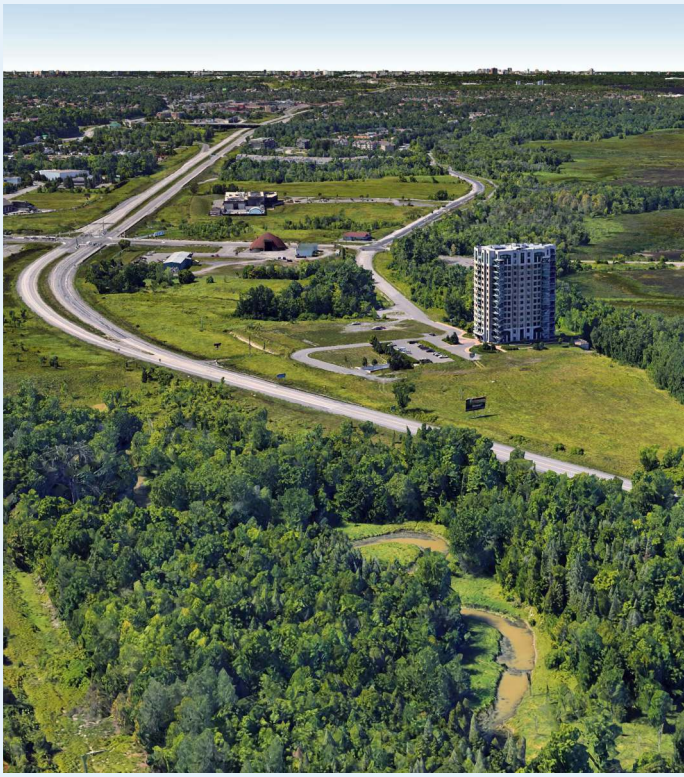
August 2018

BRIGIL

"Proud to build a better quality of life"

Petrie's Landing I - Towers 3 to 5

Transportation Impact Assessment Strategy Report



PARSONS

Petrie's Landing I - Towers 3 to 5

Transportation Impact Assessment Strategy Report

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Strategy Report

1. SCREENING FORM

The screening form was prepared for the subject development and included as part of the subsequent report. The screening form confirmed the need for a Transportation Impact Assessment (TIA) based on the Trip Generation, Location and Safety triggers, given that the proposed development consists of three towers with a total of 806 additional condominium units, located at a lot bounded to the south by OR-174 (speed limit of 90 km/h) and partially within the Trim TOD zone. The screening form is provided in Appendix A.

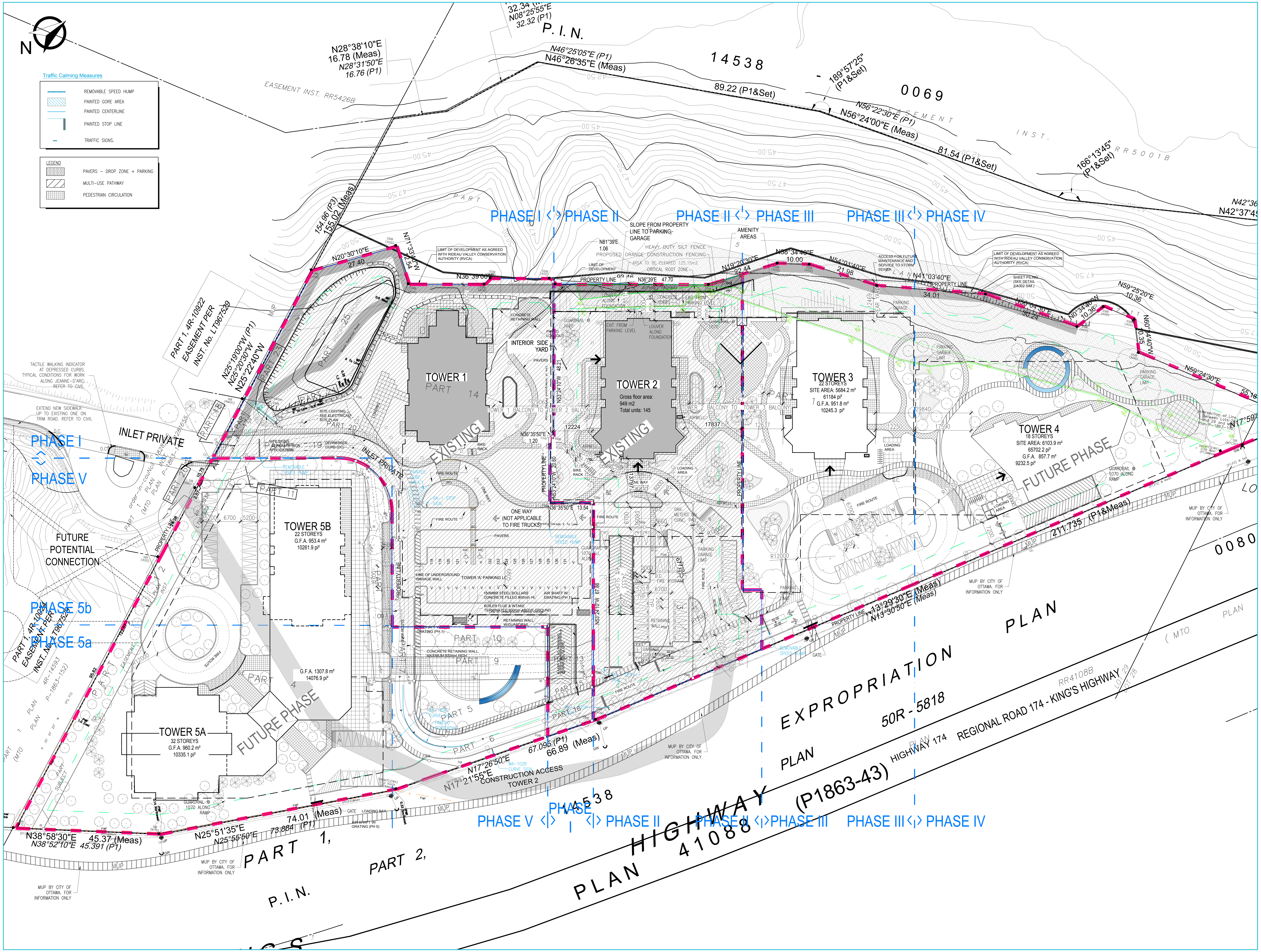
2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1. PROPOSED DEVELOPMENT

The proposed Brigil's residential development is located at 8900 Jeanne d'Arc Boulevard (formerly 8911 North Service Road). The site is in Ward 1, Orléans, and is designated as R5 Residential Fifth Density Zone according to the Part 6, sec. 163-164 of the Zoning By-Law No. 2008-250. Currently the site consists of a 15-storey tower containing 89 condominium units (Tower 1), approximately 34 surface parking spaces and a second tower in construction that will consist of 145 units (Tower 2). The site's local context is illustrated in Figure 1.

Figure 1: Local Context

Brigil is proposing to proceed with the construction of Towers 3 to 5 within the planned Petrie's Landing I development. For this assessment, horizon years have been assumed to be the year 2022, representing interim build-out, year 2024, representing full build-out and occupancy of all towers, and the year 2029, representing the plus five years horizon. Tower 3 will consist of 22 storeys and 201 units. Tower 4 will consist of 18 storeys and 137 units. Tower 5A and 5B will consist of 32 storeys, 286 units, and 22 storeys, 182 units, respectively. Access to site will be provided via the existing phases of the development through Jeanne D'Arc Boulevard. The site plan is illustrated in Figure 2.



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OUVRAGE Project

PETRIES LANDING I - TOWER 3

EMPLACEMENT Location: OTTAWA, ON

NO PROJET No.: 11467

NO	RÉVISION	DATE (aa.mm.jj)
A	FOR COORDINATION	2018.05.01
B	FOR COORDINATION	2018.06.01
C	FOR COORDINATION	2018.06.06
D	FOR COORDINATION	2018.06.20
E	FOR COORDINATION	2018.07.06
F	FOR COORDINATION V-2	2018.07.06

Préliminaire
NE PAS UTILISER POUR CONSTRUCTION

DESSINÉ PAR Drawn by: O.C.
VÉRIFIÉ PAR Checked by: ANT.C/F.P.
DATE (aa.mm.jj): 18.07.06
ÉCHELLE Scale: 1:500

TITRE DU DESSIN Drawing Title

SITE PLAN CONCEPT

RÉVISION Revision: F
NO. DESSIN Dwg Number: A100

I:\P_11400\11467\CAD\11467 A100 Site Plan.dwg

3. EXISTING CONDITIONS

3.1. AREA ROAD NETWORK

Ottawa Regional Road 174 (OR 174) is an east-west City-owned freeway, which extends from HWY 417 in the west to Trim Road and continues east. Within the study area, OR 174 has a four-lane cross section and auxiliary turn lanes are provided at its intersection with Trim Road. The posted speed limit within the study area is 90 km/h.

Trim Road is classified as an arterial roadway south of OR 174 and as a major collector roadway between OR 174 and Jeanne D'Arc Boulevard (formerly known as North Service Road). North of Jeanne D'Arc Boulevard, Trim Road is classified as a local roadway. Within the study area, Trim Road has a two-lane cross section, a concrete sidewalk on the west side, a multi-use pathway on the east side and one curb cycle lane on each direction. The posted speed limit is 50 km/h.

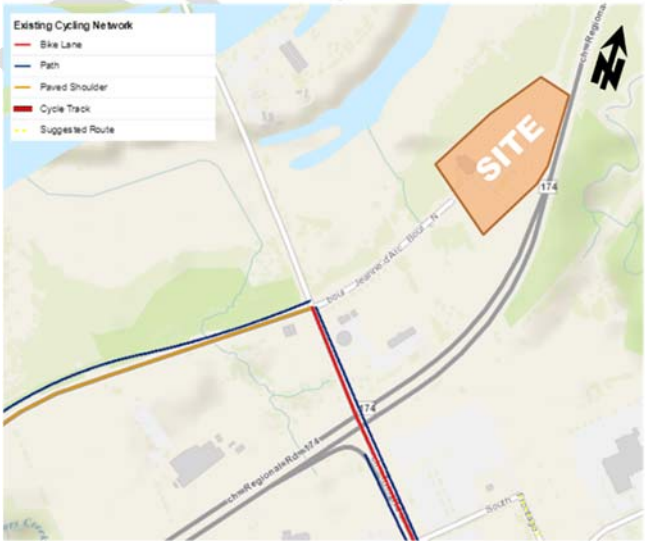
Jeanne D'Arc Boulevard is a major collector roadway west of Trim Road, with a posted speed limit of 60 km/h. East of Trim Road, Jeanne D'Arc Boulevard (formerly known as North Service Road) is classified as a local roadway with an unposted speed limit assumed to be 50 km/h. Within the study area, Jeanne D'Arc Boulevard has a two-lane cross section.

3.2. PEDESTRIAN AND CYCLING NETWORK

The pedestrian facilities include a concrete sidewalk and a multi-use path on the west and east side of Trim Road, respectively, north of OR 174. A multi-use pathway also exists along the north side of Jeanne D'Arc Boulevard, west of Trim Road.

According to the City's 2013 Official Cycling Plan, Trim Road and Jeanne D'Arc Boulevard (west of Trim Road) are classified as spine routes. Currently, paved shoulders and an off-road multi-use pathway exist along Jeanne D'Arc Boulevard, west of Trim Road. On Trim Road, one bicycle-lane is provided on both sides of the road south of Jeanne D'Arc Boulevard. Figure 3 depicts the existing area of study cycling network.

Figure 3: Area Cycling network

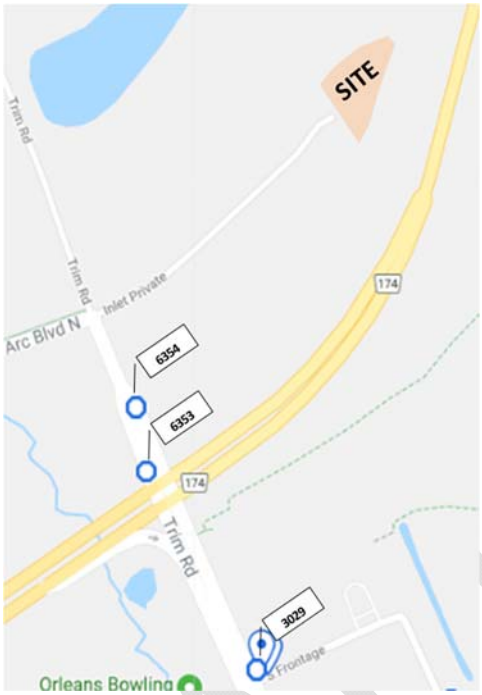


3.3. TRANSIT NETWORK

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #22, 38, 91, 95, 122, 221. Bus stops for Routes #38 and #122 are provided along Jeanne D'Arc Boulevard, approximately 350 m west of the Trim/Jeanne D'Arc intersection. Additional stops are provided for Route #122 on Trim Road, approximately 100 meters south of the

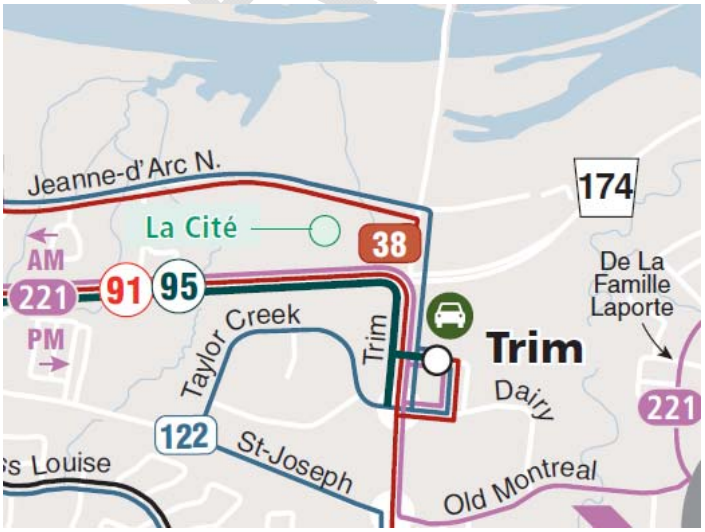
Trim/Jeanne D'Arc intersection as depicted in Figure 4. Bus stops for Routes #22, 91, 95 and 221 are provided at the existing OC Transpo 'Park and Ride' lot, approximately 250 m south of the Trim/OR 174 intersection.

Figure 4: OC Transpo Existing Bus Stops



Regular Routes #91, 95 and 122 provide frequent all-day service. Routes #22, 38 and 221 provide weekday morning and afternoon peak hour service only. Frequency of transit service near the site is approximately three to four buses pear hour, with higher frequency at the OC Transpo 'Park and Ride' lot.

Figure 5: Area Transit Network



www.octranspo.ca, accessed April 26th, 2018.

3.4. EXISTING STUDY AREA INTERSECTION

Trim/OR 174

The Trim/OR 174 intersection is a signalized four-legged intersection. The eastbound approach consists of a single left-turn lane, two through lanes and a single channelized right-turn lane. The westbound approach consists of a single left-turn lane, a through lane and a shared through/right-turn lane. The northbound approach consists of two left-turn lanes, a single through lane and a shared through/right-turn lane. The southbound approach consists of a single left-turn lane, a single through lane and a left-turn lane.

Trim/Jeanne D'Arc

The Trim/Jeanne D'Arc intersection is a four-legged intersection with all-way STOP control. All approaches consist of a single full-movement lane. The northbound approach includes a bike lane.

3.5. EXISTING INTERSECTION VOLUMES

The existing peak hour traffic volumes (illustrated in Figure 6 below) were obtained from the City of Ottawa and from counts performed by Parsons in 2018. The full traffic volume counts are provided in Appendix B.

Figure 6: Existing Peak Hour Traffic Volumes

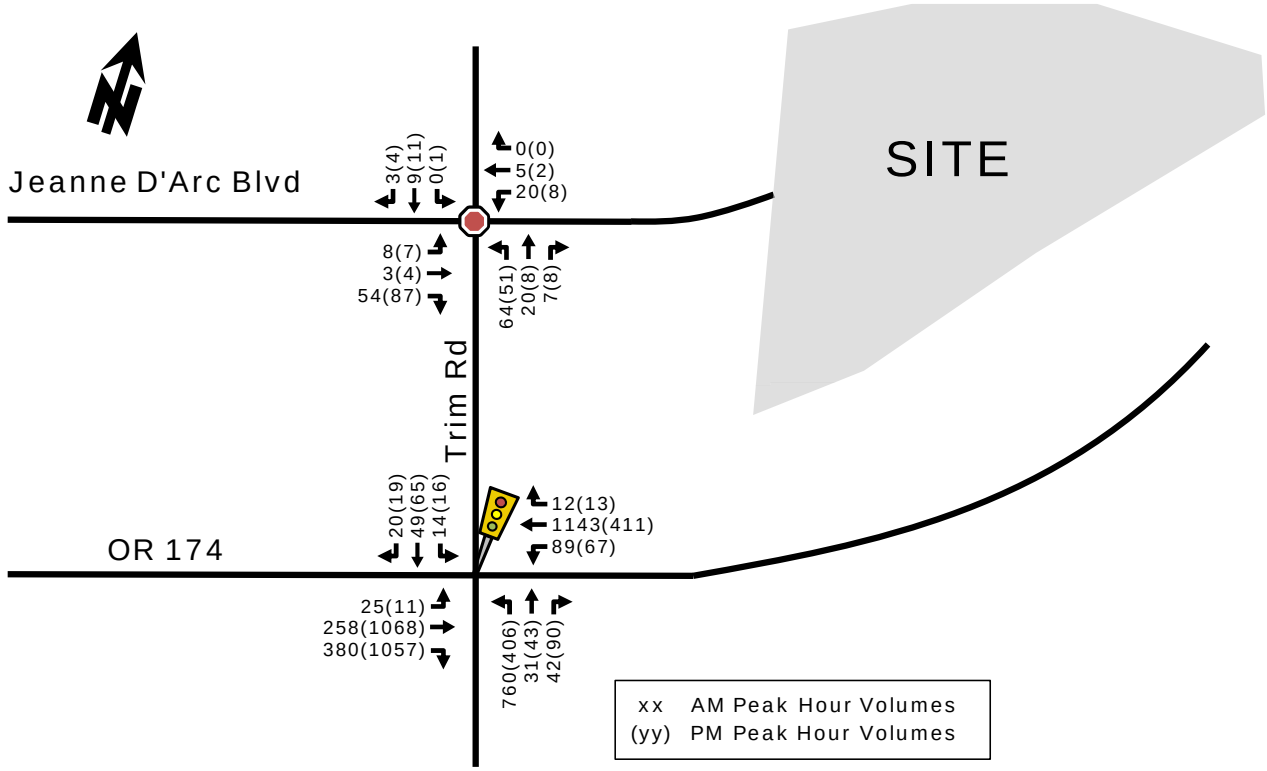


Table 1 provides a summary of the existing traffic operations at study area intersections based on the SYNCHRO (V9) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio for signalized intersections, delay (s) for stop-controlled and roundabout intersections, and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersections 'as a whole' were assessed based on a weighted v/c ratio or delay, and the SYNCHRO model output of existing conditions is provided within Appendix C.

Table 1: Existing Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim (unsignalized)	A(A)	7.8(7.7)	NB(NB)	7.5(7.3)	A(A)	-
Trim/OR 174	D(D)	0.89(0.82)	NBL(EBT)	39.4(27.3)	D(C)	0.84(0.75)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 1, study area intersections 'as a whole' are currently operating at an acceptable LoS 'D' or better during the weekday peak hours. With regard to the 'critical movements' at study area intersections, they are operating at an acceptable LoS 'D' or better.

3.6. EXISTING ROAD SAFETY CONDITIONS

Collision history for study area (2012 to 2016, inclusive) was obtained from the City of Ottawa. All collisions were registered at the Trim Road/OR 174 intersection. The majority (79%, or 55) of collisions involved property damage, 20% or 14 collisions involved non-fatal injuries, and 1 resulted in a fatal injury. The collision that resulted in a fatal injury involved a

vehicle that ran off road while heading in the east direction on February 2014. The road conditions were dry and the environment was clear.

Regarding the type of collision, rear ends accounted for 74% (or 51 collisions) of collisions, turning movements and sideswipe accounted for 9% (or 6 collisions) each, and angled, single vehicle other and other accounted for 3% (or 2 collisions) each. Majority of the rear end collisions took place on OR 174 in the westbound direction and in the eastbound direction involving vehicles slowing down and going ahead. Nine (9) rear end collisions were registered on Trim Road in the northbound direction. Turning movement collisions mainly involved EB vehicles turning left and WB vehicles going ahead during dark conditions. Given the geometry of OR174, high-speeds may be the cause of the collisions at this intersection. Currently, there are "Prepare to Stop when Flashing" signals on OR 174 approximately 600 meters to the west of Trim Road and 600 meters to the east of Trim Road.

Regarding Trim Road at Jeanne D'Arc Boulevard, no collisions were registered between 2012 and 2016.

A standard unit of measure for assessing collisions at an intersection is based on the number collisions per million entering vehicles (MEV). The reported collision rate for Trim Road at OR 174 was 1.11 MEV.

No additional collision mitigation measures are recommended at this time. The stop ahead warning sign and flashers have been provided on either side of the intersection on OR 174, and the intersection has recently been reconstructed. The effects of these improvements should be documented prior to any additional changes by the City. It is anticipated that the grade separation of this intersection in the future will address the collisions along OR-174.

The collision data and related analysis is included in Appendix D.

3.7. EXISTING AREA TRAFFIC MANAGEMENT MEASURES

Within the area of study, the following traffic management measures are identified:

- Two "Prepare to Stop when Flashing" signals on OR 174, each approximately 600 meters to the west of Trim Road and 600 meters to the east of Trim Road; and,
- One High Deer Collision Corridor signal on OR 174 westbound approximately 300 meters to the west of Trim Road.

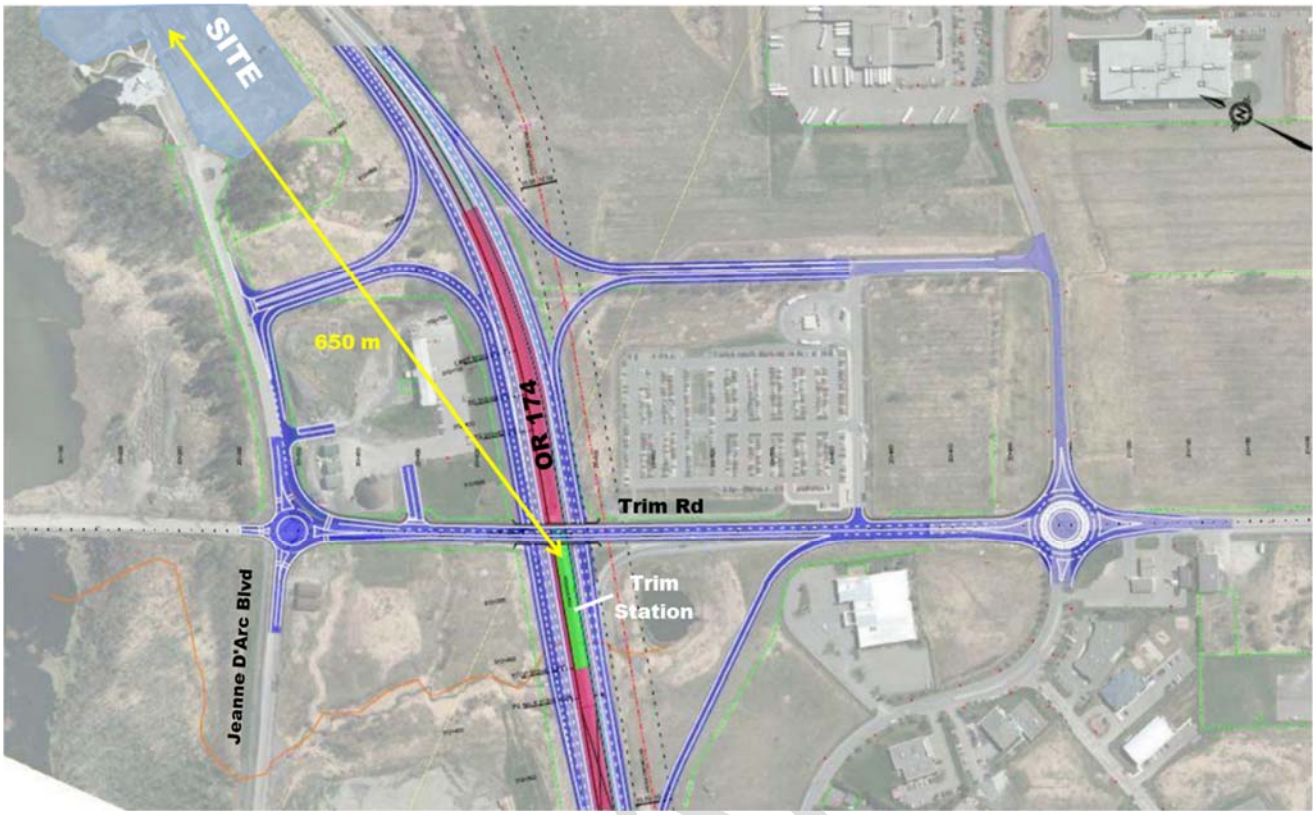
4. PLANNED CONDITIONS

4.1. PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES

OR 174 Light-Rail

Schedule D of the Official Plan – Rapid Transit and Transit Priority Network identifies the light rail Confederation Line east extension to Trim Road. According to the Confederation Line East Functional Design Report, the LRT east extension includes a grade separated crossing on Trim Road at OR 174 and a light-rail station on OR 174 at Trim Road, with opening year 2022. Figure 7 illustrates the planned LRT station and interchange at Trim road. Other planned adjacent network changes include a roundabout on Trim Road at Jeanne D'Arc Boulevard and access ramps from Jeanne D'Arc to/from OR 174, directly west from the subject site. It is noted that the subject site is located approximately 650 m from the future Trim Road LRT Station and is therefore considered to be within the Trim TOD area.

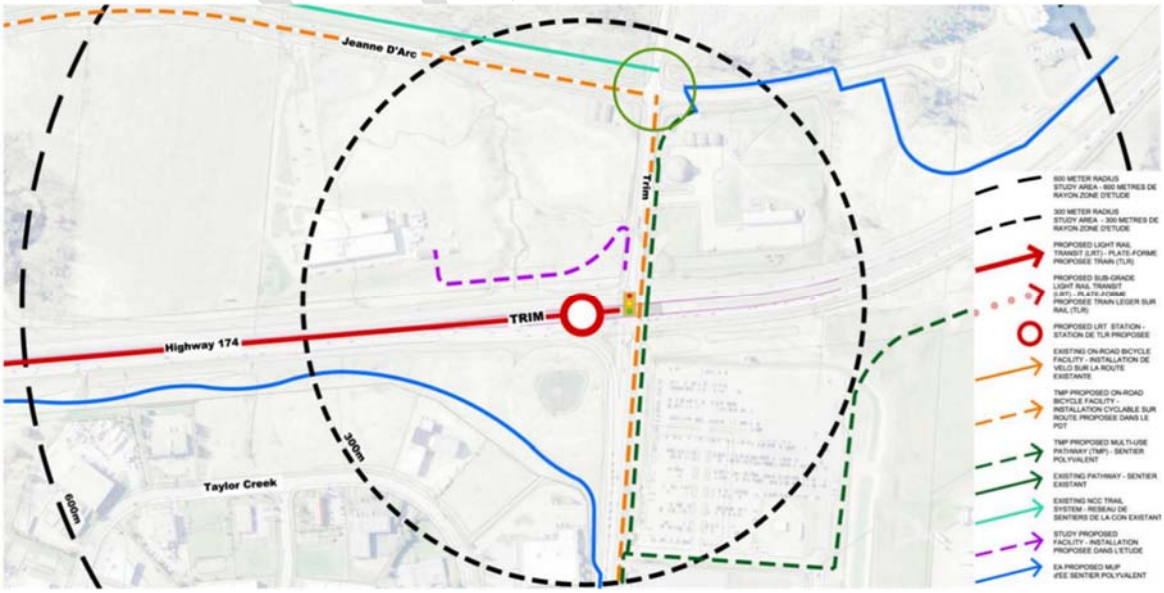
Figure 7: Confederation Line East Extension Interchange at Trim Road



http://www.stage2lrt.ca/wp-content/uploads/2015/09/Doc_2_---_Confederation_Line_East_Functional_Design_Report.pdf, accessed May 10th, 2018.

Figure 8**Error! Reference source not found.** illustrates planned connectivity features at Trim Road light-rail station, as presented by the City of Ottawa during a connectivity workshop held in August 2016. A planned City-owned multi-use pathway along Jeanne D'Arc Boulevard, east of Trim Road, that heads south and borders the subject site along the southern edge is noted.

Figure 8: Trim Road LRT Station Connectivity Study



http://www.stage2lrt.ca/resources/, accessed May 10th, 2018.

OR 174 Widening

An Environmental Assessment for the potential widening of OR 174 was conducted by the Townships of Prescott-Russell/City of Ottawa. The widening of OR 174 to six-lanes from Hwy 417 to Trim Road and to four-lanes from Trim Road to the City boundary is identified as a road project in the current 2013 City of Ottawa Transportation Master Plan. However, the widening of OR 174 is not identified as part of the Affordable Network Plan within the TMP. Therefore, the road widening of OR 174 east of Trim Road is unlikely within the foreseeable future.

Cycling Network

Within the Ottawa 2013 Cycling Plan, both Trim Road north of Jeanne D'Arc Boulevard and Jeanne D'Arc Boulevard east of Tim Road are identified as major cycling pathways. To the north, the planned pathway will extend along Trim Road to Petrie Island Beach and to the east, the planned MUP will extend along Jeanne D'Arc Boulevard to Cardinal Creek, bordering the subject site along the southern edge. Trim Road is classified as a Spine route south of Jeanne D'Arc Boulevard.

Jeanne D'Arc Culvert Renewal

According to Ward 1 Construction Map, culvert renewal is planned along Jeanne D'Arc Boulevard, west and east of Trim Road for the period 2018 - 2021.

Petrie's Landing Traffic Calming Concept

Within the TIS for Tower 2 of the Petrie's Landing I Development (prepared by Parsons), an addendum traffic calming plan was prepared. The traffic-calming plan has been developed with the intention to be implemented during the construction of Tower 2, and subsequently as each additional Tower is completed. It is noted that the subject site plan is generally consistent with the traffic calming plan. The aforementioned traffic calming plan is included in Appendix E.

4.2. OTHER AREA DEVELOPMENTS

4.2.1. PETRIE'S LANDING I - 2013 TIS

Delcan (now known as Parsons) prepared a Transportation Impact Study on December 2013 to support the Site Plan Application for Towers I, II, III, IV and a retirement residence within the subject site, for a total of 845 high-rise residential condominium units. The horizon years included in the assessment were 2018 (representing full occupancy of Tower 2) and 2024 (representing full occupancy of Towers III and IV). The proposed towers were projected to generate 297 and 285 veh/h during the weekday morning and afternoon peak hours. A traffic calming plan was prepared as addendum to the TIS and is included as Appendix E. Currently, Tower 1 has been built and Tower 2 is under construction. Vehicle volumes generated by Tower 2 are included in Appendix F.

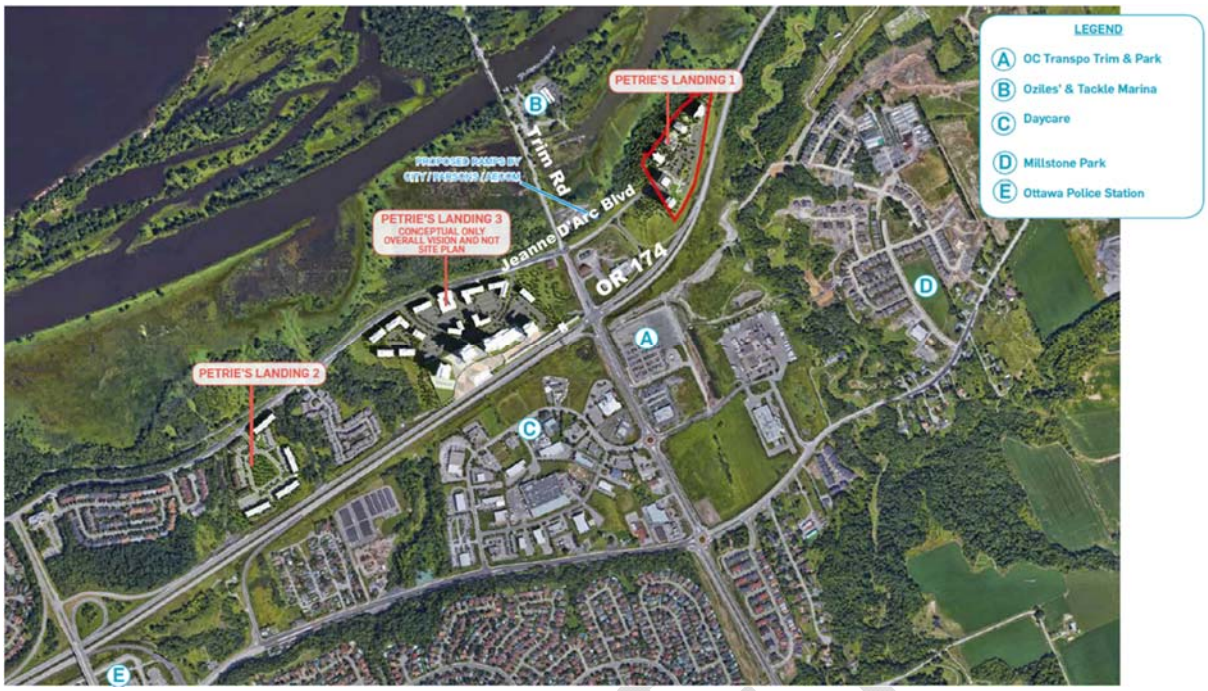
4.2.2. PETRIE'S LANDING II

Brigil is proposing the construction of a residential development consisting of approximately 300 to 430 residential units. The proposed Petrie's Landing II is located south of Jeanne D'Arc Boulevard, approximately 1.5 km west of the subject site, as illustrated in Figure 9. Currently, over 60% of the development is completed (phases 1 and 2). The projected two-way vehicle trips for this proposed residential development are approximately 150 veh/h during both peak hours. Vehicle volumes generated by this development at study area intersections are included in Appendix F.

4.2.3. PETRIE'S LANDING III

Brigil is proposing the construction of a mixed-use development consisting of approximately 370,000 ft^2 of office, 23,000 ft^2 of retail and up to 790 residential units. The proposed Petrie's Landing III is located south of Jeanne D'Arc Boulevard, approximately 1 km west of the subject site, as illustrated in Figure 9. The projected two-way vehicle trips for this proposed mixed-use development is approximately 660 and 685 veh/h during the morning and afternoon peak hours, respectively. Vehicle volumes generated by this development at study area intersections are included in Appendix F.

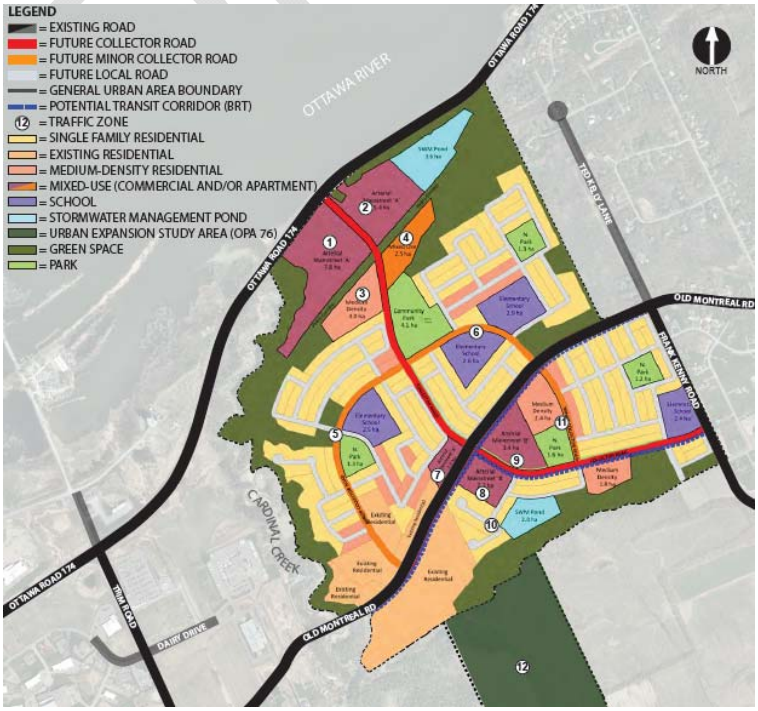
Figure 9: Petrie's Landing I, II and III Concept Plan



4.2.4. CARDINAL CREEK VILLAGE

Tamarack Homes is currently constructing a 1,446-unit subdivision and a 430,000 ft^2 shopping centre, south of OR 174 and east of Cardinal Creek, as illustrated in Figure 10. The Transportation Impact Study (prepared by IBI Group) projected approximately 1,460 veh/h and 2,619 veh/h by horizon year 2031 (full build-out) during the morning and afternoon peak hours, respectively. Vehicle volumes generated by this development at study area intersections are included in Appendix F.

