

283-285 McLeod Street Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Prepared for:

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Prepared by:



13 Markham Avenue
Ottawa, ON K2G 3Z1

August 2021

PN: 2020-15

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1 Screening

This study has been prepared according to the City of Ottawa’s 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component, but excluding the network impact component.

2 Existing and Planned Conditions

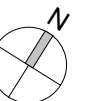
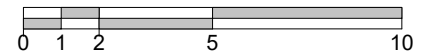
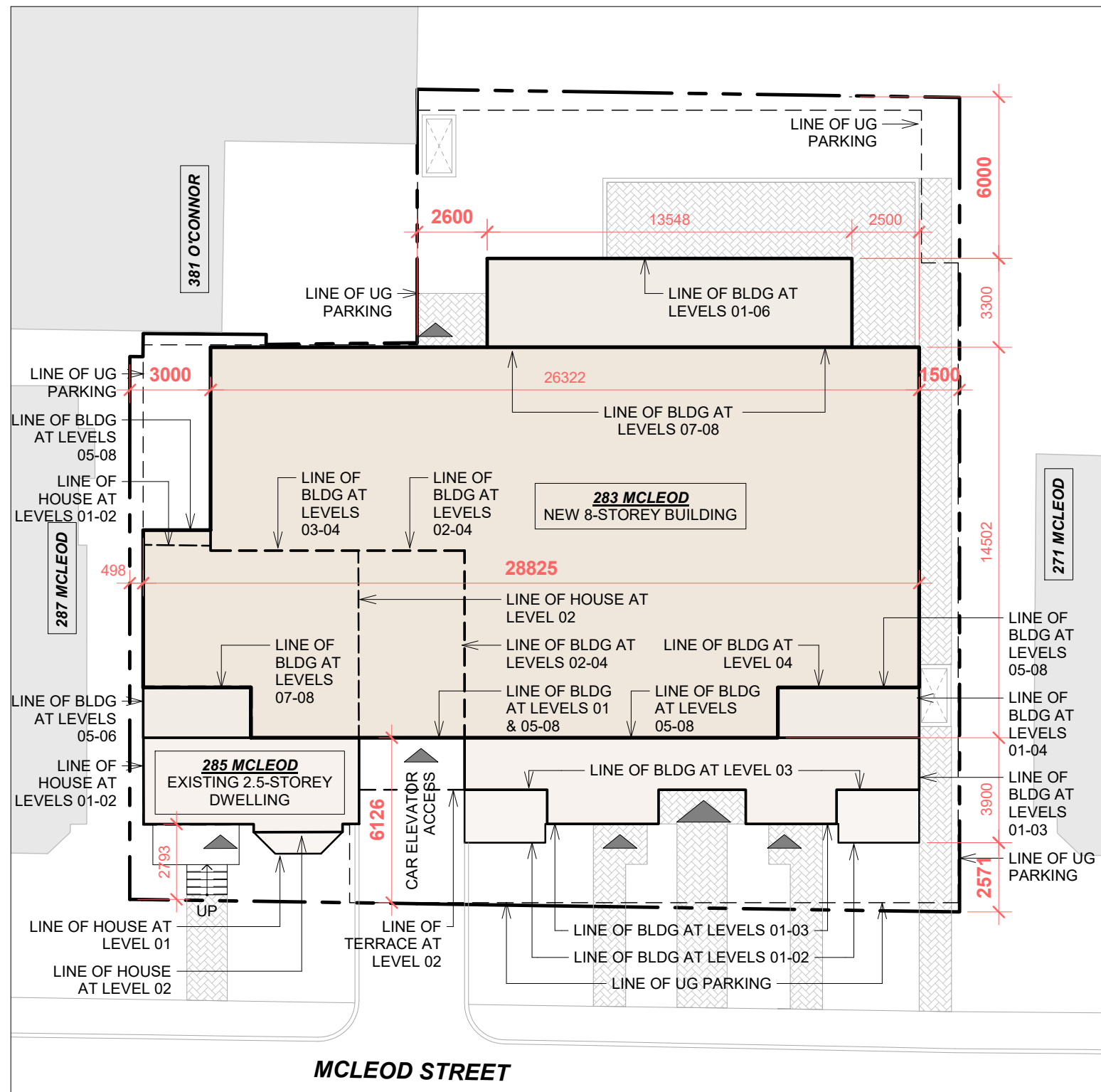
2.1 Proposed Development

The subject property, located at 283-285 McLeod Street, is zoned as Fourth Density Residential Zone (R4S). The property has two existing 2 storey buildings on the front property line. The proposed development would add a third, 6-storey, building which would include a total of 30 residential units. A total of 11 underground parking stalls and 19 bicycle parking stalls are shown on the site plan which would be accessed via a car elevator with a driveway on McLeod Street. For the purposes of this TIA, the projected full build-out and occupancy horizon is 2022. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: August 20, 2020



283-285 MCLEOD
Ottawa, ON

SITE PLAN

grc architects

June 23, 2021



BASEMENT FLOOR PLAN

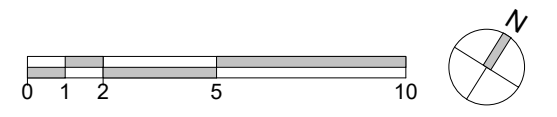
LEGEND

- AMENITY
- COMMON
- PARKING
- RESIDENTIAL
- SERVICE & STORAGE
- VERTICAL CIRCULATION



GROUND FLOOR PLAN

30 RESIDENTIAL UNITS			
RES. PARKING	BICYCLE PARKING	AMENITY AREA	
REQUIRED: 8	REQUIRED: 15	TOTAL REQUIRED:	180m ²
PROVIDED: 11	PROVIDED: 19	TOTAL PROVIDED:	398.1m ²
VISITOR PARKING		COMMUNAL REQUIRED:	90m ²
REQUIRED: 2		COMMUNAL PROVIDED:	181m ²
PROVIDED: 0			



283-285 MCLEOD
Ottawa, ON

BASEMENT & GROUND FLOOR PLANS - SCENARIO 4C4

grc architects

June 18, 2021

2.2 Existing Conditions

2.2.1 Area Road Network

McLeod Street

McLeod Street is a City of Ottawa one-way arterial road with a one-lane urban cross-section including sidewalks and on-street parking on the south side. The unposted speed limit is 50 km/hr and the Ottawa Official Plan reserves a 20 metre right-of-way for this road.

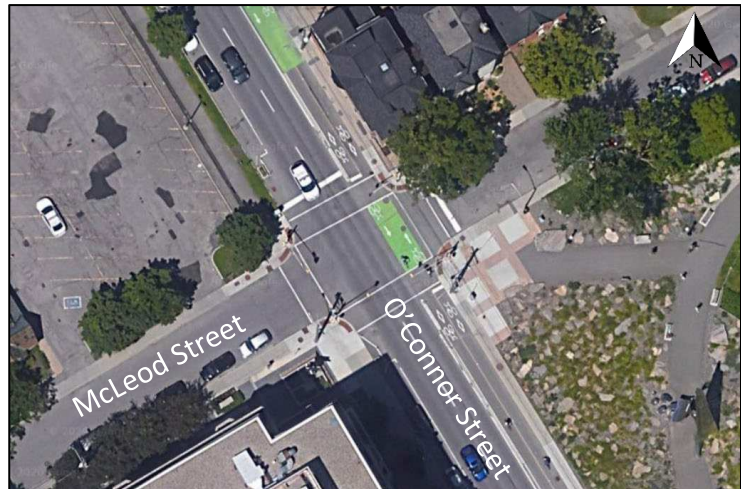
O'Connor Street

McLeod Street is a City of Ottawa one-way arterial road with a two-lane urban cross-section including sidewalks, cycletrack on the east side and on-street parking on the west side. The unposted speed limit is 50 km/hr and the Ottawa Official Plan reserves a 20 metre right-of-way for this road.

2.2.2 Existing Intersections

McLeod Street at O'Connor Street

The intersection of McLeod Street at O'Connor Street is a signalized intersection with shared movement lanes on all approaches. Westbound left turns are prohibited on red. There is an advanced pedestrian and cyclist phase for pedestrians and cyclists crossing north or south. A dedicated space and bicycle signals are provided for the cycletrack running along O'Connor Street on the east leg of the intersection.



