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Transportation Impact Assessment

PROPOSED GAS STATION DEVELOPMENT

8605 Campeau Drive, City of Ottawa

December 17, 2020
Project No: NT-20-091

Consulting Engineers

A Division of NextEng Consulting Group Inc.

December 17, 2020

J+B Engineering Inc.
25 Centurian Drive, Suite 201
Markham, ON L3R 5N8

Attention: Janusz Kuszynski

Re: Transportation Impact Assessment
Proposed Gas Station Development
8605 Campeau Drive, City of Ottawa
Our Project No. NT-20-091

NexTrans Consulting Engineers (a Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Impact Assessment for the above noted property.

The subject property is currently vacant. Based on the preliminary site plan prepared by Petro Canada, dated May 9, 2018, the development proposal is to develop the vacant lands to include a gas station comprising of five (5) gasoline pumps with 10 fueling stations, a convenience store and eating establishment with a drive through, and an oil change building. Access to the site is proposed through one (1) right-in / right-out entrances located via Campeau Drive, one (1) full movement entrance via Tangers Outlet Westerly Site Access and one (1) full movement entrance via Tangers Outlet parking lot. The preliminary site plan provides for a total of 20 parking spaces.

The study concludes that the development proposal can adequately be accommodated by the existing transportation network with negligible traffic impact to the adjacent public roadways. We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

NEXTRANS CONSULTING ENGINEERS

Prepared by:	Reviewed by:	Approved by:
Andy Bilawejian		
Andy Bilawejian, B.Eng., EIT Transportation Analyst	Annosan Srikantha, P.Eng. Project Engineer – Transportation	Richard Pernicky, MITE Principal

EXECUTIVE SUMMARY

Nextrans Consulting Engineers was retained by Janusz Kuszynski (the 'Client') to undertake a Transportation Impact Assessment for the proposed gas station development, in the City of Ottawa. The subject property is located at the southeast corner of Campeau Drive and Palladium Drive intersection, municipally known as 8605 Campeau Drive.

Development Proposal

The subject property is currently vacant. Based on the preliminary site plan prepared by Petro Canada, dated May 9, 2018, the development proposal is to develop the vacant lands to include a gas station comprising of five (5) gasoline pumps with 10 fueling stations, a convenience store and eating establishment with a drive through, and an oil change building. Access to the site is proposed through one (1) right-in / right-out entrances located via Campeau Drive, one (1) full movement entrance via Tangers Outlet Westerly Site Access and one (1) full movement entrance via Tangers Outlet parking lot. The preliminary site plan provides for a total of 20 parking spaces.

Capacity Analysis

The proposed development is anticipated to generate 110 two-way trips (61 inbound and 49 outbound) during the AM peak hours and 119 two-way trips (60 inbound and 59 outbound) during the PM peak hours.

The intersection capacity analysis results (based on the methodology and procedures outlined in the Highway Capacity Manual, HCM 2000 and HCM 2010 Roundabout, published by the Transportation Research Board) indicate that the study intersection and proposed access are expected to operate with excellent levels of service.

Access/Parking Review

According to the Site Plan provided, access to the site is proposed through one (1) right-in / right-out entrances located via Campeau Drive, one (1) full movement entrance via Tangers Outlet Westerly Site Access and one (1) full movement entrance via Tangers Outlet parking lot. In accordance with Ontario Traffic Manual (OTM) Book 5, we recommend appropriate signage consisting of a STOP Signs (Ra-1) be provided on the Campeau Drive, Tangers Outlet Westerly Site Access and Tangers Outlet parking lot egress driveways, a DISABLES PARKING PERMIT Sign (Rb-93) and DO NOT ENTER Sign (Rb-19) at the accessible parking spaces and end of drive-through aisle respectively.

Based on City of Ottawa Zoning By-law 2008-250, a total of 19 parking spaces will be required for the proposed development with 169.76 m^2 of convenience store, 115 m^2 drive through restaurant and 71.5 m^2 automobile service station GFA. The preliminary site plan provides for a total of 20 parking spaces, which results in a technical surplus of one (1) parking spaces.

Loading Area Review

A Suncor Tanker Truck turning path assessment was conducted to evaluate the expected movements to and from the proposed development site. The site is accessible from a circulation perspective.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

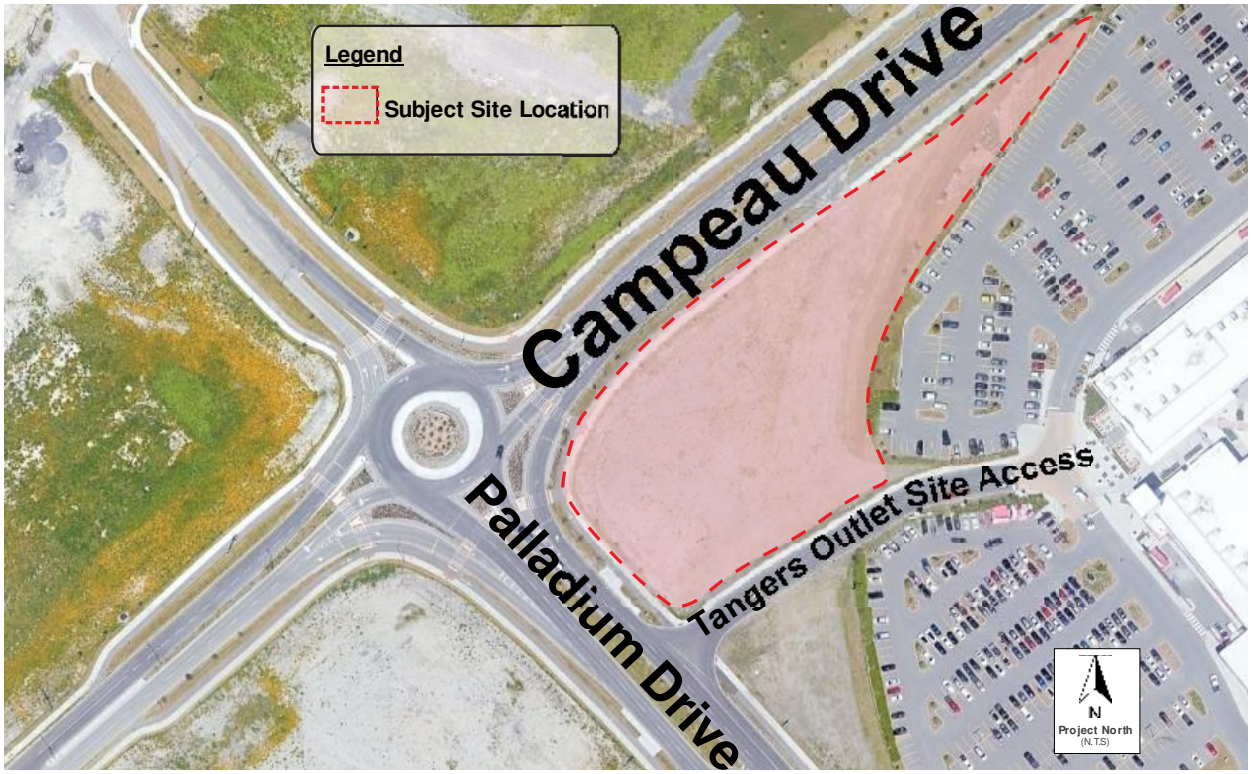
APPENDICES

1.0 INTRODUCTION

Nextrans Consulting Engineers was retained by Janusz Kuszynski (the 'Client') to undertake a Transportation Impact Assessment for the proposed gas station development, in the City of Ottawa. The subject property is located at the southeast corner of Campeau Drive and Palladium Drive intersection, municipally known as 8605 Campeau Drive.

The location of the proposed development is illustrated in **Figure 1-1**.

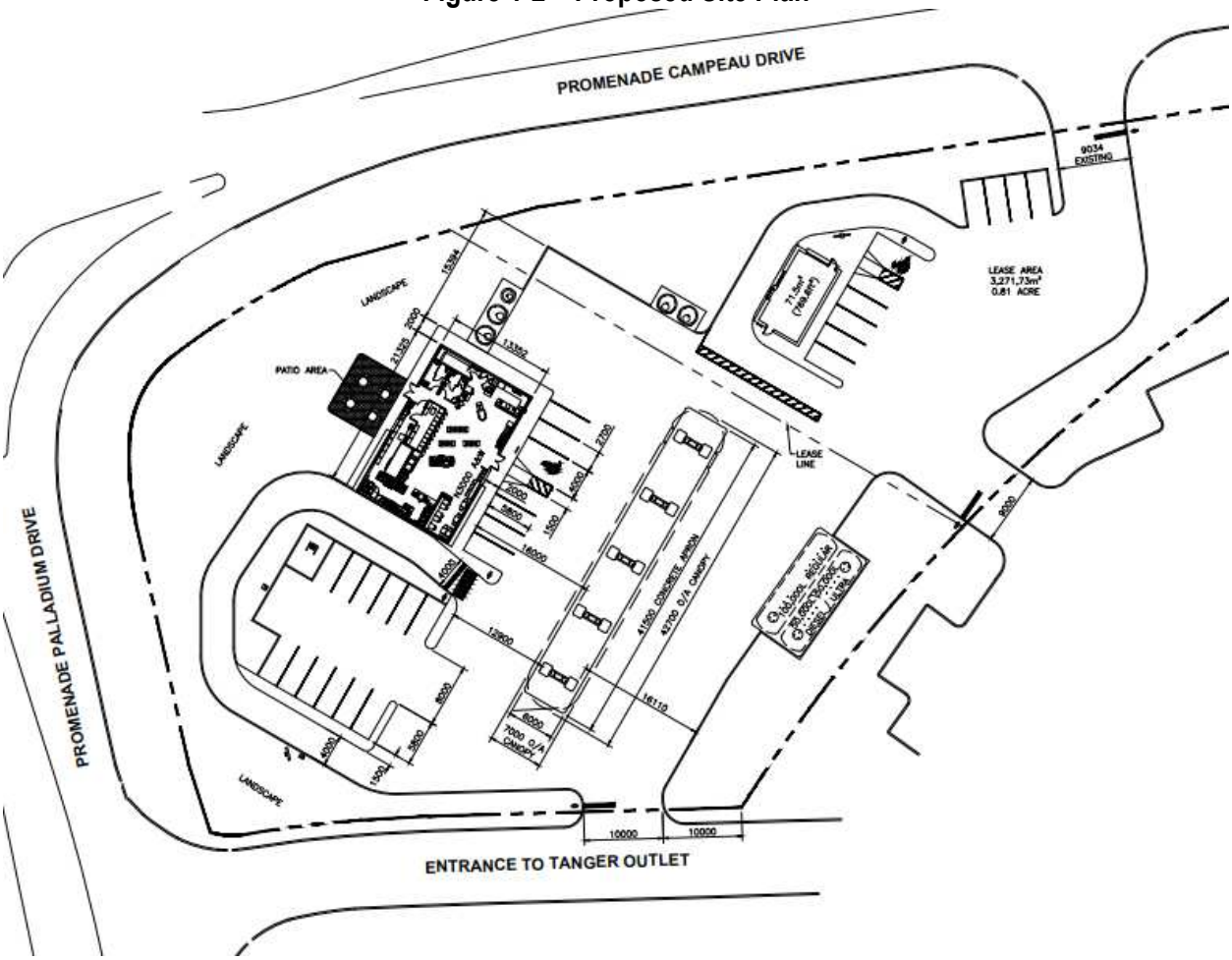
Figure 1-1 – Site Location



The subject property is currently vacant. Based on the preliminary site plan prepared by Petro Canada, dated May 9, 2018, the development proposal is to develop the vacant lands to include a gas station comprising of five (5) gasoline pumps with 10 fueling stations, a convenience store and eating establishment with a drive through, and an oil change building. Access to the site is proposed through one (1) right-in / right-out entrances located via Campeau Drive, one (1) full movement entrance via Tangers Outlet Westerly Site Access and one (1) full movement entrance via Tangers Outlet parking lot. The preliminary site plan provides for a total of 20 parking spaces. The preliminary site plan is provided in **Figure 1-2**; **Appendix A** also provides a larger scale version of the proposed site plan.

Given the nature of the development proposal, the analysis will include the weekday morning and afternoon peak periods for traffic assessment purposes.

Figure 1-2 – Proposed Site Plan



2.0 EXISTING TRAFFIC CONDITIONS

2.1. Existing Road Network

The existing subject lands are located on the southeast corner of Campeau Drive and Palladium Drive intersection, municipally known as 8605 Campeau Drive. The road network is described as follows:

Palladium Drive: is classified as an east-west Arterial road under the jurisdiction of the City of Ottawa, in accordance with the *Official Plan Consolidation for the City of Ottawa – October 2011*; however, functions in the north-south directions in the vicinity of the subject site. Palladium Drive has a four-lane cross section (2 lanes per direction) and posted speed limit of 60 km/h in the vicinity of the subject site.

Campeau Drive: is classified as an east-west Arterial road under the jurisdiction of the City of Ottawa, in accordance with the *Official Plan Consolidation for the City of Ottawa – October 2011*. Campeau Drive has a four-lane cross section (2 lanes per direction) and posted speed limit of 60 km/h in the vicinity of the subject site.

2.2. Existing Active Transportation Network

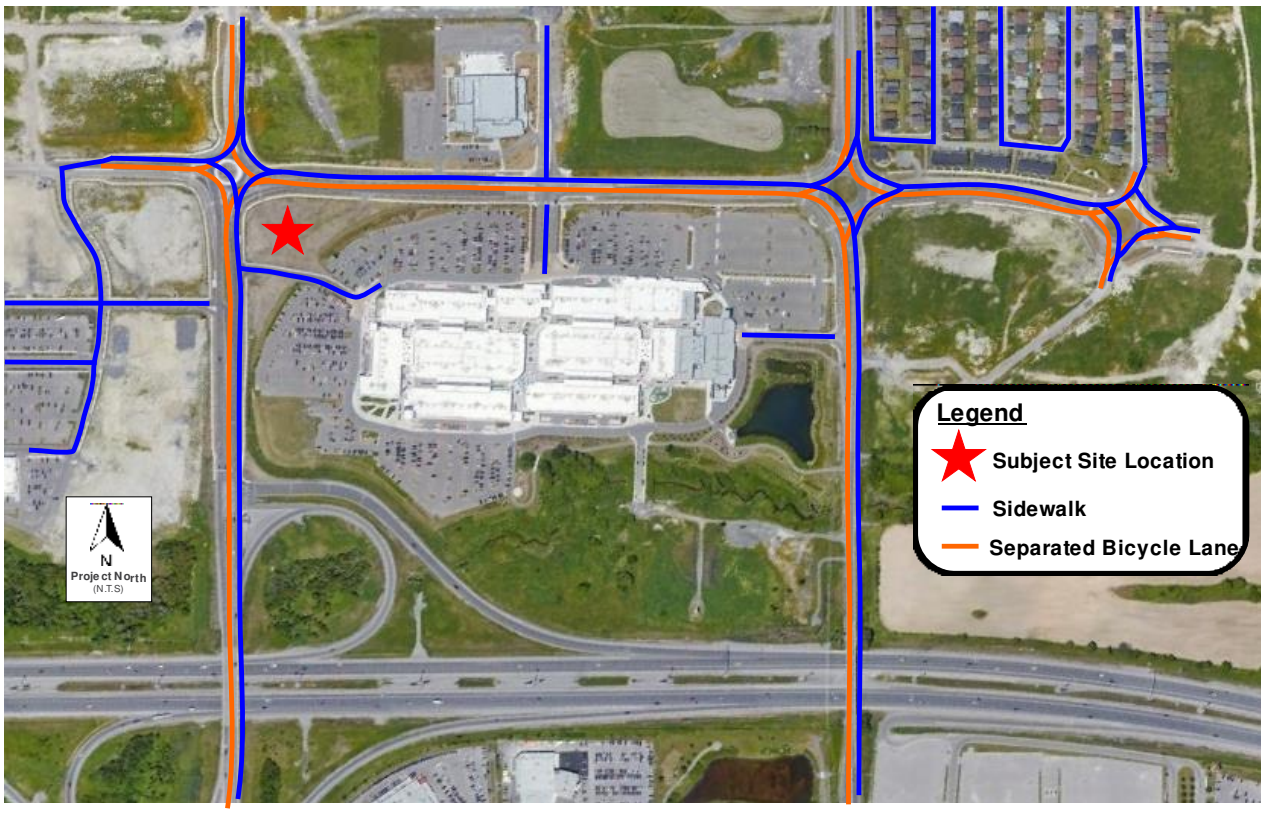
Sidewalks

The area surrounding the proposed development is serviced with dedicated walkways. Currently, sidewalks are available on Campeau Drive, Palladium Drive and Huntmar Drive, as well as throughout the residential and commercial areas surrounding the subject site.

