The Corporation of the Municipality of Clarington: Comprehensive Plan for the Former Goodyear Lands

Transportation Impact Study

Municipality of Clarington

60591532

November 2023

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AECOM: 2015-04-13

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Table of Contents

Figures

Tables

Appendices

1. Introduction

1.1 Purpose & Background

AECOM Canada Ltd. (AECOM) on behalf of SvN Urban Planners and for the Municipality of Clarington has completed a transportation review of the former Goodyear lands as part of the Bowmanville East Secondary Plan. The purpose of this study was to:

- Assess the existing traffic conditions in the vicinity of the subject site;
- Forecast future traffic volumes associated with the new land use;
- Assess the future operations at intersections in the vicinity of the subject site; and
- Identify operational and safety concerns, and any required mitigation measures, where appropriate.

The following Traffic Impact Study was prepared in compliance with Durham Region Traffic Impact Study Guidelines.

1.2 Study Area

The subject site is located within Bowmanville situated within the Municipality of Clarington (**Figure 1-1**). The subject site is generally located within Queen Street to the north, and Bowmanville Creek to the southwest. The immediate adjacent lands are primarily low-density residential with supporting commercial facilities along the main corridor (King Street) which runs parallel to Queen Street. Currently the property contains the former Goodyear manufacturing plant which has been dormant since its closure in November 2016. Notable north-south corridors within the surrounding transportation network are Highway 57 and Liberty Street, which provide access to Highway 401. Baseline Road and King Street (Highway 2) are primary east-west corridors connecting Bowmanville to nearby communities.

Figure 1-1: Study Area

The following existing boundary intersections are examined in this report:

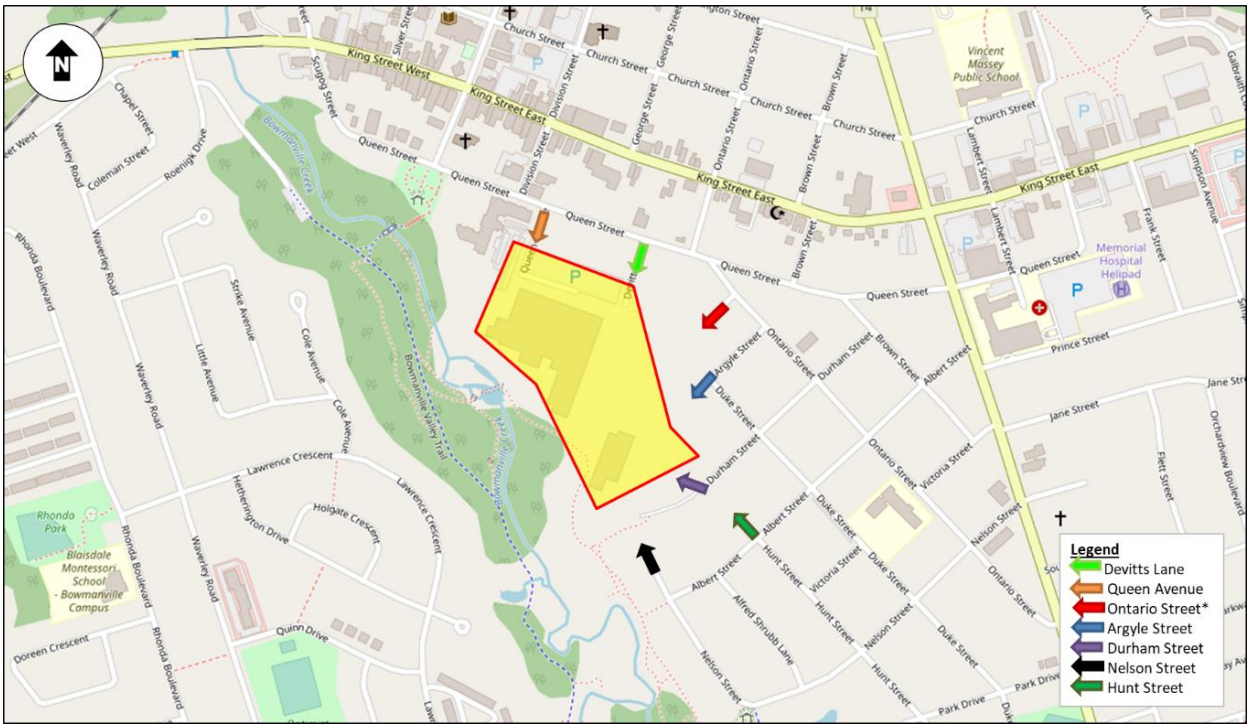
- **King Street Corridor**
  - King Street West and Roenigk Drive
  - King Street West and Scugog Street
  - King Street West and Temperance Street
  - King Street West and Division Street
- **King Street and Liberty Street**
- **Liberty Street Corridor**
  - Liberty Street South and Queen Street
  - Liberty Street South and Jane/Victoria Street
  - Liberty Street South and Nelson Street
  - Liberty Street South and Ontario Street
  - Liberty Street South and Parkway Avenue Street
  - Liberty Street South and Baseline Road

1.2.1 Future Site Access

Currently two access locations exist from Queen Street, via Queen Avenue and Devitts Lane. There is also an internal connection to both Queen Avenue and Devitts Lane via Raynes Avenue which runs through the former Goodyear Lands parking lot.

Staff from the Municipality and SvN were consulted regarding potential future access to the new land uses which is summarized below in **Figure 1-2**.

Figure 1-2: Goodyear Lands Possible Access Locations



2. Existing Conditions

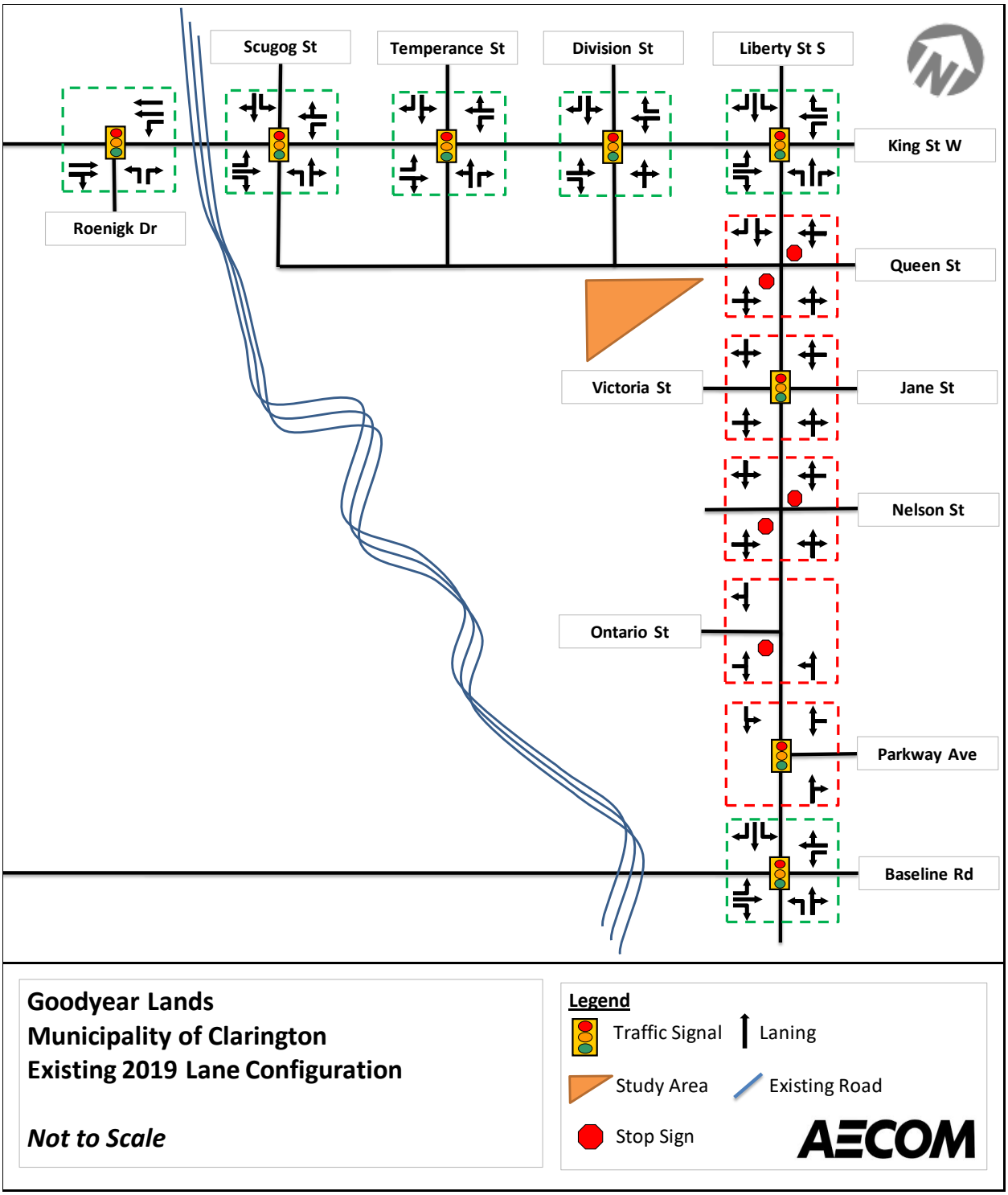
2.1 Road Network

Key roadways that form the boundary network for the existing conditions review are as follows:

- **Liberty Street** is a north-south arterial road under the jurisdiction of Durham Region. Near the site, it provides two lanes of traffic and has a posted speed limit of 50 kilometres per hour. No on-street parking or bicycle lanes are present.
- **King Street** is an east-west arterial road under the jurisdiction of Durham Region. Near the site, it has a posted speed limit of 50 kilometres per hour and provides two lanes of traffic east of Scugog Street (where on street parking is available). West of Scugog Street, King Street becomes four lanes with no on-street parking or bicycle lanes present.
- **Queen Street** is an east-west collector road under the jurisdiction of the Municipality of Clarington. Near the site, it provides two lanes of traffic. No bicycle lanes are present.
- **Baseline Road** is an east-west arterial road under the jurisdiction of Durham Region. Near the site, it provides two lanes of traffic. No on-street parking or bicycle lanes are present.

The existing lane configuration at the time of the collection of the baseline traffic information for the study area intersections within the boundary road network is shown in **Figure 2-1**.

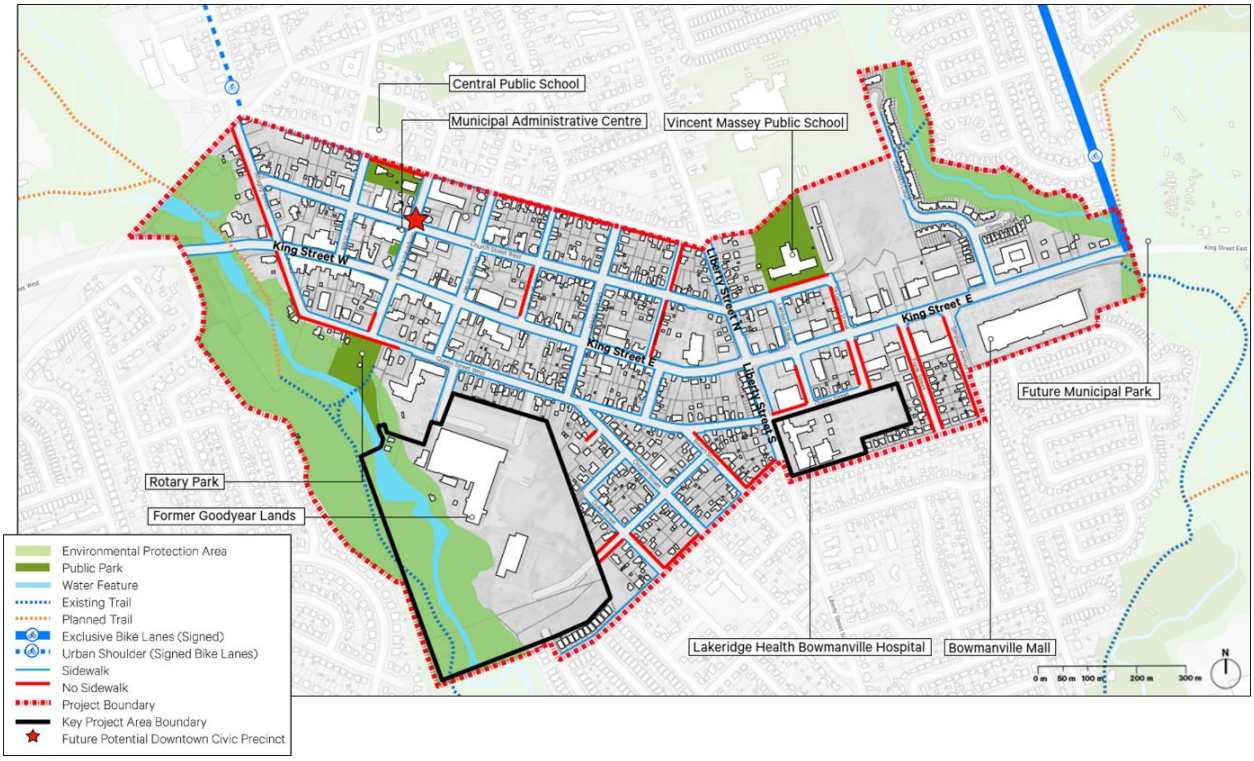
Figure 2-1: Existing Lane Configuration



2.2 Active Transportation

Figure 2-2 illustrates are the active transportation provisions currently available within the defined study area.

Figure 2-2: Existing Active Transportation Network

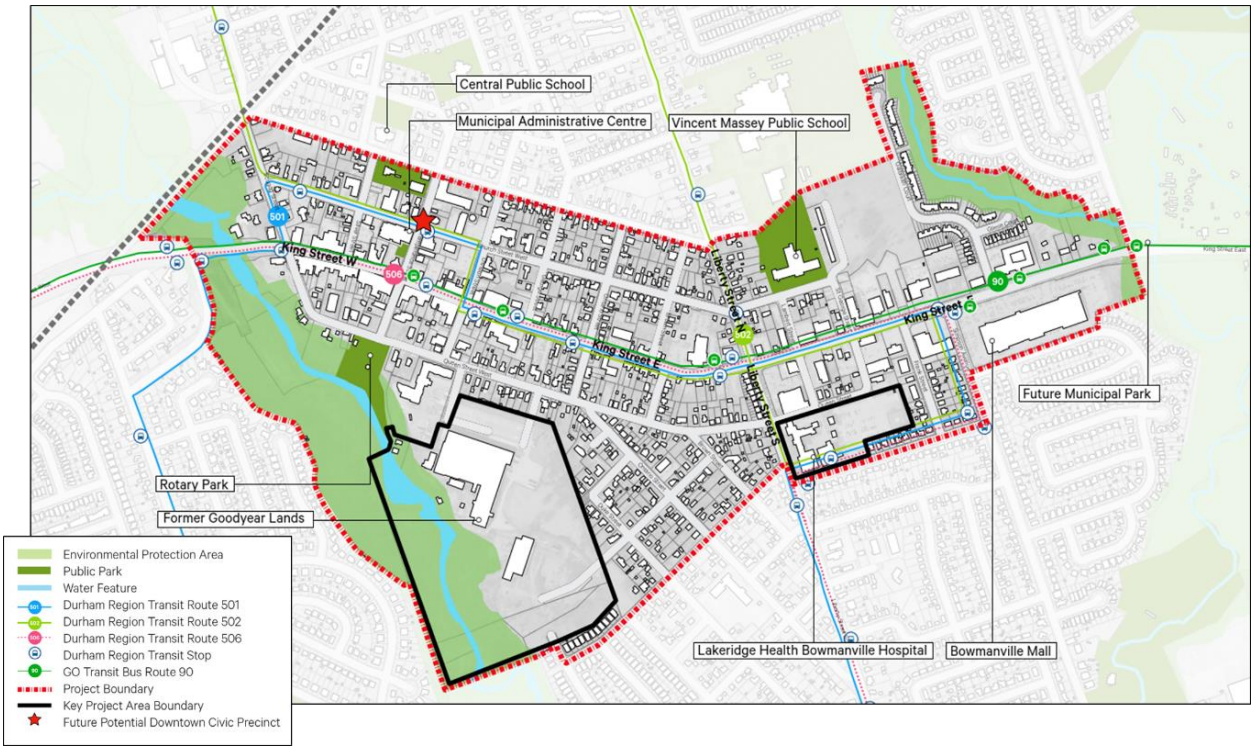


2.3 Transit Network

As displayed below in **Figure 2-3,** three transit routes currently function within the defined study area;

- Durham Region Transit Route 506 operating from the Bowmanville GO Park and Ride to Lakebreeze Drive and Waterview Lane in Newcastle.
- Durham Region Transit Route 501 operating from Highway 2 and Boswell Drive to Church Street and Temperance Street within Bowmanville.
- GO Bus Transit Route 90 operating from the Oshawa GO Station to King Avenue East and Beaver Street South in Newcastle.

Figure 2-3: Existing Transit Network



2.4 Data Collection

2.4.1 Durham Region

Traffic data was collected from the Durham Region Traffic Engineering & Operations Division. The respective AM and PM Peak Hours volume dates are summarized in **Table 2-1**. Turning movement count data and signal timing data can be found in **Appendix B**.

It is noted the above 2017 and 2018 traffic counts were acquired at the beginning of this study (2018) and were considered current at that time of study initiation. Given the lapse of time since study inception as well as COVID pandemic impacts on travel habits, and based on insight from Durham Region, newer traffic counts from 2021 and 2022 at select intersections (Scugog Street & King Street West, Liberty Street and King Street West, and Queen Street and Liberty Street South) were reviewed to consider the relevance of the aforementioned counts and determine the need for growth rate adjustments for future traffic forecasts. Based on a review of the select counts, it was identified that the newer counts from 2021 and 2022 observed between 4% and 24% less overall vehicular volume depending on the intersection and peak hour. As such, it was determined that maintaining the 2017 and 2018 count volumes and growing them to the future horizon year would result in a more conservative analysis approach.

Table 2-1: Turning Movement Count Dates and Peak Hours

Intersections	Weekday AM Peak Hour Survey Date	Weekday AM Peak Hour Peak Hour	Weekday PM Peak Hour Survey Date	Weekday PM Peak Hour Peak Hour
Roenigk Drive & King Street West	May 17th, 2018	8:15 AM to 9:15 AM	May 17th, 2018	4:15 PM to 5:15 PM
Scugog Street & King Street West	May 18th, 2017	8:15 AM to 9:15 AM	May 18th, 2017	5:45 PM to 6:45 PM
Temperance Street & King Street West	May 18th, 2017	8:15 AM to 9:15 AM	May 18th, 2017	3:15 PM to 4:15 PM
Division Street & King Street West	May 18th, 2017	8:15 AM to 9:15 AM	May 18th, 2017	3:30 PM to 4:30 PM
Liberty Street & King Street West	May 18th, 2017	8:15 AM to 9:15 AM	May 18th, 2017	5:00 PM to 6:00 PM
Queen Street & Liberty Street South	May 10th, 2017	8:00 AM to 9:00 AM	May 10th, 2017	4:00 PM to 5:00 PM
Victoria Street/Jane Street & Liberty Street South	Dec 12th, 2018	7:45 AM to 8:45 AM	Dec 12th, 2018	3:30 PM to 4:30 PM
Nelson Street & Liberty Street South	Dec 12th, 2018	7:45 AM to 8:45 AM	Dec 12th, 2018	3:15 PM to 4:15 PM
Ontario Street & Liberty Street South	Dec 12th, 2018	7:45 AM to 8:45 AM	Dec 12th, 2018	4:15 PM to 5:15 PM
Parkway Avenue & Liberty Street South	Dec 12th, 2018	8:00 AM to 9:00 AM	Dec 12th, 2018	4:15 PM to 5:15 PM
Baseline Road West & Liberty Street South	May 18th, 2017	8:15 AM to 9:15 AM	May 18th, 2017	5:00 PM to 6:00 PM

2.4.2 Growth Rate

Appendix E of the Municipality of Clarington Transportation Master Plan identified annual growth rates within the study area between the 2011 horizon year and the 2031 horizon year. The growth rates are summarized below in **Table 2-2**. These growth rates were incorporated to normalize the source date to a common 2019 base year.

