



Westwood Estates Phase 3 Residential Subdivision Development

Traffic Impact Study
FINAL

February 3, 2023



Prepared for:
Lester Shoalts Limited

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1.0 INTRODUCTION

1.1 Study Objective

R.V. Anderson Associates Limited (RVA) was retained by **Lester Shoalts Limited** to complete a Traffic Impact Study (TIS) for the proposed Westwood Estates residential development on the east side of Cement Plant Road, in the City of Port Colborne. This TIS has been completed in support of Phase 3 of the development, with an anticipated opening year of 2023.

1.2 Site Location

The proposed residential development is bounded by Cement Plant Road to the west, Stanley Street to the north, Olga Drive to the east, and Lakeshore Road West to the south. The road network within the subdivision will consist of an extension of Sugarloaf Street (extending west), three new public roads, and an extension of Lancaster Drive (extending south). The surrounding area road network consists of predominantly local and collector roads servicing strictly residential land uses.

With the development situated on the east side of Cement Plant Road, the subdivision resides within the boundaries of the City of Port Colborne. However, Cement Plant Road serves as the border between the Township of Wainfleet (west) and the City of Port Colborne (east).

The project site location and the surrounding area roadway network is shown in **Figure 1**.



Figure 1: Study Area

1.3 Study Area

Based on consultation with City and Town staff, the study intersections considered for traffic impact analysis are listed below:

- Cement Plant Road at Provincial Highway 3;
- Cement Plant Road at Clarence Street;
- Lancaster Drive at Clarence Street;
- Lancaster Drive at Stanley Street;
- Sugarloaf Street at Steele Street; and
- The proposed roundabout intersection on Cement Plant Road

2.0 EXISTING CONDITIONS

2.1 Existing Road Network

The study area road network primarily consists of local and collector roads under the jurisdiction of the City of Port Colborne, with some of the corridors intersecting with Provincial Roads (Highway 3) and roads under the jurisdiction of the Township of Wainfleet.

Cement Plant Road is a north-south collector road under the jurisdiction of the City of Port Colborne. The roadway consists of a two-lane rural cross-section posted at 50km/hr. The corridor is approximately two (2) kilometres in its entirety, with the northerly terminus being Highway 3 and the southerly terminus being Lakeshore Road West. A stormwater pond resides on the west side of the road, directly opposite from the subject development. The corridor maintains a level vertical alignment throughout, with two curvatures near Clarence Street.

Clarence Street is an east-west collector under the jurisdiction of the City of Port Colborne. In close proximity to the site, the corridor consists of a two-lane urban cross-section posted at 40km/hr. Clarence Street serves as the southernmost bridge connection over the canal and was recently extended west to intersect with Cement Plant Road.

Lancaster Drive is a local roadway under the jurisdiction of the City of Port Colborne, with an assumed posted speed limit of 40km/hr. The roadway travels north-south and is approximately 100 metres in its entirety.

Sugarloaf Street is denoted as an arterial road from its easterly limits to Lakeshore Road West, from which Lakeshore Road West takes over as the primary east-west arterial route travelling along Lake Erie. Near the subject development, at the westerly limit of the corridor, Sugarloaf Street is denoted as a local road, servicing residential land uses and other local road connections.

In the residential area, the roadway is a two-lane rural cross-section posted at 40km/hr, with no immediately apparent issues pertaining to vertical or horizontal alignment.

Provincial Highway 3 is an east-west provincial corridor comprised of a two-lane rural cross-section, posted at 80km/hr. The roadway generally does not have any auxiliary turning lanes for intersecting roads but provides an auxiliary left-turn lane and right-turn taper for Cement Plant Road. The roadway serves as the primary route for east-west travel near the subject development. The corridor maintains a level grade and straight horizontal alignment throughout.

Steele Street is a north-south arterial road under the jurisdiction of the City of Port Colborne. The urban cross-section is comprised of two-lanes, with a general posted speed limit of 50km/hr, and some Community Safety Zones (CSZs) which are posted at 40km/hr. There are no apparent concerns regarding vertical or horizontal alignment throughout the entirety of the street.

2.2 Transit

The Niagara Region Transit service provides on-demand rideshare services for the City of Port Colborne. This on-demand service provides transit accommodation for trips within the City boundaries, as well as intra-regional travel between the Niagara community transit hubs (only from Port Colborne City Hall).

2.3 Active Transportation

While there are certain segments within the surrounding community that provide pedestrian sidewalks, there are no dedicated pedestrian facilities in the immediate vicinity of the development. Cyclists are not provided with a dedicated facility but can utilize the roadway as a shared facility.

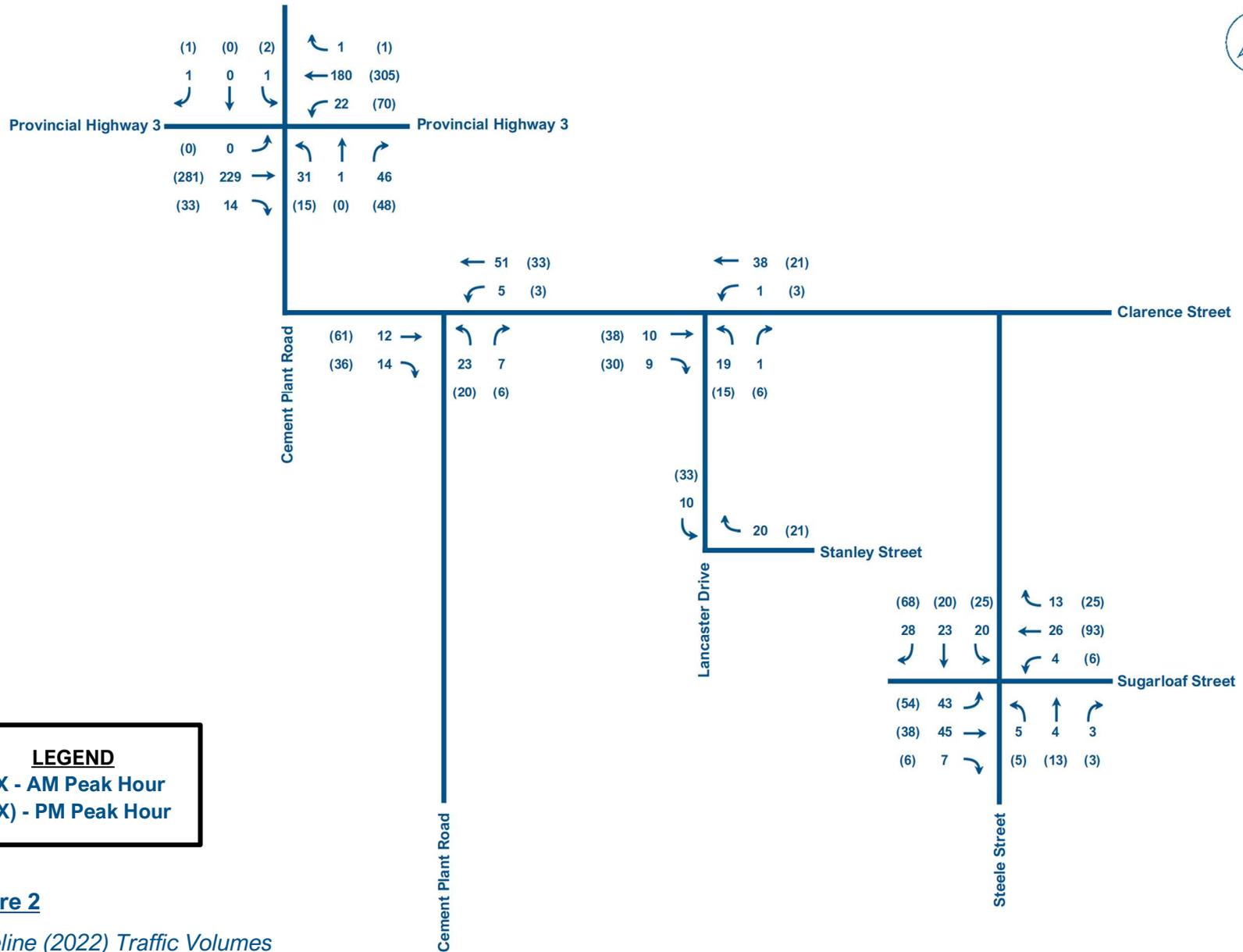
At the time of this study, there are no planned improvements to provide enhanced active transportation facilities along the study area roadways.

2.4 Existing Traffic Data

Intersection turning movement count (TMC) data was collected for the study area intersections on August 9th, 2022; the raw count data is provided in **Appendix A**.

An analysis of the data determined that the overall peak hours for the study area road network generally occurred between 7:45 a.m. and 8:45 a.m. during the weekday a.m. peak period and between 4:00 p.m. and 5:00 p.m. during the weekday p.m. peak period.

The 2022 baseline intersection volumes for the weekday a.m. and p.m. peak hours are presented in **Figure 2**.



3.0 FUTURE BACKGROUND TRAFFIC

3.1 Study Horizon Years

As per the *Region of Niagara TIS Guidelines*, the analysis adopted future planning horizons of 2023 for expected occupancy and 2028 for 5 years post full build-out.

3.2 Study Area Transportation Network Improvements

At the time of this study, there are no road network improvements that are scheduled to take place within the 2028 ultimate horizon year.

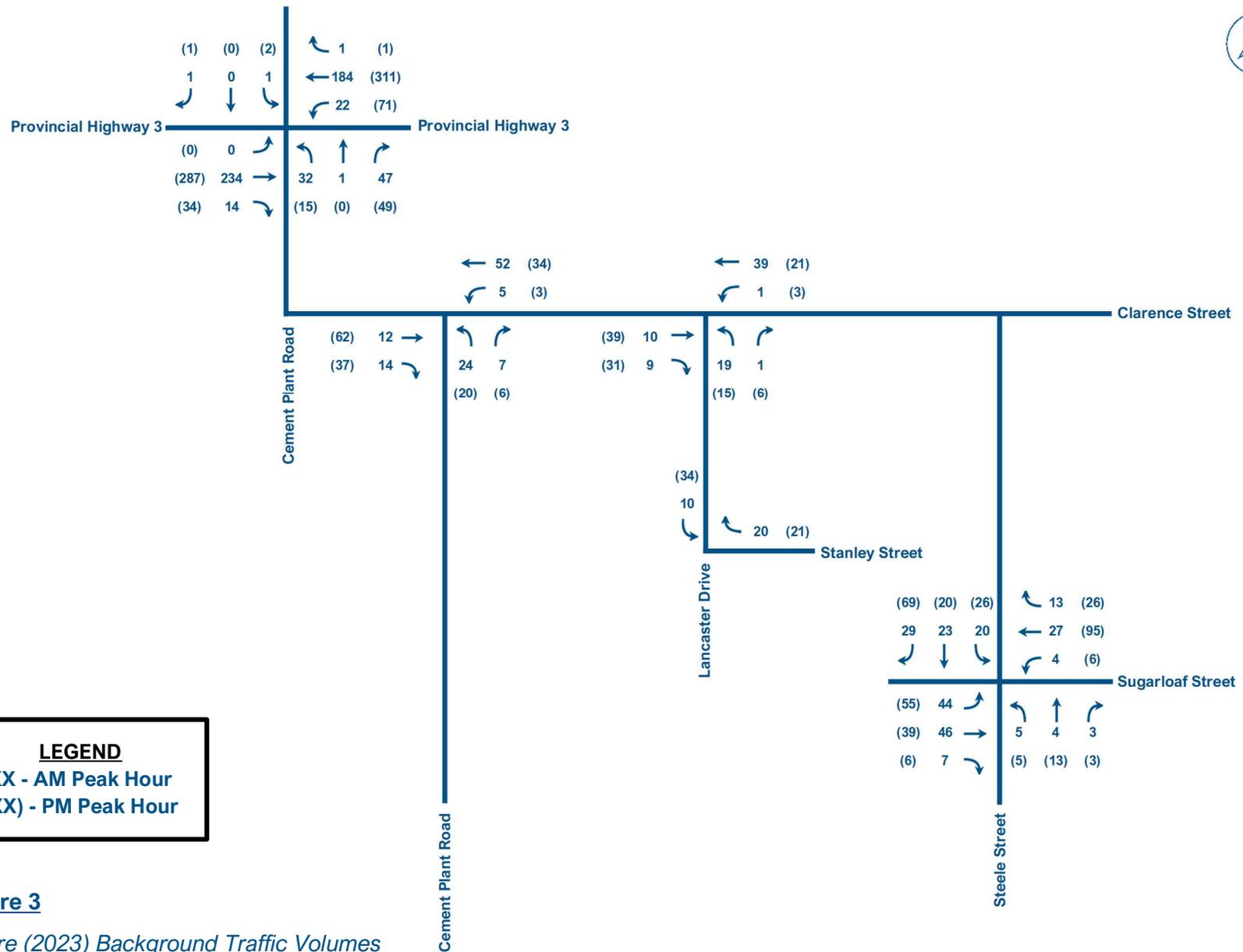
3.3 Future Background Development Traffic

As confirmed with City staff, there are currently no approved developments in the immediate vicinity of the study area.

3.4 Future Background Traffic Volumes

Given there are no approved background developments within the immediate area of the study corridors, an annualized growth rate in isolation can be used to reasonably estimate future background traffic volumes. Therefore, a 2% per annum growth rate has been applied to all turning movements at the study area intersections, as per the *Region of Niagara TIS Guidelines*.

The resulting 2023 and 2028 future background intersection volumes are presented in **Figure 3** and **Figure 4**.