2.2.3 Existing Driveways

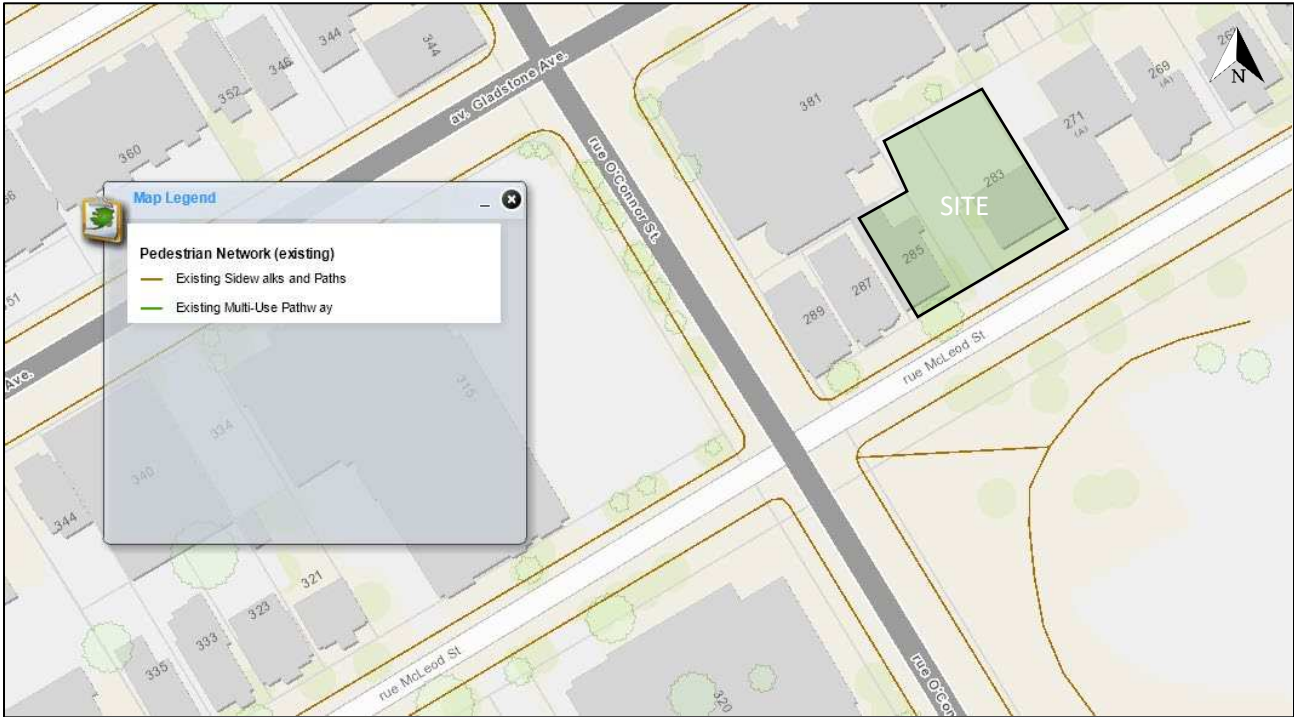
Residential driveways are present along the north side of McLeod Street and along the south side to the east of the site. Along O'Connor Street, driveways are present on west side of the roadway south of McLeod Street. None of the residential driveways would provide access to significant traffic generators and would therefore have no impact on this TIA. Additionally, there is a driveway located along McLeod Street that leads to the Canadian Museum of Nature parking lot, approximately 90 metres east of the proposed development. However, since the peak use of this parking lot is expected to happen outside the AM and PM peak hours, the AM and PM peak hour museum trip generation is not anticipated to impact the subject development.

2.2.4 Cycling and Pedestrian Facilities

Figure 4 illustrates the pedestrian facilities in the study area and Figure 5 illustrates the cycling facilities.

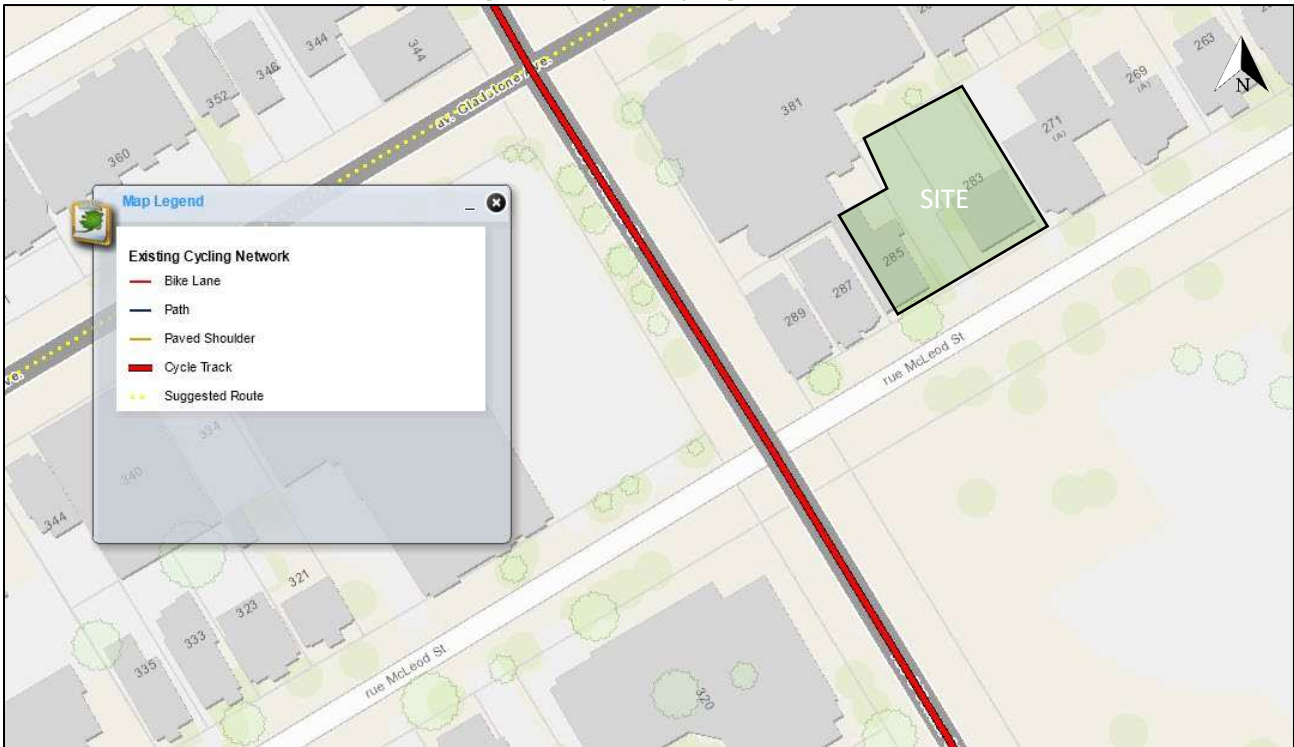
Sidewalks are provided along both sides of the roadways in the study area. The cycling network consists of a cycletrack along O'Connor Street.

Figure 4: Study Area Pedestrian Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: August 21, 2020

Figure 5: Study Area Cycling Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: August 21, 2020

2.2.5 Existing Transit

Routes #5, 6, 7, 14, 114 and 55 are within a 400-metre radius of the proposed development. Route #5 runs along Elgin Street, routes #6 and #7 run along Bank Street, routes #14 and #114 run along Gladstone Avenue, and route #55 runs along Catherine Street and Gladstone Avenue, Bank Street, and Catherine Street. There are no existing transit routes along McLeod Street and O'Connor Street. The frequency of these routes within proximity of the proposed site currently are:

- Route #5 – every 15-20 minutes during the peak hours, and 30-45 minutes during the off-peak times
- Route #6 – every 7-15 minutes during the peak hours, and 15-30 minutes during the off-peak times
- Route #7 – every 7-15 minutes during the peak hours, and 15-30 minutes during the off-peak times
- Route #14 – 15 minute service entire day before 7 pm, and 30 minute service after 7 pm
- Route #114 – once an hour between 9 and 11 am
- Route #55 – every 15 minutes during the peak hours, and 30 minutes during the off-peak times

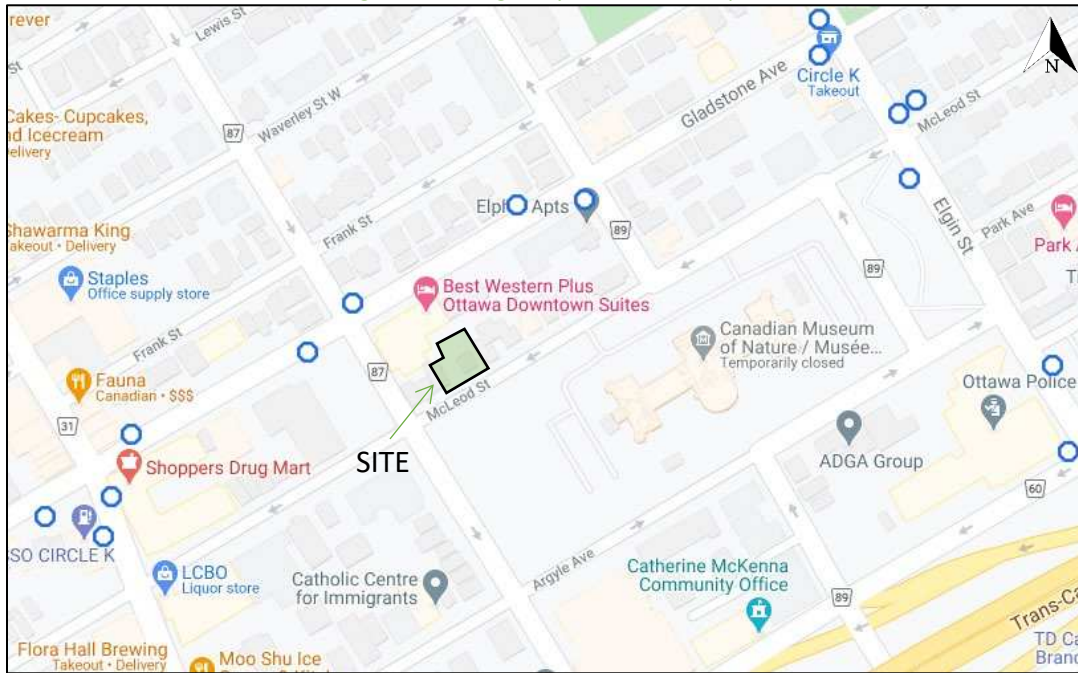
Figure 6 illustrates the transit system map in the Study Area and Figure 7 illustrates nearby transit stops.