Cycling

The area surrounding the proposed development is serviced with dedicated bike lanes. Currently, separated bicycle lanes are available on Campeau Drive, Palladium Drive and Huntmar Drive. **Figure 2-1** depicts the locations of the sidewalks and bike lanes in the vicinity of the subject site.

Figure 2-1 – Sidewalk and Bike Lane Availability



2.3. Existing Traffic Volumes

Based on the Terms of Reference established with City of Ottawa staff, provided in **Appendix B**, existing traffic volumes at the study area intersection of Campeau Drive and Palladium Drive were obtained from the City of Ottawa dated Monday, November 18, 2019 from 7:00 AM to 6:00 PM. Peak periods to be analyzed are the morning (7:00 – 10:00 AM) and the afternoon (4:00 – 7:00 PM) peak periods. In accordance to the City of Ottawa *Transportation Impact Assessment Guidelines (2017),* dated June 2017, Peak Hour factor for existing conditions have been set to 0.90, and Heavy vehicle have been set to 1.7. Detailed existing traffic data is provided in **Appendix C**.

2.4. Existing Traffic Assessment

The existing volumes are illustrated in **Figure 2-2** and were analyzed using Synchro 10 software. The methodology of the software follows the procedures described and outlined in the highway Capacity manual, HCM 2000 and HCM 2010 Roundabout, published by the Transportation Research Board. The detailed results are provided in **Appendix D** and summarized in **Table 2.1**.

Figure 2-2 – Existing Traffic Volumes

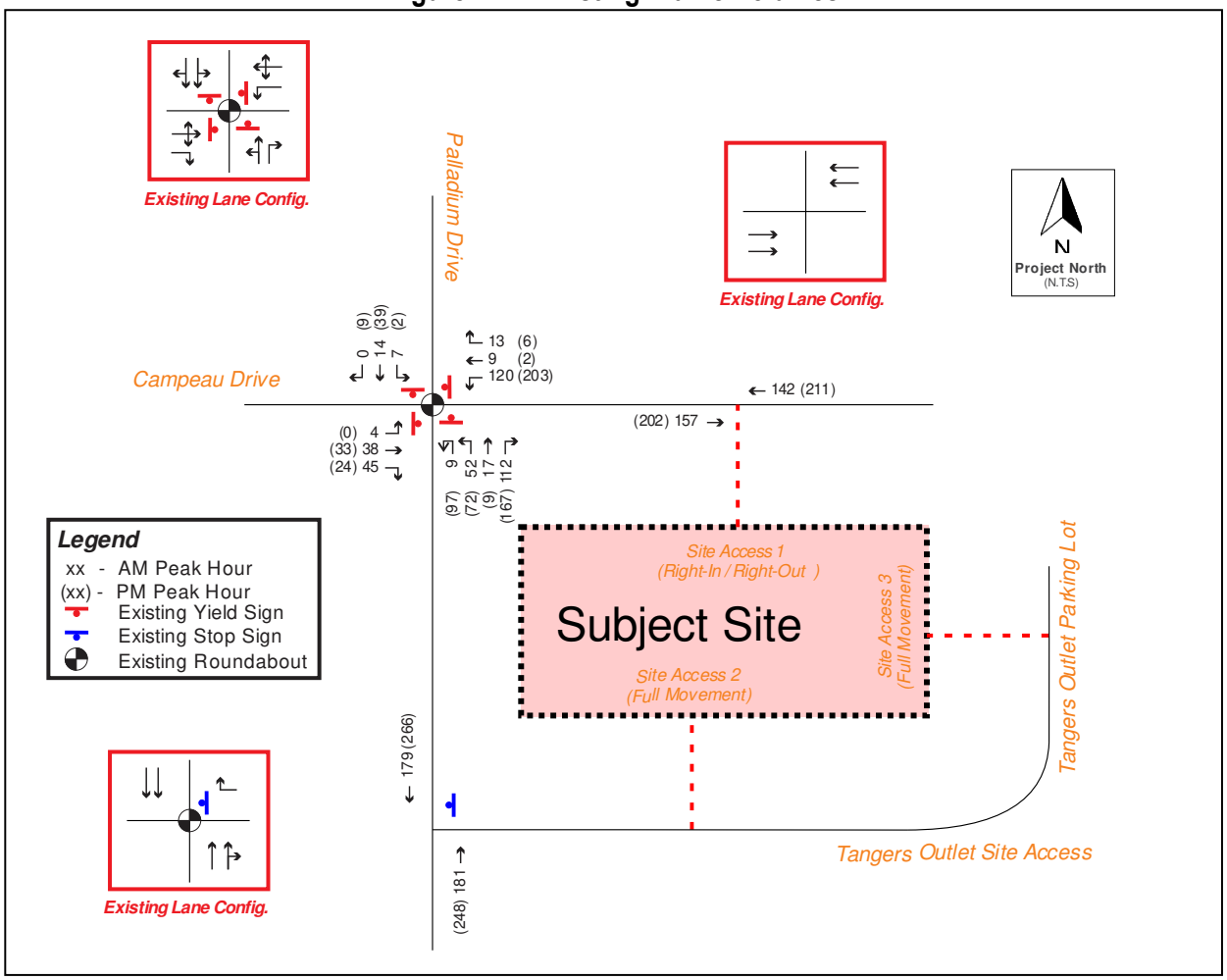


Table 2.1 – Level of Service – Existing Traffic Assessments

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95th Queue (m)	LOS (v/c)	Delay (s)	Queue (m)
Palladium Drive and Campeau Drive (unsignalized)	EBLT	A (0.134)	5.4	0	A (0.325)	9.7	1
	EBR	A (0.051)	4.6	0	A (0.036)	5.7	0
	SBLT	A (0.050)	4.8	0	A (0.215)	8.0	1
	SBR	A (0.027)	4.5	0	A (0.025)	5.6	0

Based on **Table 2.1**, the study area intersection is currently operating at excellent levels of service during peak hour time periods with no critical movements identified.

3.0 FUTURE BACKGROUND CONDITIONS

3.1. Background Traffic Growth

For assessment purposes, a 5-year planning horizon was selected, representing a horizon year of 2025. A conservative 2% growth rate has been applied to the through volumes along Palladium Drive and Campeau Drive intersection. In accordance to the City of Ottawa *Transportation Impact Assessment Guidelines (2017),* dated June 2017, Peak Hour factor for future conditions has been set to 1.00.

Background developments were obtained from the City of Ottawa Development Application website: https://app01.ottawa.ca/postingplans/home.jsf?lang=en. Background development locations are provided in **Figure 3-1**, and are as follows:

- 8825 Campeau Drive – UPS Distribution Centre located south of Campeau Drive, approximately 500-m west of the Campeau Drive and Palladium Drive intersection. Site currently exists, and has been captured in the existing TMC.
- 8700 Campeau Drive / 3199 Palladium Drive – Office Development located at the northwest corner of Palladium Drive and Campeau Drive. Proposed development consists of a five (5)-storey office building with a GFA of 150,000 ft^2. Site generated traffic is provided in **Figure 3-2**.
- 8600 Campeau Drive – Hotel Development located at the northeast corner of Campeau Drive and Palladium Drive. Site currently exists, and has been captured in the existing TMC.
- 3280 Palladium Drive – Medical office building located at the northeast corner of Palladium Drive and Upper Canada Street. Site currently exists, and has been captured in the existing TMC.
- 3001 Palladium Drive / 3075 Palladium Drive / 3015 Palladium Drive / 3005 Palladium Drive – In accordance to the Transportation Impact Study Addendum #13 prepared by Parsons, dated May 18, 2017, the background development is anticipated to generate 577 two-way trips (343 inbound and 235 outbound) during the AM peak hours and 1,199 two-way trips (536 inbound and 663 outbound) during the PM peak hours. However, Cabela's Sporting Goods store currently exists, and has been captured in the existing TMC, and the UPS Distribution Centre has been accounted for in background development 8825 Campeau Drive above. As such, **Table 3.1** depicts the trips generated by the background development excluding the Sporting Goods store and UPS Distribution Centre, as detailed in the Transportation Impact Study Addendum #13 prepared by Parsons, dated May 18, 2017.

Table 3.1 – 3001 Palladium Drive / 3075 Palladium Drive / 3015 Palladium Drive / 3005 Palladium Drive Site Traffic Trip Generation

Land Use	Area	AM Peak (veh/h)			PM Peak (veh/h)		
Large Format Retail	**120,000 ft²**	88	72	159	212	230	442
Shopping Centre	**68,262 ft²**	65	41	106	188	205	393
Fast Food Restaurant	**5,220 ft²**	103	99	202	75	70	145
Auto Parts / Furniture Stores	**83,115 ft²**	41	39	80	108	115	223
Industrial Park	**165,000 ft²**	97	22	119	28	107	135
Large Format Retail Pass-by (30%)		-24	-24	-48	-66	-66	-132
Shopping Centre Pass-by (30%)		-16	-16	-32	-59	-59	-118
Fast Food Restaurant Pass-by (50%)		-51	-51	-102	-36	-36	-72
Auto Parts / Furniture Stores Pass-by (5%)		-2	-2	-4	-6	-6	-12
Multi-Purpose Trips (5%)		-18	-13	-31	-28	-34	-62
New Trips		**283**	**167**	**449**	**416**	**526**	**942**

As detailed in **Table 3.1**, the background developments are anticipated to generate 449 two-way trips (283 inbound and 167 outbound) during the AM peak hours and 942 two-way trips (416 inbound and 526 outbound) during the PM peak hours. **Figure 3.3** depicts the background development trip distribution, in accordance to the information detailed in **Table 4.3** below.

Since the Terms of Reference established with the City indicate we only need to analyze the Palladium Drive and Campeau Drive intersection, background development traffic at only this intersection has been analyzed, with through volumes projected to the site access locations. The future (2025) background traffic volumes are provided in **Figure 3-4**. The detailed calculations are provided in **Appendix E** and **Table 3.2** summarizes the level of service at the study area intersection under future background traffic conditions.

Figure 3-1 – Background Development Locations

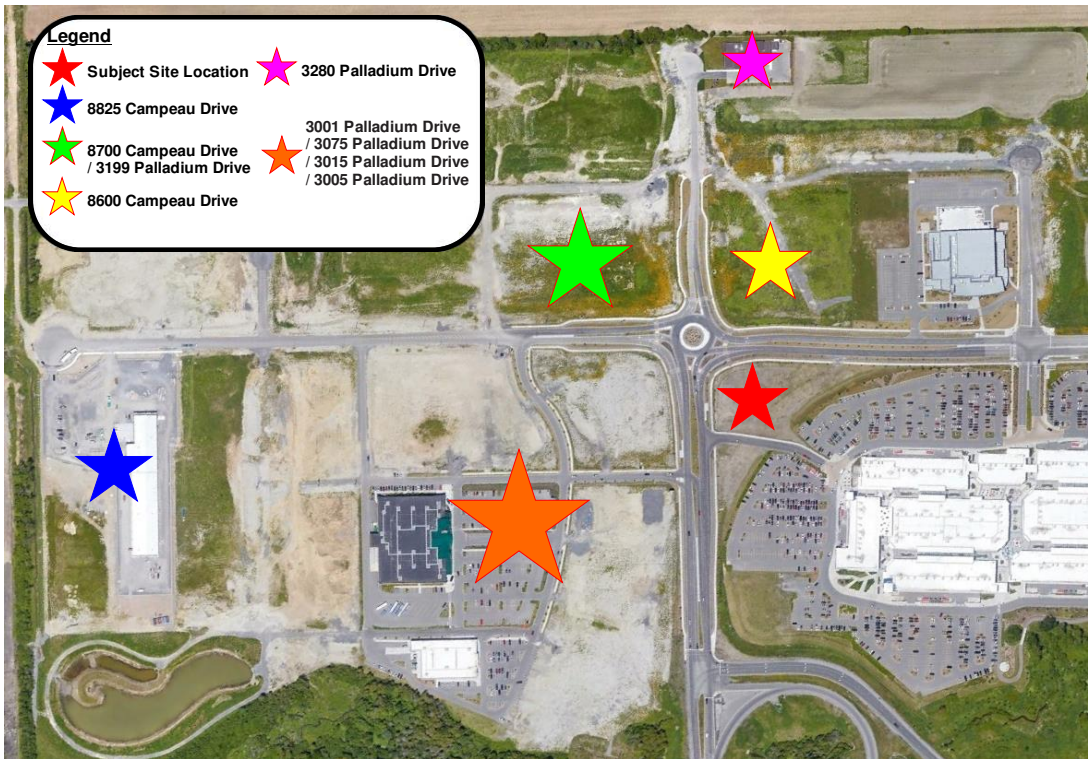


Figure 3-2 – Future Background Development Trip Distribution (8700 Campeau Drive / 3199 Palladium Drive)

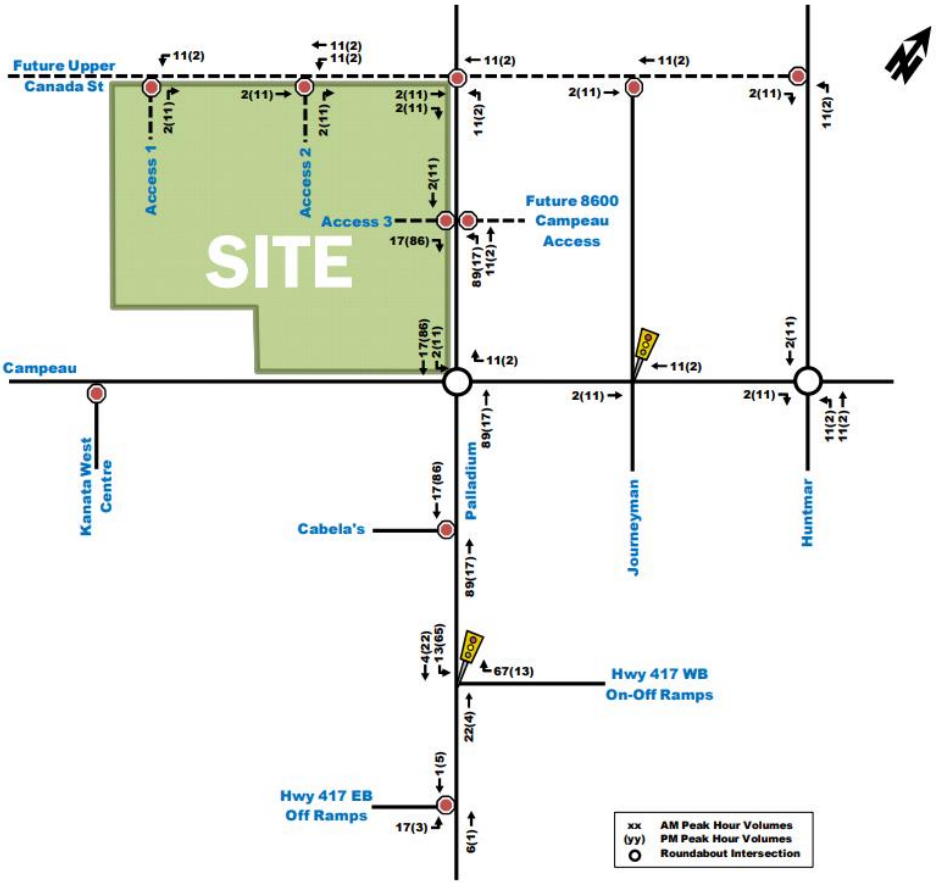


Figure 3-3 – Future Background Development Trip Distribution (3001 Palladium Drive / 3075 Palladium Drive / 3015 Palladium Drive / 3005 Palladium Drive)

