



Proposed Residential Development 30 Shaftsbury Drive

Transportation Impact Study

City of Kitchener

Prepared for:
Cook Homes Waterloo Limited

December 2025

Transportation Impact Study

PROJECT RECORD

Municipality: City of Kitchener

Company or Firm: Salvini Consulting Inc.

Report Name: Proposed Residential Development
30 Shaftsbury Drive
Transportation Impact Study

Client: Cook Homes Waterloo Limited

Submission Date: December 2025

I hereby certify that the attached document has been prepared accurately and to the best of my knowledge. The assumptions and analysis contained herein have been formulated using sound transportation planning and traffic operations methodologies.

Individual accepting corporate responsibility:

Name: Julia Salvini, President

Engineer's Seal



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1 Introduction

This Transportation Impact Study (“TIS”) has been prepared in support of planning applications to permit a residential development in the City of Kitchener. This study was undertaken as a submission requirement in accordance with pre-submission consultation with City staff. A copy of the Pre-Study Conference Form with the agreed to parameters for the study is included in Appendix A.

The site is located on the east side of Shaftsbury Drive south of Ebydale Drive near the signalized intersection of Heritage Drive and Ottawa Street North. The current use of the site is the Hope Lutheran Church. The church currently has vehicular (and pedestrian) access to both Ebydale Drive and Oldfield Drive along with pedestrian access to Shaftsbury Drive.

The proposal is to redevelop the site for residential uses. The proposal includes for 88 residential units in a combination of residential forms on the site. Six street fronting units are proposed on Oldfield Drive, and 82 units are proposed in a six-storey apartment building on the main part of the site. Access to a central parking area for the apartment is proposed by way of a new driveway connection to Ebydale Drive opposite the driveway to the KW Musical Productions site on the north side of the street. A Site Location Plan and Concept Site Plan are attached with the figures in Appendix B.

The primary purpose of this study is to assess the impact of the proposal on the transportation network in the area and identify any improvements that are needed to support the proposal. The study area includes the nearby Heritage Drive intersection with Ottawa Street North, which is signalized, and the site driveway intersection with Ebydale Drive opposite the driveway for the KW Musical Productions site.

A five-year horizon year of 2030 was chosen in discussion with City staff.

It is the finding of this study that the proposal will generate about 34 trips in the weekday morning and afternoon peak hours. No road improvements are proposed to accommodate the subject development beyond construction of the driveway itself.



2 Existing Transportation Conditions

2.1 Transportation Context

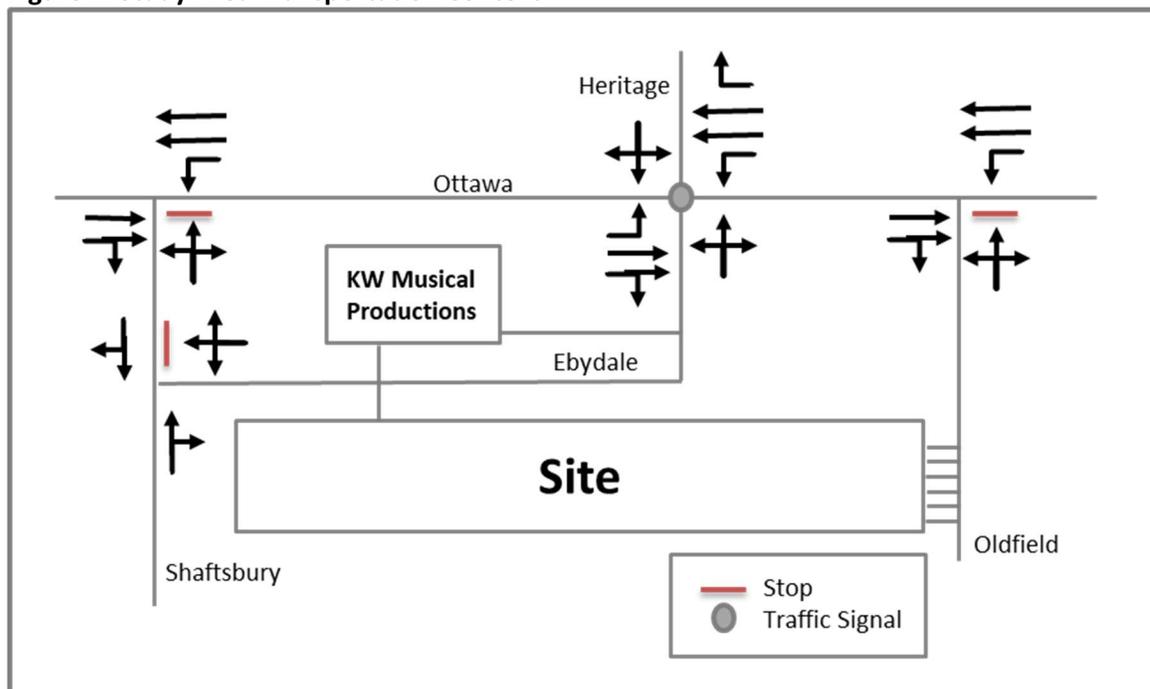
The site is located in the City of Kitchener. The study area includes the nearby signalized intersection at Heritage/Ottawa and the site driveway intersection with Ebydale Drive proposed opposite the driveway for the KW Musical Productions site.

Ebydale Drive is a short east-west road along the north frontage of the site that swings north and operates as Heritage Drive from the bend in Ebydale Drive to Ottawa Street and beyond. Ebydale Drive and Heritage Drive are City roads with a single lane in each direction in a rural cross section. There is a sidewalk on the south and east sides of the road pair. In the vicinity of the site, together they provide access to the community uses nearby including a dental office, the KW Musical Productions site, the Hope Lutheran Church and Anselma House. Beyond Ottawa Street North, Heritage Drive provides access to more community uses and the residential area to the north.

Ottawa Street North is a Regional road providing an important east-west connection through the City of Kitchener. In the vicinity of the site, it is generally two-lanes with a centre turn lane that provides for left turn lanes at the intersections. There is also an auxiliary right turn lane at the Heritage Drive intersection, which is under traffic signal control. On-street bicycles lanes are available on Ottawa Street in the study area.

The site also has frontage on Shaftsbury Drive to the west and Oldfield Drive to the east. Sidewalks are available on both sides of most of the nearby streets. Figure 1 below illustrates the lane configurations at key intersections and the traffic control in the study area.

Figure 1: Study Area Transportation Context



Transit service is available via local route 23 and iXpress route 205. Route 23 connects between Stanley Park Mall and Fairway Station through the local neighborhood providing generally 30 minute service everyday at nearby bus stops at both Ottawa/Heritage and Ottawa/Oldfield. Route 205 (together with route 204) provides express service from Ottawa Street closer to Lackner Boulevard to the east connecting this area to Borden Station and Central Station via both Ottawa Street and Victoria Street. The route(s) continue to the west providing connections to Sunrise Centre and The Boardwalk in west Kitchener.

2.2 Traffic Volume Data

Traffic data was available at the Ottawa/Heritage intersection from the Region of Waterloo database for Tuesday, March 7, 2023. Salvini Consulting commissioned weekday peak period turning movement count data at the intersection of the KW Musical Productions driveway on Ebydale Drive where the site driveway is planned to align on Wednesday, October 15, 2025. The traffic data that was collected from the Regional database and by Salvini Consulting is included in Appendix C.

Existing traffic volumes are illustrated in the figures in Appendix B.

2.3 Traffic Operations Assessment

The traffic operations at the Ottawa/Heritage intersection were assessed using Synchro version 12 for the existing traffic conditions. Existing lane configurations, signal timing, truck percentages and pedestrian volumes were included in the analysis along with a peak hour factor of 1.0 in keeping with Regional practice; otherwise, default synchro values were used for other analysis parameters. The capacity analysis is summarized in Tables 1 and 2 below with detailed worksheets included in Appendix D.

Table 1: Existing Traffic Operations - Ottawa/Heritage

Measure of Effectiveness	AM Peak Hour						
	EBL	EBTR	WBL	WBT	WBR	NB	SB
AM Peak Hour							
Level of service	A	A	B	B	A	C	D
Delay (s)	5.8	6.2	11.9	11.2	2.7	22.7	38.0
Volume/capacity	0.12	0.19	0.02	0.21	0.18	0.08	0.72
95 th Percentile Queue (m)	10.2	23.6	3	31.0	9.9	8.7	47.6
Storage	25	-	25	-	25	-	-
PM Peak Hour							
Level of service	A	A	A	A	A	C	C
Delay (s)	3.6	4.3	8.0	8.2	2.5	24.5	33.5
Volume/capacity	0.13	0.24	0.01	0.26	0.07	0.13	0.61
95 th Percentile Queue (m)	7.4	25.9	1.7	37.1	5.3	8.7	31.6
Storage	25	-	25	-	25	-	-



Table 2: Existing Traffic Operations - Ebydale/KW Musical Productions

Measure of Effectiveness	AM Peak Hour				PM Peak Hour			
	EB	WB	NB	SB	EB	WB	NB	SB
Level of service	A	-	-	A	A	-	-	A
Delay (s)	0.3	-	-	8.4	4.4	-	-	8.4
Volume/capacity	-	-	-	-	0.01	-	-	-
95 th Percentile Queue (m)	-	-	-	-	0.1	-	-	0.1

The analysis indicates that the two study area intersections are operating at acceptable levels in the two study peak hours with level of service D or better on all approaches.

3 Background Traffic

3.1 Traffic Volume Forecast

Future background traffic volumes for the future horizon year (2030) were forecast based on a simple growth rate of one (1) percent per year in the study area. A seven (7) percent growth rate was added to the Ottawa/Heritage intersection, and a five (5) percent growth rate was added to the site driveway intersection to reflect growth from 2023 and 2025, respectively. Background traffic forecasts are illustrated in the figures in Appendix B.

3.2 Traffic Operations Assessment

The traffic operations at the study area intersections were assessed for future background traffic conditions. The capacity analysis is summarized in the tables below with detailed worksheets included in Appendix E.

Table 3: Future Background Traffic Operations - Ottawa/Heritage

Measure of Effectiveness	AM Peak Hour						
	EBL	EBTR	WBL	WBT	WBR	NB	SB
AM Peak Hour							
Level of service	A	A	B	B	A	C	D
Delay (s)	6.2	6.7	12.4	11.9	2.8	22.6	38.9
Volume/capacity	0.13	0.21	0.02	0.23	0.19	0.08	0.74
95 th Percentile Queue (m)	11.3	26.6	3.4	34.3	10.4	9.0	51.7
Storage	25	-	25	-	25	-	-
PM Peak Hour							
Level of service	A	A	A	A	A	C	C
Delay (s)	3.9	4.5	8.5	8.6	2.9	24.0	34.4
Volume/capacity	0.14	0.26	0.01	0.28	0.07	0.13	0.63
95 th Percentile Queue (m)	8.2	28.9	1.7	41.3	6.1	9.0	34.2
Storage	25	-	25	-	25	-	-



Table 4: Future Background Traffic Operations - Ebydale/KW Musical Productions

Measure of Effectiveness	AM Peak Hour				PM Peak Hour			
	EB	WB	NB	SB	EB	WB	NB	SB
Level of service	A	-	-	A	A	-	-	A
Delay (s)	0.3	-	-	8.4	4.4	-	-	8.4
Volume/capacity	-	-	-	-	0.01	-	-	-
95 th Percentile Queue (m)	-	-	-	-	0.1	-	-	0.1

The analysis indicates that the two study area intersections are expected to operate at acceptable levels under future background traffic conditions with level of service D or better on all approaches.

4 Proposal and Site Traffic

The proposal includes for the development of 88 residential units in six street fronting townhomes on Oldfield Drive and a six-storey apartment building with 82 units and access from Ebydale Drive. The driveway on Ebydale Drive is proposed opposite the existing driveway for the KW Musical Productions site and would be stop controlled on the site driveway approach. Sight distance is available to the Shaftsbury Drive intersection to the west and to Heritage Drive to the east providing appropriate sight distance for the new driveway connection.

Garbage and loading will be made available on-site and confirmed when a more detailed site plan is developed. Parking for vehicles and bicycles are proposed to meet minimum Zoning By-law requirements.

Pedestrian connections to the site are proposed to Oldfield Drive, Shaftsbury Drive, and Ebydale Drive to facilitate more direct access for pedestrians to the surrounding active transportation infrastructure.

Site traffic was estimated by reviewing data in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 12th Edition. The Single-Family Attached Housing land use and the Multifamily Housing (Mid-Rise) land use were chosen to best represent the uses on the site. The Single-Family Attached Housing land use was used to model the street fronting townhomes, and the Multifamily Housing (Mid-Rise) land use was used to model the apartment uses.

The ITE data and the trip generation estimates are summarized in the table below. Average rates for the ITE data were chosen for both land use types. Excerpts from the ITE Trip Generation Manual are included in Appendix F.



Table 5: Proposed Site Traffic Generation Rates and Estimated Trips

Description		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
ITE Multifamily Housing (Mid-Rise) LU 221	Formula	Average			Average		
	Rate (trips(T)/unit)	0.09	0.29	0.38	0.24	0.14	0.38
	Trips (82 units)	7	24	31	20	11	31
ITE Single-Family Attached LU 215	Formula	Average			Average		
	Rate (trips (T)/unit)	0.12	0.35	0.47	0.29	0.22	0.51
	Trips (6 units)	1	2	3	2	1	3
Total	Trips (88 units)	8	26	34	22	13	34

*NOTE: based on data in the ITE Trip Generation Manual, 12th Edition

The resulting estimated site traffic is 34 vehicle trips in each of the weekday morning and afternoon peak hours.

Site traffic trips were distributed in accordance with local traffic patterns through the Ottawa/Heritage intersection. Site traffic distribution and volumes are included in the figures in Appendix B.

The site is currently operating as the Hope Lutheran Church and is generating traffic in the local transportation network. Information in the ITE Trip Generation Manual was reviewed to estimate how much traffic the site could be generating today in both the weekday peak hours and the Sunday peak hour, when traffic is likely highest. The data for the Church land use (land use code 560) was chosen to best represent the current use of the site. The GFA of the current building is about 8,600 s.f. The estimated traffic is summarized in the table below.

Table 6: Estimated Existing Site Traffic – Church Use (ITE Land Use Code 560)

Description	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
Rate (t/1,000 sf)	0.23	0.14	0.37	0.18	0.25	0.43	5.26	5.94	11.20
Trips (8,600 sf)	2	1	3	2	2	4	45	51	96

*NOTE: based on data in the ITE Trip Generation Manual, 12th Edition

It is estimated that the existing church use generates minimal traffic during the weekday peak hours – about three or four trips measured in both directions. However, the estimated peak hour trips on a Sunday are close to 100 vehicles measured entering and exiting the site.



5 Future Total Traffic

Future total traffic was determined by adding site traffic to future background traffic. The future total traffic volumes for the two study peak hours are illustrated in the figures in Appendix B.

5.1 Traffic Operations Assessment

The traffic operations at the study area intersections were assessed for future total traffic conditions. The capacity analysis is summarized in the tables below with detailed worksheets included in Appendix G.

Table 7: Future Total Traffic Operations - Ottawa/Heritage

Measure of Effectiveness	AM Peak Hour						
	EBL	EBTR	WBL	WBT	WBR	NB	SB
AM Peak Hour							
Level of service	A	A	B	B	A	C	D
Delay (s)	6.3	6.8	12.7	12.0	2.8	20.8	39.5
Volume/capacity	0.13	0.21	0.02	0.23	0.19	0.15	0.75
95 th Percentile Queue (m)	11.5	27.2	4.2	34.7	10.6	13.1	52.0
Storage	25	-	25	-	25	-	-
PM Peak Hour							
Level of service	A	A	A	A	A	C	D
Delay (s)	3.9	4.6	8.7	8.8	2.9	23.8	35.1
Volume/capacity	0.14	0.27	0.03	0.29	0.07	0.19	0.64
95 th Percentile Queue (m)	8.3	29.8	3.6	41.7	6.2	11.3	35.0
Storage	25	-	25	-	25	-	-

Table 8: Future Total Traffic Operations - Ebydale/Site/KW Musical Productions

Measure of Effectiveness	AM Peak Hour				PM Peak Hour			
	EB	WB	NB	SB	EB	WB	NB	SB
Level of service	A	A	A	A	A	A	A	A
Delay (s)	0.3	2.6	8.7	8.4	4.4	4.1	8.4	8.4
Volume/capacity	-	-	0.02	-	0.01	0.01	0.01	-
95 th Percentile Queue (m)	-	0.1	0.6	-	0.1	0.3	0.2	0.1

The analysis indicates that the two study area intersections are expected to continue operate at acceptable levels under future total traffic conditions with the proposal with level of service D or better on all approaches.