Figure 6: Existing Study Area Transit Service



Source: <http://www.octranspo.com/> Accessed: August 21, 2020

Figure 7: Existing Study Area Transit Stops



Source: <http://www.octranspo.com/> Accessed: August 21, 2020

2.2.6 Existing Area Traffic Management Measures

Speed bumps are present along McLeod Street, east and west of O'Connor Street. Concrete planters located east of the subject site provide additional traffic calming measures.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersection. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date
McLeod Street at O'Connor Street	March 21, 2017

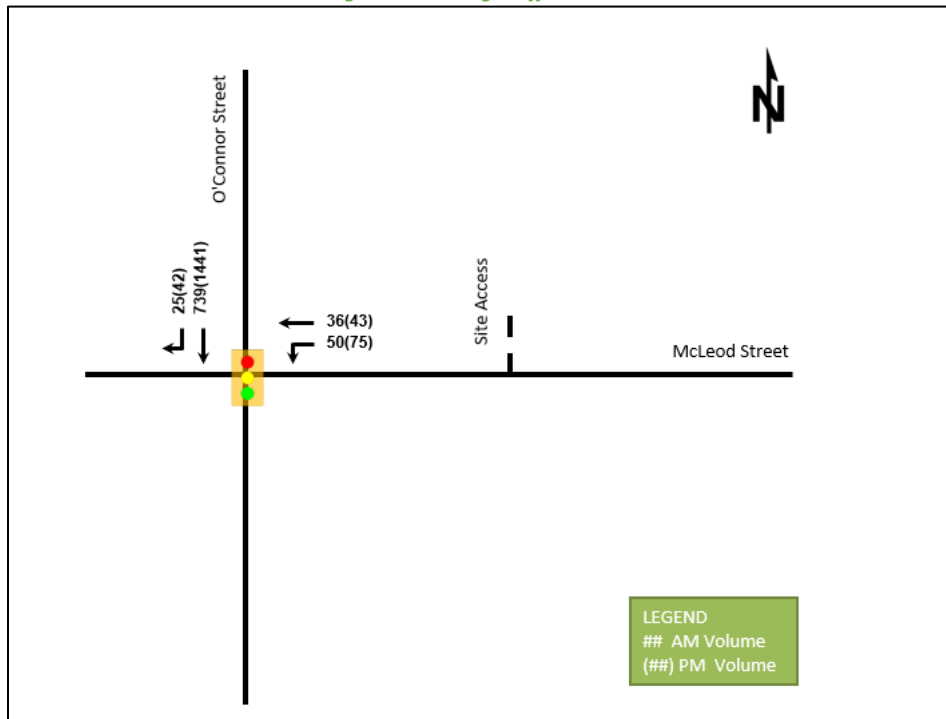
Figure 8 illustrates the 2020 existing horizon traffic volumes and Table 2 summarizes the existing intersection operations. As shown above, the turning movement count data has been collected in 2017. Due to the ongoing COVID-19 health crisis undertaking turning movement counts is not possible as the counted volumes would not reflect typical traffic conditions.

A negative (-2 to -0.2%) growth rate is indicated in AM, PM, and 8-hour total City of Ottawa intersection Traffic Growth Rates. For the purposes of this study, 0% growth will be applied to the study area intersection and 2017 traffic volumes will be analysed for the 2020 existing scenario to produce a conservative estimate. Detailed turning movement count data is included in Appendix B.

Synchro (Version 11) was used to model the Study Area intersection. The Heavy Vehicle percentage (HV %) has been calculated for each turning movement at the Study Area intersection. All Heavy Vehicle percentages calculated to be less than 2% were entered into the Synchro model as 2% in order to produce a conservative analysis. These calculations are shown in Appendix C. All parameters have been coded using the City of Ottawa's

TIA Guidelines and default parameters. Synchro worksheets for the 2020 existing horizon is included in Appendix D.

Figure 8: Existing Traffic Counts



Additionally, the collected intersection counts also provided existing pedestrian and cyclist demands at the four Study Area intersections for both AM and PM peak periods. Figure 9 illustrates the existing pedestrian volumes and Figure 10 illustrates the existing cyclist volumes at the Study Area.

Figure 9: Existing Pedestrian Volumes

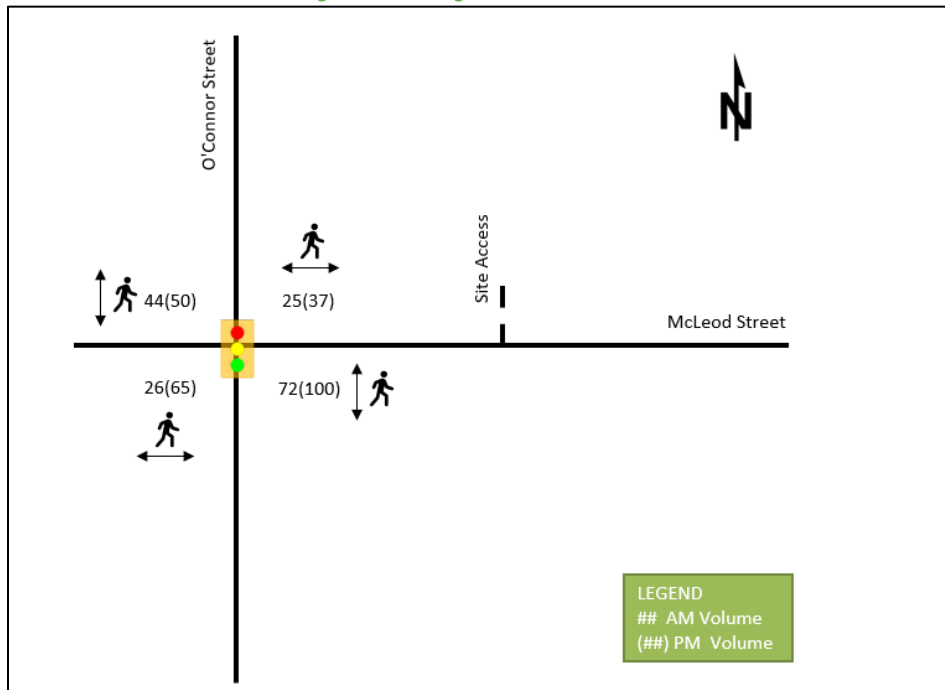


Figure 10: Existing Cycling Volumes

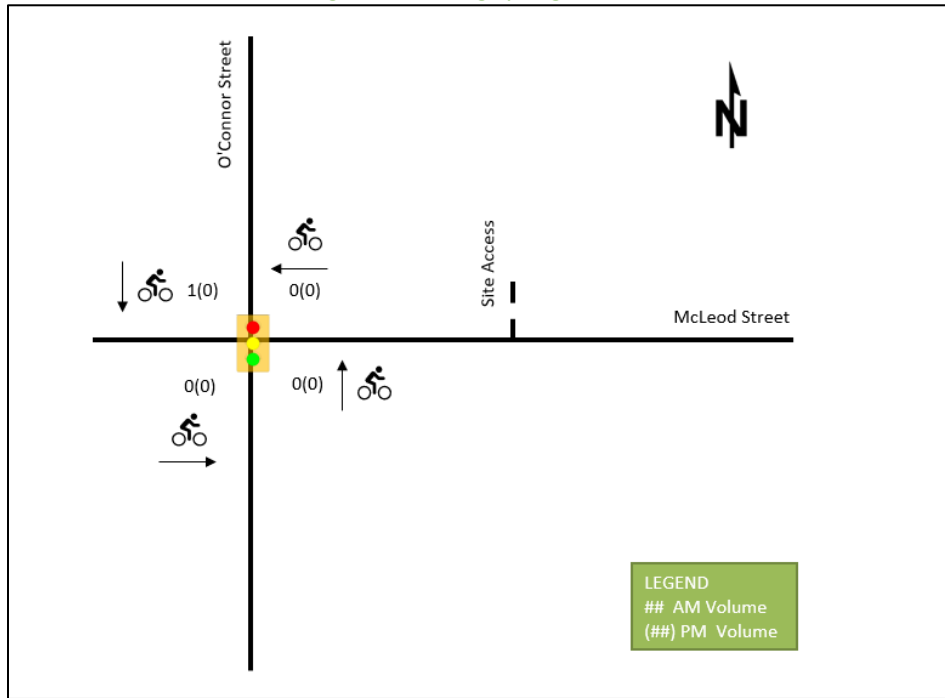


Table 2: Existing Intersection Operations

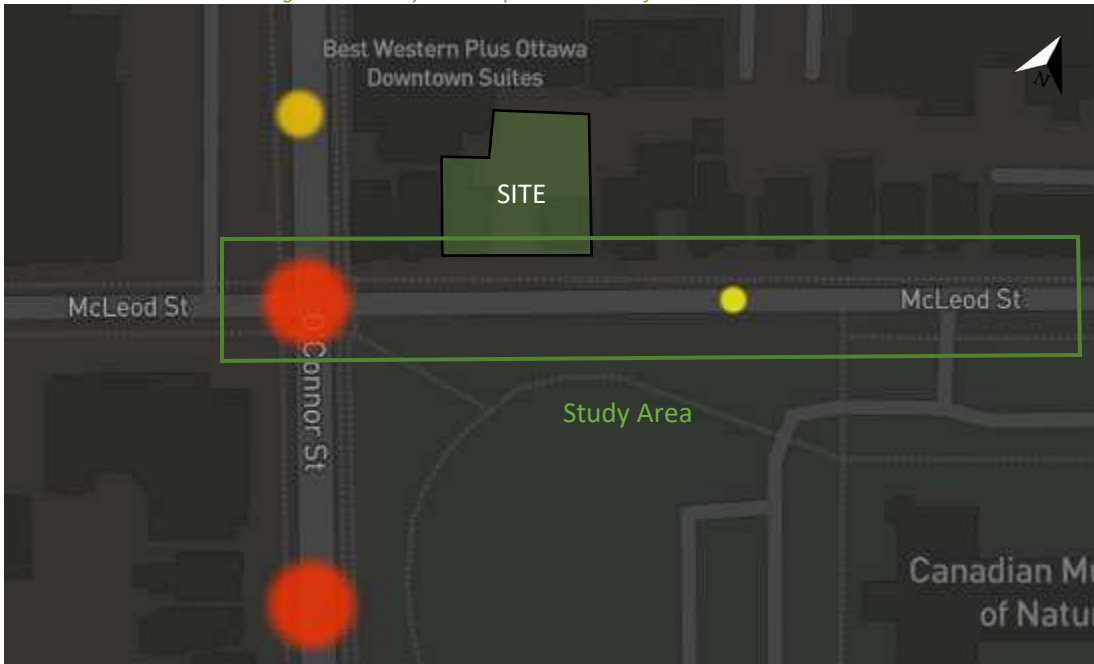
Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
McLeod Street & O'Connor Street <i>Signalized</i>	WBL/T	A	0.41	33	24	A	0.51	34	31
	SBT/R	A	0.39	5	36	C	0.76	12	#136
	Overall	A	0.43	8	-	C	0.78		-
Notes:	Saturation flow rate of 1800 veh/h/lane								
	PHF = 0.90								
	# - 95% percentile exceeds capacity; queue may be longer								

The volume for the 95th percentile cycle exceeds capacity at southbound approach at McLeod Street and O'Connor Street intersection during the PM peak period. However, since V/C ratio is less than one, it can be assumed that the 95th percentile queue will rarely be exceeded. Although the 95th percentile queue is largest at this approach, it is caused by existing conditions. The subject development is not anticipated to impact the intersection operations due to the low trip generation, as indicated by Step 1 Screening Form (Appendix A).