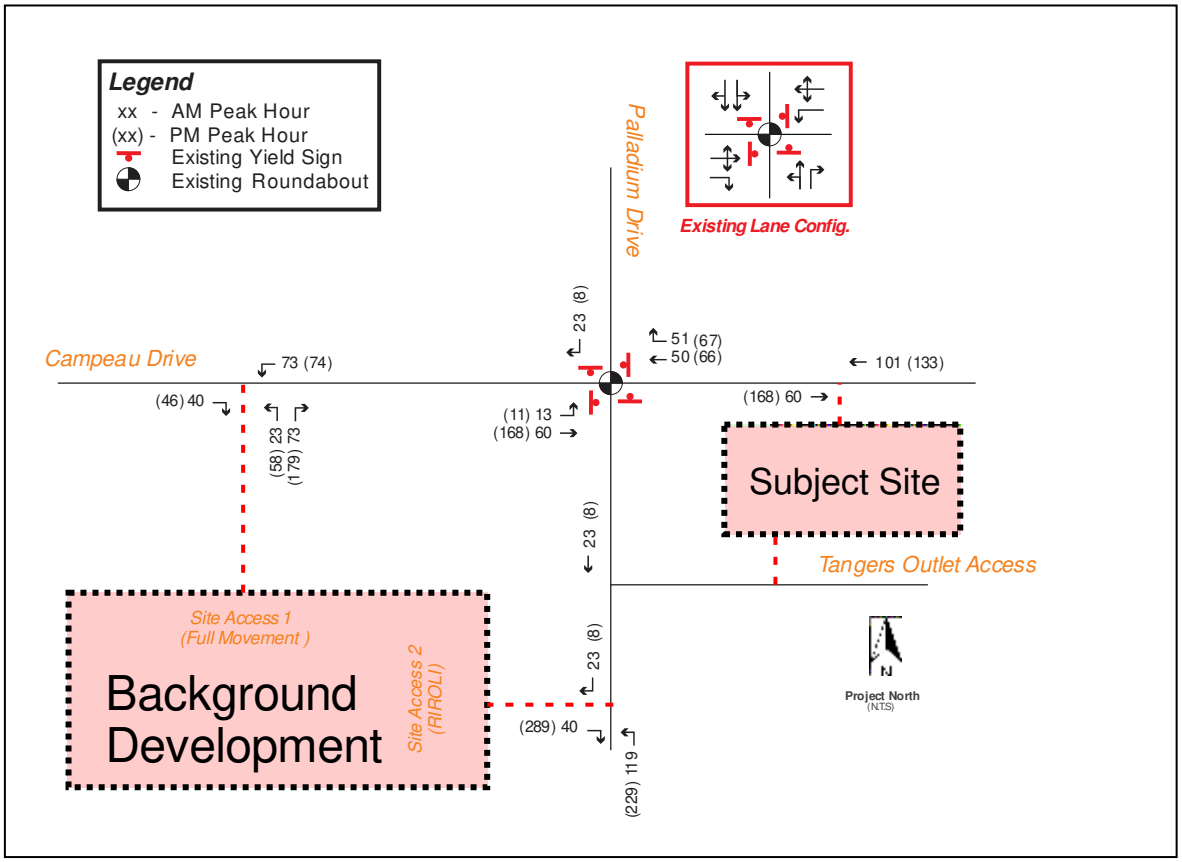


Figure 3-4 – Future (2025) Background Traffic Volumes

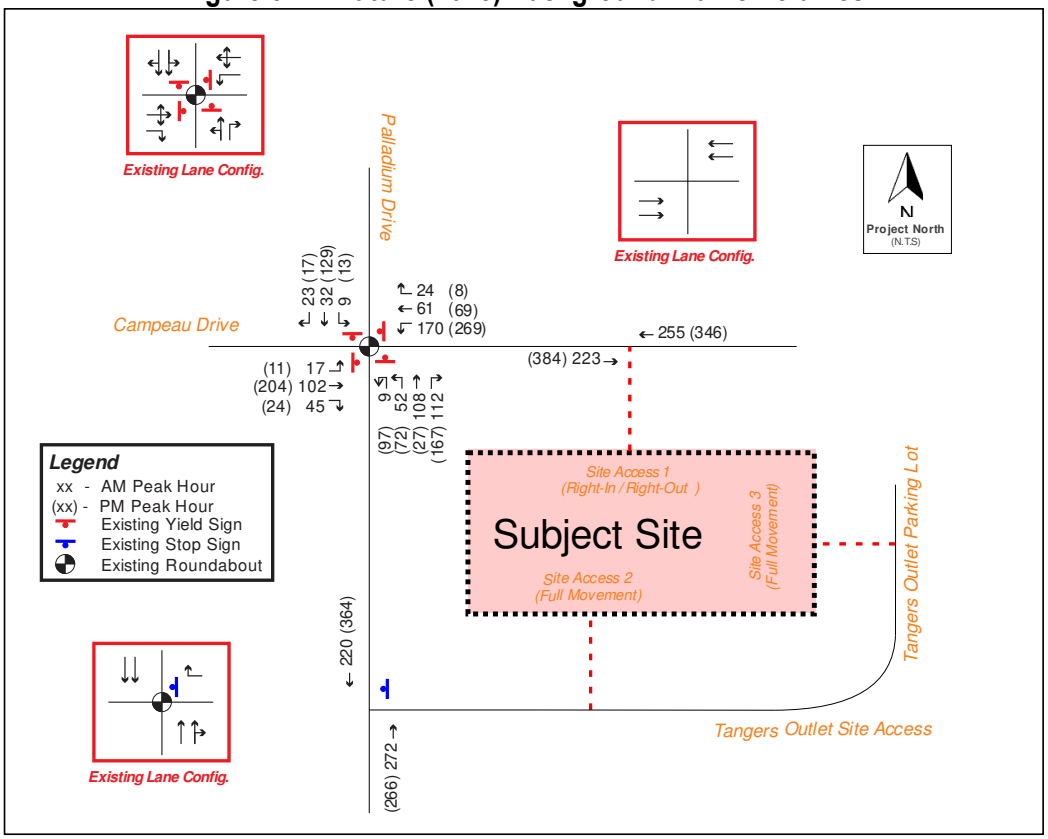


Table 3.2 – Level of Service – Future (2025) Background Traffic Assessments

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95th Queue (m)	LOS (v/c)	Delay (s)	95th Queue (m)
Palladium Drive and Campeau Drive (unsignalized)	EBLT	A (0.134)	5.4	0	A (0.325)	9.7	1
	EBR	A (0.051)	4.6	0	A (0.036)	5.7	0
	SBLT	A (0.050)	4.8	0	A (0.215)	8.0	1
	SBR	A (0.027)	4.5	0	A (0.025)	5.6	0

As summarized in **Table 3.2**, under future background conditions, the study area intersection will continue to operate at excellent levels of service during both peak hour periods with no critical movements identified.

4.0 SITE TRAFFIC

The subject property is currently vacant. Based on the preliminary site plan prepared by Petro Canada, dated May 9, 2018, the development proposal is to develop the vacant lands to include a gas station comprising of five (5) gasoline pumps with 10 fueling stations, a convenience store and eating establishment with a drive through, and an oil change building. Based on discussions with the Client, the drive through restaurant will have a total GFA of 115m^2 while the remainder of the GFA will be for the convenience store. For the purpose of this study, the proposed scenarios were analyzed using Synchro 10 software.

Trip rates and site generated trips were derived from the information contained in the *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE) for "Gasoline/Service Station with Convenience Market" (LUC 945), "Quick Lubrication Vehicle Shop" (LUC 941) and "Fast-Food Restaurant with Drive-Through Window" (LUC934).

Based on the information contained in the Trip Generation Handbook, 3rd Edition published by the Institute of Transportation Engineers (ITE), the average pass-by rates for LUC 945 is 62% and 56% for the weekday AM and PM peak periods, respectively. The trip generation summary is shown in **Table 4.1** and **Figure 4-1**.

Table 4.1 – Site Traffic Trip Generation (Based on ITE)

ITE Land Use	Parameter	Morning Peak Hour			Afternoon Peak Hour		
		In	Out	Total	In	Out	Total
Gasoline/Service Station with Convenience Market (10 fueling positions) (LUC 945)	Gross New Trips	64	61	125	71	69	140
	Trip Rate	6.40	6.10	12.50	7.10	6.90	14.00
	Pass-by (62/56%)	39	39	78	40	40	80
	New Trips	**25**	**22**	**47**	**31**	**29**	**60**
	New Rate	**2.50**	**2.20**	**4.70**	**3.10**	**2.90**	**6.00**
Quick Lubrication Vehicle Shop (769.6 ft^2) (LUC 945)	Gross New Trips	10	3	13	8	11	19
	Trip Rate	4.64	1.39	6.03	3.71	5.10	8.81
	New Trips	**10**	**3**	**13**	**8**	**11**	**19**
	New Rate	**4.64**	**1.39**	**6.03**	**3.71**	**5.10**	**8.81**
Fast-Food Restaurant with Drive-Through Window (1,237.85 ft^2) (LUC 945)	Gross New Trips	26	24	50	21	19	40
	Trip Rate	21.00	19.39	40.39	16.96	15.35	32.31
	New Trips	**26**	**24**	**50**	**21**	**19**	**40**
	New Rate	**21.00**	**19.39**	**40.39**	**16396**	**15.35**	**32.31**
Net Total Trips		**61**	**49**	**110**	**60**	**59**	**119**

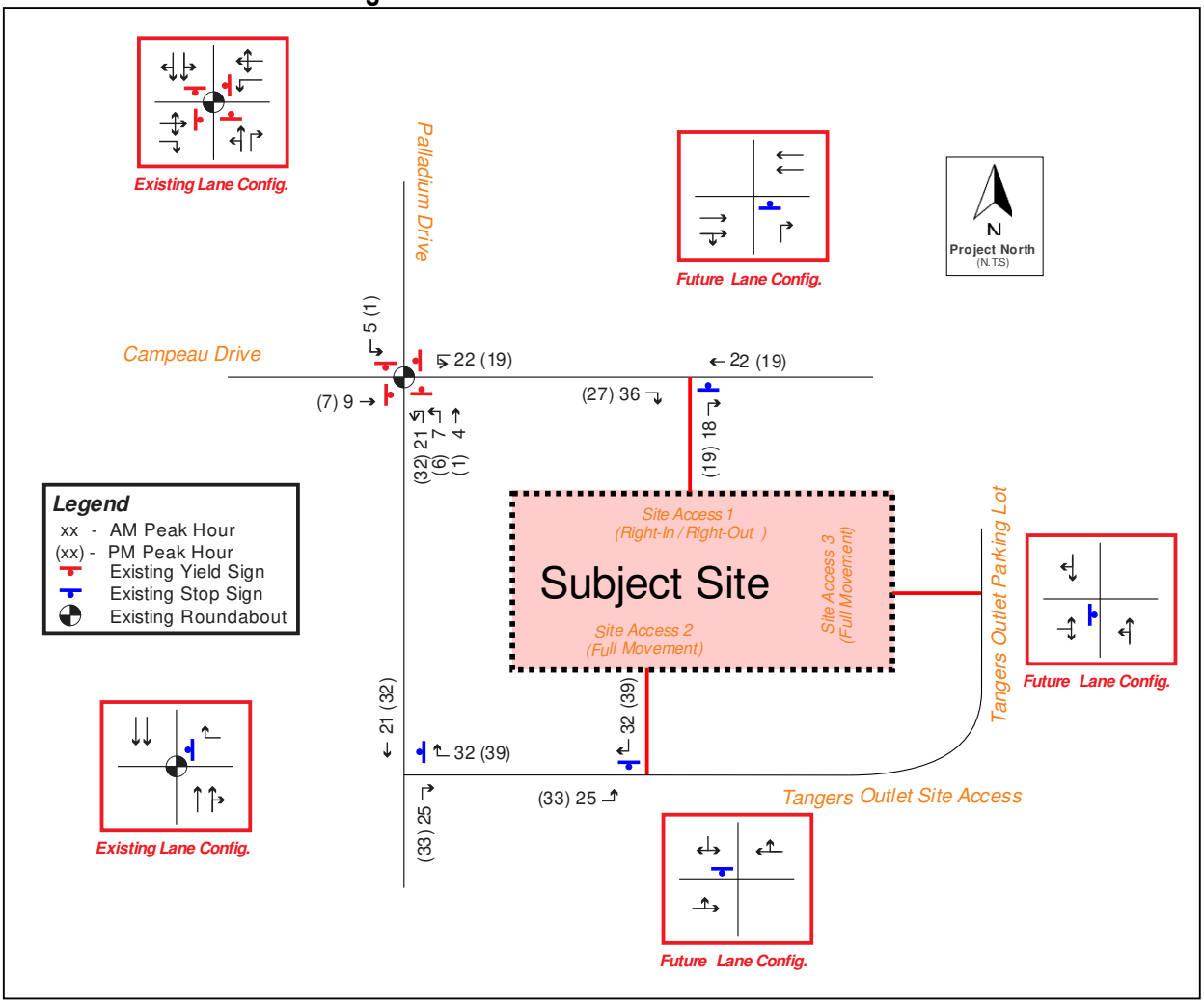
As shown in **Table 4.1**, the proposed development is anticipated to generate 110 two-way trips (61 inbound and 49 outbound) during the AM peak hours and 119 two-way trips (60 inbound and 59 outbound) during the PM peak hours.

The assumptions for the trip distribution rates are based on the existing traffic patterns at the Campeau Drive and Palladium Drive intersection, and routes that drivers would likely take to access the subject site and engineering judgement based on ease of site access. As a result, site trip distribution is summarized for the inbound and outbound site traffic movements during the morning and afternoon peak hours in **Table 4.2**.

Table 4.2 – Site Traffic Trip Distribution

Direction	Via	AM Peak Hour		PM Peak Hour	
		Inbound	Outbound	Inbound	Outbound
North	Palladium Drive	8%	8%	2%	2%
South	Palladium Drive	42%	42%	55%	55%
East	Campeau Drive	36%	36%	32%	32%
West	Campeau Drive	14%	14%	11%	11%
Total		**100%**	**100%**	**100%**	**100%**

Figure 4-1 - Site Generated Traffic Volumes



5.0 FUTURE TOTAL TRAFFIC CONDITIONS

The future (2025) total traffic volumes under proposed conditions (future background traffic volumes plus site generated traffic volumes) are illustrated in **Figure 5-1**, and were analyzed using Synchro 10 software. The detailed calculations are provided in **Appendix F** and summarized in **Table 5.1**. As previously mentioned, in accordance to the City of Ottawa *Transportation Impact Assessment Guidelines (2017),* dated June 2017, Peak Hour factor for future conditions has been set to 1.00.