6 Conclusions and Recommendations

This Transportation Impact Study has been undertaken in accordance with pre-study consultation with City staff in order to understand the transportation context and infrastructure needed to support the proposed planning applications for the site. The conclusions of this study are based on a Concept Site Plan that includes 82 residential apartment units along with six (6) street fronting townhomes, and are as follows:

- The proposal is estimated to generate 34 trips in each of the weekday morning and afternoon peak hours. Although the current church use generates very little traffic in the weekday peak hours, during the Sunday peak hour, it is estimated that the existing use could be generating close to 100 trips.
- The Ottawa/Heritage intersection is currently operating at acceptable levels in both study peak hours and is forecast to continue to operate at acceptable levels in the future with and without the proposal.
- A new driveway connection is planned to Ebydale Drive to align opposite the existing driveway to the KW Musical Productions site. A single lane approach is recommended with stop control on the site driveway approach. The intersection is currently operating at acceptable levels in both study peak hours and is forecast to continue to operate at acceptable levels in the future with and without the proposal.
- Pedestrian connections to the site are proposed to Ebydale Drive, Shaftsbury Drive and Oldfield Drive on all the frontages of the site to connect to existing active transportation infrastructure in the area.



Appendix A: Pre-Study Conference Form

APPENDIX A

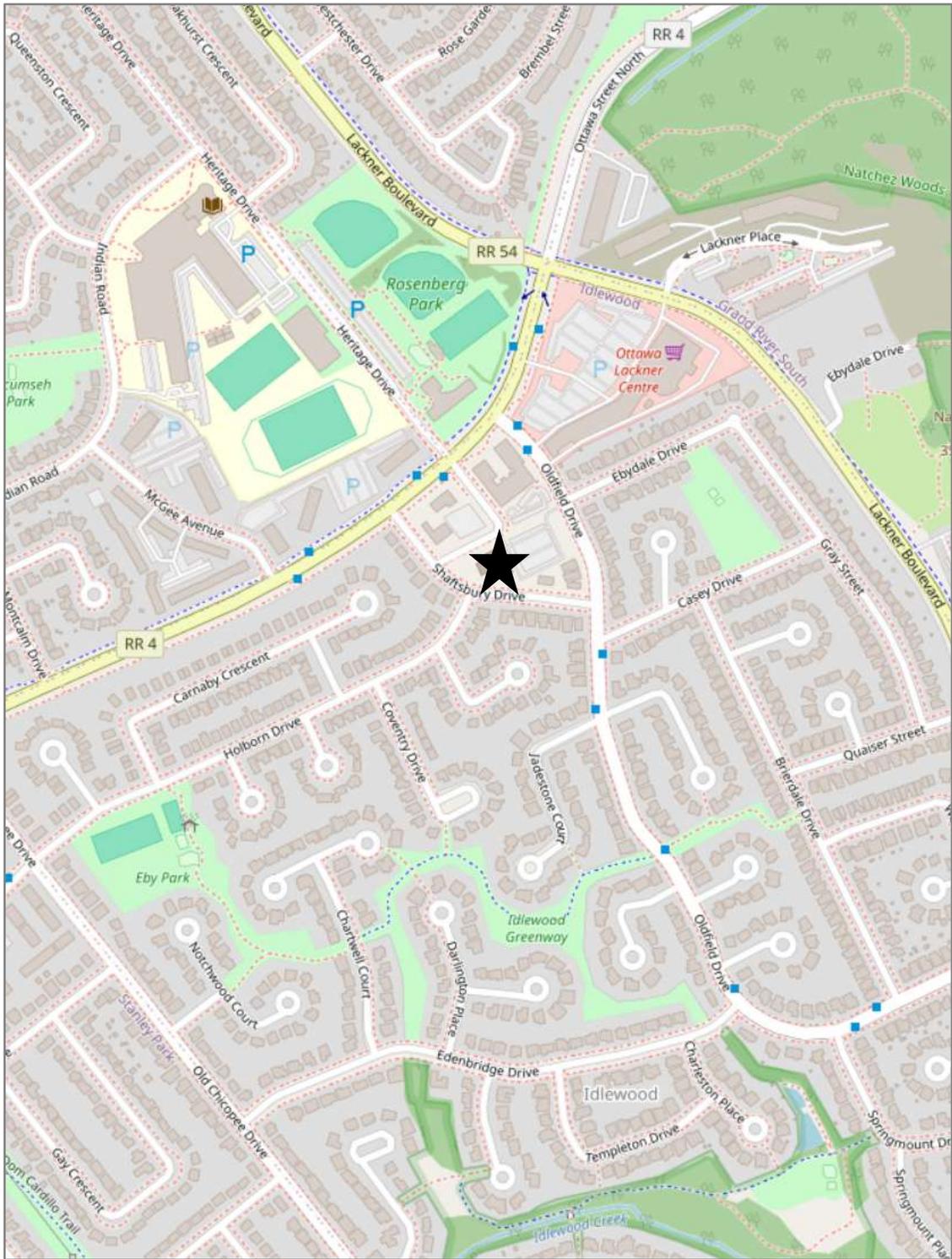
Hope Lutheran Church, 30 Shaftsbury Drive, City of Kitchener PRE-STUDY CONFERENCE FORM

Item	Description	Details
ISSUES		
1	List any issues expected that may impact the content or recommendations of the subject Transportation Impact Study	<ul style="list-style-type: none"> ✓ Existing use is a church. Proposed use is residential. A peak hour trip generation comparison of the two uses will be provided in the report.
INTRODUCTION		
2	Nature of application (Attach a drawing)	<ul style="list-style-type: none"> ✓ Official Plan Amendment ✓ Zoning Amendment ○ Site Plan Control Application ○ Plan of Subdivision ○ Community Plan ○ Other
3	TIS process, and relevant policies, procedures and approvals	<ul style="list-style-type: none"> ✓ Guidelines for the preparation of Transportation Impact Studies in Support of Development Applications (ROW) ✓ Transportation Impact Studies Requirements for Capacity Analysis, Roundabouts, Turn Lanes (ROW) ○ Safety Analysis Checklist ○ Policy and Procedures for Access onto Regional Roads
4	Public Meeting	<ul style="list-style-type: none"> ✓ Required ○ Not Required
CONTEXT		
5	Study intersections (intersections to be analyzed) NOTE: the consultant is responsible to identify any further intersections impacted as the study progresses	<ul style="list-style-type: none"> ✓ Ottawa/Heritage ✓ Ebydale/Site Access
6	Size and number of phases of development	<ul style="list-style-type: none"> ✓ 82 apartment units and 6 townhouse units for a total of 88 residential units
7	Approved and pending approval development applications	<ul style="list-style-type: none"> ○ n/a
8	Planned transportation system improvements	<ul style="list-style-type: none"> ○ n/a

TRAVEL DEMAND		
9	Horizon years	<ul style="list-style-type: none"> ✓ 5 years from date of TIS ○ 5 years after full occupancy ○ Transportation Plan horizon for large scale projects ○ Interim years
10	Peak hour determination	<ul style="list-style-type: none"> ✓ AM weekday peak hour of adjacent roadway ✓ PM weekday peak hour of adjacent roadway ○ Saturday peak of adjacent roadway ○ AM weekday peak hour of development ○ PM weekday peak hour of development ○ Saturday peak of development ○ Other...
11	Background	<ul style="list-style-type: none"> ○ Historical traffic/transit counts ○ ROW travel demand forecasts ○ Approved and pending approval development applications (see point 7) ✓ 1% per year growth rate over study horizon
12	Trip Generation	<ul style="list-style-type: none"> ✓ ITE average rates ✓ ITE fitted equation ○ Rates published elsewhere ○ Observed rates for similar areas ○ Observed rates for similar developments in the local area
13	Trip reductions (TDM, internal, pass-by)	<ul style="list-style-type: none"> ○ Transportation Demand Management Checklist ○ Published Travel Demand Management reductions ○ Observed Travel demand Management reductions ○ ITE internal capture reductions for mixed-use developments ○ Observed internal capture reductions for mixed-use developments ○ IT pass-by reductions ○ Observed [pass-by reductions for similar developments ○ Other...
14	Trip distribution	<ul style="list-style-type: none"> ✓ ITE trip distribution IN/OUT split ○ Regional travel demand ○ Population and employment distribution ○ Market analysis of catchment area ○ Other...
15	Trip assignment	<ul style="list-style-type: none"> ✓ Local traffic pattern ✓ Site layout and access design ○ Existing turning movements ○ Other...

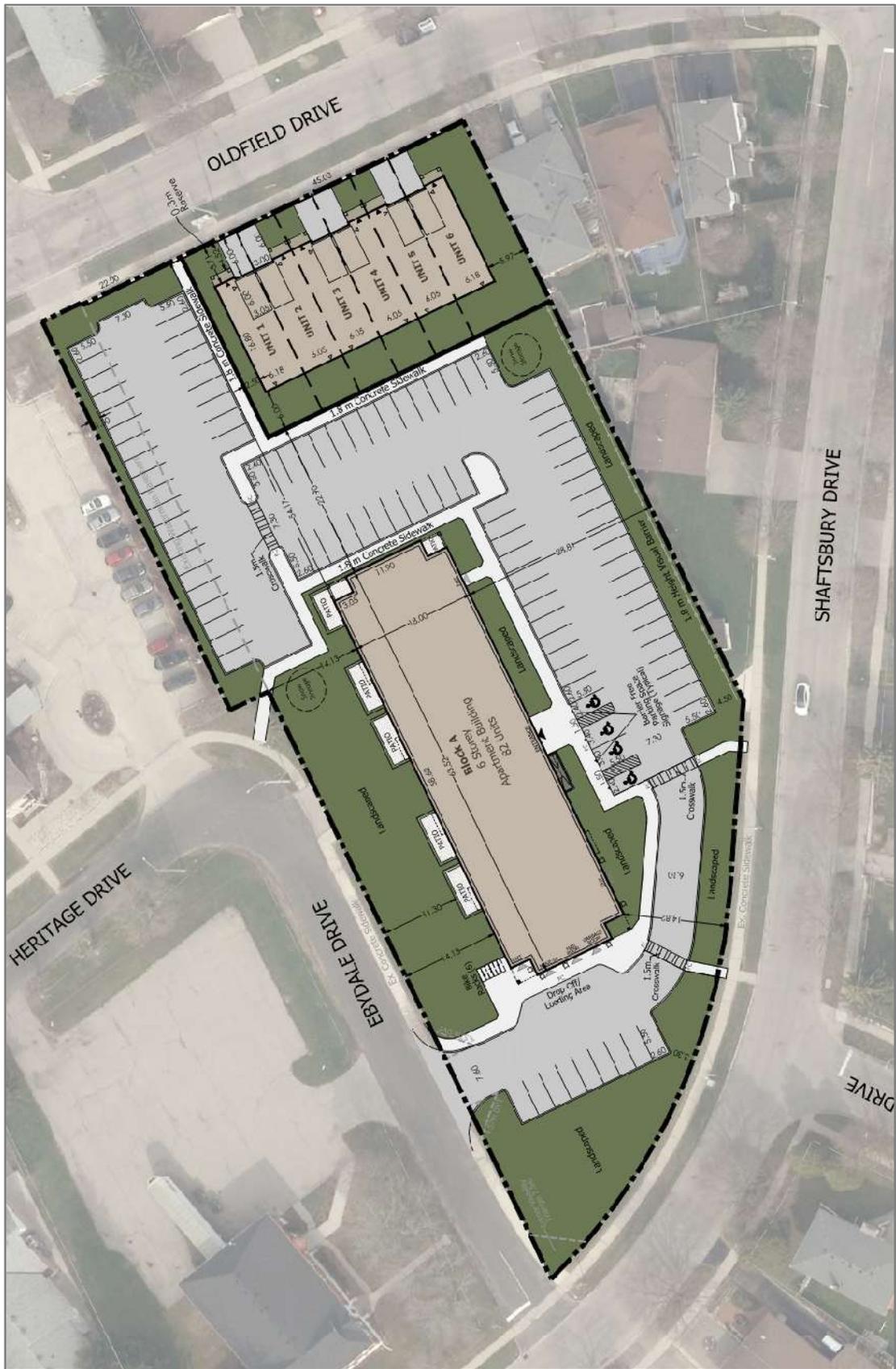
EVALUATION OF IMPACTS		
16	Traffic impact analysis (use approved software)	<ul style="list-style-type: none"> ✓ Unsignalized intersections ✓ Left turn warrant analysis ○ Signal warrant analysis ✓ Signalized intersections ✓ LOS, v/c, delay, queuing ✓ ROW saturation flow rates at ROW intersections ✓ Existing signal timings for existing conditions ✓ Optimize signal timings for future conditions ✓ Queuing analysis ○ Roundabouts
17	Roundabout feasibility (use approved software)	<ul style="list-style-type: none"> ○ Initial screening TBD ○ Intersection control study (10 year horizon)
18	Transit assessment	<ul style="list-style-type: none"> ✓ Frequency and hours of service ✓ Presence of bus stops ○ Reliability of service ○ Passenger loads ○ Travel time
19	Pedestrian assessment	<ul style="list-style-type: none"> ✓ Presence, connectivity and width of sidewalks ○ Barriers and buffers from traffic ✓ Crossing opportunities at intersections ○ Delay at intersections ○ Number of driveways and traffic volumes at the driveways ○ Presence of illumination ✓ Future plans and needs (desire lines/policy/demand)
20	Cycling assessment	<ul style="list-style-type: none"> ✓ Presence of a dedicated facility ✓ Network connectivity ○ Number and width of travel lanes adjacent to the route ○ Volume and speed of traffic ○ Percentage of trucks and buses encountered ○ Pavement condition ○ Presence of parking/showers/change rooms ✓ Future plans and needs (desire lines/policy/demand)
21	Safety analysis	<ul style="list-style-type: none"> ○ Road safety review ○ Collision risk analysis ○ Access conflict evaluation
22	Site access and circulation	<ul style="list-style-type: none"> ✓ Review sight distances at all new access points ○ Internal traffic controls ○ Loading facilities and access ✓ Service/maintenance vehicle access ○ Emergency vehicle access
23	Submission format	<ul style="list-style-type: none"> ○ Three hard copies of main report including appendices (other than analysis results/output) ○ Minimum one original hard copy must be sealed by a professional engineer ✓ Electronic copy of complete report and all appendices ✓ Electronic copy of operational analysis files (e.g. Synchro, Arcady) ○ Electronic copy of all signal warrant calculation files

Appendix B: Figures



Site Location Plan

© OpenStreetMap contributors

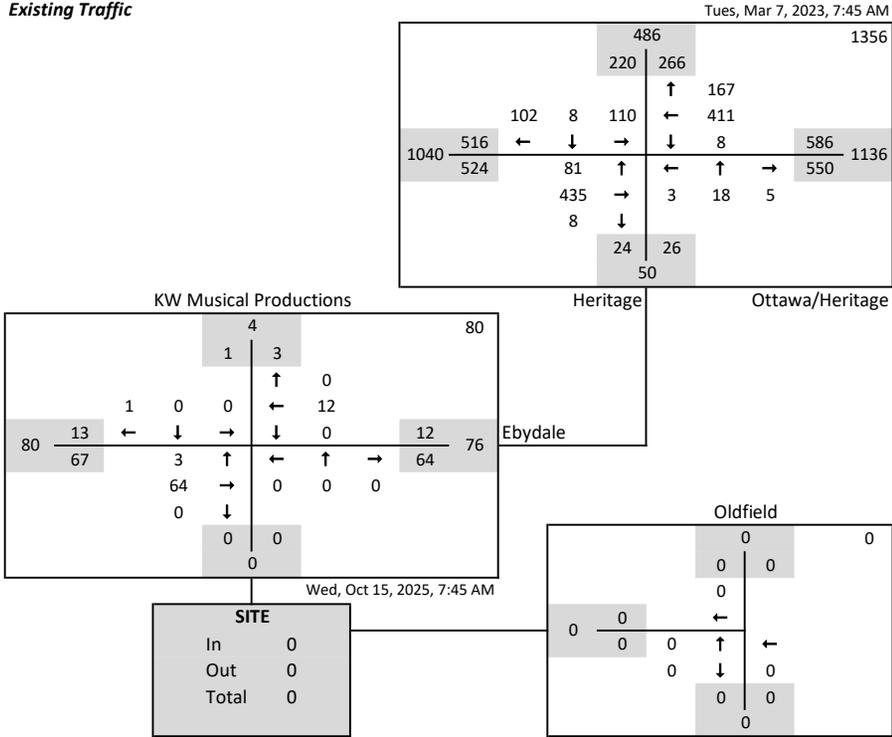


Concept Site Plan

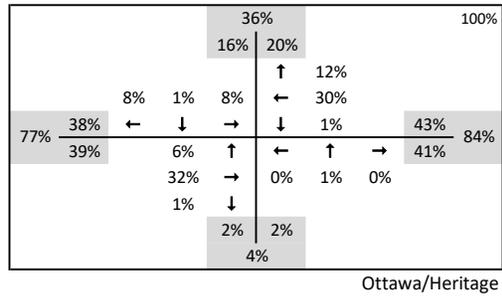
Source: MHBC

Proposed Residential Development
Hope Lutheran Church Site, 30 Shaftsbury Dr., Kitchener