Table 2-2: CTMP Annual Growth Rates

Street Name	Direction	Annual Growth Rate
King Street	East-West	2%
Roenigk Drive	North-South	2%
Liberty Street	North-South	1%
Queen Street	East-West	3%

2.5 Existing Traffic Volumes

The existing traffic conditions were analyzed on the basis of the traffic volumes presented in **Figure 2-4** and **Figure 2-5**. The analysis is based on the existing lane configurations displayed above in **Figure 2-1**. It should be noted that volumes may differ slightly from raw data with the addition of ambient traffic growth and due to minor volume balancing prior to undertaking the existing conditions assessment.

Figure 2-4: Existing Traffic Volumes – AM Peak Hour

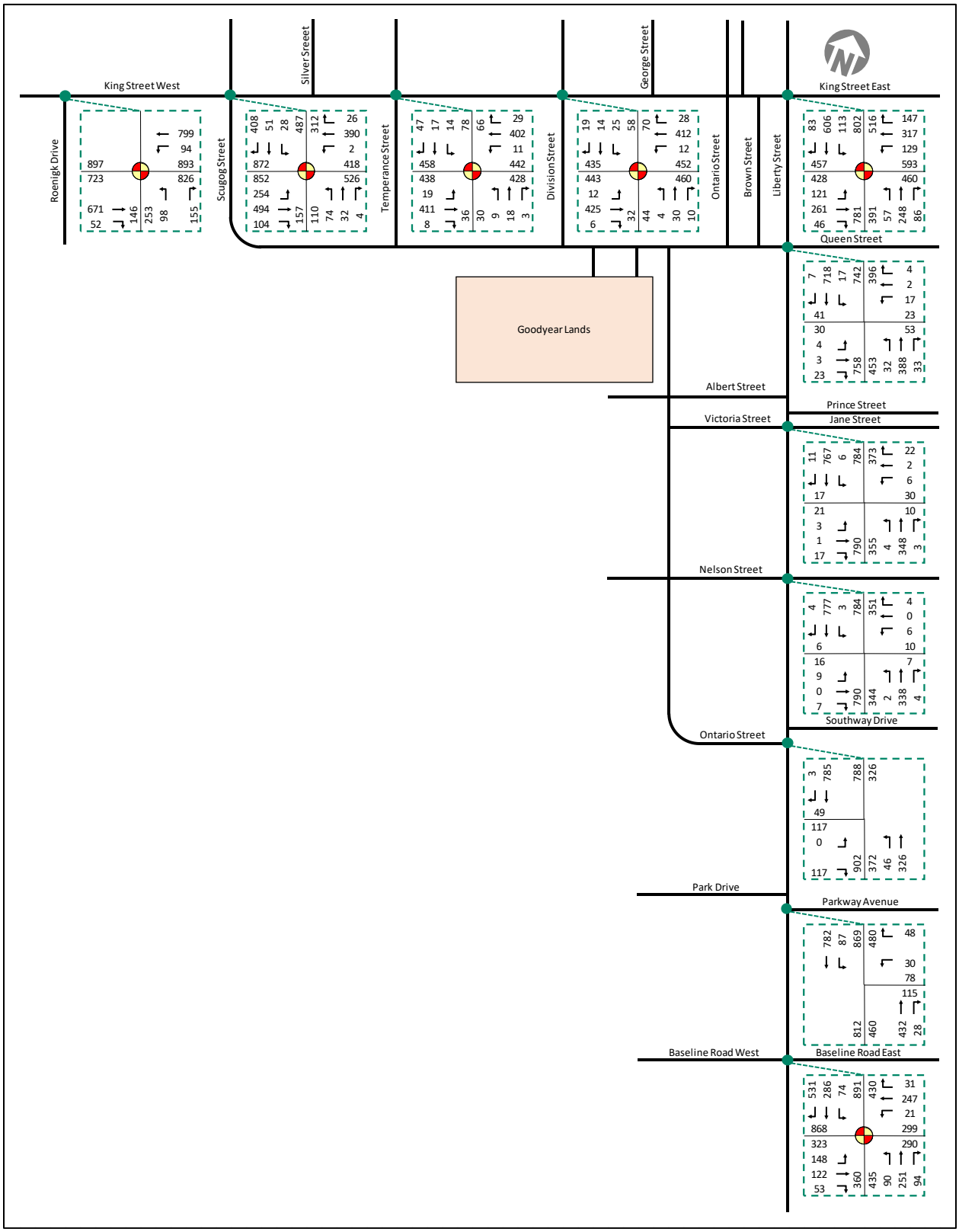
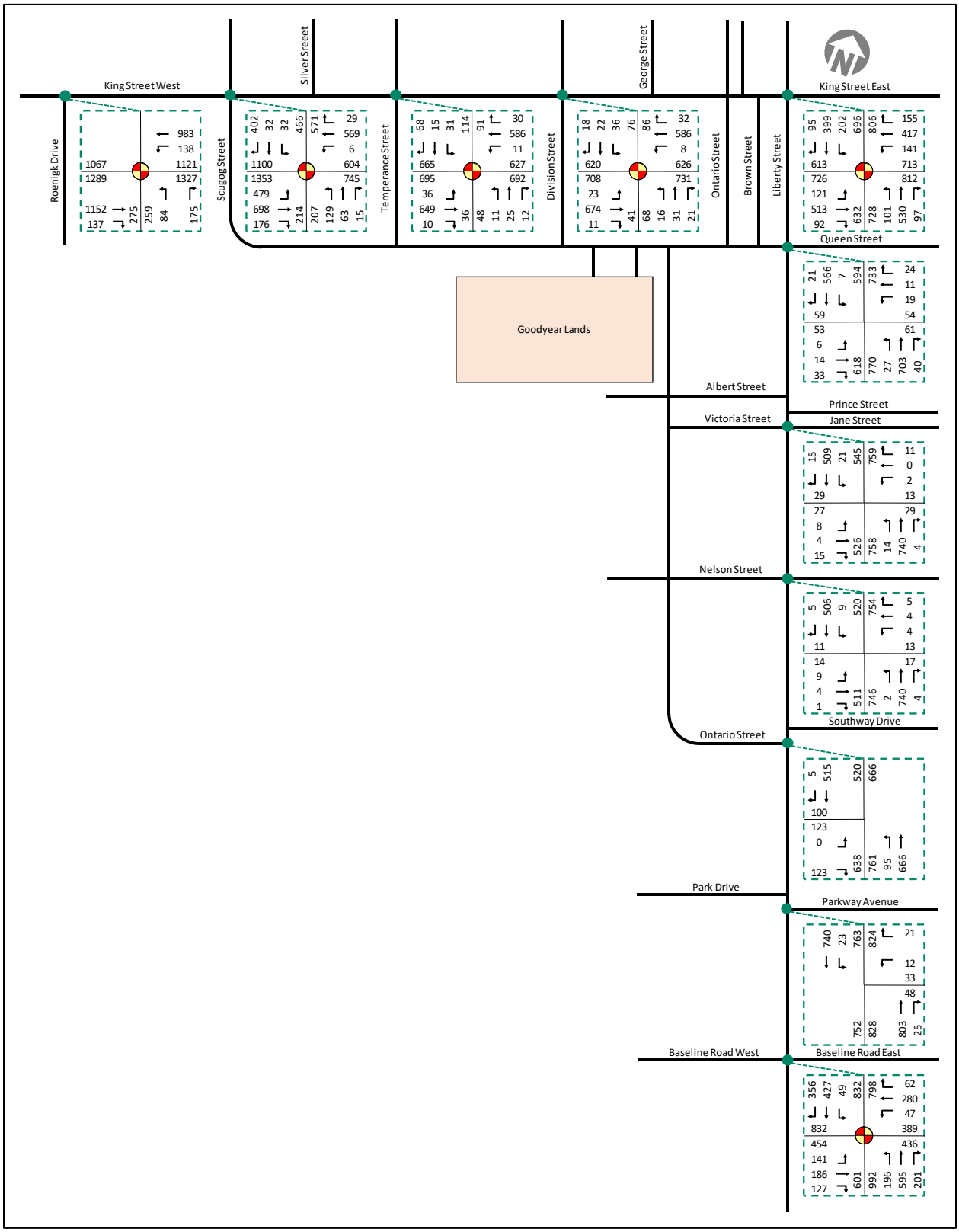


Figure 2-5: Existing Traffic Volumes – PM Peak Hour



2.6 Existing Traffic Assessment

Intersection operations were assessed using the Synchro software package, which is based on the methodology outlined in the *Highway Capacity Manual (HCM)*, 2000 (Transportation Research Board). The unsignalized intersections were analyzed using HCM 2000 TWSC (Two-Way Stop Control) or AWSC (All-Way Stop Control), as appropriate.

Table 2-3 to **Table 2-5** summarize the overall traffic operations using measures of effectiveness (Level of Service (LOS), volume-to-capacity ratio (v/c), control delay, and 95th percentile queue lengths) at each intersection under Existing Conditions using HCM 2000 methodology. LOS is a qualifying measure of traffic operations at an intersection, which relates the delay per vehicle for a 15-minute analysis period. The v/c ratio is a measure of the proportion of the calculated intersection capacity that is utilized by the modelled traffic volumes. Detailed Level of Service definitions related to intersection operations are contained in **Appendix A**. Detailed Synchro outputs for the Existing Conditions traffic operations are contained in **Appendix C**. Critical movements are highlighted and defined as movements where the v/c ratio exceeds 0.85, or LOS is 'E' or worse.

As displayed in **Table 2-3**, the network signalized intersections function well in the AM peak hour, exhibiting only two critical movements, of which one operates at LOS F (i.e., eastbound left-turn at Liberty Street & Baseline Road). The eastbound left-turn movement exceeds its storage capacity with a delay of 92.7 seconds. Multiple PM peak hour critical movements are identified, including two LOS F movements and three operating over capacity (i.e., eastbound left-turn and northbound left-turn at Scugog Street & King Street, and eastbound left-turn at Liberty Street & Baseline Road). Seven movements are shown to exceed their storage capacity during the PM peak hour.

A signal optimization exercise was undertaken to assess the opportunity for improved operations at the intersections experiencing over capacity conditions. **Table 2-4** summarizes the critical movements at the intersections after the optimization of signal phase splits. While some improvement is observed, the critical movements and the movements generating queues are observed to continue exceeding their respective available storage / link distances.\

It is noted that the Liberty Street & Victoria Street / Jane Street and Liberty Street & Parkway Avenue are midblock half-signals for pedestrian crossings. However, for the purpose of this analysis, they were modelled as *unsignalized* in order to assess the side street stop delays.

Table 2-3: Existing Traffic HCM Report Summary – Signalized Intersections

2019 Existing Conditions			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Roenigk Drive & King Street (Signalized)	350	EBT	4.9	A	0.33	31.5	13.3	B	0.67	121.5
	80	WBL	5.0	A	0.24	10.8	13.4	B	0.50	19.4
	170	WBT	4.5	A	0.36	37.5	8.2	A	0.41	60.0
	35	NBL	31.0	C	0.45	26.7	38.7	D	0.45	28.1
	170	NBR	29.4	C	0.23	18.3	36.9	D	0.24	21.0
	Overall Intersection		8.2	A	0.37	-	13.8	B	0.62	-
Scugog Street & King Street (Signalized)	40	EBL	9.3	A	0.57	20.2	74.6	E	1.07	132.1
	170	EBT	9.8	A	0.54	46.0	14.0	B	0.67	137.4
	170	EBR	4.9	A	0.08	3.0	11.0	B	0.13	3.2
	225	WBT	4.9	A	0.33	10.5	25.4	C	0.46	66.3
	35	NBL	79.8	E	0.88	33.0	430.4	F	1.79	71.1
	110	NBT	20.7	C	0.08	10.1	26.1	C	0.17	21.0
	50	SBL	20.8	C	0.09	8.9	25.7	C	0.11	11.8
	250	SBT	26.2	C	0.60	39.8	30.1	C	0.53	46.9
	Overall Intersection		15.6	B	0.70	-	51.4	D	1.32	-
Temperance Street & King Street (Signalized)	25	EBL	11.7	B	0.06	4.7	1.5	A	0.10	0.5
	225	EBT	15.8	B	0.50	72.5	6.5	A	0.61	45.5
	20	WBL	1.3	A	0.03	0.2	3.7	A	0.04	0.7
	115	WBT	4.8	A	0.51	4.3	5.5	A	0.55	32.9
	105	NBT	20.3	C	0.07	8.5	27.9	C	0.10	13.5
	15	NBR	19.7	B	0.00	0.0	26.8	C	0.01	2.2
	205	SBT	20.7	C	0.10	10.7	28.9	C	0.16	18.6
	20	SBR	20.0	B	0.03	5.7	27.2	C	0.04	9.8
	Overall Intersection		11.3	B	0.37	-	8.3	A	0.49	
Division Street & King Street (Signalized)	115	EBT	7.6	A	0.48	37.0	4.1	A	0.64	9.4
	10	EBR	6.4	A	0.01	0.0	0.0	A	0.01	0.0
	415	WBT	10.5	B	0.48	52.5	3.8	A	0.54	19.1
	10	WBR	6.5	A	0.02	2.2	0.5	A	0.02	0.2
	95	NBT	21.4	C	0.10	11.3	29.7	C	0.16	18.7
	215	SBT	21.9	C	0.13	11.9	30.5	C	0.21	20.0
	15	SBR	20.5	C	0.01	3.2	27.8	C	0.01	4.2
	Overall Intersection		10.3	B	0.37	-	6.4	A	0.53	-
Liberty Street & King Street (Signalized)	50	EBL	26.0	C	0.49	24.6	17.8	B	0.50	14.4
	155	EBT	30.4	C	0.56	64.3	47.2	D	0.98	158.1
	50	EBR	22.2	C	0.04	5.2	15.0	B	0.06	4.0
	70	WBL	23.7	C	0.44	26.0	39.3	D	0.70	33.9
	190	WBT	33.9	C	0.68	79.1	39.9	D	0.80	118.6
	30	WBR	23.8	C	0.18	17.1	24.1	C	0.20	22.8
	30	NBL	24.5	C	0.43	14.6	23.3	C	0.31	27.2
	95	NBT	16.4	B	0.35	37.9	40.0	D	0.86	148.8
	35	NBR	13.4	B	0.07	2.7	19.4	B	0.07	10.0
	55	SBL	16.4	B	0.29	24.4	76.7	E	0.99	64.4
	95	SBT	27.3	C	0.79	123.8	18.5	B	0.46	69.0
	30	SBR	13.6	B	0.09	9.7	13.9	B	0.07	9.1
	Overall Intersection		25.1	C	0.72	-	36.3	D	0.98	-
Liberty Street & Baseline Road (Signalized)	40	EBL	92.7	F	0.98	55.9	130.5	F	1.07	65.3
	145	EBT	26.3	C	0.30	30.0	29.5	C	0.41	47.6
	80	EBR	24.1	C	0.04	7.1	26.4	C	0.09	11.6
	45	WBL	24.5	C	0.09	7.9	27.3	C	0.18	15.6
	210	WBT	34.5	C	0.71	66.3	37.5	D	0.73	87.6
	35	NBL	8.7	A	0.17	16.6	13.0	B	0.41	42.9
	115	NBT	10.4	B	0.37	52.4	22.4	C	0.81	222.9
	25	SBL	9.0	A	0.19	17.0	16.6	B	0.36	17.0
	225	SBT	8.9	A	0.23	43.2	10.9	B	0.34	59.8
	30	SBR	12.4	B	0.51	87.6	10.5	B	0.29	19.9
	Overall Intersection		22.3	C	0.65	-	27.1	C	0.90	-

Table 2-4: Existing Traffic HCM Report Summary – Optimized Signalized Intersections

2019 Existing Conditions - Optimized			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Scugog Street & King Street (Signalized)	40	EBL	10.7	B	0.60	30.2	109.1	F	1.15	138.7
	35	NBL	45.8	D	0.76	25.8	92.8	F	0.97	58.2
	Overall Intersection		16.6	B	0.69	-	44.2	D	1.11	-
Liberty Street & King Street (Signalized)	155	EBT	23.0	C	0.49	53.9	42.1	D	0.87	147.0
	30	NBL	61.9	E	0.74	28.2	26.0	C	0.34	28.9
	95	NBT	19.4	B	0.41	47.2	54.1	D	0.94	160.1
	55	SBL	20.1	C	0.36	26.0	76.3	E	0.98	63.7
	95	SBT	44.5	D	0.94	143.8	20.9	C	0.49	73.6
	Overall Intersection		27.7	C	0.74	-	37.5	D	0.93	-
Liberty Street & Baseline Road (Signalized)	40	EBL	29.1	C	0.74	27.3	87.5	F	0.98	50.7
	145	EBT	15.6	B	0.29	17.8	21.3	C	0.42	337.3
	115	NBT	10.2	B	0.44	43.9	23.5	C	0.87	169.4
	30	SBR	11.7	B	0.53	36.4	9.3	A	0.32	19.8
	Overall Intersection		13.9	B	0.60	-	22.5	C	0.90	-

Table 2-5 summarizes the intersection operations for unsignalized intersections in the study area. Two critical movements were identified during the Existing Conditions AM peak hour, while four were identified during the PM peak hour. No queues were identified extending to adjacent intersections and v/c ratios function well below 1.0 for all movements.