Figure 5-1 – Future (2025) Traffic Volumes

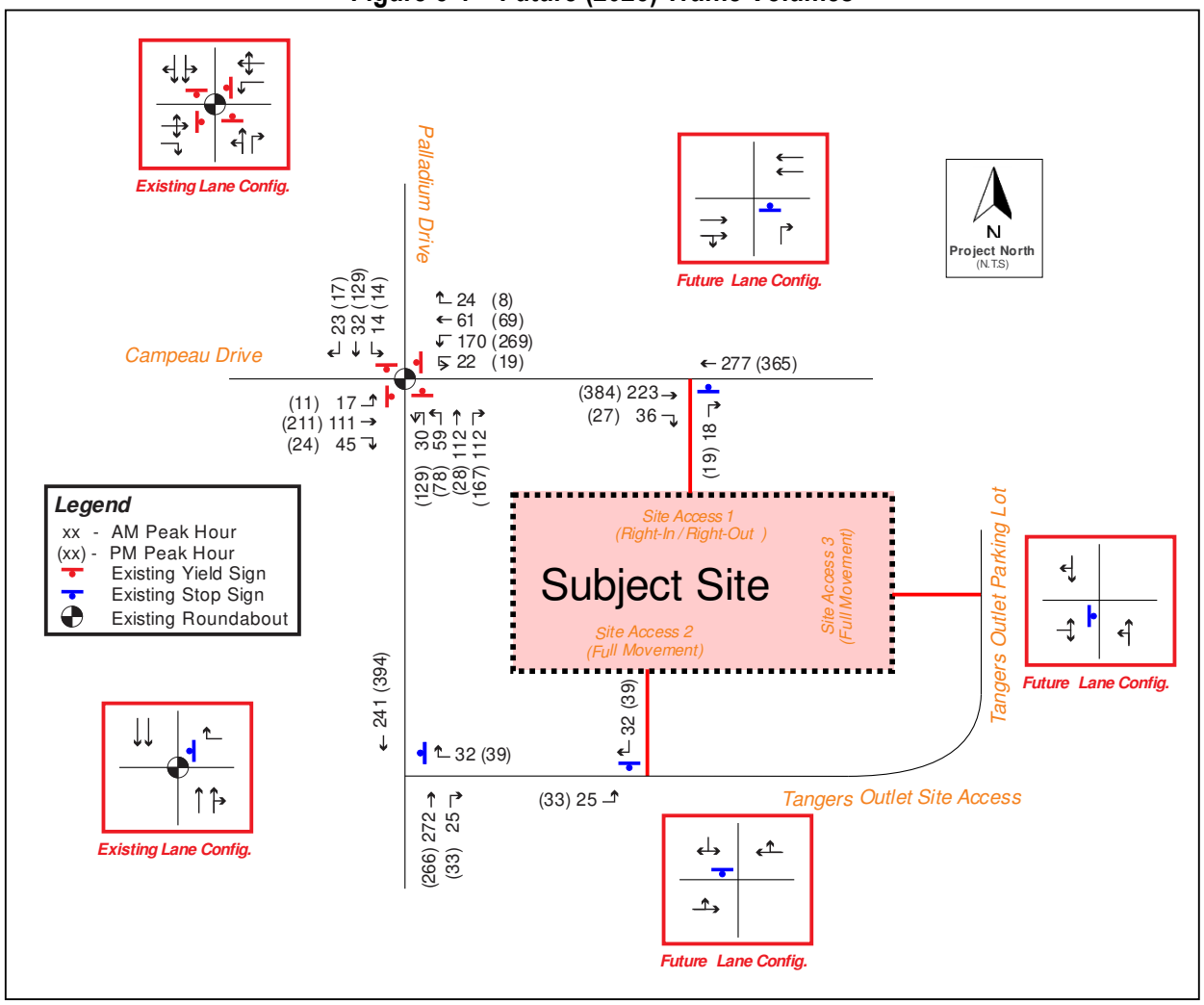


Table 5.1 – Level of Service – Future (2025) Total Traffic Assessments

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95th Queue (m)	LOS (v/c)	Delay (s)	Queue (m)
Campeau Drive and Site Access 1 (unsignalized)	NBR	A (0.02)	9.1	0.5	A (0.02)	9.6	0.6
Palladium Drive and Tangers Outlet Access (unsignalized)	WBR	A (0.04)	9.3	0.9	A (0.04)	9.3	1.1

Table 5.1 – Level of Service – Future (2025) Total Traffic Assessments Cont'd

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS (v/c)	Delay (s)	95th Queue (m)	LOS (v/c)	Delay (s)	Queue (m)
Tangers Outlet Access and Site Access 2 (unsignalized)	EBLT SBLR	A (0.02) A (0.03)	7.3 8.4	0.4 0.7	A (0.02) A (0.04)	7.3 8.4	0.5 0.8
Palladium Drive and Campeau Drive (unsignalized)	EBLT EBR SBLT SBR	A (0.151) A (0.054) A (0.059) A (0.029)	5.8 4.8 5.2 4.8	1 0 0 0	A (0.354) A (0.038) A (0.230) A (0.027)	10.6 6.0 8.6 6.0	2 0 1 0

As summarized in **Table 5.1**, under future total conditions, the study area intersection will continue to operate at excellent levels of service during both peak hour periods with no critical movements identified.

6.0 PARKING ASSESSMENT

Based on the information contained in the City of Ottawa Zoning By-law No. 2008-250, the subject site is located in "Area C" on Schedule 1A. The technical parking requirement for the proposed development is detailed in **Table 6.1**.

Table 6.1 – Vehicle Parking Requirements (ZBL 2008-250)

Use	GFA	Rate	Parking Requirement	Parking Provided	Difference
Gas Bar	-	None	0	20	+1
Automobile Service Station	71.5 m^2	1 per 100 m^2	1		
Convenience Store	169.76 m^2	3.4 per 100 m^2	6		
Restaurant – Fast Food	115 m^2	10 per 100 m^2	12		
Total			**19**	**20**	**+1**

Based on City of Ottawa Zoning By-law 2008-250, a total of 19 parking spaces will be required for the proposed development with 169.76 m^2 of convenience store, 115 m^2 drive through restaurant and 71.5 m^2 automobile service station GFA. The preliminary site plan provides for a total of 20 parking spaces, which results in a technical surplus of one (1) parking spaces.

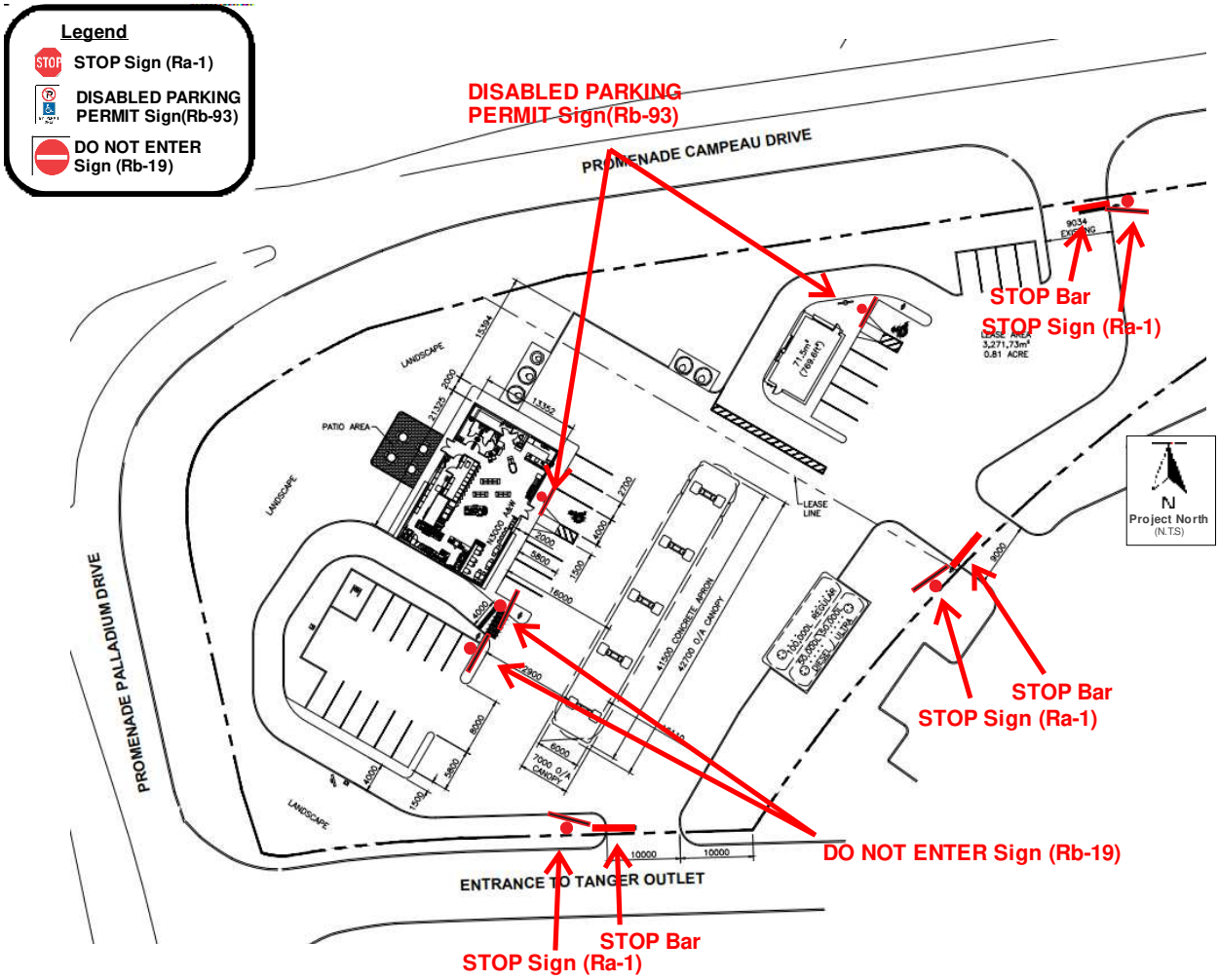
7.0 LOADING AND ON-SITE CIRCULATION

As previously mentioned, access to the site is proposed through one (1) right-in / right-out entrances located via Campeau Drive, one (1) full movement entrance via Tangers Outlet Westerly Site Access and one (1) full movement entrance via Tangers Outlet parking lot. In accordance with Ontario Traffic Manual (OTM) Book 5, we recommend appropriate signage consisting of a STOP Signs (Ra-1) be provided on the Campeau

Drive, Tangers Outlet Westerly Site Access and Tangers Outlet parking lot egress driveways, a DISABLES PARKING PERMIT Sign (Rb-93) and DO NOT ENTER Sign (Rb-19) at the accessible parking spaces and end of drive-through aisle respectively, see **Figure 7-1.**

AutoTURN analysis was undertaken for an 18-m long WB-19 truck and 5.6-m long passenger vehicle to the proposed refueling station and parking spaces. Maneuverability is provided in **Figures 7.2** and **7-3**.

Figure 7-1 – Signage Plan



8.0 TRANSPORTATION DEMAND MANAGEMENT

Transportation demand management (TDM) refers to variety of strategies to reduce congestion, minimize the number of single-occupant vehicles, encourage non-auto modes of travel, and reduce vehicle dependency to create a sustainable transportation system.

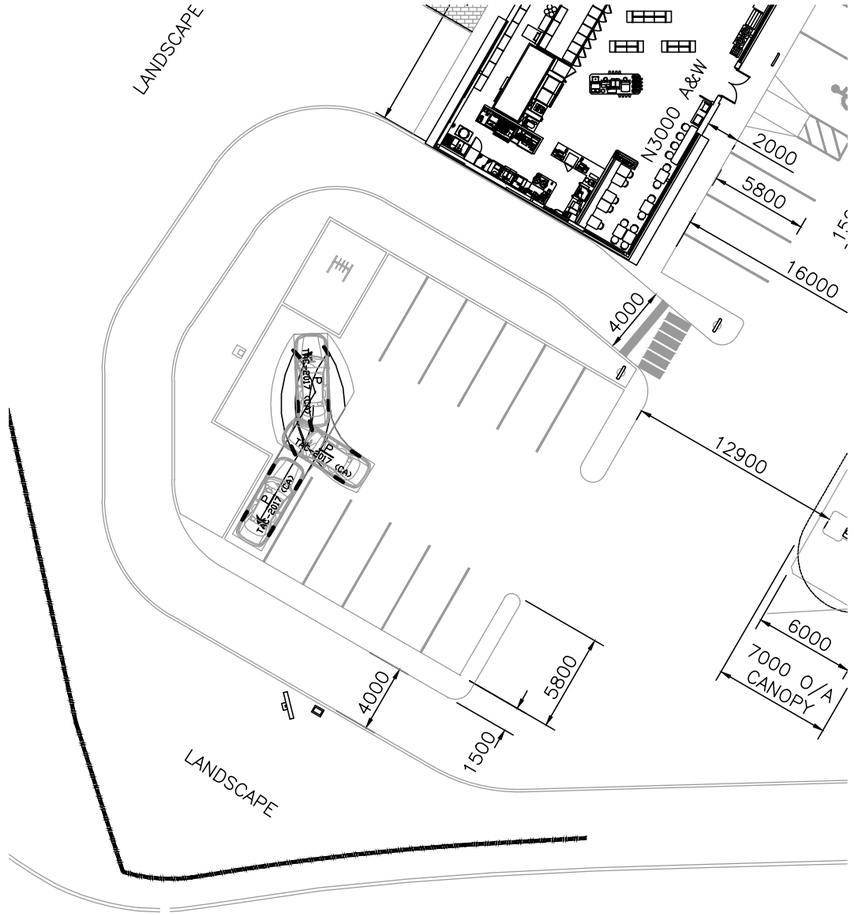
Based on our experience, excessive parking supply imposes environmental costs, contradicts community development objectives for more livable and walkable communities, and tends to increase driving and discourage the use of alternative mode of travel. It is anticipated that the combination of reduced parking supply and an efficient public transit system will encourage the use of alternative modes of travel.

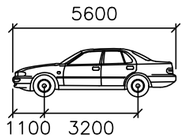
Pedestrian sidewalks are provided on both sides of the roadways, and sidewalk connectivity is provided throughout the proposed municipal road to ensure a complete sidewalk network.

9.0 CONCLUSION

The findings and conclusions of our analysis are as follows:

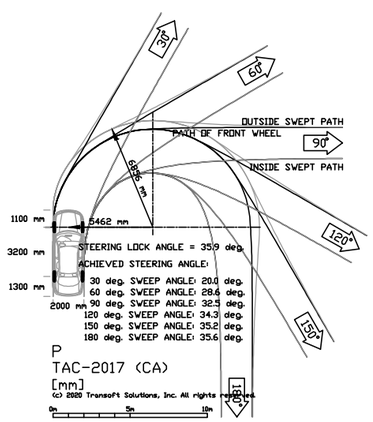
- The subject property is currently vacant. Based on the preliminary site plan prepared by Petro Canada, dated May 9, 2018, the development proposal is to develop the vacant lands to include a gas station comprising of five (5) gasoline pumps with 10 fueling stations, a convenience store and eating establishment with a drive through, and an oil change building. Access to the site is proposed through one (1) right-in / right-out entrances located via Campeau Drive, one (1) full movement entrance via Tangers Outlet Westerly Site Access and one (1) full movement entrance via Tangers Outlet parking lot. The preliminary site plan provides for a total of 20 parking spaces.
- The proposed development is anticipated to generate 110 two-way trips (61 inbound and 49 outbound) during the AM peak hours and 119 two-way trips (60 inbound and 59 outbound) during the PM peak hours.
- The intersection capacity analysis results (based on the methodology and procedures outlined in the Highway Capacity Manual, HCM 2000 and HCM 2010 Roundabout, published by the Transportation Research Board) indicate that the study intersection and access are expected to continue to operate with acceptable levels of service.
- In accordance with Ontario Traffic Manual (OTM) Book 5, we recommend appropriate signage consisting of a STOP Signs (Ra-1) be provided on the Campeau Drive, Tangers Outlet Westerly Site Access and Tangers Outlet parking lot egress driveways, a DISABLES PARKING PERMIT Sign (Rb-93) and DO NOT ENTER Sign (Rb-19) at the accessible parking spaces and end of drive-through aisle respectively.
- Based on City of Ottawa Zoning By-law 2008-250, a total of 19 parking spaces will be required for the proposed development with 169.76 m^2 of convenience store, 115 m^2 drive through restaurant and 71.5 m^2 automobile service station GFA. The preliminary site plan provides for a total of 20 parking spaces, which results in a technical surplus of one (1) parking spaces.
- The site is functional from a maneuverability perspective.

