TRANSPORTATION IMPACT STUDY

159 & 163 SULPHUR SPRINGS ROAD

CITY OF HAMILTON

PREPARED FOR:

2691715 ONTARIO LIMITED & 2568843 ONTARIO LIMITED
MIZRAHI DEVELOPMENTS

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

NOVEMBER 2024

CFCA FILE NO. 2736-7210

CROZIER

Revision Number	Date	Comments
Rev.0	November 2024	Issued for Draft Submission
Rev.1	November 2024	Issued for 1st Submission

Executive Summary

2691715 Ontario Limited & 2568843 Ontario Limited retained C.F. Crozier & Associates to complete a Transportation Impact Study to support the Official Plan Amendment, Zoning By-Law Amendment, and Draft Plan of Subdivision (DPOS) Application for a residential development proposal situated at 159 and 163 Sulphur Springs Road, Ancaster, in the City of Hamilton.

The development proposal consists of 14 single-detached units and 61 block townhouse units, per the Site Plan prepared by The Biglieri Group, dated October 15, 2024. The site is proposed to be serviced by a single full-moves access connection along Sulphur Springs Road.

Due to the short turn around time on the project, a terms of reference was not submitted prior to the submission of this transportation impact study. An agreed upon terms of reference will be discussed with municipal staff following this submission to ensure a consensus is reached on the traffic modeling parameters used in the analysis of this site.

In the 2024 existing conditions, all intersections are operating efficiently with reserve capacity to accommodate future traffic volumes. No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

In the 2035 future background conditions, the intersection of Wilson Street East and Sulphur Springs Road/Church Street has a level-of-service (LOS) of C and C, a control delay of 23.3 seconds and 34.6 seconds and an overall volume-to-capacity (v/c) ratio of 0.90 and 1.05 in the a.m. and p.m. peak hours, respectively. As the intersection was assumed to experience a 2% growth rate over an 11-year horizon period, the intersection reaches above capacity conditions in the 2035 future background scenario, particularly at the eastbound approach along Sulphur Springs Road. However, based on the developments currently located along the roadway, a 2% growth rate is a conservative estimate as the roadway is not expected to experience growth of this magnitude.

All other intersections are operating efficiently with reserve capacity to accommodate future traffic volumes. No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment.

The proposed development is forecast to generate a total of 38 and 49 two-way trips during the weekday a.m. and p.m. peak hours, respectively.

Similar to the 2035 future background conditions, in the 2035 future total conditions, the intersection of Wilson Street East and Sulphur Springs Road/Church Street has an LOS of C and D, a control delay of 24.6 seconds and 36.2 seconds and an overall v/c ratio of 0.91 and 1.07 in the a.m. and p.m. peak hours, respectively. As the results indicate only a slight increase in overall v/c ratios and delays compared to the 2035 future background scenario, the site-generated trips are not expected to notably impact traffic operations at the signalized intersection of Wilson Street East and Sulphur Springs Road/Church Street.

All other intersections are operating efficiently with reserve capacity to accommodate future traffic volumes. No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment.

Auxiliary left-turn lane warrant analysis was conducted at the existing site access along Sulphur Springs Road for the 2035 future total scenario using the MTO's Design Supplement for TAC GDGCR. The existing site access is not warranted for left-turn lanes under the 2035 future total scenario.

The available sight distance for the site access along Sulphur Springs Road meets the minimum sight distance requirements for Case B1 (Left Turn from the Minor Road).

For Case B2/B3 (Right Turn / Crossing Maneuver from the Minor Road), the minimum sight distance requirement is not met. However, the existing trees along Sulphur Springs Road can be adjusted and removed to ensure proper sightline requirements are met. Furthermore, providing a daylighting triangle according to the Rural Hamilton Official Plan (Chapter C – City Wide Systems and Designations) would help ensure that the minimum sight distance is provided. For local-to-local roads, the Rural Hamilton Official Plan requires a minimum daylighting triangle of 4.57 m by 4.57 m, which can be accommodated within the current concept plan.

The proposed site access meets the intersection spacing, access spacing, and clear throat length requirements outlined in the TAC GDGCR. Furthermore, the proposed site access is in compliance with the access width requirements outlined in the TAC GDGCR and the Ontario Building Code. The entry lane immediately diverges into two 6.0 m lanes divided by a landscaped boulevard median. This was done to support alternative fire route access while maintaining the minimum 6.0 m lane width. It is important to note that due to site boundary constraints, the lanes converge into a single 7.0 m lane. To help support fire route access, during the construction, a mountable curb with a paved shoulder may be implemented. Furthermore, the internal roadway provides several hammerhead turnaround points to support emergency vehicle maneuvers.

The proposed parking supply for the development proposal is sufficient when compared with the parking requirements outlined in the City of Hamilton's Zoning By-Law 24-052. According to Section 5.7.5 of the City of Hamilton's Zoning By-Law 24-052 there are no bicycle parking requirements for single-detached dwellings and townhouse dwellings. It is expected that residents and visitors will be parking bicycles within the individual garage spaces.

Based on the study findings, the proposed development can be supported from a traffic operations perspective as the development will not materially impact the study road network.

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1.0 Introduction

2691715 Ontario Limited & 2568843 Ontario Limited retained C.F. Crozier & Associates Inc. (Crozier) to complete a Transportation Impact Study to support the proposed residential development located within Ancaster, in the City of Hamilton. The proposed development is located at 159 & 163 Sulphur Springs Road.

Due to the short turn around time on the project, a terms of reference was not submitted prior to the submission of this transportation impact study. An agreed upon terms of reference will be discussed with municipal staff following this submission to ensure a consensus is reached on the traffic modeling parameters used in the analysis of this site.

1.1 Developments Lands

The subject lands cover an area of approximately 10.1 ha and currently cover two municipal addresses, 159 and 163 Sulphur Springs Road, in the City of Hamilton (City). The property, located in a residential neighbourhood, is bounded by forested areas and a Heritage Trail to the north, a forested area to the east, Sulphur Springs Road to the south, and residential properties to the west. Two (2) residential dwellings occupy the site, accessed through an existing private road off Sulphur Springs Road. Two (2) ponds are also located on the subject lands while the remainder is mostly forested or landscaped. The Niagara Escarpment Commission (NEC) designates the lands as Escarpment Protection Area, and the forested areas to the north are Escarpment Natural Area. Most of the subject lands are also located within the Hamilton Conservation Authority (HCA) Regulated Area.

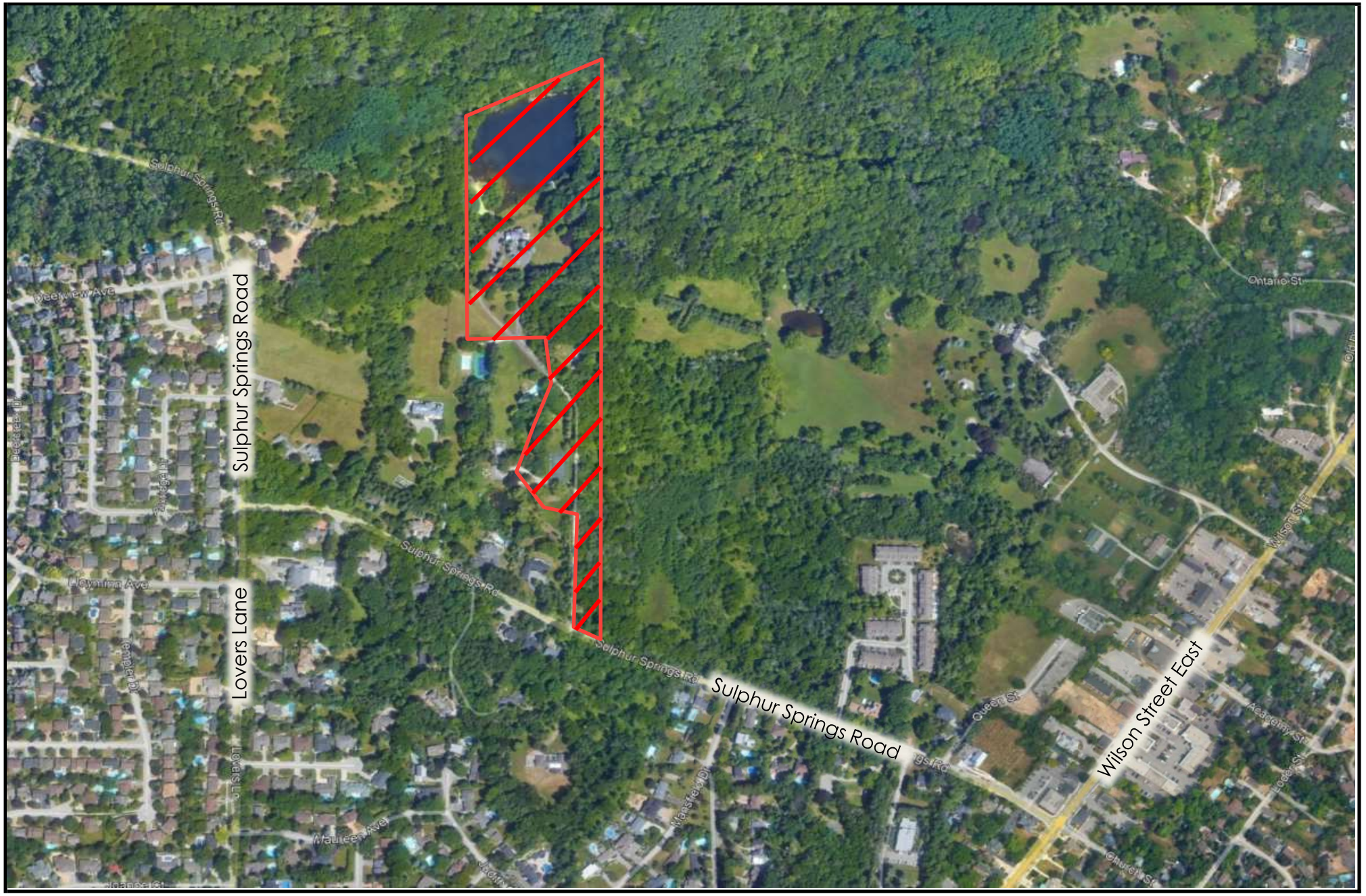
Figure 1 includes the Site Location Plan.

1.2 Development Proposal

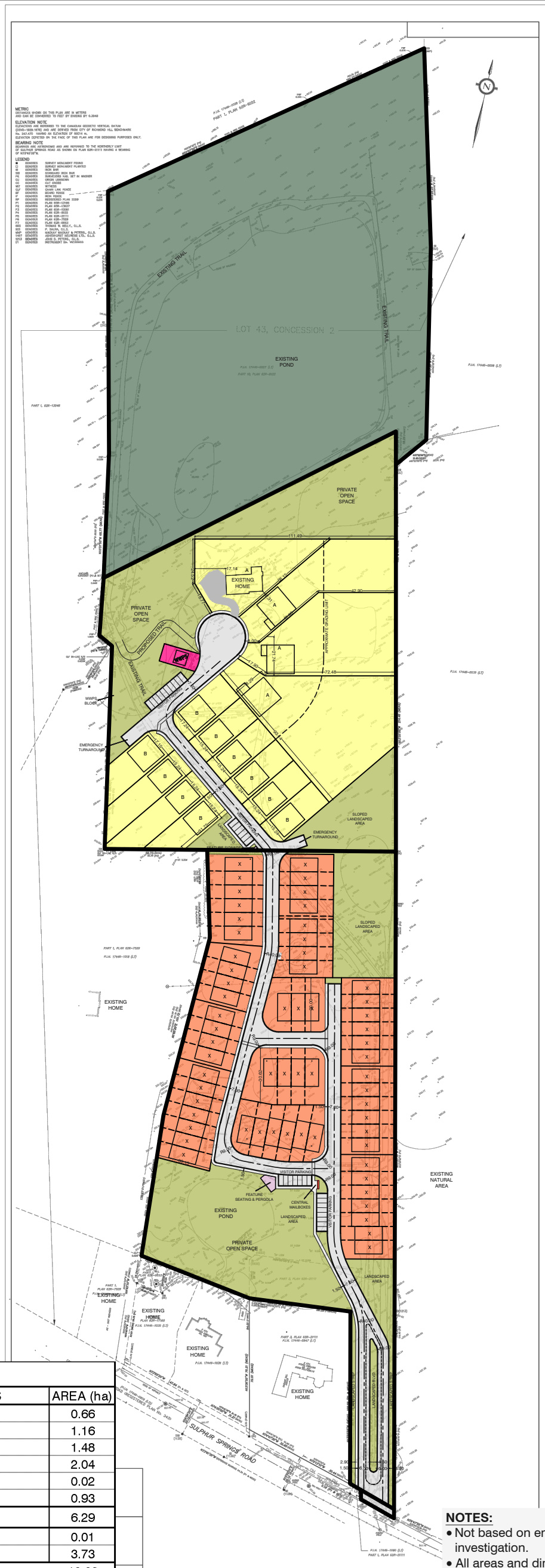
Per the Site Plan prepared by The Biglieri Group, dated October 15, 2024, the proposed development includes the following:

- 14 single-family detached units;
- 61 block townhouse units;
- Amenity areas and parks, landscaped features;
- Stormwater management ponds;
- A sewage pumping station; and
- An internal private road network.

Figure 2 outlines the current Site Plan (dated October 15, 2024).



Legend	159 & 163 Sulphur Springs Road	CROZIER CONSULTING ENGINEERS	Figure 1
Approximate Boundary	Site Location		Project No. 2736-7210 Date. 2024-11-26 Analyst. AK



SITE STATISTICS		
DESCRIPTION	UNITS	AREA (ha)
DETACHED (15.24/50ft.)	10	0.66
DETACHED (18.29m/60ft.)	4	1.16
BLOCK TOWNHOUSE (7.62m/25ft.)	61	1.48
PARKS AND OPEN SPACE		2.04
WW PUMPING STATION		0.02
PRIVATE ROAD/SIDEWALK/PARKING		0.93
NET DEVELOPMENT TOTAL	75	6.29
ROAD WIDENING		0.01
NATURAL HERITAGE SERVICE		3.73
TOTAL	75	10.03
SERVICED ROAD LENGTH	700m	
VISITOR PARKING	31 spaces	

NOTES:

- Not based on engineering, enviornmental or any other required technical investigation.
- All areas and dimensions are approximate and subject to change.
- Boundary lines are based on available PDF of a plan of survey.

C:\Users\ashields\The Biglieri Group\TBG_Project - 24218\2 - TBG Design\1 - TBG Working Drawings\1 - AutoCAD\24218-CSP_4-24.10.15

CONCEPTUAL SITE PLAN

ADDRESS:
159 & 163 SULPHUR SPRINGS ROAD, ANCASTER

Project No:
24218

Scale:
1:2500

October 15, 2024

Designed By:
MP

1.3 Study Purpose and Scope

The purpose of the study is to evaluate the transportation-related impacts of the proposed development on the study road network and to recommend or confirm any required mitigation measures, if warranted. This TIS is in support of an Official Plan Amendment, Zoning By-Law Amendment, and Draft Plan of Subdivision (DPOS) Application.

The study reviews the following main aspects of the proposed development from a transportation engineering perspective:

- The existing road network and record information relating to road jurisdiction, road classification, posted speed limit, lane configuration, cross-section elements;
- Impacts of development traffic on the study road network through analyzing existing, future background, and future total traffic operations;
- Need for external roadway improvements to mitigate traffic impacts;
- Safety requirements of the proposed site access; and
- The proposed parking supply in comparison to the City's Zoning By-law requirements.

The study has been completed in accordance with the City of Hamilton Transportation Assessment Guidelines (2024) (TA Guidelines).

This Transportation Impact Study considers the following study intersections:

- Lovers Lane and Sulphur Springs Road
- Wilson Street East and Sulphur Springs Road/Church Street
- Existing Site Access and Sulphur Springs Road

The City of Hamilton's TA Guidelines require the analysis of the five-year horizon from the build-out year (2030). Therefore, the 2035 horizon year was analyzed.

2.0 Existing Conditions

This section outlines the current conditions of the transportation network in the vicinity of the site. Details of the study road network, including traffic controls, lane configurations, speed limits, transit routes and stops, active transportation infrastructure and other relevant transportation elements are identified. The existing traffic operations are also summarized.

2.1 Study Road Network

The study road network consists of the existing road network near the site, which includes the study intersections and the adjoining roadway segments. **Table 1** delineates the study roadways.

Table 1: Study Roadways

Feature	Roadways		
	Sulphur Springs Road	**Lovers Lane**	**Wilson Street East/Church Street**
Direction	Two-way (East-West)	Two-way (North-South)	Two-way (North-South)
Classification	Local[1]	Local[1]	Major Arterial
Jurisdiction	City of Hamilton	City of Hamilton	City of Hamilton
Speed Limit	40 km/h	50 km/h[2]	50 km/h[2]
Number of travel lanes	Two	Two	Two
Median type	None	None	Painted median
Active Transportation	2.0 m Sidewalks (south side road between Wilson Street East and Ryerson Park Private Access; north side of road between Wilson Street East and Mansfield Drive) 1.2 m Sidewalk (north side of road spanning 150 m to the east)	1.8 m Sidewalk (west side of road) Painted Bikeways (south of Sulphur Springs Road)	1.8 m Sidewalks (Both Sides – south of Sulphur Springs Road) 1.6 m Sidewalks with 1.8 m buffers (Both Sides – north of Sulphur Springs Road)

Note 1: Although the roadway is not shown in the City of Hamilton's Official Plan Functional Road Classification Maps, it is assumed to be a local road based on its characteristics.
Note 2: A jurisdictional speed limit of 50 km/h is assumed on the roadways with no posted speed limit.

The relevant road classification maps are shown in **Appendix A**.

2.2 Transit Operations

Hamilton Street Railway (HSR) operates bus routes within the study area. **Table 2** below outlines the existing transit routes, direction, days of operation, peak hour headways, and the location of bus stops in the study area.

Table 2: Transit Operations in Study Area

Route	Direction	Limits	Days of Operation	Peak Hour Headways (min)[1]	Bus Stops in Study Area
16 Ancaster	Two-way (North-South)	Meadowlands Terminal to Garner/Wilson	Monday to Sunday	30	Wilson Street East at Sulphur Springs Road (650 m, 9-minute walk)

Appendix B contains the relevant transit map.

2.3 Transportation Data

A variety of transportation data was obtained and used to support the analysis in this study. Turning movement count data was collected during the hours of 6:00 a.m. to 9:45 a.m. and 3:00 p.m. to 6:45 p.m by Spectrum Inc. on October 22, 2024.

It is important to note that the signal timing data for the signalized intersection of Wilson Street East and Sulphur Springs Road/Church Street was originally requested to the City of Hamilton on October 17, 2024, and was not received at the time of writing this report. Thus, the signal timing plan was optimized in Synchro based on the existing traffic volumes and carried through to the future background and future total scenarios.

Appendix C contains all transportation data used in support of this study.

2.4 Traffic Modelling and Assumptions

The existing traffic conditions on the study road network were modelled in Synchro 11 based on "Highway Capacity Manual 2010 (HCM 2010)" methodology and using the default Synchro parameters. Roadway geometrics were modelled based on the existing study road network description outlined in **Section 2.1**.

The traffic volumes used in the existing conditions model are the volumes established in **Section 2.3**, based on the turning movement count survey data. This survey data was also applied to the model for the heavy vehicle percentages and peak hour factors as calculated for each intersection during each time period. **Table 3** outlines the calculated peak hour factors at each intersection during each peak hour.

Table 3: Peak Hour Factors

Intersection	Peak Hour	Peak Hour Factor
Lovers Lane and Sulphur Springs Road	A.M. 7:45 a.m. to 8:45 a.m.	0.92
	P.M. 5:00 p.m. – 6:00 p.m.	0.98
Wilson Street East and Sulphur Springs Road/Church Street	A.M. 7:30 a.m. to 8:30 a.m.	0.96
	P.M. 4:45 p.m. – 5:45 p.m.	0.94
Existing Site Access and Sulphur Springs Road	A.M. 8:00 a.m. to 9:00 a.m.	0.91
	P.M. 4:45 p.m. – 5:45 p.m.	0.96

The signal timing plans identified in **Section 2.3** were incorporated into the model for the signalized study intersections, while stop control was applied in the model to the remaining study intersections as applicable.

The assessment of the study intersections is based on the "Highway Capacity Manual (HCM)" methodology, which prescribes a method for estimating the Level of Service, control delay, and volume-to-capacity of an intersection along with the approaches and movements of the

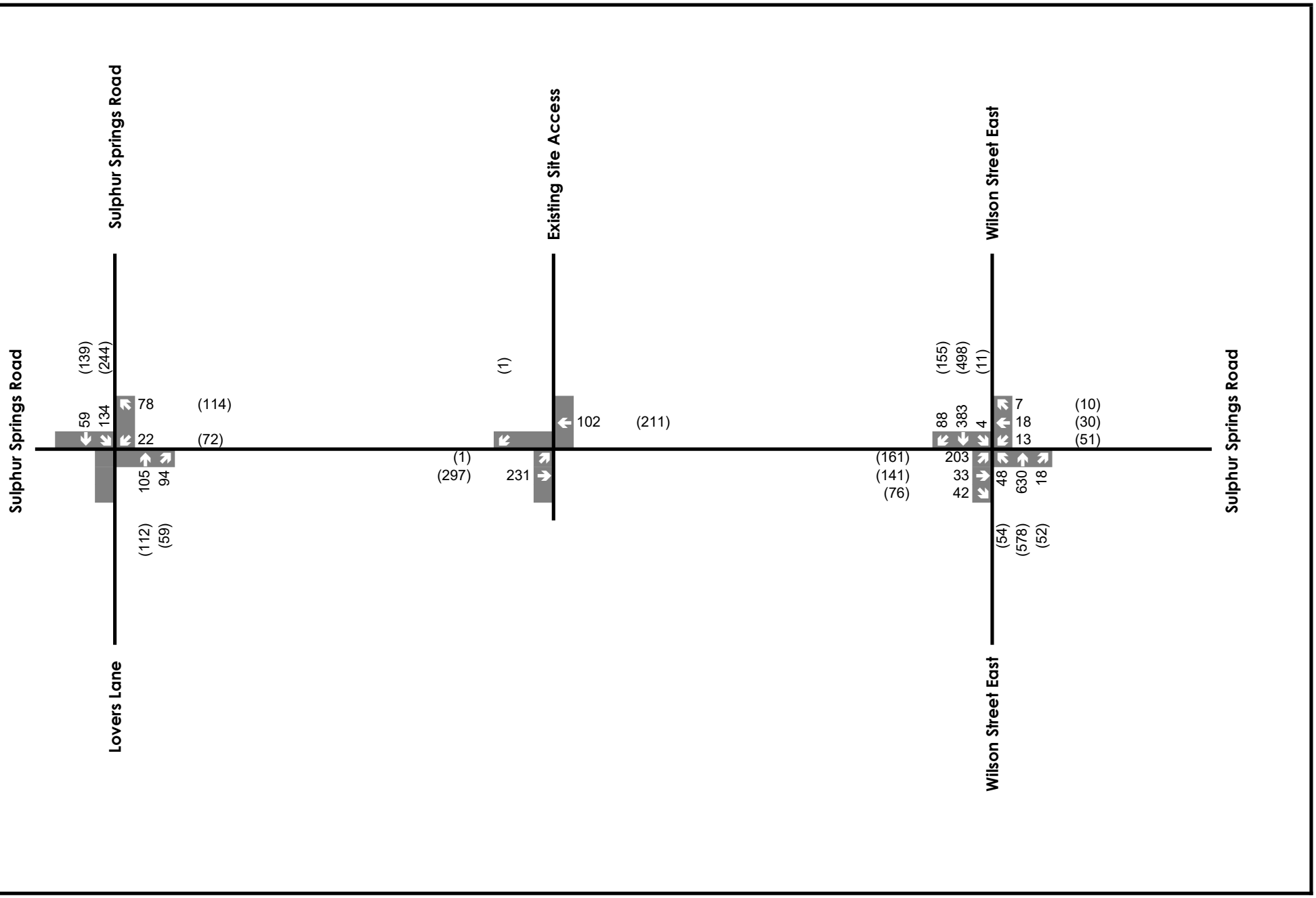
intersection. The Level of Service (LOS) metric provides a general performance measure of the quality of the service from a driver's perspective and ranges a letter from "A" to "F"; "A" representing best performance and "F" representing worst performance. **Appendix D** contains the Level of Service definitions.

Control delay is the additional time added per vehicle as a result of the intersection and its associated control (i.e.. Traffic Light / Stop Control) compared to the average speed on the adjoining roadway segments. Finally, the volume-to-capacity ratio indicates the fraction of the capacity for a particular movement or lane used by traffic.

Additionally, queuing was analyzed in this study using Synchro 11 software. The 95th percentile queue length metric, which represents the 95th percentile queue length of the peak hour traffic simulated in Synchro 11, was considered in this study for the auxiliary turn storage lanes.

2.5 Intersection Operations

Table 4 outlines the 2024 existing conditions traffic operations at the study intersections. Synchro 11 was used to determine intersection operations at both the signalized and unsignalized study intersections. **Figure 3** illustrates the 2024 existing conditions traffic volumes used in the operational analysis. **Appendix E** contains the detailed capacity analysis worksheets.



Legend

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

159 & 163 Sulphur Springs Road

2024 Existing Conditions Traffic Volumes

CROZIER CONSULTING ENGINEERS

Figure 3

Project No. 2736-7210
Date. 2024-11-26
Analyst. AK

Table 4: 2024 Existing Conditions Traffic Operations

Intersection	Performance Metrics						
	Movement	LOS[1]		Delay (s)		v/c ratio[2,3]	
		AM	PM	AM	PM	AM	PM
Lovers Lane and Sulphur Springs Road	**Overall**	**A**	**B**	**8.8**	**11.1**	**0.27**	**0.52**
	NBTR	A	A	8.7	9.1	0.25	0.23
	WBL	A	A	9.0	10.0	0.04	0.13
	WBR	A	A	8.1	8.9	0.11	0.17
	SBTL	A	B	9.2	12.8	0.27	0.52
Wilson Street East and Sulphur Springs Road/Church Street	**Overall**	**B**	**B**	**14.4**	**16.3**	**0.71**	**0.74**
	EBLTR	C	C	21.1	25.4	0.62	0.74
	WBLTR	B	B	11.4	12.5	0.07	0.20
	NBL	A	B	8.2	10.2	0.11	0.19
	NBTR	B	B	15.9	17.7	0.71	0.74
	SBL	A	A	7.2	8.7	0.02	0.06
	SBT	B	B	10.9	13.4	0.45	0.58
	SBR	A	A	2.4	2.4	0.11	0.20
Existing Site Access and Sulphur Springs Road	**Overall**	**A**	**A**	**0.0**	**9.4**	**-**	**0.01**
	EBTL	A	A	0.0	7.7	-	0.01
	WBTR	-	-	-	-	-	-
	SBLR	-	A	-	9.4	-	0.01

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro). The overall Level of Service of a two-way stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2010). The overall Level of Service of an all-way stop-controlled intersection is based on the overall delay for the intersection (HCM 2010).

Note 2: According to the City of Hamilton TA Guidelines, for signalized intersections, the critical v/c ratio is 0.85 for through/shared movements and 0.90 for exclusive turning movements.

Note 3: According to the City of Hamilton TA Guidelines for unsignalized intersections, a LOS of D or greater represents near capacity conditions.

Note 4: All v/c ratios above critical thresholds are bolded with red text.

Note 5: HCM 2010 only outputs LOS, delay and v/c ratios for left/right-turning movements.

In the 2024 existing conditions, all intersections are operating efficiently with reserve capacity to accommodate future traffic volumes.

Table 5 outlines the results of the 2024 existing conditions queuing assessment.

Table 5: 2024 Existing Conditions Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)		Auxiliary Lane Storage Length (m)
		AM	PM	
Lovers Lane and Sulphur Springs Road	WBL	0.1	0.4	35.0
Wilson Street East and Sulphur Springs Road/Church Street	NBL	7.3	9.2	35.0
	SBL	1.5	3.0	35.0
	SBR	5.4	7.6	35.0

No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

3.0 Future Background Conditions

This section summarizes the future background conditions of the study road network and provides details relating to growth rates, future transportation network improvements, and background developments within the study area. As established in **Section 1.3**, this study considers the 2035 horizon year in the future background traffic analysis, the results of which are summarized herein in **Section 3.3.**

3.1 Growth Rate

A growth rate of 2% was applied to all traffic to forecast future traffic growth at the study intersections as per industry standards.

3.2 Background Developments

The project team has identified several developments near the site, which may have forecasted trips travelling past the site or along the study roadways. The development details and respective traffic volume forecasts are discussed in the subsequent sections, and the forecasted volumes have been incorporated into the future background volumes for all horizon years. As the reports associated with the background developments were not available, the trips associated with the background developments were determined using the ITE Trip Generation Manual, 11th Edition. **Table 6** summarizes the background developments, their site statistics and the associated trip generation.

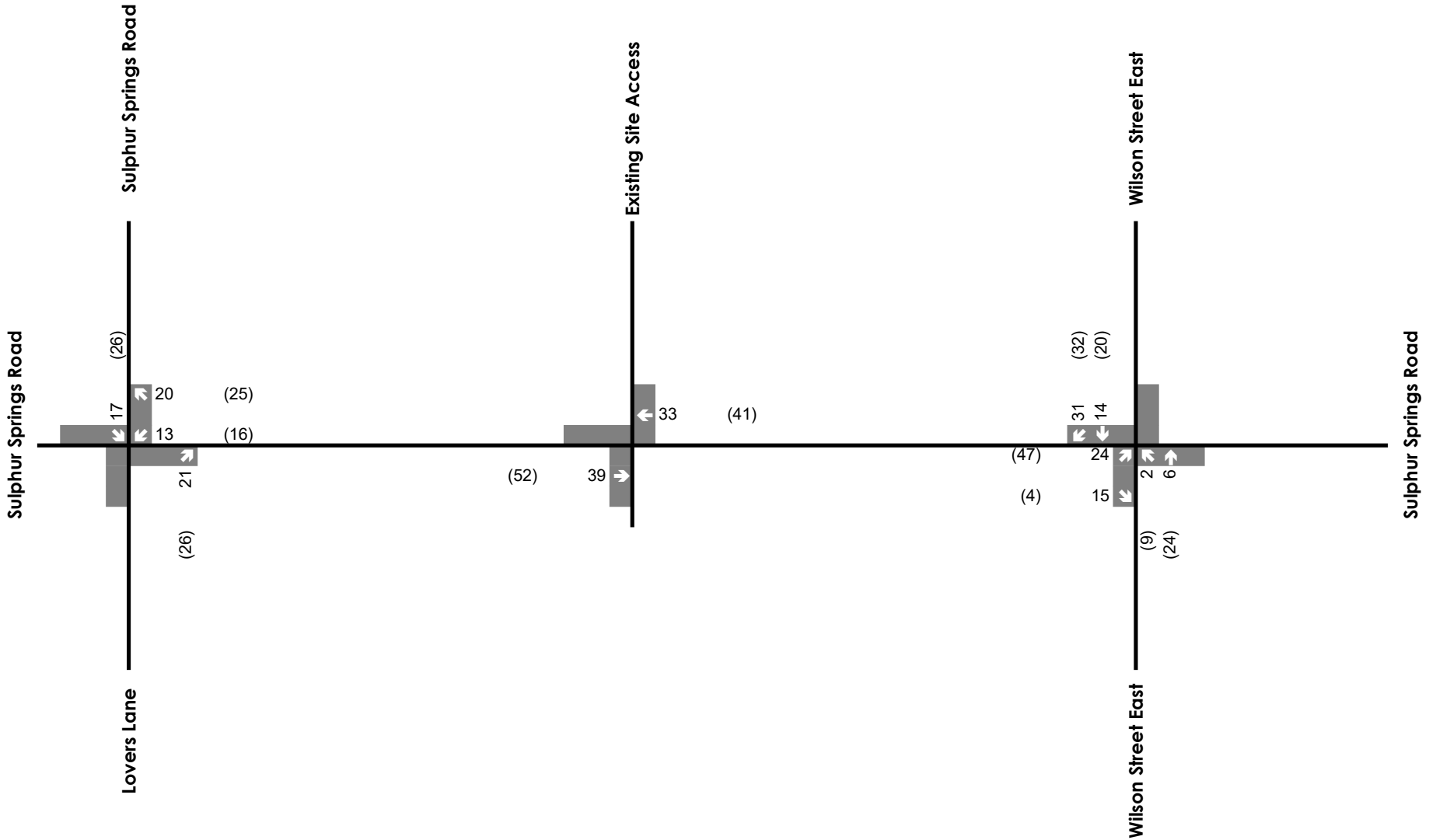
Table 6: Summary of Background Developments

Development	Land Use & Site Statistics	Trip Generation			
		AM		PM	
		In	Out	In	Out
154 Wilson Street East	• 17 three-storey townhouse dwellings • Private condominium road • 2 parking spaces per unit	1	2	4	2
223 Wilson Street East	• A one-storey office building with 940 m^2 GFA • 10 surface parking spaces including 1 barrier-free parking space • 5 bicycle parking spaces	21	2	4	21
392 Wilson Street East	• An eight-storey mixed-use building containing 118 residential units and 1,474m^2 of commercial space at grade	17	36	54	46
442-462 Wilson Street East[1]	• A seven-storey retirement home with 201 beds and four commercial units (combined GFA of 263 m^2) OR • A six-storey 161-unit mixed use development with seven commercial units (combined GFA of 883m^2)	23	15	24	34
280 Wilson Street East	• A three-storey 6-unit block townhouse development to the rear of the site • Modifications to the existing building to accommodate 3 commercial units and 2 residential dwellings	1	2	2	1
342 Wilson Street East[2]	• A three-storey mixed-use building with 1 ground floor commercial unit and 14 residential dwelling units above • 18 underground parking spaces	N/A	N/A	N/A	N/A

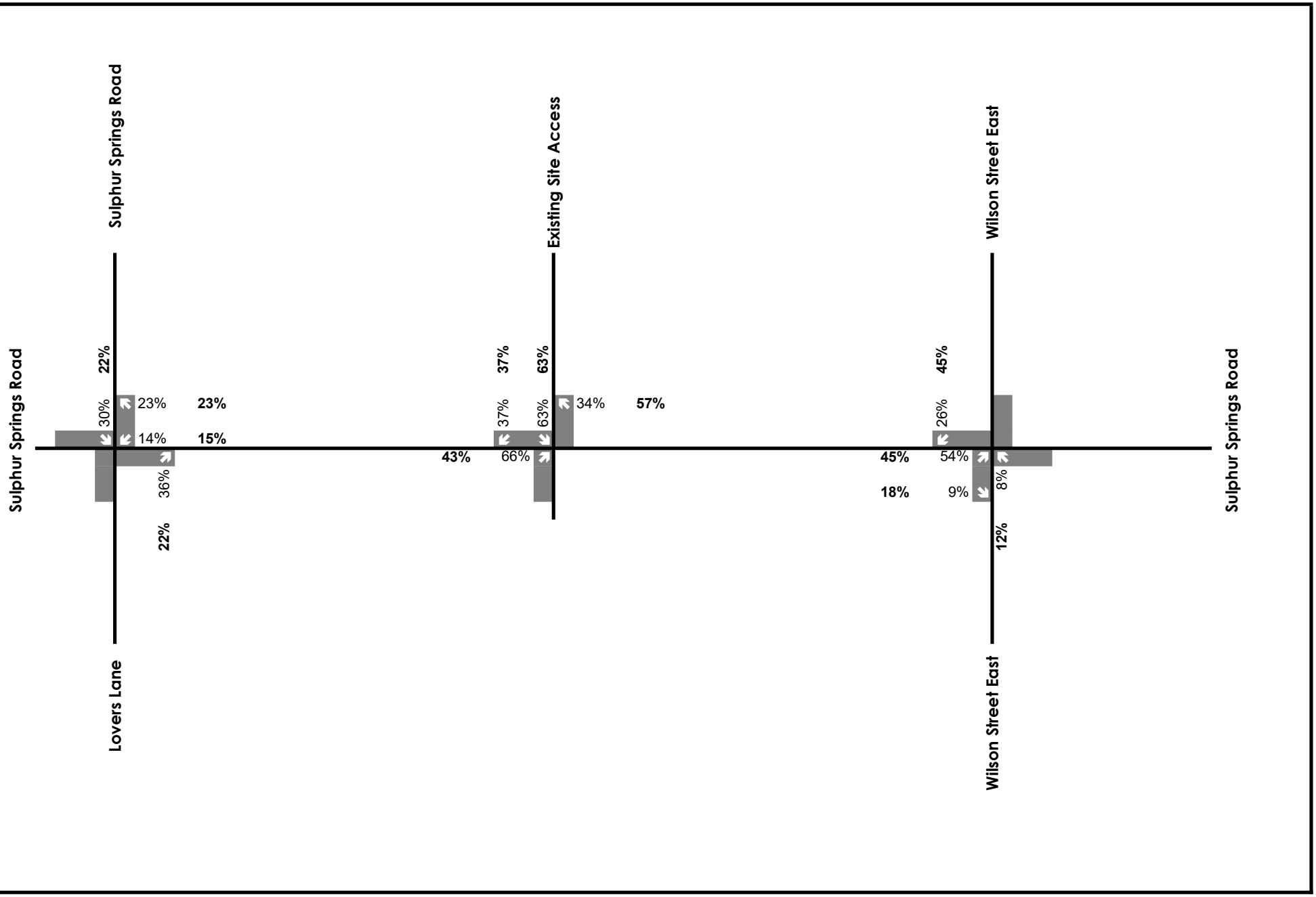
Note 1: The trip generation was based on the concept that produces the most amount of trips
Note 2: As the details regarding the commercial unit space were not provided, the trips associated with this proposed background development were not included in the analysis.

3.3 Intersection Operations

Table 7 outlines the 2035 future background traffic operations for the study intersections. Synchro 11 was used to determine intersection operations at both the signalized and unsignalized study intersections. **Figure 4** illustrates trip assignment for the background developments. **Figure 5** shows the 2035 future background traffic operations. **Appendix E** contains the detailed capacity analysis worksheets.



Legend	159 & 163 Sulphur Springs Road	CROZIER CONSULTING ENGINEERS	Figure 5
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	Background Developments Trip Assignment		Project No. 2736-7210 Date. 2024-11-26 Analyst. AK



Legend	159 & 163 Sulphur Springs Road	CROZIER CONSULTING ENGINEERS	Figure 6
xx A.M. Peak Hour Traffic Volumes **(xx) P.M. Peak Hour Traffic Volumes**	**Trip Distribution**		Project No. 2736-7210 Date. 2024-11-26 Analyst. AK

Table 7: 2035 Future Background Traffic Operations

Intersection	Performance Metrics						
	Movement	LOS[1]		Delay (s)		v/c ratio[2,3]	
		AM	PM	AM	PM	AM	PM
Lovers Lane and Sulphur Springs Road	**Overall**	**B**	**C**	**10.2**	**16.5**	**0.38**	**0.74**
	NBTR	B	B	10.1	11.1	0.37	0.36
	WBL	A	B	9.7	11.5	0.08	0.21
	WBR	A	B	9.1	10.6	0.18	0.27
	SBTL	B	C	10.8	22.0	0.38	0.74
Wilson Street East and Sulphur Springs Road/Church Street	**Overall**	**C**	**C**	**23.3**	**34.6**	**0.90**	**1.05**
	EBLTR	D	E	38.6	73.6	**0.87**	**1.05**
	WBLTR	B	B	11.6	13.4	0.10	0.27
	NBL	A	B	9.4	18.8	0.19	0.44
	NBTR	C	D	27.7	36.3	**0.90**	**0.95**
	SBL	A	B	8.0	10.4	0.04	0.11
	SBT	B	B	12.9	18.1	0.58	0.74
	SBR	A	A	2.2	2.4	0.17	0.28
Existing Site Access and Sulphur Springs Road	**Overall**	**A**	**B**	**0.0**	**10.0**	**-**	**0.01**
	EBTL	A	A	0.0	7.9	-	0.01
	WBTR	-	-	-	-	-	-
	SBLR	-	B	-	10.0	-	0.01

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro). The overall Level of Service of a two-way stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2010). The overall Level of Service of an all-way stop-controlled intersection is based on the overall delay for the intersection (HCM 2010).

Note 2: According to the City of Hamilton TA Guidelines, for signalized intersections, the critical v/c ratio is 0.85 for through/shared movements and 0.90 for exclusive turning movements.

Note 3: According to the City of Hamilton TA Guidelines for unsignalized intersections, a LOS of D or greater represents near capacity conditions.

Note 4: All v/c ratios above critical thresholds are bolded with red text.

Note 5: HCM 2010 only outputs LOS, delay and v/c ratios for left/right-turning movements.

In the 2035 future background conditions, the intersection of Wilson Street East and Sulphur Springs Road/Church Street has an LOS of C and C, a control delay of 23.3 seconds and 34.6 seconds and an overall volume-to-capacity (v/c) ratio of 0.90 and 1.05 in the a.m. and p.m. peak hours, respectively. As the intersection was assumed to experience a 2% growth rate over an 11-year horizon period, the intersection reaches above capacity conditions in the 2035 future background scenario, particularly at the eastbound approach along Sulphur Springs Road. However, based on the developments currently located along the roadway, a 2% growth rate is a conservative estimate as the roadway is not expected to experience growth of this magnitude.

All other intersections are operating efficiently with reserve capacity to accommodate future traffic volumes.

Table 8 outlines the results of the 2035 future background queuing assessment. Similar to existing conditions, no queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

Table 8: 2035 Future Background Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)		Auxiliary Lane Storage Length (m)
		AM	PM	
Lovers Lane and Sulphur Springs Road	WBL	0.3	0.8	35.0
Wilson Street East and Sulphur Springs Road/Church Street	NBL	9.7	17.4	35.0
	SBL	1.7	3.8	35.0
	SBR	6.8	9.1	35.0

4.0 Site Generated Traffic

The proposed development will result in additional turning movements at the study intersections. Therefore, this section describes the trip forecasting methodology and results of this forecast for the development proposal.

The site generated traffic forecasting methodology for this study consists of two steps. The first step, Trip Generation, projects the number of trips that originate or are destined for the proposed development, while the second step, Trip Distribution and Assignment, assigns trips to the study road network based on the expected distribution of trips to catchment areas and expected shortest paths for trips destined for particular locations.

4.1 Trip Generation

As noted, the proposed development consists of the following:

- 14 single-family detached units;
- 61 townhouse units;

The trip generation of the proposed residential development was forecasted using published data from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition.

The applicable fitted curve equations for Land Use Category (LUC) 210 "Single-Family Detached Housing" were applied to the proposed single-family detached units and the applicable fitted curve equations for LUC 215 "Single-Family Attached Housing" was applied to the block townhouse units.

Relevant excerpts from the ITE Trip Generation Manual, 11th Edition have been included in **Appendix F**. The forecasted trip generation of the proposed residential development is summarized in **Table 9**.

Table 9: Trip Generation

Land Use (Units/GFA)	Trip Type	AM				PM			
		Equation/ Rate	Trips Generated			Equation/ Rate	Trips Generated		
			Inbound	Outbound	Total		Inbound	Outbound	Total
210: Single-Family Detached-Housing (14 Units)	**Net Total Trips**	Ln(T) = 0.91 Ln(X) + 0.12	3	9	12	Ln(T) = 0.94 Ln(X) + 0.27	10	6	16
215: Single-Family Attached Housing (61 Units)	**Net Total Trips**	T = 0.52(X) – 5.70	7	19	26	T = 0.60(X) – 3.93	19	14	33
Total Trips		**N/A**	**10**	**28**	**38**	**N/A**	**29**	**20**	**49**

Therefore, the full-buildout of the proposed development is expected to generate a total of 38 and 49 two-way trips during the weekday a.m. and p.m. peak hours, respectively.