Table 2-5: Existing Traffic HCM Report Summary – Unsignalized Intersections

2019 Existing Conditions			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Liberty Street & Queen Street (Unsignalized)	100	EBLTR	27.7	D	0.18	4.7	41.7	E	0.39	21.7
	75	WBLTR	75.2	F	0.35	10.2	92.2	F	0.64	23.6
	100	NBLTR	1.4	A	0.05	1.2	0.9	A	0.03	0.8
	100	SBLTR	0.5	A	0.02	0.4	0.3	A	0.01	0.2
Liberty Street & Victoria Street/Jane Street (Unsignalized)	100	EBLTR	23.6	C	0.11	2.9	29.6	D	0.17	4.5
	100	WBLTR	21.2	C	0.14	3.5	20.9	C	0.06	1.4
	75	NBLTR	0.2	A	0.01	0.2	0.5	A	0.02	0.4
	75	SBLTR	0.2	A	0.01	0.1	0.8	A	0.03	0.7
Liberty Street & Nelson Street (Unsignalized)	75	EBLTR	28.1	D	0.10	0.1	46.0	E	0.15	2.8
	75	WBLTR	24.9	C	0.06	0.1	32.5	D	0.09	1.8
	100	NBLTR	0.1	A	0.00	0.0	0.1	A	0.00	0.0
	100	SBLTR	0.1	A	0.00	0.0	0.4	A	0.01	0.3
Liberty Street & Ontario Street (Unsignalized)	150	EBLR	23.8	C	0.42	15.1	14.0	B	0.25	7.4
	75	NBTL	2.1	A	0.07	1.7	2.5	A	0.10	2.5
	75	SBTR	0.0	A	0.54	0.0	0.0	A	0.33	0.0
Liberty Street & Parkway Avenue (Unsignalized)	75	WBLR	41.9	E	0.50	18.8	70.5	F	0.42	13.0
	75	NBTR	0.0	A	0.30	0.0	0.0	A	0.53	0.0
	75	SBTL	2.7	A	0.10	2.6	1.2	A	0.04	1.0

3. Future Conditions

3.1 Future Road Network

The key roadways that form the boundary network for the study area identified in **Section 2.1** were retained for the assessment of Future Conditions. Within and outside the study area, both the Municipality of Clarington and Durham Region have several ongoing and planned Public Works Projects which will affect the road network capacity and potentially divert existing and future traffic travelling through the study intersections. The future road network improvements from the Clarington Transportation Master Plan (TMP) and Durham Region TMP, shown in **Figure 3-1** and **Figure 3-2** respectively, were referenced to identify the road network improvements anticipated by 2041.

The Clarington TMP identifies Baseline Road as a future road improvement within the study area road network which will see a widening from a two-lane to four-lane cross-section. Intersection improvements including left- and right-turn storage lanes are expected at major crossing roads including the study intersection at Liberty Street & Baseline Road. Based on guidance from Clarington, the widening is planned to be implemented by 2031 but only if the contemplated new Highway 401 / Lambs Road interchange comes to fruition. For the purpose of this 2041 traffic assessment, the Baseline Road improvements have been assumed to be implemented.

By 2031, plans are in place to widen Liberty Street South (Regional Road 14) from its current two-lane cross-section to a three-lane cross-section featuring a new centre two-way left-turn lane, as identified in both the Clarington TMP and Durham Region TMP. The widening extends from Baseline Road to King Street, affecting several study intersections. The project is expected to improve operational performance along Liberty Street South for vehicles making left-turn movements from Liberty Street South onto the cross streets, as well as vehicles making left-turn movements onto Liberty Street South from the cross streets.

To the east of the BESP study area, the Ontario Ministry of Transportation (MTO) has identified Lambs Road as a potential future interchange location on Highway 401. Possible ramp modifications and/or closures may also take place at the Liberty Street interchange and Bennett Road interchanges. The broader road network improvements would likely divert traffic from the Liberty Street corridor and reduce overall local vehicle volumes, lending to better area traffic operations.

Outside the western limit of the study area, Bowmanville Avenue (Regional Road 57) is undergoing a reconstruction, urbanization, and widening project from north of the CP Rail bridge (i.e., approximately 200 metres south of King Street West) to 400 metres north of Stevens Road (i.e., approximately 670 metres north of King Street West). Future plans are identified in both the Clarington TMP and Durham Region TMP for further widening to the north up to Nash Road, and also to the south (to Baseline Road).

Figure 3-1: Clarington TMP Existing Road Network and Recommended Improvements (Goodyear Lands Shown in Blue)

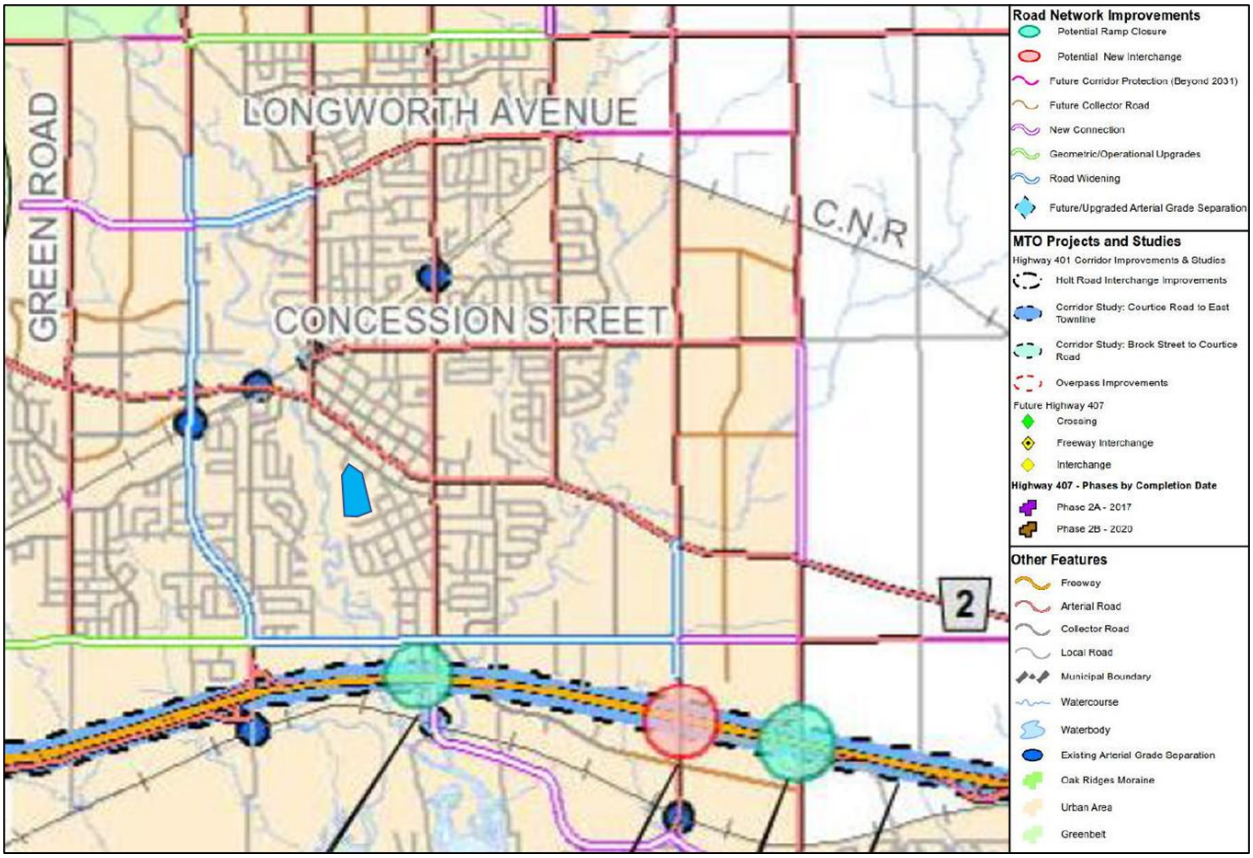
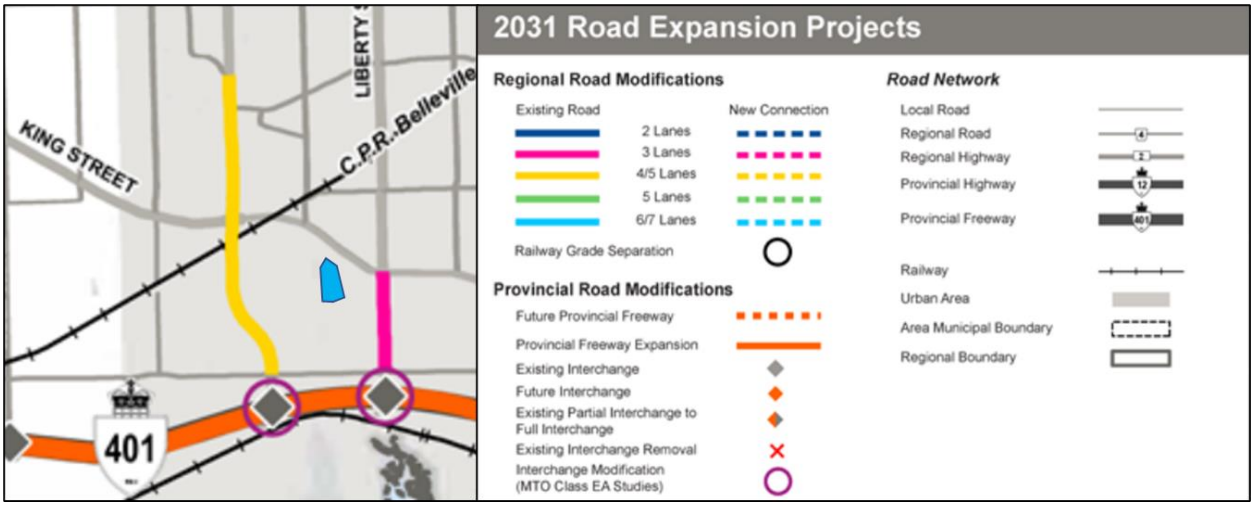


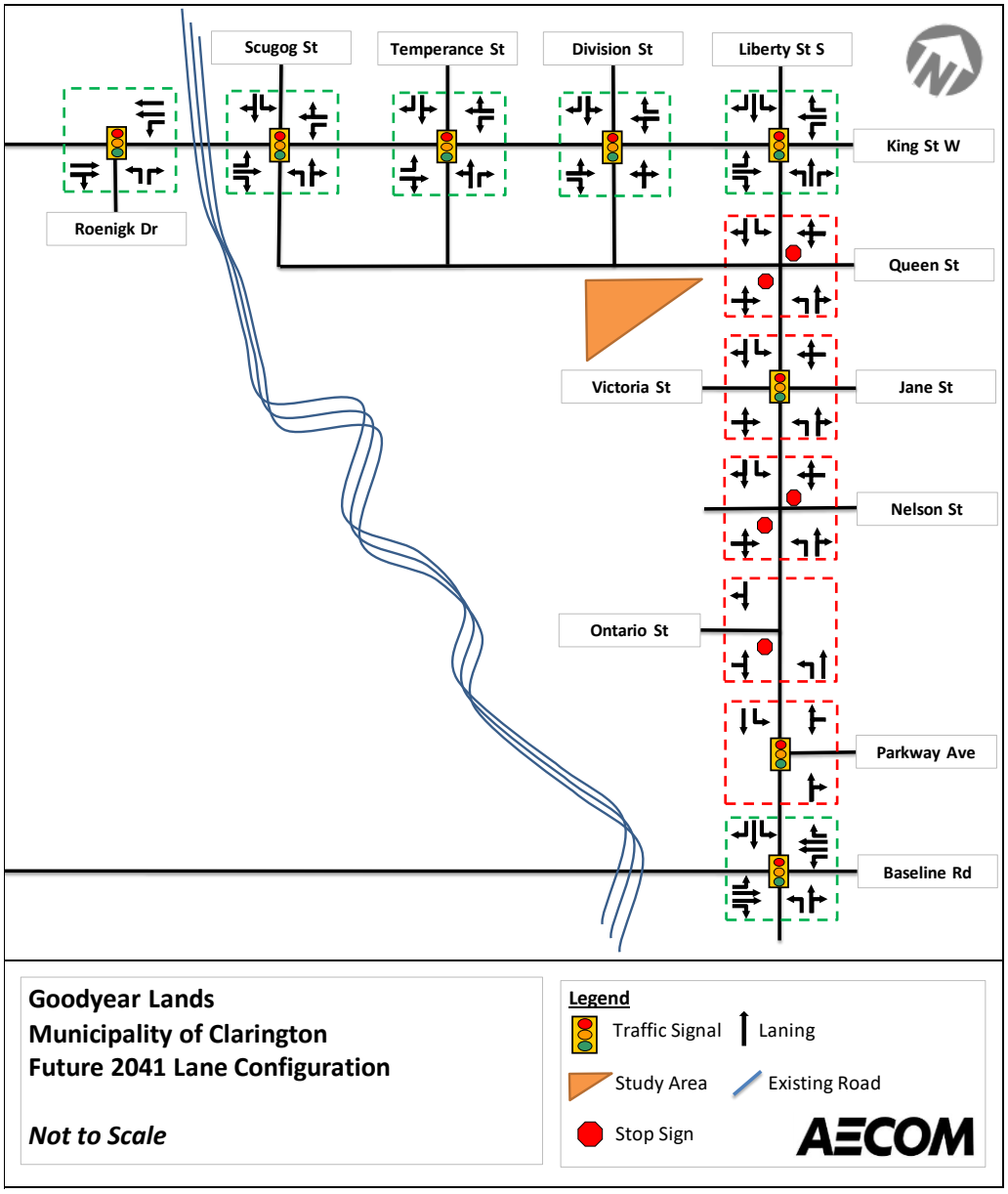
Figure 3-2: Durham Region TMP 2031 Road Expansion Projects (Goodyear Lands Shown in Blue)



Additional capacity created by the widening to 4/5 lanes directly to the west of the Secondary Plan area is expected to divert vehicular demand from parallel north-south routes, notably including Liberty Street. As traffic along Liberty Street reaches its capacity, traffic patterns will adjust to optimize travel delays with the expectation that vehicles travelling through the study area will reroute to Bowmanville Avenue. The details of the estimated vehicle diversion resulting from the widening of Bowmanville Avenue are described in **Section 3.5** and **Section 3.6**.

The lane configurations used in the analysis of Future 2041 traffic operations are shown in **Figure 3-3**.

Figure 3-3: Future 2041 Lane Configuration



3.2 Future Active Transportation

Improvements to active transportation facilities including sidewalks, cycling, and multi-use trails are identified within and surrounding the Secondary Plan area. These improvements are anticipated to encourage further adoption of active transportation travel modes and continue the shift away from driving.

The Secondary Plan area will bring higher density development with mixed-use planning which will further promote walking and cycling trips. Commercial businesses within the Secondary Plan area will also largely be located on the ground floor of multi-storey residential developments which will allow for walk-in use by local residents rather than customers driving in from outside neighbourhoods.

The Future Active Transportation Network for the Bowmanville East Secondary Plan area is shown in **Figure 3-4**. The network shows several improvements which will allow for increased adoption of active transportation modes including walking and cycling. New sidewalks are planned to be implemented throughout sections of the road network currently missing connectivity. This includes sections of Scugog Street and Queen Street connecting to the Goodyear Lands, Church Steet at the northern border of the Secondary Plan area, and several internal roads including Temperance Street, George Street, Brown Street, Duke Street, Lambert Street, Frank Street, St. George Street, and Simpson Avenue. The new sidewalk infrastructure will improve mobility and safety and is expected to facilitate an increased walking mode share within the neighbourhood for trips to and from residences, schools, and local businesses.

The Secondary Plan Active Transportation Network indicates an extension of the active transportation network to the existing exclusive bike lanes on Mearns Avenue north of King Street East at the eastern limit of the Secondary Plan area. A new urban shoulder facility is proposed along Scugog Street connecting to the north. Although an urban shoulder is not a specifically designated bikeway, it is a space delineated by an edge line that a cyclist may ride in instead of riding in the vehicular shared curb lane. Newly planned trails are also shown to significantly add to the trail network and provide connections to the west, northwest, northeast, and east. Overall, the improvements to the active transportation network within and leading outside of the study area to neighbouring communities will improve connections, mobility and cyclist safety, and is expected to drive an increase in active transportation modes for trips within, originating from, and destined to the Secondary Plan area.

Figure 3-4: Secondary Plan Future Active Transportation Network

The Proposed Cycle and Trail Network from the Clarington TMP is shown in **Figure 3-5**. The network indicates improved connectivity in the broader area surrounding the Bowmanville East Secondary Plan and the Goodyear Lands study area. A trail extension is proposed northward from the east end of the study area connecting to the local road network near Longworth Avenue. King Street though the Secondary Plan area is designated as a Key Active Transportation Destination, which should see improvements to walking and cycling facilities along the corridor, identified as a Clarington Initiative from west of Bowmanville to Lambs Road. A potential regional trail connection is also identified, extending northwest from the Secondary Plan area well beyond Bowmanville limits. Scugog Street to the north of the study area is shown as an existing cycling route with cycle lanes present along the southern portion and connecting to Longworth Avenue cycling facilities.

Figure 3-5: Clarington TMP Active Transportation (Goodyear Lands Shown in Blue)

The Durham Region TMP identifies the Regional Cycling and Trail Network at a broad level while the more recent 2021 Regional Cycling Plan (RCP) provides an updated version of the Primary Cycling Network (PCN) from the TMP (which was based on the previous 2012 RCP). An excerpt of the PCN showing the phasing timeline for cycling improvements (Map 2 from the RCN) is shown in **Figure 3-6**. An excerpt of the PCN

showing the cycling improvements by facility type (Map 1 from the RCP) is shown in **Figure 3-7**. Future cycling lanes are identified for Baseline Road within the study area road network as a long-term project (i.e., post-2030). To the west of the study area, an in-boulevard multi-use pathway on Bowmanville Avenue between Baseline Road and Longworth Avenue, connecting to the future Bowmanville GO Station, is identified as a short-term capital project (2022-2029), with a further extension northward as a buffered paved shoulder to Nash Road identified as a short-term infill project (2022-2029). East of Liberty Street, cycle tracks on Lambs Road are identified as a short-term infill project south of Baseline Road and cycling lanes are identified as a long-term project to the north to Longworth Avenue.