2.2.8 Collision Analysis

Collision data has been acquired from the City of Ottawa for five years (2014-2018) prior to the commencement of this TIA for the surrounding Study Area road network. Table 3 illustrates the collisions at the intersections and road segments within the Study Area, and Table 4 summarizes the collision types and conditions of the 10 collisions recorded in the Study Area. Collision data is included in Appendix E.

Figure 11: Study Area Representation of Collision Locations



Source: <https://maps.bikeottawa.ca/collisions/> Accessed: August 22, 2020

Table 3: Summary of Collision Locations, 2014-2018

Intersections / Segments	Number	%
Intersections / Segments	10	100%
McLeod Street between O'Connor Street and Metcalfe Street	2	20%
McLeod Street at O'Connor Street	8	80%

Table 4: Collision Summary

Total Collisions		Number	%
Total Collisions		10	100%
Classification	Fatality	0	0%
	Non-Fatal Injury	0	0%
	Property Damage Only	10	100%
Initial Impact Type	Approaching	0	0%
	Angle	3	30%
	Rear End	1	10%
	Sideswipe	3	30%
	Turning Movement	0	0%
	SMV Unattended Vehicle	2	20%
	SMV Other	1	10%
	Other	0	0%
Road Surface Condition	Dry	6	60%
	Wet	3	30%
	Loose Snow	1	10%
	Slush	0	0%
	Packed Snow	0	0%
	Ice	0	0%
	Loose Sand or Gravel	0	0%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The Study Area had a total of 10 collisions during the 2014-2018 time period, where all collisions involved property damage only. Three collisions had impact on an angle and three collisions had sideswipe impact. Weather/road conditions are a contributing factor for four collisions in this area. None of the collisions in the Study Area involved cyclists or pedestrians.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

The subject development is within the Centretown Community Design Plan (CDP) Area. As such, it is subject to the planning policies outlined in the CDP. The CDP proposes improvements to pedestrian, bicycle, transit and vehicular level of service (LOS). As part of this plan, McLeod Street has been outlined as a Potential Pedestrian Priority Street and the McLeod Street and O'Connor Street intersection is a potential location for Improved Pedestrian Crossings. As per page 54 of the Centretown CDP, the improvements to pedestrian crossings may include:

- *Advanced yield lines to improve the visibility of crossing pedestrians*
- *Installations of curb extensions and removal of on-street parking to improve visibility*
- *Zebra crossings or raised traffic tables*
- *No right turn movement on red*
- *Accelerated implementation of pedestrian countdown signals*
- *Less stringent warrants for implementation of mid-block pedestrian crossing signals*
- *Pedestrian priority push button to activate walk signals*

O'Connor Street is also outlined as a Future Phase of Two-Way Conversion, which will transform the street from two-lane one directional street to a two-way street with one lane in each direction. The exact timing of this is not clear. For the purposes of this study, it was assumed that the Two-Way Conversion will happen beyond the 2022 full build-out horizon of the subject development.

2.3.2 Other Study Area Developments

The impact of the subject development trips is anticipated to be minimal and does not trigger trip generation and the need for synchro network analysis. While there are other developments within a 400 metre radius of the subject site, their impact on transportation network will be assessed through TIA process for those developments. Therefore, this TIA will only focus on the subject development.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of McLeod Street and O'Connor Street. McLeod Street is noted as the boundary road for the site.

3.2 Time Periods

As the proposed development is composed entirely of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2022.

4 Exemption Review

Table 5 summarizes the exemptions for this TIA.

Table 5: Exemption Review

Module	Element	Explanation	Exempt/Required
Forecasting			
3.1 – 3.3	3.1 – 3.3	Only required when Step 1 trip generation trigger is met	Exempt
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Required
	4.1.3 New Street Networks	Only required for plans of subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Required
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
4.4 Access Intersection Design	4.4.3 Intersection Design	Only required when Step 1 trip generation trigger is met	Exempt
Network Impact Component			
4.5 – 4.9	4.5 – 4.9	Only required when Step 1 trip generation trigger is met	Exempt

5 Next Steps

Following the circulation and review of the TIA, any outstanding comments will be documents within the context of the site plan in the Step 4 Strategy Report. Once remaining TIA Steps are completed and sign-off has been received from City Transportation Project Manager, a signed and stamped final report will be provided to City staff.

Appendix A

TIA Screening Form and PM Certification Form



TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed¹ or registered² professional in good standing, whose field of expertise [check appropriate field(s)] is either transportation engineering or transportation planning .

1,2 License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

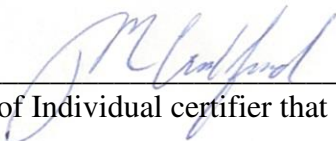
City Of Ottawa
Infrastructure Services and Community
Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d'infrastructure et Viabilité des
collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at Newmarket this 28 day of June, 2018.
(City)

Name: Mark Crockford
(Please Print)

Professional Title: Professional Engineer


Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)
Address: 628 Haines Road
City / Postal Code: Newmarket / L3Y 6V5
Telephone / Extension: (905) 251-4070
E-Mail Address: Mark.Crockford@CGHTransportation.com



City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 14-Aug-20
Project Number: 2020-15
Project Reference: 283 - 285 McLeod

1.1 Description of Proposed Development	
Municipal Address	283 - 285 McLeod
Description of Location	50 m east of O'Connor Street at McLeod Street
Land Use Classification	Residential
Development Size	30 Residential Units
Accesses	1 full movement access on McLeod Street
Phase of Development	1 Phase
Buildout Year	
TIA Requirement	Design Review Component

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	30 Units
Trip Generation Trigger	No

1.3 Location Triggers	
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	No
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	Yes
Location Trigger	Yes

1.4. Safety Triggers	
Are posted speed limits on a boundary street 80 km/hr or greater?	No
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	No
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?	Yes
Is the proposed driveway within auxiliary lanes of an intersection?	No
Does the proposed driveway make use of an existing median break that serves an existing site?	No
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	No
Does the development include a drive-thru facility?	No
Safety Trigger	Yes

Appendix B

Traffic Data

Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

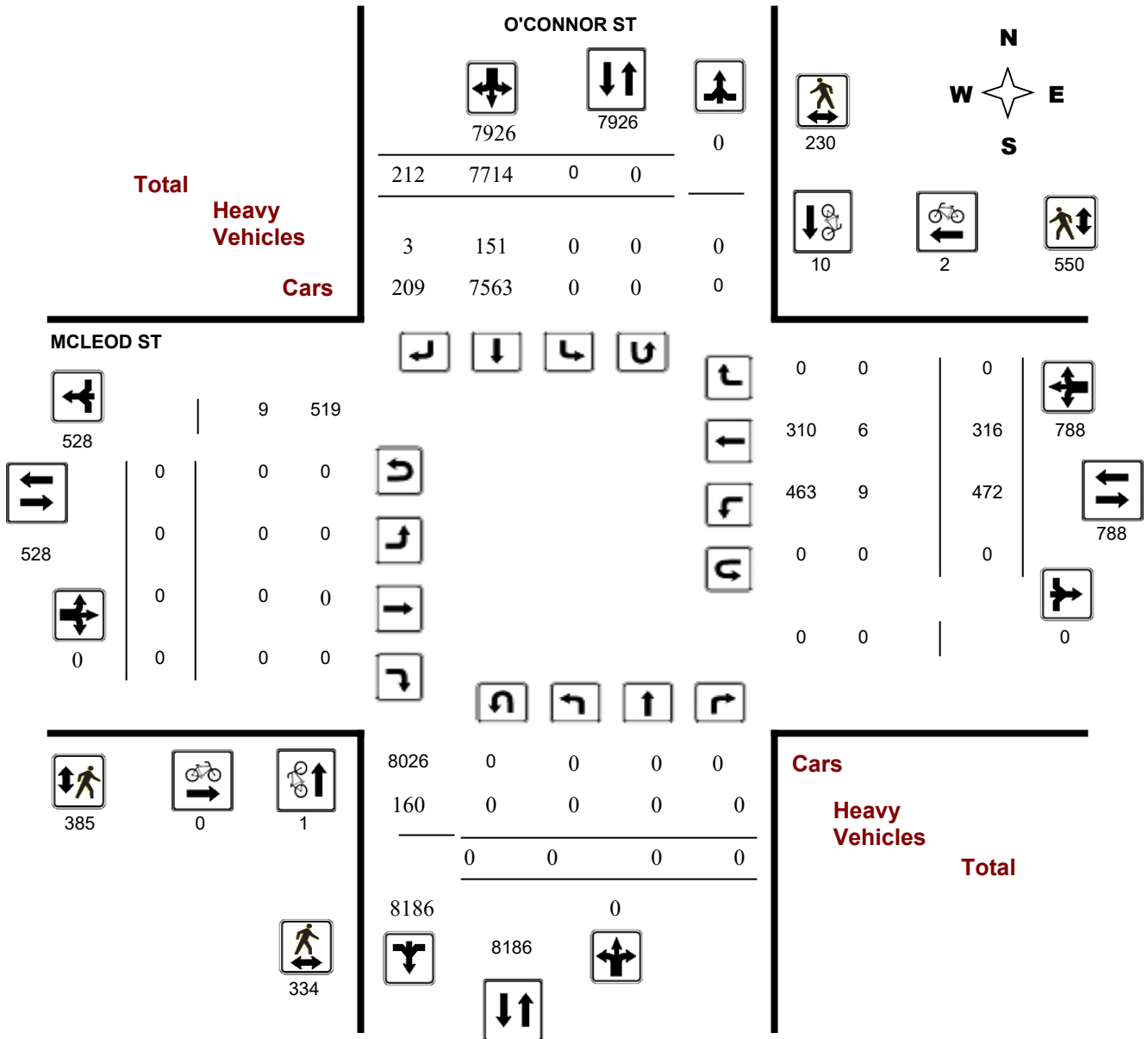
Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study Diagram



Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

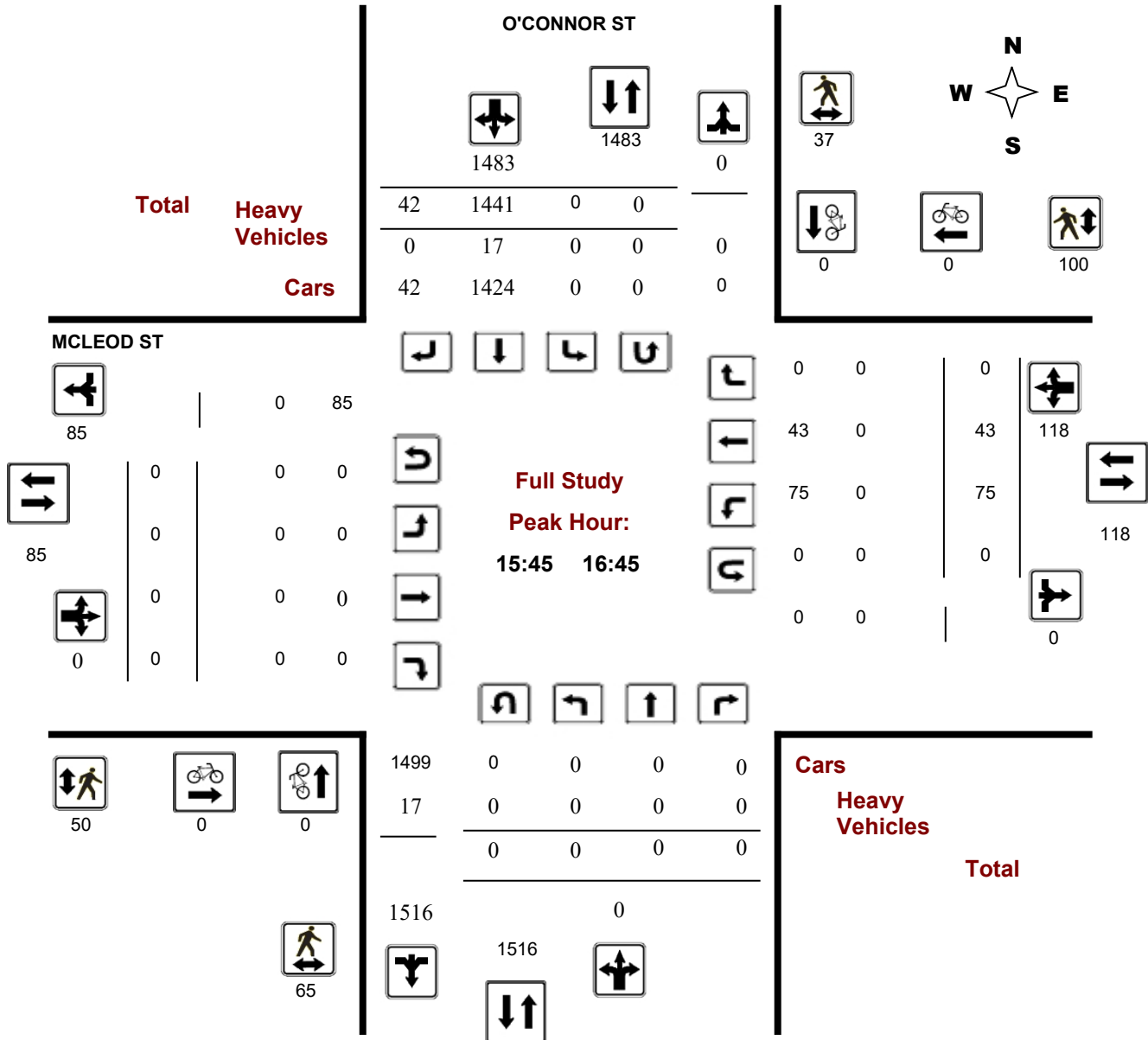
Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study Peak Hour Diagram





Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

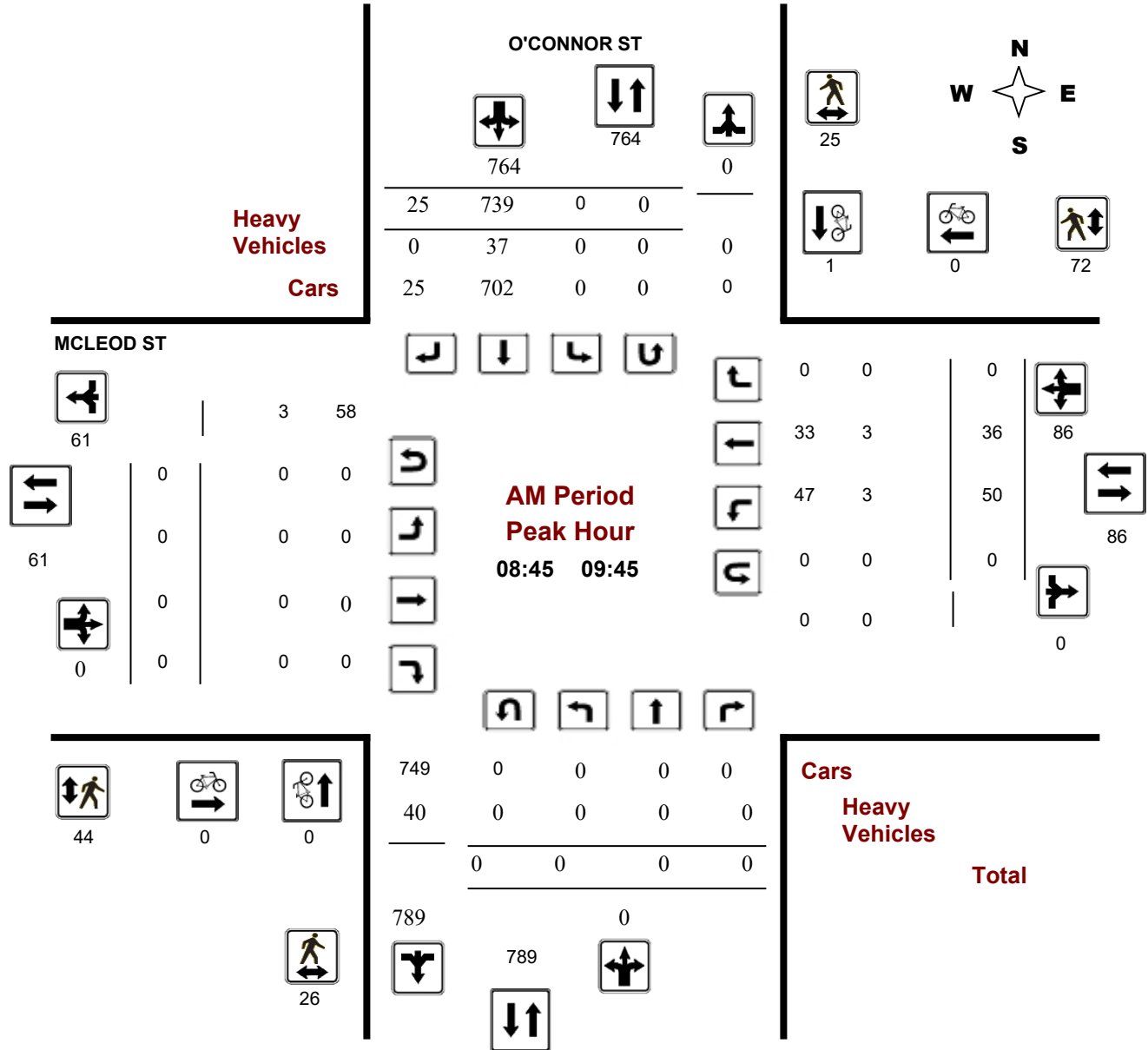
MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