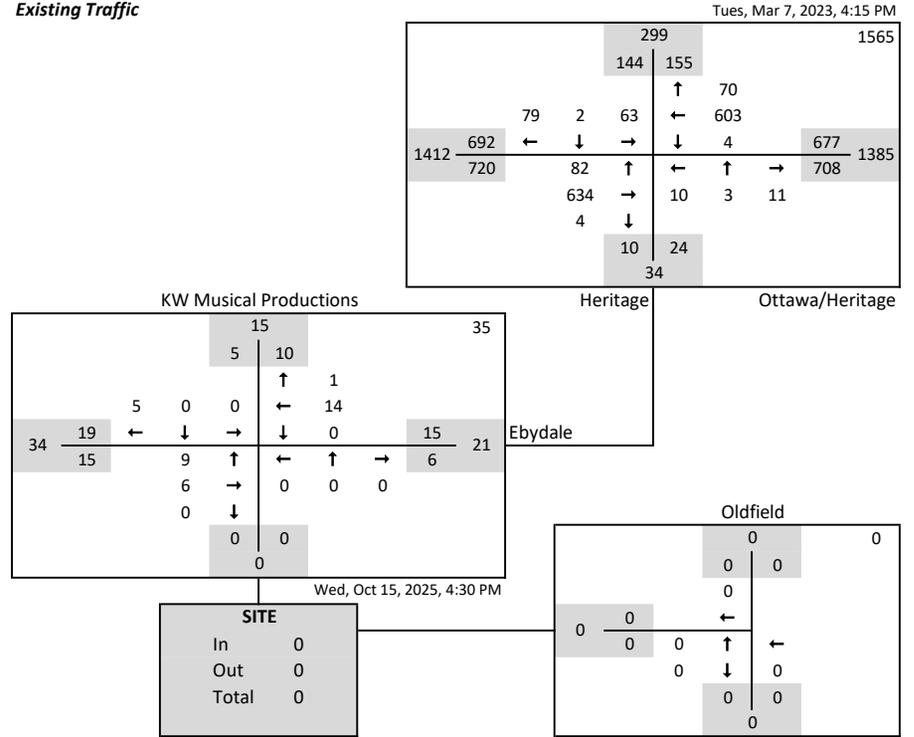
AM Peak Hour
Existing Traffic



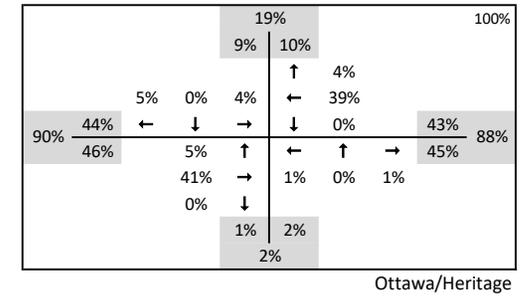
Existing Distribution



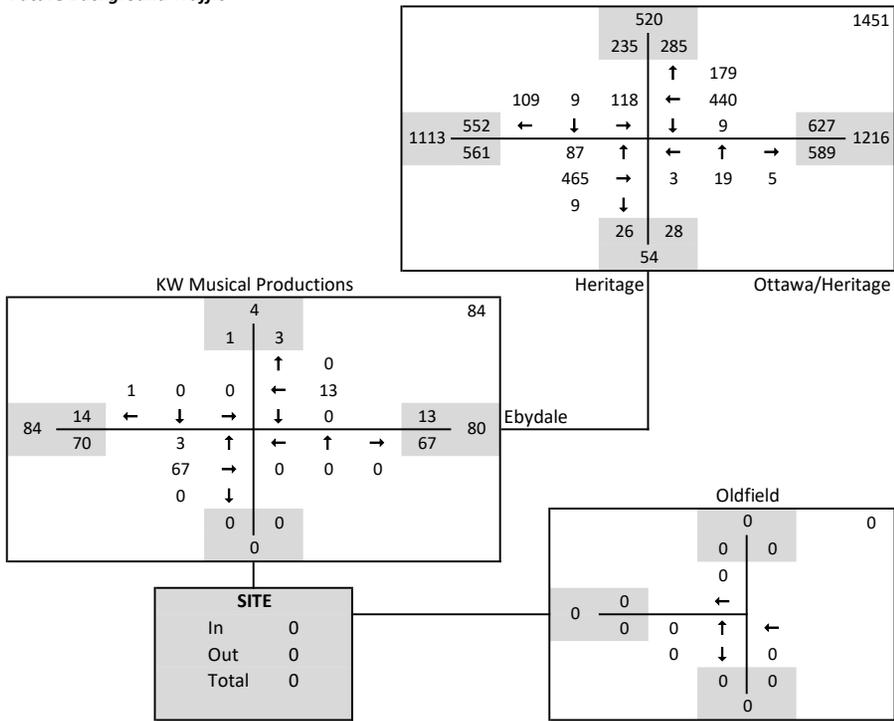
PM Peak Hour
Existing Traffic



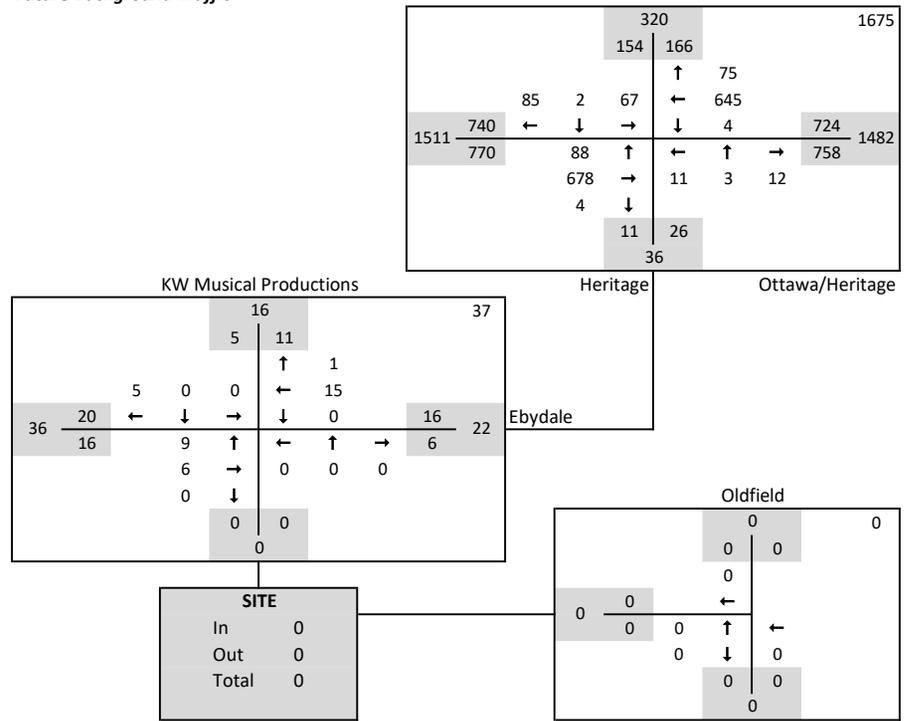
Existing Distribution



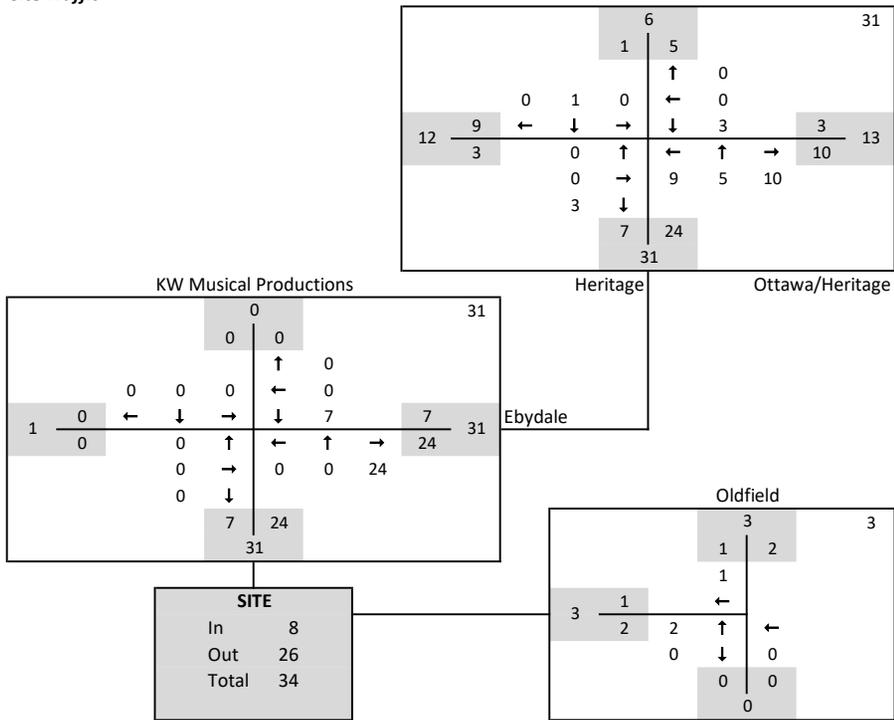
AM Peak Hour
Future Background Traffic



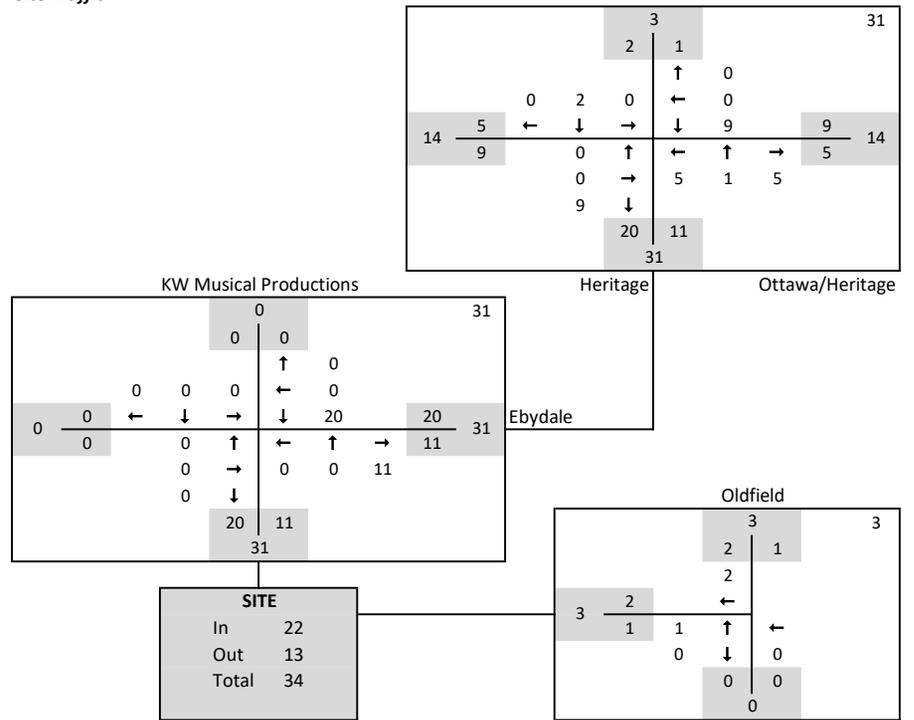
PM Peak Hour
Future Background Traffic



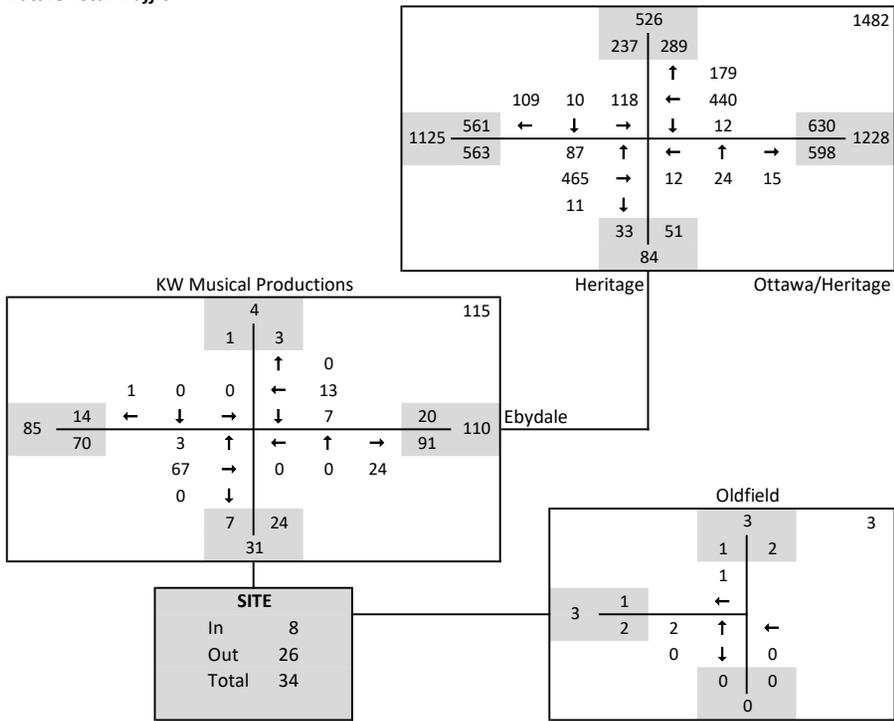
AM Peak Hour
Site Traffic



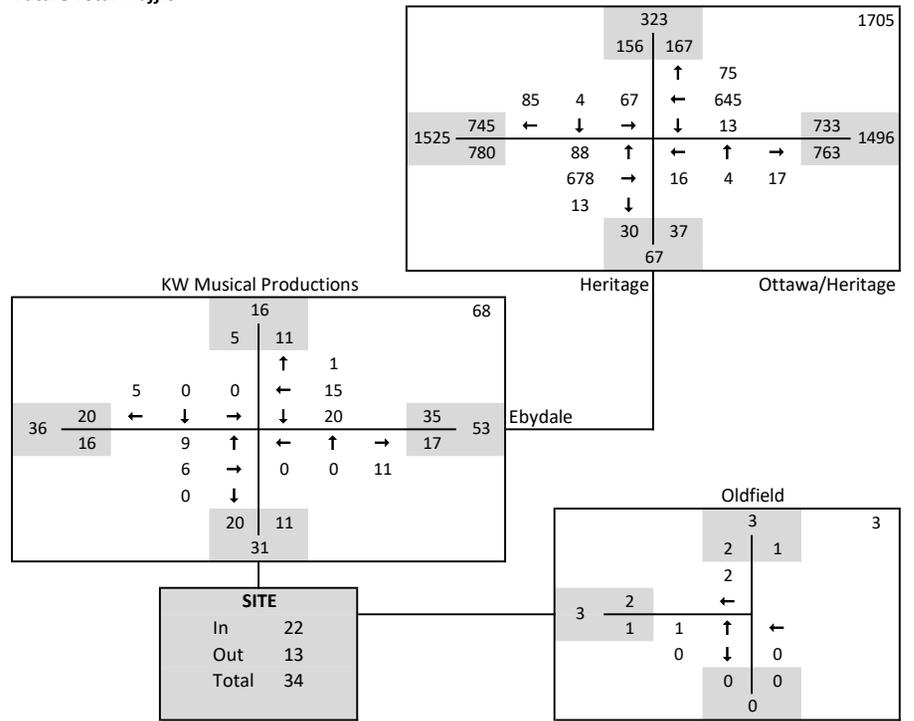
PM Peak Hour
Site Traffic



AM Peak Hour
Future Total Traffic



PM Peak Hour
Future Total Traffic

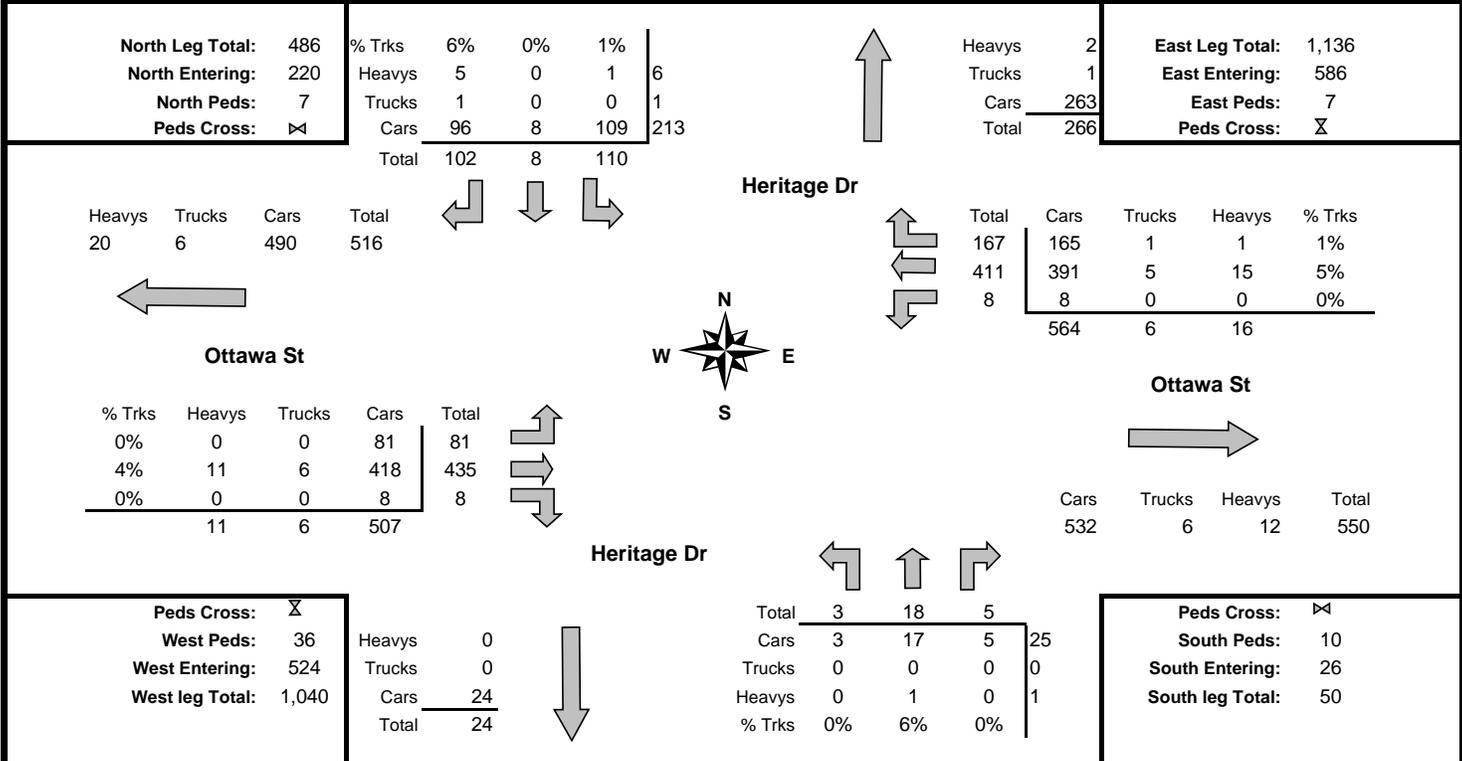


Appendix C: Traffic Data

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT



<h2>Morning Peak Diagram</h2>	Count Period From: 7:30 AM To: 10:30 AM	Peak Hour From: 7:45 AM To: 8:45 AM
Municipality: Kitchener Intersection: Ottawa St @ Heritage Dr Control: Signalized Major Road: Ottawa St	Weather conditions: Clear/Dry Person(s) who counted: Cam	GeoID: 22592 Count Date: Tuesday, 07-Mar-23



Comments

To determine total vehicles entering the intersection during morning peak hour, add all leg totals entering.

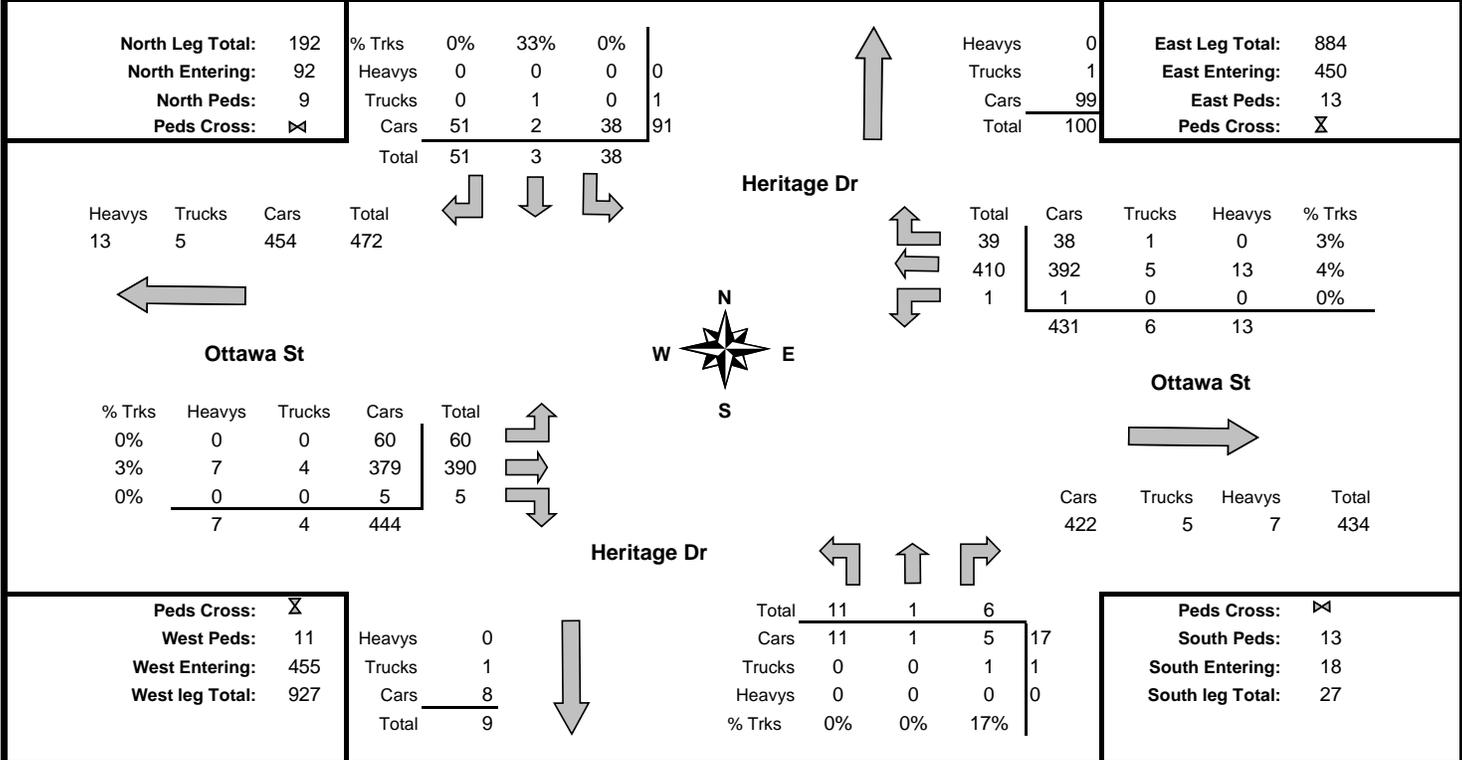
Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
 Therefore, total vehicles entering intersection = **1,356**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
 Therefore, vehicles entering from the west = **524**

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT



<h2>Mid-day Peak Diagram</h2>	Count Period From: 12:00 PM To: 2:00 PM	Peak Hour From: 12:00 PM To: 1:00 PM
Municipality: Kitchener Intersection: Ottawa St @ Heritage Dr Control: Signalized Major Road: Ottawa St	Weather conditions: Clear/Dry Person(s) who counted: Cam	GeoID: 22592 Count Date: Tuesday, 07-Mar-23



Comments

To determine total vehicles entering the intersection during mid-day peak hour, add all leg totals entering.

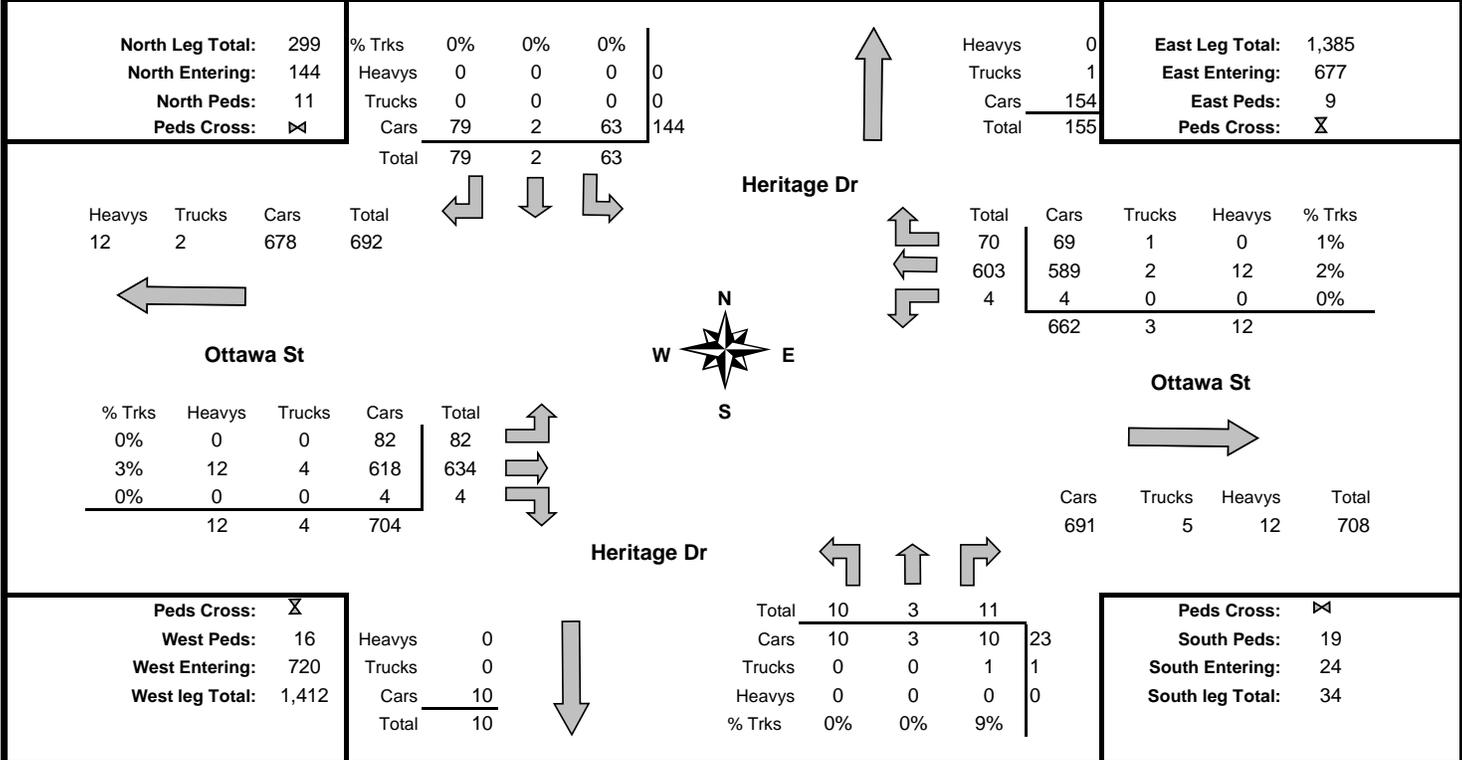
Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
 Therefore, total vehicles entering intersection = **1,015**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
 Therefore, vehicles entering from the west = **455**

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT



<h2>Afternoon Peak Diagram</h2>	Count Period From: 3:00 PM To: 6:00 PM	Peak Hour From: 4:15 PM To: 5:15 PM
Municipality: Kitchener Intersection: Ottawa St @ Heritage Dr Control: Signalized Major Road: Ottawa St	Weather conditions: Clear/Dry Person(s) who counted: Cam	GeoID: 22592 Count Date: Tuesday, 07-Mar-23



Comments

To determine total vehicles entering the intersection during afternoon peak hour, add all leg totals entering.

- Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
 Therefore, total vehicles entering intersection = **1,565**
- Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
 Therefore, vehicles entering from the west = **720**

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT



Total Count Diagram

Municipality: Kitchener
Intersection: Ottawa St @ Heritage Dr
Control: Signalized
Major Road: Ottawa St

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

GeoID: 22592
Count Date: Tuesday, 07-Mar-23

North Leg Total: 2,095
North Entering: 995
North Peds: 74
Peds Cross: ∇
Bicycles Entering: 3
Buggies Entering: 0

	2%	4%	1%	
% Trks	2%	4%	1%	
Heavys	6	0	4	10
Trucks	4	1	1	6
Cars	537	23	419	979
Total	547	24	424	

Heavys	8
Trucks	8
Cars	1,084
Total	1,100

East Leg Total: 8,339
East Entering: 4,178
East Peds: 84
Peds Cross: ∇
Bicycles Entering: 5
Buggies Entering: 0

Heavys	Trucks	Cars	Total
97	46	4,065	4,208



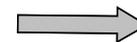
Ottawa St



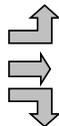
Heritage Dr