Figure 3-6: Regional Cycling Plan Map 2: Primary Cycling Network by Phase (Goodyear Lands Shown in Blue)

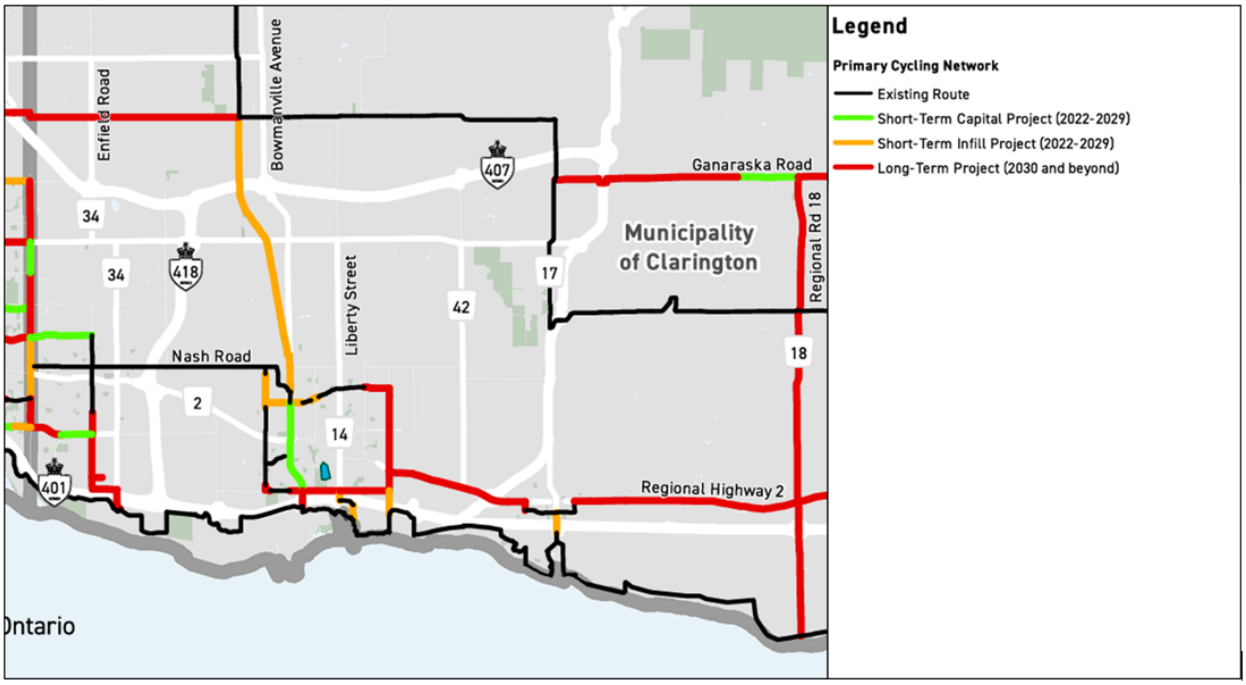
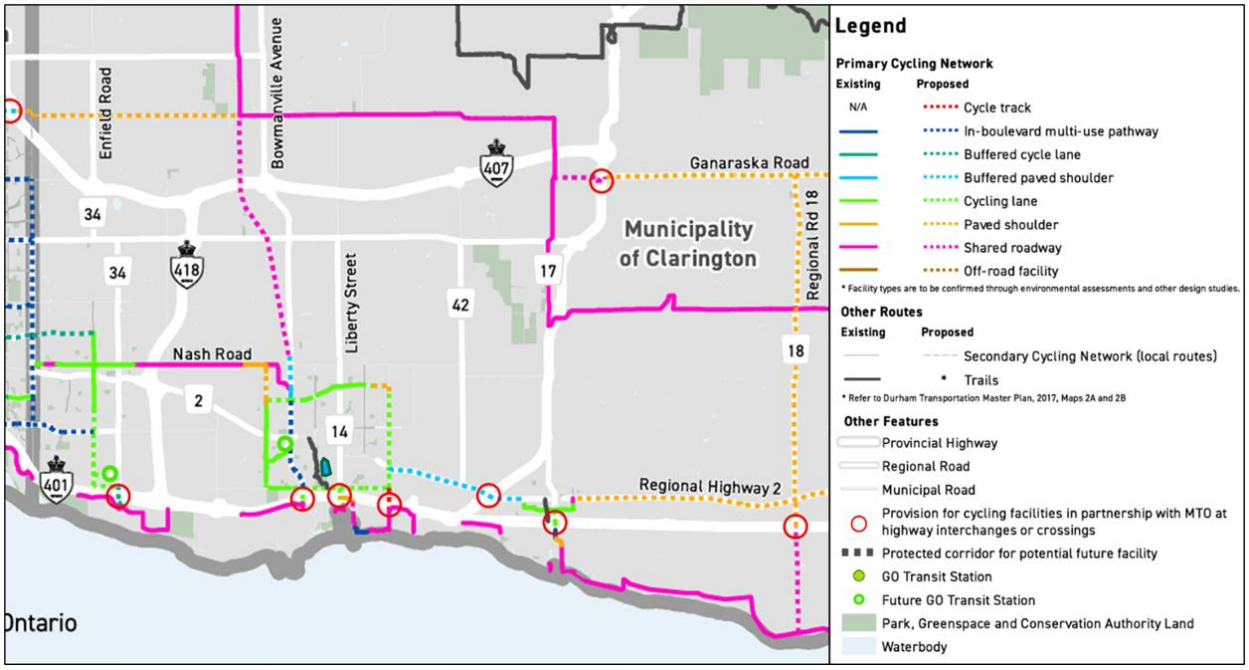


Figure 3-7: Regional Cycling Plan Map 1: Primary Cycling Network by Facility Type (Goodyear Lands Shown in Blue)

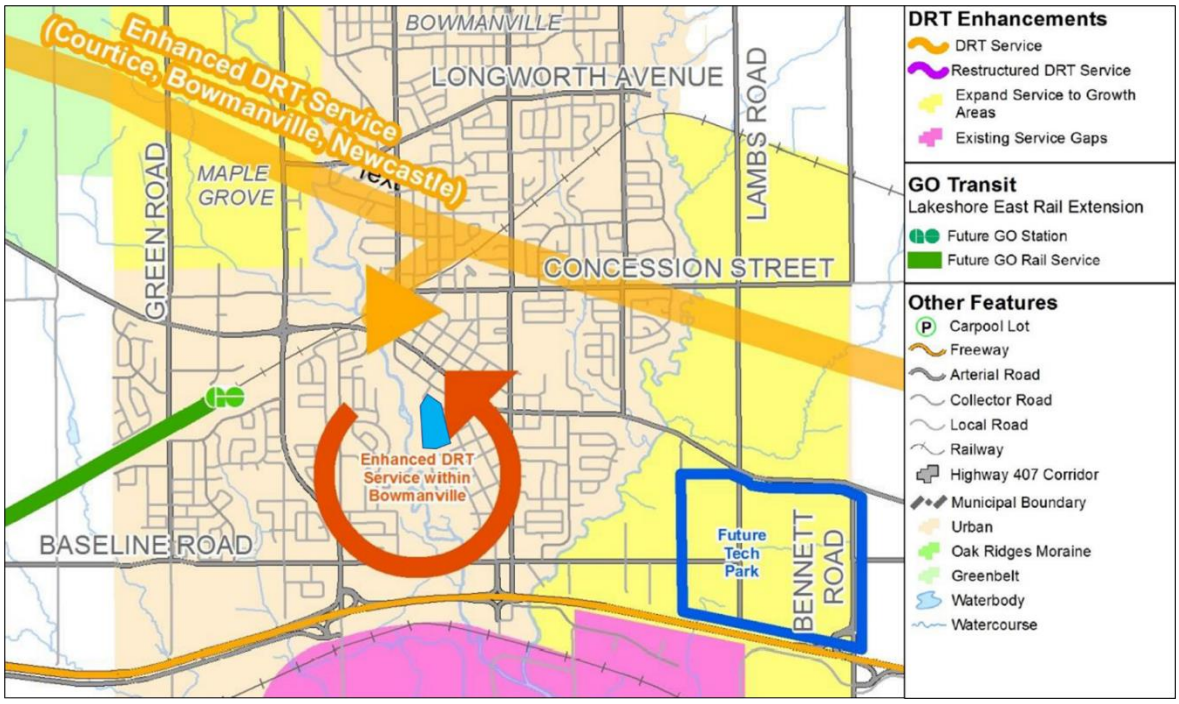


The improvements identified in the Secondary Plan, Clarington TMP, and Durham RCP are shown to significantly expand the active transportation network within and surrounding the BESP study area. These improvements will improve connections, mobility and cyclist safety, and will likely contribute to a major increase in the adoption of active transportation modes such as walking and cycling, especially considering the existing lack of active transportation facilities as identified in **Section 2.2**.

3.3 Future Transit Network

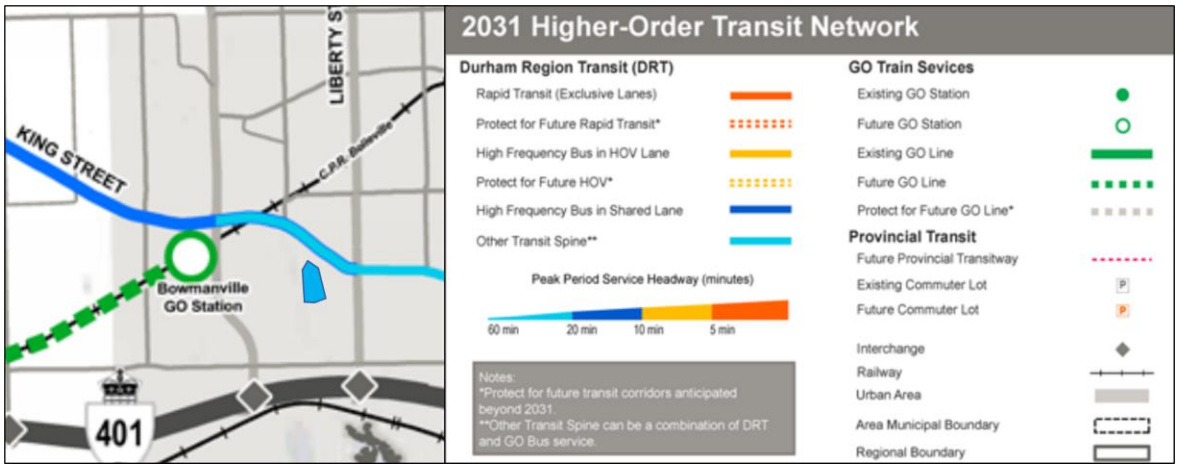
Transit service improvements planned within the Secondary Plan area and surrounding road network were reviewed to identify changes which may contribute to an increase in trips taken by transit to and from the study area. Proposed transit routes and facilities identified in the Clarington TMP, shown in **Figure 3-8**, indicate several high-level improvements to the transit network. In general, enhanced Durham Region Transit (DRT) service is planned for Courtice, Bowmanville, and Newcastle, as well as within Bowmanville itself. The location of the future Bowmanville GO Station is also identified, located approximately 1.3 kilometres to the west of the Goodyear Lands.

Figure 3-8: Clarington TMP Proposed Transit Routes and Facilities (Goodyear Lands Shown in Blue)



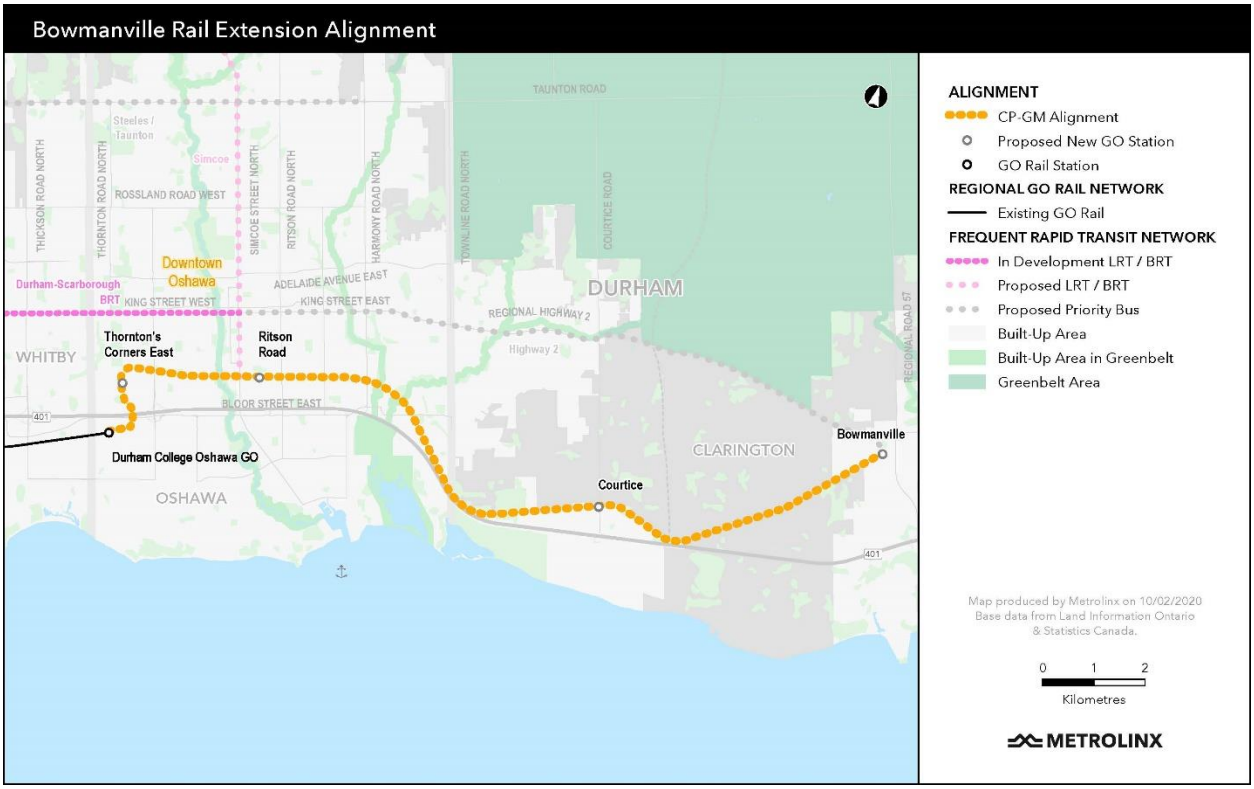
The Durham Region TMP also identifies several improvements to the higher-order transit network by 2031, as shown in **Figure 3-9**. King Street will feature higher frequency bus service with improved headways through the study area. Based on the Region's TMP and DRT's The Route Ahead Service Strategy (2022 - 2025), a future PULSE rapid bus corridor will be implemented by 2025 on King Street East between Oshawa Centre Terminal and Liberty Street in Bowmanville, further improving transit connections to the Secondary Plan area.

Figure 3-9: Durham TMP 2031 Higher-Order Transit Network (Goodyear Lands Shown in Blue)



An overview of the Bowmanville Rail Extension Alignment and new stations planned by Metrolinx as part of their Regional Transportation Plan is shown in **Figure 3-10**. The extension is part of the Lakeshore East GO Line, which will see corridor improvements extending from Union Station in downtown Toronto to an east terminus at the proposed Bowmanville GO Station. The extension includes electrification, track / signal upgrades, and 15-minute or better service to Ritson / Central Oshawa GO Station, with two-way all-way service to Bowmanville. The extension will connect Bowmanville and the Secondary Plan area to other urban centres within Clarington and Durham Region as well as major employment areas like Toronto. Compared to the current lack of any higher-order transit or rail connections available in Bowmanville, the network upgrades will provide new transit opportunities in proximity to residents and jobs and will encourage a major shift away from driving as the primary mode.

Figure 3-10: Metrolinx Bowmanville Rail Extension Alignment



3.4 Future Traffic Volumes

This section describes the trip generation and distribution exercise undertaken for the anticipated and planned development within the Bowmanville East Secondary Plan study area to estimate intersection traffic volumes under the future horizon year. A full

build-out of the Secondary Plan area may be as late as 2051, depending on numerous factors such as development planning and approvals, phasing of the development, and broader economic and housing market factors. However, the assessment was undertaken for the 2041 horizon year assuming faster than potentially expected development build-out and absorption rates in order to reflect a conservative scenario. Intersection traffic volumes were updated to forecast future turning movement volumes under the 2041 horizon year under two scenarios: Future Background Conditions and Future Total Conditions. The former Future Background Conditions reflects all development plans within the Secondary Plan area with the exception of the subject Goodyear Lands. The latter Future Total Conditions reflects the full build-out of the Secondary Plan area including the Goodyear Lands.

3.4.1 Existing Conditions Validation

Before developing the future turning movement volumes for the study area intersections, AECOM undertook a validation exercise for the Existing Conditions traffic volumes. The Existing Conditions volumes were reviewed and compared against more recently completed intersection turning movement counts to consider if significant changes to vehicle demand have not occurred since undertaking the assessment.

Durham Region's Traffic Engineering & Operations Traffic Volume Counts website was used to access the most recent available turning movement counts at the following three key intersections within the study area:

- Scugog Street & King Street: turning movement count dated Tuesday, May 11, 2021
- Liberty Street & King Street: turning movement count dated Tuesday, May 11, 2021
- Liberty Street & Queen Street: turning movement count dated Wednesday, October 19, 2022

While it is noted that the 2021 traffic volumes were collected during the COVID-19 pandemic and may represent lower than typical traffic volumes, the Existing Conditions traffic volumes based on a 2019 analysis year report were observed to be considerably higher demand (i.e., approximately 10 – 30%) across all turning movements and the overall intersection when compared to the newer counts. The count at Liberty Street & Queen Street collected in fall of 2022 (post-pandemic) also reported an overall intersection volume 4% lower than those used in the Existing Conditions assessment.

The review and comparison of turning movement count volumes indicated that the volumes used in the Existing Conditions assessment are appropriate for continued use in the Future Conditions traffic forecast.

3.4.2 Secondary Plan Area Trip Generation

Based on the future build-out land use plans for the Secondary Plan area, the demonstration model yields developed by SvN were shared with AECOM. The modelling information shared provides statistics for each neighbourhood block including gross floor areas (GFA), building heights, residential unit counts and planned population, commercial GFAs, and projected employment. A summary of the total demonstration model yields for the Goodyear Lands and the rest of the Secondary Plan area is shown in **Table 3-1**, which represents the incremental increase to the existing population and employment of the area. The land use plan and demonstration model yields by block are included in **Appendix D**.

Table 3-1: Demonstration Model Yields

Bowmanville East Secondary Plan Area	Commercial GFA (m^2)	Employment (Jobs)	Residential Units	Residential Population
Secondary Plan Area not including Goodyear Lands	19,757	827	4,282	7,503
Goodyear Lands	4,431	98	1,026	1,799
Total Secondary Plan Area	24,188	925	5,308	9,302

The land use statistics including the residential unit count and commercial GFA were used to inform a trip generation exercise performed for the entire Secondary Plan area with and without the inclusion of the Goodyear Lands (i.e., Blocks 30a to 30l), which were included separately in the Future Total Conditions assessment. The Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition was used to develop trip generation rates and volumes based on assumed land uses including residential, office, retail, restaurant, and services Land Use Codes (LUC). Due to the mixed-use nature of the Secondary Plan area and unknown tenant types for the commercial lands, a blended commercial trip rate was developed based on land use categories and a percentage breakdown agreed upon with SvN. The referenced trip generation land uses include the following:

- **Residential**
  - LUC 221: Multi-family Housing (Mid-Rise) – used for residential buildings between three and 10 floors
  - LUC 222: Multi-family Housing (High-Rise) – used for residential buildings taller than 10 floors
- **Commercial**
  - Retail (50% of Commercial GFA)
    - LUC 820: Shopping Centre

- Office and Services (30% of Commercial GFA)
  - LUC 712: Small Office Building – used to represent offices including real estate, law, tax services, etc.
  - LUC 720: Medical-Dental Office Building – used to represent medical offices including physiotherapists, dentists, clinics, etc.
  - LUC 911: Walk-In Bank
- Restaurant (20% of Commercial GFA)
  - LUC 930: Fast Casual Restaurant
  - LUC 933: Fast Food Restaurant without Drive-Through Window
  - LUC 936: Coffee/Donut Shop without Drive-Through Window

Further to the above noted land uses, an expansion of the hospital is planned for block 39a, located on the southeast corner of the intersection of Liberty Street & Queen Street. The medical land use code for Hospital (LUC 610) was used for generating trips associated with the hospital addition.

Trip numbers were calculated on a block-by-block basis based on the anticipated land use statistics for each respective block. The residential unit counts were multiplied by the ITE Trip Generation Manual rates for mid-rise and/or high-rise multifamily housing depending on the planned height of the building(s). Commercial GFA was multiplied by the blended commercial trip generation rate.

Due to the mixed-use nature of the development to take place within the Secondary Plan area, an internal capture (IC) rate was applied to the entire development area to reflect trips made between the various land uses. The 3rd Edition of the ITE Trip Generation Handbook was used to extract rates for commercial, restaurant, residential, and retail land uses and applied to the entire development area. The internal capture rates resulted in overall reductions of approximately 22.5% of AM peak hour trips (23.7% inbound and 21.5% outbound) and 26.0% of PM peak hour trips (25.0% inbound and 27.1% outbound).