Figure 10: Cardinal Creek Village



4.3. TRANSIT

As mentioned previously, transit is served within the area with bus stops for routes #38 and #122 on Jeanne D'Arc Boulevard, approximately 680 m from the site; for route #122 on Trim Road approximately 500 meters from the site; and bus stops for routes #22, 91, 95 and 221 on Trim Road at the existing OC Transpo 'Park and Ride' lot, approximately 820 m from the site.

4.4. NETWORK CONCEPT

The Bilberry Creek Screenline, SL-45, is in close proximity to the proposed development, capturing east-west traffic on OR 174 and Bilberry Creek. The Frank Kenny Screenline, SL-46, is also in close proximity to the proposed development, capturing east-west traffic on OR 174 and the projection of Ted Kelly Lane. It is not anticipated that this development will have significant impacts on these Screenlines.

4.5. INTERSECTION DESIGN

The proposed site will access the adjacent road network through Jeanne D'Arc Boulevard at Trim Road. The strategy analysis will review and document the access requirements if it is required.

5. TIME PERIODS

Given the land use of the proposed development, the weekday morning and afternoon peak hours will be analyzed.

6. HORIZON YEARS

The subject site is assumed to develop at a 2 year per tower rate for the remaining Petrie's Landing I development, given the current market demand. Therefore, for the purposes of this analysis the site full-occupancy date is assumed to be year 2024. The plus five years horizon will be analyzed for year 2029. An interim 2022 horizon is analyzed to account for transportation demand projections for Towers 3 and 4, prior to the completion of the LRT extension and station at Trim Road.

Considering construction trends of the past years, the following phasing is assumed for other area developments:

Year 2022

- Petrie's Landing I – Towers 3 and 4 built;
- Petrie's Landing II – 100% built;
- Petrie's Landing III – 30% built; and,
- Cardinal Creek – 40% built.

Year 2024

- Petrie's Landing I – 100% built;
- Petrie's Landing II – 100% built;
- Petrie's Landing III – 50% built; and,
- Cardinal Creek – 60% built.

Year 2029

- Petrie's Landing II – 100% built;
- Petrie's Landing III – 100% built; and,
- Cardinal Creek – 90% built.

7. EXEMPTIONS REVIEW

Based on the foregoing analysis and review of the existing conditions, it is recommended that any future work within the context of this TIA excludes the following modules and elements summarized in Table 3.

Table 2: Exemptions Review Summary

Module	Element	Exemption Consideration
4.2 Parking	4.2.2 Parking Spillover	The subject site is located within a 800 meters walk of the planned Trim Road LRT transit station, as depicted in Figure 20. Considering Sections 101(5)(d), 101(5)(e), 102(5), 103(1) and 103(2) of the Zoning By-Law 2008-250-Consolidation-Part 4, the subject development is required to provide 640 parking spaces for residents, 131 parking spaces for visitors and 44 parking spaces for commercial uses, for a total of 796 parking spaces. With a proposed total of 864 underground and surface parking spaces, the subject development is meeting City requirements.

In addition to the above recommendations of the Exemptions Review, the following exemptions are also proposed for both Step 3 – Forecasting and Step 4 – Analysis and are summarized in Table 3.

Table 3: Additional Recommended Exemptions Summary

Module	Element	Exemption Consideration
4.4 Access Intersection Design	4.4.2 Intersection Control	Site access will operate at Jeanne D'Arc Boulevard Dead-End and will not require an intersection screening for a signal or roundabout.
	4.4.3 Intersection Design	Site access will operate at Jeanne D'Arc Boulevard Dead-End and will not require an intersection screening for a signal or roundabout.
4.6 Neighbourhood Traffic Management	All Elements	Given the site's location relative to the existing road network, no cut through traffic is expected.

Next sections will review the trips generated by the subject development and compare them to the total volume along Trim Road and OR 174 to assess future network operations.

8. DEVELOPMENT GENERATED TRAVEL DEMAND

8.1. TRIP GENERATION AND MODE SHARES

8.1.1. TRIP GENERATION

Appropriate trip generation rates for the proposed development were obtained from the City's TRANS Trip Generation – Residential Trip Rates (Table 6.3 of the TRANS Trip Generation Study) for suburban apartments and are summarized in Table 4.

Table 4: TRANS Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Land Use	Data Source	Trip Rate	
		AM Peak	PM Peak
Tower 3	TRANS (ITE 232)	0.46	0.46
Tower 4	TRANS (ITE 232)	0.46	0.46
Tower 5A	TRANS (ITE 232)	0.46	0.46
Tower 5B	TRANS (ITE 232)	0.46	0.46

Using the TRANS Trip Generation rate, the total amount of vehicle trips generated by the proposed apartment units were projected and the results are summarized in Table 5. From the information provided, it is our understanding that retail uses to be accommodated within Tower 5, will be small scale and oriented to serve retirement units within the same tower. Therefore, they are not expected to impact the adjacent transportation network.

Table 5: TRANS Vehicle Trip Generation

Land Use	Units	AM Peak (veh/h)			PM Peak (veh/h)		
		In	Out	Total	In	Out	Total
Tower 3	201 du	25	67	92	53	39	92
Tower 4	137 du	17	46	63	36	27	63
Tower 5A	286 du	36	96	132	76	56	132
Tower 5B	182 du	23	61	84	48	36	84
Total		**101**	**270**	**371**	**213**	**158**	**371**

8.1.2. MODE SHARES

Considering the location of the site within Trim TOD area and the planned Light Rail East extension discussed in section 4.1, which will provide Light Rail service within the vicinity of the site, it is anticipated that transit ridership will increase once the LRT starts operation in 2022. To reflect conditions before LRT, Orleans' modal shares obtained from the 2011 Trans O-D Survey have been applied to phases completed before 2022 (Towers 3 and 4). Using the TRANS Auto Trips projected in Table 5 and the modal share percentages from Orleans of the TRANS 2011 O-D Survey, the 2022 total people trips for the proposed development were projected and are summarized in Table 6.

Table 6: Site Trip Generation – 2022 (Towers 3 and 4)

Travel Mode	AM Mode Share	AM Peak (persons/h)			PM Mode Share	PM Peak (persons/h)		
		In	Out	Total		In	Out	Total
Auto Driver	55%	42	113	155	64%	89	66	155
Auto Passenger	10%	7	20	27	21%	28	22	50
Transit	35%	27	73	100	15%	20	17	37
Non-motorized	0%	0	0	0	0%	0	0	0
Total People Trips	**100%**	**76**	**206**	**282**	**100%**	**137**	**105**	**242**
Total 'New' Tower 3 and 4 Auto Trips		**42**	**113**	**155**		**89**	**66**	**155**

To reflect conditions once the LRT is in service (post-2022), modal share percentages were adjusted to reflect the City of Ottawa transit share targets for TOD areas. Using the TRANS Auto Trips projected in Table 5 and the TRANS 2011 O-D Survey modal share percentages from Orleans the 2024 total people trips for the proposed development were projected. To reflect for the anticipated decrease in traffic generated by Towers 3 and 4 once LRT service starts, the adjusted modal shares were applied to the 2024 total people trips. Table 7 summarizes total people trips and adjusted modal shares due to LRT operation for year 2024.

Table 7: Total Site Trip Generation – 2024

Travel Mode	AM Mode Share	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Auto Driver	30%	56	147	203	100	74	174
Auto Passenger	10%	19	49	68	33	25	58
Transit	60%	111	294	405	200	148	347
Non-motorized	0%	0	0	0	0	0	0
Total People Trips	**100%**	**185**	**490**	**675**	**333**	**246**	**580**
Total 'New' Auto Trips		**56**	**147**	**203**	**100**	**74**	**174**

As shown in Table 7, the proposed site is projected to generate approximately 675 and 580 two-way person-trips per hour during the weekday morning and afternoon peak hours, respectively. Approximately 405 and 347 two-way transit trips per hour and 174 to 203 two-way auto trips per hour are anticipated, during the weekday morning and afternoon periods. It is noted the active mode trips during the peak periods was not considered as the site is bounded by OR 174 to the south, Ottawa River to the north.

8.2. TRIP DISTRIBUTION

Considering the site's connectivity and the planned adjacent road network, the trip distribution is outlined next:

- (From/To) the East: 10%;
- (From/To) the South: 15%; and,
- (From/To) the West: 75%.

8.3. TRIP ASSIGNMENT

Based on this distribution, site-generated traffic at interim build-out (2022) was assigned to the existing adjacent network and is illustrated in Figure 11. Site-generated traffic at full build-out (2024) was assigned to the planned adjacent network and is illustrated in Figure 12.

Figure 11: Interim Build-Out Site-Generated Traffic (year 2022)

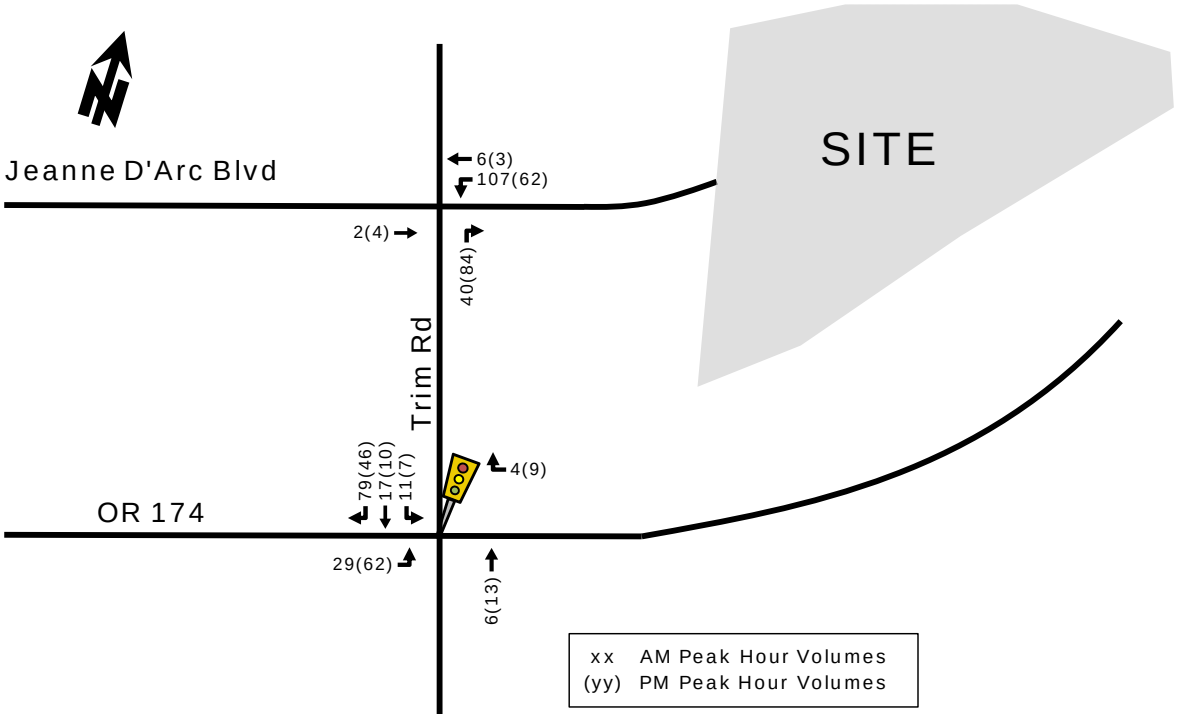
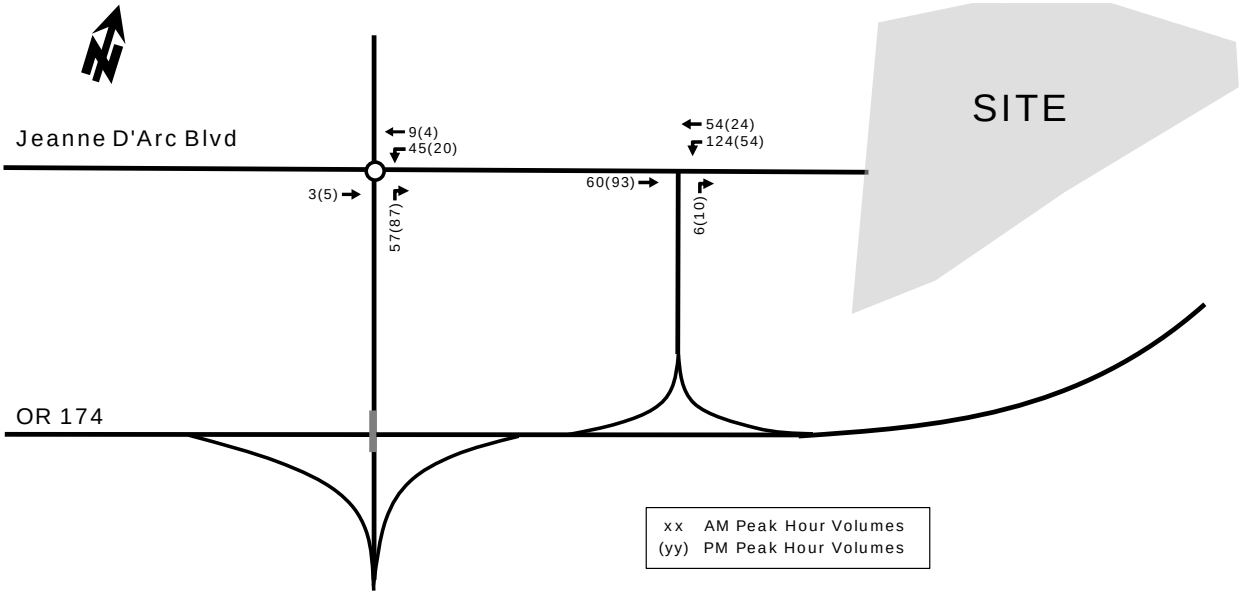


Figure 12: Full Build-Out Site-Generated Traffic (year 2024)



9. BACKGROUND NETWORK TRAVEL DEMAND

9.1. TRANSPORTATION NETWORK PLANS

The transportation network changes have been discussed within Section 4.1 and none are anticipated to impact the transportation analysis for this development.

9.2. BACKGROUND GROWTH

The following background traffic growth through the immediate study area (summarized in Table 8) was calculated based on historical traffic count data (years 2007, 2008, 2010, 2012, and 2017) provided by the City of Ottawa at the Trim/OR 174 intersection. Detailed analysis of the background growth is included in Appendix G.

Table 8: Trim/OR 174 Historical Background Growth (2007 – 2017)

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	2.64%	1.03%	-0.66%	-0.05%	**0.13%**
AM Peak	4.40%	2.49%	0.26%	0.84%	**1.13%**
PM Peak	-3.09%	0.12%	-0.16%	-0.37%	**-0.24%**

As show in Table 8, in past years OR 174 and Trim Road have experienced approximate annual growth in traffic volume of -0.37% to 0.84% and -3.09% to 4.40%, respectively. Therefore, the subsequent analysis of future conditions will assume a 1% annual growth rate along OR 174 and Trim Road, in addition to other area developments-generated traffic.

9.2.1. PROJECTED BACKGROUND 2022 OPERATIONS

Figure 13 illustrates the future background traffic volumes for the year 2022, including both background growth and other area developments. Table 9 summarizes the future background operations for the 2022 future background traffic volumes.

Figure 13: Projected Background 2022 Traffic Volumes

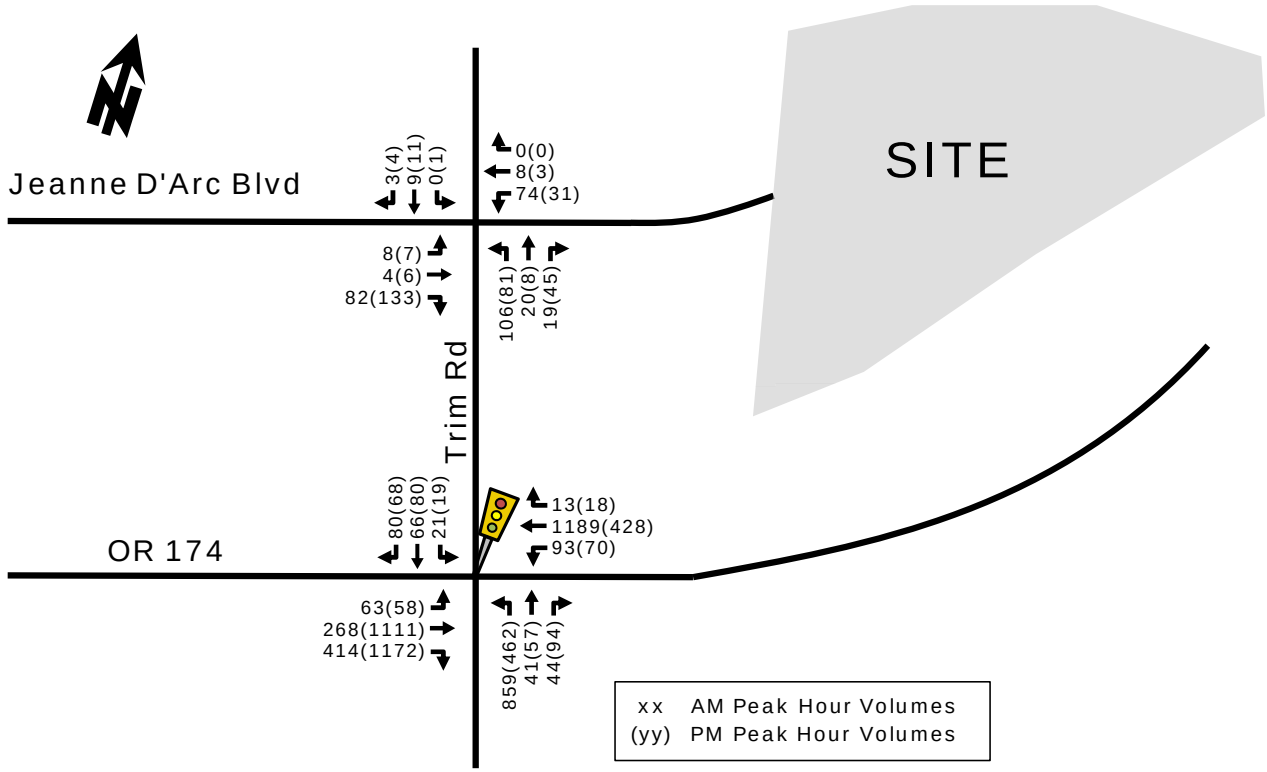


Table 9: Projected Background 2022 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim (unsignalized)	A(A)	8.6(8.2)	NB(NB)	8.1(7.9)	A(A)	-
Trim/OR 174	E(D)	0.99(0.86)	NBL(EBT)	48.4(29.9)	E(C)	0.94(0.79)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 9, the unsignalized Jeanne D'Arc/Trim intersection 'as a whole' is projected to continue operating at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements', they are also operating at a LoS 'A'.

The Trim/OR174 intersection is expected to experience lower levels of performance due to additional background traffic. As such, the Trim/OR174 intersection 'as a whole' is projected to operate at a LoS 'E' during peak hours (as compared to existing LoS 'D') with critical movements operating also at a LoS 'E' (as compared to existing LoS 'D'). Mitigative measures are not recommended with the opening of the Trim Road Rapid Transit station and proposed Trim Road overpass projected for 2022. The SYNCHRO model output of 2022 background conditions is provided within Appendix H.

9.2.2. PROJECTED BACKGROUND 2024 OPERATIONS

Figure 14 illustrates the future background traffic volumes for the year 2024, considering planned transportation network changes and including both background growth and other area developments generated traffic. Table 10 summarizes the future background operations for the year 2024 future background traffic volumes.

Figure 14: Projected Background 2024 Traffic Volumes

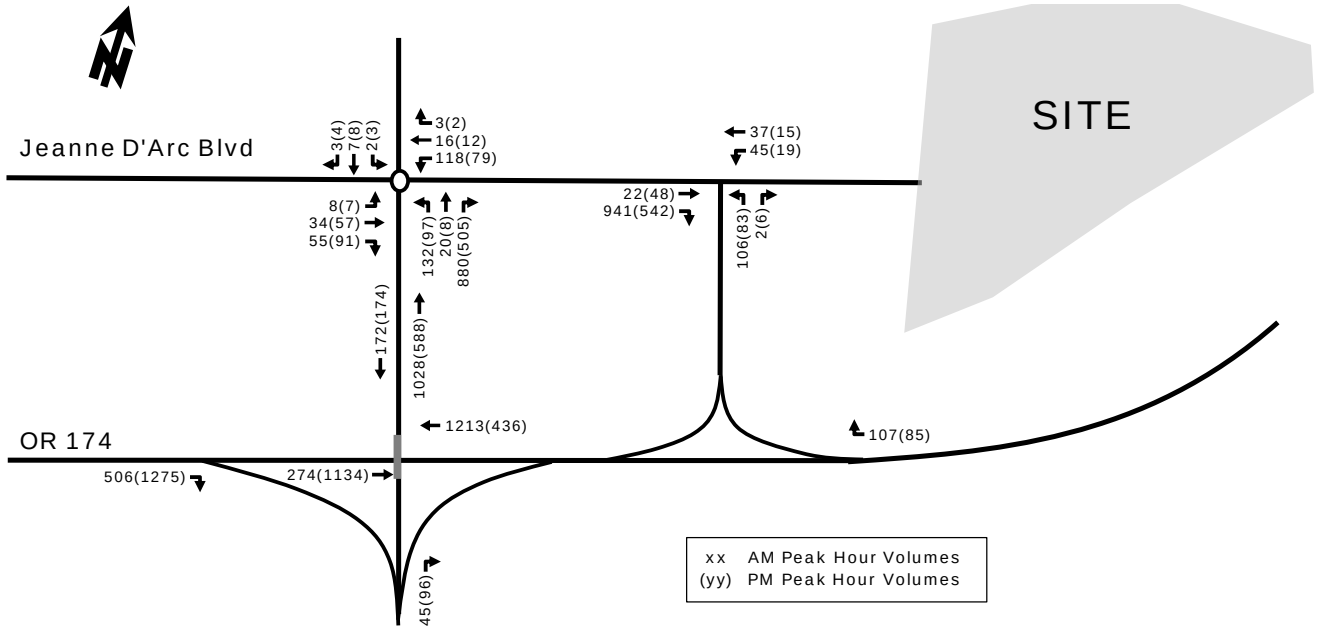


Table 10: Projected Background 2024 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim	A(A)	8.5(8.1)	SBL(SBL)	3.7(3.8)	A(A)	0.51(0.29)
Jeanne D'Arc/OR 174 WB On/Off Ramp	C(B)	16.6(12.0)	NB(NB)	1.9(1.7)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 10, at full build-out and considering planned area network, study area intersections 'as a whole' would operate at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements' at the future unsignalized Jeanne D'Arc/OR 174 WB On-Off Ramp intersection, they would operate at an acceptable LoS 'C' or better. The SYNCHRO model output of 2024 background conditions is provided within Appendix I.

9.2.3. PROJECTED BACKGROUND 2029 OPERATIONS

Figure 15 illustrates the future background traffic volumes for the year 2029, considering planned transportation network changes and including both background growth and other area developments generated traffic. Table 11 summarizes the future background operations for the year 2029 future background traffic volumes.

Figure 15: Projected Background 2029 Traffic Volumes

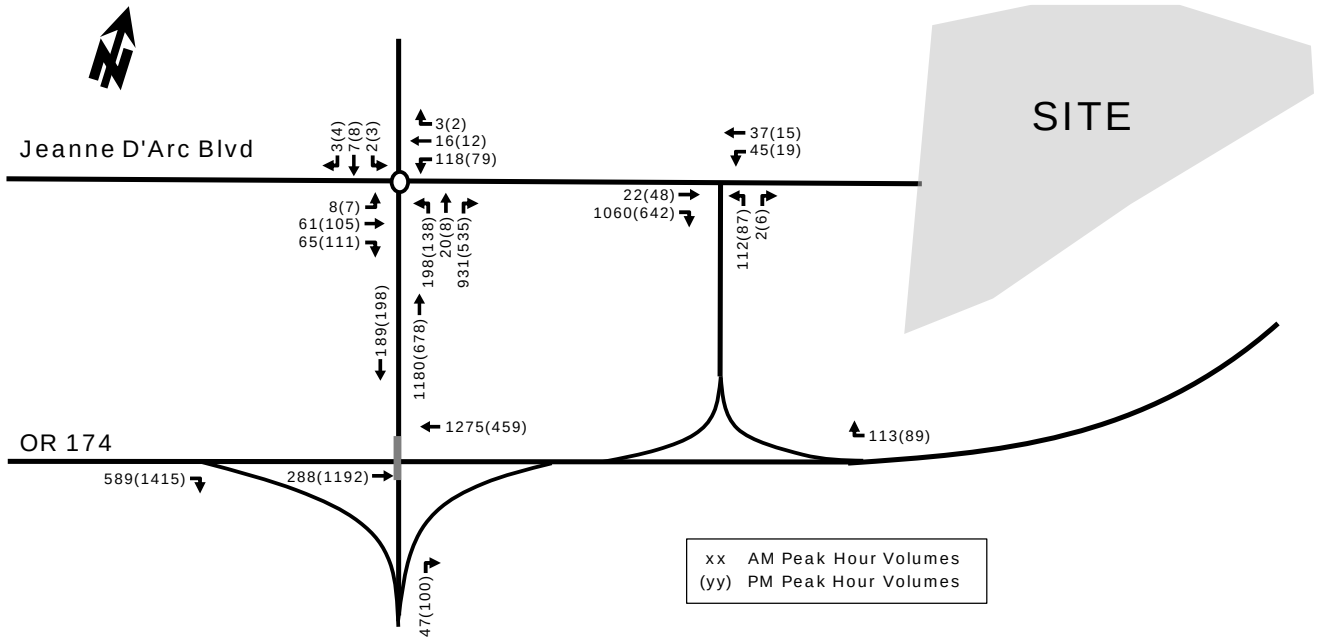


Table 11: Projected Background 2029 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim	A(A)	8.5(8.1)	SBL(SBL)	3.7(3.8)	A(A)	0.51(0.29)
Jeanne D'Arc/OR 174 WB On-Off Ramp	C(B)	18.4(12.6)	NB(NB)	1.9(1.6)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 11, study area intersections will operate similarly to the 2024 background conditions with slight increases in delay and v/c due the increase in background traffic. The SYNCHRO model output of 2029 background conditions is provided within Appendix J.

9.3. OTHER AREA DEVELOPMENTS

For the purpose of this assessment and given the current state of subject site (Tower 1 has been built, Tower 2 is in construction) and other area developments, the following time horizons are assumed:

The trip generation and distribution for these other area developments are included as Appendix F.

Trips generated by other area developments were obtained from the 2013 Petrie's Landing I TIS and the Cardinal Creek Village 2013 CTS, as summarized in Table 12.

Table 12: Other Area Developments Vehicle Trip Generation

	AM Peak (persons/h)			PM Peak (persons/h)		
	In	Out	Total	In	Out	Total
Petrie's Landing I - Tower 2	13	57	70	39	24	63
Petrie's Landing II	22	108	130	104	52	156
Petrie's Landing III	422	237	659	254	430	584
Cardinal Creek (External Only)	412	940	1,352	1,246	980	2,226
Total	**869**	**1342**	**2211**	**1643**	**1486**	**3029**

9.3.1. PETRIE'S LANDING I - TOWER 2

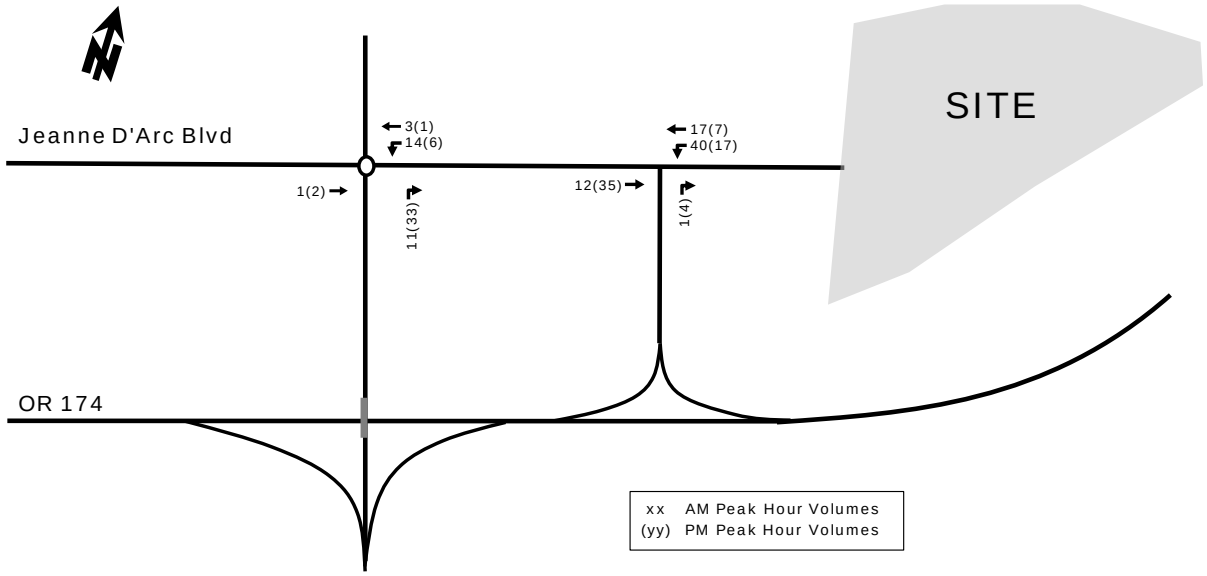
For the purpose of this assessment and given the current state of subject site (Tower 1 has been built, Tower 2 is in construction), the following time horizons are assumed for Petrie's Landing I – Tower 2:

Year 2022

- Petrie's Landing I
  - Tower 2 – 100% built.

Considering Table 12 and trip distribution percentages (section 8.2), Petrie's Landing I - Tower 2 projected traffic volumes are illustrated in Figure 16.

Figure 16: Petrie's Landing I Tower 2 Projected Traffic Volumes



9.3.2. PETRIE'S LANDING II

For the purpose of this assessment and given the current state of other area developments, the following time horizons are assumed for Petrie's Landing II:

Year 2022

- Petrie's Landing II – 100% built.

Year 2024

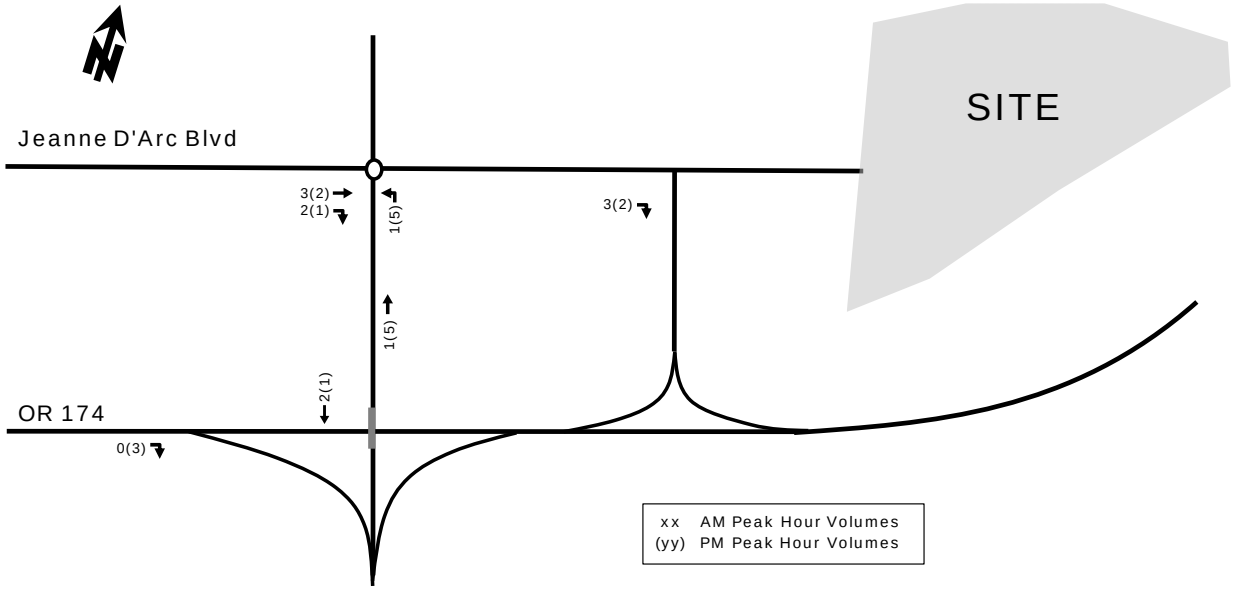
- Petrie's Landing II – 100% built.

Year 2029

- Petrie's Landing II – 100% built.

Figure 17 illustrates the projected traffic volumes for Petrie's Landing II at full build-out, obtained from the 2013 Petrie's Landing I TIS. Considering assumed time horizons,65% of build-out volumes will be applied in year 2022, 100% in year 2024 and 100% in year 2029.

Figure 17: Petrie's Landing II Projected Traffic Volumes – Full Build Out



9.3.3. PETRIE'S LANDING III

For the purpose of this assessment and given the current state of other area developments, the following time horizons are assumed for Petrie's Landing III:

Year 2022

- Petrie's Landing III – 30% built.

Year 2024

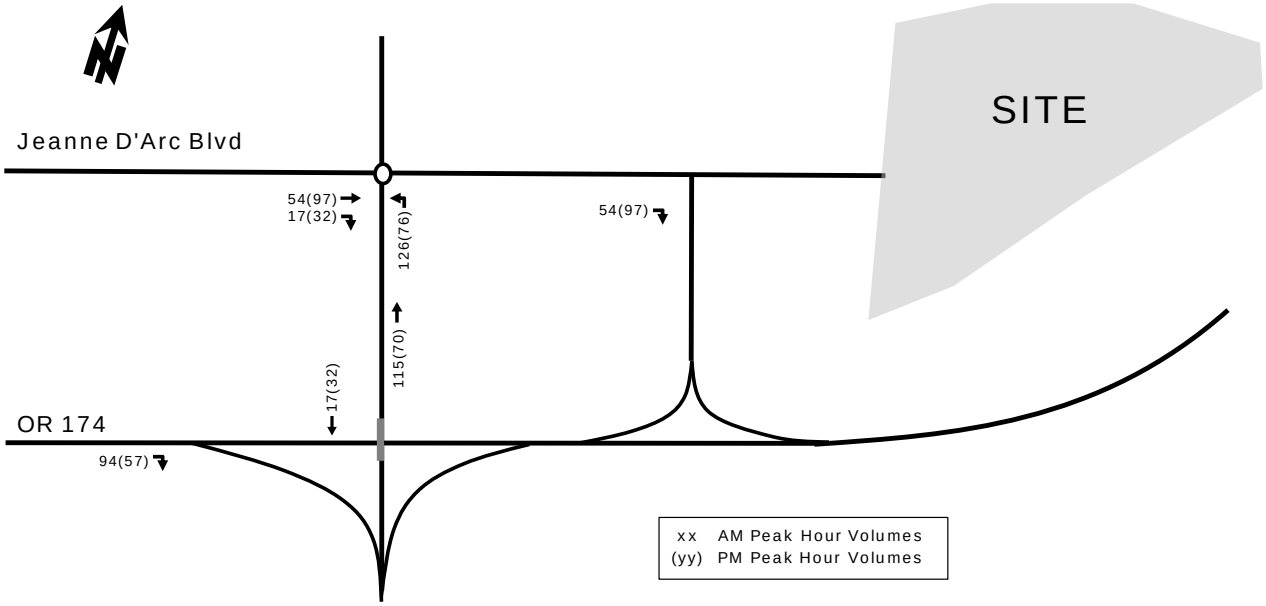
- Petrie's Landing III – 50% built.