Start Time: 07:00

WO No: 36783

Device: Miovision



Turning Movement Count - Peak Hour Diagram

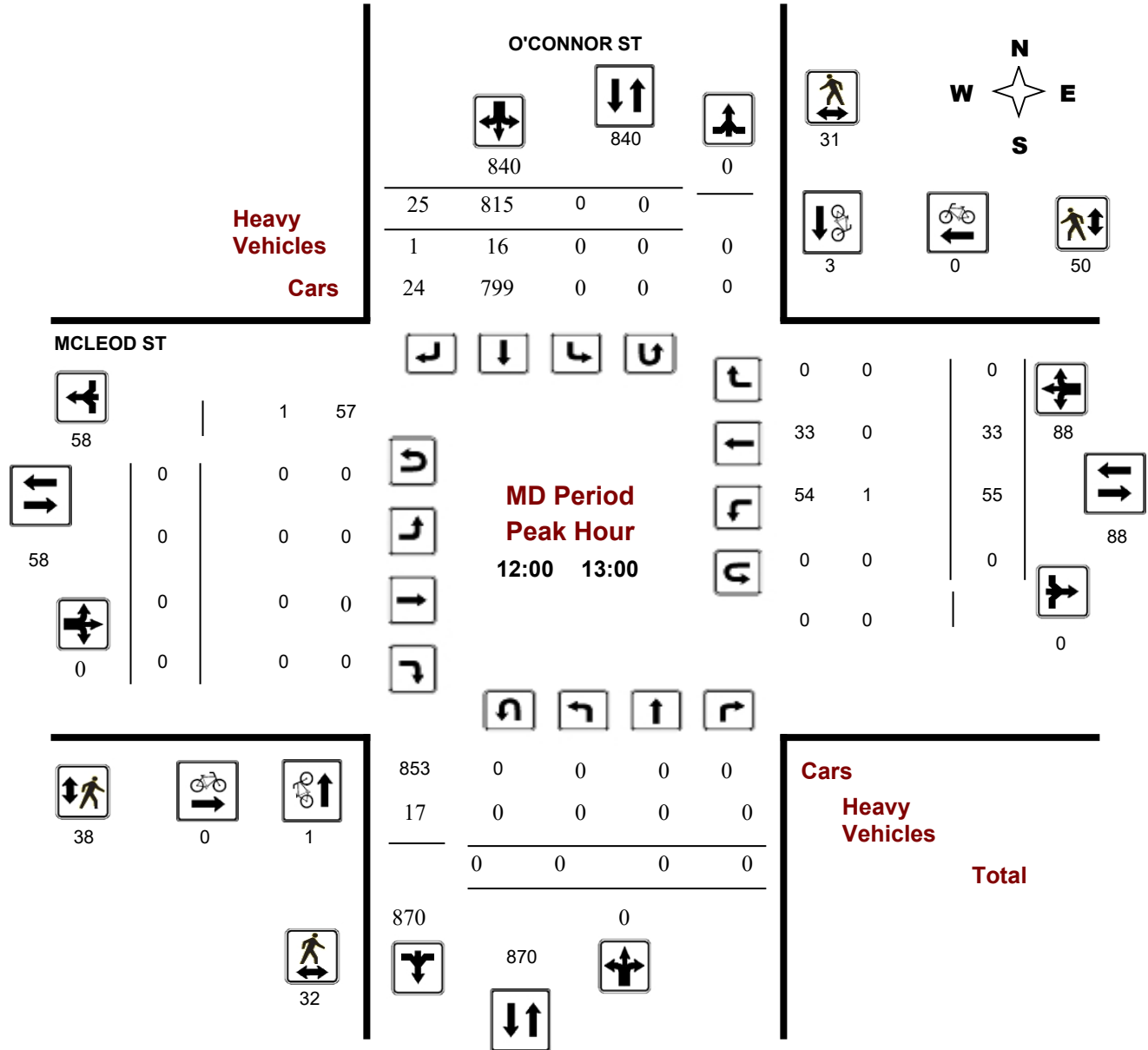
MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

Start Time: 07:00

WO No: 36783

Device: Miovision



Comments

Turning Movement Count - Peak Hour Diagram

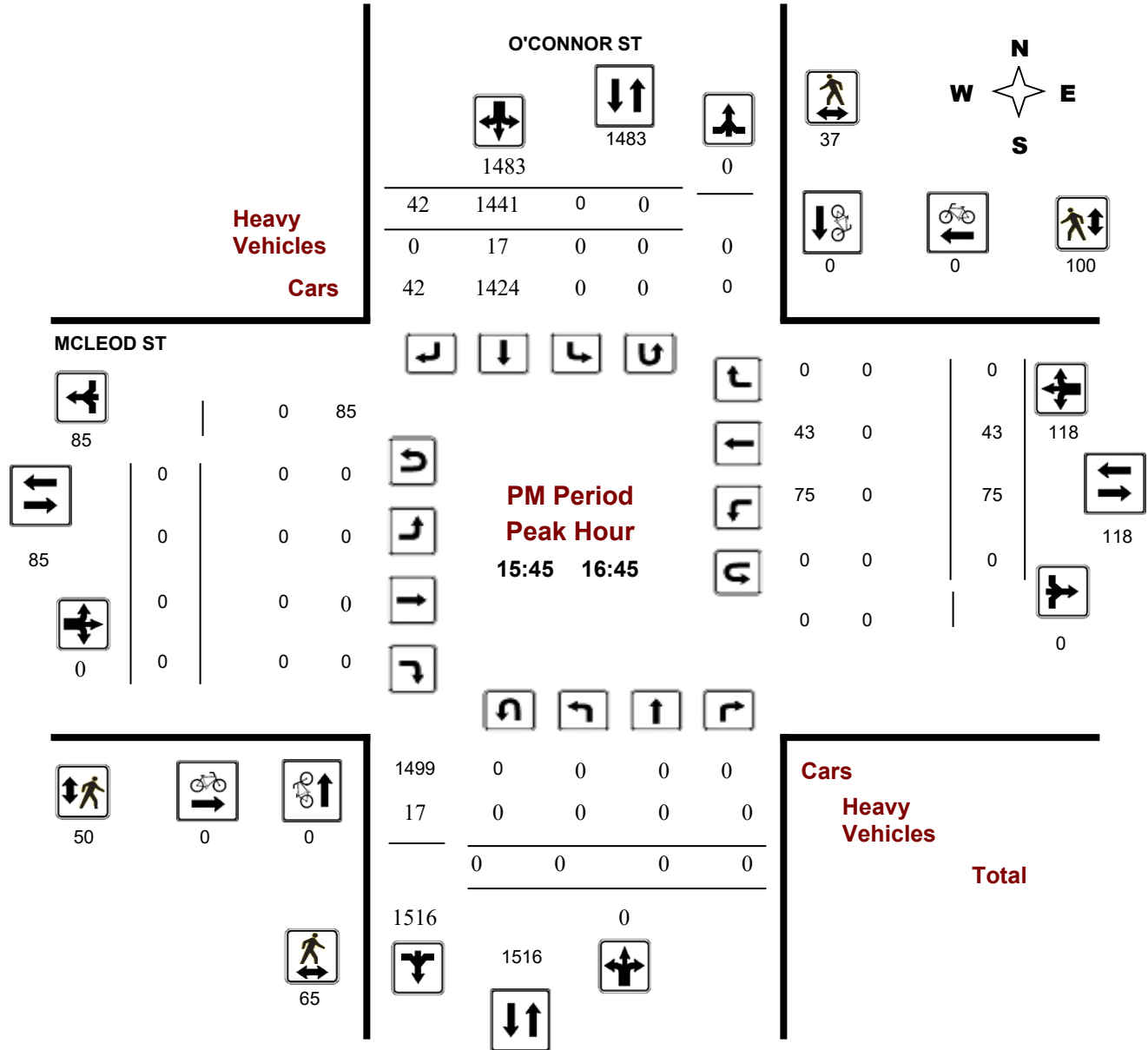
MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

Start Time: 07:00

WO No: 36783

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Tuesday, March 21, 2017

Total Observed U-Turns

AADT Factor

Northbound: 0 Southbound: 0
 Eastbound: 0 Westbound: 0

1.00

Period	O'CONNOR ST										MCLEOD ST										Grand Total
	Northbound					Southbound					Eastbound					Westbound					
	LT	ST	RT	NB TOT	STR TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	STR TOT	LT	ST	RT	WB TOT	STR TOT	
07:00 08:00	0	0	0	0	0	637	18	655	655	0	0	0	0	31	22	0	53	53	708		
08:00 09:00	0	0	0	0	0	721	22	743	743	0	0	0	0	48	35	0	83	83	826		
09:00 10:00	0	0	0	0	0	738	30	768	768	0	0	0	0	50	31	0	81	81	849		
11:30 12:30	0	0	0	0	0	773	22	795	795	0	0	0	0	62	35	0	97	97	892		
12:30 13:30	0	0	0	0	0	792	26	818	818	0	0	0	0	52	30	0	82	82	900		
15:00 16:00	0	0	0	0	0	1359	28	1387	1387	0	0	0	0	66	55	0	121	121	1508		
16:00 17:00	0	0	0	0	0	1417	43	1460	1460	0	0	0	0	74	41	0	115	115	1575		
17:00 18:00	0	0	0	0	0	1277	23	1300	1300	0	0	0	0	89	67	0	156	156	1456		
Sub Total	0	0	0	0	0	7714	212	7926	7926	0	0	0	0	472	316	0	788	788	8714		
U Turns				0				0	0				0				0	0	0		
Total	0	0	0	0	0	7714	212	7926	7926	0	0	0	0	472	316	0	788	788	8714		
EQ 12Hr	0	0	0	0	0	10722	295	11017	11017	0	0	0	0	656	439	0	1095	1095	12112		
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39								
AVG 12Hr	0	0	0	0	0	10105	278	10383	11017	0	0	0	0	618	414	0	1032	1095	12112		
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													1								
AVG 24Hr	0	0	0	0	0	13238	364	13602	13602	0	0	0	0	810	542	0	1352	1352	14954		