Based on the future trends in mode split anticipated to reduce automobile usage in the future, a further reduction was applied to the new trips generated by the development of the Secondary Plan area. Considering the major improvements to the active transportation and transit networks as discussed in **Section 3.2** and **Section 3.3**, respectively, a shift from automobile driving to more sustainable travel modes is anticipated. For the purpose of the assessment, 10% of new trips were assumed to use the new transit facilities including the Bowmanville GO train service extension in close proximity to the study area as well as the upgraded DRT PULSE service along King Street and within Bowmanville in general. The upgrades and new connections to the active transportation network (i.e., walking and cycling facilities) as well as the nature of

the businesses planned for the area are expected to capture a further 10% of new trips generated by the development as residents will likely walk, rather than drive, to the businesses which will be located in the ground level of residential developments. Further factors including an increasing trend in telecommuting (i.e., work from home), trip-chaining (i.e., combining trips such as school drop-offs on the way to work, etc.), and peak spreading (i.e., more flexible working hours leading to a shift in departure times to a non-peak hour and non-peak period) were considered to attribute to a further 5% trip reduction. Overall, a 25% reduction factor applied to the newly generated auto trips is justified by the active transportation and transit network improvements as well as general mode-shift trends. For reference, the Durham TMP mode share targets for 2031 indicate a combined 35% sustainable modes (i.e., 13% auto passenger, 12% transit, and 10% walking and cycling) for Existing Urban Areas in South Durham such as downtown Bowmanville. It should be noted that trip generation rates in the ITE Trip Generation Manual already account for some non-auto mode travel inherent in the survey data. However, the majority of ITE Trip Generation surveys are taken in suburban settings in the United States, likely with limited transit and active transportation connections. Accordingly, the 25% trip reduction factor for new trips was deemed appropriate based on TMP targets.

Table 3-2 summarizes the residential, commercial, and total trips generated by the Goodyear Lands and the rest of the Bowmanville East Secondary Plan area before any adjustment, after reduction for internal capture trips, and after the 25% travel demand planning reduction.

It is also noted that a school is planned for the subject Goodyear Lands development area. Applicable to the Future Total Conditions volume forecast only, the future school will accommodate an estimated 500 to 600 students. For the purpose of the assessment, the estimated trips generated by the school were calculated based on 600 students using the Elementary School (520) Land Use Code from the ITE Trip Generation Manual, 10th Edition. Due to the location of the school within the Goodyear Lands, it was estimated that approximately 75% of trips would originate from the immediate and directly adjacent neighbourhoods located south of King Street and west of Liberty Street and volumes were therefore not reflected at the study intersections. The remaining 25% of inbound and outbound trips were evenly distributed between the northwest, northeast, and southeast sections of the Secondary Plan area located north of King Street and/or east of Liberty Street. **Table 3-3** summarizes the calculation of school-related trips with the adjusted external trip values.

Table 3-2: Trip Generation Summary for Secondary Plan Area

Bowmanville East Secondary Plan Area	Residential Trips				Commercial Trips				Total Trips			
	AM		PM		AM		PM		AM		PM	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Goodyear Lands	95	282	268	171	252	139	183	225	347	421	451	397
Rest of BESP	388	1122	1120	716	1276	677	864	1137	1664	1798	1984	1853
Total BESP Area	**483**	**1404**	**1388**	**887**	**1528**	**816**	**1047**	**1362**	**2011**	**2219**	**2435**	**2250**
Goodyear Lands Less Internal Capture Trips	89	231	225	144	179	101	116	148	265	331	338	289
Rest of BESP Less Internal Capture Trips	363	918	940	602	904	493	546	747	1270	1412	1488	1352
Total BESP Area Less Internal Capture Trips	**452**	**1149**	**1164**	**745**	**1083**	**594**	**662**	**895**	**1535**	**1743**	**1826**	**1641**
Goodyear Lands Less Internal Capture Trips & 25%	67	173	169	108	134	76	87	111	199	248	254	217
Rest of BESP Less Internal Capture Trips & 25%	272	689	705	451	678	369	410	560	953	1059	1116	1014
Total BESP Area Less Internal Capture Trips & 25%	**339**	**862**	**873**	**559**	**812**	**445**	**496**	**671**	**1151**	**1307**	**1370**	**1231**

Table 3-3: Trip Generation for Goodyear Lands School

Description / Trip Generation Manual, 10th Edition Land Use Code	Students	Calculation Method	Trip Generation Rates & Distributions						Trip Generation		Distribution of Generated Trips			
			AM	PM	AM In	AM Out	PM In	PM Out	AM Peak	PM Peak	AM In	AM Out	PM In	PM Out
Elementary School (520)	600	Average Rate	0.67	0.17	54%	46%	48%	52%	402	102	217	185	49	53
Maximum:	-	-							**402**	**102**	**217**	**185**	**49**	**53**
Adjusted:	-	-							**101**	**26**	**54**	**46**	**12**	**13**

3.4.3 Secondary Plan Trip Assignment

The trip numbers developed in the trip generation exercise were assigned to the Secondary Plan area road network and study intersections using information from the Transportation Tomorrow Survey (TTS) developed by the University of Toronto Data Management Group, as well as existing traffic trends observed under the Existing Conditions assessment. Based on the subject block location and origin / destination distributions, the traffic volumes associated with each planning block of the Secondary Plan demonstration model were manually assigned to the road network.

The Traffic Analysis Zones (TAZ) from the Greater Golden Horseshoe Model V4 (GGHM) which make up the Secondary Plan area were used to run a TTS query to determine the origins of trips entering the study area and destination of trips exiting the study area. TAZs 2168 and 2184 were identified to best capture the development area of the Secondary Plan and Goodyear Lands. A TTS query was run to extract the trips originating from and destined to the GGHMV4 zones 2168 and 2184 and grouped based on the general direction relative to the Secondary Plan area. **Table 3-4** and **Table 3-5** summarize the percentage distribution for trips originating (i.e., outbound) from the zones and trips destined (i.e., inbound) to the zones, respectively. Based on the travel direction required to drive to or from the TTS origin / destination, vehicle trips were assigned accordingly (i.e., trips traveling to the Greater Toronto Area would access the Highway 401 westbound on-ramp accessible from the west leg of the intersection of Liberty Street & Baseline Road, trips traveling to north of Clarington would use King Street West to access either Bowmanville Avenue or Highway 418 west of the study area, etc.).

Table 3-4: Trip Distribution for Trips Outbound from BESP Traffic Zones during AM Peak Hour – TTS Matrix

From \ To	Greater Toronto Area, West of Clarington	North of Clarington	Within Clarington
GGHMV4 Zones 2168 and 2184	19.4%	1.7%	78.8%

Table 3-5: Trip Distribution for Trips Inbound from BESP Traffic Zones during AM Peak Hour – TTS Matrix

From \ To	Greater Toronto Area, West of Clarington	North of Clarington	Within Clarington
GGHMV4 Zones 2168 and 2184	21.0%	0.4%	78.6%

It is noted that for both outbound and inbound trips, the vast majority of trips are destined to or originating from Clarington, followed by the remaining Greater Toronto

Area, and finally a small percentage to/from planning districts north of Clarington such as Scugog. For trips within Clarington, major origins / destinations for existing traffic within the local road network were reviewed and identified during the AM and PM peak hours. The traffic distribution for the portion of generated trips assigned within Clarington is summarized in **Table 3-6**.

Table 3-6: Trip Distribution for New Trips within Clarington

Origin / Destination	AM Peak Hour	PM Peak Hour
East on King Street	14.9%	20.2%
West on King Street	34.3%	32.5%
North on Liberty Street	15.8%	21.5%
South on Liberty Street	12.3%	14.1%
West on Baseline Road	22.8%	11.8%

The information from the TTS and the trip distribution for local trips were combined to estimate the overall trip distribution for all new trips associated with the Bowmanville East Secondary Plan development area. Trips were assigned to the network according to the estimated rates and based on the location of each trip generating block.

3.4.4 Future Background Traffic Volumes

The assigned turning movement volumes associated with the background development of the Secondary Plan area not including the Goodyear Lands are shown in **Figure 3-11** and **Figure 3-12** for the AM and PM peak hours, respectively. The background development generated trips were added to the Existing Conditions traffic volumes in **Figure 2-4** and **Figure 2-5** to obtain the Future Background Conditions turning movement volumes. For all movements that were not directly impacted by the background development assignment, a nominal ambient annual growth rate of 0.5% per year was applied up to the 2041 horizon year for the assessment.

As noted in **Section 3.1**, Bowmanville Avenue (Regional Road 57) to the west of the Secondary Plan area will be widened from two to four lanes by 2041. This widening is expected to divert volumes from the parallel Liberty Street which will potentially result in over capacity conditions to Bowmanville Avenue and relieve the Liberty Street corridor. Through an iterative travel demand assignment process, it was determined that the widening would conservatively divert at least 110 vehicles in the northbound peak direction during the PM peak hour, bringing corridor intersections to at- or below-capacity conditions.

The final Future Background Conditions turning movement volumes used for the assessment are shown in **Figure 3-13** for the 2041 AM peak hour and **Figure 3-14** for the 2041 PM peak hour.

Figure 3-11: Secondary Plan Area Background Development Generated Trip Assignment – AM Peak Hour

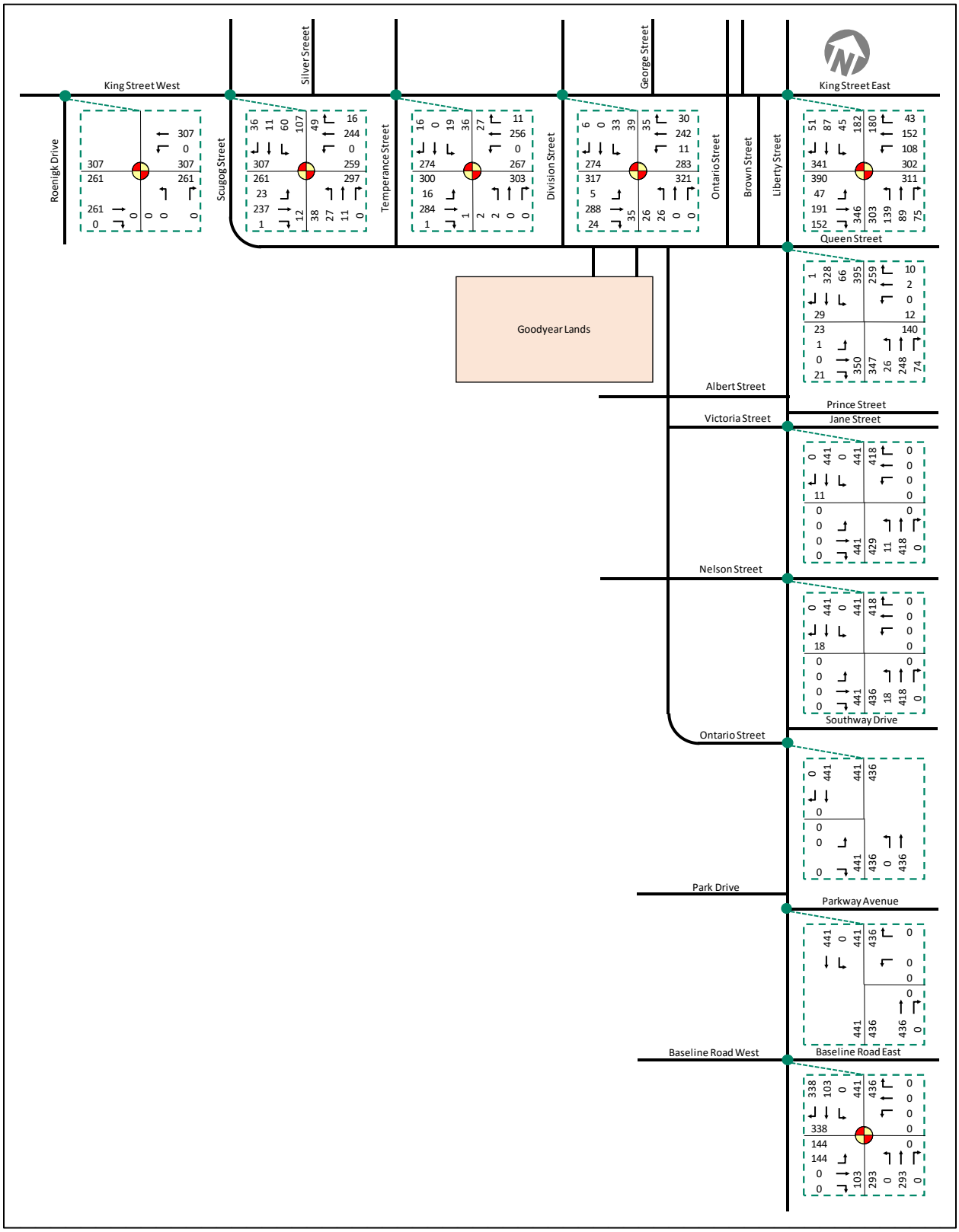


Figure 3-12: Secondary Plan Area Background Development Generated Trip Assignment – PM Peak Hour