Total	Cars	Trucks	Heavys	% Trks
544	535	4	5	2%
3,599	3,466	42	91	4%
35	35	0	0	0%
Total	4,036	46	96	

Ottawa St



% Trks	Heavys	Trucks	Cars	Total
1%	2	4	517	523
3%	89	34	3,572	3,695
0%	0	0	47	47
	91	38	4,136	



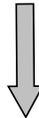
Heritage Dr



Cars	Trucks	Heavys	Total
4,030	37	94	4,161

Peds Cross: ∇
West Peds: 135
West Entering: 4,265
West leg Total: 8,473
Bicycles Entering: 2
Buggies Entering: 0

Heavys	0
Trucks	1
Cars	105
Total	106



Total	62	33	42	
Cars	62	32	39	133
Trucks	0	0	2	2
Heavys	0	1	1	2
% Trks	0%	3%	7%	

Peds Cross: ∇
South Peds: 115
South Entering: 137
South leg Total: 243
Bicycles Entering: 1
Buggies Entering: 0

Comments

To determine total vehicles entering the intersection, add all leg totals entering.

Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering
 Therefore, total vehicles entering intersection = **9,575**

Example 2: Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn
 Therefore, vehicles entering from the west = **4,265**

Notes: None

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT



Estimated Daily Traffic

Total Factor = Monthly Factor 1 x Daily Factor 1 x 24 Hour Factor 1.74 = 1.740000

Municipality: Kitchener
Intersection: Ottawa St @ Heritage Dr
Control: Signalized
Major Road: Ottawa St

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

GeoID: 22592
Count Date: Tuesday, 07-Mar-23

North Leg Total: 3,645	% Trks	2%	4%	1%	
North Entering: 1,731	Heavys	10	0	7	17
North Peds: N/A	Trucks	7	2	2	10
Peds Cross: ⇄	Cars	934	40	729	1,703
	Total	952	42	738	

Heavys	14
Trucks	14
Cars	1,886
Total	1914

East Leg Total: 14,510
East Entering: 7,270
East Peds: N/A
Peds Cross: ✕

Heavys	169
Trucks	80
Cars	7,073
Total	7,322

Heritage Dr

Total	947	Cars	931	Trucks	7	Heavys	9	% Trks	2%
	6,262		6,031		73		158		4%
	61		61		0		0		0%
			7,023		80		167		

Ottawa St



Ottawa St

% Trks	1%	Heavys	3	Trucks	7	Cars	900	Total	910
	3%		155		59		6,215		6,429
	0%		0		0		82		82
			158		66		7,197		

Heritage Dr

Cars	7,012
Trucks	64
Heavys	164
Total	7,240

Peds Cross: ✕
West Peds: N/A
West Entering: 7,421
West leg Total: 14,743

Heavys	0
Trucks	2
Cars	183
Total	184

Total	108	57	73	
Cars	108	56	68	231
Trucks	0	0	3	3
Heavys	0	2	2	3
% Trks	0%	3%	7%	

Peds Cross: ⇄
South Peds: N/A
South Entering: 238
South leg Total: 423

Comments

To determine the EDT (Estimated Daily Traffic), add all four leg totals and divide by two.
 This will give you the approximate number of vehicles entering and exiting the intersection in a 24-hour period

Example:
$$\frac{(\text{West leg total} + \text{South leg total} + \text{East leg total} + \text{North leg total})}{2} \quad \text{EDT} = \quad 16,661$$

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT



Peak Hour Factor By Movement

Municipality: Kitchener
Intersection: Ottawa St @ Heritage Dr
Control: Signalized
Major Road: Ottawa St

Weather conditions:
 Clear/Dry

GeoID: 22592
Count Date: Tuesday, 07-Mar-23

Person(s) who counted:
 Cam

North Approach PHF

AM Peak: 0.62
 Mid-day Peak: 0.85
 PM Peak: 0.84

	Movement		
PM	0.86	0.25	0.79
MID	0.61	0.38	0.68
AM	0.64	0.50	0.53

East Approach PHF

AM Peak: 0.74
 Mid-day Peak: 0.84
 PM Peak: 0.94

AM AM Peak Hour
 MID Mid-day Peak Hour
 PM PM Peak Hour

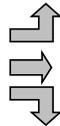
Ottawa St

Heritage Dr



	AM	MID	PM	
	0.47	0.81	0.60	Movement
	0.84	0.83	0.97	
	0.67	0.25	0.50	

	PM	MID	AM
Movement	0.54	0.83	0.47
	0.96	0.83	0.91
	0.33	0.42	0.67



Ottawa St



Heritage Dr

West Approach PHF

AM Peak: 0.80
 Mid-day Peak: 0.84
 PM Peak: 0.89

0.38	0.41	0.63	AM
0.46	0.25	0.50	MID
0.83	0.75	0.92	PM
Movement			

South Approach PHF

AM Peak: 0.46
 Mid-day Peak: 0.56
 PM Peak: 0.86

Comments

Intersection: Ottawa St @ Heritage Dr
GeoID: 22592
Municipality: Kitchener
Major Road: Ottawa St