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

MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study 15 Minute Increments

O'CONNOR ST

MCLEOD ST

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	0	0	0	0	118	0	118	6	0	0	0	0	8	3	0	11	6	129
07:15 07:30	0	0	0	0	0	128	7	135	8	0	0	0	0	6	6	0	12	8	147
07:30 07:45	0	0	0	0	0	201	6	207	3	0	0	0	0	6	5	0	11	3	218
07:45 08:00	0	0	0	0	0	190	5	195	5	0	0	0	0	11	8	0	19	5	214
08:00 08:15	0	0	0	0	0	195	7	202	5	0	0	0	0	13	8	0	21	5	223
08:15 08:30	0	0	0	0	0	157	6	163	7	0	0	0	0	10	11	0	21	7	184
08:30 08:45	0	0	0	0	0	192	6	198	6	0	0	0	0	14	8	0	22	6	220
08:45 09:00	0	0	0	0	0	177	3	180	7	0	0	0	0	11	8	0	19	7	199
09:00 09:15	0	0	0	0	0	185	8	193	11	0	0	0	0	11	10	0	21	11	214
09:15 09:30	0	0	0	0	0	163	6	169	10	0	0	0	0	15	9	0	24	10	193
09:30 09:45	0	0	0	0	0	214	8	222	9	0	0	0	0	13	9	0	22	9	244
09:45 10:00	0	0	0	0	0	176	8	184	4	0	0	0	0	11	3	0	14	4	198
11:30 11:45	0	0	0	0	0	192	3	195	3	0	0	0	0	20	9	0	29	3	224
11:45 12:00	0	0	0	0	0	177	4	181	6	0	0	0	0	12	9	0	21	6	202
12:00 12:15	0	0	0	0	0	206	9	215	3	0	0	0	0	18	8	0	26	3	241
12:15 12:30	0	0	0	0	0	198	6	204	3	0	0	0	0	12	9	0	21	3	225
12:30 12:45	0	0	0	0	0	210	6	216	1	0	0	0	0	14	9	0	23	1	239
12:45 13:00	0	0	0	0	0	201	4	205	10	0	0	0	0	11	7	0	18	10	223
13:00 13:15	0	0	0	0	0	178	9	187	2	0	0	0	0	12	5	0	17	2	204
13:15 13:30	0	0	0	0	0	203	7	210	5	0	0	0	0	15	9	0	24	5	234
15:00 15:15	0	0	0	0	0	329	9	338	4	0	0	0	0	14	13	0	27	4	365
15:15 15:30	0	0	0	0	0	354	5	359	5	0	0	0	0	15	14	0	29	5	388
15:30 15:45	0	0	0	0	0	318	6	324	1	0	0	0	0	16	14	0	30	1	354
15:45 16:00	0	0	0	0	0	358	8	366	6	0	0	0	0	21	14	0	35	6	401
16:00 16:15	0	0	0	0	0	386	8	394	1	0	0	0	0	26	9	0	35	1	429
16:15 16:30	0	0	0	0	0	361	12	373	7	0	0	0	0	17	9	0	26	7	399
16:30 16:45	0	0	0	0	0	336	14	350	3	0	0	0	0	11	11	0	22	3	372
16:45 17:00	0	0	0	0	0	334	9	343	3	0	0	0	0	20	12	0	32	3	375
17:00 17:15	0	0	0	0	0	354	2	356	0	0	0	0	0	32	13	0	45	0	401
17:15 17:30	0	0	0	0	0	342	5	347	2	0	0	0	0	23	19	0	42	2	389
17:30 17:45	0	0	0	0	0	301	9	310	5	0	0	0	0	14	14	0	28	5	338
17:45 18:00	0	0	0	0	0	280	7	287	3	0	0	0	0	20	21	0	41	3	328
Total:	0	0	0	0	0	7714	212	7926	154	0	0	0	0	472	316	0	788	154	8,714

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study Cyclist Volume

Time Period	O'CONNOR ST			MCLEOD ST			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street 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	1	1	0	0	0	1
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	1	1	1
11:45 12:00	0	1	1	0	0	0	1
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	0	2	2	0	0	0	2
12:30 12:45	0	1	1	0	0	0	1
12:45 13:00	1	0	1	0	0	0	1
13:00 13:15	0	2	2	0	0	0	2
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	1	1	0	0	0	1
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	1	1	0	0	0	1
17:15 17:30	0	0	0	0	1	1	1
17:30 17:45	0	1	1	0	0	0	1
17:45 18:00	0	0	0	0	0	0	0
Total	1	10	11	0	2	2	13



Transportation Services - Traffic Services

Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study Pedestrian Volume

O'CONNOR ST

MCLEOD ST

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	5	3	8	6	6	12	20
07:15 07:30	5	5	10	5	4	9	19
07:30 07:45	14	2	16	8	7	15	31
07:45 08:00	10	6	16	11	6	17	33
08:00 08:15	5	13	18	18	27	45	63
08:15 08:30	15	4	19	15	26	41	60
08:30 08:45	10	6	16	13	27	40	56
08:45 09:00	10	6	16	18	19	37	53
09:00 09:15	7	5	12	10	20	30	42
09:15 09:30	4	9	13	7	23	30	43
09:30 09:45	5	5	10	9	10	19	29
09:45 10:00	2	4	6	5	10	15	21
11:30 11:45	6	7	13	9	14	23	36
11:45 12:00	9	4	13	5	7	12	25
12:00 12:15	9	9	18	10	9	19	37
12:15 12:30	9	5	14	10	10	20	34
12:30 12:45	6	13	19	13	10	23	42
12:45 13:00	8	4	12	5	21	26	38
13:00 13:15	6	11	17	12	12	24	41
13:15 13:30	10	4	14	6	16	22	36
15:00 15:15	6	7	13	15	11	26	39
15:15 15:30	16	14	30	14	11	25	55
15:30 15:45	10	10	20	12	13	25	45
15:45 16:00	14	11	25	9	26	35	60
16:00 16:15	18	9	27	13	31	44	71
16:15 16:30	16	9	25	11	22	33	58
16:30 16:45	17	8	25	17	21	38	63
16:45 17:00	21	14	35	18	20	38	73
17:00 17:15	16	8	24	15	28	43	67
17:15 17:30	13	2	15	36	28	64	79
17:30 17:45	11	9	20	14	23	37	57
17:45 18:00	21	4	25	16	32	48	73
Total	334	230	564	385	550	935	1499



Transportation Services - Traffic Services

Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study Heavy Vehicles

O'CONNOR ST

MCLEOD ST

Northbound

Southbound

Eastbound

Westbound

Time Period	Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
	LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00 07:15	0	0	0	0	0	6	0	6	6	0	0	0	0	0	0	0	0	0	6
07:15 07:30	0	0	0	0	0	7	1	8	8	0	0	0	0	0	1	0	1	1	9
07:30 07:45	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	3
07:45 08:00	0	0	0	0	0	5	0	5	5	0	0	0	0	0	0	0	0	0	5
08:00 08:15	0	0	0	0	0	5	0	5	5	0	0	0	0	0	0	0	0	0	5
08:15 08:30	0	0	0	0	0	7	0	7	7	0	0	0	0	0	1	0	1	1	8
08:30 08:45	0	0	0	0	0	6	0	6	6	0	0	0	0	0	0	0	0	0	6
08:45 09:00	0	0	0	0	0	7	0	7	7	0	0	0	0	1	0	0	1	1	8
09:00 09:15	0	0	0	0	0	11	0	11	11	0	0	0	0	1	0	0	1	1	12
09:15 09:30	0	0	0	0	0	10	0	10	10	0	0	0	0	1	2	0	3	3	13
09:30 09:45	0	0	0	0	0	9	0	9	9	0	0	0	0	0	1	0	1	1	10
09:45 10:00	0	0	0	0	0	3	1	4	4	0	0	0	0	1	0	0	1	1	5
11:30 11:45	0	0	0	0	0	3	0	3	3	0	0	0	0	1	0	0	1	1	4
11:45 12:00	0	0	0	0	0	6	0	6	6	0	0	0	0	1	0	0	1	1	7
12:00 12:15	0	0	0	0	0	2	1	3	3	0	0	0	0	1	0	0	1	1	4
12:15 12:30	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	3
12:30 12:45	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1
12:45 13:00	0	0	0	0	0	10	0	10	10	0	0	0	0	0	0	0	0	0	10
13:00 13:15	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	0	0	2
13:15 13:30	0	0	0	0	0	5	0	5	5	0	0	0	0	1	0	0	1	1	6
15:00 15:15	0	0	0	0	0	4	0	4	4	0	0	0	0	1	1	0	2	2	6
15:15 15:30	0	0	0	0	0	5	0	5	5	0	0	0	0	0	0	0	0	0	5
15:30 15:45	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1
15:45 16:00	0	0	0	0	0	6	0	6	6	0	0	0	0	0	0	0	0	0	6
16:00 16:15	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1
16:15 16:30	0	0	0	0	0	7	0	7	7	0	0	0	0	0	0	0	0	0	7
16:30 16:45	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	3
16:45 17:00	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	3
17:00 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	0	0	2
17:30 17:45	0	0	0	0	0	5	0	5	5	0	0	0	0	0	0	0	0	0	5
17:45 18:00	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	3
Total: None	0	0	0	0	0	151	3	154	154	0	0	0	0	9	6	0	15	15	169



Transportation Services - Traffic Services

Turning Movement Count - Study Results

MCLEOD ST @ O'CONNOR ST

Survey Date: Tuesday, March 21, 2017

WO No: 36783

Start Time: 07:00

Device: Miovision

Full Study 15 Minute U-Turn Total

O'CONNOR ST

MCLEOD ST

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	0	0	0

Appendix C

HV% Calculation

















[1] McLeod Street at O'Connor Street												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	0	0	0	37	0	0	0	0	3	3	0
Total Volume	0	0	0	0	739	25	0	0	0	50	36	0
HV%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	5%	0%	#DIV/0!	#DIV/0!	#DIV/0!	6%	8%	#DIV/0!
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	0	0	0	17	0	0	0	0	0	0	0
Total Volume	0	0	0	0	1441	42	0	0	0	75	43	0
HV%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1%	0%	#DIV/0!	#DIV/0!	#DIV/0!	0%	0%	#DIV/0!