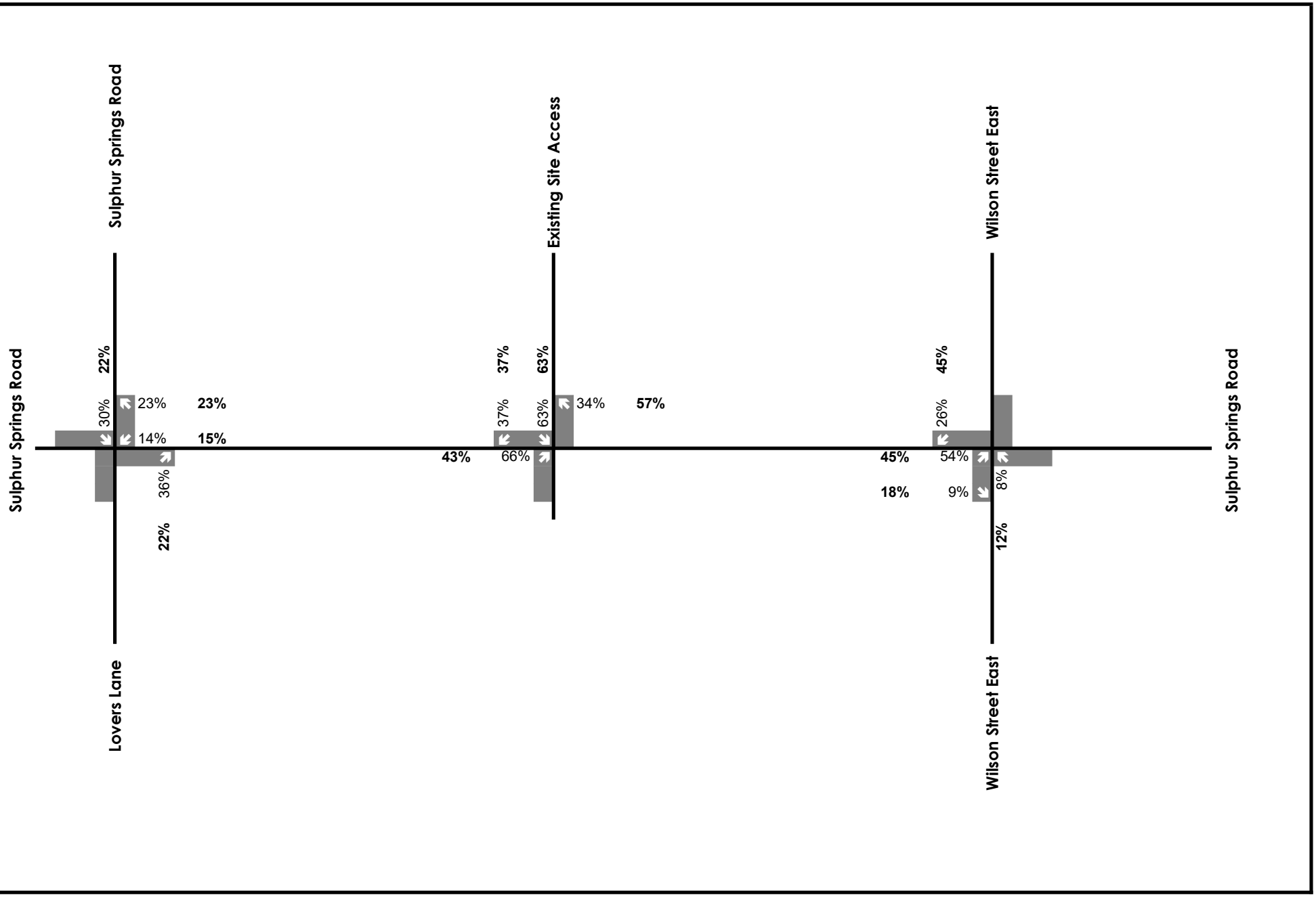
4.2 Trip Distribution and Assignment

The trips generated by the proposed development were distributed to the study road network using 2016 Transportation Tomorrow Survey (TTS) data. Excerpts from the TTS query have been included in **Appendix G**. **Table 10** outlines the trip distribution for the proposed development divided into time and direction of travel.

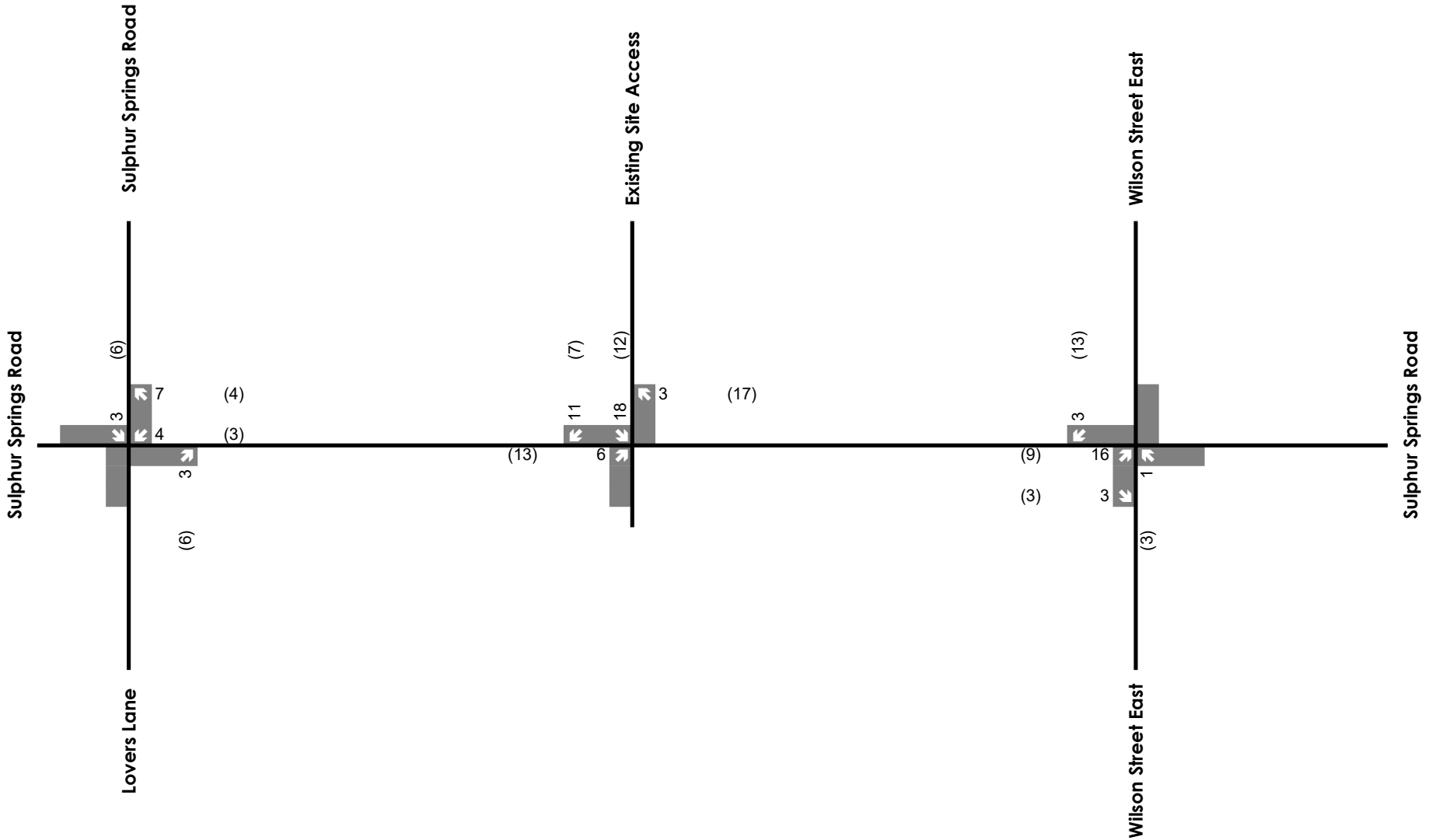
Table 10: Trip Distribution

Distribution	A.M.		P.M.	
	Inbound	Outbound	Inbound	Outbound
South via Lovers Lane	35.9%	14.4%	21.7%	14.7%
North via Lovers Lane	29.7%	22.7%	21.6%	22.7%
South via Wilson Street E	8.3%	9.0%	12.0%	17.7%
North via Wilson Street E	26.2%	53.9%	44.7%	44.9%
Total	**100%**	**100%**	**100%**	**100%**

Figure 6 illustrates the trip distribution and **Figure 7** outlines the primary trip assignment.



Legend	159 & 163 Sulphur Springs Road	CROZIER CONSULTING ENGINEERS	Figure 6
xx A.M. Peak Hour Traffic Volumes **(xx) P.M. Peak Hour Traffic Volumes**	**Trip Distribution**		Project No. 2736-7210 Date. 2024-11-26 Analyst. AK



Legend	159 & 163 Sulphur Springs Road	CROZIER CONSULTING ENGINEERS	Figure 7
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	Trip Assignment		Project No. 2736-7210 Date. 2024-11-26 Analyst. AK

5.0 Future Total Conditions

This section will summarize the future total conditions of the study road network. The future total traffic volumes for the horizon years consist of the following components:

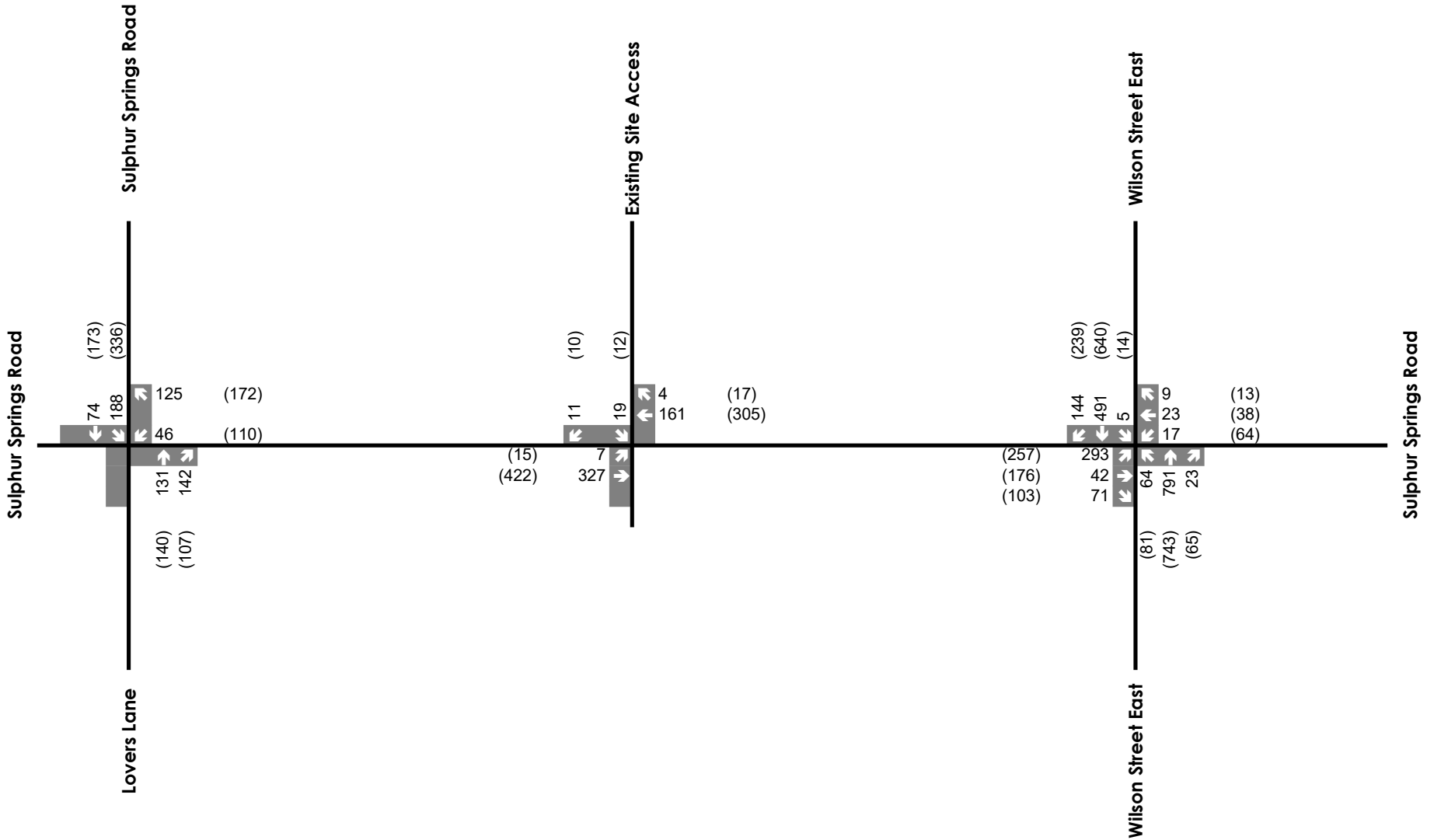
- Future background traffic volumes from the corresponding horizon year.
- Proposed development site-generated traffic volumes.

The resulting total volumes in the 2035 horizon year are presented in **Figure 8.**

5.1 Intersection Operations

Table 11 outlines the 2035 future total traffic operations for the study intersections. Synchro 11 was used to determine intersection operations at both the signalized and unsignalized study intersections. **Figure 8** illustrates the 2035 future total traffic operations.

Appendix E contains the detailed capacity analysis worksheets.



Legend	159 & 163 Sulphur Springs Road	CROZIER CONSULTING ENGINEERS	Figure 8
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	2035 Future Total Traffic Volumes		Project No. 2736-7210 Date. 2024-11-26 Analyst. AK

Table 11: 2035 Future Total Traffic Operations

Intersection	Performance Metrics						
	Movement	LOS[1]		Delay (s)		v/c ratio[2,3]	
		AM	PM	AM	PM	AM	PM
Lovers Lane and Sulphur Springs Road	**Overall**	**B**	**C**	**10.3**	**17.1**	**0.39**	**0.76**
	NBTR	B	B	10.3	11.3	0.38	0.37
	WBL	A	B	9.8	11.7	0.09	0.22
	WBR	A	B	9.2	10.8	0.20	0.28
	SBTL	B	C	11.0	23.1	0.39	0.76
Wilson Street East and Sulphur Springs Road/Church Street	**Overall**	**C**	**D**	**24.6**	**36.2**	**0.91**	**1.07**
	EBLTR	D	F	44.4	80.6	**0.91**	**1.07**
	WBLTR	B	B	11.5	13.4	0.10	0.27
	NBL	A	B	9.5	19.6	0.19	0.46
	NBTR	C	D	27.7	36.3	**0.90**	**0.95**
	SBL	A	B	8.0	10.4	0.04	0.11
	SBT	B	B	12.9	18.1	0.58	0.74
	SBR	A	A	2.2	2.4	0.17	0.29
Existing Site Access and Sulphur Springs Road	**Overall**	**B**	**B**	**11.6**	**13.4**	**0.06**	**0.05**
	EBTL	A	A	7.6	8.0	0.06	0.01
	WBTR	-	-	-	-	-	-
	SBLR	B	B	11.6	13.4	0.06	0.05

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro). The overall Level of Service of a two-way stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2010). The overall Level of Service of an all-way stop-controlled intersection is based on the overall delay for the intersection (HCM 2010).
Note 2: According to the City of Hamilton TA Guidelines, for signalized intersections, the critical v/c ratio is 0.85 for through/shared movements and 0.90 for exclusive turning movements.
Note 3: According to the City of Hamilton TA Guidelines for unsignalized intersections, a LOS of D or greater represents near capacity conditions.
Note 4: All v/c ratios above critical thresholds are bolded with red text.
Note 5: HCM 2010 only outputs LOS, delay and v/c ratios for left/right-turning movements.

Similar to the 2035 future background conditions, in the 2035 future total conditions, the intersection of Wilson Street East and Sulphur Springs Road/Church Street has an LOS of C and D, a control delay of 24.6 seconds and 36.2 seconds and an overall v/c ratio of 0.91 and 1.07 in the a.m. and p.m. peak hours, respectively. As the results indicate only a slight increase in overall v/c ratios and delays compared to the 2035 future background scenario, the site-generated trips are not expected to notably impact traffic operations at the signalized intersection of Wilson Street East and Sulphur Springs Road/Church Street.

All other intersections are operating efficiently with reserve capacity to accommodate future traffic volumes.

Table 12 outlines the results of the 2035 future total queuing assessment. Similar to existing and future background conditions, no queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

Table 12: 2035 Future Total Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)		Auxiliary Lane Storage Length (m)
		AM	PM	
Lovers Lane and Sulphur Springs Road	WBL	0.3	0.8	35.0
Wilson Street East and Sulphur Springs Road/Church Street	NBL	9.8	18.5	35.0
	SBL	1.7	3.8	35.0
	SBR	6.9	9.3	35.0

6.0 Warrants Analysis

6.1 Left-Turn Lane Warrant Analysis

Auxiliary left-turn lane warrant analysis was conducted at the existing site access along Sulphur Springs Road. This intersection was reviewed for left-turn lane analysis for the future total scenario. The analysis was conducted using the MTO's Design Supplement for TAC GDGCR. As per industry standard, the assumed design speed for turn lane analysis was set to 10 km/h greater than the posted speed limit.

The existing site access is not warranted for left-turn lanes under the 2035 future total scenario.

Appendix H contains left-turn lane warrant analysis worksheets.

7.0 Recommendations

As the signalized intersection of Wilson Street East and Sulphur Springs Road/Church Street reaches above capacity conditions in both the a.m. and p.m. peak hours of the 2035 future background scenario, it is recommended to optimize the signal timings at the intersection in both the 2035 future background and 2035 future total scenarios. The results of the signal optimization are tabulated in **Table 13**.

Table 13: 2035 Future Background and 2035 Future Total Optimized

Intersection	Scenario	Performance Metrics						
		Movement	LOS[1]		Delay (s)		v/c ratio[2,3]	
			AM	PM	AM	PM	AM	PM
Wilson Street East and Sulphur Springs Road/Church Street	2035 Future Background Scenario	**Overall**	**C**	**C**	**22.5**	**31.9**	**0.88**	**0.98**
		EBLTR	D	E	44.1	56.2	**0.88**	**0.98**
		WBLTR	B	B	13.7	15.2	0.10	0.25
		NBL	A	C	9.5	21.8	0.18	0.45
		NBTR	C	D	23.2	36.8	0.84	**0.94**
		SBL	A	B	8.6	14.0	0.04	0.14
		SBT	B	C	12.8	20.1	0.54	0.73
		SBR	A	A	2.1	3.9	0.16	0.29
Wilson Street East and Sulphur Springs Road/Church Street	2035 Future Total Scenario	**Overall**	**C**	**D**	**24.6**	**33.0**	**0.91**	**0.98**
		EBLTR	D	E	44.4	56.3	**0.91**	**0.98**
		WBLTR	B	B	11.5	15.7	0.10	0.25
		NBL	A	C	9.5	24.8	0.19	0.49
		NBTR	C	D	27.7	38.7	**0.90**	**0.94**
		SBL	A	B	8.0	15.4	0.04	0.15
		SBT	B	C	12.9	21.4	0.58	0.74
		SBR	A	A	2.2	4.6	0.17	0.31

As shown in **Table 13**, the signal optimization results in above critical v/c ratios at the signalized intersection of Wilson Street East and Sulphur Springs Road/Church Street. However, the signal optimization results in slight reductions in overall v/c ratios and delays.

8.0 Site Access Review

The development proposal includes a full-moves access along Sulphur Springs Road that will provide access/egress to and from the site. This section evaluates the suitability of the site access from a transportation safety perspective and recommends mitigation measures, if warranted. The safety review of the access includes an assessment of whether turning maneuvers can be made safely at the site access without issues related to sight lines and road geometry.

8.1 Intersection Sight Distance

Section 9.9 of the TAC GDGCR provides intersection sight distance for different intersection control types. The calculated and design sight distances are further summarized in TAC GDGCR Tables 9.9.4, 9.9.6 and 9.9.12 for vehicles turning left from stop, turning right from stop, or turning left from the major road, respectively.

Case B1 (Left Turn from the Minor Road) and Case B2/B3 (Right Turn / Crossing Maneuver from the Minor Road) were used to evaluate sight line adequacy for the site access. **Table 14** outlines the sight distance requirements and compares them to the available sight distance, which was measured during a site visit.

Table 14: Intersection Sight Distance Assessment

Site Access and Sulphur Springs Road Posted Speed = 40 km/h Design Speed = 50 km/h		
Formula (TAC	**ISD = 0.278 * V_{major} * t_g**	
Feature	**Case B1 – Left Turn**	**Case B2/B3 – Right Turn**
Time Gap[2]	Left Turn: 7.5s + 0.0s = **7.5s**	Right Turn: 6.5s + 0.0s = **6.5s**
Required Sight Distance	105 m (looking west)	95 m (looking east)
Available Sight Distance	~290 m	~93 m

Note 1: To calculate Time Gap, base time gap is required. This default parameter is based on particular turning cases (such as Case B1 and Case B2/B3) and particular design vehicles. Roadways with more than one lane per direction require additions of 0.5s and 0.7s per addition lane for passenger car and truck design vehicles, respectively. For minor street approach upgrades that exceed 3%, additions of 0.2s and 0.1s for Case B1 and Case B2/B3, respectively, are required per percent grade. Refer to Section 9.9 of TAC-GDGCR for additional details.

The available sight distance for the site access along Sulphur Springs Road meets the minimum sight distance requirements for Case B1 (Left Turn from the Minor Road). For Case B2/B3 (Right Turn / Crossing Maneuver from the Minor Road), the minimum sight distance requirement is not met. However, the existing trees along Sulphur Springs Road can be adjusted and removed to ensure proper sightline requirements are met. Furthermore, providing a daylighting triangle according to the Rural Hamilton Official Plan (Chapter C – City Wide Systems and Designations) would help ensure that the minimum sight distance is provided. For local-to-local roads, the Rural Hamilton Official Plan requires a minimum daylighting triangle of 4.57 m by 4.57 m.

8.2 Access Spacing

Access spacing is the distance between existing or future driveways. The required spacing per Figure 8.9.2 in TAC GDGCR is summarized in **Table 15**.

Table 15: Access Spacing

Feature	Minimum Spacing Requirement	Measured Access Spacing
Suggested Minimum Spacing for Residential Land Use	1.0 m	~30.0 m

The proposed access spacing for the site access along Sulphur Springs Road meets the minimum requirements as outlined in the TAC GDGCR.

8.3 Intersection Spacing

The minimum intersection spacing between three-legged intersections along local roads is shown in section 9.4.2.3 of the TAC GDGCR.

Table 16: Intersection Spacing Requirement

Site Access	Roadway Type	Intersection Type (Adjacent Intersection)	Intersection Spacing Requirements	Intersection Spacing Measurement	Intersection Spacing Requirement Met?
Sulphur Springs Road Site Access	Local	Three-legged	40 m	~190 m	Yes

The proposed site access meets the intersection spacing requirements outlined in the TAC GDGCR.

8.4 Access Width

Access widths were measured against the standards in Table 8.9.1: Typical Driveway Dimensions in the TAC GDGCR, and the Ontario Building Code. The results are summarized in **Table 17**.

Table 17: Access Width Requirements

Land Use	Requirements		Measurements	
	TAC Manual	Ontario Building Code	Sulphur Springs Site Access Width	Sulphur Springs Entry Lane Width
Residential	2.0 - 7.3 m	6.0 m	16.8 m	6.31 m

The proposed site access is in compliance with the access width requirements outlined in the TAC GDGCR and the Ontario Building Code. It is important to note that although the total access width is approximately 16.8 m, the entry lane is separated by the exit lane using a landscaped median. Thus, for the purpose of emergency vehicle maneuverability, the entry lane is approximately 6.3 m, which is sufficient according to the Ontario Building Code. The entry lane immediately diverges into two 6.0 m lanes divided by a landscaped boulevard median. This was done to support alternative fire route access while maintaining the minimum 6.0 m lane width. It is important to note that due to site boundary constraints, the lanes converge into a single 7.0 m lane. To help support fire route access, during the construction, a mountable curb with a paved shoulder may be implemented. Furthermore, the internal roadway provides several hammerhead turnaround points to support emergency vehicle maneuvers.

8.5 Throat length

Clear throat lengths were measured against the specifications outlined in the TAC GDGCR and are summarized in **Table 18**. The throat lengths for the proposed development as well as for the existing roadways was measured for comparison. Based on the land uses available in Table 8.9.3: Suggested Minimum Clear Throat Lengths for Major Driveways, the throat length requirement was determined based on the land use labelled "Apartments" with less than 100 units and the "Collector" roadway type.

Table 18: Clear Throat Length Requirements

Site Access	Land Use	Development Size	Roadway Type	Clear Throat Length Requirements	Measured Clear Throat Length
Sulphur Springs Road Site Access	Apartments	<100 Units	Collector	8.0 m	140.5 m

The proposed site access meets the clear throat length requirements outlined in the TAC GDGCR.

Appendix I contains relevant TAC GDGCR excerpts.

9.0 Parking Review

The following section reviews the adequacy of the parking supply of the proposed development. The parking review includes an assessment of the proposed parking supply of the development against the requirements outlined in the City of Hamilton's Zoning By-Law requirements.

9.1 Vehicle Parking Assessment

Section 5.7.1 of the City of Hamilton's Zoning By-Law 24-052 (replacing Section 5 of Zoning By-Law 05-200) outlines the minimum number of vehicle parking spaces required for the proposed development. It is important to note that the proposed development is located outside of Parking Areas 1, 2 and 3. The proposed parking supply was compared against the Zoning By-Law requirements and tabulated in **Table 19**.

Table 19: City of Hamilton Zoning By-Law 24-052 Vehicle Parking Requirements

Building (By-Law Land Use)	Units / GFA	Minimum Bicycle Parking Space Rate	Required Minimum Parking Spaces
Single Detached Dwelling	14 Units	1 space per dwelling unit	14
Street Townhouse Dwelling	61 Units	1 space per dwelling unit	61
Total Required Vehicle Parking Spaces			**75**
Total Proposed Vehicle Parking Spaces			**181**[1]
Surplus/Deficit			**+106**

Note 1: The proposed vehicle parking supply includes 2 garage parking spaces per unit and a total of 31 visitor parking spaces

As outlined above, the City of Hamilton's Zoning By-Law requires the development to provide a minimum parking supply of 75 parking spaces. The site plan proposes 181 parking spaces, resulting in a parking surplus of 106 parking spaces. Therefore, the proposed parking supply for the development proposal is sufficient when compared with the parking requirements outlined in the City of Hamilton's Zoning By-Law 24-052.

9.2 Bicycle Parking Assessment

According to Section 5.7.5 of the City of Hamilton's Zoning By-Law 24-052 (replacing Section 5 of Zoning By-Law 05-200), there are no bicycle parking requirements for single-detached dwellings and townhouse dwellings. It is expected that residents and visitors will be parking bicycles within the individual garage spaces.

10.0 Conclusions

This study has analyzed potential traffic impact on the boundary road network in relation to the proposed residential development situated at 159 & 163 Sulphur Springs Road, Ancaster, City of Hamilton. The analyses contained within this report may be summarized with the following key findings:

Data Collection:

- Spectrum traffic counts were collected for the a.m. and p.m. peak hours and used to perform the Synchro analysis.
- A growth rate of 2% was applied to the boundary road network as per industry standards.
- The site-generated traffic was distributed using TTS data.
- The site-generated traffic was obtained using the ITE Trip Generation Manual, 11th Edition.
- The existing signal timing plans were originally requested to the City of Hamilton on October 17, 2024, and were not received at the time of writing this report. Thus, the signal timing plans were optimized in Synchro based on the existing volumes and carried through to the future background and future total scenarios. Once signal timing plans are received from the City of Hamilton, the assumptions, analyses and conclusions contained within this report will be reconfirmed.
- The analysis undertaken herein was prepared using the most recent concept plan available at the time of writing this report. Any minor changes to the plan are not expected to materially affect the conclusions contained within this report.

Existing Conditions:

- In the 2024 existing conditions, all intersections are operating efficiently with reserve capacity to accommodate future traffic volumes.
- No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

Future Background Conditions:

- In the 2035 future background conditions, the intersection of Wilson Street East and Sulphur Springs Road/Church Street has an LOS of C and C, a control delay of 23.3 seconds and 34.6 seconds and an overall volume-to-capacity (v/c) ratio of 0.90 and 1.05 in the a.m. and p.m. peak hours, respectively. As the intersection was assumed to experience a 2% growth rate over an 11-year horizon period, the intersection reaches above capacity conditions in the 2035 future background scenario, particularly at the eastbound approach along Sulphur Springs Road. However, based on the developments currently located along the roadway, a 2% growth rate is a conservative estimate as the roadway is not expected to experience growth of this magnitude.
- All other intersections are operating efficiently with reserve capacity to accommodate future traffic volumes.
- No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

Future Total Conditions:

- The proposed development is expected to generate a total of 38 and 49 two-way trips during the weekday a.m. and p.m. peak hours, respectively.

- Similar to the 2035 future background conditions, in the 2035 future total conditions, the intersection of Wilson Street East and Sulphur Springs Road/Church Street has an LOS of C and D, a control delay of 24.6 seconds and 36.2 seconds and an overall v/c ratio of 0.91 and 1.07 in the a.m. and p.m. peak hours, respectively.

- As the results indicate only a slight increase in overall v/c ratios and delays compared to the 2035 future background scenario, the site-generated trips are not expected to notably impact traffic operations at the signalized intersection of Wilson Street East and Sulphur Springs Road/Church Street.

- All other intersections are operating efficiently with reserve capacity to accommodate future traffic volumes.

- No queuing exceedances of the auxiliary turn storage lanes were recorded in this assessment. Therefore, queuing on the study road network is not expected to result in notable operational impacts.

Warrants Analysis:

- Auxiliary left-turn lane warrant analysis was conducted at the existing site access along Sulphur Springs Road for the 2035 future total scenario using the MTO's Design Supplement for TAC GDGCR.

- The existing site access is not warranted for left-turn lanes under the 2035 future total scenario.

Site Access Review:

- The available sight distance for the site access along Sulphur Springs Road meets the minimum sight distance requirements for Case B1 (Left Turn from the Minor Road).

- For Case B2/B3 (Right Turn / Crossing Maneuver from the Minor Road), the minimum sight distance requirement is not met. However, the existing trees along Sulphur Springs Road can be adjusted and removed to ensure proper sightline requirements are met. Furthermore, providing a daylighting triangle according to the Rural Hamilton Official Plan (Chapter C – City Wide Systems and Designations) would help ensure that the minimum sight distance is provided. For local-to-local roads, the Rural Hamilton Official Plan requires a minimum daylighting triangle of 4.57 m by 4.57 m.

- The proposed access spacing for the site access along Sulphur Springs Road meets the minimum requirements as outlined in the TAC GDGCR.

- The proposed site access meets the intersection spacing requirements outlined in the TAC GDGCR.

- The proposed site access is in compliance with the access width requirements outlined in the TAC GDGCR and the Ontario Building Code.

- The proposed site access meets the clear throat length requirements outlined in the TAC GDGCR.

Parking Review:

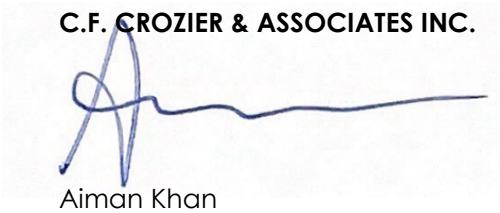
- The proposed parking supply for the development proposal is sufficient when compared with the parking requirements outlined in the City of Hamilton's Zoning By-Law 24-052.

- According to Section 5.7.5 of the City of Hamilton's Zoning By-Law 24-052 there are no bicycle parking requirements for single-detached dwellings and townhouse dwellings. It is expected that residents and visitors will be parking bicycles within the individual garage spaces.

In conclusion, the proposed development can be supported from a transportation operations perspective. We trust that this review satisfies any transportation concerns associated with the concept plan for this development. Please feel free to contact the undersigned for any further information required.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Aiman Khan
Engineering Intern, Transportation

C.F. CROZIER & ASSOCIATES INC.

R. Aaron Wignall, Associate
Senior Project Manager, Transportation

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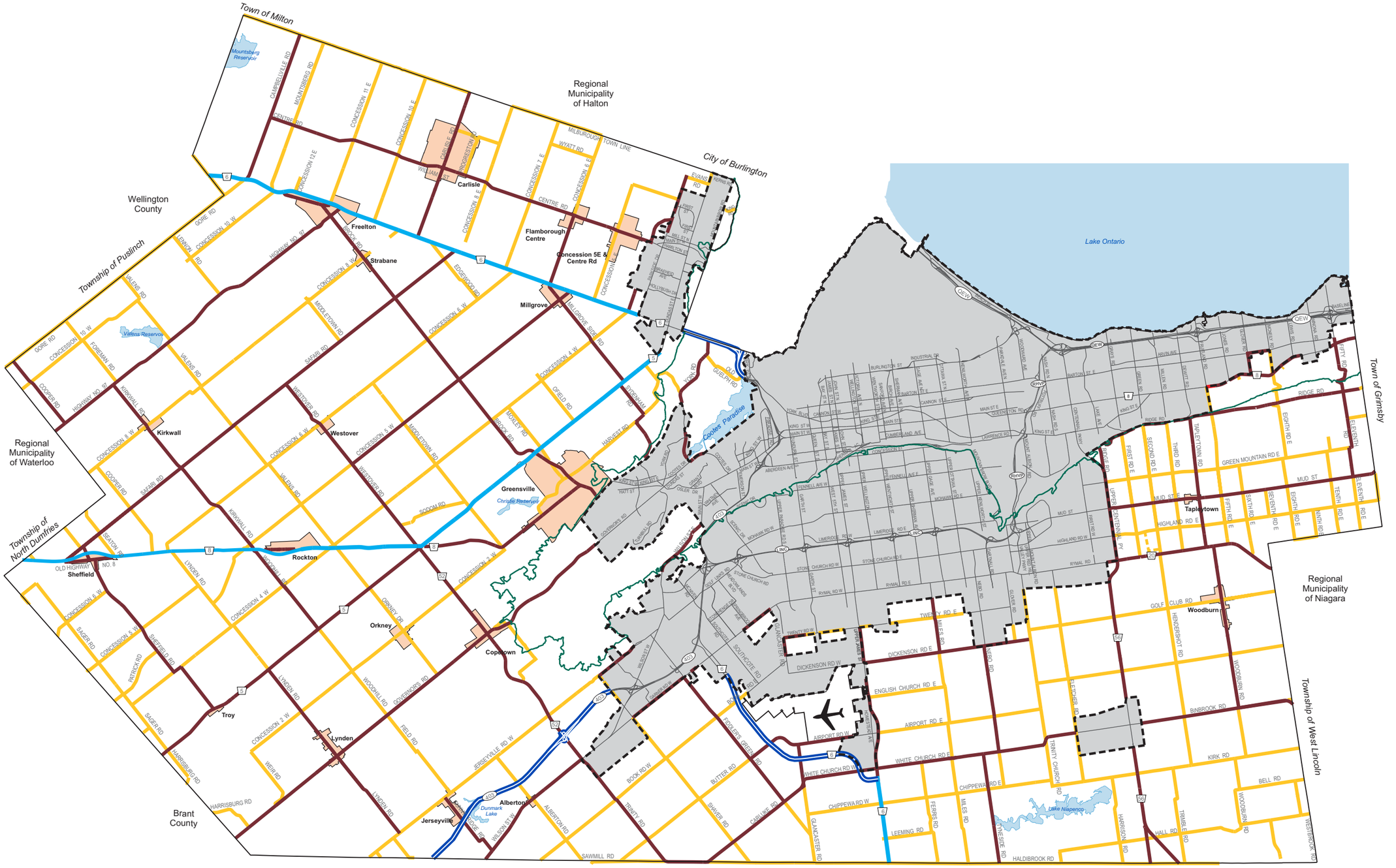
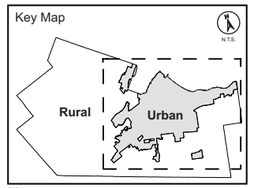
APPENDIX A

Road Classification Map Excerpts



Key Map

N.T.S.



Note: For Urban Functional Road Classification, refer to Schedule C-1 of the Urban Hamilton Official Plan.

Legend

- Arterial
- Collector
- Provincial Highway (Controlled Access)
- Provincial Highway

Proposed Roads

- Collector

Other Features

- Rural Settlement Areas
- Urban Area
- John C. Munro Hamilton International Airport
- Municipal Boundary
- Urban Boundary
- Niagara Escarpment

Hamilton Official Plan Schedule C

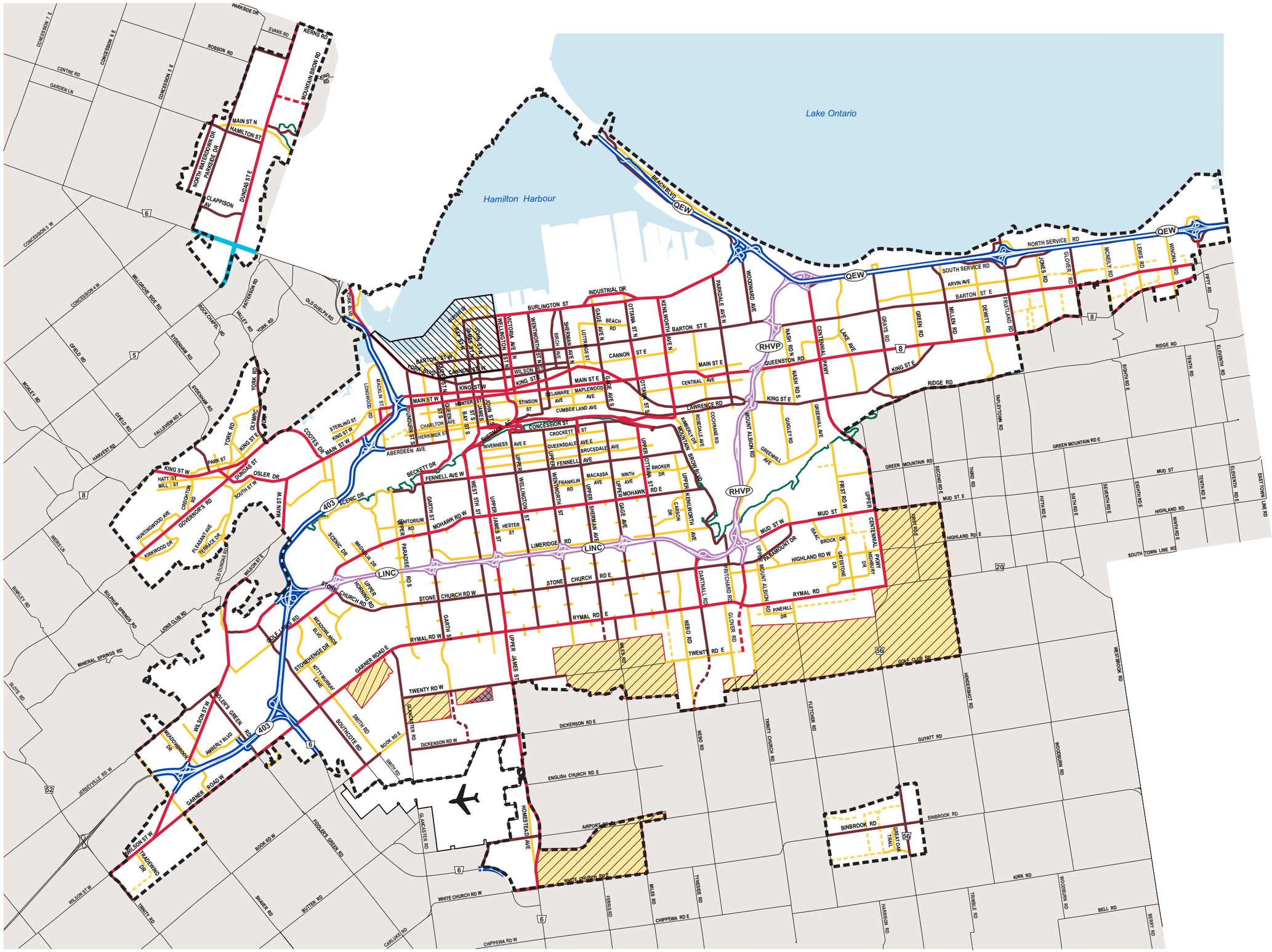
Rural Functional Road Classification

Not To Scale

Date: Dec. 6/23

Hamilton

PLANNING & ECONOMIC DEVELOPMENT DEPARTMENT



Note: For Rural Functional Road Classification, refer to Schedule C-1 (future amendment).

Legend

- Urban Expansion Area - Neighbourhoods
- Urban Expansion Area - Employment
- Major Arterial
- Minor Arterial
- Collector
- Provincial Highway (Controlled Access)
- Provincial Highway
- Parkway

Proposed Roads

- Major Arterial
- Minor Arterial
- Collector

Other Features

- Rural Area
- John C. Munro Hamilton International Airport
- Niagara Escarpment
- Urban Boundary
- Municipal Boundary
- Lands subject to Non Decision 113 West Harbour Setting Sail

Council Adoption: July 9, 2009
Ministerial Approval: March 16, 2011
Effective Date: August 16, 2013

Urban Hamilton Official Plan
Schedule C
Functional Road Classification

Not To Scale

Date: Nov. 2022

Hamilton

PLANNING & ECONOMIC DEVELOPMENT DEPARTMENT

APPENDIX B

Transit Map Excerpts

ROUTE 16 - ANCASTER ROUTING

AM ROUTE (16)
From Meadowlands to Garner/Wilson

The bus leaves Martindale Cr. and travels south to Golflinks, west on Golflinks, north on McNiven, north-west on Rousseaux, south-west on Wilson, south on Shaver and west on Garner. The recovery point will be north side of Garner just east of Wilson.

AM ROUTE (16F)
From Garner/Wilson to Meadowlands

The bus leaves Garner and Wilson, travels north-east on Wilson, north on Shaver, east on Jerseyville, south on Meadowbrook, north-east on Wilson, south-east on Amberly, south on Fiddler's Green, east on Garden, south on Anson, west on Garner, north on Fiddler's Green, north-east on Wilson, south-east on Rousseaux, south on McNiven, east on Golflinks, north on Neville, west on Martindale. The recovery point will be on Martindale north of Golflinks.

PM ROUTE (16F)
From Meadowlands to Garner/Wilson

The bus leaves Martindale and travels south to Golflinks, west on Golflinks, north on McNiven, north-west on Rousseaux, south-west on Wilson, south on Fiddler's Green, east on Garden, south on Anson, west on Garner, north on Fiddler's Green, north-west on Amberly, south-west on Wilson, north on Meadowbrook, west on Jerseyville, south on Shaver and west on Garner. The recovery point will be north side of Garner just east of Wilson.

PM ROUTE (16)
From Garner/Wilson to Meadowlands

The bus leaves Garner and Wilson and travels north-east on Wilson, south-east on Rousseaux, south on McNiven, east on Golflinks, north on Neville, west on Martindale. The recovery point will be on Martindale north of Golflinks.

All Route 16 Ancaster trips that are interlined with Route 43 Stone Church are indicated with an '*'.

SATURDAY - Eastbound

TIMEPOINTS	G	F	E	D	C	B	A	
	Garner & Wilson	Jerseyville & Shaver (16F)	Wilson & Amberly	Fiddlers Green & Garden(16F)	Fiddlers Green & Wilson	Wilson & Rousseaux	Meadowlands Terminal Platform 3	Interline
7 am	7:27	7:32	7:37	7:42	7:44	7:49	7:58	*
	7:57	8:02	8:07	8:12	8:14	8:19	8:28	*
8 am to 11 am	Leave Garner and Wilson from 8:27 am to 11:57 am							
	:27	:32	:37	:42	:44	:49	:58	*
	:57	:02	:07	:12	:14	:19	:28	*
12 pm	12:32		12:36		12:38	12:42	12:51	*
1 pm to 9 pm	Leave Garner and Wilson from 1:07 pm to 9:37 pm							
	:07	---	:11	---	:13	:17	:26	*
	:37	---	:41	---	:43	:47	:56	*
10 pm	10:07	---	10:11	---	10:13	10:17	10:26	*
	10:36	---	10:40	---	10:42	10:46	10:55	*
11 pm	11:07	---	11:11	---	11:13	11:17	11:26	*
	11:37	---	11:41	---	11:43	11:47	11:56	*
12 am	12:07	---	12:11	---	12:13	12:17	12:26	

SATURDAY - Westbound

TIMEPOINTS		A	B	C	D	E	F	G
	Interline	Meadowlands Terminal Platform 3	Wilson & Rousseaux	Fiddlers Green & Wilson	Fiddlers Green & Garden (16F)	Wilson & amberly	Jerseyville & Shaver (16F)	Garner & Wilson
7 am	*	7:19	7:26	7:30	---	7:32	---	7:36
	*	7:49	7:56	8:00	---	8:02	---	8:06
8 am to 11 am	Leave Meadowlands Terminal from 8:19 am to 11:49 am							
	*	:19	:26	:30	---	:32	---	:36
	*	:49	:56	:00	---	:02	---	:06
12 pm to 10 pm	Leave Meadowlands Terminal from 12:19 pm to 10:49 pm							
	*	:19	:26	:30	:35	:39	:43	:48
	*	:49	:56	:00	:05	:09	:13	:18
11 pm	*	11:19	11:26	11:30	11:35	11:39	11:43	11:48
	*	11:49	11:56	12:00	12:05	12:09	12:13	12:18
12 pm	*	12:19	12:26	12:30	12:35	12:39	12:43	12:48

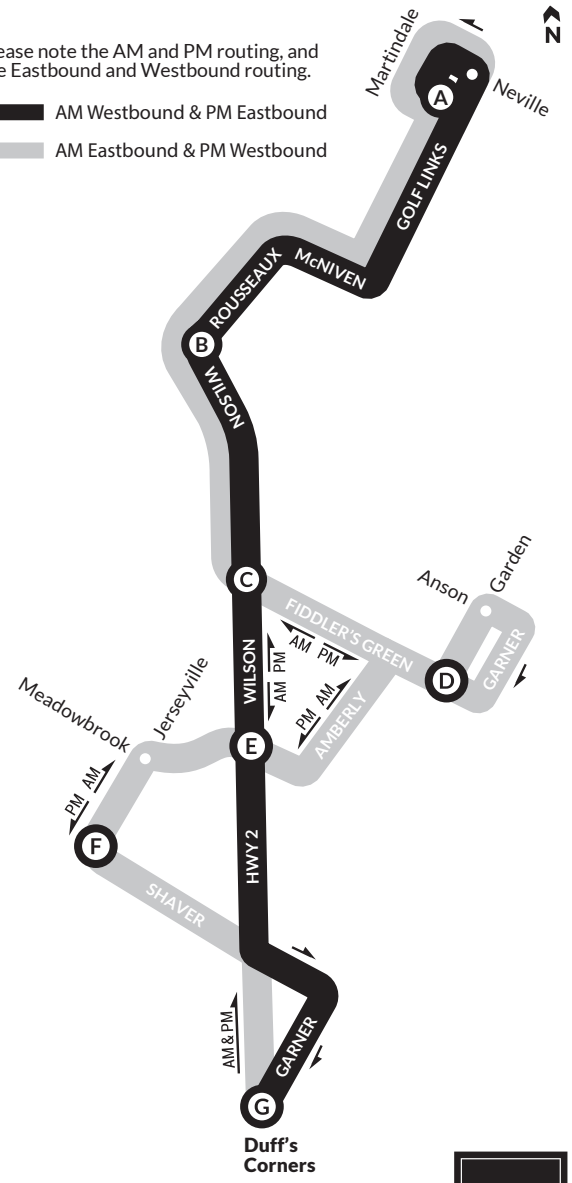
Ancaster
Effective September 1, 2024

16

Please note the AM and PM routing, and the Eastbound and Westbound routing.

