Simcoe Street, within the existing 4-lane cross-section, and south of Conlin Road coded with 2 general-purpose lanes and BRT lanes in the median.

It is noted that the BRT along Simcoe Street and the widening of Taunton Road is not in the current Regional Roads Capital Budget and Nine-Year Forecast (to 2032). However, it was agreed with Regional and City staff to include these two projects in the 2033 sub-area road network to introduce potential impacts on the Stevenson Road North and midblock arterial corridors with the lesser capacity for Simcoe Street and the HOV lanes on Simcoe Street. A sensitivity analysis without the widening of Taunton Road was also conducted to analyze the impacts on Stevenson Road North.

The future population and employment projections and planned developments within the sub-area were reviewed to confirm the 2033 model road network. The 2033 sub-area model road network along with centroid connectors and number of lanes, as approved by the Region, is shown in **Figure 10**.

Table 1: Planned Sub-Area Road Network Improvements by 2033

Road	From	To	Improvement	Timeline	Status	Source
Type C Arterial	Thickson Road	Stevenson Road	New Road	2033	Deletion to be confirmed*	Regional OP, Oshawa OP, Whitby OP
Simcoe Street	Conlin Road	Winchester Road	Lane Widening (5 lanes)	2022	Constructed	Durham Public Works Website
Type B - Midblock Arterial	Anderson Street	Garrard Road	New Road	2033	Proposed	EA, Town of Whitby
Britannia Midblock Connector	Garrard Road	Thornton Road	New Road	2032	Proposed	EA, Town of Whitby, City
Britannia Avenue Extension	Thornton Road	Windfields Farm Drive	New Road	2026	Proposed	EA, Town of Whitby
Taunton Road	Anderson Street	Simcoe Street	Widened to 6 lanes with HOV lanes	2033	Proposed	Durham TMP
Winchester Road	Garrard Road	Simcoe Street	Lane Widening (4 lanes)	Beyond 2031	Proposed	Durham TMP
Thickson Road	Taunton Road	Highway 407	Lane Widening (4/5 lanes)	2028-2032	Proposed / Budgeted	Durham TMP
Conlin Road	Stevenson Road	Garrard Road	Lane Widening (4 lanes)	2032	Proposed	City

Note:
*A separate study was conducted to confirm the transportation impacts of the east-west Type 'C' midblock arterial deletion. As such, the implementation of the east-west midblock arterial is not considered in the future conditions assessment documented in this report.

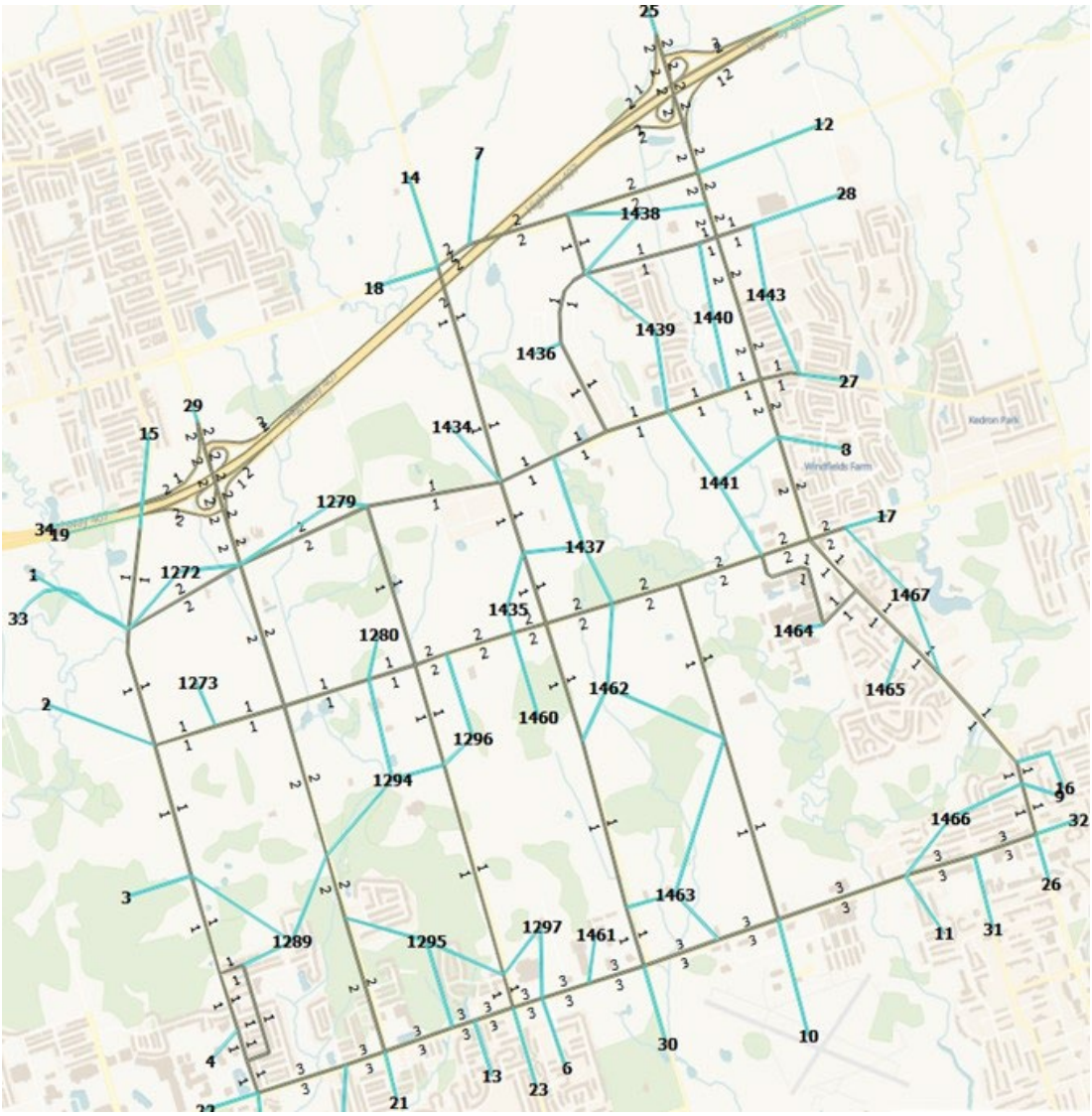


Figure 10: 2033 Sub-Area EMME Model Network

2.2.3 2033 Sub-Area Mode Split

Travel modes coded in the 2033 sub-area model include auto, light truck, medium truck, and heavy truck. The Origin-Destination (OD) demand and mode share are summarized in **Table 2**. It is observed that auto is the predominant mode, accounting for 97% of forecasted 2033 vehicular traffic, while trucks make up the remaining 3%. It is to be noted that the details on the panned land use breakdown for the Northwood Business Park were not available when this analysis was conducted and there is no direct connection to Stevenson Road from the Northwood Business Park. Therefore, the Region's OD demand truck percentage was maintained for this modelling exercise. We note that an increase in future truck percentage is possible based on the proposed land use for the Northwood Business Park; however, this increase is not expected to change the recommendation for Stevenson Road (to protect for a 4-lane cross-section).

Table 2: 2033 Sub-Area Model Mode Split

Mode	2033 OD Demand AM Peak Hour	2033 OD Demand PM Peak Hour	2033 Mode Split (%) AM Peak Hour	2033 Mode Split (%) PM Peak Hour
Auto	18,404	19,911	97.1%	97.3%
Light Truck	205	194	1.1%	0.9%
Medium Truck	129	131	0.7%	0.6%
Heavy Truck	209	225	1.1%	1.1%
Total	**18,947**	**20,461**	**100%**	**100%**

2.2.4 2033 Sub-Area Trip Distribution and Assignment

The same trip patterns were assumed for 2033 based on the traversal matrices extracted from the DRTPM. Therefore, no changes were made to the sub-area trip distribution. The traffic assignment procedure follows the multi-class traffic assignment in EMME, utilizing four traversal matrices in the subarea model, which is consistent with the DRTPM specification.

2.2.5 2033 Sub-Area Modelling Results

A summary of critical v/c ratios for each scenario is presented in **Table 3** and **Table 4** for the weekday AM and PM peak hours, respectively. Additionally, **Table 5** and **Table 6** provide summaries of modelled travel times by corridor for the weekday AM and PM peak hours, respectively. The modelled link volumes on Stevenson Road are presented in **Table 7** and **Table 8**.

Detailed 2033 sub-area model plots, including link volumes, v/c ratios, and select link analysis, are provided in **Appendix A**.

The findings from the macro-modelling analysis for the 2033 horizon are summarized below:

- Based on lane capacity of 500 vehicle/hour/lane coded in the Region's EMME model, the forecasted volumes on Stevenson Road do not warrant a 4-lane cross-section in 2033.
- Conlin Road and Stevenson Road are both expected to operate with acceptable v/c ratios (<0.90 according to Region's standards).
- Without the planned widening, the traffic demand on Taunton Road is expected to exceed available capacity under 2033 conditions, particularly along the section between Stevenson Road and Simcoe Street (v/c ratios ≤ 1.14).
- Even with the assumption that the Simcoe Street BRT converted a general traffic lane to transit only lane south of Conlin Road, the increased demand on Stevenson Road does not warrant a 4-lane cross-section by 2033.
- The Britannia Avenue Extension with the midblock connector (between Garrard Road and Thornton Road) implemented provides additional east-west capacity as an inter-municipal alternative. This extension also provides congestion relief on Conlin Road.
- The widening of Conlin Road between Stevenson Road and Garrard Road improves operations along this corridor. Consideration can be given to widen Conlin Road from Garrard Road to Thickson Road to maintain a consistent 4-lane cross-section and further improve corridor operations.

Table 3: 2033 Sub-Area Model AM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB			WB/SB		
	2016	2033		2016	2033	
		Sc1	Sc1A		Sc1	Sc1A
Taunton Road: Thickson Road to Thornton Road	0.48	0.59	0.62	0.79	0.77	0.82
Taunton Road: Thornton Road to Stevenson Road	0.57	0.59	0.63	0.87	**0.92**	**1.01**
Taunton Road: Stevenson Road to Simcoe Street	0.49	0.54	0.61	**0.90**	**1.01**	**1.14**
Conlin Road: Thickson Road to Thornton Road	0.47	0.72	0.75	0.81	0.80	**0.90**
Conlin Road: Thornton Road to Stevenson Road	0.71	0.51	0.57	0.84	0.63	0.69
Conlin Road: Stevenson Road to Simcoe Street	0.40	0.58	0.58	0.43	0.69	0.70
Thickson Road: Taunton Road to Conlin Road	0.88	0.80	0.78	0.71	0.73	0.71
Garrard Road: Taunton Road to Conlin Road	0.43	0.63	0.80	0.30	0.51	0.47
Thornton Road: Taunton Road to Conlin Road	0.52	0.83	0.82	0.40	0.77	0.80
Stevenson Road: Taunton Road to Conlin Road	0.18	0.61	0.61	0.08	0.56	0.61
Simcoe Street: Taunton Road to Conlin Road	0.89	**1.29**	**1.29**	0.56	**1.11**	**1.13**

Notes:

Sc1: Scenario 1 – Future 2033 sub-area network and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Table 4: 2033 Sub-Area Model PM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB			WB/SB		
	2016	2033		2016	2033	
		Sc1	Sc1A		Sc1	Sc1A
Taunton Road: Thickson Road to Thornton Road	0.74	0.79	0.85	0.54	0.63	0.66
Taunton Road: Thornton Road to Stevenson Road	0.84	**0.93**	**1.01**	0.65	0.71	0.75
Taunton Road: Stevenson Road to Simcoe Street	0.87	**1.00**	**1.14**	0.62	0.70	0.80
Conlin Road: Thickson Road to Thornton Road	0.88	0.80	**0.90**	0.62	0.74	0.77
Conlin Road: Thornton Road to Stevenson Road	0.80	0.67	0.74	0.74	0.54	0.61
Conlin Road: Stevenson Road to Simcoe Street	0.41	0.70	0.71	0.41	0.60	0.59
Thickson Road: Taunton Road to Conlin Road	0.77	0.74	0.71	0.87	0.81	0.81
Garrard Road: Taunton Road to Conlin Road	0.27	0.80	0.70	0.41	0.80	0.80
Thornton Road: Taunton Road to Conlin Road	0.49	0.84	**0.90**	0.51	0.82	**0.91**
Stevenson Road: Taunton Road to Conlin Road	0.04	0.62	0.66	0.13	0.69	0.70
Simcoe Street: Taunton Road to Conlin Road	0.58	**1.28**	**1.26**	0.83	**1.21**	**1.21**

Notes:

Sc1: Scenario 1 – Future 2033 sub-area network and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Table 5: 2033 Sub-Area Model AM Peak Hour Corridor Travel Times

Road	EB/ NB Travel Time (min:sec)			EB/ NB Travel Time (min:sec)		
	2016	2033		2016	2033	
		Sc 1	Sc 1A		Sc 1	Sc 1A
Taunton Road (Anderson to Simcoe)	05:13	05:23	05:33	07:22	07:43	09:02
Conlin Road (Anderson to Simcoe)	04:25	04:50	04:57	05:23	05:23	05:36
Anderson Street (Taunton to Hwy 407)	03:25	03:37	03:38	03:36	03:49	03:53
Thickson Road (Taunton to Hwy 407)	04:23	03:19	03:16	03:20	03:22	03:17
Garrard Road (Taunton to Hwy 407)	02:07	02:20	02:23	02:04	02:10	02:08
Thornton Road (Taunton to Hwy 407)	04:23	04:31	04:30	04:14	05:14	05:22
Stevenson Road (Taunton to Conlin)	02:23	02:44	02:43	02:23	02:33	02:37
Simcoe Street (Taunton to Hwy 407)	06:17	08:59	09:08	05:17	07:50	07:52

Notes:

Sc1: Scenario 1 – Future 2033 sub-area network and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Table 6: 2033 Sub-Area Model PM Peak Hour Corridor Travel Times

Road	EB/ NB Travel Time (min:sec)			EB/ NB Travel Time (min:sec)		
	2016	2033		2016	2033	
		Sc 1	Sc 1A		Sc 1	Sc 1A
Taunton Road (Anderson to Simcoe)	07:03	07:37	08:59	05:29	05:43	06:02
Conlin Road (Anderson to Simcoe)	05:10	05:25	05:45	04:55	04:58	05:07
Anderson Street (Taunton to Hwy 407)	03:35	03:49	03:55	03:28	03:49	03:47
Thickson Road (Taunton to Hwy 407)	03:37	03:13	03:08	04:23	03:34	03:32
Garrard Road (Taunton to Hwy 407)	02:03	02:22	02:16	02:05	02:28	02:25
Thornton Road (Taunton to Hwy 407)	04:19	05:05	05:16	04:23	04:44	04:49
Stevenson Road (Taunton to Conlin)	02:23	02:38	02:43	02:23	02:52	02:54
Simcoe Street (Taunton to Hwy 407)	05:01	07:32	07:31	07:07	08:38	08:40

Notes:

Sc1: Scenario 1 – Future 2033 sub-area network and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Table 7: 2033 Sub-Area Model AM Peak Hour Stevenson Road Link Volumes

Road	EB/NB			WB/SB		
	2016	2033		2016	2033	
		Sc1	Sc1A		Sc1	Sc1A
South of Conlin	87	305	303	39	281	303
North of Taunton	88	305	303	40	221	243

Notes:

Sc1: Scenario 1 – Future 2033 sub-area network and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Table 8: 2033 Sub-Area Model PM Peak Hour Stevenson Road Link Volumes

Road	EB/NB			WB/SB		
	2016	2033		2016	2033	
		Sc1	Sc1A		Sc1	Sc1A
South of Conlin	20	309	332	65	344	351
North of Taunton	21	250	272	64	323	330

Notes:

Sc1: Scenario 1 – Future 2033 sub-area network and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

2.3 Sub-Area Future (2051) Conditions

This section documents the sub-area EMME modelling assumptions and results for the 2051 horizon year. For the purpose of confirming whether the same two-lane cross section would be sufficient for Stevenson Road to accommodate future growth following the closure of the Oshawa Executive Airport, the Region ran the 2033 DRTPM with the airport being closed and provided the sub-area model files as key input to the 2051 analysis. The analysis assessed traffic patterns for the year 2051, assuming the potential closure of the Oshawa Executive Airport to occur in 2041, and Stevenson Road would be extended south from Taunton Road to Rossland Road as a four-lane road.

The future 2051 sub-area network (referred to as "Scenario 3") was modelled for both the weekday AM and PM hours to assess the transportation impacts on Stevenson Road with the potential closure of the Oshawa Executive Airport.

2.3.1 2051 Sub-Area Trip Generation

The trip generation for 2051 is a two-step process. First, using the 2033 trip matrices from the updated DRTPM, a trip generation rate was calculated using future land use projections and trip forecasts from the Envision Durham initiative and Durham TMP. Second, the additional trips generated by the redevelopment of the airport lands were based on the land use estimates provided by the City. The future 2051 transportation demand for the sub-area were then estimated by applying the calculated trip generation rate to the 2031 trip forecasts (see section 2.3.1.1, "Base Trip Matrices for 2051") and adding the estimated trips from the Airport Lands redevelopment (see section 2.3.1.2, "Airport Lands Trip Generation").

2.3.1.1 Base Trip Matrices for 2051

The trip generation rate for 2051 was developed in consideration of future employment and population projections as well as the forecasted trips documented in the "Envision Durham Phase 2 Study" (October 2022) and "Durham TMP Modelling Report" (January 2018). This rate was then applied to the 2033 trip matrices for 2051 conditions, assuming the same trip distribution patterns. The equation for calculating the forecasted trips for 2051 is as follows:

$$2051\ Forecasted\ Trips = \underbrace{\frac{2031\ Trips}{2031\ (Population + Employment)}}_{Blended\ Trip\ Generation\ Rate} x\ 2051\ (Population + Employment)$$

A summary of the trip generation rate calculations is presented in **Table 9**, with a total of 26,803 trips forecasted in the sub-area for the weekday AM peak hour and 28,985 trips for the PM peak hour.

Table 9: 2051 Trip Generation Rates Calculations

	Origin – AM Peak Hour		Destination – PM Peak Hour	
	2031	**2051**	**2031**	**2051**
Population	907,290	1,300,000	907,290	1,300,000
Employment	307,470	460,020	307,470	460,020
Trips	327,815	**474,959**[1]	408,896	**592,435**[1]
Trip Growth	45 %		45 %	
Trip Generation Rate (CAGR)	**1.87 %**[2]		**1.87 %**[2]	

Notes:
2031 and 2051 population and employment forecasts based on "Envision Durham Phase 2 Report"
2031 trip forecasts based on "Durham TMP Modelling Report"
[1]2051 trip forecasts calculated based on blended trip generation rate of 1.87%
[2]Compounded Annual Growth Rate (CAGR) derived based on 2031 land use and trip proportion

2.3.1.2 Airport Lands Trip Generation

Currently, there is no policy direction on the future land use for the airport lands after the planned closure. In consultation with the City, land use estimates were developed by treating the airport lands as a greenfield development, resulting in an estimate of 5,157 people and 1,289 jobs.

Site trips for the redeveloped airport lands were calculated by applying a similar trip generation rate as calculated in preceding section. It is estimated that 1,740 and 2,170 trips will be generated during the weekday AM and PM peak hours, respectively, as shown in **Table 10**. These trips represent both inbound and outbound trips to/from the airport zones (29 and 32). The average of the inbound and outbound trip distribution (ratio) for the three proxy zones were applied to the airport land trips to/from zones 29 and 32.

Table 10: Trip Generation for Oshawa Executive Airport Land Redevelopment in 2051

	Origin – 2051 AM Peak Hour		Destination 2051 – PM Peak Hour	
	Envision Durham	**Airport Lands Redevelopment**	**Envision Durham**	**Airport Lands Redevelopment**
Population	1,300,000	5,157	1,300,000	5,157
Employment	460,020	1,289	460,020	1,289
Trips	**474,959**	**1,740**	**592,435**	**2,170**

2.3.2 2051 Sub-Area Road Network

Additional planned infrastructure improvements by 2051 are listed in **Table 11**. Based on discussion with the City and Region, the Stevenson Road extension south of Taunton Road was assumed to have a 4-lane cross-section. The 2051 sub-area network is shown in **Figure 11**.

Table 11: Planned Sub-Area Road Network Improvements by 2051

Road	From	To	Improvement	Timeline	Status	Source
Thornton Road	Taunton Road	Howden Road	Lane Widening (4/5 lanes)	2035	Proposed	Durham TMP
Oshawa Executive Airport	-	-	Potential Closure	2041	Proposed	City

Road	From	To	Improvement	Timeline	Status	Source
Stevenson Road Extension	Taunton Road	Rossland Road	New Road (4 lanes)	Before 2051	Assumed	-
Dryden Boulevard / Beatrice Street Connection	Thornton Road	Somerville Street	New Road (2 lanes)	Before 2051	Assumed	-

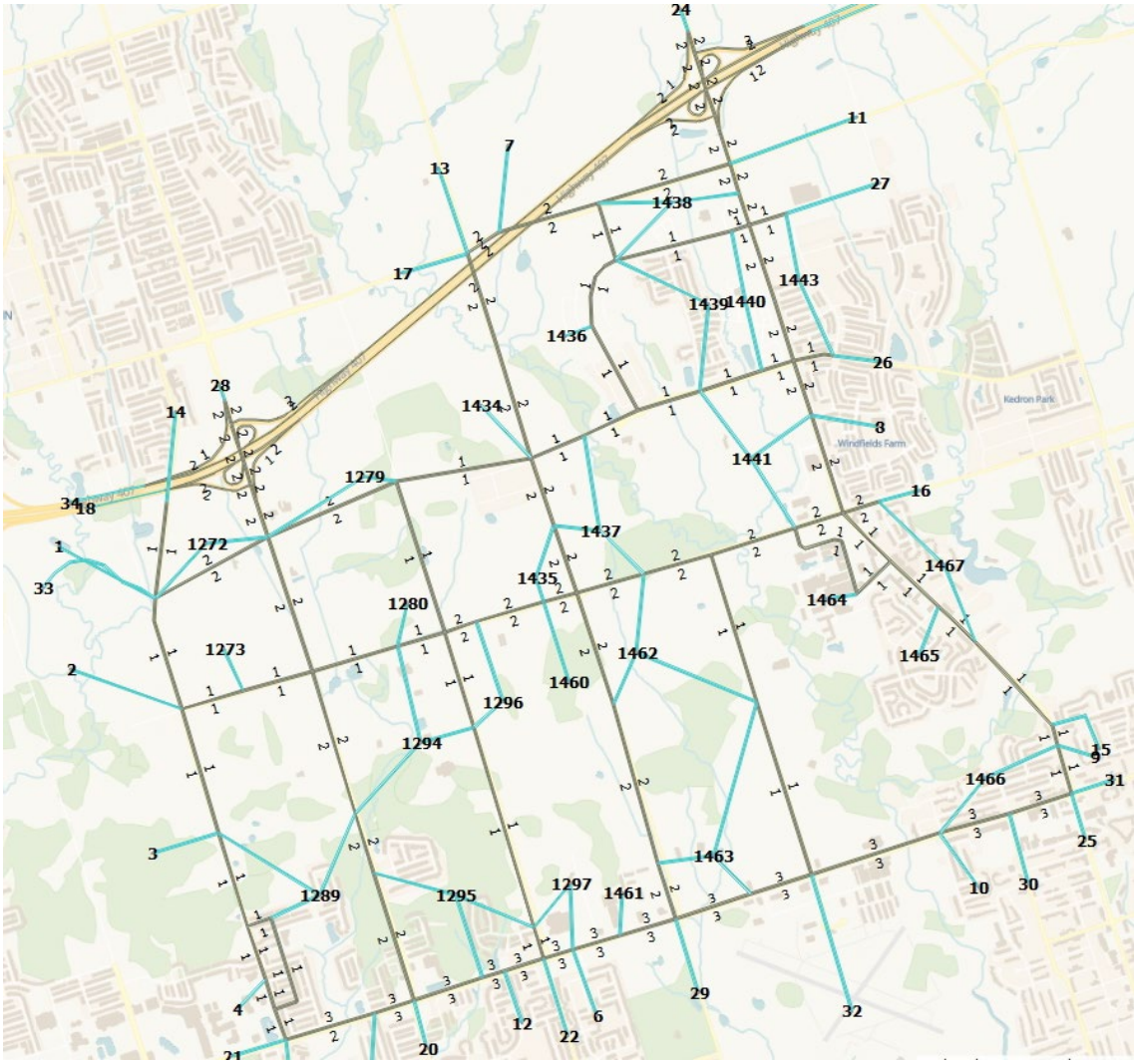


Figure 11: 2051 Sub-area EMME Model Network

2.3.3 2051 Sub-Area Mode Split

The same mode share from 2033 was assumed in 2051. The 2051 trip demand by mode share are summarized in **Table 12**.

Table 12: 2051 Sub-Area Model Trip Demand and Mode Split

Mode	2051 OD Demand AM Peak Hour	2051 OD Demand PM Peak Hour	2051 Mode Split (%) AM Peak Hour	2051 Mode Split (%) PM Peak Hour
Auto	26,068	28,239	97.3%	97.4%
Light Truck	279	262	1.0%	0.9%
Medium Truck	164	172	0.6%	0.6%
Heavy Truck	292	313	1.1%	1.1%
Total	**26,803**	**28,985**	**100%**	**100%**

2.3.4 2051 Sub-Area Trip Distribution and Assignment

To account for the trip distribution of the additional site trip generated by the airport lands, the following assumptions were used:

- It was assumed that 50% of the airport land trips would access the road network external to the sub-area limits and 50% of the trips with access the road network within the sub-area limits (870 AM peak hour trips and 1085 PM peak hour trips).
- Based on the location of sub-area zones shown in **Figure 11**, it was assumed that airport land trips within the sub-area limits will originate from zones #29 and #32 located south of Taunton Road at Thornton Road and Stevenson Road, respectively.
- Since zone #32 has direct access to the airport land, 60% of trips (522 and 651 during the weekday AM and PM peak hours, respectively) were assigned to this zone. The remaining trips (348 and 434 during the weekday AM and PM peak hours, respectively) were assigned to zone #29.
- Since zones #1466 in the City of Oshawa, #1289 and #1295 in the Town of Whitby have similar land composition (mix of residential and employment) proposed for the airport land, site trips were assumed to have a similar trip distribution as these zones to derive 2051 sub-area matrices for the macro-modelling analysis.

The traffic assignment procedure follows the multi-class traffic assignment in EMME, utilizing four traversal matrices in the subarea model, which is consistent with the DRTPM specification.

2.3.5 2051 Sub-Area Modelling Results

A summary of critical v/c ratios for each scenario is presented in **Table 13** and **Table 14** for the weekday AM and PM peak hours, respectively. **Table 15** and **Table 16** provide summaries of modelled travel times by corridor for the weekday AM and PM peak hours, respectively. The modelled link volumes on Stevenson Road are presented in **Table 17** and **Table 18**.

Detailed 2051 sub-area model plots, including link volumes, v/c ratios, and select link analysis, are provided in **Appendix B**.

The findings from the macro-modelling analysis for the 2051 horizon are summarized below:

- Stevenson Road is also expected to serve as an alternative route to Simcoe Street to avoid congestion.