Year 2029

- Petrie's Landing III – 100% built.

Figure 18 illustrates the projected traffic volumes for Petrie's Landing III at full build-out, obtained from the 2013 Petrie's Landing I TIS. Considering assumed time horizons, 30% of build-out volumes will be applied in year 2022, 50% in year 2024 and 100% in year 2029.

Figure 18: Petrie's Landing III Projected Traffic Volumes – Full Build-Out



9.3.4. CARDINAL CREEK VILLAGE

For the purpose of this assessment and given the current state of other area developments, the following time horizons are assumed for Cardinal Creek Village:

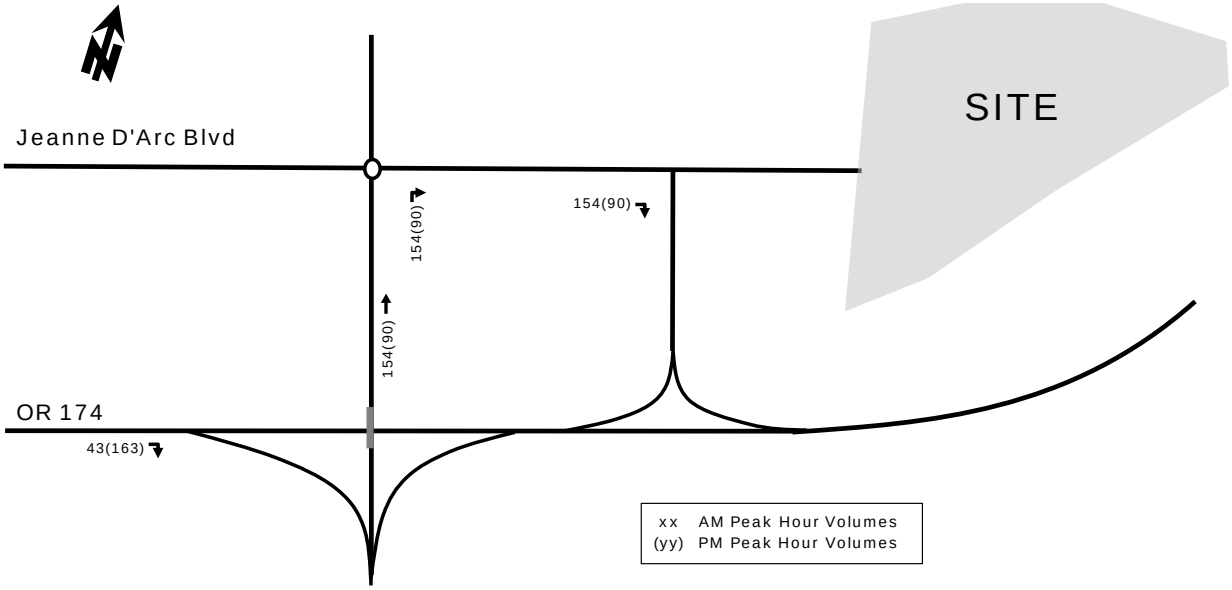
Year 2022
- Cardinal Creek – 40% built.

Year 2024
- Cardinal Creek – 60% built.

Year 2029
- Cardinal Creek – 90% built.

Figure 19 illustrates the projected traffic volumes for Cardinal Creek Village at horizon year 2029 at study area intersections (obtained from the 2013 Cardinal Creek Village CTS). Considering assumed time horizons, 40% of full build-out volumes will be applied in year 2022, 60 % in year 2024 and 90% in year 2029.

Figure 19: Cardinal Creek 2029 Projected Traffic Volumes at Study Area Intersections



Based on Cardinal Creek Village Transportation Impact Study (October, 2013), Exhibit 11.

10. DEMAND RATIONALIZATION

The forecasted background volumes do not identify any lane constraints due to capacity for site entry and egress and no changes to the trip generation or distribution analysis is required.

11. DEVELOPMENT DESIGN

The proposed Site Plan includes a network of paved interlocked sidewalks 2.0 meters wide that connect to Towers 1 to 4. Paved interlocked paths connecting to surface parking spaces, garbage collection pads and the planned off-site MUP. As such, the proposed site plan is considered supportive of pedestrian and cycling connectivity towards the future rail station. Considering Tower 5 is located within 600 meters walk of the future LRT Trim Road Station, a further improvement to pedestrian access would be to provide a walking connection to the concrete sidewalk on Inlet Private cul-de-sac from Tower 5. This connection could be planned in conjunction with the opening of the Trim Road LRT station.

The proposed road network consists of two-way roadways 7.0-meter-wide (3.5 meters lanes) and curve radii of 8 to 12 meters. No issues are noted for access of municipal and emergency services HSU vehicles, as shown in turning templates performed by others (Figure 2). Also, the proposed layout of the road network is consistent with traffic calming principles and is considered appropriate for safe sharing of the road with cyclists. The proposed site plan is consistent with the 2016 traffic calming concept prepared by Parsons as addendum # 3 to the Petrie's Landing I 2013 TIS. Table 13 summarizes updated traffic calming measures to be incorporated for Tower 5.

Table 13: Traffic Calming Measures

Phase	Measure	Location	Notes
Tower 5	Signage – Yield Signs	Inlet Private cul-de-sac: (i) On Tower 5 underground parking ramp and on circle at Tower 5 underground parking ramp. (ii) On Tower 5 surface parking aisle at circle.	(i) Regulates conflicts between exiting and entering vehicles from/to Tower 5 (ii) Regulates conflicts between exiting and entering vehicles from/to Tower 5 surface parking
	Signage – Stop Sign	On Private Approach, for exiting vehicles	Controls conflict of exiting vehicles from the visitor surface parking with vehicles from/to the underground parking

One 7.0-meter-wide two-way ramp is proposed for access to Tower 5 underground parking, located at Tower 5 private approach. To access the underground parking of towers 1 to 4, two 7.0-meter-wide two-way ramps located in front of tower 2 and tower 4 are proposed. The ramps providing access to the lower level parking should be within a percent grade safe for the movement of vehicles and pedestrians.

The City's Private Approach By-Law states that a private approach may be greater than 6% but shall not exceed 12% provided that a subsurface melting device sufficient to keep the private approach free of ice at all times is installed and properly maintained. In addition, our review of the available industry literature indicates that ramp grades should ideally not exceed 12%. However, a ramp grade up to 15% is acceptable if pedestrians are specifically excluded from using the ramp and transition grades are provided. Therefore, the proposed ramp grades should function acceptably provided appropriate pedestrian signage is installed, a subsurface melting device is installed for ramps exposed to ice/snow, and the appropriate transition grades are provided.

Regarding site access during construction, easements will have to be provided to avoid conflicts between construction access routes and existing towers access routes, fire routes, sidewalks, parking spaces and City's existing or future MUPs.

12. PARKING SUPPLY

The subject site is located within 600 meters radius and 800 meters walk of the planned Trim Road LRT transit station, as depicted in Figure 20. Considering Sections 101(5)(d), 101(5)(e), 102(5), 103(1) and 103(2) of the Zoning By-Law 2008-250-Consolidation-Part 4, the vehicle and bicycle parking requirements have been estimated and summarized in Table 14 and Table 16, respectively.

Figure 20: Site Distance to the Planned Trim Road LRT Station

Table 14: Vehicle Parking Spaces Requirements

Land Use		Commercial	Residents (rate)	Visitors	Total Spaces
Tower 3	Residential	-	241 (1.2 per unit)	40	281
Tower 4	Residential	-	164 (1.2 per unit)	27	192
Tower 5	Retirement (5A)	22	143 (0.5 per unit)	28	193
	Residential (5B)	22	91 (0.5 per unit)	17	130
Subtotal		44	640	131	796

According to Table 14, the subject development is required to provide 640 parking spaces for residents, 131 parking spaces for visitors and 44 parking spaces for commercial uses, for a total of 796 parking spaces. With a total of 864 proposed underground and surface parking spaces, the subject development is meeting City requirements. Table 15 compares required and proposed parking spaces for each tower.

Table 15: Total Required and Proposed Parking Spaces

Land Use		Required	Proposed
Tower 3	Residential	281	284
Tower 4	Residential	192	137
Tower 5	Retirement (5A)	193	295
	Residential (5B)	130	148
Total		796	864

Table 16 summarizes bicycle parking requirements as per City of Ottawa Zoning By-Law-Part 4, sections 100-114.

Table 16: Bicycle Parking Requirements

Land Use		Units	Bicycle Spaces
Tower 3	Residential	201	101
Tower 4	Residential	137	69
Tower 5	Retirement (5A)	286	72
	Residential (5B)	182	46
Total			286

13. BOUNDARY STREET DESIGN

13.1. EXISTING CONDITIONS

Given the development's location within the general urban area and on a Major Pathway, the target levels of service for pedestrians and cyclists are PLoS 'C' and BLoS 'D', respectively. There are currently no MMLoS targets for transit or trucks on Jeanne D'Arc Boulevard within the study area. The multi-modal level of service analysis for the existing road segment adjacent to the site is summarized in Table 17, with detailed analysis provided in Appendix K.

Table 17: MMLOS – Jeanne D'Arc Boulevard Adjacent to the Site – South Side of Existing Road

Road Segment	Level of Service			
	Pedestrian (PLoS)		Bicycle (BLoS)	
	PLoS	Target	BLoS	Target
Existing Conditions (before LRT opening)				
Jeanne D'Arc Boulevard	C	C	E	D

The MMLOS road segment analysis shows that existing conditions on the south side of Jeanne D'Arc Boulevard does not meet MMLOS area targets for cyclists. To meet the target BLoS 'D' for Jeanne D'Arc Boulevard east of Trim Road, the City can consider reducing vehicle speeds to 40 km/h along Jeanne D'Arc Boulevard or providing a separated cycling facility.

13.2. 2024 CONDITIONS

On year 2024, after LRT opening date, the site context will involve a high-speed road (OR 174) connecting to a local, low-speed road (Jeanne D'Arc Boulevard) that will function as a connector from the site to the rail station, therefore a significant increase in pedestrians and cyclists volumes are anticipated. As such, speed management measures will be required to achieve necessary speed transitions and minimize speed differentials on Jeanne D'Arc Boulevard. To protect vulnerable users, a reduction of conflict zones should be sought while encouraging rail connectivity.

Given the development's location within 600 meters radius of a transit station, the target levels of service for pedestrians and cyclists will be PLoS 'A' and BLoS 'B', respectively. For the purposes of future conditions analysis, it is assumed that access to the future Trim Road LRT station will be provided both on the west side and east side of the Trim Road overpass to connect to the Trim Road Park & Ride. The multi-modal level of service analysis for the road segment along Jeanne D'Arc Boulevard adjacent to the site, considering planned network (Figure 21), is summarized in Table 18, with detailed analyses provided in Appendix L.

Figure 21: Planned Network MMLOS Analysis - Segments and Intersections

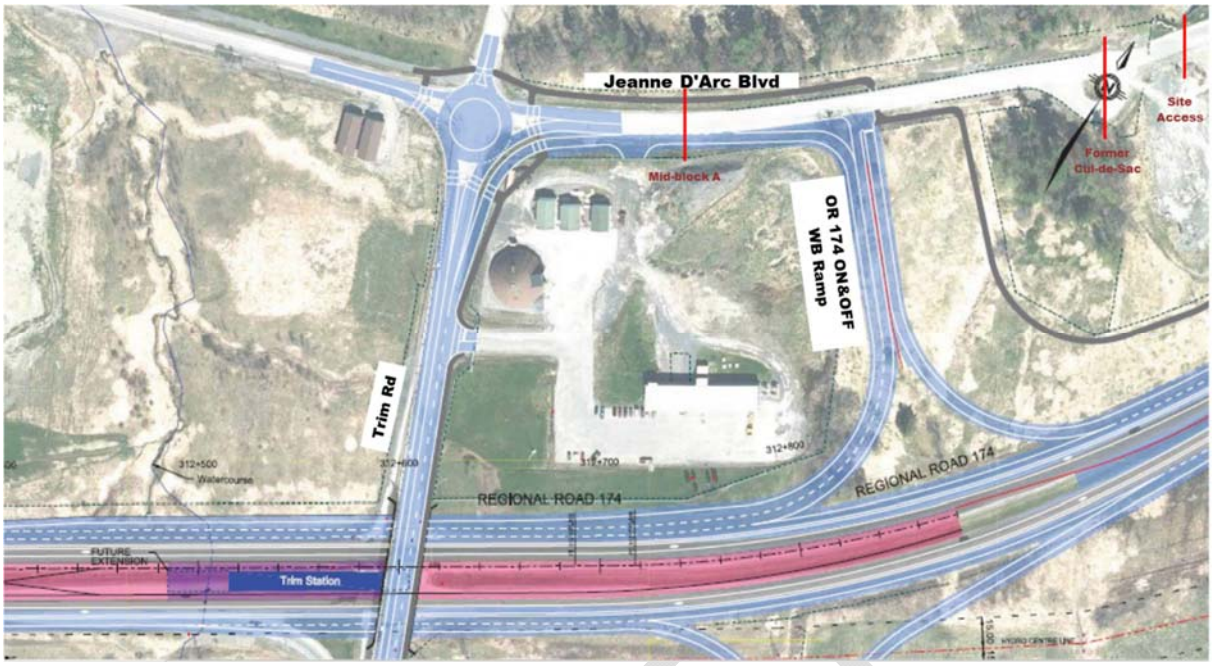


Table 18: MMLOS – Jeanne D'Arc Boulevard adjacent to the Site – South Side of Road-2024

Road Segment	Level of Service			
	Pedestrian (PLoS)		Bicycle (BLoS)	
	PLoS	Target	BLoS	Target
2024 Planned Transportation Network				
Jeanne D'Arc Boulevard	C	A	E	B
Cul-de-Sac	A	A	D	B
Site Access	A	A	B	B

The MMLOS analysis shows that planned conditions on the south side of Jeanne D'Arc Boulevard, would not meet MMLOS area targets for both pedestrians and cyclists, with the exception of the Site Access regarding pedestrians and cyclists and the Cul-de-Sac regarding pedestrians. The critical segment for this road is the south side of Jeanne D'Arc Boulevard between Trim Road and OR 174 WB ramp. Assuming a 2.0 m sidewalk with less than 0.5 m curb and given expected traffic volumes on this segment (approximately 1,000 vehicles during the peak hour), would result in a PLoS 'C'. Providing a 2.0 m sidewalk with a minimum boulevard width of 2.0 m and reducing vehicle speeds to 30 km/h or less would result in PLoS 'A'. The bicycle level of service can be improved by provided curbside bike lanes.

14. ACCESS INTERSECTION DESIGN

14.1. LOCATION AND DESIGN OF ACCESS

Site access will operate at the end of Inlet Private, approximately 320 metres to the east of Jeanne D'Arc/ Trim intersection. The site two-way access is proposed to be 7.8 m wide with a throat length of 50 metres and is therefore meeting the City of Ottawa requirements. The nearest existing intersection for future conditions will be Jeanne D'Arc Boulevard at OR 174 On/Off ramps, approximately 100 metres to the west. At full build-out during weekday morning and afternoon peak hours, the site will generate one vehicle every 14 seconds and will attract one vehicle every 22 seconds, approximately. Considering Tower 5 separated access via Inlet Private cul-de-sac and the projected vehicle generation, no issues are anticipated at site access.

It is noted that an interlocked paved sidewalk is proposed on the north side of the driveway, connecting to towers 1 to 4. Given the existing concrete sidewalk on the south side of Jeanne D'Arc Boulevard, a texturized pedestrian crossing is proposed at the site access to connect both sidewalks. Considering Tower 5 is located within 600 meters radius and 800 meters walk of the future LRT Trim Road Station, a further improvement to pedestrian access would be to provide a walking connection between Tower 5 and the Inlet Private cul-de-sac south sidewalk.

15. TRANSPORTATION DEMAND MANAGEMENT

The development generated travel demand has been estimated in Section 12 using modal shares from the 2011 TRANS O-D survey for Orleans. These modal shares reflect conditions for a wide variety of transportation services supply within Orleans. Given site location at Orleans' north-eastern edge, they might not reflect site's current conditions. However, considering development phasing (full occupancy by 2024) and the LRT East Extension to Trim Road at OR 174 by 2022, it is anticipated that transit shares will increase, and auto shares will decrease for the subject site within the horizon analysis.

Once the envisioned LRT East Extension is completed, and to support the anticipated rise in transit ridership, post-occupancy TDM measures are recommended and attached as Appendix M.

16. TRANSIT

16.1. ROUTE CAPACITY

Considering project phasing and Delcan 2013 Petrie's Landing I Transportation Impact Study estimations for tower 2, site-generated transit trips on year 2024 are estimated to be 405 and 347 'new' two-way passengers during the weekday morning and afternoon peak hour, respectively, as summarized in **Error! Reference source not found.**Table 19.

Table 19: Site-Generated Transit Trips

Land Use	Horizon	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Tower 2	Existing	4	18	22	13	8	21
Towers 3 and 4	2022	27	73	100	20	17	37
Towers 3 to 5	2024	111	294	405	200	148	347
Total		**142**	**385**	**527**	**233**	**173**	**405**

According to Table 19**Error! Reference source not found.Error! Reference source not found.**, the required bus fleet to serve the site-generated transit demand would be;

Year 2022

- Morning - inbound passengers: 1 single bus;
- Morning - outbound passengers: 1 articulated bus;
- Afternoon - inbound passengers: 1 single bus; and,
- Afternoon - outbound passengers: 1 single bus.

Year 2024

- Considering the envisioned LRT East extension line is projected to enter operation in 2022 and assuming a similar capacity to that of the Confederation Line (600 passengers per train and 12 trains per hour during peak), it is anticipated that the future transit network will have sufficient capacity to accommodate the subject development transit demand.

16.2. TRANSIT PRIORITY

No transit priority measures are anticipated on Trim Road within the area of study. Although it is projected that in year 2022, before the opening of the overpass on Trim Road/OR 174 NBL movements at Trim Road/OR 174 intersection will operate at an inadequate LoS 'E' due to background traffic, NBT movements will continue operating at an acceptable LoS 'B'. Once the Trim Road overpass at OR 174 is built, NBL traffic will use the WB On-Ramp at Jeanne D'Arc/OR 174, with LoS 'A' at Jeanne D'Arc and LoS 'A' at the WB On-Ramp. Through movements at Trim Road/OR 174 will experience a further improved level of service due to the opening of the overpass.

17. REVIEW OF NETWORK CONCEPT

The subject site is designated as R5A [2327] H(109.4) and R5A [2327] H(101), according to the Part 6, sec. 163-164 of the Zoning By-Law No. 2008-250. Considering the planned transportation network includes expanded transit and traffic capacity through the extension of LRT services to Trim Road, the provision of an overpass on Trim Road at OR 174, the construction of a roundabout on Trim Road at Jeanne D'Arc Boulevard and the construction of On/Off ramps to OR 174 from Jeanne D'Arc Boulevard, no changes to network concepts are anticipated to serve the subject development.

18. INTERSECTION DESIGN

18.1. TOTAL PROJECTED 2022 CONDITIONS

The total projected 2022 volumes were derived by superimposing 2022 site-generated volumes (Figure 11) onto 2022 background traffic volumes (Figure 13) and are illustrated as Figure 22. Table 20 provides a performance summary of study area intersections, based on total projected 2022 traffic volumes and existing adjacent road network. The SYNCHRO model output of 2022 projected conditions is provided within Appendix N.

Figure 22: Total Projected 2022 Peak Hour Traffic Volumes

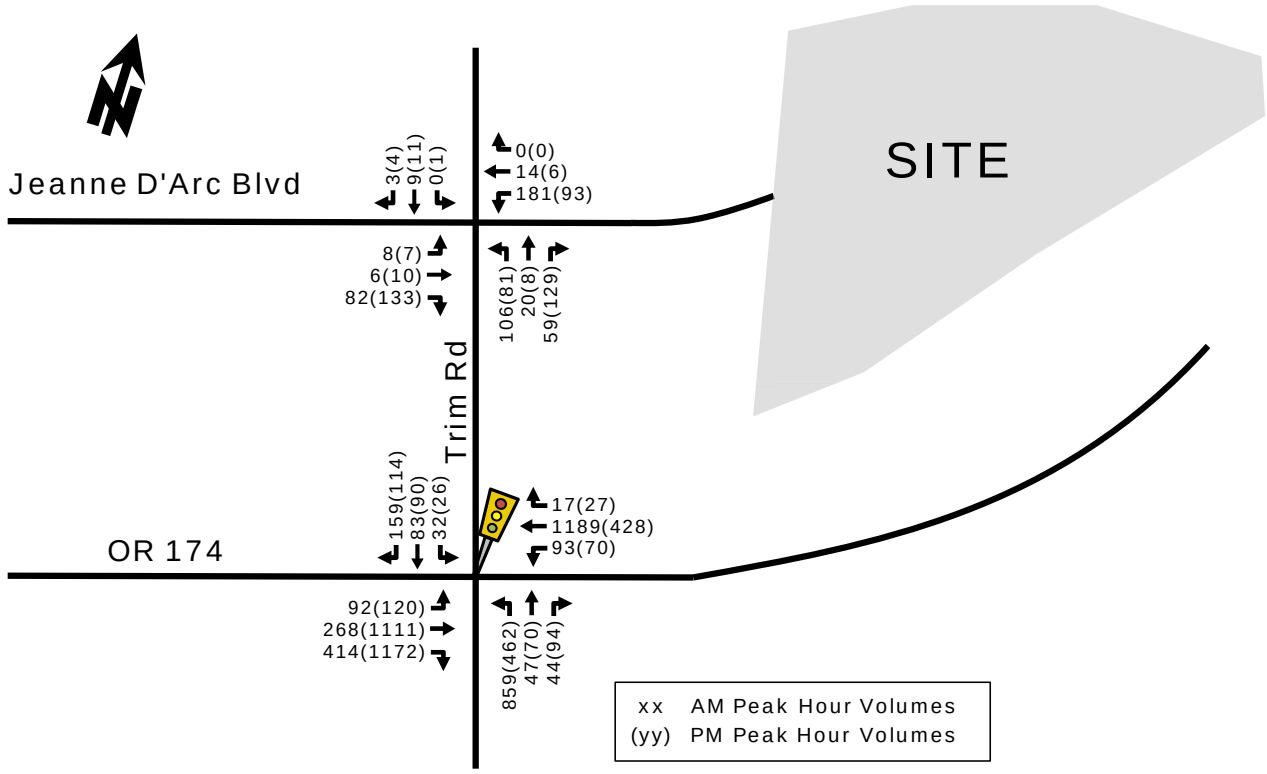


Table 20: Total Projected 2022 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim (unsignalized)	A(A)	9.7(9.0)	EB(NB)	9.2(8.7)	A(A)	-
Trim/OR 174	F(E)	1.08(0.98)	WBT(EBT)	71.5(39.4)	F(D)	1.06(0.90)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 20, the unsignalized Jeanne D'Arc/Trim intersection 'as a whole' is projected to continue operating at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements', they are also operating at a LoS 'A'.

At interim conditions, the Trim/OR 174 intersection is expected to continue experiencing high levels of congestion. While the site generated volumes will not impact the critical movements (east and west bound through movements), the site-generated traffic lower the intersections level of service. As such, the Trim/OR 174 intersection 'as a whole' is projected to operate at a LoS 'F' during peak hours (as compared to background LoS 'E') with critical movements operating also at a LoS 'F' (as compared to background LoS 'E'). Mitigative measures are not recommended, however, given the opening of the Trim Road Rapid Transit station and proposed Trim Road overpass projected for 2022.

18.1.1. MULTIMODAL LEVEL OF SERVICE ANALYSIS

As stated in the MMLoS Guidelines, intersection level of service measures is only analysed at signalized intersections. As such, the Jeanne D'Arc/Trim intersection was not considered in this section. Due to the highway nature of the Trim/OR174 intersection, it is also not being considered in this section.

18.2. TOTAL PROJECTED 2024 CONDITIONS

The total projected 2024 volumes were derived by superimposing full build-out site-generated volumes (Figure 12) onto 2024 background traffic volumes (Figure 14) and are illustrated as Figure 23**Error! Reference source not found.**. Table 21**Error! Reference source not found.** provides a performance summary of study area intersections, based on total projected 2024 traffic volumes and widened (i.e. six lanes) OR 174. The SYNCHRO model output of 2024 total projected conditions is provided within Appendix O.

Figure 23: Total Projected 2024 Peak Hour Traffic Volumes

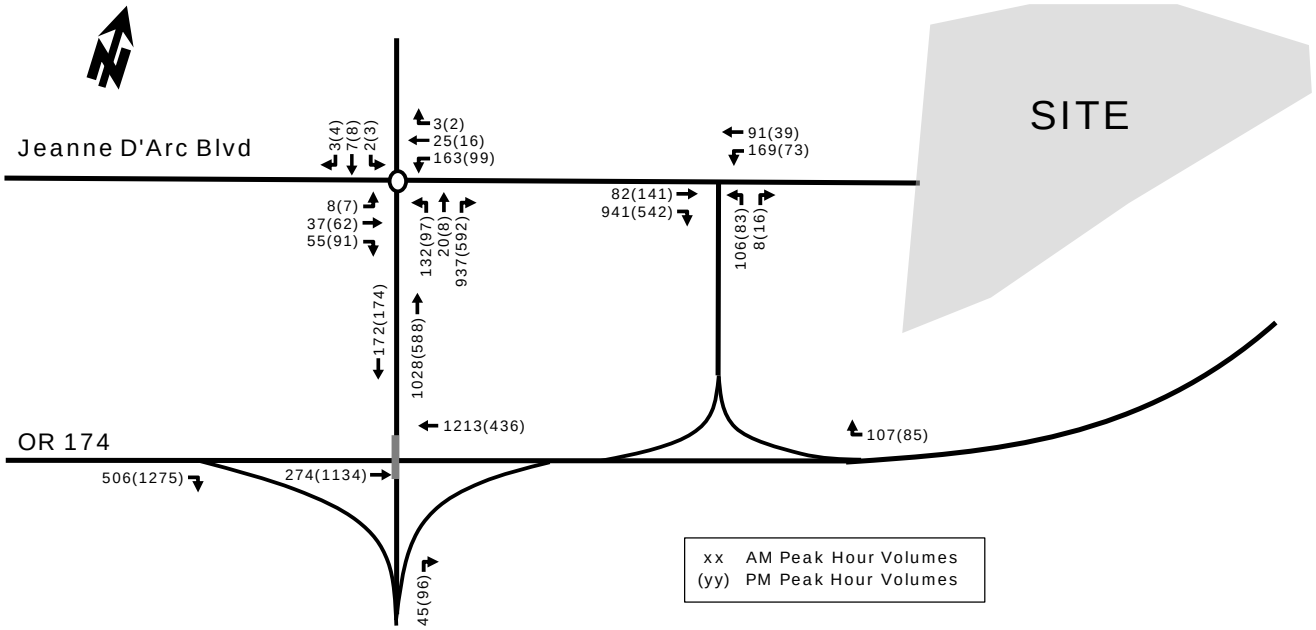


Table 21: Total Projected 2024 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim	A(A)	8.8(8.2)	SBL(SBL)	3.8(3.7)	A(A)	0.54(0.34)
Jeanne D'Arc/OR 174 WB On-Off Ramp	E(C)	38.1(15.5)	NB(NB)	4.1(2.4)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 21**Error! Reference source not found.**, the unsignalized Jeanne D'Arc/Trim intersection 'as a whole' is projected to continue operating at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements', they are also operating at an LoS 'A'.

Considering the planned improvements to area network, the future unsignalized Jeanne D'Arc/OR 174 WB On-Off Ramp intersection 'as a whole' is projected to operate at a LoS 'A' during peak hours with critical movements operating at a LoS 'E' (as compared to background LoS 'C') during the morning peak hour. Given the City planned MUP as well as vehicular volumes at this intersection, the City of Ottawa could consider the provision of a pedestrian cross over on Jeanne D'Arc Boulevard, east of OR 174 WB On-Off Ramp.

18.3. TOTAL PROJECTED 2029 CONDITIONS – PLUS FIVE YEARS

The total projected 2029 volumes were derived by superimposing full build-out site-generated volumes (Figure 12) onto projected 2029 background traffic volumes (Figure 15), and are illustrated as Figure 24**Error! Reference source not found.**. Table 22**Error! Reference source not found.** provides a performance summary of study area intersections, based on total projected 2029 traffic volumes, widened (i.e. six lanes) OR 174 and the above-mentioned background 2029 mitigative measures (e.g. dual eastbound left-turn lane and triple northbound left-turn lanes at the Trim/OR 174 intersection). The SYNCHRO model output of these projected conditions is provided within Appendix P.

Figure 24: Total Projected 2029 Peak Hour Traffic Volumes

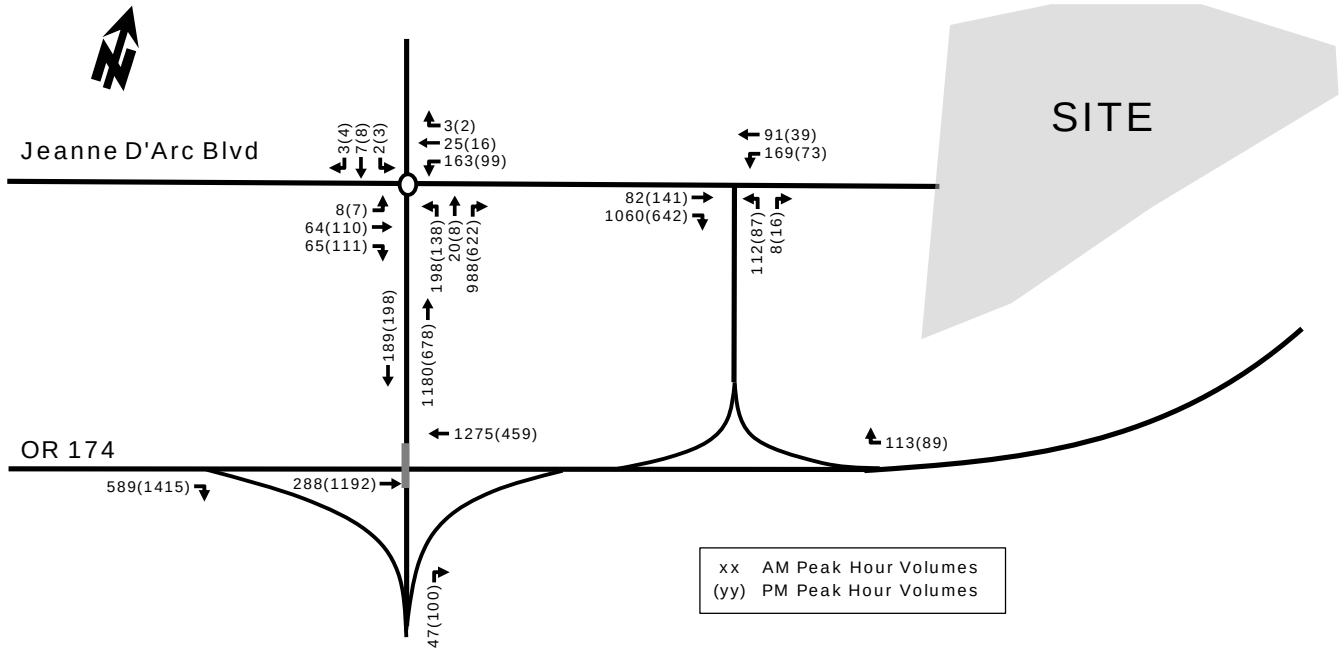


Table 22: Total Projected 2029 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Jeanne D'Arc/Trim	A(A)	9.1(8.4)	SBL(SBL)	4.0(3.9)	A(A)	0.57(0.36)
Jeanne D'Arc/OR 174 WB On-Off Ramp	E(C)	47.1(16.8)	NB(NB)	4.6(2.3)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 22**Error! Reference source not found.**, the unsignalized Jeanne D'Arc/Trim intersection 'as a whole' is projected to continue operating at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements', they are also operating at an LoS 'A'.

The unsignalized Jeanne D'Arc/OR 174 WB On-Off Ramp intersection 'as a whole' is projected to operate similarly to year 2024 at a LoS 'A' during peak hours with critical movement operating also at a LoS 'E' during the AM peak and LoS 'C' during the PM peak.

18.3.1. MULTIMODAL LEVEL OF SERVICE ANALYSIS

Once the LRT Trim Road station opens, the development will be within 600 meters of high-frequency transit. At such point, the applicable target levels of service for pedestrians and cyclists will be PLoS 'A' and BLoS 'B', respectively. At present, there are no MMLOS targets for transit or trucks on Jeanne D'Arc Boulevard within the area of study.

For the purposes of this analysis, it is assumed that access to the future Trim Road LRT station will be provided both on the west side and east side of the Trim Road overpass. The multi-modal level of service analysis for the roundabout study area intersection, considering the planned network (Figure 21), is summarized in Table 23, with detailed analyses provided in Appendix L. As stated in the MMLoS Guidelines, only signalized or roundabout intersections are considered for the intersection level of service measures.

Table 23: MMLOS – Trim/Jeanne D'Arc Roundabout, Post LRT Opening

Intersection	Level of Service			
	Pedestrian (PLoS)		Bicycle (BLoS)	
	PLoS	Target	BLoS	Target
Trim / Jeanne D'Arc Roundabout	B	A	D	B

The MMLOS analysis shows that the planned study area intersections, according to information reviewed and assumptions made, would be below the area targets for both the pedestrian and bicycle levels of service. Regarding Trim/Jeanne D'Arc roundabout, the MMLOS analysis has been applied to represent conditions according to the functional designs found on the "*Confederation Line East Functional Design Report (Blair Station to Trim Road)*".

With regard to pedestrians, the a PLoS 'B' is achieved for the intersection, not reaching the PLoS 'A' target. As the intersection is a roundabout, it is difficult to provide a higher level of service without compromising the design and function of the intersection. To achieve a PLoS 'A', the northbound right-turn slip lane will need to be removed thereby delaying the high northbound right-turn movement.

With regard to cyclists, the MUP on Jeanne D'Arc Boulevard's north side and the curbside bike lanes on Trim Road, result in BLoS 'B' and meet area MMLOS targets for all approaches except for the southbound approach, which results in PLoS 'D'. A pocket bike lane or curbside bike lane on the southbound approach would increase the level of service, achieving a BLOS 'B'.

19. SUMMARY OF IMPROVEMENTS INDICATED AND MODIFICATION OPTIONS

Proposed Development

- The proposed development is located at 8900 Jeanne D'Arc Boulevard (formerly 8911 North Service Road). The site is in Ward 1, Orléans, and is designated as R5 Residential Fifth Density Zone according to the Part 6, sec. 163-164 of the Zoning By-Law No. 2008-250. Currently the site consists of a 15-storey tower containing 89 condominium units (Tower 1), approximately 34 surface parking spaces and a second tower in construction that will consist of 145 units (Tower 2);
- The proposed development will continue with the residential Towers 3 to 5 within the planned Petrie's Landing I
- The horizon years for build-out are anticipated to include Towers 3 and 4 by 2022 and Towers 5a and 5b by 2024; and,
- In total, Tower 3 will consist of 22 storeys and 201 units. Tower 4 will consist of 18 storeys and 137 units. Tower 5A and 5B will consist of 32 storeys, 286 units, and 22 storeys, 182 units, respectively.