Intersection Control: Signalized
Date: Tuesday, 07-Mar-23
Name: Cam
Weather: Clear/Dry

Approach Control	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND			TOTAL	TOTAL HOUR
	Signalized			Signalized			Signalized			Signalized				
7:30 to 7:45	14	90	2	0	95	14	0	0	0	4	0	8	227	
7:45 to 8:00	21	105	1	1	91	32	0	1	1	13	0	14	280	
8:00 to 8:15	43	119	2	2	109	88	2	11	1	37	3	40	457	
8:15 to 8:30	11	114	3	3	122	38	1	4	1	52	4	33	386	1,350
8:30 to 8:45	6	97	2	2	89	9	0	2	2	8	1	15	233	1,356
8:45 to 9:00	11	112	2	3	82	4	0	0	1	11	0	13	239	1,315
9:00 to 9:15	21	84	4	4	95	14	0	1	3	6	0	14	246	1,104
9:15 to 9:30	10	97	3	1	86	23	3	1	1	9	0	15	249	967
9:30 to 9:45	13	94	3	0	100	5	2	1	1	9	0	19	247	981
9:45 to 10:00	13	106	0	3	122	8	1	1	0	8	0	14	276	1,018
10:00 to 10:15	10	97	3	1	91	7	1	0	1	11	0	8	230	1,002
10:15 to 10:30	6	110	2	0	92	5	3	1	2	9	2	11	243	996
AM Peak Hour														
7:45 to 8:45	81	435	8	8	411	167	3	18	5	110	8	102	1,356	
# of trucks in peak	0	6	0	0	5	1	0	0	0	0	0	1	13	
# of heavies in peak	0	11	0	0	15	1	0	1	0	1	0	5	34	
% heavies (Total)	0%	4%	0%	0%	5%	1%	0%	6%	0%	1%	0%	6%	3%	

12:00 to 12:15	10	117	1	0	124	10	2	0	0	4	0	21	289	
12:15 to 12:30	18	117	0	0	109	6	1	0	3	9	2	8	273	
12:30 to 12:45	18	81	1	0	93	12	2	0	2	11	0	10	230	
12:45 to 13:00	14	75	3	1	84	11	6	1	1	14	1	12	223	1,015
13:00 to 13:15	11	103	0	2	84	14	2	0	1	15	0	17	249	975
13:15 to 13:30	11	77	1	0	92	7	2	1	1	13	0	14	219	921
13:30 to 13:45	8	72	0	0	73	16	0	0	0	8	1	7	185	876
13:45 to 14:00	14	83	0	0	90	10	0	1	0	12	0	11	221	874
Midday Peak Hour														
12:00 to 13:00	60	390	5	1	410	39	11	1	6	38	3	51	1,015	
# of trucks in peak	0	4	0	0	5	1	0	0	1	0	1	0	12	
# of heavies in peak	0	7	0	0	13	0	0	0	0	0	0	0	20	
% heavies (Total)	0%	3%	0%	0%	4%	3%	0%	0%	17%	0%	33%	0%	3%	

15:00 to 15:15	21	142	0	0	104	14	3	0	0	15	3	22	324	
15:15 to 15:30	11	124	3	1	112	14	1	0	2	13	1	20	302	
15:30 to 15:45	16	134	1	2	138	14	5	1	1	14	1	29	356	
15:45 to 16:00	22	131	1	1	156	25	1	3	2	13	1	17	373	1,355
16:00 to 16:15	26	135	1	0	149	27	5	0	1	13	1	22	380	1,411
16:15 to 16:30	15	160	3	1	155	11	3	1	3	14	0	17	383	1,492
16:30 to 16:45	9	157	1	0	141	29	1	1	3	13	0	20	375	1,511
16:45 to 17:00	38	165	0	2	155	23	3	0	2	16	2	19	425	1,563
17:00 to 17:15	20	152	0	1	152	7	3	1	3	20	0	23	382	1,565
17:15 to 17:30	14	147	0	1	147	14	0	0	2	11	0	17	353	1,535
17:30 to 17:45	21	135	2	0	136	18	3	0	1	7	0	17	340	1,500
17:45 to 18:00	27	163	2	3	131	15	6	0	0	12	1	20	380	1,455
PM Peak Hour														
16:15 to 17:15	82	634	4	4	603	70	10	3	11	63	2	79	1,565	
# of trucks in peak	0	4	0	0	2	1	0	0	1	0	0	0	8	
# of heavies in peak	0	12	0	0	12	0	0	0	0	0	0	0	24	
% heavies (Total)	0%	3%	0%	0%	2%	1%	0%	0%	9%	0%	0%	0%	2%	

Intersection: Ottawa St @ Heritage Dr
GeoID: 22592
Municipality: Kitchener
Major Road: Ottawa St

Intersection Control: Signalized
Date: Tuesday, 07-Mar-23
Name: Cam
Weather: Clear/Dry

PEDESTRIAN CROSSING							
Time	Crossing Approach					TOTAL	TOTAL HOUR
	East App.	West App.	North App.	South App.			
7:30 to 7:45	0	4	0	3	7		
7:45 to 8:00	2	8	2	4	16		
8:00 to 8:15	2	22	1	2	27		
8:15 to 8:30	2	2	4	2	10		60
8:30 to 8:45	1	4	0	2	7		60
8:45 to 9:00	1	5	2	4	12		56
9:00 to 9:15	0	1	0	2	3		32
9:15 to 9:30	6	2	1	3	12		34
9:30 to 9:45	6	1	6	1	14		41
9:45 to 10:00	0	3	0	4	7		36
10:00 to 10:15	3	0	2	1	6		39
10:15 to 10:30	5	0	1	3	9		36
AM Peak Hour					130		
7:45 to 8:45	7	36	7	10	60		
12:00 to 12:15	2	4	0	5	11		
12:15 to 12:30	7	3	7	2	19		
12:30 to 12:45	2	2	0	3	7		
12:45 to 13:00	2	2	2	3	9		46
13:00 to 13:15	1	12	3	8	24		59
13:15 to 13:30	3	8	3	8	22		62
13:30 to 13:45	3	4	1	4	12		67
13:45 to 14:00	4	2	2	2	10		68
Midday Peak Hour					114		
12:00 to 13:00	13	11	9	13	46		
15:00 to 15:15	4	7	1	7	19		
15:15 to 15:30	2	3	2	2	9		
15:30 to 15:45	4	5	6	2	17		
15:45 to 16:00	3	5	3	7	18		63
16:00 to 16:15	4	4	7	3	18		62
16:15 to 16:30	3	4	3	6	16		69
16:30 to 16:45	4	4	3	5	16		68
16:45 to 17:00	0	6	0	4	10		60
17:00 to 17:15	2	2	5	4	13		55
17:15 to 17:30	2	2	2	0	6		45
17:30 to 17:45	4	1	2	5	12		41
17:45 to 18:00	0	3	3	4	10		41
PM Peak Hour					164		
16:15 to 17:15	9	16	11	19	55		

Ebydale Dr @ KW Musical Productions

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Kitchener
Site #: 000000001
Intersection: Ebydale Dr & KW Musical Production
TFR File #: 1
Count date: 15-Oct-2025

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Ebydale Dr runs W/E

North Leg Total: 4
 North Entering: 1
 North Peds: 1
 Peds Cross: \times

Heavys	0	0	0
Trucks	0	0	0
Cars	1	0	1
Totals	1	0	



Heavys	0
Trucks	0
Cars	3
Totals	3

East Leg Total: 76
 East Entering: 12
 East Peds: 1
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	0	13	13



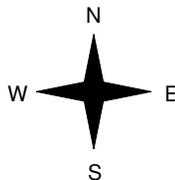
KW Musical Productions



Cars	Trucks	Heavys	Totals
0	0	0	0
12	0	0	12
12	0	0	



Ebydale Dr



Heavys	Trucks	Cars	Totals
0	0	3	3
1	0	63	64
1	0	66	



Ebydale Dr



Cars	Trucks	Heavys	Totals
63	0	1	64

Peds Cross: \times
 West Peds: 8
 West Entering: 67
 West Leg Total: 80

Comments

Ebydale Dr @ KW Musical Productions

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Kitchener
Site #: 000000001
Intersection: Ebydale Dr & KW Musical Production
TFR File #: 1
Count date: 15-Oct-2025

Weather conditions:
Clear/Dry
Person(s) who counted:
Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Ebydale Dr runs W/E

North Leg Total: 15
 North Entering: 5
 North Peds: 0
 Peds Cross: \times

Heavys	0	0	0
Trucks	0	0	0
Cars	5	0	5
Totals	5	0	5



Heavys	0
Trucks	0
Cars	10
Totals	10

East Leg Total: 21
 East Entering: 15
 East Peds: 0
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	0	19	19



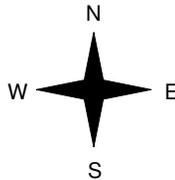
KW Musical Productions



Cars	Trucks	Heavys	Totals
1	0	0	1
14	0	0	14
15	0	0	15



Ebydale Dr



Heavys	Trucks	Cars	Totals
0	0	9	9
0	1	5	6
0	1	14	15



Ebydale Dr



Cars	Trucks	Heavys	Totals
5	1	0	6

Peds Cross: \times
 West Peds: 0
 West Entering: 15
 West Leg Total: 34

Comments

Ebydale Dr @ KW Musical Productions

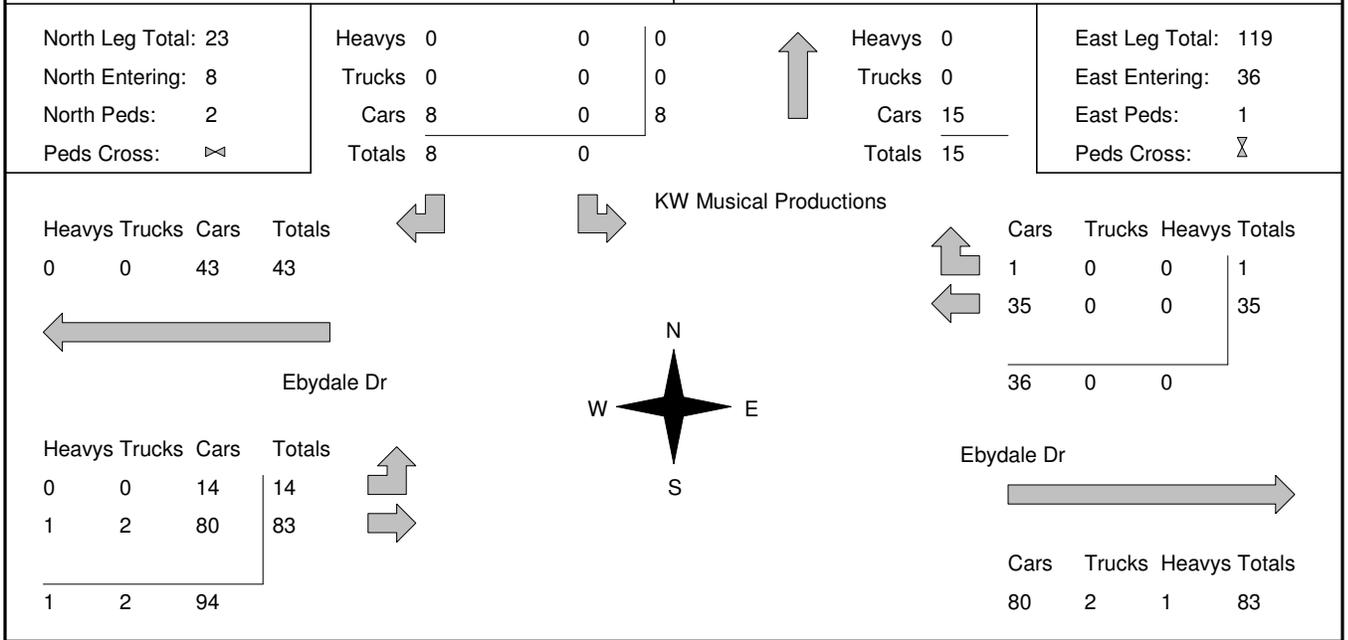
Total Count Diagram

Municipality: Kitchener
Site #: 000000001
Intersection: Ebydale Dr & KW Musical Production
TFR File #: 1
Count date: 15-Oct-2025

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Pyramid Traffic Inc

**** Non-Signalized Intersection ****

Major Road: Ebydale Dr runs W/E



Peds Cross: \times
 West Peds: 8
 West Entering: 97
 West Leg Total: 140

Comments

Appendix D: Existing Capacity Analysis

Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	435	8	8	411	167	3	18	5	110	8	102
Future Volume (vph)	81	435	8	8	411	167	3	18	5	110	8	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	25.0		25.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99		0.97		0.99			0.97	
Frt		0.997				0.850		0.974			0.937	
Flt Protected	0.950			0.950				0.994			0.976	
Satd. Flow (prot)	1825	3500	0	1825	3476	1617	0	1779	0	0	1660	0
Flt Permitted	0.470			0.495				0.962			0.828	
Satd. Flow (perm)	899	3500	0	945	3476	1571	0	1717	0	0	1403	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				167		5			47	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		221.1			181.7			105.2			149.1	
Travel Time (s)		15.9			13.1			7.6			10.7	
Confl. Peds. (#/hr)	7		10	10		7	36		7	7		36
Peak Hour 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
Heavy Vehicles (%)	0%	4%	0%	0%	5%	1%	0%	6%	0%	6%	0%	1%
Adj. Flow (vph)	81	435	8	8	411	167	3	18	5	110	8	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	443	0	8	411	167	0	26	0	0	220	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	47.0		42.0	42.0	42.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	9.0	57.0		48.0	48.0	48.0	35.0	35.0		35.0	35.0	
Total Split (s)	12.0	60.0		48.0	48.0	48.0	40.0	40.0		40.0	40.0	
Total Split (%)	12.0%	60.0%		48.0%	48.0%	48.0%	40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	8.0	54.0		42.0	42.0	42.0	34.0	34.0		34.0	34.0	
Yellow Time (s)	3.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)		36.0		36.0	36.0	36.0	10.0	10.0		10.0	10.0	
Flash Don't Walk (s)		6.0		6.0	6.0	6.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	
Act Effct Green (s)	56.2	54.2		45.6	45.6	45.6		15.6			15.6	
Actuated g/C Ratio	0.69	0.66		0.56	0.56	0.56		0.19			0.19	
v/c Ratio	0.12	0.19		0.02	0.21	0.18		0.08			0.72	

AM Ex AM Peak Hour Existing Traffic 2:36 pm 11/19/2025 Baseline

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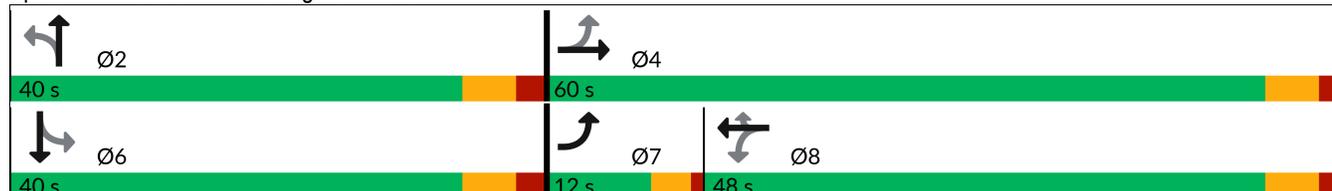


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay (s/veh)	5.8	6.2		11.9	11.2	2.7		22.7			38.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay (s/veh)	5.8	6.2		11.9	11.2	2.7		22.7			38.0	
LOS	A	A		B	B	A		C			D	
Approach Delay (s/veh)		6.2			8.8			22.7			38.0	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	3.5	12.0		0.6	16.6	0.0		2.7			25.3	
Queue Length 95th (m)	10.2	23.6		3.0	31.0	9.9		8.7			47.6	
Internal Link Dist (m)		197.1			157.7			81.2			125.1	
Turn Bay Length (m)	25.0			25.0		25.0						
Base Capacity (vph)	708	2320		526	1937	949		719			612	
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	0.11	0.19		0.02	0.21	0.18		0.04			0.36	

Intersection Summary

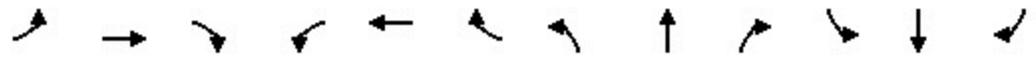
Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	81.8
Natural Cycle:	95
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.72
Intersection Signal Delay (s/veh):	12.8
Intersection LOS:	B
Intersection Capacity Utilization:	100.5%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 7: Heritage & Ottawa



Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	634	4	4	603	70	10	3	11	63	2	79
Future Volume (vph)	82	634	4	4	603	70	10	3	11	63	2	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	25.0		25.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99		0.97		0.98				0.98
Frt		0.999				0.850		0.938				0.926
Flt Protected	0.950			0.950				0.980				0.979
Satd. Flow (prot)	1825	3540	0	1825	3579	1617	0	1679	0	0	1713	0
Flt Permitted	0.389			0.410				0.846				0.848
Satd. Flow (perm)	744	3540	0	781	3579	1566	0	1441	0	0	1477	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				69		11				57
Link Speed (k/h)		50			50			50				50
Link Distance (m)		221.1			181.7			105.2				149.1
Travel Time (s)		15.9			13.1			7.6				10.7
Confl. Peds. (#/hr)	11		19	19		11	16		9	9		16
Peak Hour 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
Heavy Vehicles (%)	0%	3%	0%	0%	2%	1%	0%	0%	9%	0%	0%	0%
Adj. Flow (vph)	82	634	4	4	603	70	10	3	11	63	2	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	638	0	4	603	70	0	24	0	0	144	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4			8			2				6
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		6		6
Switch Phase												
Minimum Initial (s)	5.0	56.2		51.2	51.2	51.2	8.0	8.0		8.0		8.0
Minimum Split (s)	9.0	66.2		57.2	57.2	57.2	14.0	14.0		14.0		14.0
Total Split (s)	13.2	70.4		57.2	57.2	57.2	39.6	39.6		39.6		39.6
Total Split (%)	12.0%	64.0%		52.0%	52.0%	52.0%	36.0%	36.0%		36.0%		36.0%
Maximum Green (s)	9.2	64.4		51.2	51.2	51.2	33.6	33.6		33.6		33.6
Yellow Time (s)	3.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0		4.0
All-Red Time (s)	1.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0				0.0
Total Lost Time (s)	4.0	6.0		6.0	6.0	6.0		6.0				6.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0		3.0
Recall Mode	None	Max		Max	Max	Max	None	None		None		None
Walk Time (s)		45.2		45.2	45.2	45.2	10.0	10.0		10.0		10.0
Flash Don't Walk (s)		6.0		6.0	6.0	6.0	19.0	19.0		19.0		19.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0		0
Act Effct Green (s)	66.5	64.5		56.0	56.0	56.0		11.1				11.1
Actuated g/C Ratio	0.76	0.74		0.64	0.64	0.64		0.13				0.13
v/c Ratio	0.13	0.24		0.01	0.26	0.07		0.13				0.61

PM Ex PM Peak Hour Existing Traffic 5:06 pm 11/19/2025 Baseline

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Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay (s/veh)	3.6	4.3		8.0	8.2	2.5		24.5			33.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay (s/veh)	3.6	4.3		8.0	8.2	2.5		24.5			33.5	
LOS	A	A		A	A	A		C			C	
Approach Delay (s/veh)		4.2			7.6			24.5			33.5	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	2.6	14.2		0.2	21.6	0.1		2.0			13.7	
Queue Length 95th (m)	7.4	25.9		1.7	37.1	5.3		8.7			31.6	
Internal Link Dist (m)		197.1			157.7			81.2			125.1	
Turn Bay Length (m)	25.0			25.0		25.0						
Base Capacity (vph)	678	2606		498	2286	1025		560			602	
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	0.12	0.24		0.01	0.26	0.07		0.04			0.24	

Intersection Summary

Area Type:	Other
Cycle Length:	110
Actuated Cycle Length:	87.6
Natural Cycle:	85
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.61
Intersection Signal Delay (s/veh):	8.7
Intersection LOS:	A
Intersection Capacity Utilization:	95.1%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 7: Heritage & Ottawa



HCM Unsignalized Intersection Capacity Analysis

4: Site/KW Music Prod & Ebydale

11/20/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	3	64	0	0	12	0	0	0	0	0	0	1
Future Volume (Veh/h)	3	64	0	0	12	0	0	0	0	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	3	64	0	0	12	0	0	0	0	0	0	1
Pedestrians		8			1						1	
Lane Width (m)		3.7			3.7						3.7	
Walking Speed (m/s)		1.0			1.0						1.0	
Percent Blockage		1			0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					155							
pX, platoon unblocked												
vC, conflicting volume	13			64			91	83	65	84	83	21
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	13			64			91	83	65	84	83	21
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1617			1538			883	805	998	904	805	1053
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	67	12	0	1								
Volume Left	3	0	0	0								
Volume Right	0	0	0	1								
cSH	1617	1538	1700	1053								
Volume to Capacity	0.00	0.00	0.00	0.00								
Queue Length 95th (m)	0.0	0.0	0.0	0.0								
Control Delay (s/veh)	0.3	0.0	0.0	8.4								
Lane LOS	A		A	A								
Approach Delay (s/veh)	0.3	0.0	0.0	8.4								
Approach LOS			A	A								
Intersection Summary												
Average Delay			0.4									
Intersection Capacity Utilization			18.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

4: Site/KW Music Prod & Ebydale

11/20/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	9	6	0	0	14	1	0	0	0	0	0	5
Future Volume (Veh/h)	9	6	0	0	14	1	0	0	0	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	9	6	0	0	14	1	0	0	0	0	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					155							
pX, platoon unblocked												
vC, conflicting volume	15			6			44	39	6	39	39	15
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	15			6			44	39	6	39	39	15
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	100
cM capacity (veh/h)	1616			1615			951	848	1077	967	849	1071
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	15	15	0	5								
Volume Left	9	0	0	0								
Volume Right	0	1	0	5								
cSH	1616	1615	1700	1071								
Volume to Capacity	0.01	0.00	0.00	0.00								
Queue Length 95th (m)	0.1	0.0	0.0	0.1								
Control Delay (s/veh)	4.4	0.0	0.0	8.4								
Lane LOS	A		A	A								
Approach Delay (s/veh)	4.4	0.0	0.0	8.4								
Approach LOS			A	A								
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			17.5%		ICU Level of Service				A			
Analysis Period (min)			15									

Appendix E: Future Background Capacity Analysis

Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	465	9	9	440	179	3	19	5	118	9	109
Future Volume (vph)	87	465	9	9	440	179	3	19	5	118	9	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	25.0		25.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99		0.97		0.99			0.97	
Frt		0.997				0.850		0.975			0.938	
Flt Protected	0.950			0.950				0.994			0.976	
Satd. Flow (prot)	1825	3500	0	1825	3476	1617	0	1780	0	0	1662	0
Flt Permitted	0.457			0.481				0.962			0.828	
Satd. Flow (perm)	874	3500	0	918	3476	1571	0	1718	0	0	1405	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				179		5			47	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		221.1			181.7			105.2			149.1	
Travel Time (s)		15.9			13.1			7.6			10.7	
Confl. Peds. (#/hr)	7		10	10		7	36		7	7		36
Peak Hour 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
Heavy Vehicles (%)	0%	4%	0%	0%	5%	1%	0%	6%	0%	6%	0%	1%
Adj. Flow (vph)	87	465	9	9	440	179	3	19	5	118	9	109
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	474	0	9	440	179	0	27	0	0	236	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	47.0		42.0	42.0	42.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	9.0	57.0		48.0	48.0	48.0	35.0	35.0		35.0	35.0	
Total Split (s)	12.0	60.0		48.0	48.0	48.0	40.0	40.0		40.0	40.0	
Total Split (%)	12.0%	60.0%		48.0%	48.0%	48.0%	40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	8.0	54.0		42.0	42.0	42.0	34.0	34.0		34.0	34.0	
Yellow Time (s)	3.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)		36.0		36.0	36.0	36.0	10.0	10.0		10.0	10.0	
Flash Don't Walk (s)		6.0		6.0	6.0	6.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	
Act Effct Green (s)	56.3	54.2		45.5	45.5	45.5		16.6			16.6	
Actuated g/C Ratio	0.68	0.65		0.55	0.55	0.55		0.20			0.20	
v/c Ratio	0.13	0.21		0.02	0.23	0.19		0.08			0.74	

AM FB AM Peak Hour Future Background Traffic 2:26 pm 11/20/2025 Baseline

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Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025

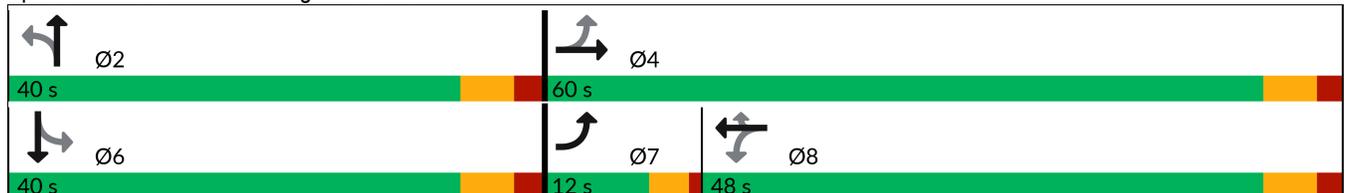


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay (s/veh)	6.2	6.7		12.4	11.9	2.8		22.6			38.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay (s/veh)	6.2	6.7		12.4	11.9	2.8		22.6			38.9	
LOS	A	A		B	B	A		C			D	
Approach Delay (s/veh)		6.6			9.3			22.6			38.9	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	4.0	13.6		0.6	18.6	0.0		2.8			28.1	
Queue Length 95th (m)	11.3	26.6		3.4	34.3	10.4		9.0			51.7	
Internal Link Dist (m)		197.1			157.7			81.2			125.1	
Turn Bay Length (m)	25.0			25.0		25.0						
Base Capacity (vph)	685	2291		504	1909	943		710			606	
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	0.13	0.21		0.02	0.23	0.19		0.04			0.39	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	82.9
Natural Cycle:	95
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.74
Intersection Signal Delay (s/veh):	13.3
Intersection LOS:	B
Intersection Capacity Utilization:	105.8%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 7: Heritage & Ottawa



Lanes, Volumes, Timings

7: Heritage & Ottawa

11/20/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	678	4	4	645	75	11	3	12	67	2	85
Future Volume (vph)	88	678	4	4	645	75	11	3	12	67	2	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	25.0		25.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99		0.97		0.98			0.98	
Frt		0.999				0.850		0.938			0.925	
Flt Protected	0.950			0.950				0.979			0.979	
Satd. Flow (prot)	1825	3540	0	1825	3579	1617	0	1677	0	0	1711	0
Flt Permitted	0.368			0.392				0.835			0.847	
Satd. Flow (perm)	704	3540	0	747	3579	1566	0	1422	0	0	1474	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				69		12			58	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		221.1			181.7			105.2			149.1	
Travel Time (s)		15.9			13.1			7.6			10.7	
Confl. Peds. (#/hr)	11		19	19		11	16		9	9		16
Peak Hour 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
Heavy Vehicles (%)	0%	3%	0%	0%	2%	1%	0%	0%	9%	0%	0%	0%
Adj. Flow (vph)	88	678	4	4	645	75	11	3	12	67	2	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	682	0	4	645	75	0	26	0	0	154	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	56.2		51.2	51.2	51.2	8.0	8.0		8.0	8.0	
Minimum Split (s)	9.0	66.2		57.2	57.2	57.2	14.0	14.0		14.0	14.0	
Total Split (s)	13.2	70.4		57.2	57.2	57.2	39.6	39.6		39.6	39.6	
Total Split (%)	12.0%	64.0%		52.0%	52.0%	52.0%	36.0%	36.0%		36.0%	36.0%	
Maximum Green (s)	9.2	64.4		51.2	51.2	51.2	33.6	33.6		33.6	33.6	
Yellow Time (s)	3.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)		45.2		45.2	45.2	45.2	10.0	10.0		10.0	10.0	
Flash Don't Walk (s)		6.0		6.0	6.0	6.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	
Act Effct Green (s)	66.5	64.5		55.9	55.9	55.9		11.6			11.6	
Actuated g/C Ratio	0.75	0.73		0.63	0.63	0.63		0.13			0.13	
v/c Ratio	0.14	0.26		0.01	0.28	0.07		0.13			0.63	

Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025

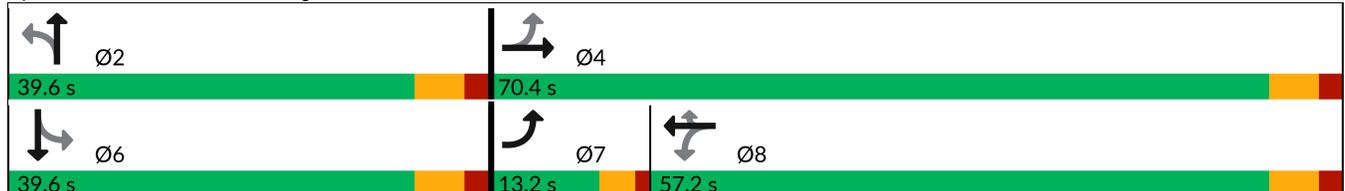


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay (s/veh)	3.9	4.5		8.5	8.6	2.9		24.0			34.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay (s/veh)	3.9	4.5		8.5	8.6	2.9		24.0			34.4	
LOS	A	A		A	A	A		C			C	
Approach Delay (s/veh)		4.5			8.1			24.0			34.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	3.0	16.1		0.2	24.1	0.4		2.1			15.3	
Queue Length 95th (m)	8.2	28.9		1.7	41.3	6.1		9.0			34.2	
Internal Link Dist (m)		197.1			157.7			81.2			125.1	
Turn Bay Length (m)	25.0			25.0		25.0						
Base Capacity (vph)	648	2591		473	2268	1018		550			598	
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	0.14	0.26		0.01	0.28	0.07		0.05			0.26	

Intersection Summary

Area Type:	Other
Cycle Length:	110
Actuated Cycle Length:	88.1
Natural Cycle:	85
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay (s/veh):	9.1
Intersection LOS:	A
Intersection Capacity Utilization:	100.5%
ICU Level of Service:	G
Analysis Period (min):	15

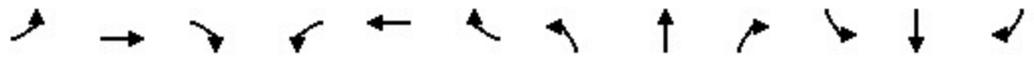
Splits and Phases: 7: Heritage & Ottawa



HCM Unsignalized Intersection Capacity Analysis

4: Site/KW Music Prod & Ebydale

11/20/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	3	67	0	0	13	0	0	0	0	0	0	1
Future Volume (Veh/h)	3	67	0	0	13	0	0	0	0	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	3	67	0	0	13	0	0	0	0	0	0	1
Pedestrians		8			1						1	
Lane Width (m)		3.7			3.7						3.7	
Walking Speed (m/s)		1.0			1.0						1.0	
Percent Blockage		1			0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					155							
pX, platoon unblocked												
vC, conflicting volume	14			67			95	87	68	88	87	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			67			95	87	68	88	87	22
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1616			1535			878	801	994	898	801	1051
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	70	13	0	1								
Volume Left	3	0	0	0								
Volume Right	0	0	0	1								
cSH	1616	1535	1700	1051								
Volume to Capacity	0.00	0.00	0.00	0.00								
Queue Length 95th (m)	0.0	0.0	0.0	0.0								
Control Delay (s/veh)	0.3	0.0	0.0	8.4								
Lane LOS	A		A	A								
Approach Delay (s/veh)	0.3	0.0	0.0	8.4								
Approach LOS			A	A								
Intersection Summary												
Average Delay			0.4									
Intersection Capacity Utilization			18.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

4: Site/KW Music Prod & Ebydale

11/20/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	6	0	0	15	1	0	0	0	0	0	5
Future Volume (Veh/h)	9	6	0	0	15	1	0	0	0	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	9	6	0	0	15	1	0	0	0	0	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					155							
pX, platoon unblocked												
vC, conflicting volume	16			6			45	40	6	40	40	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			6			45	40	6	40	40	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	100
cM capacity (veh/h)	1615			1615			949	847	1077	966	848	1070
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	15	16	0	5								
Volume Left	9	0	0	0								
Volume Right	0	1	0	5								
cSH	1615	1615	1700	1070								
Volume to Capacity	0.01	0.00	0.00	0.00								
Queue Length 95th (m)	0.1	0.0	0.0	0.1								
Control Delay (s/veh)	4.4	0.0	0.0	8.4								
Lane LOS	A		A	A								
Approach Delay (s/veh)	4.4	0.0	0.0	8.4								
Approach LOS			A	A								
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			17.5%		ICU Level of Service				A			
Analysis Period (min)			15									