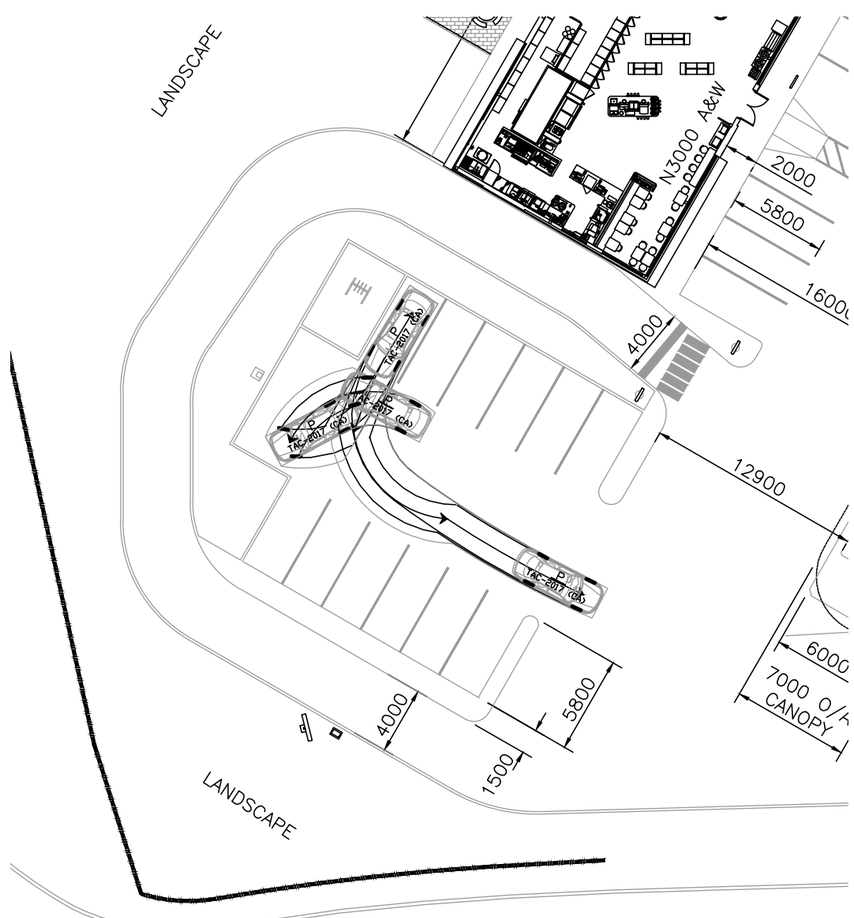




P

	mm
Width	: 2000
Track	: 2000
Lock to Lock Time	: 6.0
Steering Angle	: 35.9





KEY PLAN

BENCHMARK

REVISIONS

NO	REVISION	DATE	BY

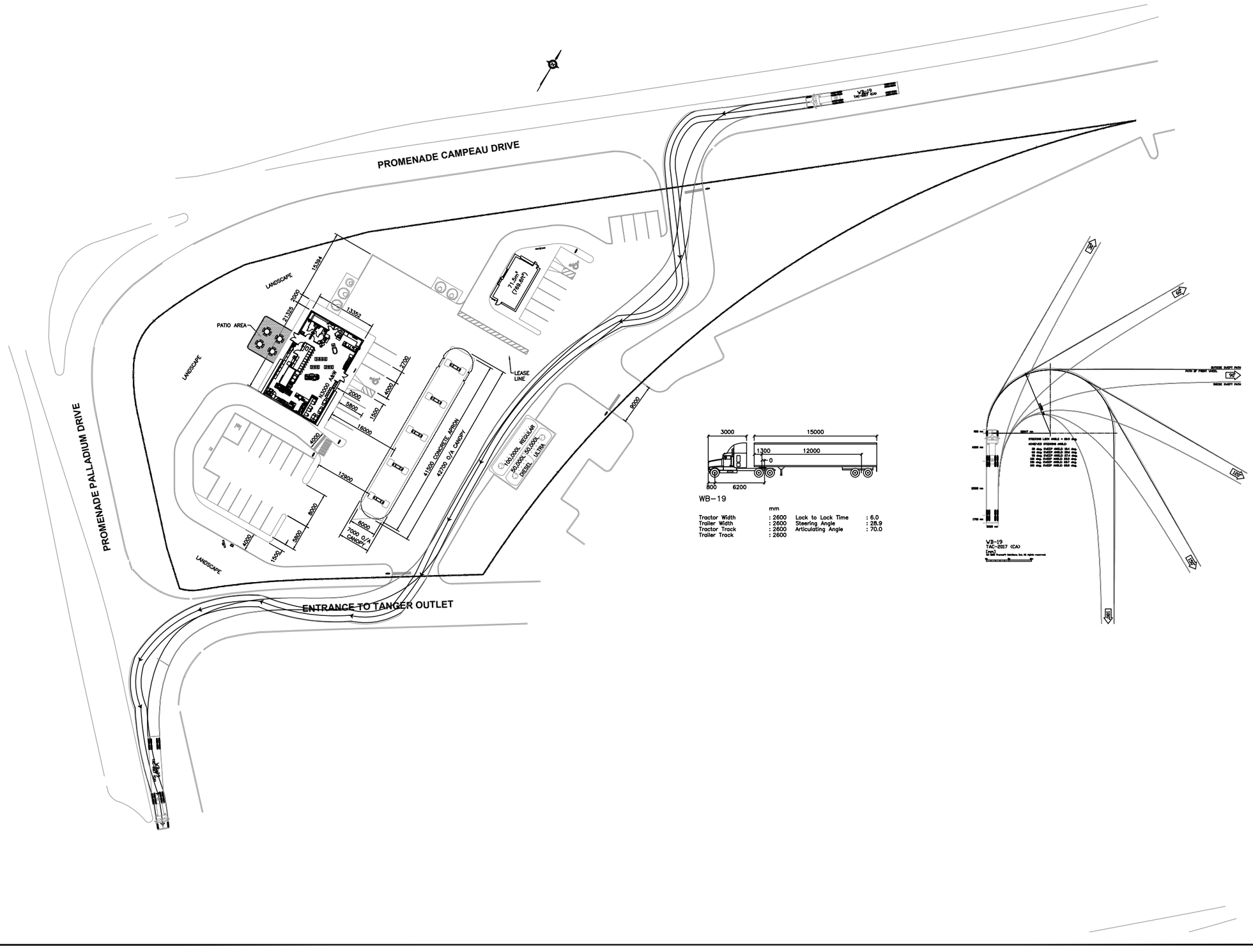
STAMP

nextrans
CONSULTING ENGINEERS
520 Industrial Parkway South, Suite 201
Aurora, Ontario L4G 6W8
Tel: 905-503-2563
www.nextrans.ca

PROJECT NAME:
GAS STATION DEVELOPMENT
8605 CAMPEAU DRIVE
(CITY OF OTTAWA)

DRAWING TITLE:
AutoTURN Analysis
(P TAC-2017)

DESIGN BY: A.S.	DATE: December 15, 2020
CHECKED BY: R.P.	PROJECT NO. NT-20-091
DRAWN BY: A.S.	
SCALE: NTS	DRAWING NO. Figure 7-2



KEY PLAN

BENCHMARK

REVISONS

NO	REVISION	DATE	BY

STAMP

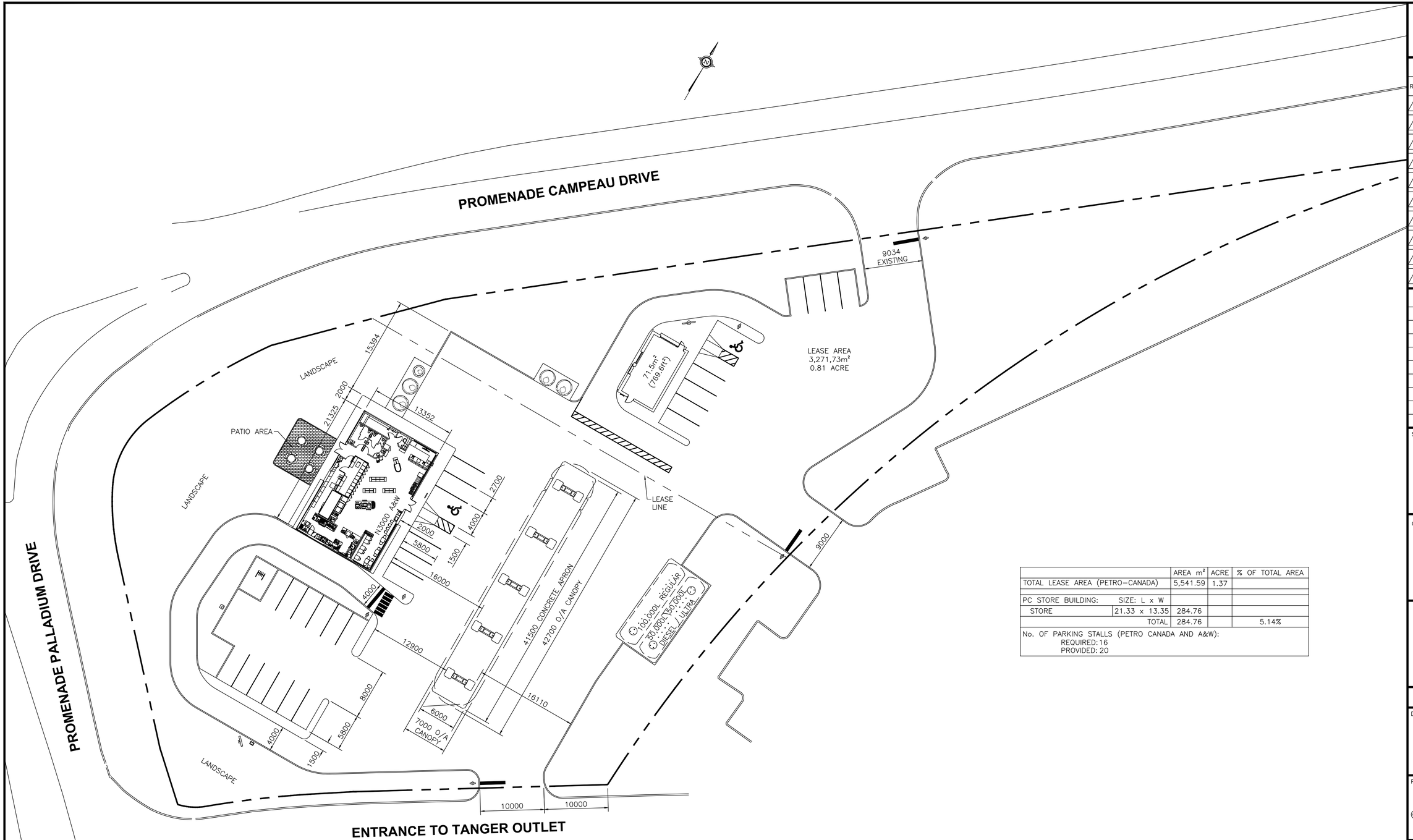
nexTrans
CONSULTING ENGINEERS
520 Industrial Parkway South, Suite 201
Aurora, Ontario L4G 6W8
Tel: 905-503-2563
www.nextrans.ca

PROJECT NAME:
GAS STATION DEVELOPMENT
8605 CAMPEAU DRIVE
(CITY OF OTTAWA)

DRAWING TITLE:
AutoTURN Analysis
(WB-19 TAC-2017)

DESIGN BY: A.S.	DATE: December 15, 2020
CHECKED BY: R.P.	PROJECT NO: NT-20-091
DRAWN BY: A.S.	
SCALE: NTS	DRAWING NO: Figure 7-3

Appendix A - Proposed Site Plan



		AREA m²	ACRE	% OF TOTAL AREA
TOTAL LEASE AREA (PETRO-CANADA)		5,541.59	1.37	
PC STORE BUILDING:	SIZE: L x W			
STORE	21.33 x 13.35	284.76		
	TOTAL	284.76		5.14%
No. OF PARKING STALLS (PETRO CANADA AND A&W): REQUIRED: 16 PROVIDED: 20				

Metric

- ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
- CONTRACTOR TO CHECK/VERIFY ALL DIMENSIONS PRIOR TO COMMENCEMENT OF WORK. ALL DESCREPANCIES TO BE REPORTED TO THE PROJECT DESIGNER.
- DO NOT SCALE DRAWINGS

Revisions

REV.	DESCRIPTION	DRAWN	APP'D.
		DATE	
-			

Issue Table

TO	FOR	DATE
--	--	--

SEAL

CONSULTANT

PETRO-CANADA
A Suncor Energy business

CENTRAL REGION

DRAWING TITLE:

SITE PLAN

PROJECT:

PROMENADE PALLADIUM DRIVE
@ PROMENADE CAMPEAU DRIVE
OTTAWA, ON

DRAWN BY: ALAIN P.	CAD INFO.:
	SHEET SIZE D (559 x 864)
DRAWING SCALE: 1:300	PETRO-CANADA CAD FILE No. 10565 SP1
DATE: MAY 09 2018	CONSULTANT CAD FILE No.
CHECKED BY:	PLOT SCALE
	PLOT DATE
APPROVED BY:	PLOT CONFIGURATION PARAMETERS
STD No./OUTLET No. 10565	SHEET No. SP1

Appendix B – Terms of Reference

Andy Bilawejian

From: Giampa, Mike <Mike.Giampa@ottawa.ca>
Sent: Tuesday, June 09, 2020 7:06 AM
To: Andy Bilawejian
Subject: RE: 8605 Campeau Drive Terms of Reference

Good morning Andy, your terms of reference are adequate. Please proceed to your scoping report.

From: Andy Bilawejian <andy@nextrans.ca>
Sent: June 04, 2020 11:07 AM
To: Giampa, Mike <Mike.Giampa@ottawa.ca>
Subject: 8605 Campeau Drive Terms of Reference

My name is Andy and I work at NexTrans Consulting Engineers. We are currently in the process of preparing scope of work for a new gas station development in the City of Ottawa. Based on the TIA Screening Form, a TIA is required. Please see attached Terms of Reference and advise if acceptable, or if you have any comments.

If you need further information, feel free to contact me.

Thanks,

Andy Bilawejian, B.Eng., EIT
Transportation Analyst

o: 905-503-2563 ext. 209
c: 416-358-2348
e: andy@nextrans.ca
w: www.nextrans.ca

NexTrans Consulting Engineers
A Division of NextEng Consulting Group Inc.
520 Industrial Parkway South, Suite 201
Aurora ON L4G 6W8

COVID UPDATE: Please be advised that we continue to service our clients to the fullest extent possible, albeit in a modified office environment, as such a reply may be slightly delayed.
Thank you and keep well!

'

'

520 Industrial Parkway South, Suite 201
Aurora ON L4G 6W8

Phone: 905-503-2563
www.nextrans.ca

nexTrans
CONSULTING ENGINEERS

NextEng Consulting Group Inc.

Terms of Reference

To: Giampa, Mike, Senior Transportation Engineer, City of Ottawa

From: Andy Bilawejian, Transportation Analyst, Nextrans Consulting Engineers

Date: June 4, 2020

Re: 8605 Campeau Drive, Gas Station Development – TOR for Traffic Impact Assessment

---

These terms of reference have been prepared to outline (for the City/s review and approval) the intended scope of work for a Traffic Impact Assessment for a proposed gas station Development consisting of 284.76 m^2 GFA of convenience store area and drive-thru fast food restaurant. The subject site is located at the southeast corner of Palladium Drive and Campeau Drive in the City of Ottawa.