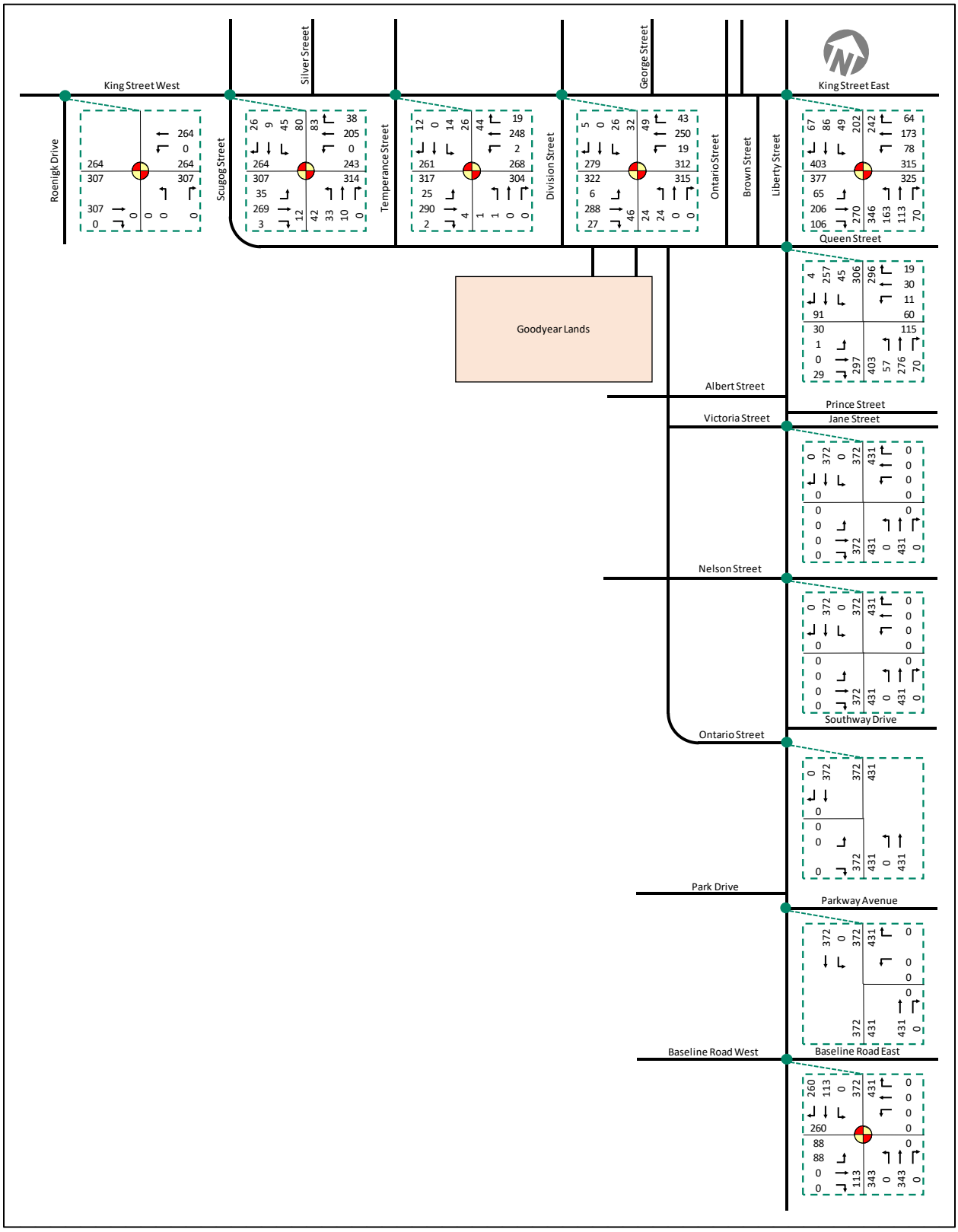


Figure 3-13: Future Background Traffic Volumes - 2041 AM Peak Hour

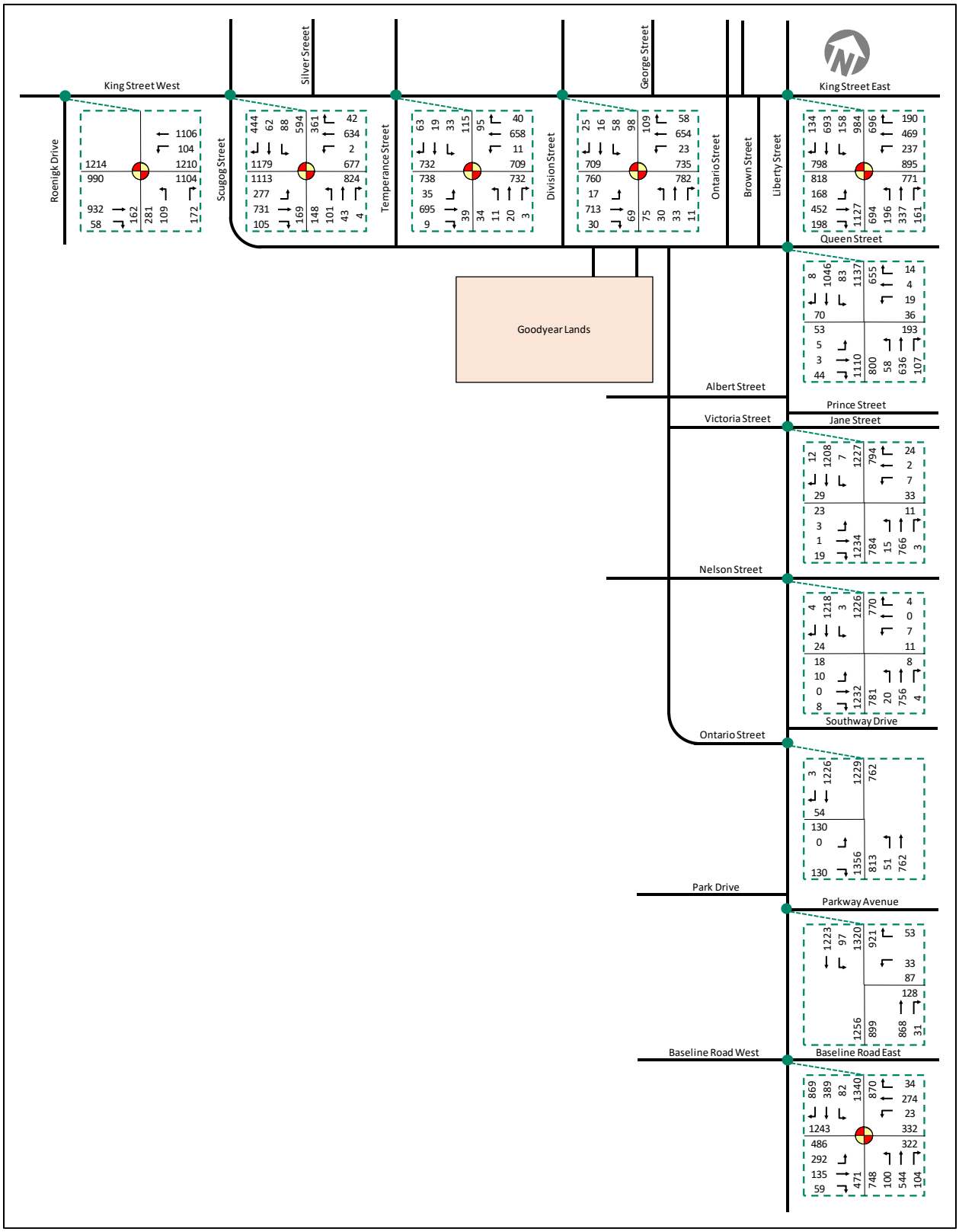
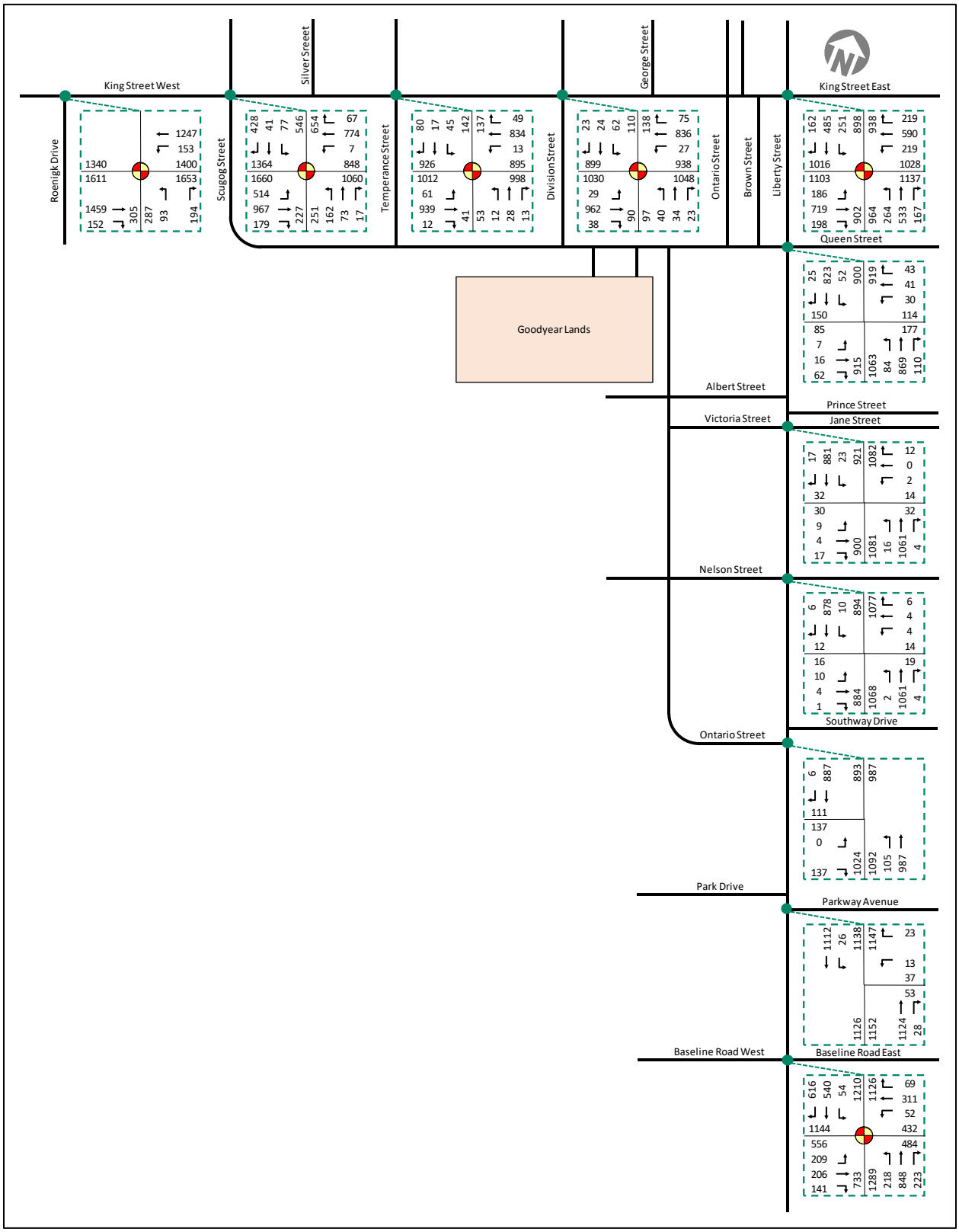


Figure 3-14: Future Background Traffic Volumes - 2041 PM Peak Hour



3.4.5 Future Total Traffic Volumes

The assigned turning movement volumes associated with the development of the Goodyear Lands only are shown in **Figure 3-15** and **Figure 3-16** for the AM and PM peak hours, respectively. The Goodyear Lands development generated trips were added to the Future Background Conditions traffic volumes in **Figure 3-13** and **Figure 3-14** to obtain the Future Total Conditions turning movement volumes.

As noted in **Section 3.1**, Bowmanville Avenue (Regional Road 57) to the west of the Secondary Plan area will be widened from two to four lanes by 2041. This widening is expected to divert volumes from the parallel Liberty Street which result in over-capacity conditions to Bowmanville Avenue and relieve the Liberty Street corridor. Through an iterative travel demand assignment process, it was determined that the widening would conservatively divert at least 130 vehicles, up from 110 in the Future Background Conditions, in the northbound peak direction during the PM peak hour, bringing corridor intersections to at- or below-capacity conditions.

The final Future Total Conditions turning movement volumes used for the assessment are shown in **Figure 3-17** for the 2041 AM peak hour and **Figure 3-18** for the 2041 PM peak hour.

Figure 3-15: Goodyear Lands Generated Trip Assignment – AM Peak Hour

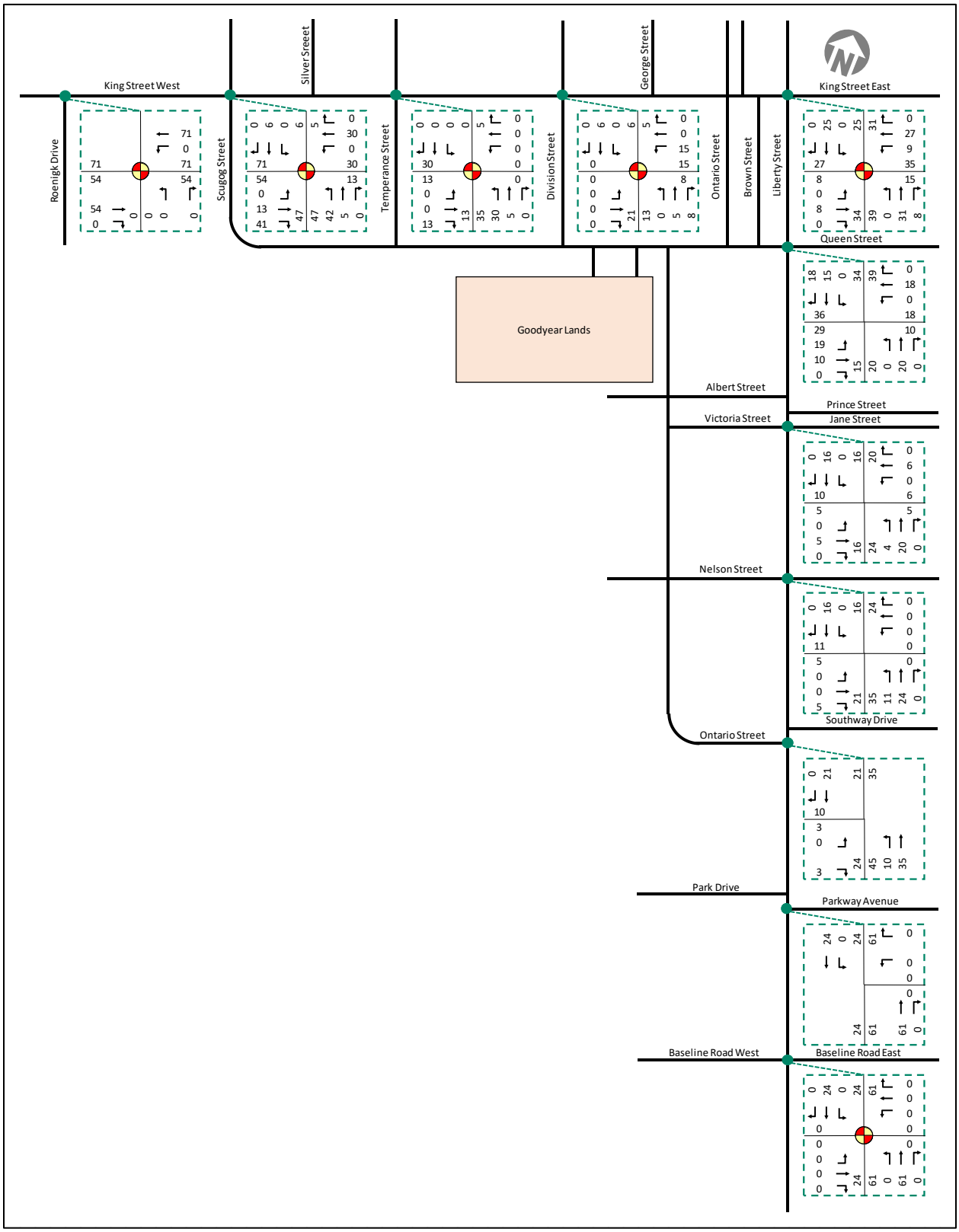


Figure 3-16: Goodyear Lands Generated Trip Assignment – PM Peak Hour

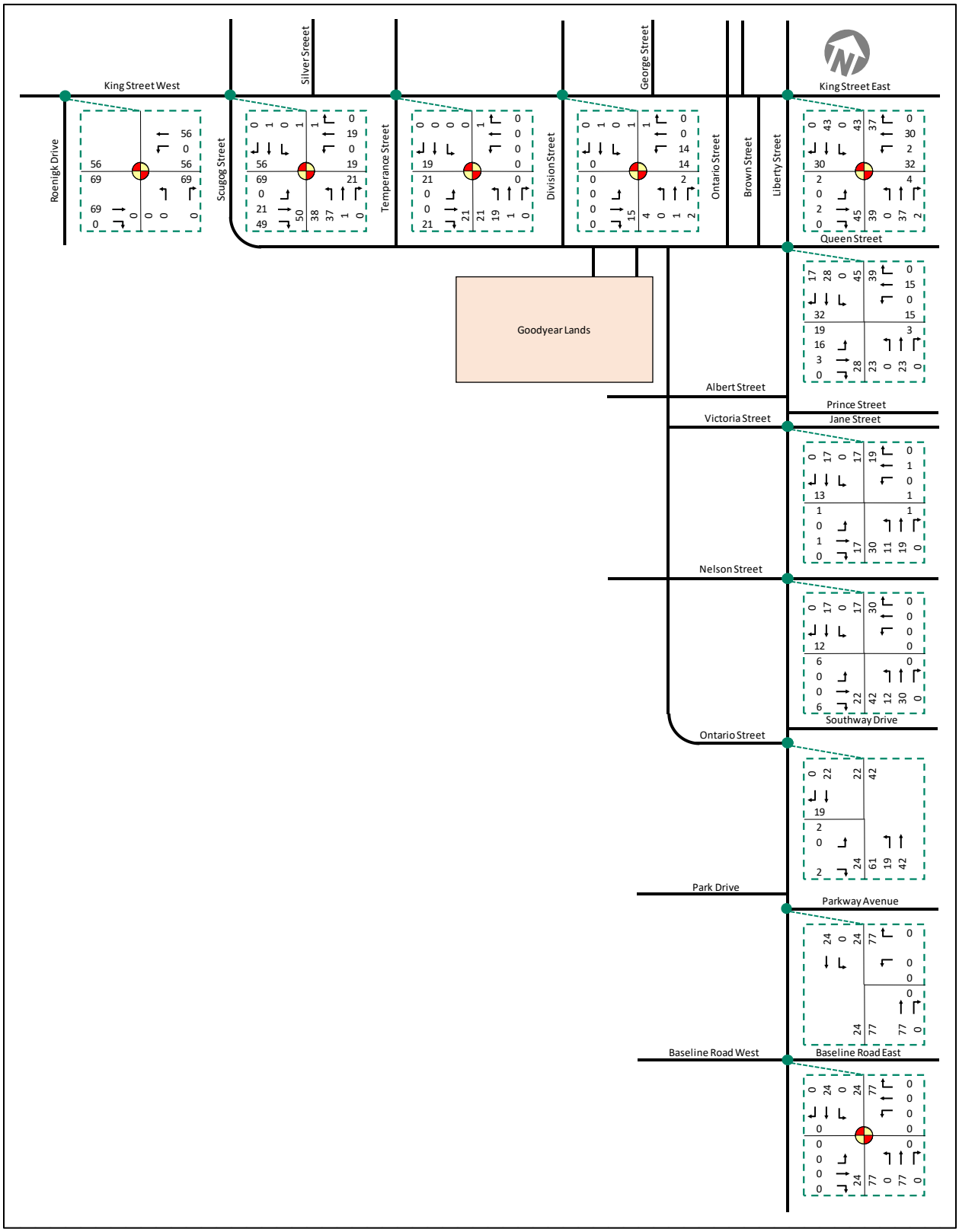


Figure 3-17: Future Total Traffic Volumes – 2041 AM Peak Hour

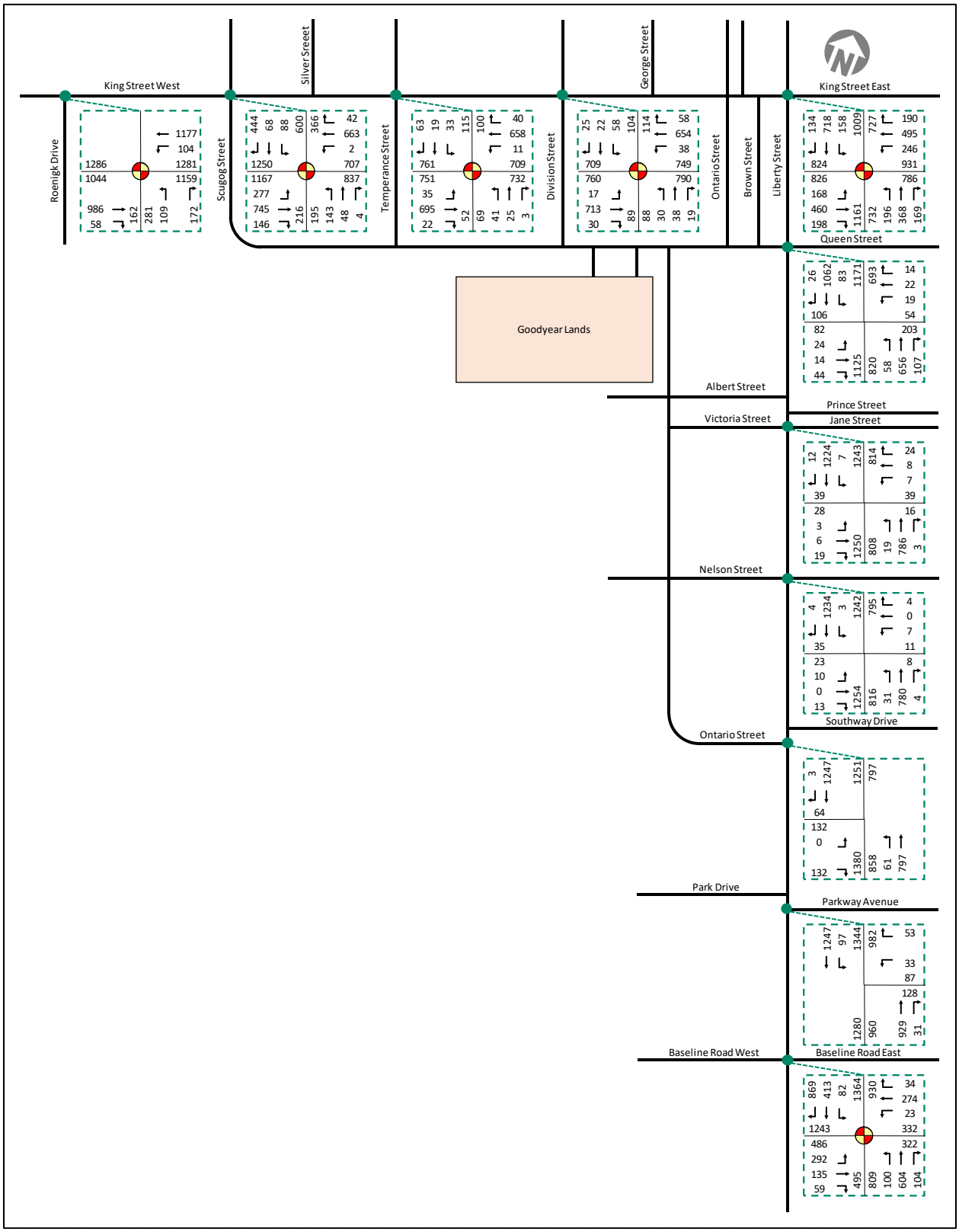
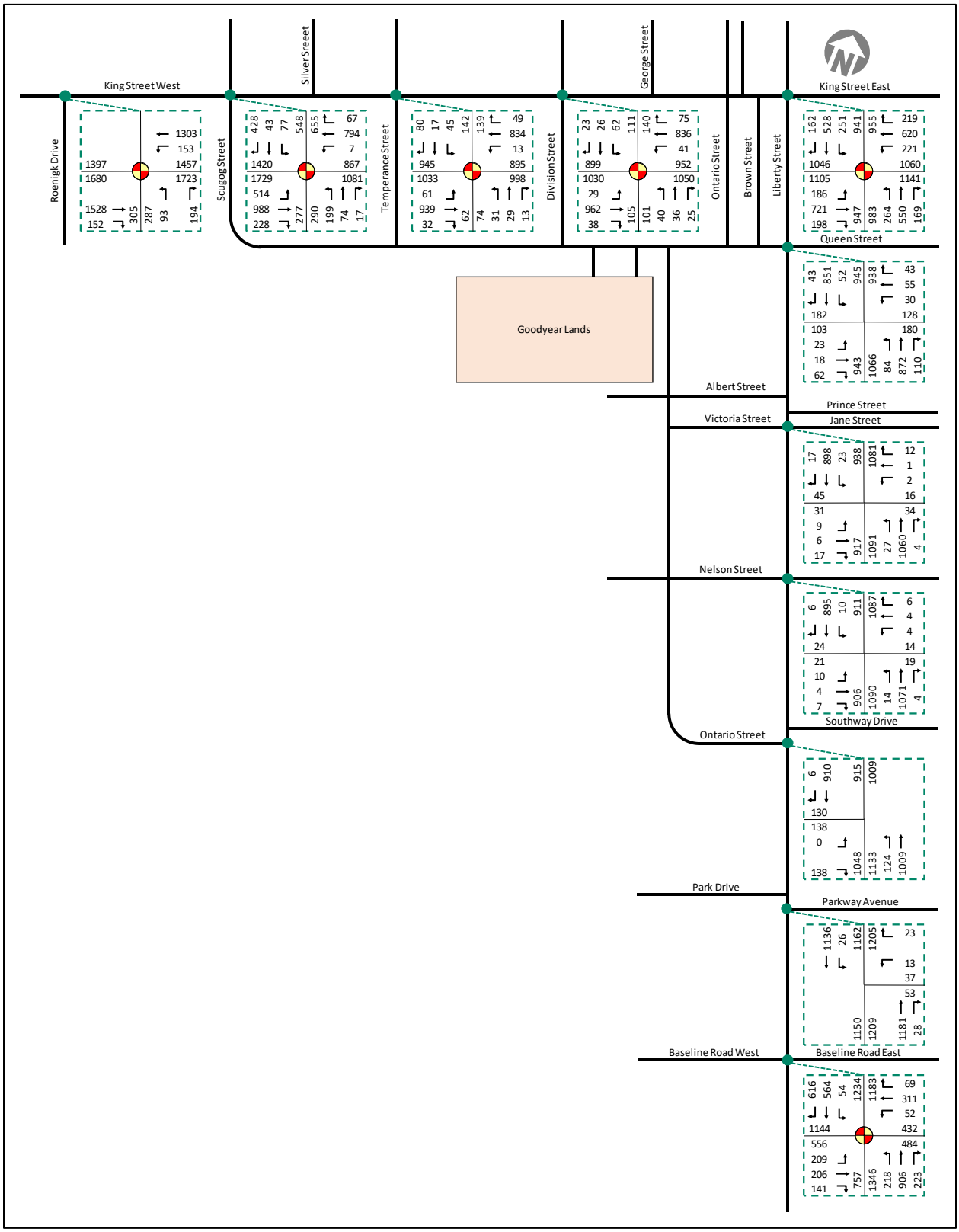


Figure 3-18: Future Total Traffic Volumes – 2041 PM Peak Hour



3.5 Future Background Traffic Assessment

This section describes the traffic operations assessment of Future Background Conditions for the study intersections within the Secondary Plan area. The Future Background Conditions include the full build-out of the Secondary Plan area with the exception of the Goodyear Lands development.