  - During the AM peak hour, Stevenson Road is used as an alternative northbound route to access Ontario Tech University/Durham College from the east or as an alternative southbound route to access areas to the south of the sub-area.
  - During the PM peak hour, Stevenson Road is used as an alternative southbound route for those traveling from the north and heading towards eastbound Taunton Road or as an alternative northbound route to access Highway 407.
- Based on lane capacity of 500 vehicle/hour/lane coded in the Region's EMME model, the forecasted volumes on Stevenson Road warrant a 4-lane cross-section in 2051; however, since several assumptions were made in the modelling of the 2051 future conditions, it is recommended that the Stevenson Road right-of-way (ROW) between Taunton Road and Conlin Road be protected for a 4-lane cross-section. The widening of Stevenson Road to 4 lanes can be confirmed with a more rigorous analysis when details are finalized for the airport lands redevelopment.
- Thornton Road would provide additional north-south capacity and more trips would be expected to use this corridor to access Conlin Road and Taunton Road.
- The sub-area road network is expected to operate near capacity along Taunton Road, Stevenson Road, and sections of Conlin Road (west of Garrard Road), with v/c ratios exceeding 0.90.
- Despite being widened to a 6-lane cross-section, Taunton Road is forecasted to experience congestion due to the lower road capacity of HOV lanes compared to general-purpose lanes in the model with single occupancy vehicles (SOVs) restricted to 4 of the 6 lanes.

2.4 East-West Midblock Transportation Assessment

As part of the Stevenson Road North EA, an additional assessment was carried out for a proposed east-west midblock arterial road extending from Stevenson Road North to Thickson Road; past the Whitby-Oshawa border. This road is currently designated as a Future Type 'C' Arterial Road in the City's Official Plan (Schedule 'B', August 2019), the Town of Whitby's Official Plan (June 2021), and Durham Region's Official Plan (May 2020).

The additional assessment evaluates the transportation, natural environment, and land-use and development constraints for the future east-west midblock Type 'C' Arterial Road to justify its deletion from the City's Official Plan. The east-west midblock transportation assessment report which documents the methodology, findings, and recommendations regarding the removal of the east-west midblock Type 'C' Arterial Road from a transportation planning and traffic operations perspective is provided in **Appendix C**.

Table 13: 2051 Sub-Area Model AM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB			WB/SB		
	2016	2033	2051	2016	2033	2051
		Sc1	Sc3		Sc1	Sc3
Taunton Road: Thickson Road to Thornton Road	0.48	0.59	0.65	0.79	0.77	**1.15**
Taunton Road: Thornton Road to Stevenson Road	0.57	0.59	0.68	0.87	**0.92**	**1.35**
Taunton Road: Stevenson Road to Simcoe Street	0.49	0.54	0.85	**0.90**	**1.01**	**1.33**
Conlin Road: Thickson Road to Thornton Road	0.47	0.72	0.83	0.81	0.74	**1.03**
Conlin Road: Thornton Road to Stevenson Road	0.71	0.51	0.74	0.84	0.63	0.79
Conlin Road: Stevenson Road to Simcoe Street	0.40	0.58	0.88	0.43	0.69	**0.91**
Thickson Road: Taunton Road to Conlin Road	0.88	0.80	**0.98**	0.71	0.73	0.86
Garrard Road: Taunton Road to Conlin Road	0.43	0.63	**0.90**	0.30	0.51	0.69
Thornton Road: Taunton Road to Conlin Road	0.52	0.83	0.89	0.40	0.77	0.72
Stevenson Road: Taunton Road to Conlin Road	0.18	0.61	**0.99**	0.08	0.56	**0.91**
Simcoe Street: Taunton Road to Conlin Road	0.89	**1.29**	**1.71**	0.56	**1.11**	**1.47**

Notes:

Sc1: Scenario 1 – Future 2033 network

Sc3: Scenario 3 – Future 2051 network

Table 14: 2051 Sub-Area Model PM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB			WB/SB		
	2016	2033	2051	2016	2033	2051
		Sc1	Sc3		Sc1	Sc3
Taunton Road: Thickson Road to Thornton Road	0.74	0.79	**1.19**	0.54	0.63	0.74
Taunton Road: Thornton Road to Stevenson Road	0.84	**0.93**	**1.39**	0.65	0.71	0.87
Taunton Road: Stevenson Road to Simcoe Street	0.87	**1.00**	**1.32**	0.62	0.70	**1.05**
Conlin Road: Thickson Road to Thornton Road	0.88	0.76	**1.10**	0.62	0.74	0.79
Conlin Road: Thornton Road to Stevenson Road	0.80	0.67	0.76	0.74	0.54	0.71
Conlin Road: Stevenson Road to Simcoe Street	0.41	0.70	**0.90**	0.41	0.60	**0.90**
Thickson Road: Taunton Road to Conlin Road	0.77	0.74	0.88	0.87	0.81	**1.05**
Garrard Road: Taunton Road to Conlin Road	0.27	0.63	**0.90**	0.41	0.69	**1.00**
Thornton Road: Taunton Road to Conlin Road	0.49	0.84	0.80	0.51	0.62	**1.02**
Stevenson Road: Taunton Road to Conlin Road	0.04	0.62	**0.92**	0.13	0.69	**1.07**
Simcoe Street: Taunton Road to Conlin Road	0.58	**1.28**	**1.90**	0.83	**1.21**	**1.58**

Notes:

Sc1: Scenario 1 – Future 2033 network

Sc3: Scenario 3 – Future 2051 network

Table 15: 2051 Sub-Area Model AM Peak Hour Corridor Travel Times

Road	EB/ NB Travel Time (min:sec)			EB/ NB Travel Time (min:sec)		
	2016	2033	2051	2016	2033	2051
		Sc 1	Sc 3		Sc 1	Sc 3
Taunton Road (Anderson to Simcoe)	05:13	05:23	06:23	07:22	07:43	14:11
Conlin Road (Anderson to Simcoe)	04:25	04:50	05:37	05:23	05:23	07:20
Anderson Street (Taunton to Hwy 407)	03:25	03:37	04:32	03:36	03:49	05:28
Thickson Road (Taunton to Hwy 407)	04:23	03:19	04:10	03:20	03:22	04:01
Garrard Road (Taunton to Hwy 407)	02:07	02:20	02:56	02:04	02:10	02:32
Thornton Road (Taunton to Hwy 407)	04:23	04:31	05:05	04:14	05:14	04:55
Stevenson Road (Taunton to Conlin)	02:23	02:44	04:37	02:23	02:33	03:40
Simcoe Street (Taunton to Hwy 407)	06:17	08:59	12:55	05:17	07:50	10:28

Notes:
Sc1: Scenario 1 – Future 2033 network
Sc3: Scenario 3 – Future 2051 network

Table 16: 2051 Sub-Area Model PM Peak Hour Corridor Travel Times

Road	EB/ NB Travel Time (min:sec)			EB/ NB Travel Time (min:sec)		
	2016	2033	2051	2016	2033	2051
		Sc 1	Sc 3		Sc 1	Sc 3
Taunton Road (Anderson to Simcoe)	07:03	07:37	15:33	05:29	05:43	07:28
Conlin Road (Anderson to Simcoe)	05:10	05:25	07:19	04:55	04:58	05:39
Anderson Street (Taunton to Hwy 407)	03:35	03:49	05:57	03:28	03:49	04:56
Thickson Road (Taunton to Hwy 407)	03:37	03:13	03:50	04:23	03:34	04:55
Garrard Road (Taunton to Hwy 407)	02:03	02:22	02:37	02:05	02:28	03:16
Thornton Road (Taunton to Hwy 407)	04:19	05:05	05:01	04:23	04:44	05:42
Stevenson Road (Taunton to Conlin)	02:23	02:38	03:45	02:23	02:52	05:18
Simcoe Street (Taunton to Hwy 407)	05:01	07:32	10:48	07:07	08:38	12:55

Notes:
Sc1: Scenario 1 – Future 2033 network
Sc3: Scenario 3 – Future 2051 network

Table 17: 2051 Sub-Area Model AM Peak Hour Stevenson Road Link Volumes

Road	EB/NB			WB/SB		
	2016	2033	2051	2016	2033	2051
		Sc1	Sc3		Sc1	Sc3
South of Conlin	87	305	487	39	281	457
North of Taunton	88	305	494	40	221	394

Notes:
Sc1: Scenario 1 – Future 2033 network
Sc3: Scenario 3 – Future 2051 network

Table 18: 2051 Sub-Area Model PM Peak Hour Stevenson Road Link Volumes

Road	EB/NB			WB/SB		
	2016	2033	2051	2016	2033	2051
		Sc1	Sc3		Sc1	Sc3
South of Conlin	20	309	461	65	344	535
North of Taunton	21	250	406	64	323	520

Notes:
Sc1: Scenario 1 – Future 2033 network
Sc3: Scenario 3 – Future 2051 network

3.0 Intersection Capacity Analysis

Study intersections under existing (2022) baseline conditions and future (2033) conditions were analyzed to evaluate the impact on traffic operations with the study area limits. Intersection operations were assessed using the Synchro 11 software which utilizes the Highway Capacity Manual (HCM) methodology published by the Transportation Research Board National Research Council. Synchro 11 can analyze both signalized and unsignalized intersections in a road corridor or network considering the spacing, interaction, queues, and operations between intersections.

Intersection operations performance metrics are reported in terms of Level of Service (LOS), delays, v/c ratios, and 95th percentile queues. Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. **Table 19** summarizes the LOS criteria for signalized and unsignalized intersections.

Table 19: Intersection Level of Service Criteria

	Average Control Delay per Vehicle (second / vehicle)	
Level of Service	**Signalized Intersection**	**Unsignalized Intersection**
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

The following Synchro parameters were adjusted based on the Region's "*Design Specifications for Traffic Control Devices, Pavement Markings, Signage and Roadside Protection*" guidelines (April 2021):

- Lane Widths
  - 3.50 m for through movements
  - 3.25 m for turning movements

Peak hour factors ("PHFs") were calculated based on existing traffic counts. A default PHF value of 0.92 was used for study intersections where 15-minute data aggregates were not available. Critical movements were identified based on the following criteria:

- where the v/c ratio for a movement is equal or greater than 0.90; and/or,
- where the LOS for a movement is 'F.'

3.1 Existing (2022) Conditions

The study area for the existing intersection capacity analysis is bounded by Thickson Road to the west, Simcoe Street to the east, Conlin Road to the north, and Taunton Road to the south and the intersections within the study area are shown in **Figure 12**.

Signalized and unsignalized intersection operations were assessed using the Synchro 11 software based on the Region's standards documented in "*Chapter 9 of the Design Specifications for Traffic Control Devices, Pavement Marking, Signage and Roadside Protection*".

Thornton Road at Conlin Road is a single-lane roundabout with a bypass lane for right-turning vehicles at the south leg; therefore, the roundabout operation was analyzed using the ARCADY software. ARCADY adopts an empirical methodology to determine the capacity, queues and delays based on various geometric parameters such as entry width, effective flare length, inscribed circle diameter, etc. In addition, a 10% capacity reduction was applied to account for driver unfamiliarity at roundabouts in North America based on industry's standard (MTO's Traffic Impact Studies Guidelines, 2021).

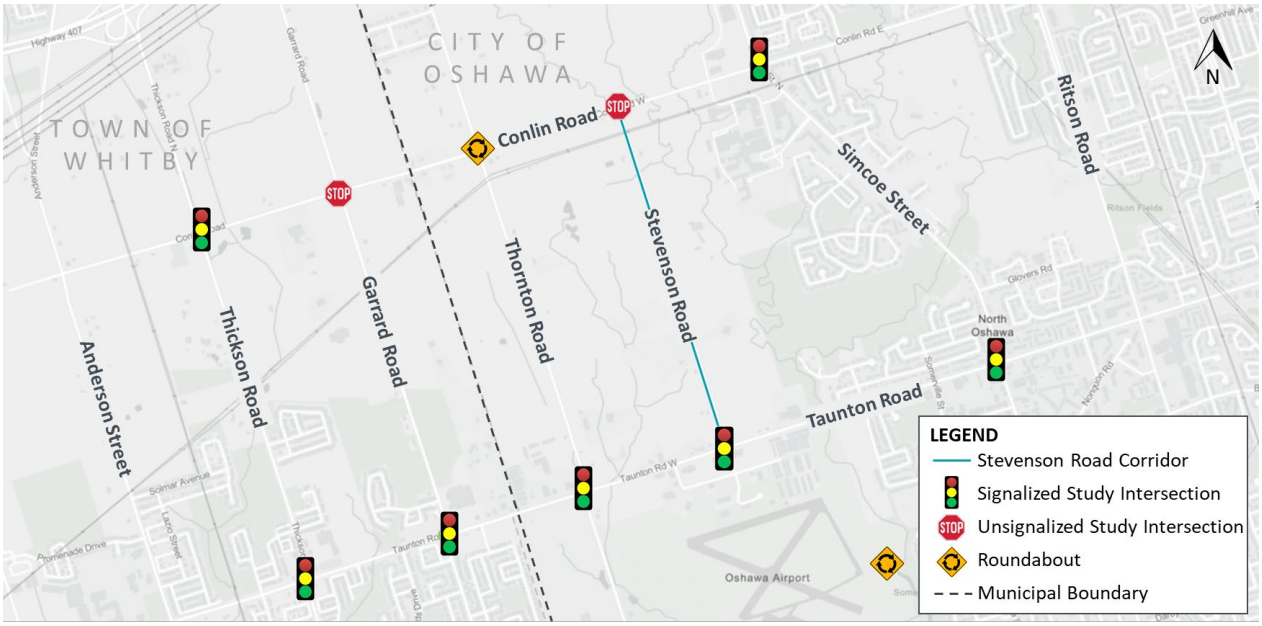


Figure 12: Study Intersections

3.2 Data Collection and Review

TraffMobility obtained existing traffic data from the Region and City, including Turning Movement Counts ("TMCs"), 24-hour Automatic Traffic Recorder ("ATR") data, signal timing plans, and collision data.

3.2.1 Traffic Counts

The Region and City provided available historic turning moment counts for the study intersections between 2011 and 2021. **Table 20** shows a summary of the latest traffic counts received and a copy of the turning movement counts are provided in **Appendix D**.

Additionally, 24-hour ATR data was provided by the Region for three locations along Simcoe Street and one location along Taunton Road. The three ATR locations on Simcoe Street are 50m north of Eastwood

Avenue North, 200m south of Conlin Road, and 325m north of Taunton Road. The ATR count location on Taunton Road is 200m east of Thickson Road.

Table 20: Turning Movement Counts Summary

Intersection	Count Date	Source
Thickson Road at Conlin Road	October 17th, 2018	Region
Garrard Road at Conlin Road	June 13th, 2018	Traffic Study (Ontario Traffic Inc.)
Thornton Road at Conlin Road	October 7th, 2020	City
Stevenson Road at Conlin Road	October 7th, 2020	City
Simcoe Street at Conlin Road	May 23rd, 2018	Region
Thickson Road at Taunton Road	May 31st, 2018	Region
Garrard Road at Taunton Road	November 7th, 2017	Region
Thornton Road at Taunton Road	May 10th, 2016	Region
Stevenson Road at Taunton Road	October 17th, 2018	Region
Simcoe Street at Taunton Road	June 8th, 2017	Region

3.2.2 Signal Timing Plans

Existing signal timing plans for the study intersections were provided by the Region. The existing signal timing plans are included in **Appendix E**.

3.3 Existing (2022) Baseline Volumes

Available traffic counts were collected over several years; therefore, background reports and historical data for the study intersections were reviewed to determine an appropriate adjustment factor to derive existing (2022) baseline traffic volumes to be used in the analysis. An average compound growth rate of 1% per annum was established as an appropriate adjustment factor to estimate existing (2022) baseline traffic volumes from historical counts. The average compound growth rate was estimated using historical weekday AM and PM peak hour turning movement counts at study intersections as shown in **Table 21**.

Table 21: Existing (2022) Baseline Growth Rate Summary

Corridor	CAGR	
	Weekday AM	Weekday PM
Conlin Road / Thickson Road	4.49%	0.29%
Conlin Road / Simcoe Street	0.25%	0.21%
Taunton Road / Thickson Road	3.34%	2.45%
Taunton Road / Garrard Road	-0.59%	0.00%
Taunton Road / Thornton Road	1.47%	1.74%
Taunton Road / Stevenson Road	0.31%	-1.65%
Taunton Road / Simcoe Street	1.14%	1.87%
Average	**1.49%**	**0.70%**
	1.09%	

Note: CAGR – compound annual growth rate

Intersection turning movement counts conducted during the pandemic (i.e., in 2020) were adjusted to the higher link volumes between adjacent study intersections to estimate pre-pandemic traffic demand. Existing intersection operations were analyzed using the lane configurations illustrated in **Figure 13,** and the existing adjusted traffic volumes shown in **Figure 14**. Analysis results are summarized in **Figure 15** and detailed summary tables and analysis reports for Synchro and ARCADY are provided in **Appendix F** and **Appendix G**, respectively.

The results show that existing operation during the weekday PM peak hour has critical turning movements (v/c ratios greater than 0.90 or LOS of 'F') at several intersections as shown in **Table 22**. The Taunton Road intersections at Thickson Road and Simcoe Street experience more operational constraints than the other study intersections.

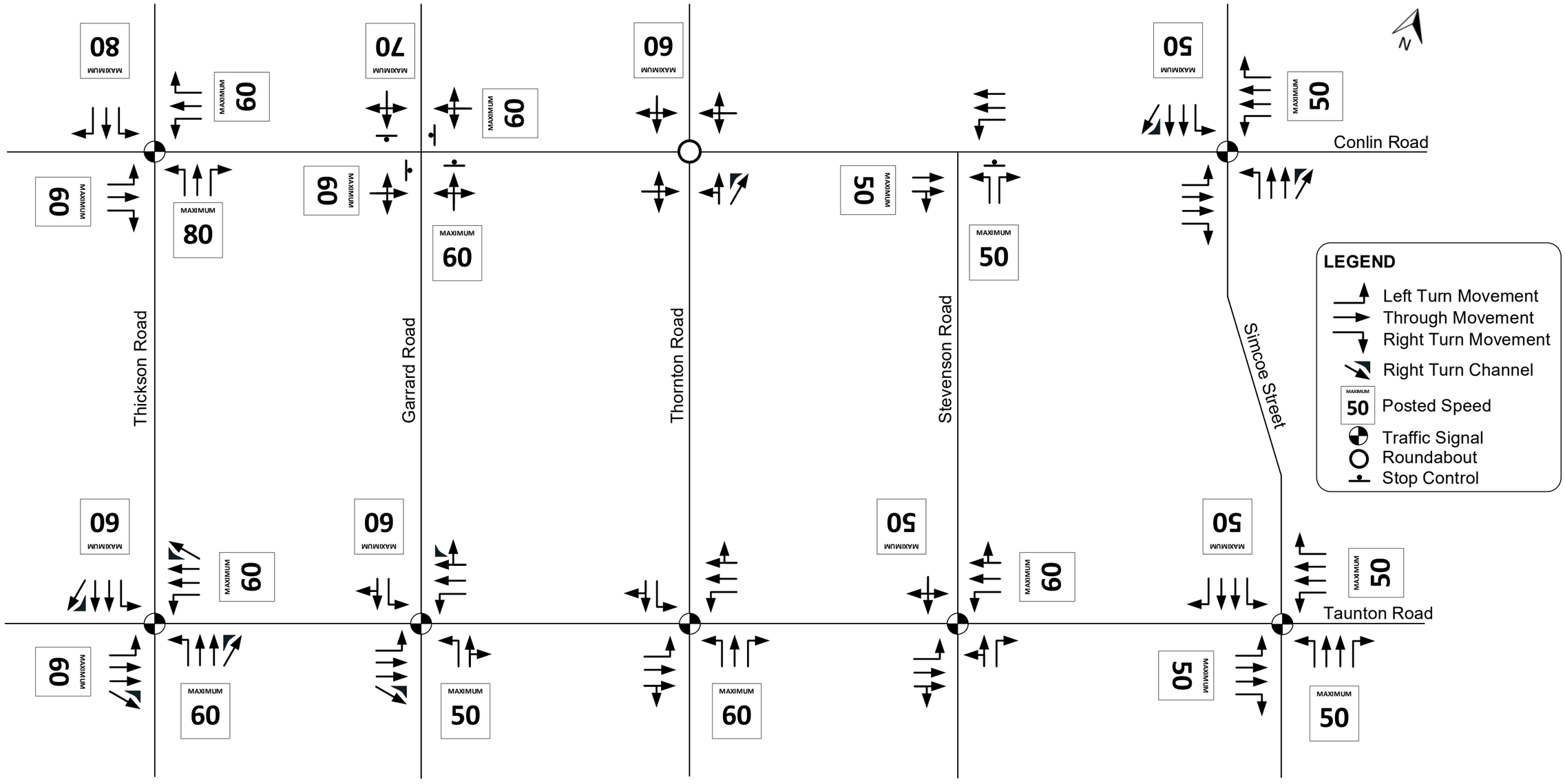


Figure 13: Existing Road Network

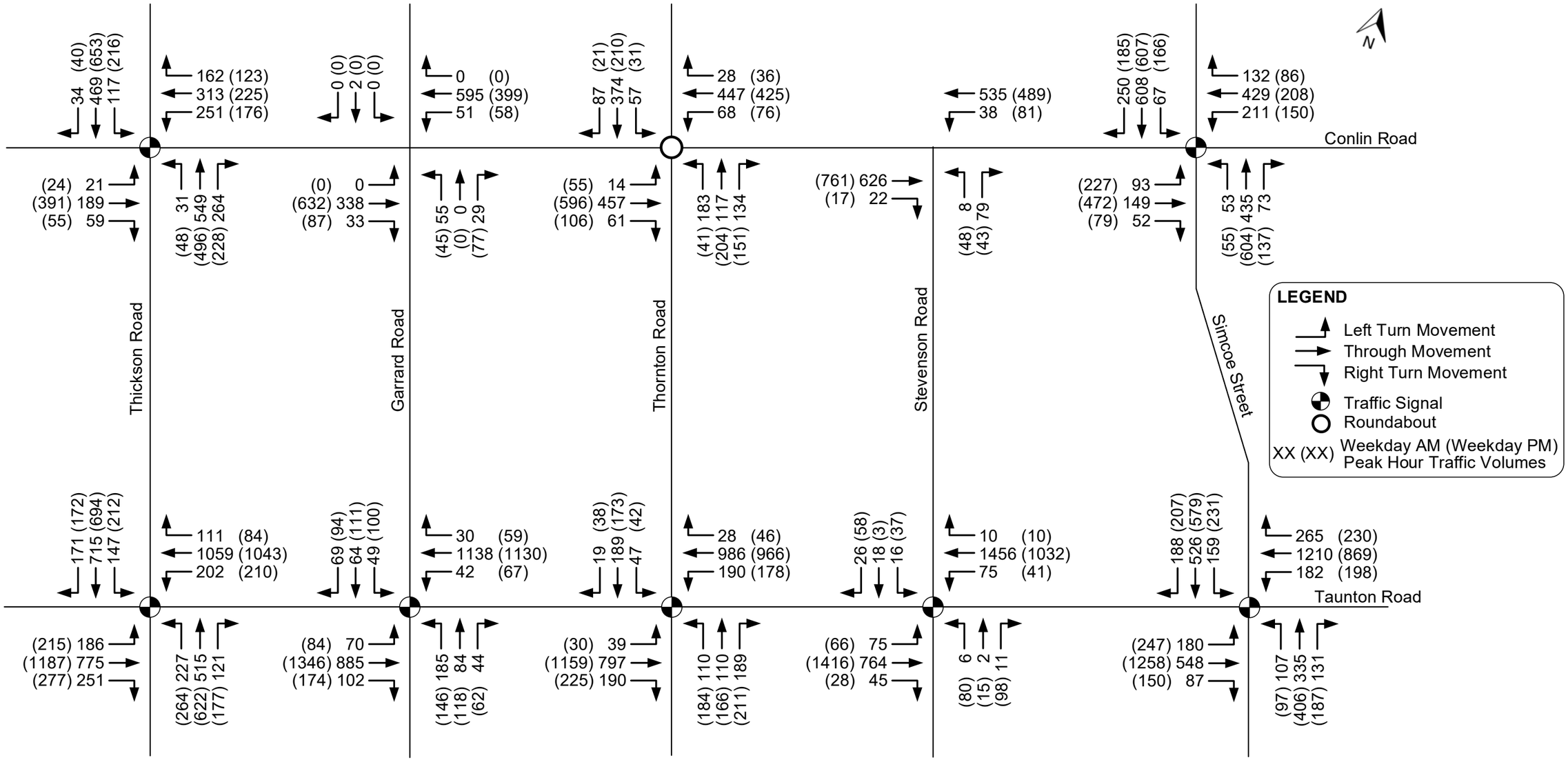


Figure 14: Existing (2022) Adjusted Traffic Volumes

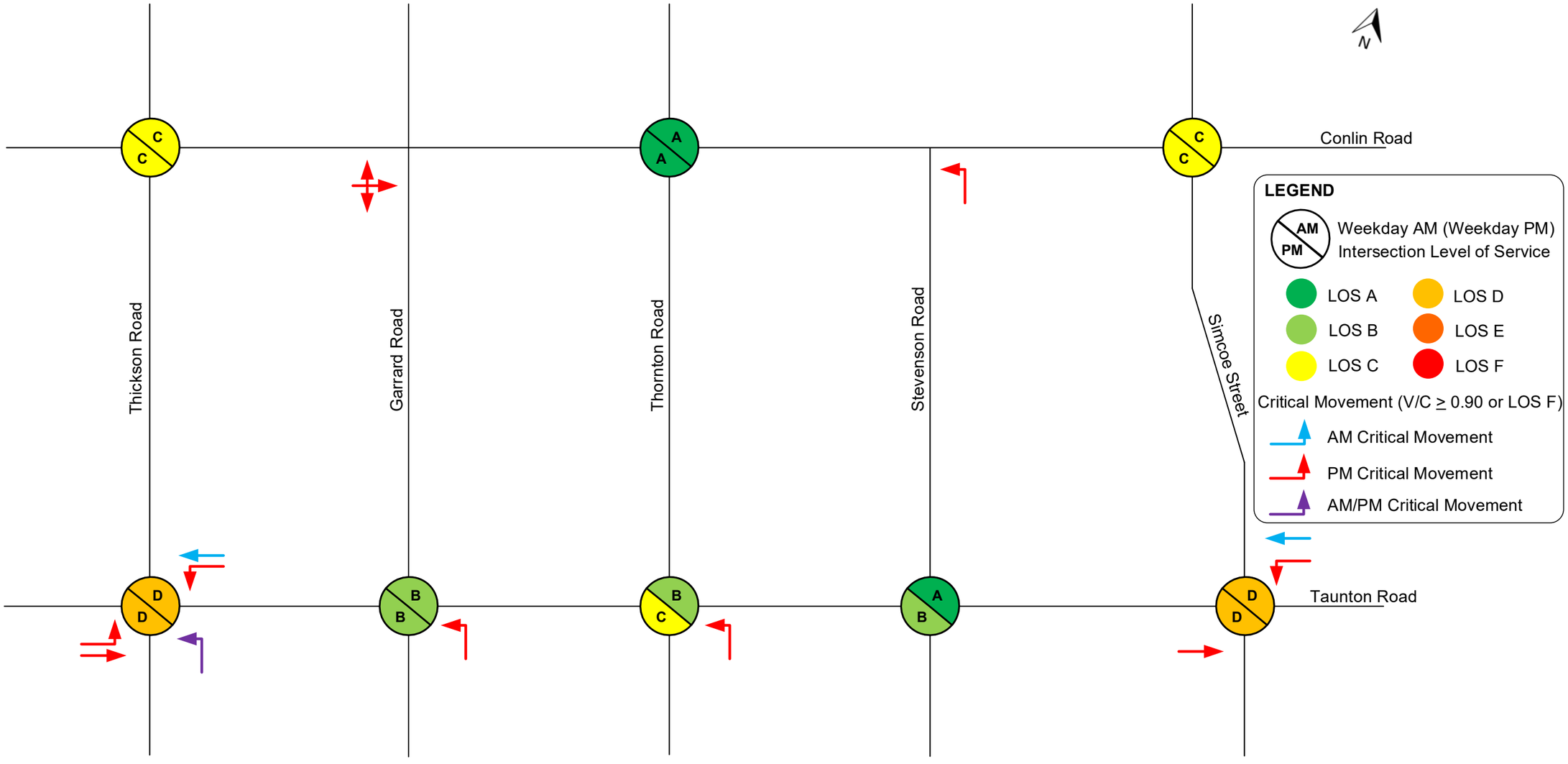


Figure 15: Existing (2022) Conditions Level of Service and Critical Movements

Table 22: Existing (2022) Conditions Intersection Operations – Critical Movements

Intersection / Critical Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Simcoe Street North & Taunton Road West at Taunton Road East (Signalized)									
EBT	D	35	0.44	67	D	44	**0.96**	181	>300
WBL	C	23	0.55	33	E	62	**0.91**	69	180
WBT	**F**	88	**1.09**	193	C	34	0.72	110	>300
Thornton Road North at Taunton Road West (Signalized)									
NBL	C	32	0.51	29	**F**	101	**0.99**	69	110
Garrard Road at Taunton Road East (Signalized)									
NBL	D	51	0.78	**54**	**F**	81	0.89	**51**	30
Thickson Road at Taunton Road East (Signalized)									
EBL	D	54	0.88	61	E	72	**0.96**	74	135
EBT	C	31	0.69	92	D	41	**0.90**	167	>200
WBL	D	41	0.86	29	**F**	81	**0.99**	76	140
WBT	D	49	**0.99**	159	D	42	0.79	140	190
NBL	D	53	**0.90**	66	**F**	89	**1.02**	93	130
Stevenson Road North at Conlin Road (Unsignalized)									
NBL	C	1	0.04	<7	**F**	51	0.41	14	50
Garrard Road at Conlin Road (Unsignalized)									
EBLTR	C	15	0.58	-	**F**	**80**	**1.09**	-	>100

Note: LOS – level of service; v/c – volume to capacity ratio

3.4 Future (2033) Conditions

This section documents the results of the future (2033) intersection capacity analysis for the weekday AM and PM peak hours. The road network in the existing Synchro model was updated to include the planned road network improvements listed in **Table 1**. Using the volumes plot from the EMME (2033) sub-area model, corridor specific average compound annual growth rates were calculated and applied to the existing (2022) volumes to forecast future (2033) volumes used in the future intersection analysis. The calculated average compound annual rates for each corridor are provided in **Table 23**. A maximum annual growth rate of 3% was used in the analysis.