AM Westbound & PM Eastbound

AM Eastbound & PM Westbound



Website: hamilton.ca/hsr
Email: hsrserve@hamilton.ca
Social: @HSR @HamiltonStreetRailway

WEEKDAY - Westbound

TIMEPOINTS		A	B	C	D	E	F	G
	Interline	Meadowlands Terminal Platform 3	Wilson & Rousseaux	Fiddlers Green & Wilson	Fiddlers Green & Garden(16F)	Wilson & Amberly	Jerseyville & Shaver (16F)	Garner & Wilson
5 am	*	5:58	6:05	6:09	---	6:11	---	6:15
6 am	*	6:34	6:41	6:45	---	6:47	---	6:51
7 am to 8 am	Leave Meadowlands Terminal from 7:04 am to 8:34 am							
	*	:04	:11	:15	---	:17	---	:21
	*	:34	:41	:45	---	:47	---	:51
9 am	*	9:09	9:16	9:20	---	9:22	---	9:26
	*	9:29	9:36	9:40	---	9:42	---	9:46
	*	9:59	10:06	10:10	---	10:12	---	10:16
10 am to 11 am	Leave Meadowlands Terminal from 10:29 am to 11:59 am							
	*	:29	:36	:40	---	:42	---	:46
	*	:59	:06	:10	---	:12	---	:16
12 pm to 1 pm	Leave Meadowlands Terminal from 12:29 pm to 1:59 pm							
	*	:29	:36	:40	:45	:49	:53	:58
	*	:59	:06	:10	:15	:19	:23	:28
2 pm	*	2:29	2:37	2:41	2:46	2:50	2:54	2:59
	*	2:59	3:07	3:11	3:16	3:20	3:24	3:29
3 pm	*	3:29	3:37	3:41	3:46	3:50	3:54	3:59
	*	3:49	3:57	4:01	4:06	4:10	4:14	4:19
4 pm	*	4:19	4:27	4:31	4:36	4:40	4:44	4:49
	*	4:49	4:57	5:01	5:06	5:10	5:14	5:19
5 pm	*	5:19	5:27	5:31	5:36	5:40	5:44	5:49
	*	5:54	6:02	6:06	6:11	6:15	6:19	6:24
6 pm	*	6:24	6:32	6:36	6:41	6:45	6:49	6:54
	*	6:54	7:02	7:06	7:11	7:15	7:19	7:24
7 pm to 11 pm	Leave Meadowlands Terminal from 7:29 pm to 11:59 pm							
	*	:29	:36	:40	:45	:49	:53	:58
	*	:59	:06	:10	:15	:19	:23	:28
12 am	*	12:29	12:36	12:40	12:45	12:49	12:53	12:58
	*	12:59	1:06	1:10	1:15	1:19	1:23	1:28

SUNDAY - Westbound

TIMEPOINTS		A	B	C	D	E	F	G
	Interline	Meadowlands Terminal Platform 3	Wilson & Rousseaux	Fiddlers Green & Wilson	Fiddlers Green & Garden(16F)	Wilson & Amberly	Jerseyville & Shaver (16F)	Garner & Wilson
7 am	*	7:19	7:26	7:30	---	7:32	---	7:36
	*	7:49	7:56	8:00	---	8:02	---	8:06
8 am to 11 am	Leave Meadowlands Terminal from 8:19 am to 11:49 am							
	*	:19	:26	:30	---	:32	---	:36
	*	:49	:56	:00	---	:02	---	:06
12 pm to 9 pm	Leave Meadowlands Terminal from 12:19 pm to 9:49 pm							
	*	:19	:26	:30	:35	:39	:43	:48
	*	:49	:56	:00	:05	:09	:13	:18
10 pm	*	10:19	10:26	10:30	10:35	10:39	10:43	10:48
	*	10:49	10:56	11:00	11:05	11:09	11:13	11:18
11 pm	*	11:19	11:26	11:30	11:35	11:39	11:43	11:48
	*	11:49	11:56	12:00	12:05	12:09	12:13	12:18

WEEKDAY - Eastbound

TIMEPOINTS	G	F	E	D	C	B	A	
	Garner & Wilson	Jerseyville & Shaver (16f)	Wilson & Amberly	Fiddlers Green & Garden(16F)	Fiddlers Green & Wilson	Wilson & Rousseaux	Meadowlands Terminal Platform 3	Interline
4 am	4:57	5:02	5:07	5:12	5:14	5:19	5:28	*
5 am to 8 am	Leave Garner and Wilson from 5:25 am to 8:55 am							
	:25	:30	:35	:40	:42	:47	:56	*
	:55	:00	:05	:10	:12	:17	:26	*
9 am	9:29	9:34	9:39	9:44	9:46	9:51	10:00	*
	9:59	10:04	10:09	10:14	10:16	10:21	10:30	*
10 am	10:29	10:34	10:39	10:44	10:46	10:51	11:00	*
	10:59	11:04	11:09	11:14	11:16	11:21	11:30	*
11 am	11:29	11:34	11:39	11:44	11:46	11:51	12:00	*
	11:59	12:04	12:09	12:14	12:16	12:21	12:30	*
12 pm	12:34	---	12:38	---	12:40	12:44	12:53	*
1 pm to 5 pm	Leave Garner and Wilson from 1:07 pm to 5:37 pm							
	:07	---	:11	---	:13	:17	:26	*
	:37	---	:41	---	:43	:47	:56	*
6 pm	6:07	---	6:11	---	6:13	6:17	6:26	
	6:37	---	6:41	---	6:43	6:47	6:56	
7 pm	7:07	---	7:11	---	7:13	7:17	7:25	*
	7:37	---	7:41	---	7:43	7:47	7:55	
8 pm to 10 pm	Leave Garner and Wilson from 8:07 pm to 10:37 pm							
	:07	---	:11	---	:13	:17	:25	*
	:37	---	:41	---	:43	:47	:55	*
11 pm	11:07	---	11:11	---	11:13	11:17	11:25	*
	11:37	---	11:41	---	11:43	11:47	11:55	*
12 am	12:07	---	12:11	---	12:13	12:17	12:25	*
	12:32	---	12:36	---	12:38	12:42	12:50	
1 am	1:02	---	1:06	---	1:08	1:12	1:20	

SUNDAY - Eastbound

TIMEPOINTS	G	F	E	D	C	B	A	
	Garner & Wilson	Jerseyville & Shaver (16f)	Wilson & Amberly	Fiddlers Green & Garden (16F)	Fiddlers Green & Wilson	Wilson & Rousseaux	Meadowlands Terminal Platform 3	Interline
7 am	7:27	7:32	7:37	7:42	7:44	7:49	7:58	*
	7:57	8:02	8:07	8:12	8:14	8:19	8:28	*
8 am to 11 am	Leave Garner and Wilson from 8:27 am to 11:57 am							
	:27	:32	:37	:42	:44	:49	:58	*
	:57	:02	:07	:12	:14	:19	:28	*
12 pm	12:32	---	12:36	---	12:38	12:42	12:51	*
1 pm to 10 pm	Leave Garner and Wilson from 1:07 pm to 10:37 pm							
	:07	---	:11	---	:13	:17	:26	*
	:37	---	:41	---	:43	:47	:56	*
11 pm	11:07	---	11:11	---	11:13	11:17	11:26	*
	11:37	---	11:41	---	11:43	11:47	11:56	
12 am	12:00	---	12:04	---	12:06	12:10	12:19	

THIS SCHEDULE IS SUBJECT TO CHANGE.
For up-to-date timetables and holiday service hours, visit **hamilton.ca/hsr**. The HSR does not take responsibility for errors in this document, for damages or inconveniences caused by delayed schedules or failures to make connections.

BUS STOP NUMBERS

EASTBOUND

Garner	
At Duff's Corners	1427
Wilson	
At Duff's Corners	4442
At McClure	1638
At 1060 Wilson	2655
Shaver	
At Caesar	1440
Opposite Sumac	1441
At Jerseyville	1441
Jerseyville	
At Stevenson	1442
At Meadowbrook	1442
Meadowbrook	
At Morwick/At Tranquility	1443
At Galley/At Speers	1444
Wilson	
At Hamilton/At Amberly	2656
Opposite Central	2633
At Seminole	2633
At Todd/At 54 Wilson	2634
Amberly	
At Sunnymeade/At Melanie	2621
At Cottingham	2622
At Fiddlers Green	2622
Fiddler's Green	
Opposite Enmore	2623
Anson At Garner	2624
Garner	
At Fiddler's Green	4484
Fiddler's Green	
At Garden	2626
At Enmore	2627
Opp. Oakley/Opp. Gilbert	2628
At Wilson	2628
Wilson	
At Fiddler's Green	2635
At St Margarets/At Cameron	2636
Opposite Dalley/At Halson	2637
At Church	2639
At Academy/At Rousseaux	2638
Rousseaux	
At Wilson/At Academy	2658
Mohawk At McNiven	2659
McNiven	
At Orton/At Golf Links	2660
Golf Links	
Opposite Onondaga	2461
At Kitty Murray	2461
At Meadowlands	2461
Opposite Martindale	2399
Neville At Martindale	2474
Martindale	
At 122 Martindale	2452
Meadowlands Terminal	
Platform 3	2470

WESTBOUND

Meadowlands Terminal	
Platform 3	2470
Golf Links	
At Legend	2471
Opposite Kitty Murray	2471
At Onondaga/At McNiven	2458
McNiven	
At Tomahawk/At Mohawk	2668
Rousseaux	
Opposite Academy	2669
Wilson	
At Old Dundas	2610
Opposite Academy	2610
At Sulphur Spring	2611
Opposite Halson	2611
At Dalley	2612
At Jerseyville	2613
At Fiddlers Green (NE)	2615
At Fiddlers Green (NW)	2617
At 35 Wilson	2617
At Dunham/Opp. Seminole	2618
At Central	2618
Fiddler's Green	
At Gilbert/At Oakley	2616
Opposite Enmore	2623
Anson At Garner	2624
Garner	
At Fiddler's Green	4484
Fiddler's Green	
At Garden	2626
At Enmore	2627
Amberly	
Opposite Bloomsbury	2630
At Leith Court	2631
Opposite Melanie	2631
Opposite Chippendale	2632
At Wilson Street	2632
Wilson	
At Valleyview	2619
At Meadowbrook	2629
Meadowbrook	
Opp. Speers/Opp. Galley	1426
Opposite Tranquility	1426
Opposite Morwick	1425
Jerseyville	
At Martin/Opp. Stevenson	1424
Jerseyville	
Opposite Shaver	1424
Shaver	
Opposite Morwick	1423
At Wilson	1422
At Wilson	1428
Opp. Liddycoat/At Garner	1428
Garner	
At Walmart	1429
Opposite Rayal Farms	1427

APPENDIX C

Traffic Data

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Turning Movement Count (3 . SULPHUR SPRINGS ROAD & 163 SULPHUR SPRINGS ROAD)

Start Time	N Approach 163 SULPHUR SPRINGS ROAD					E Approach SULPHUR SPRINGS ROAD					W Approach SULPHUR SPRINGS ROAD					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	UTurn E:E	Peds E:	Approach Total	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	4	
06:15:00	0	0	0	0	0	0	3	0	0	3	11	0	0	0	11	14	
06:30:00	0	0	0	0	0	0	6	0	0	6	17	0	0	0	17	23	
06:45:00	0	0	0	1	0	0	5	0	0	5	20	0	0	0	20	25	66
07:00:00	0	0	0	0	0	0	8	0	0	8	30	0	0	0	30	38	100
07:15:00	0	0	0	0	0	0	24	0	0	24	32	0	0	0	32	56	142
07:30:00	0	0	0	0	0	0	15	0	0	15	53	1	0	0	54	69	188
07:45:00	0	0	0	2	0	0	26	0	0	26	54	0	0	0	54	80	243
08:00:00	0	0	0	0	0	0	20	0	0	20	63	0	0	0	63	83	288
08:15:00	0	0	0	1	0	0	31	0	0	31	58	0	0	0	58	89	321
08:30:00	0	0	0	1	0	0	24	0	0	24	46	0	0	0	46	70	322
08:45:00	0	0	0	0	0	0	27	0	0	27	64	0	0	0	64	91	333
09:00:00	0	0	0	0	0	0	20	0	0	20	48	0	0	0	48	68	318
09:15:00	0	0	0	0	0	0	29	0	0	29	40	0	0	0	40	69	298
09:30:00	0	0	0	0	0	0	27	0	0	27	16	0	0	0	16	43	271
09:45:00	0	0	0	5	0	0	24	0	0	24	34	0	1	0	35	59	239
BREAK																	
15:00:00	0	1	0	3	1	0	40	0	0	40	41	0	0	0	41	82	
15:15:00	0	0	0	0	0	0	34	0	0	34	30	0	0	0	30	64	
15:30:00	0	0	0	2	0	0	42	0	0	42	41	0	0	0	41	83	
15:45:00	0	1	0	1	1	0	52	0	0	52	69	0	0	0	69	122	351
16:00:00	0	0	0	0	0	0	57	0	0	57	60	0	0	0	60	117	386
16:15:00	0	0	0	0	0	0	50	0	0	50	72	0	0	0	72	122	444
16:30:00	0	0	0	0	0	0	56	0	0	56	73	0	0	0	73	129	490
16:45:00	1	0	0	0	1	0	53	0	0	53	71	1	0	0	72	126	494
17:00:00	0	0	0	3	0	0	52	0	0	52	81	0	0	0	81	133	510
17:15:00	0	0	0	0	0	0	41	0	0	41	79	0	0	0	79	120	508
17:30:00	0	0	0	1	0	0	38	0	0	38	78	0	0	0	78	116	495
17:45:00	0	0	0	2	0	0	41	0	0	41	61	0	0	0	61	102	471
18:00:00	0	0	0	2	0	0	49	0	0	49	45	0	0	0	45	94	432
18:15:00	0	0	0	3	0	0	24	0	0	24	42	0	0	0	42	66	378
18:30:00	0	0	0	0	0	0	29	0	0	29	32	0	0	0	32	61	323
18:45:00	0	0	0	0	0	0	15	0	0	15	26	0	0	0	26	41	262

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Grand Total	1	2	0	27	3	0	962	0	0	962	1491	2	1	0	1494	**2459**	-
Approach%	33.3%	66.7%	0%		-	0%	100%	0%		-	99.8%	0.1%	0.1%		-	**-**	-
Totals %	0%	0.1%	0%		0.1%	0%	39.1%	0%		39.1%	60.6%	0.1%	0%		60.8%	**-**	-
Heavy	0	0	0		-	0	14	0		-	22	0	0		-	**-**	-
Heavy %	0%	0%	0%		-	0%	1.5%	0%		-	1.5%	0%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 08:00 AM - 09:00 AM Weather: Clear Sky (11.37 °C)

Start Time	N Approach 163 SULPHUR SPRINGS ROAD					E Approach SULPHUR SPRINGS ROAD					W Approach SULPHUR SPRINGS ROAD					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	0	0	0	0	0	0	20	0	0	20	63	0	0	0	63	83
08:15:00	0	0	0	1	0	0	31	0	0	31	58	0	0	0	58	89
08:30:00	0	0	0	1	0	0	24	0	0	24	46	0	0	0	46	70
08:45:00	0	0	0	0	0	0	27	0	0	27	64	0	0	0	64	91
Grand Total	0	0	0	2	0	0	102	0	0	102	231	0	0	0	231	**333**
Approach%	0%	0%	0%		-	0%	100%	0%		-	100%	0%	0%		-	**-**
Totals %	0%	0%	0%		0%	0%	30.6%	0%		30.6%	69.4%	0%	0%		69.4%	**-**
PHF	0	0	0		0	0	0.82	0		0.82	0.9	0	0		0.9	**-**
Heavy	0	0	0		0	0	2	0		2	2	0	0		2	**-**
Heavy %	0%	0%	0%		0%	0%	2%	0%		2%	0.9%	0%	0%		0.9%	**-**
Lights	0	0	0		0	0	97	0		97	228	0	0		228	**-**
Lights %	0%	0%	0%		0%	0%	95.1%	0%		95.1%	98.7%	0%	0%		98.7%	**-**
Single-Unit Trucks	0	0	0		0	0	2	0		2	0	0	0		0	**-**
Single-Unit Trucks %	0%	0%	0%		0%	0%	2%	0%		2%	0%	0%	0%		0%	**-**
Buses	0	0	0		0	0	0	0		0	2	0	0		2	**-**
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0.9%	0%	0%		0.9%	**-**
Bicycles on Road	0	0	0		0	0	3	0		3	1	0	0		1	**-**
Bicycles on Road %	0%	0%	0%		0%	0%	2.9%	0%		2.9%	0.4%	0%	0%		0.4%	**-**
Pedestrians	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	100%		-	-	-	0%		-	-	-	0%		**-**

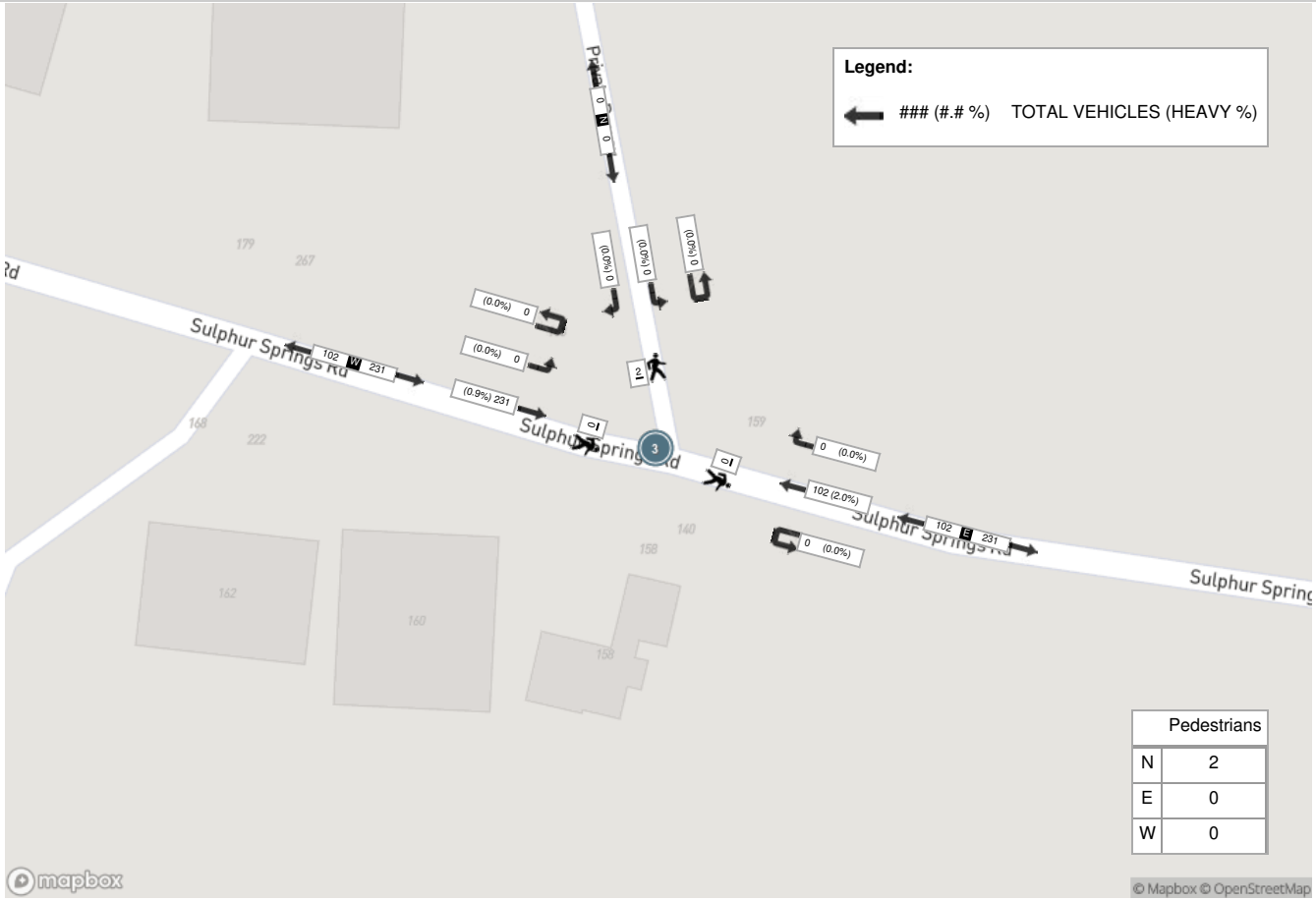
Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Broken Clouds (24.7 °C)

Start Time	N Approach 163 SULPHUR SPRINGS ROAD					E Approach SULPHUR SPRINGS ROAD					W Approach SULPHUR SPRINGS ROAD					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	0	0	0	0	0	0	50	0	0	50	72	0	0	0	72	122
16:30:00	0	0	0	0	0	0	56	0	0	56	73	0	0	0	73	129
16:45:00	1	0	0	0	1	0	53	0	0	53	71	1	0	0	72	126
17:00:00	0	0	0	3	0	0	52	0	0	52	81	0	0	0	81	133
Grand Total	1	0	0	3	1	0	211	0	0	211	297	1	0	0	298	**510**
Approach%	100%	0%	0%		-	0%	100%	0%		-	99.7%	0.3%	0%		-	**-**
Totals %	0.2%	0%	0%		0.2%	0%	41.4%	0%		41.4%	58.2%	0.2%	0%		58.4%	**-**
PHF	0.25	0	0		0.25	0	0.94	0		0.94	0.92	0.25	0		0.92	**-**
Heavy	0	0	0		0	0	1	0		1	3	0	0		3	**-**
Heavy %	0%	0%	0%		0%	0%	0.5%	0%		0.5%	1%	0%	0%		1%	**-**
Lights	1	0	0		1	0	208	0		208	293	1	0		294	**-**
Lights %	100%	0%	0%		100%	0%	98.6%	0%		98.6%	98.7%	100%	0%		98.7%	**-**
Single-Unit Trucks	0	0	0		0	0	1	0		1	2	0	0		2	**-**
Single-Unit Trucks %	0%	0%	0%		0%	0%	0.5%	0%		0.5%	0.7%	0%	0%		0.7%	**-**
Buses	0	0	0		0	0	0	0		0	1	0	0		1	**-**
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0.3%	0%	0%		0.3%	**-**
Bicycles on Road	0	0	0		0	0	2	0		2	1	0	0		1	**-**
Bicycles on Road %	0%	0%	0%		0%	0%	0.9%	0%		0.9%	0.3%	0%	0%		0.3%	**-**
Pedestrians	-	-	-	3	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	100%		-	-	-	0%		-	-	-	0%		**-**

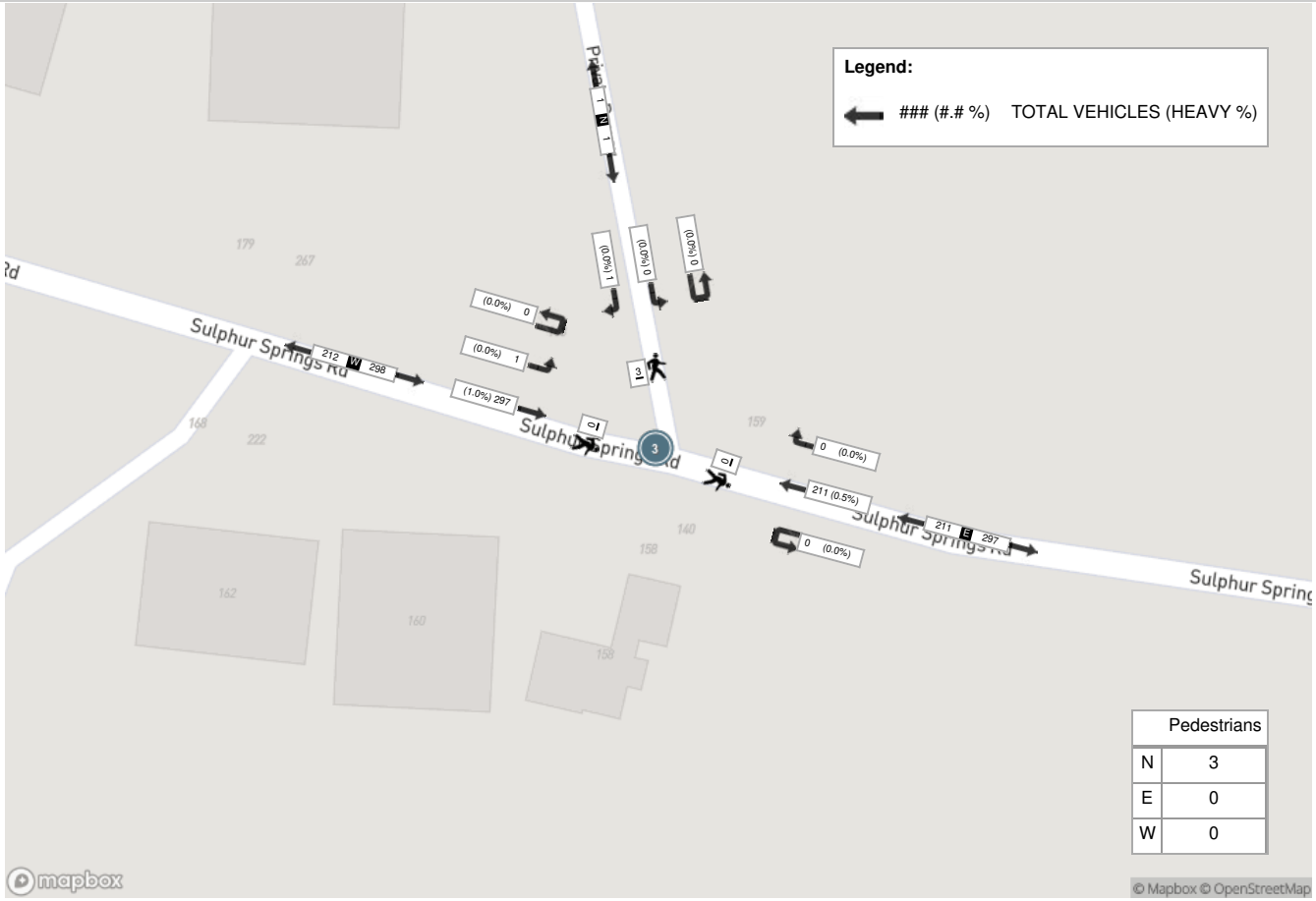
Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 08:00 AM - 09:00 AM Weather: Clear Sky (11.37 °C)



Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Broken Clouds (24.7 °C)



Crozier & Associates
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CANADA

Turning Movement Count (1 . SULPHUR SPRINGS ROAD & LOVERS LANE)

Start Time	N Approach SULPHUR SPRINGS ROAD					E Approach SULPHUR SPRINGS ROAD					S Approach LOVERS LANE					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
06:00:00	1	2	0	0	3	0	0	0	0	0	1	3	0	0	4	7	
06:15:00	2	6	0	0	8	2	0	0	0	2	6	3	0	0	9	19	
06:30:00	6	5	0	2	11	6	1	0	0	7	10	5	1	1	16	34	
06:45:00	4	11	0	0	15	4	0	0	0	4	10	10	0	0	20	39	99
07:00:00	4	18	0	0	22	8	1	0	0	9	12	13	0	0	25	56	148
07:15:00	5	18	0	0	23	15	6	0	0	21	14	12	0	0	26	70	199
07:30:00	10	43	0	0	53	12	5	0	0	17	13	25	0	0	38	108	273
07:45:00	15	30	0	0	45	19	5	0	0	24	24	26	0	1	50	119	353
08:00:00	13	33	0	1	46	17	5	0	0	22	28	26	0	0	54	122	419
08:15:00	22	37	0	0	59	19	8	0	0	27	22	26	0	0	48	134	483
08:30:00	5	27	0	1	32	20	4	1	0	25	18	31	0	1	49	106	481
08:45:00	19	37	0	0	56	22	5	0	0	27	26	22	0	0	48	131	493
09:00:00	8	30	0	0	38	9	11	0	0	20	18	15	0	0	33	91	462
09:15:00	21	24	0	0	45	17	11	0	0	28	13	15	0	0	28	101	429
09:30:00	16	10	0	0	26	19	7	0	0	26	6	20	0	0	26	78	401
09:45:00	13	17	0	2	30	17	8	0	1	25	17	18	0	0	35	90	360
BREAK																	
15:00:00	15	26	0	1	41	24	14	0	1	38	17	26	0	1	43	122	
15:15:00	22	17	0	1	39	24	13	0	0	37	11	33	0	0	44	120	
15:30:00	16	35	0	0	51	25	18	0	0	43	14	28	0	0	42	136	
15:45:00	21	46	0	1	67	32	15	0	1	47	21	35	0	0	56	170	548
16:00:00	29	40	0	0	69	43	16	0	0	59	21	34	0	0	55	183	609
16:15:00	36	55	0	0	91	32	14	0	0	46	11	33	0	0	44	181	670
16:30:00	29	58	0	0	87	36	22	0	0	58	15	21	0	0	36	181	715
16:45:00	36	64	0	0	100	29	24	0	0	53	8	26	0	0	34	187	732
17:00:00	26	69	0	1	95	33	19	0	0	52	13	27	0	0	40	187	736
17:15:00	29	58	0	0	87	26	19	0	0	45	14	31	0	0	45	177	732
17:30:00	48	53	0	0	101	26	10	0	0	36	24	28	0	0	52	189	740
17:45:00	39	47	0	2	86	24	16	0	0	40	14	14	0	0	28	154	707
18:00:00	23	36	0	2	59	29	19	0	0	48	12	28	0	0	40	147	667
18:15:00	24	31	0	3	55	14	8	0	0	22	12	16	0	0	28	105	595
18:30:00	21	19	0	0	40	18	12	0	0	30	10	10	0	0	20	90	496
18:45:00	13	17	0	0	30	8	10	0	0	18	9	6	0	0	15	63	405

Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Grand Total	591	1019	0	17	1610	629	326	1	3	956	464	666	1	4	1131	**3697**	-
Approach%	36.7%	63.3%	0%		-	65.8%	34.1%	0.1%		-	41%	58.9%	0.1%		-	**-**	-
Totals %	16%	27.6%	0%		43.5%	17%	8.8%	0%		25.9%	12.6%	18%	0%		30.6%	**-**	-
Heavy	7	14	0		-	8	7	0		-	9	13	0		-	**-**	-
Heavy %	1.2%	1.4%	0%		-	1.3%	2.1%	0%		-	1.9%	2%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 08:00 AM - 09:00 AM Weather: Clear Sky (11.37 °C)

Start Time	N Approach SULPHUR SPRINGS ROAD					E Approach SULPHUR SPRINGS ROAD					S Approach LOVERS LANE					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
08:00:00	13	33	0	1	46	17	5	0	0	22	28	26	0	0	54	122
08:15:00	22	37	0	0	59	19	8	0	0	27	22	26	0	0	48	134
08:30:00	5	27	0	1	32	20	4	1	0	25	18	31	0	1	49	106
08:45:00	19	37	0	0	56	22	5	0	0	27	26	22	0	0	48	131
Grand Total	59	134	0	2	193	78	22	1	0	101	94	105	0	1	199	**493**
Approach%	30.6%	69.4%	0%		-	77.2%	21.8%	1%		-	47.2%	52.8%	0%		-	**-**
Totals %	12%	27.2%	0%		39.1%	15.8%	4.5%	0.2%		20.5%	19.1%	21.3%	0%		40.4%	**-**
PHF	0.67	0.91	0		0.82	0.89	0.69	0.25		0.94	0.84	0.85	0		0.92	**-**
Heavy	1	0	0		1	2	1	0		3	2	6	0		8	**-**
Heavy %	1.7%	0%	0%		0.5%	2.6%	4.5%	0%		3%	2.1%	5.7%	0%		4%	**-**
Lights	58	133	0		191	74	20	1		95	92	97	0		189	**-**
Lights %	98.3%	99.3%	0%		99%	94.9%	90.9%	100%		94.1%	97.9%	92.4%	0%		95%	**-**
Single-Unit Trucks	1	0	0		1	2	1	0		3	0	4	0		4	**-**
Single-Unit Trucks %	1.7%	0%	0%		0.5%	2.6%	4.5%	0%		3%	0%	3.8%	0%		2%	**-**
Buses	0	0	0		0	0	0	0		0	2	2	0		4	**-**
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	2.1%	1.9%	0%		2%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Bicycles on Road	0	1	0		1	2	1	0		3	0	2	0		2	**-**
Bicycles on Road %	0%	0.7%	0%		0.5%	2.6%	4.5%	0%		3%	0%	1.9%	0%		1%	**-**
Pedestrians	-	-	-	2	-	-	-	-	0	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	66.7%		-	-	-	0%		-	-	-	33.3%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

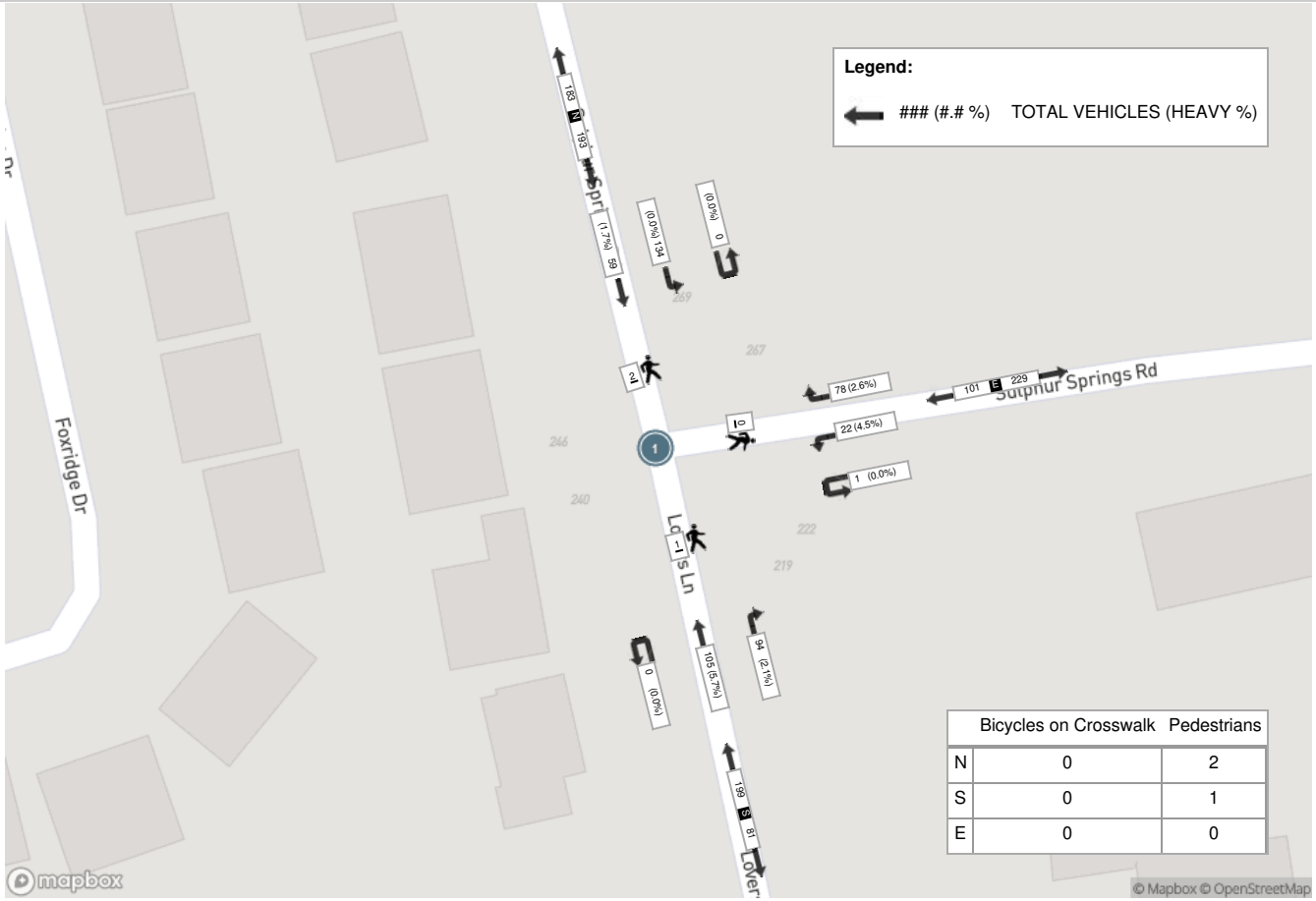
Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Broken Clouds (24.7 °C)

Start Time	N Approach SULPHUR SPRINGS ROAD					E Approach SULPHUR SPRINGS ROAD					S Approach LOVERS LANE					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:45:00	36	64	0	0	100	29	24	0	0	53	8	26	0	0	34	187
17:00:00	26	69	0	1	95	33	19	0	0	52	13	27	0	0	40	187
17:15:00	29	58	0	0	87	26	19	0	0	45	14	31	0	0	45	177
17:30:00	48	53	0	0	101	26	10	0	0	36	24	28	0	0	52	189
Grand Total	139	244	0	1	383	114	72	0	0	186	59	112	0	0	171	**740**
Approach%	36.3%	63.7%	0%		-	61.3%	38.7%	0%		-	34.5%	65.5%	0%		-	**-**
Totals %	18.8%	33%	0%		51.8%	15.4%	9.7%	0%		25.1%	8%	15.1%	0%		23.1%	**-**
PHF	0.72	0.88	0		0.95	0.86	0.75	0		0.88	0.61	0.9	0		0.82	**-**
Heavy	1	4	0		5	0	0	0		0	0	0	0		0	**-**
Heavy %	0.7%	1.6%	0%		1.3%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Lights	137	237	0		374	113	71	0		184	59	108	0		167	**-**
Lights %	98.6%	97.1%	0%		97.7%	99.1%	98.6%	0%		98.9%	100%	96.4%	0%		97.7%	**-**
Single-Unit Trucks	1	3	0		4	0	0	0		0	0	0	0		0	**-**
Single-Unit Trucks %	0.7%	1.2%	0%		1%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Buses	0	1	0		1	0	0	0		0	0	0	0		0	**-**
Buses %	0%	0.4%	0%		0.3%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Bicycles on Road	1	3	0		4	1	1	0		2	0	4	0		4	**-**
Bicycles on Road %	0.7%	1.2%	0%		1%	0.9%	1.4%	0%		1.1%	0%	3.6%	0%		2.3%	**-**
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	100%		-	-	-	0%		-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

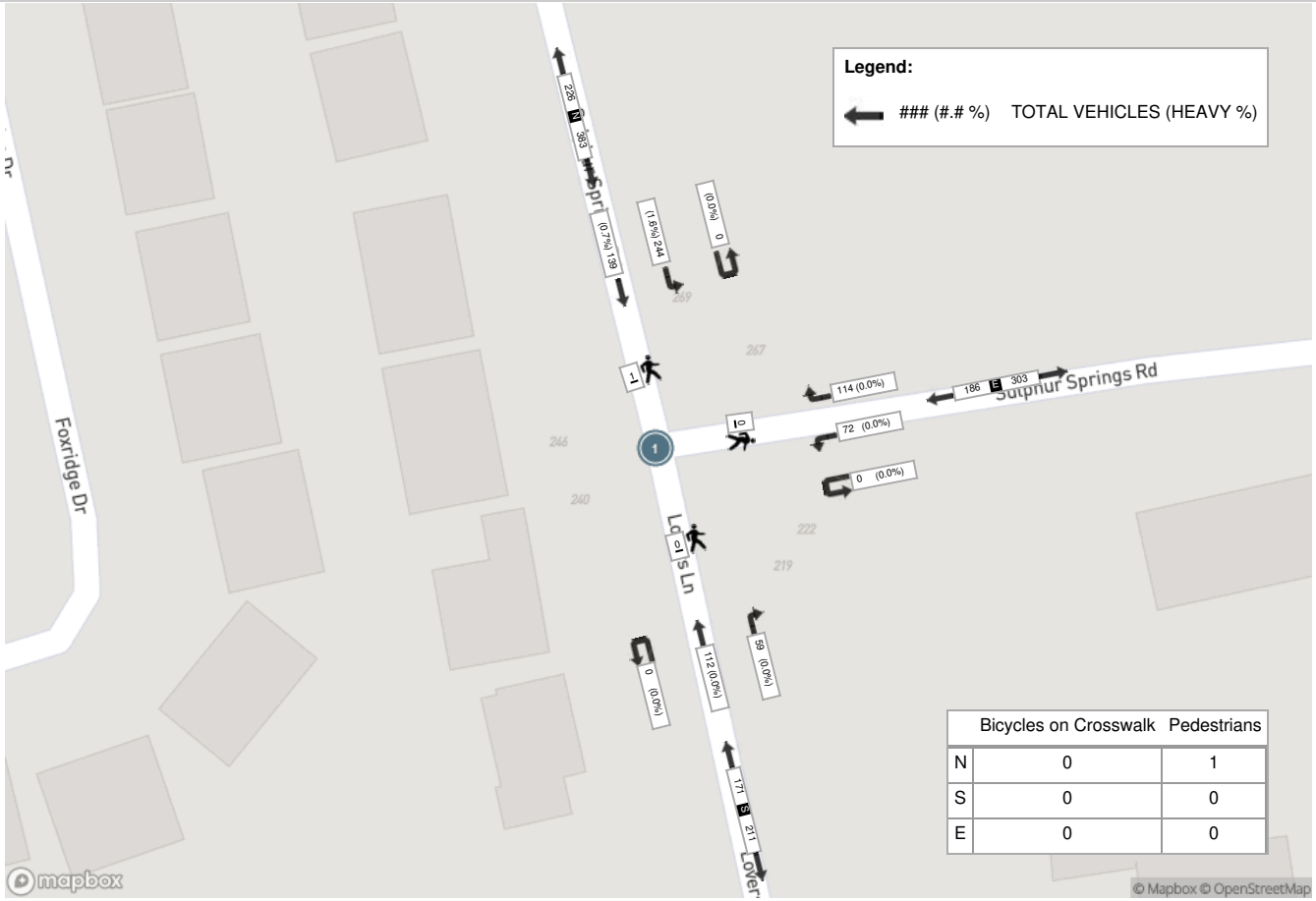
Peak Hour: 08:00 AM - 09:00 AM Weather: Clear Sky (11.37 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	2
S	0	1
E	0	0

Crozier & Associates
SUITE 301 211 YONGE
STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Broken Clouds (24.7 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	1
S	0	0
E	0	0

Spectrum

Turning Movement Count
Location Name: SULPHUR SPRINGS ROAD/CHURCH STREET T & WILSON STREET EAS
Date: Tue, Oct 22, 2024 Deployment Lead: Rey Fernandez

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Turning Movement Count (2 . SULPHUR SPRINGS ROAD/CHURCH STREET T & WILSON STREET EAS)