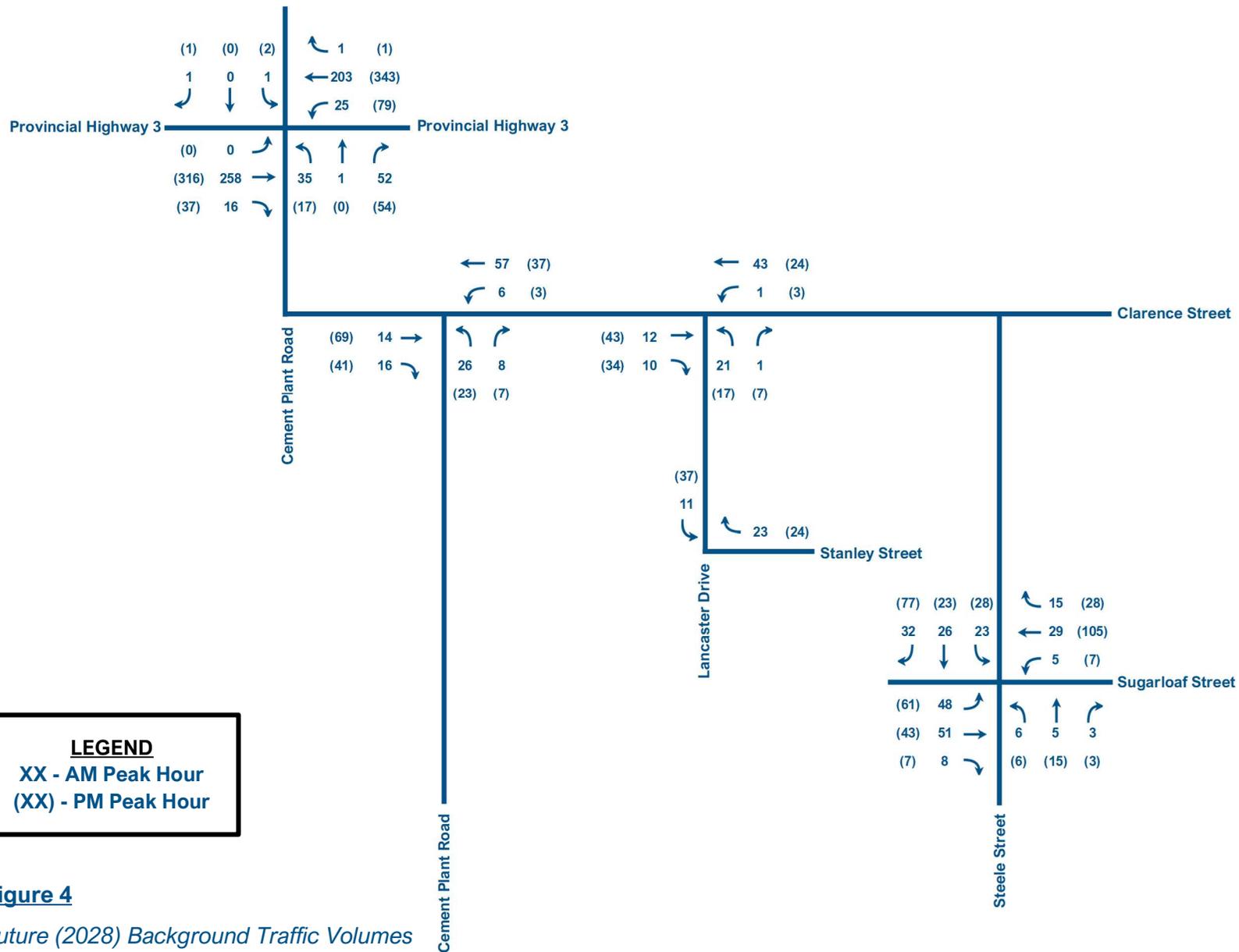


Figure 4
 Future (2028) Background Traffic Volumes

4.0 SITE GENERATED TRAFFIC

4.1 Site Plan Layout

The proposed site plan, as shown in **Figure 5**, prepared by Upper Canada Consultants and dated May 2022, consists of the following key features relevant to this study:

- 167 detached dwellings;
- 52 townhome units; and
- 96 apartment units;

The proposed vehicular access configuration consists of a roundabout access off of Cement Plant Road, an unsignalized intersection at Lancaster Drive & Stanley Street, and an extension of Sugarloaf Street. From these entry/exit points, internal circulation is accommodated by three new public roads, tentatively named Street 'A', Street 'B', and Street 'C'.

Based on the layout of the site plan, in addition to travel demand forecasting principles, it can be reasonably assumed that the new roundabout access at Cement Plant Road and Street 'A' will be the primary route for residents travelling west/northwest, while the Sugarloaf extension will be the primary route for residents travelling east/northeast. As such, only the residents residing on the Lancaster Drive Extension are expected to travel through the intersection of Lancaster Drive & Stanley Street, with all other residents utilizing the aforementioned subdivision access points.

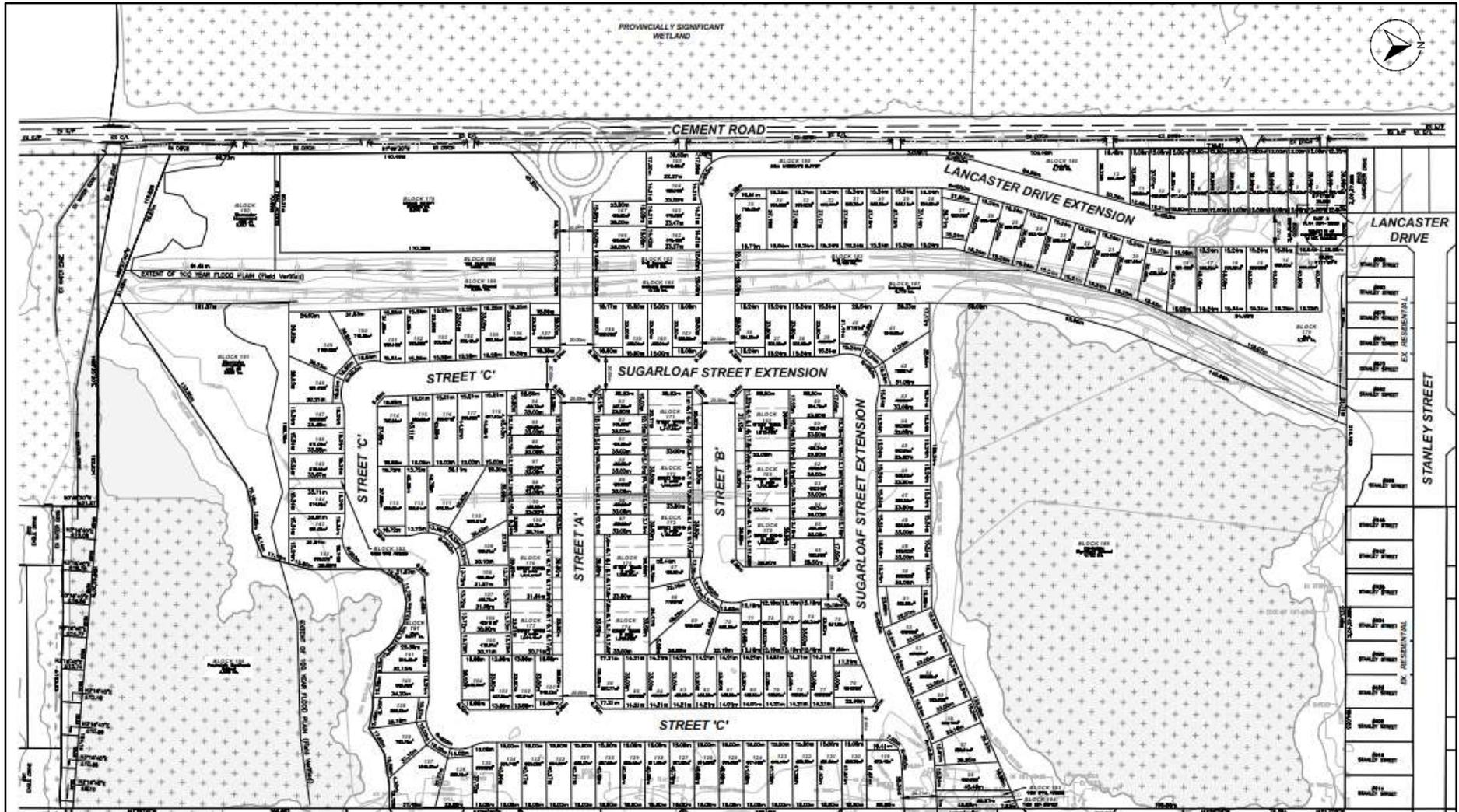


Figure 5: Site Plan

4.2 Site Trip Generation

Site generated traffic for each phase of the proposed residential development during peak periods of the adjacent street traffic were estimated using the Institute of Transportation Engineer's (ITE) *Trip Generation Manual (11th Edition)* methodology, referencing ITE Land Use Codes (LUC) for Single Family Detached housing (LUC 210), Single Family Attached housing (LUC 215), and Multifamily Housing Mid-Rise (LUC 221).

As presented in **Table 1**, the estimated vehicular trip generation for the subject site is approximately 43 inbound and 123 outbound trips during the weekday a.m. peak hour, and 135 inbound and 84 outbound trips during the weekday p.m. peak hour.

Table 1: Trip Generation

Land Use Code (LUC)	Peak Hour	Units	Trip Equation	Total Trips	Inbound % / Outbound %	Inbound / Outbound
Single Family Detached (LUC 210)	Weekday a.m.	167	$\text{Ln}(\text{Trips}) = 0.91 \text{Ln}(\text{Units}) + 0.12$	119	26 / 74	31 / 88
	Weekday p.m.		$\text{Ln}(\text{Trips}) = 0.94 \text{Ln}(\text{Units}) + 0.27$	161	63 / 37	101 / 60
Single Family Attached (LUC 215)	Weekday a.m.	52	$\text{Trips} = 0.52 (\text{Units}) - 5.70$	21	31 / 69	7 / 14
	Weekday p.m.		$\text{Trips} = 0.60 (\text{Units}) - 3.93$	27	57 / 43	15 / 12
Multifamily Housing (Mid-Rise) (LUC 221)	Weekday a.m.	96	$\text{Trips} = 0.44 (\text{Units}) - 11.61$	31	23 / 77	7 / 24
	Weekday p.m.		$\text{Trips} = 0.39 (\text{Units}) + 0.34$	38	61 / 39	23 / 15

4.3 Site Trip Distribution

Given the majority of trips generated by the site during the weekday a.m. and p.m. peak hours will be commuter trips, 2016 Transportation Tomorrow Survey (TTS) commuter data was reviewed to estimate the distribution of the site generated traffic to the surrounding road network.

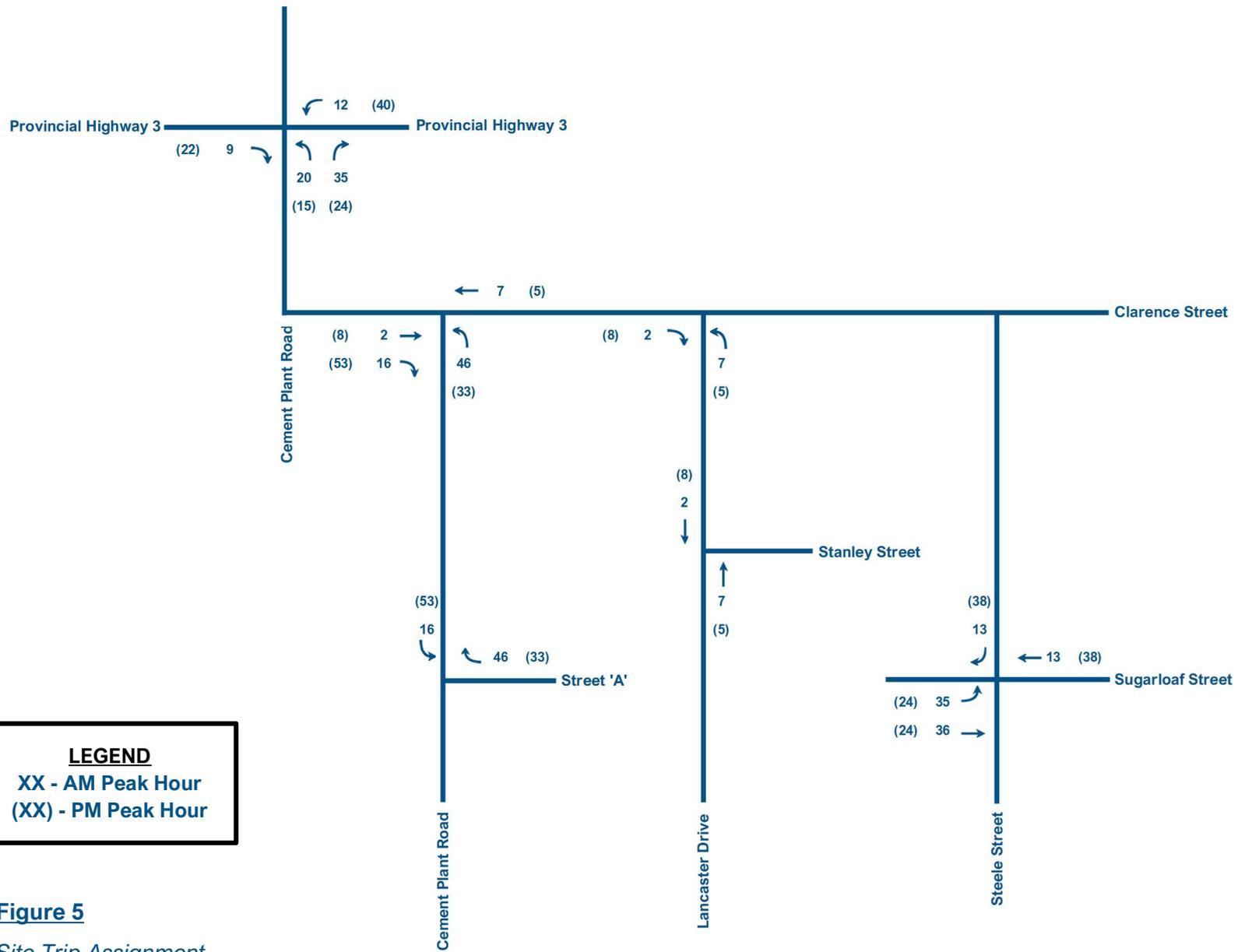
Table 2 outlines the estimated trip distribution assumptions for the site generated trips, which is based on the analyzed TTS data provided in **Appendix B**.

Table 2: Site Distribution

Direction	Distribution Percentages
Cement Plant Road / Highway 3 (West)	8%
Cement Plant Road / Highway 3 (East)	36%
Sugarloaf Street / Steele Street (North)	28%
Sugarloaf Street / Steele Street (East)	28%
Total	100%

4.4 Site Trip Assignment

The site generated traffic has been assigned to individual turning movements at the study area intersections based on the trip generation estimates and the trip distribution assumptions. The resulting trip assignment for the total site build-out is shown in **Figure 5**.