Signal timing splits at all signalized intersections were optimized in the analysis of future (2033) intersection analysis (Scenario 1 with planned widening of Taunton Road).

Table 23: Future (2033) Growth Rate Summary

Corridor	CAGR
	Weekday AM/PM
Conlin Road	2.5%
Taunton Road	1.0%
Simcoe Street	0.0%
Stevenson Road	3.0%
Thornton Road	2.5%
Garrard Road	3.0%
Thickson Road	3.0%

Note: CAGR - compound annual growth rate

The future 2033 road configurations and forecasted traffic volumes are presented in **Figure 16** and **Figure 17**, respectively.

Synchro was used to assess operations for signalized and unsignalized intersections while ARCADY was used to assess roundabout operations. It is noted that the intersection of Conlin Road at Garrard Road was assessed in future (2033) conditions as both an unsignalized intersection and a roundabout.

Analysis results are summarized in **Figure 18** and detailed summary tables and analysis reports for Synchro and ARCADY are provided in **Appendix F** and **Appendix G**, respectively.

The results show that Taunton Road intersections at Thickson Road and Simcoe Street are expected to experience operational constraints with several critical movements (v/c ratios greater than 0.90 or LOS of 'F') during both the weekday AM and PM peak hours under future (2033) conditions, as shown in **Table 24**. The intersection of Thickson Road at Conlin Road is also expected to have operational constraints for several movements during both peak hours.

Roundabout operations results show that all approaches for both Conlin Road roundabouts at Garrard Road (sensitivity analysis) and Thornton Road (existing) are expected to operate at LOS A during both the weekday AM and PM peak hours, except for the south approach (LOS E) at the Thornton Road roundabout during the AM peak hour, and the east approach (LOS C) for the roundabout at Garrard Road during the PM peak hour.

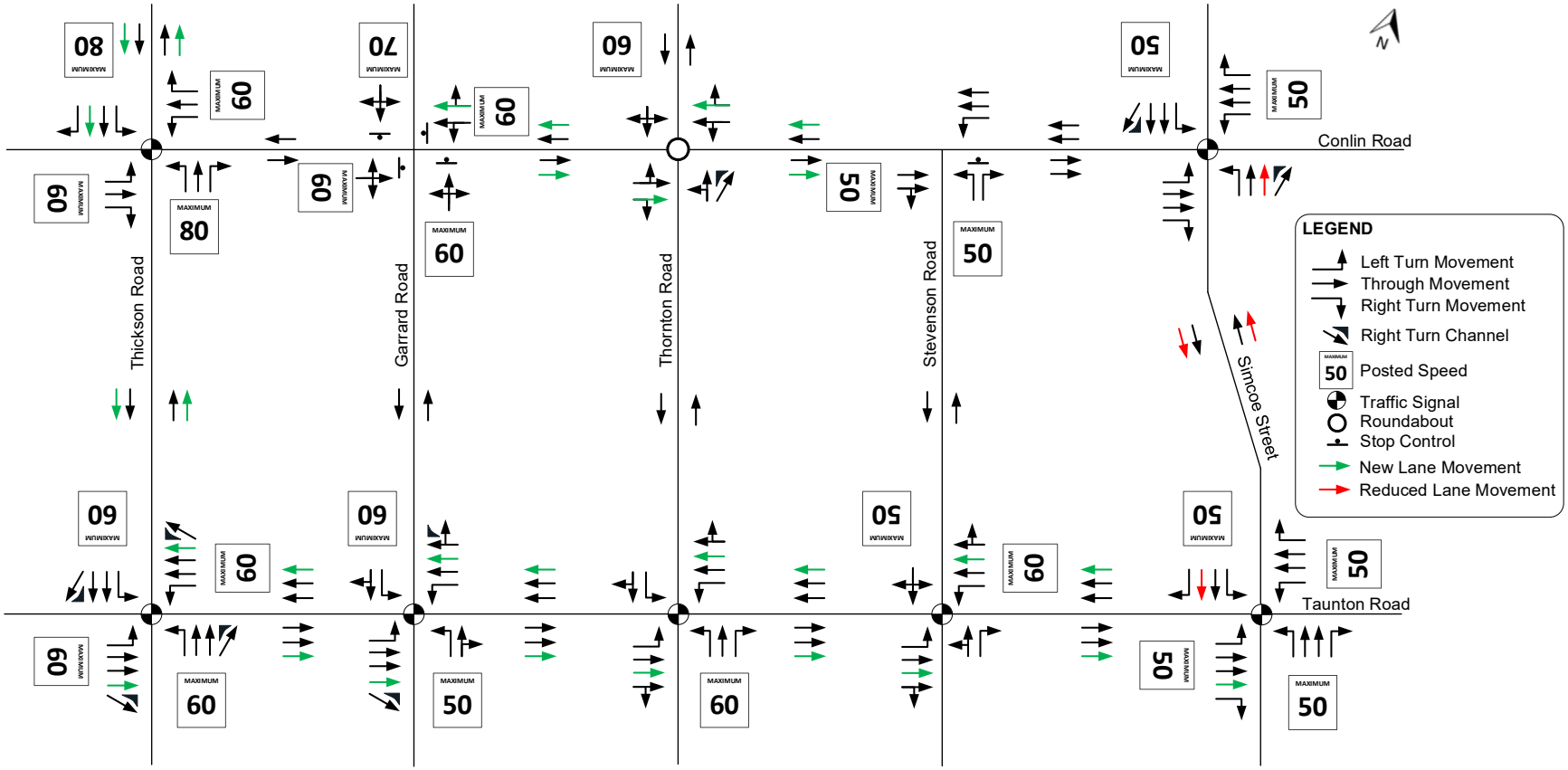


Figure 16: Future (2033) Lane Configuration - Scenario 1

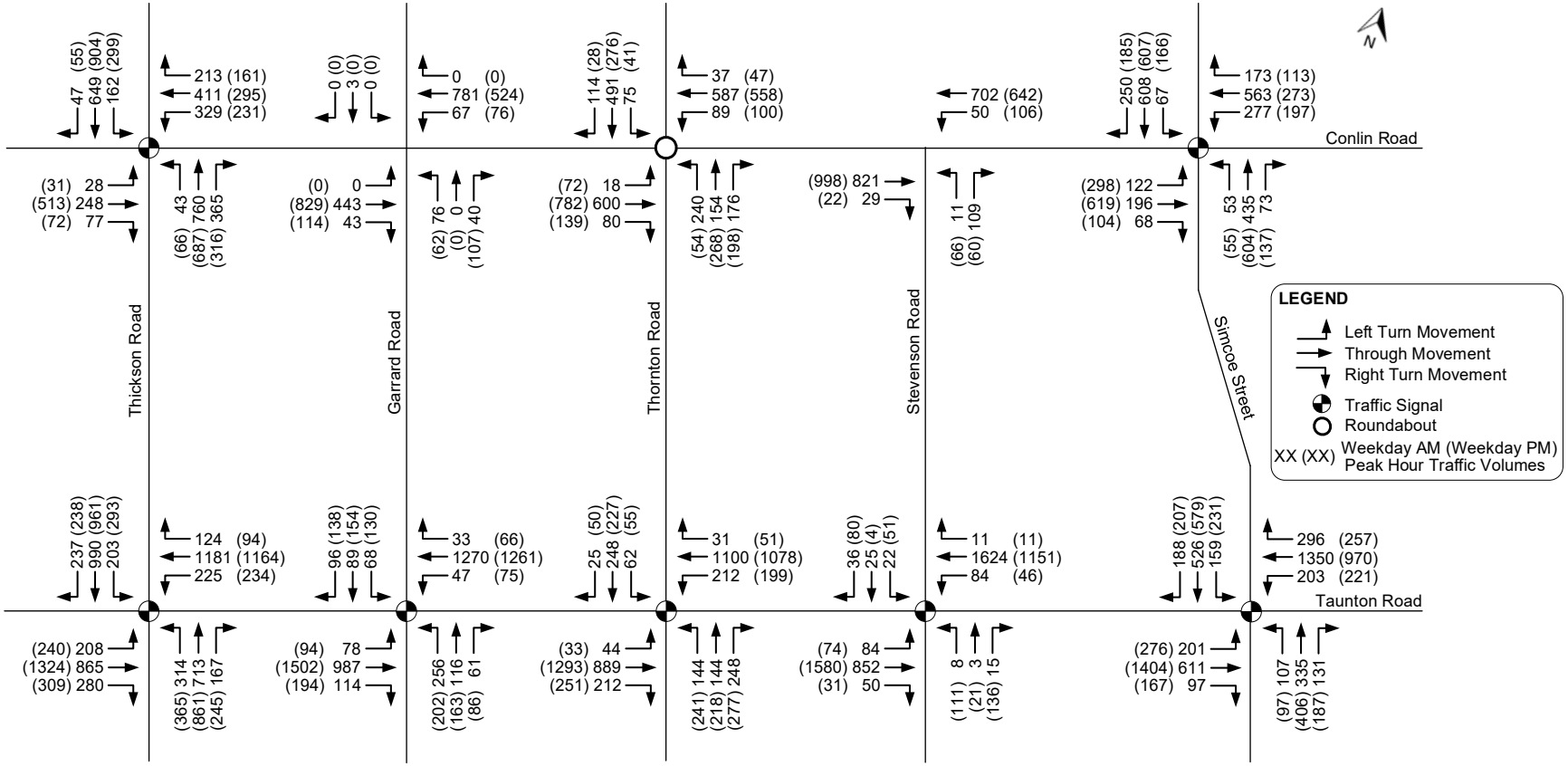


Figure 17: Future (2033) Traffic Volumes - Scenario 1

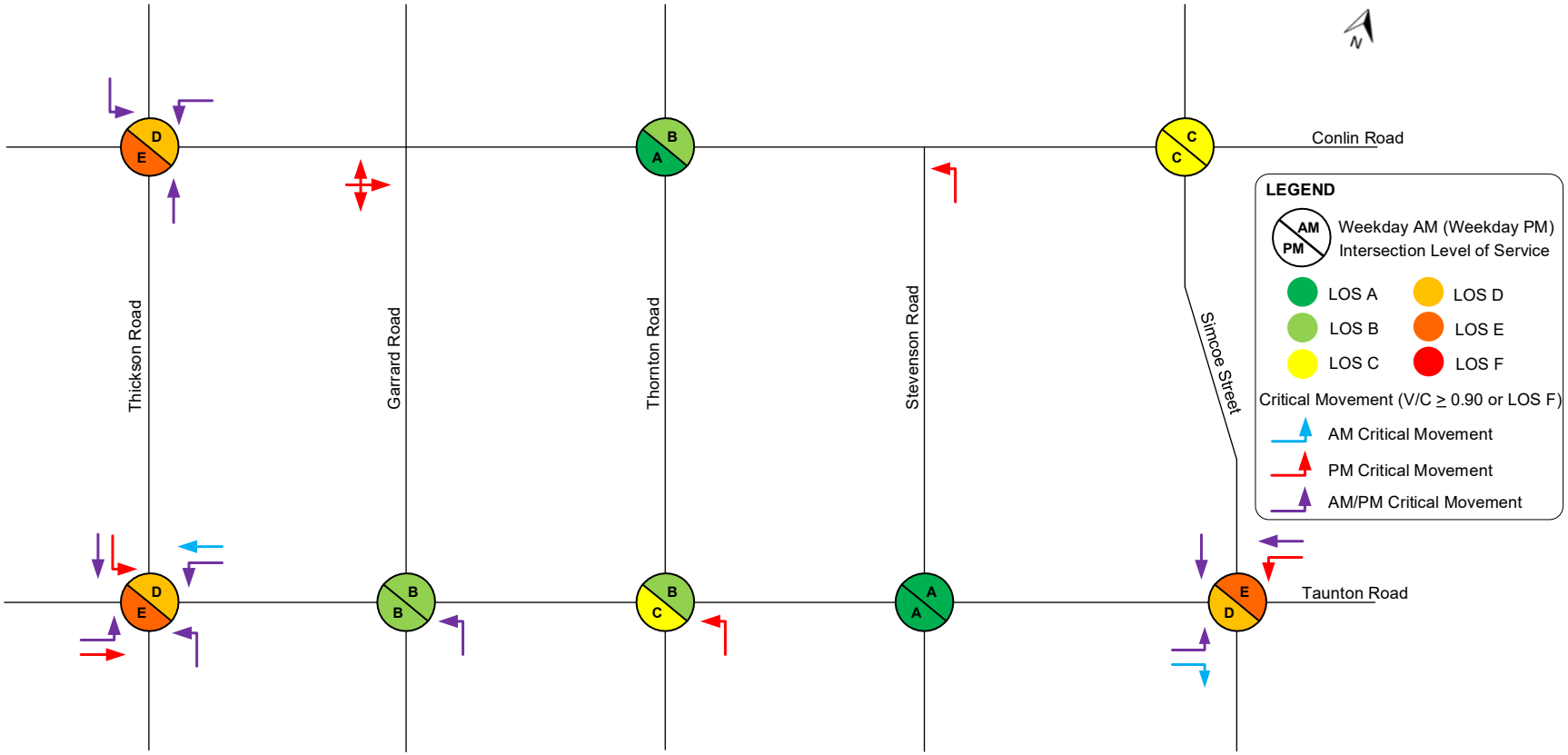


Figure 18: Future (2033) Intersection LOS and Critical Movements – Scenario 1

Table 24: Future (2033) Conditions Intersection Operations – Scenario 1 Critical Movements

Intersection / Critical Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Simcoe Street North & Taunton Road West at Taunton Road East (Signalized)									
Overall	E	58	**1.04**	-	D	45	0.97	-	-
EBL	F	91	**0.98**	72	**F**	100	**0.97**	52	125
EBR	**F**	161	0.07	19	C	26	0.17	3	25
WBL	B	17.1	0.52	36	E	73	**0.96**	32	180
WBT	**F**	92	**1.11**	206	D	54	**0.93**	109	>300
SBT	E	60	**1.00**	177	E	62	**0.95**	123	>150
Thornton Road North at Taunton Road West (Signalized)									
NBL	D	47	0.75	35	**F**	93	**1.01**	84	110
Garrard Road at Taunton Road East (Signalized)									
NBL	E	63	**0.91**	**88**	**F**	95	**0.98**	**84**	30
Thickson Road at Taunton Road East (Signalized)									
Overall	D	49	**1.02**	-	E	59	**1.05**	-	-
EBL	**F**	84	**0.99**	72	**F**	87	**1.00**	87	135
EBT	D	39	0.75	75	E	61	**0.99**	138	>200
WBL	**F**	89	**1.03**	71	E	78	**0.98**	82	140
WBT	D	54	**1.02**	126	D	51	0.88	115	190
NBL	E	69	**0.97**	103	**F**	100	**1.07**	130	130
SBL	C	23	0.62	35	E	57	**0.91**	92	135
SBT	E	68	**1.02**	153	E	72	**1.01**	157	>120
Thickson Road at Conlin Road (Signalized)									
Overall	D	48	**1.09**	-	**F**	78	**1.37**	-	-
WBL	**F**	91	**1.05**	**109**	**F**	245	**1.42**	**95**	70
NBT	**F**	110	1.15	215	**F**	183	**1.31**	213	>150
SBL	E	57	0.90	37	**F**	157	**1.24**	92	115
Stevenson Road North at Conlin Road (Unsignalized)									
NBL	E	36	0.09	3	**F**	273	**1.16**	45	50
Garrard Road at Conlin Road (Unsignalized)									
EBLTR	D	26	0.79	26	**F**	259	**1.52**	26	>100

Note: LOS – level of service; v/c – volume to capacity ratio; Scenario 1 – future 2033 network

4.0 Multi-Modal Level of Service

This section documents the Multi-Modal Level of Service (MMLOS) analysis of the preferred design alternative for Stevenson Road North between Conlin Road and Taunton Road for the year 2033.

4.1 Multi-Modal Level of Service Evaluation Methodology

The Multi-Modal Level of Service (MMLOS) methodology is based on the Ontario Traffic Council's (OTC) MMLOS guidelines and analysis tool (2022) and the performance measures for evaluating MMLOS are presented in **Table 25**.

Table 25: Summary of Intersection and Segment Measures

	Walking	Cycling	Transit	Trucks	Cars
Segments	Pedestrian Facility Width	Bike Facility Width per Direction	Transit Facility Type	Width of Curb Lane	Mid-block V/C Ratio
	Pedestrian Buffer Width	Bike Buffer Width	Presence of Transit Passenger Amenities	Car Level of Service	Curb Lane Conflicts
	Maximum Distance Between Controlled Crossings	Conflicts with Other Modes	Pedestrian Level of Service (as a measure of Passenger Access)		
Signalized Intersections	Enhanced Pedestrian Measures	Enhanced Bicycle Measures	Presence of Transit Priority Measures	Average Effective Turning Radius	Percentage of Turning Movements with Dedicated Lanes
	Average Effective Turning Radius	Average Effective Turning Radius			
	Signal Cycle Length[1]	Signal Cycle Length[1]	Transit Movement Delay[1]	Car Level of Service[1]	Intersection Delay[1]
	Number of Uncontrolled Conflicts[1]	Number of Uncontrolled Conflicts[1]	Pedestrian Level of Service[1]		
Unsignalized Intersections	Marked Controlled Crossings	Presence of Bike Facilities	Pedestrian Level of Service	Average Effective Turning Radius	
	Average Crossing Distance	Requirements to Stop			
	Average Effective Turning Radius	Average Effective Turning Radius			
			Transit Movement Delay[1]	Car Level of Service[1]	Intersection Delay[1]

[1] These Measures are considered ONLY when completing operational analysis (OTC, 2021).

4.2 Multi-Modal Level of Service Results

The MMLOS analysis results for the preferred design alternative for Stevenson Road North between Conlin Road and Taunton Road for the year 2033 are summarized in **Table 26**. The completed analysis from the OTC MMLOS tool is provided in **Appendix H**.

Table 26: Multi-Modal Level of Service Evaluation

Type of Study	**Planning Project – Environmental Assessment**		
Mode	Target LOS (2033 Future)	Observed LOS (2033 Future)	Existing LOS
Stevenson Road North at Taunton Road (Intersection)			
Area Type	Neighbourhood Connector		Neighbourhood Connector
Pedestrian	E	D	D
Cycling	D	N/A[1]	N/A[1]
Transit	B	D	D
Truck	D	B	B
Cars	D	B	B
Stevenson Road North at Conlin Road (Intersection)			
Area Type	Industrial Boulevard		Rural Connector
Pedestrian	D	F	F
Cycling	D	N/A[1]	N/A[1]
Transit	D	C	C
Truck	B	A	A
Cars	E	D	D
Stevenson Road North (Segment)			
Area Type	Industrial Boulevard		Rural Connector
Pedestrian	D	D	N/A[1]
Cycling	D	A	N/A[1]
Transit	D	E	F
Truck	B	B	B
Cars	E	C	C

[1] No results can be calculated because the studied intersections or segments failed one of the related active transportation design check questions (OTC, 2021).

The signalized intersection at Taunton Road meets the target level of service for all modes except for transit and cycling. The proposed multi-use path along Stevenson Road North from north of Taunton Road to south of Conlin Road, does not contribute to the level of accommodation provided to cyclists at the intersection. During detailed design, treatments such as cross rides, green conflict markings, dedicated intersection features, bicycle signal heads and leading bike intervals (LBIs) could be considered to improve cycling level of service at this intersection.

Furthermore, the transit mode does not meet the MMLOS target due to the lack of transit priorities (i.e., transit signal priority, queue jump lanes, transit lanes) at all approaches for the Stevenson Road North and Taunton Road intersection.

The unsignalized intersection at Conlin Road does not meet the target level of service for pedestrian mainly due to the long uncontrolled crossing distance (approximately 24.5m) and marked crossings provided at only one approach. The level of service for cycling could not be computed at this

intersection since it failed one of the related active transportation design check questions (lack of intersection design feature to facilitate the crossing of cyclists such as bike boxes and queuing spaces).

For the Stevenson Road North segment, all the modes meet the LOS requirements except transit since this is not a transit route and required passenger amenities such as shelters, seating, shade trees etc. are not provided.

5.0 Findings

EMME sub-area network modelling, Synchro intersection capacity analysis for signalized and unsignalized intersections, and ARCADY roundabout analysis were conducted for the 2033 and 2051 horizons to determine the transportation needs of the future road network within the defined study area limits. MMLOS analysis was conducted for the preferred design alternative for Stevenson Road North between Conlin Road and Taunton Road for the year 2033. The analysis evaluated the transportation impacts of the study area's network for weekday AM and PM peak hours. Key study findings from the evaluation of the results are:

2033 Horizon Year

- Based on the projected growth by 2033 and the forecasted volumes for Stevenson Road, a two-lane cross-section would be sufficient.
- The future intersection analysis in 2033 show that several study intersections are expected to operate with capacity constraints, which include:
    - Taunton Road intersections at Thickson Road and Simcoe Street are expected to experience operational constraints with several critical movements (v/c ratios greater than 0.90 or LOS of 'F') during both the weekday AM and PM peak hours.
    - The Thickson Road at Conlin Road intersection is also expected to have operational constraints for several movements during both peak hours.
- Without the planned widening, the traffic demand on Taunton Road is expected to exceed available capacity under 2033 conditions, particularly along the section between Stevenson Road and Simcoe Street (v/c ratios ≤ 1.14).
- The roundabout operations results show that all approaches for both Conlin Road roundabouts at Garrard Road (sensitivity analysis) and Thornton Road (existing) are expected to operate at LOS A during both the weekday AM and PM peak hours, except for the south approach (LOS E) at the Thornton Road roundabout during the AM peak hour.
- A multi-use path proposed along the Stevenson Road North study corridor improves the level of service for pedestrian and cyclists with the preferred design alternative; however, Stevenson Road North intersection improvements at Taunton Road and Conlin Road are required to improve LOS for pedestrians and cyclists.

2051 Horizon Year

- The road network is expected to operate near capacity along Taunton Road, Stevenson Road, and sections of Conlin Road (west of Garrard Road), with v/c ratios exceeding 0.90.
- The forecasted volumes on Stevenson Road warrant a 4-lane cross-section in 2051; however, since several assumptions were made in the modelling of the 2051 future conditions, it is recommended that the Stevenson Road right-of-way (ROW) between Taunton Road and Conlin Road be protected for a 4-lane cross-section. The widening of Stevenson Road to 4 lanes can be confirmed with a more rigorous analysis when details are finalized for the airport lands redevelopment.

Appendix A

2033 Sub-Area Modelling Results

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca

Appendix B

2051 Sub-Area Modelling Results

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca

Appendix C

Report for the Removal of East-West Midblock Type 'C' Arterial Assessment

Transportation Report for the Removal of East-West Midblock Type ‘C’ Arterial

Stevenson Road North Environmental Assessment (EA) Study – Schedule ‘C ’

Date: August 29, 2024
Prepared for: City of Oshawa, 50 Centre Street South, Oshawa, ON, L1H 3Z7

Document Revision History

Rev	Description	Prepared/ Revised By	Reviewed By	Approved By	Date Issued (M/D/Y)
R0	Draft Report	A. Sathya	R. Sooklall	T. Chow	09/05/2023
R1	Final Report	A. Sathya	R. Sooklall	T. Chow	08/29/2024

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1.0 Introduction

The City of Oshawa ("City") is currently conducting a Municipal Class 'Schedule C' Environmental Assessment (EA) study for Stevenson Road North. The primary aim of this Class EA is to assess future needs and justifications based on projected land use changes and anticipated traffic demand. Additionally, the study aims to identify potential environmental impacts associated with geometric improvements, if deemed necessary, to meet future requirements.

As part of the Stevenson Road North EA, an additional assessment is being carried out for a proposed east-west midblock arterial road extending from Stevenson Road North to Thickson Road; past the Whitby-Oshawa border, as shown in **Figure 1**. Currently, the east-west midblock arterial is identified in the City's Official Plan (refer to Official Plan Schedule 'B', dated August 2019) as a Future Type 'C' Arterial Road and has also been identified in both the Town of Whitby ("Town") and Durham Region ("Region") Official Plans (dated June 2021 and May 2020, respectively). The additional assessment evaluates the transportation, natural environment, and land-use and development constraints for the future east-west midblock Type 'C' Arterial Road to justify its deletion from the City's Official Plan.