Existing Conditions

- Study area intersections 'as a whole' are currently operating at an acceptable LoS 'D' or better during the weekday peak hours; and,

- The MMLOS road segment analysis shows that existing conditions on the south side of Jeanne D'Arc Boulevard do not meet MMLOS area targets for cyclists. To meet the target BLoS 'D' for Jeanne D'Arc Boulevard east of Trim Road, the City can consider reducing vehicle speeds to 40 km/h along Jeanne D'Arc Boulevard or provide separated cycling facilities.

Background Conditions

- Background traffic growth was calculated as a 1% annual growth rate along OR 174 and Trim Road based on historical traffic count data provided by the City of Ottawa at the Trim/OR 174 intersection;
- Other area development considered included Petries Landing I existing Towers 1 and 2, Petries Landing II residential development (300 to 430 units), Petries Landing III mixed use development (approximately 370,000 ft^2 of office, 23,000 ft^2 of retail and up to 790 residential units) and Cardinal Creek Village (1,446-unit subdivision and a 430,000 ft2 shopping centre);
- Interim build-out is anticipated prior to the grade separation of the Trim / OR 174 intersection and the opening of LRT;
- In year 2022, the Trim/OR 174 intersection is expected to experience lower levels of performance due to additional background traffic. As such, the Trim/OR 174 intersection 'as a whole' is projected to operate at a LoS 'E' during peak hours (as compared to existing LoS 'D') with critical movements operating also at a LoS 'E' (as compared to existing LoS 'D');
- In year 2024 and considering planned improvements to the area network (i.e. Trim Road overpass at OR 174, the Trim Road roundabout at Jeanne D'Arc Boulevard and the westbound On-Off ramps to OR 174 from Jeanne D'Arc Boulevard), study area intersections 'as a whole' would operate at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements' at future unsignalized Jeanne D'Arc/OR 174 WB On-Off Ramp intersection, they would operate at an acceptable LoS 'C'; and,
- In year 2029, study area intersections will operate similarly to the 2024 background conditions with slight increases in delay and v/c due the increase in background traffic.

Trip Generation and Parking

- Interim build-out (year 2022), it is estimated that the site will generate approximately 282 and 242 two-way people trips during the weekday morning and afternoon peak hours, of which 155 trips, both in weekday morning and afternoon peak hours, will be made by car;
- Full build-out (year 2024), the modal share percentages were adjusted to reflect the City of Ottawa transit share targets for TOD areas, and it is estimated that total site will generate approximately 675 and 580 two-way person-trips per hour during the weekday morning and afternoon peak hours, respectively;
- Approximately 405 and 347 two-way transit trips per hour and 174 to 203 two-way auto trips per hour are anticipated, during the weekday morning and afternoon periods; and,
- The subject development will provide a total of 864 underground and surface parking spaces, meeting City requirements.

Projected Conditions

- In year 2022 at interim build-out, the Trim/OR 174 intersection is expected to continue experiencing high levels of congestion. As such, the Trim/OR 174 intersection 'as a whole' is projected to operate at a LoS 'F' during peak hours (as compared to background LoS 'E') with critical movements operating also at a LoS 'F' (as compared to background LoS 'E'). Mitigative measures are not recommended, however, given the opening of the Trim Road Rapid Transit station and proposed Trim Road overpass projected for 2022;
- In year 2024 at full build-out and considering planned improvements to the area network (i.e. Trim Road overpass at OR 174, the Trim Road roundabout at Jeanne D'Arc Boulevard and the westbound On-Off ramps to OR 174 from Jeanne D'Arc Boulevard), the future unsignalized Jeanne D'Arc/OR 174 WB On-Off Ramp intersection 'as a whole' is projected to operate at a LoS 'A' during peak hours with critical movements operating at a LoS 'E' during the morning peak hour (as compared to background LoS 'C');

- In year 2029, The unsignalized Jeanne D'Arc/OR 174 WB On-Off Ramp intersection 'as a whole' is projected to operate similarly to year 2024 at a LoS 'A' during peak hours with critical movements operating also at a LoS 'E'. It is recommended that the city explores the provision of a fully actuated traffic signal at this location; and,
- The MMLoS segment analysis shows that pedestrian and bicycle targets aren't met on the south side of Jeanne D'arc Boulevard and the bicycle targets aren't met at the Cul-de-Sac. Providing a 2.0m sidewalk, 2.0m boulevard and reducing speeds to 30km/h will improve the the PLoS to an 'A'. Similarly, the target BLoS 'B' can be reached by providing curb-side bike lanes; and,
- The MMLOS intersection analysis shows that the planned study area intersections would be below the area targets for both pedestrian and bicycle levels of service. To meet the target PLoS of 'A' and BLoS 'B' within the study area intersections, the City can consider the following options:
  - Remove the northbound sight-turn slip lane; and,
  - Install a pocket or curbside bike lane on the southbound approach.

Site Access, Circulation and Connectivity

- Site access is located at Inlet Private, approximately 320 metres to the east of Jeanne D'Arc / Trim Road intersection. The site two-way access is proposed to be 7.8 m wide with a throat length of 50 metres and is therefore meeting the City of Ottawa requirements;
- The internal road network consists of two-way roadways 7.0-meter-wide (3.5 meters lanes) and curve radii of 8 to 12 meters. No issues are noted for access of municipal and emergency services HSU vehicles;
- The proposed site plan is considered supportive of pedestrian connectivity towards the future rail station by providing a network of paved interlocked sidewalks 2.0 meters wide that connect Towers I to 4 to Jeanne D'Arc Boulevard south sidewalk. Paved interlocked paths connecting to surface parking spaces, garbage collection pads and the planned MUP are also proposed;
- The proposed site plan is considered supportive of cycling connectivity towards the future rail station by providing a road network layout that is consistent with traffic calming principles and safe sharing of the road with bike users. Connections to the City planned MUP to the south of the site are also included; and,
- Considering Tower 5 is located within 600 meters walk of the future LRT Trim Road Station, the following opportunity for further improving pedestrian access to rail is to provide a walking connection to the concrete sidewalk on Inlet private cul-de-sac from Tower 5. This connection would be planned in conjunction with the opening of the Trim Road LRT station.

TRANSIT

- Site-generated transit trips at interim build-out are estimated to be 100 and 37 'new' two-way passengers during the weekday morning and afternoon peak hour, respectively.
- These volumes can be accommodated by an articulated bus during the AM peak and a single bus during the PM peak; and
- Site-generated transit trips at full build-out are estimated to be 405 and 347 'new' two-way passengers during the weekday morning and afternoon peak hour, respectively. Considering the envisioned LRT East extension line is projected to enter operation in 2022 and assuming a similar capacity to that of the Confederation Line (600 passengers per train and 12 trains per hour during peak), it is anticipated that the future transit network will have sufficient capacity to accommodate the subject development transit demand.

Based on the foregoing, the proposed Site Plan for Petrie's Landing I Towers 3 to 5, is recommended from a transportation perspective.

Prepared By:	Reviewed By:
Andrés Pena, M.Sc. Engineer in Training	Andrew Harte, P.Eng. Senior Transportation Engineer

Appendix A

Screening Form

PARSONS

1223 Michael Street, Suite 100, Ottawa, Ontario, K1J 7T2
P: +1 613.738.4160 l F: +1 613.739.7105 l www.parsons.com

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	13-Jun-18
Project	Petrie's Landing I Towers 3 to 5
Project Number	476705

Results of Screening	Yes/No
Development Satisfies the Trip Generation Trigger	Yes
Development Satisfies the Location Trigger	Yes
Development Satisfies the Safety Trigger	Yes

Module 1.1 - Description of Proposed Development	
Municipal Address	8900 Jeanne D'Arc Boulevard, Orleans, ON, K4A 0S9
Description of location	Existing tower with 89 residential units and a second tower consisting of 145 residential units currently under construction. Access to tower 1 provided at the end of Jeanne D'Arc Boulevard. Construction access to tower 2 provided through Jeanne D'Arc former Cul-De-Sac.
Land Use	Residential
Development Size	806 Apartment Units (high-rise) distributed in Towers 3, 4, 5A and 5B.
Number of Accesses and Locations	1 vehicular access from the West via Jeanne D'Arc Blvd to towers 3, 4 and 5. 1 additional vehicular access from Jeanne D'Arc Blvd to tower 5 via Inlet Private former Cul-De-Sac.
Development Phasing	Two Phases: Towers 3 to 4 by 2022. Tower 5 by 2024.
Buildout Year	Year 2024 (Towers 3 to 5)
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	806	Units
Trip Generation Trigger Met?	Yes	

Module 1.3 - Location Triggers		
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	No	
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	Yes	Development is partially within Trim TOD Zone
Location Trigger Met?	Yes	

Module 1.4 - Safety Triggers		
Posted Speed Limit on any boundary road	>80	km/h
Horizontal / Vertical Curvature on a boundary street limits sight lines at a proposed driveway	No	
A proposed driveway is 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) or within auxiliary lanes of an intersection;	No	
A proposed driveway makes use of an existing median break that serves an existing site	No	
There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development	No	
The development includes a drive-thru facility	No	
Safety Trigger Met?	Yes	

Appendix B

City of Ottawa Traffic Data

Transportation Services - Traffic Services

W.O. 36942

Turning Movement Count - 15 Minute Summary Report

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017

Total Observed U-Turns

Northbound: 2 Southbound: 0

Eastbound: 6 Westbound: 0

		TRIM RD									REGIONAL RD 174									
		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	227	6	9	**242**	1	4	5	**10**	**252**	1	53	83	**137**	17	300	2	**319**	**456**	**708**
07:15	07:30	183	4	5	**192**	3	8	1	**12**	**204**	4	73	101	**178**	19	323	2	**344**	**522**	**726**
07:30	07:45	162	9	21	**192**	2	6	2	**10**	**202**	7	65	110	**182**	23	312	6	**341**	**523**	**725**
07:45	08:00	188	12	7	**207**	2	9	3	**14**	**221**	13	67	86	**166**	30	208	2	**240**	**406**	**627**
08:00	08:15	169	10	13	**192**	3	11	4	**18**	**210**	4	64	89	**157**	23	227	2	**252**	**409**	**619**
08:15	08:30	172	9	15	**196**	8	11	4	**23**	**219**	9	75	105	**189**	16	194	3	**213**	**402**	**621**
08:30	08:45	161	11	17	**189**	6	11	4	**21**	**210**	4	87	83	**174**	20	228	1	**249**	**423**	**633**
08:45	09:00	159	6	15	**180**	2	12	5	**19**	**199**	5	94	96	**195**	24	227	2	**253**	**448**	**647**
09:00	09:15	134	6	11	**151**	1	5	6	**12**	**163**	4	94	82	**180**	22	162	2	**186**	**366**	**529**
09:15	09:30	155	11	10	**176**	3	6	5	**14**	**190**	1	92	83	**176**	13	199	0	**212**	**388**	**578**
09:30	09:45	147	6	14	**167**	3	11	3	**17**	**184**	10	84	85	**180**	11	197	1	**209**	**389**	**573**
09:45	10:00	102	8	18	**128**	1	10	5	**16**	**144**	4	93	92	**192**	14	148	1	**163**	**355**	**499**
11:30	11:45	114	11	13	**138**	3	18	5	**26**	**164**	6	125	99	**230**	11	135	2	**148**	**378**	**542**
11:45	12:00	89	11	13	**113**	4	11	2	**17**	**130**	8	91	108	**207**	18	137	5	**160**	**367**	**497**
12:00	12:15	81	8	17	**106**	2	11	3	**16**	**122**	3	124	90	**217**	19	134	3	**156**	**373**	**495**
12:15	12:30	80	6	7	**93**	0	10	8	**18**	**111**	5	138	117	**260**	9	123	4	**136**	**396**	**507**
12:30	12:45	68	9	9	**86**	3	5	4	**12**	**98**	2	125	111	**238**	18	144	3	**165**	**403**	**501**
12:45	13:00	98	12	12	**122**	0	10	7	**17**	**139**	5	116	126	**247**	13	131	3	**147**	**394**	**533**
13:00	13:15	90	9	14	**113**	3	10	2	**15**	**128**	7	126	106	**239**	6	116	2	**124**	**363**	**491**
13:15	13:30	92	6	14	**114**	3	11	3	**17**	**131**	6	130	113	**249**	9	95	2	**106**	**355**	**486**
15:00	15:15	95	10	27	**132**	2	9	3	**14**	**146**	6	240	210	**456**	8	105	2	**115**	**571**	**717**
15:15	15:30	110	11	21	**142**	12	11	7	**30**	**172**	5	245	205	**455**	10	105	5	**120**	**575**	**747**
15:30	15:45	82	12	22	**116**	5	13	5	**23**	**139**	3	258	211	**473**	11	79	2	**92**	**565**	**704**
15:45	16:00	91	14	27	**132**	3	21	10	**34**	**166**	3	265	233	**501**	16	100	5	**121**	**622**	**788**
16:00	16:15	109	10	18	**137**	6	25	6	**37**	**174**	2	300	250	**552**	14	98	3	**115**	**667**	**841**
16:15	16:30	110	10	17	**137**	3	8	1	**12**	**149**	3	274	280	**557**	20	106	3	**129**	**686**	**835**
16:30	16:45	96	9	28	**133**	4	11	2	**17**	**150**	3	229	294	**526**	17	107	2	**126**	**652**	**802**
16:45	17:00	96	12	18	**126**	4	12	3	**19**	**145**	6	256	237	**499**	15	99	1	**115**	**614**	**759**
17:00	17:15	117	7	23	**147**	6	13	6	**25**	**172**	2	270	266	**538**	15	93	2	**110**	**648**	**820**
17:15	17:30	135	4	29	**168**	1	14	6	**21**	**189**	3	246	252	**502**	15	116	2	**133**	**635**	**824**
17:30	17:45	111	11	12	**134**	5	7	2	**14**	**148**	6	259	246	**511**	11	90	1	**102**	**613**	**761**
17:45	18:00	115	6	17	**138**	1	13	6	**20**	**158**	6	194	240	**440**	17	104	0	**121**	**561**	**719**
TOTAL:		3938	286	513	**4739**	105	347	138	**590**	**5329**	156	4952	4889	**10003**	504	4942	76	**5522**	**15525**	**20854**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36942

REGIONAL RD 174 @ TRIM RD

Count Date: Wednesday, April 19, 2017 **Start Time:** 07:00

	TRIM RD			REGIONAL RD 174			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	0	**0**	5	0	**5**	**5**
08:00 09:00	3	0	**3**	0	0	**0**	**3**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	1	0	**1**	3	0	**3**	**4**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	1	0	**1**	0	0	**0**	**1**
Total	5	0	**5**	8	0	**8**	**13**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

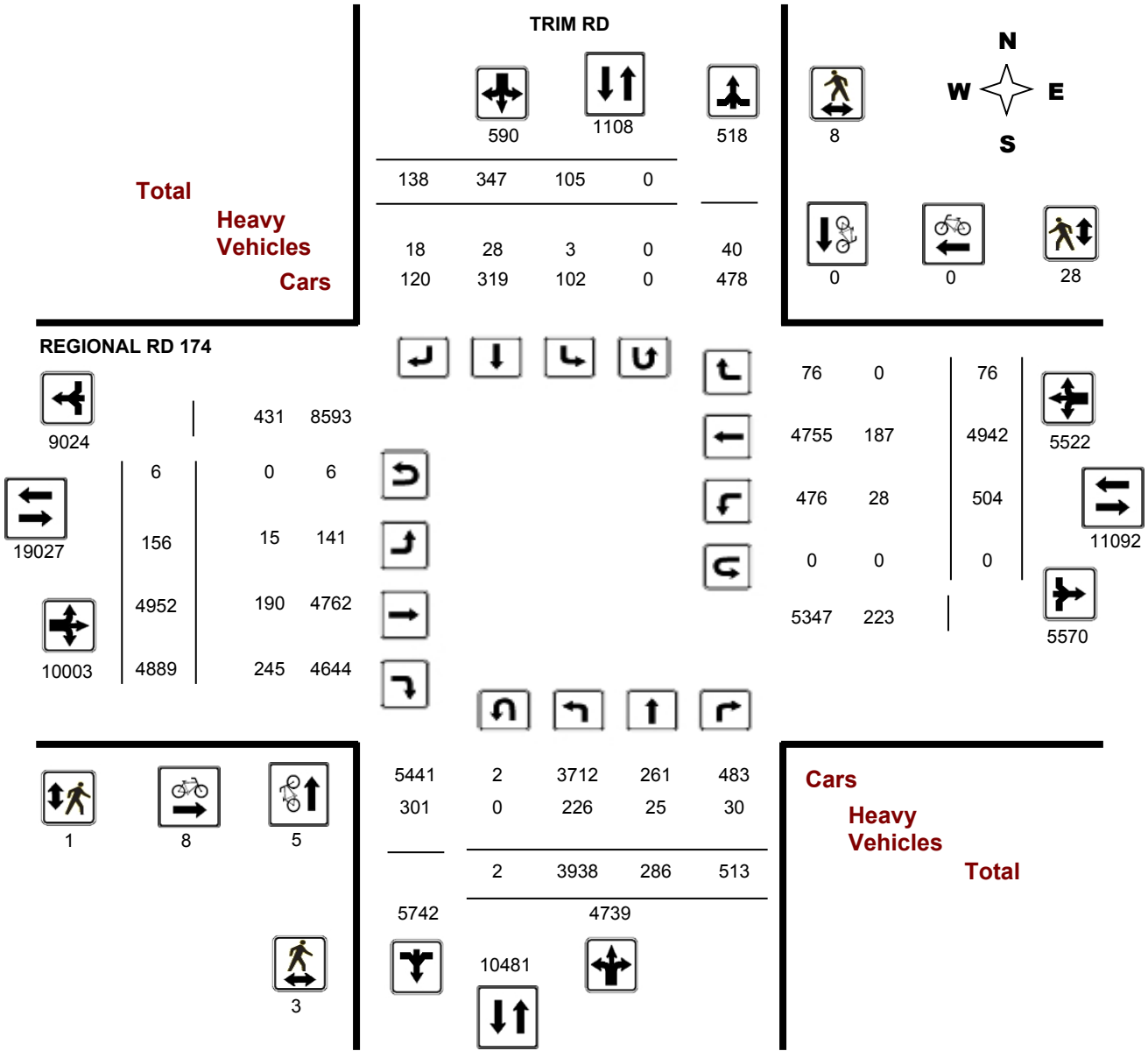
Turning Movement Count - Full Study Diagram

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017

WO#: 36942

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O. 36942

Turning Movement Count - Heavy Vehicle Report

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017

		TRIM RD									REGIONAL RD 174									
		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	08:00	33	2	5	**40**	0	2	2	**4**	**44**	5	22	34	**61**	3	29	0	**32**	**93**	**137**
08:00	09:00	32	4	5	**41**	0	4	0	**4**	**45**	3	28	41	**72**	1	31	0	**32**	**104**	**149**
09:00	10:00	36	3	5	**44**	1	2	2	**5**	**49**	1	45	39	**85**	6	22	0	**28**	**113**	**162**
11:30	12:30	25	4	2	**31**	2	3	2	**7**	**38**	2	34	31	**67**	10	34	0	**44**	**111**	**149**
12:30	13:30	21	3	6	**30**	0	3	2	**5**	**35**	4	28	27	**59**	2	27	0	**29**	**88**	**123**
15:00	16:00	32	4	3	**39**	0	6	2	**8**	**47**	0	13	31	**44**	0	23	0	**23**	**67**	**114**
16:00	17:00	23	3	3	**29**	0	6	3	**9**	**38**	0	16	28	**44**	5	15	0	**20**	**64**	**102**
17:00	18:00	24	2	1	**27**	0	2	5	**7**	**34**	0	4	14	**18**	1	6	0	**7**	**25**	**59**
Sub Total		226	25	30	**281**	3	28	18	**49**	**330**	15	190	245	**450**	28	187	0	**215**	**665**	**995**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		226	25	30	**0**	3	28	18	**49**	**330**	15	190	245	**450**	28	187	0	**215**	**665**	**995**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
36942

Turning Movement Count - Pedestrian Volume Report

REGIONAL RD 174 @ TRIM RD

Count Date: Wednesday, April 19, 2017 **Start Time:** 07:00

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	1	**1**	**1**
07:15 07:30	0	1	**1**	0	2	**2**	**3**
07:30 07:45	1	1	**2**	0	1	**1**	**3**
07:45 08:00	0	0	**0**	0	3	**3**	**3**
07:00 08:00	1	2	**3**	0	7	**7**	**10**
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**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 09:15	0	0	**0**	0	2	**2**	**2**
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	4	**4**	**4**
09:00 10:00	0	0	**0**	0	6	**6**	**6**
11:30 11:45	0	0	**0**	0	1	**1**	**1**
11:45 12:00	0	0	**0**	0	1	**1**	**1**
12:00 12:15	0	0	**0**	0	1	**1**	**1**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	3	**3**	**3**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	1	**1**	0	1	**1**	**2**
13:00 13:15	0	0	**0**	0	0	**0**	**0**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	1	**1**	0	1	**1**	**2**
15:00 15:15	0	0	**0**	0	0	**0**	**0**
15:15 15:30	0	1	**1**	0	1	**1**	**2**
15:30 15:45	0	0	**0**	0	1	**1**	**1**
15:45 16:00	0	2	**2**	0	4	**4**	**6**
15:00 16:00	0	3	**3**	0	6	**6**	**9**
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**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 17:15	0	0	**0**	1	0	**1**	**1**
17:15 17:30	0	0	**0**	0	1	**1**	**1**
17:30 17:45	2	1	**3**	0	3	**3**	**6**
17:45 18:00	0	1	**1**	0	1	**1**	**2**
17:00 18:00	2	2	**4**	1	5	**6**	**10**
Total	3	8	**11**	1	28	**29**	**40**

Comment:

Transportation Services - Traffic Services

Work Order 36942

Turning Movement Count - Full Study Summary Report

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017

Total Observed U-Turns

Northbound: 2 Southbound: 0

Eastbound: 6 Westbound: 0

AADT Factor .90

Full Study

	TRIM RD									REGIONAL RD 174									
	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	760	31	42	**833**	8	27	11	**46**	**879**	25	258	380	**663**	89	1143	12	**1244**	**1907**	**2786**
08:00 09:00	661	36	60	**757**	19	45	17	**81**	**838**	22	320	373	**715**	83	876	8	**967**	**1682**	**2520**
09:00 10:00	538	31	53	**622**	8	32	19	**59**	**681**	19	363	342	**724**	60	706	4	**770**	**1494**	**2175**
11:30 12:30	364	36	50	**450**	9	50	18	**77**	**527**	22	478	414	**914**	57	529	14	**600**	**1514**	**2041**
12:30 13:30	348	36	49	**433**	9	36	16	**61**	**494**	20	497	456	**973**	46	486	10	**542**	**1515**	**2009**
15:00 16:00	378	47	97	**522**	22	54	25	**101**	**623**	17	1008	859	**1884**	45	389	14	**448**	**2332**	**2955**
16:00 17:00	411	41	81	**533**	17	56	12	**85**	**618**	14	1059	1061	**2134**	66	410	9	**485**	**2619**	**3237**
17:00 18:00	478	28	81	**587**	13	47	20	**80**	**667**	17	969	1004	**1990**	58	403	5	**466**	**2456**	**3123**
Sub Total	3938	286	513	**4737**	105	347	138	**590**	**5327**	156	4952	4889	**9997**	504	4942	76	**5522**	**15519**	**20846**
U Turns				**2**				**0**	**2**				**6**				**0**	**6**	**8**
Total	3938	286	513	**4739**	105	347	138	**590**	**5329**	156	4952	4889	**10003**	504	4942	76	**5522**	**15525**	**20854**
EQ 12Hr	5474	398	713	**6587**	146	482	192	**820**	**7407**	217	6883	6796	**13904**	701	6869	106	**7676**	**21580**	**28987**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	4926	358	642	**5928**	131	434	173	**738**	**6666**	195	6195	6116	**12514**	631	6182	95	**6908**	**19422**	**26088**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	6454	469	841	**7766**	172	569	226	**967**	**8733**	256	8115	8012	**16393**	826	8099	125	**9050**	**25443**	**34176**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

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

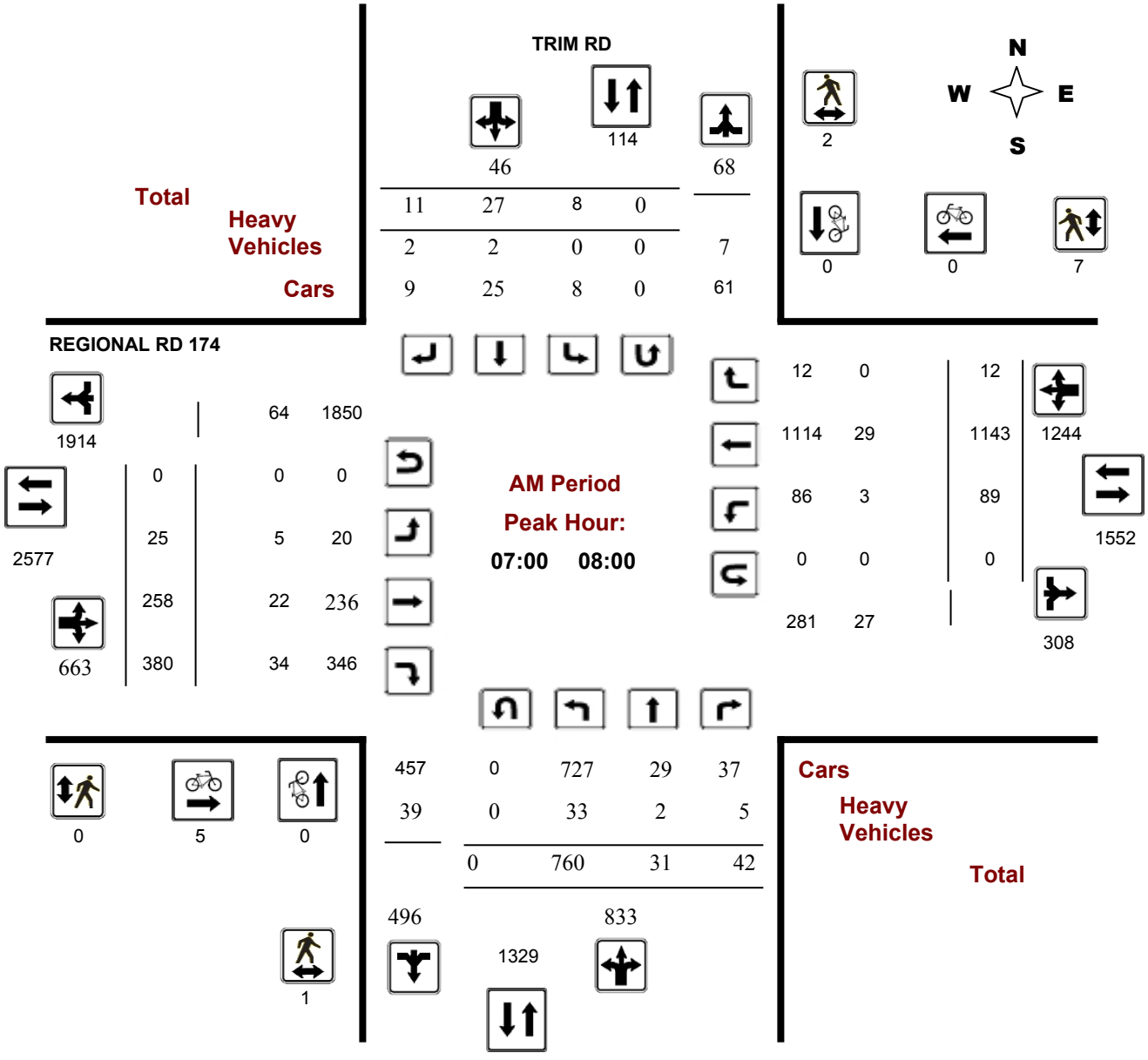
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017
Start Time: 07:00

WO No: 36942
Device: Miovision



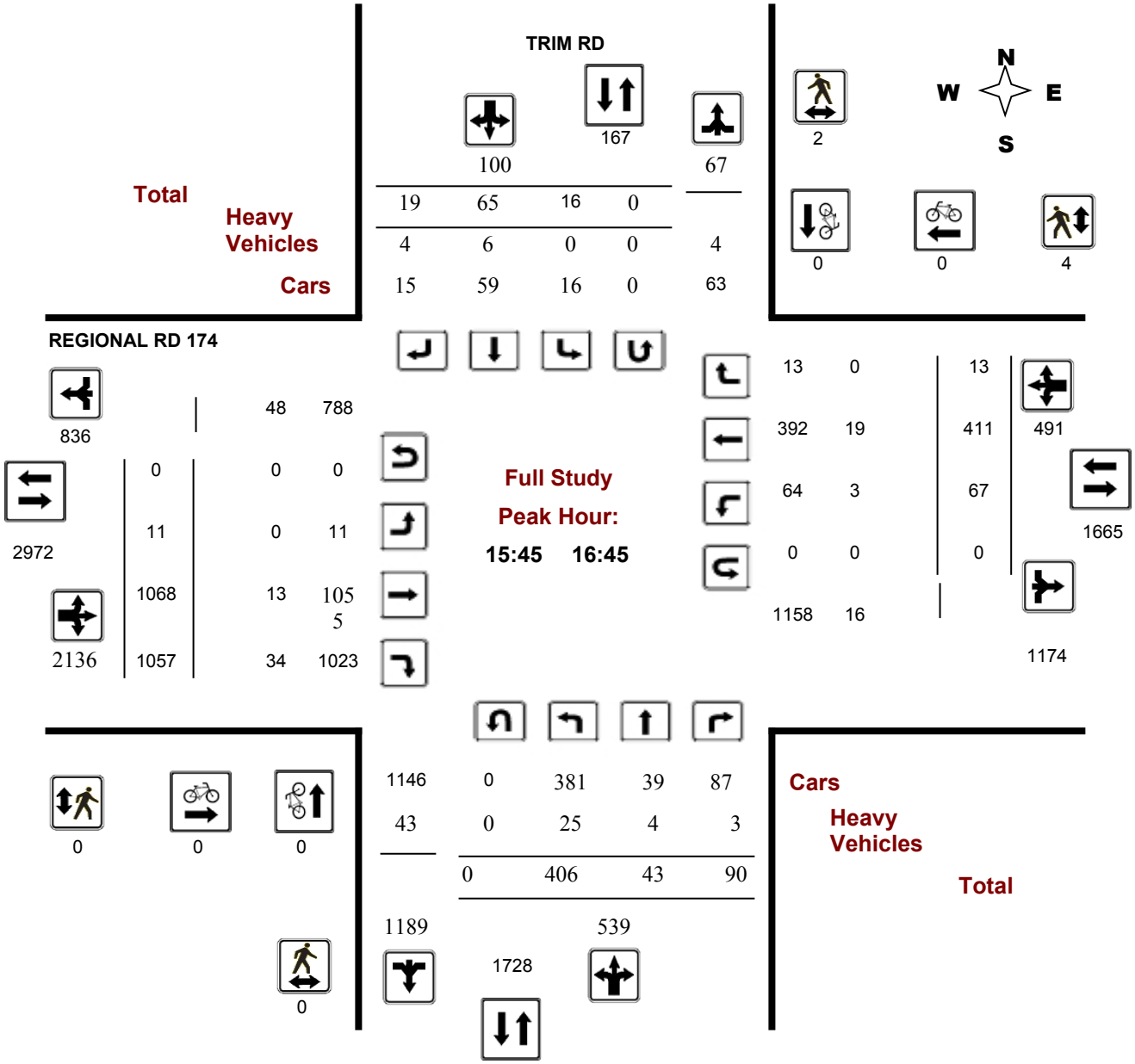
Comments

Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017
Start Time: 07:00
WO No: 36942
Device: Miovision



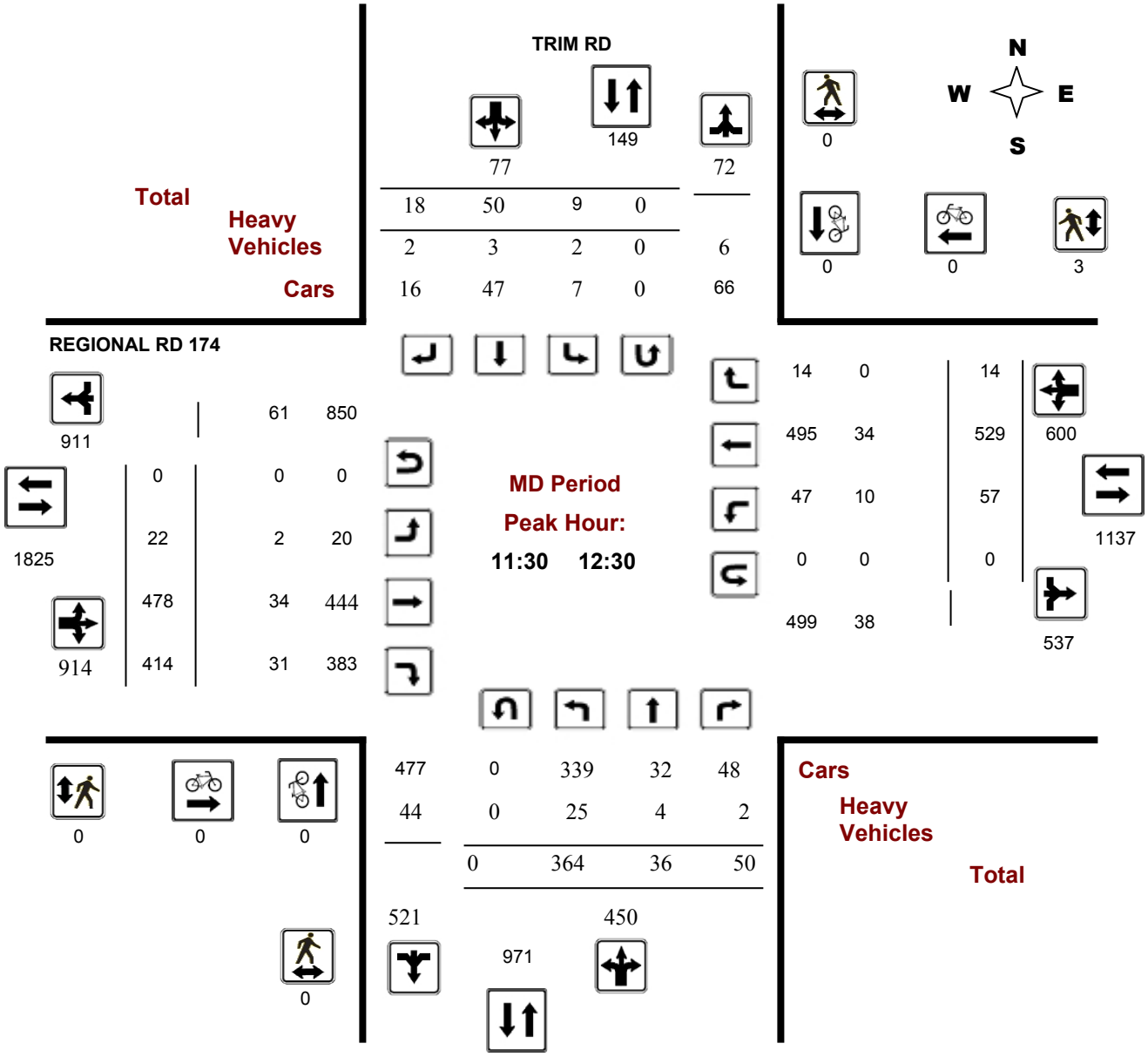
Comments

Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017
Start Time: 07:00
WO No: 36942
Device: Miovision