Start Time	N Approach SULPHUR SPRINGS ROAD						E Approach WILSON STREET EAST						S Approach SULPHUR SPRINGS ROAD						W Approach WILSON STREET EAST						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	1	0	6	0	1	7	0	23	0	0	0	23	0	0	0	0	1	0	0	39	0	0	0	39	69	
06:15:00	2	0	14	0	0	16	3	33	0	0	1	36	0	0	2	0	1	2	2	63	1	0	0	66	120	
06:30:00	1	0	20	0	2	21	3	36	0	0	0	39	1	0	0	0	2	1	0	65	2	0	0	67	128	
06:45:00	1	0	22	0	0	23	5	54	0	1	0	60	1	0	1	0	3	2	0	92	2	0	0	94	179	496
07:00:00	0	2	31	0	0	33	7	54	0	0	2	61	1	0	2	0	1	3	1	112	0	0	0	113	210	637
07:15:00	1	1	36	0	0	38	16	48	0	0	2	64	0	2	1	0	4	3	3	117	9	0	0	129	234	751
07:30:00	4	8	38	0	0	50	8	69	0	0	1	77	3	2	4	0	0	9	6	165	6	0	0	177	313	936
07:45:00	8	17	44	0	3	69	18	88	5	0	1	111	2	3	8	0	3	13	16	137	8	0	1	161	354	1111
08:00:00	3	10	55	0	1	68	20	94	1	0	0	115	3	5	8	0	0	16	10	156	12	0	1	178	377	1278
08:15:00	13	10	49	0	2	72	21	82	2	0	2	105	0	0	1	0	2	1	0	152	10	0	0	162	340	1384
08:30:00	11	3	51	0	1	65	23	106	1	0	4	130	0	3	3	0	7	6	3	166	12	0	1	181	382	1453
08:45:00	15	10	48	0	0	73	24	101	0	0	1	125	4	10	1	0	3	15	5	156	14	0	1	175	388	1487
09:00:00	14	6	49	0	0	69	26	87	1	0	6	114	1	3	7	0	3	11	2	124	8	0	0	134	328	1438
09:15:00	9	4	42	0	0	55	18	94	4	0	4	116	2	3	5	0	6	10	1	142	8	0	0	151	332	1430
09:30:00	4	1	20	0	3	25	27	96	5	0	2	128	4	2	4	0	3	10	2	120	13	0	3	135	298	1346
09:45:00	9	1	31	0	6	41	22	75	2	0	2	99	4	2	10	0	4	16	4	112	14	0	7	130	286	1244
BREAK																										
15:00:00	21	5	41	0	10	67	29	119	2	0	12	150	1	4	4	0	7	9	6	132	15	0	5	153	379	
15:15:00	13	2	35	0	5	50	33	131	3	0	3	167	2	4	9	0	8	15	5	117	13	0	2	135	367	
15:30:00	16	6	29	0	4	51	36	148	3	0	4	187	6	10	15	0	6	31	8	138	5	0	4	151	420	
15:45:00	9	13	52	0	7	74	47	142	0	0	3	189	2	7	12	0	14	21	8	120	18	0	4	146	430	1596
16:00:00	18	11	54	0	2	83	34	123	1	0	3	158	0	16	12	0	11	28	9	132	18	0	6	159	428	1645
16:15:00	16	20	54	0	0	90	33	114	1	0	1	148	0	6	10	0	1	16	5	133	17	0	2	155	409	1687
16:30:00	20	29	43	0	3	92	40	138	3	0	2	181	2	11	12	0	3	25	13	152	18	0	4	183	481	1748
16:45:00	20	35	34	0	1	89	47	144	3	0	2	194	2	7	9	0	10	18	15	147	7	0	0	169	470	1788
17:00:00	16	49	42	0	5	107	31	118	0	0	0	149	4	5	15	0	5	24	11	145	15	0	1	171	451	1811
17:15:00	20	28	42	0	3	90	37	98	5	0	0	140	2	7	15	0	2	24	13	134	14	0	2	161	415	1817
17:30:00	23	23	38	0	2	84	31	128	3	0	5	162	0	4	7	0	9	11	9	132	7	0	1	148	405	1741
17:45:00	12	14	42	0	5	68	36	137	1	0	0	174	0	5	9	0	5	14	5	126	9	0	6	140	396	1667
18:00:00	16	5	40	0	2	61	47	108	2	0	4	157	0	5	9	0	12	14	8	105	13	0	4	126	358	1574
18:15:00	17	1	32	0	1	50	24	92	0	0	0	116	0	1	8	0	5	9	3	102	16	0	2	121	296	1455
18:30:00	11	3	27	0	7	41	22	100	1	0	8	123	0	1	6	0	2	7	7	119	24	0	5	150	321	1371
18:45:00	22	3	19	0	3	44	20	88	1	0	0	109	2	1	1	0	2	4	2	100	8	0	3	110	267	1242
Grand Total	366	320	1180	0	79	1866	788	3068	50	1	75	3907	49	129	210	0	145	388	182	3952	336	0	65	4470	**10631**	-
Approach%	19.6%	17.1%	63.2%	0%		-	20.2%	78.5%	1.3%	0%		-	12.6%	33.2%	54.1%	0%		-	4.1%	88.4%	7.5%	0%		-	-	-
Totals %	3.4%	3%	11.1%	0%		17.6%	7.4%	28.9%	0.5%	0%		36.8%	0.5%	1.2%	2%	0%		3.6%	1.7%	37.2%	3.2%	0%		42%	-	-
Heavy	7	2	19	0		-	12	68	0	0		-	0	2	5	0		-	1	80	2	0		-	-	-
Heavy %	1.9%	0.6%	1.6%	0%		-	1.5%	2.2%	0%	0%		-	0%	1.6%	2.4%	0%		-	0.5%	2%	0.6%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: SULPHUR SPRINGS ROAD/CHURCH STREET T & WILSON STREET EAS
Date: Tue, Oct 22, 2024 Deployment Lead: Rey Fernandez

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 08:00 AM - 09:00 AM **Weather: Clear Sky (11.37 °C)**

Start Time	N Approach SULPHUR SPRINGS ROAD						E Approach WILSON STREET EAST						S Approach SULPHUR SPRINGS ROAD						W Approach WILSON STREET EAST						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	3	10	55	0	1	68	20	94	1	0	0	115	3	5	8	0	0	16	10	156	12	0	1	178	377
08:15:00	13	10	49	0	2	72	21	82	2	0	2	105	0	0	1	0	2	1	0	152	10	0	0	162	340
08:30:00	11	3	51	0	1	65	23	106	1	0	4	130	0	3	3	0	7	6	3	166	12	0	1	181	382
08:45:00	15	10	48	0	0	73	24	101	0	0	1	125	4	10	1	0	3	15	5	156	14	0	1	175	388
Grand Total	42	33	203	0	4	278	88	383	4	0	7	475	7	18	13	0	12	38	18	630	48	0	3	696	**1487**
Approach%	15.1%	11.9%	73%	0%		-	18.5%	80.6%	0.8%	0%		-	18.4%	47.4%	34.2%	0%		-	2.6%	90.5%	6.9%	0%		-	**-**
Totals %	2.8%	2.2%	13.7%	0%		18.7%	5.9%	25.8%	0.3%	0%		31.9%	0.5%	1.2%	0.9%	0%		2.6%	1.2%	42.4%	3.2%	0%		46.8%	**-**
PHF	0.7	0.83	0.92	0		0.95	0.92	0.9	0.5	0		0.91	0.44	0.45	0.41	0		0.59	0.45	0.95	0.86	0		0.96	**-**
Heavy	0	2	1	0		3	3	13	0	0		16	0	0	0	0		0	0	21	1	0		22	**-**
Heavy %	0%	6.1%	0.5%	0%		1.1%	3.4%	3.4%	0%	0%		3.4%	0%	0%	0%	0%		0%	0%	3.3%	2.1%	0%		3.2%	**-**
Lights	42	31	201	0		274	84	370	4	0		458	7	18	13	0		38	18	608	47	0		673	**-**
Lights %	100%	93.9%	99%	0%		98.6%	95.5%	96.6%	100%	0%		96.4%	100%	100%	100%	0%		100%	100%	96.5%	97.9%	0%		96.7%	**-**
Single-Unit Trucks	0	0	1	0		1	2	8	0	0		10	0	0	0	0		0	0	8	1	0		9	**-**
Single-Unit Trucks %	0%	0%	0.5%	0%		0.4%	2.3%	2.1%	0%	0%		2.1%	0%	0%	0%	0%		0%	0%	1.3%	2.1%	0%		1.3%	**-**
Buses	0	2	0	0		2	1	5	0	0		6	0	0	0	0		0	0	10	0	0		10	**-**
Buses %	0%	6.1%	0%	0%		0.7%	1.1%	1.3%	0%	0%		1.3%	0%	0%	0%	0%		0%	0%	1.6%	0%	0%		1.4%	**-**
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	3	0	0		3	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	**-**
Bicycles on Road	0	0	1	0		1	1	0	0	0		1	0	0	0	0		0	0	1	0	0		1	**-**
Bicycles on Road %	0%	0%	0.5%	0%		0.4%	1.1%	0%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.1%	**-**
Pedestrians	-	-	-	-	3	-	-	-	-	-	7	-	-	-	-	-	12	-	-	-	-	-	3	-	**-**
Pedestrians%	-	-	-	-	11.5%		-	-	-	-	26.9%		-	-	-	-	46.2%		-	-	-	-	11.5%		**-**
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	3.8%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Spectrum

Turning Movement Count
Location Name: SULPHUR SPRINGS ROAD/CHURCH STREET T & WILSON STREET EAS
Date: Tue, Oct 22, 2024 Deployment Lead: Rey Fernandez

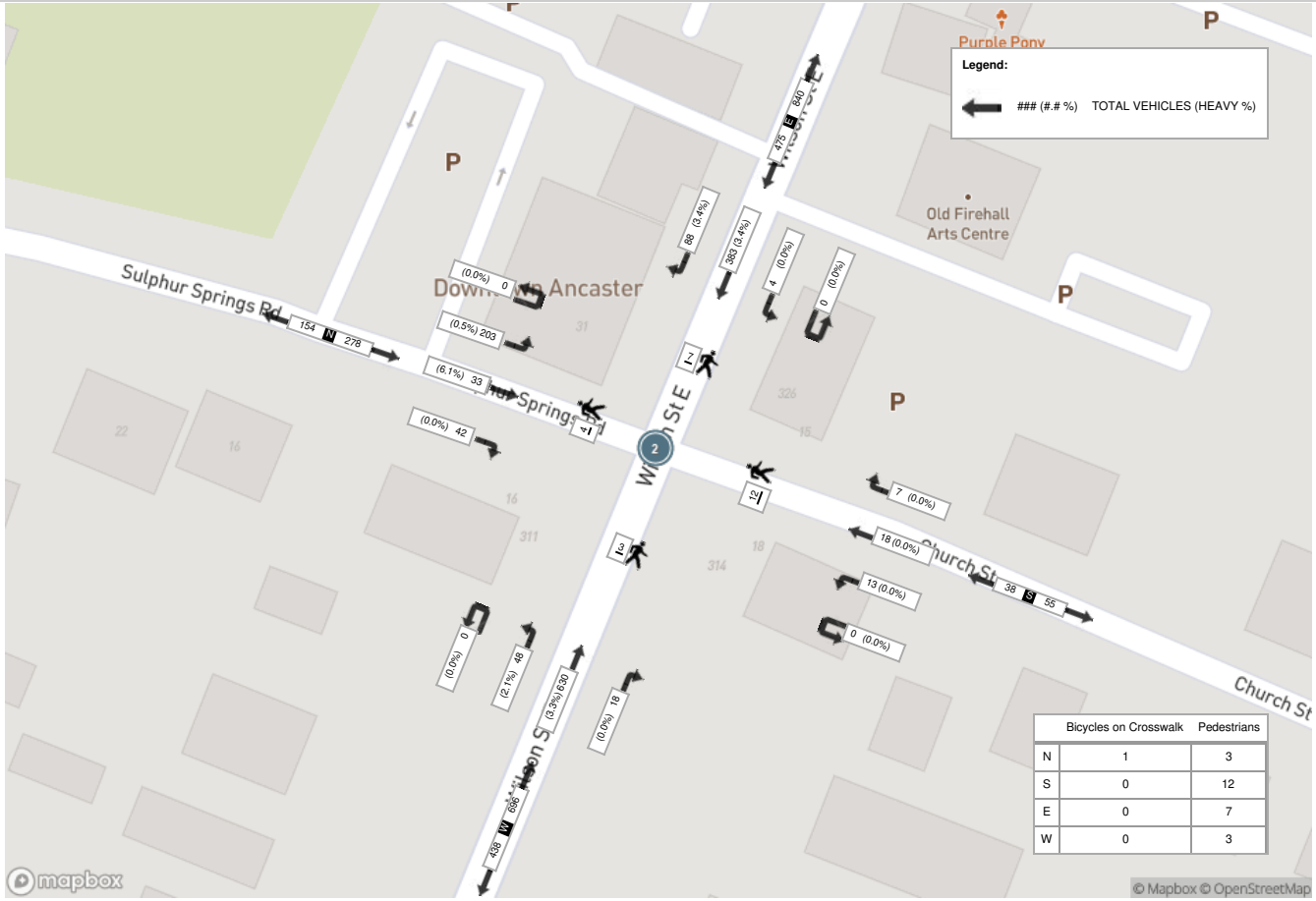
Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Broken Clouds (24.7 °C)

Start Time	N Approach SULPHUR SPRINGS ROAD						E Approach WILSON STREET EAST						S Approach SULPHUR SPRINGS ROAD						W Approach WILSON STREET EAST						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	20	29	43	0	3	92	40	138	3	0	2	181	2	11	12	0	3	25	13	152	18	0	4	183	481
16:45:00	20	35	34	0	1	89	47	144	3	0	2	194	2	7	9	0	10	18	15	147	7	0	0	169	470
17:00:00	16	49	42	0	5	107	31	118	0	0	0	149	4	5	15	0	5	24	11	145	15	0	1	171	451
17:15:00	20	28	42	0	3	90	37	98	5	0	0	140	2	7	15	0	2	24	13	134	14	0	2	161	415
Grand Total	76	141	161	0	12	378	155	498	11	0	4	664	10	30	51	0	20	91	52	578	54	0	7	684	**1817**
Approach%	20.1%	37.3%	42.6%	0%		-	23.3%	75%	1.7%	0%		-	11%	33%	56%	0%		-	7.6%	84.5%	7.9%	0%		-	**-**
Totals %	4.2%	7.8%	8.9%	0%		20.8%	8.5%	27.4%	0.6%	0%		36.5%	0.6%	1.7%	2.8%	0%		5%	2.9%	31.8%	3%	0%		37.6%	**-**
PHF	0.95	0.72	0.94	0		0.88	0.82	0.86	0.55	0		0.86	0.63	0.68	0.85	0		0.91	0.87	0.95	0.75	0		0.93	**-**
Heavy	1	0	3	0		4	2	6	0	0		8	0	0	1	0		1	1	8	0	0		9	**-**
Heavy %	1.3%	0%	1.9%	0%		1.1%	1.3%	1.2%	0%	0%		1.2%	0%	0%	2%	0%		1.1%	1.9%	1.4%	0%	0%		1.3%	**-**
Lights	75	141	157	0		373	151	490	11	0		652	10	30	50	0		90	50	567	53	0		670	**-**
Lights %	98.7%	100%	97.5%	0%		98.7%	97.4%	98.4%	100%	0%		98.2%	100%	100%	98%	0%		98.9%	96.2%	98.1%	98.1%	0%		98%	**-**
Single-Unit Trucks	1	0	2	0		3	1	2	0	0		3	0	0	0	0		0	1	4	0	0		5	**-**
Single-Unit Trucks %	1.3%	0%	1.2%	0%		0.8%	0.6%	0.4%	0%	0%		0.5%	0%	0%	0%	0%		0%	1.9%	0.7%	0%	0%		0.7%	**-**
Buses	0	0	1	0		1	1	2	0	0		3	0	0	1	0		1	0	3	0	0		3	**-**
Buses %	0%	0%	0.6%	0%		0.3%	0.6%	0.4%	0%	0%		0.5%	0%	0%	2%	0%		1.1%	0%	0.5%	0%	0%		0.4%	**-**
Articulated Trucks	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	1	0	0		1	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.1%	**-**
Bicycles on Road	0	0	1	0		1	2	2	0	0		4	0	0	0	0		0	1	3	1	0		5	**-**
Bicycles on Road %	0%	0%	0.6%	0%		0.3%	1.3%	0.4%	0%	0%		0.6%	0%	0%	0%	0%		0%	1.9%	0.5%	1.9%	0%		0.7%	**-**
Pedestrians	-	-	-	-	10	-	-	-	-	-	4	-	-	-	-	-	19	-	-	-	-	-	7	-	**-**
Pedestrians%	-	-	-	-	23.3%		-	-	-	-	9.3%		-	-	-	-	44.2%		-	-	-	-	16.3%		**-**
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	4.7%		-	-	-	-	0%		-	-	-	-	2.3%		-	-	-	-	0%		**-**

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

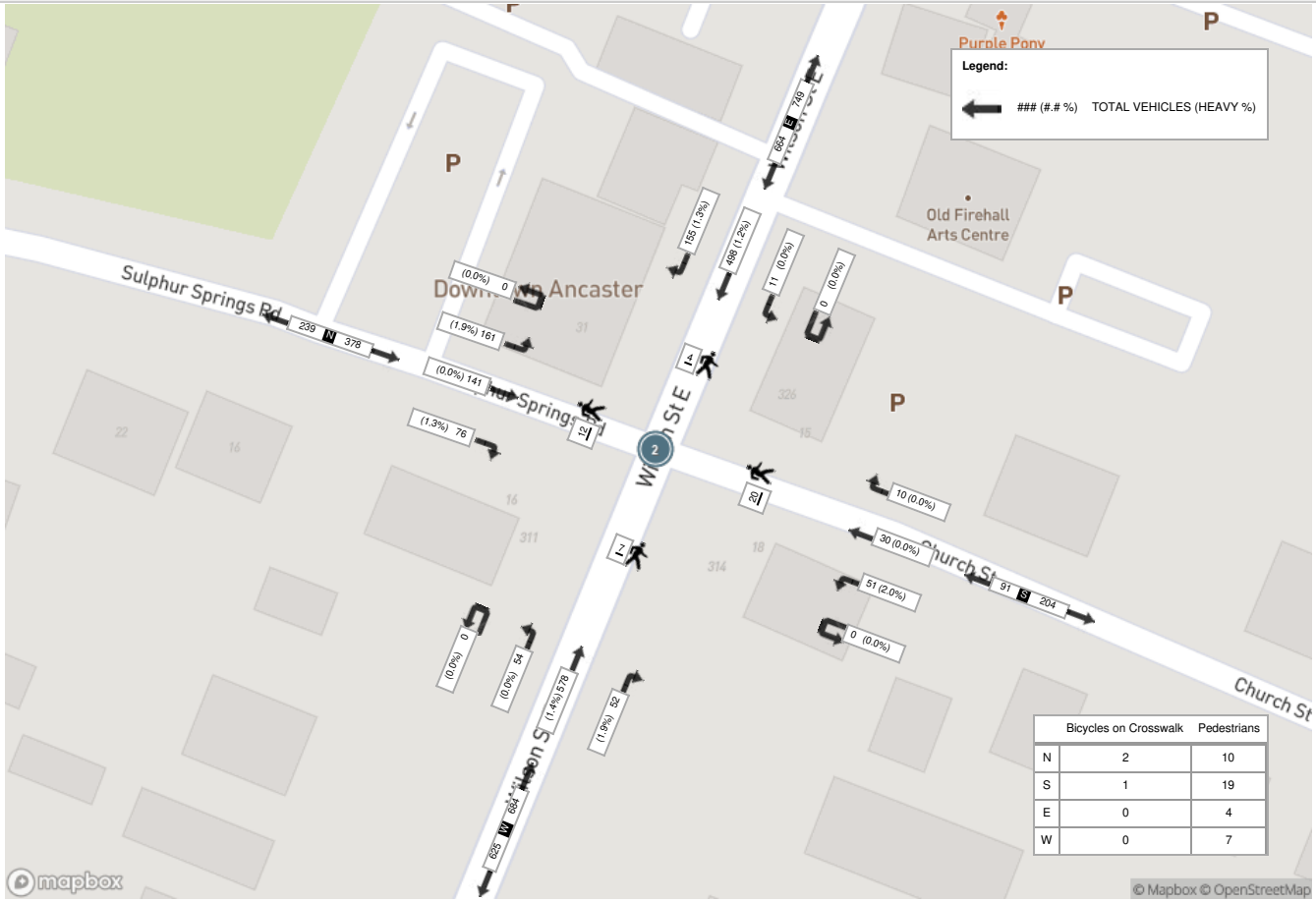
Peak Hour: 08:00 AM - 09:00 AM **Weather: Clear Sky (11.37 °C)**



	Bicycles on Crosswalk	Pedestrians
N	1	3
S	0	12
E	0	7
W	0	3

Crozier & Associates
SUITE 301 211 YONGE STREET
TORONTO ONTARIO, M5B 1M4
CANADA

Peak Hour: 04:30 PM - 05:30 PM **Weather: Broken Clouds (24.7 °C)**



APPENDIX D

Level of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX E

Detailed Capacity Analysis

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	78	105	94	134	59
Future Volume (vph)	22	78	105	94	134	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.936			
Flt Protected	0.950					0.966
Satd. Flow (prot)	1719	1568	1700	0	0	1824
Flt Permitted	0.950					0.966
Satd. Flow (perm)	1719	1568	1700	0	0	1824
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)	1	2				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	6%	3%	0%	2%
Adj. Flow (vph)	24	85	114	102	146	64
Shared Lane Traffic (%)						
Lane Group Flow (vph)	24	85	216	0	0	210
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	78	105	94	134	59
Future Vol, veh/h	22	78	105	94	134	59
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	3	6	3	0	2
Mvmt Flow	24	85	114	102	146	64
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	8.3	8.7	9.2
HCM LOS	A	A	A

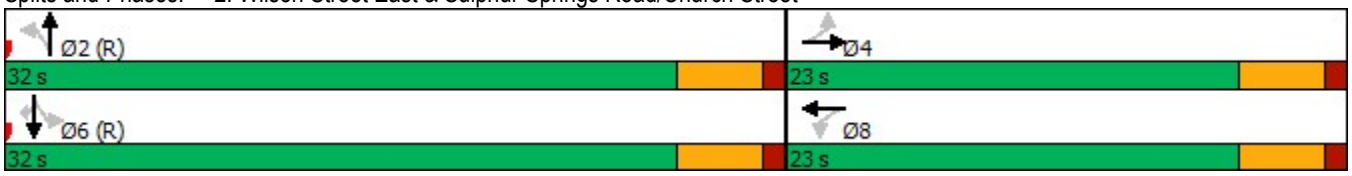
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	69%
Vol Thru, %	53%	0%	0%	31%
Vol Right, %	47%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	199	22	78	193
LT Vol	0	22	0	134
Through Vol	105	0	0	59
RT Vol	94	0	78	0
Lane Flow Rate	216	24	85	210
Geometry Grp	2	7	7	2
Degree of Util (X)	0.254	0.04	0.113	0.264
Departure Headway (Hd)	4.225	6.028	4.784	4.536
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	852	594	749	793
Service Time	2.244	3.76	2.516	2.557
HCM Lane V/C Ratio	0.254	0.04	0.113	0.265
HCM Control Delay	8.7	9	8.1	9.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.1	0.4	1.1

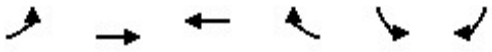
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	203	33	42	13	18	7	48	630	18	4	383	88
Future Volume (vph)	203	33	42	13	18	7	48	630	18	4	383	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		1.00	1.00		1.00		0.97
Frt		0.979			0.976			0.996				0.850
Flt Protected		0.965			0.983		0.950			0.950		
Satd. Flow (prot)	0	1742	0	0	1767	0	1805	1890	0	1787	1776	1615
Flt Permitted		0.759			0.879		0.463			0.230		
Satd. Flow (perm)	0	1360	0	0	1579	0	877	1890	0	431	1776	1573
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			7			4				92
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	7		3	3		7	4		12	12		4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	4%	0%	0%	4%	4%	0%	0%	0%	1%	7%	0%
Adj. Flow (vph)	211	34	44	14	19	7	50	656	19	4	399	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	289	0	0	40	0	50	675	0	4	399	92
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	23.0	23.0		23.0	23.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	41.8%	41.8%		41.8%	41.8%		58.2%	58.2%		58.2%	58.2%	58.2%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		18.5			18.5		27.5	27.5		27.5	27.5	27.5
Actuated g/C Ratio		0.34			0.34		0.50	0.50		0.50	0.50	0.50
v/c Ratio		0.62			0.07		0.11	0.71		0.02	0.45	0.11
Control Delay		21.1			11.4		8.2	15.9		7.2	10.9	2.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		21.1			11.4		8.2	15.9		7.2	10.9	2.4
LOS		C			B		A	B		A	B	A
Approach Delay		21.1			11.4			15.3			9.3	
Approach LOS		C			B			B			A	
Queue Length 50th (m)		23.0			2.3		2.5	49.8		0.2	24.6	0.0
Queue Length 95th (m)		45.5			7.7		7.3	85.2		1.5	43.2	5.4
Internal Link Dist (m)		612.9			133.9			78.9			72.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)							35.0			35.0		35.0
Base Capacity (vph)		469			535		438	947		215	888	832
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		0.62			0.07		0.11	0.71		0.02	0.45	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 14.4		Intersection LOS: B	
Intersection Capacity Utilization 69.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	231	102	0	0	0
Future Volume (vph)	0	231	102	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	0	1881	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1881	1863	0	1863	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	2			2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%
Adj. Flow (vph)	0	254	112	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	254	112	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 15.5%		ICU Level of Service A	
Analysis Period (min) 15			

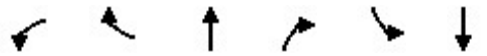
Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	297	211	0	0	1
Future Vol, veh/h	1	297	211	0	0	1
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	1	2	2	0
Mvmt Flow	1	309	220	0	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	223	0	-	0	534	223
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	311	-
Critical Hdwy	4.1	-	-	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.3
Pot Cap-1 Maneuver	1358	-	-	-	507	822
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	743	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1355	-	-	-	503	820
Mov Cap-2 Maneuver	-	-	-	-	503	-
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	741	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1355	-	-	-	820
HCM Lane V/C Ratio	0.001	-	-	-	0.001
HCM Control Delay (s)	7.7	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	72	114	112	59	244	139
Future Volume (vph)	72	114	112	59	244	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.953			
Flt Protected	0.950					0.969
Satd. Flow (prot)	1805	1615	1811	0	0	1811
Flt Permitted	0.950					0.969
Satd. Flow (perm)	1805	1615	1811	0	0	1811
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)		1				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%
Adj. Flow (vph)	73	116	114	60	249	142
Shared Lane Traffic (%)						
Lane Group Flow (vph)	73	116	174	0	0	391
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	72	114	112	59	244	139
Future Vol, veh/h	72	114	112	59	244	139
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	0	0	0	0	2	1
Mvmt Flow	73	116	114	60	249	142
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	9.3	9.1	12.8
HCM LOS	A	A	B

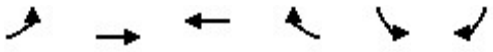
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	64%
Vol Thru, %	65%	0%	0%	36%
Vol Right, %	35%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	171	72	114	383
LT Vol	0	72	0	244
Through Vol	112	0	0	139
RT Vol	59	0	114	0
Lane Flow Rate	174	73	116	391
Geometry Grp	2	7	7	2
Degree of Util (X)	0.226	0.129	0.165	0.517
Departure Headway (Hd)	4.653	6.307	5.094	4.758
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	766	565	698	754
Service Time	2.716	4.084	2.87	2.81
HCM Lane V/C Ratio	0.227	0.129	0.166	0.519
HCM Control Delay	9.1	10	8.9	12.8
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.9	0.4	0.6	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	141	76	51	30	10	54	578	52	11	498	155
Future Volume (vph)	161	141	76	51	30	10	54	578	52	11	498	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.99	1.00		0.99		0.96
Frt		0.973			0.985			0.988				0.850
Flt Protected		0.979			0.973		0.950			0.950		
Satd. Flow (prot)	0	1778	0	0	1800	0	1770	1870	0	1770	1900	1583
Flt Permitted		0.817			0.745		0.337			0.218		
Satd. Flow (perm)	0	1481	0	0	1374	0	623	1870	0	403	1900	1523
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			11			11				165
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	4		7	7		4	12		20	20		12
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	2%	0%	0%	2%	0%	2%
Adj. Flow (vph)	171	150	81	54	32	11	57	615	55	12	530	165
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	402	0	0	97	0	57	670	0	12	530	165
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	24.0	24.0		24.0	24.0		31.0	31.0		31.0	31.0	31.0
Total Split (%)	43.6%	43.6%		43.6%	43.6%		56.4%	56.4%		56.4%	56.4%	56.4%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		19.5			19.5		26.5	26.5		26.5	26.5	26.5
Actuated g/C Ratio		0.35			0.35		0.48	0.48		0.48	0.48	0.48
v/c Ratio		0.74			0.20		0.19	0.74		0.06	0.58	0.20
Control Delay		25.4			12.5		10.2	17.7		8.7	13.4	2.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		25.4			12.5		10.2	17.7		8.7	13.4	2.4
LOS		C			B		B	B		A	B	A
Approach Delay		25.4			12.5			17.1			10.8	
Approach LOS		C			B			B			B	
Queue Length 50th (m)		33.4			6.0		3.1	51.2		0.6	36.8	0.0
Queue Length 95th (m)		#73.6			14.8		9.2	#89.5		3.0	62.3	7.6
Internal Link Dist (m)		612.9			133.9			78.9			72.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)							35.0			35.0		35.0
Base Capacity (vph)		541			494		300	906		194	915	819
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		0.74			0.20		0.19	0.74		0.06	0.58	0.20

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 16.3		Intersection LOS: B	
Intersection Capacity Utilization 72.9%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	297	211	0	0	1
Future Volume (vph)	1	297	211	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	0	1863	1881	0	1644	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1881	0	1644	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	3			3		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	1%	2%	2%	0%
Adj. Flow (vph)	1	309	220	0	0	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	310	220	0	1	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 26.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	297	211	0	0	1
Future Vol, veh/h	1	297	211	0	0	1
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	1	2	2	0
Mvmt Flow	1	309	220	0	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	223	0	-	0	534	223
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	311	-
Critical Hdwy	4.1	-	-	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.3
Pot Cap-1 Maneuver	1358	-	-	-	507	822
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	743	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1355	-	-	-	503	820
Mov Cap-2 Maneuver	-	-	-	-	503	-
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	741	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1355	-	-	-	820
HCM Lane V/C Ratio	0.001	-	-	-	0.001
HCM Control Delay (s)	7.7	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	41	118	131	139	185	74
Future Volume (vph)	41	118	131	139	185	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.930			
Flt Protected	0.950					0.965
Satd. Flow (prot)	1719	1568	1692	0	0	1823
Flt Permitted	0.950					0.965
Satd. Flow (perm)	1719	1568	1692	0	0	1823
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)	1	2				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	6%	3%	0%	2%
Adj. Flow (vph)	45	128	142	151	201	80
Shared Lane Traffic (%)						
Lane Group Flow (vph)	45	128	293	0	0	281
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	118	131	139	185	74
Future Vol, veh/h	41	118	131	139	185	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	3	6	3	0	2
Mvmt Flow	45	128	142	151	201	80
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	9.3	10.1	10.8
HCM LOS	A	B	B

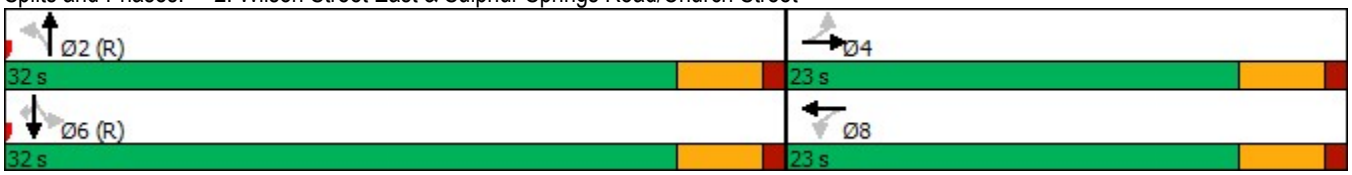
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	71%
Vol Thru, %	49%	0%	0%	29%
Vol Right, %	51%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	270	41	118	259
LT Vol	0	41	0	185
Through Vol	131	0	0	74
RT Vol	139	0	118	0
Lane Flow Rate	293	45	128	282
Geometry Grp	2	7	7	2
Degree of Util (X)	0.365	0.079	0.183	0.377
Departure Headway (Hd)	4.481	6.381	5.134	4.82
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	798	558	694	743
Service Time	2.53	4.154	2.906	2.871
HCM Lane V/C Ratio	0.367	0.081	0.184	0.38
HCM Control Delay	10.1	9.7	9.1	10.8
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.7	0.3	0.7	1.8

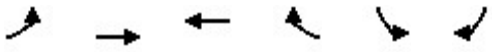
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	277	42	69	17	23	9	63	791	23	5	491	142
Future Volume (vph)	277	42	69	17	23	9	63	791	23	5	491	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		1.00	1.00				0.97
Frt		0.976			0.976			0.996				0.850
Flt Protected		0.966			0.983		0.950			0.950		
Satd. Flow (prot)	0	1739	0	0	1767	0	1805	1890	0	1787	1776	1615
Flt Permitted		0.756			0.852		0.365			0.145		
Satd. Flow (perm)	0	1351	0	0	1531	0	692	1890	0	273	1776	1573
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			9			4				148
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	7		3	3		7	4		12	12		4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	4%	0%	0%	4%	4%	0%	0%	0%	1%	7%	0%
Adj. Flow (vph)	289	44	72	18	24	9	66	824	24	5	511	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	405	0	0	51	0	66	848	0	5	511	148
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	23.0	23.0		23.0	23.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	41.8%	41.8%		41.8%	41.8%		58.2%	58.2%		58.2%	58.2%	58.2%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		18.5			18.5		27.5	27.5		27.5	27.5	27.5
Actuated g/C Ratio		0.34			0.34		0.50	0.50		0.50	0.50	0.50
v/c Ratio		0.87			0.10		0.19	0.90		0.04	0.58	0.17
Control Delay		38.6			11.6		9.4	27.7		8.0	12.9	2.2
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		38.6			11.6		9.4	27.7		8.0	12.9	2.2
LOS		D			B		A	C		A	B	A
Approach Delay		38.6			11.6			26.4			10.5	
Approach LOS		D			B			C			B	
Queue Length 50th (m)		36.8			2.9		3.5	73.0		0.2	34.4	0.0
Queue Length 95th (m)		#83.9			9.0		9.7	#146.1		1.7	59.4	6.8
Internal Link Dist (m)		612.9			133.9			78.9			72.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)							35.0			35.0		35.0
Base Capacity (vph)		468			520		346	947		136	888	860
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		0.87			0.10		0.19	0.90		0.04	0.58	0.17

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 23.3		Intersection LOS: C	
Intersection Capacity Utilization 87.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	327	161	0	0	0
Future Volume (vph)	0	327	161	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	0	1881	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1881	1863	0	1863	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	2			2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%
Adj. Flow (vph)	0	359	177	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	359	177	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	327	161	0	0	0
Future Vol, veh/h	0	327	161	0	0	0
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	1	2	2	2	2
Mvmt Flow	0	359	177	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	179	0	-	0	538	179
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	359	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1397	-	-	-	504	864
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1395	-	-	-	502	863
Mov Cap-2 Maneuver	-	-	-	-	502	-
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	706	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1395	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	107	167	140	100	330	173
Future Volume (vph)	107	167	140	100	330	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.944			
Flt Protected	0.950					0.968
Satd. Flow (prot)	1805	1615	1794	0	0	1809
Flt Permitted	0.950					0.968
Satd. Flow (perm)	1805	1615	1794	0	0	1809
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)		1				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%
Adj. Flow (vph)	109	170	143	102	337	177
Shared Lane Traffic (%)						
Lane Group Flow (vph)	109	170	245	0	0	514
Sign Control	Stop		Stop			Stop

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

Intersection	
Intersection Delay, s/veh	16.5
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	107	167	140	100	330	173
Future Vol, veh/h	107	167	140	100	330	173
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	0	0	0	0	2	1
Mvmt Flow	109	170	143	102	337	177
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	11	11.1	22
HCM LOS	B	B	C

Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	66%
Vol Thru, %	58%	0%	0%	34%
Vol Right, %	42%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	240	107	167	503
LT Vol	0	107	0	330
Through Vol	140	0	0	173
RT Vol	100	0	167	0
Lane Flow Rate	245	109	170	513
Geometry Grp	2	7	7	2
Degree of Util (X)	0.354	0.211	0.271	0.746
Departure Headway (Hd)	5.202	6.948	5.727	5.229
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	691	516	627	693
Service Time	3.238	4.687	3.466	3.257
HCM Lane V/C Ratio	0.355	0.211	0.271	0.74
HCM Control Delay	11.1	11.5	10.6	22
HCM Lane LOS	B	B	B	C
HCM 95th-tile Q	1.6	0.8	1.1	6.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	249	176	100	64	38	13	77	743	65	14	640	226
Future Volume (vph)	249	176	100	64	38	13	77	743	65	14	640	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00		1.00	1.00				0.96
Frt		0.974			0.985			0.988				0.850
Flt Protected		0.977			0.973		0.950			0.950		
Satd. Flow (prot)	0	1779	0	0	1800	0	1770	1870	0	1770	1900	1583
Flt Permitted		0.805			0.678		0.209			0.151		
Satd. Flow (perm)	0	1462	0	0	1252	0	388	1870	0	281	1900	1523
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			13			11				239
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	4		7	7		4	12		20	20		12
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	2%	0%	0%	2%	0%	2%
Adj. Flow (vph)	265	187	106	68	40	14	82	790	69	15	681	240
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	558	0	0	122	0	82	859	0	15	681	240
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	24.0	24.0		24.0	24.0		31.0	31.0		31.0	31.0	31.0
Total Split (%)	43.6%	43.6%		43.6%	43.6%		56.4%	56.4%		56.4%	56.4%	56.4%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		19.5			19.5		26.5	26.5		26.5	26.5	26.5
Actuated g/C Ratio		0.35			0.35		0.48	0.48		0.48	0.48	0.48
v/c Ratio		1.05			0.27		0.44	0.95		0.11	0.74	0.28
Control Delay		73.6			13.4		18.8	36.3		10.4	18.1	2.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		73.6			13.4		18.8	36.3		10.4	18.1	2.4
LOS		E			B		B	D		B	B	A
Approach Delay		73.6			13.4			34.8			13.9	
Approach LOS		E			B			C			B	
Queue Length 50th (m)		~64.4			7.9		5.2	78.2		0.8	53.2	0.1
Queue Length 95th (m)		#117.9			18.4		17.4	#153.4		3.8	#92.1	9.1
Internal Link Dist (m)		612.9			133.9			78.9			72.1	

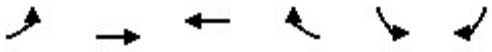
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)							35.0			35.0		35.0
Base Capacity (vph)		533			452		186	906		135	915	857
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		1.05			0.27		0.44	0.95		0.11	0.74	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 1.05			
Intersection Signal Delay: 34.6		Intersection LOS: C	
Intersection Capacity Utilization 92.6%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	422	305	0	0	2
Future Volume (vph)	2	422	305	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	0	1863	1881	0	1644	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1881	0	1644	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	3			3		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	1%	2%	2%	0%
Adj. Flow (vph)	2	440	318	0	0	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	442	318	0	2	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	422	305	0	0	2
Future Vol, veh/h	2	422	305	0	0	2
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	1	2	2	0
Mvmt Flow	2	440	318	0	0	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	321	0	-	0	765	321
Stage 1	-	-	-	-	321	-
Stage 2	-	-	-	-	444	-
Critical Hdwy	4.1	-	-	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.3
Pot Cap-1 Maneuver	1250	-	-	-	371	724
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1247	-	-	-	368	722
Mov Cap-2 Maneuver	-	-	-	-	368	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	644	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1247	-	-	-	722
HCM Lane V/C Ratio	0.002	-	-	-	0.003
HCM Control Delay (s)	7.9	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	46	125	131	142	188	74
Future Volume (vph)	46	125	131	142	188	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.930			
Flt Protected	0.950					0.965
Satd. Flow (prot)	1719	1568	1692	0	0	1823
Flt Permitted	0.950					0.965
Satd. Flow (perm)	1719	1568	1692	0	0	1823
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)	1	2				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	6%	3%	0%	2%
Adj. Flow (vph)	50	136	142	154	204	80
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	136	296	0	0	284
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	125	131	142	188	74
Future Vol, veh/h	46	125	131	142	188	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	3	6	3	0	2
Mvmt Flow	50	136	142	154	204	80
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	9.4	10.3	11
HCM LOS	A	B	B

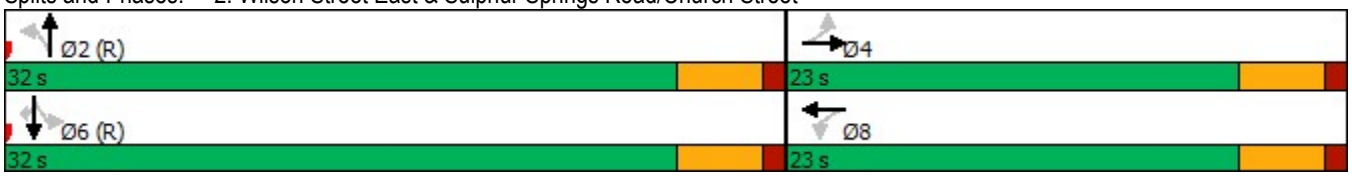
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	72%
Vol Thru, %	48%	0%	0%	28%
Vol Right, %	52%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	273	46	125	262
LT Vol	0	46	0	188
Through Vol	131	0	0	74
RT Vol	142	0	125	0
Lane Flow Rate	297	50	136	285
Geometry Grp	2	7	7	2
Degree of Util (X)	0.373	0.089	0.195	0.385
Departure Headway (Hd)	4.52	6.402	5.154	4.863
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	792	556	690	735
Service Time	2.575	4.181	2.933	2.92
HCM Lane V/C Ratio	0.375	0.09	0.197	0.388
HCM Control Delay	10.3	9.8	9.2	11
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.7	0.3	0.7	1.8

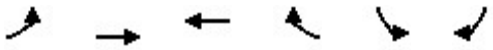
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	42	71	17	23	9	64	791	23	5	491	144
Future Volume (vph)	293	42	71	17	23	9	64	791	23	5	491	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		1.00	1.00				0.97
Frt		0.976			0.976			0.996				0.850
Flt Protected		0.965			0.983		0.950			0.950		
Satd. Flow (prot)	0	1737	0	0	1767	0	1805	1890	0	1787	1776	1615
Flt Permitted		0.754			0.858		0.365			0.145		
Satd. Flow (perm)	0	1347	0	0	1542	0	692	1890	0	273	1776	1573
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			9			4				150
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	7		3	3		7	4		12	12		4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	4%	0%	0%	4%	4%	0%	0%	0%	1%	7%	0%
Adj. Flow (vph)	305	44	74	18	24	9	67	824	24	5	511	150
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	423	0	0	51	0	67	848	0	5	511	150
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	23.0	23.0		23.0	23.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	41.8%	41.8%		41.8%	41.8%		58.2%	58.2%		58.2%	58.2%	58.2%
Maximum Green (s)	18.5	18.5		18.5	18.5		27.5	27.5		27.5	27.5	27.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		18.5			18.5		27.5	27.5		27.5	27.5	27.5
Actuated g/C Ratio		0.34			0.34		0.50	0.50		0.50	0.50	0.50
v/c Ratio		0.91			0.10		0.19	0.90		0.04	0.58	0.17
Control Delay		44.4			11.5		9.5	27.7		8.0	12.9	2.2
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		44.4			11.5		9.5	27.7		8.0	12.9	2.2
LOS		D			B		A	C		A	B	A
Approach Delay		44.4			11.5			26.4			10.5	
Approach LOS		D			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 24.6		Intersection LOS: C	
Intersection Capacity Utilization 88.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	327	161	4	19	11
Future Volume (vph)	7	327	161	4	19	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.997		0.951	
Flt Protected		0.999			0.969	
Satd. Flow (prot)	0	1879	1857	0	1717	0
Flt Permitted		0.999			0.969	
Satd. Flow (perm)	0	1879	1857	0	1717	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	2			2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%
Adj. Flow (vph)	8	359	177	4	21	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	367	181	0	33	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	327	161	4	19	11
Future Vol, veh/h	7	327	161	4	19	11
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	1	2	2	2	2
Mvmt Flow	8	359	177	4	21	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	183	0	-	0	556	181
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	375	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1392	-	-	-	492	862
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	695	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1390	-	-	-	487	861
Mov Cap-2 Maneuver	-	-	-	-	487	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	694	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1390	-	-	-	579
HCM Lane V/C Ratio	0.006	-	-	-	0.057
HCM Control Delay (s)	7.6	0	-	-	11.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	110	172	140	107	336	173
Future Volume (vph)	110	172	140	107	336	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.942			
Flt Protected	0.950					0.968
Satd. Flow (prot)	1805	1615	1790	0	0	1809
Flt Permitted	0.950					0.968
Satd. Flow (perm)	1805	1615	1790	0	0	1809
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)		1				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%
Adj. Flow (vph)	112	176	143	109	343	177
Shared Lane Traffic (%)						
Lane Group Flow (vph)	112	176	252	0	0	520
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.9%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	17.1
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	110	172	140	107	336	173
Future Vol, veh/h	110	172	140	107	336	173
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	0	0	0	0	2	1
Mvmt Flow	112	176	143	109	343	177
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	11.2	11.3	23.1
HCM LOS	B	B	C