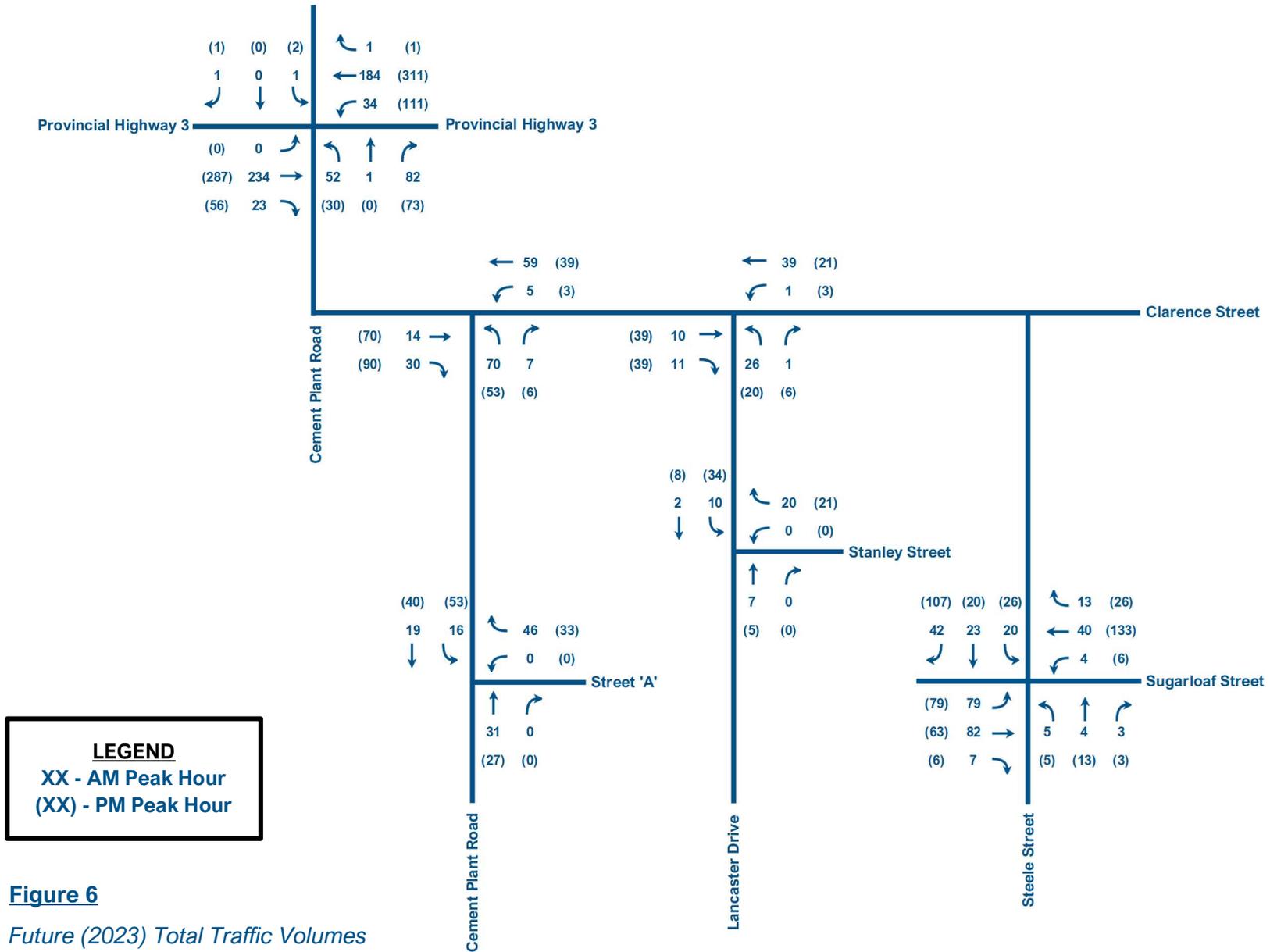


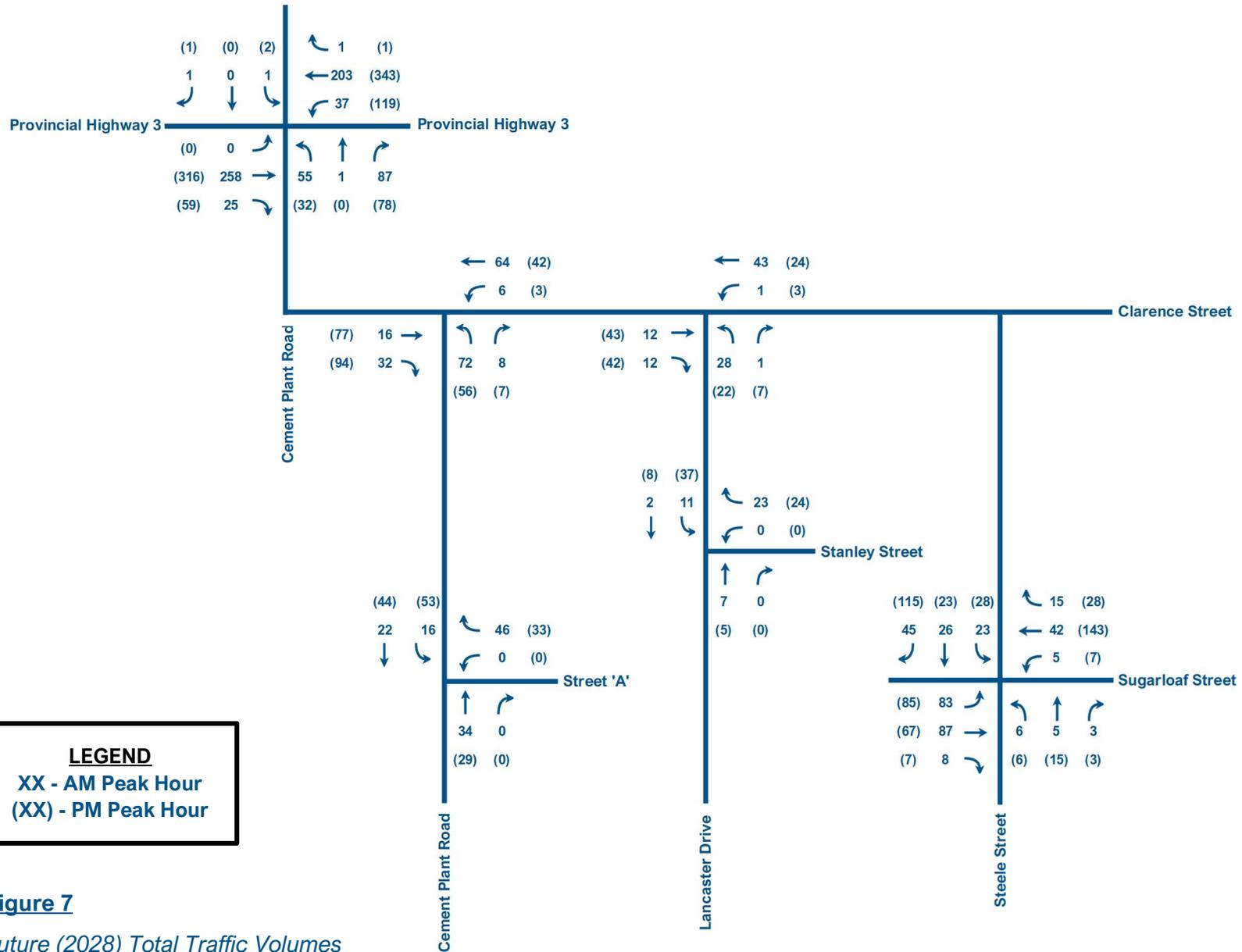
LEGEND
 XX - AM Peak Hour
 (XX) - PM Peak Hour

Figure 5
 Site Trip Assignment

5.0 FUTURE TOTAL TRAFFIC

The future total intersection volumes for each future horizon year were projected by combining the estimated site generated traffic from the subject development with the future background traffic projections for each horizon year. The resulting 2023 and 2028 future total intersection volumes are presented in **Figure 6** and **Figure 7**, respectively.





6.0 CAPACITY ANALYSIS

6.1 Intersection Capacity Analysis

The industry standard Synchro macroscopic traffic analysis software was utilized to analyse the study intersections. Key performance measures such as Level of Service (LOS), volume-to-capacity ratio (v/c ratio), and 95th percentile queuing were reported, and are defined below:

- **Average vehicle control delay** is used to characterize LOS for the entire intersection, an approach, or movement. Delay quantifies the variations in travel time and is also a surrogate measure of driver discomfort and fuel consumption.
- **V/c ratio** quantifies the degree to which the capacity of each signal phase is utilized by a defined lane group.
- **95th percentile queue** is the queue length which is expected to be exceeded only 5% of the time; it is common practice to identify preferred storage length requirements for auxiliary turn lanes at signalized intersections based on estimated peak hour 95th percentile queueing.

Table 3 identifies the control delay thresholds (seconds of delay per vehicle) for each LOS based on Highway Capacity Manual (HCM) methodology.

Table 3: Characteristics of Level of Service at Intersections

LEVEL OF SERVICE (LOS)	CONTROL DELAY (seconds / vehicle)
	UNSIGNALIZED INTERSECTION
A	≤ 10
B	> 10 to 15
C	> 15 to 25
D	> 25 to 35
E	> 35 to 50
F	> 50

Detailed Highway Capacity Manual (HCM) output reports from the capacity analysis are provided in **Appendix C**.

The following sections present and describe the results of the intersection capacity analysis at each study area intersections in accordance with the *Niagara Region Guidelines for Transportation Impact Studies*.

6.2 Cement Plant Road & Provincial Highway 3

Table 4: Capacity Analysis Results – Cement Plant Road at Provincial Highway 3

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Existing 2022	EBTR	0.00	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	WBL	0.02	A	7.8	<1 veh	0.06	A	8.2	<1 veh
	WBT	0.12	A	0.0	<1 veh	0.20	A	0.0	<1 veh
	NBLTR	0.14	B	11.8	<1 veh	0.13	B	12.8	<1 veh
	SBLTR	0.00	B	11.5	<1 veh	0.01	C	16.6	<1 veh
	Intersection	-	A	2.1	-	-	A	1.9	-
Future Background 2023	EBTR	0.00	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	WBL	0.02	A	7.8	<1 veh	0.06	A	8.2	<1 veh
	WBT	0.12	A	0.0	<1 veh	0.20	A	0.0	<1 veh
	NBLTR	0.14	B	11.9	<1 veh	0.13	B	12.9	8
	SBLTR	0.00	B	11.6	<1 veh	0.01	C	16.9	<1 veh
	Intersection	-	A	2.1	-	-	A	1.9	-
Future Total 2023	EBTR	0.00	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	WBL	0.03	A	7.9	<1 veh	0.10	A	8.4	<1 veh
	WBT	0.12	A	0.0	<1 veh	0.20	A	0.0	<1 veh
	NBLTR	0.25	B	13.0	8	0.26	C	16.0	8
	SBLTR	0.00	B	12.5	<1 veh	0.01	C	20.2	<1 veh
	Intersection	-	A	3.3	-	-	A	3.0	-
Future Background 2028	EBTR	0.00	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	WBL	0.02	A	7.9	<1 veh	0.07	A	8.3	<1 veh
	WBT	0.13	A	0.0	<1 veh	0.22	A	0.0	<1 veh
	NBLTR	0.17	B	12.5	<1 veh	0.16	B	14.0	<1 veh
	SBLTR	0.00	B	12.2	<1 veh	0.01	C	18.9	<1 veh
	Intersection	-	A	2.2	-	-	A	2.0	-
Future Total 2028	EBTR	0.00	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	WBL	0.03	A	8.0	<1 veh	0.11	A	8.5	<1 veh
	WBT	0.13	A	0.0	<1 veh	0.22	A	0.0	<1 veh
	NBLTR	0.27	B	13.9	<1 veh	0.30	C	17.9	<1 veh
	SBLTR	0.00	B	13.1	<1 veh	0.01	C	22.7	<1 veh
	Intersection	-	A	3.4	-	-	A	3.2	-

As shown in **Table 4**, the intersection of Cement Plant Road & Provincial Highway 3 is currently operating with substantial reserve capacity, delays not exceeding LOS “C” (15 to 25 seconds of delay), and no queuing concerns. With the addition of site generated traffic and background corridor growth, all movements are expected to continue operating with similar performance measures, with v/c ratios peaking at 0.30 in the northbound approach. There are no recommendations to provide additional capacity for any of the movements at this intersection through the ultimate 2028 horizon year.

6.3 Cement Plant Road & Clarence Street

Table 5: Capacity Analysis Results – Cement Plant Road at Clarence Street

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Existing 2022	EBTR	0.04	A	6.9	<1 veh	0.03	A	7.3	<1 veh
	WBTL	0.03	A	7.3	<1 veh	0.11	A	7.3	<1 veh
	NBLR	0.07	A	7.3	<1 veh	0.04	A	7.4	<1 veh
	Intersection	-	A	7.2	-	-	A	7.3	-
Future Background 2023	EBTR	0.04	A	6.9	<1 veh	0.03	A	7.3	<1 veh
	WBTL	0.03	A	7.4	<1 veh	0.11	A	7.3	<1 veh
	NBLR	0.07	A	7.3	<1 veh	0.05	A	7.4	<1 veh
	Intersection	-	A	7.2	-	-	A	7.3	-
Future Total 2023	EBTR	0.10	A	7.0	<1 veh	0.04	A	7.6	<1 veh
	WBTL	0.05	A	7.6	<1 veh	0.14	A	7.5	<1 veh
	NBLR	0.08	A	7.8	<1 veh	0.05	A	7.9	<1 veh
	Intersection	-	A	7.5	-	-	A	7.7	-
Future Background 2028	EBTR	0.04	A	6.9	<1 veh	0.04	A	7.4	<1 veh
	WBTL	0.03	A	7.4	<1 veh	0.13	A	7.3	<1 veh
	NBLR	0.08	A	7.3	<1 veh	0.05	A	7.4	<1 veh
	Intersection	-	A	7.3	-	-	A	7.4	-
Future Total 2028	EBTR	0.11	A	7.0	<1 veh	0.09	A	7.8	<1 veh
	WBTL	0.06	A	7.6	<1 veh	0.20	A	7.5	<1 veh
	NBLR	0.09	A	7.8	<1 veh	0.06	A	7.9	<1 veh
	Intersection	-	A	7.6	-	-	A	A	-

As seen in **Table 5**, the intersection of Cement Plant Road & Clarence Street is currently operating with ample reserve capacity, delays less than ten (10) seconds for all movements, and no issues pertaining to queueing. With the addition of site generated traffic and background corridor growth, it is expected that all movements will continue operate with similar performance measures through the ultimate 2028 horizon year. There are no recommendations to provide additional physical capacity at this intersection.

6.4 Lancaster Drive & Clarence Street

Table 6: Capacity Analysis Results – Lancaster Drive at Clarence Street

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Existing 2022	EBTR	0.01	A	0.0	<1 veh	0.04	A	0.0	<1 veh
	WBTL	0.00	A	0.2	<1 veh	0.00	A	0.9	<1 veh
	NBLR	0.02	A	8.9	<1 veh	0.02	A	8.9	<1 veh
	Intersection	-	A	2.4	-	-	A	1.9	-
Future Background 2023	EBTR	0.01	A	0.0	<1 veh	0.04	A	0.0	<1 veh
	WBTL	0.00	A	0.2	<1 veh	0.00	A	0.9	<1 veh
	NBLR	0.02	A	8.9	<1 veh	0.02	A	8.9	<1 veh
	Intersection	-	A	2.4	-	-	A	1.8	-
Future Total 2023	EBTR	0.01	A	0.0	<1 veh	0.05	A	0.0	<1 veh
	WBTL	0.00	A	0.2	<1 veh	0.00	A	0.9	<1 veh
	NBLR	0.03	A	8.9	<1 veh	0.03	A	9.0	<1 veh
	Intersection	-	A	2.8	-	-	A	2.0	-
Future Background 2028	EBTR	0.01	A	0.0	<1 veh	0.05	A	0.0	<1 veh
	WBTL	0.00	A	0.2	<1 veh	0.00	A	0.8	<1 veh
	NBLR	0.03	A	8.9	<1 veh	0.03	A	9.0	<1 veh
	Intersection	-	A	2.3	-	-	A	1.8	-
Future Total 2028	EBTR	0.02	A	0.0	<1 veh	0.06	A	0.0	<1 veh
	WBTL	0.00	A	0.2	<1 veh	0.00	A	0.8	<1 veh
	NBLR	0.04	A	9.0	<1 veh	0.03	A	9.1	<1 veh
	Intersection	-	A	2.7	-	-	A	2.0	-

As illustrated in **Table 6**, the intersection of Lancaster Drive & Clarence Street currently has significant reserve capacity for all movements, nominal delays, and no queueing concerns. This is expected to continue through the ultimate 2028 horizon year, with only marginal increases to the v/c ratio at the result of site generated traffic and background corridor growth. There are no mitigation measures recommended for this intersection as a result of site generated traffic.