Appendix D

Synchro Intersection Worksheets – Existing Conditions

Lanes, Volumes, Timings
1: O'Connor Street & McLeod Street

2020 Existing Conditions AM Peak Hour
283-285 McLeod Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	50	36	0	0	0	0	0	739	25
Future Volume (vph)	0	0	0	50	36	0	0	0	0	0	739	25
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor					0.98							1.00
Frt												0.995
Flt Protected					0.972							
Satd. Flow (prot)	0	0	0	0	1502	0	0	1497	0	0	2877	0
Flt Permitted					0.972							
Satd. Flow (perm)	0	0	0	0	1468	0	0	1497	0	0	2877	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												8
Link Speed (k/h)		50			50			50				50
Link Distance (m)		69.3			162.0			58.9				74.4
Travel Time (s)		5.0			11.7			4.2				5.4
Confl. Peds. (#/hr)				26								44
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	6%	8%	3%	7%	2%	2%	5%	2%
Adj. Flow (vph)	0	0	0	56	40	0	0	0	0	0	821	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	96	0	0	0	0	0	849	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		3.0			3.0			3.0				3.0
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2			2				2
Detector Template				Left	Thru			Thru				Thru
Leading Detector (m)				2.0	10.0			10.0				10.0
Trailing Detector (m)				0.0	0.0			0.0				0.0
Detector 1 Position(m)				0.0	0.0			0.0				0.0
Detector 1 Size(m)				2.0	0.6			0.6				0.6
Detector 1 Type				Cl+Ex	Cl+Ex			Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0			0.0				0.0
Detector 1 Queue (s)				0.0	0.0			0.0				0.0
Detector 1 Delay (s)				0.0	0.0			0.0				0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				0.0
Turn Type				Perm	NA							NA
Protected Phases					8			2				6

Lane Group	Ø1	Ø5
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	1	5

Lanes, Volumes, Timings
1: O'Connor Street & McLeod Street

2020 Existing Conditions AM Peak Hour
283-285 McLeod Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								
Detector Phase				8	8			2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0			5.0			10.0	
Minimum Split (s)				20.4	20.4			23.1			30.1	
Total Split (s)				21.0	21.0			49.0			49.0	
Total Split (%)				28.0%	28.0%			65.3%			65.3%	
Maximum Green (s)				15.6	15.6			43.9			43.9	
Yellow Time (s)				3.3	3.3			3.3			3.3	
All-Red Time (s)				2.1	2.1			1.8			1.8	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.4			5.1			5.1	
Lead/Lag								Lag			Lag	
Lead-Lag Optimize?								Yes			Yes	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Recall Mode				None	None			C-Max			C-Max	
Walk Time (s)				7.0	7.0			7.0			14.0	
Flash Dont Walk (s)				8.0	8.0			11.0			6.0	
Pedestrian Calls (#/hr)				26	26			0			72	
Act Effct Green (s)					12.0						56.6	
Actuated g/C Ratio					0.16						0.75	
v/c Ratio					0.41						0.39	
Control Delay					33.1						5.2	
Queue Delay					0.0						0.0	
Total Delay					33.1						5.2	
LOS					C						A	
Approach Delay					33.1						5.2	
Approach LOS					C						A	
Queue Length 50th (m)					12.8						19.3	
Queue Length 95th (m)					24.4						36.2	
Internal Link Dist (m)		45.3			138.0			34.9			50.4	
Turn Bay Length (m)												
Base Capacity (vph)					305						2171	
Starvation Cap Reductn					0						0	
Spillback Cap Reductn					0						0	
Storage Cap Reductn					0						0	
Reduced v/c Ratio					0.31						0.39	
Intersection Summary												
Area Type:	CBD											
Cycle Length:	75											
Actuated Cycle Length:	75											
Offset:	56 (75%), Referenced to phase 2:NBT and 6:SBT, Start of Green											
Natural Cycle:	60											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.41											
Intersection Signal Delay:	8.1						Intersection LOS: A					
Intersection Capacity Utilization	42.1%						ICU Level of Service A					
Analysis Period (min)	15											

















Splits and Phases: 1: O'Connor Street & McLeod Street



Lane Group	Ø1	Ø5
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	3.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	7%	7%
Maximum Green (s)	3.0	3.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
1: O'Connor Street & McLeod Street

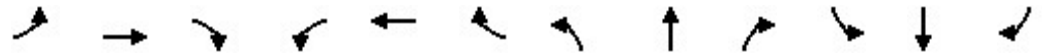
2020 Existing Conditions AM Peak Hour
283-285 McLeod Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	75	43	0	0	0	0	0	1441	42
Future Volume (vph)	0	0	0	75	43	0	0	0	0	0	1441	42
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor					0.94							1.00
Frt												0.996
Flt Protected					0.969							
Satd. Flow (prot)	0	0	0	0	1522	0	0	1497	0	0	2963	0
Flt Permitted					0.969							
Satd. Flow (perm)	0	0	0	0	1428	0	0	1497	0	0	2963	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												6
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		69.3			162.0			58.9			74.4	
Travel Time (s)		5.0			11.7			4.2			5.4	
Confl. Peds. (#/hr)				65								50
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	3%	7%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	83	48	0	0	0	0	0	1601	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	131	0	0	0	0	0	1648	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2			2				2
Detector Template				Left	Thru			Thru				Thru
Leading Detector (m)				2.0	10.0			10.0				10.0
Trailing Detector (m)				0.0	0.0			0.0				0.0
Detector 1 Position(m)				0.0	0.0			0.0				0.0
Detector 1 Size(m)				2.0	0.6			0.6				0.6
Detector 1 Type				Cl+Ex	Cl+Ex			Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0			0.0				0.0
Detector 1 Queue (s)				0.0	0.0			0.0				0.0
Detector 1 Delay (s)				0.0	0.0			0.0				0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				0.0
Turn Type				Perm	NA							NA
Protected Phases					8			2				6
Permitted Phases				8								

Lane Group	Ø1	Ø5
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(m)		
Link Offset(m)		
Crosswalk Width(m)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (k/h)		
Number of Detectors		
Detector Template		
Leading Detector (m)		
Trailing Detector (m)		
Detector 1 Position(m)		
Detector 1 Size(m)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(m)		
Detector 2 Size(m)		
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	1	5
Permitted Phases		

Lanes, Volumes, Timings
1: O'Connor Street & McLeod Street

2020 Existing Conditions AM Peak Hour
283-285 McLeod Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase				8	8			2				6
Switch Phase												
Minimum Initial (s)				10.0	10.0			5.0				10.0
Minimum Split (s)				20.4	20.4			23.1				30.1
Total Split (s)				25.0	25.0			45.0				45.0
Total Split (%)				33.3%	33.3%			60.0%				60.0%
Maximum Green (s)				19.6	19.6			39.9				39.9
Yellow Time (s)				3.3	3.3			3.3				3.3
All-Red Time (s)				2.1	2.1			1.8				1.8
Lost Time Adjust (s)					0.0			0.0				0.0
Total Lost Time (s)					5.4			5.1				5.1
Lead/Lag								Lag				Lag
Lead-Lag Optimize?								Yes				Yes
Vehicle Extension (s)				3.0	3.0			3.0				3.0
Recall Mode				None	None			C-Max				C-Max
Walk Time (s)				7.0	7.0			7.0				14.0
Flash Dont Walk (s)				8.0	8.0			11.0				6.0
Pedestrian Calls (#/hr)				65	65			0				100
Act Effct Green (s)					13.5							55.1
Actuated g/C Ratio					0.18							0.73
v/c Ratio					0.51							0.76
Control Delay					34.4							12.0
Queue Delay					0.0							0.0
Total Delay					34.4							12.0
LOS					C							B
Approach Delay					34.4							12.0
Approach LOS					C							B
Queue Length 50th (m)					16.5							80.3
Queue Length 95th (m)					30.7							#135.6
Internal Link Dist (m)		45.3			138.0			34.9				50.4
Turn Bay Length (m)												
Base Capacity (vph)					373							2179
Starvation Cap Reductn					0							0
Spillback Cap Reductn					0							0
Storage Cap Reductn					0							0
Reduced v/c Ratio					0.35							0.76

Intersection Summary

Area Type:	CBD
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	16 (21%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	13.7
Intersection LOS:	B
Intersection Capacity Utilization:	65.5%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Lane Group	Ø1	Ø5
Detector Phase		
Switch Phase		
Minimum Initial (s)	3.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	7%	7%
Maximum Green (s)	3.0	3.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Queue shown is maximum after two cycles.

Splits and Phases: 1: O'Connor Street & McLeod Street



Appendix E

Collision Data

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2016-11-01	2016	20:41	MCLEOD ST btwn O'CONNOR ST & METCALFE ST	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2018-02-06	2018	Unknown	MCLEOD ST btwn O'CONNOR ST & METCALFE ST (_3ZA8GN)	01 - Clear	00 - Unknown	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	03 - Loose snow

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2015-04-05	2015	13:59	MCLEOD ST @ O'CONNOR ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2015-05-25	2015	13:07	MCLEOD ST @ O'CONNOR ST	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	02 - Wet
2015-12-22	2015	16:45	MCLEOD ST @ O'CONNOR ST	02 - Rain	05 - Dusk	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	02 - Wet
2016-08-21	2016	9:10	MCLEOD ST @ O'CONNOR ST	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet
2016-01-04	2016	15:59	MCLEOD ST @ O'CONNOR ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2017-11-08	2017	17:30	MCLEOD ST @ O'CONNOR ST	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	07 - SMV other	01 - Dry
2017-01-07	2017	13:27	MCLEOD ST @ O'CONNOR ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2018-02-05	2018	17:00	MCLEOD ST @ O'CONNOR ST (0007282)	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry

LOCATION & GEOID	TOTAL_COLLISIONS	TOTAL_CYCLIST_COLLISIONS	TOTAL_PEDESTRIAN_COLLISIONS
MCLEOD ST btwn O'CONNOR ST & METCALFE ST (_3ZA8GN)	2	0	0
MCLEOD ST @ O'CONNOR ST (0007282)	8	0	0