Comments

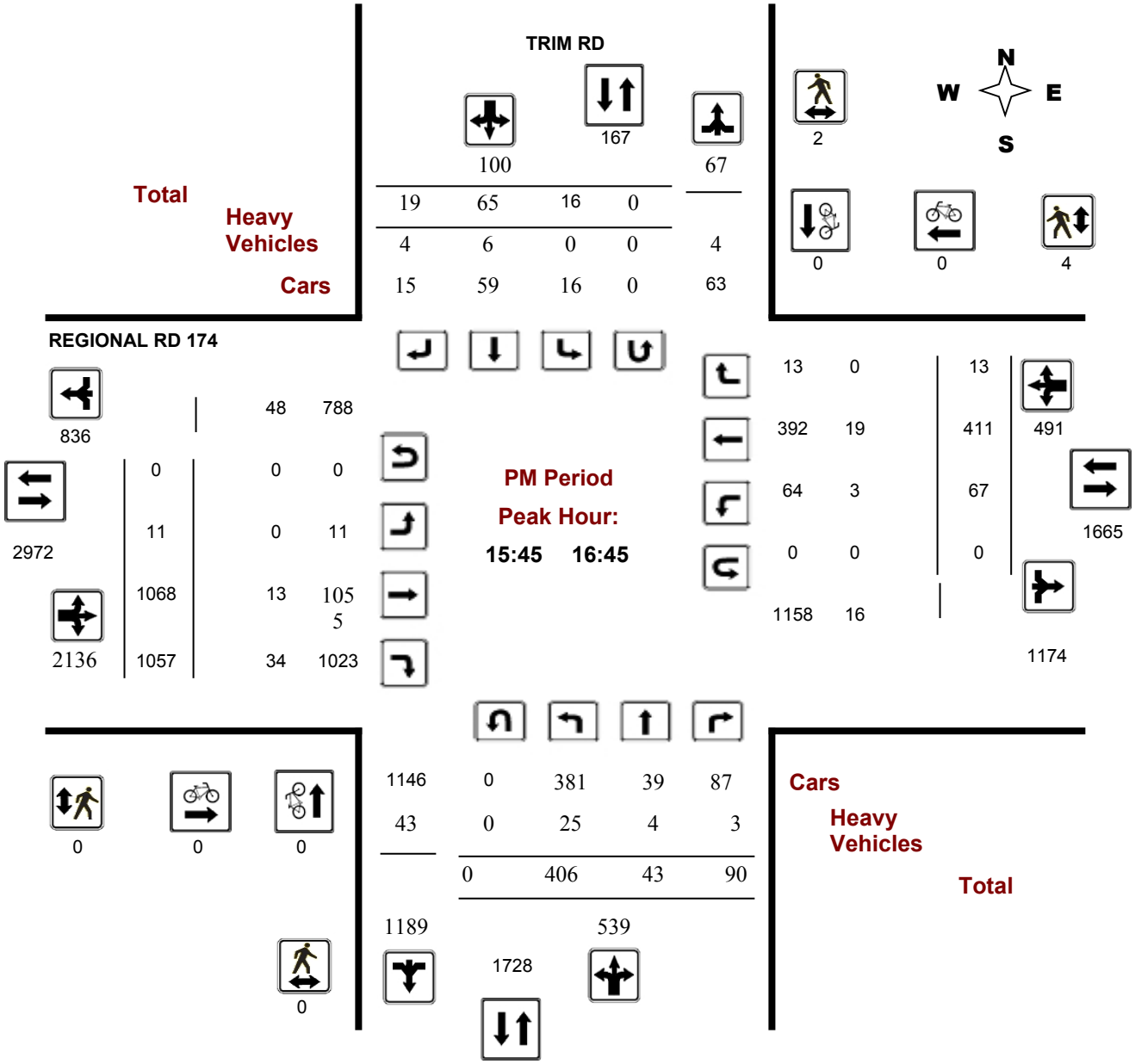
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

REGIONAL RD 174 @ TRIM RD

Survey Date: Wednesday, April 19, 2017
Start Time: 07:00

WO No: 36942
Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
36942

Turning Movement Count - 15 Min U-Turn Total Report

REGIONAL RD 174 @ TRIM RD

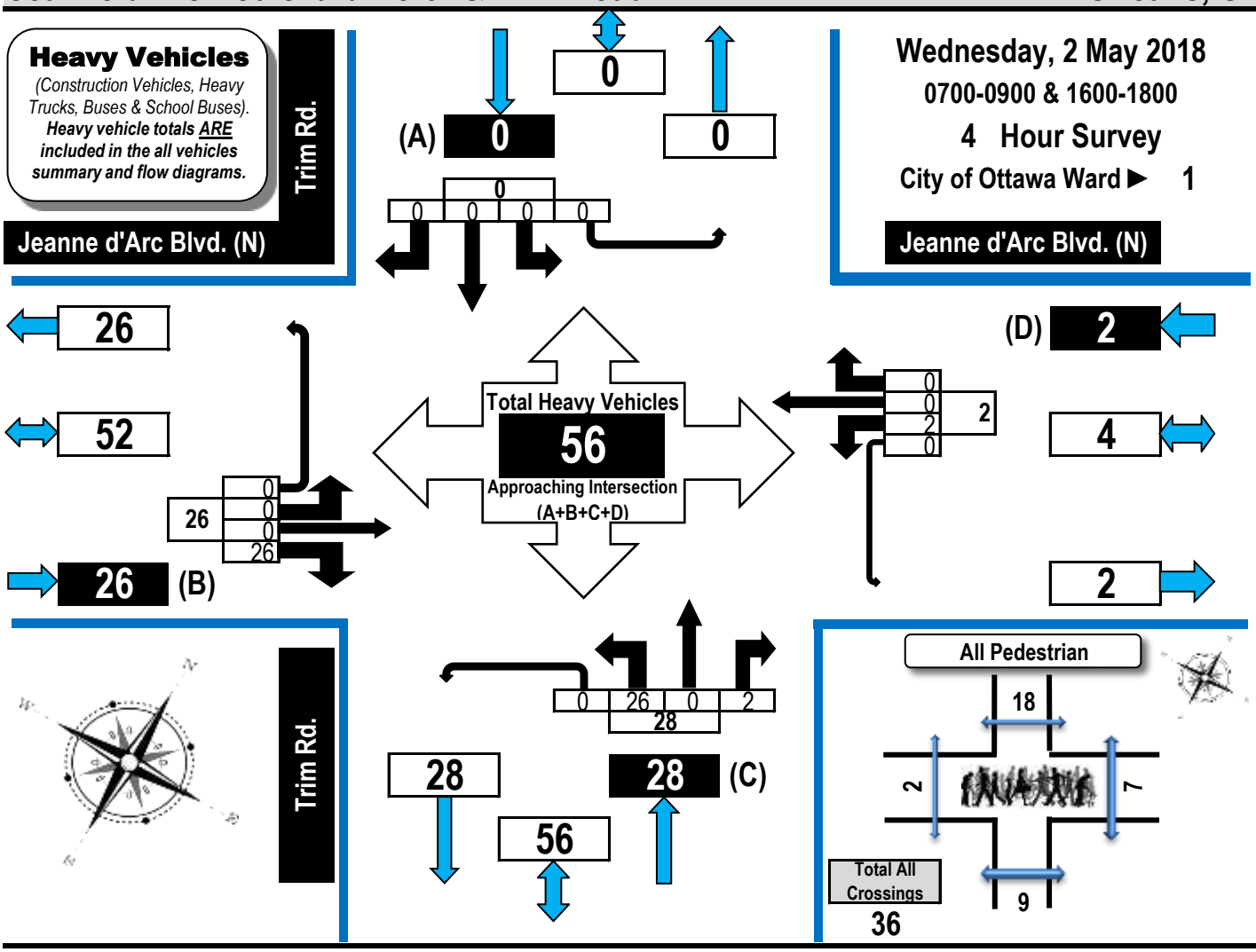
Survey Date: Wednesday, April 19, 2017

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	1	0	1
09:45	10:00	0	0	3	0	3
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	2	0	0	0	2
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	1	0	1
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	1	0	1
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		2	0	6	0	8

Turning Movement Count
Heavy Vehicle Summary
Flow Diagram

Heavy Trucks, Buses, and School Buses

Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON



Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON

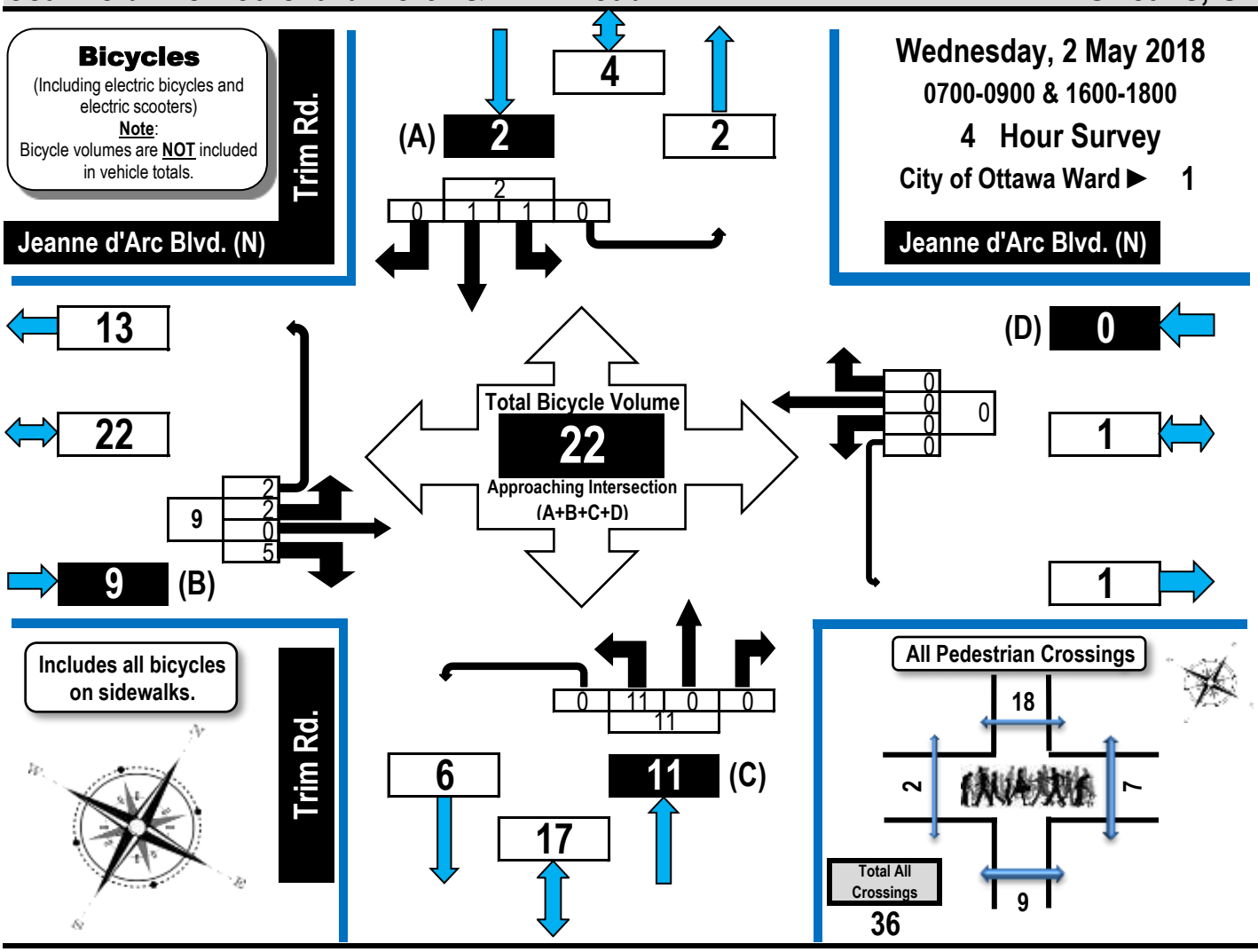
Survey Date: Wednesday, 2 May 2018 **Start Time:** 0700
Weather: Clear 17C/Overcast 20C **Survey Duration:** 4 Hrs. **Survey Hours:** 0700-0900 & 1600-1800
(AM/PM)

	Jeanne d'Arc Blvd. (N) Eastbound					Jeanne d'Arc Blvd. (N) Westbound					Trim Rd. Northbound					Trim Rd. Southbound					
Time Period	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	G.Tot.
0700-0800	0	0	3	0	3	1	0	0	0	1	9	0	1	0	10	0	0	0	0	0	14
0800-0900	0	0	7	0	7	1	0	0	0	1	10	0	1	0	11	0	0	0	0	0	19
1600-1700	0	0	9	0	9	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	14
1700-1800	0	0	7	0	7	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	9
Totals	0	0	26	0	26	2	0	0	0	2	26	0	2	0	28	0	0	0	0	0	56

Turning Movement Count
Bicycle Summary
Flow Diagram

Bicycles, Electric Bicycles, and Electric Scooters

Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON



Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON

Survey Date: Wednesday, 2 May 2018 **Start Time:** 0700
Weather: Clear 17C/Overcast 20C **Survey Duration:** 4 Hrs. **Survey Hours:** 0700-0900 & 1600-1800
(AM/PM)

	Jeanne d'Arc Blvd. (N) Eastbound					Jeanne d'Arc Blvd. (N) Westbound					Trim Rd. Northbound					Trim Rd. Southbound					
Time Period	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	G.Tot.
0700-0800	0	0	0	1	1	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	7
0800-0900	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	3
1600-1700	0	0	1	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	3
1700-1800	2	0	4	1	7	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	9
Totals	2	0	5	2	9	0	0	0	0	0	11	0	0	0	11	1	1	0	0	2	22

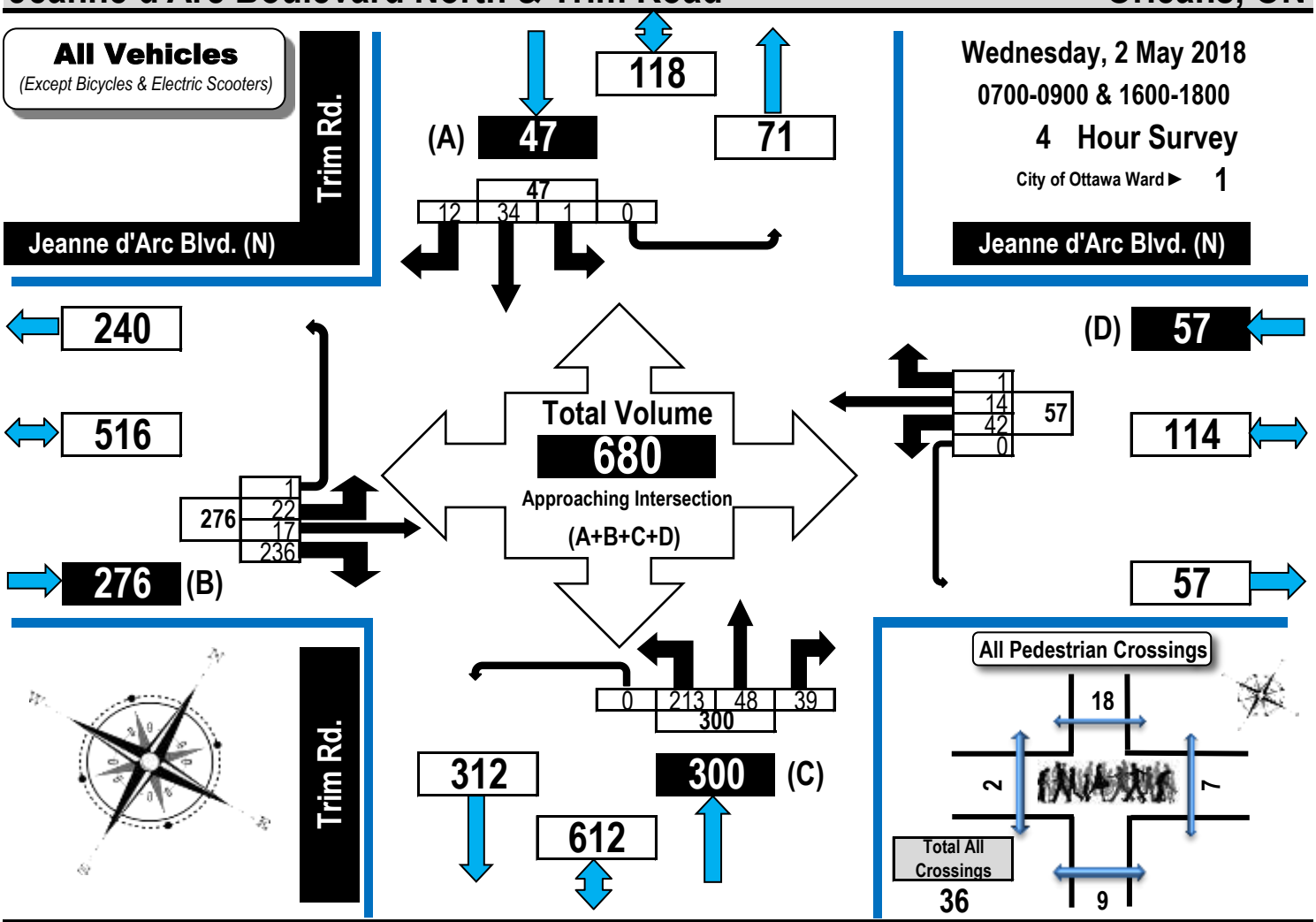
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

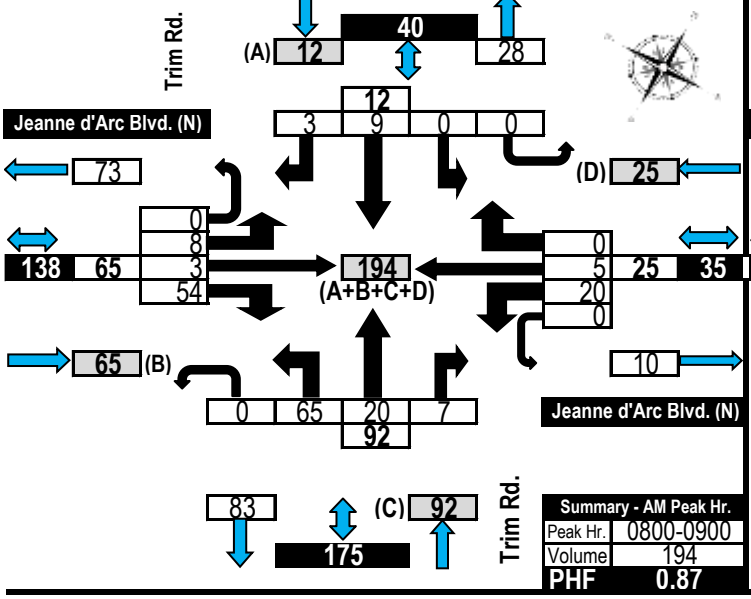
Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Wednesday, 2 May 2018
0700-0900 & 1600-1800
4 Hour Survey
City of Ottawa Ward ▶ 1

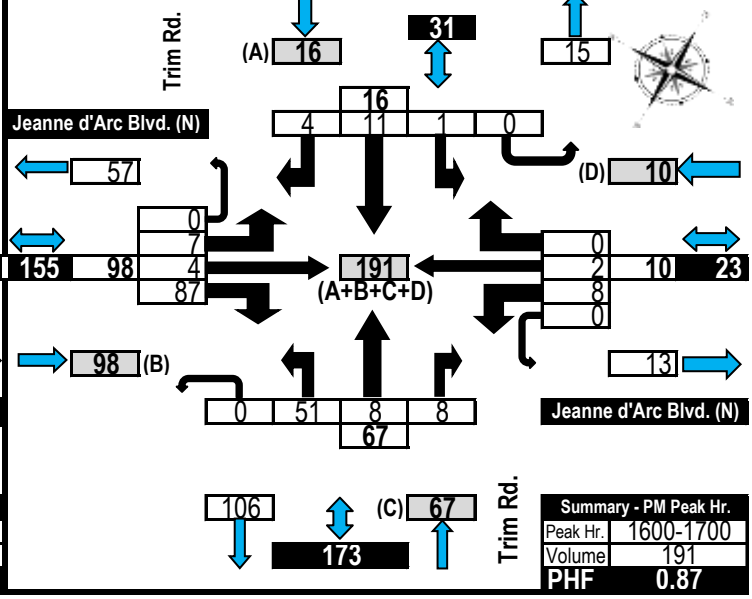


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0800-0900
Volume	194
PHF	0.87

PM Peak Hour Flow Diagram



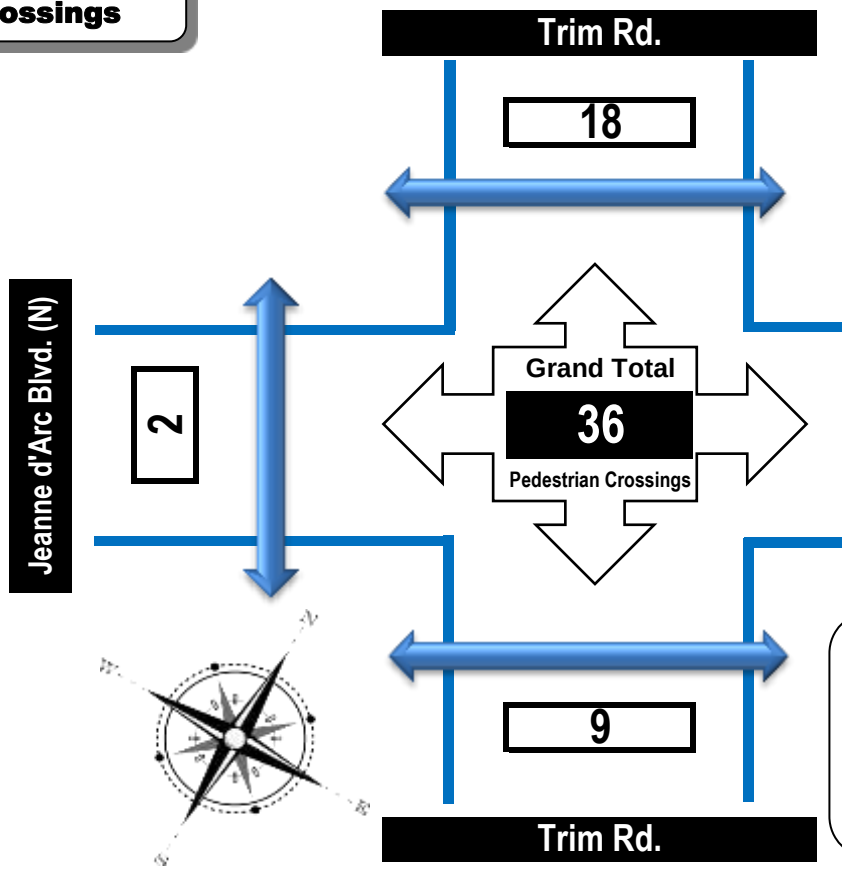
Summary - PM Peak Hr.	
Peak Hr.	1600-1700
Volume	191
PHF	0.87

Turning Movement Count
Pedestrian Crossings Summary and Flow Diagram

Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON

Pedestrian Crossings

Wednesday, 2 May 2018
0700-0900 & 1600-1800
4 Hours
City of Ottawa Ward ► 1



Note

*The values in the summary table below and the flow diagram represent the number of pedestrian crossing**s** **NOT** the number of individual pedestrian**s** crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.*

Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON

Survey Date: Wednesday, 2 May 2018 **Start Time:** 0700
Weather: Clear 17C/Overcast 20C **Survey Duration:** 4 Hrs. **Survey Hours:** 0700-0900 & 1600-1800
(AM/PM)

Time Period	West Side Crossing Jeanne d'Arc Blvd. (N)	East Side Crossing Jeanne d'Arc Blvd. (N)	Street Total	South Side Crossing Trim Rd.	North Side Crossing Trim Rd.	Street Total	Grand Total
0700-0800	0	1	1	1	3	4	5
0800-0900	1	5	6	5	8	13	19
1600-1700	1	0	1	1	2	3	4
1700-1800	0	1	1	2	5	7	8
Totals	2	7	9	9	18	27	36

ACCURATE TRUSTED TRAFFIC DATA

Turning Movement Count

Summary Report Including AM/PM Peak Hours, PHF, AADT and Expansion Factors

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

Jeanne d'Arc Boulevard North & Trim Road — Orléans, ON

Survey Date: Wednesday, 2 May 2018 **Start Time:** 0700 **AADT Factor:** 0.9

Weather-AM/PM Clear 17C/Overcast 20C **Survey Duration:** 4 Hrs. **Survey Hours:** 0700-0900 & 1600-1800

	Jeanne d'Arc Blvd. (N) Eastbound					Jeanne d'Arc Blvd. (N) Westbound						Trim Rd. Northbound					Trim Rd. Southbound						
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800	1	1	42	0	44	3	4	0	0	7	51	59	10	14	0	83	0	5	0	0	5	88	139
0800-0900	8	3	54	0	65	20	5	0	0	25	90	65	20	7	0	92	0	9	3	0	12	104	194
1600-1700	7	4	87	0	98	8	2	0	0	10	108	51	8	8	0	67	1	11	4	0	16	83	191
1700-1800	6	9	53	1	69	11	3	1	0	15	84	38	10	10	0	58	0	9	5	0	14	72	156
Totals	22	17	236	1	276	42	14	1	0	57	333	213	48	39	0	300	1	34	12	0	47	347	680

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor Applicable to the Day and Month of the Turning Movement Count

➡ Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts ⬅

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39

Equ. 12 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 0.9

AADT 12-hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31

AADT 24 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

AM Peak Hour Factor ➡ 0.87														Highest Hourly Vehicle Volume between 0700h & 1000h									
AM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
0800-0900	8	3	54	0	65	20	5	0	0	25	90	65	20	7	0	92	0	9	3	0	12	104	194

OFF Peak Hour Factor ➡ ###														Highest Hourly Vehicle Volume between 1130h & 1330h									
Off Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
N/A																							

PM Peak Hour Factor ➡ 0.87														Highest Hourly Vehicle Volume between 1500h & 1800h									
PM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
1600-1700	7	4	87	0	98	8	2	0	0	10	108	51	8	8	0	67	1	11	4	0	16	83	191

Comments

Heavy vehicle totals consist primarily of OC Transpo and school buses. Bicycle volumes include those using sidewalks.

Notes:

1. Includes all vehicle types except bicycles and electric scooters.
2. Expansion factors are not applied to turning movement counts if they are less than 8-hours in duration.
3. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

Disclaimer:

Appendix C

SYNCHRO Capacity Analysis: Existing Conditions

Existing AM
1: Trim & Jeanne D'Arc

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	3	54	20	5	0	64	20	7	0	9	3
Future Volume (vph)	8	3	54	20	5	0	64	20	7	0	9	3
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
Hourly flow rate (vph)	9	3	60	22	6	0	71	22	8	0	10	3

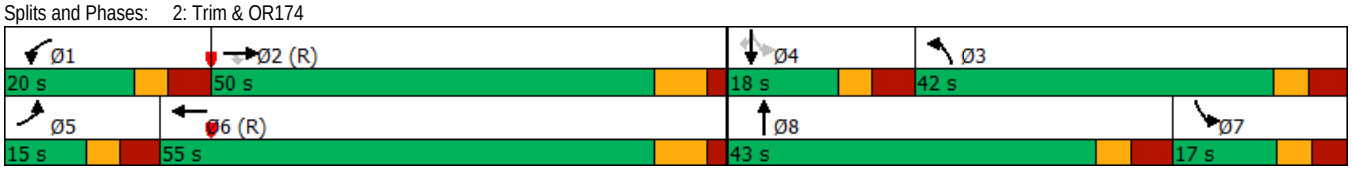
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	72	28	101	13
Volume Left (vph)	9	22	71	0
Volume Right (vph)	60	0	8	3
Hadj (s)	-0.44	0.19	0.13	-0.10
Departure Headway (s)	3.7	4.4	4.2	4.1
Degree Utilization, x	0.07	0.03	0.12	0.01
Capacity (veh/h)	928	789	820	847
Control Delay (s)	7.0	7.6	7.8	7.2
Approach Delay (s)	7.0	7.6	7.8	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	24.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	25	258	380	89	1143	760	31	14	49	20
Future Volume (vph)	25	258	380	89	1143	760	31	14	49	20
Lane Group Flow (vph)	28	287	422	99	1283	844	81	16	54	22
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8	7	4	
Permitted Phases			2					4		4
Detector Phase	5	2	2	1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.1	41.2	41.2	12.5	41.2	12.2	42.4	11.9	17.4	17.4
Total Split (s)	15.0	50.0	50.0	20.0	55.0	42.0	43.0	17.0	18.0	18.0
Total Split (%)	11.5%	38.5%	38.5%	15.4%	42.3%	32.3%	33.1%	13.1%	13.8%	13.8%
Yellow Time (s)	3.3	5.1	5.1	3.3	5.1	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.8	2.1	2.1	4.2	2.1	3.9	4.1	3.6	4.1	4.1
Lost Time Adjust (s)	-3.1	-3.2	-3.2	-3.5	-3.2	-3.2	-3.4	-2.9	-3.4	-3.4
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	10.1	47.9	47.9	14.7	57.7	37.3	48.5	24.3	14.0	14.0
Actuated g/C Ratio	0.08	0.37	0.37	0.11	0.44	0.29	0.37	0.19	0.11	0.11
v/c Ratio	0.21	0.23	0.52	0.52	0.85	0.89	0.07	0.06	0.28	0.06
Control Delay	59.8	29.5	5.2	64.0	40.5	57.3	14.8	25.9	57.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.8	29.5	5.2	64.0	40.5	57.3	14.8	25.9	57.7	0.3
LOS	E	C	A	E	D	E	B	C	E	A
Approach Delay		16.7			42.2		53.6		38.4	
Approach LOS		B			D		D		D	
Queue Length 50th (m)	6.8	27.2	0.0	24.0	166.6	106.3	2.5	2.5	12.9	0.0
Queue Length 95th (m)	16.6	38.3	22.3	42.3	#216.1	#138.6	9.3	6.8	26.2	0.0
Internal Link Dist (m)		222.6			537.2		301.4		202.0	
Turn Bay Length (m)	155.0		200.0	130.0		180.0		120.0		60.0
Base Capacity (vph)	143	1250	810	208	1503	961	1171	303	192	357
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.23	0.52	0.48	0.85	0.88	0.07	0.05	0.28	0.06

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 20 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 39.4	Intersection LOS: D
Intersection Capacity Utilization 77.5%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 2: Trim & OR174



Existing PM
1: Trim Rd & Jeanne D'Arc

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	4	87	8	2	0	51	8	8	1	11	4
Future Volume (vph)	7	4	87	8	2	0	51	8	8	1	11	4
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
Hourly flow rate (vph)	8	4	97	9	2	0	57	9	9	1	12	4

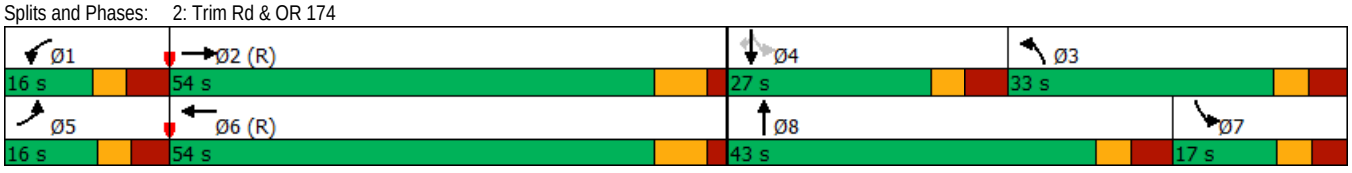
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	109	11	75	17
Volume Left (vph)	8	9	57	1
Volume Right (vph)	97	0	9	4
Hadj (s)	-0.49	0.20	0.11	-0.10
Departure Headway (s)	3.6	4.4	4.3	4.1
Degree Utilization, x	0.11	0.01	0.09	0.02
Capacity (veh/h)	963	793	813	842
Control Delay (s)	7.1	7.5	7.7	7.2
Approach Delay (s)	7.1	7.5	7.7	7.2
Approach LOS	A	A	A	A

Intersection Summary					
Delay			7.3		
Level of Service			A		
Intersection Capacity Utilization			23.4%	ICU Level of Service	A
Analysis Period (min)			15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	11	1068	1057	67	411	406	43	16	65	19
Future Volume (vph)	11	1068	1057	67	411	406	43	16	65	19
Lane Group Flow (vph)	12	1187	1174	74	471	451	148	18	72	21
Turn Type	Prot	NA	Free	Prot	NA	Prot	NA	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8	7	4	
Permitted Phases			Free					4		4
Detector Phase	5	2		1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	10.0		5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.1	41.2		12.5	41.2	12.2	42.4	11.9	17.4	17.4
Total Split (s)	16.0	54.0		16.0	54.0	33.0	43.0	17.0	27.0	27.0
Total Split (%)	12.3%	41.5%		12.3%	41.5%	25.4%	33.1%	13.1%	20.8%	20.8%
Yellow Time (s)	3.3	5.1		3.3	5.1	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.8	2.1		4.2	2.1	3.9	4.1	3.6	4.1	4.1
Lost Time Adjust (s)	-3.1	-3.2		-3.5	-3.2	-3.2	-3.4	-2.9	-3.4	-3.4
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	9.6	55.8	130.0	12.4	63.5	25.6	45.9	33.2	23.0	23.0
Actuated g/C Ratio	0.07	0.43	1.00	0.10	0.49	0.20	0.35	0.26	0.18	0.18
v/c Ratio	0.10	0.82	0.77	0.46	0.29	0.70	0.13	0.05	0.23	0.05
Control Delay	57.3	39.8	3.9	65.3	22.0	54.4	11.7	24.2	48.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	39.8	3.9	65.3	22.0	54.4	11.7	24.2	48.2	0.2
LOS	E	D	A	E	C	D	B	C	D	A
Approach Delay		22.1			27.9		43.9		35.2	
Approach LOS		C			C		D		D	
Queue Length 50th (m)	2.9	149.6	0.0	17.9	33.3	55.6	3.8	2.8	16.0	0.0
Queue Length 95th (m)	9.3	#191.8	0.0	34.1	58.2	71.5	12.6	7.4	30.1	0.0
Internal Link Dist (m)		313.9			321.3		154.2		204.2	
Turn Bay Length (m)	150.0		200.0	130.0		230.0		120.0		55.0
Base Capacity (vph)	156	1455	1517	166	1649	733	1129	376	315	450
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.82	0.77	0.45	0.29	0.62	0.13	0.05	0.23	0.05

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 27.0	Intersection LOS: C
Intersection Capacity Utilization 74.5%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 2: Trim Rd & OR 174



Appendix D

Collision Data and Analysis

Total Area

Classification of Accident	*Rear End*	*Turning Movement*	*Sideswipe*	*Angle*	*Approaching*	*Single Vehicle (other)*	*Single vehicle (Unattended vehicle)*	*Other*	*Total*	
P.D. only	39	5	6	1	0	2	0	2	55	80%
Non-fatal injury	12	1	0	1	0	0	0	0	14	20%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**51**	**6**	**6**	**2**	**0**	**2**	**0**	**2**	**69**	100%
	#1 or 74%	#2 or 9%	#2 or 9%	#4 or 3%	#7 or 0%	#4 or 3%	#7 or 0%	#4 or 3%		

REGIONAL RD 174/TRIM RD

Years	*Total # Collisions*	*24 Hr AADT Veh Volume*	*Days*	*Collisions/MEV*
2012-2016	69	34,176	1825	**1.11**

Classification of Accident	*Rear End*	*Turning Movement*	*Sideswipe*	*Angle*	*Approaching*	*Single Vehicle (other)*	*Single vehicle (Unattended vehicle)*	*Other*	*Total*	
P.D. only	39	5	6	1	0	2	0	2	55	80%
Non-fatal injury	12	1	0	1	0	0	0	0	14	20%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**51**	**6**	**6**	**2**	**0**	**2**	**0**	**2**	**69**	100%
	74%	9%	9%	3%	0%	3%	0%	3%		

JEANNE D'ARC BOULEVARD/TRIM RD

Years	*Total # Collisions*	*24 Hr AADT Veh Volume*	*Days*	*Collisions/MEV*
2012-2016	0	2,391	1825	**0.00**

Classification of Accident	*Rear End*	*Turning Movement*	*Sideswipe*	*Angle*	*Approaching*	*Single Vehicle (other)*	*Single vehicle (Unattended vehicle)*	*Other*	*Total*	
P.D. only	0	0	0	0	0	0	0	0	0	
Non-fatal injury	0	0	0	0	0	0	0	0	0	
Non reportable	0	0	0	0	0	0	0	0	0	
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0%

Appendix E

Petrie's Landing | Traffic Calming Concept

PARSONS

1223 Michael Street, Suite 100 | Ottawa, Ontario K1J7T2
P: +1 613.738.4160 | www.parsons.com

30 August 2016

OUR REF: 982847-02311

Brigil
98 rue Lois
Gatineau (Hull), QC J8Y 3R7

Attention: Jean-Luc Rivard, Director – Land Development

Dear Jean-Luc:

Re: Petrie's Landing I TIS Towers II, III and IV – Addendum #3

This Addendum #3 has been prepared in response to the City of Ottawa's comments regarding potential traffic calming concerns within the Petrie's Landing development. The concerns raised to date include potential sight line issues at underground parking entrances, vehicle conflict zones with multiple accesses or bends on Inlet Private, and speeding along Inlet Private along the south limits of the site. To address these, a conceptual traffic-calming plan was developed and provided to the City for comment on June 30, 2016. Subsequent to this conceptual submission, additional comments were provided by the City and the plan was revised to focus solely on Tower II.