6.5 Sugarloaf Street & Steele Street

Table 7: Capacity Analysis Results – Sugarloaf Street at Steele Street

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Existing 2022	EBLTR	0.02	A	7.8	<1 veh	0.03	A	8.2	<1 veh
	WBLTR	0.12	A	7.3	<1 veh	0.13	A	8.1	<1 veh
	NBLTR	0.05	A	7.3	<1 veh	0.16	A	7.7	<1 veh
	SBLTR	0.09	A	7.5	<1 veh	0.14	A	7.9	<1 veh
	Intersection	-	A	7.6	-	-	A	8.0	-
Future Background 2023	EBLTR	0.02	A	7.8	<1 veh	0.03	A	8.2	<1 veh
	WBLTR	0.12	A	7.3	<1 veh	0.14	A	8.1	<1 veh
	NBLTR	0.05	A	7.3	<1 veh	0.16	A	7.7	<1 veh
	SBLTR	0.09	A	7.5	<1 veh	0.15	A	7.9	<1 veh
	Intersection	-	A	7.6	-	-	A	A	-
Future Total 2023	EBLTR	0.02	A	8.5	<1 veh	0.03	A	8.9	<1 veh
	WBLTR	0.22	A	7.6	<1 veh	0.21	A	8.8	<1 veh
	NBLTR	0.07	A	7.6	<1 veh	0.22	A	8.1	<1 veh
	SBLTR	0.11	A	7.8	<1 veh	0.20	A	8.5	<1 veh
	Intersection	-	A	8.1	-	-	A	8.7	-
Future Background 2028	EBLTR	0.02	A	7.9	<1 veh	0.03	A	8.4	<1 veh
	WBLTR	0.14	A	7.4	<1 veh	0.15	A	8.3	<1 veh
	NBLTR	0.06	A	7.5	<1 veh	0.18	A	7.9	<1 veh
	SBLTR	0.10	A	7.6	<1 veh	0.17	A	8.1	<1 veh
	Intersection	-	A	7.7	-	-	A	8.2	-
Future Total 2028	EBLTR	0.02	A	8.7	<1 veh	0.04	A	9.1	<1 veh
	WBLTR	0.23	A	7.7	<1 veh	0.23	A	9.0	<1 veh
	NBLTR	0.08	A	7.7	<1 veh	0.24	A	8.2	<1 veh
	SBLTR	0.12	A	7.9	<1 veh	0.22	A	8.7	<1 veh
	Intersection	-	A	8.2	-	-	A	8.9	-

As seen in **Table 7**, the all-way stop-controlled intersection of Sugarloaf & Steele Street is currently operating with ample reserve capacity, delays less than ten (10) seconds, and no queueing. Under all future traffic scenarios, the intersection is expected to continue operating well, with v/c ratios not exceeding 0.24 through the ultimate 2028 horizon year. There are no mitigation measures recommended at this intersection as a result of site build-out.

6.6 Lancaster Drive & Stanley Street

Table 8: Capacity Analysis Results – Lancaster Drive at Stanley Street

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Future Total 2023	WBLR	0.02	A	8.4	<1 veh	0.02	A	8.4	<1 veh
	NBTR	0.01	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	SBTL	0.01	A	5.7	<1 veh	0.02	A	5.9	<1 veh
		-	A	5.9	-	-	A	6.3	-
Future Total 2028	WBLR	0.02	A	8.4	<1 veh	0.02	A	8.4	<1 veh
	NBTR	0.01	A	0.0	<1 veh	0.00	A	0.0	<1 veh
	SBTL	0.01	A	6.2	<1 veh	0.02	A	6.0	<1 veh
		-	A	6.3	-	-	A	6.4	-

With the extension of Lancaster Drive, the development will create a new minor stop-controlled intersection at Lancaster Drive & Stanley Street. As shown in **Table 8**, this new intersection is expected to operate with v/c ratios not exceeding 0.02, negligible delays, and no queuing through the ultimate 2028 horizon year. There are recommendations to provide additional capacity at this intersection.

7.0 ROUNDABOUT FEASIBILITY

7.1 Cement Plant Road & Western Site Access (Minor Stop-Controlled)

Table 9: Capacity Analysis Results – Cement Plant Road at ‘Street A’

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Future Total 2023	WBLR	0.05	A	8.6	<1 veh	0.03	A	8.6	<1 veh
	NBTR	0.02	A	0.0	<1 veh	0.02	A	0.0	<1 veh
	SBLT	0.01	A	3.3	<1 veh	0.04	A	4.3	<1 veh
	Intersection	-	A	4.6	-	-	A	4.5	-
Future Total 2028	WBLR	0.05	A	8.7	<1 veh	0.03	A	8.6	<1 veh
	NBTR	0.02	A	0.0	<1 veh	0.02	A	0.0	<1 veh
	SBLT	0.01	A	3.1	<1 veh	0.04	A	4.2	<1 veh
	Intersection	-	A	4.4	-	-	A	4.3	-

As illustrated in **Table 9**, the minor stop-controlled configuration is expected to yield substantial reserve capacity, delays less than ten (10) seconds, and no queuing issues through the ultimate 2028 horizon year.

7.2 Cement Plant Road Roundabout Access

As shown in the Final Plan of Subdivision, the access off of Cement Plant Road is currently proposed as a roundabout intersection; as a result, the Township of Wainfleet has requested a roundabout analysis to determine the viability of a roundabout at this location. The analysis was completed using the Arcady roundabout assessment software, with the raw outputs available in **Appendix D**.

Table 10: Capacity Analysis Results – Cement Plant Road at ‘Street A’

SCENARIO	MOVE.	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Future Total 2023	WBLR	0.07	A	5.2	<1 veh	0.05	A	5.1	<1 veh
	NBTR	0.05	A	5.1	<1 veh	0.04	A	5.2	<1 veh
	SBLT	0.05	A	5.1	<1 veh	0.14	A	5.5	<1 veh
	Intersection	-	A	5.1	-	-	A	5.4	-
Future Total 2028	WBLR	0.07	A	5.3	<1 veh	0.05	A	5.1	<1 veh
	NBTR	0.05	A	5.1	<1 veh	0.04	A	5.6	<1 veh
	SBLT	0.06	A	5.1	<1 veh	0.14	A	5.2	<1 veh
	Intersection	-	A	5.2	-	-	A	5.4	-

As seen in **Table 10**, the roundabout configuration is expected to operate with ample reserve capacity, negligible delays, and no queuing concerns, with a slight decrease in reserve capacity compared to the minor stop-controlled intersection. However, this can be expected for intersections where volumes are commonly low, as minor stop-controlled intersections provide free-flow movement for the major approach. For this reason, the conversion from a minor stop-controlled intersection to a roundabout is usually considered from a safety perspective, rather than a traffic operations perspective.

Based on the *Transportation Association of Canada (TAC) Roundabout Design Guide (2017)*, the implementation of roundabouts will generally (1) reduce vehicle operating speeds and speed differential, (2) simplify decision-making for road users, and (3) reduce the amount of conflict points at the intersection. These intersection improvements generally result in fewer total collisions, as well as a significant decrease in projected personal injury collisions.

Given the consistently straight and flat alignment of Cement Plant Road, there is a possibility that the roadway could foster excessive operating speeds. Implementing a roundabout along this corridor will act as a physical traffic calming measure and alleviate collision types such as right-angle and head-on collisions, which are the most serious collision types. It is therefore recommended that the roundabout included in the current Final Plan of Subdivision be implemented along Cement Plant Road.

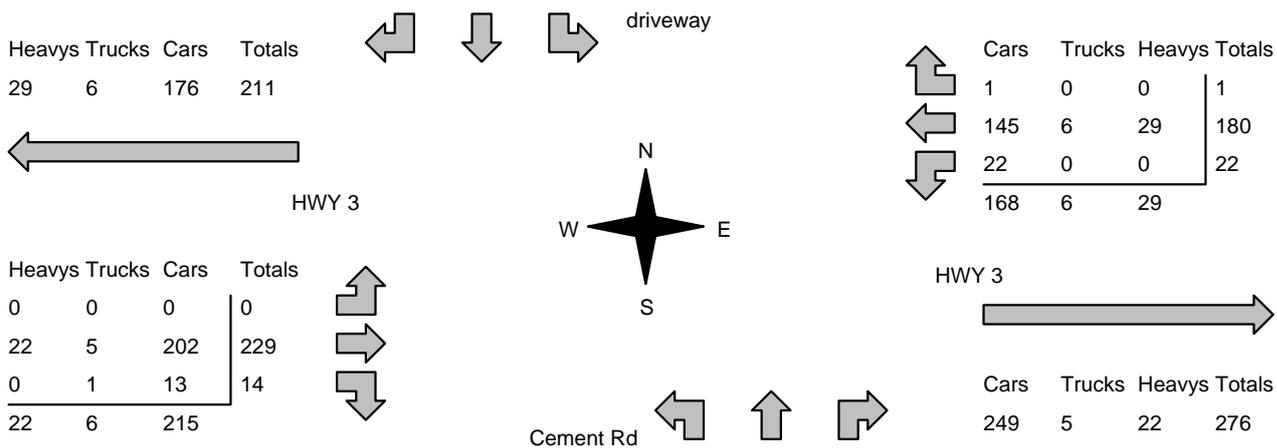
8.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

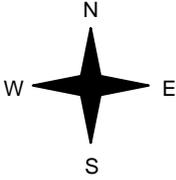
The results of the traffic impact study can be summarized as follows:

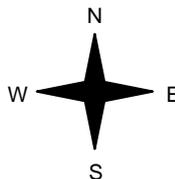
- The proposed residential development is estimated to generate approximately 43 inbound and 123 outbound trips during the weekday a.m. peak hour, and 135 inbound and 84 outbound trips during the weekday p.m. peak hour.
- As per the results of the intersection capacity analysis, the site generated traffic is not expected to result in any delay or queuing concerns at the study area intersections through the ultimate 2028 horizon year.
- Minor stop-control and a roundabout are expected to yield similar measures of effectiveness for the Cement Plant Road at 'Street A' intersection through to the ultimate 2028 horizon year. However, it is recommended that the roundabout that is currently proposed in the Final Plan of Subdivision be implemented, as it will provide added safety benefits through the elimination of right-angle collisions and also would serve to reduce travel speeds.
- There are no geometric improvements recommended at any of the existing study area intersections as a result of the site generated traffic.
- The existing roadway system has sufficient capacity to accommodate the anticipated traffic generation from the subject development.

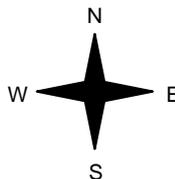
APPENDIX A

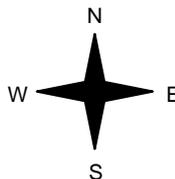
Raw Count Data

<h2>Morning Peak Diagram</h2>	Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak From: 7:45:00 To: 8:45:00																																																										
Municipality: Port Colborne Site #: 2215000001 Intersection: HWY 3 & Cement Rd TFR File #: 1 Count date: 9-Aug-22	Weather conditions: Person counted: Person prepared: Person checked:																																																											
** Non-Signalized Intersection **	Major Road: HWY 3 runs W/E																																																											
North Leg Total: 4 North Entering: 2 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>1</td><td>0</td><td>1</td><td>2</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>1</td><td>0</td><td>1</td><td></td></tr> </table>	Heavys	0	0	0	0	Trucks	0	0	0	0	Cars	1	0	1	2	Totals	1	0	1		<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>2</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>2</td></tr> </table>	Heavys	0	Trucks	0	Cars	2	Totals	2	East Leg Total: 479 East Entering: 203 East Peds: 0 Peds Cross: ☒																													
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Peds Cross: ☒ West Peds: 2 West Entering: 243 West Leg Total: 454	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>35</td></tr> <tr><td>Trucks</td><td>1</td></tr> <tr><td>Heavys</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>36</td></tr> </table>	Cars	35	Trucks	1	Heavys	0	Totals	36	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>30</td><td>1</td><td>46</td><td>77</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>30</td><td>1</td><td>46</td><td></td></tr> </table>	Cars	30	1	46	77	Trucks	0	0	0	0	Heavys	0	0	0	0	Totals	30	1	46		Peds Cross: ☒ South Peds: 0 South Entering: 77 South Leg Total: 113																													
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<h2>Comments</h2>																																																												