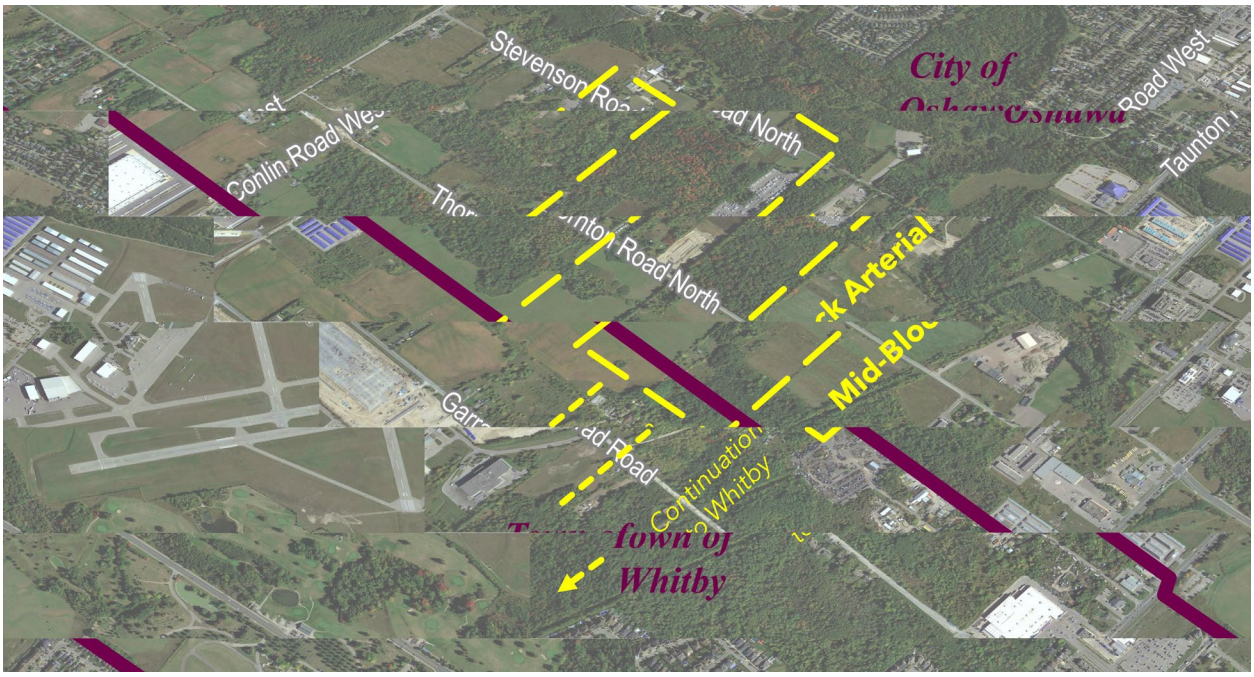


Figure 1: East-West Midblock Type 'C' Arterial Conceptual Limits (Source: Gannett Fleming)

This transportation assessment report was prepared by TraffMobility Engineering Inc. ("TraffMobility") as a subconsultant for Gannett Fleming and the City. The report documents the methodology, findings, and recommendations regarding the removal of the east-west midblock Type 'C' Arterial Road from a transportation planning and traffic operations perspective.

The transportation assessment consists of an existing conditions analysis, as well as identifying the transportation needs in future horizon years (2033 and 2051). The purpose of the assessment is to determine the associated traffic impacts with and without the east-west midblock arterial for both 2033 and 2051 horizon years conditions and to confirm the justification for its removal. Of note, determining the physical location or alignment of the east-west midblock arterial is outside of the study scope.

1.1 Transportation Assessment Study Limits

The study limits or analysis areas for the transportation assessment are presented in **Figure 2**. The EMME modelling sub-area is bounded by Simcoe Street to the east, Highway 407 to the north, Taunton Road West to the south, and it was expanded to include Anderson Street in consultation with the Region to the west. The Synchro intersection capacity analysis area is bounded by Conlin Road to the north, Taunton Road to the south, Simcoe Street to the east, and Thickson Road to the west.

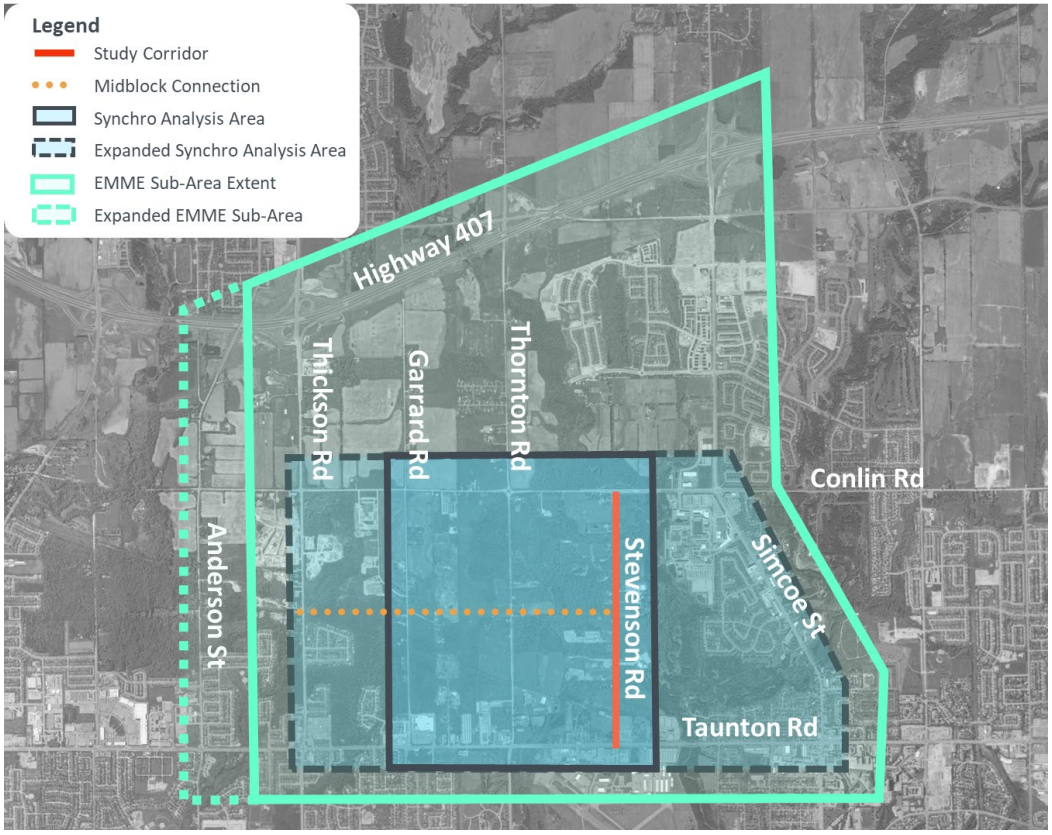


Figure 2: Transportation Assessment Study Limits

1.2 Transportation Assessment Approach

The approved transportation assessment methodology, as shown in **Figure 3,** comprises of two components:

1. EMME sub-area analysis that follows the traditional four-step transportation demand modelling process using the Durham Region Transportation Planning Model (DRTPM). Refer to **Section 2.0** for sub-area network modelling analysis details and results.
2. Intersection capacity analysis using Synchro for signalized and unsignalized study intersections, and ARCADY for roundabout analysis. Refer to **Section 3.0** for details on intersection and roundabout analyses and results.

The Region provided the sub-area EMME network files and associated traversal matrices (auto, light truck, medium truck, and heavy truck) for the weekday AM and PM peak hours from the DRTPM for the 2016 base year and 2033 horizon year, updated through the 2023 Region-Wide Development Charge Background Study initiative as part of the Regional Official Plan Review (adopted by Regional Council in May 2023). Network review and validation on the sub-area models were performed to ensure the

appropriate planned improvements (e.g., future road widening) within the study area are captured in the models.

Using the confirmed land use estimates and network assumptions, model scenarios were developed in consultation with the Region for the 2033 horizon year. The EMME link plots and travel patterns extracted for the future horizon years were used to inform the Synchro analysis.

It is worth nothing that the update to the Region's 2051 model was still under development at the time this study was conducted; therefore, it was agreed that the Region would run the DRTPM with the airport being closed for the 2033 horizon and provide the EMME sub-area models with 2033 demand matrices and trip assignments to TraffMobility. The methodology for developing the 2051 trip matrices, as approved by the Region, is described in detail in **Section 2.3**.

Intersection capacity analysis was carried out to evaluate the operational impacts of the east west midblock arterial deletion under existing (2022) baseline conditions and future (2033) conditions. Signalized and unsignalized intersection operations were assessed using the Synchro 11 software while roundabouts were analyzed using ARCADY.

For additional details, refer to the Transportation Assessment and Modelling Methodology Memo (available under separate cover), which was approved by the City, Town and Region in October 2022.

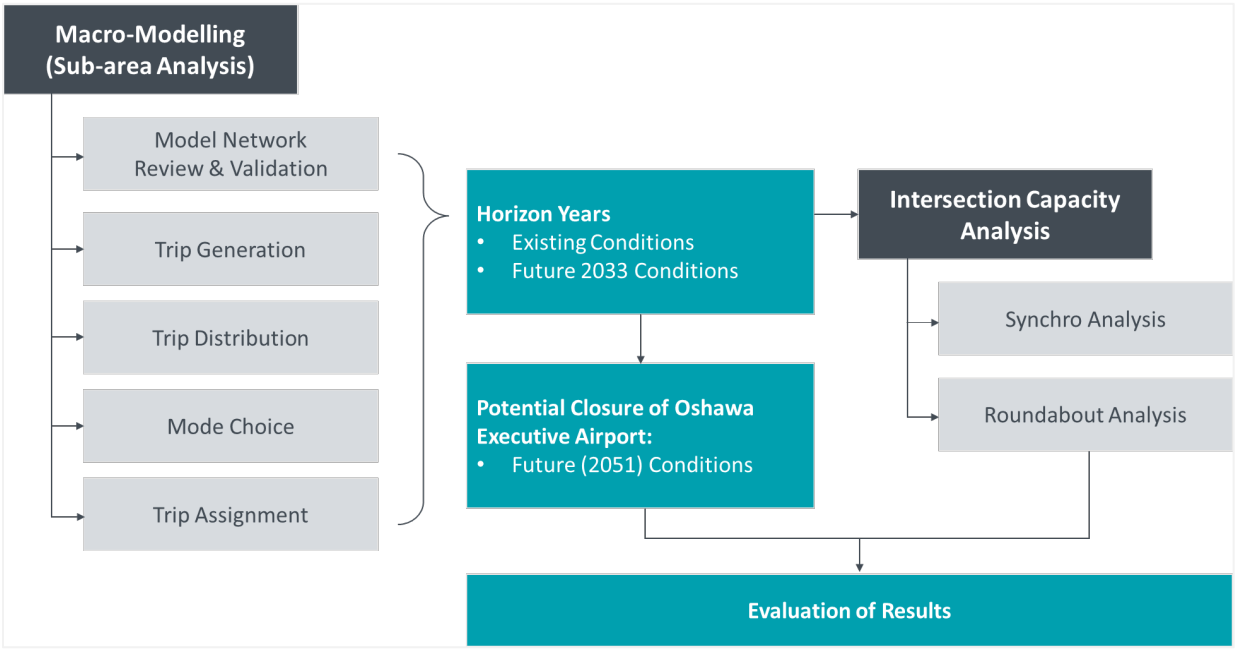


Figure 3: Transportation Assessment Methodology

2.0 Macro-Modelling Analysis

2.1 Sub-Area Existing (2016) Conditions

The 2016 sub-area model was reviewed and validated to confirm speed, lane capacities and volumes. Population and employment densities by traffic zone were provided by the Region, and the approved model network with centroid connectors and number of lanes, is presented in **Figure 4**.

Screenline analyses were conducted to compare modelled and observed link volumes, with results shown in **Figure 5** and **Figure 6** for the weekday AM and PM peak hours, respectively. The screenline analyses demonstrated that the weekday AM and PM models resulted in R^2 values greater than 0.90, indicating that the modelled volumes closely align with observed demands within the sub-area.

However, it was observed that the model significantly underestimated trips assigned to Stevenson Road compared to observed traffic counts. As a result, the link cost was adjusted along the study corridor to improve traffic assignment on Stevenson Road. The modelled volumes on Stevenson Road, after adjusting the link costs, are ≤ 88 vehicles during AM peak hour and ≤ 65 vehicles during PM Peak hour, which are closer to observed existing demand of 84 vehicles and 95 vehicles during the AM and PM peak hours, respectively. The link volume plots for the calibrated sub-area model are provided in **Figure 7**.

Existing 2016 weekday AM and PM peak hours volume to capacity (v/c) ratio plots in **Figure 8** show that Stevenson Road is operating within residual capacity (v/c ratio < 0.20) during both peak hours. Taunton Road and Conlin Road are also operating within capacity, with v/c ≤ 0.90 during both the AM and PM peak hours. South of Highway 407, Thickson Road and Simcoe Street have v/c ratios greater than 1.0 in the peak directions (northbound during AM and southbound during PM peak hours, respectively). Select link analyses (SLA) were conducted for Stevenson Road, and the results in **Figure 9** showed that most trips are distributed to/from Taunton Road and Ontario Tech University/Durham College campus.

The sub-area model was validated against the observed traffic counts, and a sensitivity analysis was carried out to determine if zone disaggregation is appropriate for the Stevenson Road study corridor. Based on the screenline analyses, it appeared that most of the trips along Stevenson Road are to/from Taunton Road and Ontario Tech University/Durham College campus. As such, it was determined that zone disaggregation is not required, as it will have little impact on the study corridor, given the observed trip patterns and lack of proposed developments along Stevenson Road.

The traffic assignment on the modelled road network from the validated 2016 sub-area model was considered to be representative of existing conditions. Therefore, it can be used to model expected operations for the 2033 and 2051 horizon years. Changes made to validate the existing 2016 sub-area model were carried forward to the future scenarios.

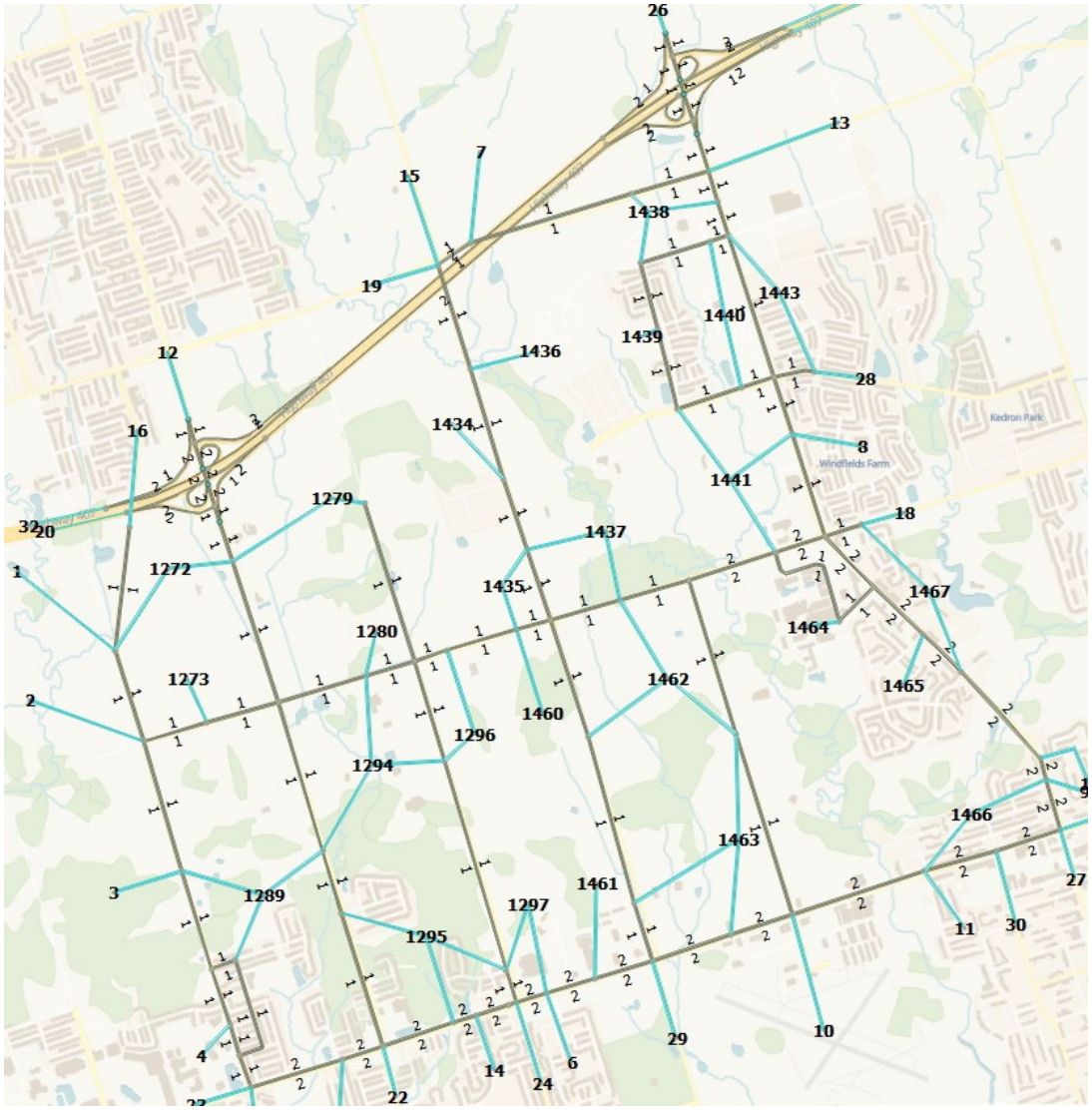


Figure 4: 2016 Sub-Area EMME Model Network

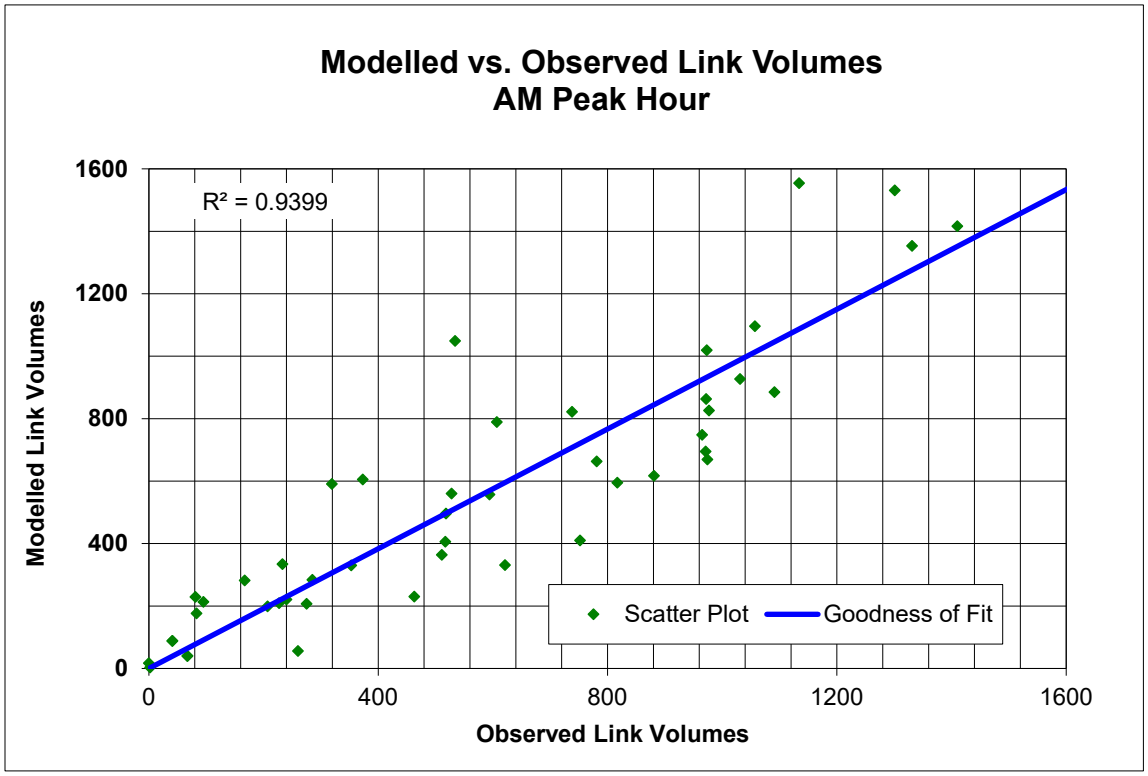


Figure 5: Existing (2016) AM Peak Hour – Modelled vs. Observed Link Volumes

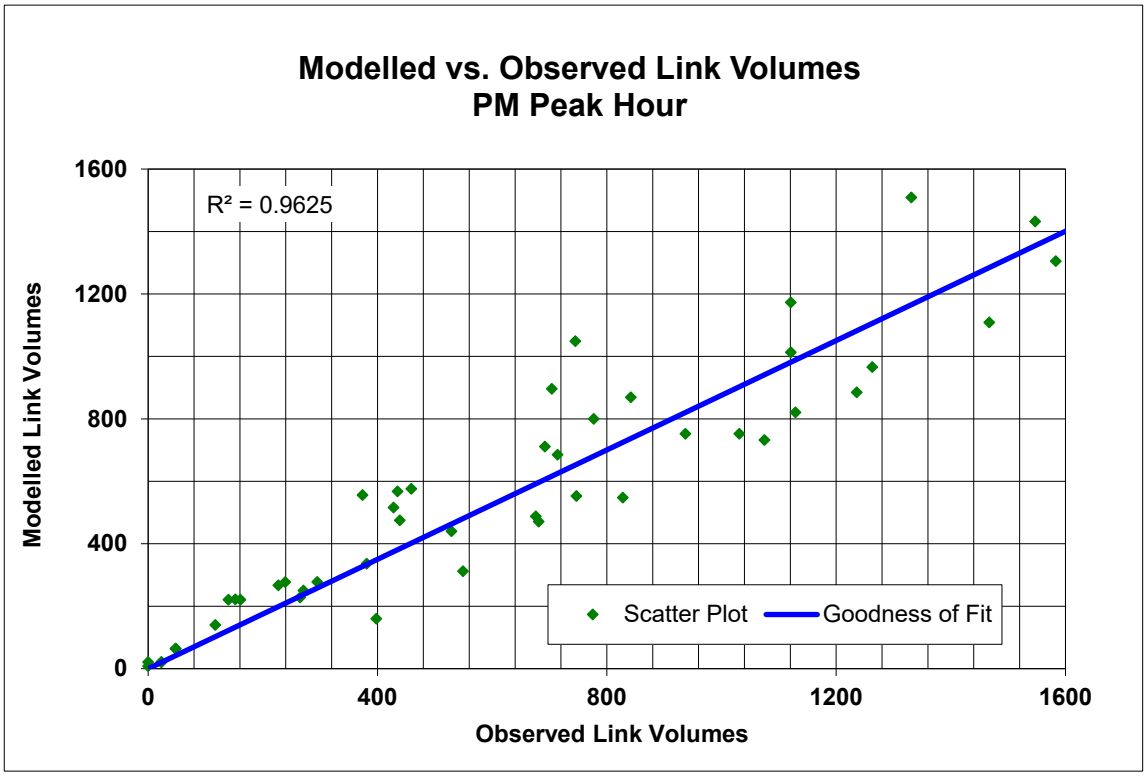
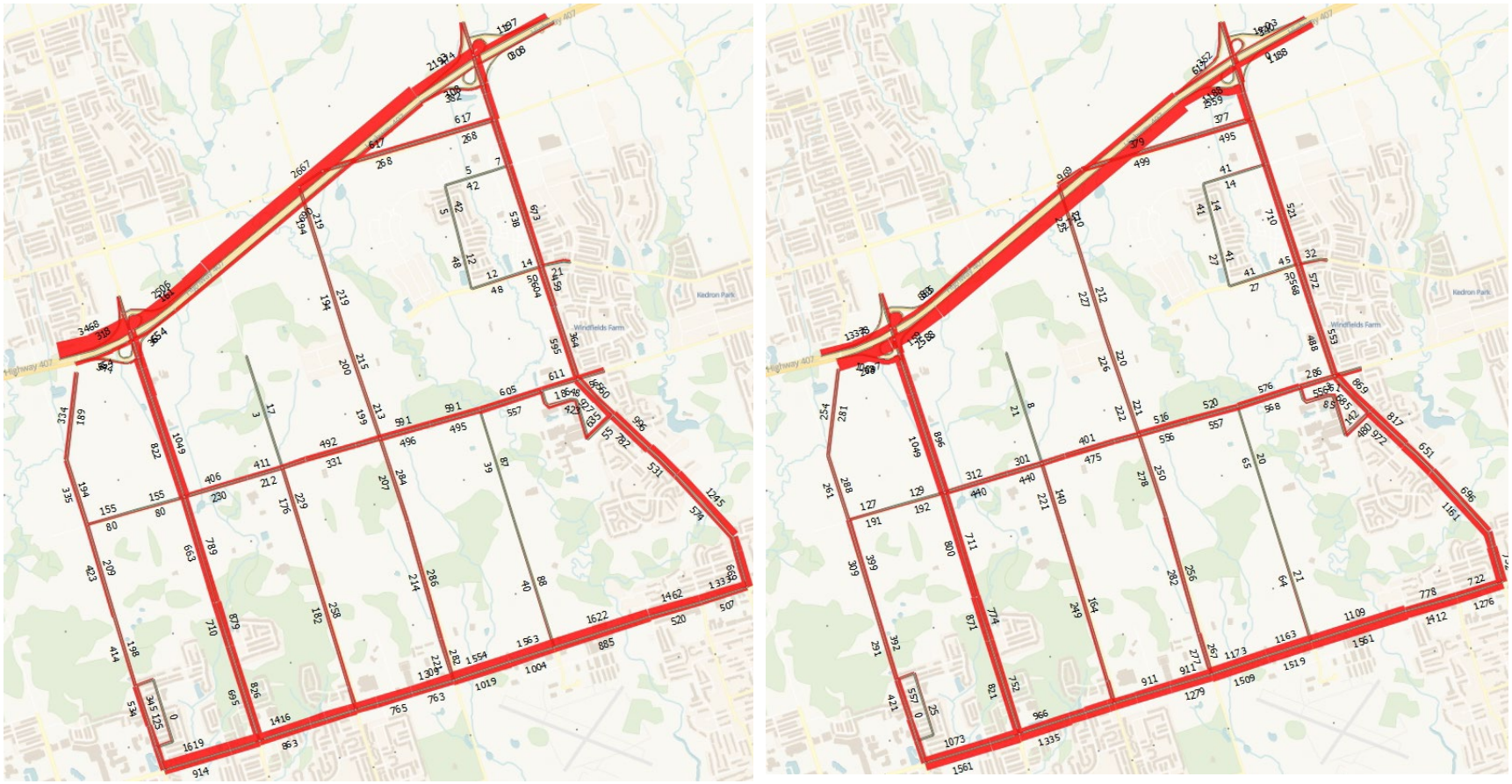
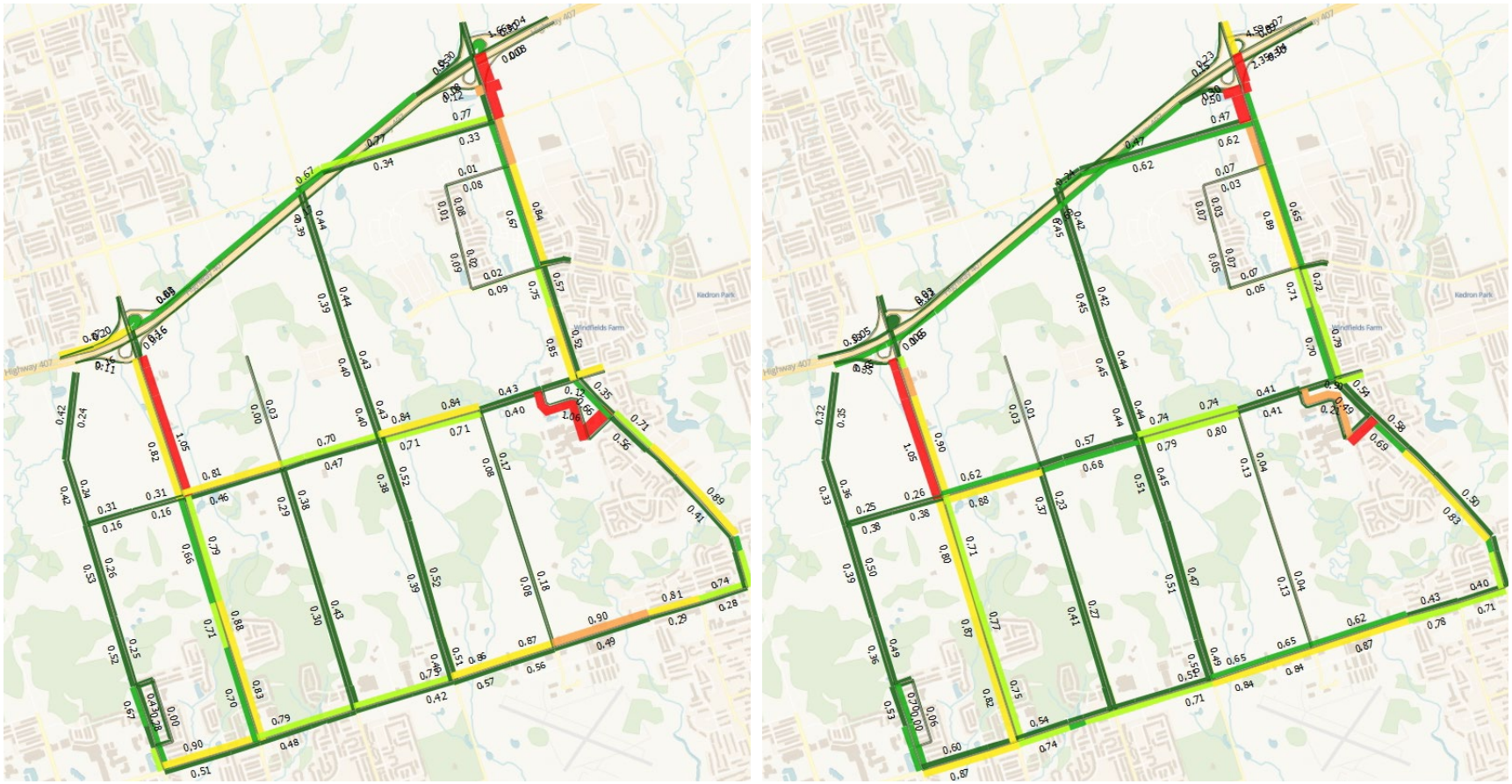