Appendix F: Excerpts from ITE Trip Generation Manual

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

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

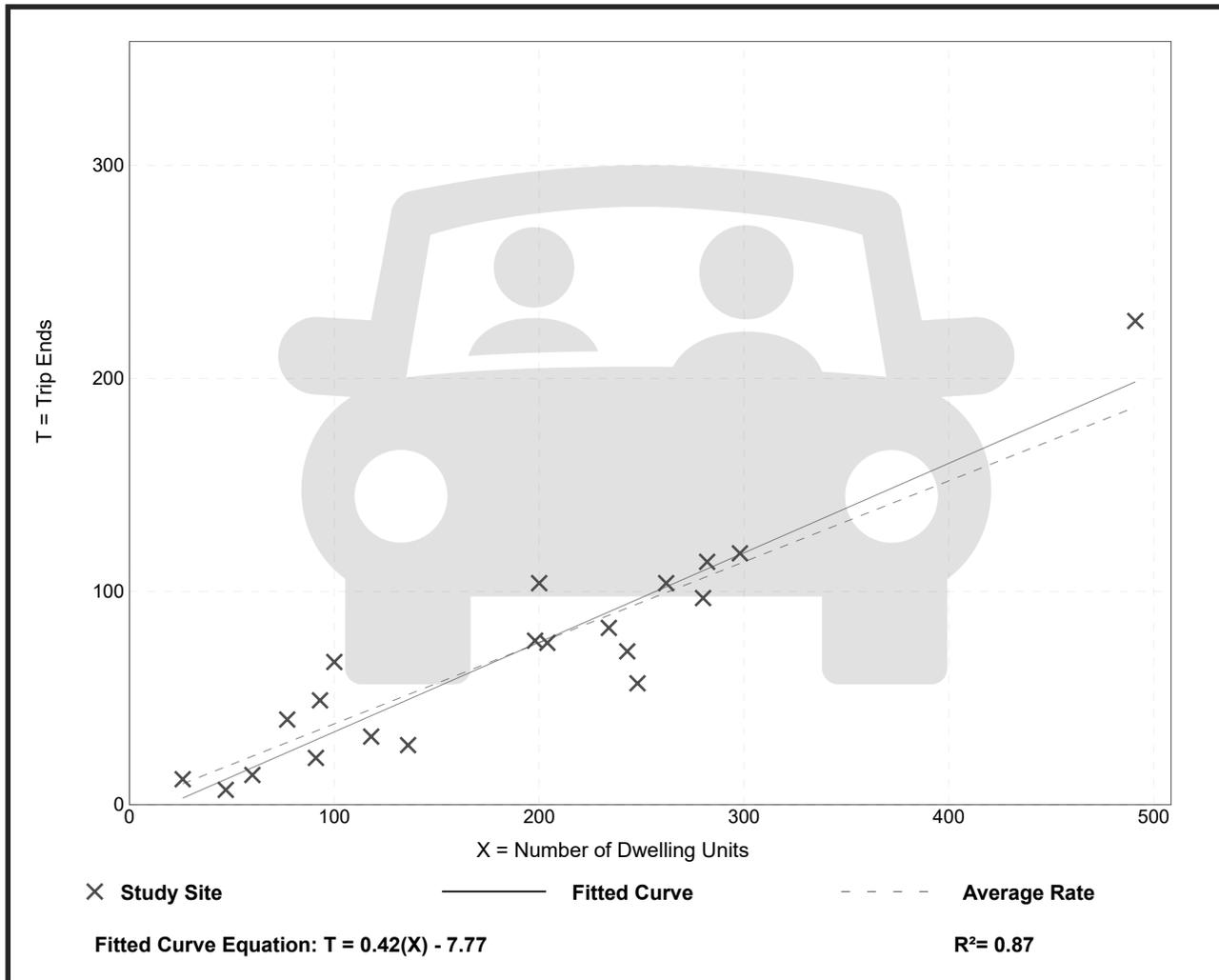
Setting/Location: General Urban/Suburban

Number of Studies: 20
 Avg. Num. of Dwelling Units: 184
 Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.38	0.15 - 0.67	0.10

Data Plot and Equation



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

Vehicle Trip Ends vs: Dwelling Units
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 21

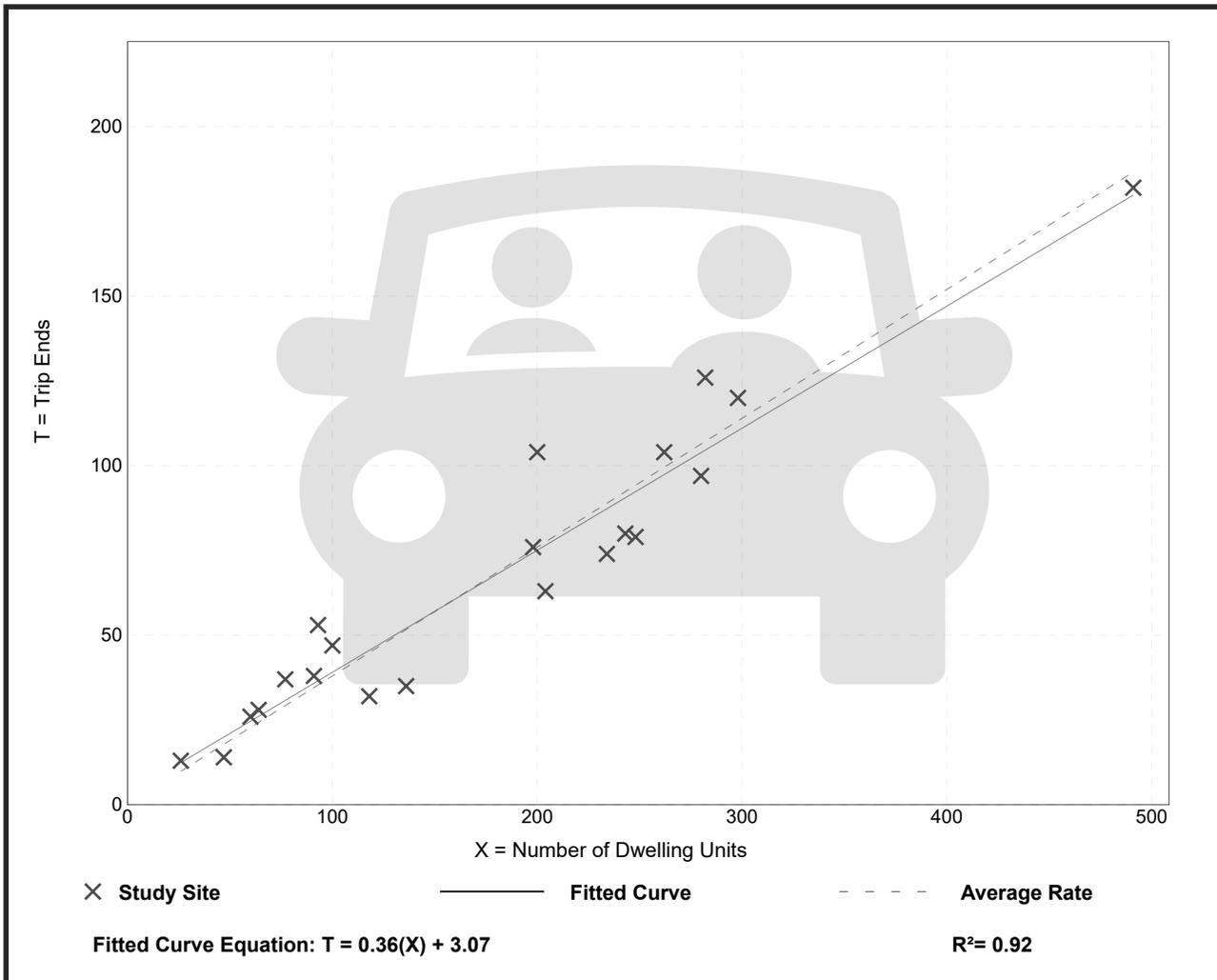
Avg. Num. of Dwelling Units: 179

Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.38	0.26 - 0.57	0.07

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: 26

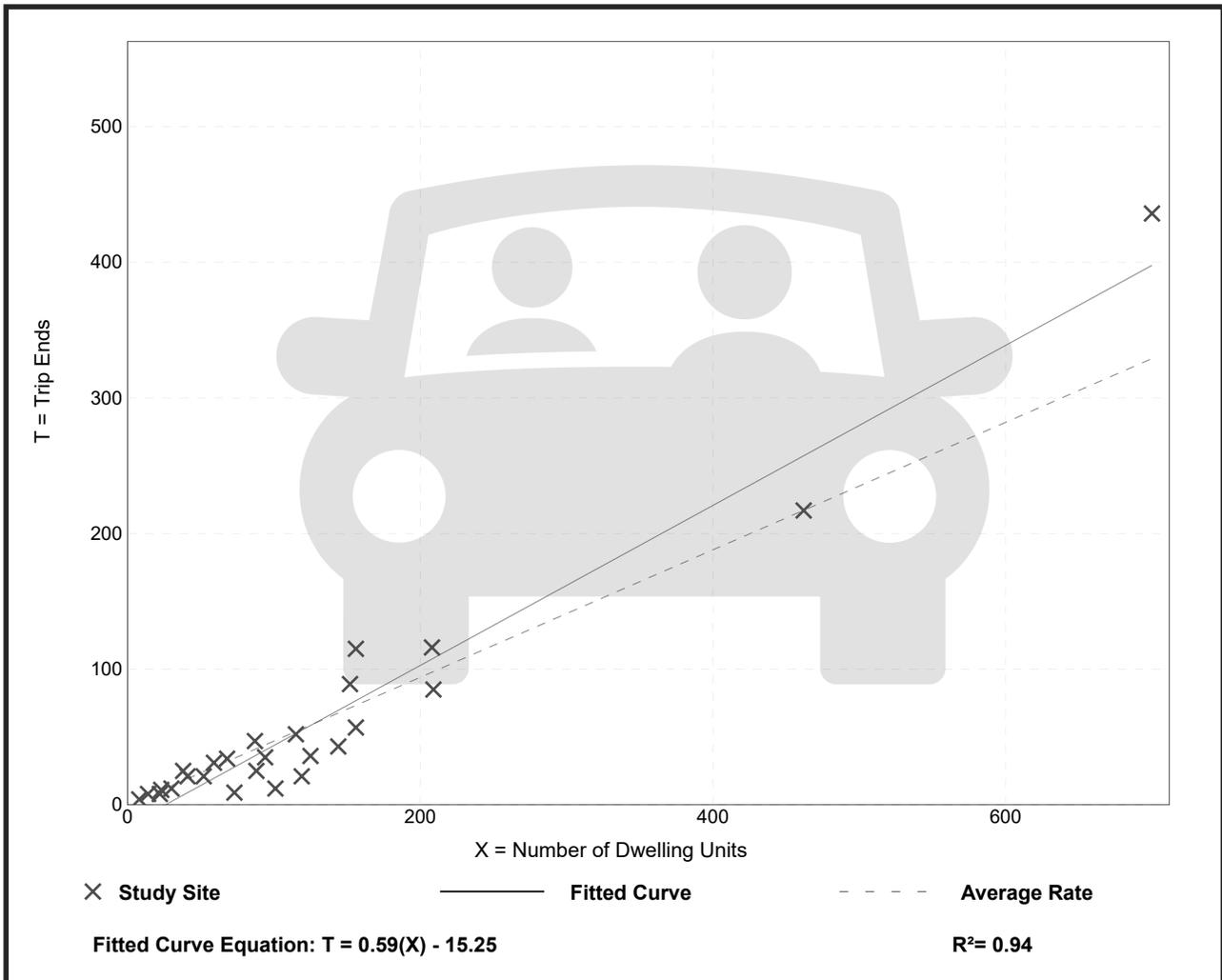
Avg. Num. of Dwelling Units: 129

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.47	0.12 - 0.74	0.16

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: 31

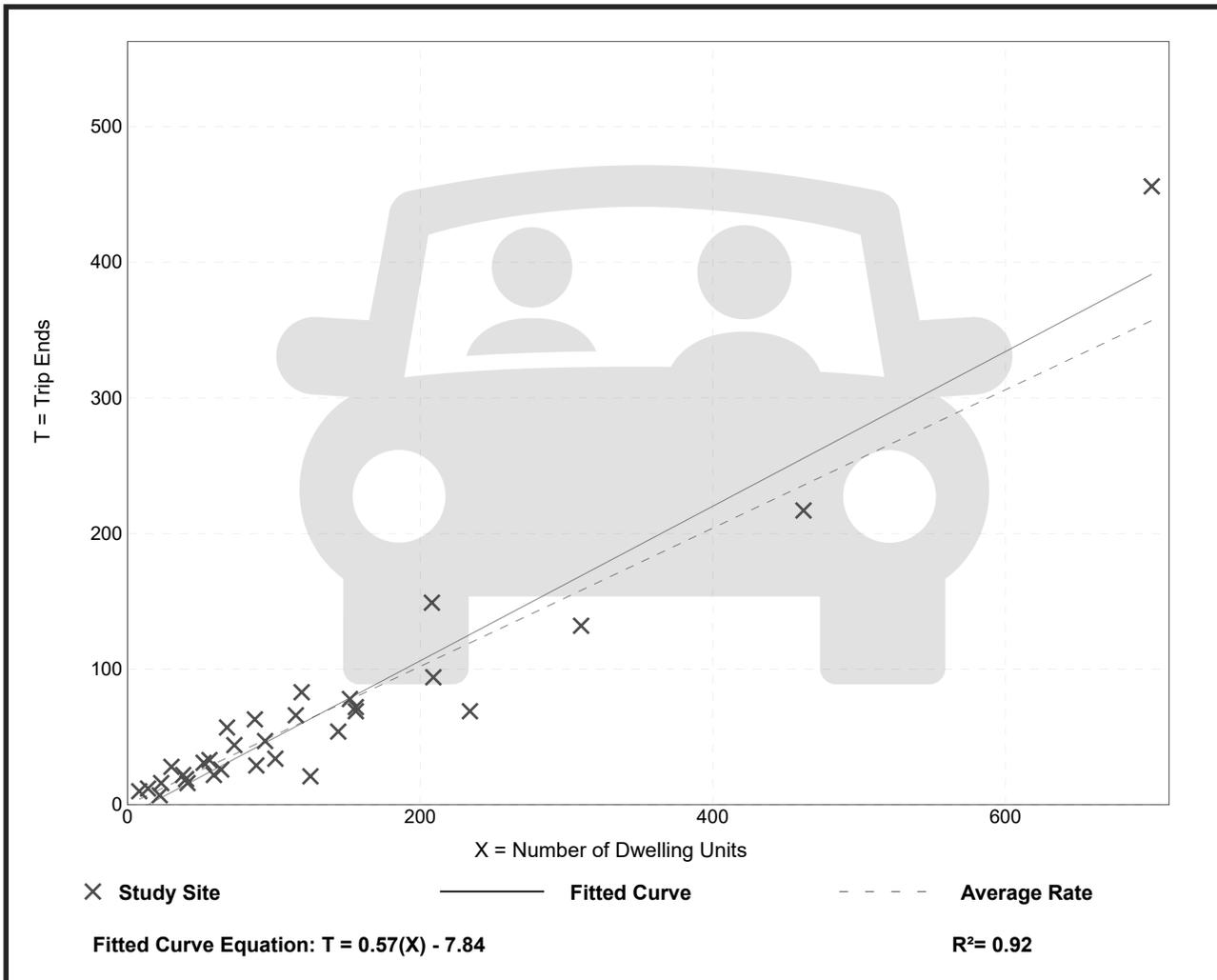
Avg. Num. of Dwelling Units: 131

Directional Distribution: 57% entering, 43% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.17 - 1.25	0.16