Afternoon Peak Diagram		Specified Period From: 16:00:00 To: 18:00:00	One Hour Peak From: 16:00:00 To: 17:00:00																																					
Municipality: Port Colborne Site #: 2215000001 Intersection: HWY 3 & Cement Rd TFR File #: 1 Count date: 9-Aug-22		Weather conditions: Person counted: Person prepared: Person checked:																																						
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North Leg Total: 4 North Entering: 3 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>1</td><td>0</td><td>2</td><td>3</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>1</td><td>0</td><td>2</td><td></td></tr> </table>	Heavys	0	0	0	0	Trucks	0	0	0	0	Cars	1	0	2	3	Totals	1	0	2			<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>1</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>1</td></tr> </table>	Heavys	0	Trucks	0	Cars	1	Totals	1	East Leg Total: 707 East Entering: 376 East Peds: 1 Peds Cross: ☒								
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Peds Cross: ☒ West Peds: 0 West Entering: 314 West Leg Total: 635	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>103</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>103</td></tr> </table>	Cars	103	Trucks	0	Heavys	0	Totals	103		<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>14</td><td>0</td><td>48</td><td>62</td></tr> <tr><td>Trucks</td><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>15</td><td>0</td><td>48</td><td></td></tr> </table>	Cars	14	0	48	62	Trucks	1	0	0	1	Heavys	0	0	0	0	Totals	15	0	48		Peds Cross: ☒ South Peds: 1 South Entering: 63 South Leg Total: 166								
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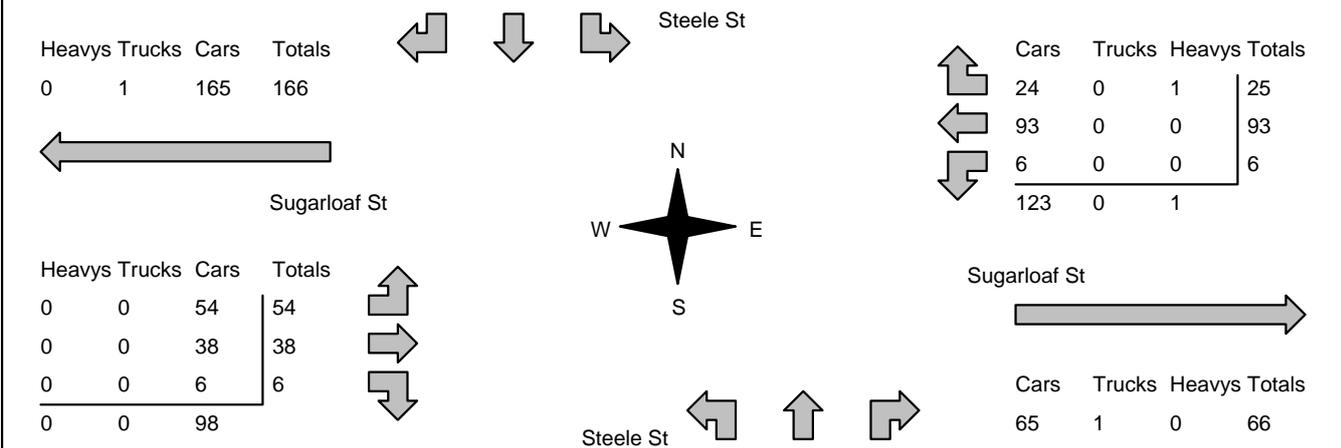
<h2>Morning Peak Diagram</h2>	Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak From: 7:45:00 To: 8:45:00																											
Municipality: Port Colborne Site #: 2215000002 Intersection: Cement Rd & Clarence St TFR File #: 1 Count date: 9-Aug-22	Weather conditions: Person counted: Person prepared: Person checked:																												
** Non-Signalized Intersection **	Major Road: Cement Rd runs W/E																												
		East Leg Total: 75 East Entering: 56 East Peds: 1 Peds Cross: 8																											
<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Heavys</th> <th style="text-align: left;">Trucks</th> <th style="text-align: left;">Cars</th> <th style="text-align: left;">Totals</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>74</td> <td>74</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;"> <p>Cement Rd</p> </div>	Heavys	Trucks	Cars	Totals	0	0	74	74		<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Cars</th> <th style="text-align: left;">Trucks</th> <th style="text-align: left;">Heavys</th> <th style="text-align: left;">Totals</th> </tr> </thead> <tbody> <tr> <td>51</td> <td>0</td> <td>0</td> <td>51</td> </tr> <tr> <td>5</td> <td>0</td> <td>0</td> <td>5</td> </tr> <tr> <td style="border-top: 1px solid black;">56</td> <td style="border-top: 1px solid black;">0</td> <td style="border-top: 1px solid black;">0</td> <td style="border-top: 1px solid black;">56</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;"> <p>Clarence St</p> </div>	Cars	Trucks	Heavys	Totals	51	0	0	51	5	0	0	5	56	0	0	56			
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<table style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td style="width:50%;"> Peds Cross: 8 West Peds: 0 West Entering: 26 West Leg Total: 100 </td> <td style="width:50%; text-align: center;"> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td>Cars</td> <td>18</td> <td>Cars</td> <td>23</td> <td>6</td> <td>29</td> </tr> <tr> <td>Trucks</td> <td>1</td> <td>Trucks</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>Heavys</td> <td>0</td> <td>Heavys</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td style="border-top: 1px solid black;">Totals</td> <td style="border-top: 1px solid black;">19</td> <td style="border-top: 1px solid black;">Totals</td> <td style="border-top: 1px solid black;">23</td> <td style="border-top: 1px solid black;">7</td> <td style="border-top: 1px solid black;">30</td> </tr> </tbody> </table> </td> </tr> </tbody> </table>	Peds Cross: 8 West Peds: 0 West Entering: 26 West Leg Total: 100	<table style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td>Cars</td> <td>18</td> <td>Cars</td> <td>23</td> <td>6</td> <td>29</td> </tr> <tr> <td>Trucks</td> <td>1</td> <td>Trucks</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>Heavys</td> <td>0</td> <td>Heavys</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td style="border-top: 1px solid black;">Totals</td> <td style="border-top: 1px solid black;">19</td> <td style="border-top: 1px solid black;">Totals</td> <td style="border-top: 1px solid black;">23</td> <td style="border-top: 1px solid black;">7</td> <td style="border-top: 1px solid black;">30</td> </tr> </tbody> </table>	Cars	18	Cars	23	6	29	Trucks	1	Trucks	0	1	1	Heavys	0	Heavys	0	0	0	Totals	19	Totals	23	7	30	<table style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td style="width:50%;"> Peds Cross: 8 South Peds: 0 South Entering: 30 South Leg Total: 49 </td> <td style="width:50%;"></td> </tr> </tbody> </table>	Peds Cross: 8 South Peds: 0 South Entering: 30 South Leg Total: 49	
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Municipality: Port Colborne Site #: 2215000002 Intersection: Cement Rd & Clarence St TFR File #: 1 Count date: 9-Aug-22	Weather conditions: Person counted: Person prepared: Person checked:																														
** Non-Signalized Intersection **	Major Road: Cement Rd runs W/E																														
		East Leg Total: 103 East Entering: 36 East Peds: 0 Peds Cross: 8																													
<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Heavys</th> <th style="text-align: left;">Trucks</th> <th style="text-align: left;">Cars</th> <th style="text-align: left;">Totals</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>52</td> <td>53</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;"> <p>Cement Rd</p> </div>	Heavys	Trucks	Cars	Totals	0	1	52	53		<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Cars</th> <th style="text-align: left;">Trucks</th> <th style="text-align: left;">Heavys</th> <th style="text-align: left;">Totals</th> </tr> </thead> <tbody> <tr> <td>32</td> <td>1</td> <td>0</td> <td>33</td> </tr> <tr> <td>3</td> <td>0</td> <td>0</td> <td>3</td> </tr> <tr> <td style="border-top: 1px solid black;">35</td> <td style="border-top: 1px solid black;">1</td> <td style="border-top: 1px solid black;">0</td> <td style="border-top: 1px solid black;"></td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;"> <p>Clarence St</p> </div>	Cars	Trucks	Heavys	Totals	32	1	0	33	3	0	0	3	35	1	0						
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Cars	Trucks	Heavys	Totals																												
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Heavys	Trucks	Cars	Totals																												
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<h2>Morning Peak Diagram</h2>	Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak From: 7:45:00 To: 8:45:00																								
Municipality: Port Colborne Site #: 2215000003 Intersection: Clarence St & Lancaster Dr TFR File #: 1 Count date: 9-Aug-22	Weather conditions: Person counted: Person prepared: Person checked:																									
** Non-Signalized Intersection **	Major Road: Clarence St runs W/E																									
		East Leg Total: 50 East Entering: 39 East Peds: 0 Peds Cross: 8																								
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Heavys</th> <th style="text-align: left;">Trucks</th> <th style="text-align: left;">Cars</th> <th style="text-align: left;">Totals</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>56</td> <td>57</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;">  <p>Clarence St</p> </div>	Heavys	Trucks	Cars	Totals	0	1	56	57		<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Cars</th> <th style="text-align: left;">Trucks</th> <th style="text-align: left;">Heavys</th> <th style="text-align: left;">Totals</th> </tr> </thead> <tbody> <tr> <td>37</td> <td>1</td> <td>0</td> <td>38</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td style="border-top: 1px solid black;">38</td> <td style="border-top: 1px solid black;">1</td> <td style="border-top: 1px solid black;">0</td> <td></td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;">  <p>Clarence St</p> </div>	Cars	Trucks	Heavys	Totals	37	1	0	38	1	0	0	1	38	1	0	
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Peds Cross: 8	West Peds: 0	West Entering: 19	West Leg Total: 76																							
Cars 10	Trucks 0	Heavys 0	Totals 10																							
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<h2>Afternoon Peak Diagram</h2>	Specified Period From: 16:00:00 To: 18:00:00	One Hour Peak From: 16:00:00 To: 17:00:00																								
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** Non-Signalized Intersection **	Major Road: Clarence St runs W/E																									
		East Leg Total: 68 East Entering: 24 East Peds: 0 Peds Cross: 8																								
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Heavys	Trucks	Cars	Totals																							
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Cars	Trucks	Heavys	Totals																							
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Cars	Trucks	Heavys	Totals																							
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<table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;"> Peds Cross: 8 West Peds: 0 West Entering: 68 West Leg Total: 104 </td> <td style="width:50%; text-align: center;"> <table style="width:100%; border-collapse: collapse;"> <tr> <td>Cars 33</td> <td>Cars 15</td> <td>6</td> <td>21</td> </tr> <tr> <td>Trucks 0</td> <td>Trucks 0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Heavys 0</td> <td>Heavys 0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Totals 33</td> <td>Totals 15</td> <td>6</td> <td></td> </tr> </table> </td> </tr> </table>	Peds Cross: 8 West Peds: 0 West Entering: 68 West Leg Total: 104	<table style="width:100%; border-collapse: collapse;"> <tr> <td>Cars 33</td> <td>Cars 15</td> <td>6</td> <td>21</td> </tr> <tr> <td>Trucks 0</td> <td>Trucks 0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Heavys 0</td> <td>Heavys 0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Totals 33</td> <td>Totals 15</td> <td>6</td> <td></td> </tr> </table>	Cars 33	Cars 15	6	21	Trucks 0	Trucks 0	0	0	Heavys 0	Heavys 0	0	0	Totals 33	Totals 15	6		<table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;"> Peds Cross: 8 South Peds: 0 South Entering: 21 South Leg Total: 54 </td> <td style="width:50%;"></td> </tr> </table>	Peds Cross: 8 South Peds: 0 South Entering: 21 South Leg Total: 54						
Peds Cross: 8 West Peds: 0 West Entering: 68 West Leg Total: 104	<table style="width:100%; border-collapse: collapse;"> <tr> <td>Cars 33</td> <td>Cars 15</td> <td>6</td> <td>21</td> </tr> <tr> <td>Trucks 0</td> <td>Trucks 0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Heavys 0</td> <td>Heavys 0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Totals 33</td> <td>Totals 15</td> <td>6</td> <td></td> </tr> </table>	Cars 33	Cars 15	6	21	Trucks 0	Trucks 0	0	0	Heavys 0	Heavys 0	0	0	Totals 33	Totals 15	6										
Cars 33	Cars 15	6	21																							
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Peds Cross: 8 South Peds: 0 South Entering: 21 South Leg Total: 54																										
<h3>Comments</h3>																										

<h2>Morning Peak Diagram</h2>	Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak From: 8:00:00 To: 9:00:00																														
Municipality: Port Colborne Site #: 2215000004 Intersection: Sugarloaf St & Steele St TFR File #: 1 Count date: 9-Aug-22	Weather conditions: Person counted: Person prepared: Person checked:																															
** Non-Signalized Intersection **	Major Road: Sugarloaf St runs W/E																															
North Leg Total: 131 North Entering: 71 North Peds: 6 Peds Cross: ☒	<table style="margin: auto;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>28</td><td>23</td><td>20</td><td>71</td></tr> <tr><td>Totals</td><td>28</td><td>23</td><td>20</td><td></td></tr> </table>	Heavys	0	0	0	0	Trucks	0	0	0	0	Cars	28	23	20	71	Totals	28	23	20			<table style="margin: auto;"> <tr><td>Heavys</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>60</td></tr> <tr><td>Totals</td><td>60</td></tr> </table>	Heavys	0	Trucks	0	Cars	60	Totals	60	East Leg Total: 111 East Entering: 43 East Peds: 4 Peds Cross: ☒
Heavys	0	0	0	0																												
Trucks	0	0	0	0																												
Cars	28	23	20	71																												
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Heavys	0																															
Trucks	0																															
Cars	60																															
Totals	60																															
<table style="margin: auto;"> <tr><td>Heavys</td><td>Trucks</td><td>Cars</td><td>Totals</td></tr> <tr><td>1</td><td>0</td><td>58</td><td>59</td></tr> </table>	Heavys	Trucks	Cars	Totals	1	0	58	59		Steele St		<table style="margin: auto;"> <tr><td>Cars</td><td>Trucks</td><td>Heavys</td><td>Totals</td></tr> <tr><td>13</td><td>0</td><td>0</td><td>13</td></tr> <tr><td>26</td><td>0</td><td>0</td><td>26</td></tr> <tr><td>4</td><td>0</td><td>0</td><td>4</td></tr> <tr><td>43</td><td>0</td><td>0</td><td></td></tr> </table>	Cars	Trucks	Heavys	Totals	13	0	0	13	26	0	0	26	4	0	0	4	43	0	0	
Heavys	Trucks	Cars	Totals																													
1	0	58	59																													
Cars	Trucks	Heavys	Totals																													
13	0	0	13																													
26	0	0	26																													
4	0	0	4																													
43	0	0																														
	Sugarloaf St		Sugarloaf St																													
<table style="margin: auto;"> <tr><td>Heavys</td><td>Trucks</td><td>Cars</td><td>Totals</td></tr> <tr><td>0</td><td>0</td><td>43</td><td>43</td></tr> <tr><td>0</td><td>0</td><td>45</td><td>45</td></tr> <tr><td>0</td><td>0</td><td>7</td><td>7</td></tr> <tr><td>0</td><td>0</td><td>95</td><td></td></tr> </table>	Heavys	Trucks	Cars	Totals	0	0	43	43	0	0	45	45	0	0	7	7	0	0	95			Steele St		<table style="margin: auto;"> <tr><td>Cars</td><td>Trucks</td><td>Heavys</td><td>Totals</td></tr> <tr><td>68</td><td>0</td><td>0</td><td>68</td></tr> </table>	Cars	Trucks	Heavys	Totals	68	0	0	68
Heavys	Trucks	Cars	Totals																													
0	0	43	43																													
0	0	45	45																													
0	0	7	7																													
0	0	95																														
Cars	Trucks	Heavys	Totals																													
68	0	0	68																													
Peds Cross: ☒ West Peds: 2 West Entering: 95 West Leg Total: 154		<table style="margin: auto;"> <tr><td>Cars</td><td>4</td><td>4</td><td>3</td><td>11</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>Totals</td><td>5</td><td>4</td><td>3</td><td></td></tr> </table>	Cars	4	4	3	11	Trucks	0	0	0	0	Heavys	0	1	0	1	Totals	5	4	3		Peds Cross: ☒ South Peds: 1 South Entering: 12 South Leg Total: 46									
Cars	4	4	3	11																												
Trucks	0	0	0	0																												
Heavys	0	1	0	1																												
Totals	5	4	3																													
<h3>Comments</h3>																																