Intersection operations under the Future Background Conditions were assessed using updated versions of the Existing Conditions Synchro models. The road network was modified to reflect the widening of Baseline Road through the study area and Liberty Street to the south of King Street, as described in **Section 3.1**. The intersection turning movement volumes were updated to those shown in **Figure 3-13** for the 2041 AM peak hour and **Figure 3-14** for the 2041 PM peak hour. Intersection signal timings and cycle lengths were optimized based on the new volumes. For movements initially shown to operate over capacity, an adjustment to the peak hour factor (PHF) was performed to reflect peak spreading and consistent demand for each 15-minute period of the peak hour during at-capacity conditions.

Table 3-7 and **Table 3-8** summarize the overall traffic operations using measures of effectiveness (Level of Service (LOS), volume-to-capacity ratio (v/c), control delay, and 95th percentile queue lengths) at each intersection under the Future Background Conditions. Detailed Synchro outputs for the Future Background Conditions traffic operations are contained in **Appendix C**. Critical movements are highlighted and defined as movements where the V/C ratio exceeds 0.85, or LOS is ‘E’ or worse.

Overall, traffic operations at signalized intersections worsen in the Future Background Conditions compared to the Existing Conditions due to the significant increase in background traffic resulting from development in the area. During the 2041 AM peak hour, 12 movements are reported as critical, of which two operate at LOS F. A total of 11 movements generate 95th percentile queue lengths which exceed the available storage / link distance, potentially causing queue spill over issues into the upstream intersections. The intersection of Liberty Street & King Street in particular is shown to reach capacity at the overall intersection level, functioning with a v/c ratio of 1.02 although still at an acceptable LOS D. It was noted that compared to the Existing Conditions traffic operations, some unsignalized intersections along Liberty Street see improvement as a result of the new two-way left-turn lane.

Table 3-7: Future Background Conditions Traffic HCM Report Summary – Signalized Intersections

2041 Future Background Conditions			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Roenigk Drive & King Street (Signalized)	350	EBT	7.0	A	0.48	55.8	20.8	C	0.87	208.5
	80	WBL	11.2	B	0.44	22.8	25.1	C	0.62	32.3
	170	WBT	7.6	A	0.54	66.4	6.2	A	0.54	76.6
	35	NBL	26.8	C	0.40	25.3	37.6	D	0.45	29.2
	170	NBR	28.5	C	0.53	30.4	38.2	D	0.48	31.7
	Overall Intersection		9.8	A	0.54	-	17.0	B	0.78	-
Scugog Street & King Street (Signalized)	40	EBL	36.0	D	0.89	54.4	65.5	E	0.98	161.9
	170	EBT	32.7	C	0.91	186.0	28.4	C	0.89	275.8
	170	EBR	10.3	B	0.08	6.2	8.5	A	0.14	10.8
	225	WBT	25.3	C	0.65	70.5	35.0	C	0.73	127.0
	35	NBL	32.1	C	0.66	23.4	62.0	E	0.81	59.3
	110	NBT	20.4	C	0.08	12.7	38.7	D	0.21	33.1
	50	SBL	28.0	C	0.31	26.0	53.0	D	0.47	36.9
	250	SBT	64.3	E	0.95	102.9	100.4	F	0.95	122.7
	Overall Intersection		36.0	D	0.94	-	47.0	D	0.98	-
Temperance Street & King Street (Signalized)	25	EBL	8.6	A	0.21	6.5	10.8	B	0.34	12.9
	225	EBT	15.3	B	0.76	101.6	18.3	B	0.84	193.9
	20	WBL	6.2	A	0.06	2.5	6.8	A	0.11	3.1
	115	WBT	15.4	B	0.76	100.9	14.9	B	0.78	156.4
	105	NBT	24.7	C	0.10	10.6	29.8	C	0.12	15.0
	15	NBR	23.7	C	0.00	0.0	28.5	C	0.01	2.5
	205	SBT	26.2	C	0.21	17.3	32.3	C	0.26	24.4
	20	SBR	24.1	C	0.05	7.6	29.0	C	0.05	11.3
	Overall Intersection		16.1	B	0.61	-	17.7	B	0.71	-
Division Street & King Street (Signalized)	115	EBT	12.6	B	0.72	81.2	13.1	B	0.80	196.6
	10	EBR	4.6	A	0.03	0.1	3.3	A	0.04	3.3
	415	WBT	11.6	B	0.68	71.6	11.2	B	0.74	153.0
	10	WBR	4.8	A	0.05	1.7	3.4	A	0.06	6.2
	95	NBT	33.6	C	0.28	11.8	62.4	E	0.52	42.7
	215	SBT	36.7	D	0.39	13.4	68.8	E	0.60	42.4
	15	SBR	29.7	C	0.02	0.0	49.3	D	0.02	8.6
	Overall Intersection		14.0	B	0.65	-	16.6	B	0.77	-
Liberty Street & King Street (Signalized)	50	EBL	81.5	F	0.93	61.0	42.5	D	0.78	48.2
	155	EBT	78.0	E	0.98	173.5	75.3	E	1.00	272.3
	50	EBR	35.1	D	0.29	30.2	29.6	C	0.26	41.0
	70	WBL	77.8	E	0.96	84.5	94.8	F	0.98	94.2
	190	WBT	63.6	E	0.93	177.6	44.1	D	0.81	194.5
	30	WBR	32.9	C	0.34	39.2	27.9	C	0.29	47.8
	30	NBL	88.6	F	0.98	73.5	92.6	F	0.99	108.6
	95	NBT	20.1	C	0.44	73.2	78.6	E	0.97	210.2
	35	NBR	15.9	B	0.14	11.9	37.3	D	0.25	38.0
	55	SBL	30.5	C	0.49	48.6	94.5	F	1.00	104.1
	95	SBT	57.5	E	0.95	224.2	67.9	E	0.92	187.4
	30	SBR	23.0	C	0.15	17.4	37.9	D	0.24	36.6
	Overall Intersection		53.1	D	1.02	-	63.4	E	1.01	-
Liberty Street & Baseline Road (Signalized)	40	EBL	72.5	E	0.94	100.6	90.2	F	0.97	62.2
	145	EBT	34.2	C	0.15	23.2	31.8	C	0.34	31.3
	80	EBR	33.0	C	0.04	9.1	29.7	C	0.09	12.9
	45	WBL	54.7	D	0.19	15.1	38.6	D	0.34	20.7
	210	WBT	65.7	E	0.75	57.4	41.5	D	0.63	44.3
	45	WBR	52.9	D	0.03	2.4	35.7	D	0.05	7.8
	35	NBL	15.0	B	0.28	21.2	12.5	B	0.57	29.6
	115	NBT	33.1	C	0.79	200.9	31.6	C	0.94	307.2
	25	SBL	22.5	C	0.46	17.7	75.0	E	0.79	34.9
	225	SBT	22.5	C	0.49	99.8	19.1	B	0.61	115.3
	30	SBR	42.0	D	0.88	184.6	21.5	C	0.67	101.5
	Overall Intersection		40.9	D	0.90	-	22.5	C	1.01	-

During the 2041 PM peak hour, the Future Background Conditions assessment indicates 16 movements operating at a critical level, with five movements operating at LOS F. A total of 19 movements generate 95th percentile queue lengths which exceed the storage

distance or the distance to the upstream intersection. Similar to the AM peak hour, the intersection of Liberty Street & King Street operates at capacity with an overall intersection v/c ratio of 1.01 but at a critical LOS E. Further, all movements at the intersection except the eastbound left- and right-turn movements generate 95th percentile queue lengths which exceed the available storage / link distance. The intersection of Liberty Street & Baseline Road also operates at capacity with a v/c ratio of 1.01.

Table 3-8 summarizes the unsignalized intersection traffic operations during the 2041 AM and PM peak hours in the Future Background Conditions. Intersection operations are generally acceptable during both peak hours with few movements reporting high delays or critical v/c ratios exceeding 0.85. Certain stop-controlled minor approach movements are shown to experience increased delay compared to the Existing Conditions, with four of the six critical movements operating at LOS F during the AM peak hour. Only two critical movements are noted during the PM peak hour, with just one operating at LOS F. Certain movements are shown to slightly improve compared to the Existing Conditions as a result of the lane widening along Liberty Street south of King Street, adding a two-way left-turn lane to the corridor.

Table 3-8: Future Background Conditions Traffic HCM Report Summary – Unsignalized Intersections

2041 Future Background Conditions			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Liberty Street & Queen Street (Unsignalized)	100	EBLTR	28.8	D	0.26	7.6	26.5	D	0.34	10.9
	75	WBLTR	99.9	F	0.52	16.3	68.0	F	0.70	31.9
	50	NBL	13.1	B	0.12	3.0	10.8	B	0.12	3.1
	100	NBTR	0.0	A	0.44	0.0	0.0	A	0.58	0.0
	50	SBL	9.6	A	0.10	2.4	10.4	B	0.07	1.8
	100	SBTR	0.0	A	0.62	0.0	0.0	A	0.50	0.0
Liberty Street & Victoria Street/Jane Street (Unsignalized)	100	EBLTR	52.4	F	0.26	7.4	27.2	D	0.17	4.5
	100	WBLTR	35.6	E	0.25	7.0	24.8	C	0.08	1.9
	50	NBL	17.8	C	0.06	1.5	11.5	B	0.03	0.7
	75	NBTR	0.0	A	0.53	0.0	0.0	A	0.70	0.0
	50	SBL	9.8	A	0.01	0.2	11.4	B	0.04	1.0
	75	SBTR	0.0	A	0.84	0.0	0.0	A	0.59	0.0
Liberty Street & Nelson Street (Unsignalized)	75	EBLTR	34.2	D	0.15	3.8	25.6	D	0.08	2.1
	75	WBLTR	30.3	D	0.08	2.0	22.6	C	0.06	1.6
	50	NBL	12.8	B	0.05	1.1	9.9	A	0.00	0.1
	100	NBTR	0.0	A	0.52	0.0	0.0	A	0.67	0.0
	50	SBL	9.7	A	0.00	0.1	10.9	B	0.02	0.4
	100	SBTR	0.0	A	0.84	0.0	0.0	A	0.55	0.0
Liberty Street & Ontario Street (Unsignalized)	150	EBLR	109.4	F	0.93	52.1	26.3	D	0.47	18.2
	50	NBL	13.6	B	0.12	3.2	10.9	B	0.16	4.2
	75	NBT	0.0	A	0.52	0.0	0.0	A	0.62	0.0
	75	SBTR	0.0	A	0.84	0.0	0.0	A	0.56	0.0
Liberty Street & Parkway Avenue (Unsignalized)	75	WBLR	62.1	F	0.65	27.9	47.1	E	0.30	8.8
	75	NBTR	0.0	A	0.64	0.0	0.0	A	0.76	0.0
	50	SBL	15.4	C	0.25	7.6	20.1	C	0.11	2.8
	75	SBT	0.0	A	0.87	0.0	0.0	A	0.74	0.0

3.6 Future Total Traffic Assessment

This section describes the traffic operations assessment of the Future Total Conditions during the weekday AM and PM peak hours in the 2041 horizon year. The Future Total Conditions reflect additional traffic associated with the development of the subject Goodyear Lands, in addition to those generated by the rest of the Bowmanville East Secondary Plan development as assessed under the Future Background Conditions.

Intersection operations under the Future Total Conditions were assessed using the updated Synchro models used in the Background Conditions Assessment in **Section 3.5**. As before, the road network was modified to reflect the widening of Baseline Road through the study area and Liberty Street to the south of King Street, as described in **Section 3.1**. The intersection turning movement volumes were updated to those shown in **Figure 3-17** for the 2041 AM peak hour and **Figure 3-18** for the 2041 PM peak hour. Intersection signal timings and cycle lengths were optimized based on the new volumes.

Table 3-9 and **Table 3-10** summarize the overall traffic operations using measures of effectiveness (Level of Service (LOS), volume-to-capacity ratio (v/c), control delay, and 95th percentile queue lengths) at each intersection under the Total Future Traffic Conditions. Detailed Synchro outputs for the Future Total Conditions traffic operations are contained in **Appendix C**. Critical movements are highlighted and defined as movements where the V/C ratio exceeds 0.85, or LOS is ‘E’ or worse.

Overall, traffic operations at signalized intersections are shown to slightly worsen in the Future Total Conditions compared to the Future Background Conditions as a result of additional auto trips generated by the development of the Goodyear Lands. During the 2041 AM peak hour, 15 movements are reported as critical, up from 12 in the Future Background Conditions, of which four operate at LOS F. A total of 13 movements generate 95th percentile queue lengths which exceed the available storage / link distance, up from 11 in the Future Background Conditions, potentially causing queue spill over issues into the upstream intersections. The intersection of Liberty Street & King Street continues to operate at capacity at the overall intersection level, functioning with a v/c ratio of 1.03 at LOS E, worsened from LOS D in the Future Background Conditions. Scugog Street & King Street is also shown to reach capacity at an overall intersection level, functioning with a v/c ratio of 1.02, up from 0.94 in the Future Background Conditions, although still at an acceptable LOS D.

Table 3-9: Future Total Conditions Traffic HCM Report Summary – Signalized Intersections

2041 Future Total Conditions			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Roenigk Drive & King Street (Signalized)	350	EBT	7.4	A	0.51	61.1	23.5	C	0.91	223.6
	80	WBL	13.1	B	0.48	25.9	26.1	C	0.62	32.1
	170	WBT	8.1	A	0.58	74.2	6.5	A	0.56	82.4
	35	NBL	26.4	C	0.39	25.1	37.5	D	0.45	29.2
	170	NBR	28.6	C	0.55	31.6	38.2	D	0.49	32.0
	Overall Intersection		10.2	B	0.57	-	18.4	B	0.80	-
Scugog Street & King Street (Signalized)	40	EBL	52.6	D	0.96	57.6	70.5	E	0.99	168.7
	170	EBT	38.4	D	0.94	191.8	31.8	C	0.92	291.5
	170	EBR	11.0	B	0.11	7.0	9.1	A	0.18	13.0
	225	WBT	26.2	C	0.68	74.1	39.5	D	0.81	135.3
	35	NBL	74.8	E	0.93	43.9	103.2	F	0.99	84.1
	110	NBT	19.8	B	0.09	13.8	38.2	D	0.21	33.3
	50	SBL	27.3	C	0.30	26.0	52.3	D	0.46	36.9
	250	SBT	67.1	E	0.96	110.0	110.4	F	0.99	130.6
	Overall Intersection		41.9	D	1.02	-	52.9	D	1.03	-
Temperance Street & King Street (Signalized)	25	EBL	8.6	A	0.21	6.5	10.8	B	0.34	12.9
	225	EBT	15.9	B	0.78	105.4	19.8	B	0.87	238.3
	20	WBL	6.3	A	0.07	2.5	7.3	A	0.12	3.3
	115	WBT	15.4	B	0.76	100.9	14.9	B	0.78	156.4
	105	NBT	26.6	C	0.23	19.0	31.0	C	0.20	20.6
	15	NBR	23.7	C	0.00	0.0	28.5	C	0.01	2.5
	205	SBT	26.3	C	0.21	17.3	32.4	C	0.27	24.4
	20	SBR	24.1	C	0.05	7.6	29.0	C	0.05	11.3
	Overall Intersection		16.6	B	0.63	-	18.6	B	0.73	-
Division Street & King Street (Signalized)	115	EBT	12.6	B	0.72	106.7	13.1	B	0.80	196.6
	10	EBR	4.6	A	0.03	2.4	3.3	A	0.04	3.3
	415	WBT	13.9	B	0.75	108.4	19.5	B	0.88	238.7
	10	WBR	4.8	A	0.05	4.9	3.4	A	0.06	6.2
	95	NBT	34.4	C	0.32	25.7	63.3	E	0.54	44.0
	215	SBT	37.6	D	0.42	27.0	70.3	E	0.62	45.3
	15	SBR	29.7	C	0.02	6.3	49.3	D	0.02	8.6
	Overall Intersection		15.3	B	0.68	-	20.1	C	0.84	-
Liberty Street & King Street (Signalized)	50	EBL	82.0	F	0.93	61.0	59.3	E	0.87	53.9
	155	EBT	82.1	F	1.00	177.7	75.9	E	1.00	273.4
	50	EBR	35.2	D	0.30	30.9	29.6	C	0.26	41.0
	70	WBL	87.4	F	1.00	89.3	102.5	F	1.00	94.8
	190	WBT	74.4	E	0.99	192.1	47.6	D	0.85	220.6
	30	WBR	33.0	C	0.34	40.2	28.0	C	0.29	48.9
	30	NBL	89.0	F	0.98	73.5	93.0	F	0.99	108.9
	95	NBT	20.9	C	0.48	81.5	85.2	F	1.00	220.2
	35	NBR	16.1	B	0.16	14.0	37.2	D	0.25	38.8
	55	SBL	31.6	C	0.51	49.5	94.6	F	1.00	104.1
	95	SBT	65.1	E	0.99	236.9	85.4	F	0.99	212.9
	30	SBR	23.0	C	0.15	17.4	37.8	D	0.24	36.6
	Overall Intersection		57.2	E	1.03	-	68.3	E	1.03	-
Liberty Street & Baseline Road (Signalized)	40	EBL	72.5	E	0.94	100.6	90.2	F	0.97	62.2
	145	EBT	34.2	C	0.15	23.2	31.8	C	0.34	31.3
	80	EBR	33.0	C	0.04	9.1	29.7	C	0.09	12.9
	45	WBL	54.7	D	0.19	15.1	38.6	D	0.34	20.7
	210	WBT	65.7	E	0.75	57.4	41.5	D	0.63	44.3
	45	WBR	52.9	D	0.03	2.4	35.7	D	0.05	7.8
	35	NBL	15.3	B	0.29	21.2	13.6	B	0.60	29.6
	115	NBT	38.7	D	0.86	234.6	43.5	D	1.00	336.7
	25	SBL	29.1	C	0.57	17.7	75.1	E	0.79	34.9
	225	SBT	23.2	C	0.51	107.7	19.9	B	0.63	122.6
	30	SBR	44.4	D	0.90	200.1	21.8	C	0.68	102.5
	Overall Intersection		42.9	D	0.92	-	35.2	D	1.06	-

During the 2041 PM peak hour, the Future Total Conditions traffic assessment indicates 19 movements operating at a critical level, up from 16 in the Future Background Conditions, with eight movements operating at LOS F. A total of 21 movements generate 95th percentile queue lengths which exceed the storage distance or the distance to the upstream intersection, up from 19 in the Future Background Conditions. Like during the AM peak hour, the intersections of Liberty Street & King Street and Scugog Street & King Street operate at capacity with overall intersection v/c ratios of 1.03. Further, all movements at the intersection of Liberty Street & King Street except the eastbound right-turn movements generate 95th percentile queue lengths which exceed the available storage / link distance. The intersection of Liberty Street & Baseline Road also continues to operate at capacity with a v/c ratio of 1.06, up from 1.01 in the Future Background Conditions.