Figure 6: Existing (2016) PM Peak Hour – Modelled vs. Observed Link Volumes



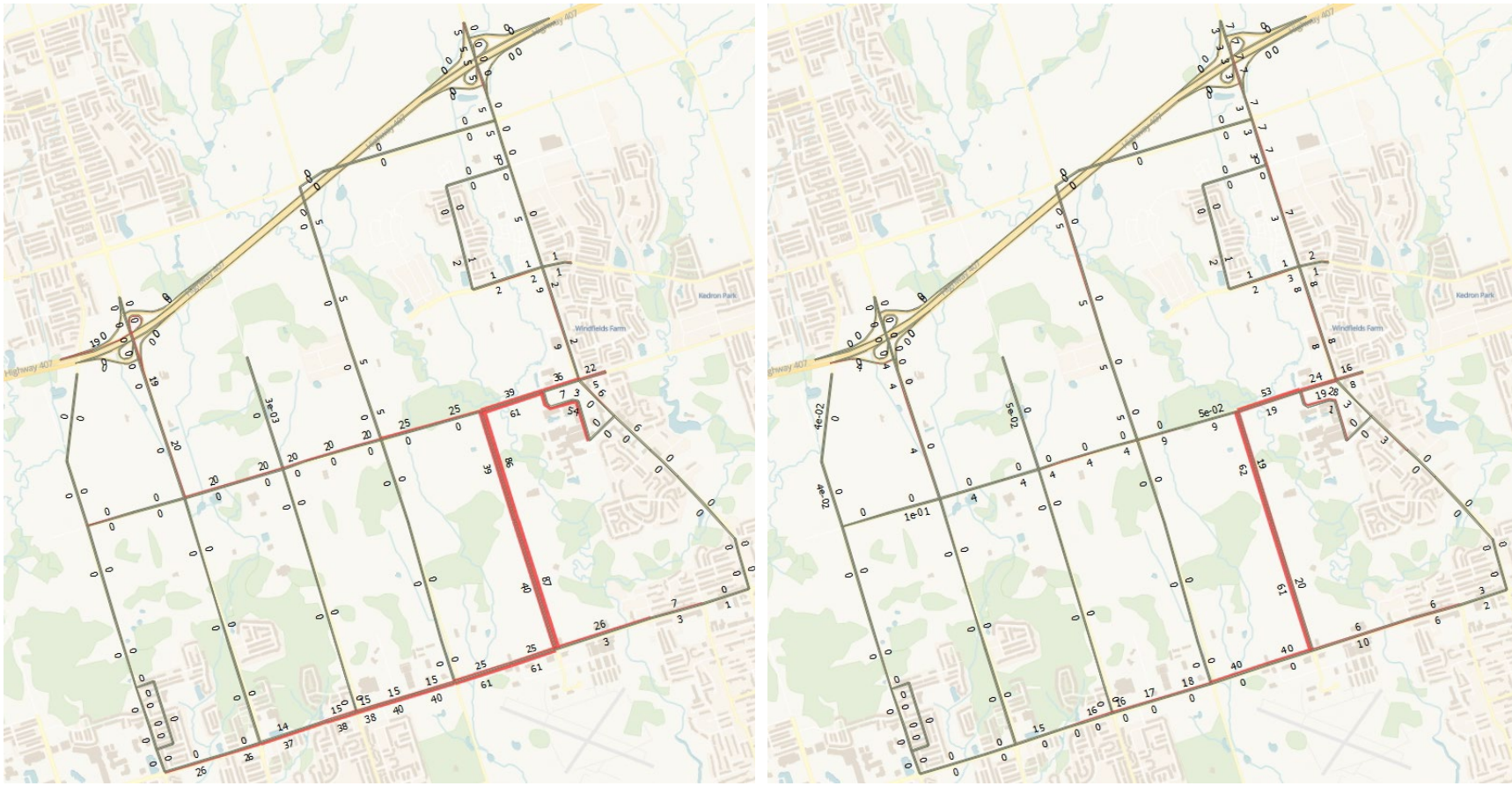
AM Peak Hour **PM Peak Hour**

Figure 7: 2016 Calibrated Model Link Volume Plots



AM Peak Hour **PM Peak Hour**

Figure 8: 2016 Calibrated Model Volume to Capacity Ratio Plots



AM Peak Hour **PM Peak Hour**

Figure 9: 2016 Calibrated Model Select Link Analysis for Stevenson Road

2.2 Sub-Area Future (2033) Conditions

This section documents the sub-area EMME modelling assumptions and results for the 2033 horizon year. The updated DRTPM being used for the sub-area model includes the 2031 preferred network based on the Durham Transportation Master Plan, 2017 (TMP) with the 2033 Region-Wide Development Charge (DC) Background Study's population and employment forecasts. This formed the key input in developing the 2033 network.

The following 2033 scenarios were modelled for both the weekday AM and PM hours to assess the impact of the east-west midblock arterial deletion:

- Scenario 1: Future 2033 network **without** east-west midblock arterial and the planned widening of Taunton Road
- Scenario 2: Future 2033 network **with** east-west midblock arterial and the planned widening of Taunton Road
- Scenario 1A: Scenario 1 with no widening of Taunton Road (sensitivity test)
- Scenario 2A: Scenario 2 with no widening of Taunton Road (sensitivity test)

2.2.1 2033 Sub-Area Trip Generation

The Region provided the sub-area model files for 2033 developed from the updated DRTPM, which included the latest trip matrices for 2033. As such, no trip generation rates were developed.

2.2.2 2033 Sub-Area Road Network

The planned infrastructure improvements by 2033 are listed in **Table 1**. It is worth noting that Taunton Road is coded with HOV lanes, which added an additional 30% of the general lane capacity per direction, consistent with the Durham TMP and other EA studies. The model also assumed bus rapid transit (BRT) along Simcoe Street, within the existing 4-lane cross-section, and south of Conlin Road coded with 2 general-purpose lanes and BRT lanes in the median.

It is noted that the BRT along Simcoe Street and the widening of Taunton Road is not in the current Regional Roads Capital Budget and Nine-Year Forecast (to 2032). However, it was agreed with Regional and City staff to include these two projects in the 2033 sub-area road network to introduce potential impacts on the Stevenson Road North and midblock arterial corridors with the lesser capacity for Simcoe Street and the HOV lanes on Simcoe Street. A sensitivity analysis without the widening of Taunton Road was also conducted to analyze the impacts on Stevenson Road North.

New links were added into the EMME sub-area model for the east-west midblock arterial. A review of future population and employment projections, along with planned adjacent developments, confirmed that no additional centroid connectors are necessary. For modelling purposes, the lane attributes for the midblock arterial were coded the same as Stevenson Road North since both are classified as "Type 'C' arterial roadways.

The 2033 sub-area model road network, including the east-west midblock arterial and centroid connectors, as approved by the Region, is shown in **Figure 10**. Existing centroids north of Taunton Road and south of Conlin Road were connected to the east-west midblock arterial to allow trips to/from these zones to directly access the midblock arterial. This model was used to assess network operations with and without the midblock arterial for the 2033 horizon year.

Table 1: Planned Sub-Area Road Network Improvements by 2033

Road	From	To	Improvement	Timeline	Status	Source
Type C Arterial	Thickson Road	Stevenson Road	New Road	2033	Deletion to be confirmed	Regional OP, Oshawa OP, Whitby OP
Simcoe Street	Conlin Road	Winchester Road	Lane Widening (5 lanes)	2022	Constructed	Durham Public Works Website
Type B - Midblock Arterial	Anderson Street	Garrard Road	New Road	2033	Proposed	EA, Town of Whitby
Britannia Midblock Connector	Garrard Road	Thornton Road	New Road	2032	Proposed	EA, Town of Whitby, City
Britannia Avenue Extension	Thornton Road	Windfields Farm Drive	New Road	2026	Proposed	EA, Town of Whitby
Taunton Road	Anderson Street	Simcoe Street	Widened to 6 lanes with HOV lanes	2033	Proposed	Durham TMP
Winchester Road	Garrard Road	Simcoe Street	Lane Widening (4 lanes)	Beyond 2031	Proposed	Durham TMP
Thickson Road	Taunton Road	Highway 407	Lane Widening (4/5 lanes)	2028-2032	Proposed / Budgeted	Durham TMP
Conlin Road	Stevenson Road	Garrard Road	Lane Widening (4 lanes)	2032	Proposed	City

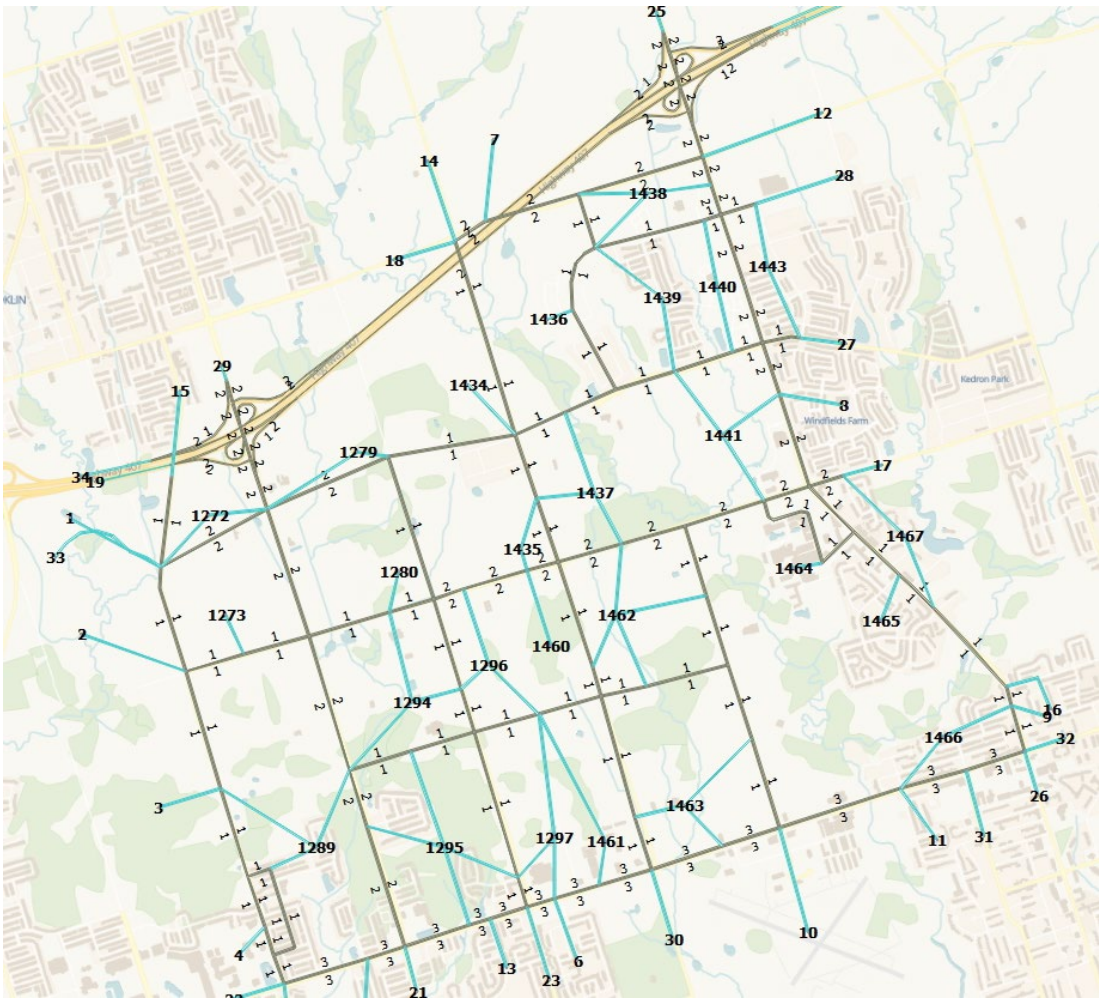


Figure 10: 2033 Sub-Area EMME Model Network with Midblock Type 'C' Arterial Road

2.2.3 2033 Sub-Area Mode Split

Travel modes coded in the 2033 sub-area model include auto, light truck, medium truck, and heavy truck. The Origin-Destination (OD) demand and mode share are summarized in **Table 2.** It is observed that auto is the predominant mode, accounting for 97% of forecasted 2033 vehicular traffic, while trucks make up the remaining 3%. It is noted that the details on the planned land use breakdown for the Northwood Business Park were not available when this analysis was conducted and that there is no direct connection to Stevenson Road North from the Northwood Business Park. Therefore, the Region's OD demand truck percentage was maintained for this modelling exercise. We note that an increase in future truck percentage is possible based on the proposed land use for the Northwood Business Park; however, this increase is not expected to change the recommendation for Stevenson Road (to protect for a 4-lane cross-section).

Table 2: 2033 Sub-Area Model Mode Split

Mode	2033 OD Demand AM Peak Hour	2033 OD Demand PM Peak Hour	2033 Mode Split (%) AM Peak Hour	2033 Mode Split (%) PM Peak Hour
Auto	18,404	19,911	97.1%	97.3%
Light Truck	205	194	1.1%	0.9%
Medium Truck	129	131	0.7%	0.6%
Heavy Truck	209	225	1.1%	1.1%
Total	**18,947**	**20,461**	**100%**	**100%**

2.2.4 2033 Sub-Area Trip Distribution and Assignment

The same trip patterns were assumed for 2033 based on the traversal matrices extracted from the DRTPM. Therefore, no changes were made to the sub-area trip distribution. The traffic assignment procedure follows the multi-class traffic assignment in EMME, utilizing four traversal matrices in the subarea model, which is consistent with the DRTPM specification.

2.2.5 2033 Sub-Area Modelling Results

A comprehensive analysis was undertaken to assess the impacts of the east-west midblock arterial deletion within the sub-area for both the weekday AM and PM peak hours. Four scenarios as described in **Section 2.2**, were modelled to understand overall operations with and without the east-west midblock arterial.

A summary of critical v/c ratios for each scenario is presented in **Table 3** and **Table 4** for the weekday AM and PM peak hours, respectively. Additionally, **Table 5** and **Table 6** provide summaries of modelled travel times by corridor for the weekday AM and PM peak hours, respectively. The modelled link volumes on Stevenson Road are presented in **Table 7** and **Table 8**.

Detailed 2033 sub-area model plots, including link volumes, v/c ratios, and select link analysis, are provided in **Appendix A**.

The findings from the macro-modelling analysis for the 2033 horizon are summarized below:

- The midblock arterial provides relief to parallel roads and is generally used as an alternative route to Conlin Road and Taunton Road. During the PM peak hour, most eastbound trips from the north use the midblock arterial to access Taunton Road via Stevenson Road.
- The Britannia Avenue Extension with the midblock connector (between Garrard Road and Thornton Road) implemented provides additional east-west capacity as an inter-municipal alternative. This extension also provides congestion relief on Conlin Road.
- The widening of Conlin Road between Stevenson Road and Garrard Road improves operations along this corridor. Consideration can be given to widen Conlin Road from Garrard Road to Thickson Road to maintain a consistent 4-lane cross-section and further improve corridor operations.
- If the midblock arterial is removed, Conlin Road and Stevenson Road are both expected to operate with acceptable v/c ratios (<0.90 according to Region's standards).
- Without the widening of Taunton Road, traffic demand on this corridor will exceed available capacity particularly along the section between Stevenson Road and Simcoe Street (v/c ratios ≤ 1.14, with or without the midblock arterial).
- Minimal impacts on Simcoe Street with or without the midblock arterial (changes in v/c ratios ≤ 0.02). Even with the assumption that the Simcoe Street BRT converted a general traffic lane to

transit only lane south of Conlin Road, the increased demand on Stevenson Road does not warrant a 4-lane cross-section by 2033.

- Overall, the removal of the midblock arterial has negligible differences in travel times on Taunton Road and Conlin Road - travel times increased by less than 30 seconds without the midblock arterial.
- Based on lane capacity of 500 vehicle/hour/lane coded in the Region's EMME model, the forecasted volumes on Stevenson Road do not warrant a 4-lane cross-section in 2033.

Table 3: 2033 Sub-Area Model AM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc1A	Sc2A		Sc1	Sc2	Sc1A	Sc2A
Taunton Road: Thickson Road to Thornton Road	0.48	0.59	0.54	0.62	0.57	0.79	0.77	0.71	0.82	0.77
Taunton Road: Thornton Road to Stevenson Road	0.57	0.59	0.58	0.63	0.61	0.87	**0.92**	0.88	**1.01**	**0.95**
Taunton Road: Stevenson Road to Simcoe Street	0.49	0.54	0.54	0.61	0.61	**0.90**	**1.01**	**1.01**	**1.14**	**1.14**
Conlin Road: Thickson Road to Thornton Road	0.47	0.72	0.71	0.75	0.72	0.81	0.80	0.68	**0.90**	0.70
Conlin Road: Thornton Road to Stevenson Road	0.71	0.51	0.47	0.57	0.53	0.84	0.63	0.49	0.69	0.54
Conlin Road: Stevenson Road to Simcoe Street	0.40	0.58	0.57	0.58	0.58	0.43	0.69	0.69	0.70	0.71
E-W Midblock Arterial: Thickson Road to Thornton Road	n/a	n/a	0.32	n/a	0.45	n/a	n/a	0.52	n/a	0.60
E-W Midblock Arterial: Thornton Road to Stevenson Road	n/a	n/a	0.16	n/a	0.20	n/a	n/a	0.56	n/a	0.64
Thickson Road: Taunton Road to Conlin Road	0.88	0.80	0.75	0.78	0.74	0.71	0.73	0.75	0.71	0.70
Garrard Road: Taunton Road to Conlin Road	0.43	0.63	0.61	0.80	0.80	0.30	0.51	0.53	0.47	0.49
Thornton Road: Taunton Road to Conlin Road	0.52	0.83	0.86	0.82	0.85	0.40	0.77	0.73	0.80	0.79
Stevenson Road: Taunton Road to Conlin Road	0.18	0.61	0.71	0.61	0.72	0.08	0.56	0.59	0.61	0.58
Simcoe Street: Taunton Road to Conlin Road	0.89	**1.29**	**1.30**	**1.29**	**1.29**	0.56	**1.11**	**1.10**	**1.13**	**1.13**

Notes:

Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial and the planned widening of Taunton Road

Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Sc2A: Scenario 2A – Scenario 2 with no widening of Taunton Road (sensitivity test)

Table 4: 2033 Sub-Area Model PM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc1A	Sc2A		Sc1	Sc2	Sc1A	Sc2A
Taunton Road: Thickson Road to Thornton Road	0.74	0.79	0.73	0.85	0.79	0.54	0.63	0.60	0.66	0.62
Taunton Road: Thornton Road to Stevenson Road	0.84	**0.93**	0.86	**1.01**	**0.96**	0.65	0.71	0.65	0.75	0.72
Taunton Road: Stevenson Road to Simcoe Street	0.87	**1.00**	**1.00**	**1.14**	**1.14**	0.62	0.70	0.70	0.80	0.79
Conlin Road: Thickson Road to Thornton Road	0.88	0.80	0.72	**0.90**	0.76	0.62	0.74	0.68	0.77	0.71
Conlin Road: Thornton Road to Stevenson Road	0.80	0.67	0.57	0.74	0.58	0.74	0.54	0.48	0.61	0.52
Conlin Road: Stevenson Road to Simcoe Street	0.41	0.70	0.70	0.71	0.71	0.41	0.60	0.59	0.59	0.61
E-W Midblock Arterial: Thickson Road to Thornton Road	n/a	n/a	0.55	n/a	0.60	n/a	n/a	0.36	n/a	0.52
E-W Midblock Arterial: Thornton Road to Stevenson Road	n/a	n/a	0.59	n/a	0.64	n/a	n/a	0.40	n/a	0.40
Thickson Road: Taunton Road to Conlin Road	0.77	0.74	0.70	0.71	0.69	0.87	0.81	0.75	0.81	0.76
Garrard Road: Taunton Road to Conlin Road	0.27	0.80	0.70	0.70	0.70	0.41	0.80	0.80	0.80	0.63
Thornton Road: Taunton Road to Conlin Road	0.49	0.84	0.80	**0.90**	0.88	0.51	0.82	**0.91**	**0.91**	**0.90**
Stevenson Road: Taunton Road to Conlin Road	0.04	0.62	0.65	0.66	0.68	0.13	0.69	0.80	0.70	0.82
Simcoe Street: Taunton Road to Conlin Road	0.58	**1.28**	**1.27**	**1.26**	**1.30**	0.83	**1.21**	**1.22**	**1.21**	**1.20**

Notes:

Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial and the planned widening of Taunton Road

Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial and the planned widening of Taunton Road

Sc1A: Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Sc2A: Scenario 2A – Scenario 2 with no widening of Taunton Road (sensitivity test)

Table 5: 2033 Sub-Area Model AM Peak Hour Corridor Travel Times

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc1A	Sc2A		Sc1	Sc2	Sc1A	Sc2A
Taunton Road (Anderson to Simcoe)	05:13	05:23	05:20	05:33	05:29	07:22	07:43	07:29	09:02	08:43
Conlin Road (Anderson to Simcoe)	04:25	04:50	04:49	04:57	04:52	05:23	05:23	05:08	05:36	05:14
Anderson Street (Taunton to Hwy 407)	03:25	03:37	03:38	03:38	03:40	03:36	03:49	03:50	03:53	03:55
Thickson Road (Taunton to Hwy 407)	04:23	03:19	03:19	03:16	03:17	03:20	03:22	03:19	03:17	03:17
Garrard Road (Taunton to Hwy 407)	02:07	02:20	02:16	02:23	02:19	02:04	02:10	02:10	02:08	02:07
Thornton Road (Taunton to Hwy 407)	04:23	04:31	04:34	04:30	04:32	04:14	05:14	05:05	05:22	05:17
Stevenson Road (Taunton to Conlin)	02:23	02:44	02:41	02:43	02:41	02:23	02:33	02:34	02:37	02:34
Simcoe Street (Taunton to Hwy 407)	06:17	08:59	09:06	09:08	09:08	05:17	07:50	07:10	07:52	07:10

Notes:

Scenario 1 – Future 2033 network without east-west midblock arterial and the planned widening of Taunton Road

Scenario 2 – Future 2033 network with east-west midblock arterial and the planned widening of Taunton Road

Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Scenario 2A – Scenario 2 with no widening of Taunton Road (sensitivity test)

Table 6: 2033 Sub-Area Model PM Peak Hour Corridor Travel Times

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc1A	Sc2A		Sc1	Sc2	Sc1A	Sc2A
Taunton Road (Anderson to Simcoe)	07:03	07:37	07:18	08:59	08:39	05:29	05:43	05:37	06:02	05:56
Conlin Road (Anderson to Simcoe)	05:10	05:25	05:12	05:45	05:17	04:55	04:58	04:52	05:07	04:56
Anderson Street (Taunton to Hwy 407)	03:35	03:49	03:53	03:55	03:56	03:28	03:49	03:46	03:47	03:47
Thickson Road (Taunton to Hwy 407)	03:37	03:13	03:12	03:08	03:11	04:23	03:34	03:31	03:32	03:35
Garrard Road (Taunton to Hwy 407)	02:03	02:22	02:14	02:16	02:10	02:05	02:28	02:26	02:25	02:23
Thornton Road (Taunton to Hwy 407)	04:19	05:05	04:59	05:16	05:13	04:23	04:44	04:46	04:49	04:46
Stevenson Road (Taunton to Conlin)	02:23	02:38	02:38	02:43	02:38	02:23	02:52	02:52	02:54	02:55
Simcoe Street (Taunton to Hwy 407)	05:01	07:32	07:32	07:31	07:35	07:07	08:38	08:02	08:40	07:58

Notes:

Scenario 1 – Future 2033 network without east-west midblock arterial and the planned widening of Taunton Road

Scenario 2 – Future 2033 network with east-west midblock arterial and the planned widening of Taunton Road

Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)

Scenario 2A – Scenario 2 with no widening of Taunton Road (sensitivity test)

Table 7: 2033 Sub-Area Model AM Peak Hour Stevenson Road Link Volumes

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc1A	Sc2A		Sc1	Sc2	Sc1A	Sc2A
South of Conlin	87	305	168	303	137	39	281	294	303	291
North of Taunton	88	305	345	303	351	40	221	210	243	222

Notes:
Scenario 1 – Future 2033 network without east-west midblock arterial and the planned widening of Taunton Road
Scenario 2 – Future 2033 network with east-west midblock arterial and the planned widening of Taunton Road
Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)
Scenario 2A – Scenario 2 with no widening of Taunton Road (sensitivity test)

Table 8: 2033 Sub-Area Model PM Peak Hour Stevenson Road Link Volumes

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc1A	Sc2A		Sc1	Sc2	Sc1A	Sc2A
South of Conlin	20	309	267	332	271	65	344	239	351	201
North of Taunton	21	250	259	272	259	64	323	366	330	377

Notes:
Scenario 1 – Future 2033 network without east-west midblock arterial and the planned widening of Taunton Road
Scenario 2 – Future 2033 network with east-west midblock arterial and the planned widening of Taunton Road
Scenario 1A – Scenario 1 with no widening of Taunton Road (sensitivity test)
Scenario 2A – Scenario 2 with no widening of Taunton Road (sensitivity test)

2.3 Sub-Area Future (2051) Conditions

This section documents the sub-area EMME modelling assumptions and results for the 2051 horizon year. For the purpose of confirming whether the same two-lane cross section would be sufficient for Stevenson Road to accommodate future growth following the closure of the Oshawa Executive Airport, the Region ran the 2033 DRTPM with the airport being closed and provided the sub-area model files as key input to the 2051 analysis. The analysis assessed traffic patterns for the year 2051, assuming the potential closure of the Oshawa Executive Airport to occur in 2041, and Stevenson Road would be extended south from Taunton Road to Rossland Road as a four-lane road.