The traffic-calming plan has been developed with the intention of the Tower II recommendations to be implemented during construction. The Tower I recommendations are conceptual in nature and can be implemented during Tower II construction. Table 1 summarizes the traffic calming measures proposed for Petrie's Landing and Figure 1 illustrates the location of each of the proposed/conceptual features.

Table 1 Petrie's Landing Proposed Traffic Calming Measures

Phase	Measure	Location	Notes
Tower II	Removable Speed Hump	Along one-way access between Tower I and II site limits	• Introduces vertical deflection along the one-way access road to limit cut through vehicles and speed in front of Towers I and II
	Removable Speed Hump	Along Inlet Private, between Tower II and III site limits	• Introduces vertical deflection along Inlet Private between Towers II and III to limit speed along the road
	Signage – Stop Signs	Introduce all-way stop control at the Tower II underground parking exit to Inlet Private	• Controls access to Inlet Private
Tower I (conceptual)	Pavement Markings – Gore Area	Exit from Tower I drop off area onto Inlet Private	• Delineates approach angle and lane width for exiting vehicles from the Tower I drop-off area to reduce vehicle conflicts on Inlet Private
	Pavement Markings - Centerline	Along Inlet Private at the 90 bend in the southwest corner of the site	• Delineates the lane widths (3.5m) and improve adherence to driving line on the curve
	Signage – Stop Sign	At one-way access from Towers I and II to Inlet Private, south of Tower I	• Controls access to Inlet Private
	Signage – Warning Curve Sign	On Inlet Private on both sides of the 90 degree bend in the southwest corner of the site	• Warning for vehicles approaching the curve to reduce speed, in conjunction with the centerline pavement marking

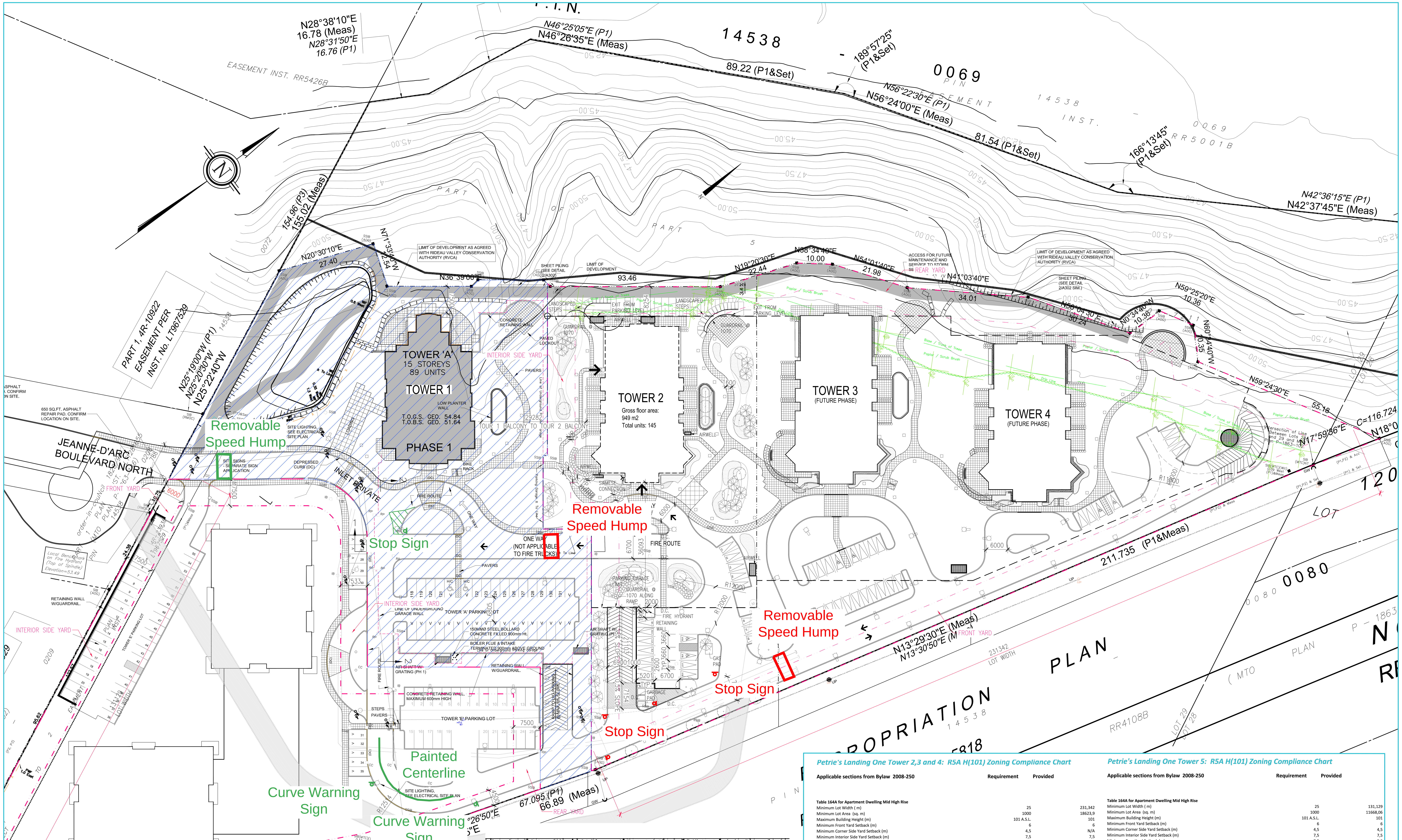
In conclusion, the proposed traffic calming measures are anticipated to address the City's comments and aggregated public feedback regarding the existing and future site operations. Should the conceptual plans be agreed upon, they can be implemented into the existing Tower II Site Plan Control submission and further implemented as the Petrie's Landing site develops.

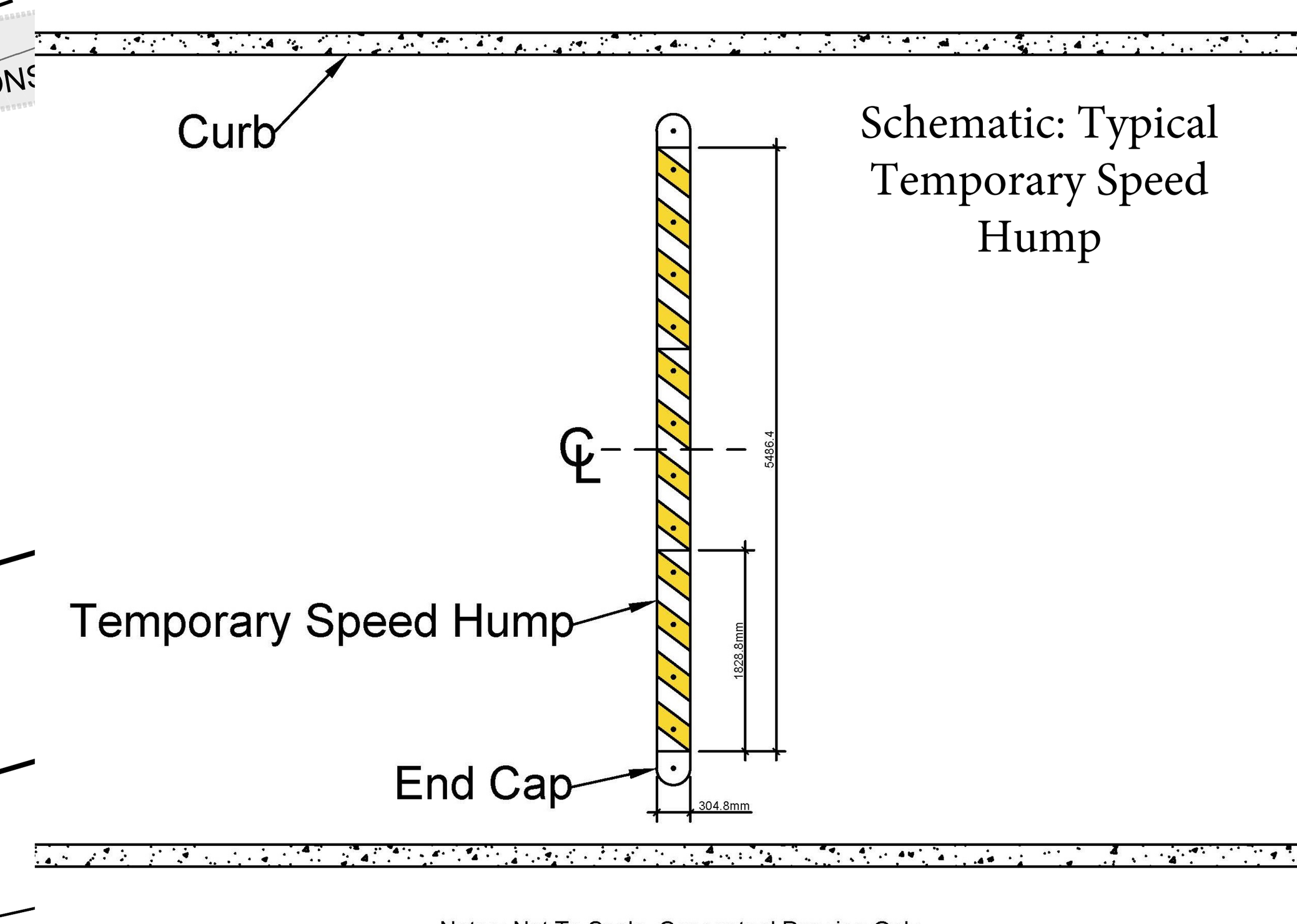
Prepared By:

Andrew Harte, P.Eng.
Transportation Engineer

Reviewed by:

Christopher Gordon, P, Eng.
Senior Project Manager





Legend:

Tower I Conceptual Measures

Tower II Proposed Measures

Petrie's Landing One Tower 2,3 and 4: R5A H(101) Zoning Compliance Chart

Applicable sections from Bylaw 2008-250	Requirement	Provided
Table 164A for Apartment Dwelling Mid High Rise		
Minimum Lot Width (m)	25	231,342
Minimum Lot Area (sq. m)	1000	18623,9
Maximum Building Height (m)	101 A.S.L.	101
Minimum Front Yard Setback (m)	6	6
Minimum Corner Side Yard Setback (m)	4,5	N/A
Minimum Interior Side Yard Setback (m)	7,5	7,5
Minimum Rear Yard Setback (m)	7,5	7,5
Section 163(9)		
Minimum landscape area (% of site)	30	48%
Section 101 and 102		
Minimum No. of parking spaces per unit	1,2	1,3
Minimum No. of visitor parking spaces per unit	0,2	0,2
Section 106		
Parking space width (m)	2.6 min 2.75 max	2,6
Minimum parking space depth (m)	5,2	5,2
Section 107		
Driveway access : min width (m) one way	3	N/A
Driveway access : min width (m) two way	6,7	6,7
Section 109		
No parking space in required front yard or corner yard		no parking units in required yards
Section 110		
Minimum landcape area of parking lot (%)	15	57%
Minimum landscape buffer width of parking lot not abutting street (m)		
...1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1.5/3	1,5
Minimum landscape buffer width of parking lot abutting street (m)	3	N/A
Section 111		
Bicycle Parking Space Provisions (number per unit)	0,5	0,5
Section 137		
Total amenity area (sq. m per unit)	6	6,0
Communal amenity area: % of total required 'total amenity area'	50	50%

Petrie's Landing One Tower 5: R5A H(101) Zoning Compliance Chart

Applicable sections from Bylaw 2008-250	Requirement	Provided
Table 164A for Apartment Dwelling Mid High Rise		
Minimum Lot Width (m)	25	131,129
Minimum Lot Area (sq. m)	1000	11668,06
Maximum Building Height (m)	101 A.S.L.	101
Minimum Front Yard Setback (m)	6	6
Minimum Corner Side Yard Setback (m)	4,5	4,5
Minimum Interior Side Yard Setback (m)	7,5	7,5
Minimum Rear Yard Setback (m)	7,5	7,5
Section 163(9)		
Minimum landscape area (% of site)	30%	40%
Section 101		
Minimum No. of parking spaces per unit	0,25 per unit plus 1/100m2 of GFA used for medical, health or personnal services	80 exterior parking
Section 106		
Parking space width (m)	2.6 min 2.75 max	2,6
Minimum parking space depth (m)	5,2	5,2
Section 107		
Driveway access : min width (m) one way	3	N/A
Driveway access : min width (m) two way	6,7	6,7
Section 109		
No parking space in required front yard or corner yard		some parking units in interior side yard only
Section 110		
Minimum landcape area of parking lot (%)	15%	33%
Minimum landscape buffer width of parking lot not abutting street (m)		
...1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1.5/3	1,5
Minimum landscape buffer width of parking lot abutting street (m)	3	N/A
Section 111		
Bicycle Parking Space Provisions (number per unit)	0,25	0,25
Section 137		
Total amenity area (sq. m per unit)	6	6,0
Communal amenity area: % of total required 'total amenity area'	50	50%

NOTES GÉNÉRALES General Notes

2. Les dimensions apparaissant aux documents devront êtres vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before starting the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of other professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

ARCHITECTURE DE PAYSAGE Landscape architect
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CIVIL Civil
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ARCHITECTES Architect
NEUF architect(e)s
630, boul. René-Lévesque O. 32e étage, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU Seal

DCYSA devient / becomes
NEUF
ARCHITECT(E)S

CLIENT Client

OUVRAGE Project
Petrie's Landing I, Phase 2

EMPLACEMENT Location: OTTAWA
NO PROJET No.: 10557

NO	RÉVISION	DATE (aa.mm.jj)
A	SITE APPROVAL	2013-12-20
B	FOR COORDINATION	2016.01.18
C	SITE PLAN APPROVAL 4TH	2016.06.03

Preliminary DO NOT USE FOR CONSTRUCTION

DESSINÉ PAR Drawn by: A.B.
VÉRIFIÉ PAR Checked by: ANT.C.
DATE (aa.mm.jj): 13.06.05
ÉCHELLE Scale: 1:500

TITRE DU DESSIN Drawing Title
Site plan

RÉVISION Revision: C
NO. DESSIN Dwg Number: A100
#14602
D07-12-13-0248

I:\P_10500\10557\CAD\10557 A100 Site Plan.dwg

Appendix F

Adjacent Developments Trip Generation and Distribution

PARSONS

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24 February 2015 OUR REF: TO3131TOY

Brigil
98 rue Lois
Gatineau (Hull), QC J8Y 3R7

Attention: Jean-Luc Rivard

Dear Jean-Luc:

Re: Petrie's Landing I TIS
Towers II, III and IV - Addendum #2

This Addendum #2 has been prepared in response to a City of Ottawa comment regarding the number of assumed residential units identified in the original TIS prepared December 2013 by Delcan (now known as Parsons). It has come to the City's attention that number of proposed residential units identified in the original TIS is less than the number of residential units identified in the Zoning By-Law Amendment/Official Plan Amendment for Towers I to IV.

Based on information provided at the time, the number of residential units identified in the original TIS are as follows:

Petrie's Landing I *- original TIS*

- **Phase I** consists of a 89 unit residential tower (Tower I);
- **Phase II** consists of a 336 unit retirement building; and
- **Phase III** consists of Towers II, III and IV, each comprised of 140 residential condo units for a total of 420 residential condo units.

The number of residential units identified in the Zoning By-Law Amendment/Official Plan Amendment is as follows:

Petrie's Landing I *- Zoning By-Law Amendment/Official Plan Amendment*

- **Phase I** consists of a 89 unit residential tower (Tower I);
- **Phase II** consists of a 314 unit retirement building; and
- **Phase III** consists of Towers II, III and IV, each comprised of 145, 175 and 145 residential condo units, respectively, for a total of 465 residential condo units.

The net difference between the original TIS and the Zoning By-Law Amendment/Official Plan Amendment equates to 23 fewer residential units assumed in the original TIS. As such, the following Tables 1 and 2 summarize the projected site-generated traffic from the original TIS report and the revised projected site-generated traffic, respectively. The revised projected site-generated traffic summarized in Table 2 is based on the number of residential units identified in the Zoning By-Law Amendment/Official Plan Amendment and the same appropriate trip generation rates/modal shares identified in the original TIS.

Table 1: Original Projected Site-Generated Traffic

Land Use	Dwelling Units	AM Peak (veh/hr)			PM Peak (veh/hr)		
		In	Out	Total	In	Out	Total
Retirement Residence	336	17	33	50	39	24	63
Tower I	89	8	35	43	22	14	36
Tower II	140	13	55	68	38	24	62
Tower III	140	13	55	68	38	24	62
Tower IV	140	13	55	68	38	24	62
Total 'New' Auto Trips		**64**	**233**	**297**	**175**	**110**	**285**

As shown in Table 1, the total projected two-way site-generated traffic for Petrie's Landing I is approximately 300 and 285 veh/h during the weekday morning and afternoon peak hours, respectively.

The following Table 2 summarizes the projected two-way site-generated traffic for Petrie's Landing I based on the number of residential units identified in the Zoning By-Law Amendment/Official Plan Amendment.

Table 2: Revised Project Site-Generated Traffic

Land Use	Dwelling Units	AM Peak (veh/hr)			PM Peak (veh/hr)		
		In	Out	Total	In	Out	Total
Retirement Residence	314	16	30	46	35	24	59
Tower I	89	8	35	43	22	14	36
Tower II	145	13	57	70	39	24	63
Tower III	175	15	63	78	45	28	73
Tower IV	145	13	57	70	39	24	63
Total 'New' Auto Trips		**65**	**242**	**307**	**180**	**114**	**294**

As shown in Table 2, the total projected two-way site-generated traffic for Petrie's Landing I, based on the number of residential units identified in the Zoning By-Law Amendment/Official Plan Amendment, is approximately 310 and 295 veh/h during the weekday morning and afternoon peak hours, respectively.

The approximate net difference in the total projected two-way site-generated traffic equates to an additional 10 veh/h (or approximately 1 additional vehicle every 6 minutes) during both weekday morning and afternoon peak hours. This amount of additional site-generated is considered negligible and will have *no* effect on the results, findings or conclusions included in the original TIS or the subsequent Addendum #1.

Therefore, based on the foregoing, the results, findings and conclusions include in the original TIS and the subsequent Addendum #1 remain valid and no further analysis is required from a transportation perspective. If there any questions, please call.

Prepared By:

Gordon R. Scobie, P.Eng.
Transportation Engineer
Ottawa Operations

Trip Generation - Petrie's Landing II

ITE Vehicle Trip Generation Rates

Land Use	Data Source	Trip Rate	
		AM Peak	PM Peak
Residential Condominiums/Townhouses	ITE 230	0.44	0.52

Modified Person Trip Generation Rates

Land Use	Data Source	Person Trip Rate	
		AM Peak	PM Peak
Residential Condominiums/Townhouses	ITE 230	0.57	0.68

Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%

ITE Fitted Curve Equations

Land Use	Data Source	Fitted Curve Equation					
		AM Peak			PM Peak		
Residential Condominiums/Townhouses	ITE 230	Ln(T)=	0.80Ln(x)	+ 0.26	Ln(T)=	0.82Ln(x)	+ 0.32

Modified Person Trip Generation

Land Use	Data Source	Area	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
			In	Out	Total	In	Out	Total
		Units	17%	83%		67%	33%	
Residential Condominiums/Townhouses	ITE 230	430 du	36	180	216	172	86	258
		Total	36	180	216	172	86	258

Total Site Trip Generation

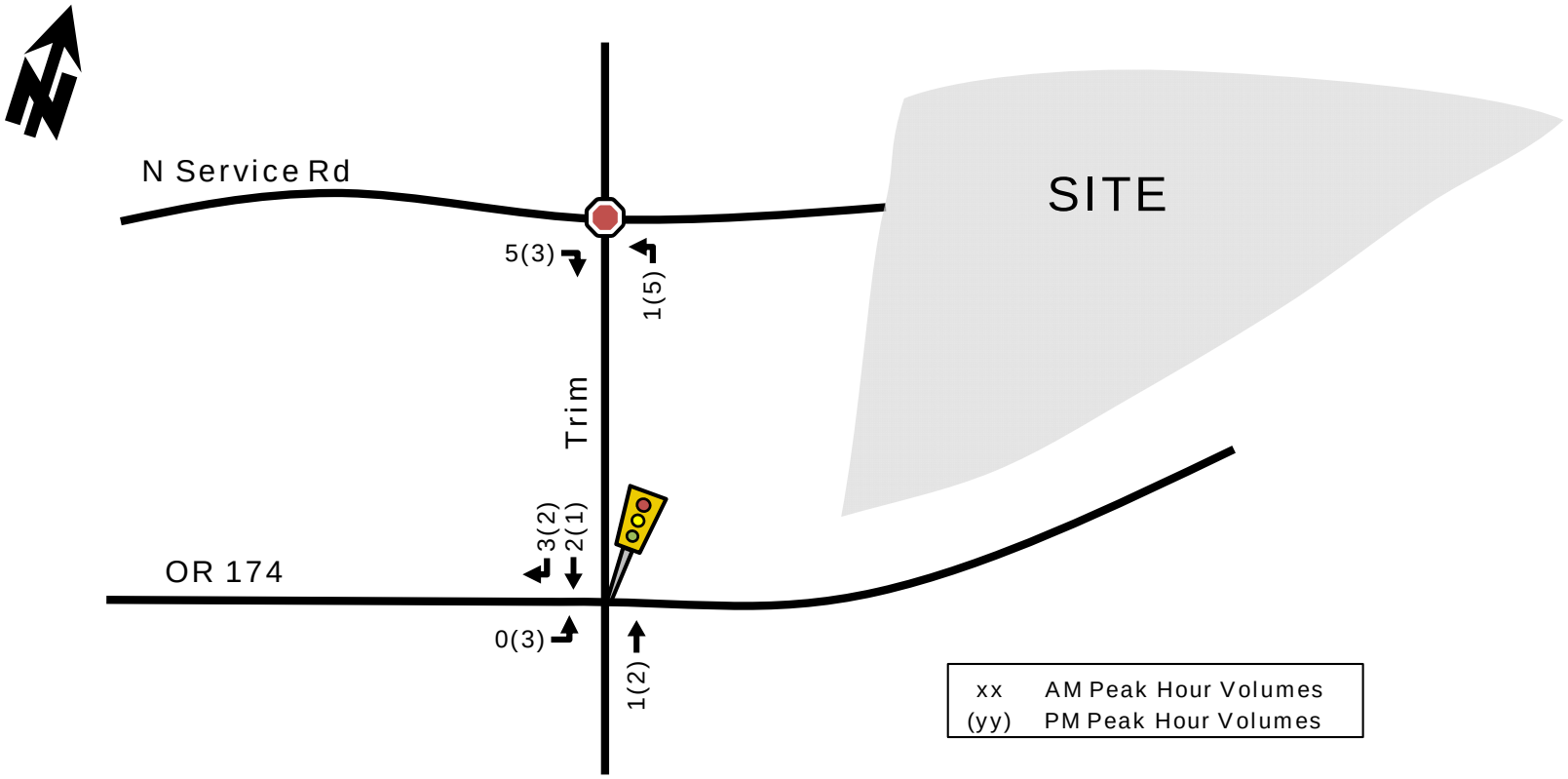
Travel Mode	Mode Share	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	60%	22	108	130	104	52	156
Auto Passenger	10%	4	18	22	17	9	26
Transit	25%	9	45	54	43	21	64
Non-motorized	5%	1	9	10	8	4	12
Total Person Trips	100%	36	180	216	172	86	258
Total 'New' Auto Trips		**22**	**108**	**130**	**104**	**52**	**156**

Total Site Vehicle Trip Generation

Travel Mode	AM Peak (veh/hr)			PM Peak (veh/hr)		
	In	Out	Total	In	Out	Total
Total Site Trip Generation	22	108	130	104	52	156
Total 'New' Auto Trips	**22**	**108**	**130**	**104**	**52**	**156**

Petrie's Landing II

New Trips



Trip Generation - Petrie's Landing III

ITE Vehicle Trip Generation Rates

Land Use	Data Source	Trip Rate	
		AM Peak	PM Peak
Residential Condominiums/Townhouses	ITE 230	0.44	0.52
General Office	ITE 710	1.56	1.49
Specialty Retail	ITE 826	1.36	2.71

Modified Person Trip Generation Rates

Land Use	Data Source	Person Trip Rate	
		AM Peak	PM Peak
Residential Condominiums/Townhouses	ITE 230	0.57	0.68
General Office	ITE 710	2.03	1.94
Specialty Retail	ITE 826	1.76	3.52

Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%

ITE Fitted Curve Equations

Land Use	Data Source	Fitted Curve Equation					
		AM Peak			PM Peak		
Residential Condominiums/Townhouses	ITE 230	Ln(T)=	0.80Ln(x)	+ 0.26	Ln(T)=	0.82Ln(x)	+ 0.32
General Office	ITE 710	Ln(T)=	0.80Ln(x)	+ 1.57	T=	1.12(x)	+ 78.45
Specialty Retail	ITE 826	T=	1.20(x)	+ 10.74	T=	2.40(x)	+ 21.48

Modified Person Trip Generation

Land Use	Data Source	Area	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
			In	Out	Total	In	Out	Total
		Units	17%	83%		67%	33%	
Residential Condominiums/Townhouses	ITE 230	790 du	59	292	351	285	141	426
		ft²	88%	12%		17%	83%	
General Office	ITE 710	370,000 ft²	623	86	709	108	533	641
		ft²	56%	44%		44%	56%	
Specialty Retail	ITE 826	23,000 ft²	28	22	50	44	56	100
		Total	710	400	1,110	437	730	1,167

Residential Condominiums/Townhouses Trip Generation

Travel Mode	Mode Share	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	60%	36	176	212	171	85	256
Auto Passenger	10%	6	29	35	29	14	43
Transit	25%	15	73	88	71	35	106
Non-motorized	5%	2	14	16	14	7	21
Total Person Trips	100%	59	292	351	285	141	426
Total 'New' Residential Condominiums/Townhouses Auto Trips		**36**	**176**	**212**	**171**	**85**	**256**

General Office Trip Generation

Travel Mode	Mode Share	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	60%	374	52	426	65	320	385
Auto Passenger	10%	63	9	72	11	54	65
Transit	25%	155	21	176	27	133	160
Non-motorized	5%	31	4	35	5	26	31
Total Person Trips	100%	623	86	709	108	533	641
Total 'New' General Office Auto Trips		**374**	**52**	**426**	**65**	**320**	**385**

Specialty Retail Trip Generation

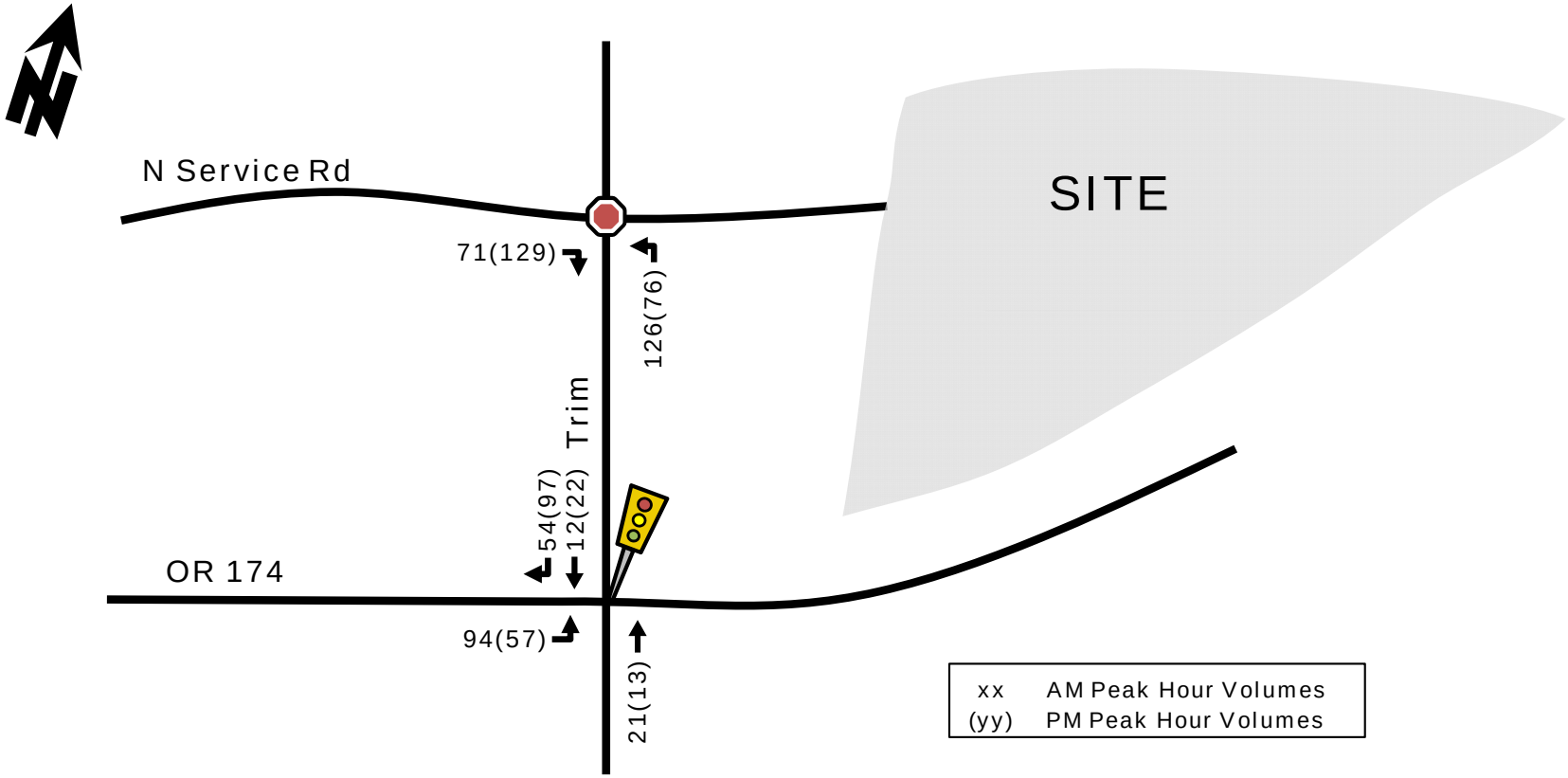
Travel Mode	Mode Share	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	60%	17	14	31	27	34	61
Auto Passenger	10%	3	2	5	4	6	10
Transit	25%	7	5	12	11	14	25
Non-motorized	5%	1	1	2	2	2	4
Total Person Trips	100%	28	22	50	44	56	100
Less Pass-by (30%)		-5	-5	-10	-9	-9	-18
Total 'New' Specialty Retail Auto Trips		**12**	**9**	**21**	**18**	**25**	**43**

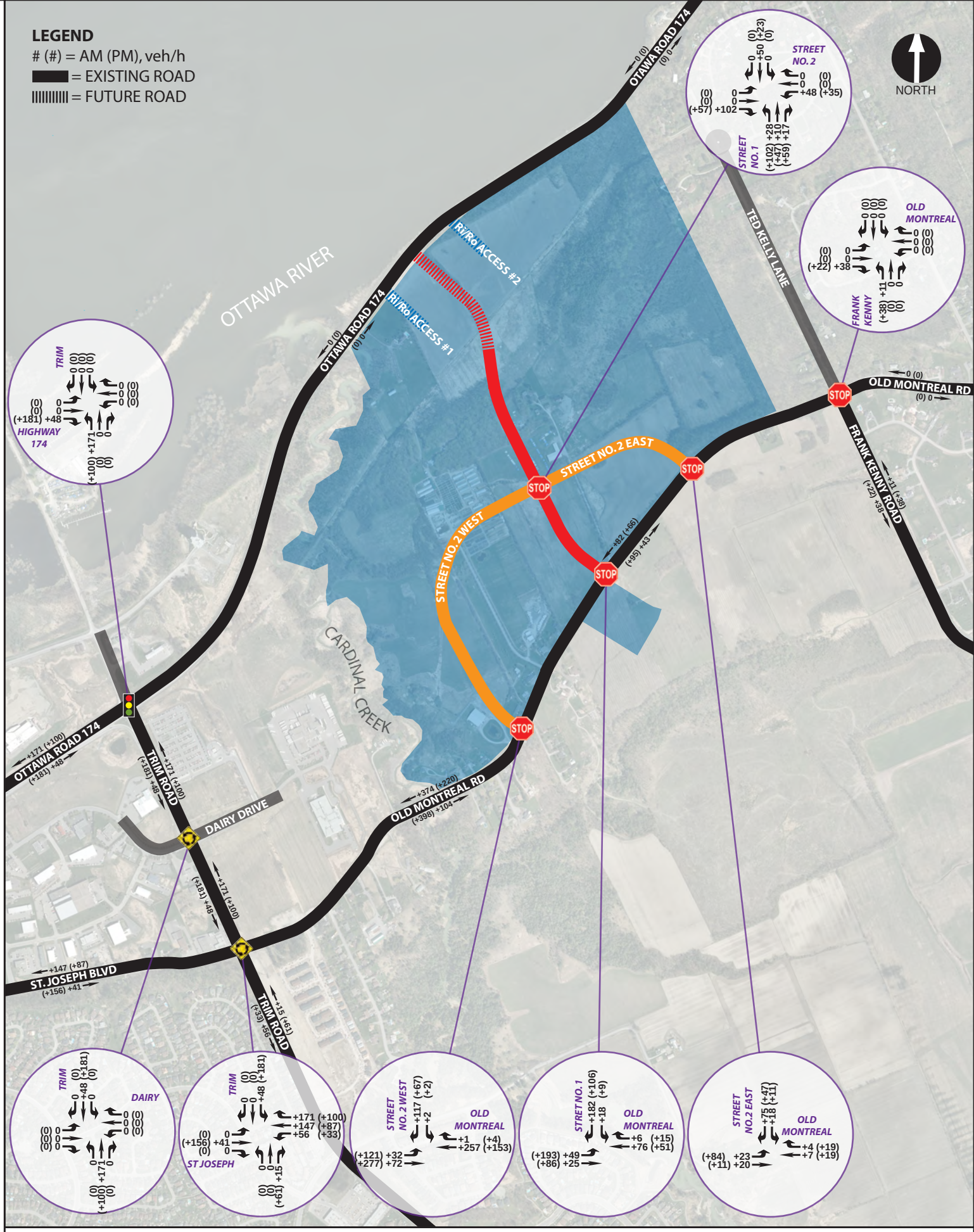
Total Site Vehicle Trip Generation

Travel Mode	AM Peak (veh/hr)			PM Peak (veh/hr)		
	In	Out	Total	In	Out	Total
ondominiums/Townhouses Trip Generation	36	176	212	171	85	256
General Office Trip Generation	374	52	426	65	320	385
Specialty Retail Trip Generation	17	14	31	27	34	61
Less Specialty Retail Pass-by (30%)	-5	-5	-10	-9	-9	-18
Total 'New' Auto Trips	**422**	**237**	**659**	**254**	**430**	**684**

Petrie's Landing III

New Trips





IBI GROUP

Cardinal Creek Village
Transportation Impact Study
(Phases 1 to 7)

EXHIBIT 11
Site Generated Traffic
(Phases 1 to 7)