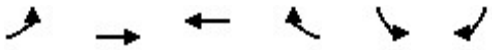
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	66%
Vol Thru, %	57%	0%	0%	34%
Vol Right, %	43%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	247	110	172	509
LT Vol	0	110	0	336
Through Vol	140	0	0	173
RT Vol	107	0	172	0
Lane Flow Rate	252	112	176	519
Geometry Grp	2	7	7	2
Degree of Util (X)	0.366	0.218	0.281	0.76
Departure Headway (Hd)	5.233	6.988	5.767	5.268
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	686	514	623	686
Service Time	3.272	4.728	3.507	3.298
HCM Lane V/C Ratio	0.367	0.218	0.283	0.757
HCM Control Delay	11.3	11.7	10.8	23.1
HCM Lane LOS	B	B	B	C
HCM 95th-tile Q	1.7	0.8	1.1	7.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	176	103	64	38	13	81	743	65	14	640	239
Future Volume (vph)	257	176	103	64	38	13	81	743	65	14	640	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00		1.00	1.00				0.96
Frt		0.974			0.985			0.988				0.850
Flt Protected		0.977			0.973		0.950			0.950		
Satd. Flow (prot)	0	1779	0	0	1800	0	1770	1870	0	1770	1900	1583
Flt Permitted		0.804			0.677		0.209			0.151		
Satd. Flow (perm)	0	1460	0	0	1250	0	388	1870	0	281	1900	1523
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			13			11				253
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	4		7	7		4	12		20	20		12
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	2%	0%	0%	2%	0%	2%
Adj. Flow (vph)	273	187	110	68	40	14	86	790	69	15	681	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	570	0	0	122	0	86	859	0	15	681	254
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	24.0	24.0		24.0	24.0		31.0	31.0		31.0	31.0	31.0
Total Split (%)	43.6%	43.6%		43.6%	43.6%		56.4%	56.4%		56.4%	56.4%	56.4%
Maximum Green (s)	19.5	19.5		19.5	19.5		26.5	26.5		26.5	26.5	26.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		19.5			19.5		26.5	26.5		26.5	26.5	26.5
Actuated g/C Ratio		0.35			0.35		0.48	0.48		0.48	0.48	0.48
v/c Ratio		1.07			0.27		0.46	0.95		0.11	0.74	0.29
Control Delay		80.6			13.4		19.6	36.3		10.4	18.1	2.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		80.6			13.4		19.6	36.3		10.4	18.1	2.4
LOS		F			B		B	D		B	B	A
Approach Delay		80.6			13.4			34.8			13.8	
Approach LOS		F			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 36.2		Intersection LOS: D	
Intersection Capacity Utilization 93.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	422	305	17	12	10
Future Volume (vph)	15	422	305	17	12	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.941	
Flt Protected		0.998			0.973	
Satd. Flow (prot)	0	1860	1867	0	1720	0
Flt Permitted		0.998			0.973	
Satd. Flow (perm)	0	1860	1867	0	1720	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	3			3		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	1%	2%	2%	0%
Adj. Flow (vph)	16	440	318	18	13	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	456	336	0	23	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	422	305	17	12	10
Future Vol, veh/h	15	422	305	17	12	10
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	1	2	2	0
Mvmt Flow	16	440	318	18	13	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	339	0	-	0	802	330
Stage 1	-	-	-	-	330	-
Stage 2	-	-	-	-	472	-
Critical Hdwy	4.1	-	-	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.3
Pot Cap-1 Maneuver	1231	-	-	-	353	716
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1228	-	-	-	345	714
Mov Cap-2 Maneuver	-	-	-	-	345	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	626	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1228	-	-	-	451
HCM Lane V/C Ratio	0.013	-	-	-	0.051
HCM Control Delay (s)	8	0	-	-	13.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	41	118	131	139	185	74
Future Volume (vph)	41	118	131	139	185	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.930			
Flt Protected	0.950					0.965
Satd. Flow (prot)	1719	1568	1692	0	0	1823
Flt Permitted	0.950					0.965
Satd. Flow (perm)	1719	1568	1692	0	0	1823
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)	1	2				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	6%	3%	0%	2%
Adj. Flow (vph)	45	128	142	151	201	80
Shared Lane Traffic (%)						
Lane Group Flow (vph)	45	128	293	0	0	281
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	118	131	139	185	74
Future Vol, veh/h	41	118	131	139	185	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	3	6	3	0	2
Mvmt Flow	45	128	142	151	201	80
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	9.3	10.1	10.8
HCM LOS	A	B	B

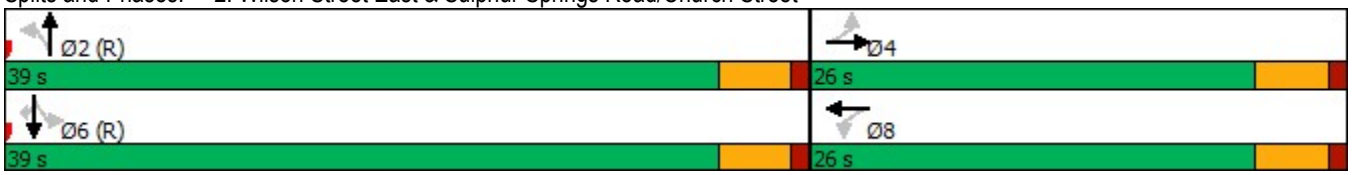
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	71%
Vol Thru, %	49%	0%	0%	29%
Vol Right, %	51%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	270	41	118	259
LT Vol	0	41	0	185
Through Vol	131	0	0	74
RT Vol	139	0	118	0
Lane Flow Rate	293	45	128	282
Geometry Grp	2	7	7	2
Degree of Util (X)	0.365	0.079	0.183	0.377
Departure Headway (Hd)	4.481	6.381	5.134	4.82
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	798	558	694	743
Service Time	2.53	4.154	2.906	2.871
HCM Lane V/C Ratio	0.367	0.081	0.184	0.38
HCM Control Delay	10.1	9.7	9.1	10.8
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.7	0.3	0.7	1.8

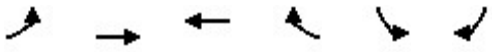
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	277	42	69	17	23	9	63	791	23	5	491	142
Future Volume (vph)	277	42	69	17	23	9	63	791	23	5	491	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		1.00	1.00				0.97
Frt		0.976			0.976			0.996				0.850
Flt Protected		0.966			0.983		0.950			0.950		
Satd. Flow (prot)	0	1739	0	0	1767	0	1805	1890	0	1787	1776	1615
Flt Permitted		0.756			0.861		0.371			0.119		
Satd. Flow (perm)	0	1349	0	0	1546	0	703	1890	0	224	1776	1571
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			9			3				148
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	7		3	3		7	4		12	12		4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	4%	0%	0%	4%	4%	0%	0%	0%	1%	7%	0%
Adj. Flow (vph)	289	44	72	18	24	9	66	824	24	5	511	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	405	0	0	51	0	66	848	0	5	511	148
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	26.0	26.0		26.0	26.0		39.0	39.0		39.0	39.0	39.0
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	60.0%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		21.5			21.5		34.5	34.5		34.5	34.5	34.5
Actuated g/C Ratio		0.33			0.33		0.53	0.53		0.53	0.53	0.53
v/c Ratio		0.88			0.10		0.18	0.84		0.04	0.54	0.16
Control Delay		44.1			13.7		9.5	23.2		8.6	12.8	2.1
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		44.1			13.7		9.5	23.2		8.6	12.8	2.1
LOS		D			B		A	C		A	B	A
Approach Delay		44.1			13.7			22.2			10.4	
Approach LOS		D			B			C			B	
Queue Length 50th (m)		45.7			3.6		4.0	83.4		0.3	39.1	0.0
Queue Length 95th (m)		#96.2			10.4		10.3	#158.3		1.8	64.4	7.0
Internal Link Dist (m)		612.9			133.9			78.9			72.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)							35.0			35.0		35.0
Base Capacity (vph)		458			517		373	1004		118	942	903
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		0.88			0.10		0.18	0.84		0.04	0.54	0.16

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 22.5		Intersection LOS: C	
Intersection Capacity Utilization 87.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	327	161	0	0	0
Future Volume (vph)	0	327	161	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	0	1881	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1881	1863	0	1863	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	2			2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%
Adj. Flow (vph)	0	359	177	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	359	177	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	327	161	0	0	0
Future Vol, veh/h	0	327	161	0	0	0
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	1	2	2	2	2
Mvmt Flow	0	359	177	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	179	0	-	0	538	179
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	359	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1397	-	-	-	504	864
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1395	-	-	-	502	863
Mov Cap-2 Maneuver	-	-	-	-	502	-
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	706	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1395	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	107	167	140	100	330	173
Future Volume (vph)	107	167	140	100	330	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.944			
Flt Protected	0.950					0.968
Satd. Flow (prot)	1805	1615	1794	0	0	1809
Flt Permitted	0.950					0.968
Satd. Flow (perm)	1805	1615	1794	0	0	1809
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)		1				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%
Adj. Flow (vph)	109	170	143	102	337	177
Shared Lane Traffic (%)						
Lane Group Flow (vph)	109	170	245	0	0	514
Sign Control	Stop		Stop			Stop

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

Intersection	
Intersection Delay, s/veh	16.5
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	107	167	140	100	330	173
Future Vol, veh/h	107	167	140	100	330	173
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	0	0	0	0	2	1
Mvmt Flow	109	170	143	102	337	177
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	11	11.1	22
HCM LOS	B	B	C

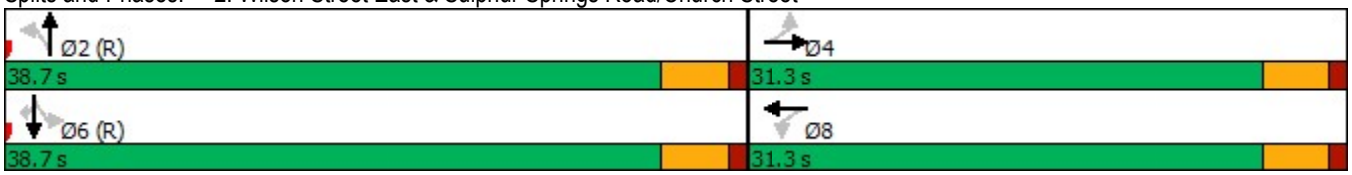
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	66%
Vol Thru, %	58%	0%	0%	34%
Vol Right, %	42%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	240	107	167	503
LT Vol	0	107	0	330
Through Vol	140	0	0	173
RT Vol	100	0	167	0
Lane Flow Rate	245	109	170	513
Geometry Grp	2	7	7	2
Degree of Util (X)	0.354	0.211	0.271	0.746
Departure Headway (Hd)	5.202	6.948	5.727	5.229
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	691	516	627	693
Service Time	3.238	4.687	3.466	3.257
HCM Lane V/C Ratio	0.355	0.211	0.271	0.74
HCM Control Delay	11.1	11.5	10.6	22
HCM Lane LOS	B	B	B	C
HCM 95th-tile Q	1.6	0.8	1.1	6.7

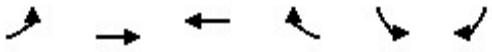
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	249	176	100	64	38	13	77	743	65	14	640	226
Future Volume (vph)	249	176	100	64	38	13	77	743	65	14	640	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		1.00	1.00				0.96
Frt		0.974			0.985			0.988				0.850
Flt Protected		0.977			0.973		0.950			0.950		
Satd. Flow (prot)	0	1778	0	0	1799	0	1770	1868	0	1770	1900	1583
Flt Permitted		0.805			0.670		0.201			0.117		
Satd. Flow (perm)	0	1461	0	0	1236	0	373	1868	0	218	1900	1515
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			11			9				190
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	4		7	7		4	12		20	20		12
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	2%	0%	0%	2%	0%	2%
Adj. Flow (vph)	265	187	106	68	40	14	82	790	69	15	681	240
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	558	0	0	122	0	82	859	0	15	681	240
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	31.3	31.3		31.3	31.3		38.7	38.7		38.7	38.7	38.7
Total Split (%)	44.7%	44.7%		44.7%	44.7%		55.3%	55.3%		55.3%	55.3%	55.3%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		26.8			26.8		34.2	34.2		34.2	34.2	34.2
Actuated g/C Ratio		0.38			0.38		0.49	0.49		0.49	0.49	0.49
v/c Ratio		0.98			0.25		0.45	0.94		0.14	0.73	0.29
Control Delay		56.2			15.2		21.8	36.8		14.0	20.1	3.9
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		56.2			15.2		21.8	36.8		14.0	20.1	3.9
LOS		E			B		C	D		B	C	A
Approach Delay		56.2			15.2			35.5			15.9	
Approach LOS		E			B			D			B	
Queue Length 50th (m)		71.6			10.1		7.0	104.0		1.1	70.3	3.4
Queue Length 95th (m)		#136.8			21.7		20.7	#184.6		4.9	110.9	14.5
Internal Link Dist (m)		612.9			133.9			78.9			72.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (m)							35.0			35.0		35.0
Base Capacity (vph)		571			480		182	917		106	928	837
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		0.98			0.25		0.45	0.94		0.14	0.73	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 31.9		Intersection LOS: C	
Intersection Capacity Utilization 92.6%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	422	305	0	0	2
Future Volume (vph)	2	422	305	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	0	1863	1881	0	1644	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1881	0	1644	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	3			3		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	1%	2%	2%	0%
Adj. Flow (vph)	2	440	318	0	0	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	442	318	0	2	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	422	305	0	0	2
Future Vol, veh/h	2	422	305	0	0	2
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	1	2	2	0
Mvmt Flow	2	440	318	0	0	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	321	0	-	0	765	321
Stage 1	-	-	-	-	321	-
Stage 2	-	-	-	-	444	-
Critical Hdwy	4.1	-	-	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.3
Pot Cap-1 Maneuver	1250	-	-	-	371	724
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1247	-	-	-	368	722
Mov Cap-2 Maneuver	-	-	-	-	368	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	644	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1247	-	-	-	722
HCM Lane V/C Ratio	0.002	-	-	-	0.003
HCM Control Delay (s)	7.9	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	46	125	131	142	188	74
Future Volume (vph)	46	125	131	142	188	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.930			
Flt Protected	0.950					0.965
Satd. Flow (prot)	1719	1568	1692	0	0	1823
Flt Permitted	0.950					0.965
Satd. Flow (perm)	1719	1568	1692	0	0	1823
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)	1	2				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	6%	3%	0%	2%
Adj. Flow (vph)	50	136	142	154	204	80
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	136	296	0	0	284
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	125	131	142	188	74
Future Vol, veh/h	46	125	131	142	188	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	3	6	3	0	2
Mvmt Flow	50	136	142	154	204	80
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	9.4	10.3	11
HCM LOS	A	B	B

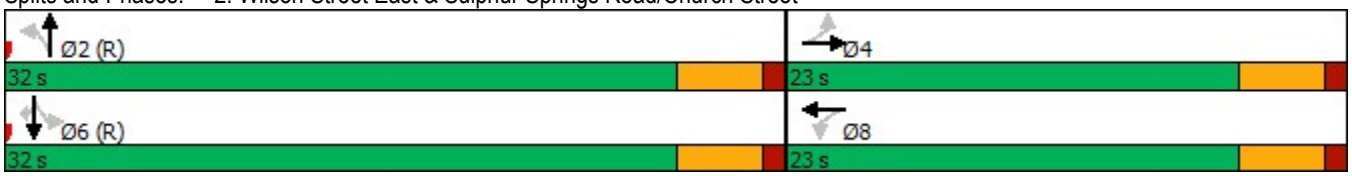
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	72%
Vol Thru, %	48%	0%	0%	28%
Vol Right, %	52%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	273	46	125	262
LT Vol	0	46	0	188
Through Vol	131	0	0	74
RT Vol	142	0	125	0
Lane Flow Rate	297	50	136	285
Geometry Grp	2	7	7	2
Degree of Util (X)	0.373	0.089	0.195	0.385
Departure Headway (Hd)	4.52	6.402	5.154	4.863
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	792	556	690	735
Service Time	2.575	4.181	2.933	2.92
HCM Lane V/C Ratio	0.375	0.09	0.197	0.388
HCM Control Delay	10.3	9.8	9.2	11
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.7	0.3	0.7	1.8

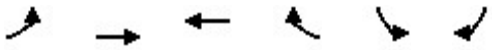
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	42	71	17	23	9	64	791	23	5	491	144
Future Volume (vph)	293	42	71	17	23	9	64	791	23	5	491	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		1.00	1.00				0.97
Frt		0.976			0.976			0.996				0.850
Flt Protected		0.965			0.983		0.950			0.950		
Satd. Flow (prot)	0	1737	0	0	1767	0	1805	1890	0	1787	1776	1615
Flt Permitted		0.754			0.858		0.365			0.145		
Satd. Flow (perm)	0	1347	0	0	1542	0	692	1890	0	273	1776	1573
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			9			4				150
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	7		3	3		7	4		12	12		4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	4%	0%	0%	4%	4%	0%	0%	0%	1%	7%	0%
Adj. Flow (vph)	305	44	74	18	24	9	67	824	24	5	511	150
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	423	0	0	51	0	67	848	0	5	511	150
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	23.0	23.0		23.0	23.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	41.8%	41.8%		41.8%	41.8%		58.2%	58.2%		58.2%	58.2%	58.2%
Maximum Green (s)	18.5	18.5		18.5	18.5		27.5	27.5		27.5	27.5	27.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		18.5			18.5		27.5	27.5		27.5	27.5	27.5
Actuated g/C Ratio		0.34			0.34		0.50	0.50		0.50	0.50	0.50
v/c Ratio		0.91			0.10		0.19	0.90		0.04	0.58	0.17
Control Delay		44.4			11.5		9.5	27.7		8.0	12.9	2.2
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		44.4			11.5		9.5	27.7		8.0	12.9	2.2
LOS		D			B		A	C		A	B	A
Approach Delay		44.4			11.5			26.4			10.5	
Approach LOS		D			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 24.6		Intersection LOS: C	
Intersection Capacity Utilization 88.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	327	161	4	19	11
Future Volume (vph)	7	327	161	4	19	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.997		0.951	
Flt Protected		0.999			0.969	
Satd. Flow (prot)	0	1879	1857	0	1717	0
Flt Permitted		0.999			0.969	
Satd. Flow (perm)	0	1879	1857	0	1717	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	2			2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%
Adj. Flow (vph)	8	359	177	4	21	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	367	181	0	33	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	327	161	4	19	11
Future Vol, veh/h	7	327	161	4	19	11
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	1	2	2	2	2
Mvmt Flow	8	359	177	4	21	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	183	0	-	0	556	181
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	375	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1392	-	-	-	492	862
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	695	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1390	-	-	-	487	861
Mov Cap-2 Maneuver	-	-	-	-	487	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	694	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1390	-	-	-	579
HCM Lane V/C Ratio	0.006	-	-	-	0.057
HCM Control Delay (s)	7.6	0	-	-	11.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	110	172	140	107	336	173
Future Volume (vph)	110	172	140	107	336	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	35.0	0.0		0.0	0.0	
Storage Lanes	1	1		0	0	
Taper Length (m)	15.0				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.942			
Flt Protected	0.950					0.968
Satd. Flow (prot)	1805	1615	1790	0	0	1809
Flt Permitted	0.950					0.968
Satd. Flow (perm)	1805	1615	1790	0	0	1809
Link Speed (k/h)	40		50			50
Link Distance (m)	411.3		147.2			120.1
Travel Time (s)	37.0		10.6			8.6
Confl. Peds. (#/hr)		1				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%
Adj. Flow (vph)	112	176	143	109	343	177
Shared Lane Traffic (%)						
Lane Group Flow (vph)	112	176	252	0	0	520
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Stop			Stop

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.9%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	17.1
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	110	172	140	107	336	173
Future Vol, veh/h	110	172	140	107	336	173
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	0	0	0	0	2	1
Mvmt Flow	112	176	143	109	343	177
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	11.2	11.3	23.1
HCM LOS	B	B	C

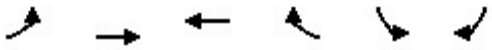
Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	66%
Vol Thru, %	57%	0%	0%	34%
Vol Right, %	43%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	247	110	172	509
LT Vol	0	110	0	336
Through Vol	140	0	0	173
RT Vol	107	0	172	0
Lane Flow Rate	252	112	176	519
Geometry Grp	2	7	7	2
Degree of Util (X)	0.366	0.218	0.281	0.76
Departure Headway (Hd)	5.233	6.988	5.767	5.268
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	686	514	623	686
Service Time	3.272	4.728	3.507	3.298
HCM Lane V/C Ratio	0.367	0.218	0.283	0.757
HCM Control Delay	11.3	11.7	10.8	23.1
HCM Lane LOS	B	B	B	C
HCM 95th-tile Q	1.7	0.8	1.1	7.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	176	103	64	38	13	81	743	65	14	640	239
Future Volume (vph)	257	176	103	64	38	13	81	743	65	14	640	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	35.0		0.0	35.0		35.0
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99			1.00				0.96
Frt		0.974			0.985			0.988				0.850
Flt Protected		0.977			0.973		0.950			0.950		
Satd. Flow (prot)	0	1778	0	0	1799	0	1770	1868	0	1770	1900	1583
Flt Permitted		0.803			0.666		0.195			0.110		
Satd. Flow (perm)	0	1456	0	0	1229	0	363	1868	0	205	1900	1513
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			10			8				187
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		636.9			157.9			102.9			96.1	
Travel Time (s)		57.3			14.2			7.4			6.9	
Confl. Peds. (#/hr)	4		7	7		4	12		20	20		12
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	2%	0%	0%	2%	0%	2%
Adj. Flow (vph)	273	187	110	68	40	14	86	790	69	15	681	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	570	0	0	122	0	86	859	0	15	681	254
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	22.5
Total Split (s)	34.0	34.0		34.0	34.0		41.0	41.0		41.0	41.0	41.0
Total Split (%)	45.3%	45.3%		45.3%	45.3%		54.7%	54.7%		54.7%	54.7%	54.7%
Maximum Green (s)	29.5	29.5		29.5	29.5		36.5	36.5		36.5	36.5	36.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)		29.5			29.5		36.5	36.5		36.5	36.5	36.5
Actuated g/C Ratio		0.39			0.39		0.49	0.49		0.49	0.49	0.49
v/c Ratio		0.98			0.25		0.49	0.94		0.15	0.74	0.31
Control Delay		56.3			15.7		24.8	38.7		15.4	21.4	4.6
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		56.3			15.7		24.8	38.7		15.4	21.4	4.6
LOS		E			B		C	D		B	C	A
Approach Delay		56.3			15.7			37.4			16.8	
Approach LOS		E			B			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 33.0		Intersection LOS: C	
Intersection Capacity Utilization 93.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Wilson Street East & Sulphur Springs Road/Church Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	422	305	17	12	10
Future Volume (vph)	15	422	305	17	12	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.941	
Flt Protected		0.998			0.973	
Satd. Flow (prot)	0	1860	1867	0	1720	0
Flt Permitted		0.998			0.973	
Satd. Flow (perm)	0	1860	1867	0	1720	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		411.3	636.9		228.3	
Travel Time (s)		37.0	57.3		16.4	
Confl. Peds. (#/hr)	3			3		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	1%	2%	2%	0%
Adj. Flow (vph)	16	440	318	18	13	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	456	336	0	23	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	422	305	17	12	10
Future Vol, veh/h	15	422	305	17	12	10
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	1	2	2	0
Mvmt Flow	16	440	318	18	13	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	339	0	-	0	802	330
Stage 1	-	-	-	-	330	-
Stage 2	-	-	-	-	472	-
Critical Hdwy	4.1	-	-	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.3
Pot Cap-1 Maneuver	1231	-	-	-	353	716
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1228	-	-	-	345	714
Mov Cap-2 Maneuver	-	-	-	-	345	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	626	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1228	-	-	-	451
HCM Lane V/C Ratio	0.013	-	-	-	0.051
HCM Control Delay (s)	8	0	-	-	13.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

APPENDIX F

ITE Trip Generation Manual, 11th Edition Excerpts

Land Use: 210
Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077,1078, 1079

Single-Family Detached Housing
(210)

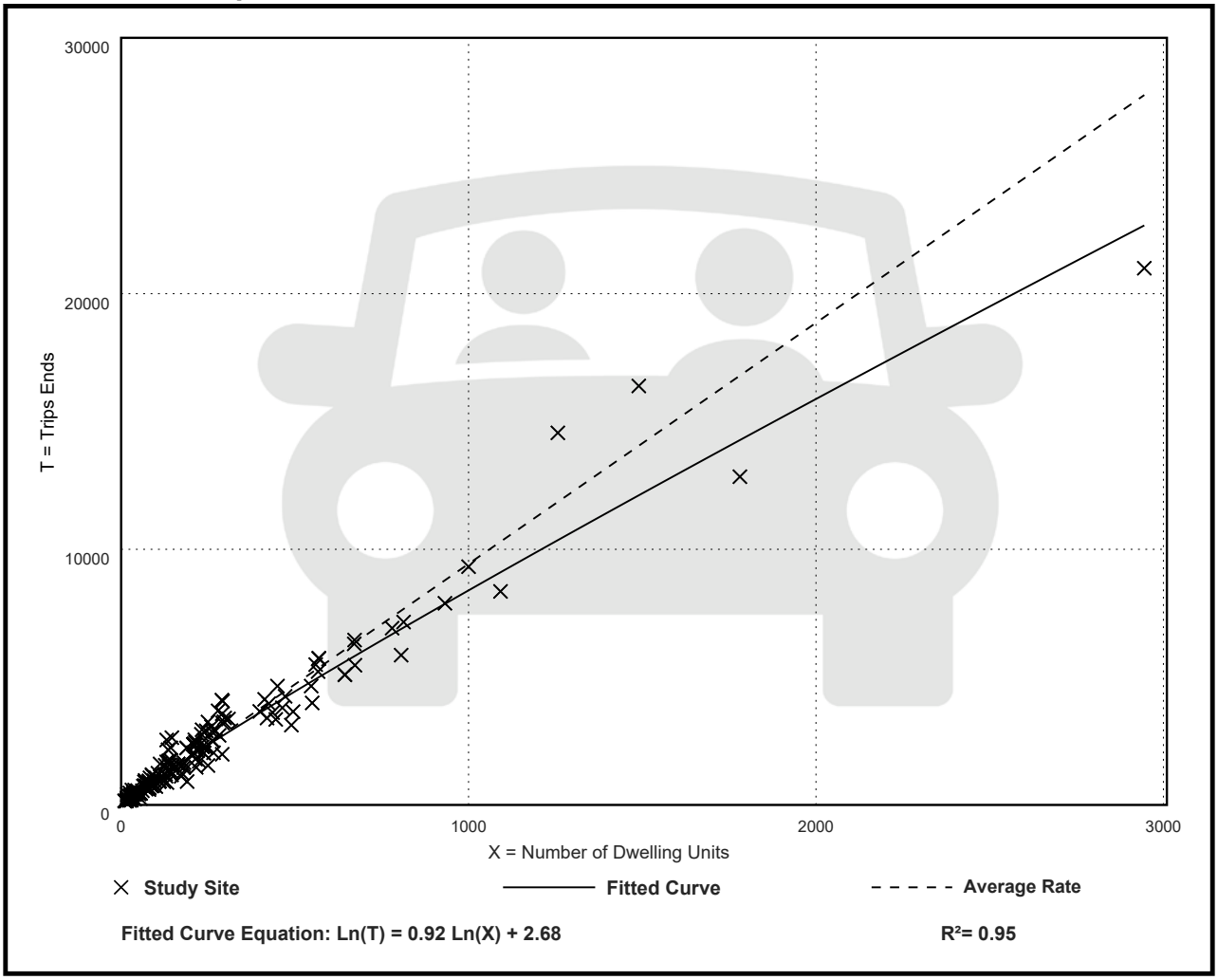
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 174
Avg. Num. of Dwelling Units: 246
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

R^2= 0.95

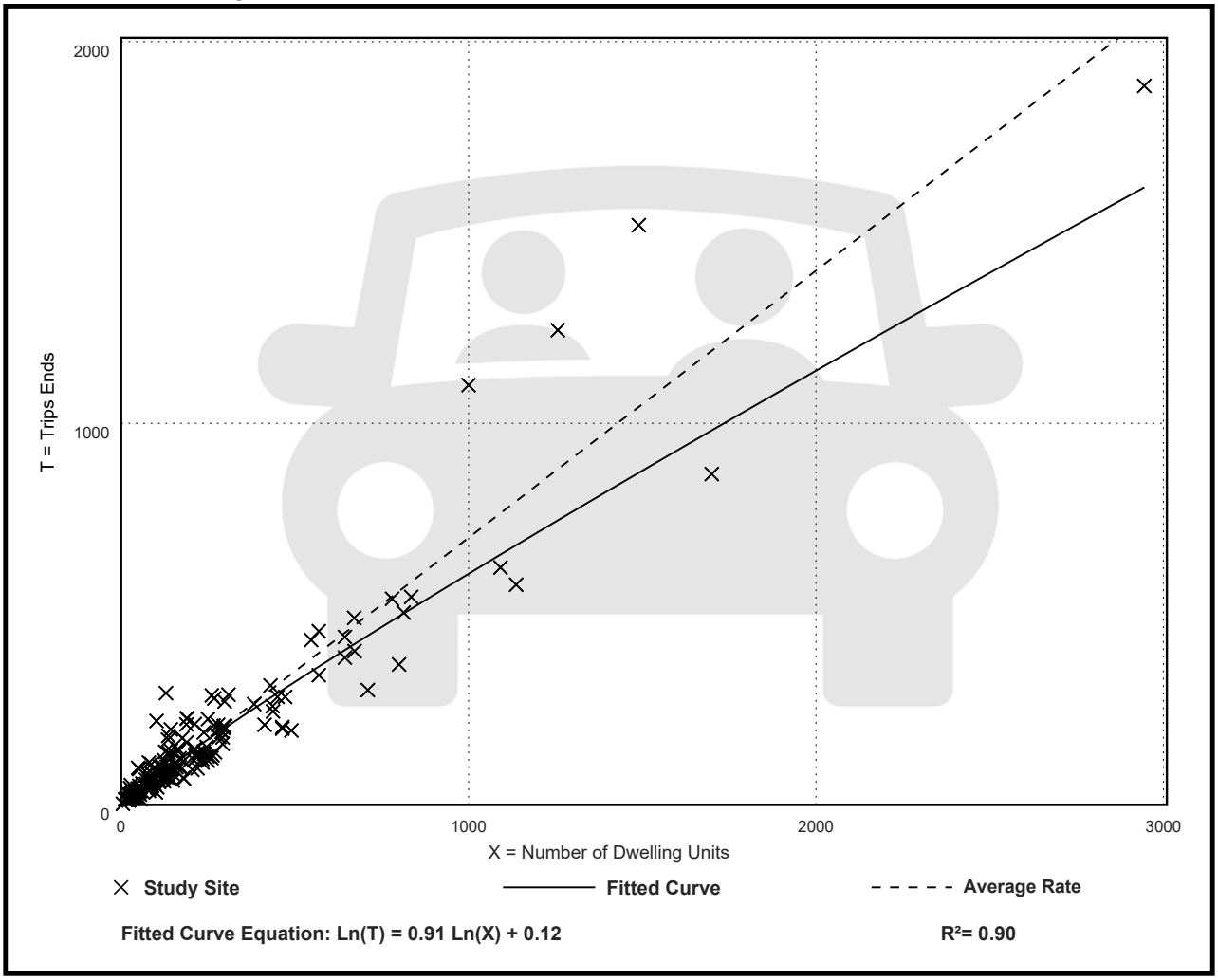
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 192
Avg. Num. of Dwelling Units: 226
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



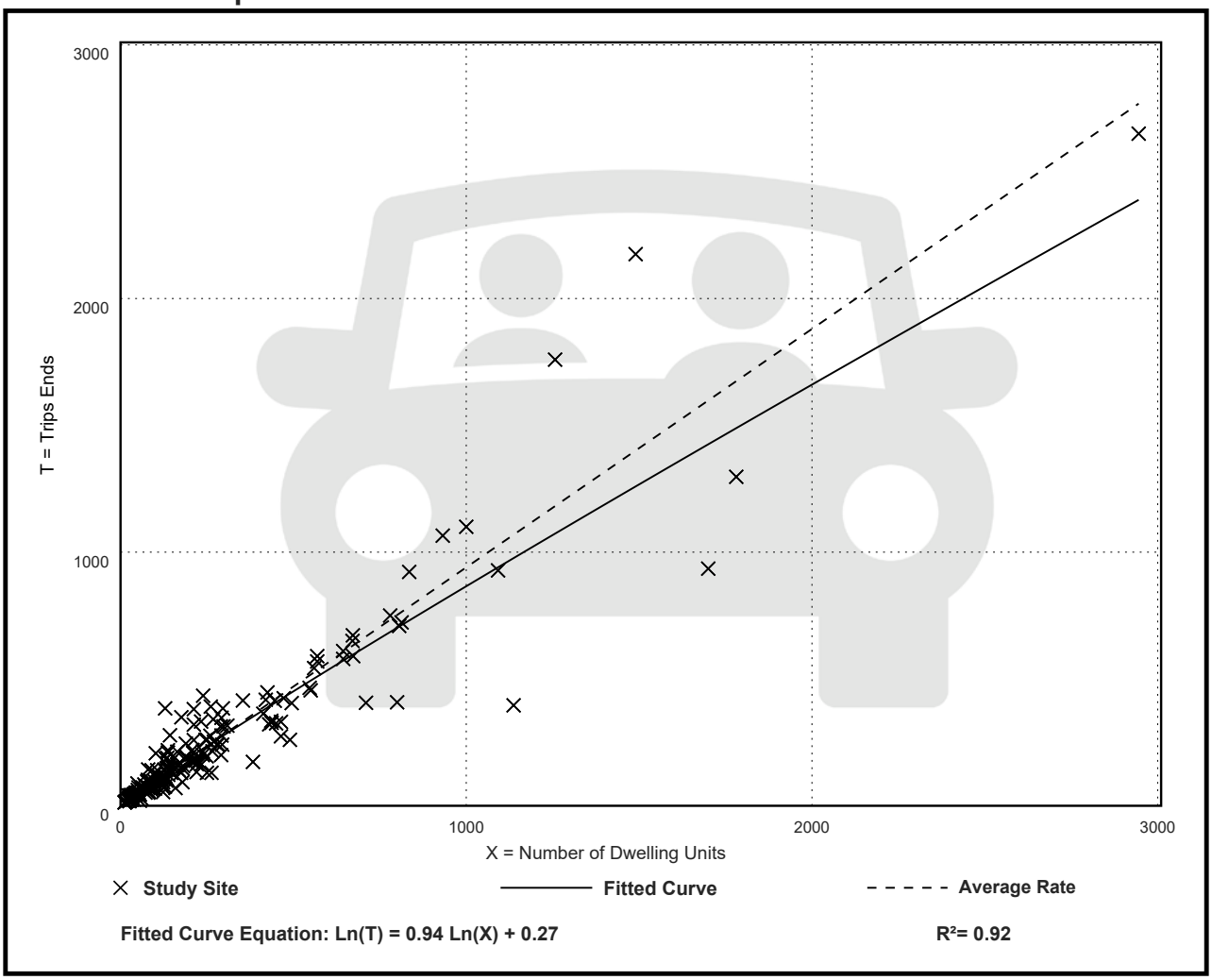
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 208
Avg. Num. of Dwelling Units: 248
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



Single-Family Detached Housing
(210)

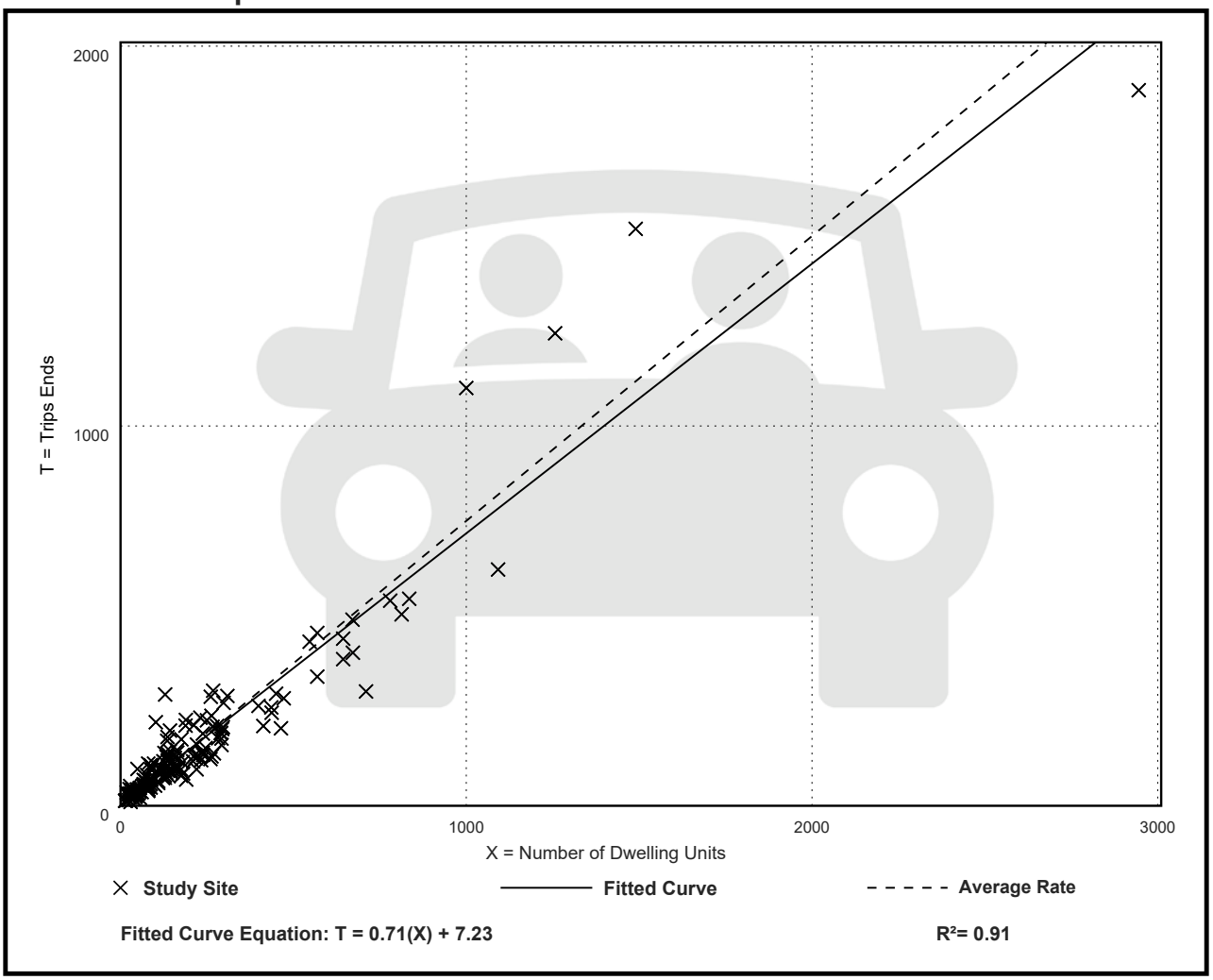
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 169
Avg. Num. of Dwelling Units: 217
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.75	0.34 - 2.27	0.25

Data Plot and Equation



Fitted Curve Equation: T = 0.71(X) + 7.23

R^2= 0.91

Single-Family Detached Housing
(210)

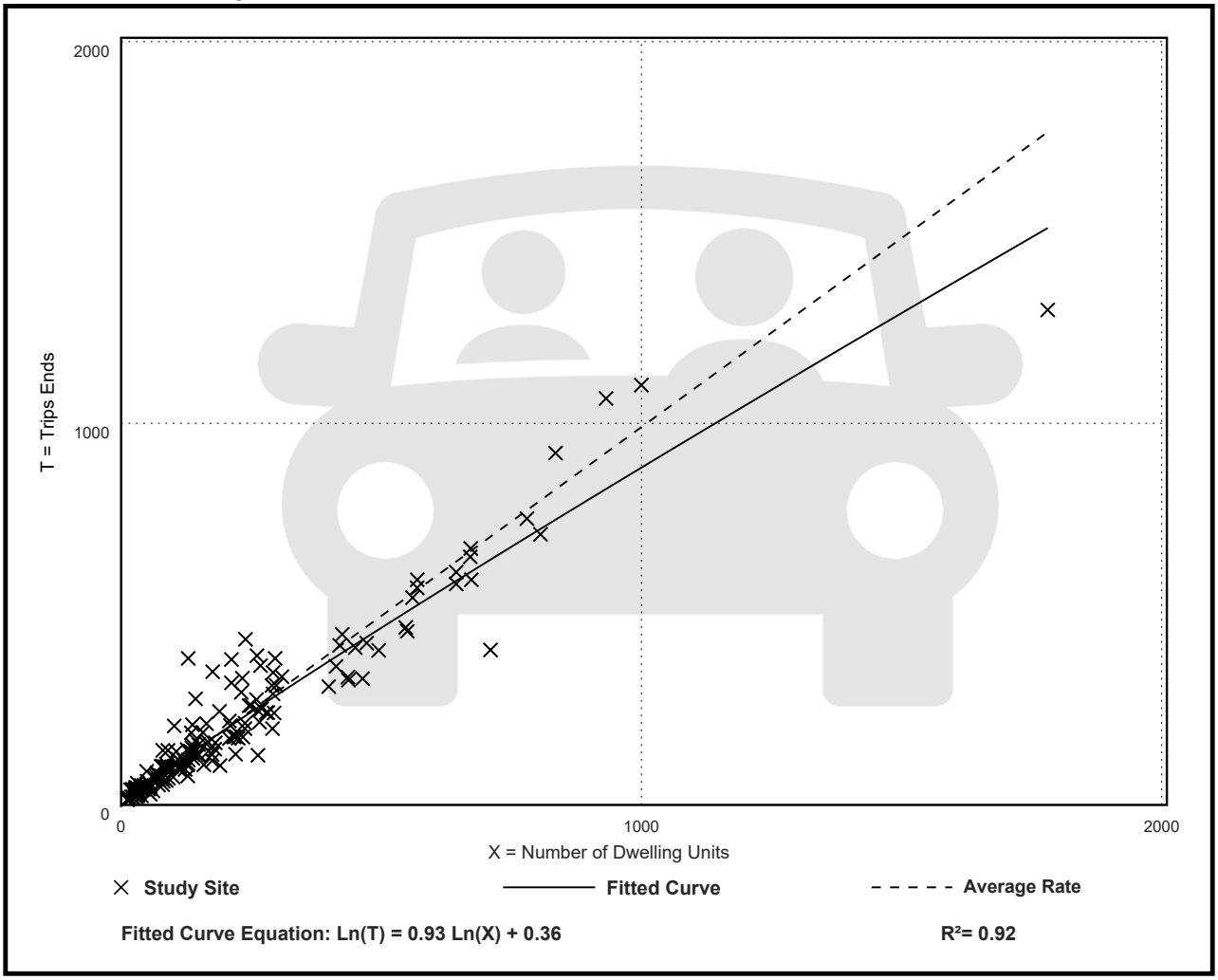
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 178
Avg. Num. of Dwelling Units: 203
Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.49 - 2.98	0.28

Data Plot and Equation



Single-Family Detached Housing
(210)

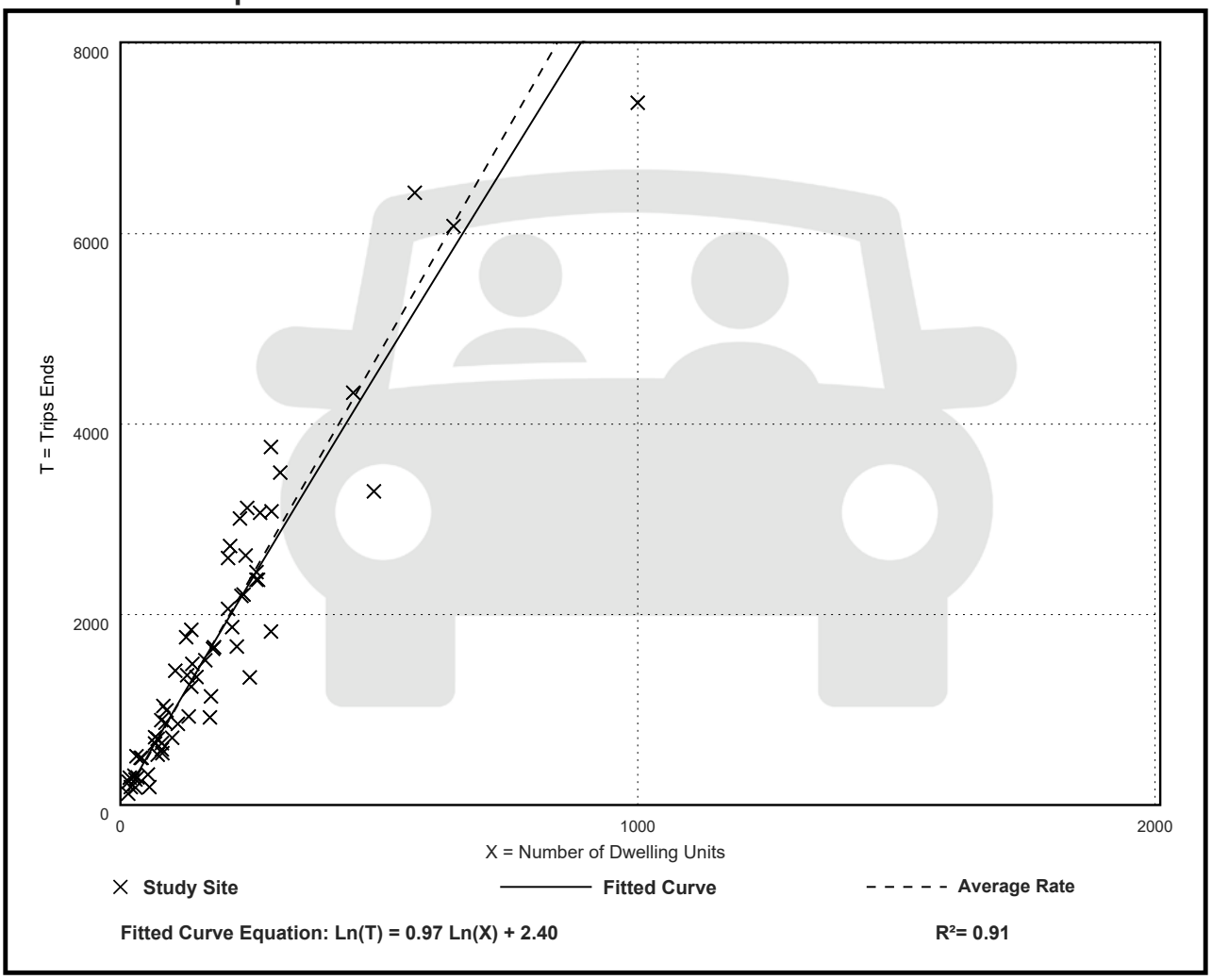
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 63
Avg. Num. of Dwelling Units: 179
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.48	3.36 - 16.52	2.26