Afternoon Peak Diagram		Specified Period From: 16:00:00 To: 18:00:00	One Hour Peak From: 16:30:00 To: 17:30:00																												
Municipality: Port Colborne Site #: 2215000004 Intersection: Sugarloaf St & Steele St TFR File #: 1 Count date: 9-Aug-22		Weather conditions: Person counted: Person prepared: Person checked:																													
** Non-Signalized Intersection **		Major Road: Sugarloaf St runs W/E																													
North Leg Total: 205 North Entering: 113 North Peds: 6 Peds Cross: \boxtimes	<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>1</td><td>1</td><td>0</td><td>2</td></tr> <tr><td>Cars</td><td>67</td><td>19</td><td>25</td><td>111</td></tr> <tr><td>Totals</td><td>68</td><td>20</td><td>25</td><td></td></tr> </table>	Heavys	0	0	0	0	Trucks	1	1	0	2	Cars	67	19	25	111	Totals	68	20	25		<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>1</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>91</td></tr> <tr><td>Totals</td><td>92</td></tr> </table>	Heavys	1	Trucks	0	Cars	91	Totals	92	East Leg Total: 190 East Entering: 124 East Peds: 0 Peds Cross: \boxtimes
Heavys	0	0	0	0																											
Trucks	1	1	0	2																											
Cars	67	19	25	111																											
Totals	68	20	25																												
Heavys	1																														
Trucks	0																														
Cars	91																														
Totals	92																														
 <p style="text-align: center;">Steele St</p> <p style="text-align: center;">Sugarloaf St</p> <p style="text-align: center;">N W — S — E</p> <p style="text-align: center;">Steele St</p> <p style="text-align: center;">Sugarloaf St</p>																															
Peds Cross: \boxtimes West Peds: 4 West Entering: 98 West Leg Total: 264	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>31</td></tr> <tr><td>Trucks</td><td>1</td></tr> <tr><td>Heavys</td><td>0</td></tr> <tr><td>Totals</td><td>32</td></tr> </table>	Cars	31	Trucks	1	Heavys	0	Totals	32	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>5</td><td>13</td><td>2</td><td>20</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Totals</td><td>5</td><td>13</td><td>3</td><td></td></tr> </table>	Cars	5	13	2	20	Trucks	0	0	1	1	Heavys	0	0	0	0	Totals	5	13	3		Peds Cross: \boxtimes South Peds: 0 South Entering: 21 South Leg Total: 53
Cars	31																														
Trucks	1																														
Heavys	0																														
Totals	32																														
Cars	5	13	2	20																											
Trucks	0	0	1	1																											
Heavys	0	0	0	0																											
Totals	5	13	3																												
Comments																															

APPENDIX B

Transportation Tomorrow Survey (TTS) Data

Origin: City of Port Colborne
 Survey Date: 2016

Planning District of Employment	Number of Commuters
PD 4 of Toronto	29
PD 8 of Toronto	14
Oakville	22
Hamilton	177
Grimsby	146
Lincoln	304
Pelham	60
Niagara-on-the-Lake	984
St. Catharines	1888
Thorold	219
Niagara Falls	1174
Welland	2316
Port Colborne	9344
Fort Erie	969
West Lincoln	8
Wainfleet	538
North Dumfries	17
Haldimand-Norfolk	274
Total	18483

APPENDIX C

HCM Reports

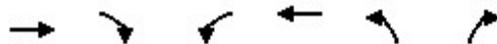
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Baseline (2022) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	229	14	22	180	1	31	1	46	1	0	1
Future Volume (Veh/h)	0	229	14	22	180	1	31	1	46	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	249	15	24	196	1	34	1	50	1	0	1
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	197			264			502	502	256	552	508	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197			264			502	502	256	552	508	196
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			93	100	94	100	100	100
cM capacity (veh/h)	1376			1300			473	463	782	410	459	845
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	264	24	197	85	2							
Volume Left	0	24	0	34	1							
Volume Right	15	0	1	50	1							
cSH	1376	1300	1700	616	552							
Volume to Capacity	0.00	0.02	0.12	0.14	0.00							
Queue Length 95th (m)	0.0	0.5	0.0	3.8	0.1							
Control Delay (s)	0.0	7.8	0.0	11.8	11.5							
Lane LOS		A		B	B							
Approach Delay (s)	0.0	0.8		11.8	11.5							
Approach LOS				B	B							
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			32.3%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Baseline (2022) Traffic Conditions
AM Peak Hour



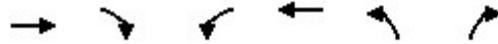
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↑	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	12	14	5	51	23	7
Future Volume (vph)	12	14	5	51	23	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	15	5	55	25	8

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	28	60	33
Volume Left (vph)	0	5	25
Volume Right (vph)	15	0	8
Hadj (s)	-0.29	0.05	0.04
Departure Headway (s)	3.7	4.0	4.1
Degree Utilization, x	0.03	0.07	0.04
Capacity (veh/h)	944	876	844
Control Delay (s)	6.9	7.3	7.3
Approach Delay (s)	6.9	7.3	7.3
Approach LOS	A	A	A

Intersection Summary		
Delay		7.2
Level of Service		A
Intersection Capacity Utilization	17.4%	ICU Level of Service
Analysis Period (min)		15

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Baseline (2022) Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	10	9	1	38	19	1
Future Volume (Veh/h)	10	9	1	38	19	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	1	41	21	1
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			21		59	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			21		59	16
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	100
cM capacity (veh/h)			1595		947	1063
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	21	42	22			
Volume Left	0	1	21			
Volume Right	10	0	1			
cSH	1700	1595	952			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.6			
Control Delay (s)	0.0	0.2	8.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Baseline (2022) Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	43	45	7	4	26	13	5	4	3	20	23	28
Future Volume (vph)	43	45	7	4	26	13	5	4	3	20	23	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	49	8	4	28	14	5	4	3	22	25	30
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	104	46	12	77								
Volume Left (vph)	47	4	5	22								
Volume Right (vph)	8	14	3	30								
Hadj (s)	0.08	-0.13	-0.03	-0.14								
Departure Headway (s)	4.2	4.1	4.3	4.1								
Degree Utilization, x	0.12	0.05	0.01	0.09								
Capacity (veh/h)	831	858	800	844								
Control Delay (s)	7.8	7.3	7.3	7.5								
Approach Delay (s)	7.8	7.3	7.3	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			24.0%	ICU Level of Service	A							
Analysis Period (min)			15									

Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Baseline (2022) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	281	33	70	305	1	15	0	48	2	0	1
Future Volume (Veh/h)	0	281	33	70	305	1	15	0	48	2	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	305	36	76	332	1	16	0	52	2	0	1
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	333			341			808	808	323	860	826	332
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	333			341			808	808	323	860	826	332
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			94	100	93	99	100	100
cM capacity (veh/h)	1226			1218			285	295	718	244	288	709
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	341	76	333	68	3							
Volume Left	0	76	0	16	2							
Volume Right	36	0	1	52	1							
cSH	1226	1218	1700	529	312							
Volume to Capacity	0.00	0.06	0.20	0.13	0.01							
Queue Length 95th (m)	0.0	1.6	0.0	3.5	0.2							
Control Delay (s)	0.0	8.2	0.0	12.8	16.6							
Lane LOS		A		B	C							
Approach Delay (s)	0.0	1.5		12.8	16.6							
Approach LOS				B	C							
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			49.8%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

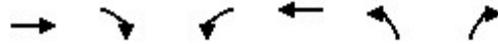
Baseline (2022) Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	61	36	3	33	20	6
Future Volume (vph)	61	36	3	33	20	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	39	3	36	22	7
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	105	39	29			
Volume Left (vph)	0	3	22			
Volume Right (vph)	39	0	7			
Hadj (s)	-0.19	0.05	0.04			
Departure Headway (s)	3.8	4.1	4.2			
Degree Utilization, x	0.11	0.04	0.03			
Capacity (veh/h)	929	862	814			
Control Delay (s)	7.3	7.3	7.4			
Approach Delay (s)	7.3	7.3	7.4			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.3			
Level of Service			A			
Intersection Capacity Utilization			15.9%	ICU Level of Service		A
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Baseline (2022) Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	38	30	3	21	15	6
Future Volume (Veh/h)	38	30	3	21	15	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	33	3	23	16	7
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			74		86	58
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			74		86	58
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			1526		913	1009
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	74	26	23			
Volume Left	0	3	16			
Volume Right	33	0	7			
cSH	1700	1526	940			
Volume to Capacity	0.04	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.6			
Control Delay (s)	0.0	0.9	8.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.9	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			14.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Baseline (2022) Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	54	38	6	6	93	25	5	13	3	25	20	68
Future Volume (vph)	54	38	6	6	93	25	5	13	3	25	20	68
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	41	7	7	101	27	5	14	3	27	22	74
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	107	135	22	123								
Volume Left (vph)	59	7	5	27								
Volume Right (vph)	7	27	3	74								
Hadj (s)	0.11	-0.08	0.00	-0.28								
Departure Headway (s)	4.5	4.3	4.6	4.2								
Degree Utilization, x	0.13	0.16	0.03	0.14								
Capacity (veh/h)	772	801	731	803								
Control Delay (s)	8.2	8.1	7.7	7.9								
Approach Delay (s)	8.2	8.1	7.7	7.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.0									
Level of Service			A									
Intersection Capacity Utilization			28.5%	ICU Level of Service	A							
Analysis Period (min)			15									

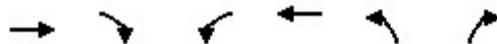
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2023) Background Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	234	14	22	184	1	32	1	47	1	0	1
Future Volume (Veh/h)	0	234	14	22	184	1	32	1	47	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	254	15	24	200	1	35	1	51	1	0	1
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	201			269			510	510	262	562	518	200
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			269			510	510	262	562	518	200
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			92	100	93	100	100	100
cM capacity (veh/h)	1371			1295			466	458	777	403	453	840
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	269	24	201	87	2							
Volume Left	0	24	0	35	1							
Volume Right	15	0	1	51	1							
cSH	1371	1295	1700	609	545							
Volume to Capacity	0.00	0.02	0.12	0.14	0.00							
Queue Length 95th (m)	0.0	0.5	0.0	4.0	0.1							
Control Delay (s)	0.0	7.8	0.0	11.9	11.6							
Lane LOS		A		B	B							
Approach Delay (s)	0.0	0.8		11.9	11.6							
Approach LOS				B	B							
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			32.5%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Future (2023) Background Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↑	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	12	14	5	52	24	7
Future Volume (vph)	12	14	5	52	24	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	15	5	57	26	8
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	28	62	34			
Volume Left (vph)	0	5	26			
Volume Right (vph)	15	0	8			
Hadj (s)	-0.29	0.05	0.05			
Departure Headway (s)	3.7	4.1	4.1			
Degree Utilization, x	0.03	0.07	0.04			
Capacity (veh/h)	942	876	842			
Control Delay (s)	6.9	7.4	7.3			
Approach Delay (s)	6.9	7.4	7.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.2			
Level of Service			A			
Intersection Capacity Utilization			17.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2023) Background Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	10	9	1	39	19	1
Future Volume (Veh/h)	10	9	1	39	19	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	1	42	21	1
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			21		60	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			21		60	16
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	100
cM capacity (veh/h)			1595		946	1063
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	21	43	22			
Volume Left	0	1	21			
Volume Right	10	0	1			
cSH	1700	1595	951			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.6			
Control Delay (s)	0.0	0.2	8.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2023) Background Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	44	46	7	4	27	13	5	4	3	20	23	29
Future Volume (vph)	44	46	7	4	27	13	5	4	3	20	23	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	50	8	4	29	14	5	4	3	22	25	32
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	106	47	12	79								
Volume Left (vph)	48	4	5	22								
Volume Right (vph)	8	14	3	32								
Hadj (s)	0.08	-0.13	-0.03	-0.15								
Departure Headway (s)	4.2	4.1	4.3	4.1								
Degree Utilization, x	0.12	0.05	0.01	0.09								
Capacity (veh/h)	830	856	797	845								
Control Delay (s)	7.8	7.3	7.3	7.5								
Approach Delay (s)	7.8	7.3	7.3	7.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			24.2%	ICU Level of Service	A							
Analysis Period (min)			15									

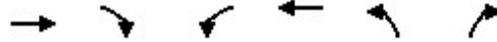
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2023) Background Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	34	71	311	1	15	0	49	2	0	1
Future Volume (Veh/h)	0	287	34	71	311	1	15	0	49	2	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	312	37	77	338	1	16	0	53	2	0	1
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	339			349			824	824	330	876	842	338
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	339			349			824	824	330	876	842	338
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			94	100	93	99	100	100
cM capacity (veh/h)	1220			1210			278	289	711	237	282	704
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	349	77	339	69	3							
Volume Left	0	77	0	16	2							
Volume Right	37	0	1	53	1							
cSH	1220	1210	1700	522	304							
Volume to Capacity	0.00	0.06	0.20	0.13	0.01							
Queue Length 95th (m)	0.0	1.6	0.0	3.6	0.2							
Control Delay (s)	0.0	8.2	0.0	12.9	16.9							
Lane LOS		A		B	C							
Approach Delay (s)	0.0	1.5		12.9	16.9							
Approach LOS				B	C							
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			50.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Future (2023) Background Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↑	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	62	37	3	34	20	6
Future Volume (vph)	62	37	3	34	20	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	40	3	37	22	7
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	107	40	29			
Volume Left (vph)	0	3	22			
Volume Right (vph)	40	0	7			
Hadj (s)	-0.19	0.05	0.04			
Departure Headway (s)	3.8	4.1	4.2			
Degree Utilization, x	0.11	0.05	0.03			
Capacity (veh/h)	929	861	812			
Control Delay (s)	7.3	7.3	7.4			
Approach Delay (s)	7.3	7.3	7.4			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.3			
Level of Service			A			
Intersection Capacity Utilization			16.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2023) Background Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	39	31	3	21	15	6
Future Volume (Veh/h)	39	31	3	21	15	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	34	3	23	16	7
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			76		88	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			76		88	59
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			1523		911	1007
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	76	26	23			
Volume Left	0	3	16			
Volume Right	34	0	7			
cSH	1700	1523	938			
Volume to Capacity	0.04	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.6			
Control Delay (s)	0.0	0.9	8.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.9	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			14.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2023) Background Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	55	39	6	6	95	26	5	13	3	26	20	69
Future Volume (vph)	55	39	6	6	95	26	5	13	3	26	20	69
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	42	7	7	103	28	5	14	3	28	22	75
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	109	138	22	125								
Volume Left (vph)	60	7	5	28								
Volume Right (vph)	7	28	3	75								
Hadj (s)	0.11	-0.08	0.00	-0.28								
Departure Headway (s)	4.5	4.3	4.6	4.2								
Degree Utilization, x	0.14	0.16	0.03	0.15								
Capacity (veh/h)	770	800	728	800								
Control Delay (s)	8.2	8.1	7.7	7.9								
Approach Delay (s)	8.2	8.1	7.7	7.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.1									
Level of Service			A									
Intersection Capacity Utilization			33.0%	ICU Level of Service	A							
Analysis Period (min)			15									

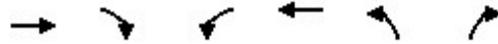
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2023) Total Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	234	23	34	184	1	52	1	82	1	0	1
Future Volume (Veh/h)	0	234	23	34	184	1	52	1	82	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	254	25	37	200	1	57	1	89	1	0	1
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	201			279			542	542	266	630	554	200
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			279			542	542	266	630	554	200
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			87	100	88	100	100	100
cM capacity (veh/h)	1371			1284			441	435	772	340	428	840
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	279	37	201	147	2							
Volume Left	0	37	0	57	1							
Volume Right	25	0	1	89	1							
cSH	1371	1284	1700	596	484							
Volume to Capacity	0.00	0.03	0.12	0.25	0.00							
Queue Length 95th (m)	0.0	0.7	0.0	7.7	0.1							
Control Delay (s)	0.0	7.9	0.0	13.0	12.5							
Lane LOS		A		B	B							
Approach Delay (s)	0.0	1.2		13.0	12.5							
Approach LOS				B	B							
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			45.4%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Future (2023) Total Traffic Conditions
AM Peak Hour