PROJECT No. 31539
DATE: October 2013
SCALE:
0m 200m 400m

Appendix G

Background Growth Analysis

Trim/OR 174
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2007	Wednesday 31 January	322	242	4191	4602	5927	5317	8831	9110	38542
2008	Friday 20 June	618	391	4770	5319	6281	6058	10034	9935	43406
2010	Friday 9 July	744	722	5389	4539	6433	6484	9542	10363	44216
2012	Friday 8 June	329	441	4696	4430	5833	5818	8875	9044	39466
2017	Wednesday 19 April	590	518	4739	5742	5522	5570	10003	9024	41708

North Leg

Year	Counts				% Change			
	NB	***SB***	***NB+SB***	***INT***	***NB***	***SB***	***NB+SB***	***INT***
2007	242	322	564	38542				
2008	391	618	1009	43406	61.6%	91.9%	78.9%	12.6%
2010	722	744	1466	44216	84.7%	20.4%	45.3%	1.9%
2012	441	329	770	39466	-38.9%	-55.8%	-47.5%	-10.7%
2017	518	590	1108	41708	17.5%	79.3%	43.9%	5.7%

Regression Estimate	2007	393	490	883	41312
Regression Estimate	2017	576	570	1147	41722
Average Annual Change		**3.89%**	**1.53%**	**2.64%**	**0.10%**

West Leg

Year	Counts				% Change			
	EB	***WB***	***EB+WB***	***INT***	***EB***	***WB***	***EB+WB***	***INT***
2007	8831	9110	17941	38542				
2008	10034	9935	19969	43406	13.6%	9.1%	11.3%	12.6%
2010	9542	10363	19905	44216	-4.9%	4.3%	-0.3%	1.9%
2012	8875	9044	17919	39466	-7.0%	-12.7%	-10.0%	-10.7%
2017	10003	9024	19027	41708	12.7%	-0.2%	6.2%	5.7%

Regression Estimate	2007	9252	9733	18985
Regression Estimate	2017	9791	9108	18899
Average Annual Change		**0.57%**	**-0.66%**	**-0.05%**

East Leg

Year	Counts				% Change			
	EB	***WB***	***EB+WB***	***INT***	***EB***	***WB***	***EB+WB***	***INT***
2007	5317	5927	11244	38542				
2008	6058	6281	12339	43406	13.9%	6.0%	9.7%	12.6%
2010	6484	6433	12917	44216	7.0%	2.4%	4.7%	1.9%
2012	5818	5833	11651	39466	-10.3%	-9.3%	-9.8%	-10.7%
2017	5570	5522	11092	41708	-4.3%	-5.3%	-4.8%	5.7%

Regression Estimate	2007	5900	6242	12143
Regression Estimate	2017	5767	5602	11369
Average Annual Change		**-0.23%**	**-1.08%**	**-0.66%**

South Leg

Year	Counts				% Change			
	NB	***SB***	***NB+SB***	***INT***	***NB***	***SB***	***NB+SB***	***INT***
2007	4191	4602	8793	38542				
2008	4770	5319	10089	43406	13.8%	15.6%	14.7%	12.6%
2010	5389	4539	9928	44216	13.0%	-14.7%	-1.6%	1.9%
2012	4696	4430	9126	39466	-12.9%	-2.4%	-8.1%	-10.7%
2017	4739	5742	10481	41708	0.9%	29.6%	14.8%	5.7%

Regression Estimate	2007	4671	4630	9300
Regression Estimate	2017	4898	5411	10308
Average Annual Change		**0.48%**	**1.57%**	**1.03%**

Trim/OR 174
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2007	Wednesday 31 January	50	32	626	402	1346	395	658	1651	5160
2008	Friday 20 June	34	14	649	439	1326	294	674	1836	5266
2010	Friday 9 July	42	46	819	454	1309	387	720	2003	5780
2012	Friday 8 June	62	64	875	414	1292	313	578	2016	5614
2017	Wednesday 19 April	48	51	807	537	1324	428	727	1890	5812

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2007	32	50	82	5160				
2008	14	34	48	5266	-56.3%	-32.0%	-41.5%	2.1%
2010	46	42	88	5780	228.6%	23.5%	83.3%	9.8%
2012	64	62	126	5614	39.1%	47.6%	43.2%	-2.9%
2017	51	48	99	5812	-20.3%	-22.6%	-21.4%	3.5%

Regression Estimate	2007	30	44	74	5297
Regression Estimate	2017	61	52	113	5901
Average Annual Change		**7.45%**	**1.78%**	**4.40%**	**1.09%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2007	658	1651	2309	5160				
2008	674	1836	2510	5266	2.4%	11.2%	8.7%	2.1%
2010	720	2003	2723	5780	6.8%	9.1%	8.5%	9.8%
2012	578	2016	2594	5614	-19.7%	0.6%	-4.7%	-2.9%
2017	727	1890	2617	5812	25.8%	-6.3%	0.9%	3.5%

Regression Estimate	2007	657	1811	2468	
Regression Estimate	2017	695	1990	2685	
Average Annual Change		**0.56%**	**0.94%**	**0.84%**	

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2007	395	1346	1741	5160				
2008	294	1326	1620	5266	-25.6%	-1.5%	-7.0%	2.1%
2010	387	1309	1696	5780	31.6%	-1.3%	4.7%	9.8%
2012	313	1292	1605	5614	-19.1%	-1.3%	-5.4%	-2.9%
2017	428	1324	1752	5812	36.7%	2.5%	9.2%	3.5%

Regression Estimate	2007	339	1326	1666	
Regression Estimate	2017	402	1308	1710	
Average Annual Change		**1.72%**	**-0.14%**	**0.26%**	

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2007	626	402	1028	5160				
2008	649	439	1088	5266	3.7%	9.2%	5.8%	2.1%
2010	819	454	1273	5780	26.2%	3.4%	17.0%	9.8%
2012	875	414	1289	5614	6.8%	-8.8%	1.3%	-2.9%
2017	807	537	1344	5812	-7.8%	29.7%	4.3%	3.5%

Regression Estimate	2007	682	406	1089	
Regression Estimate	2017	874	519	1393	
Average Annual Change		**2.50%**	**2.47%**	**2.49%**	

Trim/OR 174
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2007	Wednesday 31 January	144	50	455	788	672	1440	2018	911	6478
2008	Friday 20 June	64	60	494	1051	424	1354	2206	723	6376
2010	Friday 9 July	107	40	603	1007	664	1334	2131	1124	7010
2012	Friday 8 June	94	69	634	905	624	1353	2024	1049	6752
2017	Wednesday 19 April	56	61	587	801	657	1284	1839	993	6278

North Leg

Year	Counts				% Change			
	NB	***SB***	***NB+SB***	***INT***	***NB***	***SB***	***NB+SB***	***INT***
2007	50	144	194	6478				
2008	60	64	124	6376	20.0%	-55.6%	-36.1%	-1.6%
2010	40	107	147	7010	-33.3%	67.2%	18.5%	9.9%
2012	69	94	163	6752	72.5%	-12.1%	10.9%	-3.7%
2017	61	56	117	6278	-11.6%	-40.4%	-28.2%	-7.0%

Regression Estimate	2007	52	114	166	6642
Regression Estimate	2017	63	58	121	6475
Average Annual Change		**2.00%**	**-6.52%**	**-3.09%**	**-0.25%**

West Leg

Year	Counts				% Change			
	EB	***WB***	***EB+WB***	***INT***	***EB***	***WB***	***EB+WB***	***INT***
2007	2018	911	2929	6478				
2008	2206	723	2929	6376	9.3%	-20.6%	0.0%	-1.6%
2010	2131	1124	3255	7010	-3.4%	55.5%	11.1%	9.9%
2012	2024	1049	3073	6752	-5.0%	-6.7%	-5.6%	-3.7%
2017	1839	993	2832	6278	-9.1%	-5.3%	-7.8%	-7.0%

Regression Estimate	2007	2148	898	3045
Regression Estimate	2017	1874	1062	2936
Average Annual Change		**-1.35%**	**1.69%**	**-0.37%**

East Leg

Year	Counts				% Change			
	EB	***WB***	***EB+WB***	***INT***	***EB***	***WB***	***EB+WB***	***INT***
2007	1440	672	2112	6478				
2008	1354	424	1778	6376	-6.0%	-36.9%	-15.8%	-1.6%
2010	1334	664	1998	7010	-1.5%	56.6%	12.4%	9.9%
2012	1353	624	1977	6752	1.4%	-6.0%	-1.1%	-3.7%
2017	1284	657	1941	6278	-5.1%	5.3%	-1.8%	-7.0%

Regression Estimate	2007	1398	575	1973
Regression Estimate	2017	1279	663	1942
Average Annual Change		**-0.88%**	**1.43%**	**-0.16%**

South Leg

Year	Counts				% Change			
	NB	***SB***	***NB+SB***	***INT***	***NB***	***SB***	***NB+SB***	***INT***
2007	455	788	1243	6478				
2008	494	1051	1545	6376	8.6%	33.4%	24.3%	-1.6%
2010	603	1007	1610	7010	22.1%	-4.2%	4.2%	9.9%
2012	634	905	1539	6752	5.1%	-10.1%	-4.4%	-3.7%
2017	587	801	1388	6278	-7.4%	-11.5%	-9.8%	-7.0%

Regression Estimate	2007	506	952	1458
Regression Estimate	2017	634	842	1476
Average Annual Change		**2.29%**	**-1.22%**	**0.12%**

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	2.64%	1.03%	-0.66%	-0.05%	**0.13%**
AM Peak	4.40%	2.49%	0.26%	0.84%	**1.13%**
PM Peak	-3.09%	0.12%	-0.16%	-0.37%	**-0.24%**

Appendix H

SYNCHRO Capacity Analysis: 2022 Background Conditions

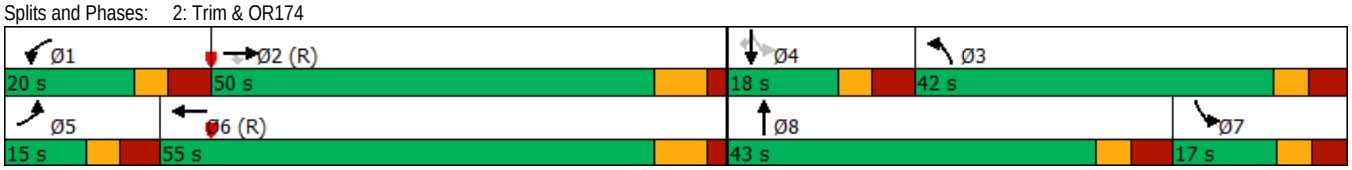
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	63	268	414	93	1189	859	41	21	66	80
Future Volume (vph)	63	268	414	93	1189	859	41	21	66	80
Lane Group Flow (vph)	70	298	460	103	1335	954	95	23	73	89
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8	7	4	
Permitted Phases			2					4		4
Detector Phase	5	2	2	1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.1	41.2	41.2	12.5	41.2	12.2	42.4	11.9	17.4	17.4
Total Split (s)	15.0	50.0	50.0	20.0	55.0	42.0	43.0	17.0	18.0	18.0
Total Split (%)	11.5%	38.5%	38.5%	15.4%	42.3%	32.3%	33.1%	13.1%	13.8%	13.8%
Yellow Time (s)	3.3	5.1	5.1	3.3	5.1	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.8	2.1	2.1	4.2	2.1	3.9	4.1	3.6	4.1	4.1
Lost Time Adjust (s)	-3.1	-3.2	-3.2	-3.5	-3.2	-3.2	-3.4	-2.9	-3.4	-3.4
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	10.7	47.2	47.2	14.8	54.0	38.0	45.8	25.2	14.0	14.0
Actuated g/C Ratio	0.08	0.36	0.36	0.11	0.42	0.29	0.35	0.19	0.11	0.11
v/c Ratio	0.50	0.24	0.56	0.53	0.95	0.99	0.08	0.08	0.38	0.25
Control Delay	70.0	29.9	5.4	64.6	52.3	73.2	16.9	25.9	60.3	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.0	29.9	5.4	64.6	52.3	73.2	16.9	25.9	60.3	1.7
LOS	E	C	A	E	D	E	B	C	E	A
Approach Delay		19.7			53.2		68.1		27.8	
Approach LOS		B			D		E		C	
Queue Length 50th (m)	17.4	28.3	0.0	25.0	~180.6	125.8	4.4	3.4	17.7	0.0
Queue Length 95th (m)	33.0	39.5	23.2	43.6	#230.8	#169.6	11.0	8.8	33.1	0.0
Internal Link Dist (m)		222.6			537.2		301.4		202.0	
Turn Bay Length (m)	155.0		200.0	130.0		180.0		120.0		60.0
Base Capacity (vph)	143	1229	828	208	1405	961	1122	301	192	357
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.24	0.56	0.50	0.95	0.99	0.08	0.08	0.38	0.25

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 20 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 48.4	Intersection LOS: D
Intersection Capacity Utilization 81.8%	ICU Level of Service D
Analysis Period (min) 15	

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

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

Splits and Phases: 2: Trim & OR174



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	4	82	74	8	0	106	20	19	0	9	3
Future Volume (vph)	8	4	82	74	8	0	106	20	19	0	9	3
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
Hourly flow rate (vph)	9	4	91	82	9	0	118	22	21	0	10	3

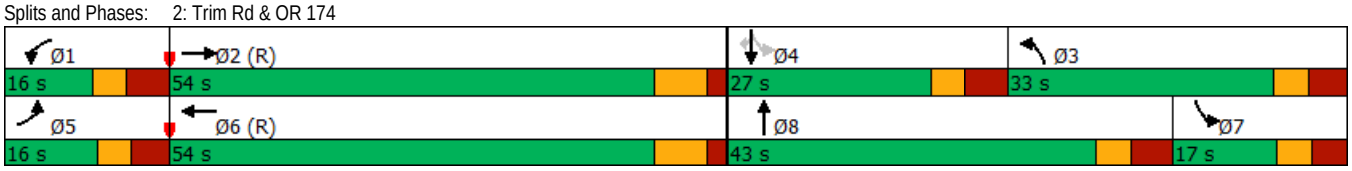
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	104	91	161	13
Volume Left (vph)	9	82	118	0
Volume Right (vph)	91	0	21	3
Hadj (s)	-0.47	0.21	0.10	-0.10
Departure Headway (s)	3.9	4.6	4.5	4.4
Degree Utilization, x	0.11	0.12	0.20	0.02
Capacity (veh/h)	868	735	773	758
Control Delay (s)	7.5	8.2	8.6	7.5
Approach Delay (s)	7.5	8.2	8.6	7.5
Approach LOS	A	A	A	A

Intersection Summary				
Delay			8.1	
Level of Service			A	
Intersection Capacity Utilization			33.3%	ICU Level of Service
Analysis Period (min)			15	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	58	1111	1172	70	428	462	57	19	80	68
Future Volume (vph)	58	1111	1172	70	428	462	57	19	80	68
Lane Group Flow (vph)	64	1234	1302	78	496	513	167	21	89	76
Turn Type	Prot	NA	Free	Prot	NA	Prot	NA	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8	7	4	
Permitted Phases			Free					4		4
Detector Phase	5	2		1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	10.0		5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.1	41.2		12.5	41.2	12.2	42.4	11.9	17.4	17.4
Total Split (s)	16.0	54.0		16.0	54.0	33.0	43.0	17.0	27.0	27.0
Total Split (%)	12.3%	41.5%		12.3%	41.5%	25.4%	33.1%	13.1%	20.8%	20.8%
Yellow Time (s)	3.3	5.1		3.3	5.1	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.8	2.1		4.2	2.1	3.9	4.1	3.6	4.1	4.1
Lost Time Adjust (s)	-3.1	-3.2		-3.5	-3.2	-3.2	-3.4	-2.9	-3.4	-3.4
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	11.5	54.8	130.0	12.0	55.1	27.1	44.0	34.1	23.0	23.0
Actuated g/C Ratio	0.09	0.42	1.00	0.09	0.42	0.21	0.34	0.26	0.18	0.18
v/c Ratio	0.43	0.86	0.86	0.50	0.35	0.75	0.15	0.06	0.28	0.17
Control Delay	65.2	43.1	6.8	67.9	27.3	55.6	13.4	23.9	49.2	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.2	43.1	6.8	67.9	27.3	55.6	13.4	23.9	49.2	0.8
LOS	E	D	A	E	C	E	B	C	D	A
Approach Delay		25.4			32.8		45.3		26.6	
Approach LOS		C			C		D		C	
Queue Length 50th (m)	15.7	159.5	0.0	19.3	47.4	63.1	6.0	3.1	20.0	0.0
Queue Length 95th (m)	30.5	#205.0	0.0	35.8	62.1	81.9	14.5	8.2	36.0	0.0
Internal Link Dist (m)		313.9			321.3		154.2		204.2	
Turn Bay Length (m)	150.0		200.0	130.0		230.0		120.0		55.0
Base Capacity (vph)	157	1429	1517	160	1429	733	1098	368	315	450
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.86	0.86	0.49	0.35	0.70	0.15	0.06	0.28	0.17

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 29.9	Intersection LOS: C
Intersection Capacity Utilization 75.8%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 2: Trim Rd & OR 174



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	6	133	31	3	0	81	8	45	1	11	4
Future Volume (vph)	7	6	133	31	3	0	81	8	45	1	11	4
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
Hourly flow rate (vph)	8	7	148	34	3	0	90	9	50	1	12	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	163	37	149	17
Volume Left (vph)	8	34	90	1
Volume Right (vph)	148	0	50	4
Hadj (s)	-0.50	0.22	-0.05	-0.10
Departure Headway (s)	3.8	4.7	4.3	4.4
Degree Utilization, x	0.17	0.05	0.18	0.02
Capacity (veh/h)	902	728	799	764
Control Delay (s)	7.6	7.9	8.2	7.5
Approach Delay (s)	7.6	7.9	8.2	7.5
Approach LOS	A	A	A	A

Intersection Summary					
Delay			7.9		
Level of Service			A		
Intersection Capacity Utilization			37.4%	ICU Level of Service	A
Analysis Period (min)			15		

Appendix I

SYNCHRO and SIDRA Capacity Analysis: 2024 Background Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	22	941	45	37	106	2
Future Volume (Veh/h)	22	941	45	37	106	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	23	991	47	39	112	2
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			23		652	518
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			23		652	518
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		73	100
cM capacity (veh/h)			1592		420	557

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1014	86	114
Volume Left	0	47	112
Volume Right	991	0	2
cSH	1700	1592	422
Volume to Capacity	0.60	0.03	0.27
Queue Length 95th (m)	0.0	0.7	8.2
Control Delay (s)	0.0	4.1	16.7
Lane LOS		A	C
Approach Delay (s)	0.0	4.1	16.7
Approach LOS			C

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	48	542	19	15	83	6
Future Volume (Veh/h)	48	542	19	15	83	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	51	571	20	16	87	6
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			51		392	336
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		392	336
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		86	99
cM capacity (veh/h)			1555		604	706

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	622	36	93
Volume Left	0	20	87
Volume Right	571	0	6
cSH	1700	1555	610
Volume to Capacity	0.37	0.01	0.15
Queue Length 95th (m)	0.0	0.3	4.1
Control Delay (s)	0.0	4.1	12.0
Lane LOS		A	B
Approach Delay (s)	0.0	4.1	12.0
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Background 2024 AM
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	139	2.0	0.100	7.5	LOS A	0.6	4.4	0.18	0.55	46.7
2	T1	21	2.0	0.100	3.0	LOS A	0.6	4.4	0.18	0.55	46.5
3	R2	926	2.0	0.507	2.5	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		1086	2.0	0.507	3.1	LOS A	0.6	4.4	0.03	0.39	48.2
East: Jeanne D'Arc											
4	L2	124	2.0	0.124	8.3	LOS A	0.7	5.2	0.39	0.58	46.2
5	T1	17	2.0	0.124	3.8	LOS A	0.7	5.2	0.39	0.58	46.0
6	R2	3	2.0	0.124	3.8	LOS A	0.7	5.2	0.39	0.58	45.0
Approach		144	2.0	0.124	7.7	LOS A	0.7	5.2	0.39	0.58	46.1
North: Trim											
7	L2	2	2.0	0.012	8.5	LOS A	0.1	0.4	0.41	0.45	47.7
8	T1	7	2.0	0.012	4.0	LOS A	0.1	0.4	0.41	0.45	47.6
9	R2	3	2.0	0.012	4.0	LOS A	0.1	0.4	0.41	0.45	46.5
Approach		13	2.0	0.012	4.8	LOS A	0.1	0.4	0.41	0.45	47.3
West: Jeanne D'Arc											
10	L2	8	2.0	0.085	8.1	LOS A	0.5	3.6	0.35	0.43	48.2
11	T1	35	2.0	0.085	3.6	LOS A	0.5	3.6	0.35	0.43	48.1
12	R2	58	2.0	0.085	3.6	LOS A	0.5	3.6	0.35	0.43	47.0
Approach		101	2.0	0.085	4.0	LOS A	0.5	3.6	0.35	0.43	47.4
All Vehicles		1344	2.0	0.507	3.7	LOS A	0.7	5.2	0.09	0.41	47.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Background 2024 PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	101	2.0	0.072	7.6	LOS A	0.4	3.0	0.23	0.55	46.4
2	T1	8	2.0	0.072	3.1	LOS A	0.4	3.0	0.23	0.55	46.3
3	R2	532	2.0	0.291	2.4	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		641	2.0	0.291	3.2	LOS A	0.4	3.0	0.04	0.40	48.1
East: Jeanne D'Arc											
4	L2	83	2.0	0.080	8.0	LOS A	0.5	3.3	0.32	0.56	46.4
5	T1	13	2.0	0.080	3.5	LOS A	0.5	3.3	0.32	0.56	46.2
6	R2	2	2.0	0.080	3.5	LOS A	0.5	3.3	0.32	0.56	45.2
Approach		98	2.0	0.080	7.3	LOS A	0.5	3.3	0.32	0.56	46.3
North: Trim											
7	L2	3	2.0	0.013	8.1	LOS A	0.1	0.5	0.34	0.44	47.9
8	T1	8	2.0	0.013	3.6	LOS A	0.1	0.5	0.34	0.44	47.7
9	R2	4	2.0	0.013	3.7	LOS A	0.1	0.5	0.34	0.44	46.6
Approach		16	2.0	0.013	4.5	LOS A	0.1	0.5	0.34	0.44	47.5
West: Jeanne D'Arc											
10	L2	7	2.0	0.128	7.9	LOS A	0.8	5.6	0.30	0.41	48.5
11	T1	60	2.0	0.128	3.4	LOS A	0.8	5.6	0.30	0.41	48.3
12	R2	96	2.0	0.128	3.4	LOS A	0.8	5.6	0.30	0.41	47.2
Approach		163	2.0	0.128	3.6	LOS A	0.8	5.6	0.30	0.41	47.7
All Vehicles		918	2.0	0.291	3.8	LOS A	0.8	5.6	0.12	0.42	47.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix J

SYNCHRO and SIDRA Capacity Analysis: 2029 Background Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	22	1060	45	37	112	2
Future Volume (Veh/h)	22	1060	45	37	112	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	23	1116	47	39	118	2
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			23		714	581
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			23		714	581
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		69	100
cM capacity (veh/h)			1592		386	514

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1139	86	120
Volume Left	0	47	118
Volume Right	1116	0	2
cSH	1700	1592	388
Volume to Capacity	0.67	0.03	0.31
Queue Length 95th (m)	0.0	0.7	9.8
Control Delay (s)	0.0	4.1	18.4
Lane LOS		A	C
Approach Delay (s)	0.0	4.1	18.4
Approach LOS			C

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	48	642	19	15	87	6
Future Volume (Veh/h)	48	642	19	15	87	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	51	676	20	16	92	6
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			51		445	389
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		445	389
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		84	99
cM capacity (veh/h)			1555		563	659

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	727	36	98
Volume Left	0	20	92
Volume Right	676	0	6
cSH	1700	1555	568
Volume to Capacity	0.43	0.01	0.17
Queue Length 95th (m)	0.0	0.3	4.7
Control Delay (s)	0.0	4.1	12.6
Lane LOS		A	B
Approach Delay (s)	0.0	4.1	12.6
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Background 2029 AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	208	2.0	0.148	7.6	LOS A	1.0	6.8	0.25	0.55	46.4
2	T1	21	2.0	0.148	3.1	LOS A	1.0	6.8	0.25	0.55	46.2
3	R2	980	2.0	0.537	2.5	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		1209	2.0	0.537	3.4	LOS A	1.0	6.8	0.05	0.40	48.0
East: Jeanne D'Arc											
4	L2	124	2.0	0.141	8.8	LOS A	0.8	6.0	0.47	0.61	46.1
5	T1	17	2.0	0.141	4.3	LOS A	0.8	6.0	0.47	0.61	46.0
6	R2	13	2.0	0.141	4.3	LOS A	0.8	6.0	0.47	0.61	45.0
Approach		154	2.0	0.141	7.9	LOS A	0.8	6.0	0.47	0.61	46.0
North: Trim											
7	L2	2	2.0	0.012	8.8	LOS A	0.1	0.4	0.45	0.47	47.6
8	T1	7	2.0	0.012	4.3	LOS A	0.1	0.4	0.45	0.47	47.4
9	R2	3	2.0	0.012	4.4	LOS A	0.1	0.4	0.45	0.47	46.3
Approach		13	2.0	0.012	5.1	LOS A	0.1	0.4	0.45	0.47	47.2
West: Jeanne D'Arc											
10	L2	8	2.0	0.118	8.1	LOS A	0.7	5.2	0.36	0.43	48.2
11	T1	64	2.0	0.118	3.6	LOS A	0.7	5.2	0.36	0.43	48.0
12	R2	68	2.0	0.118	3.6	LOS A	0.7	5.2	0.36	0.43	46.9
Approach		141	2.0	0.118	3.9	LOS A	0.7	5.2	0.36	0.43	47.5
All Vehicles		1517	2.0	0.537	3.9	LOS A	1.0	6.8	0.12	0.42	47.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Background 2029 PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	145	2.0	0.106	7.8	LOS A	0.6	4.6	0.31	0.57	46.1
2	T1	8	2.0	0.106	3.3	LOS A	0.6	4.6	0.31	0.57	46.0
3	R2	563	2.0	0.308	2.4	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		717	2.0	0.308	3.5	LOS A	0.6	4.6	0.07	0.41	48.0
East: Jeanne D'Arc											
4	L2	83	2.0	0.084	8.3	LOS A	0.5	3.5	0.38	0.57	46.2
5	T1	13	2.0	0.084	3.7	LOS A	0.5	3.5	0.38	0.57	46.1
6	R2	2	2.0	0.084	3.7	LOS A	0.5	3.5	0.38	0.57	45.1
Approach		98	2.0	0.084	7.6	LOS A	0.5	3.5	0.38	0.57	46.2
North: Trim											
7	L2	3	2.0	0.014	8.3	LOS A	0.1	0.5	0.38	0.45	47.8
8	T1	8	2.0	0.014	3.8	LOS A	0.1	0.5	0.38	0.45	47.6
9	R2	4	2.0	0.014	3.9	LOS A	0.1	0.5	0.38	0.45	46.5
Approach		16	2.0	0.014	4.7	LOS A	0.1	0.5	0.38	0.45	47.3
West: Jeanne D'Arc											
10	L2	7	2.0	0.181	7.9	LOS A	1.2	8.4	0.31	0.40	48.4
11	T1	111	2.0	0.181	3.4	LOS A	1.2	8.4	0.31	0.40	48.3
12	R2	117	2.0	0.181	3.4	LOS A	1.2	8.4	0.31	0.40	47.2
Approach		235	2.0	0.181	3.5	LOS A	1.2	8.4	0.31	0.40	47.7
All Vehicles		1065	2.0	0.308	3.9	LOS A	1.2	8.4	0.15	0.42	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix K

Multimodal Level of Service Analysis: Existing Conditions

Multi-Modal Level of Service - Intersections Form

Consultant	**PARSONS**	**Project**	**Petries Landing I**
Scenario	**Jeanne D'Arc @ Trim**	**Date**	**7/12/2018**
Comments	**Year 2022 Before LRT Conditions**		

INTERSECTIONS		Existing Conditions			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	0 - 2	0 - 2	0 - 2	0 - 2
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**85**	**85**	**85**	**85**
	Ped. Exposure to Traffic LoS	**B**	**B**	**B**	**B**
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	**B**	**B**	**B**	**B**
		B			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	≤ 50 m	Not Applicable	≤ 50 m	Not Applicable
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	**D**	**Not Applicable**	**D**	**Not Applicable**
	Separated or Mixed Traffic	**Mixed Traffic**	**Separated**	**Mixed Traffic**	**Separated**
	Left Turn Approach	No lane crossed	1 lane crossed	No lane crossed	1 lane crossed
	Operating Speed	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**C**	**D**	**C**	**E**
	Level of Service	**D**	**D**	**D**	**E**
		E			

Multi-Modal Level of Service - Segments Form

Consultant	**PARSONS**	**Project**	**Petrie's Landing I**
Scenario	**Jeanne D'Arc East of Trim**	**Date**	**5/18/2018**
Comments	**Existing Conditions and Possible**		
	Improvements		

SEGMENTS		**Street A**	Section Site Access	Section Former Cul-de-Sac	Section Mid-block
Pedestrian	Sidewalk Width Boulevard Width	-	≥ 2 m < 0.5	≥ 2 m < 0.5	≥ 2 m < 0.5
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000	≤ 3000
	Operating Speed On-Street Parking		> 30 to 50 km/h no	> 30 to 50 km/h no	> 50 to 60 km/h no
	Exposure to Traffic PLoS		**B**	**B**	**C**
	Effective Sidewalk Width		2.0 m	2.0 m	2.0 m
	Pedestrian Volume				
	Crowding PLoS		-	-	-
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	A	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	2-3 lanes total
	Operating Speed		≤ 40 km/h	>40 to <50 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS		**B**	**D**	**E**
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)				
	No. of Lanes at Unsignalized Crossing				
	Sidestreet Operating Speed				
	Unsignalized Crossing - Lowest LoS		-	-	-
	Level of Service		**-**	**-**	**-**

Appendix L

Multimodal Level of Service Analysis: Planned Network

Multi-Modal Level of Service - Intersections Form

Consultant	**PARSONS**	**Project**	**Petries Landing I**
Scenario	**Jeanne D'Arc @ Trim**	**Date**	**6/26/2018**
Comments	**Post-2022 Conditions: LRT Overpass**		
	OR 174 Ramp, Jeanne D'Arc Roundabout		

INTERSECTIONS		**Jeanne D'Arc@Trim Roundabout**			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	0 - 2	3	3	0 - 2
	Median	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m	Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	Conventional with Receiving Lane	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	**93**	**79**	**78**	**93**
	Ped. Exposure to Traffic LoS	**A**	**B**	**B**	**A**
	Cycle Length	0	0	0	0
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	**A**	**B**	**B**	**A**
		B			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	≤ 50 m	Not Applicable	Not Applicable	Not Applicable
	Right Turning Speed	≤ 25 km/h	Not Applicable	Not Applicable	Not Applicable
	Cyclist relative to RT motorists	**D**	**Not Applicable**	**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**Mixed Traffic**	**Separated**	**Separated**	**Separated**
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h
	Left Turning Cyclist	**B**	**B**	**B**	**B**
	Level of Service	**D**	**B**	**B**	**B**
		D			

Multi-Modal Level of Service - Segments Form

Consultant	**PARSONS**	**Project**	**Petrie's Landing I**
Scenario	**Jeanne D'Arc East of Trim**	**Date**	**6/26/2018**
Comments	**Post-2022 Conditions: LRT Overpass**		
	OR 174 Ramp, Jeanne D'Arc Roundabout		

SEGMENTS		**Street A**	Site Access South Side	Former Cul-de-Sac South Side	Mid-block A South Side
Pedestrian	Sidewalk Width Boulevard Width		≥ 2 m > 2 m	≥ 2 m > 2 m	≥ 2 m < 0.5
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000	> 3000
	Operating Speed On-Street Parking		> 30 to 50 km/h no	> 30 to 50 km/h no	> 30 to 50 km/h no
	Exposure to Traffic PLoS	**-**	**A**	**A**	**C**
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		-	-	-
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility		Mixed Traffic	Mixed Traffic	Mixed Traffic
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	2-3 lanes total
	Operating Speed		≤ 40 km/h	>40 to <50 km/h	>40 to <50 km/h
	# of Lanes & Operating Speed LoS		**B**	**D**	**D**
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS	**E**	-	-	-
	Bike Lane Blockages				
	Blockage LoS		-	-	-
	Median Refuge Width (no median = < 1.8 m)			≥ 1.8 m refuge	< 1.8 m refuge
	No. of Lanes at Unsignalized Crossing			≤ 3 lanes	≤ 3 lanes
	Sidestreet Operating Speed			≤ 40 km/h	≥ 65 km/h
	Unsignalized Crossing - Lowest LoS		-	**A**	**E**
	Level of Service		**-**	**D**	**E**

Appendix M

Transportation Demand Management Checklist

Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.3—Transportation Demand Management) requires proponents of qualifying developments to assess the context, need and opportunity for transportation demand management (TDM) measures at their development. The guidelines require that proponents complete the City's **TDM Measures Checklist**, at a minimum, to identify any TDM measures being proposed.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM Measures Checklist: Non-Residential Developments
- TDM Measures Checklist: Residential developments

Readers are encouraged to contact the City of Ottawa's TDM Officer for any guidance and assistance they require to complete this checklist.

Using the Checklist

The City's *TIA Guidelines* are designed so that *Module 3.1—Development-Generated Travel Demand*, *Module 4.1—Development Design*, and *Module 4.2—Parking* are complete before a proponent begins *Module 4.3—Transportation Demand Management*.

Within Module 4.3, *Element 4.3.1—Context for TDM* and *Element 4.3.2—Need and Opportunity* are intended to create an understanding of the need for any TDM measures, and of the results they are expected to achieve or support. Once those two elements are complete, proponents begin *Element 4.3.3—TDM Program* that requires proponents to identify proposed TDM measures using the **TDM Measures Checklist**, at a minimum. The *TIA Guidelines* note that the City may require additional analysis for large or complex development proposals, or those that represent a higher degree of performance risk; as well, proponents proposing TDM measures for a new development must also propose an implementation plan that addresses planning and coordination, funding and human resources, timelines for action, performance targets and monitoring requirements.

This **TDM Measures Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family, condominium or subdivision). Readers may download the applicable checklist in electronic format and complete it electronically, or print it out and complete it by hand. As an alternative, they may create a freestanding document that lists the TDM measures being proposed and provides additional detail on them, including an implementation plan as required by the City's *TIA Guidelines*.

Each measure in the checklist is numbered for easy reference. Each measure is also flagged as:

- BASIC —The measure is generally feasible and effective, and in most cases would benefit the development and its users.
- BETTER —The measure could maximize support for users of sustainable modes, and optimize development performance.
- ★ —The measure is one of the most dependably effective tools to encourage the use of sustainable modes.

Glossary

This glossary defines and describes the following measures that are identified in the **TDM Measures Checklist**:

TDM program management
- Program coordinator
- Travel surveys

Parking
- Priced parking

Walking & cycling
- Information on walking/cycling routes & destinations
- Bicycle skills training
- Valet bike parking

Transit
- Transit information
- Transit fare incentives
- Enhanced public transit service
- Private transit service

Ridesharing
- Ridematching service
- Carpool parking price incentives
- Vanpool service

Carsharing & bikesharing
- Bikeshare stations & memberships
- Carshare vehicles & memberships

TDM marketing & communications
- Multimodal travel information
- Personalized trip planning
- Promotions

Other incentives & amenities
- Emergency ride home
- Alternative work arrangements
- Local business travel options
- Commuter incentives
- On-site amenities

For further information on selecting and implementing TDM measures (particularly as they apply to non-residential developments, with a focus on workplaces), readers may find it helpful to consult Transport Canada's *Workplace Travel Plans: Guidance for Canadian Employers*, which can be downloaded in English and French from the ACT Canada website at www.actcanada.com/resources/act-resources.

▶ *TDM program management*

While some TDM measures can be implemented with a minimum of effort through routine channels (e.g. parking or human resources), more complex measures or a larger development site may warrant assigning responsibility for TDM program coordination to a designated person either inside or outside the implementing organization. Similarly, some TDM measures are more effective if they are targeted or customized for specific audiences, and would benefit from the collection of related information.