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.97 Ln(X) + 2.40

R^2= 0.91

Single-Family Detached Housing
(210)

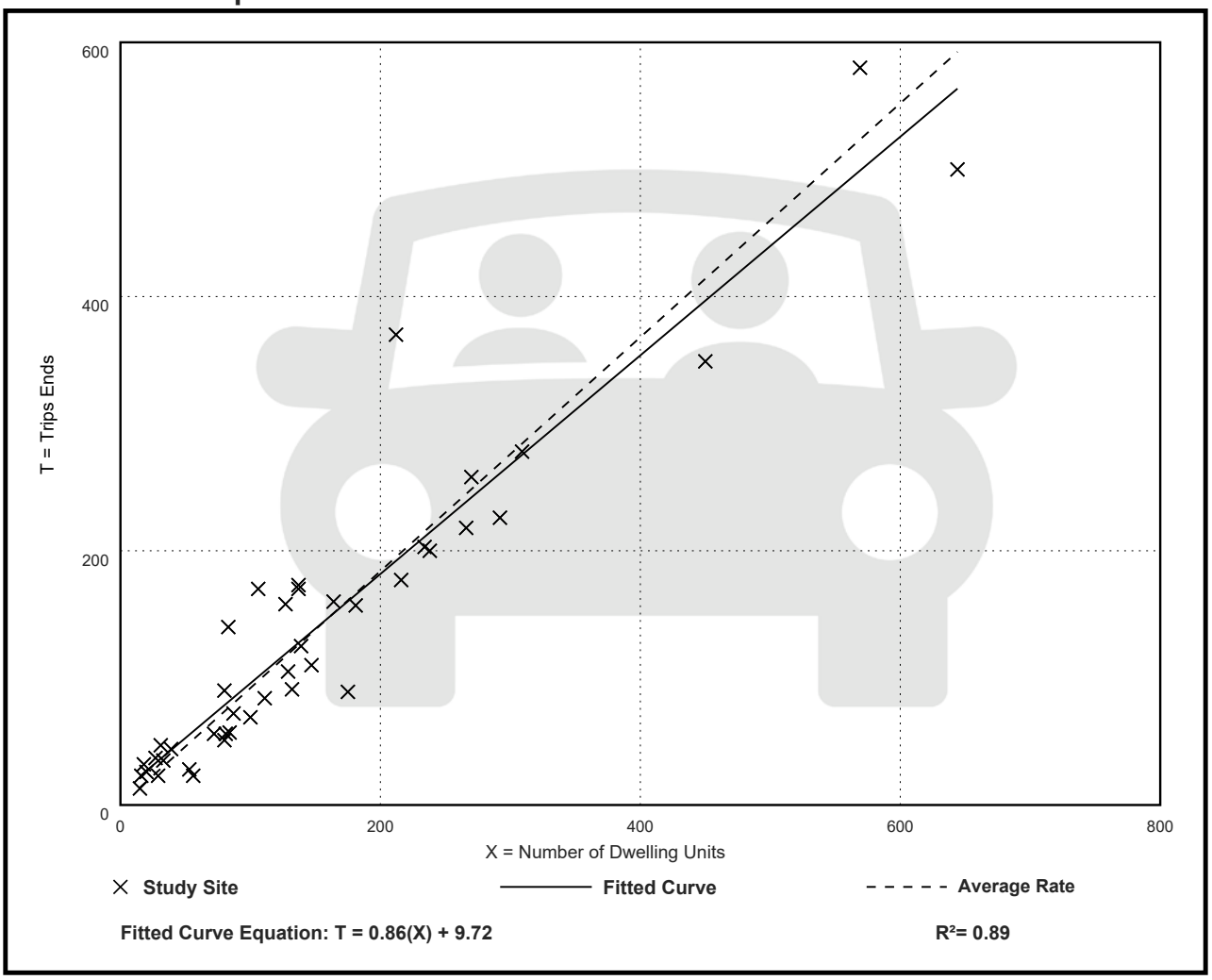
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 42
Avg. Num. of Dwelling Units: 152
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.92	0.41 - 1.78	0.27

Data Plot and Equation



Fitted Curve Equation: T = 0.86(X) + 9.72

R^2= 0.89

Single-Family Detached Housing
(210)

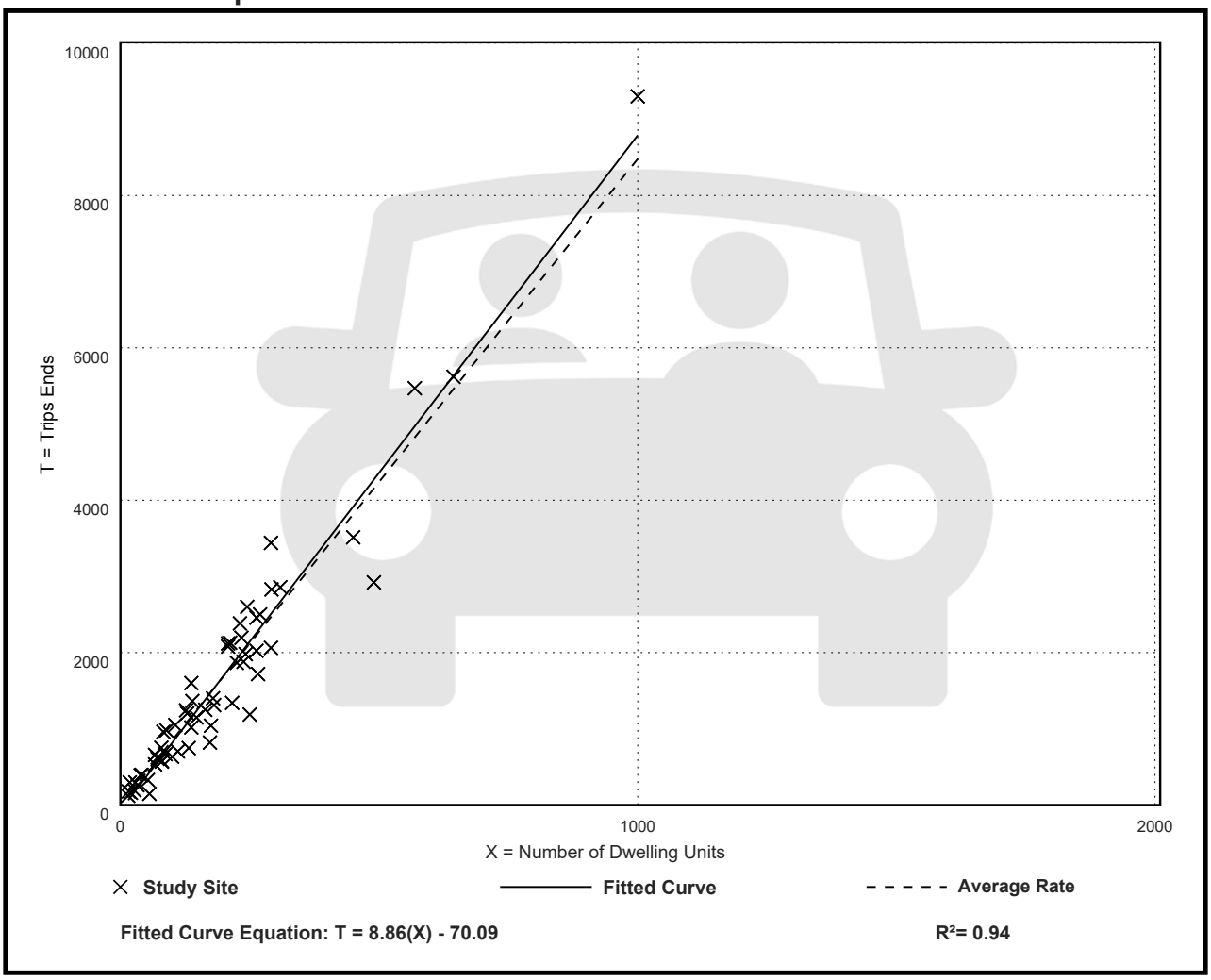
Vehicle Trip Ends vs: Dwelling Units
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 60
Avg. Num. of Dwelling Units: 186
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
8.48	2.61 - 16.44	1.74

Data Plot and Equation



Single-Family Detached Housing
(210)

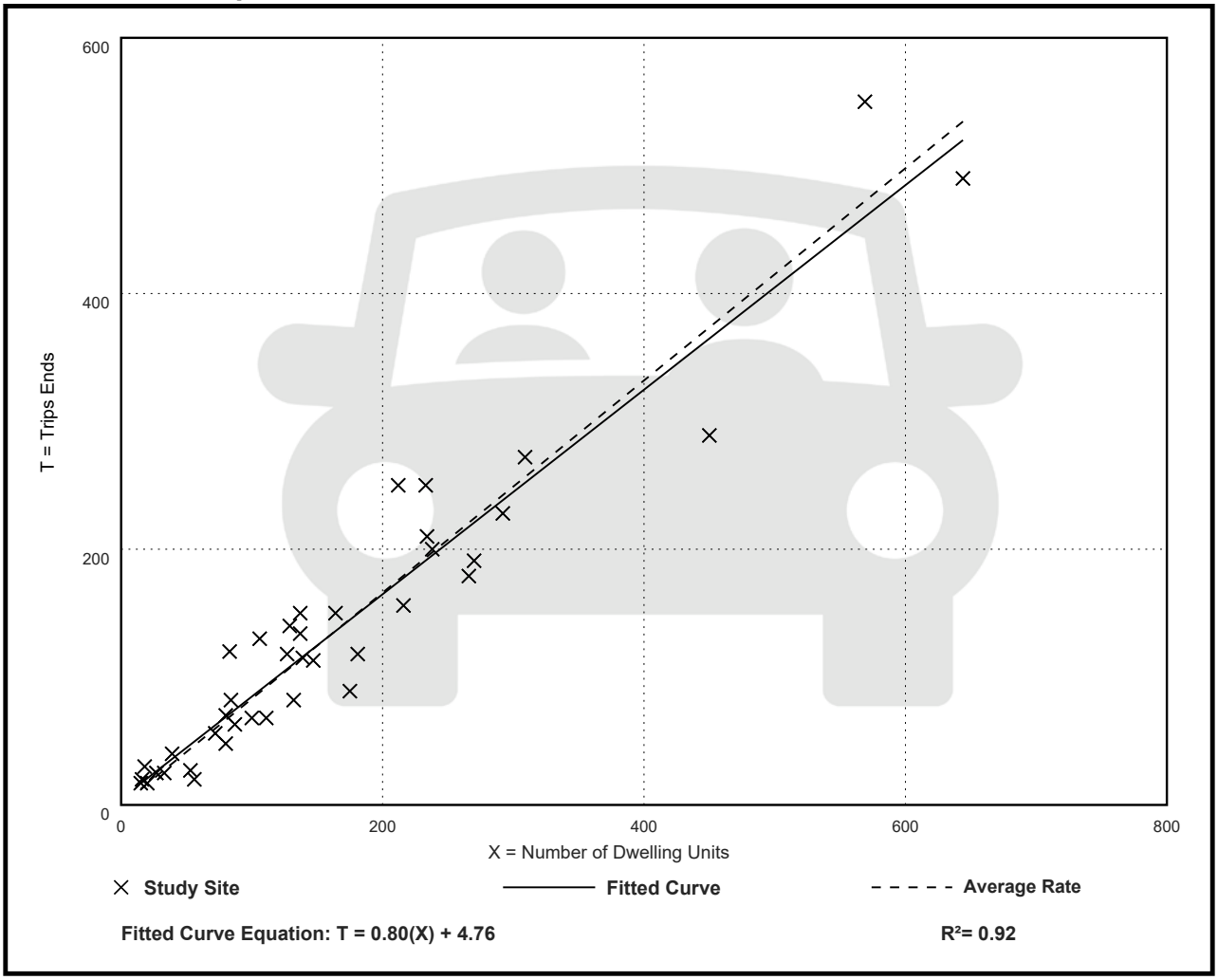
Vehicle Trip Ends vs: Dwelling Units
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 40
Avg. Num. of Dwelling Units: 162
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.83	0.36 - 1.67	0.19

Data Plot and Equation



Fitted Curve Equation: T = 0.80(X) + 4.76

R^2= 0.92

Single-Family Detached Housing
(210)

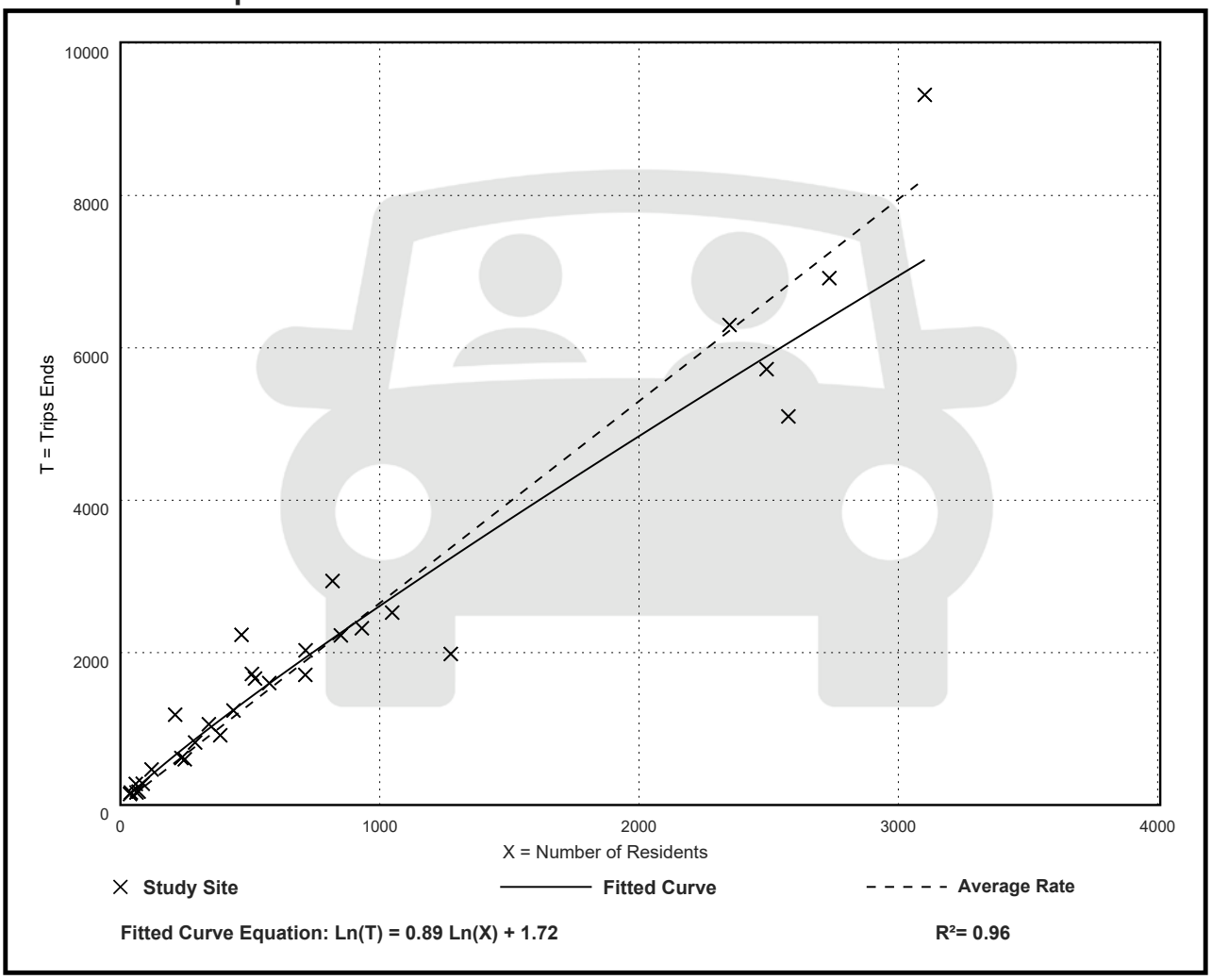
Vehicle Trip Ends vs: Residents
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 30
Avg. Num. of Residents: 810
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
2.65	1.56 - 5.62	0.64

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.89 Ln(X) + 1.72

R^2= 0.96

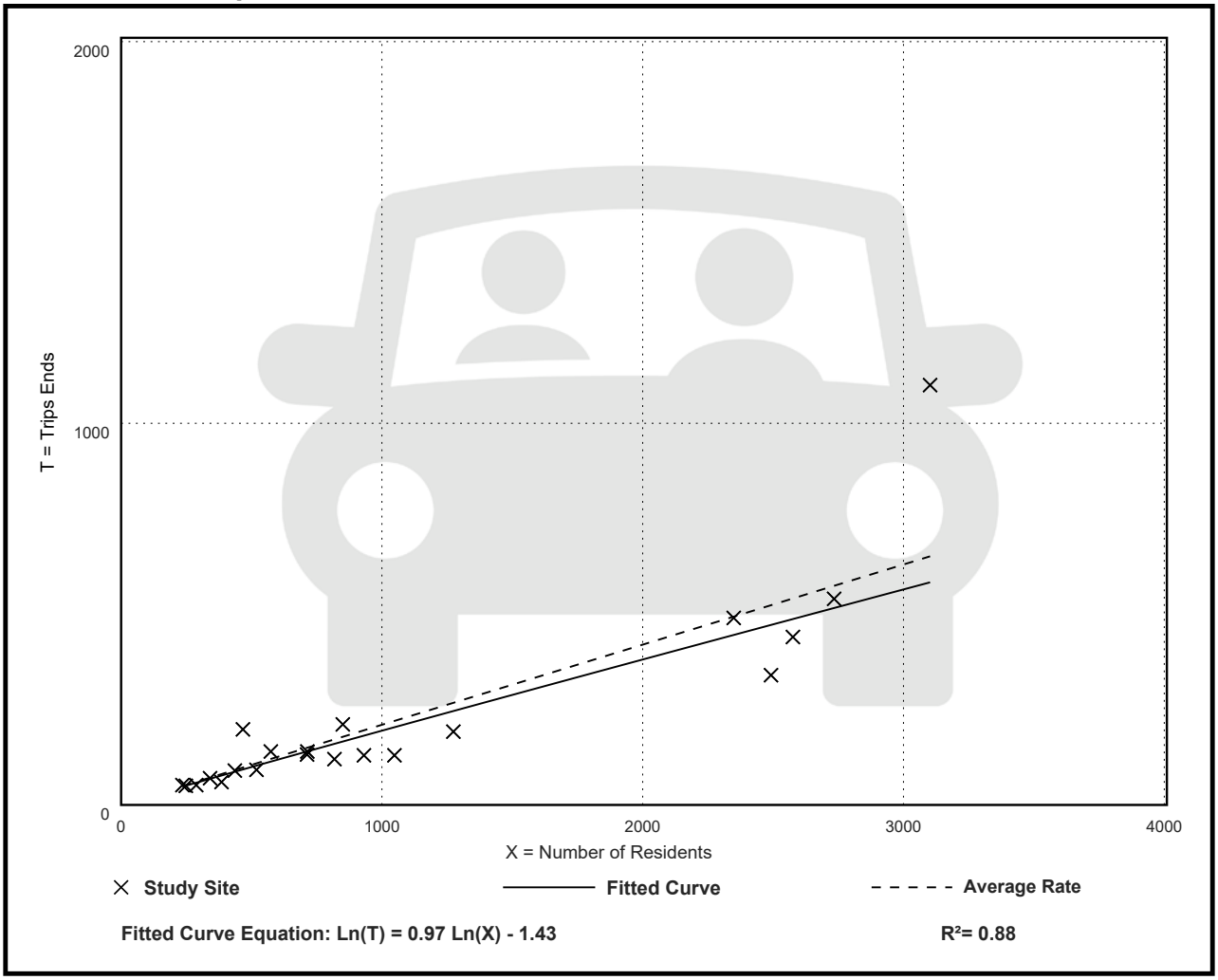
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Residents**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. Num. of Residents: 1100
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.21	0.12 - 0.42	0.08

Data Plot and Equation



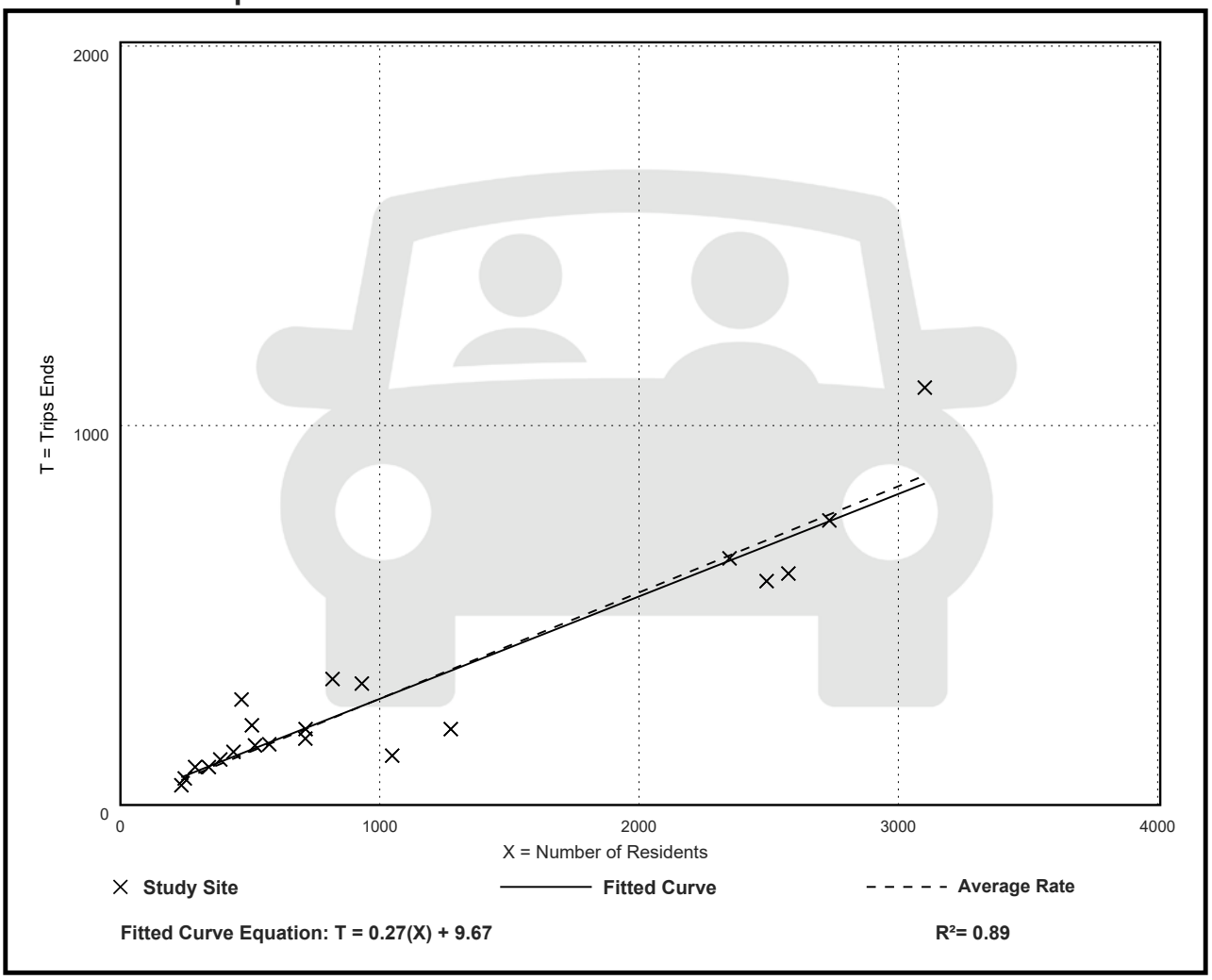
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Residents
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 21
Avg. Num. of Residents: 1083
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.28	0.12 - 0.60	0.08

Data Plot and Equation



Single-Family Detached Housing
(210)

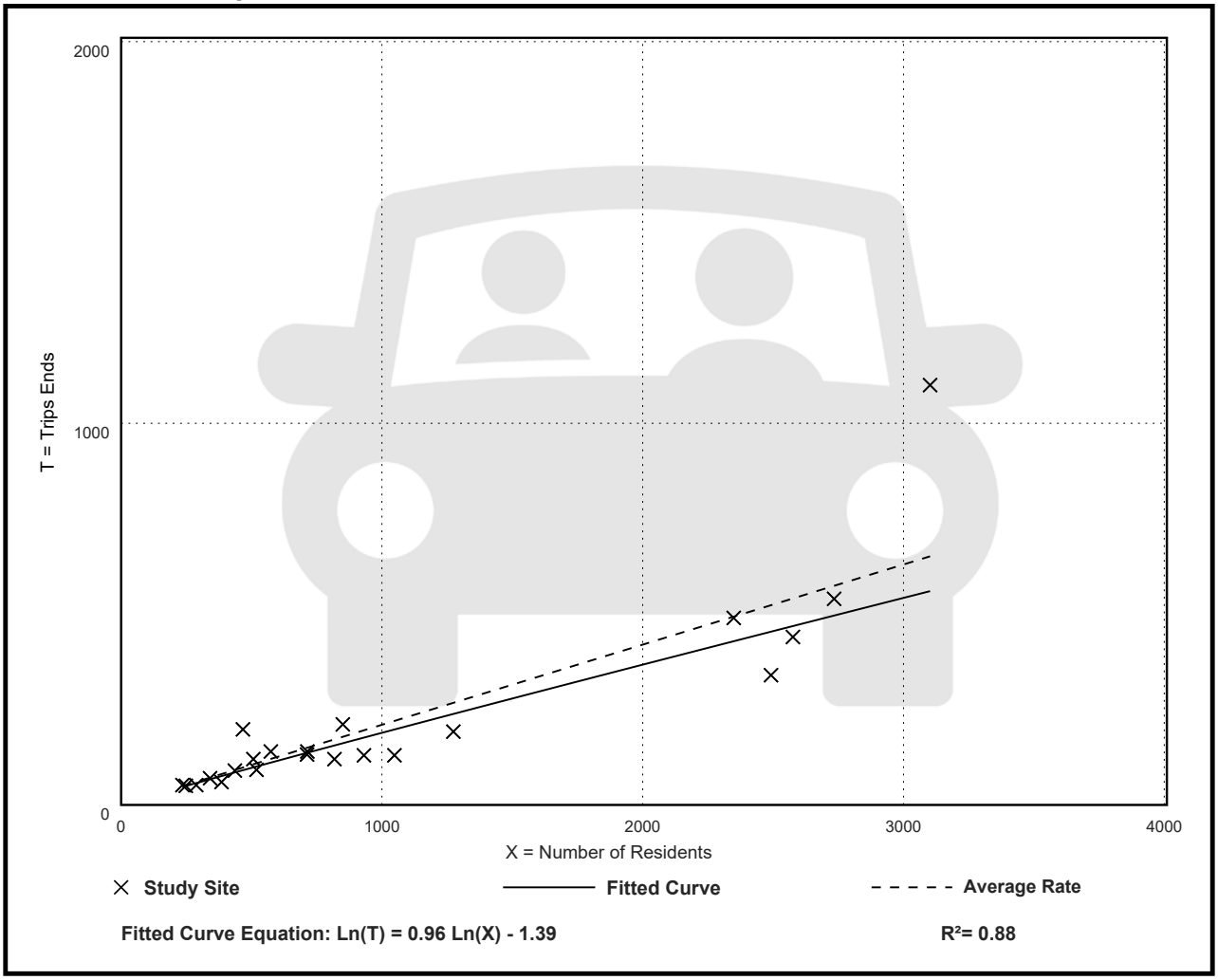
Vehicle Trip Ends vs: Residents
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 22
Avg. Num. of Residents: 1073
Directional Distribution: 30% entering, 70% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.21	0.12 - 0.42	0.08

Data Plot and Equation



Single-Family Detached Housing
(210)

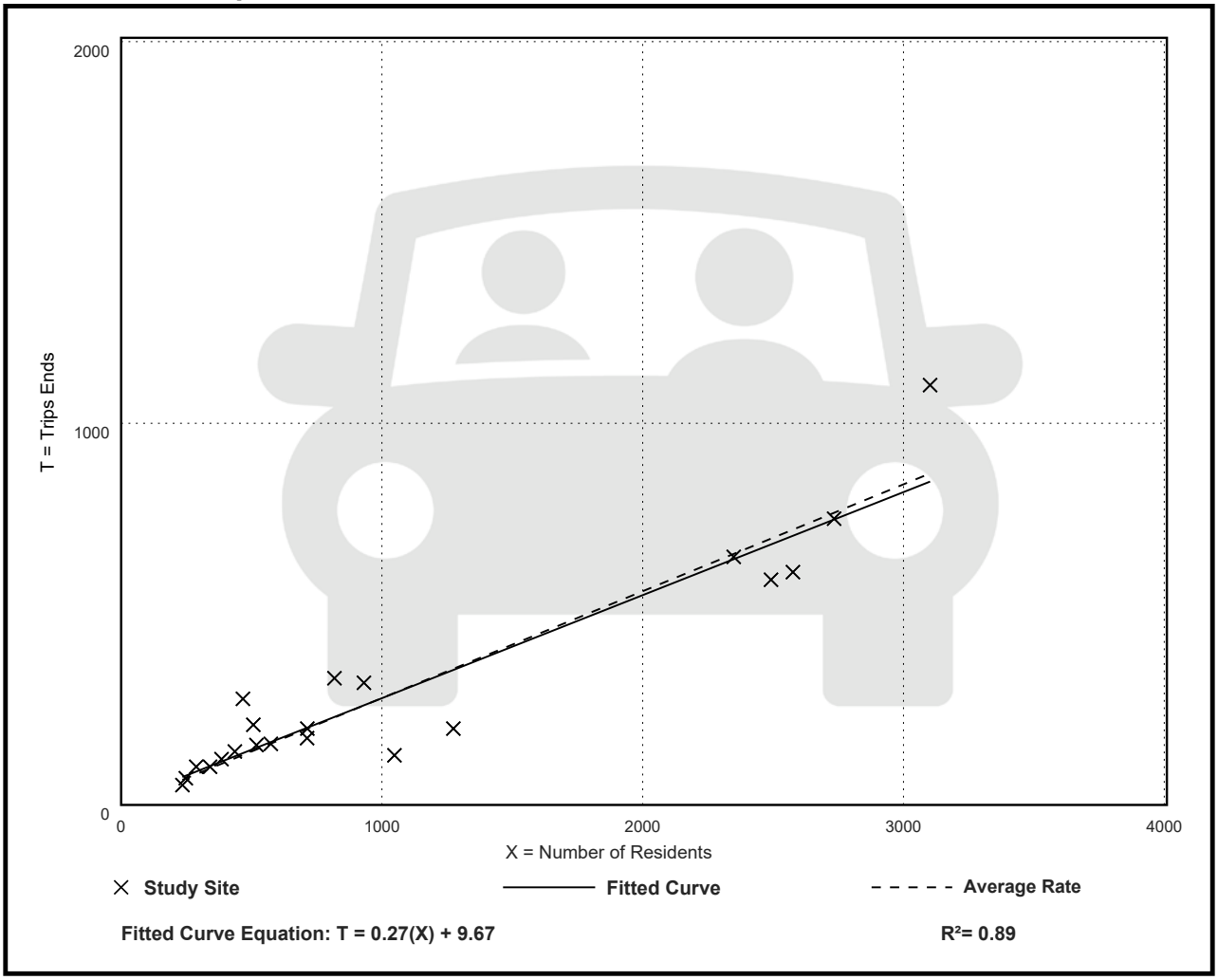
Vehicle Trip Ends vs: Residents
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 21
Avg. Num. of Residents: 1083
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.28	0.12 - 0.60	0.08

Data Plot and Equation



Single-Family Detached Housing
(210)

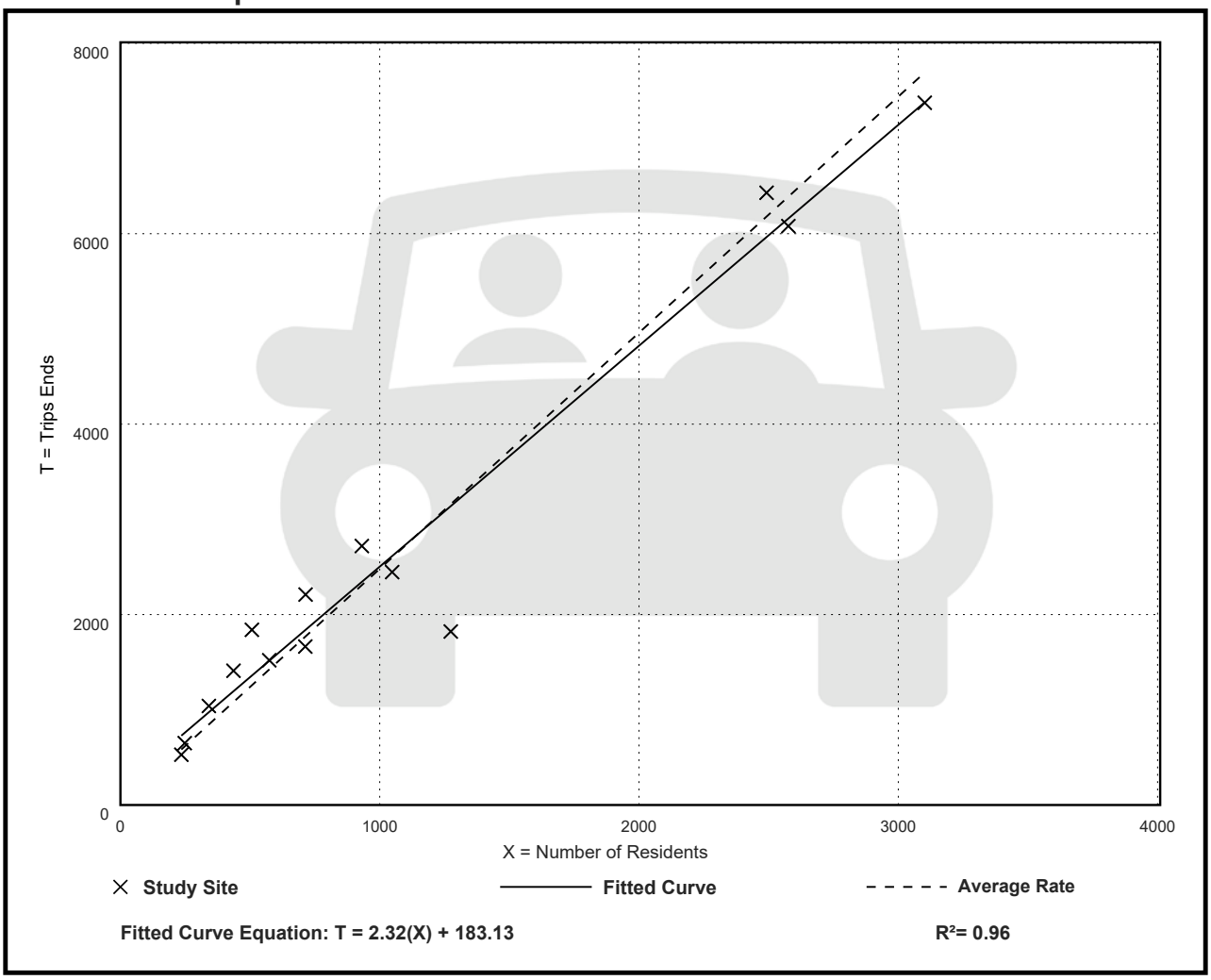
Vehicle Trip Ends vs: Residents
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 14
Avg. Num. of Residents: 1085
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
2.48	1.43 - 3.63	0.46

Data Plot and Equation



Fitted Curve Equation: T = 2.32(X) + 183.13

R^2= 0.96

Single-Family Detached Housing
(210)

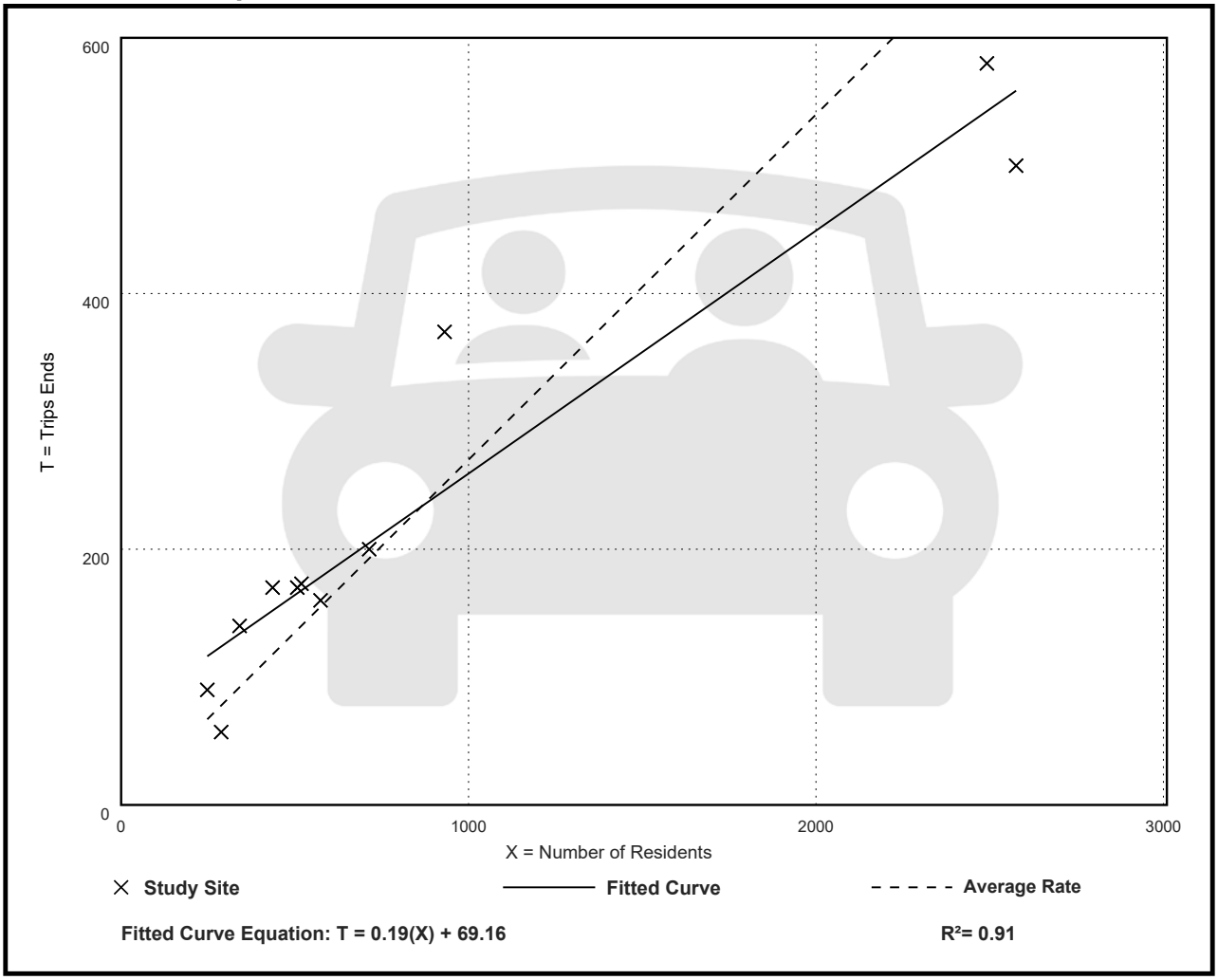
Vehicle Trip Ends vs: Residents
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 11
Avg. Num. of Residents: 875
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.27	0.19 - 0.41	0.08

Data Plot and Equation



Single-Family Detached Housing
(210)

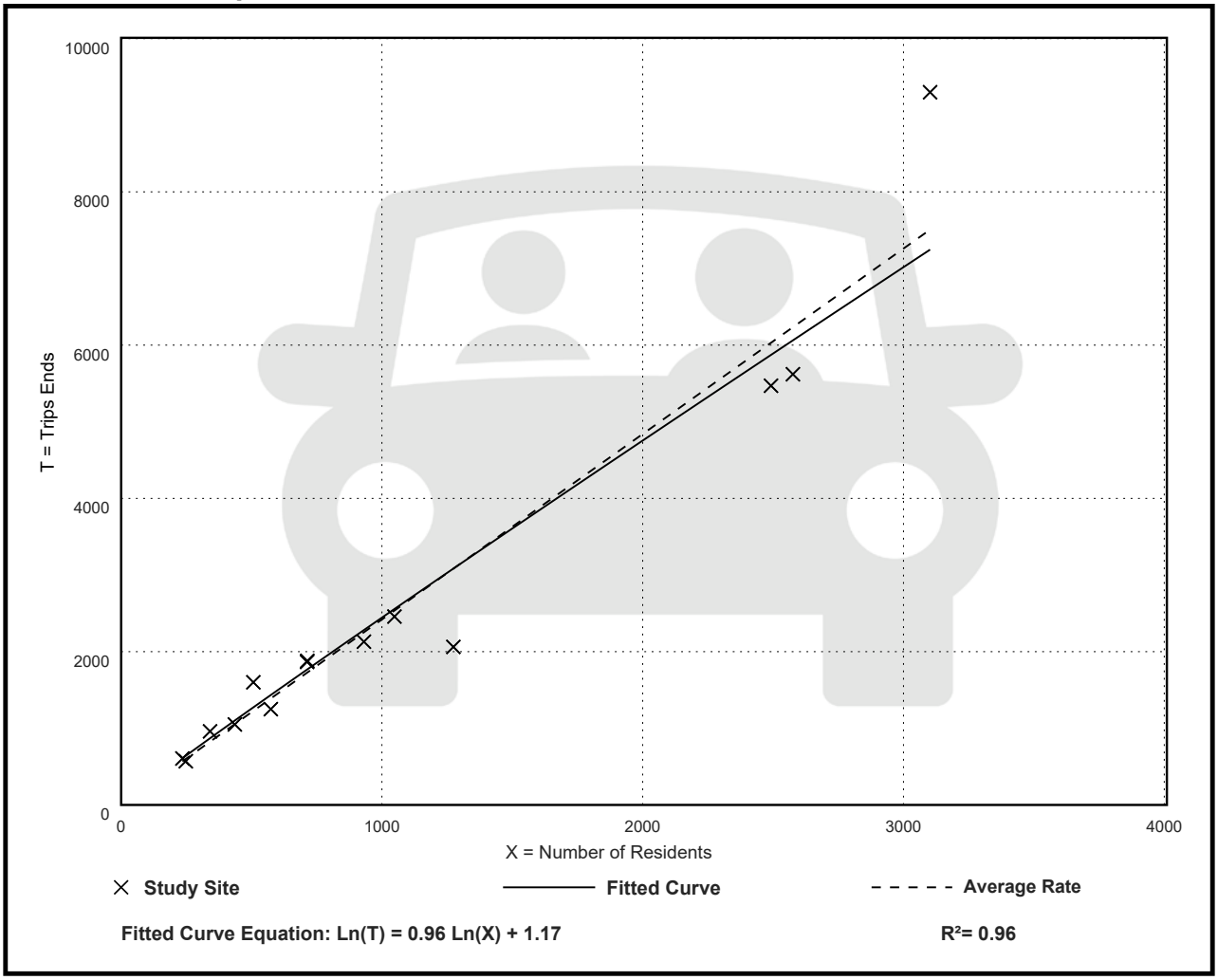
Vehicle Trip Ends vs: Residents
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 14
Avg. Num. of Residents: 1085
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
2.42	1.62 - 3.16	0.43

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 1.17

R^2= 0.96

Single-Family Detached Housing
(210)

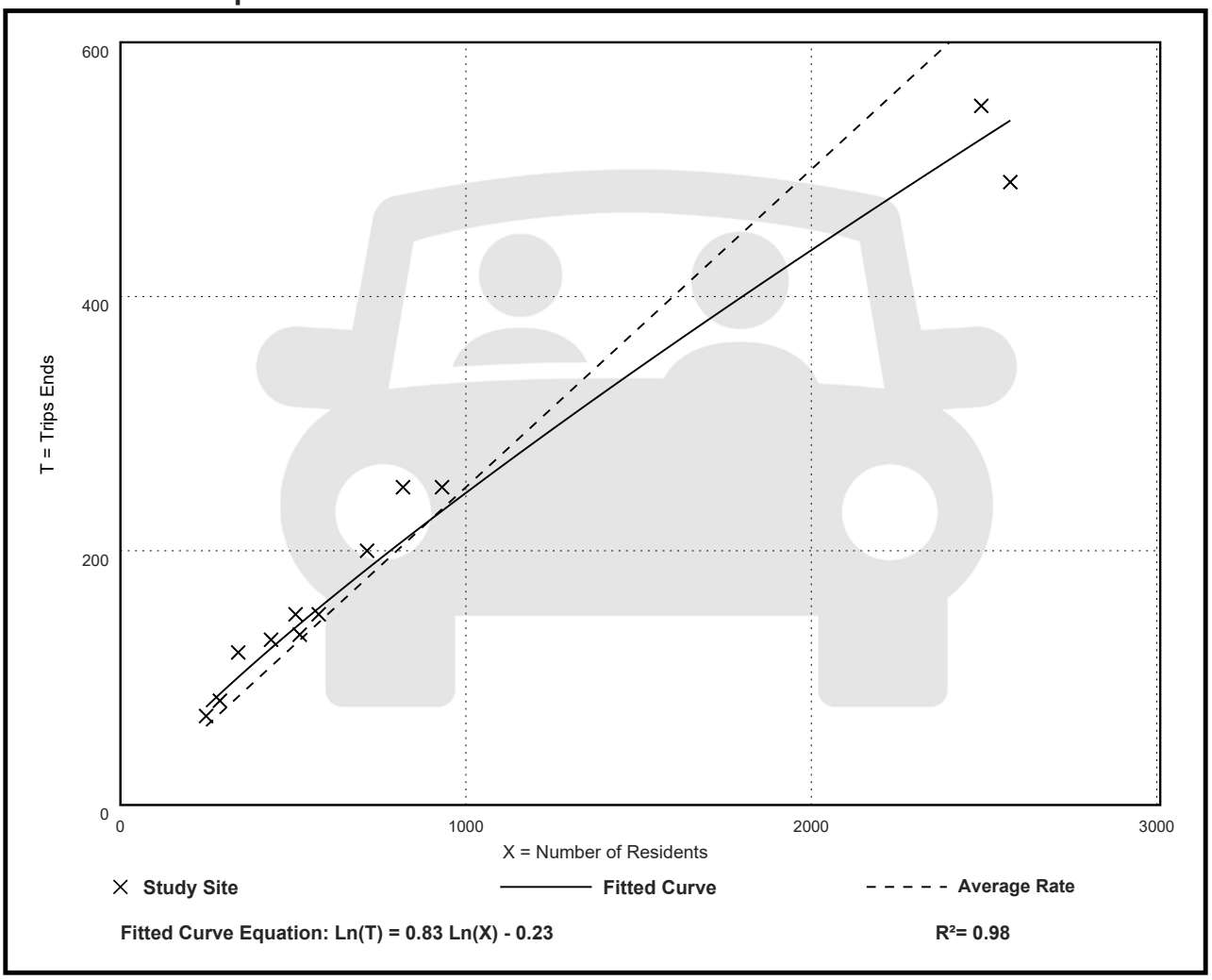
Vehicle Trip Ends vs: Residents
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 12
Avg. Num. of Residents: 870
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.25	0.19 - 0.35	0.05

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.83 Ln(X) - 0.23

R^2= 0.98

Land Use: 215
Single-Family Attached Housing

Description

Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space.