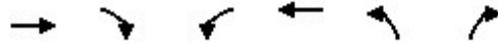
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	14	30	5	59	70	7
Future Volume (vph)	14	30	5	59	70	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	33	5	64	76	8

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	48	69	84
Volume Left (vph)	0	5	76
Volume Right (vph)	33	0	8
Hadj (s)	-0.38	0.05	0.16
Departure Headway (s)	3.8	4.2	4.3
Degree Utilization, x	0.05	0.08	0.10
Capacity (veh/h)	922	838	807
Control Delay (s)	7.0	7.6	7.8
Approach Delay (s)	7.0	7.6	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay		7.5	
Level of Service		A	
Intersection Capacity Utilization	19.2%		ICU Level of Service A
Analysis Period (min)		15	

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2023) Total Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	10	11	1	39	26	1
Future Volume (Veh/h)	10	11	1	39	26	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	12	1	42	28	1
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		61	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			23		61	17
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1592		945	1062
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	23	43	29			
Volume Left	0	1	28			
Volume Right	12	0	1			
cSH	1700	1592	948			
Volume to Capacity	0.01	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.8			
Control Delay (s)	0.0	0.2	8.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.2	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2023) Total Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	79	82	7	4	40	13	5	4	3	20	23	42
Future Volume (vph)	79	82	7	4	40	13	5	4	3	20	23	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	89	8	4	43	14	5	4	3	22	25	46
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	183	61	12	93								
Volume Left (vph)	86	4	5	22								
Volume Right (vph)	8	14	3	46								
Hadj (s)	0.10	-0.09	-0.03	-0.22								
Departure Headway (s)	4.3	4.2	4.5	4.2								
Degree Utilization, x	0.22	0.07	0.02	0.11								
Capacity (veh/h)	815	818	742	792								
Control Delay (s)	8.5	7.6	7.6	7.8								
Approach Delay (s)	8.5	7.6	7.6	7.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.1									
Level of Service			A									
Intersection Capacity Utilization			29.1%	ICU Level of Service	A							
Analysis Period (min)			15									

Westwood Estates TIS
5: Cement Plant Road & 'Street A'

Future (2023) Total Traffic Conditions
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	46	31	0	16	19
Future Volume (Veh/h)	0	46	31	0	16	19
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	50	34	0	17	21
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	89	34			34	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89	34			34	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			99	
cM capacity (veh/h)	902	1039			1578	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	50	34	38			
Volume Left	0	0	17			
Volume Right	50	0	0			
cSH	1039	1700	1578			
Volume to Capacity	0.05	0.02	0.01			
Queue Length 95th (m)	1.2	0.0	0.3			
Control Delay (s)	8.6	0.0	3.3			
Lane LOS	A		A			
Approach Delay (s)	8.6	0.0	3.3			
Approach LOS	A					
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization		18.7%		ICU Level of Service		A
Analysis Period (min)			15			

Westwood Estates TIS
6: Lancaster Drive & Stanley Street

Future (2023) Total Traffic Conditions
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	20	8	0	10	3
Future Volume (Veh/h)	0	20	8	0	10	3
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	22	9	0	11	3
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	34	9			9	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34	9			9	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			99	
cM capacity (veh/h)	973	1073			1611	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	22	9	14			
Volume Left	0	0	11			
Volume Right	22	0	0			
cSH	1073	1700	1611			
Volume to Capacity	0.02	0.01	0.01			
Queue Length 95th (m)	0.5	0.0	0.2			
Control Delay (s)	8.4	0.0	5.7			
Lane LOS	A		A			
Approach Delay (s)	8.4	0.0	5.7			
Approach LOS	A					
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization		17.4%		ICU Level of Service		A
Analysis Period (min)			15			

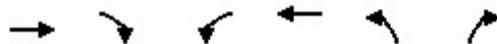
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2023) Total Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	56	111	311	1	30	0	73	2	0	1
Future Volume (Veh/h)	0	287	56	111	311	1	30	0	73	2	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	312	61	121	338	1	33	0	79	2	0	1
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	339			373			924	924	342	1002	954	338
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	339			373			924	924	342	1002	954	338
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			90			86	100	89	99	100	100
cM capacity (veh/h)	1220			1185			230	242	700	181	232	704
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	373	121	339	112	3							
Volume Left	0	121	0	33	2							
Volume Right	61	0	1	79	1							
cSH	1220	1185	1700	437	240							
Volume to Capacity	0.00	0.10	0.20	0.26	0.01							
Queue Length 95th (m)	0.0	2.7	0.0	8.1	0.3							
Control Delay (s)	0.0	8.4	0.0	16.0	20.2							
Lane LOS		A		C	C							
Approach Delay (s)	0.0	2.2		16.0	20.2							
Approach LOS				C	C							
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			54.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

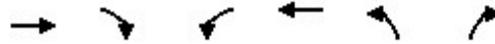
Future (2023) Total Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	70	90	3	39	53	6
Future Volume (vph)	70	90	3	39	53	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	98	3	42	58	7
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	174	45	65			
Volume Left (vph)	0	3	58			
Volume Right (vph)	98	0	7			
Hadj (s)	-0.30	0.05	0.15			
Departure Headway (s)	3.8	4.3	4.5			
Degree Utilization, x	0.18	0.05	0.08			
Capacity (veh/h)	927	822	759			
Control Delay (s)	7.6	7.5	7.9			
Approach Delay (s)	7.6	7.5	7.9			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.7			
Level of Service			A			
Intersection Capacity Utilization			20.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2023) Total Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	39	39	3	21	20	6
Future Volume (Veh/h)	39	39	3	21	20	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	42	3	23	22	7
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			84		92	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			84		92	63
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			1513		906	1002
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	84	26	29			
Volume Left	0	3	22			
Volume Right	42	0	7			
cSH	1700	1513	928			
Volume to Capacity	0.05	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.8			
Control Delay (s)	0.0	0.9	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.9	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			14.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2023) Total Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	79	63	6	6	133	26	5	13	3	26	20	107
Future Volume (vph)	79	63	6	6	133	26	5	13	3	26	20	107
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	68	7	7	145	28	5	14	3	28	22	116
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	161	180	22	166								
Volume Left (vph)	86	7	5	28								
Volume Right (vph)	7	28	3	116								
Hadj (s)	0.11	-0.05	0.00	-0.35								
Departure Headway (s)	4.7	4.5	4.9	4.4								
Degree Utilization, x	0.21	0.22	0.03	0.20								
Capacity (veh/h)	727	760	665	761								
Control Delay (s)	8.9	8.8	8.1	8.5								
Approach Delay (s)	8.9	8.8	8.1	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.7									
Level of Service			A									
Intersection Capacity Utilization			40.4%	ICU Level of Service	A							
Analysis Period (min)			15									

Westwood Estates TIS
5: Cement Plant Road & 'Street A'

Future (2023) Total Traffic Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	33	27	0	53	40
Future Volume (Veh/h)	0	33	27	0	53	40
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	29	0	58	43
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	188	29			29	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188	29			29	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			96	
cM capacity (veh/h)	772	1046			1584	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	36	29	101			
Volume Left	0	0	58			
Volume Right	36	0	0			
cSH	1046	1700	1584			
Volume to Capacity	0.03	0.02	0.04			
Queue Length 95th (m)	0.9	0.0	0.9			
Control Delay (s)	8.6	0.0	4.3			
Lane LOS	A		A			
Approach Delay (s)	8.6	0.0	4.3			
Approach LOS	A					
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization		22.1%		ICU Level of Service		A
Analysis Period (min)			15			

Westwood Estates TIS
6: Lancaster Drive & Stanley Street

Future (2023) Total Traffic Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	21	5	0	34	8
Future Volume (Veh/h)	0	21	5	0	34	8
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	5	0	37	9
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	88	5			5	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	88	5			5	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			98	
cM capacity (veh/h)	892	1078			1616	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	23	5	46			
Volume Left	0	0	37			
Volume Right	23	0	0			
cSH	1078	1700	1616			
Volume to Capacity	0.02	0.00	0.02			
Queue Length 95th (m)	0.5	0.0	0.6			
Control Delay (s)	8.4	0.0	5.9			
Lane LOS	A		A			
Approach Delay (s)	8.4	0.0	5.9			
Approach LOS	A					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization			19.2%	ICU Level of Service	A	
Analysis Period (min)			15			

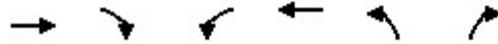
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2028) Background Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	258	16	25	203	1	35	1	52	1	0	1
Future Volume (Veh/h)	0	258	16	25	203	1	35	1	52	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	280	17	27	221	1	38	1	57	1	0	1
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	222			297			564	564	288	622	572	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	222			297			564	564	288	622	572	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			91	100	92	100	100	100
cM capacity (veh/h)	1347			1264			428	425	751	362	421	818
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	297	27	222	96	2							
Volume Left	0	27	0	38	1							
Volume Right	17	0	1	57	1							
cSH	1347	1264	1700	575	502							
Volume to Capacity	0.00	0.02	0.13	0.17	0.00							
Queue Length 95th (m)	0.0	0.5	0.0	4.8	0.1							
Control Delay (s)	0.0	7.9	0.0	12.5	12.2							
Lane LOS		A		B	B							
Approach Delay (s)	0.0	0.9		12.5	12.2							
Approach LOS				B	B							
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			35.8%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Future (2028) Background Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	14	16	6	57	26	8
Future Volume (vph)	14	16	6	57	26	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	17	7	62	28	9
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	32	69	37			
Volume Left (vph)	0	7	28			
Volume Right (vph)	17	0	9			
Hadj (s)	-0.28	0.05	0.04			
Departure Headway (s)	3.8	4.1	4.2			
Degree Utilization, x	0.03	0.08	0.04			
Capacity (veh/h)	937	872	837			
Control Delay (s)	6.9	7.4	7.3			
Approach Delay (s)	6.9	7.4	7.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.3			
Level of Service			A			
Intersection Capacity Utilization			18.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2028) Background Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	←
Traffic Volume (veh/h)	12	10	1	43	21	1
Future Volume (Veh/h)	12	10	1	43	21	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	11	1	47	23	1
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			24		68	18
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			24		68	18
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	100
cM capacity (veh/h)			1591		937	1060
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	24	48	24			
Volume Left	0	1	23			
Volume Right	11	0	1			
cSH	1700	1591	941			
Volume to Capacity	0.01	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.6			
Control Delay (s)	0.0	0.2	8.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2028) Background Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	48	51	8	5	29	15	6	5	3	23	26	32
Future Volume (vph)	48	51	8	5	29	15	6	5	3	23	26	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	55	9	5	32	16	7	5	3	25	28	35
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	116	53	15	88								
Volume Left (vph)	52	5	7	25								
Volume Right (vph)	9	16	3	35								
Hadj (s)	0.08	-0.13	0.01	-0.15								
Departure Headway (s)	4.3	4.1	4.4	4.1								
Degree Utilization, x	0.14	0.06	0.02	0.10								
Capacity (veh/h)	821	844	778	833								
Control Delay (s)	7.9	7.4	7.5	7.6								
Approach Delay (s)	7.9	7.4	7.5	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.7									
Level of Service			A									
Intersection Capacity Utilization			25.3%	ICU Level of Service	A							
Analysis Period (min)			15									

Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2028) Background Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	316	37	79	343	1	17	0	54	2	0	1
Future Volume (Veh/h)	0	316	37	79	343	1	17	0	54	2	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	343	40	86	373	1	18	0	59	2	0	1
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	374			383			909	909	363	968	928	374
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	374			383			909	909	363	968	928	374
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			93	100	91	99	100	100
cM capacity (veh/h)	1184			1175			241	255	682	201	248	673
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	383	86	374	77	3							
Volume Left	0	86	0	18	2							
Volume Right	40	0	1	59	1							
cSH	1184	1175	1700	478	263							
Volume to Capacity	0.00	0.07	0.22	0.16	0.01							
Queue Length 95th (m)	0.0	1.9	0.0	4.6	0.3							
Control Delay (s)	0.0	8.3	0.0	14.0	18.9							
Lane LOS		A		B	C							
Approach Delay (s)	0.0	1.6		14.0	18.9							
Approach LOS				B	C							
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			54.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Future (2028) Background Traffic Conditions
PM Peak Hour



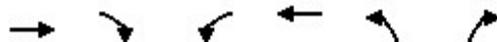
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	69	41	3	37	23	7
Future Volume (vph)	69	41	3	37	23	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	45	3	40	25	8

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	120	43	33
Volume Left (vph)	0	3	25
Volume Right (vph)	45	0	8
Hadj (s)	-0.19	0.05	0.04
Departure Headway (s)	3.8	4.1	4.3
Degree Utilization, x	0.13	0.05	0.04
Capacity (veh/h)	926	856	804
Control Delay (s)	7.4	7.3	7.4
Approach Delay (s)	7.4	7.3	7.4
Approach LOS	A	A	A

Intersection Summary			
Delay		7.4	
Level of Service		A	
Intersection Capacity Utilization	16.7%		ICU Level of Service A
Analysis Period (min)		15	

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2028) Background Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	43	34	3	24	17	7
Future Volume (Veh/h)	43	34	3	24	17	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	37	3	26	18	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			84		98	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			84		98	66
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			1513		900	998
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	84	29	26			
Volume Left	0	3	18			
Volume Right	37	0	8			
cSH	1700	1513	928			
Volume to Capacity	0.05	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.7			
Control Delay (s)	0.0	0.8	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.8	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			14.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2028) Background Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	61	43	7	7	105	28	6	15	3	28	23	77
Future Volume (vph)	61	43	7	7	105	28	6	15	3	28	23	77
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	47	8	8	114	30	7	16	3	30	25	84
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	121	152	26	139								
Volume Left (vph)	66	8	7	30								
Volume Right (vph)	8	30	3	84								
Hadj (s)	0.10	-0.07	0.02	-0.29								
Departure Headway (s)	4.6	4.3	4.7	4.3								
Degree Utilization, x	0.15	0.18	0.03	0.17								
Capacity (veh/h)	757	786	707	785								
Control Delay (s)	8.4	8.3	7.9	8.1								
Approach Delay (s)	8.4	8.3	7.9	8.1								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.2									
Level of Service			A									
Intersection Capacity Utilization			35.2%	ICU Level of Service	A							
Analysis Period (min)			15									

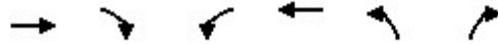
Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2028) Total Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	258	25	37	203	1	55	1	87	1	0	1
Future Volume (Veh/h)	0	258	25	37	203	1	55	1	87	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	280	27	40	221	1	60	1	95	1	0	1
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	222			307			596	596	294	690	608	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	222			307			596	596	294	690	608	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			85	100	87	100	100	100
cM capacity (veh/h)	1347			1254			405	404	746	305	397	818
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	307	40	222	156	2							
Volume Left	0	40	0	60	1							
Volume Right	27	0	1	95	1							
cSH	1347	1254	1700	561	445							
Volume to Capacity	0.00	0.03	0.13	0.28	0.00							
Queue Length 95th (m)	0.0	0.8	0.0	9.0	0.1							
Control Delay (s)	0.0	8.0	0.0	13.9	13.1							
Lane LOS		A		B	B							
Approach Delay (s)	0.0	1.2		13.9	13.1							
Approach LOS				B	B							
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			48.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