The following scenarios were modelled for both the weekday AM and PM hours to assess the impact of the east-west midblock arterial deletion and potential closure of the Oshawa Executive Airport in 2051:

- Scenario 3: Future 2051 network without east-west midblock arterial
- Scenario 4: Future 2051 network with east-west midblock arterial

2.3.1 2051 Sub-Area Trip Generation

The trip generation for 2051 is a two-step process. First, using the 2033 trip matrices from the updated DRTPM, a trip generation rate was calculated using future land use projections and trip forecasts from the Envision Durham initiative and Durham TMP. Second, the additional trips generated by the redevelopment of the airport lands were based on the land use estimates provided by the City. The future 2051 transportation demand for the sub-area were then estimated by applying the calculated trip generation rate to the 2031 trip forecasts (see section 2.3.1.1, "Base Trip Matrices for 2051") and adding the estimated trips from the Airport Lands redevelopment (see section 2.3.1.2, "Airport Lands Trip Generation").

2.3.1.1 Base Trip Matrices for 2051

The trip generation rate for 2051 was developed in consideration of future employment and population projections as well as the forecasted trips documented in the "Envision Durham Phase 2 Study" (October 2022) and "Durham TMP Modelling Report" (January 2018). This rate was then applied to the 2033 trip matrices for 2051 conditions, assuming the same trip distribution patterns. The equation for calculating the forecasted trips for 2051 is as follows:

$$2051\ Forecasted\ Trips = \underbrace{\frac{2031\ Trips}{2031\ (Population + Employment)}}_{Blended\ Trip\ Generation\ Rate} x\ 2051\ (Population + Employment)$$

A summary of the trip generation rate calculations is presented in **Table 9**, with a total of 26,803 trips forecasted in the sub-area for the weekday AM peak hour and 28,985 trips for the PM peak hour.

Table 9: 2051 Trip Generation Rates Calculations

	Origin – AM Peak Hour		Destination – PM Peak Hour	
	2031	**2051**	**2031**	**2051**
Population	907,290	1,300,000	907,290	1,300,000
Employment	307,470	460,020	307,470	460,020
Trips	327,815	**474,959[1]**	408,896	**592,435[1]**
Trip Growth	45 %		45 %	
Trip Generation Rate (CAGR)	**1.87 %[2]**		**1.87 %[2]**	

Notes:
2031 and 2051 population and employment forecasts based on "Envision Durham Phase 2 Report"
2031 trip forecasts based on "Durham TMP Modelling Report"
[1]2051 trip forecasts calculated based on blended trip generation rate of 1.87%
[2]Compounded Annual Growth Rate (CAGR) derived based on 2031 land use and trip proportion

2.3.1.2 Airport Lands Trip Generation

Currently, there is no policy direction on the future land use for the airport lands after the planned closure. In consultation with the City, land use estimates were developed by treating the airport lands as a greenfield development, resulting in an estimate of 5,157 people and 1,289 jobs.

Site trips for the redeveloped airport lands were calculated by applying a similar trip generation rate as calculated in preceding section. It is estimated that 1,740 and 2,170 trips will be generated during the weekday AM and PM peak hours, respectively, as shown in **Table 10**. These trips represent both inbound and outbound trips to/from the airport zones (29 and 32). The average of the inbound and outbound trip distribution (ratio) for the three proxy zones were applied to the airport land trips to/from zones 29 and 32.

Table 10: Trip Generation for Oshawa Executive Airport Land Redevelopment in 2051

	Origin – 2051 AM Peak Hour		Destination 2051 – PM Peak Hour	
	Envision Durham	**Airport Lands Redevelopment**	**Envision Durham**	**Airport Lands Redevelopment**
Population	1,300,000	5,157	1,300,000	5,157
Employment	460,020	1,289	460,020	1,289
Trips	**474,959**	**1,740**	**592,435**	**2,170**

2.3.2 2051 Sub-Area Road Network

Additional planned infrastructure improvements by 2051 are listed in **Table 11**. Based on discussion with the City and Region, the Stevenson Road extension south of Taunton Road was assumed to have a 4-lane cross-section. The links for the east-west midblock arterial and centroid connectors were coded similar to the 2033 sub-area model. The 2051 sub-area network is shown in **Figure 11**.

Table 11: Planned Sub-Area Road Network Improvements by 2051

Road	From	To	Improvement	Timeline	Status	Source
Thornton Road	Taunton Road	Howden Road	Lane Widening (4/5 lanes)	2035	Proposed	Durham TMP
Oshawa Executive Airport	-	-	Potential Closure	2041	Proposed	City

Road	From	To	Improvement	Timeline	Status	Source
Stevenson Road Extension	Taunton Road	Rossland Road	New Road (4 lanes)	Before 2051	Assumed	-
Dryden Boulevard / Beatrice Street Connection	Thornton Road	Somerville Street	New Road (2 lanes)	Before 2051	Assumed	-

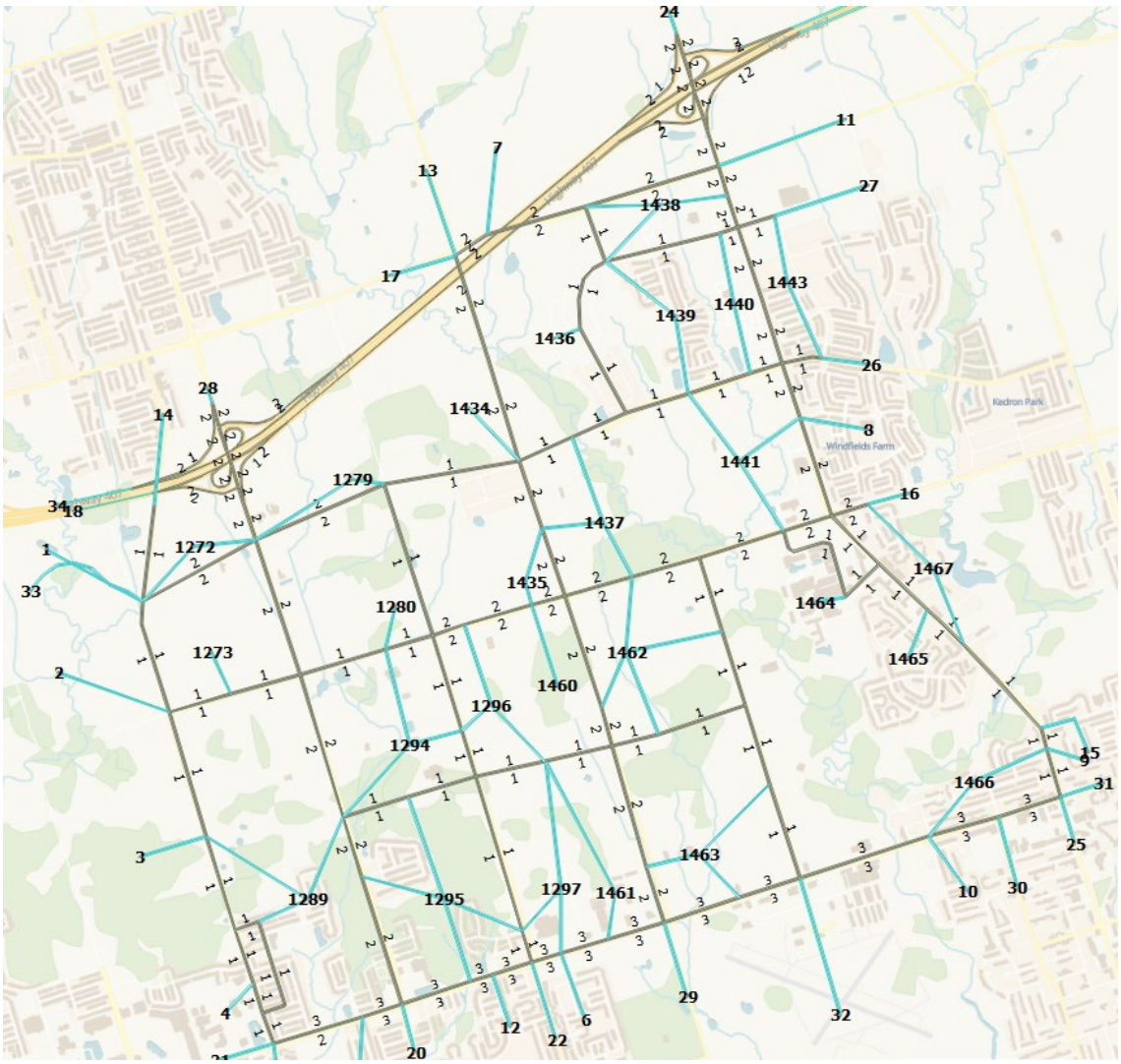


Figure 11: 2051 EMME Model Network with Midblock Type 'C' Arterial Road and Number of Lanes

2.3.3 2051 Sub-Area Mode Split

The same mode share from 2033 was assumed in 2051. The 2051 trip demand by mode share are summarized in **Table 12**.

Table 12: 2051 Sub-Area Model Trip Demand and Mode Split

Mode	2051 OD Demand AM Peak Hour	2051 OD Demand PM Peak Hour	2051 Mode Split (%) AM Peak Hour	2051 Mode Split (%) PM Peak Hour
Auto	26,068	28,239	97.3%	97.4%
Light Truck	279	262	1.0%	0.9%
Medium Truck	164	172	0.6%	0.6%
Heavy Truck	292	313	1.1%	1.1%
Total	**26,803**	**28,985**	**100%**	**100%**

2.3.4 2051 Sub-Area Trip Distribution and Assignment

To account for the trip distribution of the additional site trip generated by the airport lands, the following assumptions were used:

- It was assumed that 50% of the airport land trips would access the road network external to the sub-area limits and 50% of the trips with access the road network within the sub-area limits (870 AM peak hour trips and 1085 PM peak hour trips).
- Based on the location of sub-area zones shown in **Figure 11**, it was assumed that airport land trips within the sub-area limits will originate from zones #29 and #32 located south of Taunton Road at Thornton Road and Stevenson Road, respectively.
- Since zone #32 has direct access to the airport land, 60% of trips (522 and 651 during the weekday AM and PM peak hours, respectively) were assigned to this zone. The remaining trips (348 and 434 during the weekday AM and PM peak hours, respectively) were assigned to zone #29.
- Since zones #1466 in the City of Oshawa, #1289 and #1295 in the Town of Whitby have similar land composition (mix of residential and employment) proposed for the airport land, site trips were assumed to have a similar trip distribution as these zones to derive 2051 sub-area matrices for the macro-modelling analysis.

The traffic assignment procedure follows the multi-class traffic assignment in EMME, utilizing four traversal matrices in the subarea model, which is consistent with the DRTPM specification.

2.3.5 2051 Sub-Area Modelling Results

A comprehensive analysis was undertaken to assess the impacts of east-west midblock arterial deletion within the sub-area for the 2051 horizon year. Two scenarios as described in **Section 2.3**, were modelled to understand overall operations with and without the east-west midblock arterial.

A summary of critical v/c ratios for each scenario is presented in **Table 13** and **Table 14** for the weekday AM and PM peak hours, respectively. **Table 15** and **Table 16** provide summaries of modelled travel times by corridor for the weekday AM and PM peak hours, respectively. The modelled link volumes on Stevenson Road are presented in **Table 17** and **Table 18**.

Detailed 2051 sub-area model plots, including link volumes, v/c ratios, and select link analysis, are provided in **Appendix B**.

The findings from the macro-modelling analysis for the 2051 horizon are summarized below:

- The midblock arterial continues to provide relief to parallel roads and is generally used as an alternative route to Conlin Road and Taunton Road. During the PM peak hour, most eastbound trips originating from the north would use the east-west midblock arterial to access Taunton Road via Stevenson Road.
- Thornton Road would provide additional north-south capacity and more trips would be expected to use this corridor to access Conlin Road and Taunton Road.
- The road network with or without the E-W midblock arterial is expected to operate near capacity along Taunton Road, Stevenson Road, and sections of Conlin Road (west of Garrard Road), with v/c ratios exceeding 0.90.
- Despite being widened to a 6-lane cross-section, Taunton Road is forecasted to experience congestion due to the lower road capacity of HOV lanes compared to general-purpose lanes in the model with single occupancy vehicles (SOVs) restricted to 4 of the 6 lanes.
- The implementation of the east-west midblock arterial is expected to only provide negligible improvements in travel times along Taunton Road and Conlin Road (reduction in travel times by less than 40 seconds).
- Stevenson Road is also expected to serve as an alternative route to Simcoe Street to avoid congestion.
    - During the AM peak hour, Stevenson Road is used as an alternative northbound route to access Ontario Tech University/Durham College from the east or as an alternative southbound route to access areas to the south of the sub-area.
    - During the PM peak hour, Stevenson Road is used as an alternative southbound route for those traveling from the north and heading towards eastbound Taunton Road or as an alternative northbound route to access Highway 407.
- Based on lane capacity of 500 vehicle/hour/lane coded in the Region's EMME model, the forecasted volumes on Stevenson Road warrant a 4-lane cross-section in 2051; however, since several assumptions were made in the modelling of the 2051 future conditions, it is recommended that the Stevenson Road right-of-way (ROW) between Taunton Road and Conlin Road be protected for a 4-lane cross-section. The widening of Stevenson Road to 4 lanes can be confirmed with a more rigorous analysis when details are finalized for the airport lands redevelopment.

Table 13: 2051 Sub-Area Model AM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc3	Sc4		Sc1	Sc2	Sc3	Sc4
Taunton Road: Thickson Road to Thornton Road	0.48	0.59	0.54	0.65	0.60	0.79	0.77	0.71	**1.15**	**1.07**
Taunton Road: Thornton Road to Stevenson Road	0.57	0.59	0.58	0.68	0.68	0.87	**0.92**	0.88	**1.35**	**1.31**
Taunton Road: Stevenson Road to Simcoe Street	0.49	0.54	0.54	0.85	0.85	**0.90**	**1.01**	**1.01**	**1.33**	**1.33**
Conlin Road: Thickson Road to Thornton Road	0.47	0.72	0.71	0.83	0.77	0.81	0.74	0.68	**1.03**	**1.00**
Conlin Road: Thornton Road to Stevenson Road	0.71	0.51	0.47	0.74	0.68	0.84	0.63	0.49	0.79	0.67
Conlin Road: Stevenson Road to Simcoe Street	0.40	0.58	0.57	0.88	**0.90**	0.43	0.69	0.69	**0.91**	**0.96**
E-W Midblock Arterial: Thickson Road to Thornton Road	n/a	n/a	0.32	n/a	0.52	n/a	n/a	0.52	n/a	0.86
E-W Midblock Arterial: Thornton Road to Stevenson Road	n/a	n/a	0.16	n/a	0.24	n/a	n/a	0.56	n/a	0.65
Thickson Road: Taunton Road to Conlin Road	0.88	0.80	0.75	**0.98**	**0.92**	0.71	0.73	0.69	0.86	0.82
Garrard Road: Taunton Road to Conlin Road	0.43	0.63	0.61	**0.90**	**0.90**	0.30	0.51	0.53	0.69	0.80
Thornton Road: Taunton Road to Conlin Road	0.52	0.83	0.86	0.89	**0.93**	0.40	0.77	0.73	0.72	0.69
Stevenson Road: Taunton Road to Conlin Road	0.18	0.61	0.62	**0.99**	**1.17**	0.08	0.56	0.59	**0.91**	0.87
Simcoe Street: Taunton Road to Conlin Road	0.89	**1.29**	**1.30**	**1.71**	**1.71**	0.56	**1.11**	**1.10**	**1.47**	**1.48**

Notes:

Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial

Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial

Sc3: Scenario 3 – Future 2051 network without east-west midblock arterial

Sc4: Scenario 4 – Future 2051 network with east-west midblock arterial

Table 14: 2051 Sub-Area Model PM Peak Hour Critical Volume to Capacity Ratios

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc3	Sc4		Sc1	Sc2	Sc3	Sc4
Taunton Road: Thickson Road to Thornton Road	0.74	0.79	0.73	**1.19**	**1.13**	0.54	0.63	0.60	0.74	0.89
Taunton Road: Thornton Road to Stevenson Road	0.84	**0.93**	0.86	**1.39**	**1.35**	0.65	0.71	0.65	0.87	0.88
Taunton Road: Stevenson Road to Simcoe Street	0.87	**1.00**	**1.00**	**1.32**	**1.32**	0.62	0.70	0.70	**1.05**	**1.05**
Conlin Road: Thickson Road to Thornton Road	0.88	0.76	0.72	**1.10**	**1.00**	0.62	0.74	0.68	0.79	0.67
Conlin Road: Thornton Road to Stevenson Road	0.80	0.67	0.57	0.76	0.66	0.74	0.54	0.45	0.71	0.63
Conlin Road: Stevenson Road to Simcoe Street	0.41	0.70	0.70	**0.90**	**0.95**	0.41	0.60	0.48	**0.90**	**0.91**
E-W Midblock Arterial: Thickson Road to Thornton Road	n/a	n/a	0.55	n/a	0.89	n/a	n/a	0.36	n/a	0.57
E-W Midblock Arterial: Thornton Road to Stevenson Road	n/a	n/a	0.59	n/a	0.67	n/a	n/a	0.40	n/a	0.30
Thickson Road: Taunton Road to Conlin Road	0.77	0.74	0.70	0.88	0.85	0.87	0.81	0.75	**1.05**	**0.97**
Garrard Road: Taunton Road to Conlin Road	0.27	0.63	0.55	**0.90**	**0.90**	0.41	0.69	0.66	**1.00**	**1.00**
Thornton Road: Taunton Road to Conlin Road	0.49	0.84	0.80	0.80	0.79	0.51	0.62	**0.91**	**1.02**	**1.06**
Stevenson Road: Taunton Road to Conlin Road	0.04	0.62	0.65	**0.92**	**0.93**	0.13	0.69	0.80	**1.07**	**1.28**
Simcoe Street: Taunton Road to Conlin Road	0.58	**1.28**	**1.27**	**1.90**	**1.88**	0.83	**1.21**	**1.22**	**1.58**	**1.58**

Notes:

Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial

Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial

Sc3: Scenario 3 – Future 2051 network without east-west midblock arterial

Sc4: Scenario 4 – Future 2051 network with east-west midblock arterial

Table 15: 2051 Sub-Area Model AM Peak Hour Corridor Travel Times

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc3	Sc4		Sc1	Sc2	Sc3	Sc4
Taunton Road (Anderson to Simcoe)	05:13	05:23	05:20	06:23	06:21	07:22	07:43	07:29	14:11	13:33
Conlin Road (Anderson to Simcoe)	04:25	04:50	04:49	05:37	05:29	05:23	05:23	05:08	07:20	06:42
Anderson Street (Taunton to Hwy 407)	03:25	03:37	03:38	04:32	04:30	03:36	03:49	03:50	05:28	05:28
Thickson Road (Taunton to Hwy 407)	04:23	03:19	03:19	04:10	04:14	03:20	03:22	03:19	04:01	04:02
Garrard Road (Taunton to Hwy 407)	02:07	02:20	02:16	02:56	02:45	02:04	02:10	02:10	02:32	02:23
Thornton Road (Taunton to Hwy 407)	04:23	04:31	04:34	05:05	05:02	04:14	05:14	05:05	04:55	04:48
Stevenson Road (Taunton to Conlin)	02:23	02:44	02:41	04:37	04:50	02:23	02:33	02:34	03:40	03:35
Simcoe Street (Taunton to Hwy 407)	06:17	08:59	09:06	12:55	12:47	05:17	07:50	07:10	10:28	09:39

Notes:

Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial

Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial

Sc3: Scenario 3 – Future 2051 network without east-west midblock arterial

Sc4: Scenario 4 – Future 2051 network with east-west midblock arterial

Table 16: 2051 Sub-Area Model PM Peak Hour Corridor Travel Times

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc3	Sc4		Sc1	Sc2	Sc3	Sc4
Taunton Road (Anderson to Simcoe)	07:03	07:37	07:18	15:33	14:55	05:29	05:43	05:37	07:28	07:26
Conlin Road (Anderson to Simcoe)	05:10	05:25	05:12	07:19	06:47	04:55	04:58	04:52	05:39	05:25
Anderson Street (Taunton to Hwy 407)	03:35	03:49	03:53	05:57	06:01	03:28	03:49	03:46	04:56	04:47
Thickson Road (Taunton to Hwy 407)	03:37	03:13	03:12	03:50	03:50	04:23	03:34	03:31	04:55	04:55
Garrard Road (Taunton to Hwy 407)	02:03	02:22	02:14	02:37	02:24	02:05	02:28	02:26	03:16	02:58
Thornton Road (Taunton to Hwy 407)	04:19	05:05	04:59	05:01	04:55	04:23	04:44	04:46	05:42	05:42
Stevenson Road (Taunton to Conlin)	02:23	02:38	02:38	03:45	03:44	02:23	02:52	02:52	05:18	05:27
Simcoe Street (Taunton to Hwy 407)	05:01	07:32	07:32	10:48	10:42	07:07	08:38	08:02	12:55	12:05

Notes:

Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial

Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial

Sc3: Scenario 3 – Future 2051 network without east-west midblock arterial

Sc4: Scenario 4 – Future 2051 network with east-west midblock arterial

Table 17: 2051 Sub-Area Model AM Peak Hour Stevenson Road Link Volumes

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc3	Sc4		Sc1	Sc2	Sc3	Sc4
South of Conlin	87	305	168	487	357	39	281	294	457	433
North of Taunton	88	305	345	494	574	40	221	210	394	377

Notes:
Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial
Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial
Sc3: Scenario 3 – Future 2051 network without east-west midblock arterial
Sc4: Scenario 4 – Future 2051 network with east-west midblock arterial

Table 18: 2051 Sub-Area Model PM Peak Hour Stevenson Road Link Volumes

Road	EB/NB					WB/SB				
	2016	2033				2016	2033			
		Sc1	Sc2	Sc3	Sc4		Sc1	Sc2	Sc3	Sc4
South of Conlin	20	309	267	461	430	65	344	239	535	417
North of Taunton	21	250	259	406	405	64	323	366	520	603

Notes:
Sc1: Scenario 1 – Future 2033 network without east-west midblock arterial
Sc2: Scenario 2 – Future 2033 network with east-west midblock arterial
Sc3: Scenario 3 – Future 2051 network without east-west midblock arterial
Sc4: Scenario 4 – Future 2051 network with east-west midblock arterial

3.0 Intersection Capacity Analysis

Study intersections under existing (2022) baseline conditions and future (2033) conditions were analyzed to evaluate the impact on traffic operations resulting from the deletion of the east-west midblock arterial. Intersection operations were assessed using the Synchro 11 software which utilizes the Highway Capacity Manual (HCM) methodology published by the Transportation Research Board National Research Council. Synchro 11 can analyze both signalized and unsignalized intersections in a road corridor or network considering the spacing, interaction, queues, and operations between intersections.

Intersection operations performance metrics are reported in terms of Level of Service (LOS), delays, v/c ratios, and 95th percentile queues. Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. **Table 19** summarizes the LOS criteria for signalized and unsignalized intersections.

Table 19: Intersection Level of Service Criteria

	Average Control Delay per Vehicle (second / vehicle)	
Level of Service	**Signalized Intersection**	**Unsignalized Intersection**
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

The following Synchro parameters were adjusted based on the Region's "*Design Specifications for Traffic Control Devices, Pavement Markings, Signage and Roadside Protection*" (April 2021) guidelines:

- Lane Widths
  - 3.50 m for through movements
  - 3.25 m for turning movements

Peak hour factors ("PHFs") were calculated based on existing traffic counts. A default PHF value of 0.92 was used for study intersections where 15-minute data aggregates were not available. Critical movements were identified based on the following criteria:

- where the v/c ratio for a movement is equal or greater than 0.90; and/or,
- where the LOS for a movement is 'F.'

3.1 Existing (2022) Conditions

The study area for the existing intersection capacity analysis is bounded by Thickson Road to the west, Simcoe Street to the east, Conlin Road to the north, and Taunton Road to the south and the intersections within the study area are shown in **Figure 12**.

Signalized and unsignalized intersection operations were assessed using the Synchro 11 software based on the Region's standards documented in "*Chapter 9 of the Design Specifications for Traffic Control Devices, Pavement Marking, Signage and Roadside Protection*".

Thornton Road at Conlin Road is a single-lane roundabout with a bypass lane for right-turning vehicles at the south leg; therefore, the roundabout operation was analyzed using the ARCADY software. ARCADY adopts an empirical methodology to determine the capacity, queues and delays based on various geometric parameters such as entry width, effective flare length, inscribed circle diameter, etc. In addition, a 10% capacity reduction was applied to account for driver unfamiliarity at roundabouts in North America based on industry's standard (MTO's Traffic Impact Studies Guidelines, 2021).

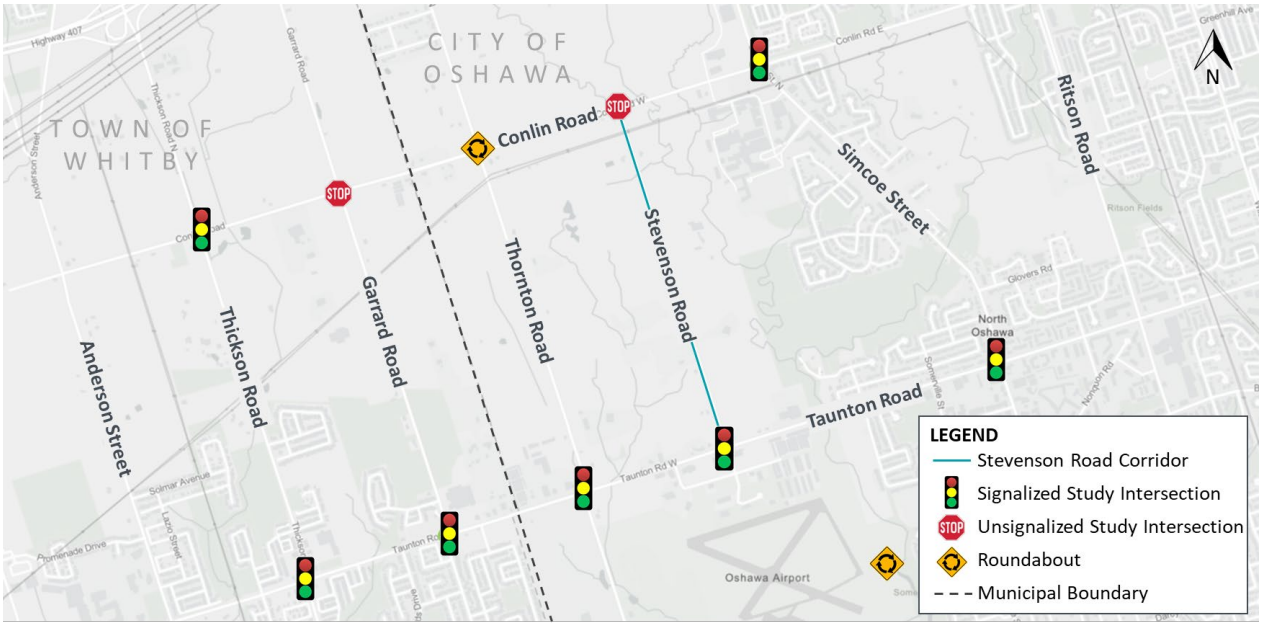


Figure 12: Study Intersections

3.2 Data Collection and Review

TraffMobility obtained existing traffic data from the Region and City, including Turning Movement Counts ("TMCs"), 24-hour Automatic Traffic Recorder ("ATR") data, signal timing plans, and collision data.