Additional Data

The database for this land use includes duplexes (defined as a single structure with two distinct dwelling units, typically joined side-by-side and each with at least one outside entrance) and townhouses/rowhouses (defined as a single structure with three or more distinct dwelling units, joined side-by-side in a row and each with an outside entrance).

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in British Columbia (CAN), California, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Utah, Virginia, and Wisconsin.

Source Numbers

168, 204, 211, 237, 305, 306, 319, 321, 357, 390, 418, 525, 571, 583, 638, 735, 868, 869, 870, 896, 912, 959, 1009, 1046, 1056, 1058, 1077

Single-Family Attached Housing
(215)

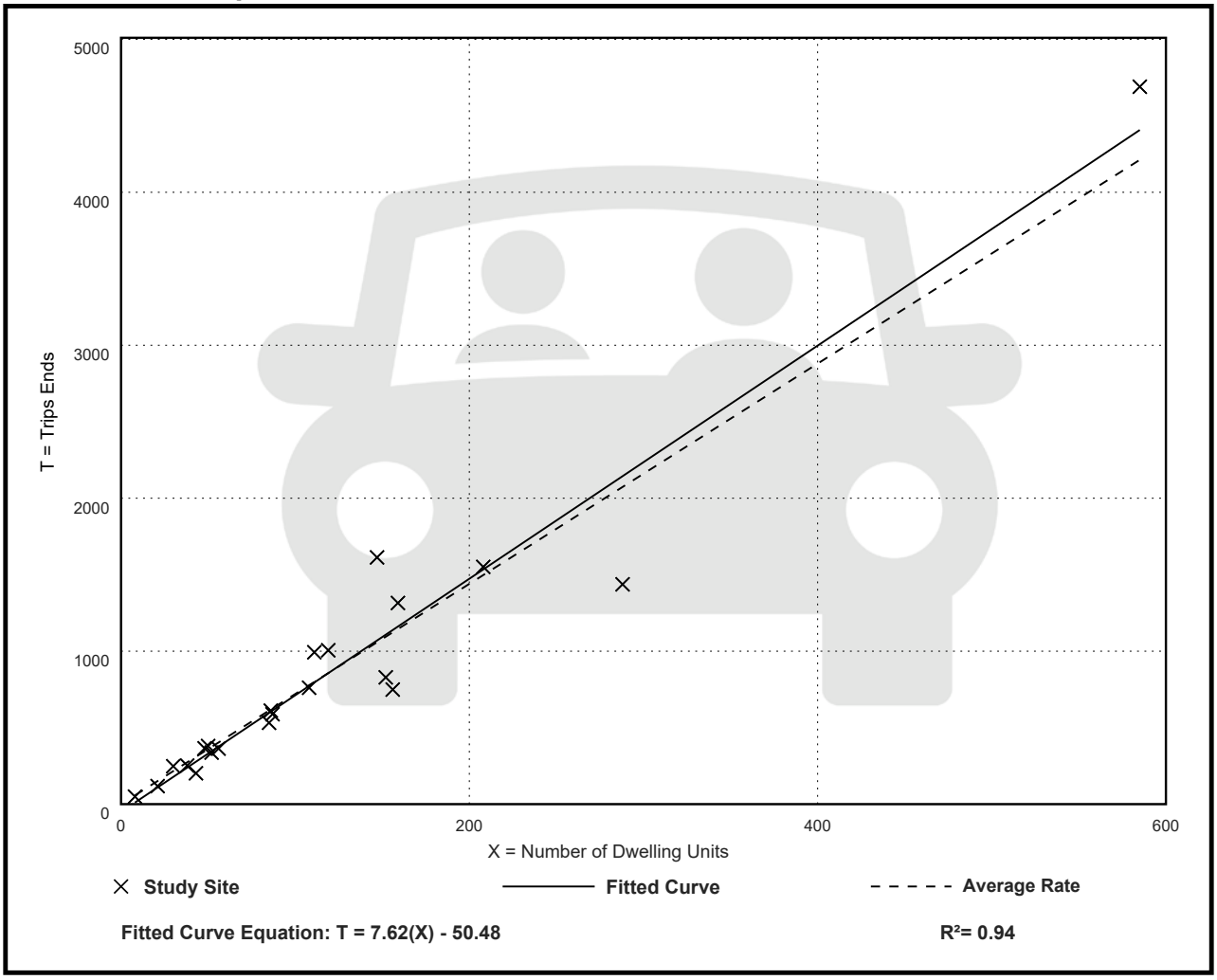
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 22
Avg. Num. of Dwelling Units: 120
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.20	4.70 - 10.97	1.61

Data Plot and Equation



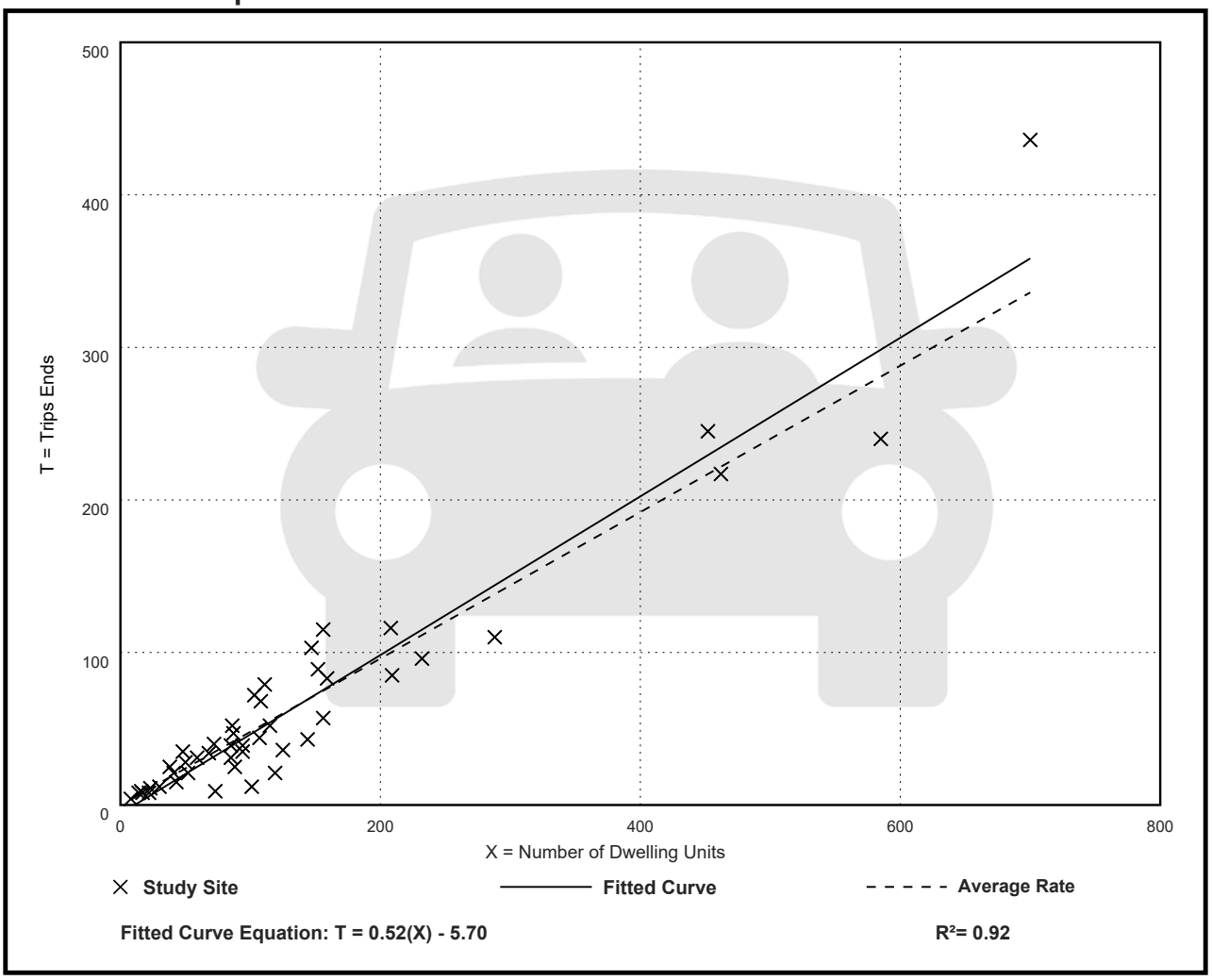
Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 46
Avg. Num. of Dwelling Units: 135
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.48	0.12 - 0.74	0.14

Data Plot and Equation



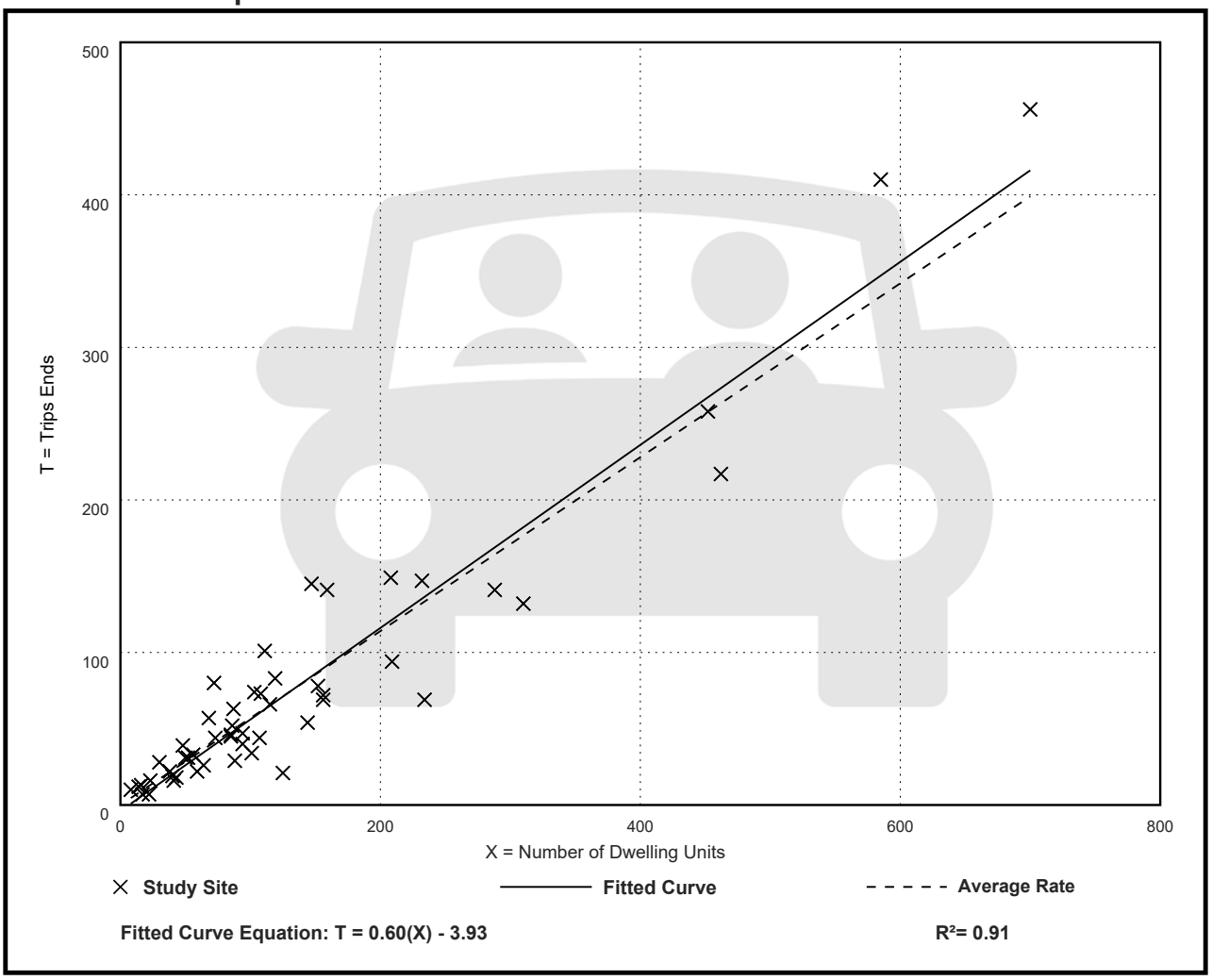
Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 51
Avg. Num. of Dwelling Units: 136
Directional Distribution: 57% entering, 43% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.17 - 1.25	0.18

Data Plot and Equation



Single-Family Attached Housing
(215)

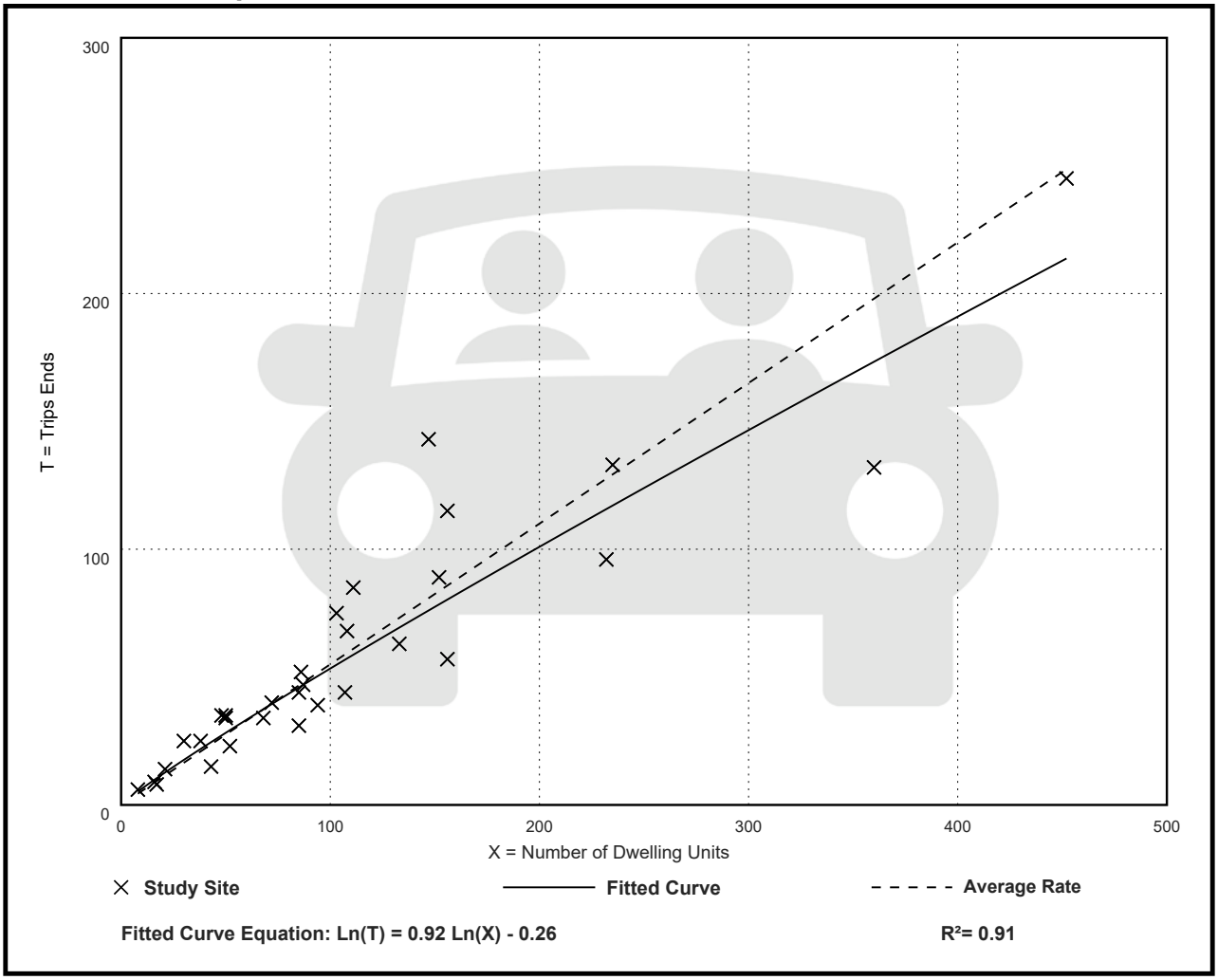
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Dwelling Units: 110
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.55	0.35 - 0.97	0.16

Data Plot and Equation



Single-Family Attached Housing
(215)

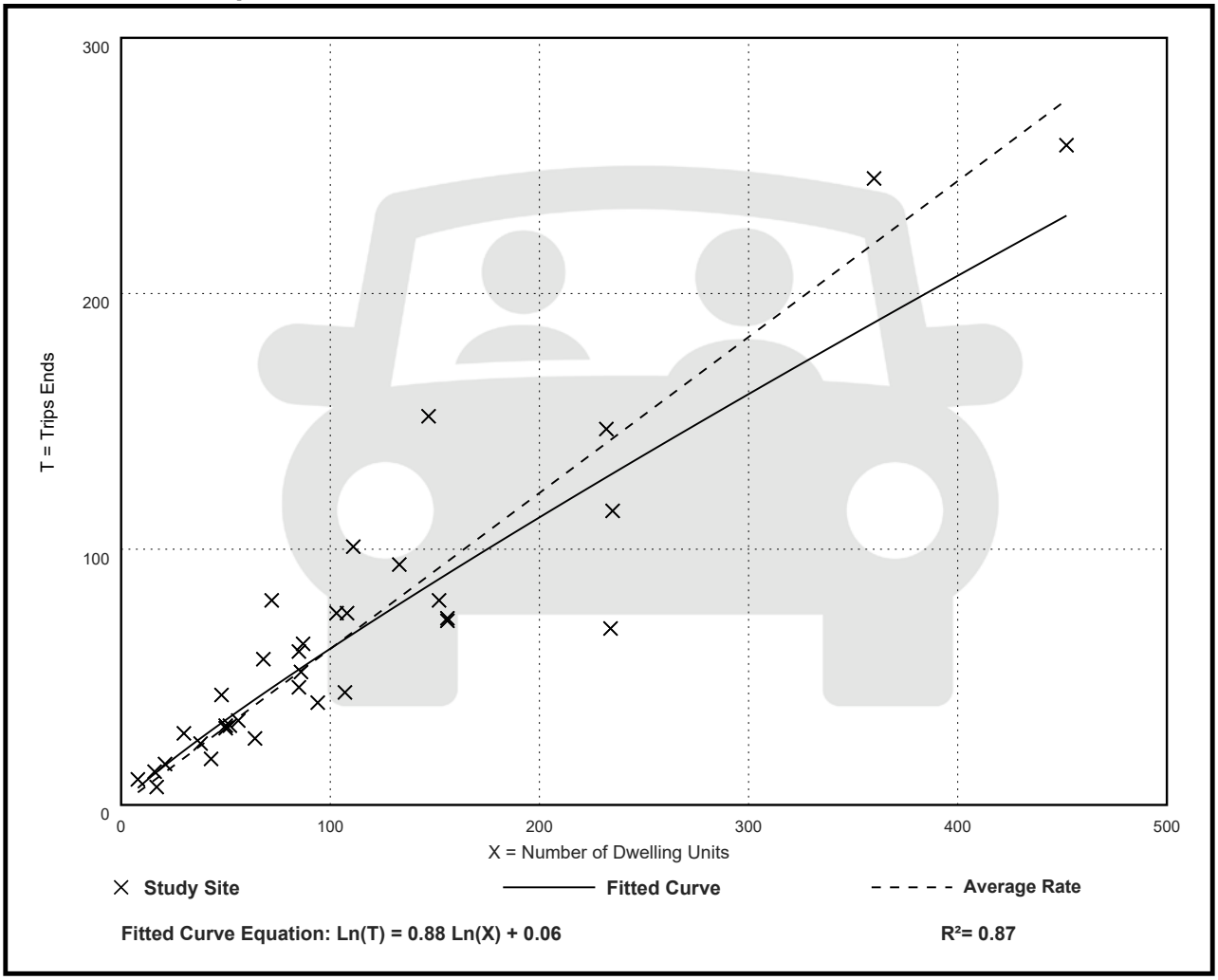
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 34
Avg. Num. of Dwelling Units: 110
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.61	0.29 - 1.25	0.18

Data Plot and Equation



Single-Family Attached Housing
(215)

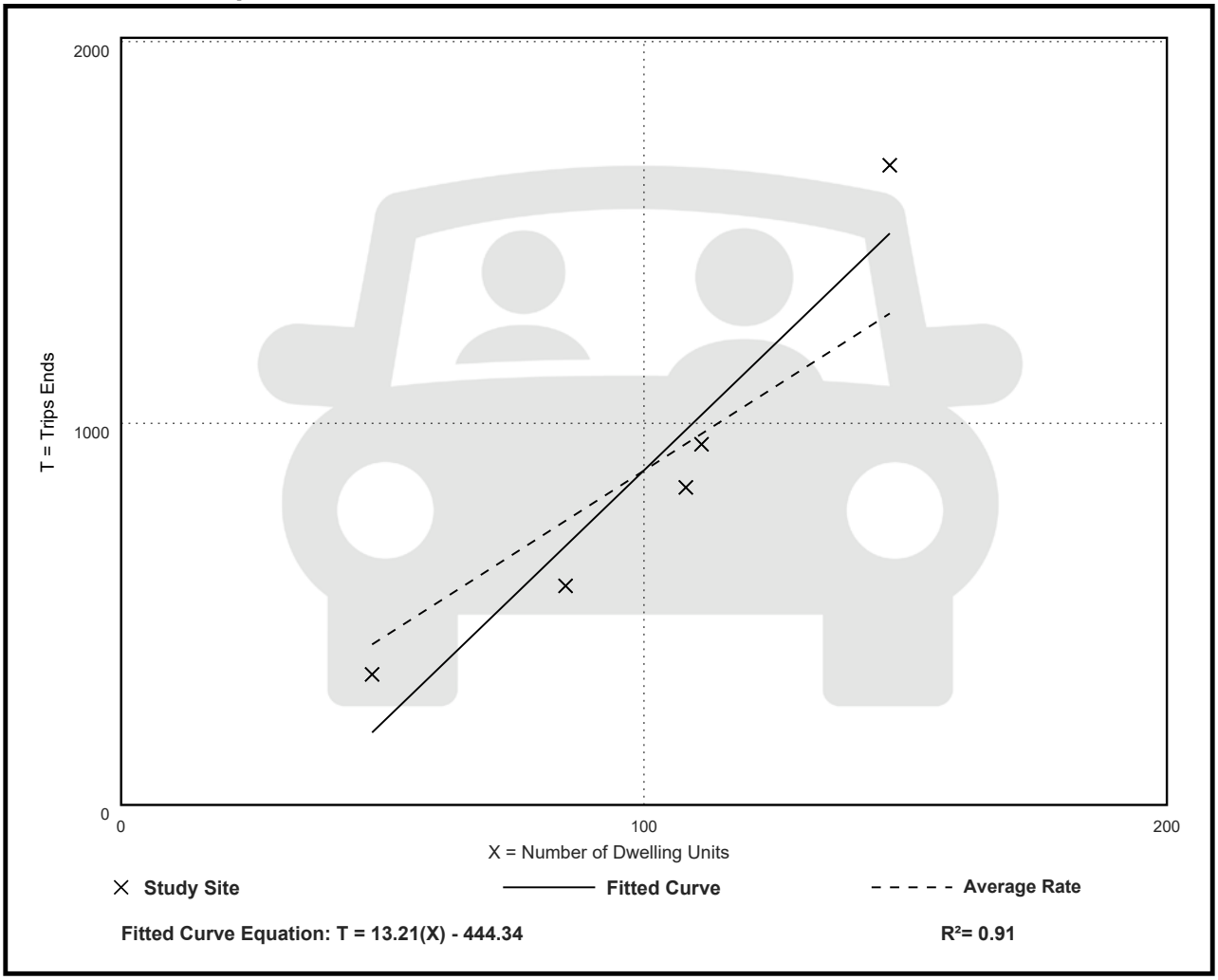
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Dwelling Units: 100
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
8.76	6.75 - 11.40	2.02

Data Plot and Equation



Fitted Curve Equation: T = 13.21(X) - 444.34

R^2= 0.91

Single-Family Attached Housing
(215)

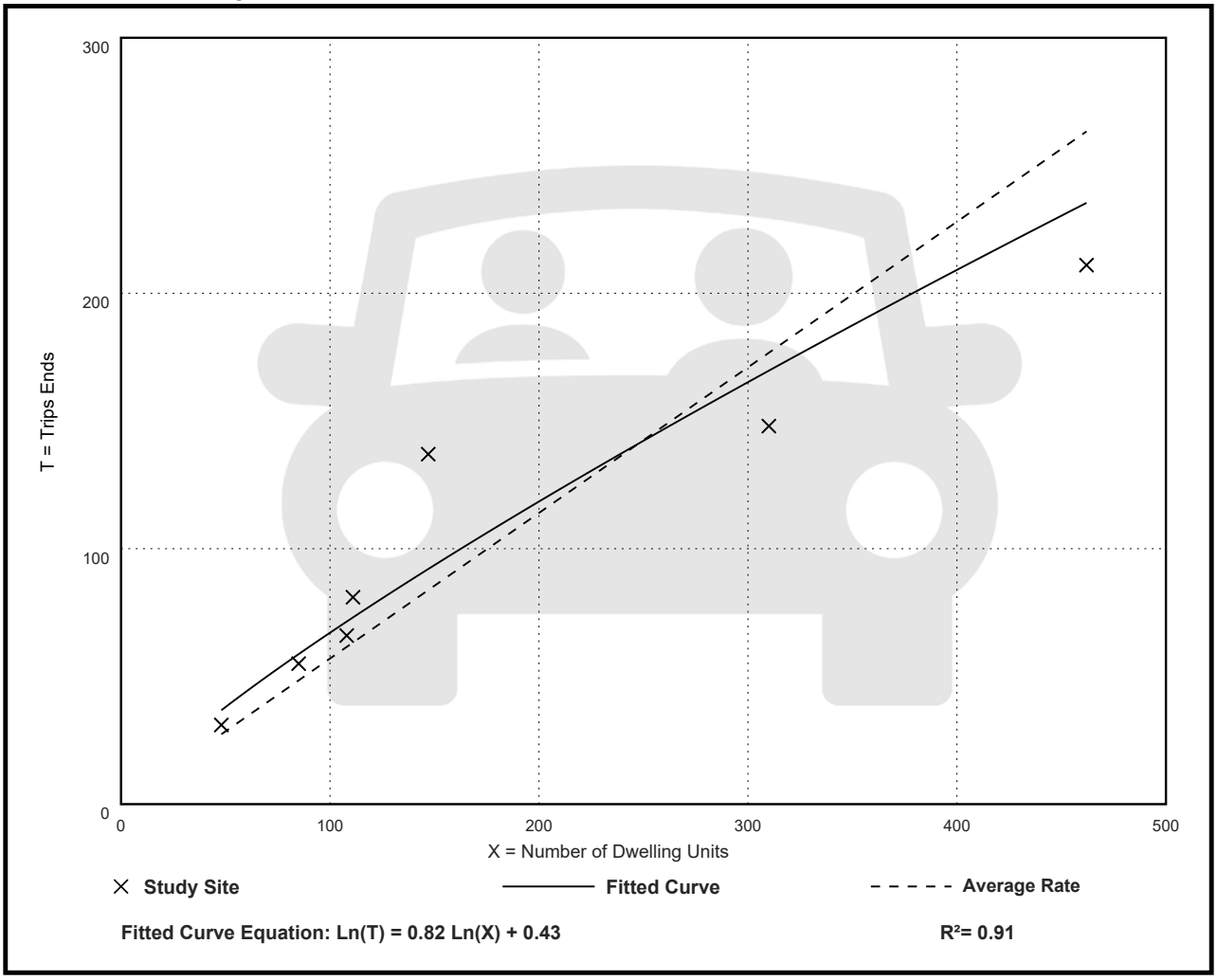
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Dwelling Units: 182
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.46 - 0.93	0.17

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.82 Ln(X) + 0.43

R^2= 0.91

Single-Family Attached Housing
(215)

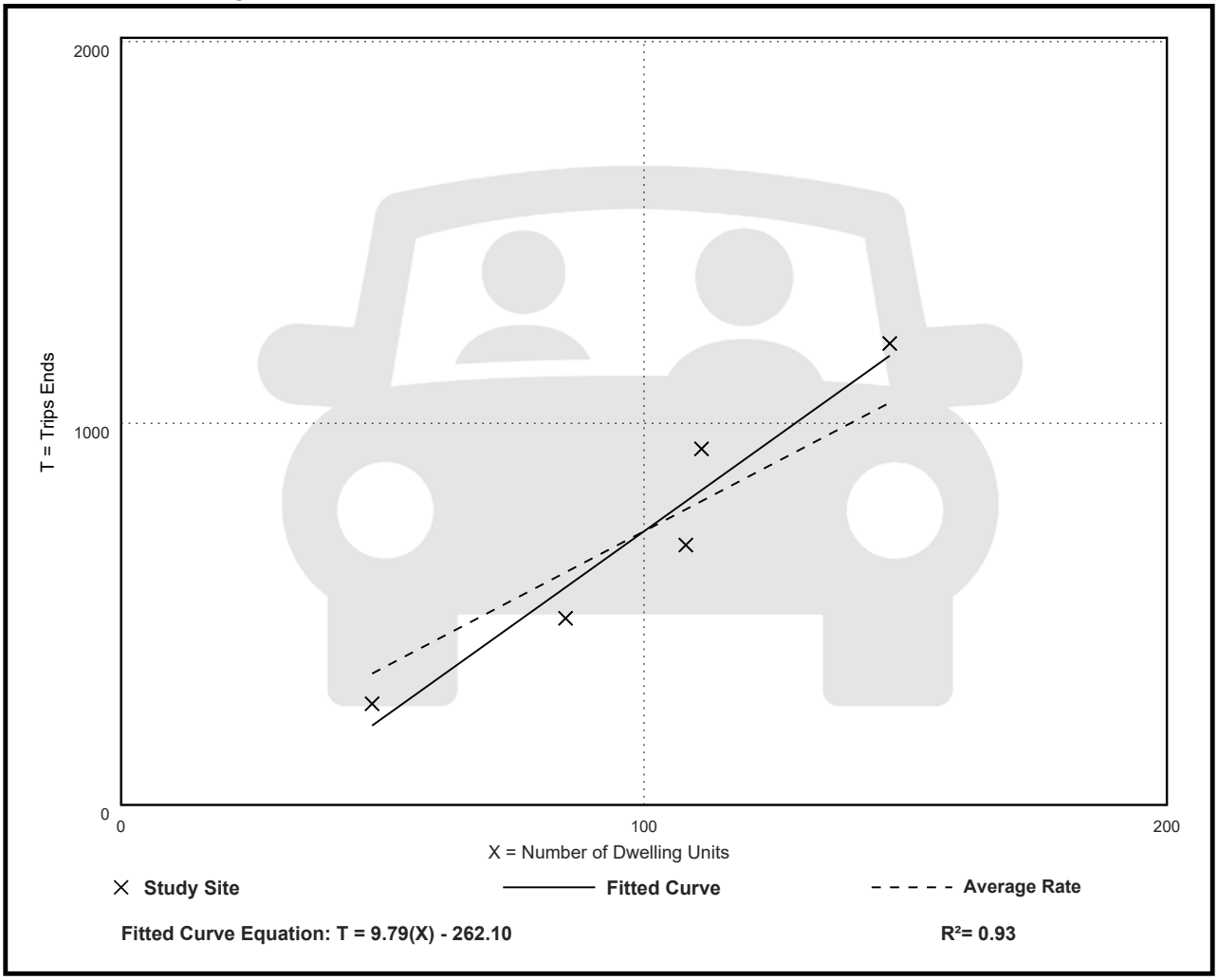
Vehicle Trip Ends vs: Dwelling Units
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Dwelling Units: 100
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.17	5.52 - 8.41	1.34

Data Plot and Equation



Fitted Curve Equation: T = 9.79(X) - 262.10

R^2= 0.93

Single-Family Attached Housing
(215)

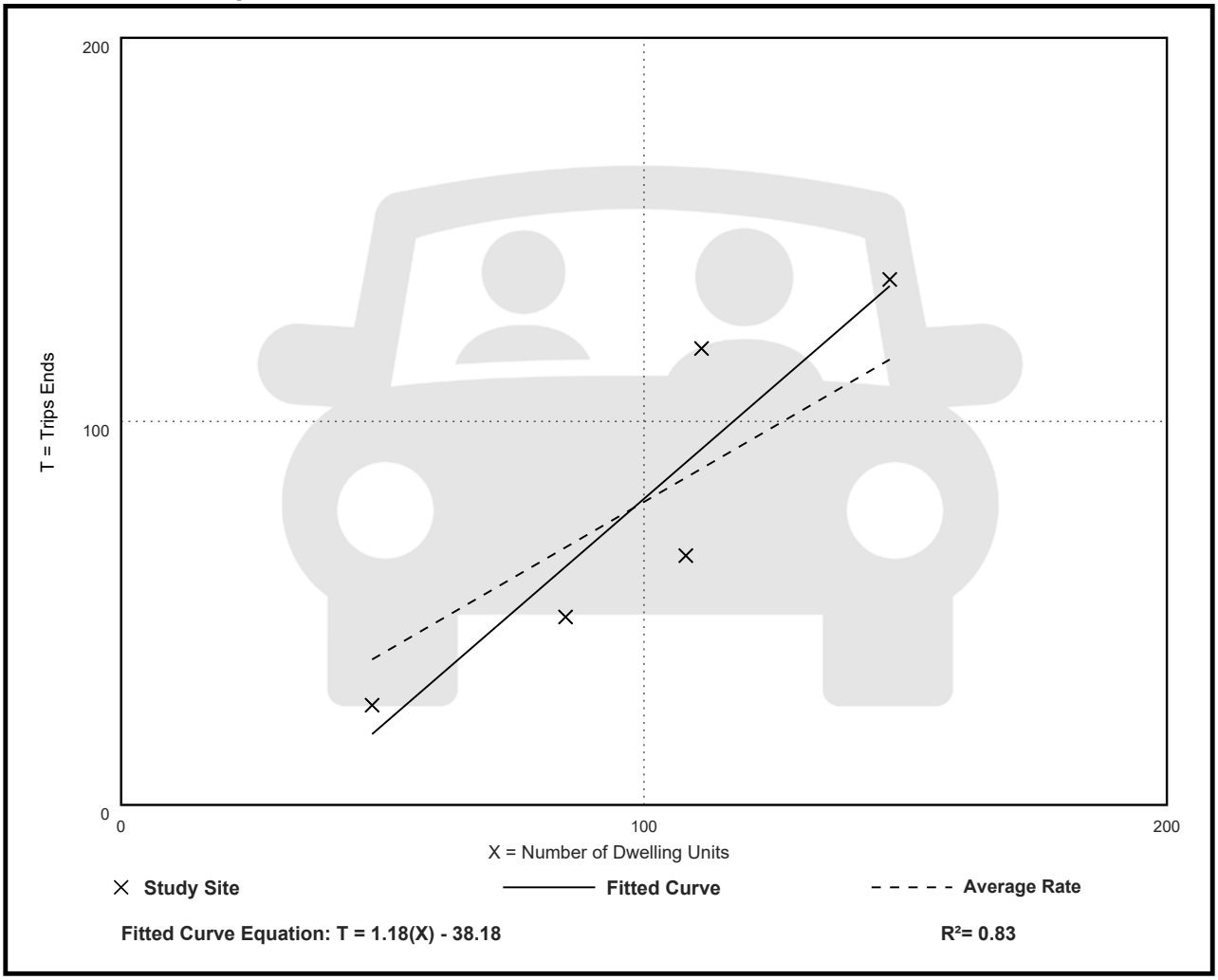
Vehicle Trip Ends vs: Dwelling Units
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Dwelling Units: 100
Directional Distribution: Not Available

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.79	0.54 - 1.07	0.24

Data Plot and Equation



Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Residents
On a: Weekday

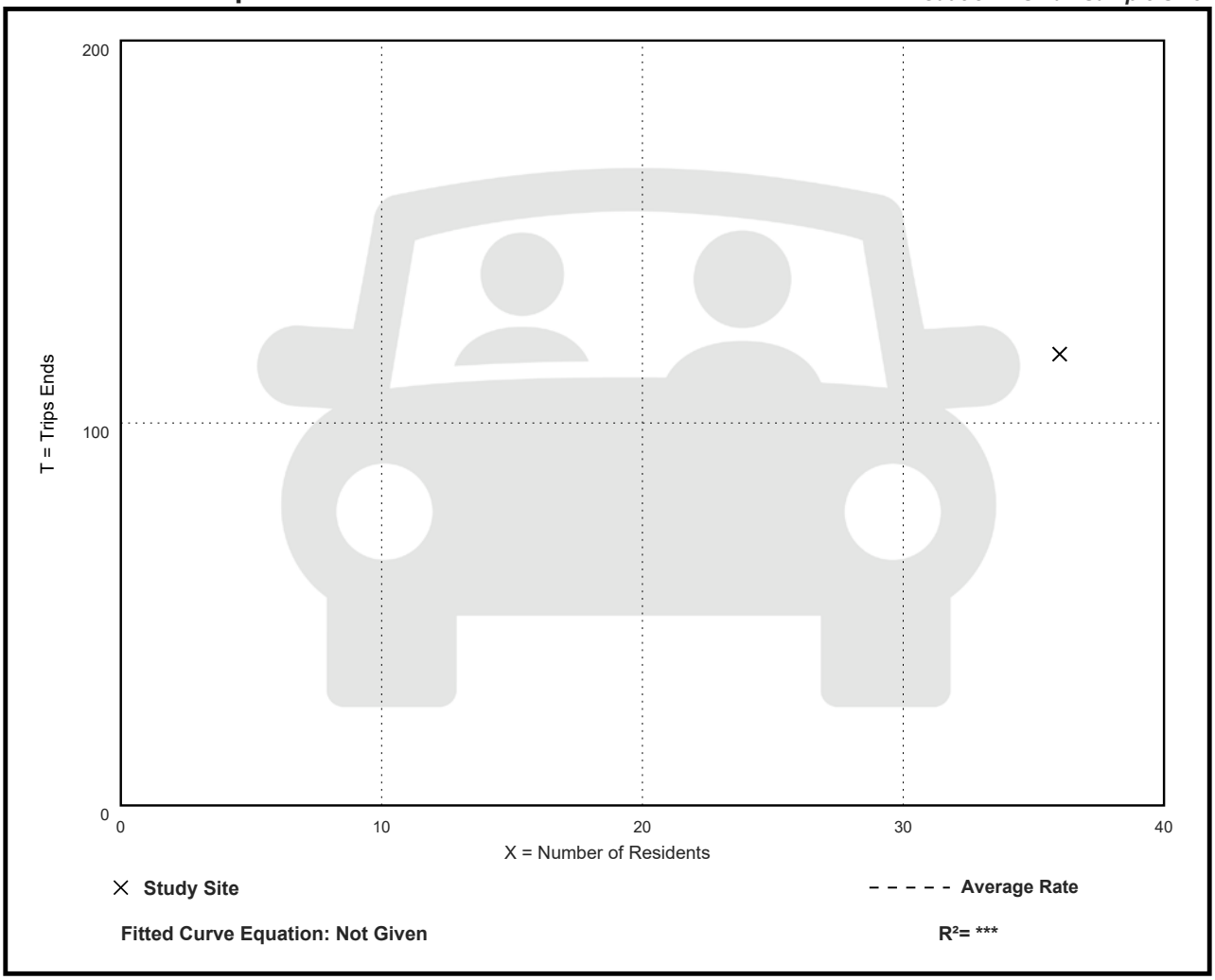
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Residents: 36
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
3.28	3.28 - 3.28	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Residents
On a: Weekday,
AM Peak Hour of Generator

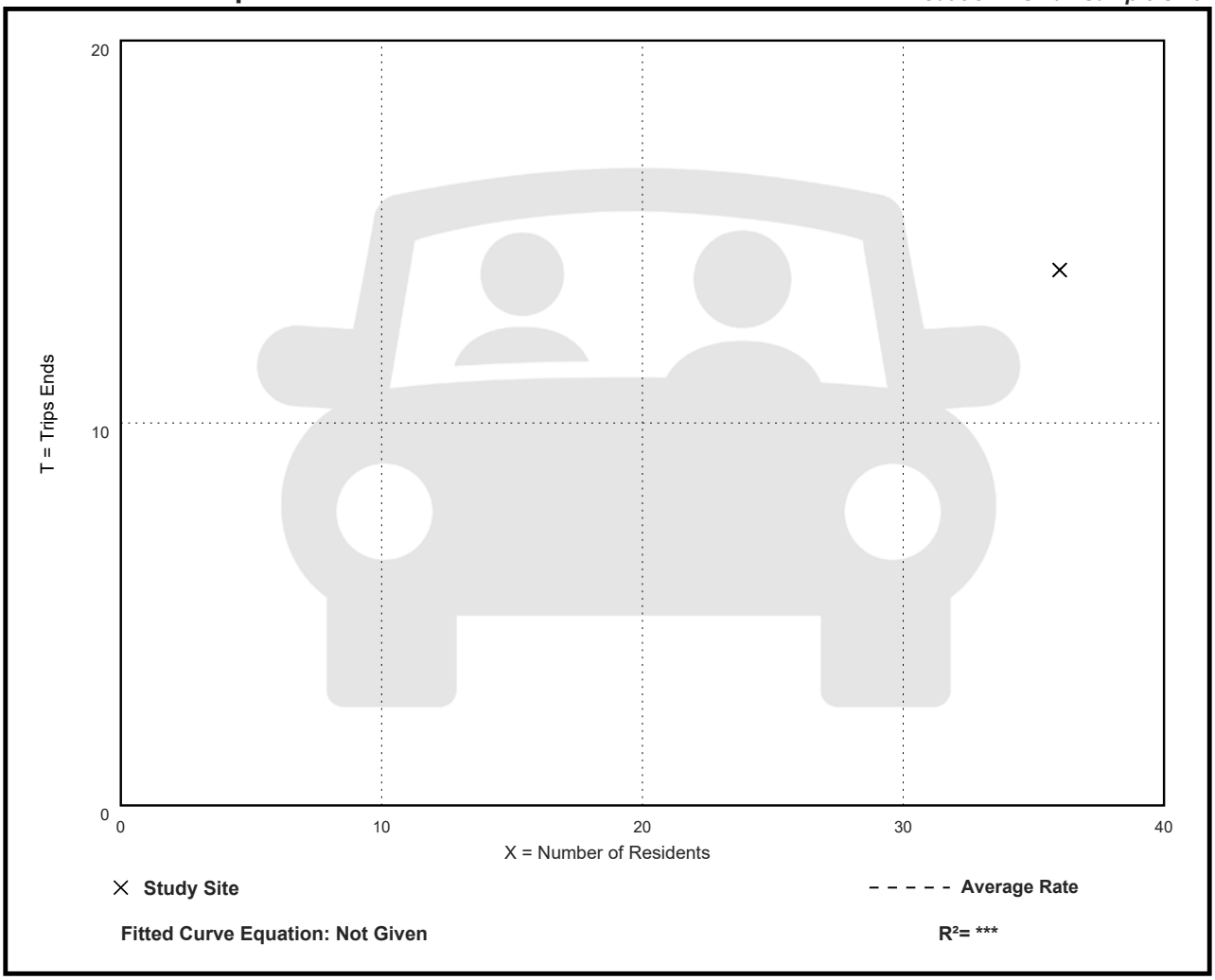
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Residents: 36
Directional Distribution: Not Available