Program coordinator. This person is charged with day-to-day TDM program development and implementation. Only in very large employers with thousands of workers is this likely to be a full-time, dedicated position. Usually, it is added to an existing role in parking, real estate, human resources or environmental management. In practice, this role may be called TDM coordinator, commute trip reduction coordinator or employee transportation coordinator. The City of Ottawa can identify external resources (e.g. non-profit organizations or consultants) that could provide these services.

Travel surveys. Travel surveys are most commonly conducted at workplaces, but can be helpful in other settings. They identify how and why people travel the way they do, and what barriers and opportunities exist for different behaviours. They usually capture the following information:

- *Personal data* including home address or postal code, destination, job type or function, employment status (full-time, part-time and/or teleworker), gender, age and hours of work
- *Commute information* including distance or time for the trip between home and work, usual methods of commuting, and reasons for choosing them
- *Barriers and opportunities* including why other commuting methods are unattractive, willingness to consider other options, and what improvements to other options could make them more attractive

▶ *Parking*

Priced parking. Charging for parking is typically among the most effective ways of getting drivers to consider other travel options. While drivers may not support parking fees, they can be more accepting if the revenues are used to improve other travel options (e.g. new showers and change rooms, improved bicycle parking or subsidized transit passes). At workplaces or daytime destinations, parking discounts (e.g. early bird specials, daily passes that cost significantly less than the equivalent hourly charge, monthly passes that cost significantly less than the equivalent daily charge) encourage long-term parking and discourage the use of other travel options. For residential uses, unbundling parking costs from dwelling purchase, lease or rental costs provides an incentive for residents to own fewer cars, and can reduce car use and the costs of parking provision.

▶ *Walking & cycling*

Active transportation options like cycling and walking are particularly attractive for short trips (typically up to 5 km and 2 km, respectively). Other supportive factors include an active, health-conscious audience, and development proximity to high-quality walking and cycling networks. Common challenges to active transportation include rain, darkness, snowy or icy conditions, personal safety concerns, the potential for bicycle theft, and a lack of shower and change facilities for those making longer trips.

Information on walking/cycling routes & destinations. Ottawa, Gatineau and the National Capital Commission all publish maps to help people identify the most convenient and comfortable walking or cycling routes.

Bicycle skills training. Potential cyclists can be intimidated by the need to ride on roads shared with motor vehicles. This barrier can be reduced or eliminated by offering cycling skills training to interested cyclists (e.g. CAN-BIKE certification courses).

Valet bike parking. For large events, temporary “valet parking” areas can be easily set up to maximize convenience and security for cyclists. Experienced local non-profit groups can help.

▶ *Transit*

Transit information. Difficulty in finding or understanding basic information on transit fares, routes and schedules can prevent people from trying transit. Employers can help by providing online links to OC Transpo and STO websites. Transit users also appreciate visible maps and schedules of transit routes that serve the site; even better, a screen that shows real-time transit arrival information is particularly useful at sites with many transit users and an adjacent transit stop or station.

Transit fare incentives. Free or subsidized transit fares are an attractive incentive for non-transit riders to try transit. Many non-users are unsure of how to pay a fare, and providing tickets or a preloaded PRESTO card (or, for special events, pre-arranging with OC Transpo that transit fares are included with event tickets) overcome that barrier.

Enhanced public transit service. OC Transpo may adjust transit routes, stop locations, service hours or frequencies for an agreed fee under contract, or at no cost where warranted by the potential ridership increase. Information provided by a survey of people who travel to a given development can support these decisions.

Private transit service. At remote suburban or rural workplaces, a poor transit connection to the nearest rapid transit station can be an obstacle for potential transit users, and an employer in this situation could initiate a private shuttle service to make transit use more feasible or attractive. Other circumstances where a shuttle makes sense include large special events, or a residential development for people with limited independent mobility who still require regular access to shops and services.

▶ *Ridesharing*

Ridesharing's potential is greatest in situations where transit ridership is low, where parking costs are high, and/or where large numbers of car commuters (e.g. employees or full-time students) live reasonably far from the workplace.

Ridematching service. Potential carpoolers in Ottawa are served by www.OttawaRideMatch.com, an online service to help people find carpool partners. Employers can arrange for a dedicated portal where their employees can search for potential carpool partners only among their colleagues, if they desire. Some very large employers may establish internal ridematching services, to maximize employee uptake and corporate control. Ridematching service providers typically include a waiver to relieve employers of liability when their employees start carpooling through a ridematching service. Ridesharing with co-workers also tends to eliminate security concerns.

Carpool parking price incentives. Discounted parking fees for carpools can be an extra incentive to rideshare.

Vanpool service. Vanpools operate in the Toronto and Vancouver metropolitan areas, where vans that carry up to about ten occupants are driven by one of the vanpool members. Vanpools tend to operate on a cost-recovery basis, and are most practical for long-distance commutes where transit is not an option. Current legislation in Ontario does not permit third-party (i.e. private or non-profit) vanpool services, but does permit employers to operate internal vanpools.

▶ *Carsharing & bikesharing*

Bikeshare station & memberships. VeloGO Bike Share and Right Bike both operate bikesharing services in Ottawa. Developments that would benefit from having a bikeshare station installed at or near their development may negotiate directly with either service provider.

Carshare vehicles & memberships. VRTUCAR and Zipcar both operate carsharing services in Ottawa, for use by the general public or by businesses as an alternative to corporate fleets. Carsharing services offer 24-hour access, self-serve reservation systems, itemized monthly billings, and outsourcing of all financing, insurance, maintenance and administrative responsibilities.

▶ *TDM marketing & communications*

Multimodal travel information. Aside from mode-specific information discussed elsewhere in this document, multimodal information that identifies and explains the full range of travel options available to people can be very influential—especially when provided at times and locations where individuals are actively choosing among those options. Examples include: employees when their employer is relocating, or when they are joining a new employer; students when they are starting a program at a new institution; visitors or customers travelling to an unfamiliar destination, or when faced with new options (e.g. shuttle services or parking restrictions); and residents when they purchase or occupy a residence that is new to them.

Personalized trip planning. As an extension to the simple provision of information, this technique (also known as *individualized marketing*) is effective in helping people make more sustainable travel choices. The approach involves identifying who is most likely to change their travel choices (notably relocating employees, students or residents) giving them customized information, training and incentives to support them in making that change. It may be conducted with assistance from an external service provider with the necessary skills, and delivered in a variety of settings including workplaces and homes.

Promotions. Special events and incentives can raise awareness and encourage individuals to examine and try new travel options.

- *Special events* can help attract attention, build participation and celebrate successes. Events that have been held in Ottawa include Earth Day (in April) Bike to Work Month (in May), Environment Week (early June), International Car Free Day (September 22), and Canadian Ridesharing Week (October). At workplaces or educational institutions, similarly effective internal events could include workshops, lunch-and-learns, inter-departmental challenges, pancake breakfasts, and so on.
- *Incentives* can encourage trial of sustainable modes, and might include loyalty rewards for duration or consistency of activity (e.g. 1,000 km commuted by bicycle), participation prizes (e.g. for completing a survey or joining a special event), or personal recognition that highlights individual accomplishments.

▶ *Other incentives & amenities*

Emergency ride home. This measure assures non-driving commuters that they will be able to get home quickly and conveniently in case of family emergency (or in some workplaces, in case of unexpected overtime, severe weather conditions, or the early departure of a carpool driver) by offering a chit or reimbursement for taxi, carshare or rental car usage. Limits on annual usage or cost per employee may be set, although across North America the actual rates of usage are typically very low.

Alternative work arrangements. A number of alternatives to the standard 9-to-5, Monday-to-Friday workweek can support sustainable commuting (and work-life balance) at workplaces:

- *Flexible working hours* allow transit commuters to take advantage of the fastest and most convenient transit services, and allow potential carpoolers to include people who work slightly different schedules in their search for carpool partners. They also allow active commuters to travel at least one direction in daylight, either in the morning or the afternoon, during the winter.
- *Compressed workweeks* allow employees to work their required hours over fewer days (e.g. five days in four, or ten days in nine), eliminating the need to commute on certain days. For employees, this can promote work-life balance and gives flexibility for appointments. For employers, this can permit extended service hours as well as reduced parking demands if employees stagger their days off.
- *Telework* is a normal part of many workplaces. It helps reduce commuting activity, and can lead to significant cost savings through workspace sharing. Telework initiatives involve many stakeholders, and may face as much resistance as support within an organization. Consultation, education and training are helpful.

Local business travel options. A common obstacle for people who might prefer to not drive to work is that their employer requires them to bring a car to work so they can make business trips during the day. Giving employees convenient alternatives to private cars for local business travel during the workday makes walking, cycling, transit or carpooling in someone else's car more practical.

- *Walking and cycling*—Active transportation can be a convenient and enjoyable way to make short business trips. They can also reduce employer expenses, although they may require extra travel time. Providing a fleet of shared bikes, or reimbursing cyclists for the kilometres they ride, are inexpensive ways to validate their choice.
- *Public transit*—Transit can be convenient and inexpensive compared to driving. OC Transpo's PRESTO cards are transferable among employees and automatically reloadable, making them the perfect tool for enabling transit use during the day.
- *Ridesharin*g—When multiple employees attend the same off-site meeting or event, they can be reminded to carpool whenever possible.
- *Taxis or ride-hailing*—Taxis and ride-hailing can eliminate parking costs, save time and eliminate collision liability concerns. Taxi chits eliminate cash transactions and minimize paperwork.
    - *Fleet vehicles or carsharing*—Fleet vehicles can be cost-effective for high travel volumes, while carsharing is a great option for less frequent trips.
    - *Interoffice shuttles*—Employers with multiple worksites in the region could use a shuttle service to move people as well as mail or supplies.
    - *Videoconferencing*—New technologies mean that staying in the office to hold meetings electronically is more viable, affordable and productive than ever.

Commuter incentives. Financial incentives can help create a level playing field and support commuting by sustainable modes. A "commuting allowance" given to all employees as a taxable benefit is one such incentive; employees who choose to drive could then be charged for parking, while other employees could use the allowance for transit fares or cycling equipment, or for spending or saving. (Note that in the United States this practice is known as "parking cash-out," and is popular because commuting allowances are not taxable up to a certain limit). Alternatively, a monthly commuting allowance for non-driving employees would give drivers an incentive to choose a different commuting mode. Another practical incentive for active commuters or transit users is to offer them discounted "rainy day" parking passes for a small number of days each month.

On-site amenities. Developments that offer services to limit employees' need for a car during their commute (e.g. to drop off clothing at the dry cleaners) or during their workday (e.g. to buy lunch) can free employees to make the commuting decision that otherwise works best for them.

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

		TDM measures: *Residential developments*	Check if proposed & add descriptions
		3. TRANSIT	
		3.1 Transit information	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☑
BETTER	3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☑ After LRT openning
		3.2 Transit fare incentives	
BASIC ★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☑ During first 6 months after LRT openning
BETTER	3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3 Enhanced public transit service	
BETTER ★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4 Private transit service	
BETTER	3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☑ For phase 5 - Retirement Units
		4. CARSHARING & BIKESHARING	
		4.1 Bikeshare stations & memberships	
BETTER	4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER	4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2 Carshare vehicles & memberships	
BETTER	4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER	4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5. PARKING	
		5.1 Priced parking	
BASIC ★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC ★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☐
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.1—Development Design) requires proponents of qualifying developments to use the City's **TDM-Supportive Development Design and Infrastructure Checklist** to assess the opportunity to implement design elements that are supportive of sustainable modes. The goal of this assessment is to ensure that the development provides safe and efficient access for all users, while creating an environment that encourages walking, cycling and transit use.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM-Supportive Development Design and Infrastructure Checklist: Non-Residential Developments
- TDM-Supportive Development Design and Infrastructure Checklist: Residential Developments

Readers are encouraged to contact the City of Ottawa's TDM Officer for any guidance and assistance they require to complete this checklist.

Using the Checklist

This **TDM-Supportive Development Design and Infrastructure Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family or condominium only; subdivisions are exempt). Readers may download the applicable checklist in electronic format and complete it electronically, or print it out and complete it by hand. As an alternative, they may create a freestanding document that lists the design and infrastructure measures being proposed and provides additional detail on them.

Each measure in the checklist is numbered for easy reference. Each measure is also flagged as:

- REQUIRED —The Official Plan or Zoning By-law provides related guidance that must be followed.
- BASIC —The measure is generally feasible and effective, and in most cases would benefit the development and its users.
- BETTER —The measure could maximize support for users of sustainable modes, and optimize development performance.

Glossary

This glossary defines and describes the following measures that are identified in the **TDM-Supportive Development Design and Infrastructure Checklist**:

Walking & cycling: Routes
- Building location & access points
- Facilities for walking & cycling
- Amenities for walking & cycling

Walking & cycling: End-of-trip facilities
- Bicycle parking
- Secure bicycle parking
- Shower & change facilities
- Bicycle repair station

Transit
- Walking routes to transit
- Customer amenities

Ridesharing
- Pick-up & drop-off facilities
- Carpool parking

Carsharing & bikesharing
- Carshare parking spaces
- Bikeshare station location

Parking
- Number of parking spaces
- Separate long-term & short-term parking areas

Other
- On-site amenities to minimize off-site trips

In addition to specific references made in this glossary, readers should consult the City of Ottawa's design and planning guidelines for a variety of different land uses and contexts, available on the City's website at www.ottawa.ca. Readers may also find the following resources to be helpful:

- *Promoting Sustainable Transportation through Site Design*, Institute of Transportation Engineers, 2004 (www.cite7.org/wpdm-package/iterp-promoting-sustainable-transportation)
- *Bicycle End-of-Trip Facilities: A Guide for Canadian Municipalities and Employers*, Transport Canada, 2010 (www.fcm.ca/Documents/tools/GMF/Transport_Canada/BikeEndofTrip_EN.pdf)

▶ *Walking & cycling: Routes*

Building location & access points. Correctly positioning buildings and their entrances can help make walking convenient, comfortable and safe. Minimizing travel distances and maximizing visibility are key.

Facilities for walking & cycling. The Official Plan gives clear direction on the provision and design of walking and cycling facilities for both access and circulation. On larger, busier sites (e.g. multi-building campuses) the inclusion of sidewalks, pathways, marked crossings, stop signs and traffic calming features can create a safer and more supportive environment for active transportation.

Amenities for walking & cycling. Lighting, landscaping, benches and wayfinding can make walking and cycling safer and more secure, comfortable and accessible.

▶ *Walking & cycling: End-of-trip facilities*

Bicycle parking. The Official Plan and Zoning By-law both address the need for adequate bicycle parking at developments. Weather protection and theft prevention are major concerns for commuters who spend hundreds or thousands of dollars on a quality bicycle. Bicycle racks should have a design that enables secure locking while preventing damage to wheels. They should be located within sight of busy areas such as main building entrances or staffed parking kiosks.

Secure bicycle parking. Ottawa's Zoning By-law requires a secure area for bicycles at office or residential developments having more than 50 bicycle parking spaces. Lockable outdoor bike cages or indoor storage rooms that limit access to registered users are ideal.

Shower & change facilities. Longer-distance cyclists, joggers and even pedestrians can need a place to shower and change at work; the lack of such facilities is a major barrier to active commuting. Lockers and drying racks provide a place to store gear away from workspaces, and showers and grooming stations allow commuters to make themselves presentable for the office.

Bicycle repair station. Cycling commuters can experience maintenance issues that make the homeward trip difficult or impossible. A small supply of tools (e.g. air pump, Allen keys, wrenches) and supplies (e.g. inner tube patches, chain lubricant) in the workplace can help.

▶ *Transit*

Customer amenities. Larger developments that feature an on-site transit stop can make transit use more attractive by providing shelters, lighting and benches. Even better, they could integrate the passenger waiting area into a building entrance.

▶ *Ridesharing*

Pick-up & drop-off facilities. Having a safe place to load or unload passengers (for carpools as well as taxis and ride-hailing services) without obstructing pedestrians, cyclists or other vehicles can help make carpooling work.

Carpool parking. At destinations with large parking lots (or lots that regularly fill to capacity), signed priority carpool parking spaces can be an effective ridesharing incentive. Priority spaces are frequently abused by non-carpoolers, so a system to provide registered users with vehicle identification tags is recommended.

▶ *Carsharing & bikesharing*

Carshare parking spaces. For developments where carsharing could be an attractive option for employees, visitors or residents, ensuring an attractive location for future carshare parking spaces can avoid challenges associated with future retrofits.

Bikeshare station location. For developments where bikesharing could be an attractive option for employees, visitor or residents, ensuring an attractive location for a future bikeshare station can avoid challenges associated with future retrofits.

▶ *Parking*

Number of parking spaces. Parking capacity is an important variable in development design, as it can either support or subvert the mode share targets set during the transportation impact analysis (TIA). While the Zoning By-law establishes any minimum and/or maximum requirements for parking capacity, it also allows a reduction in any minimum to reflect the existence of on-site shower, change and locker rooms provided for cyclists.

Separate long-term & short-term parking areas. Because access to unused parking spaces can be a powerful incentive to drive, developments can better manage their parking supply and travel behaviours by separating long-term from short-term parking through the use of landscaping, gated controls or signs. Doing so makes it difficult for long-term parkers (e.g. commuters) to park in short-term areas (e.g. for visitors) as long as enforcement occurs; it also protects long-term parking capacity for its intended users.

▶ *Other*

On-site amenities to minimize off-site trips. Developments that offer facilities to limit employees' need for a car during their commute (e.g. to drop off children at daycare) or during their workday (e.g. to hit the gym) can free employees to make the commuting decision that otherwise works best for them.

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑ Phase V: a further improvement would be to provide a walking connection between Tower V west entrance and Inlet Private sidewalk
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑ See 1.2.1
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☑
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☑
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☑
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☑

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑ Bicycle parking spaces will be required for Phase V should independent living seniors reside in Tower 5
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☑ One bike repair station to serve all residents and users of City planned MUP
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☑
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☑
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☑

Appendix N

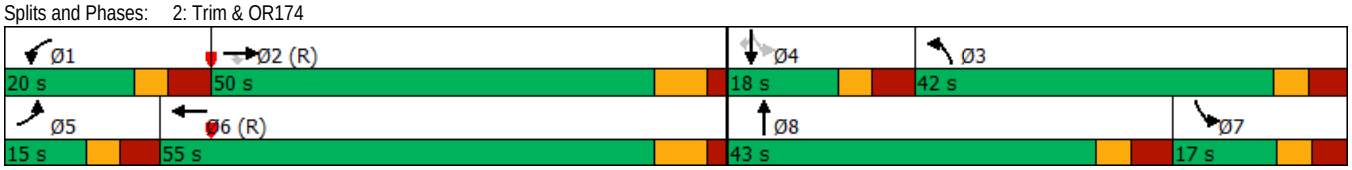
SYNCHRO Capacity Analysis: 2022 Total Projected Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	92	268	414	93	1189	859	47	32	83	159
Future Volume (vph)	92	268	414	93	1189	859	47	32	83	159
Lane Group Flow (vph)	102	298	460	103	1340	954	101	36	92	177
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8	7	4	
Permitted Phases			2					4		4
Detector Phase	5	2	2	1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.1	41.2	41.2	12.5	41.2	12.2	42.4	11.9	17.4	17.4
Total Split (s)	15.0	50.0	50.0	20.0	55.0	42.0	43.0	17.0	18.0	18.0
Total Split (%)	11.5%	38.5%	38.5%	15.4%	42.3%	32.3%	33.1%	13.1%	13.8%	13.8%
Yellow Time (s)	3.3	5.1	5.1	3.3	5.1	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.8	2.1	2.1	4.2	2.1	3.9	4.1	3.6	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.2	7.2	7.5	7.2	7.2	7.4	6.9	7.4	7.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	7.9	43.9	43.9	11.4	47.8	34.8	42.4	19.4	10.6	10.6
Actuated g/C Ratio	0.06	0.34	0.34	0.09	0.37	0.27	0.33	0.15	0.08	0.08
v/c Ratio	0.99	0.26	0.57	0.70	1.08	1.08	0.10	0.17	0.63	0.55
Control Delay	146.6	32.3	5.9	81.6	88.4	100.5	18.9	29.9	77.7	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	146.6	32.3	5.9	81.6	88.4	100.5	18.9	29.9	77.7	9.8
LOS	F	C	A	F	F	F	B	C	E	A
Approach Delay		31.7			87.9		92.7		32.6	
Approach LOS		C			F		F		C	
Queue Length 50th (m)	26.6	29.4	0.0	25.8	~201.4	~140.9	5.2	5.5	23.2	0.0
Queue Length 95th (m)	#63.1	41.1	24.7	#48.2	#244.3	#180.7	12.2	12.4	#45.4	11.4
Internal Link Dist (m)		222.6			537.2		301.4		202.0	
Turn Bay Length (m)	155.0		200.0	130.0		180.0		120.0		60.0
Base Capacity (vph)	103	1145	803	162	1244	880	1048	235	145	323
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.26	0.57	0.64	1.08	1.08	0.10	0.15	0.63	0.55

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 20 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 71.5	Intersection LOS: E
Intersection Capacity Utilization 91.3%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 2: Trim & OR174



FT 2022 AM
1: Trim & Jeanne D'Arc

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	6	82	181	14	0	106	20	59	0	9	3
Future Volume (vph)	8	6	82	181	14	0	106	20	59	0	9	3
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
Hourly flow rate (vph)	9	7	91	201	16	0	118	22	66	0	10	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	107	217	206	13
Volume Left (vph)	9	201	118	0
Volume Right (vph)	91	0	66	3
Hadj (s)	-0.46	0.22	-0.04	-0.10
Departure Headway (s)	4.3	4.8	4.6	4.8
Degree Utilization, x	0.13	0.29	0.27	0.02
Capacity (veh/h)	794	715	731	670
Control Delay (s)	7.9	9.7	9.3	7.9
Approach Delay (s)	7.9	9.7	9.3	7.9
Approach LOS	A	A	A	A

Intersection Summary				
Delay			9.2	
Level of Service			A	
Intersection Capacity Utilization			42.5%	ICU Level of Service
Analysis Period (min)			15	

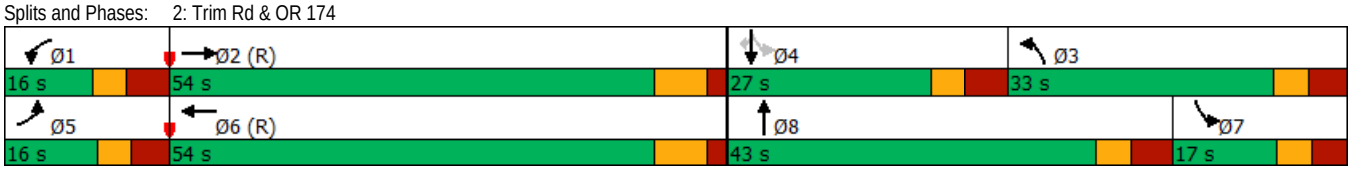
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	120	1111	1172	70	428	462	70	26	90	114
Future Volume (vph)	120	1111	1172	70	428	462	70	26	90	114
Lane Group Flow (vph)	133	1234	1302	78	506	513	182	29	100	127
Turn Type	Prot	NA	Free	Prot	NA	Prot	NA	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8	7	4	
Permitted Phases			Free					4		4
Detector Phase	5	2		1	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	10.0		5.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.1	41.2		12.5	41.2	12.2	42.4	11.9	17.4	17.4
Total Split (s)	16.0	54.0		16.0	54.0	33.0	43.0	17.0	27.0	27.0
Total Split (%)	12.3%	41.5%		12.3%	41.5%	25.4%	33.1%	13.1%	20.8%	20.8%
Yellow Time (s)	3.3	5.1		3.3	5.1	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.8	2.1		4.2	2.1	3.9	4.1	3.6	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.2		7.5	7.2	7.2	7.4	6.9	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	10.8	48.5	130.0	8.6	46.8	23.9	40.6	28.3	19.6	19.6
Actuated g/C Ratio	0.08	0.37	1.00	0.07	0.36	0.18	0.31	0.22	0.15	0.15
v/c Ratio	0.95	0.98	0.86	0.70	0.42	0.85	0.18	0.10	0.37	0.31
Control Delay	122.9	60.6	6.8	89.7	32.3	65.0	15.8	26.8	54.3	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	122.9	60.6	6.8	89.7	32.3	65.0	15.8	26.8	54.3	1.9
LOS	F	E	A	F	C	E	B	C	D	A
Approach Delay		37.5			39.9		52.1		25.2	
Approach LOS		D			D		D		C	
Queue Length 50th (m)	~38.5	~169.4	0.0	19.9	50.4	65.2	7.8	4.5	23.3	0.0
Queue Length 95th (m)	#80.9	#216.7	0.0	#44.5	65.9	84.5	17.1	10.6	40.9	0.0
Internal Link Dist (m)		313.9			321.3		154.2		204.2	
Turn Bay Length (m)	150.0		200.0	130.0		230.0		120.0		55.0
Base Capacity (vph)	140	1265	1517	115	1211	652	1030	306	268	416
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.98	0.86	0.68	0.42	0.79	0.18	0.09	0.37	0.31

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 39.5	Intersection LOS: D
Intersection Capacity Utilization 84.2%	ICU Level of Service E
Analysis Period (min) 15	

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

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

Splits and Phases: 2: Trim Rd & OR 174



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	10	133	93	6	0	81	8	129	1	11	4
Future Volume (vph)	7	10	133	93	6	0	81	8	129	1	11	4
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
Hourly flow rate (vph)	8	11	148	103	7	0	90	9	143	1	12	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	167	110	242	17
Volume Left (vph)	8	103	90	1
Volume Right (vph)	148	0	143	4
Hadj (s)	-0.49	0.22	-0.25	-0.10
Departure Headway (s)	4.2	4.9	4.3	4.7
Degree Utilization, x	0.19	0.15	0.29	0.02
Capacity (veh/h)	815	685	791	693
Control Delay (s)	8.1	8.8	9.1	7.8
Approach Delay (s)	8.1	8.8	9.1	7.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.7			
Level of Service	A			
Intersection Capacity Utilization	45.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix O

SYNCHRO and SIDRA Capacity Analysis: 2024 Total Projected Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	82	941	169	91	106	8
Future Volume (Veh/h)	82	941	169	91	106	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	86	991	178	96	112	8
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			86		1034	582
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			86		1034	582
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		51	98
cM capacity (veh/h)			1510		227	513

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1077	274	120
Volume Left	0	178	112
Volume Right	991	0	8
cSH	1700	1510	236
Volume to Capacity	0.63	0.12	0.51
Queue Length 95th (m)	0.0	3.0	20.0
Control Delay (s)	0.0	5.3	35.1
Lane LOS		A	E
Approach Delay (s)	0.0	5.3	35.1
Approach LOS			E

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	141	542	73	39	83	16
Future Volume (Veh/h)	141	542	73	39	83	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	148	571	77	41	87	17
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			148		628	434
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		628	434
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		79	97
cM capacity (veh/h)			1434		422	622

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	719	118	104
Volume Left	0	77	87
Volume Right	571	0	17
cSH	1700	1434	446
Volume to Capacity	0.42	0.05	0.23
Queue Length 95th (m)	0.0	1.3	6.8
Control Delay (s)	0.0	5.1	15.5
Lane LOS		A	C
Approach Delay (s)	0.0	5.1	15.5
Approach LOS			C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Future 2024 AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	139	2.0	0.100	7.5	LOS A	0.6	4.5	0.19	0.55	46.6
2	T1	21	2.0	0.100	3.0	LOS A	0.6	4.5	0.19	0.55	46.5
3	R2	992	2.0	0.543	2.5	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		1152	2.0	0.543	3.1	LOS A	0.6	4.5	0.03	0.39	48.2
East: Jeanne D'Arc											
4	L2	175	2.0	0.173	8.4	LOS A	1.1	7.6	0.40	0.59	46.1
5	T1	24	2.0	0.173	3.9	LOS A	1.1	7.6	0.40	0.59	46.0
6	R2	3	2.0	0.173	3.9	LOS A	1.1	7.6	0.40	0.59	45.0
Approach		202	2.0	0.173	7.8	LOS A	1.1	7.6	0.40	0.59	46.1
North: Trim											
7	L2	2	2.0	0.012	8.8	LOS A	0.1	0.4	0.45	0.47	47.6
8	T1	7	2.0	0.012	4.3	LOS A	0.1	0.4	0.45	0.47	47.4
9	R2	3	2.0	0.012	4.3	LOS A	0.1	0.4	0.45	0.47	46.4
Approach		13	2.0	0.012	5.0	LOS A	0.1	0.4	0.45	0.47	47.2
West: Jeanne D'Arc											
10	L2	8	2.0	0.092	8.4	LOS A	0.5	3.9	0.41	0.46	48.0
11	T1	38	2.0	0.092	3.9	LOS A	0.5	3.9	0.41	0.46	47.9
12	R2	58	2.0	0.092	3.9	LOS A	0.5	3.9	0.41	0.46	46.8
Approach		104	2.0	0.092	4.3	LOS A	0.5	3.9	0.41	0.46	47.3
All Vehicles		1471	2.0	0.543	3.8	LOS A	1.1	7.6	0.11	0.42	47.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Future 2024 PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	101	2.0	0.072	7.6	LOS A	0.4	3.1	0.24	0.55	46.4
2	T1	8	2.0	0.072	3.1	LOS A	0.4	3.1	0.24	0.55	46.2
3	R2	624	2.0	0.342	2.4	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		734	2.0	0.342	3.1	LOS A	0.4	3.1	0.04	0.39	48.2
East: Jeanne D'Arc											
4	L2	103	2.0	0.100	8.0	LOS A	0.6	4.2	0.32	0.56	46.4
5	T1	17	2.0	0.100	3.5	LOS A	0.6	4.2	0.32	0.56	46.2
6	R2	2	2.0	0.100	3.5	LOS A	0.6	4.2	0.32	0.56	45.2
Approach		122	2.0	0.100	7.3	LOS A	0.6	4.2	0.32	0.56	46.3
North: Trim											
7	L2	3	2.0	0.014	8.2	LOS A	0.1	0.5	0.36	0.45	47.8
8	T1	8	2.0	0.014	3.7	LOS A	0.1	0.5	0.36	0.45	47.7
9	R2	4	2.0	0.014	3.8	LOS A	0.1	0.5	0.36	0.45	46.6
Approach		16	2.0	0.014	4.6	LOS A	0.1	0.5	0.36	0.45	47.4
West: Jeanne D'Arc											
10	L2	7	2.0	0.136	8.0	LOS A	0.8	5.9	0.33	0.42	48.4
11	T1	65	2.0	0.136	3.5	LOS A	0.8	5.9	0.33	0.42	48.2
12	R2	96	2.0	0.136	3.5	LOS A	0.8	5.9	0.33	0.42	47.1
Approach		168	2.0	0.136	3.7	LOS A	0.8	5.9	0.33	0.42	47.6
All Vehicles		1040	2.0	0.342	3.7	LOS A	0.8	5.9	0.12	0.42	47.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix P

SYNCHRO and SIDRA Capacity Analysis: 2029 Total Projected Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	82	1060	169	91	112	8
Future Volume (Veh/h)	82	1060	169	91	112	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	86	1116	178	96	118	8
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			86		1096	644
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			86		1096	644
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		43	98
cM capacity (veh/h)			1510		208	473

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1202	274	126
Volume Left	0	178	118
Volume Right	1116	0	8
cSH	1700	1510	216
Volume to Capacity	0.71	0.12	0.58
Queue Length 95th (m)	0.0	3.0	24.8
Control Delay (s)	0.0	5.3	42.7
Lane LOS		A	E
Approach Delay (s)	0.0	5.3	42.7
Approach LOS			E

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	105.7%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	141	642	73	39	87	16
Future Volume (Veh/h)	141	642	73	39	87	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	148	676	77	41	92	17
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			148		681	486
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		681	486
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		77	97
cM capacity (veh/h)			1434		394	581

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	824	118	109
Volume Left	0	77	92
Volume Right	676	0	17
cSH	1700	1434	415
Volume to Capacity	0.48	0.05	0.26
Queue Length 95th (m)	0.0	1.3	7.9
Control Delay (s)	0.0	5.1	16.8
Lane LOS		A	C
Approach Delay (s)	0.0	5.1	16.8
Approach LOS			C

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Future 2029 AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	208	2.0	0.149	7.7	LOS A	1.0	7.0	0.26	0.55	46.4
2	T1	21	2.0	0.149	3.1	LOS A	1.0	7.0	0.26	0.55	46.2
3	R2	1045	2.0	0.572	2.5	LOS A	0.0	0.0	0.00	0.36	48.4
Approach		1275	2.0	0.572	3.3	LOS A	1.0	7.0	0.05	0.40	48.0
East: Jeanne D'Arc											
4	L2	175	2.0	0.189	8.9	LOS A	1.2	8.4	0.49	0.62	46.0
5	T1	27	2.0	0.189	4.4	LOS A	1.2	8.4	0.49	0.62	45.8
6	R2	3	2.0	0.189	4.4	LOS A	1.2	8.4	0.49	0.62	44.8
Approach		205	2.0	0.189	8.2	LOS A	1.2	8.4	0.49	0.62	45.9
North: Trim											
7	L2	2	2.0	0.013	9.1	LOS A	0.1	0.5	0.50	0.49	47.4
8	T1	7	2.0	0.013	4.6	LOS A	0.1	0.5	0.50	0.49	47.3
9	R2	3	2.0	0.013	4.7	LOS A	0.1	0.5	0.50	0.49	46.2
Approach		13	2.0	0.013	5.4	LOS A	0.1	0.5	0.50	0.49	47.0
West: Jeanne D'Arc											
10	L2	8	2.0	0.128	8.4	LOS A	0.8	5.6	0.43	0.47	48.0
11	T1	67	2.0	0.128	3.9	LOS A	0.8	5.6	0.43	0.47	47.8
12	R2	68	2.0	0.128	3.9	LOS A	0.8	5.6	0.43	0.47	46.7
Approach		144	2.0	0.128	4.2	LOS A	0.8	5.6	0.43	0.47	47.3
All Vehicles		1637	2.0	0.572	4.0	LOS A	1.2	8.4	0.14	0.43	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Jeanne D'Arc/Trim]

Future 2029 PM
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Trim											
1	L2	146	2.0	0.107	7.9	LOS A	0.7	4.7	0.32	0.57	46.1
2	T1	8	2.0	0.107	3.4	LOS A	0.7	4.7	0.32	0.57	46.0
3	R2	656	2.0	0.359	2.4	LOS A	0.0	0.0	0.00	0.36	48.5
Approach		811	2.0	0.359	3.4	LOS A	0.7	4.7	0.06	0.40	48.0
East: Jeanne D'Arc											
4	L2	103	2.0	0.105	8.3	LOS A	0.6	4.4	0.39	0.57	46.2
5	T1	17	2.0	0.105	3.8	LOS A	0.6	4.4	0.39	0.57	46.1
6	R2	2	2.0	0.105	3.8	LOS A	0.6	4.4	0.39	0.57	45.1
Approach		122	2.0	0.105	7.6	LOS A	0.6	4.4	0.39	0.57	46.2
North: Trim											
7	L2	3	2.0	0.014	8.4	LOS A	0.1	0.5	0.40	0.46	47.7
8	T1	8	2.0	0.014	3.9	LOS A	0.1	0.5	0.40	0.46	47.6
9	R2	4	2.0	0.014	4.0	LOS A	0.1	0.5	0.40	0.46	46.5
Approach		16	2.0	0.014	4.8	LOS A	0.1	0.5	0.40	0.46	47.3
West: Jeanne D'Arc											
10	L2	7	2.0	0.191	8.0	LOS A	1.2	8.9	0.35	0.42	48.3
11	T1	116	2.0	0.191	3.5	LOS A	1.2	8.9	0.35	0.42	48.1
12	R2	117	2.0	0.191	3.5	LOS A	1.2	8.9	0.35	0.42	47.0
Approach		240	2.0	0.191	3.7	LOS A	1.2	8.9	0.35	0.42	47.6
All Vehicles		1188	2.0	0.359	3.9	LOS A	1.2	8.9	0.16	0.42	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.