3.2.1 Traffic Counts

The Region and City provided available historic turning moment counts for the study intersections between 2011 and 2021. **Table 20** shows a summary of the latest traffic counts received and a copy of the turning movement counts are provided in **Appendix C**.

Additionally, 24-hour ATR data was provided by the Region for three locations along Simcoe Street and one location along Taunton Road. The three ATR locations on Simcoe Street are 50m north of Eastwood

Avenue North, 200m south of Conlin Road, and 325m north of Taunton Road. The ATR count location on Taunton Road is 200m east of Thickson Road.

Table 20: Turning Movement Counts Summary

Intersection	Count Date	Source
Thickson Road at Conlin Road	October 17th, 2018	Region
Garrard Road at Conlin Road	June 13th, 2018	Traffic Study (Ontario Traffic Inc.)
Thornton Road at Conlin Road	October 7th, 2020	City
Stevenson Road at Conlin Road	October 7th, 2020	City
Simcoe Street at Conlin Road	May 23rd, 2018	Region
Thickson Road at Taunton Road	May 31st, 2018	Region
Garrard Road at Taunton Road	November 7th, 2017	Region
Thornton Road at Taunton Road	May 10th, 2016	Region
Stevenson Road at Taunton Road	October 17th, 2018	Region
Simcoe Street at Taunton Road	June 8th, 2017	Region

3.2.2 Signal Timing Plans

Existing signal timing plans for the study intersections were provided by the Region. The existing signal timing plans are included in **Appendix D**.

3.3 Existing (2022) Baseline Volumes

Available traffic counts were collected over several years; therefore, background reports and historical data for the study intersections were reviewed to determine an appropriate adjustment factor to derive existing (2022) baseline traffic volumes to be used in the analysis. An average compound growth rate of 1% per annum was established as an appropriate adjustment factor to estimate existing (2022) baseline traffic volumes from historical counts. The average compound growth rate was estimated using historical weekday AM and PM peak hour turning movement counts at study intersections as shown in **Table 21**.

Table 21: Existing (2022) Baseline Growth Rate Summary

Corridor	CAGR	
	Weekday AM	Weekday PM
Conlin Road / Thickson Road	4.49%	0.29%
Conlin Road / Simcoe Street	0.25%	0.21%
Taunton Road / Thickson Road	3.34%	2.45%
Taunton Road / Garrard Road	-0.59%	0.00%
Taunton Road / Thornton Road	1.47%	1.74%
Taunton Road / Stevenson Road	0.31%	-1.65%
Taunton Road / Simcoe Street	1.14%	1.87%
Average	**1.49%**	**0.70%**
	1.09%	

Note: CAGR – compound annual growth rate

Intersection turning movement counts conducted during the pandemic (i.e., in 2020) were adjusted to the higher link volumes between adjacent study intersections to estimate pre-pandemic traffic demand. Existing intersection operations were analyzed using the lane configurations illustrated in **Figure 13,** and the existing adjusted traffic volumes shown in **Figure 14**. Analysis results are summarized in **Figure 15** and detailed summary tables and analysis reports for Synchro and ARCADY are provided in **Appendix E** and **Appendix F**, respectively.

The results show that existing operation during the weekday PM peak hour has critical turning movements (v/c ratios greater than 0.90 or LOS of 'F') at several intersections as shown in **Table 22**. The Taunton Road intersections at Thickson Road and Simcoe Street experience more operational constraints than the other study intersections.

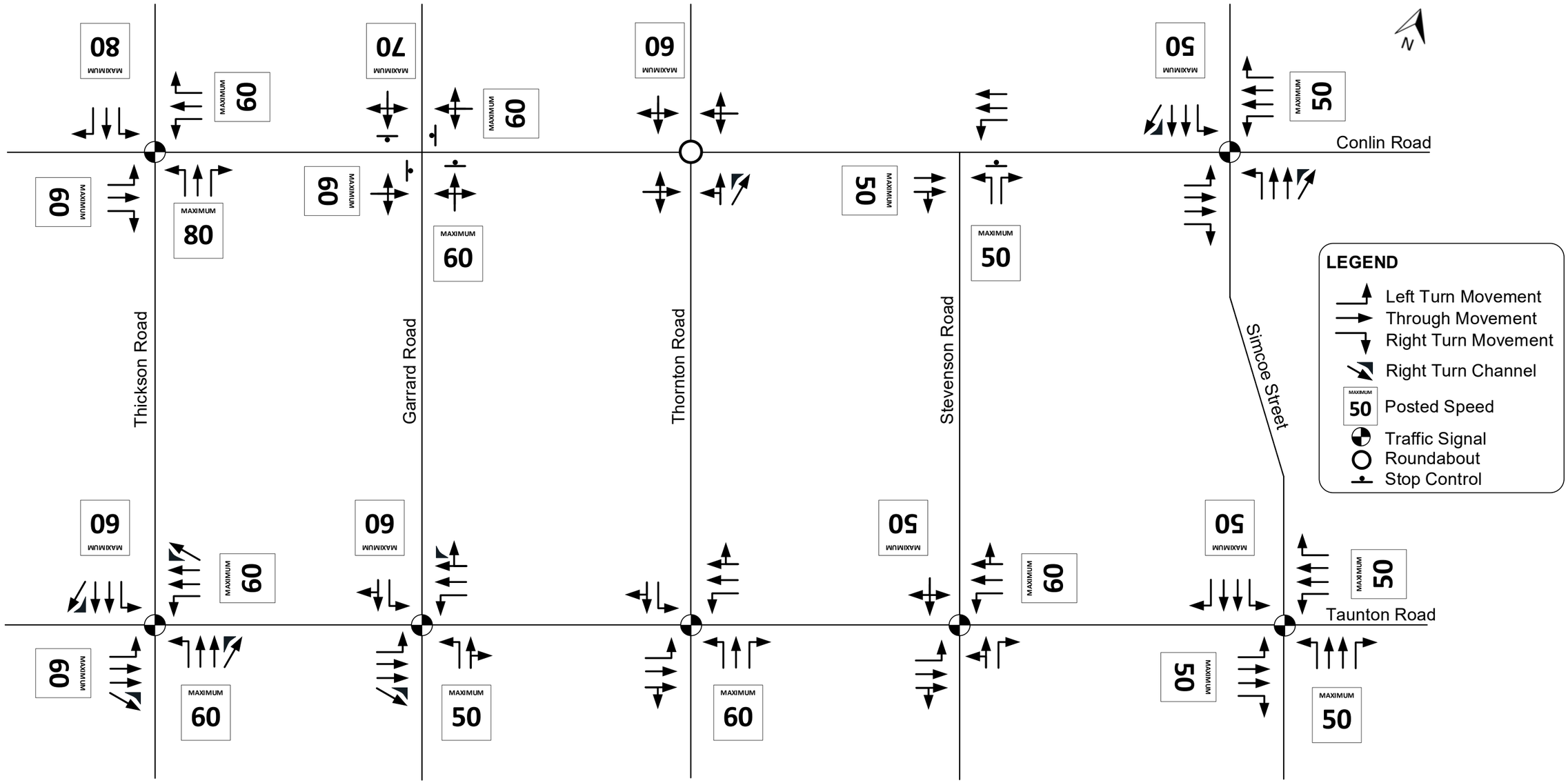


Figure 13: Existing Road Network

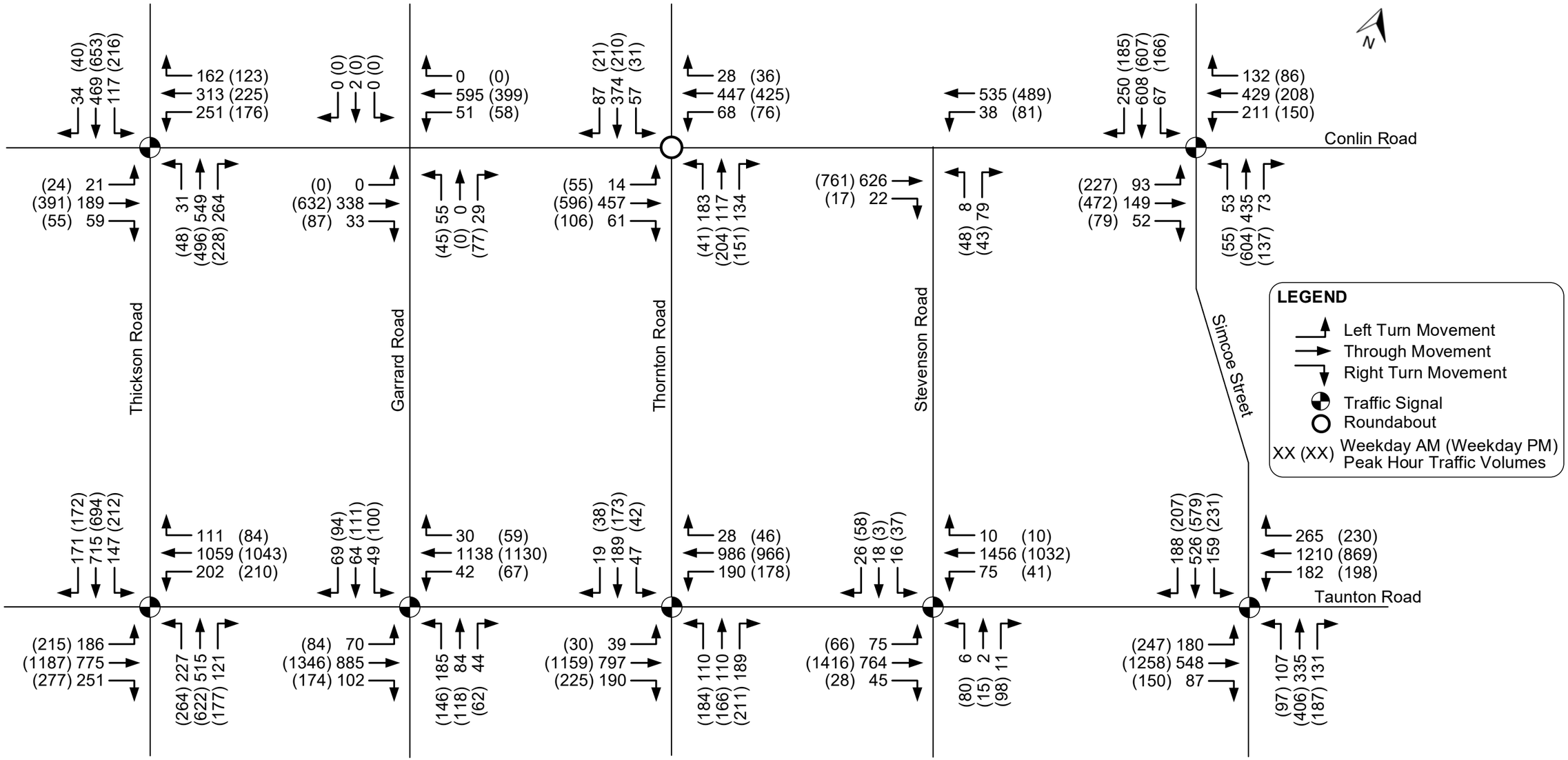


Figure 14: Existing (2022) Adjusted Traffic Volumes

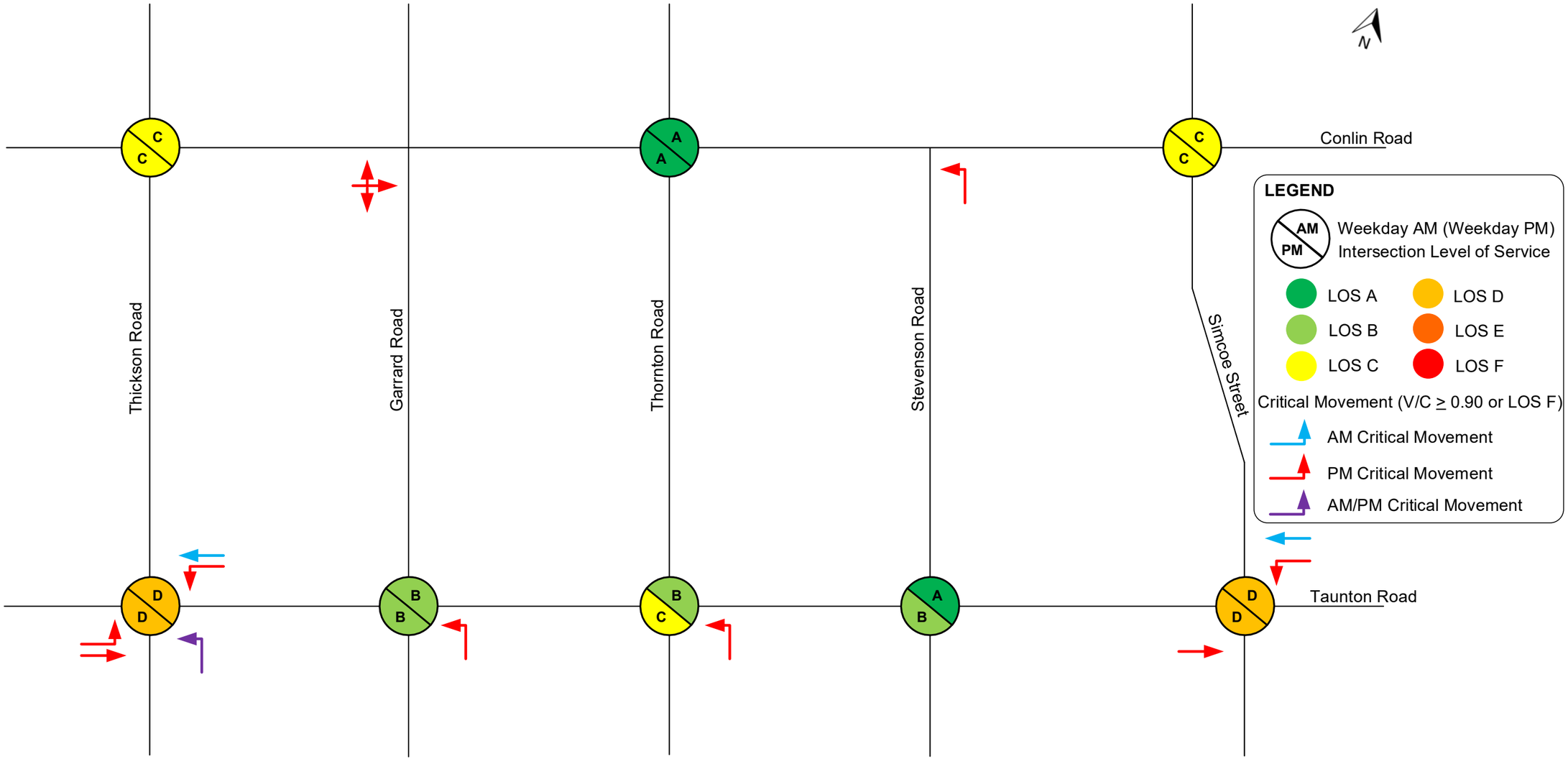


Figure 15: Existing (2022) Conditions Level of Service and Critical Movements

Table 22: Existing (2022) Conditions Intersection Operations – Critical Movements

Intersection / Critical Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Simcoe Street North & Taunton Road West at Taunton Road East (Signalized)									
EBT	D	35	0.44	67	D	44	**0.96**	181	>300
WBL	C	23	0.55	33	E	62	**0.91**	69	180
WBT	**F**	88	**1.09**	193	C	34	0.72	110	>300
Thornton Road North at Taunton Road West (Signalized)									
NBL	C	32	0.51	29	**F**	101	**0.99**	69	110
Garrard Road at Taunton Road East (Signalized)									
NBL	D	51	0.78	**54**	**F**	81	0.89	**51**	30
Thickson Road at Taunton Road East (Signalized)									
EBL	D	54	0.88	61	E	72	**0.96**	74	135
EBT	C	31	0.69	92	D	41	**0.90**	167	>200
WBL	D	41	0.86	29	**F**	81	**0.99**	76	140
WBT	D	49	**0.99**	159	D	42	0.79	140	190
NBL	D	53	**0.90**	66	**F**	89	**1.02**	93	130
Stevenson Road North at Conlin Road (Unsignalized)									
NBL	C	1	0.04	<7	**F**	51	0.41	14	50
Garrard Road at Conlin Road (Unsignalized)									
EBLTR	C	15	0.58	-	**F**	**80**	**1.09**	-	>100

Note: LOS – level of service; v/c – volume to capacity ratio

3.4 Future (2033) Conditions

This section documents the results of the future (2033) intersection capacity analysis for the weekday AM and PM peak hours. The road network in the existing Synchro model was updated to include the planned road network improvements listed in **Table 1**. Using the volumes plot from the EMME (2033) sub-area model, corridor specific average compound annual growth rates were calculated and applied to the existing (2022) volumes to forecast future (2033) volumes used in the future intersection analysis. The calculated average compound annual rates for each corridor are provided in **Table 23**. A maximum annual growth rate of 3% was used in the analysis.

Signal timing splits at all signalized intersections were optimized in the analysis of future (2033) intersection analysis. To assess the impacts on intersection operations with the removal of the east-west midblock arterial the following analysis scenarios were conducted for the weekday AM and PM peak hours:

- Scenario 1: Future (2033) network without east-west midblock arterial
- Scenario 2: Future (2033) network with east-west midblock arterial

Table 23: Future (2033) Growth Rate Summary

Corridor	CAGR
	Weekday AM/PM
Conlin Road	2.5%
Taunton Road	1.0%
Simcoe Street	0.0%
Stevenson Road	3.0%
Thornton Road	2.5%
Garrard Road	3.0%
Thickson Road	3.0%

Note: CAGR - compound annual growth rate

3.4.1 Future (2033) Intersection Analysis – Scenario 1

Future (2033) intersection analysis was conducted using the road network without the east-west midblock arterial (Scenario 1) shown in **Figure 16** and the forecasted future (2033) traffic volumes illustrated in **Figure 17**.

Synchro was used to assess operations for signalized and unsignalized intersections while ARCADY was used to assess roundabout operations. It is noted that the intersection of Conlin Road at Garrard Road was assessed in future (2033) conditions as both an unsignalized intersection and a roundabout.

Analysis results are summarized in **Figure 18** and detailed summary tables and analysis reports for Synchro and ARCADY are provided in **Appendix E** and **Appendix F**, respectively.

The results show that Taunton Road intersections at Thickson Road and Simcoe Street are expected to experience operational constraints with several critical movements (v/c ratios greater than 0.90 or LOS of 'F') during both the weekday AM and PM peak hours under future (2033) conditions without the midblock arterial as shown in **Table 24**. The intersection of Thickson Road at Conlin Road is also expected to have operational constraints for several movements during both peak hours.

Roundabout operations results show that all approaches for both Conlin Road roundabouts at Garrard Road (sensitivity analysis) and Thornton Road (existing) are expected to operate at LOS A during both the weekday AM and PM peak hours, except for the south approach (LOS E) at the Thornton Road roundabout during the AM peak hour, and the east approach (LOS C) for the roundabout at Garrard Road during the PM peak hour.

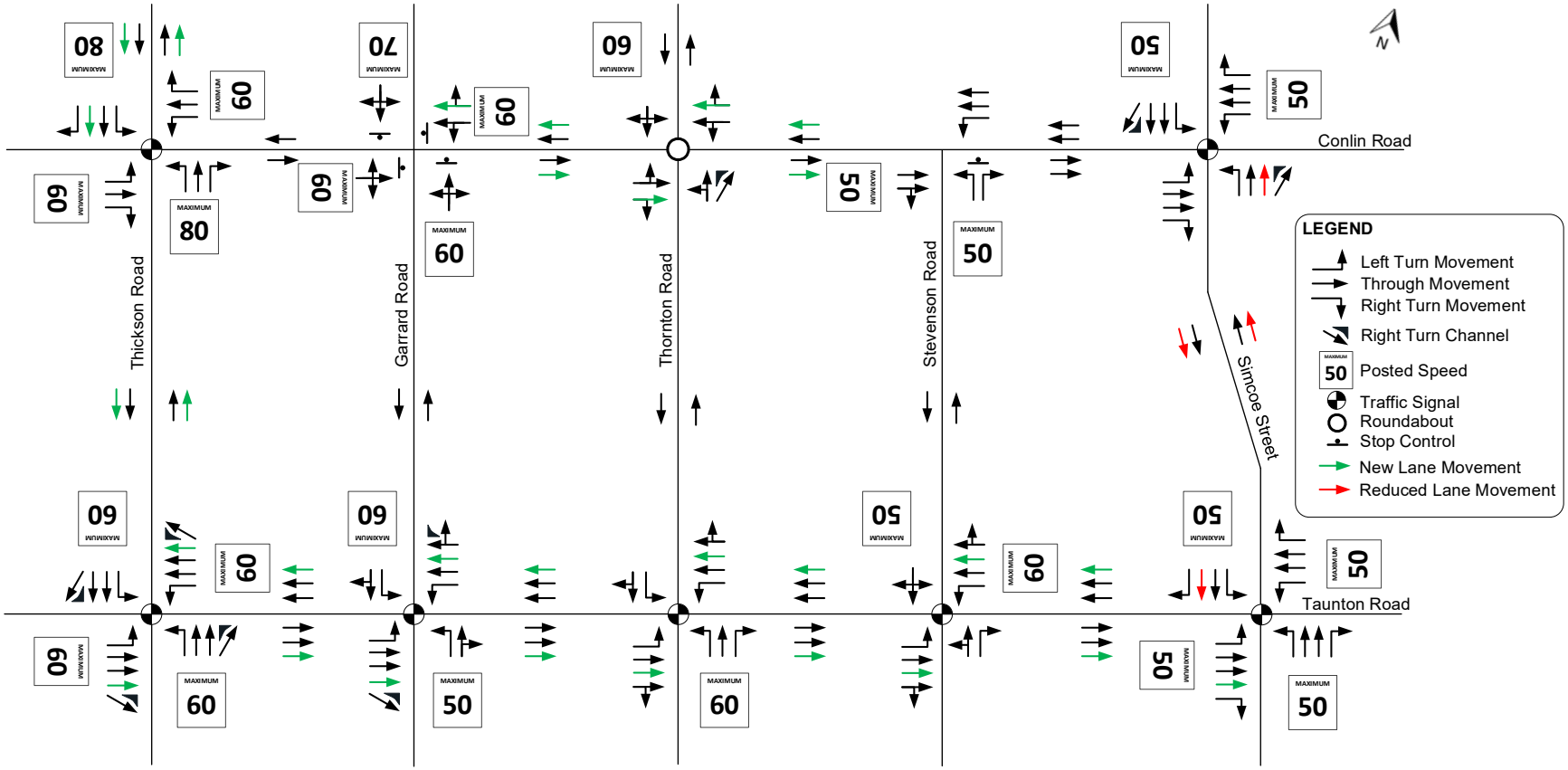


Figure 16: Future (2033) Lane Configuration - Scenario 1

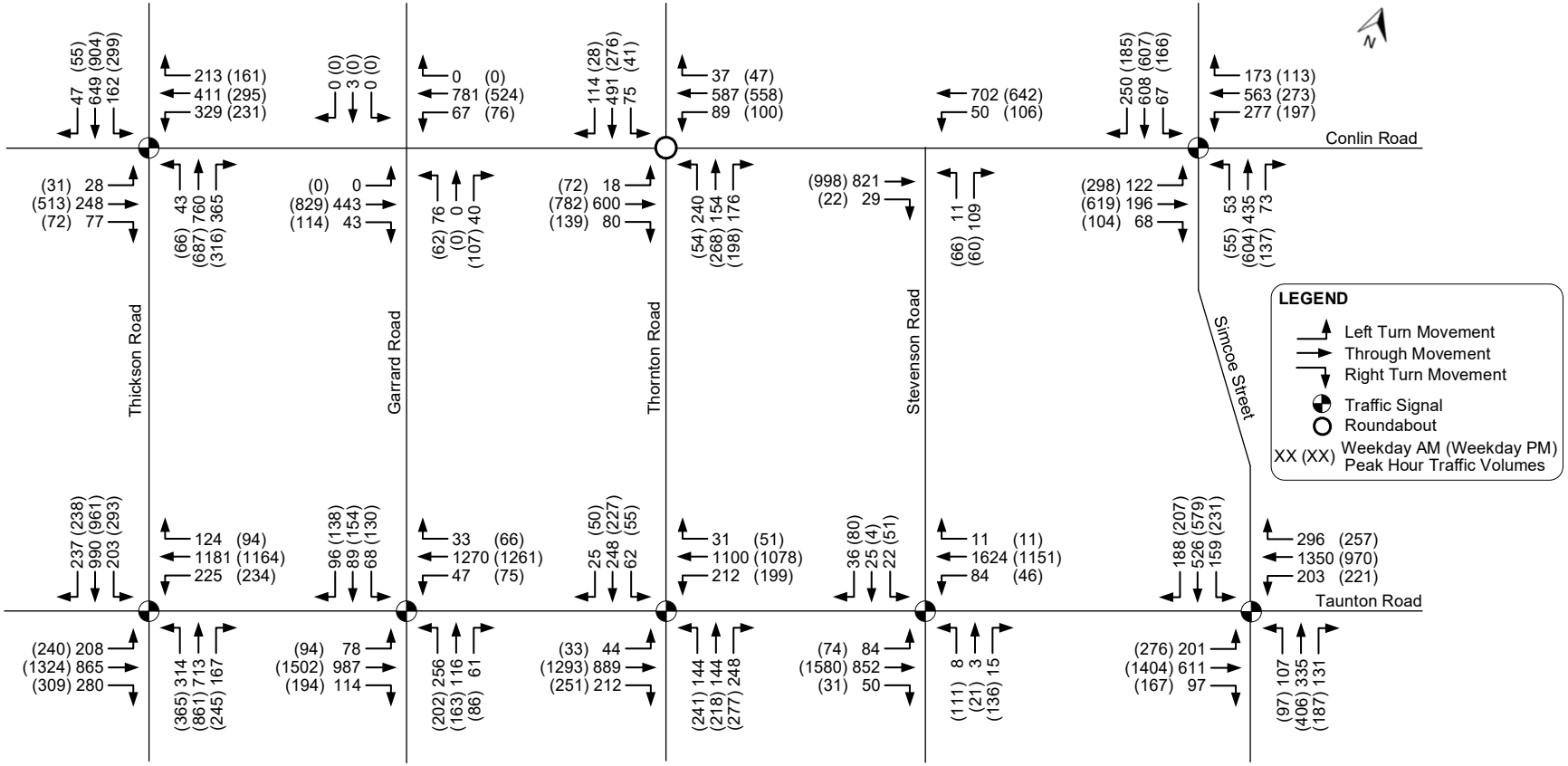


Figure 17: Future (2033) Traffic Volumes - Scenario 1

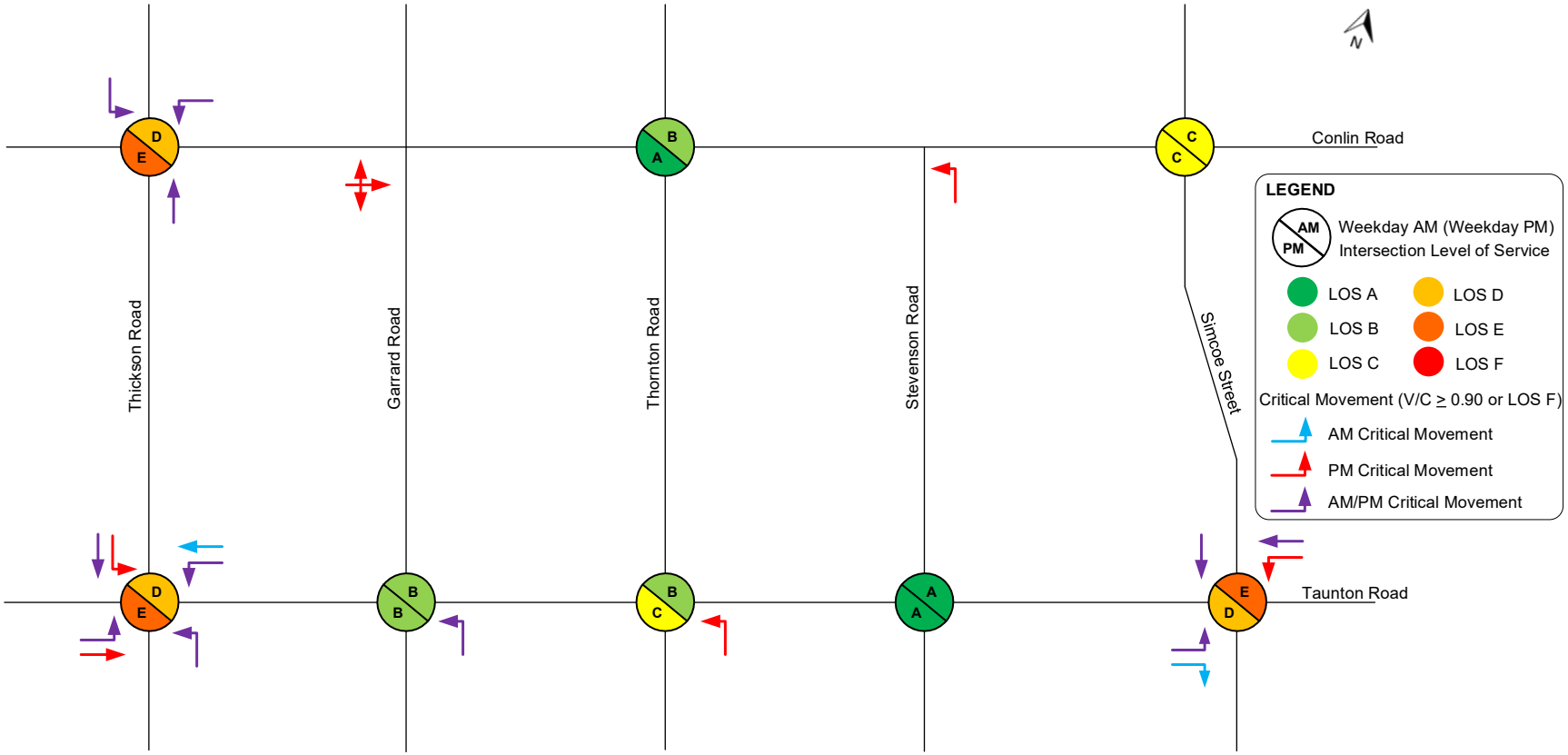


Figure 18: Future (2033) Intersection LOS and Critical Movements – Scenario 1

Table 24: Future (2033) Conditions Intersection Operations – Scenario 1 Critical Movements