Table 3-10 summarizes the unsignalized intersection traffic operations during the 2041 AM and PM peak hours in the Future Total Conditions. The number of critical movements during the AM peak hour increases from six in the Future Background Conditions to 12 in the Future Total Conditions, largely resulting from additional traffic infiltration on minor streets due to the location of the Goodyear Lands. Six of the critical movements during the AM peak hour operate at LOS F, with the stop-controlled shared westbound left/through/right-turn movement at Liberty Street & Queen Street operating with a particularly high delay of 232.3 seconds. It was noted in discussions with Durham Region that the signalization of the adjacent intersection to the south at Liberty Street & Prince Street is being considered to accommodate traffic associated with Lakeridge Health Bowmanville Hospital which may alleviate traffic on the westbound approach to Liberty Street & Queen Street. Three critical movements are noted during the PM peak hour in the Future Total Conditions, compared to two in the Future Background Conditions, with two operating at LOS F.

It is noted that the intersections of Liberty Street & Parkway Avenue and Liberty Street & Victoria Street / Jane Street both operate with a half-signal to facilitate protected pedestrian crossings of Liberty Street, however the intersections are assessed under stop-control in Synchro (since Synchro cannot model half-signals). Given the periodic pedestrian signal phase call-ups, this will create additional gaps in Liberty Street traffic and thus opportunities for traffic turning from Parkway Avenue and Victoria Steet / Jane Street. Thus, the anticipated operations at the intersections are expected to be better than forecast in the table below.

Table 3-10: Future Total Conditions Traffic HCM Report Summary – Unsignalized Intersections

2041 Future Total Conditions			AM Peak Hour				PM Peak Hour			
Intersection	Link/Storage Distance	Turning Movement	Delay (sec)	LOS	v/c	95th Percentile Queue	Delay (sec)	LOS	v/c	95th Percentile Queue
Liberty Street & Queen Street (Unsignalized)	100	EBLTR	60.9	F	0.60	23.7	47.3	E	0.56	22.6
	75	WBLTR	232.3	F	0.98	34.0	104.7	F	0.88	44.9
	50	NBL	13.8	B	0.12	3.2	11.3	B	0.13	3.3
	100	NBTR	0.0	A	0.45	0.0	0.0	A	0.58	0.0
	50	SBL	9.6	A	0.10	2.4	10.5	B	0.07	1.8
	100	SBTR	0.0	A	0.64	0.0	0.0	A	0.53	0.0
Liberty Street & Victoria Street/Jane Street (Unsignalized)	100	EBLTR	60.0	F	0.34	10.1	29.8	D	0.20	5.5
	100	WBLTR	51.7	F	0.37	11.7	26.0	D	0.09	2.1
	50	NBL	18.7	C	0.08	1.9	11.9	B	0.05	1.3
	75	NBTR	0.0	A	0.55	0.0	0.0	A	0.71	0.0
	50	SBL	9.9	A	0.01	0.2	11.4	B	0.04	1.1
	75	SBTR	0.0	A	0.86	0.0	0.0	A	0.60	0.0
Liberty Street & Nelson Street (Unsignalized)	75	EBLTR	36.3	E	0.19	5.1	24.9	C	0.11	2.7
	75	WBLTR	35.1	E	0.10	2.4	23.8	C	0.07	1.7
	50	NBL	13.2	B	0.08	1.9	10.1	B	0.02	0.1
	100	NBTR	0.0	A	0.54	0.0	0.0	A	0.68	0.0
	50	SBL	9.8	A	0.00	0.1	11.0	B	0.02	0.4
	100	SBTR	0.0	A	0.85	0.0	0.0	A	0.56	0.0
Liberty Street & Ontario Street (Unsignalized)	150	EBLR	122.8	F	0.98	55.7	27.8	D	0.49	19.3
	50	NBL	14.1	B	0.15	4.1	11.2	B	0.19	5.2
	75	NBT	0.0	A	0.55	0.0	0.0	A	0.64	0.0
	75	SBTR	0.0	A	0.85	0.0	0.0	A	0.58	0.0
Liberty Street & Parkway Avenue (Unsignalized)	75	WBLR	85.4	F	0.76	34.1	69.2	F	0.40	12.2
	75	NBTR	0.0	A	0.68	0.0	0.0	A	0.81	0.0
	50	SBL	18.3	C	0.30	9.5	25.3	D	0.14	3.8
	75	SBT	0.0	A	0.88	0.0	0.0	A	0.76	0.0

3.7 Mitigation Measures

With the operational issues identified in both the Future Background and Future Total Conditions traffic assessments, mitigation measures to improve the performance of intersections should be considered as the Secondary Plan area is developed. The following measures, among others, should be considered to maintain acceptable traffic operations:

- Intersection operations should be monitored for the need to optimize signal timings as traffic patterns change with development and as other area planned transportation infrastructure improvements come to fruition;
- Left- and right-turn auxiliary lanes at intersections should be maintained in order to mitigate queue spill over between the closely spaced intersections along King Street and other Secondary Plan streets;
- With the development of the BESP area, potential opportunities for auxiliary lane additions or improvements / lengthening should be explored and considered. However, this should also judiciously consider other impacts such as loss of on-street parking or pedestrian amenity space along King Street since the general right-of-way is constrained along the *main street* portion of the corridor;

- Signal timing co-ordination along King Street and / or along Liberty Street should be explored to allow for fewer interruptions to traffic flow, resulting in shorter queue lengths, less vehicle idling, and reduced noise pollution;
- The implementation of signal actuation and vehicle detector (i.e., overhead or in-ground) improvements can be considered in order to optimize the efficiency of intersection operations;
- As technology improves, the potential implementation of smart signals (e.g., Split Cycle Offset Optimization Technique/Urban Traffic Control (SCOOT/UTC), Sydney Co-ordinated Adaptive Traffic System (SCATS), etc.) should be explored for study area intersections which may benefit operationally; and
- Transportation Demand Management strategies, further discussed in **Section 3.8**, to reduce vehicle trips by encouraging the shift to more sustainable travel modes such as walking, cycling, or transit should be implemented to reduce overall traffic demand.

It is noted that a by-product of potentially high traffic congestion within the Secondary Plan area will also encourage a shift of drivers to other time periods (i.e., off-peak), other routes, and other modes including walking, cycling, and transit. The recommended measures should be considered and evaluated to help address latent demand within the BESP road network and accommodate sustainable growth within the area.

3.8 Transportation Demand Management

The Official Plans and Transportation Master Plans of the Municipality and the Region have a goal of reducing peak hour travel demand, reducing auto dependency, increasing vehicle occupancy, and encourage linked trips and other modes of travel. These goals support Transportation Demand Management (TDM) strategies that help to reduce overall automobile usage and contribute to environmental sustainability goals. Traffic Impact Studies (TIS) for future developments in the area will be required, as per both the Municipality of Clarington and the Durham Region Traffic Impact Study Guidelines, to include a TDM section discussing the strategies that will be employed as part of each proposal to reduce automobile trips and meet the Municipality's and Region's goals. This section describes some of the strategies that the Municipality and Region can employ as part of the development of the Bowmanville East Secondary Plan area and Goodyear Lands.

3.8.1 Mode Shift to Active Transportation and Transit

As discussed in **Sections 3.2** and **3.3**, The Municipality and Region have a series of long term plans to the 2031 and 2041 horizons for improving both active transportation facilities and transit services within and surrounding the Secondary Plan area. Improvements to sidewalk facilities and trails serve to encourage walking within the mixed-use neighbourhood planned for BESP. Local roads currently featuring no sidewalk facilities which require pedestrians to walk at the side of the road will see safer and more accessible communities with the addition of sidewalk paths. Further, new connections to the cycling network surrounding the area will encourage the use of bicycles for short- and medium-distance trips within the vicinity of the Secondary Plan area. The analysis assumes that approximately 10% of new trips generated by the development of the Secondary Plan area and Goodyear Lands will resort to active transportation modes rather than driving, however, existing trips taken by automobile are also likely to be reduced by the improvements coming to the area.

The incorporation of bicycle parking racks within all new developments as part of the Municipality's policies will serve to further encourage alternative modes of transportation. Requiring the minimum number of bicycle parking spaces for development within the Secondary Plan area and Clarington as a whole will serve to increase the adoption of cycling.

The transit facilities described in **Section 3.3** will lead to a much higher than existing adoption of transit services to complete commuting and recreational trips taken within the study area. The introduction of GO Transit train service just outside of the Secondary Plan area should provide significant relief to the road network and interchanges currently serving commuter trips to other areas of Durham Region and the Greater Toronto Area. Further, increases in DRT PULSE service including improved headways and expanded networks should further capture trips which are currently only possible by car. Similar to the active transportation facilities, the analysis assumes that approximately 10% of new trips generated by the development of the Secondary Plan area and Goodyear Lands will use the transit services rather than driving, however, existing trips taken by automobile are also likely to be reduced by the improvements coming to the area.

3.8.2 Parking Management Strategies

Development within the Bowmanville East Secondary Plan area will result in significant population and employment growth. Accordingly, the trips taken by new residents and employees will use the existing and future transportation network to travel to and from destinations. By considering and encouraging parking management strategies in the future, the Municipality and Region can begin at the source to limit the number of trips

taken by car. An abundant and low-cost supply of parking only serves to encourage vehicle ownership and single-occupant vehicle (SOV) trips.

Municipalities have more recently opted to apply parking maximums for new developments, rather than the traditional minimum parking rates, in order to limit the number of vehicles brought to an area as part of new developments. By limiting parking at the origins (i.e., residences) and at the destinations (i.e., businesses, retail, services, etc.), individuals are required to consider other modes of travel including active transportation and transit. Additionally, limiting the supply of free or low-cost parking will further discourage automobile trips or encourage higher vehicle occupancy through carpooling. Further, reducing or removing minimum parking requirements could help to get additional housing built more quickly, affordably, and sustainably by removing the costly requirement for developers to provide vehicle parking in new housing developments. The provision and development of required minimum parking in new residential projects can lead to increased project costs, longer construction timelines, and higher carbon emissions.

Parking can further be reduced through the unbundling of residential rental units and parking spaces. Unbundling of rental units and parking spaces is when the owner charges for parking as a separate cost to tenants. It is anticipated that this “unbundling” would encourage a portion of future tenants to not purchase a second vehicle per household or any vehicle at all. For reference, the Town of Ajax Transportation Demand Management Plan lists the unbundling of parking as a potential parking management strategy which could result in a 10-30% reduction in required number of vehicular parking spaces.

It is also noted that the provision of bicycle parking spaces will potentially lead to a reduction in the required number of vehicular parking spaces. For reference, the Town of Ajax TDM Plan lists the provision of bicycle facilities such as bicycle storage as a parking management strategy which results in typical parking requirement reductions of 5-15%.

4. Summary of Findings and Recommendations

As part of the Bowmanville East Secondary Plan study, AECOM conducted an evaluation of traffic operations and travel patterns during the weekday AM and PM peak hours under the Existing, Future Background, and Future Total Conditions. The evaluation was conducted to assess the impacts of the development of the Secondary Plan area including the subject Goodyear Lands on traffic operations at key intersections.

The traffic operations analysis was conducted for intersections along the major streets of the Secondary Plan study area: King Street and Liberty Street. Existing traffic volumes were collected and used for the development of a Synchro traffic model to assess operations based on the existing intersection traffic demand, lane configurations, and signal timing plans, where applicable. Overall, the Existing Conditions assessment identified generally acceptable operations with some operational concerns at the intersections of Scugog Street & King Street, Liberty Street & King Street, and Liberty Street & Baseline Road. The PM peak hour assessment generally revealed a higher number of critical movements (i.e., movements operating at LOS E or worse or with a v/c ratio of 0.85 or higher) and movements generating 95th percentile queue lengths which exceed their respective storage distance or distance to the upstream intersection.

For the Future Background Conditions, operations were assessed under the 2041 horizon year with all anticipated and planned Secondary Plan area development with the exception of the subject Goodyear Lands site. A trip generation exercise was undertaken using the applicable ITE Trip Generation Manual, 10th Edition land use codes to estimate the new auto volumes associated with the development of the Secondary Plan area outside the Goodyear Lands. SvN provided AECOM with the demonstration model yields with block-by-block information on the development type, building heights, anticipated residential units, and anticipated employment. The block statistics were used to estimate trip generation volumes based on the trip generation rates for residential units as well as a blended commercial rate accounting for various business types including medical offices, restaurants, and other uses. Due to the mixed-use nature of the study area development, an internal capture rate of approximately 22% to 26% was applied to the trip numbers to reflect trips between the commercial and residential uses which do not contribute to auto traffic. A trip reduction factor of 25% was also applied based on the planned transit and active transportation network improvements encouraging a shift to other modes, as well as changing behavioural trends including increased work from home, trip chaining, and peak spreading. The generated trips were assigned to the road network using origin and destination breakdown information from the Transportation Tomorrow Survey (TTS) as well as existing travel pattern trends within the study area.

To develop the future model, the Existing Conditions Synchro model was updated to reflect the planned road widening modifications including Baseline Road from two to four lanes and Liberty Street from two to three lanes (i.e., the addition of a centre two-way left-turn lane) within the study area road network. Further, the planned widening of Bowmanville Avenue (Regional Road 57) to the west of the study area was accounted for through a conservative volume diversion during the PM peak hour to bring demand to at- and below-capacity conditions. It was estimated that at least 110 vehicles in the Future Background Conditions and 130 vehicles in the Future Total Conditions traveling in the northbound direction on Liberty Street would detour to the widened Bowmanville Avenue.

The Future Background Conditions generally showed worsened operations throughout the network as a result of the significant increase in population and employment in the Secondary Plan area. The intersection of Liberty Street & King Street in particular was shown to reach capacity during both peak hours. The intersection of Scugog Street & King Street is also shown to near capacity during both peak hours. Finally, the intersection of Liberty Street & Baseline Road nears capacity during the AM peak hour and operates at capacity during the PM peak hour.

The Future Total Conditions assessment was undertaken with the addition of Goodyear Lands associated traffic to the Future Background Conditions volumes. The same strategy for trip generation and trip assignment was used for the planning blocks within the Goodyear Lands as was conducted for the Future Background Conditions volumes. The traffic operations assessment revealed that intersections would continue to worsen slightly across the studied road network, with a number of additional movements operating at a critical level, as compared with the Future Background Conditions.

Due to the built form of the study corridors assessed and the limited space for significant intersection improvements (i.e., additional through lanes, dual left-turns, etc.), no network modifications beyond those already planned and discussed were implemented into the model. Traffic signal timings were modified and optimized to best accommodate the new demands estimated for the Future Background and Future Total Conditions. Due to the significant growth anticipated, several of the key signalized intersections along the King Street and Liberty Street corridors will begin to see at-capacity conditions, characteristic and consistent with a dense and mature urban environment. This is generally anticipated to lead to increased use of the area local road network, as vehicles are encouraged to shift to more direct minor streets to avoid the capacity issues (e.g., drivers from the Goodyear Lands using Hunt Street and Duke Street to access Baseline Road rather than traveling to Liberty Street). There is potential that with the new planned interchange at Highway 401 & Lambs Road to the east of the study area, Liberty Street will see further relief with vehicles diverting to the parallel corridor, similar to what is expected with the widening of Bowmanville Avenue.

Despite some of the operational and capacity concerns identified in the assessment, the development of the Bowmanville East Secondary Plan area reflects a more sustainable development program and provides an opportunity to encourage a new lifestyle for residents and workers with the implementation of major transit improvements (i.e., DRT PULSE service, Bowmanville GO Station, etc.) and an expansion of the active transportation network (i.e., additional and improved cycling, trail, and sidewalk facilities). Encouraging a mixed-use built form with commercial businesses at the ground level of residential buildings as planned would lead to a walking environment and community feel which discourages driving. Lower parking rates for development proposals would further reduce the number of vehicles added to the road network. In general, the build-out of the Goodyear Lands does not significantly affect the road network operations compared to those in the Future Background Conditions resulting from the anticipated build out of the Secondary Plan study area.

Given the scale of development and long planning horizon for the Secondary Plan area and the Goodyear lands, additional transportation review and study is suggested as the development comes to fruition. This should include:

- **Transportation Study:** Completion of additional transportation and traffic impact studies to satisfy the Durham and Clarington development approval process specific to submitted Draft Plans of Subdivision and/or Site Plans, or for phases of the Goodyer development. The timing for the need of these studies, as well as the scope of work should be reviewed with municipal and regional staff to confirm the approach and assumptions, but it is generally noted that the work will include a comprehensive and detailed assessment of traffic conditions, demand forecasts, traffic impacts, improvement needs (road widenings, auxiliary turn lanes, traffic controls, pedestrian and bicycle facilities, and transit provisions, as applicable), and basic design elements (e.g., turn lane storage lengths);
- **Transit Planning**: Liaise with Durham Region Transit throughout the future development planning process to:
  - Monitor the future growth and service demand needs;
  - Plan for transit routes along the area arterial and collector road network; and
  - Ensure that sufficient space is protected for transit stops as part of the road right-of-way (per the Region of Durham's Standard Drawings S-500 Series – Transit and / or DRT's Transit Stop Guidelines, as appropriate).

It is noted that Local Area Transit Plans (LATPs) are proposed to be initiated by Durham Region Transit in The Route Ahead Service Strategy for transit service planning in specific growth areas of the Region. Bowmanville is one area identified for a future LATP.