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.39	0.39 - 0.39	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

Single-Family Attached Housing
(215)

Vehicle Trip Ends vs: Residents
On a: Weekday,
PM Peak Hour of Generator

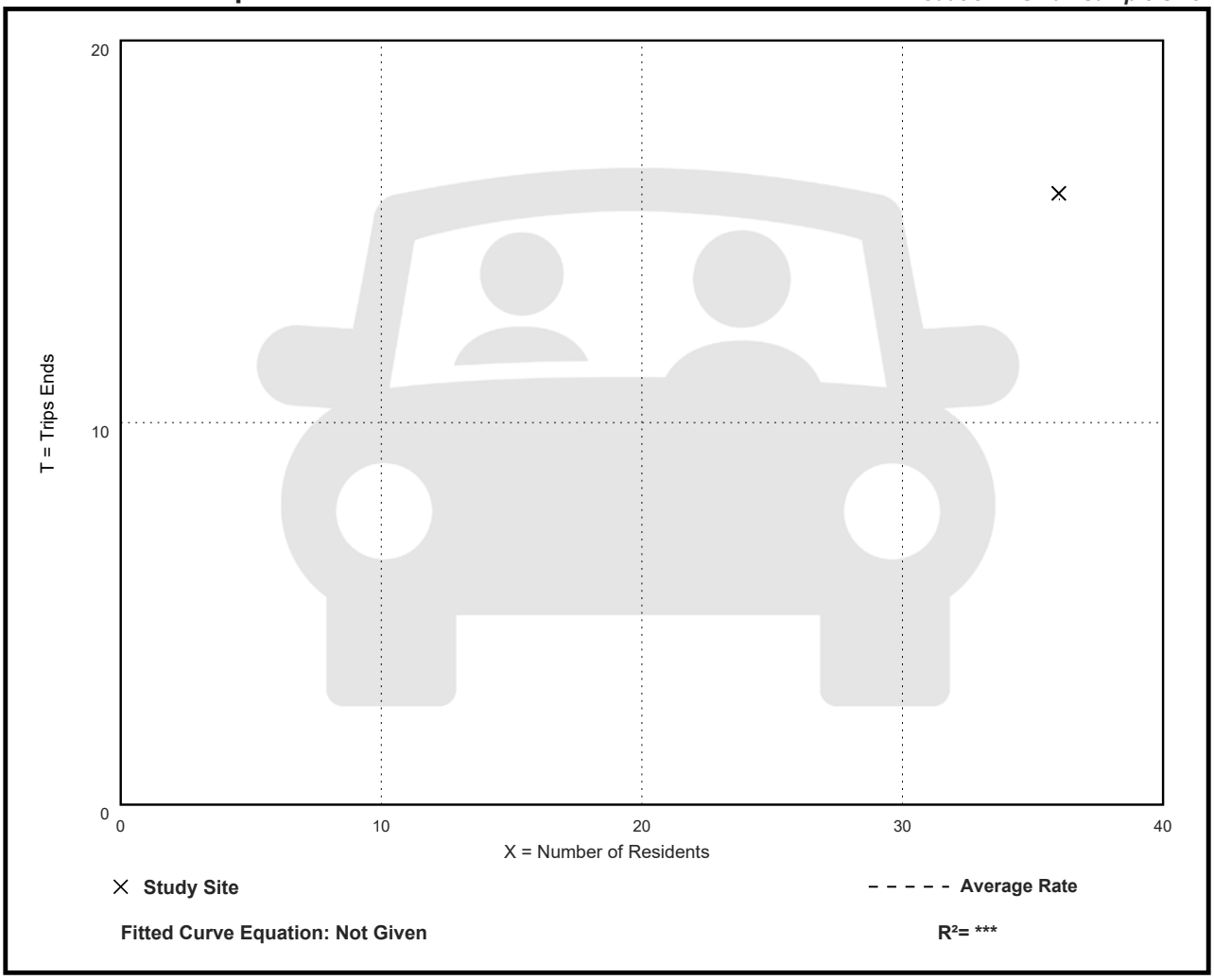
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Residents: 36
Directional Distribution: Not Available

Vehicle Trip Generation per Resident

Average Rate	Range of Rates	Standard Deviation
0.44	0.44 - 0.44	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

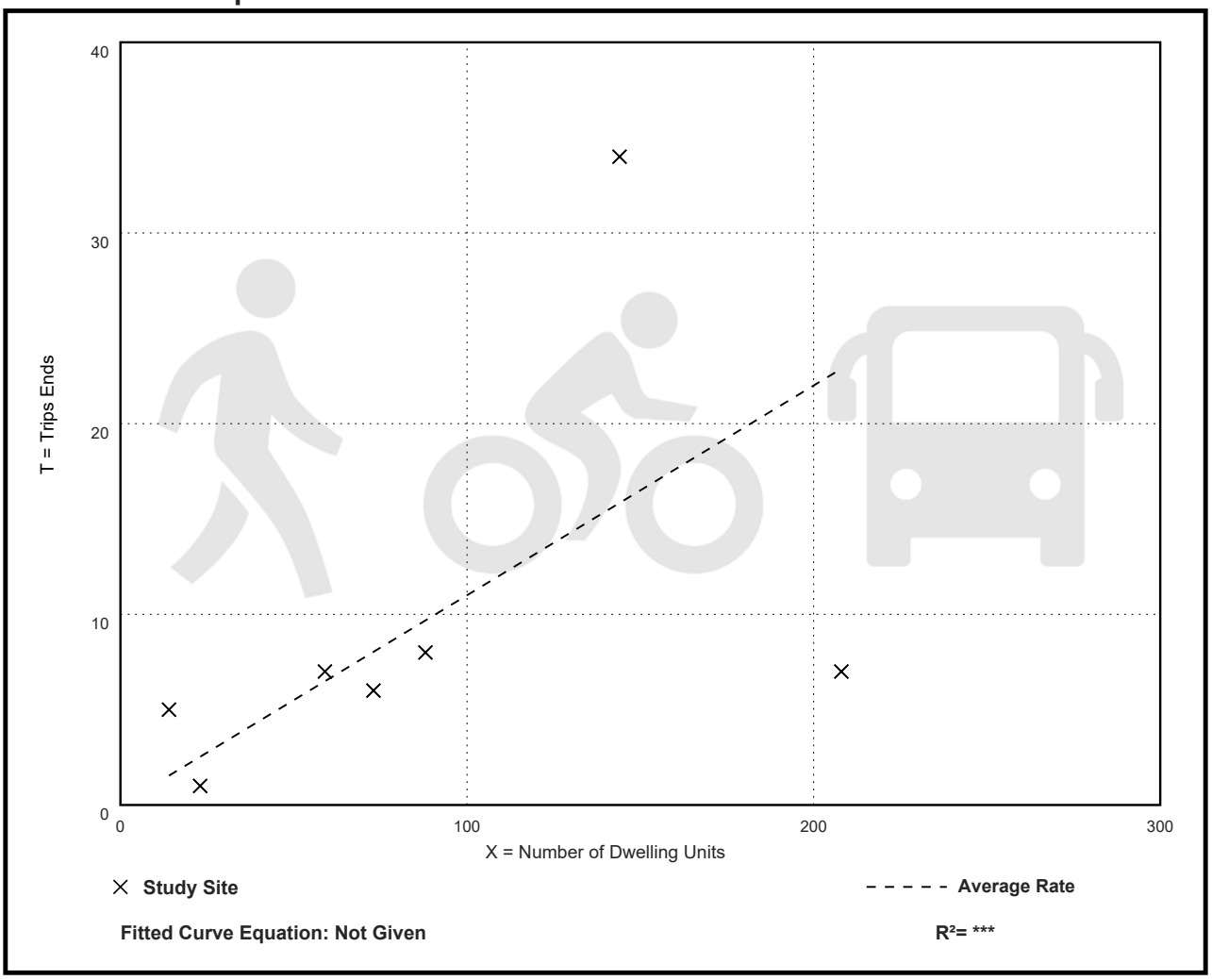
Single-Family Attached Housing
(215)

Walk+Bike+Transit Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Dwelling Units: 87
Directional Distribution: 75% entering, 25% exiting

Walk+Bike+Transit Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.11	0.03 - 0.36	0.09

Data Plot and Equation



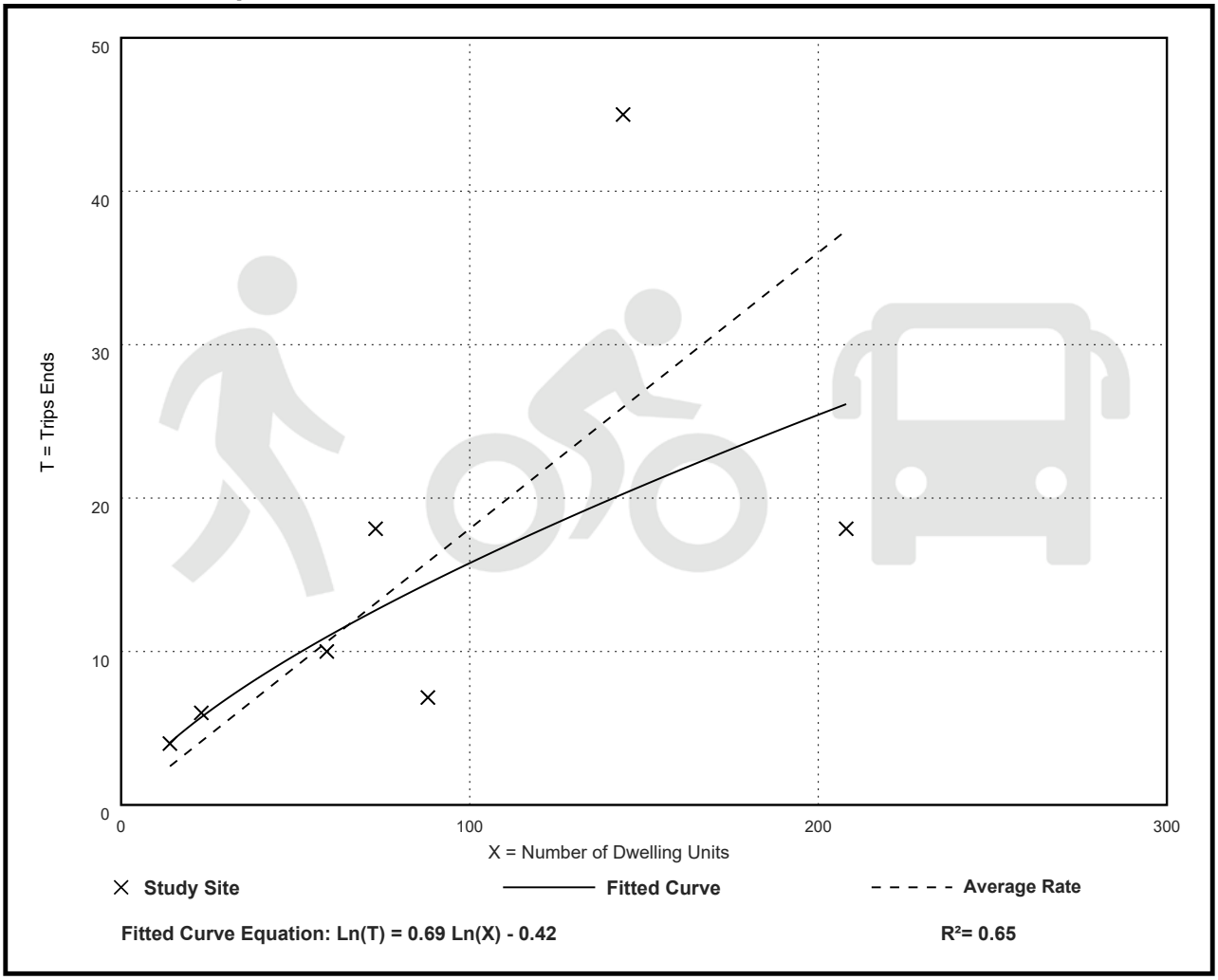
Single-Family Attached Housing
(215)

Walk+Bike+Transit Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Dwelling Units: 87
Directional Distribution: 38% entering, 62% exiting

Walk+Bike+Transit Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.18	0.08 - 0.31	0.11

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.69 Ln(X) - 0.42

R^2= 0.65

APPENDIX G

Transportation Tomorrow Survey (TTS) Excerpts

Fri Oct 18 2024 11:49:52 GMT-0400 (Eastern Daylight Time) - Run Time: 3022ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(2006 GTA zone of destination - gta06_dest In 5109, 5138, 5105
and
Start time of trip - start_time In 0630-0930
and
Trip purpose of destination - purp_dest In H,)

Trip 2016
Table:

,5105,5109
3816,0,19
5059,0,24
5104,19,0
5135,19,0
5248,0,24
8920,0,40

Fri Oct 18 2024 11:57:08 GMT-0400 (Eastern Daylight Time) - Run Time: 3039ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of destination - gta06_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
(2006 GTA zone of origin - gta06_orig In 5109, 5138, 5105
and
Start time of trip - start_time In 0630-0930
and
Trip purpose of origin - purp_orig In H,)

Trip 2016
Table:

,5105,5109,5138
55,26,0,0
313,35,0,0

452,11,0,0
1197,0,47,0
3421,19,0,0
4052,35,0,0
4062,0,25,0
4077,16,25,0
4081,0,22,0
4082,0,24,0
5036,35,18,0
5040,29,0,0
5056,54,0,0
5058,0,22,0
5059,59,136,0
5065,0,68,0
5067,0,50,0
5087,16,0,0
5094,25,0,0
5104,132,0,0
5109,59,139,0
5112,0,28,0
5119,0,0,17
5121,36,0,0
5135,107,0,67
5138,0,28,0
5142,0,90,0
5144,28,0,0
5155,16,0,0
5159,33,0,0
5163,0,24,0
5164,0,48,0
5174,21,0,0
5180,0,83,0
5184,0,28,0
5190,14,0,0
5191,0,0,13
5192,0,17,0
5194,108,28,0
5195,18,0,0
5197,35,0,0
5198,28,88,0
5207,0,41,0
5233,0,29,0
5246,13,0,9
5248,0,24,0
6011,0,22,0
7042,0,0,47
7136,0,28,0

7303,59,0,0

7352,38,0,0

7395,0,29,0

8920,21,0,0

Fri Oct 18 2024 11:53:36 GMT-0400 (Eastern Daylight Time) - Run Time: 2957ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of origin - gta06_orig

Column: 2006 GTA zone of destination - gta06_dest

Filters:

(2006 GTA zone of destination - gta06_dest In 5109, 5138, 5105

and

Start time of trip - start_time In 1530-1830

and

Trip purpose of destination - purp_dest In H,)

Trip 2016

Table:

,5105,5109,5138

57,15,0,0

313,35,0,0

452,11,0,0

3325,0,50,0

3421,19,0,0

3699,18,0,0

4061,0,24,0

4062,0,25,0

4077,89,0,0

4086,0,22,0

5008,0,139,0

5036,26,28,0

5040,29,0,0

5044,19,0,0

5051,0,35,0

5056,54,0,0

5059,117,96,0

5065,33,162,0

5067,0,50,0

5075,0,40,0

5094,25,0,0

5104,37,0,0

5112,46,29,0

5119,0,0,17

5129,19,0,0

5135,71,0,47

5142,0,40,0

5155,16,0,0

5159,33,28,0

5163,0,24,0

5164,0,48,0

5172,47,0,0

5174,21,0,0

5190,14,0,0

5193,0,45,0

5194,71,0,0

5195,18,0,0

5197,59,0,0

5198,28,88,0

5199,24,0,0

5207,13,41,9

5233,0,29,0

5248,0,47,0

6026,12,0,0

7042,0,0,47

7303,59,0,0

7352,38,0,0

7395,0,29,0

8908,0,28,0

8920,21,0,0

8950,54,0,0

9068,0,28,0

Fri Oct 18 2024 11:58:08 GMT-0400 (Eastern Daylight Time) - Run Time: 2758ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

(2006 GTA zone of origin - gta06_orig In 5109, 5138, 5105

and

Start time of trip - start_time In 1530-1830

and

Trip purpose of origin - purp_orig In H,)

Trip 2016

Table:

,5105,5109,5138

77,13,0,0

4054,35,0,0

5059,59,0,20

5065,33,75,0

5105,24,0,0

5112,57,29,0

5115,0,24,0

5122,24,0,0

5138,24,0,0

5139,0,24,0

5180,117,0,0

5183,0,76,0

5192,28,0,0

5207,0,28,0

5228,21,0,0

5248,0,47,0

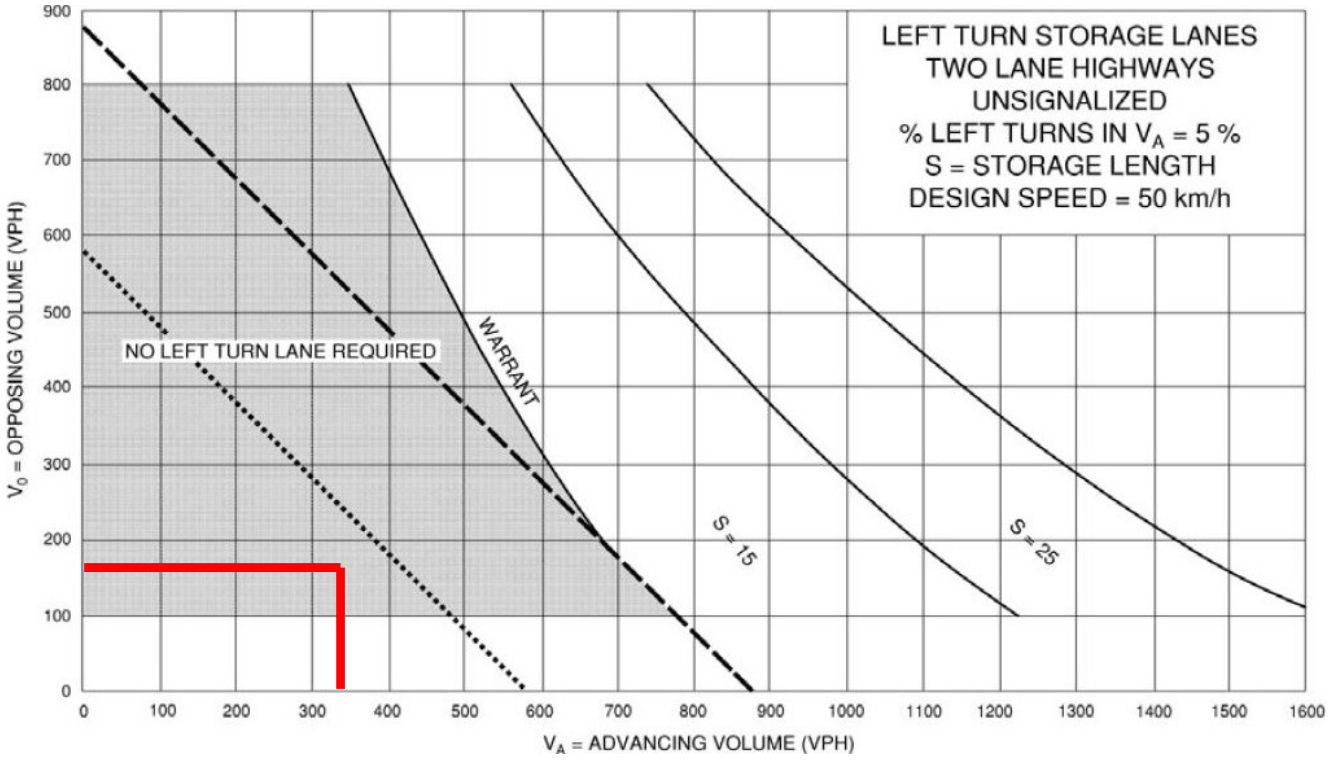
8905,13,0,0

9998,42,0,0

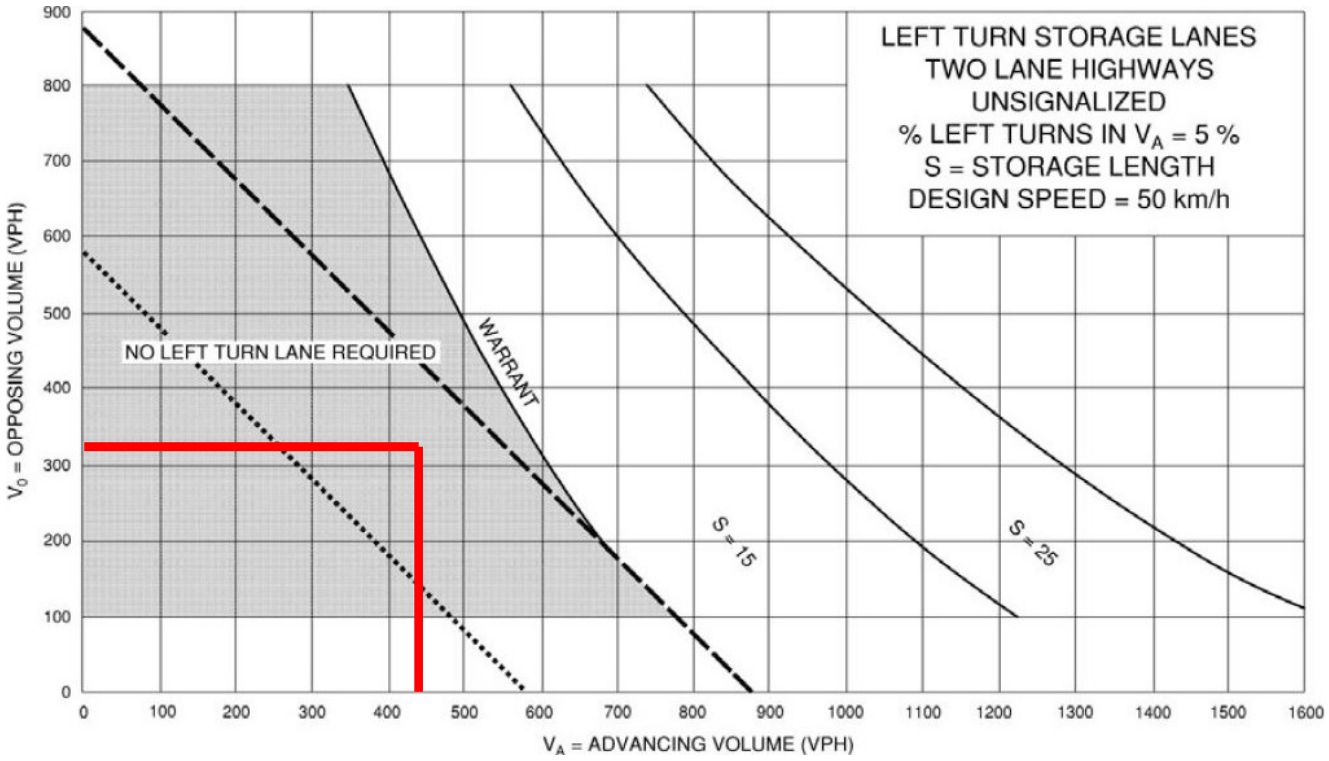
APPENDIX H

Warrants

AM Peak Hour



PM Peak Hour



Left-Turn Lane Warrant

Existing Site Access and Sulphur Springs Road

2035 Future Total Horizon

APPENDIX I

TAC Excerpts

collector roadways, while a 3.0 m minimum is the suggested dimension for both commercial and industrial land uses. If there is a need to provide parallel parking between driveways along the roadway, a spacing of 6.0 to 7.5 m is suitable. If the spacing provided is in the range of 3.0 to 5.0 m, the space may appear inviting to a driver wishing to park, but if used, severely hampers the operation of the driveways by reducing sight lines and interfering with the turning paths of the vehicles.

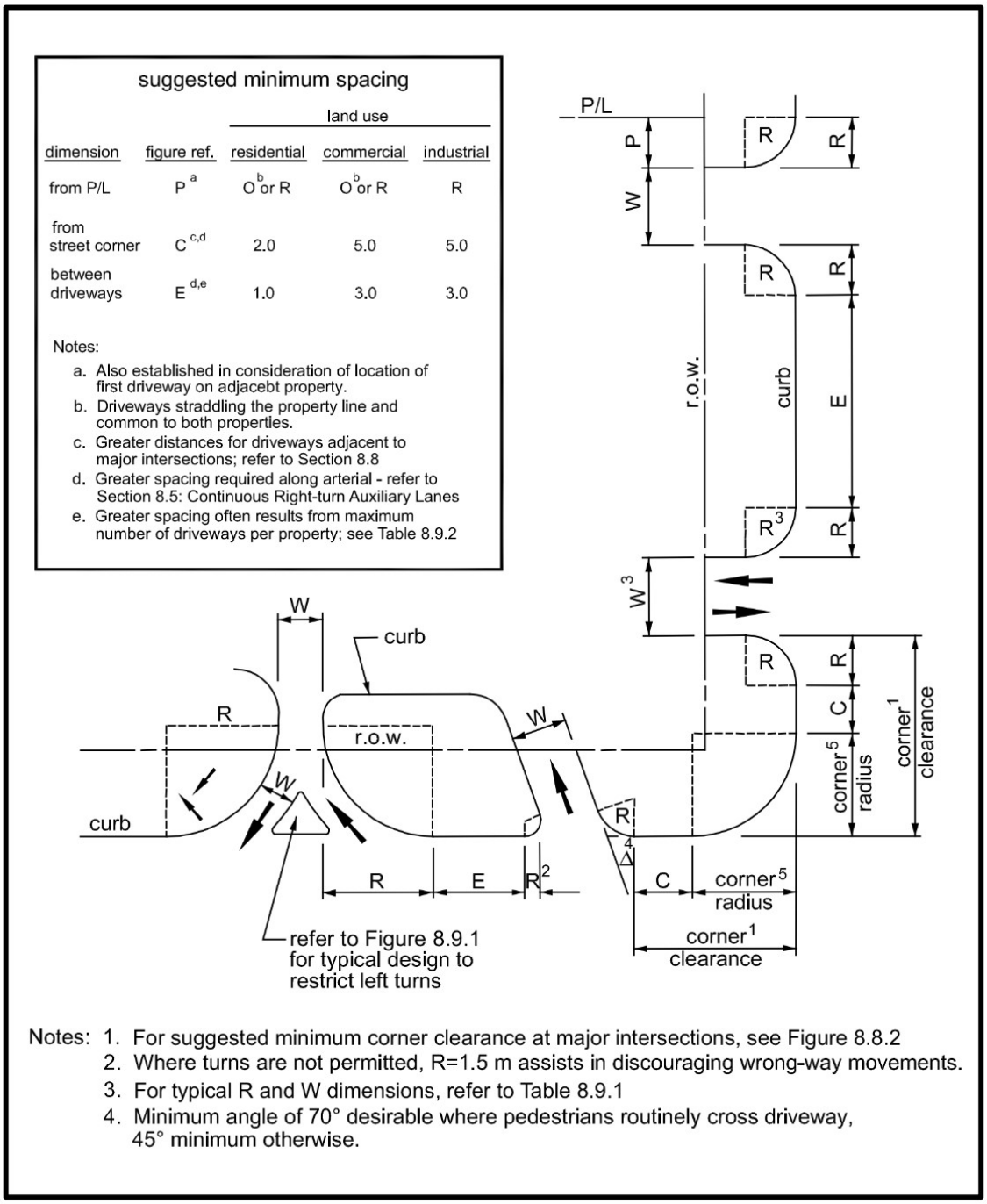


Figure 8.9.2: Driveway Spacing Guidelines – Locals and Collectors

9.4.2.1 Arterials

Along signalized arterial roads, vehicular traffic volumes are generally high. It is therefore desirable to provide spacing between signalized intersections that is consistent with the desired vehicular traffic progression speed and signal cycle lengths. By spacing the intersections uniformly, based on known or assumed running speeds and appropriate cycle lengths, signal progression in both directions can be achieved. Progression allows platoons of vehicles to travel through successive intersections without stopping. For a progression speed of about 50 km/h and a cycle length of 60 s, the corresponding desired spacing between signalized intersections is approximately 400 m. As speeds increase, the optimal intersection spacing increases proportionately.

Where an arterial corridor must accommodate a variety of road users (e.g., vehicles, cyclists, and pedestrians), vehicle operations and the consequent intersection designs must balance the various needs while recognizing that the priority of arterial roadways is generally servicing vehicular traffic movement.

A typical minimum intersection spacing along arterial roadways is 200 m, generally only applicable in areas of intense existing development or restrictive physical controls where feasible alternatives do not exist. The 200 m spacing allows for minimum lengths of back to back storage for left turning vehicles at the adjacent intersections.

The close spacing does not permit signal progression; therefore, it is normally preferable not to signalize the intersection that interferes with progression along a major arterial. Intersection spacing at or near the 200 m minimum is normally only acceptable along minor arterials, where optimizing traffic mobility is not as important as along major arterials.

Where intersection spacing along an arterial does not permit an adequate level of traffic service, many alternatives can be considered to improve traffic flow. These include, but are not limited to:

- Converting two-way to one-way operation
- Implementing cul-de-sacs for minor connecting roads
- Introducing channelization to restrict turning movements at selected intersections to right turns only.

The designer's options may be substantially limited by the policies of the local jurisdiction.

On divided arterial roads, a right-in, right-out intersection without a median opening may be permitted at least 100 m from an adjacent all-directional intersection. The distance is measured between the closest edges of pavement of the adjacent intersecting roads.

In retrofit situations, the desired spacing of intersections along an arterial is sometimes compromised in consideration of other design controls, such as the nature of existing adjacent development and the associated access needs.

9.4.2.2 Collectors

The typical minimum spacing between adjacent intersections along a collector road is 60 m.

9.4.2.3 Locals

Along local roads, the minimum spacing between four-legged intersections is normally 60 m. Where the adjacent intersections are three-legged, a minimum spacing of 40 m is acceptable.

contrasting construction materials across the driveway assists in defining a pedestrian crossing zone to the driver.

The radius of the curb return style or the flare required to accommodate an equivalent turning radius is meaningful only when considered in combination with the width of the driveway throat.

8.9.5 WIDTH

The width of a two-way driveway is measured parallel to the road since turns are generally oriented at right angles. The dimension is typically measured beyond any entrance flare. The width of one-way driveways, which are normally skewed, is measured perpendicular to the driveway.

It is desirable to state suitable driveway widths as a design domain. Dimensions at the lower end of the domain are intended to define the minimum spatial and operational requirements. The maximum dimensions assist in preventing driveways from becoming unwieldy with large paved areas and poorly defined travel paths. The most appropriate width of a driveway is determined in combination with the radius of the curb return (or the design vehicle turning radius and flare dimensions, if a straight flared design is adopted), the desired operating characteristics such as turning speed, and physical limitations which may exist at the site.

Table 8.9.1 provides a typical design domain for driveway throat widths and radii for both two-way and one-way operation. In locations where special vehicles such as long combination vehicles or similar vehicles are present, wider driveway throat dimensions or larger radii may be required.

Table 8.9.1: Typical Driveway[c] Dimensions

Dimension (m)	Land Use		
	Residential	Commercial	Industrial
Width (W)			
- One way	3.0[a] – 4.3	4.5[a] – 7.5	5.0 – 9.0
- Two way	2.0[a] – 7.3	7.2[a] – 12.0[b]	9.0[a] – 15.0[b]
Right turn radius (R)	3.0 – 4.5	4.5 – 12.0	9.0 – 15.0

Notes:

a. Minimum widths are normally used with radii at or near the upper end of the specified range
b. Increased widths may be considered for capacity purposes; where up to 3 exit lanes and 2 entry lanes are employed, 17.0 m is the maximum width exclusive of any median
c. Applicable to driveways only, not road intersections

8.9.6 ANGLE OF DRIVEWAY

Two-way driveways normally intersect the roadway curb at or near 90°. However, a minimum acute angle of 70°, as measured from the roadway curb line, normally operates in an acceptable manner.

For one-way driveways, where a skewed intersection assists in efficient traffic operation, skews in the range of 45° to 60° are appropriate in industrial areas where pedestrians are infrequent. For commercial and residential land uses, where pedestrian volumes are normally moderate to high, minimum skew angles in the range of 60° to 70° are preferred to improve the driver's visibility of the pedestrian, and vice versa, and to encourage lower turning speeds.

Stopping sight distance is the sum of the distance travelled during the perception and reaction time and the braking distance.

$$SSD = 0.278Vt + 0.039 \frac{V^2}{a} \quad (2.5.2)$$

Where:

SSD = Stopping sight distance (m)
t = Brake reaction time, 2.5 s
V = Design speed (km/h)
a = Deceleration rate (m/s^2)

Table 2.5.2 gives the minimum stopping sight distances on level grade, on wet pavement, for a range of design speeds. These values are used for vertical curve design, intersection geometry and the placement of traffic control devices. The stopping sight distances quoted in **Table 2.5.2** may need to be increased for a variety of reasons related to grade and vehicle type as noted below.

Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles[54]

Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance	
			Calculated (m)	Design (m)
20	13.9	4.6	18.5	20
30	20.9	10.3	31.2	35
40	27.8	18.4	46.2	50
50	34.8	28.7	63.5	65
60	41.7	41.3	83.0	85
70	48.7	56.2	104.9	105
80	55.6	73.4	129.0	130
90	62.6	92.9	155.5	160
100	69.5	114.7	184.2	185
110	76.5	138.8	215.3	220
120	83.4	165.2	248.6	250
130	90.4	193.8	284.2	285

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s^2 used to determine calculated sight distance.

Table 9.9.3: Time Gap for Case B1, Left Turn from Stop

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	7.5
Single-unit truck	9.5
Combination truck (WB 19 and WB 20)	11.5
Longer truck	To be established by road authority

Notes: Time gaps are for a stopped vehicle to turn left onto a two-lane highway with no median and with grades of 3% or less. The table values should be adjusted as follows:

- For multi-lane highways: For left turns onto two-lane highways with more than two lanes, add 0.5 s for passenger cars and 0.7 s for trucks for each additional lane, from the left, in excess of one, to be crossed by the turning vehicle.
- For minor approach grades: If the approach grade is an upgrade that exceeds 3%, add 0.2 s for each percent grade for left turns.
- Some road authorities use higher values for certain specialized vehicles (e.g., Alberta uses 22 s for very long log trucks).

The intersection sight distance along the major road (distance b in **Figure 9.9.2**) is determined by:

$$ISD = 0.278\ V_{major}\ t_g \qquad (9.9.1)$$

Where:

ISD = intersection sight distance (length of the leg of sight triangle along the major road) (m)
V_{major} = design speed of the major road (km/h)
t_g = time gap for minor road vehicle to enter the major road (s)

For example, a passenger car turning left onto a two-lane major road should be provided sight distance equivalent to a time gap of 7.5 s in major-road traffic. If the design speed of the major road is 100 km/h, this corresponds to a sight distance of 0.278(100)(7.5) = 208.5 or 210 m, rounded for design.

A passenger car turning left onto a four-lane undivided roadway will need to cross two near lanes, rather than one. This increases the recommended gap in major-road traffic from 7.5 to 8.0 s. The corresponding value of sight distance for this example would be 223 m. If the minor-road approach to such an intersection is located on a 4% upgrade, then the time gap selected for intersection sight distance design for left turns should be increased from 8.0 to 8.8 s, equivalent to an increase of 0.2 s for each percent grade.

The design values for intersection sight distance for passenger cars are shown in **Table 9.9.4**. **Figure 9.9.4** includes design values, based on the time gaps for the design vehicles included in **Table 9.9.3**.

No adjustment of the recommended sight distance values for the major-road grade is generally needed because both the major- and minor-road vehicle will be on the same grade when departing from the intersection. However, if the minor-road design vehicle is a heavy truck and the intersection is located near a sag vertical curve with grades over 3%, then an adjustment to extend the recommended sight distance based on the major-road grade should be considered.

Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn From Stop

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	41.7	45
30	35	62.6	65
40	50	83.4	85
50	65	104.3	105
60	85	125.1	130
70	105	146.0	150
80	130	166.8	170
90	160	187.7	190
100	185	208.5	210
110	220	229.4	230
120	250	250.2	255
130	285	271.1	275

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right turns (case B2) will provide sufficient sight distance for a passenger car to cross the near roadway to reach the median. Possible exceptions are addressed in the discussion of case B3.

The time gaps in **Table 9.9.3** can be decreased by 1.0 s for right-turn maneuvers without undue interference with major-road traffic. These adjusted time gaps for the right turn from the minor road are shown in **Table 9.9.5**. Design values based on these adjusted time gaps are shown in **Table 9.9.6** for passenger cars. **Figure 9.9.5** includes the design values for the design vehicles for each of the time gaps in **Table 9.9.5**.

Table 9.9.5: Time Gap for Case B2—Right Turn from Stop and Case B3—Crossing Maneuver

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	6.5
Single-unit truck	8.5
Combination truck (WB 19 and WB 20)	10.5

Note: Time gaps are for a stopped vehicle to turn left onto a two-lane highway with no median and with grades of 3% or less. The table values should be adjusted as follows:

- For multi-lane highways: For left turns onto two-lane highways with more than two lanes, add 0.5 s for passenger cars and 0.7 s for trucks for each additional lane, from the left, in excess of one, to be crossed by the turning vehicle.
- For minor approach grades: If the approach grade is an upgrade that exceeds 3%, add 0.1 s for each percent grade for left turns.

Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	36.1	40
30	35	54.2	55
40	50	72.3	75
50	65	90.4	95
60	85	108.4	110
70	105	126.5	130
80	130	144.6	145
90	160	162.6	165
100	185	180.7	185
110	220	198.8	200
120	250	216.8	220
130	285	234.9	235

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane highway with no median and with grades of 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

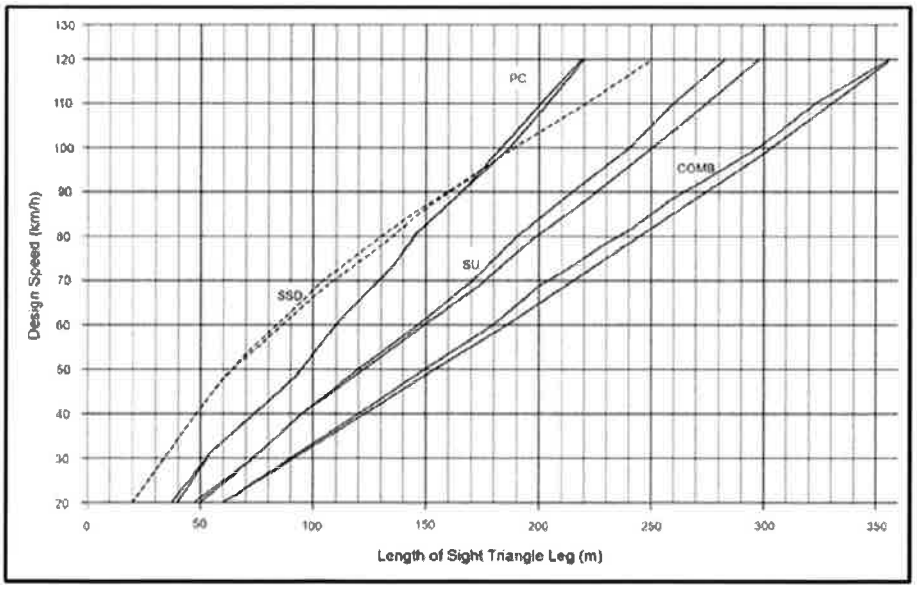


Figure 9.9.5: Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver (Calculated and Design Values Plotted)

Case F – Left Turns from the Major Road

All locations along a major highway from which vehicles are permitted to turn left across opposing traffic, including intersections and driveways, should have sufficient sight distance to accommodate the left-turn maneuver. Left-turning drivers need sufficient sight distance to decide when to turn left across the lane(s) used by opposing traffic. Sight distance design should be based on a left turn by a stopped vehicle, since a vehicle that turns left without stopping would need less sight distance. The sight distance along the major road to accommodate left turns is the distance traversed at the design speed of the major road in the travel time for the design vehicle given in **Table 9.9.11**.

Table 9.9.11: Time Gap for Case F, Left Turns from the Major Road

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	5.5
Single-unit truck	6.5
Combination truck (WB 19 and WB 20)	7.5

Note: Adjustment for multi-lane highways: For turning vehicles that cross more than one opposing lane, add 0.5 s for passenger cars and 0.7 s for trucks for each additional lane to be crossed.

The table also contains appropriate adjustment factors for the number of major-road lanes to be crossed by the turning vehicle. The unadjusted time gap in **Table 9.9.11** for passenger cars was used to develop the sight distances in **Table 9.9.12** and is illustrated in **Figure 9.9.8.**

Table 9.9.12: Intersection Sight Distance – Case F, Left Turn from the Major Road

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance	
		Passenger Cars	
		Calculated (m)	Design (m)
20	20	30.6	35
30	35	45.9	50
40	50	61.2	65
50	65	76.5	80
60	85	91.7	95
70	105	107.0	110
80	130	122.3	125
90	160	137.6	140
100	185	152.9	155
110	220	168.2	170
120	250	183.5	185
130	285	198.8	200

Note: Intersection sight distance shown is for a passenger car making a left turn from an undivided highway. For other conditions and design vehicles, the time gap should be adjusted and the sight distance recalculated.

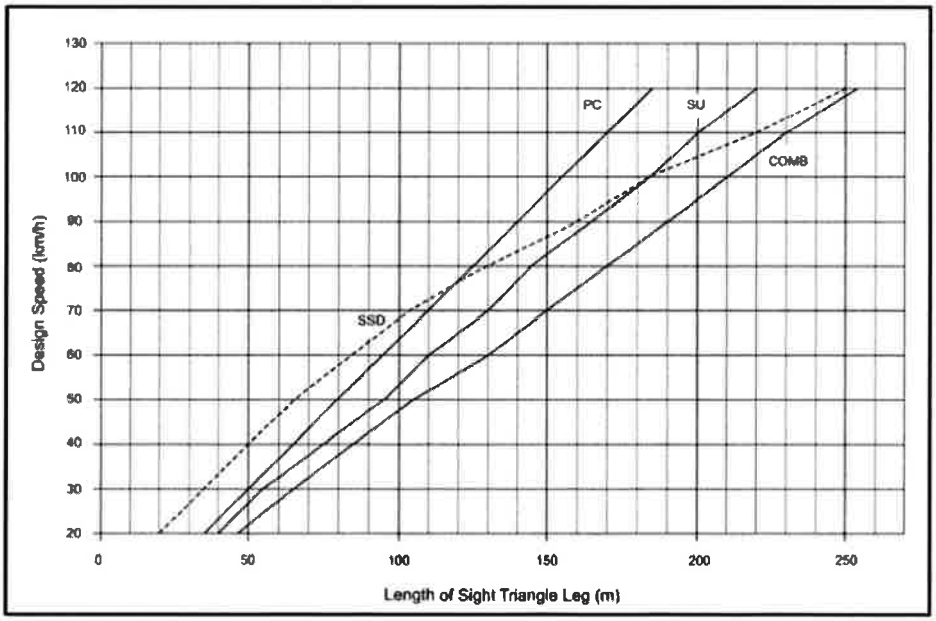


Figure 9.9.8: Intersection Sight Distance – Case F, Left Turn from the Major Road

8.9.10 CLEAR THROAT LENGTHS

In order for major driveways to operate efficiently, both from the road side and internally, it is desirable to provide a no conflict and storage zone within the driveway. This zone is commonly referred to as the clear throat length or set-back distance and is measured from the ends of the driveway curb return radii at the roadway and the point of first conflict on-site. **Figure 8.5.2** illustrates how a throat length is measured. Failure to provide sufficient throat distance results in frequent blocking of on-site circulation roads which can in turn create queues of entering vehicles. The provision of appropriate clear throat length or storage space is particularly important for drive-in service developments where the customers remain in their vehicles while waiting to be served. These types of developments include drive-in restaurants and banks, automatic car washes, and parking facilities with entry control. For large developments, the appropriate throat length is best determined by a detailed traffic analysis based on the traffic control provided at the road and the anticipated volumes and types of traffic. **Table 8.9.3** is a guideline for suggested minimum clear throat lengths for various types of developments.

Table 8.9.3: Suggested Minimum Clear Throat Lengths for Major Driveways[14]

Land Use	Development Size	Minimum Clear Throat Length (m)	
		Collector	Arterial
Light Industrial	<10,000 m^2	8	15
	10,000 – 45,000 m^2	15	30
	>45,000 m^2	15	60
Discount Store	>3,000 m^2	8	15-25
Shopping Centre	<25,000 m^2	8	15
	25,000 – 45,000 m^2	15	25
	45,001 – 70,000 m^2	25	60
	>70,000 m^2	40	75
Supermarket	<2,000 m^2	15	25
	>2,000 m^2	25	40
Apartments	<100 units	8	15
	100 – 200 units	15	25
	>200 units	25	40
Quality restaurant	<1,500 m^2	8	15
	>1,500 m^2	8	25
Fast food restaurant	<200 m^2	8	25
	>200 m^2	15	40
General office	<5,000 m^2	8	15
	5,000 – 10,000 m^2	8	25
	10,001 – 20,000 m^2	15	30
	20,001 – 45,000 m^2	30	45
	>40,000 m^2	40	75
Motel	<150 rooms	8	25
	>150 rooms	8	30

Notes
1. Refer to Figure 8.5.2 for method of measurement
2. For major developments, it is desirable to determine throat lengths and queue on the basis of a site-specific traffic study