Introduction

The report introduction will include:

1. Description of site location
2. Description of nature of application
3. Description of proposed development and land use
4. Proposed study area

Existing Traffic Assessment

The existing conditions within the study area will be summarized and documented. This will include, but not limited to:

- A description of key roads and intersections (lanes, speed limits)
- Identifying forms of traffic control, lane configurations, turning restrictions
- Identifying pedestrian and cycling facilities
- Noting the location of adjacent driveways and access points
- Identifying other traffic generators in the vicinity of the site

Turning movement counts will be collected during weekday AM (7am-10am), weekday PM (4pm-7pm) peak periods at the following study area intersections:

- Campeau Drive and Palladium Drive

Once existing traffic volumes have been collected, we will prepare a baseline model of existing traffic operations at the study area intersections using Synchro v.10 analysis for the identified critical time periods (weekday AM and PM peak hours). The existing analysis will include levels of service, volume to capacity ratios, and queuing at the key study intersections.`

Future Background Traffic Assessment

Future Background consists of background growth and other background development traffic. We will obtain historic AADT records and estimate a background growth rate for the assumed full build-out year for the proposed development along with a 5-year time horizon period thereafter.

We do understand that there is and may be further redevelopment applications, as such traffic generation associated with those developments will be included in our analysis to reflect our horizon year assessment.

Operational deficiencies as a result of future forecasted traffic volumes will be identified and mitigative measures will be proposed and documented in the final report.

Site Traffic Assessment

The weekday AM and PM peak hour traffic to be generated by the proposed development will be estimated based on information published in the *Trip Generation, 10th Edition,* by the Institute of Transportation Engineers (ITE).

The directional trip distribution and assignment for traffic approaching and departing the site will be determined based upon existing traffic patterns and Transportation Tomorrow Survey (TTS) 2016 data.

Future Total Traffic Assessment

Future total traffic consists of future background plus site traffic. Operational deficiencies as a result of site traffic will be identified and mitigative measures will be proposed and documented in the final report. We will develop and recommend appropriate intersection controls and geometric improvements for all key intersections as well as determine the appropriateness of the proposed site access location(s) and the lane requirements at these new locations.

Parking / On Site Circulation and Site Access Review

- Review the available parking to determine whether the proposed parking supply is sufficient to accommodate the parking demand of the proposed site and meets current by-law requirements.
- We will review and provide comment on the most recent site plan with respect to the functionality of the internal vehicular circulation to facilitate vehicle maneuvering, loading, servicing, parking and pick-up / drop-off activities.
- Using Auto TURN, we will confirm the turning radius requirements and site circulation for passenger and heavy vehicles.
- Determine the appropriateness of access location and ensure adequate connections to main corridors are provided.
- Assign appropriate internal signage to site plan.

Transit and Transportation Demand Management Plan

A review of the existing and future transit availability in the area and recommendations shall be made to ensure acceptable walking distances are proposed to the subject lands. Transit routes, service frequencies, and stations will be identified in the study area.

Appendix C – Existing Traffic Data

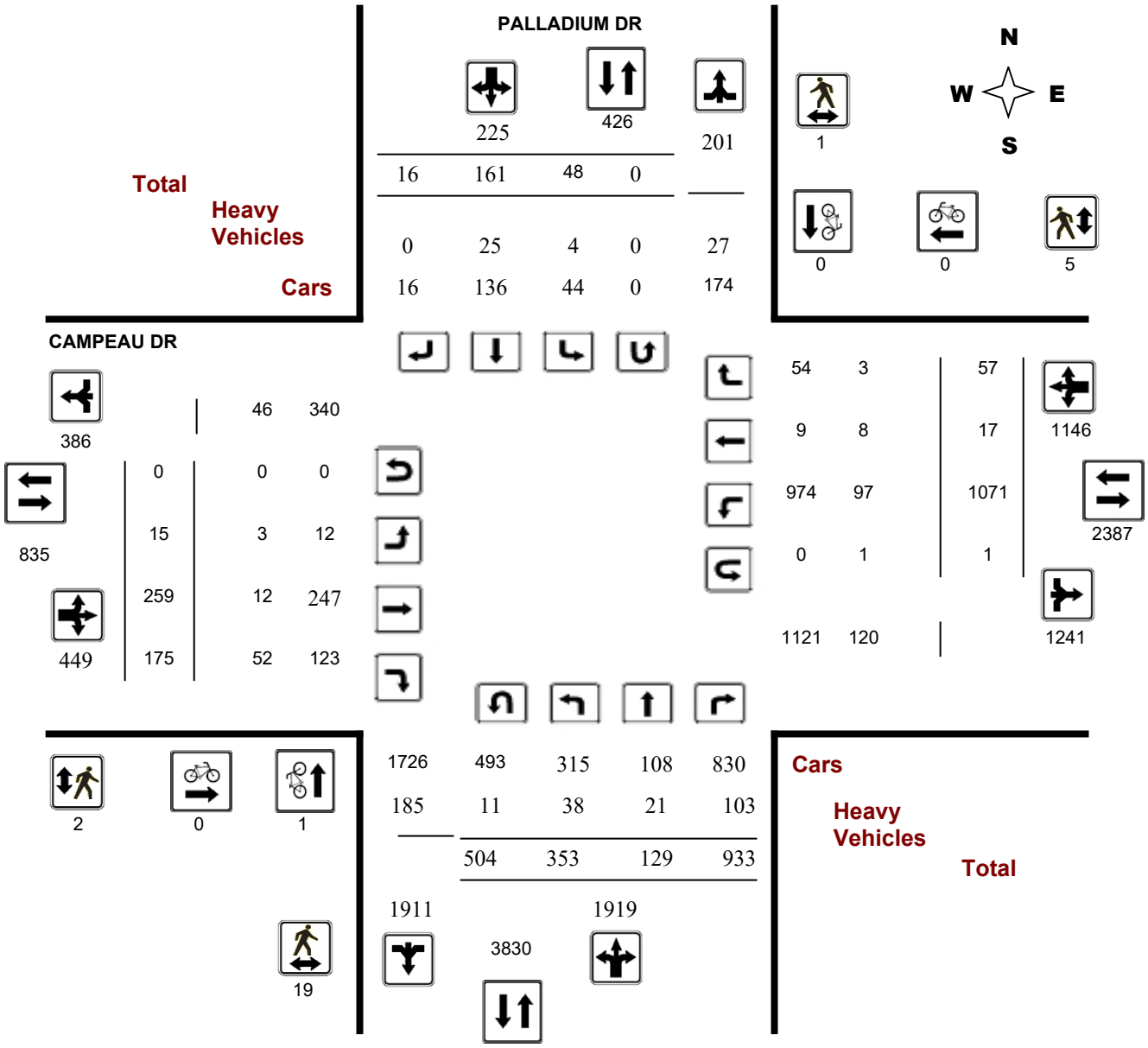
Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019
Start Time: 07:00
WO No: 39002
Device: Miovision

Full Study Diagram



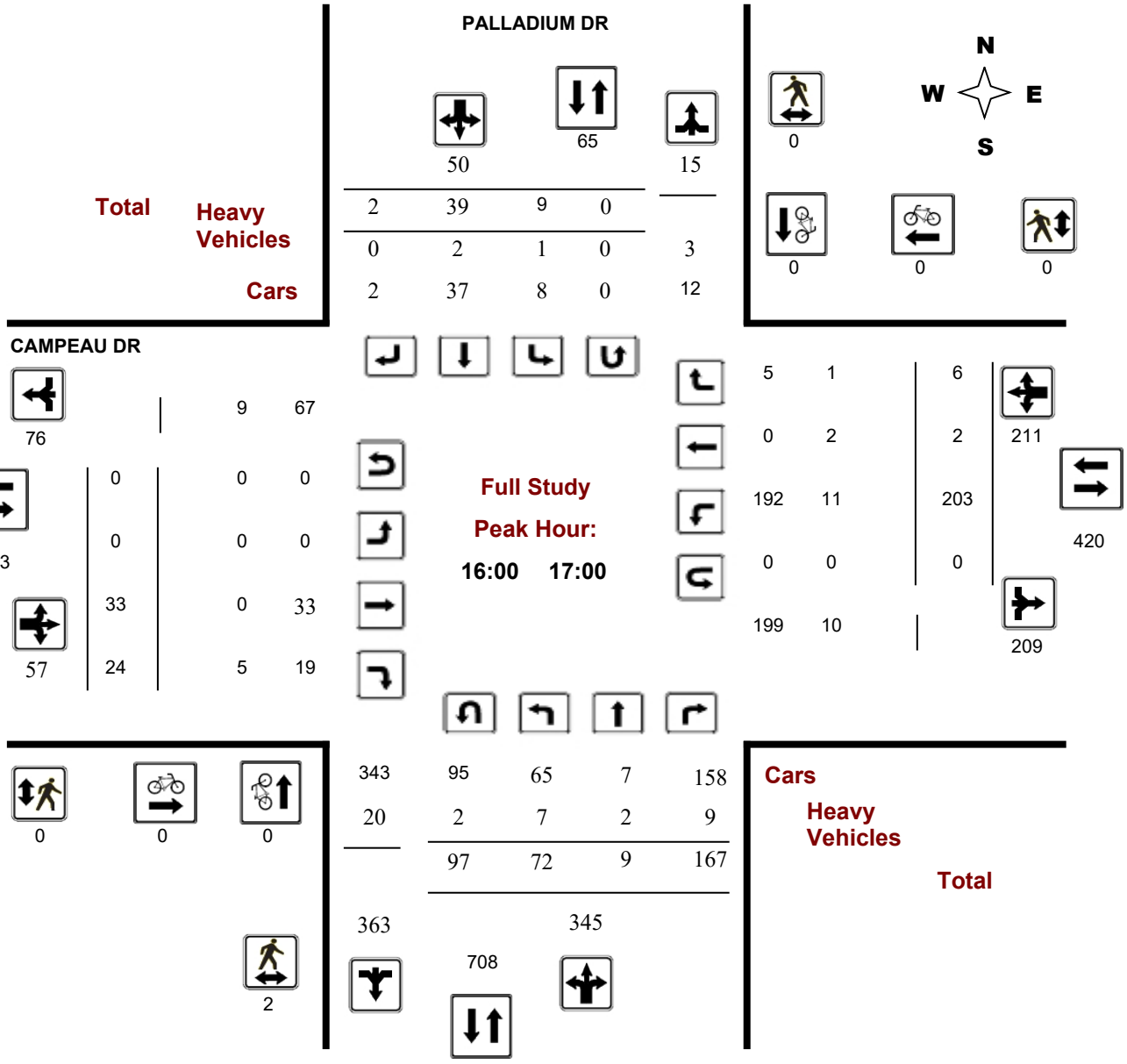
Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019
Start Time: 07:00
WO No: 39002
Device: Miovision

Full Study Peak Hour Diagram



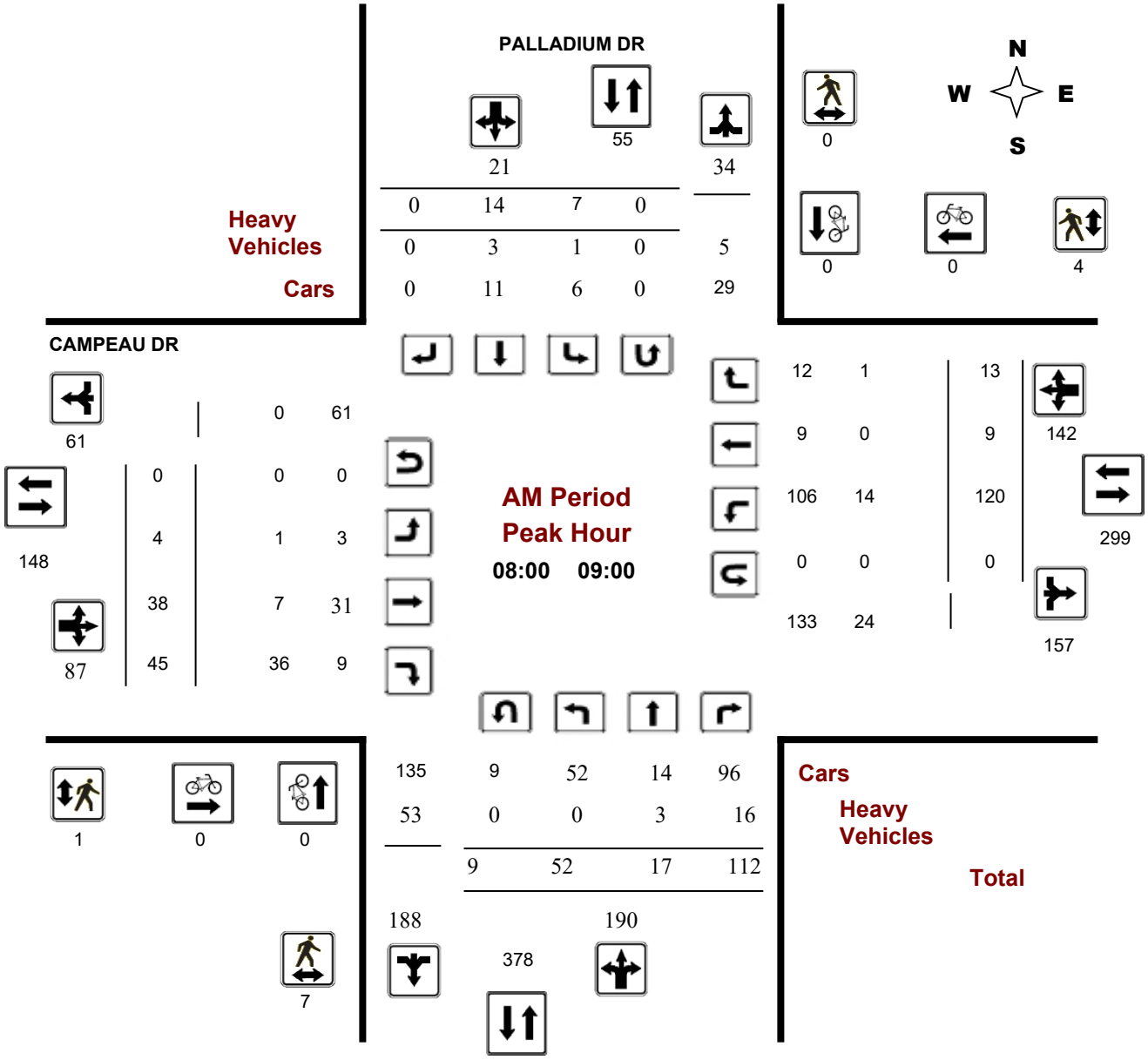
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision



Comments

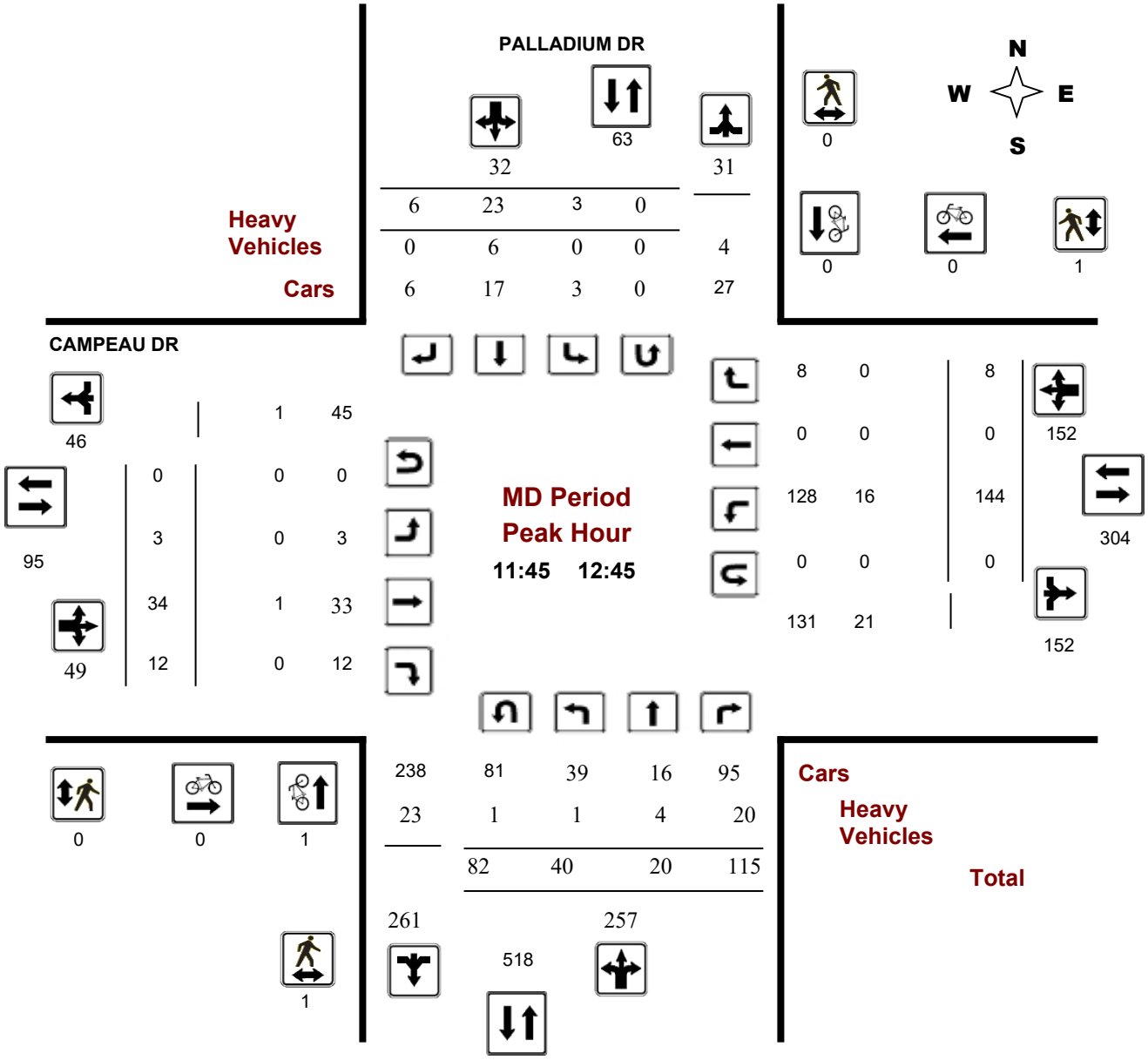
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision



Comments

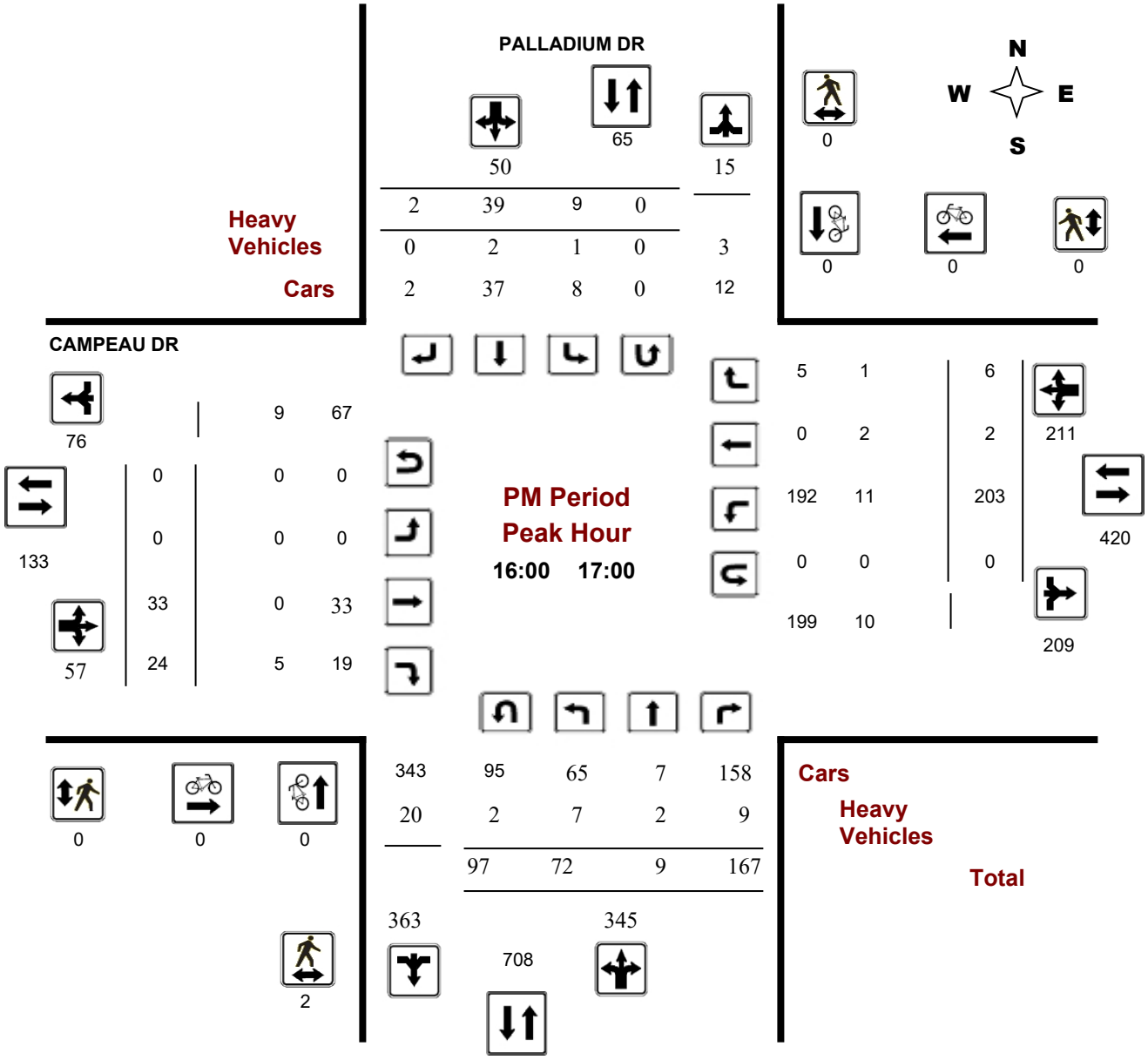
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision

Full Study Summary (8 HR Standard)

Survey Date: Monday, November 18, 2019

Total Observed U-Turns

Northbound: 504 Southbound: 0

Eastbound: 0 Westbound: 1

AADT Factor

1.00

	PALLADIUM DR								CAMPEAU DR									
	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	30	26	75	**131**	3	9	2	**14**	**145**	3	21	24	**48**	106	0	5	**111**	**159**	**304**
08:00 09:00	52	17	112	**181**	7	14	0	**21**	**202**	4	38	45	**87**	120	9	13	**142**	**229**	**431**
09:00 10:00	33	19	85	**137**	11	15	2	**28**	**165**	1	23	11	**35**	100	0	8	**108**	**143**	**308**
11:30 12:30	39	19	107	**165**	0	22	6	**28**	**193**	3	37	12	**52**	146	0	9	**155**	**207**	**400**
12:30 13:30	33	14	100	**147**	8	27	2	**37**	**184**	3	36	13	**52**	124	0	4	**128**	**180**	**364**
15:00 16:00	47	20	140	**207**	10	26	1	**37**	**244**	1	43	18	**62**	140	1	12	**153**	**215**	**459**
16:00 17:00	72	9	167	**248**	9	39	2	**50**	**298**	0	33	24	**57**	203	2	6	**211**	**268**	**566**
17:00 18:00	47	5	147	**199**	0	9	1	**10**	**209**	0	28	28	**56**	132	5	0	**137**	**193**	**402**
Sub Total	353	129	933	**1415**	48	161	16	**225**	**1640**	15	259	175	**449**	1071	17	57	**1145**	**1594**	**3234**
U Turns				**504**				**0**	**504**				**0**				**1**	**1**	**505**
Total	353	129	933	**1919**	48	161	16	**225**	**2144**	15	259	175	**449**	1071	17	57	**1146**	**1595**	**3739**
EQ 12Hr	491	179	1297	**2667**	67	224	22	**313**	**2980**	21	360	243	**624**	1489	24	79	**1593**	**2217**	**5197**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	462	169	1222	**2514**	63	211	21	**295**	**2980**	20	339	229	**588**	1403	22	75	**1501**	**2217**	**5197**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1**					
AVG 24Hr	606	221	1601	**3293**	82	276	27	**386**	**3679**	26	444	300	**771**	1838	29	98	**1967**	**2738**	**6417**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute Increments

		PALLADIUM DR									CAMPEAU DR									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	6	3	17	27	1	0	1	2	5	2	2	2	6	20	0	1	21	5	56
07:15	07:30	4	6	14	25	1	2	0	3	3	0	4	4	8	24	0	1	25	3	61
07:30	07:45	8	12	27	55	1	3	1	5	10	0	9	12	21	29	0	2	31	10	112
07:45	08:00	12	5	17	37	0	4	0	4	5	1	6	6	13	33	0	1	34	5	88
08:00	08:15	19	3	30	52	2	0	0	2	5	0	0	3	3	30	5	5	40	5	97
08:15	08:30	20	8	31	60	2	7	0	9	8	2	11	4	17	28	0	1	29	8	115
08:30	08:45	8	2	26	36	2	3	0	5	7	1	10	12	23	35	4	3	42	7	106
08:45	09:00	5	4	25	42	1	4	0	5	3	1	17	26	44	27	0	4	31	3	122
09:00	09:15	3	4	22	31	5	5	1	11	4	0	7	6	13	24	0	5	29	4	84
09:15	09:30	12	7	22	44	2	3	0	5	7	1	7	0	8	28	0	1	29	7	86
09:30	09:45	9	6	18	41	3	4	0	7	2	0	5	1	6	26	0	0	26	2	80
09:45	10:00	9	2	23	42	1	3	1	5	6	0	4	4	8	22	0	2	24	6	79
11:30	11:45	8	4	18	45	0	6	1	7	4	0	8	3	11	37	0	3	40	4	103
11:45	12:00	10	5	29	66	0	2	1	3	9	0	9	5	14	36	0	2	38	9	121
12:00	12:15	7	7	30	62	0	7	4	11	8	2	8	3	13	31	0	1	32	8	118
12:15	12:30	14	3	30	64	0	7	0	7	7	1	12	1	14	42	0	3	45	7	130
12:30	12:45	9	5	26	65	3	7	1	11	8	0	5	3	8	35	0	2	37	8	121
12:45	13:00	6	3	21	56	2	5	0	7	4	0	13	4	17	28	0	0	28	4	108
13:00	13:15	11	3	25	59	1	13	1	15	5	2	9	3	14	37	0	1	38	5	126
13:15	13:30	7	3	28	71	2	2	0	4	9	1	9	3	13	24	0	1	25	9	113
15:00	15:15	9	5	31	77	0	10	0	10	8	1	8	6	15	30	1	3	34	8	136
15:15	15:30	14	6	36	79	4	6	0	10	8	0	11	4	15	36	0	1	37	8	141
15:30	15:45	13	7	37	83	4	1	0	5	6	0	12	7	19	33	0	5	38	6	145
15:45	16:00	11	2	36	84	2	9	1	12	12	0	12	1	13	41	0	3	44	12	153
16:00	16:15	13	2	41	90	3	5	1	9	6	0	8	7	15	39	0	1	40	6	154
16:15	16:30	20	3	33	75	4	11	0	15	8	0	11	7	18	50	0	2	52	8	160
16:30	16:45	15	3	46	93	0	7	0	7	5	0	6	2	8	65	2	1	68	5	176
16:45	17:00	24	1	47	87	2	16	1	19	4	0	8	8	16	49	0	2	51	4	173
17:00	17:15	11	2	38	73	0	5	0	5	7	0	6	4	10	37	1	0	39	7	127
17:15	17:30	12	1	40	70	0	2	1	3	6	0	6	7	13	32	0	0	32	6	118
17:30	17:45	13	1	42	75	0	0	0	0	6	0	11	8	19	33	2	0	35	6	129
17:45	18:00	11	1	27	53	0	2	0	2	7	0	5	9	14	30	2	0	32	7	101
Total:		353	129	933	1919	48	161	16	225	202	15	259	175	449	1071	17	57	1146	202	3,739

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision

Full Study Cyclist Volume

Time Period		PALLADIUM DR			CAMPEAU DR			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	0	0	0	0	0
07:15	07:30	0	0	0	0	0	0	0
07:30	07:45	0	0	0	0	0	0	0
07:45	08:00	0	0	0	0	0	0	0
08:00	08:15	0	0	0	0	0	0	0
08:15	08:30	0	0	0	0	0	0	0
08:30	08:45	0	0	0	0	0	0	0
08:45	09:00	0	0	0	0	0	0	0
09:00	09:15	0	0	0	0	0	0	0
09:15	09:30	0	0	0	0	0	0	0
09:30	09:45	0	0	0	0	0	0	0
09:45	10:00	0	0	0	0	0	0	0
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	1	0	1	0	0	0	1
12:00	12:15	0	0	0	0	0	0	0
12:15	12:30	0	0	0	0	0	0	0
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	0	0	0	0	0	0	0
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0
Total		1	0	**1**	0	0	0	1

Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision

Full Study Pedestrian Volume

	PALLADIUM DR			CAMPEAU DR			
Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	**Total**	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	**Total**	**Grand Total**
07:00 07:15	0	0	**0**	0	0	**0**	**0**
07:15 07:30	0	0	**0**	0	0	**0**	**0**
07:30 07:45	0	0	**0**	0	0	**0**	**0**
07:45 08:00	0	0	**0**	0	0	**0**	**0**
08:00 08:15	3	0	**3**	0	4	**4**	**7**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	1	0	**1**	1	0	**1**	**2**
08:45 09:00	3	0	**3**	0	0	**0**	**3**
09:00 09:15	1	0	**1**	0	0	**0**	**1**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
11:30 11:45	0	1	**1**	1	0	**1**	**2**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	1	0	**1**	0	1	**1**	**2**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	1	0	**1**	0	0	**0**	**1**
13:00 13:15	1	0	**1**	0	0	**0**	**1**
13:15 13:30	2	0	**2**	0	0	**0**	**2**
15:00 15:15	0	0	**0**	0	0	**0**	**0**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	1	0	**1**	0	0	**0**	**1**
15:45 16:00	1	0	**1**	0	0	**0**	**1**
16:00 16:15	0	0	**0**	0	0	**0**	**0**
16:15 16:30	0	0	**0**	0	0	**0**	**0**
16:30 16:45	2	0	**2**	0	0	**0**	**2**
16:45 17:00	0	0	**0**	0	0	**0**	**0**
17:00 17:15	1	0	**1**	0	0	**0**	**1**
17:15 17:30	0	0	**0**	0	0	**0**	**0**
17:30 17:45	1	0	**1**	0	0	**0**	**1**
17:45 18:00	0	0	**0**	0	0	**0**	**0**
Total	19	1	**20**	2	5	**7**	**27**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision

Full Study Heavy Vehicles

		PALLADIUM DR									CAMPEAU DR									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	1	3	**4**	1	0	0	**1**	**5**	1	0	0	**1**	0	0	1	**1**	**2**	**7**
07:15	07:30	0	0	2	**2**	0	1	0	**1**	**3**	0	0	0	**0**	0	0	0	**0**	**0**	**3**
07:30	07:45	0	2	7	**9**	0	1	0	**1**	**10**	0	0	1	**1**	4	0	0	**4**	**5**	**15**
07:45	08:00	0	0	3	**3**	0	2	0	**2**	**5**	0	0	0	**0**	4	0	0	**4**	**4**	**9**
08:00	08:15	0	1	4	**5**	0	0	0	**0**	**5**	0	0	0	**0**	7	0	0	**7**	**7**	**12**
08:15	08:30	0	2	3	**5**	1	2	0	**3**	**8**	1	0	0	**1**	4	0	0	**4**	**5**	**13**
08:30	08:45	0	0	6	**6**	0	1	0	**1**	**7**	0	1	12	**13**	3	0	1	**4**	**17**	**24**
08:45	09:00	0	0	3	**3**	0	0	0	**0**	**3**	0	6	24	**30**	0	0	0	**0**	**30**	**33**
09:00	09:15	0	1	2	**3**	0	1	0	**1**	**4**	0	1	6	**7**	1	0	0	**1**	**8**	**12**
09:15	09:30	2	1	1	**6**	0	1	0	**1**	**7**	0	0	0	**0**	2	0	0	**2**	**2**	**9**
09:30	09:45	0	1	0	**1**	0	1	0	**1**	**2**	0	0	0	**0**	4	0	0	**4**	**4**	**6**
09:45	10:00	1	0	5	**6**	0	0	0	**0**	**6**	0	1	0	**1**	4	0	0	**4**	**5**	**11**
11:30	11:45	0	0	2	**3**	0	1	0	**1**	**4**	0	0	0	**0**	4	0	0	**4**	**4**	**8**
11:45	12:00	0	1	7	**9**	0	0	0	**0**	**9**	0	1	0	**1**	4	0	0	**4**	**5**	**14**
12:00	12:15	1	1	4	**6**	0	2	0	**2**	**8**	0	0	0	**0**	4	0	0	**4**	**4**	**12**
12:15	12:30	0	0	6	**6**	0	1	0	**1**	**7**	0	0	0	**0**	5	0	0	**5**	**5**	**12**
12:30	12:45	0	2	3	**5**	0	3	0	**3**	**8**	0	0	0	**0**	3	0	0	**3**	**3**	**11**
12:45	13:00	0	0	3	**4**	0	0	0	**0**	**4**	0	0	0	**0**	3	0	0	**3**	**3**	**7**
13:00	13:15	1	0	3	**5**	0	0	0	**0**	**5**	0	1	0	**1**	4	0	0	**4**	**5**	**10**
13:15	13:30	0	2	3	**6**	1	2	0	**3**	**9**	0	0	0	**0**	3	0	0	**3**	**3**	**12**
15:00	15:15	1	2	4	**7**	0	1	0	**1**	**8**	1	1	2	**4**	5	1	0	**6**	**10**	**18**
15:15	15:30	0	0	8	**8**	0	0	0	**0**	**8**	0	0	0	**0**	4	0	0	**4**	**4**	**12**
15:30	15:45	0	2	4	**6**	0	0	0	**0**	**6**	0	0	1	**1**	5	0	0	**5**	**6**	**12**
15:45	16:00	2	0	5	**9**	0	3	0	**3**	**12**	0	0	0	**0**	8	0	0	**8**	**8**	**20**
16:00	16:15	1	0	3	**6**	0	0	0	**0**	**6**	0	0	2	**2**	3	0	0	**3**	**5**	**11**
16:15	16:30	1	2	5	**8**	0	0	0	**0**	**8**	0	0	1	**1**	1	0	1	**2**	**3**	**11**
16:30	16:45	2	0	1	**3**	0	2	0	**2**	**5**	0	0	1	**1**	3	2	0	**5**	**6**	**11**
16:45	17:00	3	0	0	**3**	1	0	0	**1**	**4**	0	0	1	**1**	4	0	0	**4**	**5**	**9**
17:00	17:15	6	0	1	**7**	0	0	0	**0**	**7**	0	0	0	**0**	0	1	0	**2**	**2**	**9**
17:15	17:30	5	0	1	**6**	0	0	0	**0**	**6**	0	0	0	**0**	0	0	0	**0**	**0**	**6**
17:30	17:45	6	0	0	**6**	0	0	0	**0**	**6**	0	0	0	**0**	1	2	0	**3**	**3**	**9**
17:45	18:00	6	0	1	**7**	0	0	0	**0**	**7**	0	0	1	**1**	0	2	0	**2**	**3**	**10**
Total:	None	38	21	103	**173**	4	25	0	**29**	**202**	3	12	52	**67**	97	8	3	**109**	**176**	**378**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

CAMPEAU DR @ PALLADIUM DR

Survey Date: Monday, November 18, 2019 **WO No:** 39002

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute U-Turn Total

Time Period		PALLADIUM DR Northbound U-Turn Total	PALLADIUM DR Southbound U-Turn Total	CAMPEAU DR Eastbound U-Turn Total	CAMPEAU DR Westbound U-Turn Total	Total
07:00	07:15	1	0	0	0	1
07:15	07:30	1	0	0	0	1
07:30	07:45	8	0	0	0	8
07:45	08:00	3	0	0	0	3
08:00	08:15	0	0	0	0	0
08:15	08:30	1	0	0	0	1
08:30	08:45	0	0	0	0	0
08:45	09:00	8	0	0	0	8
09:00	09:15	2	0	0	0	2
09:15	09:30	3	0	0	0	3
09:30	09:45	8	0	0	0	8
09:45	10:00	8	0	0	0	8
11:30	11:45	15	0	0	0	15
11:45	12:00	22	0	0	0	22
12:00	12:15	18	0	0	0	18
12:15	12:30	17	0	0	0	17
12:30	12:45	25	0	0	0	25
12:45	13:00	26	0	0	0	26
13:00	13:15	20	0	0	0	20
13:15	13:30	33	0	0	0	33
15:00	15:15	32	0	0	0	32
15:15	15:30	23	0	0	0	23
15:30	15:45	26	0	0	0	26
15:45	16:00	35	0	0	0	35
16:00	16:15	34	0	0	0	34
16:15	16:30	19	0	0	0	19
16:30	16:45	29	0	0	0	29
16:45	17:00	15	0	0	0	15
17:00	17:15	22	0	0	1	23
17:15	17:30	17	0	0	0	17
17:30	17:45	19	0	0	0	19
17:45	18:00	14	0	0	0	14
Total		504	0	0	1	505

Appendix D - Existing Traffic Level of Service Calculations

Intersection	
Intersection Delay, s/veh	4.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	3	4	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	96	0	0	24
Demand Flow Rate, veh/h	98	0	0	24
Vehicles Circulating, veh/h	170	92	55	215
Vehicles Exiting, veh/h	69	177	213	37
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	1	4	7	0
Ped Cap Adj	0.999	1.000	1.000	1.000
Approach Delay, s/veh	4.3	0.0	0.0	4.2
Approach LOS	A	-	-	A

Lane	Left	Right			Left	Right
Designated Moves	LT	R			LT	R
Assumed Moves	LT	R			LT	R
RT Channelized						
Lane Util	0.480	0.520			1.000	0.000
Critical Headway, s	5.193	5.193			5.193	5.193
Entry Flow, veh/h	47	51			24	0
Cap Entry Lane, veh/h	953	953			911	911
Entry HV Adj Factor	0.982	0.980			0.987	1.000
Flow Entry, veh/h	46	50			24	0
Cap Entry, veh/h	935	934			899	911
V/C Ratio	0.049	0.054			0.026	0.000
Control Delay, s/veh	4.3	4.3			4.2	4.0
LOS	A	A			A	A
95th %tile Queue, veh	0	0			0	0

Intersection	
Intersection Delay, s/veh	5.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	3	4	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	64	0	0	55
Demand Flow Rate, veh/h	66	0	0	56
Vehicles Circulating, veh/h	387	202	40	425
Vehicles Exiting, veh/h	94	230	413	17
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.3	0.0	0.0	5.5
Approach LOS	A	-	-	A

Lane	Left	Right		Left	Right
Designated Moves	LT	R		LT	R
Assumed Moves	LT	R		LT	R
RT Channelized					
Lane Util	0.576	0.424		0.821	0.179
Critical Headway, s	5.193	5.193		5.193	5.193
Entry Flow, veh/h	38	28		46	10
Cap Entry Lane, veh/h	767	767		739	739
Entry HV Adj Factor	0.980	0.964		0.981	1.000
Flow Entry, veh/h	37	27		45	10
Cap Entry, veh/h	752	740		725	739
V/C Ratio	0.050	0.036		0.062	0.014
Control Delay, s/veh	5.3	5.2		5.6	5.0
LOS	A	A		A	A
95th %tile Queue, veh	0	0		0	0

Appendix E - Future Background Level of Service Calculations

Intersection	
Intersection Delay, s/veh	5.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	3	4	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	164	0	0	64
Demand Flow Rate, veh/h	167	0	0	65
Vehicles Circulating, veh/h	224	189	130	297
Vehicles Exiting, veh/h	138	227	261	151
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	1	4	7	0
Ped Cap Adj	0.999	1.000	1.000	1.000
Approach Delay, s/veh	5.1	0.0	0.0	4.7
Approach LOS	A	-	-	A

Lane	Left	Right	Left	Right
Designated Moves	LT	R	LT	R
Assumed Moves	LT	R	LT	R
RT Channelized				
Lane Util	0.725	0.275	0.646	0.354
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	121	46	42	23
Cap Entry Lane, veh/h	903	903	840	840
Entry HV Adj Factor	0.983	0.978	0.985	1.000
Flow Entry, veh/h	119	45	41	23
Cap Entry, veh/h	887	883	827	840
V/C Ratio	0.134	0.051	0.050	0.027
Control Delay, s/veh	5.4	4.6	4.8	4.5
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	3	4	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	239	0	0	159
Demand Flow Rate, veh/h	243	0	0	162
Vehicles Circulating, veh/h	518	211	232	516
Vehicles Exiting, veh/h	160	391	529	47
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.3	0.0	0.0	7.7
Approach LOS	A	-	-	A

Lane	Left	Right		Left	Right
Designated Moves	LT	R		LT	R
Assumed Moves	LT	R		LT	R
RT Channelized					
Lane Util	0.901	0.099		0.895	0.105
Critical Headway, s	5.193	5.193		5.193	5.193
Entry Flow, veh/h	219	24		145	17
Cap Entry Lane, veh/h	673	673		674	674
Entry HV Adj Factor	0.981	1.000		0.982	1.000
Flow Entry, veh/h	215	24		142	17
Cap Entry, veh/h	661	673		662	674
V/C Ratio	0.325	0.036		0.215	0.025
Control Delay, s/veh	9.7	5.7		8.0	5.6
LOS	A	A		A	A
95th %tile Queue, veh	1	0		1	0

Appendix F - Future Total Level of Service Calculations

Intersection	
Intersection Delay, s/veh	5.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	3	4	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	173	0	0	69
Demand Flow Rate, veh/h	176	0	0	70
Vehicles Circulating, veh/h	273	222	166	348
Vehicles Exiting, veh/h	145	263	283	155
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	1	4	7	0
Ped Cap Adj	0.999	1.000	1.000	1.000
Approach Delay, s/veh	5.5	0.0	0.0	5.0
Approach LOS	A	-	-	A

Lane	Left	Right			Left	Right
Designated Moves	LT	R			LT	R
Assumed Moves	LT	R			LT	R
RT Channelized						
Lane Util	0.739	0.261			0.671	0.329
Critical Headway, s	5.193	5.193			5.193	5.193
Entry Flow, veh/h	130	46			47	23
Cap Entry Lane, veh/h	860	860			798	798
Entry HV Adj Factor	0.983	0.978			0.986	1.000
Flow Entry, veh/h	128	45			46	23
Cap Entry, veh/h	845	841			787	798
V/C Ratio	0.151	0.054			0.059	0.029
Control Delay, s/veh	5.8	4.8			5.2	4.8
LOS	A	A			A	A
95th %tile Queue, veh	1	0			0	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	223	36	0	277	0	18
Future Volume (Veh/h)	223	36	0	277	0	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	223	36	0	277	0	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			259		380	130
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			259		380	130
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	98
cM capacity (veh/h)			1303		595	896

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	149	110	138	138	18
Volume Left	0	0	0	0	0
Volume Right	0	36	0	0	18
cSH	1700	1700	1700	1700	896
Volume to Capacity	0.09	0.06	0.08	0.08	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	0.0	0.0	0.0	0.0	9.1
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.1
Approach LOS					A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	32	272	25	0	241
Future Volume (Veh/h)	0	32	272	25	0	241
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	32	272	25	0	241
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	405	148			297	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	405	148			297	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	574	871			1261	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	32	181	116	120	120
Volume Left	0	0	0	0	0
Volume Right	32	0	25	0	0
cSH	871	1700	1700	1700	1700
Volume to Capacity	0.04	0.11	0.07	0.07	0.07
Queue Length 95th (m)	0.9	0.0	0.0	0.0	0.0
Control Delay (s)	9.3	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.3	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	18.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	0	0	0	0	32
Future Volume (Veh/h)	25	0	0	0	0	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	0	0	0	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				50	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				50	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	97
cM capacity (veh/h)	1623				944	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	25	0	32
Volume Left	25	0	0
Volume Right	0	0	32
cSH	1623	1700	1085
Volume to Capacity	0.02	0.00	0.03
Queue Length 95th (m)	0.4	0.0	0.7
Control Delay (s)	7.3	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	3	4	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	246	0	0	160
Demand Flow Rate, veh/h	250	0	0	163
Vehicles Circulating, veh/h	571	252	259	575
Vehicles Exiting, veh/h	167	418	562	48
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.2	0.0	0.0	8.3
Approach LOS	B	-	-	A

Lane	Left	Right	Left	Right
Designated Moves	LT	R	LT	R
Assumed Moves	LT	R	LT	R
RT Channelized				
Lane Util	0.904	0.096	0.896	0.104
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	226	24	146	17
Cap Entry Lane, veh/h	638	638	636	636
Entry HV Adj Factor	0.981	1.000	0.982	1.000
Flow Entry, veh/h	222	24	143	17
Cap Entry, veh/h	626	638	625	636
V/C Ratio	0.354	0.038	0.230	0.027
Control Delay, s/veh	10.6	6.0	8.6	6.0
LOS	B	A	A	A
95th %tile Queue, veh	2	0	1	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	384	27	0	365	0	19
Future Volume (Veh/h)	384	27	0	365	0	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	384	27	0	365	0	19
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			411		580	206
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			411		580	206
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	98
cM capacity (veh/h)			1144		445	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	256	155	182	182	19
Volume Left	0	0	0	0	0
Volume Right	0	27	0	0	19
cSH	1700	1700	1700	1700	801
Volume to Capacity	0.15	0.09	0.11	0.11	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	0.0	0.0	9.6
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.6
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	39	266	33	0	396
Future Volume (Veh/h)	0	39	266	33	0	396
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	39	266	33	0	396
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	480	150			299	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	480	150			299	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	514	870			1259	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	39	177	122	198	198
Volume Left	0	0	0	0	0
Volume Right	39	0	33	0	0
cSH	870	1700	1700	1700	1700
Volume to Capacity	0.04	0.10	0.07	0.12	0.12
Queue Length 95th (m)	1.1	0.0	0.0	0.0	0.0
Control Delay (s)	9.3	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.3	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	18.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	0	0	0	0	39
Future Volume (Veh/h)	33	0	0	0	0	39
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	0	0	0	0	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				66	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				66	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	96
cM capacity (veh/h)	1623				920	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	33	0	39
Volume Left	33	0	0
Volume Right	0	0	39
cSH	1623	1700	1085
Volume to Capacity	0.02	0.00	0.04
Queue Length 95th (m)	0.5	0.0	0.8
Control Delay (s)	7.3	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		