Data Plot and Equation



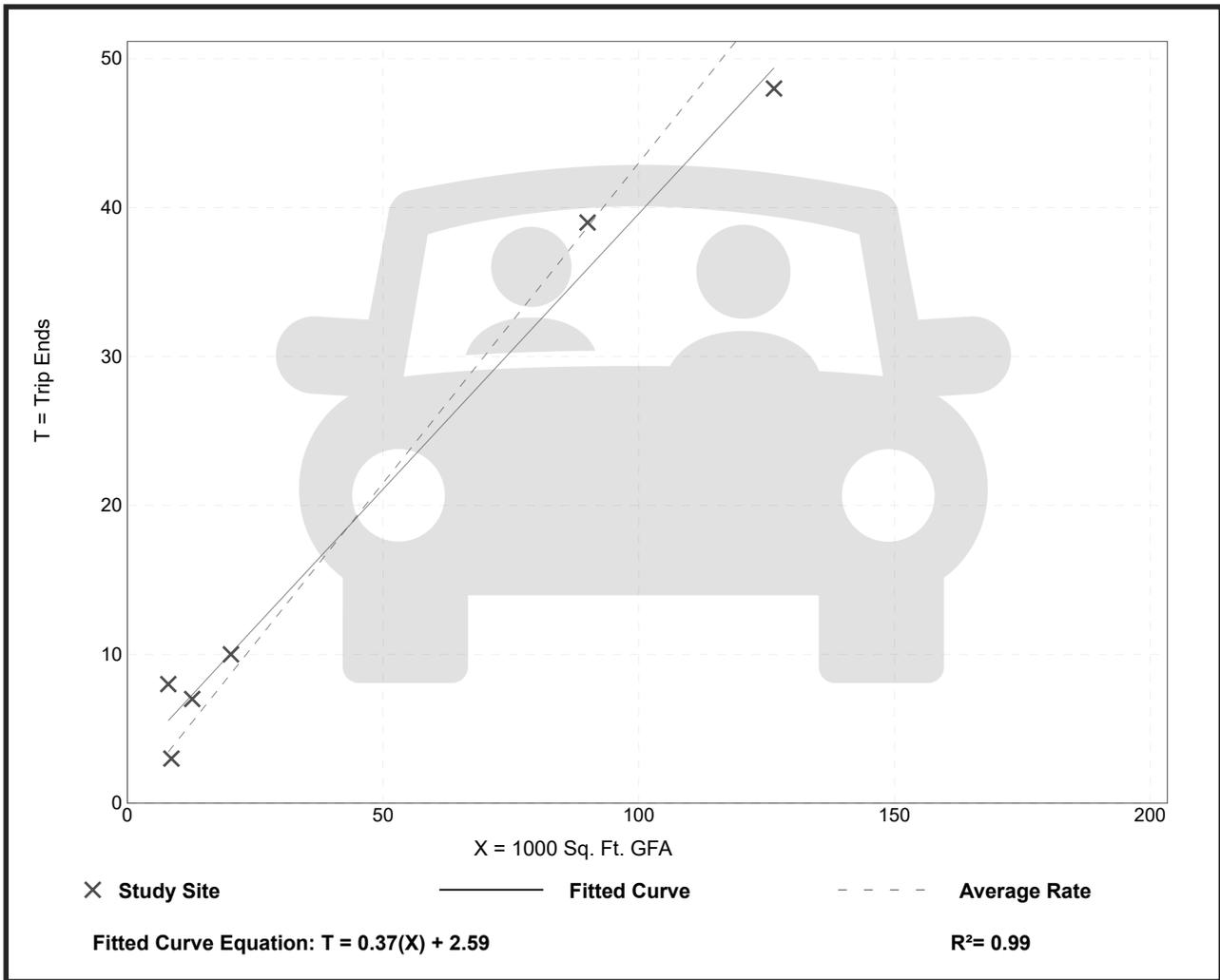
Church (560)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
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: 6
 Avg. 1000 Sq. Ft. GFA: 44
 Directional Distribution: 41% entering, 59% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.43	0.35 - 1.00	0.12

Data Plot and Equation



Church (560)

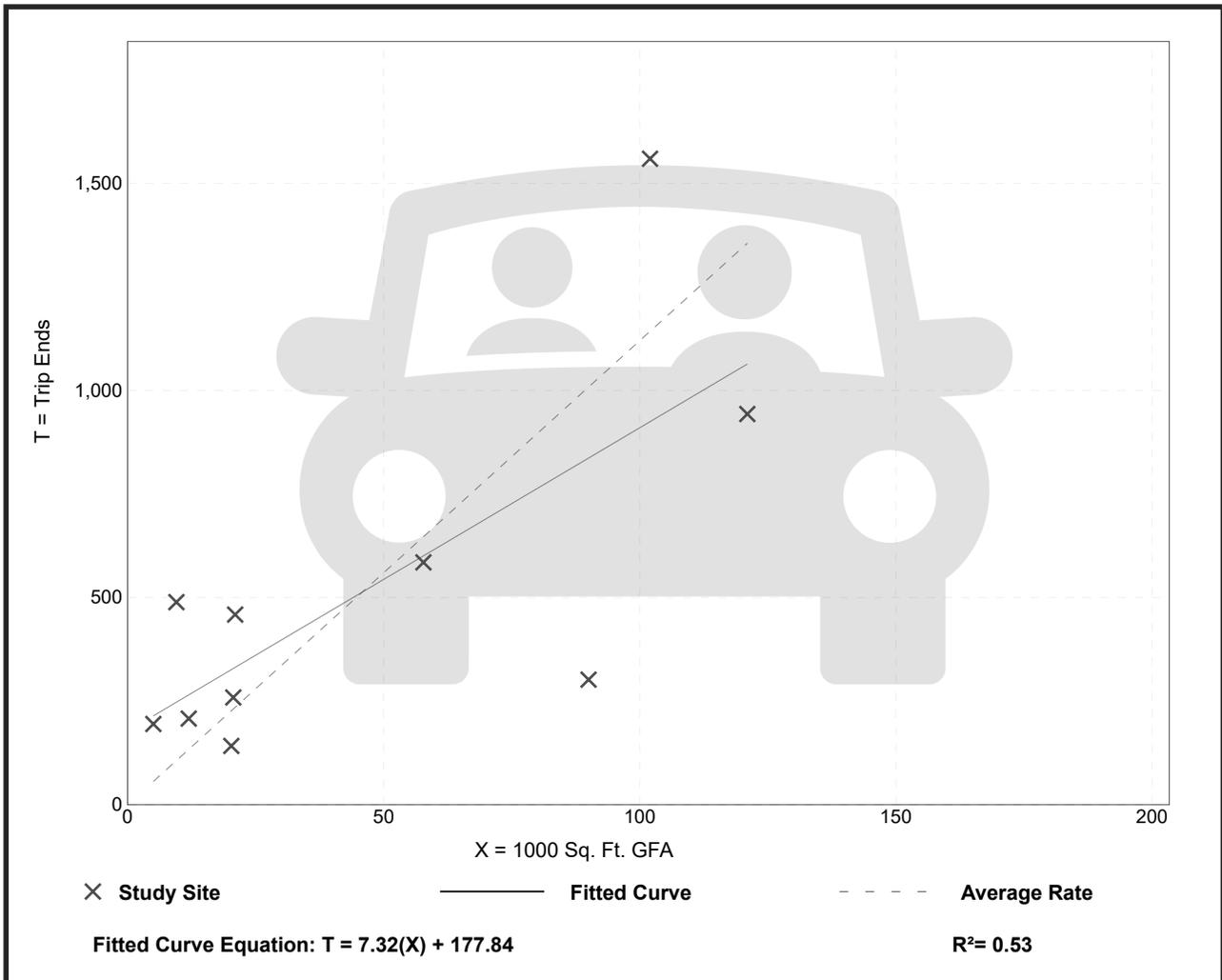
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
 Number of Studies: 10
 Avg. 1000 Sq. Ft. GFA: 46
 Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.20	3.36 - 51.31	8.68

Data Plot and Equation



Appendix G: Future Total Capacity Analysis

Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	465	11	12	440	179	12	24	15	118	10	109
Future Volume (vph)	87	465	11	12	440	179	12	24	15	118	10	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	25.0		25.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99		0.97		0.99				0.97
Frt		0.997				0.850		0.960				0.938
Flt Protected	0.950			0.950				0.988				0.976
Satd. Flow (prot)	1825	3500	0	1825	3476	1617	0	1762	0	0	1662	0
Flt Permitted	0.457			0.480				0.913				0.816
Satd. Flow (perm)	874	3500	0	916	3476	1571	0	1619	0	0	1385	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				179		15				46
Link Speed (k/h)		50			50			50				50
Link Distance (m)		221.1			181.7			105.2				149.1
Travel Time (s)		15.9			13.1			7.6				10.7
Confl. Peds. (#/hr)	7		10	10		7	36		7	7		36
Peak Hour 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
Heavy Vehicles (%)	0%	4%	0%	0%	5%	1%	0%	6%	0%	6%	0%	1%
Adj. Flow (vph)	87	465	11	12	440	179	12	24	15	118	10	109
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	476	0	12	440	179	0	51	0	0	237	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4			8			2				6
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		6		6
Switch Phase												
Minimum Initial (s)	5.0	47.0		42.0	42.0	42.0	8.0	8.0		8.0		8.0
Minimum Split (s)	9.0	57.0		48.0	48.0	48.0	35.0	35.0		35.0		35.0
Total Split (s)	12.0	60.0		48.0	48.0	48.0	40.0	40.0		40.0		40.0
Total Split (%)	12.0%	60.0%		48.0%	48.0%	48.0%	40.0%	40.0%		40.0%		40.0%
Maximum Green (s)	8.0	54.0		42.0	42.0	42.0	34.0	34.0		34.0		34.0
Yellow Time (s)	3.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0		4.0
All-Red Time (s)	1.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0				0.0
Total Lost Time (s)	4.0	6.0		6.0	6.0	6.0		6.0				6.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0		3.0
Recall Mode	None	Max		Max	Max	Max	None	None		None		None
Walk Time (s)		36.0		36.0	36.0	36.0	10.0	10.0		10.0		10.0
Flash Don't Walk (s)		6.0		6.0	6.0	6.0	19.0	19.0		19.0		19.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0		0
Act Effct Green (s)	56.2	54.2		45.5	45.5	45.5		16.9				16.9
Actuated g/C Ratio	0.68	0.65		0.55	0.55	0.55		0.20				0.20
v/c Ratio	0.13	0.21		0.02	0.23	0.19		0.15				0.75

AM FT AM Peak Hour Future Total Traffic 2:39 pm 11/20/2025 Baseline

J Salvini

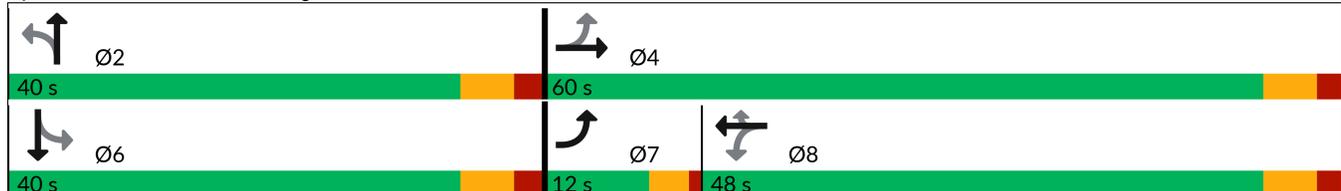


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay (s/veh)	6.3	6.8		12.7	12.0	2.8		20.8			39.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay (s/veh)	6.3	6.8		12.7	12.0	2.8		20.8			39.5	
LOS	A	A		B	B	A		C			D	
Approach Delay (s/veh)		6.7			9.4			20.8			39.5	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	4.0	13.8		0.9	18.7	0.0		4.7			28.5	
Queue Length 95th (m)	11.5	27.2		4.2	34.7	10.6		13.1			52.0	
Internal Link Dist (m)		197.1			157.7			81.2			125.1	
Turn Bay Length (m)	25.0			25.0		25.0						
Base Capacity (vph)	682	2283		501	1902	940		673			595	
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	0.13	0.21		0.02	0.23	0.19		0.08			0.40	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	83.2
Natural Cycle:	95
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.75
Intersection Signal Delay (s/veh):	13.6
Intersection LOS:	B
Intersection Capacity Utilization:	105.8%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 7: Heritage & Ottawa



Lanes, Volumes, Timings
7: Heritage & Ottawa

11/20/2025

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	678	13	13	645	75	16	4	17	67	4	85
Future Volume (vph)	88	678	13	13	645	75	16	4	17	67	4	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	25.0		25.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99		0.97		0.98			0.98	
Frt		0.997				0.850		0.938			0.926	
Flt Protected	0.950			0.950				0.979			0.979	
Satd. Flow (prot)	1825	3532	0	1825	3579	1617	0	1677	0	0	1713	0
Flt Permitted	0.368			0.389				0.804			0.844	
Satd. Flow (perm)	704	3532	0	741	3579	1566	0	1369	0	0	1471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				69		17			56	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		221.1			181.7			105.2			149.1	
Travel Time (s)		15.9			13.1			7.6			10.7	
Confl. Peds. (#/hr)	11		19	19		11	16		9	9		16
Peak Hour 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
Heavy Vehicles (%)	0%	3%	0%	0%	2%	1%	0%	0%	9%	0%	0%	0%
Adj. Flow (vph)	88	678	13	13	645	75	16	4	17	67	4	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	691	0	13	645	75	0	37	0	0	156	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	56.2		51.2	51.2	51.2	8.0	8.0		8.0	8.0	
Minimum Split (s)	9.0	66.2		57.2	57.2	57.2	14.0	14.0		14.0	14.0	
Total Split (s)	13.2	70.4		57.2	57.2	57.2	39.6	39.6		39.6	39.6	
Total Split (%)	12.0%	64.0%		52.0%	52.0%	52.0%	36.0%	36.0%		36.0%	36.0%	
Maximum Green (s)	9.2	64.4		51.2	51.2	51.2	33.6	33.6		33.6	33.6	
Yellow Time (s)	3.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)		45.2		45.2	45.2	45.2	10.0	10.0		10.0	10.0	
Flash Don't Walk (s)		6.0		6.0	6.0	6.0	19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	
Act Effct Green (s)	66.5	64.5		55.9	55.9	55.9		11.8			11.8	
Actuated g/C Ratio	0.75	0.73		0.63	0.63	0.63		0.13			0.13	
v/c Ratio	0.14	0.27		0.03	0.29	0.07		0.19			0.64	

PM FT PM Peak Hour Future Total Traffic 2:37 pm 11/20/2025 Baseline

J Salvini

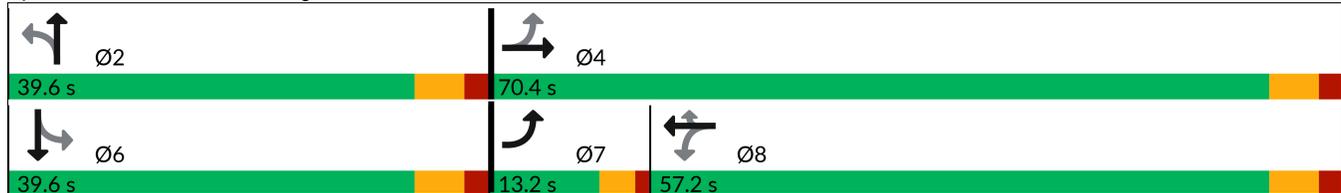


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay (s/veh)	3.9	4.6		8.7	8.8	2.9		23.8			35.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay (s/veh)	3.9	4.6		8.7	8.8	2.9		23.8			35.1	
LOS	A	A		A	A	A		C			D	
Approach Delay (s/veh)		4.5			8.2			23.8			35.1	
Approach LOS		A			A			C			D	
Queue Length 50th (m)	3.0	16.5		0.8	24.4	0.4		3.0			16.0	
Queue Length 95th (m)	8.3	29.8		3.6	41.7	6.2		11.3			35.0	
Internal Link Dist (m)		197.1			157.7			81.2			125.1	
Turn Bay Length (m)	25.0			25.0		25.0						
Base Capacity (vph)	646	2578		468	2262	1015		531			594	
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	0.14	0.27		0.03	0.29	0.07		0.07			0.26	

Intersection Summary

Area Type:	Other
Cycle Length:	110
Actuated Cycle Length:	88.4
Natural Cycle:	85
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.64
Intersection Signal Delay (s/veh):	9.3
Intersection LOS:	A
Intersection Capacity Utilization:	100.5%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 7: Heritage & Ottawa



HCM Unsignalized Intersection Capacity Analysis

4: Site/KW Music Prod & Ebydale

11/20/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	3	67	0	7	13	0	0	0	24	0	0	1
Future Volume (Veh/h)	3	67	0	7	13	0	0	0	24	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	3	67	0	7	13	0	0	0	24	0	0	1
Pedestrians		8			1						1	
Lane Width (m)		3.7			3.7						3.7	
Walking Speed (m/s)		1.0			1.0						1.0	
Percent Blockage		1			0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					155							
pX, platoon unblocked												
vC, conflicting volume	14			67			109	101	68	126	101	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			67			109	101	68	126	101	22
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	1616			1535			857	783	994	825	783	1051
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	70	20	24	1								
Volume Left	3	7	0	0								
Volume Right	0	0	24	1								
cSH	1616	1535	994	1051								
Volume to Capacity	0.00	0.00	0.02	0.00								
Queue Length 95th (m)	0.0	0.1	0.6	0.0								
Control Delay (s/veh)	0.3	2.6	8.7	8.4								
Lane LOS	A	A	A	A								
Approach Delay (s/veh)	0.3	2.6	8.7	8.4								
Approach LOS			A	A								
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			16.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

4: Site/KW Music Prod & Ebydale

11/20/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	9	6	0	20	15	1	0	0	11	0	0	5
Future Volume (Veh/h)	9	6	0	20	15	1	0	0	11	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	9	6	0	20	15	1	0	0	11	0	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					155							
pX, platoon unblocked												
vC, conflicting volume	16			6			85	80	6	91	80	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			6			85	80	6	91	80	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	100	100	100
cM capacity (veh/h)	1615			1615			886	796	1077	878	796	1070
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	15	36	11	5								
Volume Left	9	20	0	0								
Volume Right	0	1	11	5								
cSH	1615	1615	1077	1070								
Volume to Capacity	0.01	0.01	0.01	0.00								
Queue Length 95th (m)	0.1	0.3	0.2	0.1								
Control Delay (s/veh)	4.4	4.1	8.4	8.4								
Lane LOS	A	A	A	A								
Approach Delay (s/veh)	4.4	4.1	8.4	8.4								
Approach LOS			A	A								
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			13.3%		ICU Level of Service				A			
Analysis Period (min)			15									