Intersection / Critical Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Simcoe Street North & Taunton Road West at Taunton Road East (Signalized)									
Overall	E	58	**1.04**	-	D	45	0.97	-	-
EBL	F	91	**0.98**	72	**F**	100	**0.97**	52	125
EBR	**F**	161	0.07	19	C	26	0.17	3	25
WBL	B	17.1	0.52	36	E	73	**0.96**	32	180
WBT	**F**	92	**1.11**	206	D	54	**0.93**	109	>300
SBT	E	60	**1.00**	177	E	62	**0.95**	123	>150
Thornton Road North at Taunton Road West (Signalized)									
NBL	D	47	0.75	35	**F**	93	**1.01**	84	110
Garrard Road at Taunton Road East (Signalized)									
NBL	E	63	**0.91**	**88**	**F**	95	**0.98**	**84**	30
Thickson Road at Taunton Road East (Signalized)									
Overall	D	49	**1.02**	-	E	59	**1.05**	-	-
EBL	**F**	84	**0.99**	72	**F**	87	**1.00**	87	135
EBT	D	39	0.75	75	E	61	**0.99**	138	>200
WBL	**F**	89	**1.03**	71	E	78	**0.98**	82	140
WBT	D	54	**1.02**	126	D	51	0.88	115	190
NBL	E	69	**0.97**	103	**F**	100	**1.07**	130	130
SBL	C	23	0.62	35	E	57	**0.91**	92	135
SBT	E	68	**1.02**	153	E	72	**1.01**	157	>120
Thickson Road at Conlin Road (Signalized)									
Overall	D	48	**1.09**	-	**F**	78	**1.37**	-	-
WBL	**F**	91	**1.05**	**109**	**F**	245	**1.42**	**95**	70
NBT	**F**	110	1.15	215	**F**	183	**1.31**	213	>150
SBL	E	57	0.90	37	**F**	157	**1.24**	92	115
Stevenson Road North at Conlin Road (Unsignalized)									
NBL	E	36	0.09	3	**F**	273	**1.16**	45	50
Garrard Road at Conlin Road (Unsignalized)									
EBLTR	D	26	0.79	26	**F**	259	**1.52**	26	>100

Note: LOS – level of service; v/c – volume to capacity ratio; Scenario 1 – future 2033 network without east-west midblock arterial

3.4.2 Future (2033) Intersection Analysis – Scenario 2

Future (2033) intersection analysis was conducted using the road network with the east-west midblock arterial (Scenario 2) shown in **Figure 19**. To forecast future (2033) traffic volumes with the midblock arterial, traffic volumes were diverted to the midblock arterial as shown in **Figure 20** and the resulting forecasted future (2033) traffic volumes used in Scenario 2 analysis are illustrated in **Figure 21**.

Synchro was used to assess operations for signalized and unsignalized intersections while ARCADY was used to assess roundabout operations. It is noted that the intersection of Conlin Road at Garrard Road was assessed in future (2033) conditions as both an unsignalized intersection and a roundabout.

Analysis results are summarized in **Figure 22** and detailed summary tables and analysis reports for Synchro and ARCADY are provided in **Appendix E** and **Appendix F**, respectively.

The results show that Taunton Road intersections at Thickson Road and Simcoe Street are expected to experience operational constraints with several critical movements (v/c ratios greater than 0.90 or LOS of 'F') during both the weekday AM and PM peak hours under future (2033) conditions with the midblock arterial as shown in **Table 25**. The intersection of Thickson Road at Conlin Road is also expected to have operational constraints for several movements during both peak hours.

Roundabout operations results show that all approaches for both Conlin Road roundabouts at Garrard Road (sensitivity analysis) and Thornton Road (existing) are expected to operate at LOS A during both the weekday AM and PM peak hours, except for the south approach (LOS E) at the Thornton Road roundabout during the AM peak hour.

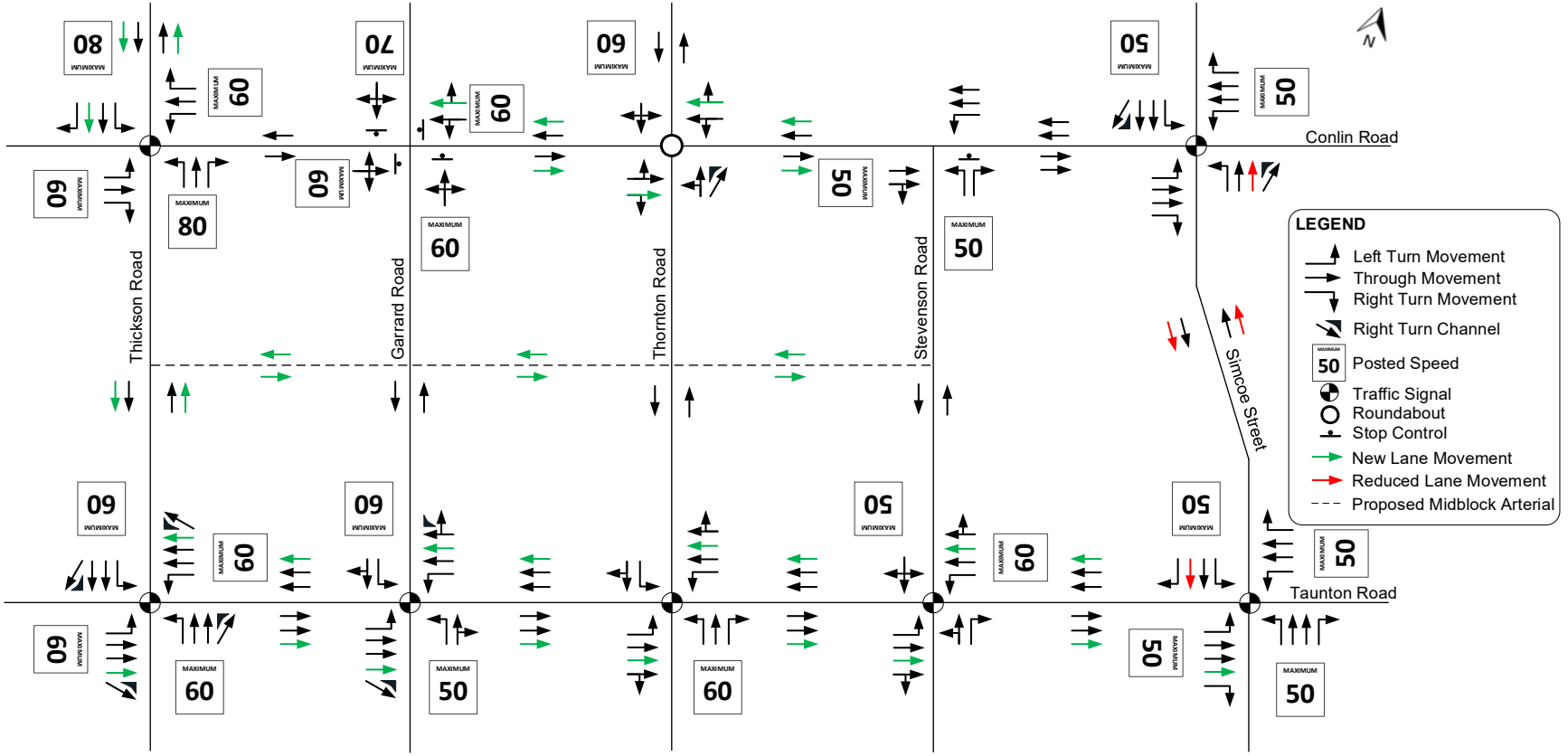


Figure 19: Future (2033) Lane Configuration – Scenario 2

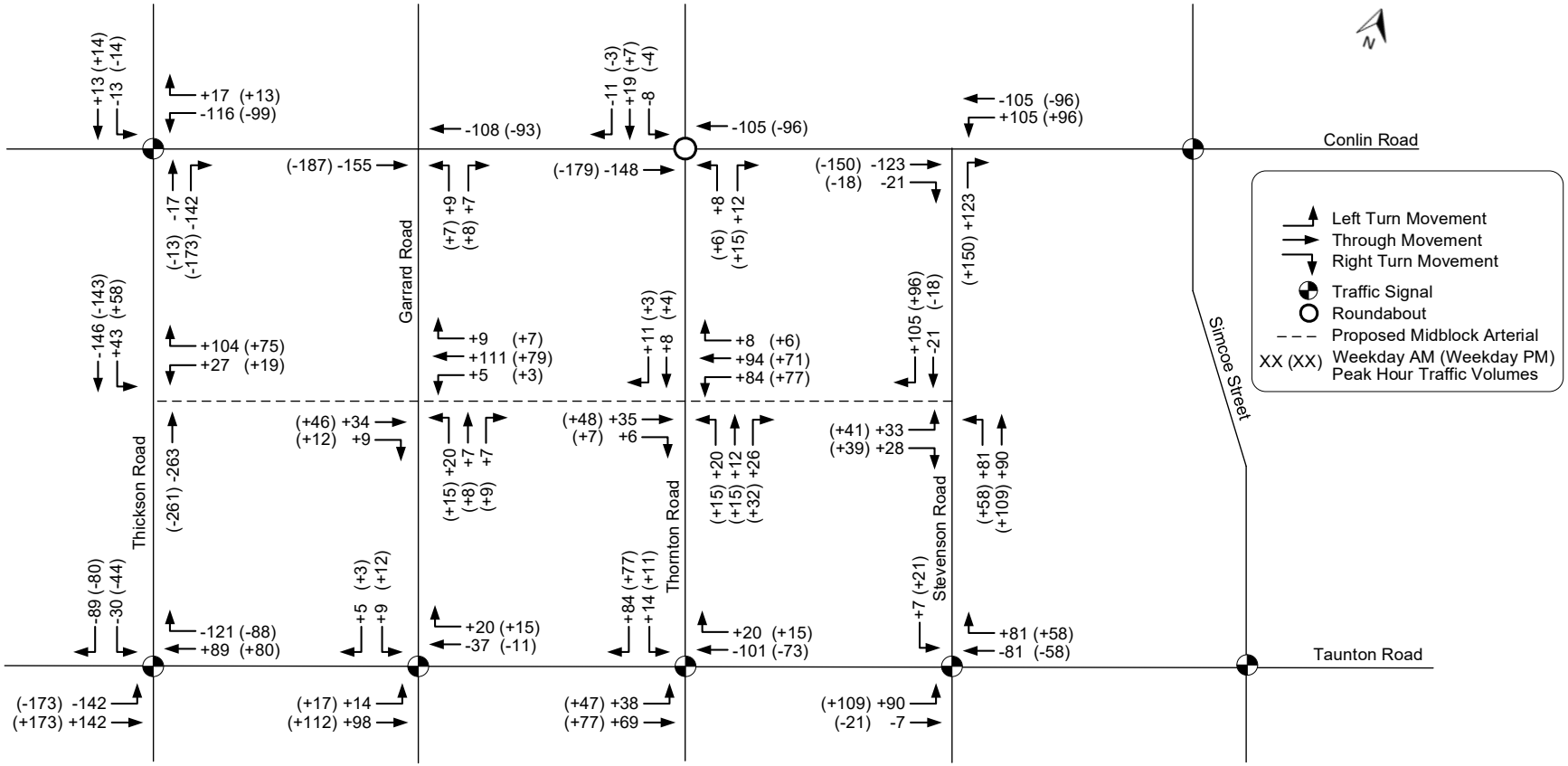


Figure 20: Future (2033) Diverted Traffic Volumes – Scenario 2

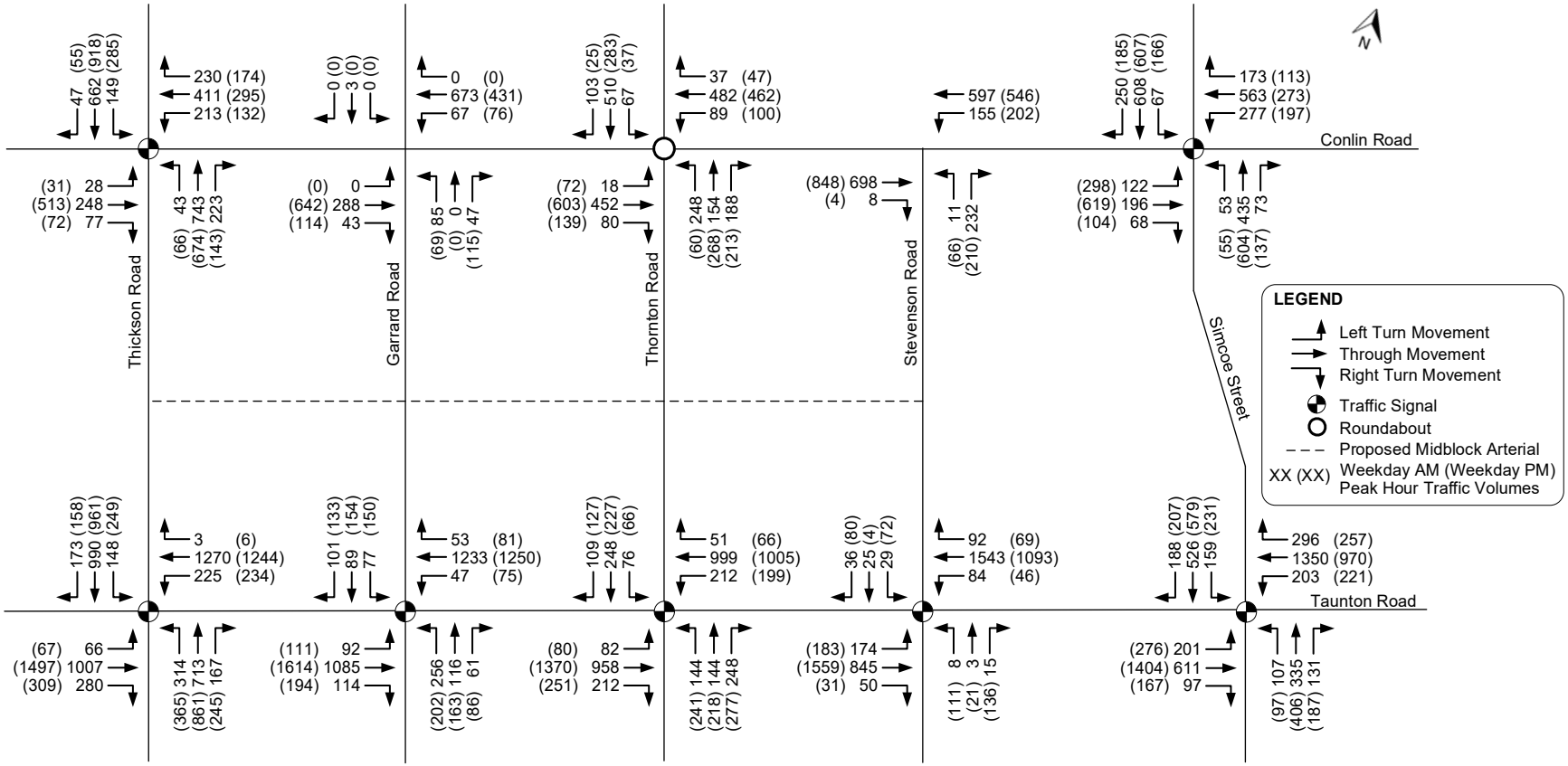


Figure 21: Future (2033) Traffic Volumes - Scenario 2

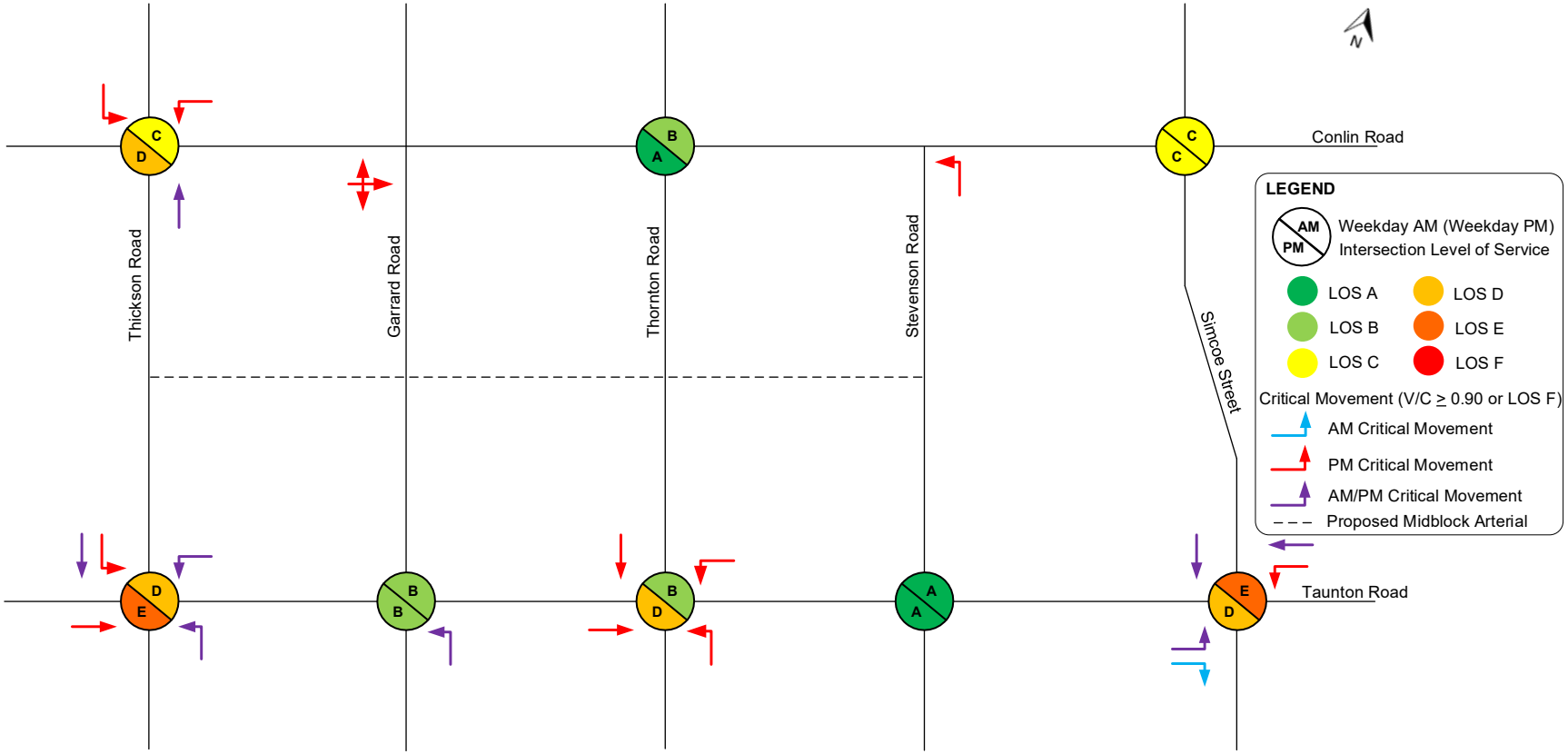


Figure 22: Future (2033) Intersection LOS and Critical Movements – Scenario 2

Table 25: Future (2033) Conditions Intersection Operations – Scenario 2 Critical Movements

Intersection / Critical Movement	AM Peak Hour				PM Peak Hour				Available Storage (m)
	LOS	Delay (s)	v/c	95th Percentile Queue (m)	LOS	Delay (s)	v/c	95th Percentile Queue (m)	
Simcoe Street North & Taunton Road West at Taunton Road East (Signalized)									
Overall	E	56	**1.03**	-	D	44	0.97	-	-
EBL	**F**	118	**1.07**	76	**F**	96	**0.97**	99	125
EBR	**F**	160	0.07	18	B	17	0.17	7	25
WBL	B	17	0.52	36	E	73	**0.96**	78	180
WBT	E	80	**1.08**	202	D	53	**0.93**	148	>300
SBT	E	60	**1.00**	177	E	61	**0.95**	191	>150
Thornton Road North at Taunton Road West (Signalized)									
Overall	B	20	0.88	-	D	36	**1.02**	-	-
EBTR	B	11	0.62	33	D	38	**0.92**	107	>200
WBL	C	28	0.81	55	**F**	94	**0.99**	80	100
NBL	E	60	0.85	46	E	64	**0.94**	81	110
SBTR	E	57	0.89	114	E	68	**0.92**	130	>250
Garrard Road at Taunton Road East (Signalized)									
NBL	E	69	**0.93**	**93**	**F**	92	**0.97**	**85**	30
Thickson Road at Taunton Road East (Signalized)									
Overall	D	42	**1.09**	-	E	63	**1.08**	-	-
EBT	D	45	0.87	92	E	57	**0.98**	153	>200
WBL	**F**	92	**1.04**	71	E	76	**0.98**	82	140
NBL	**F**	85	**1.02**	105	**F**	100	**1.07**	128	130
SBL	C	21	0.55	30	E	70	**0.95**	86	135
SBT	E	59	**0.99**	149	**F**	127	**1.16**	171	>120
Thickson Road at Conlin Road (Signalized)									
Overall	C	32	**0.93**	-	D	54	**1.24**	-	-
WBL	D	47	0.84	67	**F**	132	**1.09**	59	70
NBT	E	59	**1.01**	202	**F**	96	**1.11**	193	>150
SBL	D	36	0.80	31	**F**	179	**1.29**	90	115
Stevenson Road North at Conlin Road (Unsignalized)									
NBL	E	3	0.11	3	**F**	347	**1.31**	49	50
Garrard Road at Conlin Road (Unsignalized)									
EBLTR	B	15	0.54	-	**F**	130	**1.22**	-	>100

Note: LOS – level of service; v/c – volume to capacity ratio; Scenario 2 – future 2033 network with east-west midblock arterial

4.0 Findings

EMME sub-area network modelling, Synchro intersection capacity analysis for signalized and unsignalized intersections, and ARCADY roundabout analysis were conducted for the 2033 and 2051 horizons to evaluate the removal of a planned east-west midblock Type 'C' Arterial Road from the future road network. The analysis evaluated road network with and without the midblock arterial for the weekday AM and PM peak hours. Key study findings from the evaluation of the results are:

2033 Horizon Year

- The implementation of the east-west midblock arterial would provide minor relief to parallel roads and would generally be used as an alternative route to Conlin Road and Taunton Road.
- The deletion of the east-west midblock arterial would make negligible differences in travel times along Taunton Road and Conlin Road, and Conlin Road and Stevenson Road are both expected to operate with acceptable v/c ratios of less than 0.90.
- Based on the projected growth by 2033 and the forecasted volumes for Stevenson Road, a two-lane cross-section would be sufficient.
- The future intersection analysis in 2033 show that several study intersections are expected to operate with capacity constraints, which include:
    - Taunton Road intersections at Thickson Road and Simcoe Street are expected to experience operational constraints with several critical movements (v/c ratios greater than 0.90 or LOS of 'F') during both the weekday AM and PM peak hours with or without the midblock arterial.
    - The Thickson Road at Conlin Road intersection is also expected to have operational constraints for several movements during both peak hours, with or without the midblock arterial.
- The roundabout operations results show that all approaches for both Conlin Road roundabouts at Garrard Road (sensitivity analysis) and Thornton Road (existing) are expected to operate at LOS A during both the weekday AM and PM peak hours, except for the south approach (LOS E) at the Thornton Road roundabout during the AM peak hour, with or without the midblock arterial. When the midblock arterial is present, the east approach for the roundabout at Garrard Road is expected to operate with LOS C during the PM peak hour.

2051 Horizon Year

- The midblock arterial continues to provide relief to parallel roads and is generally used as an alternative route to Conlin Road and Taunton Road. During the PM peak hour, most eastbound trips originating from the north would use the east-west midblock arterial to access Taunton Road via Stevenson Road.
- The road network with or without the E-W midblock arterial is expected to operate near capacity along Taunton Road, Stevenson Road, and sections of Conlin Road (west of Garrard Road), with v/c ratios exceeding 0.9.
- The removal of the midblock arterial has negligible differences in travel times along Taunton Road and Conlin Road.
- The forecasted volumes on Stevenson Road warrant a 4-lane cross-section in 2051; however, since several assumptions were made in the modelling of the 2051 future conditions, it is recommended that the Stevenson Road right-of-way (ROW) between Taunton Road and Conlin Road be protected for a 4-lane cross-section. The widening of Stevenson Road to 4 lanes can be confirmed with a more rigorous analysis when details are finalized for the airport lands redevelopment.

Appendix D

Existing Traffic Counts

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca

Appendix E

Existing Signal Timing Plans

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca

Appendix F

Intersection Operations Synchro Reports

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca

TRAFFMOBILITY

Appendix G

ARCADY Roundabout Analysis Reports

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca

Appendix H

MMLOS Analysis Results (2033)

This document is available upon request.

Please contact Engineering Services at
engineering@oshawa.ca