Future (2028) Total Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	16	32	6	64	72	8
Future Volume (vph)	16	32	6	64	72	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	35	7	70	78	9
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	52	77	87			
Volume Left (vph)	0	7	78			
Volume Right (vph)	35	0	9			
Hadj (s)	-0.37	0.05	0.15			
Departure Headway (s)	3.8	4.2	4.3			
Degree Utilization, x	0.06	0.09	0.10			
Capacity (veh/h)	915	834	802			
Control Delay (s)	7.0	7.6	7.8			
Approach Delay (s)	7.0	7.6	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.6			
Level of Service			A			
Intersection Capacity Utilization			20.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2028) Total Traffic Conditions
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	12	12	1	43	28	1
Future Volume (Veh/h)	12	12	1	43	28	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	13	1	47	30	1
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			26		68	20
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			26		68	20
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1588		936	1058
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	26	48	31			
Volume Left	0	1	30			
Volume Right	13	0	1			
cSH	1700	1588	939			
Volume to Capacity	0.02	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.8			
Control Delay (s)	0.0	0.2	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2028) Total Traffic Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	83	87	8	5	42	15	6	5	3	23	26	45
Future Volume (vph)	83	87	8	5	42	15	6	5	3	23	26	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	95	9	5	46	16	7	5	3	25	28	49
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	194	67	15	102								
Volume Left (vph)	90	5	7	25								
Volume Right (vph)	9	16	3	49								
Hadj (s)	0.10	-0.09	0.01	-0.21								
Departure Headway (s)	4.3	4.3	4.6	4.3								
Degree Utilization, x	0.23	0.08	0.02	0.12								
Capacity (veh/h)	807	798	724	780								
Control Delay (s)	8.7	7.7	7.7	7.9								
Approach Delay (s)	8.7	7.7	7.7	7.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.2									
Level of Service			A									
Intersection Capacity Utilization			30.3%	ICU Level of Service	A							
Analysis Period (min)			15									

Westwood Estates TIS
5: Cement Plant Road & 'Street A'

Future (2028) Total Traffic Conditions
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	46	34	0	16	22
Future Volume (Veh/h)	0	46	34	0	16	22
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	50	37	0	17	24
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	95	37			37	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	37			37	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			99	
cM capacity (veh/h)	895	1035			1574	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	50	37	41			
Volume Left	0	0	17			
Volume Right	50	0	0			
cSH	1035	1700	1574			
Volume to Capacity	0.05	0.02	0.01			
Queue Length 95th (m)	1.2	0.0	0.3			
Control Delay (s)	8.7	0.0	3.1			
Lane LOS	A		A			
Approach Delay (s)	8.7	0.0	3.1			
Approach LOS	A					
Intersection Summary						
Average Delay			4.4			
Intersection Capacity Utilization		18.9%		ICU Level of Service		A
Analysis Period (min)			15			

Westwood Estates TIS
6: Lancaster Drive & Stanley Street

Future (2028) Total Traffic Conditions
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	23	7	0	11	2
Future Volume (Veh/h)	0	23	7	0	11	2
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	25	8	0	12	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	34	8			8	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34	8			8	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			99	
cM capacity (veh/h)	972	1074			1612	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	25	8	14			
Volume Left	0	0	12			
Volume Right	25	0	0			
cSH	1074	1700	1612			
Volume to Capacity	0.02	0.00	0.01			
Queue Length 95th (m)	0.6	0.0	0.2			
Control Delay (s)	8.4	0.0	6.2			
Lane LOS	A		A			
Approach Delay (s)	8.4	0.0	6.2			
Approach LOS	A					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization			17.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
1: Cement Plant Road/Private Lane & Highway 3

Future (2028) Total Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	316	59	119	343	1	32	0	78	2	0	1
Future Volume (Veh/h)	0	316	59	119	343	1	32	0	78	2	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	343	64	129	373	1	35	0	85	2	0	1
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	374			407			1007	1007	375	1092	1038	374
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	374			407			1007	1007	375	1092	1038	374
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			89			83	100	87	99	100	100
cM capacity (veh/h)	1184			1152			200	214	671	153	205	673
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	407	129	374	120	3							
Volume Left	0	129	0	35	2							
Volume Right	64	0	1	85	1							
cSH	1184	1152	1700	398	207							
Volume to Capacity	0.00	0.11	0.22	0.30	0.01							
Queue Length 95th (m)	0.0	3.0	0.0	10.0	0.4							
Control Delay (s)	0.0	8.5	0.0	17.9	22.7							
Lane LOS		A		C	C							
Approach Delay (s)	0.0	2.2		17.9	22.7							
Approach LOS				C	C							
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			58.7%		ICU Level of Service				B			
Analysis Period (min)			15									

Westwood Estates TIS
2: Cement Plant Road & Clarence Street

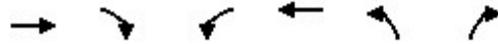
Future (2028) Total Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	77	94	3	42	56	7
Future Volume (vph)	77	94	3	42	56	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	84	102	3	46	61	8
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	186	49	69			
Volume Left (vph)	0	3	61			
Volume Right (vph)	102	0	8			
Hadj (s)	-0.30	0.05	0.14			
Departure Headway (s)	3.8	4.3	4.5			
Degree Utilization, x	0.20	0.06	0.09			
Capacity (veh/h)	920	817	752			
Control Delay (s)	7.8	7.5	7.9			
Approach Delay (s)	7.8	7.5	7.9			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.8			
Level of Service			A			
Intersection Capacity Utilization			21.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
3: Lancaster Drive & Clarence Street

Future (2028) Total Traffic Conditions
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	43	42	3	24	22	7
Future Volume (Veh/h)	43	42	3	24	22	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	46	3	26	24	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			93		102	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			93		102	70
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	99
cM capacity (veh/h)			1501		895	993
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	93	29	32			
Volume Left	0	3	24			
Volume Right	46	0	8			
cSH	1700	1501	917			
Volume to Capacity	0.05	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.9			
Control Delay (s)	0.0	0.8	9.1			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.8	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			15.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Westwood Estates TIS
4: Steele Street & Sugarloaf Street

Future (2028) Total Traffic Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	85	67	7	7	143	28	6	15	3	28	23	115
Future Volume (vph)	85	67	7	7	143	28	6	15	3	28	23	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	92	73	8	8	155	30	7	16	3	30	25	125
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	173	193	26	180								
Volume Left (vph)	92	8	7	30								
Volume Right (vph)	8	30	3	125								
Hadj (s)	0.11	-0.05	0.02	-0.35								
Departure Headway (s)	4.7	4.6	5.0	4.5								
Degree Utilization, x	0.23	0.24	0.04	0.22								
Capacity (veh/h)	715	746	646	746								
Control Delay (s)	9.1	9.0	8.2	8.7								
Approach Delay (s)	9.1	9.0	8.2	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.9									
Level of Service			A									
Intersection Capacity Utilization			42.6%	ICU Level of Service	A							
Analysis Period (min)			15									

Westwood Estates TIS
5: Cement Plant Road & 'Street A'

Future (2028) Total Traffic Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	33	29	0	53	44
Future Volume (Veh/h)	0	33	29	0	53	44
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	32	0	58	48
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	196	32			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	196	32			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			96	
cM capacity (veh/h)	764	1042			1580	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	36	32	106			
Volume Left	0	0	58			
Volume Right	36	0	0			
cSH	1042	1700	1580			
Volume to Capacity	0.03	0.02	0.04			
Queue Length 95th (m)	0.9	0.0	0.9			
Control Delay (s)	8.6	0.0	4.2			
Lane LOS	A		A			
Approach Delay (s)	8.6	0.0	4.2			
Approach LOS	A					
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization		22.4%		ICU Level of Service		A
Analysis Period (min)			15			

Westwood Estates TIS
6: Lancaster Drive & Stanley Street

Future (2028) Total Traffic Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	24	5	0	37	8
Future Volume (Veh/h)	0	24	5	0	37	8
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	26	5	0	40	9
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	94	5			5	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	94	5			5	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			98	
cM capacity (veh/h)	883	1078			1616	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	26	5	49			
Volume Left	0	0	40			
Volume Right	26	0	0			
cSH	1078	1700	1616			
Volume to Capacity	0.02	0.00	0.02			
Queue Length 95th (m)	0.6	0.0	0.6			
Control Delay (s)	8.4	0.0	6.0			
Lane LOS	A		A			
Approach Delay (s)	8.4	0.0	6.0			
Approach LOS	A					
Intersection Summary						
Average Delay			6.4			
Intersection Capacity Utilization			19.3%	ICU Level of Service	A	
Analysis Period (min)			15			



APPENDIX D

Arcady Reports



Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.3.1598

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Filename: 226429-Roundabout Feasibility.j10
Report generation date: 2023-02-03 9:52:11 AM

- » Cement Plant Road at 'Street A' - 2023, AM
- » Cement Plant Road at 'Street A' - 2023, PM
- » Cement Plant Road at 'Street A' - 2028, AM
- » Cement Plant Road at 'Street A' - 2028, PM

Summary of junction performance

	AM							PM						
	Set ID	95% Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Set ID	95% Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS
Cement Plant Road at 'Street A' - 2023														
Arm 1	D1	0.5	5.24	0.07	A	5.13	A	D2	0.5	5.12	0.05	A	5.38	A
Arm 2		0.5	5.05	0.05	A				0.5	5.54	0.14	A		
Arm 3		0.5	5.07	0.05	A				0.5	5.16	0.04	A		
Cement Plant Road at 'Street A' - 2028														
Arm 1	D3	0.5	5.25	0.07	A	5.15	A	D4	0.5	5.13	0.05	A	5.41	A
Arm 2		0.5	5.07	0.06	A				0.5	5.58	0.14	A		
Arm 3		0.5	5.09	0.05	A				0.5	5.17	0.04	A		

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

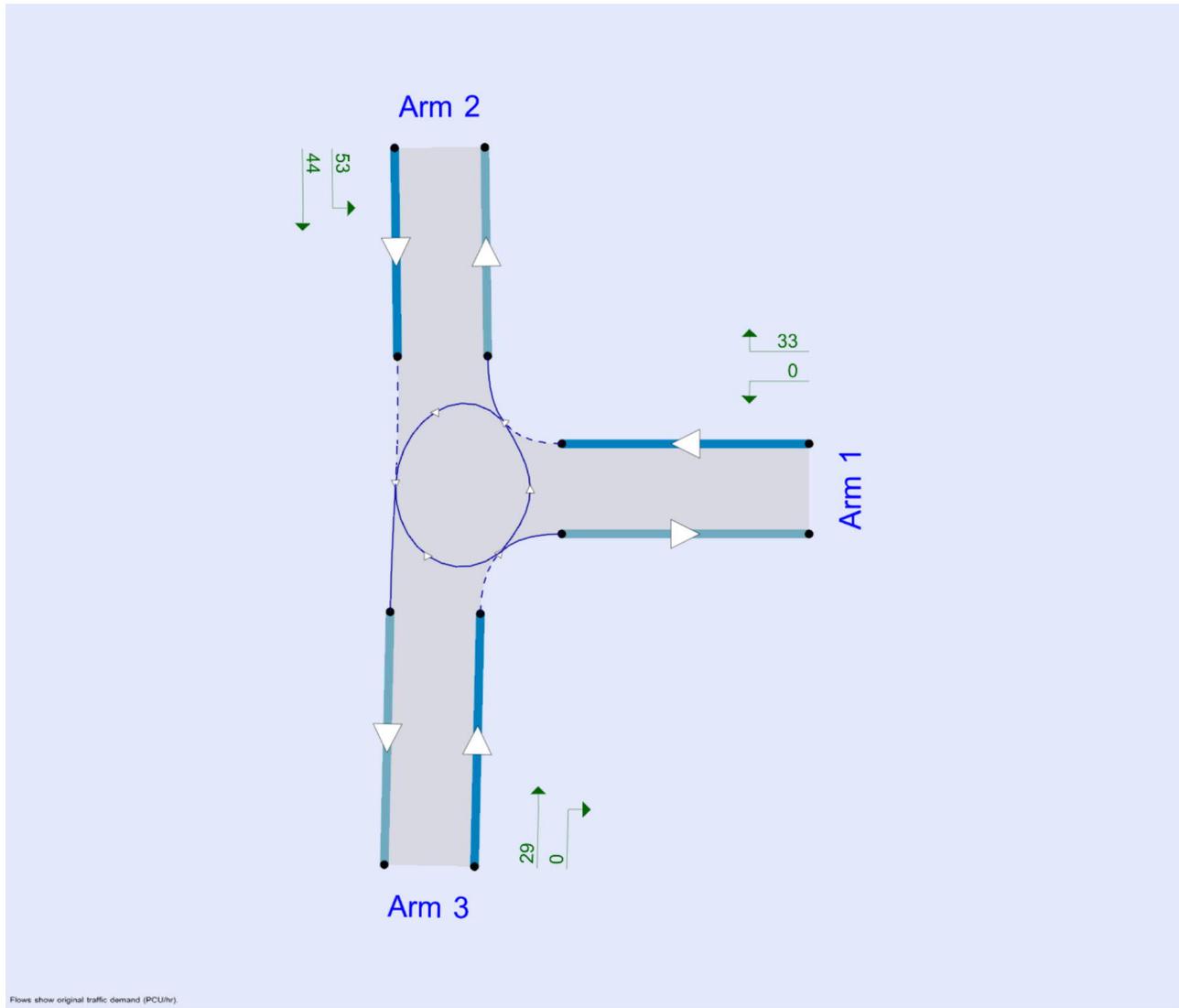
File summary

File Description

Title	
Location	
Site number	
Date	2022-10-18
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	RVAINT\arcady
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
✓		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2023	AM	ONE HOUR	08:00	09:30	15
D2	2023	PM	ONE HOUR	08:00	09:30	15
D3	2028	AM	ONE HOUR	08:00	09:30	15
D4	2028	PM	ONE HOUR	08:00	09:30	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Cement Plant Road at 'Street A'	100.000

Cement Plant Road at 'Street A' - 2023, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS
1	0.07	5.24	0.1	0.5	A
2	0.05	5.05	0.1	0.5	A
3	0.05	5.07	0.0	0.5	A

Cement Plant Road at 'Street A' - 2023, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS
1	0.05	5.12	0.1	0.5	A
2	0.14	5.54	0.2	0.5	A
3	0.04	5.16	0.0	0.5	A

Cement Plant Road at 'Street A' - 2028, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS
1	0.07	5.25	0.1	0.5	A
2	0.06	5.07	0.1	0.5	A
3	0.05	5.09	0.1	0.5	A

Cement Plant Road at 'Street A' - 2028, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS
1	0.05	5.13	0.1	0.5	A
2	0.14	5.58	0.2	0.5	A
3	0.04	5.17	0.0	0.5	A